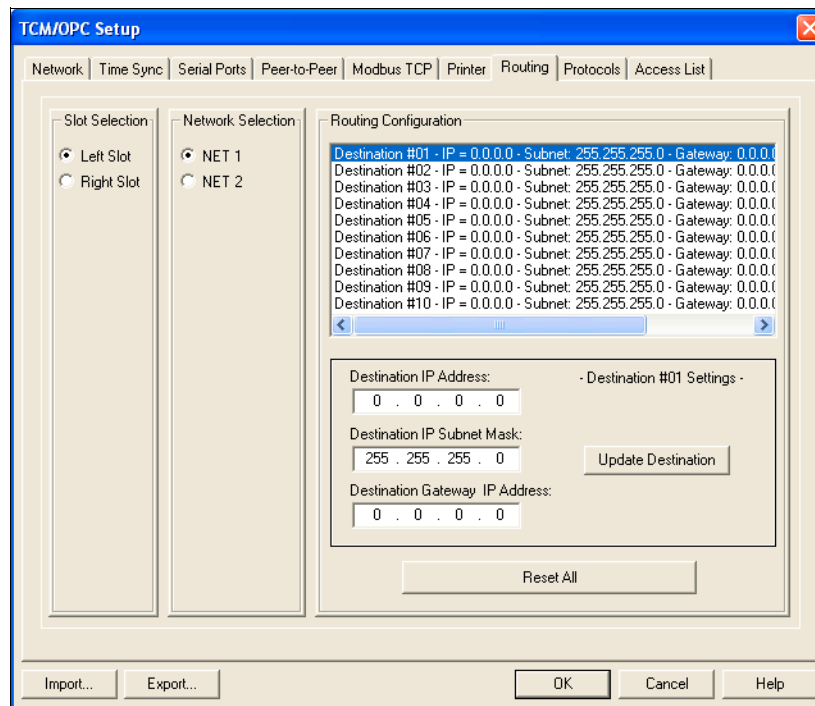## Configuring TCM Routing

This procedure explains how to configure routing on a Tricon TCM. Up to 10 different routes can be configured for each network; each slot (module) has two networks (NET 1 and NET 2).

Procedure

1 Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the slot where the TCM module is installed and then click Setup.

The TCM Setup dialog box appears.

3 Click the Routing tab.

4 Select the module (slot) you want to configure routing for.

5 Select the network (NET 1 or NET 2) you want to configure routing for.

6 Select a destination route and then specify these properties.

Property	Action
Destination Gateway IP Address	Enter the IP address which is used if the controller is not on the same subnet as other devices.

Property	Action
Destination IP Subnet Mask	Enter the IP address of the subnet mask.
	If the gateway address is on NET 2, then the subnet mask must be the same as the NET 2 subnet mask defined on the Network tab. If the gateway address is on NET 1, then the subnet mask must be the same as the NET 1 subnet mask defined on the Network tab. See Configuring TCM Network Ports on page 328.
Destination Gateway IP Address	Enter the IP address of the gateway to which the controller is connected. The gateway address must always be on NET 1 or NET 2.

7 Click Update Destination to apply the settings.

   Note   If necessary, click Reset All to change all destination settings for the selected slot to their default, unconfigured state.

8 Click OK to save your changes.

Configuring TCM Protocols (Tricon 10.3 and Later Only)

This procedure explains how to configure the TSAA, TriStation, and OPC protocols used for TCM communication in Tricon 10.3 and later systems.

The OPC protocol is available only with model 4353 and 4354 TCMs, and is supported on NET 2 only. Additionally, because NET 2 is reserved for OPC communication, the TSAA protocol is not available on NET 2 for model 4353 and 4354 TCMs.

Note   The Protocols tab in the TCM Setup dialog box appears only when the target system version is configured for Tricon 10.3 or later. For Tricon 10.1 and 10.2, the TSAA and TriStation protocols are configured on the Network tab (see Configuring TCM Network Ports on page 328).

Procedure

1 Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the slot where the TCM module is installed and then click Setup.

   The TCM/OPC or TCM/B Setup dialog box appears.

3 Click the Protocols tab.

4   Select the module (slot) you want to configure protocols for.

5   Specify these properties for the protocol(s) you will be using with the TCM.

Protocol	Property	Action
TriStation	TriStation Port Number	Enter the UDP port to use for TriStation connections on NET 1 and NET 2. The default for both ports is 1502.
		Cannot be the same as the Management or TSAA port numbers.
		See UDP Base Port Number on page 730 for additional information.
Management	Management Port Number	Enter the UDP port to use for the Enhanced Diagnostic Monitor's connection to TCM communication status information on NET 1 and NET 2. The default for both ports is 1510.
		This must be the same value as the Management UDP Port Number property in the Enhanced Diagnostic Monitor's Network Configuration dialog box.
		Cannot be the same as the TriStation or TSAA port numbers.
		For more information, see the *Enhanced Diagnostic Monitor User's Guide*.

Protocol	Property	Action
TSAA	TSAA Port Number	Enter the UDP port to use for TSAA connections, including DDE Server and SOE Recorder, on NET 1 and NET 2. The default for both ports is 1500.
		Available only for NET 1 on model 4353 and 4354 TCMs.
		Cannot be the same as the TriStation or Management port numbers.
		A value of 0 indicates that TSAA communication is disabled on that port. See UDP Base Port Number on page 730 for additional information.
	Multicast IP Address	Enter the IP address that TSAA multicasts should be sent to. The default is 0.0.0.0 (IP multicasting is disabled).
		Available only for NET 1 on model 4353 and 4354 TCMs.
		Bin data and/or SOE data available messages will be sent to the specified address, so that all members of the group will receive the data.
		Note: To use TSAA multicasting, your network hardware (such as routers) must also support multicasting. See your Network Administrator or IT department for more information.
	Multicast Update Rate	Enter the update rate, in milliseconds, for TSAA IP multicasting. Can be from 250 to 2,000. The default value is 1000.
		Available only for NET 1 on model 4353 and 4354 TCMs.
		Bin data and/or SOE data available messages will be sent to the multicast IP address at the specified update rate (for example, by default, bin data will be multicast every 1,000ms).
OPC A&E SOE	SOE Block Number	Enter the SOE block number used when events are retrieved by an OPC client. Can be from 0 to 14. The default value is 0 (not configured). Must be unique for each TCM installed in a system.
		Available with TCM models 4353 and 4354 only.
	SOE Severity	Enter the severity (priority) level for SOE events (state changes obtained from the SOE block). Can be from 1 to 1,000. The default value is 500.
		Available with TCM models 4353 and 4354 only.

Protocol	Property	Action
OPC A&E System Events	Info Severity	Severity levels identify the urgency of an event. Enter a number to represent the severity level for informational system events. Can be from 1 (lowest) to 1,000 (highest). Enter 0 if you do not want the TCM to send notifications of informational system events to OPC clients. The default value is 100.
	Minor Severity	Enter a number to represent the severity level for minor system events. Can be from 1 (lowest) to 1,000 (highest). Enter 0 if you do not want the TCM to send notifications of minor system events to OPC clients. The default value is 300.
	Major Severity	Enter a number to represent the severity level for major system events. Can be from 1 (lowest) to 1000 (highest). Enter 0 if you do not want the TCM to send notifications of major system events to OPC clients. The default value is 500.
	Fatal Severity	Enter a number to represent the severity level for fatal system events. Can be from 1 (lowest) to 1000 (highest). Enter 0 if you do not want the TCM to send notifications of fatal system events to OPC clients. The default value is 700.
	Disable All	Click to prevent the TCM from sending system event notifications to OPC clients. Sets the severity levels for all system event types to 0.
	Reset All	Click to reset all OPC severity levels to their default values.

6   Click OK to save your changes.

CAUTION

In Tricon 10.3 and later systems, TSAA clients using a TCM interface have write access to the NET 1 and NET 2 ports by default. Depending on your configuration, this may create a security issue.

Please note that this default behavior is *opposite* of that on TCMs in Tricon 10.2 and earlier systems.

To disable write access by TSAA clients, you **must** enable and configure the TCM access control list. See Controlling Access to the TCM on page 459.
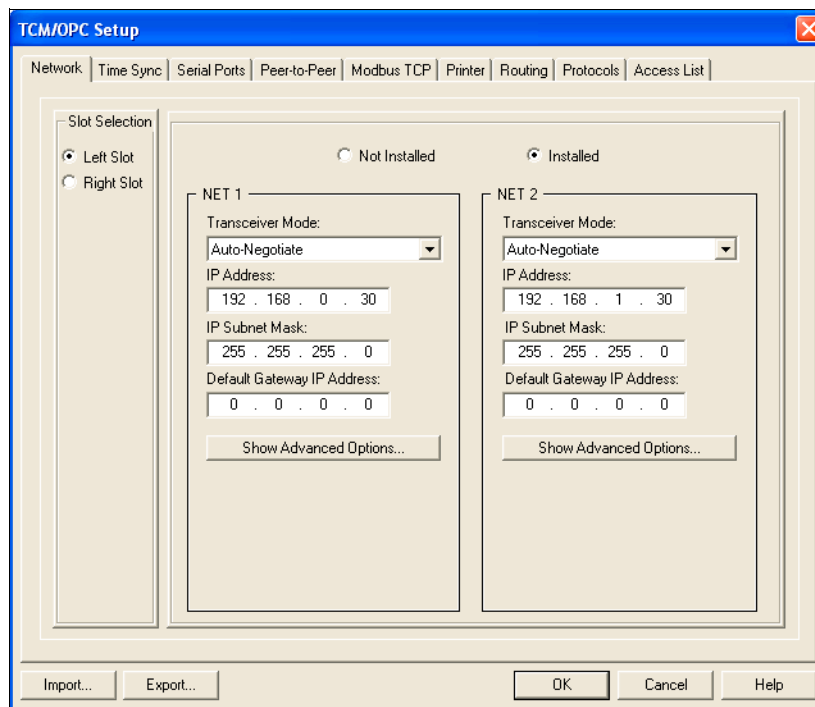
Exporting the TCM Configuration to a File

Once TCM configuration is complete, you may want to export it to an XML file. Not only does this provide a backup of your configuration settings, it also allows you to import the settings to other TCMs, saving time and effort, and ensuring that all TCMs in a system have the same configuration. Invensys technical support may also ask for an exported configuration file to assist in troubleshooting TCM problems.

Note An exported TCM configuration file cannot be modified outside of TriStation. If the XML file is changed after export, you will be unable to import it into TriStation.

Procedure

1 Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the slot where the TCM module is installed and then click Setup.

The TCM Setup dialog box appears.

3 Click Export.

If the TCM configuration has been changed, but not saved, you are asked if you want to include the unsaved changes in the exported file.

4 Navigate to the folder you want to save the exported configuration file in, enter a file name, and click Save.

Note A TCM configuration file exported from a model 4351A/4352A TCM installed in a Tricon 10.3 or later system cannot be imported to the same model TCM installed in a Tricon 10.2 or earlier system.

Importing the TCM Configuration From a File

If you have already configured a TCM, and exported the configuration to a file, you can import the saved configuration to another TCM.

If a configuration item exists in the exported file, but is not applicable to the TCM it is being imported to, that item will be ignored. For example, if OPC configuration information is included in the exported file, but the TCM the file is being imported to does not support OPC, all OPC settings will be ignored.

If a configuration item exists in the TCM, but not in the file being imported, the default value will be used. For example, if the TCM supports OPC, but OPC configuration items are not included in the exported file, all OPC settings will be set to the default values. These values will need to be manually configured.

In all cases, once the import is complete, you should review the TCM configuration to ensure that all settings have been correctly configured for your implementation.

Procedure

1   Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2   Double-click the slot where the TCM module is installed and then click Setup.

The TCM Setup dialog box appears.

3   Click Import.

If the TCM configuration has been changed, but not yet saved, you are asked if you want to overwrite the existing configuration, including the unsaved changes, with the imported settings.
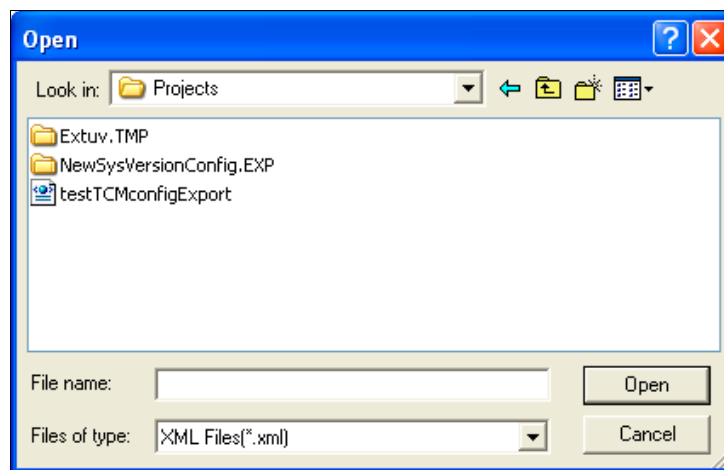
4   Navigate to the folder where the exported configuration file is located, and click Open.

TCM configuration settings are imported from the selected file.

5   Click each tab of the TCM Setup dialog box to review and verify that all settings have been correctly configured.

6   Click OK to save your changes.

Configuring Tricon Time Synchronization

This section explains how to use the Time Synchronization communication protocol with Tricon controllers. Time synchronization enables a network of Triconex controllers to synchronize time with each other or with external devices, such as a DCS or the Global Positioning System.

Topics include:

About Tricon Time Synchronization

This table summarizes the ways Tricon controller time can be synchronized to an external device or to the Tricon master node in a Peer-to-Peer network.

Table 36   Tricon Time Synchronization

Module	Time Synchronization Options
ACM	• To a Foxboro DCS. • To the Tricon master node in a Peer-to-Peer network.
ACM or NCM	• To an OPC client. For more information, see the *Communication Guide for Tricon v9-v10 Systems*. • By writing aliased data to the TIMESET or TIMEADJ function blocks in a TriStation 1131 application. For assistance with the specialized programming that is required, contact Invensys Technical Support. • To the Tricon master node in a Peer-to-Peer network.
NCMG	• To the GPS (Global Positioning System). • To the Tricon master node in a Peer-to-Peer network.
SMM	• To the Honeywell Universal Control Network (UCN).
TCM	• To the GPS (Global Positioning System). • To SNTP. • To the Tricon master node in a Peer-to-Peer network (Triconex Time Synchronization).

Using a Tricon ACM to Synchronize Time

This procedure explains how to use a Tricon ACM to enable time synchronization based on:

- The Foxboro I/A Series nodebus system time
- The Tricon master node in a Peer-to-Peer network

Procedure

1 Expand the Configuration tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the ACM slot, and then click Setup.

3 Specify these properties on the ACM Setup screen.

| Property	Action
Privilege	For synchronization on NET 2, specify Read/Write. The default is Read.
Time Synchronization	• Select On NET 1 enable time synchronization with external source to allow time synchronization with a Foxboro I/A DCS. • Select NET 2 to enable time synchronization with the Tricon Master node (controller).

4 Click OK to save your changes.

Using a Tricon NCM to Synchronize Time

This procedure explains how to use a Tricon NCM to enable time synchronization with the Tricon master node in a Peer-to-Peer network.

Procedure

1 Expand the Configuration tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the NCM slot, and then click Setup.
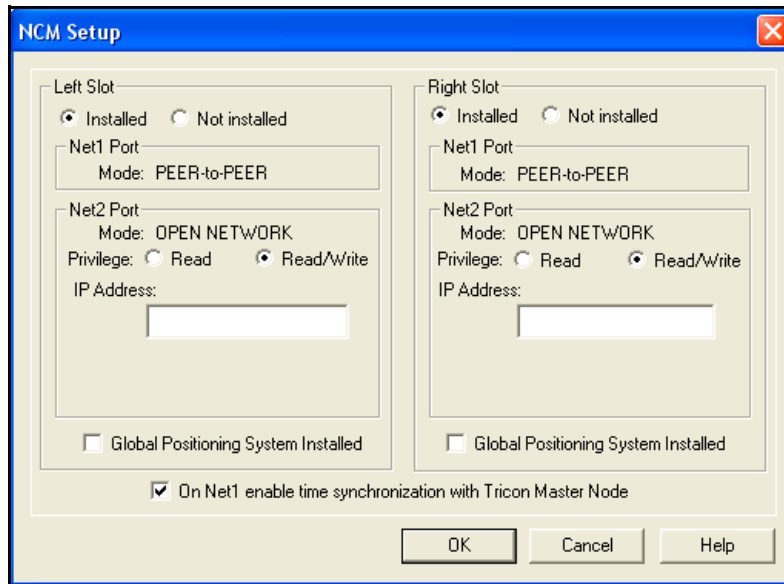
3 Select the On NET 1 enable time synchronization with Tricon Master Node check box.

4 Click OK to save your changes.

Using a Tricon NCM/G to Synchronize Time

This procedure explains how to use a Tricon NCM/G to enable time synchronization through the Global Positioning System (GPS) by using the Trimble Acutime Gold Smart GPS Antenna. If the Tricon NCMG is in a Peer-to-Peer network, it can be used as the master node for time synchronization of the controllers on the network.

For information on installing the kit, see the *Communication Guide for Tricon v9-v10 Systems*.

CAUTION   To ensure the accuracy of GPS time adjustments, the Tricon clock must be set to within 10 minutes of the correct local time.

Procedure

1   Expand the Configuration tree, double-click Configuration, and expand Hardware Allocation.

2   Double-click the NCM/G slot, and then click Setup.

3   Specify these properties on the NCM Setup screen.

| Property	Action
Global Positioning System Installed	Select this check box to enable time synchronization through the GPS.
	If selected, other controllers can also be synchronized to the Tricon master controller.
Time Synchronization	For a network of Triconex controllers, select the On NET 1 enable time synchronization with the Tricon Master Node check box.

4   Click OK to save your changes.

Using a Tricon SMM to Synchronize Time

This procedure explains how to configure a Tricon SMM module to synchronize time based on the Honeywell Universal Control Network (UCN).

For more information, see the *SMM User's Guide.*

Procedure

1 Expand the Configuration tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the SMM slot, and then click Setup.
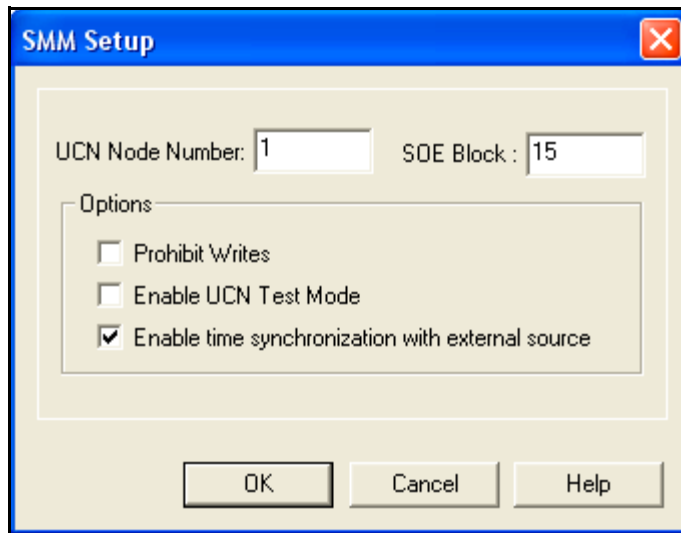
3 Select the Enable time synchronization with external source check box.

4 Click OK to save your changes.

Using a Tricon TCM to Synchronize Time

The information in this section explains how to enable time synchronization on a TCM. Time synchronization can be enabled using the following protocols:

- GPS
- SNTP
- Triconex Time Synchronization via DLC (NET 1 only) or UDP/IP (NET 1 or NET 2[2]) on a Peer-to-Peer network

In a redundant network of Triconex controllers that each have two TCMs installed, you can implement redundant time synchronization by configuring time synchronization for both TCM modules (both left and right slots). Time synchronization can be enabled only for a single logical slot. If the TCM is installed in the COM slot, you configure time synchronization only for the left slot (there is no redundancy when installed in the COM slot).

Note   **The information and procedures in this section do not apply to model 4351 and 4352 TCMs**. If you have one of these older model TCMs installed in your system, please see Appendix C, TCM Model 4351/4352 Configuration.

Topics include:

- Configuring GPS Time Synchronization on the TCM on page 349
- Configuring SNTP Time Synchronization on the TCM on page 351
- Configuring Triconex Time Synchronization on the TCM on page 353

Configuring GPS Time Synchronization on the TCM

This procedure explains how to configure a TCM to enable time synchronization through the Global Positioning System (GPS) by using the Trimble Acutime Gold Smart GPS Antenna. For information on installing the kit, see *Triconex Application Note #43*, available on the Invensys Global Customer Support (GCS) website.

CAUTION   To ensure the accuracy of GPS time adjustments, the Tricon clock must be set to within 10 minutes of the correct local time.

If the TCM is in a Peer-to-Peer network, it can also be used as the master node for time synchronization of other controllers on the network. In this configuration, the master node TCM synchronizes time with the GPS, and any slave nodes on the Peer-to-Peer network synchronize their time with the master TCM. In this way, all nodes on the Peer-to-Peer network are synchronized with GPS time.

If the TCM is acting as a slave node on a Peer-to-Peer network, it *cannot* be configured for GPS time synchronization. Slave nodes synchronize their time *only* to the master node on the Peer-to-Peer network, and reject all other time change requests.

GPS time synchronization uses Serial Port 1 on the TCM.

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2. NET 2 is not available for Triconex Time Synchronization with model 4353 and 4354 TCMs.

Procedure

1   Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2   Double-click the slot where the TCM module is installed and then click Setup. The TCM Setup dialog box appears.

3   Click the Time Sync tab.
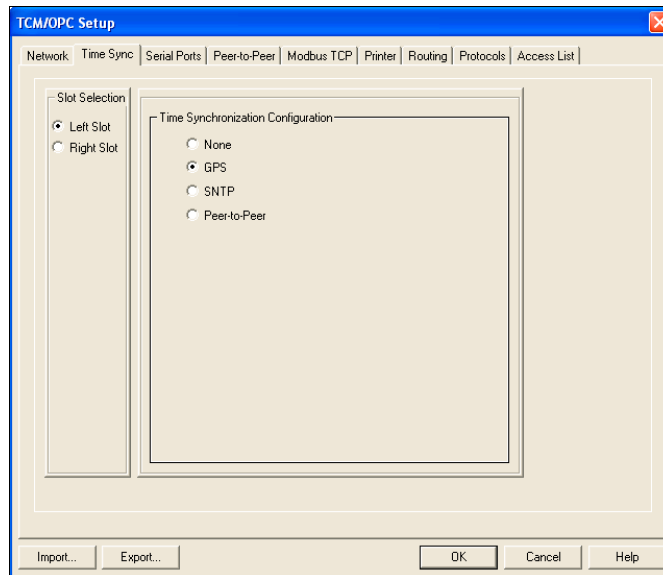
4   Under Slot Selection, click Left Slot. You must configure the module in the left slot first.

5   Under Time Synchronization Configuration, select GPS.

If you previously configured Port 1 to use a Modbus protocol, selecting GPS will reset Port 1 to use the GPS protocol. See Configuring TCM Serial Ports on page 326 for more information.

6   (Optional) If you have a redundant TCM installed in the right slot, under Slot Selection, click Right Slot, and then select GPS Redundant.

> **Note**   The module in the right slot can be configured only if it has been installed (see Configuring TCM Network Ports on page 328) and if the module in the left slot has already been configured for GPS time synchronization.

7   Click OK to save your changes.

Enabling the TCM as a Master Node for Triconex Time Synchronization (Optional)

If you also want the TCM to be able to act as a master node for time synchronization of other controllers on a Peer-to-Peer network (using Triconex Time Synchronization) do the following:

1   In the Configuration tree, click Operating Parameters (see Setting Tricon Operating Parameters on page 295).

2   Select the Enable Tricon Node Time Synchronization check box.

Configuring SNTP Time Synchronization on the TCM

This procedure explains how to configure TCM time synchronization to an SNTP server.
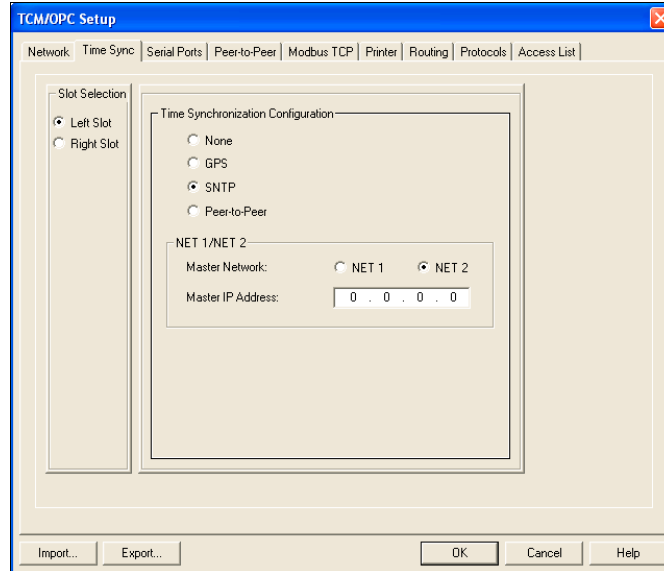
If the TCM is in a Peer-to-Peer network, it can also be used as the master node for time synchronization of other controllers on the network. In this configuration, the master node TCM synchronizes time with the SNTP server, and any slave nodes on the Peer-to-Peer network synchronize their time with the master TCM. In this way, all nodes on the Peer-to-Peer network are synchronized with SNTP time.

If the TCM is acting as a slave node on a Peer-to-Peer network, it *cannot* be configured for SNTP time synchronization. Slave nodes synchronize their time *only* to the master node on the Peer-to-Peer network, and reject all other time change requests.

Note   SNTP time synchronization is less accurate than GPS time synchronization. Because the SNTP server resides on a PC, network load issues or PC performance can result in delays in processing time update requests from the Tricon.

Procedure

1   Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2   Double-click the slot where the TCM module is installed and then click Setup. The TCM Setup dialog box appears.

3   Click the Time Sync tab.

4   Under Slot Selection, click Left Slot. You must configure the module in the left slot first.

5   Select these properties.

Property	Action
Time Synchronization Configuration	Select SNTP. The default is None.
SNTP Master Network	Click the network the SNTP server is located on.
SNTP Master IP Address	Enter the IP address of the SNTP server to synchronize time with.

6   (Optional) If you have a redundant TCM installed in the right slot, under Slot Selection, click Right Slot, and then select these properties.

Property	Action
Time Synchronization Configuration	Select SNTP Redundant.
SNTP Master Network	Click the network the SNTP server is located on. This can be different than the master network selected for the left slot.
SNTP Master IP Address	Enter the IP address of the SNTP server to synchronize time with.

Note   The module in the right slot can be configured only if it has been installed (see Configuring TCM Network Ports on page 328) and if the module in the left slot has already been configured for SNTP time synchronization.

7   Click OK to save your changes.

Enabling the TCM as a Master Node for Triconex Time Synchronization (Optional)

If you also want the TCM to be able to act as a master node for time synchronization of other controllers on a Peer-to-Peer network (using Triconex Time Synchronization) do the following:

1   In the Configuration tree, click Operating Parameters (see Setting Tricon Operating Parameters on page 295).

2   Select the Enable Tricon Node Time Synchronization check box.

Configuring Triconex Time Synchronization on the TCM

In a Peer-to-Peer network, Triconex Time Synchronization can be used to synchronize time across controllers on a network. The controller with the lowest node number serves as the master node.

The master node can also synchronize its time with a GPS or an SNTP server. In this configuration, the master node synchronizes time with the GPS or SNTP server, and any slave nodes on the Peer-to-Peer network synchronize their time with the master node. In this way, all nodes on the Peer-to-Peer network are synchronized with GPS or SNTP time.

Configuring a Master Node

This procedure describes how to configure the TCM as a master node on the Peer-to-Peer network when GPS or SNTP time synchronization is **not** being used.

If you want the master node to synchronize to a GPS or SNTP server, use the procedures in the these sections:

- Configuring GPS Time Synchronization on the TCM on page 349
- Configuring SNTP Time Synchronization on the TCM on page 351

Procedure

1   Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2   Double-click the slot where the TCM module is installed and then click Setup. The TCM Setup dialog box appears.

3   Click the Time Sync tab.

4   Under Time Synchronization Configuration, select None.

5   Click OK to save your changes.

6   In the Configuration tree, click Operating Parameters (see Setting Tricon Operating Parameters on page 295).

7   Select the Enable Tricon Node Time Synchronization check box.

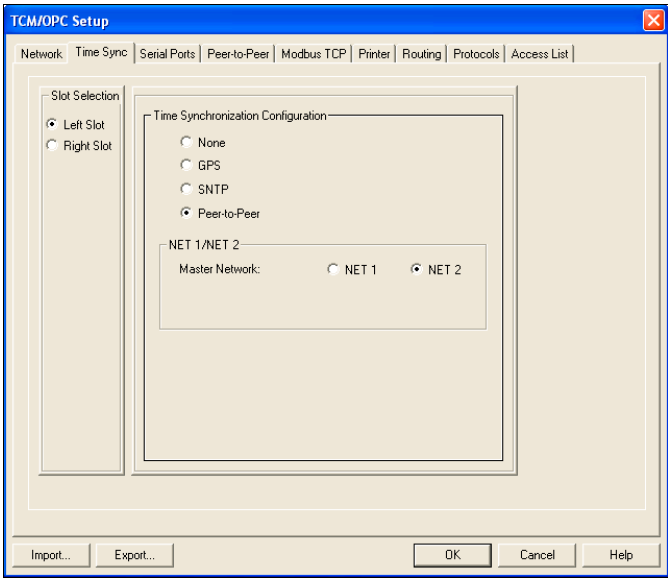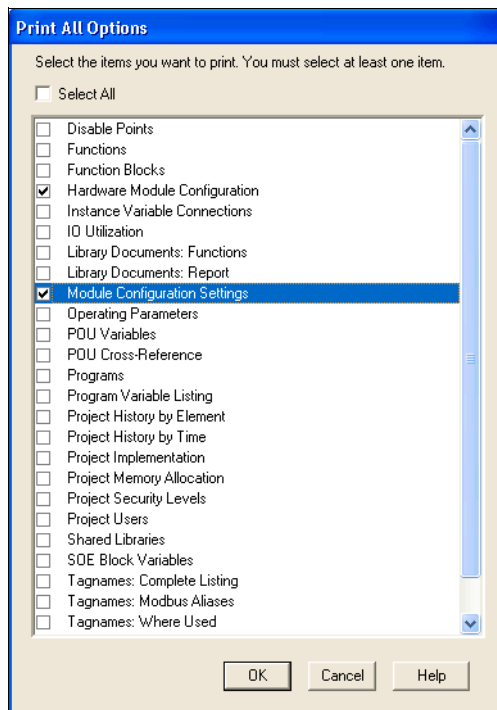This allows the controller to participate as a master node in time synchronization across the Peer-to-Peer network.

Configuring a Slave Node

This procedure describes how to configure the TCM as a slave node on the Peer-to-Peer network.

Procedure

1   Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2   Double-click the slot where the TCM module is installed and then click Setup. The TCM Setup dialog box appears.

3 Click the Time Sync tab.

4 Under Slot Selection, click Left Slot. You must configure the module in the left slot first.

5 Specify these properties.

Property	Action
Time Synchronization Configuration	Select Peer-to-Peer. The default is None.
Peer-to-Peer Master Network	Click the network you want to enable Triconex Time Synchronization for. The default is NET 2.This property applies to the modules installed in both the left and right slots simultaneously.

Note If you have a redundant TCM installed in the right slot, Time Synchronization Configuration is automatically set to Peer-to-Peer and cannot be changed.

6 Click OK to save your changes.

7 In the Configuration tree, click Operating Parameters (see Setting Tricon Operating Parameters on page 295).

8 Select the Enable Tricon Node Time Synchronization check box.

This allows the controller to participate as a slave node in time synchronization across the Peer-to-Peer network.

Printing the Tricon Module Configuration

Once Tricon controller configuration is complete, you may want to print the module configuration information. Not only does this provide a backup of your configuration settings, it also can assist Invensys technical support when troubleshooting configuration problems.

Procedure

1   Open the Project Workspace (see The Project Workspace on page 19).

2   On the File menu, select Print All. The Print All Options dialog box appears.

Print All Options

Select the items you want to print. You must select at least one item.

☐ Select All

☐ Disable Points
☐ Functions
☐ Function Blocks
☑ Hardware Module Configuration
☐ Instance Variable Connections
☐ IO Utilization
☐ Library Documents: Functions
☐ Library Documents: Report
☑ Module Configuration Settings
☐ Operating Parameters
☐ POU Variables
☐ POU Cross-Reference
☐ Programs
☐ Program Variable Listing
☐ Project History by Element
☐ Project History by Time
☐ Project Implementation
☐ Project Memory Allocation
☐ Project Security Levels
☐ Project Users
☐ Shared Libraries
☐ SOE Block Variables
☐ Tagnames: Complete Listing
☐ Tagnames: Modbus Aliases
☐ Tagnames: Where Used

[OK] [Cancel] [Help]

3   Select the check boxes for the following documents:

  • Hardware Module Configuration—Prints a report listing the controller hardware (MPs, CMs, I/O modules) currently configured in the project.

  • Module Configuration Settings—Prints a report listing the current configuration settings for each applicable module in the project's hardware configuration. Only modules that require configuration in TriStation are included in this report. For example, TCM and EPI module configuration details are included, but the AI/DI module is not, as it does not require configuration in TriStation.

  Note   To quickly clear the check boxes for all the documents in the list, and make it easier to select only those documents you want to print, clear the Select All check box.

4   Click OK. The Print dialog box appears.

5   Select the printer you want to use, and the desired settings (number of copies, page orientation, etc), and then click OK.

4

Trident and Tri-GP Controller Configuration

Overview

This figure shows the main steps for configuring the Trident or Tri-GP controller, and their typical order in the project cycle. The controller must be configured before an application can be downloaded and implemented on a controller.
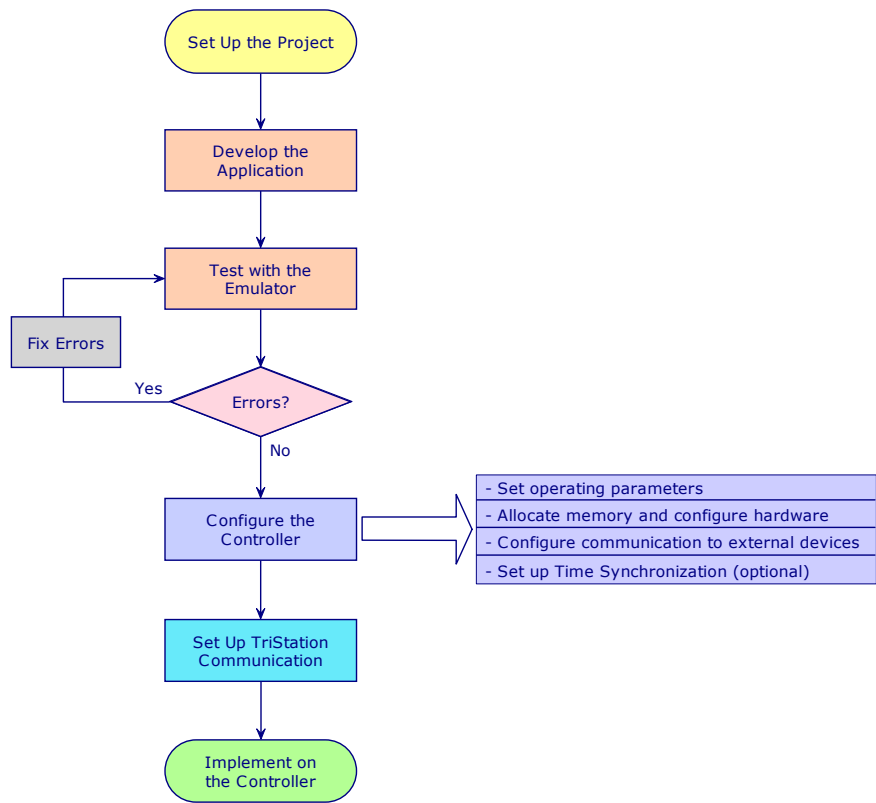
Trident and Tri-GP Controller Configuration Steps

This list includes the steps that can or should be done during Trident or Tri-GP controller configuration. Controller configuration must be completed before an application is downloaded to the controller.

Description	See
☐ Set the operating parameters.	Setting Trident or Tri-GP Operating Parameters on page 361
☐ Allocate memory and hardware.	Allocating Memory for Trident or Tri-GP Points on page 364
☐ Configure hardware.	Configuring Trident and Tri-GP Hardware on page 375
☐ Configure communication to external devices.	Configuring Trident or Tri-GP Communication Modules on page 390
☐ Set up time synchronization.	Configuring Trident or Tri-GP Time Synchronization on page 430

The Trident and Tri-GP Controller Workspace

This section explains the Controller Workspace, which is where you specify the configuration for the project. Topics include:

- The Trident and Tri-GP Controller Trees on page 359
- The Trident and Tri-GP Configuration Trees on page 359
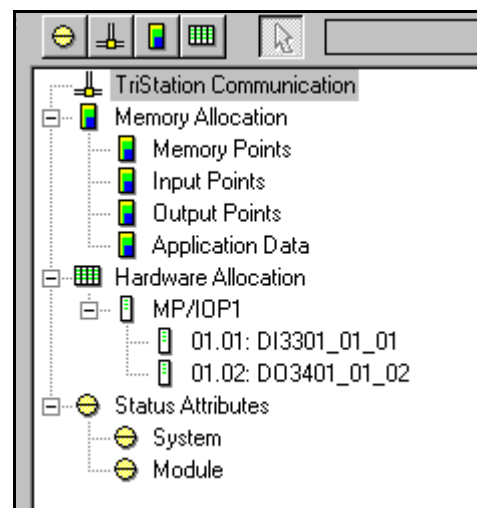- The Trident and Tri-GP Controller and Emulator Panels on page 360

The Trident and Tri-GP Controller Trees

The Trident and Tri-GP Controller trees include the elements (operating parameters, communication settings, memory allocation, and hardware allocation) that can be configured. The tree also includes the Controller and Emulator Panels used to emulate and run an application. The Trident Controller tree is shown at right.
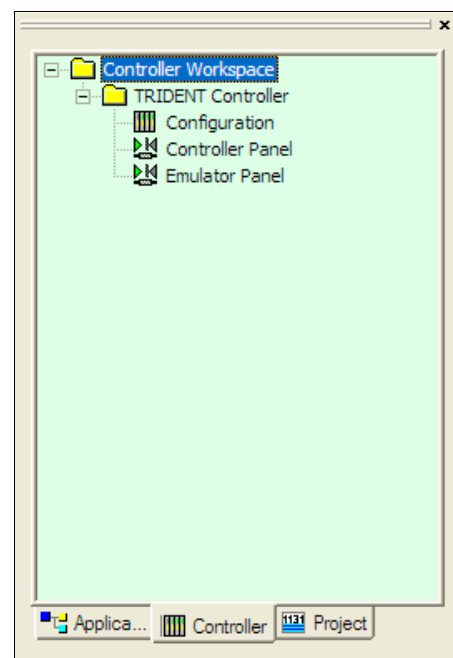
The Trident and Tri-GP Configuration Trees

The Trident and Tri-GP Configuration trees include operating parameters, communication, memory allocation, hardware allocation, and Status Attributes.

The Trident and Tri-GP Controller and Emulator Panels

The Trident and Tri-GP Controller and Emulator Panels display programs running in emulation or in the controller.

Controller and
Emulator tree
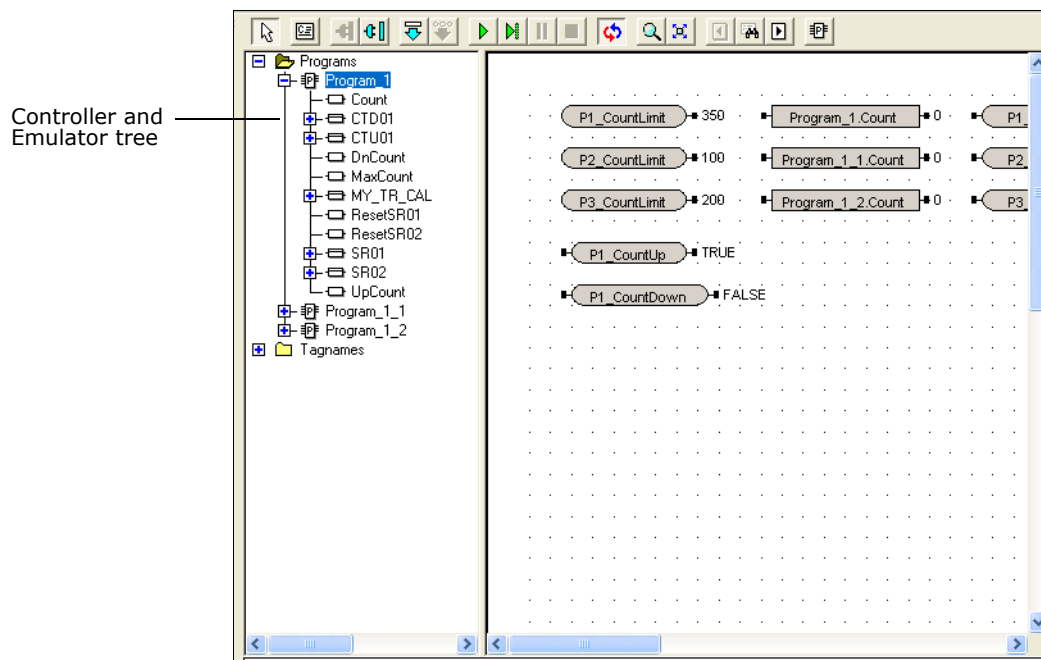
Setting Trident or Tri-GP Operating Parameters

This procedure explains how to specify Trident or Tri-GP operating parameters, which are settings that affect the general operation of the controller, including settings to restrict access to the controller from a TriStation PC and from remote devices.
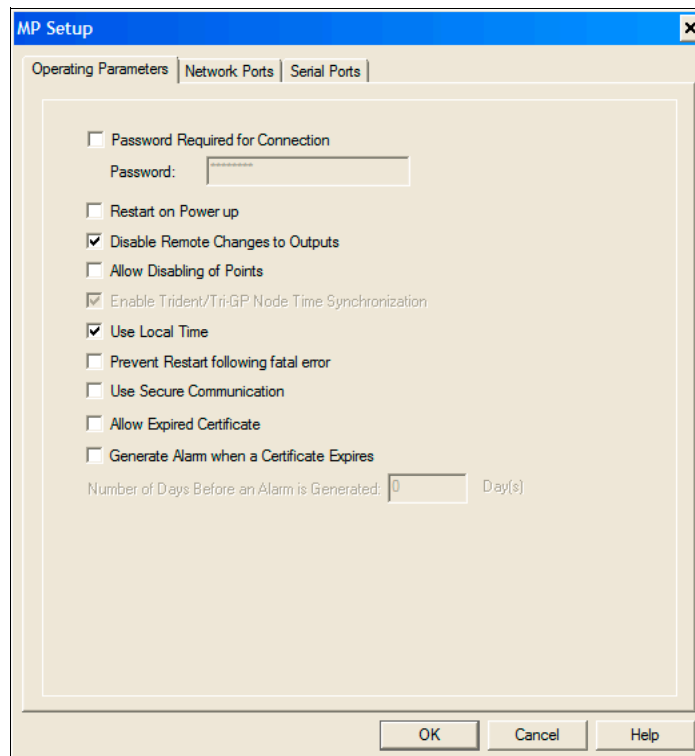
Note   Using the Print All command, you can print a report listing the current Operating Parameters settings. See Printing Project Documents on page 97.

You can view Trident or Tri-GP operating parameters by clicking Operating Parameters on the Trident or Tri-GP Configuration tree. However, you cannot make changes to the operating parameters from that screen. You must access the Operating Parameters tab on the MP Setup dialog box (as described below) to set or change operating parameters.

Note   The target system version displayed on the Operating Parameters screen is the target system version currently configured in the project. This value is not obtained from a connected controller. To view the actual system version of your Trident or Tri-GP system, see Determining Your Trident or Tri-GP Controller's System Version on page 365.

Procedure

1   On the Configuration tree, open the Hardware Allocation node, and then double-click the MP. The Item Properties dialog box appears.

2   Click Setup. The MP Setup dialog box appears.

3   Specify these properties on the Operating Parameters tab.

Property	Action
Password Required for Connection	Select the check box to restrict access by requiring a password when connecting to the controller. The default is cleared.
Password	Enter the password required to access the controller. The default is PASSWORD.
Restart on Power Up	Select the check box to have the application restarted after a power failure. The default is cleared.
Disable Remote Changes to Outputs	Clear the check box to allow remote devices to write to output points. The default is selected.
Allow Disabling of Points	Select the check box to allow points to be disabled from TriStation 1131. The default is cleared. This property can be changed only when your project is in the Download All state. If you change this property (by selecting or clearing the check box), you must perform a Download All to apply your changes to the controller. TriStation 1131 will automatically rebuild the application before it is downloaded.
Enable Trident/Tri-GP Node Time Synchronization (Trident 2.x/3.x or Tri-GP only)	Select the check box to allow the controller to participate in time synchronization across the Peer-to-Peer network as a master node or a slave node (see Configuring Triconex Time Synchronization on the Trident or Tri-GP 2.x/3.x CM on page 435). Applicable to Trident 2.x/3.x and Tri-GP systems only. The default is selected, and cannot be changed.
Use Local Time	Clear the check box if you do not want to use local time. The default is selected.
Prevent Restart Following Fatal Error (Trident 2.x/3.x or Tri-GP only)	Select the check box to prevent the MPs from restarting automatically after a fatal error occurs. By default, when a Trident or Tri-GP MP detects a fatal error condition, it will automatically restart, and when possible, re-educate from the other active MPs. This allows the system to overcome temporary problems without user intervention. When this property is selected, if the MP detects a fatal error, it will shut down without a restart attempt, requiring user intervention to restart the MP. This will cause the controller to go to either DUAL or SINGLE mode. In all cases, if an MP attempts to automatically restart more than three times in 30 minutes, all future restart attempts will be disabled, to prevent the MP from continually restarting. If all three MPs shut down, user intervention will be required to restart the system. Applicable to Trident 2.x/3.x and Tri-GP systems only. The default is cleared. **Note:** The default restart behavior described above applies to Trident 1.x systems, but cannot be changed.

Property	Action
Use Secure Communication	Select the check box if you want to enable secure communication between the Trident or Tri-GP 3.x controller and TriStation 1131.
	Note: When this option is selected, the default connection type will automatically use secure communication to connect to the controller. However, you still have the option to not use secure communication for a specific connection; see Preparing to Download to the Controller on page 534 for more information.
	See Secure Communication on page 271 for more information about configuring and using secure communication.
	Applicable to Trident/Tri-GP 3.x systems with a CIM installed only. The default is cleared (secure communication is not enabled).
Allow Expired Certificate	Select the check box if you want to allow secure connections to Trident or Tri-GP 3.x controllers even if the TriStation server and/or client certificate is expired.
	If a certificate expires, and this option is not selected, you will be unable to connect to the controller via a network connection. In this case, you will have to connect via a serial connection, or perform a Download All operation to download a new certificate.
	Applicable only to TriStation or Enhanced Diagnostic Monitor connections to Trident/Tri-GP 3.x systems with a CIM installed. Does not apply to OPC UA client/server certificates.
	The default is cleared.
Generate Alarm When a Certificate Expires	Select the check box if you want to be alerted when a certificate used for secure communication expires.
	When selected, the fault LEDs on the MPs will turn ON when a certificate has expired, or is close to expiring. An alarm event will also appear in the Enhanced Diagnostic Monitor.
	Applicable to Trident/Tri-GP 3.x systems with a CIM installed only. The default is cleared.
Number of Days Before an Alarm Is Generated	If you choose to be warned when a certificate expires, you also need to select how many days should pass after expiration before the warning occurs.
	You can enter from 0 to 255 days. If you enter 0, a warning will occur immediately upon certificate expiration. The default is 1 day.
	Applicable to Trident/Tri-GP 3.x systems with a CIM installed only.

4   Click OK to save.

Allocating Memory for Trident or Tri-GP Points

This procedure explains how to change the amount of memory used for input, output, and memory points (tagnames) in the application.

Initially, the amount of memory for input and output points is determined by the number and type of I/O modules configured in the TriStation 1131 project. The amount of memory for memory points is set when a TriStation 1131 project is created. You can change these allocations at any time before building and downloading the application.

CAUTION

After an application has been downloaded to the controller or Emulator, changes to memory allocation require a Download All (see Using the Download All Command on page 559).

See What Are Undeclared Tagnames? on page 194 for more information about memory allocation for points.

Procedure

1 Expand the Controller tree, double-click Configuration, and then expand Memory Allocation.

2 Double-click the type of point you want to change.
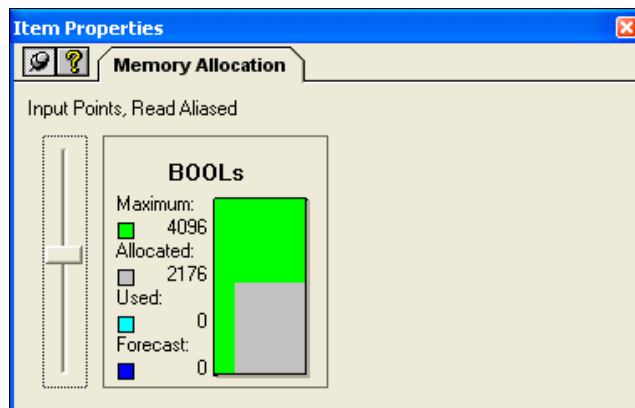
3 Move the slider up or down to change the memory allocated for the selected point.

4 Repeat for all points to be changed.

Note Using the Print All command, you can print a report listing the current memory allocation settings. See Printing Project Documents on page 97.

Configuring the Trident or Tri-GP Target System Version

This procedure explains how to change the target system version in your project. The target system version determines which Trident or Tri-GP controller features and modules can be configured in a project. You originally set the target system version when you created a new project, or when you converted an existing project to TriStation 1131 4.6 or later.

If you change the system version of your Trident controller (for example, you upgrade your Trident system from 1.4 to 2.0), you must logically configure the change in the TriStation 1131 project. This change requires a Download All.

Before committing to the target system version change, you are allowed to back up your project.

Configuring the target system version is a three-step process:

- Determine the system version of the Trident or Tri-GP controller the project will be downloaded to.
- Validate the target system version change to review the changes that will be made to the project before committing to the change.
- Change the target system version in the project.

Topics include:

Determining Your Trident or Tri-GP Controller's System Version

Before changing the target system version in your TriStation 1131 project, you should determine the system version of the Trident or Tri-GP controller you will be downloading the project to. You need to know the following:

- The model number of the Main Processor modules installed in the Trident or Tri-GP (3101 or 3101S2)
- The Trident or Tri-GP system version (for example, 1.5, 2.0, etc.)

The target system version currently configured in the project is displayed on the Operating Parameters screen and at the top of the Select Main Processor dialog box.

Procedure

1   Do one of the following:

- If any of the following scenarios are true, go to step 2:

    — You know you have a Trident 1.x system.

     — You are unable to connect to the Trident or Tri-GP controller.

     — For a Trident controller, you do not have the Enhanced Diagnostic Monitor 2.2 or later. The Trident target system version is not available in Enhanced Diagnostic Monitor 2.1 and earlier.

     — For a Tri-GP controller, you do not have the Enhanced Diagnostic Monitor 2.5.0 or later. The Tri-GP target system version is not available in Enhanced Diagnostic Monitor 2.4.0 and earlier.

    • If the above scenarios do not apply to your situation, go to step 3.

2 Refer to your sales order paperwork, which should specify your Trident or Tri-GP controller's system version. You do not need to continue with this procedure.

3 Open the Enhanced Diagnostic Monitor (for more detailed instructions, see the *Enhanced Diagnostic Monitor User's Guide*).

4 Connect to the node (controller) whose system version you want to find.

5 In the System Overview tree, click System Overview. The System Overview window appears.

Trident System Version
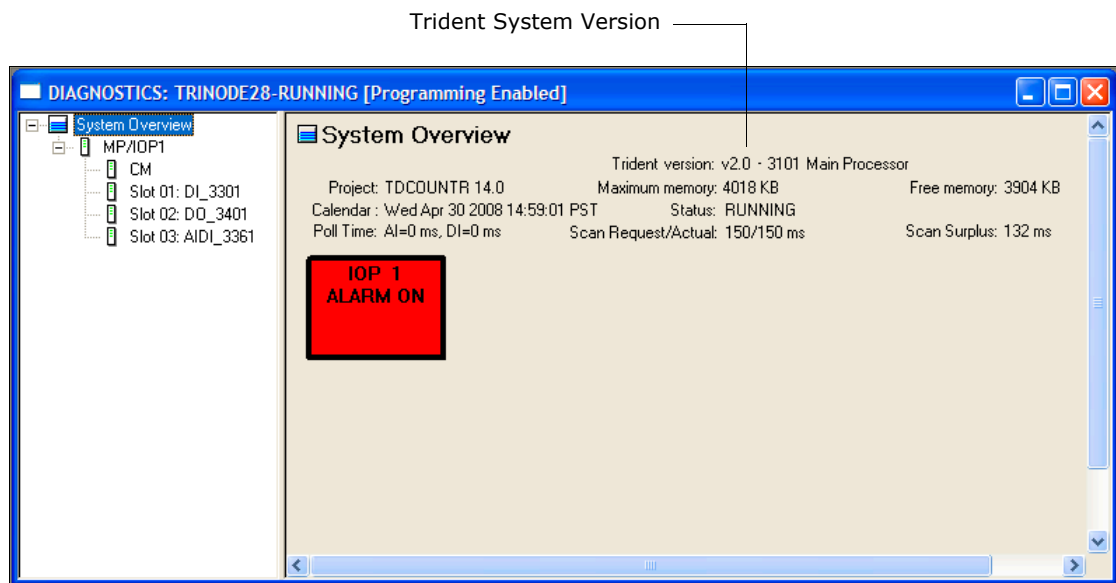
6 View the system version information, located at the top of the System Overview window.

    Note   System version information is not available for Trident 1.x controllers. This property will display 0 when you are connected to a Trident 1.x controller.

Validating a Trident or Tri-GP Target System Version Change

Before committing to a target system version change, you should validate the change to determine what effect it will have on your project. Validation allows you to plan ahead for the changes that will occur when you switch from one target system version to another.

For detailed information about the changes that occur when switching from one target system version to another, see the Results of a Trident or Tri-GP Target System Version Change on page 371.

Procedure

1   Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2   Double-click the IOP whose target system version you want to change, and then click Replace MP.

3   Specify these properties in the Replace Main Processor dialog box.

Property	Description
Model	The Main Processor model installed in the Trident or Tri-GP controller that this project will be downloaded to.
Target System Version	The system version of the Trident[a] or Tri-GP controller that this project will be downloaded to. Use the on-screen descriptions to help you determine the correct version to select, based on your Trident or Tri-GP controller configuration.

a. TriStation 1131 4.10.1 does not support Trident controller versions 1.1 and earlier. For a list of TriStation 1131 versions compatible with your Trident controller, see the applicable Trident *Product Release Notice* (available on the Invensys Global Customer Support website).

Note   If you are not sure which Trident or Tri-GP system version to select, use the
Enhanced Diagnostic Monitor or your sales paperwork to verify your
controller's system version information. See Determining Your Trident or Tri-GP
Controller's System Version on page 365 for more information.

4   Select the Validate Only check box.

5   Click OK.

TriStation 1131 analyzes your project settings and current controller configuration to
determine the modifications that will be made to the project if you change to the selected
target system version.

6   In the Messages pane, review the results of the validation to determine if you want to
commit to the target system version change.

Changing the Trident or Tri-GP Target System Version

The target system version determines which Trident or Tri-GP controller features and modules
can be configured in a project. You selected the target system version for your project when you
created it, or when you converted the project from a previous version of TriStation 1131.

If you have upgraded your Trident or Tri-GP system to a newer version, you also need to change
the target system version in your TriStation 1131 project.

When changing the target system version, you can upgrade or downgrade the version number
of the Trident or Tri-GP system (for example, upgrade from 1.5 to 2.0, or downgrade from 1.5 to
1.3).

Changing the target system version requires a Download All. You cannot change the project's
target system version while the project is in the Download Changes state.

You cannot be connected to the controller while you are changing the target system version.

If time synchronization has been enabled on the Trident CM or MP (as described below), it will
be disabled during a target system version change from 1.x to 2.x, or vice-versa.

- On the Trident 2.x controller, time synchronization is enabled if the Enable
  Trident/Tri-GP Node Time Synchronization check box is selected on the Operating
  Parameters tab of the MP Setup dialog box.

  Note   In TriStation 1131 4.10.1, the Enable Trident/Tri-GP Node Time Synchronization
  check box is always selected, and cannot be changed. Time synchronization will
  always be enabled.

- On the Trident 1.x controller, time synchronization is enabled if either the On NET 1
  Enable Time Synchronization or the On NET 2 Enable Time Synchronization properties
  are selected on the Network tab of the CM Setup dialog box.

You will need to re-enable time synchronization after the target system version change is
complete. See Configuring Trident or Tri-GP Time Synchronization on page 430 for more
information.

Upgrading or downgrading *within* a major Trident controller version (for example, from 1.2 to
1.6) will NOT change your time synchronization settings.

CAUTION

If you are upgrading from Trident 1.x to Trident 2.x, the configuration settings for the CM will be reset to their default values during the target system version change.

We recommend writing down your Trident 1.x CM onfiguration details *before* changing the target system version, so that you can use them to reconfigure the Trident 2.x CM after the target system version change is complete.
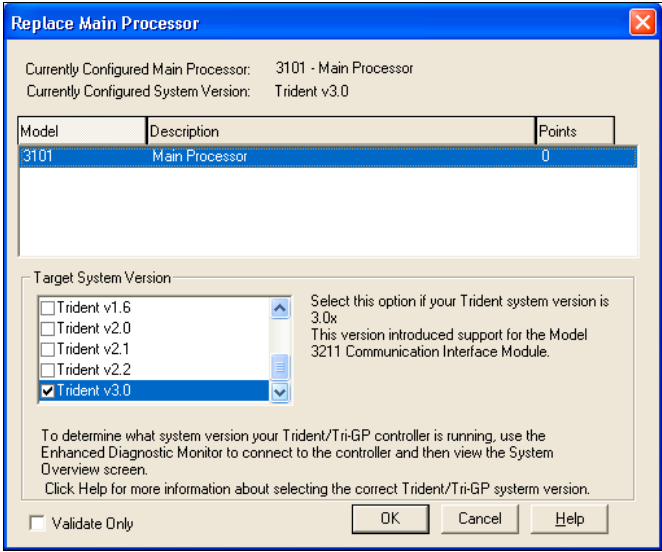
Before committing to a target system version change, you should validate the change to determine what effect it will have on your project. See Validating a Trident or Tri-GP Target System Version Change on page 367.

Procedure

1 Verify that you are not connected to the controller.

2 If needed, change the project state to Download All.

- On the Commands menu, click Change State to Download All.

- In the Change Project State to Download All dialog box, click Change State.

3 Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

4 Double-click the IOP whose system version you want to change, and then click Replace MP.
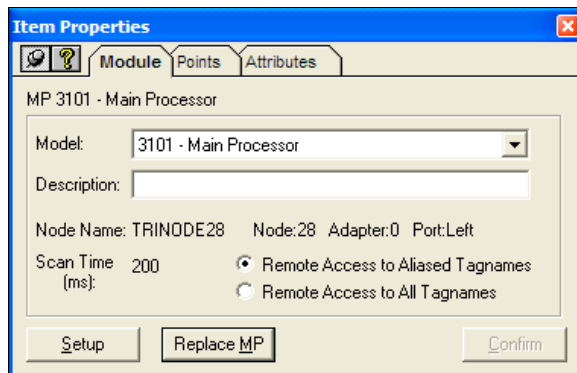
Note   If the Replace MP button is unavailable, the project is in the Download Changes state. Go back to step 2 to change the project state before continuing.

5 Specify these properties in the Replace Main Processor dialog box.

Property	Description
Model	The Main Processor model installed in the Trident or Tri-GP controller that this project will be downloaded to.
Target System Version	The system version of the Trident[a] or Tri-GP controller that this project will be downloaded to. Use the on-screen descriptions to help you determine the correct version to select, based on your Trident or Tri-GP configuration.

a. TriStation 1131 4.10.1 does not support Trident controller versions 1.1 and earlier. For a list of TriStation 1131 versions compatible with your Trident controller, see the applicable Trident *Product Release Notice* (available on the Invensys Global Customer Support website).

Note If you are not sure which Trident or Tri-GP system version to select, use the Enhanced Diagnostic Monitor to verify your system version information. See Determining Your Trident or Tri-GP Controller's System Version on page 365 for more information.

6 Click OK.

7 When asked to confirm your selection, click Yes to continue.

8 When asked to backup your project before changing the target system version, do one of the following:

- (Recommended) Click Yes and then specify the folder to save the backup file to. Use the suggested name, or specify a new one. The file extension (.bt2) does not have to be included in the name.

- Click No to continue without creating a backup file.

TriStation 1131 reconfigures your project to the selected target system version. All current configuration settings are maintained; however, any parameters that did not exist in the previous version are set to their default values.

9 In the Messages pane, review the results of the target system version change. For more information, see Results of a Trident or Tri-GP Target System Version Change on page 371.

10 To finish the process, you must build the application and download it to the controller.

Results of a Trident or Tri-GP Target System Version Change

The following tables describe the changes that are made to your project when changing from one target system version to another:

- Trident Target System Version Change Matrix on page 372
- Tri-GP Target System Version Change Matrix on page 373

To use the Trident or Tri-GP Target System Version Change Matrix:

1 Find the column for your current system version on the top.

2 Then move down to locate the row (on the left) for the system version you want to change your project to.

The box where your selected column and row meet describes the changes that will be made to your project if you change to the new target system version.

Table 37   Trident Target System Version Change Matrix

ORIGINAL VERSION	1.0 or 1.1	1.2, 1.3.x, or 1.4.x	1.5.x or 1.6.x	2.0.x	2.1.x or 2.2.x
NEW VERSION	**Note:** A target system version change (upgrade or downgrade) requires that the project state be changed to Download All, with one are converting a project created in a version of TriStation 1131 prior to 4.6. During project conversion, projects created with a previou 1131 will remain in the Download Changes state regardless of a target system version change. For more information, see Converting Version 4.10.1 on page 11.				
1.0 or 1.1			NOT ALLOWED	NOT ALLOWED	NOT ALLOWED	NOT ALLOWED
1.2, 1.3.x, or 1.4.x		**UPGRADE** • Add support for model 3381 PI module. • Add support for model 3481 AO module. • Add support for model 3482 AI module. • Add support for model 3201 CM.		**DOWNGRADE** • Remove model 3361 AI /DI module.	**DOWNGRADE** • Remove model 3361 AI /DI module. • Remove support for enhanced model 3201 CM.	**DOWNGRADE** • Remove model 3361 AI /DI module. • Add support for model 3381 PI module. • Remove model 3382 EPI module. • Remove model 3411 SDO module. • Remove model 3311 HRDI module. • Remove support for enhanced model 3201 CM.
1.5.x or 1.6.x		**UPGRADE** • Add support for model 3381 PI module. • Add support for model 3481 AO module. • Add support for model 3482 AI module. • Add support for model 3361 AI /DI module. • Add support for model 3201 CM.	**UPGRADE** • Add support for model 3361 AI /DI module.		**DOWNGRADE** • Remove support for enhanced model 3201 CM.	**DOWNGRADE** • Remove model 3382 EPI module. • Add support for model 3381 PI module. • Remove model 3411 SDO module. • Remove model 3311 HRDI module. • Remove support for enhanced model 3201 CM.
NEW VERSION					
2.0.x		**UPGRADE** • Add support for model 3381 PI module. • Add support for model 3481 AO module. • Add support for model 3482 AI module. • Add support for model 3361 AI /DI module. • Add support for original and enhanced model 3201 CM.	**UPGRADE** • Add support for model 3361 AI /DI module. • Add support for enhanced model 3201 CM.	**UPGRADE** • Add support for enhanced model 3201 CM.		**DOWNGRADE** • Remove model 3382 EPI module. • Add support for model 3381 PI module. • Remove model 3411 SDO module. • Remove model 3311 HRDI module.

Table 37 **Trident Target System Version Change Matrix** *(continued)*

ORIGINAL VERSION	1.0 or 1.1	1.2, 1.3.x, or 1.4.x	1.5.x or 1.6.x	2.0.x	2.1.x or 2.2.x	3.0.x
2.1.x or 2.2.x	**UPGRADE** • Replace model 3381 PI module with model 3382 EPI module. • Add support for model 3481 AO module. • Add support for model 3482 AI module. • Add support for model 3361 AI /DI module. • Add support for model 3382 EPI module. • Add support for model 3411 SDO module. • Add support for model 3311 HRDI module. • Add support for original and enhanced model 3201 CM.	**UPGRADE** • Replace model 3381 PI module with model 3382 EPI module. • Add support for model 3361 AI /DI module. • Add support for model 3382 EPI module. • Add support for model 3411 SDO module. • Add support for model 3311 HRDI module. • Add support for enhanced model 3201 CM.	**UPGRADE** • Replace model 3381 PI module with model 3382 EPI module. • Add support for model 3382 EPI module. • Add support for model 3411 SDO module. • Add support for model 3311 HRDI module. • Add support for enhanced model 3201 CM.	**UPGRADE** • Replace model 3381 PI module with model 3382 EPI module. • Add support for model 3382 EPI module. • Add support for model 3411 SDO module. • Add support for model 3311 HRDI module.		**DOWNGRADE** • Remove model 3211 CIM.
3.0.x	**UPGRADE** • Add support for model 3381 PI module. • Add support for model 3481 AO module. • Add support for model 3482 AI module. • Add support for model 3361 AI /DI module. • Add support for original and enhanced model 3201 CM. • Add support for model 3211 CIM.	**UPGRADE** • Add support for model 3361 AI /DI module. • Add support for enhanced model 3201 CM. • Add support for model 3211 CIM.	**UPGRADE** • Add support for enhanced model 3201 CM. • Add support for model 3211 CIM.	**UPGRADE** • Replace model 3381 PI module with model 3382 EPI module. • Add support for model 3382 EPI module. • Add support for model 3411 SDO module. • Add support for model 3311 HRDI module. • Add support for model 3211 CIM.	**UPGRADE** • Add support for model 3211 CIM.	

Table 38 **Tri-GP Target System Version Change Matrix**

NEW VERSION	ORIGINAL VERSION	2.1.x or 2.2.x	3.x
		Note: A target system version change (upgrade or downgrade) requires that the project state be changed to Download All.	
2.1.x or 2.2.x			**DOWNGRADE** • Remove model 3211S2 CIM.
3.x		**UPGRADE** • Add support for model 3211S2 CIM.	

Configuring Trident and Tri-GP Hardware

This section explains how to configure the hardware allocation for a Trident or Tri-GP controller. Topics include:

- Configuring the Trident or Tri-GP Main Processors (MPs) on page 375
- Inserting a Trident or Tri-GP Module on page 382
- Removing a Trident or Tri-GP Module on page 383
- Configuring a Trident or Tri-GP SDO Module on page 383
- Configuring a Trident or Tri-GP HRDI Module on page 384
- Configuring a Trident or Tri-GP PI or EPI Module on page 387

Note   For information on configuring the CM or CIM, see Configuring Trident or Tri-GP Communication Modules on page 390.

Configuring the Trident or Tri-GP Main Processors (MPs)

This section explains how to configure the Trident or Tri-GP MP properties, network ports, and serial ports. Topics include:

- Specifying Trident or Tri-GP MP Module Properties on page 375
- Displaying Trident or Tri-GP MP Attribute Properties on page 377
- Configuring Trident 1.x MP Network Ports on page 378
- Configuring Trident 2.x/3.x or Tri-GP MP Network Ports on page 379
- Configuring Trident or Tri-GP MP Serial Ports on page 380

Specifying Trident or Tri-GP MP Module Properties

This procedure explains how to view and specify properties on the Trident or Tri-GP MP Module tab. This procedure applies to all Trident and Tri-GP MPs.

Procedure

1   On the Controller tree, double-click Configuration.

2   On the Configuration tree, open the Hardware Allocation node, and then double-click an MP. The Item Properties dialog box appears.
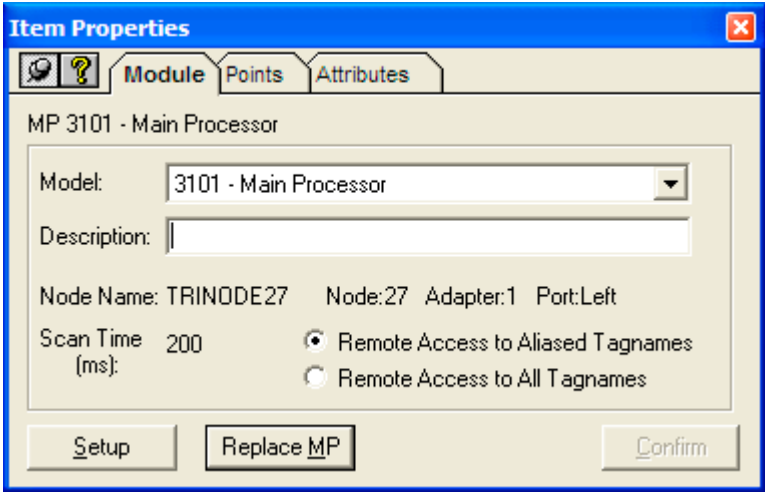
3 Specify these properties on the Module tab.

Property	Action
Model	Select the model used in the physical system.
Description	Enter a description, if desired.
Node Name	Displays the node name and number.
Scan Time	Displays the scan time, if it has been specified.
Remote Access to Aliased Tagnames	Select to allow TSAA applications (such as Triconex DDE Server) to have remote access only to aliased tagnames.
Remote Access to All Tagnames	Select to allow TSAA applications (such as Triconex DDE Server) to have remote access to all tagnames, including unaliased tagnames.

4 Click Confirm to save your changes.

Note You cannot specify point properties for a Trident or Tri-GP MP.

Displaying Trident or Tri-GP MP Attribute Properties

This procedure explains how to display MP attribute properties (status and control attributes).

Procedure

1   On the Controller tree, double-click Configuration.

2   On the Configuration tree, open the Hardware Allocation node, and then double-click an MP. The Item Properties dialog box appears.
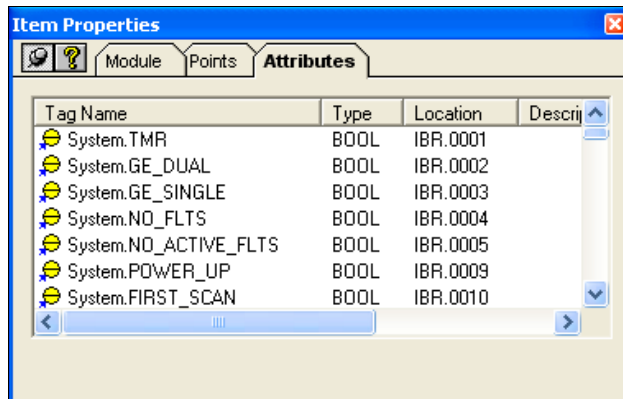
3   Click the Attributes tab.

These properties are displayed on the Attributes tab.

Property	Description
Tagname	The name of the status or control attribute.
Data Type	The data type.
Location	The memory location for the attribute.
Description	The description of the attribute.

Configuring Trident 1.x MP Network Ports

This procedure explains how to configure network ports on a Trident 1.x MP, which supports network connections to a TriStation PC.

Each port must be configured separately and can operate independently with different Modbus Masters. Or, they can operate as redundant serial ports, connected to redundant ports of the same Modbus Master.

Procedure

1 Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the MP slot, click Setup, and then click the Network Ports tab.
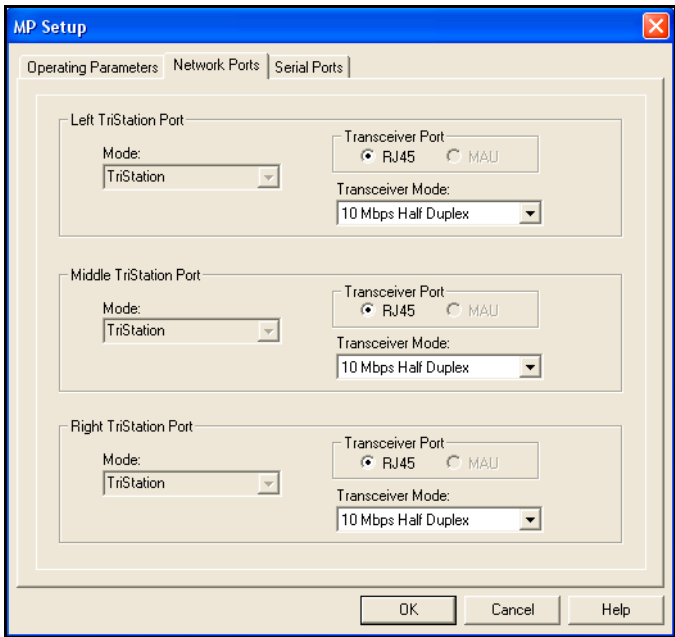
3 Specify these properties on the Network Ports tab.

Property	Action
Mode	Set to TriStation; cannot be changed.
Transceiver Port	Set to RJ-45; cannot be changed.
Transceiver Mode	Select half or full duplex depending on the installation.

4 Click OK to save your changes.

Configuring Trident 2.x/3.x or Tri-GP MP Network Ports

This procedure explains how to configure network ports on a Trident 2.x/3.x or Tri-GP MP, which supports network connections to a TriStation PC.

Each port must be configured separately and can operate independently with different Modbus Masters. Or, they can operate as redundant serial ports, connected to redundant ports of the same Modbus Master.

Note   The first time you connect to the Trident 2.x/3.x or Tri-GP controller to download your application, you **must** connect either via serial port, or via a network connection to the Left MP, using the default IP address. IP addresses configured for the Middle and Right MP network ports are not valid for the initial connection to the Trident 2.x/3.x or Tri-GP controller. See Connecting to the Trident or Tri-GP 2.x/3.x Controller for the First Time on page 483 for more information.

Procedure

1   Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2   Double-click the MP slot, click Setup, and then click the Network Ports tab.

3   Specify these properties on the Network Ports tab.

Property	Action
Mode	Set to TriStation; cannot be changed.
Transceiver Port	Set to RJ-45; cannot be changed.
Transceiver Mode	Select half or full duplex depending on the installation.

Property	Action
IP Address	Specify the IP address of the controller.
	The default IP address is 192.168.255.*n*, where *n* is the node number of the controller. The default IP address is for connection to the Left MP only.

4 Click OK to save your changes.

Configuring Trident or Tri-GP MP Serial Ports

This procedure explains how to configure serial ports on a Trident or Tri-GP MP, which supports serial connections using Modbus Slave RTU protocol.

Procedure

1 Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the MP slot, click Setup, and then click the Serial Ports tab.
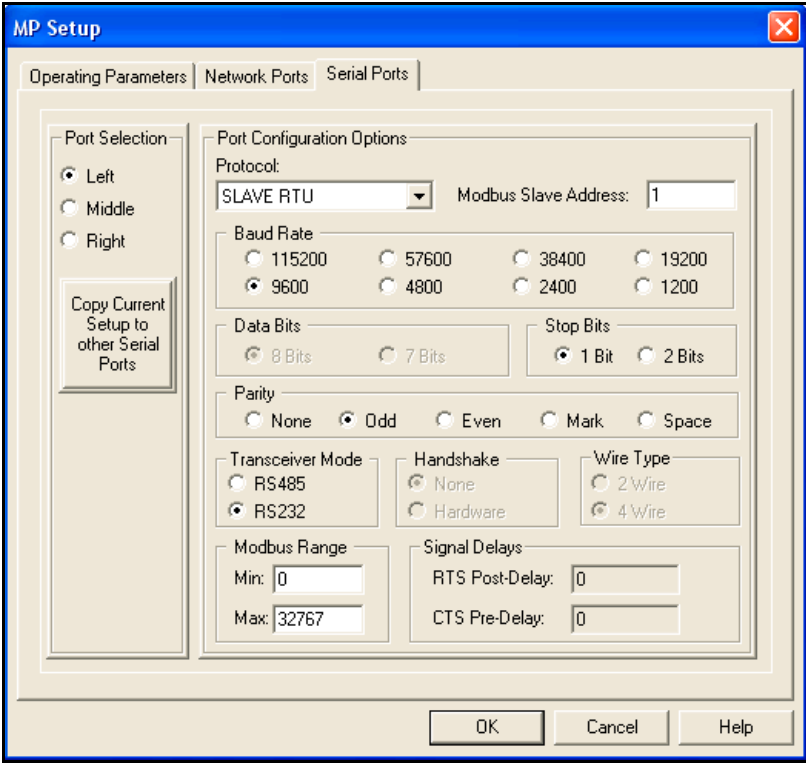
3 Specify these properties on the Serial Ports tab.

Property	Action
Port Selection	Select the port to be configured.
Protocol	Only Modbus Slave RTU is available.

Property	Action
Modbus Slave Address	Enter the slave address of the serial port on the MP Baseplate.
Baud Rate	Select the rate used in the installation.
Data Bits	Set at 8 bits; cannot be changed.
Stop Bits	Select 1 Bit or 2 Bits.
Parity	Select a parity option.
Transceiver Mode	Select RS-232 or RS-485, depending on the physical connection.
Handshake	Set to none; cannot be changed.
Wire Type	Set to 4 wire; cannot be changed.
Modbus (Minimum and Maximum) Range	Enter a minimum value (0 is default) and maximum value (32,767 is maximum).
Signal Delays	Set to 0; cannot be changed.
Copy Current Setup to Other Serial Ports Command	Click to have the settings for the selected port copied to the other two serial ports on the MP.

4   Click OK to save your changes.

Inserting a Trident or Tri-GP Module

This procedure explains how to insert a Trident or Tri-GP module in a configuration.

If a CM is added to a configuration after the application has been downloaded to the controller, you must use the Download All command to download the change.

Note If you already have a model 3301 or 3301S2 DI module installed, you can quickly change it to a model 3311 or 3311S2 HRDI module (and vice-versa) by double-clicking on the module in the configuration pane, selecting the model 3311 or 3311S2 HRDI module from the Model list in the Item Properties dialog box, and then clicking Confirm. This configuration shortcut can also be used when switching between the model 3481/3481S2 and 3482/3482S2 AO modules.

Procedure

1 On the Controller tree, double-click Configuration.

2 On the Configuration tree, open the Hardware Allocation node, and then click the MP slot.

3 On the Tools menu, click Insert Module. The Insert Module dialog box appears.

4 Select the type of module you want to add to the configuration, and click OK.

   The mouse pointer changes to look like this:
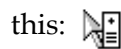
5 Click on the configuration pane to add the module to the configuration.

Configuration pane

Module being added
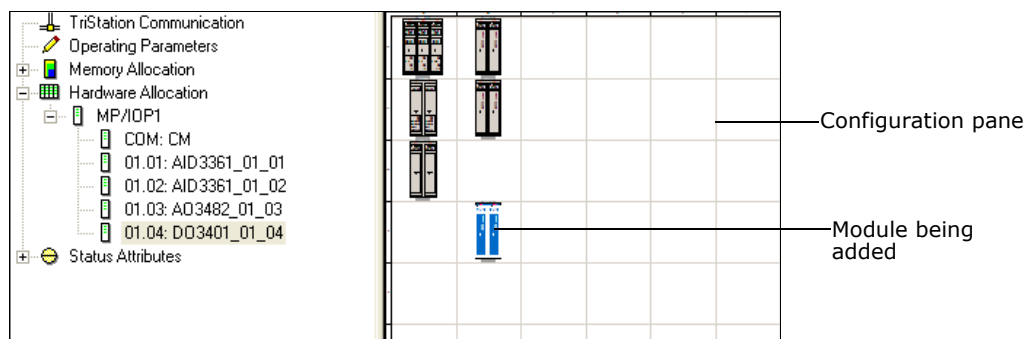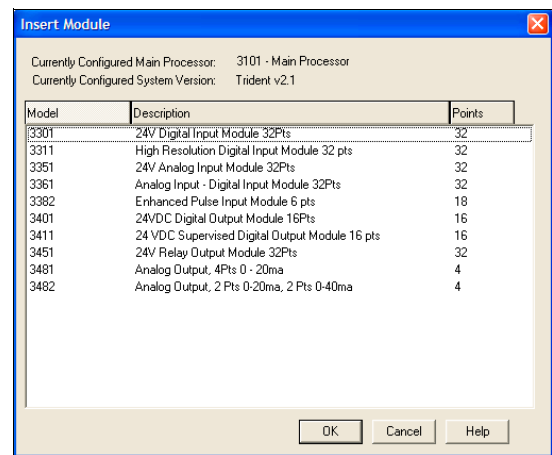
6 If you added an SDO, HRDI, EPI, PI, CM, or CIM module, configure the module using the instructions specific to that module:

   • Configuring a Trident or Tri-GP SDO Module on page 383

   • Configuring a Trident or Tri-GP HRDI Module on page 384

   • Configuring a Trident or Tri-GP PI or EPI Module on page 387

   • Configuring Trident or Tri-GP Communication Modules on page 390

Removing a Trident or Tri-GP Module

This procedure explains how to remove a module from a Trident or Tri-GP controller configuration.

If a CM or CIM is removed from a configuration after the application has been downloaded to the controller, you must use the Download All command to download the change.

Procedure

1   On the Controller tree, double-click Configuration.

2   On the Configuration tree, click Hardware Allocation.

3   On the configuration pane, click the icon that represents the module, and then press the Delete key.

Configuring a Trident or Tri-GP SDO Module

This procedure explains how to configure a Trident (model 3411) or Tri-GP (model 3411S2) Supervised Digital Output (SDO) module, which provides loop supervision to field devices in fire and gas applications. 16 points are available; each point can be independently configured.

The model 3411 SDO module is compatible only with Trident 2.1 and later systems. See the *Planning and Installation Guide for Trident v2-v3 Systems* for more information.

The model 3411S2 SDO module is compatible only with Tri-GP v2.1 and later systems. See the *Planning and Installation Guide for Tri-GP v2-v3 Systems* for more information.

Procedure

1   On the Controller tree, double-click Configuration.

2   On the Configuration tree, expand the Hardware Allocation node, and then expand the MP node the SDO module is installed in.

3   Double-click the SDO module, and then click Setup.
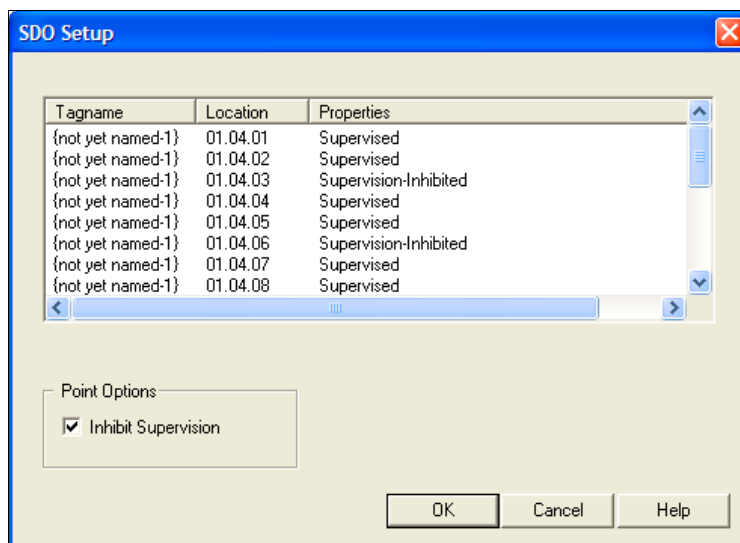
4 Select the tagname (point) to be configured, and then select how you want the point to be configured:

- If you want to inhibit supervision for the selected point, select the Inhibit Supervision check box This will suppress reporting of supervisory alarms (i.e. open-loads).

- If you want the selected point to be supervised, clear the Inhibit Supervision check box. This will provide detection and alarming of supervisory (i.e. open-load) conditions.

The default for each point is Supervised (the check box is cleared).

⚠️ **WARNING**   Using the SYS_OVD_INHIBIT function block to inhibit OVDs on a point overrides the supervisory configuration and results in loss of supervision of that point. See the *TriStation Libraries Reference* for more information about the SYS_OVD_INHIBIT function block.

5 Continue to select tagnames and specify settings as needed.

- Press Shift and click to select multiple contiguous tagnames.

- Press Ctrl and click to select multiple non-contiguous tagnames.

6 Click OK to save your changes.

Configuring a Trident or Tri-GP HRDI Module

This procedure explains how to configure a Trident (model 3311) or Tri-GP (model 3311S2) High-Resolution Digital Input (HRDI) module, which allows you to enable highly-accurate sequence of events (SOE) recording for point transitions at a resolution of up to 1 msec.

A point transition (or event) is the state change of a Boolean variable from True to False or from False to True. The HRDI has 32 points available; each point can be independently configured.

Note   For more information about using sequence of events in your application, see SOE Development on page 254.

The model 3311 HRDI module is compatible only with Trident v2.1 and later systems. See the *Planning and Installation Guide for Trident v2-v3 Systems* for more information.

The model 3311S2 HRDI module is compatible only with Tri-GP v2.1 and later systems. See the *Planning and Installation Guide for Tri-GP v2-v3 Systems* for more information.

Procedure

1 On the Controller tree, double-click Configuration.

2 On the Configuration tree, expand the Hardware Allocation node, and then expand the MP node the HRDI module is installed in.

3 Double-click the HRDI module, and then click Setup.
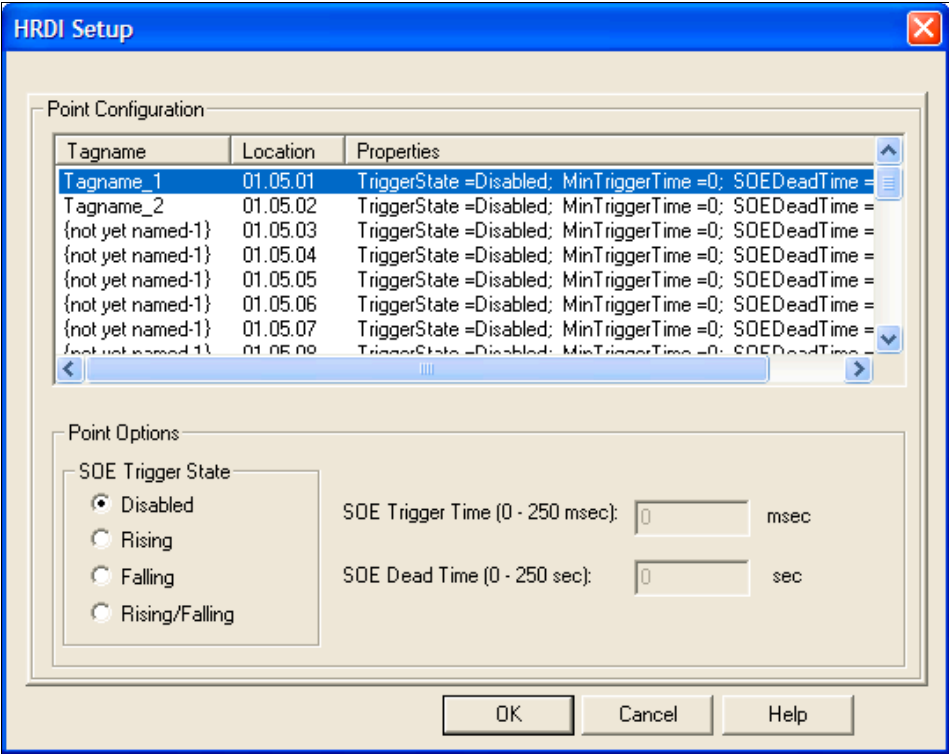
4   Select the tagname to be configured, and then specify these properties in the HRDI Setup dialog box.

Property	Action
SOE Trigger State	Determines if SOE is enabled for the selected point. When SOE is enabled, the HRDI module will time stamp and record point transitions for the selected point.
	Select the option to be used for the selected point.
	• **Disabled**: SOE is not enabled for the point. Point transitions will not be reported.
	• **Rising**: SOE is enabled for the point. Point transitions will be reported when the Boolean value changes from False to True (0 to 1).
	• **Falling**: SOE is enabled for the point. Point transitions will be reported when the Boolean value changes from True to False (1 to 0).
	• **Rising/Falling**: SOE is enabled for the point. Point transitions will be reported for *both* Rising and Falling changes (False to True, *or* True to False).
	The default is Disabled.

Property	Action
SOE Trigger Time	Defines the number of milliseconds (with an accuracy of 1 msec or less) a signal must be stable before its change in state (transition) causes the reporting of an event. Also known as the *debounce period*.
	A longer trigger time results in a longer debounce period, so that pulse widths that fall within the debounce period will not be reported as an event.
	Enter the trigger time in milliseconds. The available range is 0 to 250 msec.
	• If any trigger with a pulse width larger than x msec needs to be reported as an event, then enter x-1 msec. For example, to report a pulse width larger than 75, enter 74 as the trigger time (because 75-1=74).
	• If any trigger with a pulse width smaller than x msec needs to be filtered out (not reported as an event), then enter x+1 msec. For example, to filter out a pulse width smaller than 30, enter 31 as the trigger time (because 30+1=31).
	The default is 0, meaning there is no debounce period, and:
	• A trigger with a pulse width larger than 1 msec will always generate an event.
	• A trigger with a pulse width smaller than 1 msec may or may not generate an event.
	Only available if SOE has been enabled for the point.
SOE Dead Time	Defines the length of time after a transition before a subsequent transition will be reported. Once a transition on the selected point has occurred, any subsequent transitions will be reported only after the dead time interval has elapsed.
	A longer dead time interval is better able to prevent the higher-level SOE application from being flooded with events, but it also means there is a higher chance of losing subsequent transition events.
	Enter the amount of dead time in seconds. The available range is 0 to 250 sec, with an accuracy of 10 msec or less.
	The default is 0, meaning any subsequent transition will generate an event as long as the previous transition on the same point has been collected and cleared. It does **not** mean that every transition on the same point will generate an event, as a transition on the same point that occurs too soon—before the previous event is cleared—may be missed.
	Only available if SOE has been enabled for the point.

5   Continue to select tagnames and specify settings as needed.

- Press Shift and click to select multiple contiguous tagnames.

- Press Ctrl and click to select multiple non-contiguous tagnames.

6   Click OK to save your changes.

Configuring a Trident or Tri-GP PI or EPI Module

This procedure explains how to configure the following Trident or Tri-GP modules:

- Model 3381 Trident Pulse Input (PI) module (compatible only with Trident 2.0 and earlier systems)

- Model 3382 Trident Enhanced Pulse Input (EPI) module (compatible only with Trident 2.1.x and later systems)

- Model 3382S2 Tri-GP Enhanced Pulse Input (EPI) module (compatible only with Tri-GP 2.1.x and later systems)

These modules are used for speed and RPM inputs. Six points are available; each point can be independently configured. Acceleration and jerk measurements for each point are available on the EPI module only.

Note   The number of points for the EPI (model 3382 or 3382S2) module displays as 24 in the Insert Module dialog box (see Inserting a Trident or Tri-GP Module on page 382). This is because each of the six available points provides speed, acceleration, and jerk measurements as separate logical points (for a total of 18 logical points); six additional points are also included in the total, but are reserved for future use.

A maximum of five EPI modules can be configured in a Trident 2.1 or later, or Tri-GP, project. For information about system configuration restrictions and validated I/O module configurations in earlier Trident system versions, please see the *Product Release Notice* for your Trident system version.

If you have a PI module installed in a Trident 2.0 or earlier project, please note the following:

- Upgrading the target system version for your project to Trident 2.1 or later will automatically upgrade the PI module to an EPI module.

- The existing PI module point configuration is retained for the EPI module during a target system version upgrade to Trident 2.1 or later.

- TriStation 1131 will not allow you to upgrade the project's target system version to Trident 2.1 or later if more than five PI modules are installed in the project. You must remove the excess PI modules from your project prior to starting a target system version change. See Configuring the Trident or Tri-GP Target System Version on page 365 for more information about changing the target system version.

- If you have more than five PI modules installed in your Trident 2.0 or earlier system, you will need to physically remove the excess modules from the Trident chassis, rewire the PI points that were connected to those modules, and reprogram your application accordingly. All of these tasks should be completed prior to upgrading to Trident 2.1.

- Because the EPI module requires a greater memory allocation than the PI module, the automatic upgrade from a PI module to an EPI module may not be successful in cases where not enough memory is available to be allocated to the EPI module(s).

Procedure

1   On the Controller tree, double-click Configuration.

2   On the Configuration tree, expand the Hardware Allocation node, and then expand the MP node the PI or EPI module is installed in.

3 Double-click the PI or EPI module, and then click Setup.
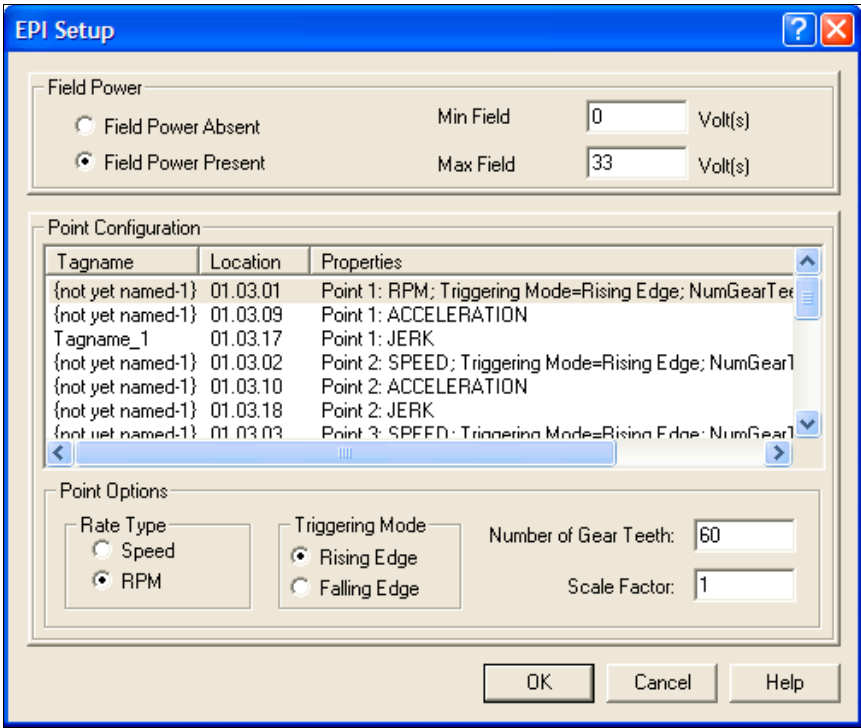
4 Select the tagname (point) to be configured, and then specify these properties in the PI Setup dialog box.

Property	Action
Field Power	Select Field Power Present if the installed system has field power connected to the Pulse Input Baseplate. The default is Field Power Absent.
Min Field	Enter the minimum range for field power in volts. The default is 0 volts. Available only when Field Power Present is selected.
Max Field	Enter the maximum range for field power in volts. The default is 33 volts. Available only when Field Power Present is selected.
Rate Type	Select Speed or RPM to specify the type of rate applied to pulse input signals. • Speed: Used for pulses measured in seconds, minutes, or hours. • RPM: Used for pulses measured in the number of revolutions per minute of the shaft that connects a gear to the rotating equipment. Not available if an Acceleration or Jerk point is selected (EPI module only).

Property	Action
Triggering Mode	Select Rising Edge or Falling Edge depending on the installation.
	Not available if an Acceleration or Jerk point is selected (EPI module only).
Number of Gear Teeth	Enter the number of gear teeth that are counted in each revolution.
	The Rate Type property must be specified as RPM to enable this property.
	Not available if an Acceleration or Jerk point is selected (EPI module only).
Scale Factor	Specifies how to convert pulse input signals into engineering units. For:
	• Pulses per second, set to 0.016667.
	• Pulses per minute, set to 1.0 (default).
	• Pulses per hour, set to 60.0
	Not available if an Acceleration or Jerk point is selected (EPI module only).

5 Continue to select tagnames and specify settings as needed.

- Press Shift and click to select multiple contiguous tagnames.
- Press Ctrl and click to select multiple non-contiguous tagnames.

6 Click OK to save your changes.

Configuring Trident or Tri-GP Communication Modules

This section explains how to configure Trident or Tri-GP communication modules (CM or CIM) for communication with external devices.

Note In addition to configuring ports on the communication module(s), you also need to configure the Trident or Tri-GP controller's network and/or serial connection to the TriStation PC, in order connect to the controller and download your application. For more information, see Chapter 6, Trident and Tri-GP Communication with TriStation 1131.

Topics include:

- Configuring the Trident 1.x Communication Module on page 390
- Configuring the Trident or Tri-GP 2.x/3.x Communication Module on page 394
- Configuring the Trident or Tri-GP 3.x Communications Integration Module on page 410

See Configuring Trident or Tri-GP Controller Printing on page 514 for instructions on configuring a Trident or Tri-GP communication module for use with a printer.

Configuring the Trident 1.x Communication Module

These procedures explain how to configure the network and serial ports on a CM installed in a Trident 1.x system. Topics include:

- Configuring Trident 1.x CM Network Ports on page 390
- Configuring Trident 1.x CM Serial Ports on page 392
- Configuring Trident 1.x CM Routing on page 393

Configuring Trident 1.x CM Network Ports

This procedure explains how to configure network ports on a Trident 1.x CM, which supports these connections:

- To a TriStation PC
- To a Peer-to-Peer network of Triconex controllers
- To an external device or network

Procedure

1 Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the CM, click Setup, and then click the Network tab.
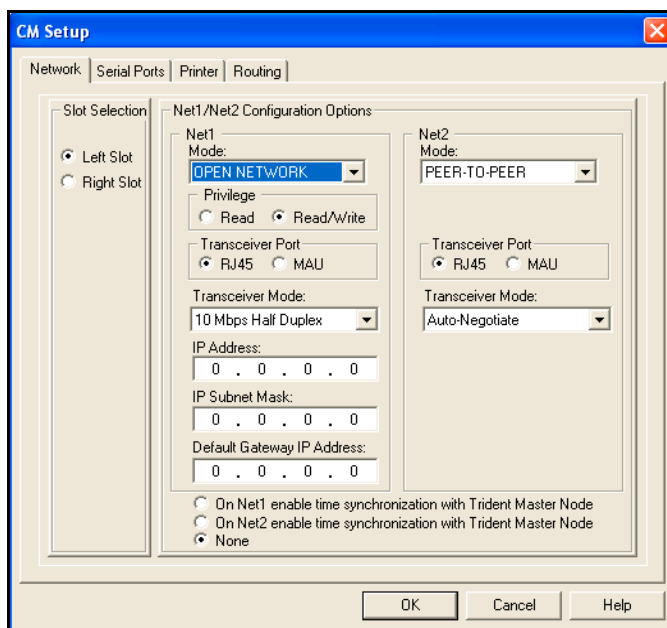
3   Specify these properties on the Network tab.

Property	Action
Slot Selection	Select the slot to be configured.
Mode	Select Open Network or Peer-to-Peer for either NET 1 or NET 2.
	You cannot use the same mode on both ports.
Privilege	Select Read to restrict access from external devices. Not available with Peer-to-Peer. The default is Read/Write.
Transceiver Port	Select the type of port used.
Transceiver Mode	Select the mode used. Not available with Peer-to-Peer.
IP Address	Enter the IP address of the controller. Not available with Peer-to-Peer.
IP Subnet Mask	Enter the subnet mask, if needed. Not available with Peer-to-Peer.
Default Gateway IP Address	Enter the default gateway, if needed. Not available with Peer-to-Peer.
Time Synchronization	Select to enable time synchronization on NET 1 or NET 2.

4   Click OK to save your changes.

Configuring Trident 1.x CM Serial Ports

This procedure explains how to configure serial ports on a Trident 1.x CM, which supports connections using Modbus slave, master, and master/slave protocols.

Procedure

1 Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the CM slot, click Setup, and then click the Serial Ports tab.
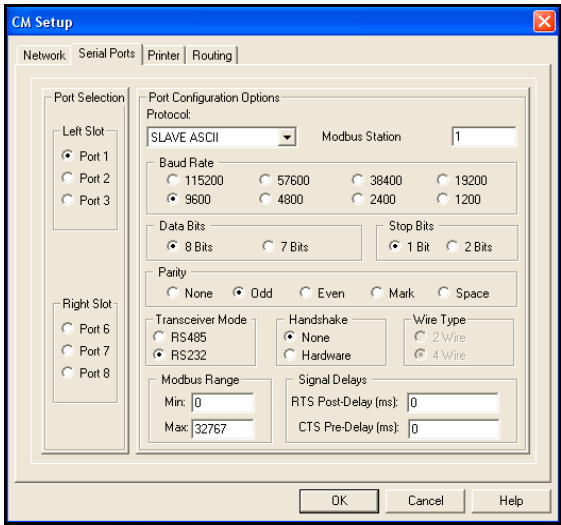
3 Specify these properties on the Serial Ports tab.

Property	Action
Port Selection	Select the port to be configured.
Protocol	Select the protocol to use.
Modbus Station	Enter the slave address of the serial port on the MP Baseplate. Not used with Master protocol. See Modbus Slave Address on page 655.
Baud Rate	Select the rate used in the installation.
Data Bits	Select 7 or 8 bits; only available with slave ASCII protocol. Set to 8 bits for all other protocols.
Stop Bits	Select 1 Bit or 2 Bits.
Parity	Select the parity option.
Transceiver Mode	Select RS-232 or RS-485, depending on the physical connection.
Handshake	Select Hardware to use signal delays to determine if the connection is valid.
Wire Type	Select 2 or 4 wire, depending on the installation.

Property	Action
Modbus (Minimum and Maximum) Range	Enter a minimum value (0 is default) and maximum value (32,767 is maximum). Only available with Modbus.
Signal Delays	Enter the number of milliseconds to adjust timing of the data transmission.

4 Click OK to save your changes.

Configuring Trident 1.x CM Routing

This procedure explains how to configure routing information for network communication on a Trident 1.x CM. This procedure is optional, depending on your network configuration. For more information, see your network administrator.

Procedure

1 Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the CM slot, click Setup, and then click the Routing tab.
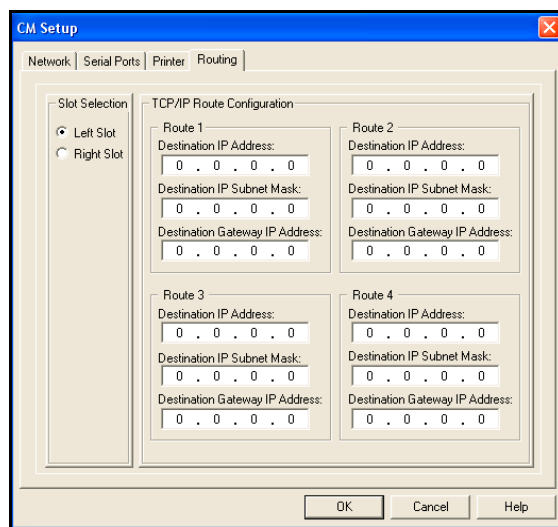
3 Specify these properties on the Routing tab.

Property	Action
Slot Selection	Select the slot to configure.
Destination Gateway IP Address	Enter the destination address.
Destination IP Subnet Mask	Enter the address for the subnet mask.
Default Gateway IP Address	Enter the address for the gateway.

4 Repeat for each route required on your network.

5 Click OK to save your changes.

Configuring the Trident or Tri-GP 2.x/3.x Communication Module

These procedures explain how to configure an enhanced CM installed in the following systems:

- Trident 2.x or 3.x
- Tri-GP 2.x or 3.x

Note   To configure a CM installed in a Trident 1.x system, see Configuring the Trident 1.x Communication Module on page 390. To configure a CIM installed in a Trident/Tri-GP 3.x system, see Configuring the Trident or Tri-GP 3.x Communications Integration Module on page 410.

A single Trident or Tri-GP 2.x/3.x controller supports a maximum of two CMs on one CM baseplate. For detailed CM installation guidelines, see the *Planning and Installation Guide* for your controller.

The following table lists the protocols supported by both the enhanced Trident CM (model 3201) and Tri-GP CM (model 3201S2) on network and serial ports.

Protocol or Standard	Network Ports	Serial Ports
TriStation	NET 1, NET 2	Port 3 only
TSAA (UDP/IP)	NET 1, NET 2	—[a]
TSAA with IP Multicast (UDP/IP)	NET 1, NET 2	—
Peer-to-Peer (UDP/IP)	NET 1, NET 2	—
Peer-to-Peer (DLC)	NET 1, NET 2	—
Modbus Slave (ASCII or RTU)	—	Any port
Modbus Master (RTU)	—	Any port
Modbus Master or Slave (TCP)	NET 1, NET 2	—
Triconex Time Synchronization via DLC	NET 1	—
Triconex Time Synchronization via UDP/IP	NET 1, NET 2	—
SNTP Triconex Time Synchronization	NET 1, NET 2	—
Network Printing using Jet Direct	NET 1, NET 2	—

a.   — means the protocol is not available on this port.

Note   While the preferred means for connecting the TriStation PC to the Trident or Tri-GP controller is via a network connection, Invensys recommends configuring a serial connection to the CM first, because it is less complex and easier to successfully connect to the CM through the serial port.

Once you have successfully connected to the CM and downloaded the initial configuration to the Trident, you can go back and configure the more complex network connection, without worrying about losing the ability to communicate with the controller altogether. See Connecting to the Trident or Tri-GP 2.x/3.x Controller for the First Time on page 483 for more information.

To configure specific types of CM ports, see these topics:

- Configuring Trident or Tri-GP 2.x/3.x CM Serial Ports on page 396
- Configuring Trident or Tri-GP 2.x/3.x CM Network Ports on page 398
- Configuring Trident or Tri-GP 2.x/3.x CM Peer-To-Peer Ports on page 400
- Configuring Trident or Tri-GP 2.x/3.x CM Modbus TCP Ports on page 403
- Configuring Trident or Tri-GP 2.x/3.x CM Routing on page 404
- Configuring Trident or Tri-GP 2.x/3.x CM Protocols on page 406

For additional information on configuring the CM, see these topics:

- Using a Trident or Tri-GP 2.x/3.x CM to Synchronize Time on page 432 for instructions on configuring the CM to synchronize time.
- Controlling Access to the CM or CIM on page 507 for instructions on controlling access to the CM on a per-client level.
- Configuring Trident or Tri-GP Controller Printing on page 514 for instructions on configuring the CM for use with a printer.

Exporting and Importing a Trident or Tri-GP 2.x/3.x CM Configuration

Once you have configured a Trident or Tri-GP 2.x/3.x CM, you can export its configuration to an XML file. This file can then be used to quickly configure other Trident or Tri-GP 2.x/3.x CMs by importing the saved configuration settings. For detailed instructions, see Exporting the Trident or Tri-GP 2.x/3.x CM Configuration to a File on page 408 and Importing the Trident or Tri-GP 2.x/3.x CM Configuration From a File on page 409.

Configuring Trident or Tri-GP 2.x/3.x CM Serial Ports

This procedure explains how to configure serial ports on a Trident or Tri-GP 2.x/3.x CM.

Procedure

1 Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the CM, and then click Setup. The CM Setup dialog box appears.

3 Click the Serial Ports tab.

4 Specify these properties.

Property	Action
Port Selection	Click the port to be configured. Ports can be configured only for a slot with an installed module.
Protocol	Select the communication protocol for the port: • All ports can use Modbus Master, Modbus Slave ASCII, or Modbus Slave RTU. • Only port 3 can use TriStation.
Port Write Enabled	Available only if Modbus Slave (ASCII or RTU) is selected as the communication protocol. Select this check box if you want to allow Modbus writes to this slave port. The default is cleared (the port is read-only).
Modbus Slave Address	If you selected Modbus Slave RTU or ASCII, enter the number of the Modbus slave device (1-247). The default is 1.

Property	Action
Baud Rate	Enter the communication rate for the port. The default is 9600.
	For a TriStation connection, the default is 115200 and cannot be changed.
Data Bits	Select 8 or 7 bits. The default is 8. Available only with Modbus Slave ASCII.
Stop Bits	Select 1 or 2 bits. The default is 1 bit.
Parity	Select the type of parity for the port. The default is Odd.
Transceiver Mode	Select RS-485 or RS-232. The default is RS-232. On port 3 when TriStation is selected as the protocol, RS-485 is not available.
Handshake	Select None or Hardware; the default is None.
Termination Options	Select the type of termination used with cables. Only available with RS-485 Transceiver Mode. The default is None.
FP Ordering	Select the order to be used with floating point numbers. Determines whether the most significant bits in a 32-bit address are the first 16 (high) or the last 16 (low). The default is Low 16 Bits First.
	Note: If you select Modbus Master as the communication protocol, this property is automatically set to High 16 Bits First and cannot be changed.
Modbus (Minimum and Maximum) Range	Enter the minimum and maximum values to be used for the Modbus data range. The default minimum is 0. The default maximum is 32,767.
Master Logical Port	Enter the port number that the CM will use in Modbus Master functions to access the port (1-15). Only available for Modbus Master.

5 Click OK to save your changes.

Configuring Trident or Tri-GP 2.x/3.x CM Network Ports

This procedure explains how to configure network ports on a Trident or Tri-GP 2.x/3.x CM.

Procedure

1 Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the CM, and then click Setup.

The CM Setup dialog box appears.

3 Specify these properties on the Network tab.

Property	Action
Slot Selection	Select the physical slot where the CM module you want to configure is installed, Left or Right.
	The CM baseplate can hold two CMs—one in the Left physical slot, and one in the Right physical slot. A CM can be configured in the Right slot only if a CM in the Left slot has already been configured.
	For more information about slot locations, see the *Planning and Installation Guide* for your controller.
	Note: If you have configured CMs in both the left and right slots, and you then uninstall the CM in the left slot, you will no longer be able to change the configuration of the CM installed in the right slot. You must re-install a CM in the left slot before you can modify the configuration of the CM in the right slot.
Not Installed, Installed	Click Installed to enable configuration of the module. Clicking Not Installed resets all options to their default state and makes them unavailable for configuration. The default is Not Installed.
Transceiver Mode	Select the communication mode.
	For NET 1, the default is 10 Mbps Half Duplex.
	For NET 2, the default is Auto-Negotiate.
IP Address	Enter the IP Address for the port. The addresses for NET 1 and NET 2 do not need to be unique.
	The default values are 0.0.0.0.
	Note: Your own IP addresses cannot be used for connecting to the controller until your application—with the IP address configuration—has been downloaded to the controller at least once, using the Download All command. See Connecting to the Trident or Tri-GP 2.x/3.x Controller for the First Time on page 483 for more information.
	The highest and lowest IP addresses in a subnet (addresses where the last number is 0 or 255, such as 192.168.55) are reserved for broadcast messaging and cannot be used as a valid IP address.
IP Subnet Mask	If needed, enter the IP address for the subnet. The default is 255.255.255.0.
Default Gateway IP Address	If needed, enter the IP address for the default gateway. The default is 0.0.0.0. Typically, this is the IP address of the network router.
	The default gateway address must be part of the subnet.

4   To configure the CM for operation behind a firewall, click Show Advanced Options and then specify the properties in the following table for NET 1 and NET 2.

Setting these properties restricts the ports that the CM can use for TCP connections to the specified range. This allows the CM to operate behind a firewall that has implemented port restrictions.

For most networks, the default settings should be sufficient. Invensys recommends that only advanced users change these settings.

Note   If these settings are misconfigured, Modbus TCP will be unable to connect. If this occurs, reset the values to the default settings to fix the problem and re-enable Modbus TCP. If you need to use this feature, please contact Invensys Global Customer Support for assistance with configuring these settings.

Property	Action
Lowest TCP Port Number	Enter the lowest TCP port number to use for an outgoing connection from the CM. Can be from 1024 to 65535. The default value is 49152. Applicable to Modbus/TCP ports.
Highest TCP Port Number	Enter the highest TCP port number to use for an outgoing connection from the CM. Can be from 1024 to 65535. The default value is 65535. Applicable to Modbus/TCP ports.

5   Click OK to save your changes.

Note   Changes to CM IP addresses are not in effect until the existing connection is closed and a new connection is opened. Once a connection is opened, it remains open until you close it, even if the IP address is changed via a download changes operation.

Configuring Trident or Tri-GP 2.x/3.x CM Peer-To-Peer Ports

This procedure explains how to configure the IP addresses for controllers communicating on a Peer-to-Peer network through a CM.

Procedure

1   Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2   Double-click the CM, and then click Setup.

The CM Setup dialog box appears.

3   Click the Peer-to-Peer tab.

4 Under Slot Selection, select the module (slot) you want to configure Peer-to-Peer ports for.

5 Select a node (controller), and specify these properties.

Property	Action
Destination UDP Port	Enter the UDP port number for each controller to be communicated with on the Peer-to-Peer network. This must be the same number that the controller uses as its UDP Base Port Number.
	The default is 1503. You should not need to change this setting unless the CM is located behind a firewall.
Network	Click the network port that the CM uses to communicate with the selected Peer-to-Peer node. The default is NET 1.
IP Address	Enter the IP address for the controller.

6 Click Update to save the new settings for the selected node.

If you forget to click Update before selecting another node, your settings will be lost.

7 Repeat steps 4 through 6 for each node to be included in the network.

Note If necessary, click Reset All to reset *all* node settings for the selected slot to their default, unconfigured state.

8 Once all nodes have been configured, specify these properties (applicable to all nodes on the Peer-to-Peer network).

Property	Action
UDP Base Port Number	For each network port, enter the UDP base port number for the controller. Enter 0 to disable Peer-to-Peer over UDP/IP on the network.
	The default is 1503 on both NET 1 and NET 2 (meaning Peer-to-Peer is enabled on both ports). UDP port numbers do not need to be unique, as long as the IP address for each port is unique. See UDP Base Port Number on page 730 for reserved values.
Enable Communication with Tricon V8, Tricon V9, and Trident v1 Peer-to-Peer Systems	Select the port—NET 1 or NET 2—on which you want to enable Peer-to-Peer communication with Tricon version 8 and 9 systems, and/or Trident version 1 systems. The default is None.
	Available only for a module installed in the left slot.

9 Click OK to save your changes.

Configuring Trident or Tri-GP 2.x/3.x CM Modbus TCP Ports

This procedure explains how to configure Modbus TCP ports on a CM, which enables Modbus communication through network ports.

Four ports are available for Modbus TCP communication.

Procedure

1   Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2   Double-click the CM, and then click Setup.

The CM Setup dialog box appears.

3   Click the Modbus TCP tab.

4   Under Slot Selection, select the module (slot) you want to configure Modbus TCP ports for.

5   Select a port and specify these properties.

Property	Action
Protocol	Select the communication protocol for the port. Options include Modbus TCP Master and Modbus TCP Slave Net.
Port Write Enabled	Available only if Modbus TCP Slave is selected as the communication protocol. Select this check box if you want to allow Modbus writes to this slave port. The default is cleared (the port is read-only).

Property	Action
Master Logical Port	Enter the number of the Modbus Master node (1-15). Available only with Modbus TCP Master protocol. Must be unique for each CM installed in a system.
TCP Port Number	Enter the number for the TCP port. The default is 502.
Network	Click the network that the selected port is connected to. The default is NET 2.
IP Address	If the port uses Modbus Master protocol, enter the IP address of the slave node. If the port uses Modbus Slave protocol, enter either of these: • To accept communication from any Modbus Master, leave the IP address as 0.0.0.0. • To accept communication only from a defined Modbus Master, enter the specific master IP address.
FP Ordering	Select the order to be used with floating point numbers. Determines whether the most significant bits in a 32-bit address are the first 16 (high) or the last 16 (low). The default is Low 16 Bits First. **Note:** If you select Modbus TCP Master as the communication protocol, this property is automatically set to High 16 Bits First and cannot be changed.
Modbus (Minimum and Maximum) Range	Enter the minimum and maximum values to be used for the Modbus data range. The default minimum is 0. The default maximum is 32,767. Available only with Modbus TCP Slave Net.

6   Click OK to save your changes.

Configuring Trident or Tri-GP 2.x/3.x CM Routing

This procedure explains how to configure routing on a CM. Up to 10 different routes can be configured for each network; each slot (module) has two networks (NET 1 and NET 2).

Procedure

1   Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2   Double-click the CM, and then click Setup.

The CM Setup dialog box appears.

3   Click the Routing tab.

4 Select the module (slot) you want to configure routing for.

5 Select the network (NET 1 or NET 2) you want to configure routing for.

6 Select a destination route and then specify these properties.

Property	Action
Destination Gateway IP Address	Enter the IP address which is used if the controller is not on the same subnet as other devices.
Destination IP Subnet Mask	Enter the IP address of the subnet mask. If the gateway address is on NET 2, then the subnet mask must be the same as the NET 2 subnet mask defined on the Network tab. If the gateway address is on NET 1, then the subnet mask must be the same as the NET 1 subnet mask defined on the Network tab. See Configuring Trident or Tri-GP 2.x/3.x CM Network Ports on page 398.
Default Gateway IP Address	Enter the IP address of the gateway to which the controller is connected. The gateway address must always be on NET 1 or NET 2.

7 Click Update Destination to apply the settings.

Note If necessary, click Reset All to change all destination settings for the selected slot to their default, unconfigured state.

8 Click OK to save your changes.

Configuring Trident or Tri-GP 2.x/3.x CM Protocols

This procedure explains how to configure the TSAA and TriStation protocols used for CM communication.

Procedure

1 Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the CM, and then click Setup.

The CM Setup dialog box appears.

3 Click the Protocols tab.
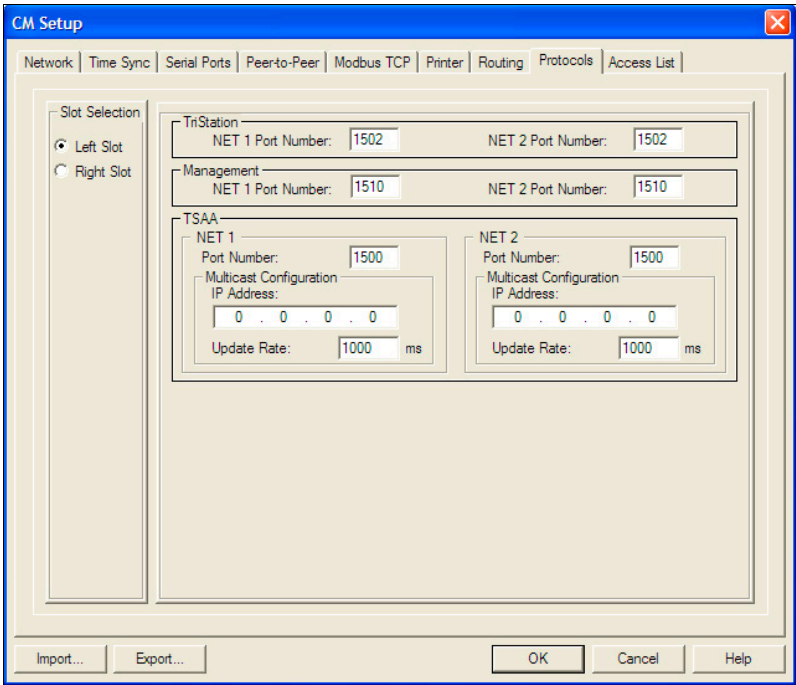
4 Select the module (slot) you want to configure protocols for.

5 Specify these properties for the protocol(s) you will be using with the CM.

Protocol	Property	Action
TriStation	TriStation Port Number	Enter the UDP port to use for TriStation connections on NET 1 and NET 2. The default for both ports is 1502.
		Cannot be the same as the Management or TSAA port numbers.
		See UDP Base Port Number on page 730 for additional information.

Protocol	Property	Action
Management	Management Port Number	Enter the UDP port to use for the Enhanced Diagnostic Monitor's connection to CM communication status information on NET 1 and NET 2. The default for both ports is 1510.
		This must be the same value as the Management UDP Port Number property in the Enhanced Diagnostic Monitor's Network Configuration dialog box.
		Cannot be the same as the TriStation or TSAA port numbers.
		For more information, see the *Enhanced Diagnostic Monitor User's Guide*.
TSAA	TSAA Port Number	Enter the UDP port to use for TSAA connections, including DDE Server and SOE Recorder, on NET 1 and NET 2. The default for both ports is 1500.
		Cannot be the same as the TriStation or Management port numbers.
		A value of 0 indicates that TSAA communication is disabled on that port. See UDP Base Port Number on page 730 for additional information.
	TSAA Multicast IP Address	Enter the IP address that TSAA multicasts should be sent to. The default is 0.0.0.0 (IP multicasting is disabled).
		Bin data and/or SOE data available messages will be sent to the specified address, so that all members of the group will receive the data.
		Note: To use TSAA multicasting, your network hardware (such as routers) must also support multicasting. See your Network Administrator or IT department for more information.
	Multicast Update Rate	Enter the update rate, in milliseconds, for TSAA IP multicasting. Can be from 250 to 2,000. The default value is 1,000.
		Bin data and/or SOE data available messages will be sent to the multicast IP address at the specified update rate (for example, by default, bin data will be multicast every 1,000ms).

6 Click OK to save your changes.

CAUTION

By default, TSAA clients have write access to the NET 1 and NET 2 ports on the Trident or Tri-GP 2.x/3.x CM. Depending on your configuration, this may create a security issue.

To disable write access by TSAA clients, you **must** enable and configure the CM access control list. See Controlling Access to the CM or CIM on page 507.

Exporting the Trident or Tri-GP 2.x/3.x CM Configuration to a File

Once CM configuration is complete, you may want to export it to an XML file. Not only does this provide a backup of your configuration settings, it also allows you to import the settings to other Trident or Tri-GP 2.x/3.x CMs, saving time and effort, and ensuring that all CMs in a system have the same configuration. Invensys technical support may also ask for an exported configuration file to assist in troubleshooting CM problems.

Note   An exported CM configuration file cannot be modified outside of TriStation 1131. If the XML file is changed after export, you will be unable to import it into TriStation 1131.

Procedure

1   Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2   Double-click the CM, and then click Setup.

The CM Setup dialog box appears.
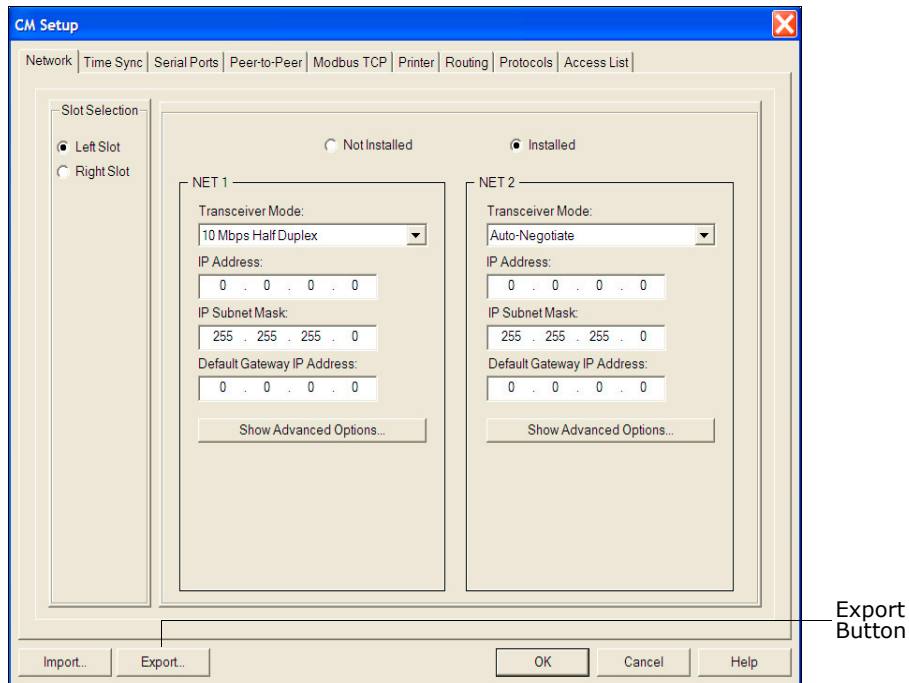
3   Click Export.

If the CM configuration has been changed, but not saved, you are asked if you want to include the unsaved changes in the exported file.

4   Navigate to the folder you want to save the exported configuration file in, enter a file name, and click Save.

Note   A CM configuration file exported from a CM installed in a Trident or Tri-GP 2.x/3.x system cannot be imported to a CM installed in a Trident 1.x system.

Importing the Trident or Tri-GP 2.x/3.x CM Configuration From a File

If you have already configured a Trident or Tri-GP 2.x/3.x CM, and exported the configuration to a file, you can import the saved configuration to another Trident or Tri-GP 2.x/3.x CM.

Once the import is complete, you should review the CM configuration to ensure that all settings have been correctly configured for your implementation.

Procedure

1 Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the CM, and then click Setup.

   The CM Setup dialog box appears.

3 Click Import.

   If the CM configuration has been changed, but not yet saved, you are asked if you want to overwrite the existing configuration, including the unsaved changes, with the imported settings.
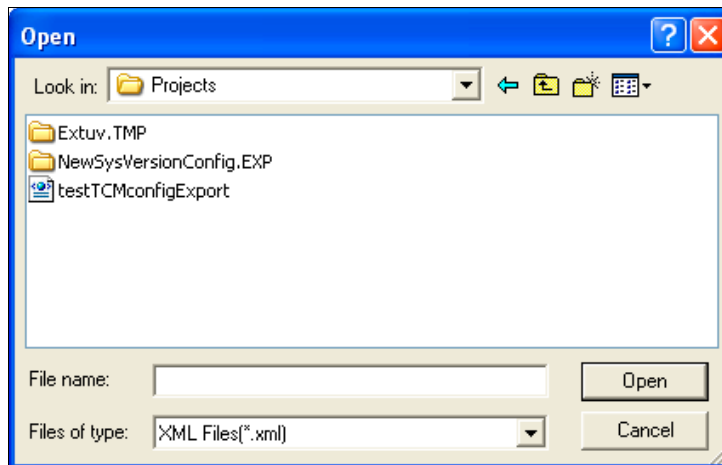
4 Navigate to the folder where the exported configuration file is located, and click Open.

   CM configuration settings are imported from the selected file.

5 Click each tab of the CM Setup dialog box to review and verify that all settings have been correctly configured.

6 Click OK to save your changes.

Configuring the Trident or Tri-GP 3.x Communications Integration Module

These procedures explain how to configure a CIM installed in a Trident or Tri-GP 3.x system.

A single Trident or Tri-GP 3.x controller supports a maximum of two CIMs on one CIM baseplate. For detailed CIM installation guidelines, see the *Planning and Installation Guide* for your controller.

The following table lists the protocols supported by both the Trident CIM (model 3211) and Tri-GP CIM (model 3211S2) on network and serial ports.

Protocol or Standard	Network Ports	Serial Ports
TriStation	NET 1, NET 2	Port 3 only
TSAA (UDP/IP)	NET 1, NET 2	—[a]
TSAA with IP Multicast (UDP/IP)	NET 1, NET 2	—
Peer-to-Peer (UDP/IP)	NET 1, NET 2	—
Embedded OPC UA Server	NET 1, NET 2	—
Modbus Slave (ASCII or RTU)	—	Any port
Modbus Master (RTU)	—	Any port
Modbus Master or Slave (TCP)	NET 1, NET 2	—
Triconex Time Synchronization via UDP/IP	NET 1, NET 2	—
SNTP Triconex Time Synchronization	NET 1, NET 2	—
Network Printing using Jet Direct	NET 1, NET 2	—

a.   — means the protocol is not available on this port.

Note   While the preferred means for connecting the TriStation PC to the Trident or Tri-GP controller is via a network connection, Invensys recommends configuring a serial connection to the CIM first, because it is less complex and easier to successfully connect to the CIM through the serial port.

Once you have successfully connected to the CIM and downloaded the initial configuration to the controller, you can go back and configure the more complex network connection, without worrying about losing the ability to communicate with the controller altogether. See for more information.

To configure specific types of CIM ports, see these topics:

- Configuring Trident or Tri-GP 3.x CIM Serial Ports on page 412
- Configuring Trident or Tri-GP 3.x CIM Network Ports on page 414
- Configuring Trident or Tri-GP 3.x CIM Peer-To-Peer Ports on page 417
- Configuring Trident or Tri-GP 3.x CIM Modbus TCP Ports on page 419
- Configuring Trident or Tri-GP 3.x CIM Routing on page 421
- Configuring Trident or Tri-GP 3.x CIM Protocols on page 423
- Configuring the Trident or Tri-GP 3.x CIM OPC UA Server on page 425

For additional information on configuring the CIM, see these topics:

- Using a Trident or Tri-GP 3.x CIM to Synchronize Time on page 437 for instructions on configuring the CIM to synchronize time.
- Controlling Access to the CM or CIM on page 507 for instructions on controlling access to the CIM on a per-client level.
- Configuring Trident or Tri-GP Controller Printing on page 514 for instructions on configuring the CM for use with a printer.

Exporting and Importing a Trident or Tri-GP 3.x CIM Configuration

Once you have configured a Trident or Tri-GP 3.x CIM, you can export its configuration to an XML file. This file can then be used to quickly configure other CIMs by importing the saved configuration settings. For detailed instructions, see Exporting the Trident or Tri-GP 3.x CIM Configuration to a File on page 428 and Importing the Trident or Tri-GP 3.x CIM Configuration From a File on page 429.

Configuring Trident or Tri-GP 3.x CIM Serial Ports

This procedure explains how to configure serial ports on a Trident or Tri-GP 3.x CIM.

Procedure

1 Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the CIM, and then click Setup. The CIM Setup dialog box appears.

3 Click the Serial Ports tab.

4 Specify these properties.

Property	Action
Port Selection	Click the port to be configured. Ports can be configured only for a slot with an installed module.
Protocol	Select the communication protocol for the port: • All ports can use Modbus Master, Modbus Slave ASCII, or Modbus Slave RTU. • Only port 3 can use TriStation.

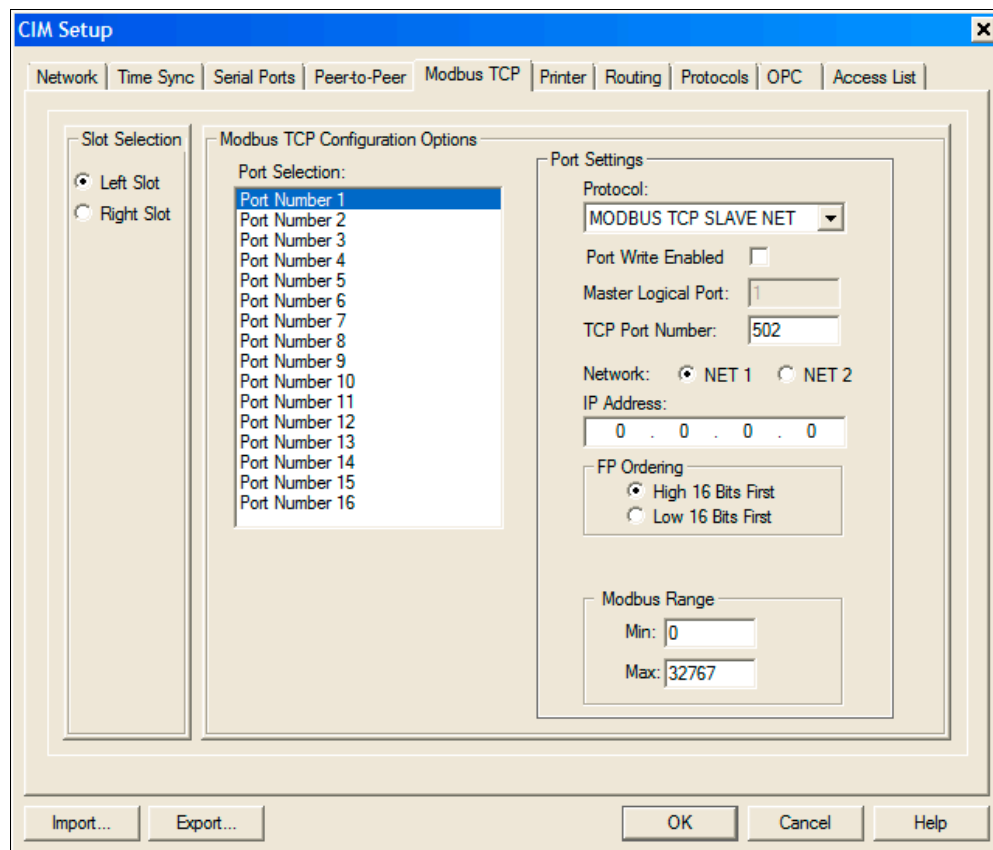| Property	Action
Port Write Enabled	Available only if Modbus Slave (ASCII or RTU) is selected as the communication protocol. Select this check box if you want to allow Modbus writes to this slave port. The default is cleared (the port is read-only).
Modbus Slave Address	If you selected Modbus Slave RTU or ASCII, enter the number of the Modbus slave device (1-247). The default is 1.
Baud Rate	Enter the communication rate for the port. The default is 9600. For a TriStation connection, the default is 115200 and cannot be changed.
Data Bits	Select 8 or 7 bits. The default is 8. Available only with Modbus Slave ASCII.
Stop Bits	Select 1 or 2 bits. The default is 1 bit.
Parity	Select the type of parity for the port. The default is Odd.
Transceiver Mode	Select RS-485 or RS-232. The default is RS-232. On port 3 when TriStation is selected as the protocol, RS-485 is not available.
Handshake	Select None or Hardware; the default is None.
Termination Options	Select the type of termination used with cables. Only available with RS-485 Transceiver Mode. The default is None.
FP Ordering	Select the order to be used with floating point numbers. Determines whether the most significant bits in a 32-bit address are the first 16 (high) or the last 16 (low). The default is Low 16 Bits First. Note: If you select Modbus Master as the communication protocol, this property is automatically set to High 16 Bits First and cannot be changed.
Modbus (Minimum and Maximum) Range	Enter the minimum and maximum values to be used for the Modbus data range. The default minimum is 0. The default maximum is 32,767.
Master Logical Port	Enter the port number that the CIM will use in Modbus Master functions to access the port (1-15). Only available for Modbus Master.

5   Click OK to save your changes.

Configuring Trident or Tri-GP 3.x CIM Network Ports

This procedure explains how to configure network ports on a Trident or Tri-GP 3.x CIM.

CAUTION

Changing any of the following properties, and then performing a download operation, will cause the CIM's OPC UA server to temporarily cease communication and restart::

- The CIM's IP address (CIM Setup > Network tab)
- The CIM's subnet mask (CIM Setup > Network tab)
- The network port the OPC UA server is configured to use (CIM Setup > OPC tab)
- The OPC UA server's TCP Port Number (CIM Setup > OPC tab)
- The OPC UA server's Alarms SOE Block Number (CIM Setup > OPC tab)

Procedure

1 Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the CIM, and then click Setup.

The CIM Setup dialog box appears.

3 Specify these properties on the Network tab.

Property	Action
Slot Selection	Select the physical slot where the CIM module you want to configure is installed, Left or Right.
	The CIM baseplate can hold two CIMs—one in the Left physical slot, and one in the Right physical slot. A CIM can be configured in the Right slot only if a CIM in the Left slot has already been configured.
	For more information about slot locations, see the *Planning and Installation Guide* for your controller.
	Note: If you have configured CIMs in both the left and right slots, and you then uninstall the CIM in the left slot, you will no longer be able to change the configuration of the CIM installed in the right slot. You must re-install a CIM in the left slot before you can modify the configuration of the CIM in the right slot.
Not Installed, Installed	Click Installed to enable configuration of the module. Clicking Not Installed resets all options to their default state and makes them unavailable for configuration. The default is Not Installed.
Transceiver Mode	Select the communication mode.
	For NET 1 and NET 2, the default is Auto-Negotiate.
IP Address	Enter the IP Address for the port. The addresses for NET 1 and NET 2 do not need to be unique.
	The default values are 0.0.0.0.
	Note: Your own IP addresses cannot be used for connecting to the controller until your application—with the IP address configuration—has been downloaded to the controller at least once, using the Download All command. See Connecting to the Trident or Tri-GP 2.x/3.x Controller for the First Time on page 483 for more information.
	The highest and lowest IP addresses in a subnet (addresses where the last number is 0 or 255, such as 192.168.55) are reserved for broadcast messaging and cannot be used as a valid IP address.
IP Subnet Mask	If needed, enter the IP address for the subnet. The default is 255.255.255.0.
Default Gateway IP Address	If needed, enter the IP address for the default gateway. The default is 0.0.0.0. Typically, this is the IP address of the network router.
	The default gateway address must be part of the subnet.

4 To configure the CIM for operation behind a firewall, specify the properties in the following table for NET 1 and NET 2.

Property	Action
Lowest TCP Port Number	Enter the lowest TCP port number to use for an outgoing connection from the CIM. Can be from 1024 to 65535. The default value is 49152. Applicable to Modbus/TCP ports.
Highest TCP Port Number	Enter the highest TCP port number to use for an outgoing connection from the CIM. Can be from 1024 to 65535. The default value is 65535. Applicable to Modbus/TCP ports.

Setting these properties restricts the ports that the CIM can use for TCP connections to the specified range. This allows the CIM to operate behind a firewall that has implemented port restrictions.

For most networks, the default settings should be sufficient. Invensys recommends that only advanced users change these settings.

Note   If these settings are misconfigured, Modbus TCP will be unable to connect. If this occurs, reset the values to the default settings to fix the problem and re-enable Modbus TCP. If you need to use this feature, please contact Invensys Global Customer Support for assistance with configuring these settings.

5   Click OK to save your changes.

Note   Changes to CIM IP addresses are not in effect until the existing connection is closed and a new connection is opened. Once a connection is opened, it remains open until you close it, even if the IP address is changed via a download changes operation.

Configuring Trident or Tri-GP 3.x CIM Peer-To-Peer Ports

This procedure explains how to configure the IP addresses for controllers communicating on a Peer-to-Peer network through a CIM.

Procedure

1 Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the CIM, and then click Setup.

The CIM Setup dialog box appears.

3 Click the Peer-to-Peer tab.

4 Under Slot Selection, select the module (slot) you want to configure Peer-to-Peer ports for.

5 Select a node (controller), and specify these properties.

Property	Action
Destination UDP Port	Enter the UDP port number for each controller to be communicated with on the Peer-to-Peer network. This must be the same number that the controller uses as its UDP Base Port Number.
	The default is 1503. You should not need to change this setting unless the CIM is located behind a firewall.

Property	Action
Network	Click the network port that the CIM uses to communicate with the selected Peer-to-Peer node. The default is NET 1.
IP Address	Enter the IP address for the controller.

6 Click Update to save the new settings for the selected node.

If you forget to click Update before selecting another node, your settings will be lost.

7 Repeat steps 4 through 6 for each node to be included in the network.

> **Note** If necessary, click Reset All to reset *all* node settings for the selected slot to their default, unconfigured state.

8 Once all nodes have been configured, specify this property (applicable to all nodes on the
Peer-to-Peer network).

Property	Action
UDP Base Port Number	For each network port, enter the UDP base port number for the controller. Enter 0 to disable Peer-to-Peer over UDP/IP on the network.
	The default is 1503 on both NET 1 and NET 2 (meaning Peer-to-Peer is enabled on both ports). UDP port numbers do not need to be unique, as long as the IP address for each port is unique. See UDP Base Port Number on page 730 for reserved values.

9 Click OK to save your changes.

Configuring Trident or Tri-GP 3.x CIM Modbus TCP Ports

This procedure explains how to configure Modbus TCP ports on a CIM, which enables Modbus communication through network ports. Sixteen ports are available for Modbus TCP communication.

Procedure

1   Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2   Double-click the CM, and then click Setup.

The CIM Setup dialog box appears.

3   Click the Modbus TCP tab.

4   Under Slot Selection, select the module (slot) you want to configure Modbus TCP ports for.

5   Select a port and specify these properties.

Property	Action
Protocol	Select the communication protocol for the port. Options include Modbus TCP Master and Modbus TCP Slave Net.

Property	Action
Port Write Enabled	Available only if Modbus TCP Slave is selected as the communication protocol. Select this check box if you want to allow Modbus writes to this slave port. The default is cleared (the port is read-only).
Master Logical Port	Enter the number of the Modbus Master node (1-15). Available only with Modbus TCP Master protocol. Must be unique for each CIM installed in a system.
TCP Port Number	Enter the number for the TCP port. The default is 502.
Network	Click the network that the selected port is connected to. The default is NET 2.
IP Address	If the port uses Modbus Master protocol, enter the IP address of the slave node. If the port uses Modbus Slave protocol, enter either of these: • To accept communication from any Modbus Master, leave the IP address as 0.0.0.0. • To accept communication only from a defined Modbus Master, enter the specific master IP address.
FP Ordering	Select the order to be used with floating point numbers. Determines whether the most significant bits in a 32-bit address are the first 16 (high) or the last 16 (low). The default is Low 16 Bits First. **Note:** If you select Modbus TCP Master as the communication protocol, this property is automatically set to High 16 Bits First and cannot be changed.
Modbus (Minimum and Maximum) Range	Enter the minimum and maximum values to be used for the Modbus data range. The default minimum is 0. The default maximum is 32,767. Available only with Modbus TCP Slave Net.

6   Click OK to save your changes.

Configuring Trident or Tri-GP 3.x CIM Routing

This procedure explains how to configure routing on a CIM. Up to 10 different routes can be configured for each network; each slot (module) has two networks (NET 1 and NET 2).

Procedure

1 Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the CIM, and then click Setup.

The CIM Setup dialog box appears.

3 Click the Routing tab.

4 Select the module (slot) you want to configure routing for.

5 Select the network (NET 1 or NET 2) you want to configure routing for.

6 Select a destination route and then specify these properties.

Property	Action
Destination Gateway IP Address	Enter the IP address which is used if the controller is not on the same subnet as other devices.

Property	Action
Destination IP Subnet Mask	Enter the IP address of the subnet mask. If the gateway address is on NET 2, then the subnet mask must be the same as the NET 2 subnet mask defined on the Network tab. If the gateway address is on NET 1, then the subnet mask must be the same as the NET 1 subnet mask defined on the Network tab. See Configuring Trident or Tri-GP 3.x CIM Network Ports on page 414.
Default Gateway IP Address	Enter the IP address of the gateway to which the controller is connected. The gateway address must always be on NET 1 or NET 2.

7   Click Update Destination to apply the settings.

   Note   If necessary, click Reset All to change all destination settings for the selected slot to their default, unconfigured state.

8   Click OK to save your changes.

Configuring Trident or Tri-GP 3.x CIM Protocols

This procedure explains how to configure the TSAA and TriStation protocols used for CIM communication.

Procedure

1 Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the CIM, and then click Setup.

The CIM Setup dialog box appears.

3 Click the Protocols tab.
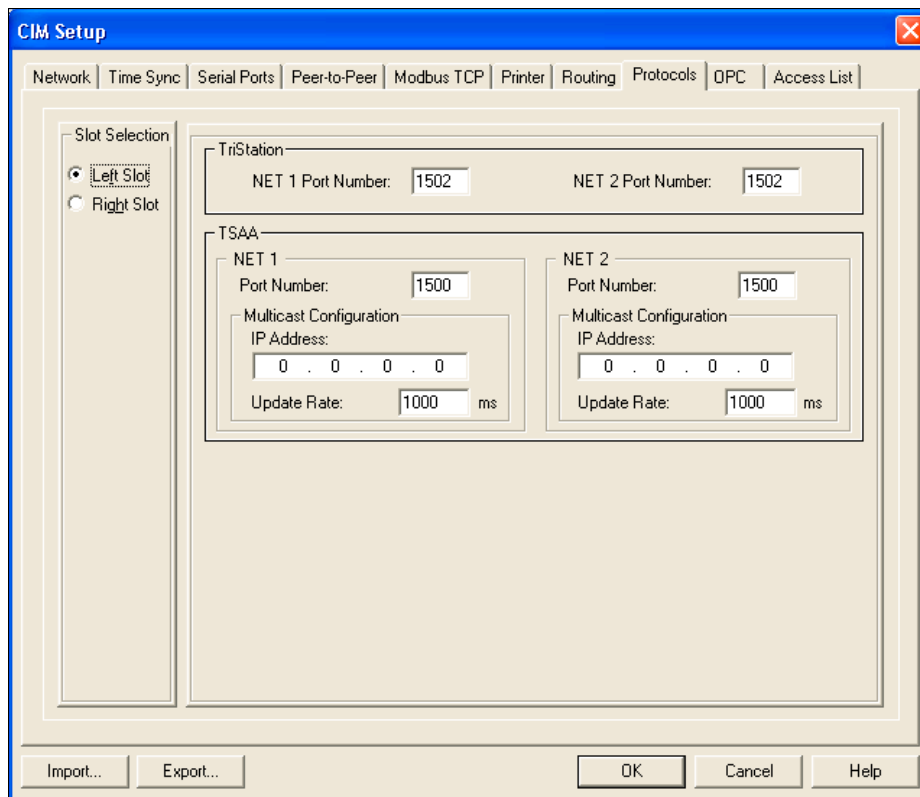
4 Select the module (slot) you want to configure protocols for.

5 Specify these properties for the protocol(s) you will be using with the CIM.

Protocol	Property	Action
TriStation	TriStation Port Number	Enter the UDP port to use for TriStation connections on NET 1 and NET 2. The default for both ports is 1502.
		Cannot be the same as the Management or TSAA port numbers.
		See UDP Base Port Number on page 730 for additional information.

Protocol	Property	Action
TSAA	TSAA Port Number	Enter the UDP port to use for TSAA connections, including DDE Server and SOE Recorder, on NET 1 and NET 2. The default for both ports is 1500.
		Cannot be the same as the TriStation or Management port numbers.
		A value of 0 indicates that TSAA communication is disabled on that port. See UDP Base Port Number on page 730 for additional information.
	TSAA Multicast IP Address	Enter the IP address that TSAA multicasts should be sent to. The default is 0.0.0.0 (IP multicasting is disabled).
		Bin data and/or SOE data available messages will be sent to the specified address, so that all members of the group will receive the data.
		Note: To use TSAA multicasting, your network hardware (such as routers) must also support multicasting. See your Network Administrator or IT department for more information.
	Multicast Update Rate	Enter the update rate, in milliseconds, for TSAA IP multicasting. Can be from 250 to 2,000. The default value is 1,000.
		Bin data and/or SOE data available messages will be sent to the multicast IP address at the specified update rate (for example, by default, bin data will be multicast every 1,000ms).

6   Click OK to save your changes.

CAUTION   By default, TSAA clients have write access to the NET 1 and NET 2 ports on the CIM. Depending on your configuration, this may create a security issue.

To disable write access by TSAA clients, you **must** enable and configure the CIM access control list. See Controlling Access to the CM or CIM on page 507.

Configuring the Trident or Tri-GP 3.x CIM OPC UA Server

This procedure explains how to configure the CIM's OPC UA server.

CAUTION

Changing any of the following properties, and then performing a download operation, will cause the CIM's OPC UA server to temporarily cease communication and restart:

- The CIM's IP address (CIM Setup > Network tab)
- The CIM's subnet mask (CIM Setup > Network tab)
- The network port the OPC UA server is configured to use (CIM Setup > OPC tab)
- The OPC UA server's TCP Port Number (CIM Setup > OPC tab)
- The OPC UA server's Alarms SOE Block Number (CIM Setup > OPC tab)

Procedure

1   Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2   Double-click the CIM, and then click Setup.

    The CIM Setup dialog box appears.

3   Click the OPC tab.

4 Select the module (slot) you want to configure the OPC UA server for.

5 Specify these properties.

Section	Property	Action
OPC	Allow Unsecured Session	Select this check box if you want to allow OPC UA clients to connect to the CIM OPC UA server without a certificate (an unsecured session). If this check box is not selected, OPC UA clients will be allowed to connect only with a certificate (a secured session). The default is cleared (only secured sessions are allowed).
Enable Communication with CIM	Network	Click the network port that the CIM uses to communicate with OPC UA clients. The default is None (OPC UA communication is disabled).
	TCP Port Number	Enter the TCP port to use for OPC UA connections on NET 1 or NET 2. The default for both ports is 4840.
SOE	SOE Block Number	Enter the SOE block number used when events are retrieved by an OPC UA client. Can be from 0 to 14. The default value is 0 (not configured). Must be unique for each CIM installed in a system. The SOE block number entered here must have a block type of EXTERNAL (see A Note About Using OPC to Collect SOE Events on page 256).
	Alarms SOE Block Number	Enter the SOE block number used when alarm events are retrieved by an OPC UA client. Can be from 0 to 14. The default value is 0 (alarms are not configured). Must be unique for each CIM installed in a system. The SOE block number entered here must have a block type of OPC (see A Note About Using OPC to Collect SOE Events on page 256). **Note:** If you have alarms configured in your application (see Alarms on page 200) you **must** enter an SOE block number. You cannot use the default value of 0.
	SOE Severity	Enter the severity (priority) level for SOE events (state changes obtained from the SOE block). Can be from 1 to 1,000. The default value is 500.

Section	Property	Action
System Events Severity	Info Severity	Severity levels identify the urgency of an event.
		Enter a number to represent the severity level for informational system events. Can be from 1 (lowest) to 1,000 (highest). Enter 0 if you do not want the CIM to send notifications of informational system events to OPC UA clients.
		The default value is 100.
	Minor Severity	Enter a number to represent the severity level for minor system events. Can be from 1 (lowest) to 1,000 (highest). Enter 0 if you do not want the CIM to send notifications of minor system events to OPC UA clients.
		The default value is 300.
	Major Severity	Enter a number to represent the severity level for major system events. Can be from 1 (lowest) to 1000 (highest). Enter 0 if you do not want the CIM to send notifications of major system events to OPC UA clients.
		The default value is 500.
	Fatal Severity	Enter a number to represent the severity level for fatal system events. Can be from 1 (lowest) to 1000 (highest). Enter 0 if you do not want the CIM to send notifications of fatal system events to OPC UA clients.
		The default value is 700.
	Output Voter Severity	Enter a number to represent the severity level for output voter events. Can be from 1 (lowest) to 1000 (highest). Enter 0 if you do not want the CIM to send notifications of output voter events to OPC UA clients.
		The default value is 900.
	Disable All	Click to prevent the CIM from sending system event notifications to OPC UA clients. Sets the severity levels for all system event types to 0.
	Reset All	Click to reset all OPC UA severity levels to their default values.

6 Click OK to save your changes.

CAUTION

By default, OPC UA clients have write access to the NET 1 and NET 2 ports on the CIM. Depending on your configuration, this may create a security issue.

To disable write access by OPC UA clients, you **must** enable and configure the CIM access control list. See Controlling Access to the CM or CIM on page 507.

Exporting the Trident or Tri-GP 3.x CIM Configuration to a File

Once CIM configuration is complete, you may want to export it to an XML file. Not only does this provide a backup of your configuration settings, it also allows you to import the settings to other CIMs, saving time and effort, and ensuring that all CIMs in a system have the same configuration. Invensys technical support may also ask for an exported configuration file to assist in troubleshooting CIM problems.

Note An exported CIM configuration file cannot be modified outside of TriStation 1131. If the XML file is changed after export, you will be unable to import it into TriStation 1131.
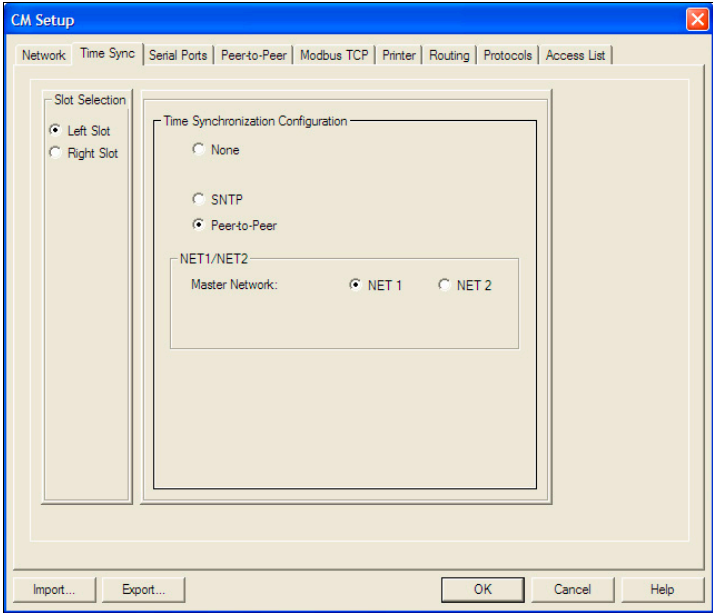
Procedure

1 Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the CIM, and then click Setup.

The CIM Setup dialog box appears.

Export Button
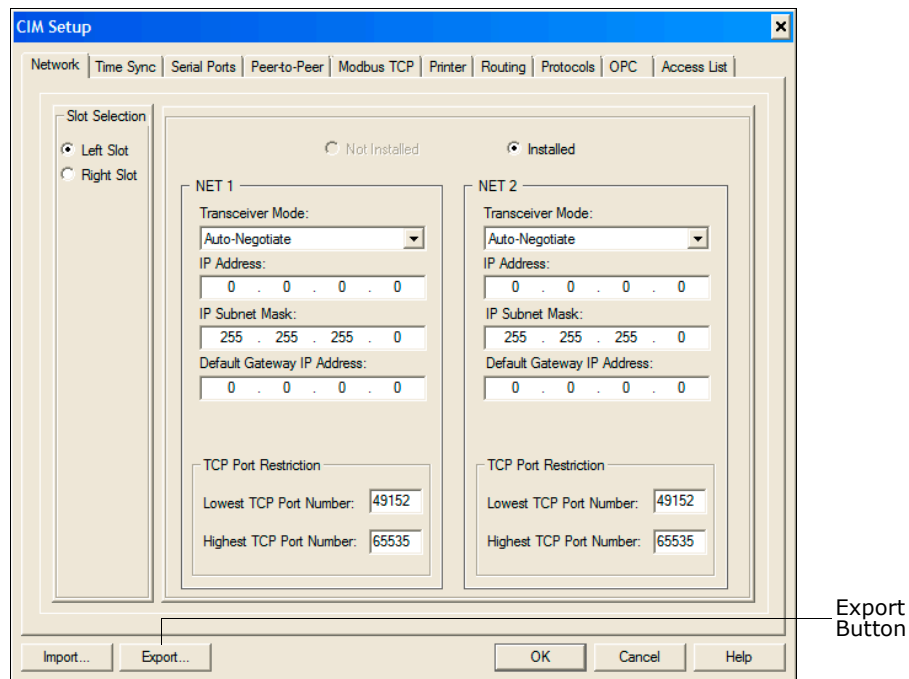
3 Click Export.

If the CIM configuration has been changed, but not saved, you are asked if you want to include the unsaved changes in the exported file.

4 Navigate to the folder you want to save the exported configuration file in, enter a file name, and click Save.

Importing the Trident or Tri-GP 3.x CIM Configuration From a File

If you have already configured a Trident or Tri-GP 3.x CIM, and exported the configuration to a file, you can import the saved configuration to another CIM.

Once the import is complete, you should review the CIM configuration to ensure that all settings have been correctly configured for your implementation.

Procedure

1. Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2. Double-click the CIM, and then click Setup.

    The CIM Setup dialog box appears.

3. Click Import.

    If the CIM configuration has been changed, but not yet saved, you are asked if you want to overwrite the existing configuration, including the unsaved changes, with the imported settings.
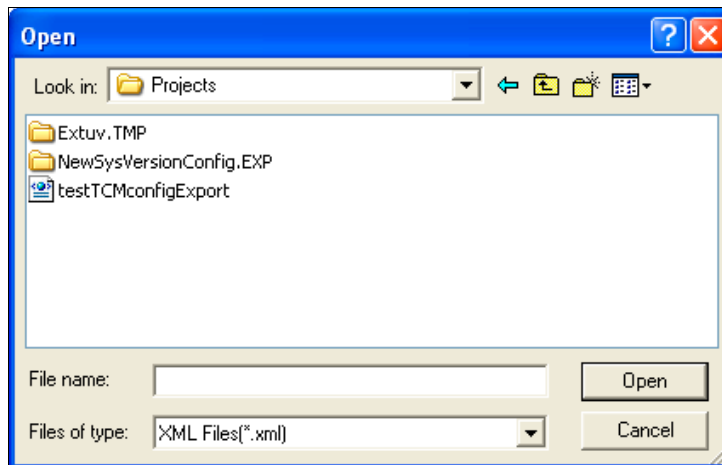
4. Navigate to the folder where the exported configuration file is located, and click Open.

    CIM configuration settings are imported from the selected file.

5. Click each tab of the CIM Setup dialog box to review and verify that all settings have been correctly configured.

6. Click OK to save your changes.

Configuring Trident or Tri-GP Time Synchronization

This section explains how to use the Time Synchronization communication protocol with Trident or Tri-GP controllers. Time synchronization enables a network of Triconex controllers to synchronize time with each other or with external devices, such as a DCS.

Topics include:

About Trident and Tri-GP Time Synchronization

This table summarizes the ways Trident or Tri-GP controller time can be synchronized to an external device or to the master node in a Peer-to-Peer network.

Table 39   Trident and Tri-GP Time Synchronization

Module	Time Synchronization Feature
CM (Trident 1.x)	• To an OPC client. For more information, see the *Communication Guide for Trident Systems*. • By writing aliased data to the TIMESET or TIMEADJ function blocks in a TriStation 1131 application. For assistance with the specialized programming that is required, contact Technical Support. • To the Trident master node in a Peer-to-Peer network.
CM (Trident and Tri-GP 2.x/3.x)	All of the 1.x CM capabilities, plus: • To SNTP. • To the Tricon, Trident, or Tri-GP master node in a Peer-to-Peer network (Triconex Time Synchronization).
CIM (Trident and Tri-GP 3.x)	All of the 2.x/3.x CM capabilities.
MP	By writing aliased data to the TIMESET or TIMEADJ function blocks in a TriStation 1131 application. For assistance with the specialized programming that is required, contact Technical Support.

Using a Trident 1.x CM to Synchronize Time

This procedure explains how to use a Trident 1.x CM to synchronize Trident controllers to the master node in a Peer-to-Peer network.

Procedure

1 Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the CM slot, click Setup, and then click the Network tab.
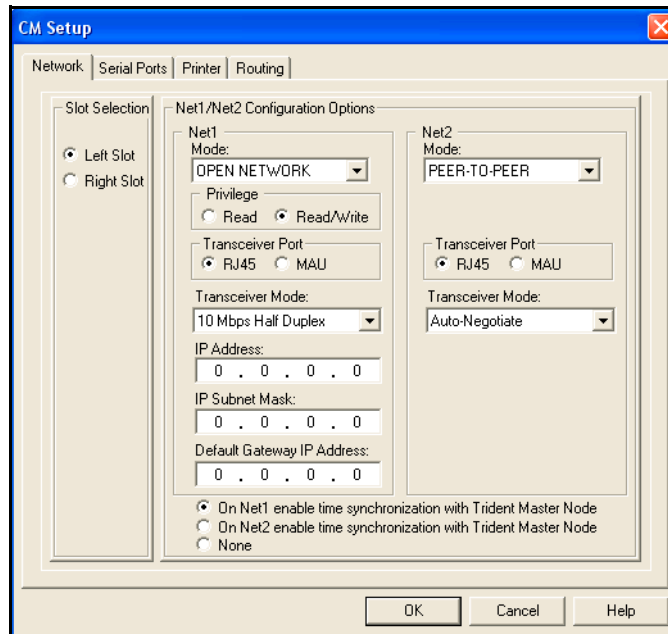
3 Select one of the following:

- On NET 1 Enable Time Synchronization with Trident Master Node
- On NET 2 Enable Time Synchronization with Trident Master Node

4 Click OK to save your changes.

Using a Trident or Tri-GP 2.x/3.x CM to Synchronize Time

The information in this section explains how to enable time synchronization on a Trident or Tri-GP 2.x/3.x CM. Time synchronization can be enabled using the following protocols:

- SNTP
- Triconex Time Synchronization via DLC (NET 1 only) or UDP/IP (NET 1 or NET 2) on a Peer-to-Peer network

In a redundant network of Trident or Tri-GP controllers that each have two CMs installed, you can implement redundant time synchronization by configuring time synchronization for both CM modules (both left and right slots). Time synchronization can be enabled only for a single logical slot.

Note   **The information and procedures in this section apply only to Trident or Tri-GP 2.x/3.x CMs**. If you are configuring a Trident 1.x CM, please see Using a Trident 1.x CM to Synchronize Time on page 431. If you are configuring a CIM, see Using a Trident or Tri-GP 3.x CIM to Synchronize Time on page 437.

Topics include:

- Configuring SNTP Time Synchronization on the Trident or Tri-GP 2.x/3.x CM on page 433
- Configuring Triconex Time Synchronization on the Trident or Tri-GP 2.x/3.x CM on page 435

Configuring SNTP Time Synchronization on the Trident or Tri-GP 2.x/3.x CM

This procedure explains how to configure Trident or Tri-GP 2.x/3.x CM time synchronization to an SNTP server.

If the CM is in a Peer-to-Peer network, it can also be used as the master node for time synchronization of other controllers on the network. In this configuration, the master node CM synchronizes time with the SNTP server, and any slave nodes on the Peer-to-Peer network synchronize their time with the master CM. In this way, all nodes on the Peer-to-Peer network are synchronized with SNTP time.

If the CM is acting as a slave node on a Peer-to-Peer network, it *cannot* be configured for SNTP time synchronization. Slave nodes synchronize their time *only* to the master node on the Peer-to-Peer network, and reject all other time change requests.

Note   Because the SNTP server resides on a PC, network load issues or PC performance can result in delays in processing time update requests from the controller.
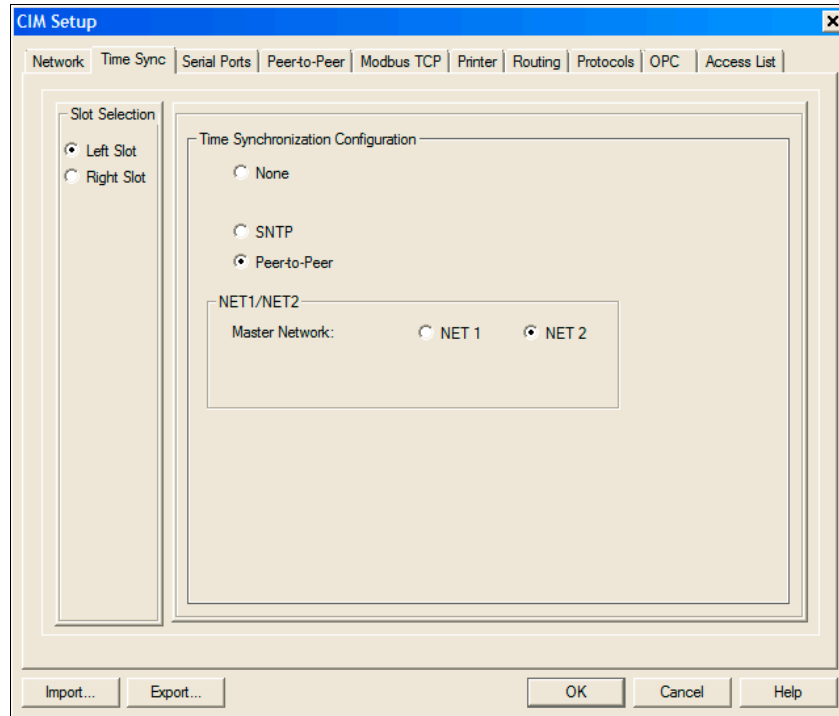
Procedure

1   Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2   Double-click the CM, and then click Setup.

The CM Setup dialog box appears.

3   Click the Time Sync tab.

4   Under Slot Selection, click Left Slot. You must configure the module in the left slot first.

5   Select these properties.

Property	Action
Time Synchronization Configuration	Select SNTP. The default is None.
SNTP Master Network	Click the network the SNTP server is located on.
SNTP Master IP Address	Enter the IP address of the SNTP server to synchronize time with.

6   (Optional) If you have a redundant CM installed in the right slot, under Slot Selection, click Right Slot, and then select these properties.

Property	Action
Time Synchronization Configuration	Select SNTP Redundant.
SNTP Master Network	Click the network the SNTP server is located on. This can be different than the master network selected for the left slot.
SNTP Master IP Address	Enter the IP address of the SNTP server to synchronize time with.

Note   The module in the right slot can be configured only if it has been installed (see Configuring Trident or Tri-GP 2.x/3.x CM Network Ports on page 398) and if the module in the left slot has already been configured for SNTP time synchronization.

7   Click OK to save your changes.

Enabling the Trident or Tri-GP 2.x/3.x CM as a Master Node for Triconex Time Synchronization (Optional)

The CM can also act as a master node for time synchronization of other controllers on a Peer-to-Peer network (using Triconex Time Synchronization). Because the Enable Trident/Tri-GP Node Time Synchronization check box is always enabled, no further configuration is needed.

Configuring Triconex Time Synchronization on the Trident or Tri-GP 2.x/3.x CM

In a Peer-to-Peer network, Triconex Time Synchronization can be used to synchronize time across controllers on a network. The controller with the lowest node number serves as the master node.

The master node can also synchronize its time with an SNTP server. In this configuration, the master node synchronizes time with the SNTP server, and any slave nodes on the Peer-to-Peer network synchronize their time with the master node. In this way, all nodes on the Peer-to-Peer network are synchronized with SNTP time.

Configuring a Master Node

This procedure describes how to configure the CM as a master node on the Peer-to-Peer network when SNTP time synchronization is **not** being used.

If you want the master node to synchronize to a SNTP server, use the procedures in Configuring SNTP Time Synchronization on the Trident or Tri-GP 2.x/3.x CM on page 433.

Procedure

1   Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2   Double-click the CM, and then click Setup.

   The CM Setup dialog box appears.

3   Click the Time Sync tab.

4   Under Time Synchronization Configuration, select None.

5   Click OK to save your changes.

Configuring a Slave Node

This procedure describes how to configure the CM as a slave node on the Peer-to-Peer network.

Procedure

1   Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2   Double-click the CM, and then click Setup.

   The CM Setup dialog box appears.

3   Click the Time Sync tab.

4   Under Slot Selection, click Left Slot. You must configure the module in the left slot first.

5   Specify these properties.

Property	Action
Time Synchronization Configuration	Select Peer-to-Peer. The default is None.
Peer-to-Peer Master Network	Click the network you want to enable Triconex Time Synchronization for. The default is NET 1.This property applies to the modules installed in both the left and right slots simultaneously.

Note   If you have a redundant CM installed in the right slot, Time Synchronization Configuration is automatically set to Peer-to-Peer and cannot be changed.

6   Click OK to save your changes.

Using a Trident or Tri-GP 3.x CIM to Synchronize Time

The information in this section explains how to enable time synchronization on a Trident or Tri-GP 3.x CIM. Time synchronization can be enabled using the following protocols:

- SNTP
- Triconex Time Synchronization via UDP/IP (NET 1 or NET 2) on a Peer-to-Peer network

In a redundant network of Trident or Tri-GP controllers that each have two CIMs installed, you can implement redundant time synchronization by configuring time synchronization for both CIM modules (both left and right slots). Time synchronization can be enabled only for a single logical slot.

Topics include:

Configuring SNTP Time Synchronization on the Trident or Tri-GP 3.x CIM

This procedure explains how to configure Trident or Tri-GP 3.x CIM time synchronization to an SNTP server.

If the CIM is in a Peer-to-Peer network, it can also be used as the master node for time synchronization of other controllers on the network. In this configuration, the master node CIM synchronizes time with the SNTP server, and any slave nodes on the Peer-to-Peer network synchronize their time with the master CIM. In this way, all nodes on the Peer-to-Peer network are synchronized with SNTP time.

If the CIM is acting as a slave node on a Peer-to-Peer network, it *cannot* be configured for SNTP time synchronization. Slave nodes synchronize their time *only* to the master node on the Peer-to-Peer network, and reject all other time change requests.

Note   Because the SNTP server resides on a PC, network load issues or PC performance can result in delays in processing time update requests from the controller.

Procedure

1   Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2   Double-click the CIM, and then click Setup.

The CIM Setup dialog box appears.

3   Click the Time Sync tab.

4   Under Slot Selection, click Left Slot. You must configure the module in the left slot first.

5   Select these properties.

Property	Action
Time Synchronization Configuration	Select SNTP. The default is None.
SNTP Master Network	Click the network the SNTP server is located on.
SNTP Master IP Address	Enter the IP address of the SNTP server to synchronize time with.

6   (Optional) If you have a redundant CIM installed in the right slot, under Slot Selection, click Right Slot, and then select these properties.

Property	Action
Time Synchronization Configuration	Select SNTP Redundant.
SNTP Master Network	Click the network the SNTP server is located on. This can be different than the master network selected for the left slot.
SNTP Master IP Address	Enter the IP address of the SNTP server to synchronize time with.

> **Note**   The module in the right slot can be configured only if it has been installed (see Configuring Trident or Tri-GP 3.x CIM Network Ports on page 414) and if the module in the left slot has already been configured for SNTP time synchronization.

7   Click OK to save your changes.

Enabling the Trident or Tri-GP 3.x CIM as a Master Node for Triconex Time Synchronization (Optional)

The CIM can also act as a master node for time synchronization of other controllers on a Peer-to-Peer network (using Triconex Time Synchronization). Because the Enable Trident/Tri-GP Node Time Synchronization check box is always enabled, no further configuration is needed.

Configuring Triconex Time Synchronization on the Trident or Tri-GP 3.x CIM

In a Peer-to-Peer network, Triconex Time Synchronization can be used to synchronize time across controllers on a network. The controller with the lowest node number serves as the master node.

The master node can also synchronize its time with an SNTP server. In this configuration, the master node synchronizes time with the SNTP server, and any slave nodes on the Peer-to-Peer network synchronize their time with the master node. In this way, all nodes on the Peer-to-Peer network are synchronized with SNTP time.

Configuring a Master Node

This procedure describes how to configure the CIM as a master node on the Peer-to-Peer network when SNTP time synchronization is **not** being used.

If you want the master node to synchronize to a SNTP server, use the procedures in Configuring SNTP Time Synchronization on the Trident or Tri-GP 3.x CIM on page 437.

Procedure

1 Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the CIM, and then click Setup.

The CIM Setup dialog box appears.

3 Click the Time Sync tab.

4 Under Time Synchronization Configuration, select None.

5 Click OK to save your changes.

Configuring a Slave Node

This procedure describes how to configure the CIM as a slave node on the Peer-to-Peer network.

Procedure

1 Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the CIM, and then click Setup.

The CIM Setup dialog box appears.

3 Click the Time Sync tab.

4 Under Slot Selection, click Left Slot. You must configure the module in the left slot first.

5 Specify these properties.

Property	Action
Time Synchronization Configuration	Select Peer-to-Peer. The default is None.
Peer-to-Peer Master Network	Click the network you want to enable Triconex Time Synchronization for. The default is NET 2.This property applies to the modules installed in both the left and right slots simultaneously.

Note If you have a redundant CIM installed in the right slot, Time Synchronization Configuration is automatically set to Peer-to-Peer and cannot be changed.

6 Click OK to save your changes.

Using Trident or Tri-GP System and Module Attributes

System and module attributes are variables that can be used to monitor status, and control Trident or Tri-GP controller operations. You can add an alias number so the variable can be read or written to.

Note   The following MP system attributes are available for Trident/Tri-GP 3.x and later systems only:

- Certificate_No_Warnings
- Certificate_None_Invalid
- Advanced_Security
- Access_All_Tagnames
- Certificate_Use_If_Expired

These attributes show a value of 0 for Trident/Tri-GP 1.x and 2.x systems.

Specifying an Alias Number for a Trident or Tri-GP Attribute

This procedure explains how to specify an alias number for a system or module attribute, which allows you to read or write to the attribute.

Procedure

1   Expand the Controller tree and double-click Configuration.

2   Expand Status Attributes and double-click the attribute to be assigned an alias.
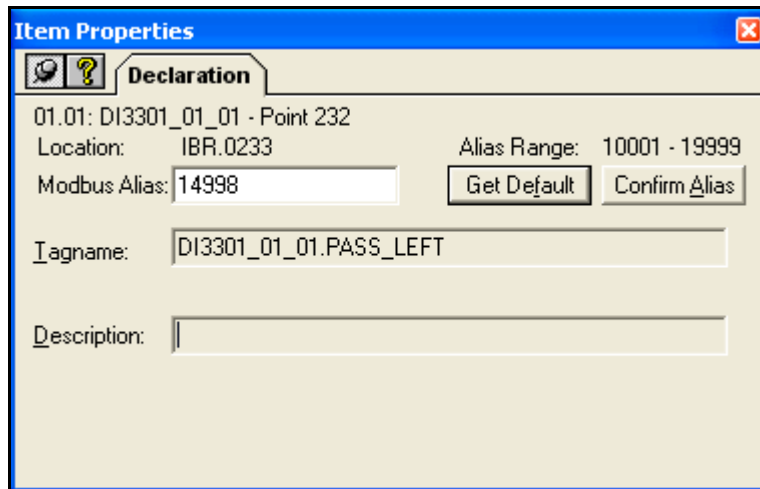
3   Click Get Default, or enter a number for the Modbus Alias and click Confirm Alias.

The alias number is assigned to the attribute.

Printing the Trident or Tri-GP Module Configuration

Once Trident or Tri-GP controller configuration is complete, you may want to print the module configuration information. Not only does this provide a backup of your configuration settings, it also can assist Invensys technical support when troubleshooting configuration problems.

Procedure

1 Open the Project Workspace (see The Project Workspace on page 19).

2 On the File menu, select Print All. The Print All Options dialog box appears.

3 Select the check boxes for the following documents:

- Hardware Module Configuration—Prints a report listing the controller hardware (MPs, CMs, I/O modules) currently configured in the project.

- Module Configuration Settings—Prints a report listing the current configuration settings for each applicable module in the project's hardware configuration. Only modules that require configuration in TriStation 1131 are included in this report. For example, CM configuration details are included, but the AI module is not, as it does not require configuration in TriStation 1131.

Note To quickly clear the check boxes for all the documents in the list, and make it easier to select only those documents you want to print, clear the Select All check box.

4 Click OK. The Print dialog box appears.

5 Select the printer you want to use, and the desired settings (number of copies, page orientation, etc), and then click OK.

5

Tricon Communication with TriStation 1131

Overview

This figure shows the main steps for setting up TriStation 1131 communication and the typical order in the project cycle. Communication setup can be done anytime before implementation.

TriStation 1131 Communication Steps

This checklist includes the items that can be or should be performed to set up communication between a TriStation PC and a Tricon controller.

Description	See
☐ Connect to a Tricon EICM	Connecting to the Tricon Controller via a Serial Connection on page 449
☐ Connect to a Tricon ACM, NCM, or TCM	• Connecting to the Tricon Controller via a Network Connection on page 452, *or* • Connecting to the Tricon Controller via a Serial Connection on page 449
☐ Configure user access to the Tricon TCM	Controlling Access to the TCM on page 459
☐ Set up printing	Configuring Tricon Controller Printing on page 465

Configuring the TriStation PC

This section explains the setup required for a network connection from the TriStation PC.

Topics include:

Note   If you will only be connecting to the Tricon controller via a serial connection, you can skip this section. Please note, however, that the preferred method of connecting the TriStation PC to the Tricon controller is via a network connection.

Installing a NIC Card in a TriStation PC

This procedure explains how to install a network interface card (NIC) in a TriStation PC to be connected to a Tricon ACM, NCM, or TCM.

Procedure - Tricon TCM

1   Install the network interface card by following the manufacturer's instructions. *Do not change the factory default settings on the NIC card.*

2   Do one of the following:

- If the network interface card has an RJ-45 connector, you can connect it to the NET 1 or NET 2 port on the TCM (model 4351/4351A/4351B/4353) via a router or hub using a patch cable.

- If the network interface card has a MTRJ (fiber) connector, you can connect it to the NET 1 or NET 2 port on the TCM (model 4352/4352A/4352B/4354) via a router or hub using a patch cable.

- If the network interface card does not have the appropriate connector for your TCM model, connect the network interface card to a media converter that is connected to the NET 1 or NET 2 port.

  Note   See the *Communication Guide for Tricon v9–v10 Systems* for more information about the differences between the TCM model 4351/4351A/4351B/4353 (copper) and model 4352/4352A/4352B/4354 (fiber).

3   Run the diagnostics provided with the network interface card according to the manufacturer's instructions.

Procedure - Tricon ACM or NCM

1   Install the network interface card by following the manufacturer's instructions. *Do not change the factory default settings on the NIC card.*

2   Do one of the following:

- If the network interface card has a BNC connector, connect it directly to the NET 2 port.

•   If the network interface card does not have a BNC connector, connect the network interface card to a media converter that is connected to the NET 2 port.

3   Run the diagnostics provided with the network interface card according to the manufacturer's instructions.

Installing the TCP/IP Protocol on a TriStation PC

These procedures explain how to install the TCP/IP protocol on a TriStation PC. The TCP/IP protocol is required for Tricon ACM, NCM, and TCM connection.

Installing TCP/IP on Windows XP or Windows Server 2003

1   On the Start menu, click Control Panel, and then double-click Network Connections.

2   Right-click the network connection where you want to install the protocol, then click Properties.

3   Do one of the following:

•   On the General tab, if the TCP/IP protocol is checked on the list of installed components, it means the protocol is installed and you are finished with this procedure.

•   If the TCP/IP protocol is not checked, go to the next step to continue the installation.

4   On the General tab, click Install.

5   In the Select Network Component Type dialog box, click Protocol, and then click Add.

6   Click the TCP/IP protocol, and then click OK.

Installing TCP/IP on Windows 7 or Windows Server 2008 R2

1   On the Start menu, click Control Panel, open Network and Internet, and then click Network and Sharing Center.

2   In the Network and Sharing Center, click Manage Network Connections.

3   Right-click the network connection you want to change, and then click Properties.

4   If prompted, enter the administrator's password or confirm the operation.

5   On the Networking tab, under This connection uses the following items, click Internet Protocol Version 4 (TCP/IPv4), and then click OK.

Note   Internet Protocol Version 4 (TCP/IPv4) must be installed to allow a TriStation 1131 application to connect to a Tricon controller. Do not install Internet Protocol Version 6 (TCP/IPv6).

Connecting to the Tricon Controller via a Serial Connection

This section explains how to make a direct (point-to-point) serial connection between a Tricon EICM or TCM and a TriStation PC. You cannot use both an EICM and TCM module in the same Tricon system. Additionally, the TCM can be used only with a Tricon 10.x controller.

By default, both the EICM and the TCM use port 4 for the TriStation connection. Invensys strongly recommends you use the default setting. If port 4 on the EICM fails, port 1, 2, or 3 can be used by changing settings on the module switch block. If port 4 on the TCM fails, you can connect to TriStation 1131 using the NET 1 or NET 2 port; see the *Communication Guide for Tricon v9–v10 Systems* for more information.

Topics include:

When to Use the Tricon Serial Connection

The preferred means for connecting the TriStation PC to the Tricon controller is via a network connection. Invensys recommends connecting the TriStation PC to the EICM or TCM via a serial connection only in the following scenarios.

Connecting to the Tricon Controller for the First Time

The first time you connect to the Tricon controller, Invensys recommends making a serial connection to the EICM or TCM, because it is less complex to configure and thus easier to successfully connect to the communication module through the serial port.

Once you have successfully connected to the EICM or TCM and downloaded the initial configuration to the Tricon controller via the serial connection, you can go back and configure the more complex network connection, without worrying about losing the ability to communicate with the controller altogether.

Connecting to the Tricon Controller When the Network Is Down

When network communication has been interrupted due to hardware or other problems with the network, the serial connection can be used as a backup means of communicating with the Tricon controller. Once the network problems have been resolved, you should restore the network connection to the Tricon controller.

Connecting to the Tricon Controller When the Access Control List Has Been Misconfigured (Tricon 10.x Only)

If you misconfigure the Access Control List, you could accidentally lock yourself out of a network connection to the Tricon controller. Once you enable TCM client access control by

selecting the Enable Access List check box, you **must** configure at least one client with TriStation Read/Write access before you save the configuration.

If this is not done, you will be unable to connect to the Tricon controller again after your next download, preventing you from making further changes to the application running on the controller, including changes to the TCM access control list. If this happens, you can use the serial connection to connect to the Tricon controller and download changes to the access control list.

See Controlling Access to the TCM on page 459 for more information.

Connecting a Tricon Serial Port to a TriStation PC

This procedure explains how to connect a Tricon EICM or TCM serial port to a TriStation PC.

Invensys provides a serial cable that has a 9-pin connector on each end. If the COM port on the PC has a 25-pin connector, you can use a Triconex 25-pin to 9-pin adapter. If you need other parts, you can purchase them from another manufacturer. For more information, see the *Communication Guide for Tricon v9–v10 Systems*.

Procedure

1   Connect one end of the serial cable to a serial port on the EICM or TCM. This is typically port 4.

2   Connect the other end of the serial cable to a COM port on the TriStation PC. The COM port is typically numbered COM1, COM2, COM3, or COM4.
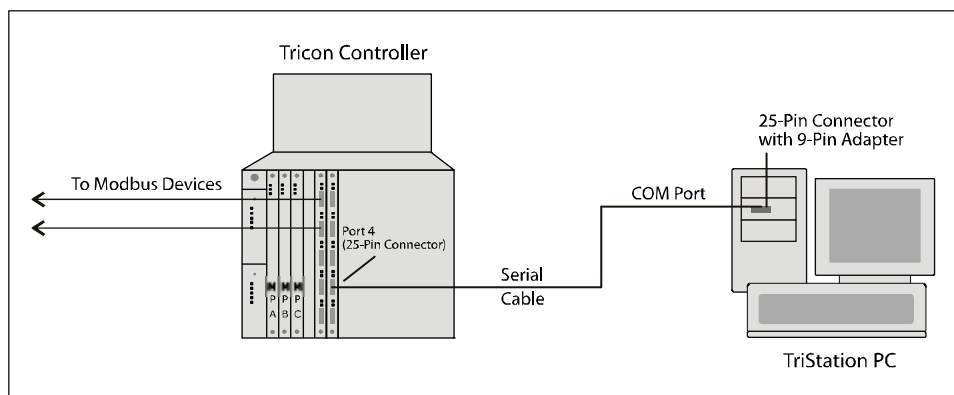
Figure 25 Connecting a Tricon Serial Port to the TriStation PC

Configuring the TriStation 1131 Serial Connection

This procedure explains how to configure the serial connection from the TriStation PC to the Tricon EICM or TCM.

Procedure

1 Expand the Controller tree, double-click Configuration, and then click TriStation Communication.

2 Specify these properties on the TriStation Communication screen.

Property	Action
Serial Connection	Select this check box.
Node Name	Enter the name of the Tricon controller. You can use a default name, or enter your own user-defined name. The default names are TRINODE01 through TRINODE31.
TriStation Port Number	Enter the UDP port to use for the TriStation 1131 connection. The default is 1502. Should be the same number specified on the TCM Setup Network tab.
Serial Port	Select the COM port on the TriStation PC to which the serial cable is connected.
Baud Rate	Specify the data transmission speed. The default is 9600. Available only when a TCM is installed.

Note The data displayed on this screen is used by TriStation 1131 only to connect to a Tricon communication port. The data that you enter will not be downloaded to the Tricon controller.

3 To complete the connection, you must configure a Tricon EICM or TCM module. See Configuring Tricon Communication Modules on page 317.

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Connecting to the Tricon Controller via a Network Connection

This section explains how to make a network connection between an ACM, NCM, or TCM communication module and a TriStation PC.

This can be a direct connection from the communication module to the PC; or a connection through a router, hub, or media converter. A router or hub is not required if you do not need to connect any additional devices besides the communication module and the PC.

You cannot use both an NCM and TCM module in the same Tricon system.

To set up the connection, you must:

- Install a network interface card and the TCP/IP protocol on the PC.
- Set the node number of the controller.
- Connect the TriStation PC to a network port on the communication module.
- Configure the connection in the TriStation 1131 project.

CAUTION   The node setting (on the ACM or NCM module or the 3008 MP Front Panel) must match the node number specified in the TriStation 1131 project. For instructions on changing the MP node setting, see the *Planning and Installation Guide for Tricon v9-v10 Systems*.

For instructions on installing a network interface card and the TCP/IP protocol on the TriStation PC, see Configuring the TriStation PC on page 447.

Topics include:

- Directly Connecting an ACM or NCM Network Port to a TriStation PC on page 453
- Connecting a TCM Network Port to a TriStation PC Using a Router or Hub on page 454
- Connecting a Tricon Network Port Using a Media Converter on page 455
- Configuring the TriStation 1131 Network Connection on page 457

Note   If you are connecting the TCM or EICM to the TriStation PC via serial port, see Connecting to the Tricon Controller via a Serial Connection on page 449.

TriStation 1131 Developer's Guide, 4.10.1

Directly Connecting an ACM or NCM Network Port to a TriStation PC

This procedure explains how to directly connect an ACM or NCM to a TriStation PC if the network interface card in the PC has a BNC connector.

The connection requires a 10Base2 coaxial cable. Invensys provides an accessory kit that includes a 10Base2 coaxial cable, BNC T-connectors, and 50-ohm terminators for unused connectors (see the *Communication Guide for Tricon v9-v10 Systems* for more information).

Procedure

1   To each end of a 10Base2 cable, attach a BNC T-connector and a terminator.

2   Attach one of the T-connectors to a BNC connector on NET 2 of the communication module. An NCM is used as an example in the following figure.

3   Attach the other T-connector to the BNC connector on the network interface card in the TriStation PC.
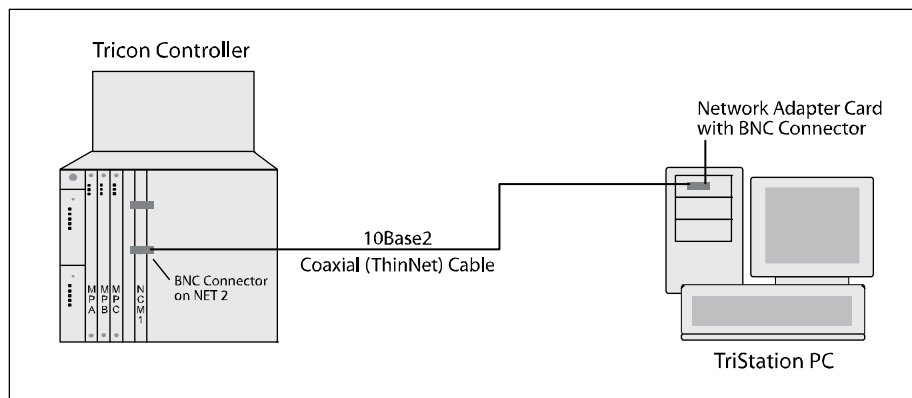
Figure 26   Directly Connecting an ACM or NCM to a TriStation PC

4   Terminate the BNC connectors on all communication modules that are installed in the Tricon controller.

To terminate an unused BNC connector, you can attach a T-connector with 50-ohm terminators on each end to produce a 25-ohm parallel resistance. Ask your network administrator for information about other termination methods.

Connecting a TCM Network Port to a TriStation PC Using a Router or Hub

This procedure explains how to connect a TCM to a TriStation PC if the network interface card in the PC has an RJ-45 connector or a MTRJ fiber connector. You must use an Ethernet router or hub between the Tricon and the TriStation PC.

The RJ-45 connection requires twisted-pair straight-through cables. The fiber connection requires 62.5/125 um multimode fiber cables. See the *Communication Guide for Tricon v9–v10 Systems* for more information about the required cables and how some may be purchased from Invensys.

Procedure

1 Attach one end of the first cable to the NET 2 port on the TCM.

2 Attach the other end of the first cable to the connector on the Ethernet router or hub.

3 Attach one end of the second cable to the connector on the network interface card in the TriStation PC.

4 Attach the other end of the second cable to the connector on the router or hub.
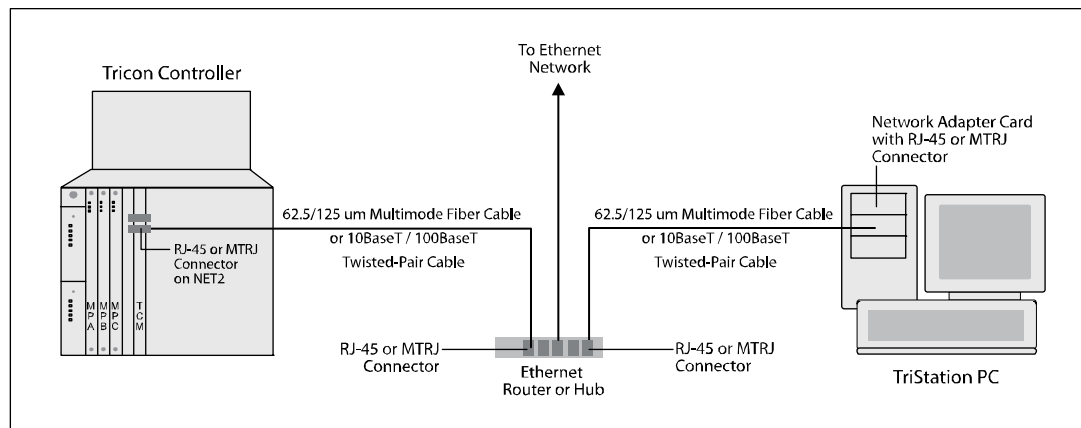
Figure 27 Connecting a TCM (Copper or Fiber) to a TriStation PC Using a Router or Hub

If the correct cable is connected to the TCM and the TCM is installed in a powered Tricon chassis, the green LED indicator turns on. If the LED indicator is not on, there is a problem with the physical cable connection.

Connecting a Tricon Network Port Using a Media Converter

This procedure explains how to connect an ACM, NCM, or TCM to a TriStation PC if the network interface card in the PC requires a media converter because it does not have the appropriate connector.

- The connection to an ACM or NCM requires a 10Base2 cable, a media converter, and another appropriate cable, such as a twisted-pair cable.

- The connection to a TCM (model 4352/4352A/4352B/4354 - Fiber) requires a 62.5/125 um multimode fiber cable, a media converter, and another appropriate cable, such as a twisted-pair cable.

Procedure for Connecting an ACM or NCM

1 To each end of a 10Base2 cable, attach a BNC T-connector and a terminator.

2 Attach one of the T-connectors to a BNC connector on the NET 2 port on the communication module.

3 Attach the other T-connector to a BNC connector on the media converter.

For the TriStation PC, you can use a 10BaseT or 100BaseTX twisted-pair cable for faster communication.

4 Attach one end of the twisted-pair cable to an RJ-45 connector on the network interface card in the TriStation 1131 PC.

5 Attach the other end of the twisted-pair cable to an RJ-45 connector on the media converter.
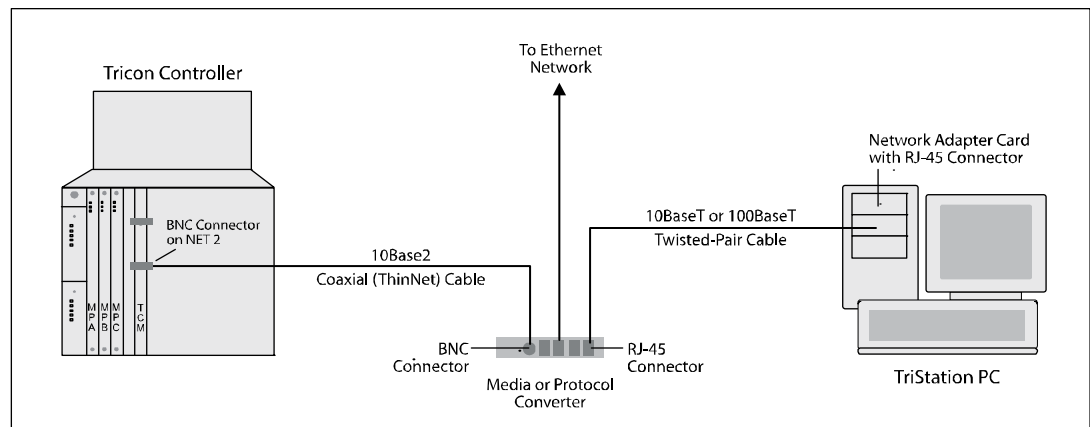
Figure 28   Connecting an ACM or NCM to the TriStation PC Using a Media Converter

Procedure for Connecting a TCM (Model 4352/4352A/4352B/4354 - Fiber)

1 Attach one end of the fiber cable to the NET 1 or NET 2 port on the TCM.

2 Connect one end of the twisted-pair cable to the RJ-45 connector on the network interface card in the TriStation PC.

3 Attach the other end of the twisted-pair cable to an RJ-45 connector on the media converter.

4 Attach the other end of the fiber cable to a MTRJ fiber connector on the media converter.
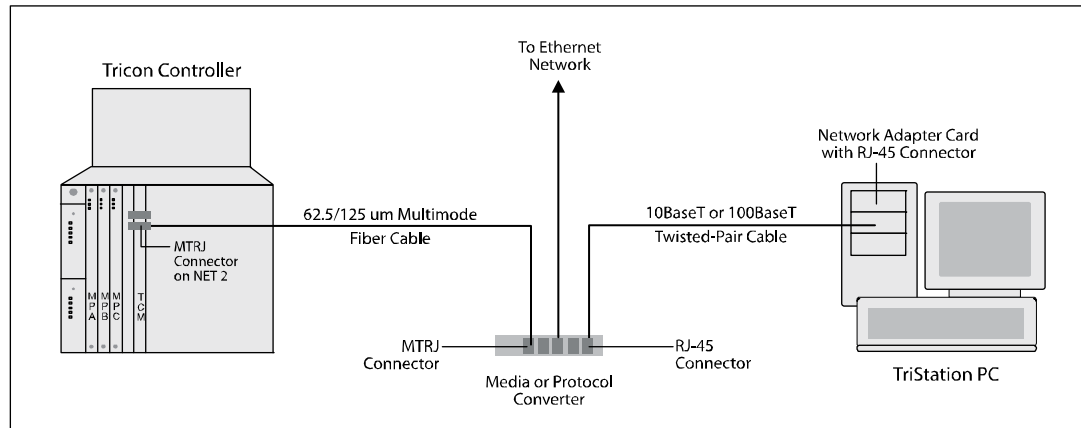
Figure 29 Connecting a TCM (Model 4352/4352A/4352B/4354) to the TriStation PC Using a Media Converter

If the correct cable is connected to the TCM and the TCM is installed in a powered Tricon chassis, the green LED indicator turns on. If the LED indicator is not on, there is a problem with the physical cable connection.

Configuring the TriStation 1131 Network Connection

This procedure explains how to configure the Tricon network connection to a TriStation PC. Before beginning this procedure, you must determine which IP address to use for the communication module. Typically, you can get an IP address from your network administrator or Information Technology department. See Setting Tricon Controller IP Addresses on page 472.

Procedure

1   In TriStation 1131, expand the Controller tree, and double-click Configuration.

2   On the Configuration tree, click TriStation Communication.

3   Specify these properties on the TriStation Communication screen.

Property	Action
Network Connection	Select the Network Connection check box.
Node Number	• For ACM and NCM, enter the number represented on the rotary switches. • For TCM, enter the number represented by the Network Node Address setting on the MP front panel. Click the browse button to select a node from the list of default node names and numbers.
Node Name	Enter a name containing eight or fewer characters to identify the Tricon controller.
IP Address	Enter the physical address of the controller on the network.
UDP Base Port Number	Enter the UDP port to use for the TriStation 1131 connection. The default is 1502. Should be the same number specified on the TCM Setup Network tab. Available only when a TCM is installed.

Note   The data displayed on this screen is used by TriStation 1131 only to connect to a Tricon communication port. The data that you enter will not be downloaded to the Tricon controller.

4   To complete the connection, you must configure a Tricon ACM, NCM, or TCM module. See Configuring Tricon Communication Modules on page 317.

Specifying the Tricon Default Connection Type

This procedure explains how to specify the default connection setting in the Connect To dialog box, which appears when you establish communication between a TriStation PC and the Tricon controller. The connection setting—Network or Serial Connection—is an initial setting and can be changed when you use the Connect command.

Procedure

1 Expand the Configuration tree, double-click Configuration, and then click TriStation Communication.

2 Verify that the Network Connection Setup (for a network connection) or TriStation PC (for a serial connection) properties are correctly configured. See the following for additional information:

- Configuring the TriStation 1131 Serial Connection on page 451

- Configuring the TriStation 1131 Network Connection on page 457

3 Under Default Connection, select one of the following:

- Network Connection

- Serial Connection

The next time you establish communication between the TriStation PC and the Tricon controller, the default connection setting you selected will be used.

Note If only one connection type is selected under Selected Connections, the default connection is automatically set based on it, and cannot be changed.

Controlling Access to the TCM

The Tricon Communication Module (TCM) gives you the ability to control who can access TCM resources through the module's network ports, and each user's level of access.

Note   Access control is supported on models 4351A/B, 4352A/B, 4353, and 4354 only. TCM models 4351 and 4352 do not support access control.

Topics include:

- What Are TCM Resources? on page 459
- How Is Access Controlled? on page 460
- What Are Access Levels? on page 460
- Configuring the Access Control List on page 463

What Are TCM Resources?

A *resource* is any service or information provided by the TCM through the supported communications protocols. Examples of these resources include:

- Access to the controller via TriStation 1131 (ability to perform a Download Changes or Download All).
- Access to Tricon controller diagnostic information via the Enhanced Diagnostic Monitor.
- Access to Tricon tagnames and system variables via OPC Data Access (DA). The OPC protocol is supported only by TCM models 4353 and 4354.
- Access to OPC Alarms and Events (A&E) data (models 4353 and 4354 only). Write access to OPC A&E is not currently supported; only read access is provided, to allow the retrieval of events.
- Access to information provided in applications such as SOE Recorder or DDE Server that use the TSAA protocol.
- Access to any other applications that use the TSAA protocol.

CAUTION   In Tricon 10.3 and later systems, TSAA clients using a TCM interface have write access to the NET 1 and NET 2 ports by default. Depending on your configuration, this may create a security issue.

Please note that this default behavior is *opposite* of that on TCMs in Tricon 10.2 and earlier systems.

To disable write access by TSAA clients, you **must** enable and configure the TCM access control list.

How Is Access Controlled?

Access is controlled via client IP addresses. You can control access for a single IP address (one client), or for a group of IP addresses (a group of clients).

If you want to group clients into a single access list entry, they must be physically separated in a sub-network, and a *network address mask* must be used to group them in the access list. A network address mask of 255.255.255.255 restricts an access list entry so that it applies only to the specific IP address identified in the entry. A network address mask of 255.255.255.0 applies an access list entry to *any* client on the same subnet as the IP address identified in the entry. Other network address masks may also be used, depending on your network structure.

For example, if you want two clients with IP addresses of 192.168.1.134 and 192.168.1.65 to share the same access permissions, and there are no other clients on the same subnet, you can group them in the access list by setting the IP address for a single entry as 192.168.1.x and the network address mask to 255.255.255.0.

For each IP address or group of IP addresses, you can set the access level, the protocols the client can use to access the TCM, and the network ports the client can use to access the TCM.

What Are Access Levels?

There are three levels of access:

- **Deny Access:** Prevents all access to resources provided by the TCM. Connections to the Tricon controller are not allowed.

- **Read Only**: Allows client to connect to the Tricon controller and view information provided via the TCM. Does not allow the client to change any settings or perform certain commands. For TCM/OPC, allows an OPC DA client to read tagnames, and allows an OPC A&E client to retrieve events.

- **Read/Write**: Full access. Allows client to view information provided by the TCM, change settings, and perform all commands (including Download Changes or Download All for TriStation 1131). For TCM/OPC, allows an OPC DA client to write to tagnames. This access level should only be provided to trusted clients.

Access levels are configured by adding entries to the access control list. A maximum of 10 entries can be provided in the access control list.

The same access level is applied to all selected protocols in a single access control list entry. If you want to provide different access levels for a selected client depending on which protocol they are using, you will need to create two separate entries in the access control list, one for each protocol.

Access levels apply to *all* users using the PC assigned the IP address entered in the access control list. This means if multiple users are using the same PC, they will all have the same access rights. For example, every user using TriStation 1131 on a PC with a particular IP address would have the same access rights to the TCM. Individual user access should be controlled via workstation security; TCM access is controlled only at the IP address level.

CAUTION

Once you enable TCM client access control by selecting the Enable Access List check box, you **must** configure at least one client with TriStation Read/Write access before you can save the configuration.

This ensures you will be able to connect to the Tricon controller again after your next download, and allows you to make further changes to the application running on the controller, including changes to the TCM access control list.

If necessary, you can also connect via a TriStation 1131 serial connection to reconfigure the access control list. See Connecting to the Tricon Controller via a Serial Connection on page 449.

Note   If you are using the TSAA and/or TriStation protocols, you must enable and use access list control to manage read/write access to specific ports. If you are using the serial and/or Modbus TCP protocols, you can also use the Port Write Enabled property to manage read/write access to specific ports. See Port Write Enabled on page 674.

Sample Access Control List and Resulting Access Control

The following table is a sample access control list, with the access control scenarios that would result if enabled on a model 4353 or 4354 TCM.

Table 40   Sample TCM (Model 4353/4354) Access Control List

Entry	IP Address	Subnet Mask	Protocol	Network	Access Level	Resulting Access Control Scenario
1	206.216.1.12	255.255.255.0	TriStation	NET 2	Read/Write	A client with an IP address of 206.216.1.12 (or any client on the same subnet) attempting to access the TCM using the TriStation protocol on NET 2 would be granted Read/Write access.
2	206.216.1.12	255.255.255.0	TSAA	NET 1	Read Only	A client with an IP address of 206.216.1.12 (or any client on the same subnet) attempting to access the TCM using the TSAA protocol on NET 1 would be granted Read Only access.
3	192.168.1.05	255.255.255.255	TriStation and OPC	NET 1 NET 2	Deny Access	A client with an IP address of 192.168.1.05 attempting to access the TCM using the TriStation protocol on NET 1 or NET 2, or OPC on NET 2, would be denied access.[a]
4	192.168.1.09	255.255.255.255	TSAA	NET 1 NET 2	Deny Access	A client with an IP address of 192.168.1.09 attempting to access the TCM using TSAA on NET 1 or NET 2 would be denied access.[b]
5	192.168.1.05	255.255.255.0	OPC and TriStation	NET 2	Read Only	A client with an IP address of 192.168.1.05 (or any client on the same subnet) attempting to access the TCM using OPC or TriStation 1131 on NET 2 would be granted Read Only access.
6	192.168.1.05	255.255.255.0	TriStation	NET 2	Read Only	A client with an IP address of 192.168.1.05 (or any client on the same subnet) attempting to access the TCM using the TriStation protocol on NET 2 would be granted Read Only access.[c]
7	192.168.1.09	255.255.255.0	OPC	NET 2	Read/Write	A client with an IP address of 192.168.1.09 (or any client on the same subnet) attempting to access the TCM using OPC on NET 2 would be granted Read/Write access.
8	0.0.0.0	0.0.0.0	All	All	Deny Access	Access is denied for all IP addresses not included in entries 1–7, using any protocol on NET 1 or NET 2.
9	NULL	NULL	NULL	NULL	NULL	None

a. OPC is supported *only* on NET 2. As a result, a client attempting to access the TCM using OPC on NET 1 will always be denied. An access control list entry configured with only OPC and NET 1 is an invalid combination that will not have any effect on client access to the TCM via OPC.

b. On the model 4353 and 4354 TCM, TSAA is supported *only* on NET 1. As a result, a client attempting to access the TCM using TSAA on NET 2 will always be denied. An access control list entry configured with only TSAA and NET 2 is an invalid combination that will not have any effect on client access to the TCM via TSAA.

c. If a client with the specific IP address of 192.168.1.05 attempts to access the TCM using the TriStation protocol on NET 2, the TCM will deny access. This is because the TCM evaluates the access control list beginning from the top, and continuing through the list until it encounters an entry that applies to the IP address requesting access. In this case, entry 3 specifically denies access to a client with the IP address of 192.168.1.05, so the TCM will deny access and not evaluate the list any further.

Configuring the Access Control List

This section describes how to enable access control on the TCM and configure the access control list for your selected clients. This does not apply to model 4351 or 4352 TCMs.

When configuring the access control list, take care to organize your entries so that the most specific are at the top, and the least specific are at the bottom. The last entry in the list should be used to define the access level for unspecified clients.

The TCM evaluates the access control list from top (Entry 1) to bottom (Entry 10). The first match that the TCM makes (between the client's network parameters and those listed in an access control list entry) determines which entry is used to authorize or deny access. If no match is found, the TCM automatically denies all access.

Once you have enabled access control and configured the access control list, you must perform a Download Changes for the access control to take effect.

Note   After a Download Changes or Download All has been performed so that access control on the TCM is enabled, all *existing* connections will remain connected, even if the client's access has been changed to Read Only or Deny Access. The new access levels will not take effect until the client disconnects and attempts to reconnect.

Procedure

1   Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2   Double-click the slot where the TCM module is installed and then click Setup.

The TCM Setup dialog box appears.

3   Click the Access List tab.

4   Specify these properties.

Property	Action
Slot Selection	Select the slot where the TCM module you want to configure an access control list for is installed.
	In most cases, you should create identical access control lists for the modules in both slots.
Enable Access List Command	Click to enable access control for this TCM. If cleared, access control will be disabled and all users can access TCM resources. The default is cleared.
Client Access List	Click on the entry for the client you want to configure or change.
Client IP Address	Specify the IP address of the client that you want to allow, restrict, or deny access to the TCM.
	Can be used in conjunction with the Client IP Subnet Mask property to create groups of IP addresses with the same access levels.
Client IP Subnet Mask	This property allows you to group IP addresses, so that you can create a single entry in the access control list for all IP addresses on the subnet.
	If needed, enter the IP address for the subnet. The default is 255.255.255.0.
Permission	Click the level of access to the TCM you want to provide for the selected client.
	If the application includes safety-critical outputs, you should not set this property to Read/Write.
Protocol	Select the protocol(s) that the selected client can use to access the TCM. The OPC protocol is supported on NET 2 only, and applies only for model 4353 or 4354 TCMs.
Network	Select the network(s) on which the selected client can access the TCM.

5   Click Update Client Entry to save the settings for the selected client.

6   Repeat steps 4 and 5 for each client to be included in the access control list.

   Note   If necessary, click Reset Client Entry to reset the settings for the *selected* client to the default, unconfigured state. Click Reset All to reset *all* entries in the access list to the default, unconfigured state.

7   If a TCM is installed in the right slot, do one of the following:

• In most cases, you should configure identical access control lists for the modules in both slots. To do so, click Copy Current Setup to Other Slot.

• To configured different access control lists for the modules in the right and left slots, repeat steps 4 through 6 for the module installed in the right slot.

8   Click OK to save your changes.

Configuring Tricon Controller Printing

A Tricon controller can print brief ASCII text messages if a communication port is connected to a printer and the TriStation 1131 application includes standard print function blocks.

Print messages are typically used for alarms, status, and maintenance. A sample alarm message might include the name of an analog input point, its time stamp and value, and a statement that the value is out of range. If the Tricon system includes numerous controllers or is connected to a DCS, alarms are typically displayed on an operator workstation.

To print from a Tricon controller with an EICM, you must connect an EICM parallel port to a Centronics-compatible printer, configure the port in the TriStation 1131 project, and use print function blocks in the TriStation 1131 application.

To print from a Tricon controller with a TCM, you must connect a TCM Ethernet port to a print server that is connected to a printer, configure these devices in the TriStation 1131 project, and use print function blocks in the TriStation 1131 application.

Topics include:

- Effect of Printing on Scan Time on page 465
- Connecting a Tricon EICM Port to a Printer on page 466
- Configuring a Tricon EICM Port for Printing on page 467
- Connecting a TCM to Printing Devices on page 468
- Connecting a TCM to Printing Devices Using a Hub on page 469
- Configuring a Tricon TCM Port for Printing on page 470
- About Function Blocks for Printing on page 471

See the *Communication Guide for Tricon v9–v10 Systems* for more information about the types of devices that can be used for printing from the Tricon controller.

Effect of Printing on Scan Time

Each time a message is printed, the print function blocks in the TriStation 1131 application are executed and the scan time increases. Typically, the print function blocks are subject to conditional execution, which means they are not executed every scan. When you set the scan time in TriStation 1131, make sure it includes the execution time for all conditional statements in the application.

If the scan time is not long enough, the execution of all conditional statements (when the conditions are True) could result in scan-time overruns. You can minimize this problem by limiting the amount of printer output. An alternative is to use a PC event logger such as the Triconex SOE Recorder. For more information, see the *SOE Recorder User's Guide.*

Connecting a Tricon EICM Port to a Printer

This procedure explains how to set up a Centronics-compatible printer and connect it directly to a Tricon EICM parallel port.

You can use a standard PC printer cable with a maximum cable length of 5 to 6 meters (15 to 20 feet), depending on the quality of the cable

Procedure

1   If the printer package has an installation program, copy the program to the TriStation PC.

2   Follow the instructions, and run the diagnostic routine, if available.

   You do not need the printer driver that may have come with the package.

3   Connect one end of the cable to the printer, and connect the other end to port 5 or 10 on the EICM. (Other EICM ports cannot be used for printing.)

4   Go to the next section to configure the EICM port for printing.
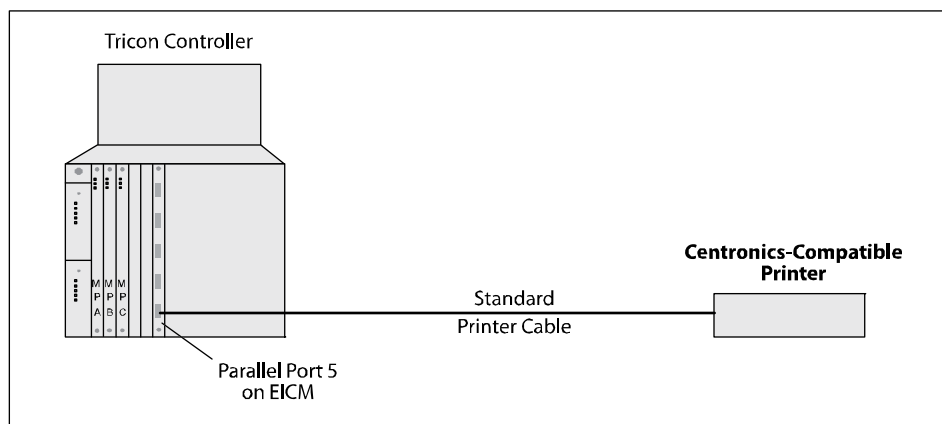
Figure 30   Connecting an EICM to a Centronics-Compatible Printer

Configuring a Tricon EICM Port for Printing

This procedure explains how to configure a Tricon EICM port that is connected to a Centronics-compatible printer.

Procedure

1 In TriStation 1131, open your project, expand the Controller tree, and double-click Configuration.

2 On the Configuration tree under Hardware Allocation, double-click EICM, and then click Setup.
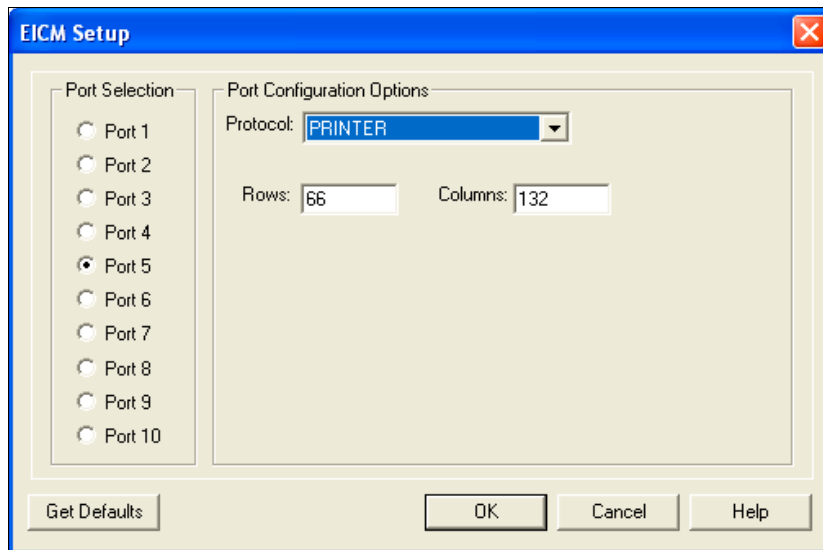
3 Specify these properties on the EICM Setup screen.

Property	Action
Port Selection	Select Port 5 or Port 10. Other ports cannot be used for printing.
Protocol	Select Printer from the Protocol list.
Rows	Enter the number of lines (rows) to be displayed on a page.
Columns	Enter the number of characters per line.

4 Click OK.

Connecting a TCM to Printing Devices

This procedure explains how to directly connect a TCM to an HP JetDirect-compatible print server and printer.

You can use standard communication cables for these connections.

Procedure

1 If the print server and printer packages have installation programs, install them on the TriStation PC.

2 Follow the instructions, and run the diagnostic routines if available.

You do not need the printer drivers that came with the packages.

3 Record the IP address of the print server. You will need the IP address when configuring the TCM printer.

Connect the printer to the print server, and connect the print server to a TCM Ethernet port (NET 1 or NET 2[1]).
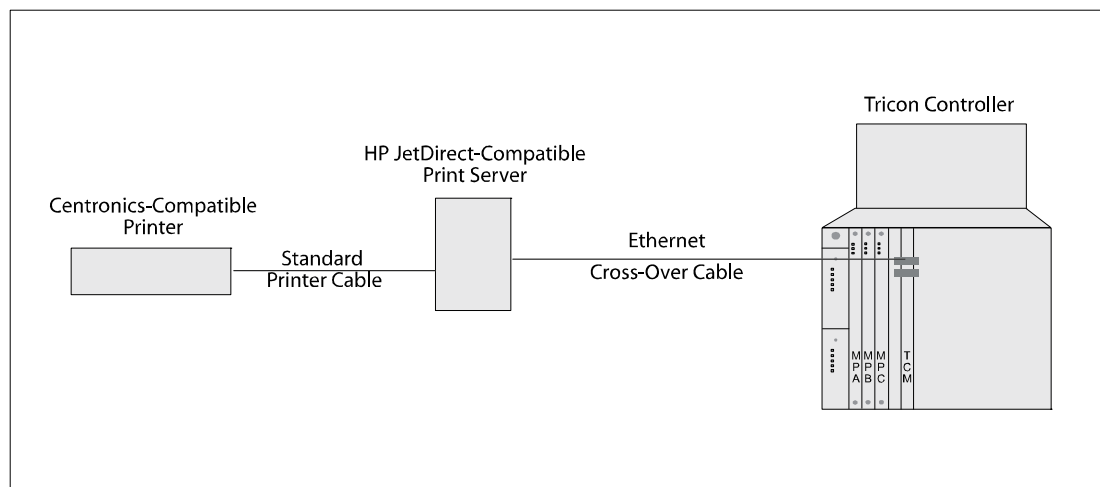
Figure 31 Connecting a Tricon TCM to a Printer and Print Server

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1. TCM models 4351/4351A/4351B and 4352/4352A/4352B only. NET 2 is reserved for OPC communication on model 4353 and 4354 TCMs.

Connecting a TCM to Printing Devices Using a Hub

This procedure explains how to connect a TCM to an HP JetDirect-compatible print server and printer by using a hub. You can use standard communication cables for these connections.

You do not need to install the printer drivers that may have come with the print server and printer packages.

Procedure

1   If the print server and printer packages have installation programs, install them on the TriStation PC.

2   Follow the instructions that came with the packages, and run the diagnostic routines, if available.

3   Record the IP address of the print server. You will need the IP address when configuring the TCM printer.

4   Connect the printer to the print server, and connect the print server to a hub. Connect the hub to a TCM Ethernet port (NET 1 or NET 2[2]).
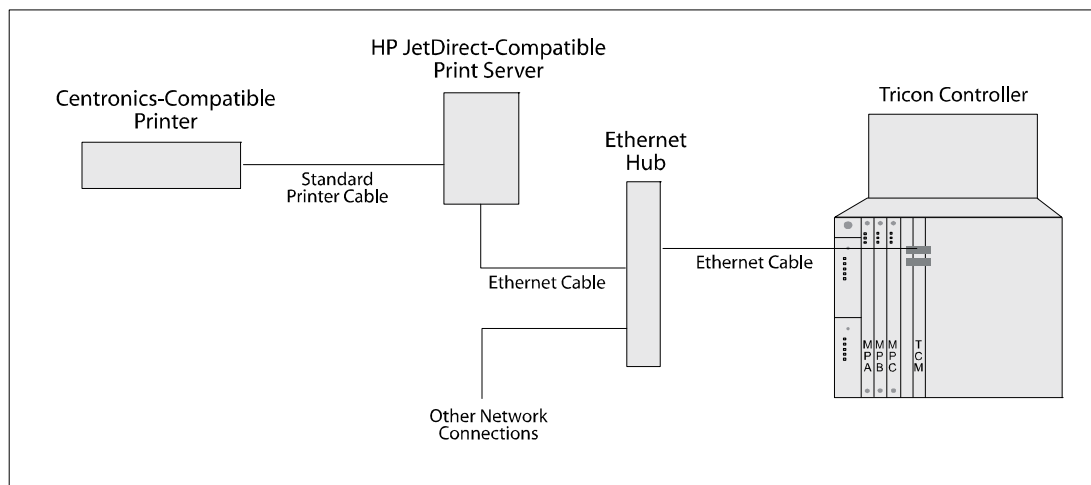
Figure 32   Connecting the Tricon TCM to a Printer Server and Printer Using a Hub

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2.   TCM models 4351/4351A/4351B and 4352/4352A/4352B only. NET 2 is reserved for OPC communication on model 4353 and 4354 TCMs.

Configuring a Tricon TCM Port for Printing

This procedure explains how to configure a Tricon TCM port that is connected to a Centronics-compatible printer. You do not need the printer driver that may have come with the printer package.

Note Because NET 2 is reserved for OPC communication, you cannot configure this port for printing with model 4353 and 4354 TCMs. The printer port can be configured on NET 1 only for these TCMs.**The information and procedures in this section do not apply to model 4351 and 4352 TCMs**. If you have one of these TCMs installed in your system, please see Appendix C, TCM Model 4351/4352 Configuration.

Procedure

1 In TriStation 1131, open your project, expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the slot where the TCM module is installed and then click Setup. The TCM Setup dialog box appears.

3 Click the Printer tab.

4 Specify these properties for the module installed in the Left Slot.

Property	Action
Printer Number	Enter the number for the printer; can only be 5 or 10. Both slots cannot have the same printer number. The default is 0, meaning a printer is not configured.
Line Width	Enter the number of characters to be printed on a line. The valid range is 80–132 characters. The default is 80 characters.
TCP Port Number	Enter the number of the TCP port for the print server. The default is 9100 for an HP printer.

Property	Action
Network	Click the network that the print server is connected to. For model 4351A/4352A and 4351B/4352B TCMs, the default is NET 2. For model 4353 and 4354 TCMs, the default is NET 1 (NET 2 is not available for printing on these TCMs).
IP Address	Enter the IP address of the print server.

5 If a module is also installed in the Right Slot, repeat step 4 for that module.

6 Click OK.

About Function Blocks for Printing

A TriStation 1131 application must use print function blocks to send messages to a printer.

Each print function block has a PRINTER parameter which specifies the port number where the printer cable is connected.

- For a Tricon EICM or TCM port, the PRINTER parameter must be 5 for a left EICM or TCM port, or 10 for a right EICM or TCM port. (Other EICM or TCM ports cannot be used for printing.)

- The PRINTER parameter must be the same number as is defined in TriStation 1131.

Each time a message is printed, the print function blocks in the TriStation 1131 application are executed and the scan time increases.

This table lists the print function blocks in the Tricon libraries.

Print Function Block	Purpose
PRINT_BOOL	Prints a three-character field containing either Off or On.
PRINT_CDT	Prints the current date and time.
PRINT_CRLF	Prints a new line (carriage return and line feed).
PRINT_CTOD	Prints the current time of day.
PRINT_DINT	Prints a DINT value.
PRINT_REAL	Prints a REAL value.
PRINT_STRING	Prints a string of text.
PRINTR_FLUSH	Clears the print buffer.

See the *TriStation 1131 Libraries Reference* for more detailed information about the print function blocks.

Setting Tricon Controller IP Addresses

When communication between a TriStation PC and a Tricon controller occurs over a network, the IP address of the controller must be specified on the communication module.

If the controller is not part of a larger network, it may be possible to use the default IP address set when the TriStation 1131 project is downloaded (assuming the correct node number and default IP address are specified in the project).

If you cannot use a default address, there are other ways to set an IP address on a network. All begin with asking the network administrator for the intended IP addresses. The easiest way is to use a Reverse ARP (RARP) server that has been programmed in advance with the intended addresses. Other ways include temporary connection of the TriStation PC to a non-Ethernet module during downloading.

All the procedures for setting the IP address are based on the assumption that the Tricon controller includes at least one communication module with an Ethernet port connected to a network.

To use the procedures, you should know how to:

- Connect the Tricon controller to a network
- Connect the TriStation PC to the controller
- Configure the TriStation 1131 project with the node number of the controller and the IP address

For more information, see the *Communication Guide for Tricon v9-v10 Systems*.

Note Typically, Triconex controllers are located on their own subnet which is connected to a larger network such as a DCS. Your network administrator can set up the subnet for compatibility with the Triconex default IP addresses and can program any routers that lie between the DCS and the Triconex subnet with addressing information about the Triconex controllers.

Topics include:

- Using the Default IP Address for TriStation Communication on page 473
- Setting a Tricon Controller IP Address Using a RARP Server on page 474
- Setting a Tricon Controller IP Address Using an EICM or TCM on page 475
- Testing a Network Connection on page 476

Using the Default IP Address for TriStation Communication

This procedure explains how to use the default IP address for network communication between a Tricon controller and a TriStation PC.

Procedure

1   Connect the Tricon controller to the network using the NET 2 port on the ACM, NCM, or TCM.

2   Power up the controller.

3   Connect the TriStation PC to the network, or directly to a NET 2 port on the ACM, NCM, or TCM.

4   In the TriStation 1131 project, expand the Controller tree, double-click Configuration, and then click TriStation Communication.

5   On the TriStation Communication screen, verify the IP Address is:

   •   192.168.1.1 (Tricon ACM, NCM, or TCM)

   If the controller includes two communication modules, the default address applies to both modules.

   Note   The left and right modules in ACM or NCM slots use the same 48-bit physical MAC address and cannot be connected to the same network.

6   On the Controller tree, click Configuration.

7   Expand Hardware Allocation, click the slot where the communication module is installed, and then click Setup.

   If a communication module is not installed, insert a communication module, and then click Setup.

8   In the Setup dialog box, enter the same IP address specified on the TriStation Communication screen.

9   If the Tricon controller includes a redundant communication module, enter the same IP address for the other slot.

10   On the Controller tree, click the Controller Panel. From the Commands menu, click Connect.

11   Wait about 40 seconds for the module to reset and become active.

   When the module is active, the Active indicator is green.

12   On the Commands menu, click Download All to download the TriStation 1131 project to the Tricon controller.

13   On the TriStation PC, from the Start menu, click the MS-DOS Command Prompt.

14   Type the command *ping* followed by the IP address to be tested.

For example, for an IP address of 206.32.216.43, enter this:

```
ping 206.32.216.43
```

If the network connection is made, the reply includes the IP address followed by byte and time information.

If the connection is not okay, the reply is Request timed out.

Note If you receive a Request timed out reply, check your network cable and port connections to verify they are securely connected, verify your configuration settings are correct, and then retry the ping command.

Setting a Tricon Controller IP Address Using a RARP Server

This procedure explains how to set the IP address of a communication module using a RARP server on the local network. To use this procedure, the network administrator must program the RARP server with the intended IP address for the controller. If this is not possible, use another method to set the IP address.

Procedure

1 Give the network administrator the MAC address, which is:

40-00-00-00-00-00 (Tricon)

2 Ask the network administrator for the IP address that is to be used for the Tricon controller.

3 Connect the Tricon controller to the network through a network port on the communication module.

4 Power up the controller.

During initialization, the communication module sends a request to the RARP server for an IP address that has been mapped to its own 48-bit MAC address.

Note The left and right modules in ACM or NCM slots use the same 48-bit physical MAC address and cannot be connected to the same network.

5 On the TriStation PC, from the Start menu, click the MS-DOS Command Prompt.

6 Enter the command *ping* followed by the IP address to be tested. For example, for an IP address of 206.32.216.43, enter this:

```
ping 206.32.216.43
```

If the network connection is made, the reply includes the IP address followed by byte and time information.

If the connection is not okay, the reply is Request timed out.

Note If you receive a Request timed out reply, check your network cable and port connections to verify they are securely connected, verify your configuration settings are correct, and then retry the ping command.

7 Connect the TriStation PC to the network, or directly to a network port on the communication module.

8   In the TriStation 1131 project, expand the Controller tree, click Configuration, and then click TriStation Communication.

9   On the TriStation Communication screen, specify the Node Number of the controller and the intended IP address.

10   On the Commands menu, click Connect. Wait until the connection is made.

11   On the Commands menu, click Download All to download the TriStation 1131 project to the controller.

Setting a Tricon Controller IP Address Using an EICM or TCM

This procedure explains how to set the IP address of the Tricon controller by initially connecting the TriStation PC to an EICM or TCM serial port, and downloading the TriStation 1131 project. After the address is set, you can disconnect the TriStation PC from the EICM or TCM serial port, and reconnect it to a NET 2 port on the ACM, NCM, or TCM.

Procedure

1   Ask the network administrator for the IP address to be used for the ACM, NCM, or TCM.

2   Connect the TriStation PC to a serial port on the EICM or TCM.

3   Connect the controller to the network using the NET 1 or NET 2 port on the TCM. On the ACM or NCM, use the NET 2 port.

4   In the TriStation 1131 project, configure the following:

   •   The EICM or TCM serial port and NET 2 Ethernet ports

   •   The node number and node name of the controller

   •   The intended IP address

5   Power up the controller.

6   On the Controller tree, click Controller Panel.

7   On the Command menu, click Connect To.

8   On the Connect To screen, select the Serial Port option and the COM port to which the TriStation cable is connected.

9   Connect to the Tricon controller and download the TriStation 1131 project.

     The ACM, NCM, or TCM initializes (resets) and accepts the IP address that you specify in the TriStation 1131 project.

10   On the TriStation PC, from the Start menu, click the MS-DOS Command Prompt.

11   Enter the command *ping* followed by the IP address to be tested. For example, for an IP address of 206.32.216.43, enter this:

```
ping 206.32.216.43
```

     If the network connection is made, the reply includes the IP address followed by byte and time information.

     If the connection is not okay, the reply is Request timed out.

> **Note** If you receive a Request timed out reply, check your network cable and port connections to verify they are securely connected, verify your configuration settings are correct, and then retry the ping command.

12 If the IP address is set, you can disconnect the TriStation PC from the EICM or TCM serial port, and connect it to a NET 2 port or to the network.

Testing a Network Connection

This procedure explains how to test a connection from a Tricon communication module to a network by using the ping command from an MS-DOS command prompt.

The test is performed on the TriStation PC. Before doing the test, you must have set the IP address of the communication module on the network.

Procedure

1 On the TriStation PC, from the Start menu, click the MS-DOS Command Prompt.

2 Type the command *ping* followed by the IP address to be tested. For example, for an IP address of 206.32.216.43, enter this:

```
ping 206.32.216.43
```

If the network connection is made, the reply includes the IP address followed by byte and time information.

If the connection is not okay, the reply is Request timed out.

6

Trident and Tri-GP Communication with TriStation 1131

Overview

This figure shows the main steps for setting up TriStation 1131 communication and the typical order in the project cycle. Communication setup can be done anytime before implementation.

```
                    ┌─────────────────────┐
                    │  Set Up the Project │
                    └─────────────────────┘
                               │
                               ▼
                    ┌─────────────────────┐
                    │     Develop the     │
                    │     Application     │
                    └─────────────────────┘
                               │
                               ▼
                    ┌─────────────────────┐
        ┌──────────▶│   Test with the     │
        │           │     Emulator        │
        │           └─────────────────────┘
   ┌────────────┐              │
   │ Fix Errors │              ▼
   └────────────┘          ◇ Errors? ◇
        └─────────────────────┘
                               │
                               ▼
                    ┌─────────────────────┐
                    │   Configure the     │
                    │     Controller      │
                    └─────────────────────┘
                               │
                               ▼
                    ┌─────────────────────┐       - Establish the physical connection
                    │  Set Up TriStation  │ ═══▶  - Configure the connection to the TriStation PC
                    │   Communication     │       - Set node and IP address of the controller
                    └─────────────────────┘
                               │
                               ▼
                    ┌─────────────────────┐
                    │   Implement on      │
                    │   the Controller    │
                    └─────────────────────┘
```

TriStation 1131 Communication Steps

This checklist includes the items that can be or should be performed to set up communication between a TriStation PC and a Trident or Tri-GP controller.

	Description	See
☐	Connect to a Trident 1.x MP	• Connecting the Trident 1.x MP to a TriStation PC on page 490
☐	Connect to a Trident 1.x CM	• Connecting the Trident 1.x CM to the TriStation PC on page 494
☐	Connect to a Trident/Tri-GP 2.x CM or MP	• Connecting to the Trident or Tri-GP 2.x/3.x Controller for the First Time on page 483 • Connecting the Trident or Tri-GP 2.x/3.x Controller to a TriStation PC on page 499
☐	Connect to a Trident/Tri-GP 3.x CM, CIM, or MP	• Connecting to the Trident or Tri-GP 2.x/3.x Controller for the First Time on page 483 • Connecting the Trident or Tri-GP 2.x/3.x Controller to a TriStation PC on page 499
☐	Configure user access to the Trident 2.x or Tri-GP CM	• Controlling Access to the CM or CIM on page 507
☐	Configure user access to the Trident or Tri-GP 3.x CIM	• Controlling Access to the CM or CIM on page 507
☐	Set up printing	• Configuring Trident or Tri-GP Controller Printing on page 514

Configuring the TriStation PC

This section explains the setup required for a network connection from the TriStation PC.

Topics include:

Note   If you will only be connecting to the Trident or Tri-GP controller via a serial connection, you can skip this section. Please note, however, that the preferred method of connecting the TriStation PC to the Trident or Tri-GP controller is via a network connection.

Installing a NIC Card in a TriStation PC

This procedure explains how to install a network interface card (NIC) in a TriStation PC to be connected to a Trident or Tri-GP MP or CM.

Procedure

1   Install the network interface card by following the manufacturer's instructions. *Do not change the factory default settings on the NIC card.*

2   Connect the network interface card directly to a CM or MP network port on the Trident or Tri-GP controller, or to an Ethernet hub.

3   Run the diagnostics provided with the network interface card according to the manufacturer's instructions.

Installing DLC or TCP/IP Protocol on a TriStation PC

These procedures explain how to install DLC or TCP/IP protocol on a TriStation PC.

- The DLC protocol is required only for connecting to a Trident 1.x MP.
- The TCP/IP protocol is required for Trident or Tri-GP CM connection.

Installing TCP/IP on Windows XP or Windows Server 2003

1   On the Start menu, click Control Panel, and then double-click Network Connections.

2   Right-click the network connection where you want to install the protocol, then click Properties.

3   Do one of the following:

- On the General tab, if the TCP/IP protocol is checked on the list of installed components, it means the protocol is installed and you are finished with this procedure.
- If the TCP/IP protocol is not checked, go to the next step to continue the installation.

4   On the General tab, click Install.

5   In the Select Network Component Type dialog box, click Protocol, and then click Add.

6   Click the TCP/IP protocol, and then click OK.

Installing TCP/IP on Windows 7 or Windows Server 2008 R2

1   On the Start menu, click Control Panel, open Network and Internet, and then click Network and Sharing Center.

2   In the Network and Sharing Center, click Manage Network Connections.

3   Right-click the network connection you want to change, and then click Properties.

4   If prompted, enter the administrator's password or confirm the operation.

5   On the Networking tab, under This connection uses the following items, click Internet Protocol Version 4 (TCP/IPv4), and then click OK.

> **Note**   Internet Protocol Version 4 (TCP/IPv4) must be installed to allow a TriStation 1131 application to connect to a Trident or Tri-GP controller. Do not install Internet Protocol Version 6 (TCP/IPv6).

Installing DLC on Windows XP, Windows Server 2003/2008 or Windows 7

Installing the DLC protocol on a Windows XP, Windows Server 2003, Windows Server 2008 R2 (32-bit only), or Windows 7 (32-bit only) workstation is a 3-step process. The DLC protocol cannot be installed on Windows 64-bit systems. As a result, you cannot connect to a Trident 1.x MP on a Windows 64-bit system.

Note   If you have already installed the DLC protocol on your workstation, you can configure it to start automatically each time you start your workstation by changing a registry value. Go to HKEY_LOCAL_MACHINE\SYSTEM\ControlSet001\Services\Dlc, and then change the Start value to 1.

Step 1: Download the DLC Protocol Installation Program

1   Open your Internet browser, and enter the following URL in the address field: http://www.microsoft.com/downloads/

2   In the Search for a Download section, perform a search for "DLC Protocol" and then go to the download page for the DLC protocol for Windows XP.

3   Follow the instructions on the download page to start the download process.

4   When prompted, save the dlc.exe file to your local drive.

5   When the download is complete, double-click the self-extracting dlc.exe file to unzip the five DLC protocol files.

Save the files to a location on your local drive that will be easy to remember (for example, C:\DLC).

Step 2: Modify the .INF File

1 Go to the location where you saved the DLC protocol files in step 4 of the previous section.

2 Right-click on NetDLC.inf, and select Open with from the shortcut menu that appears. Then select Notepad from the Open with dialog box and click OK. The .inf file opens in Notepad.

3 Scroll down until you see the following section:

```
;---------------------------------------------------------------------
; DLC Service Definitions and Settings
;---------------------------------------------------------------------
[DLC_Service_Inst]
DisplayName      = %DLC_Desc%
ServiceType      = 1 ;SERVICE_KERNEL_DRIVER
StartType        = 3 ;SERVICE_MANUAL_START
ErrorControl     = 1 ;SERVICE_ERROR_NORMAL
ServiceBinary    = %12%\dlc.sys
AddReg           = AddReg_Service_Inst
Description      = %DLC_Desc%

[AddReg_Service_Inst]
HKR,"Parameters",,%FLG_ADDREG_KEYONLY%,
```

4 Change the value for StartType from 3 to 1. This ensures that the DLC protocol will start automatically each time you start your workstation.

5 Save the file and then exit Notepad.

Step 3: Configure the DLC Protocol Network Connection

1 Go to the location where you saved the DLC protocol files in Step 1.

2 Double-click install.cmd to start the installation script.

3 On the Start menu, click Control Panel, and then double-click Network Connections.

4 Right-click the network connection where you want to install the protocol, then click Properties.

5 On the General tab, click Install.

6 In the Select Network Component Type dialog box, click Protocol, and then click Add.

7 Click the DLC Protocol, and then click OK.

8 Once installation is complete, you can close the Network Connections dialog box.

Connecting to the Trident or Tri-GP 2.x/3.x Controller for the First Time

The first time you connect to the Trident or Tri-GP 2.x/3.x controller, you are limited to the following two connection options:

- Serial connection to the communication module (CM or CIM), *or*
- Network connection to the Left MP, using the default IP address only

You cannot connect to the controller via a network connection to the CM/CIM or the Right or Middle network ports on the MP until you have completed all of the following tasks:

- Configure the CM/CIM and/or MP (Right and Middle ports) network connection in TriStation 1131, including configuring your own IP addresses for the desired network port(s).
- Successfully connect to the controller via the first-time connection options described above.
- Download your application to the controller using the Download All command.

Once your application—with the IP addresses for the other MP and/or CM/CIM network ports correctly configured—has been downloaded to the controller, you can disconnect from the Trident or Tri-GP controller and reconnect using your desired network connection.

Note   After you have successfully configured your network configuration for the CM/CIM and/or the Right and Middle MP, you can change the default IP address for the Left MP to your desired IP address for future network connections.

Connecting Via the Serial Connection (Recommended)

Invensys recommends using the serial connection for the initial connection to the Trident 2.x/3.x or Tri-GP controller because it is less complex to configure and thus easier to successfully connect to the CM/CIM through the serial port.

Once you have successfully connected to the CM/CIM and downloaded the initial configuration to the Trident or Tri-GP controller via the serial connection, you can go back and configure the more complex network connection, without worrying about losing the ability to communicate with the controller altogether. See Connecting to the Trident or Tri-GP Controller via a Serial Connection on page 484 for more information.

Connecting via the Left MP Network Port

If you need to use a network connection for the initial connection to the controller, you must connect using the default IP address (192.168.255.*n*) with the Left MP.

Your own IP addresses for other MP and CM/CIM modules cannot be used for connecting to the controller until your application—with the IP addresses for the other MP and/or CM/CIM network ports correctly configured—has been downloaded to the controller at least once, using the Download All command. See Connecting to the Trident or Tri-GP Controller via a Network Connection on page 489 for more information.

Connecting to the Trident or Tri-GP Controller via a Serial Connection

This section explains how to make a direct (point-to-point) serial connection between a Trident or Tri-GP 2.x/3.x communication module and a TriStation PC.

Note   You cannot connect the TriStation PC to the Trident 1.x controller via a serial connection. See Connecting to the Trident or Tri-GP Controllervia a Network Connection on page 489 for instructions on connecting the TriStation PC to a Trident 1.x.

Port 3 on the CM and CIM is the only serial port that supports TriStation communication. If port 3 on the CM or CIM fails, you can connect to TriStation 1131 using the NET 1 or NET 2 port; see the *Communication Guide for Trident v2-v3 Systems* for more information.

Topics include:

- When to Use the Trident or Tri-GP Serial Connection on page 484
- Connecting a Trident or Tri-GP 2.x/3.x Serial Port to a TriStation PC on page 486
- Configuring the TriStation 1131 Serial Connection on page 487

When to Use the Trident or Tri-GP Serial Connection

The preferred means for connecting the TriStation PC to the Trident or Tri-GP controller is via a network connection. Invensys recommends connecting the TriStation PC to the Trident or Tri-GP controller via a serial connection only in the following scenarios.

Connecting to the Trident or Tri-GP Controller for the First Time

The first time you connect to the Trident or Tri-GP controller, Invensys recommends making a serial connection to the communication module, because it is less complex to configure and thus easier to successfully connect to the communication module through the serial port.

Once you have successfully connected to the communication module and downloaded the initial configuration to the Trident or Tri-GP controller via the serial connection, you can go back and configure the more complex network connection without worrying about losing the ability to communicate with the controller altogether.

See Connecting to the Trident or Tri-GP 2.x/3.x Controller for the First Time on page 483 for more information.

Connecting to the Trident or Tri-GP Controller When the Network Is Down

When network communication has been interrupted due to hardware or other problems with the network, the serial connection can be used as a backup means of communicating with the Trident or Tri-GP controller. Once the network problems have been resolved, you should restore the network connection to the Trident or Tri-GP controller.

Connecting to the Trident or Tri-GP Controller When the Access Control List has Been Misconfigured

If you misconfigure the access control list, you could accidentally lock yourself out of a network connection to the Trident or Tri-GP controller. Once you enable client access control by selecting the Enable Access List check box, you **must** configure at least one client with TriStation Read/Write access before you save the configuration.

If this is not done, you will be unable to connect to the Trident or Tri-GP controller again after your next download, preventing you from making further changes to the application running on the controller, including changes to the access control list. If this happens, you can use the serial connection to connect to the Trident or Tri-GP controller and download changes to the access control list.

See Controlling Access to the CM or CIM on page 507 for more information.

Connecting a Trident or Tri-GP 2.x/3.x Serial Port to a TriStation PC

This procedure explains how to connect serial port 3 on the Trident or Tri-GP 2.x/3.x communication module to a TriStation PC.

Invensys provides a serial cable that has a 9-pin connector on each end. If the COM port on the PC has a 25-pin connector, you can use a Triconex 25-pin to 9-pin adapter. If you need other parts, you can purchase them from another manufacturer. For more information, see the *Communication Guide for Trident v2-v3 Systems*.

Procedure

1   Connect one end of the serial cable to serial port 3 on the CM or CIM.

2   Connect the other end of the serial cable to a COM port on the TriStation PC. The COM port is typically numbered COM1, COM2, COM3, or COM4.
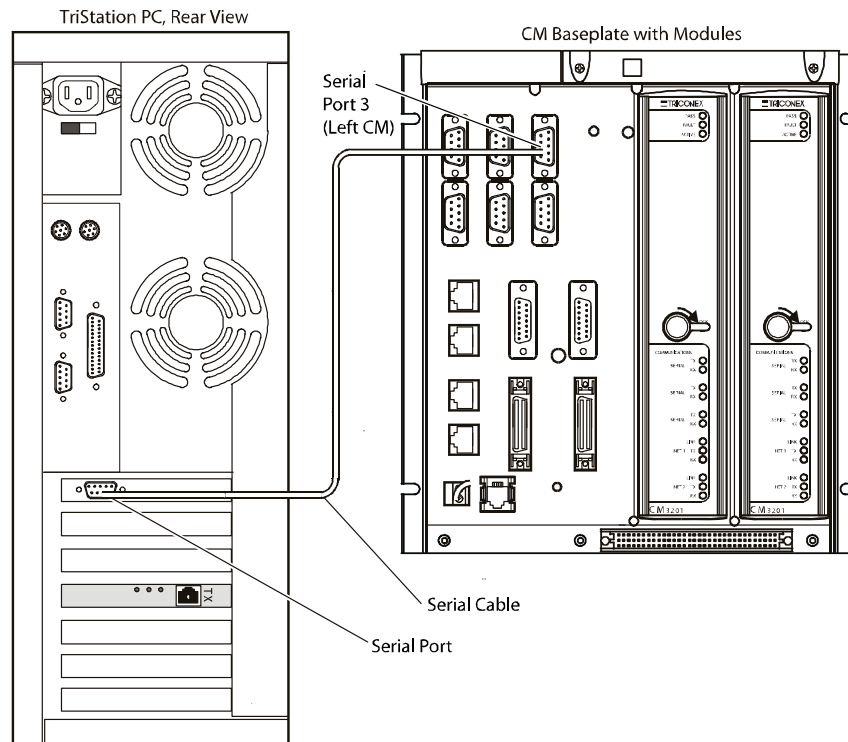
Figure 33   Connecting a Trident or Tri-GP 2.x/3.x CM Serial Port to the TriStation PC

Configuring the TriStation 1131 Serial Connection

This procedure explains how to configure a Trident or Tri-GP 2.x/3.x communication module serial port that is connected to a TriStation PC.

Procedure

1 Expand the Controller tree, double-click Configuration, and then click TriStation Communication.

2 Specify these properties on the TriStation Communication screen.

   Note   The data displayed on this screen is used by TriStation 1131 only to connect to a Trident or Tri-GP communication port. The data that you enter will not be downloaded to the Trident or Tri-GP controller.

Property	Action
Serial Connection (Trident/Tri-GP 2.x and later only)	Select this check box.
Node Name	Enter the name of the Trident or Tri-GP controller. You can use a default name, or enter your own user-defined name. The default names are TRINODE01 through TRINODE63.
Serial Port	Select the COM port on the TriStation PC to which the serial cable is connected.
	You cannot change the default baud rate of 115200.

3 On the Configuration tree, expand Hardware Allocation, double-click CM or CIM, and then click Setup.

4 Specify these properties on the Serial Ports tab of the CM or CIM Setup dialog box.

Property	Action
Port	Select the port that the TriStation PC is attached to. You **must** select port 3, as this is the only serial port supported for TriStation 1131 connection.
Protocol	Select TriStation.

TriStation 1131 Developer's Guide, 4.10.1

5 Click OK.

Connecting to the Trident or Tri-GP Controllervia a Network Connection

This section explains how to make a network connection between a Trident or Tri-GP communication module (CM or CIM) or main processor (MP), and a TriStation PC. This can be a direct connection from the Trident or Tri-GP controller to the PC, or a connection through a router, hub, or media converter. A router or hub is not required if you do not need to connect any additional devices besides the Trident or Tri-GP controller and the PC.

To set up the connection, you must:

- Install a network interface card and the TCP/IP protocol on the PC.
- Set the node number of the controller.
- Connect the PC to a network port on the communication module or MP.
- Configure the connection in the TriStation 1131 project.

> **CAUTION**
>
> The node setting (on the MP Baseplate) must match the node number specified in the TriStation 1131 project. For instructions on changing the MP node setting, see the *Planning and Installation Guide for Trident v2-v3 Systems*.

For instructions on installing a network interface card and the TCP/IP protocol on the TriStation PC, see Configuring the TriStation PC on page 480.

Topics include:

Note   If you are connecting the Trident or Tri-GP 2.x/3.x controller to the TriStation PC via serial port, see

Connecting the Trident 1.x MP to a TriStation PC

This section explains how a Trident 1.x MP can be used for a network connection to a TriStation PC using the DLC protocol. This can be a direct connection from the MP to the PC, or a connection through a hub on a network.

Communication between the Trident 1.x MP and the TriStation PC requires the DLC protocol to be installed on the PC. For more information, see Configuring the TriStation PC on page 480.

Topics include:

- Directly Connecting a Trident 1.x MP to a TriStation PC on page 490
- Connecting a Trident 1.x MP to a TriStation PC Using a Hub on page 491
- Configuring the TriStation 1131 Connection on page 492

Note   If you are connecting the Trident 1.x controller to the TriStation PC via the CM, see Connecting the Trident 1.x CM to the TriStation PC on page 494.

Directly Connecting a Trident 1.x MP to a TriStation PC

This procedure explains how to directly connect a TriStation PC to a network port on a Trident 1.x MP Baseplate using a 10BaseT cross-over cable.

Procedure

1   Attach one end of the cross-over cable to one of the RJ-45 connectors on the MP Baseplate. This is typically MP A, as shown in the figure.

2   Attach the other end of the cross-over cable to the network interface card in the PC.
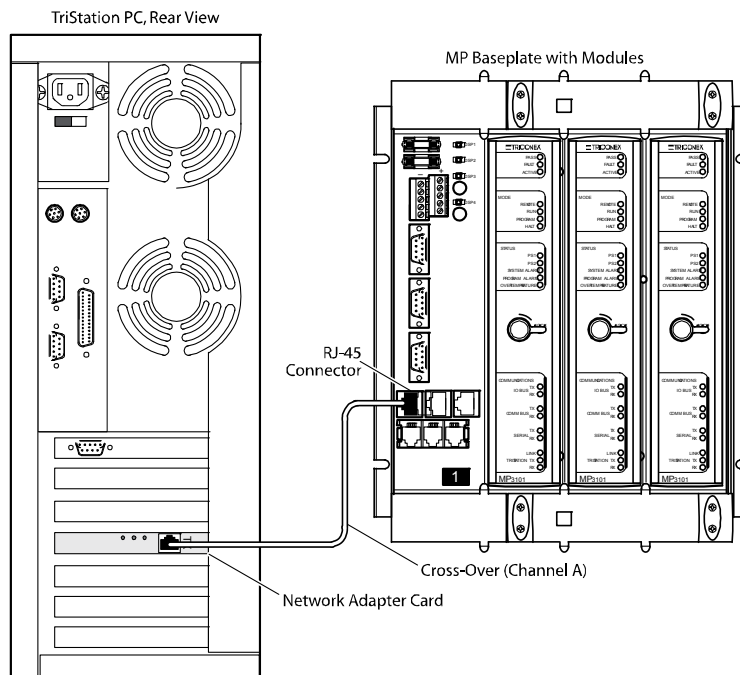
Figure 34   Connecting the TriStation PC to a Trident 1.x Main Processor

Connecting a Trident 1.x MP to a TriStation PC Using a Hub

This procedure explains how to connect a Trident 1.x MP to a TriStation PC using a 10BaseT straight-through cable and a hub.

Procedure

1   Attach at least one 10BaseT straight-through cable from an RJ-45 connector on an MP Baseplate to the hub.

   Note   Using more than one cable provides redundancy for the TriStation connection. If you use only one cable during live operation, you have to unplug it and move it to another RJ-45 connector if the original connection fails.

2   Attach the network interface card in the TriStation PC to the hub using another 10BaseT straight-through cable.
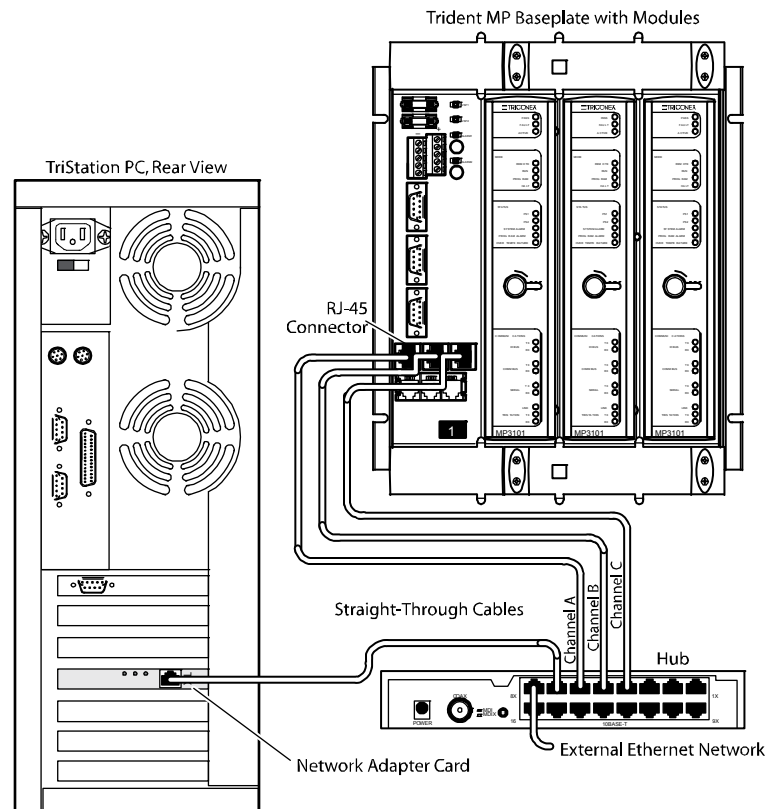
Figure 35   Connecting the TriStation PC to the Trident 1.x Main Processor Using a Hub

Configuring the TriStation 1131 Connection

This procedure explains how to configure a Trident 1.x MP connection to a TriStation PC.

Procedure

1 Expand the Controller tree, and double-click Configuration.

2 On the Configuration tree, click TriStation Communication.

3 Specify these properties on the TriStation Communication screen.

Property	Action
Select Connection	Select the Main Processor Connection (Trident 1.x only) check box.
Node Number	Enter the number specified on the address plug on the MP Baseplate.
Node Name	Enter a name with eight or fewer characters to identify the Trident controller.
Main Processor Setup	Select Left, Middle, or Right to specify which MP port is connected to the TriStation PC.
NIC Index	Enter the index position of the network interface card in the TriStation PC.

Note   The data displayed on this screen is used by TriStation 1131 only to connect to a Trident communication port. The data that you enter will not be downloaded to the Trident controller.

4 On the Configuration tree, expand Hardware Allocation, and then double-click the Main Processors (MP/IOP1).

5 In the Properties dialog box, click Setup.

6 In the MP Setup dialog box, click the Network Ports tab.
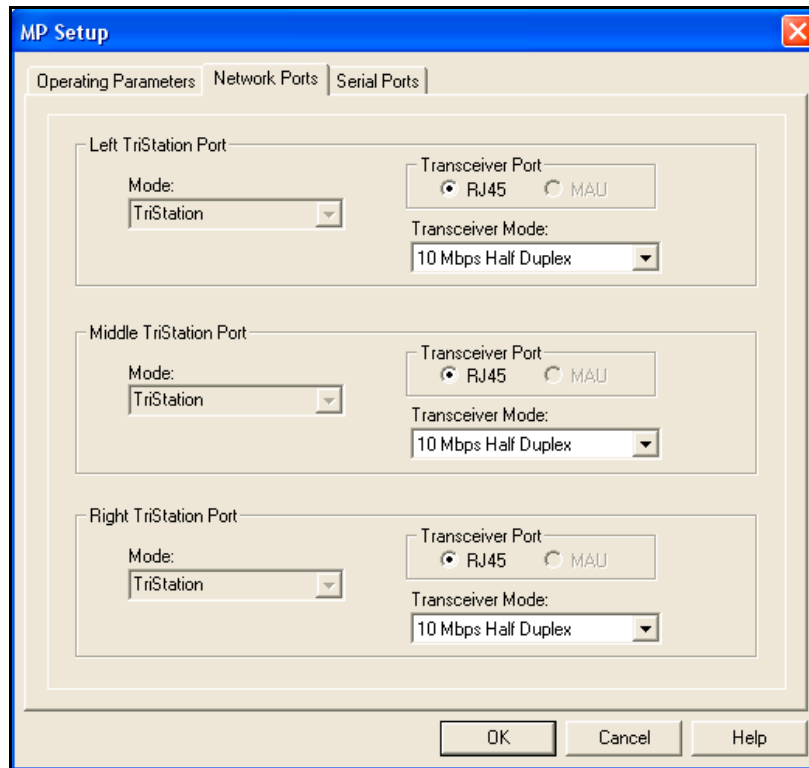
7   For the port that is physically connected to the TriStation PC (Left, Middle, or Right) specify the Transceiver Mode to match the installed hardware.

8   Click OK to save your changes.

Connecting the Trident 1.x CM to the TriStation PC

This section explains how to configure a Trident 1.x CM connection to the TriStation PC. Topics include:

- Directly Connecting a Trident 1.x CM to a TriStation PC on page 494
- Connecting a Trident 1.x CM to a TriStation PC Using a Hub on page 495
- Configuring the TriStation 1131 Connection on page 496

Note If you are connecting the Trident 1.x controller to the TriStation PC via the MP, see Connecting the Trident 1.x MP to a TriStation PC on page 490.

Directly Connecting a Trident 1.x CM to a TriStation PC

This procedure explains how to directly connect a Trident 1.x CM to a TriStation PC using a cross-over cable.

For a NET 1 port, you must use a 10BaseT cable. For a NET 2 port, you can use either a 10BaseT or 100BaseTX cable. On the CM baseplate, you can attach the cable to an RJ-45 connector or to a MAU. For information about MAUs, see the *Communication Guide for Trident v1 Systems*.

Procedure

1 Attach one end of a cross-over cable to a NET 1 or NET 2 connector on the CM baseplate, as shown in this example.

2 Attach the other end of the cross-over cable to the network interface card in the TriStation PC.
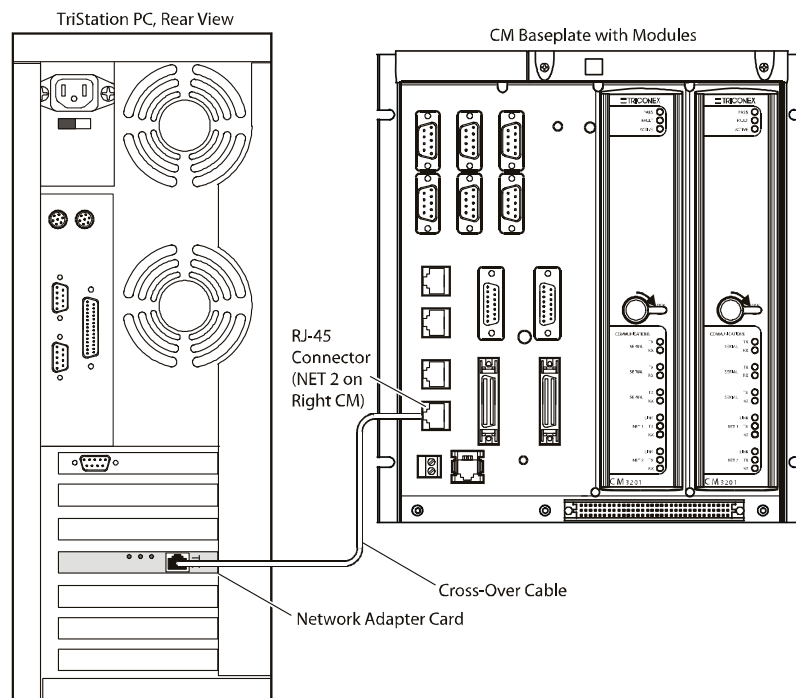
Figure 36 Connecting the TriStation PC Directly to a Trident 1.x CM

Connecting a Trident 1.x CM to a TriStation PC Using a Hub

This procedure explains how to connect a Trident 1.x CM to a TriStation PC using a straight-through cable and a hub.

For a NET 1 port, you must use a 10BaseT cable. For a NET 2 port, you can use either a 10BaseT or 100BaseTX cable. On the CM baseplate, you can attach the cable to an RJ-45 connector or to a MAU. For information about MAUs, see the *Communication Guide for Trident v1 Systems*.

Procedure

1 Attach one end of a straight-through cable to a NET 1 or NET 2 connector on the CM baseplate.

2 Attach the other end of the straight-through cable to a network hub, as shown in the example below.

3 Connect the TriStation PC to the hub using another straight-through cable.
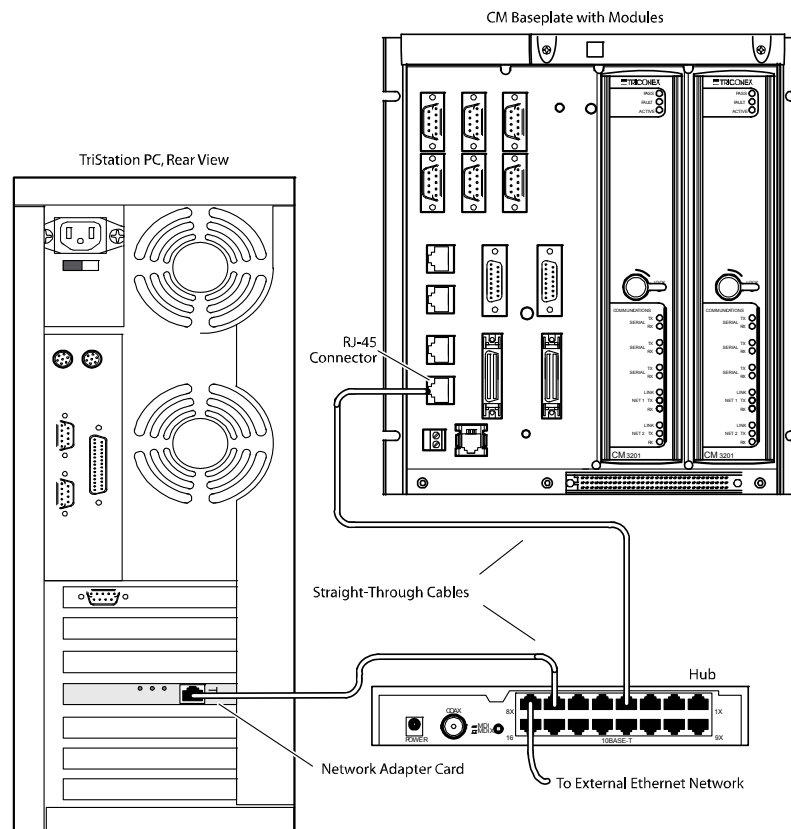
Figure 37 Connecting the TriStation PC to a Trident 1.x CM Using a Hub

Configuring the TriStation 1131 Connection

This procedure explains how to configure a Trident 1.x CM connection to a TriStation PC.

Before you begin this procedure, you must determine the IP address to use for the CM. If the connection goes through a gateway or a router, you also need IP addresses for those devices. Typically, you can get the necessary IP addresses from your network administrator or Information Technology department. See Setting Trident or Tri-GP Controller IP Addresses on page 521.

Procedure

1. Expand the Controller tree, and double-click Configuration.

2. On the Configuration tree, click TriStation Communication.

3. Specify these properties on the TriStation Communication screen.

Property	Action
Select Connection	Select the Network Connection check box.
Node Number	Enter the number specified on the address plug on the MP baseplate.
Node Name	Enter a name that contains eight or fewer characters to identify the Trident controller.
IP Address	Enter the IP address.

Note The data displayed on this screen is used by TriStation 1131 only to connect to a Trident communication port. The data that you enter will not be downloaded to the Trident controller.

4. On the Configuration tree, double-click the CM (COM: CM).

5 In the Properties dialog box, click Setup.

6 Specify these properties for the NET 1 or NET 2 port, depending on which is connected to the TriStation PC.

Property	Action
Slot Selection	Select Left Slot or Right Slot, depending on which slot contains the module that is connected to the TriStation PC.
Mode	For the TriStation connection, select Open Network.
	For each CM on a baseplate, you can select Open Network for either NET 1 or NET 2, but not for both ports.
Privilege	Select Read or Read/Write to specify access privileges for external devices on the network.
	A TriStation 1131 application must use the Privilege option in conjunction with the MP.REMOTE_WRT_ENBL control attribute (and possibly other write controls) to enable writes by external devices.
Transceiver Port	Select RJ-45 or MAU depending on the type of CM baseplate port to which you have physically attached the TriStation cable.

Property	Action
Transceiver Mode	Select the Auto mode if the TriStation cable can auto-negotiate to either 10 or 100 megabits per second.
	If your cable operates at only one speed, select the appropriate speed from the list.
IP Address	If using the default node number, do not change this property (leave blank).
	If using a different node number, enter the IP address that identifies the controller on the network. This must be the same address you entered in step 2.
IP Subnet Mask	Get the subnet mask from your network administrator.
Default Gateway IP Address	If the CM connection to the TriStation PC goes through a default gateway, enter the IP address of the gateway.
Time Synchronization	Select None. This property does not apply to TriStation communication.

7 Click OK to save your changes.

Connecting the Trident or Tri-GP 2.x/3.x Controller to a TriStation PC

This section explains how to connect the Trident or Tri-GP 2.x/3.x controller to the TriStation PC via a network port on the communication module (CM or CIM) or MP.

If you will be using the default IP address for the Trident or Tri-GP controller (192.168.255.<*node*>), you must connect the controller to the TriStation PC via a network port on the Left MP. The network ports on the Middle MP, Right MP, and CM/CIM do not have default IP addresses; you must configure the IP addresses for these ports based on your network configuration.

If you want to be able to retrieve communication status information from the CM/CIM, you must connect the controller to the TriStation PC via a network port on the CM/CIM.

Note   If the TriStation PC is connected only to the MP, you will not be able to view communication status information in the Enhanced Diagnostic Monitor. See the *Enhanced Diagnostic Monitor User's Guide* for more information.

CAUTION

If you will be connecting to the Trident or Tri-GP 2.x/3.x controller for the *very first time* via a network connection, you must use the default IP address (192.168.255.<*node*>), and connect to the controller via the Left MP.

See Connecting to the Trident or Tri-GP 2.x/3.x Controller for the First Time on page 483 for more information.

Topics include:

- Directly Connecting a Trident or Tri-GP 2.x/3.x Network Port to a TriStation PC on page 500
- Connecting a Trident or Tri-GP 2.x/3.x Network Port to a TriStation PC Using a Hub on page 501
- Configuring the TriStation 1131 Network Connection on page 502

Directly Connecting a Trident or Tri-GP 2.x/3.x Network Port to a TriStation PC

This procedure explains how to directly connect a Trident or Tri-GP 2.x/3.x communication module or MP network port to a TriStation PC using a cross-over cable.

- On the CM, for a NET 1 port, you must use a 10BaseT cable. For a NET 2 port, you can use either a 10BaseT or 100BaseTX cable.

- On the CIM, for a NET 1 or NET 2 port, you must use a 100BaseTX cable.

- On the MP baseplate, for a TriStation port, you must use a 10BaseT cable.

Procedure

1 Attach one end of a cross-over cable to a NET 1 or NET 2 connector on the CM baseplate, as shown in this example, or to a TriStation port on the MP baseplate.

2 Attach the other end of the cross-over cable to the network interface card in the TriStation PC.
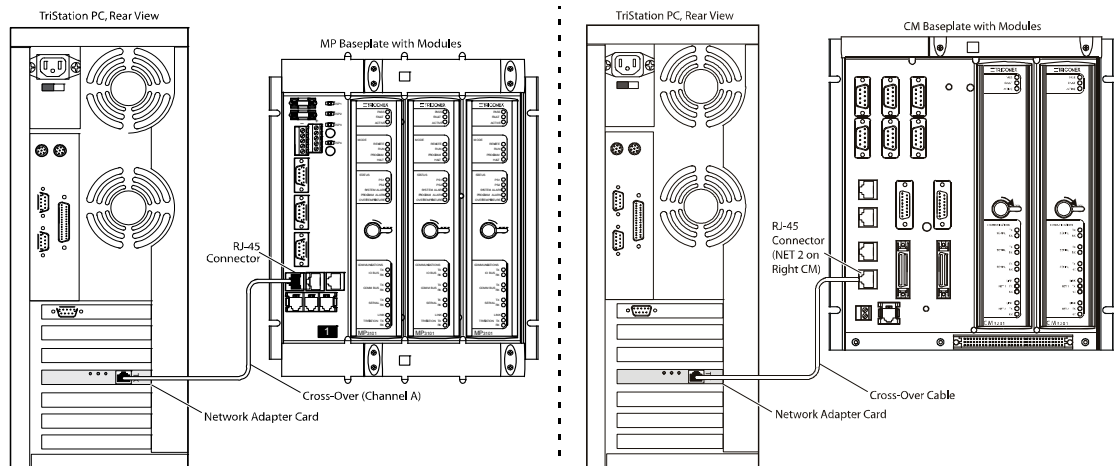
Figure 38 Connecting the TriStation PC Directly to a Trident or Tri-GP 2.x/3.x MP (left) or CM (right) Using a Hub

Connecting a Trident or Tri-GP 2.x/3.x Network Port to a TriStation PC Using a Hub

This procedure explains how to connect a Trident or Tri-GP 2.x/3.x communication module or MP network port to a TriStation PC using a straight-through cable and a hub.

- On the CM, for a NET 1 port, you must use a 10BaseT cable. For a NET 2 port, you can use either a 10BaseT or 100BaseTX cable.

- On the CIM, for a NET 1 or NET 2 port, you must use a 100BaseTX cable.

- On the MP baseplate, for a TriStation port, you must use a 10BaseT cable.

Procedure

1 Attach one end of a straight-through cable to a NET 1 or NET 2 connector on the CM baseplate, or to a TriStation port on the MP baseplate.

2 Attach the other end of the straight-through cable to a network hub, as shown in the example below.

3 Connect the TriStation PC to the hub using another straight-through cable.
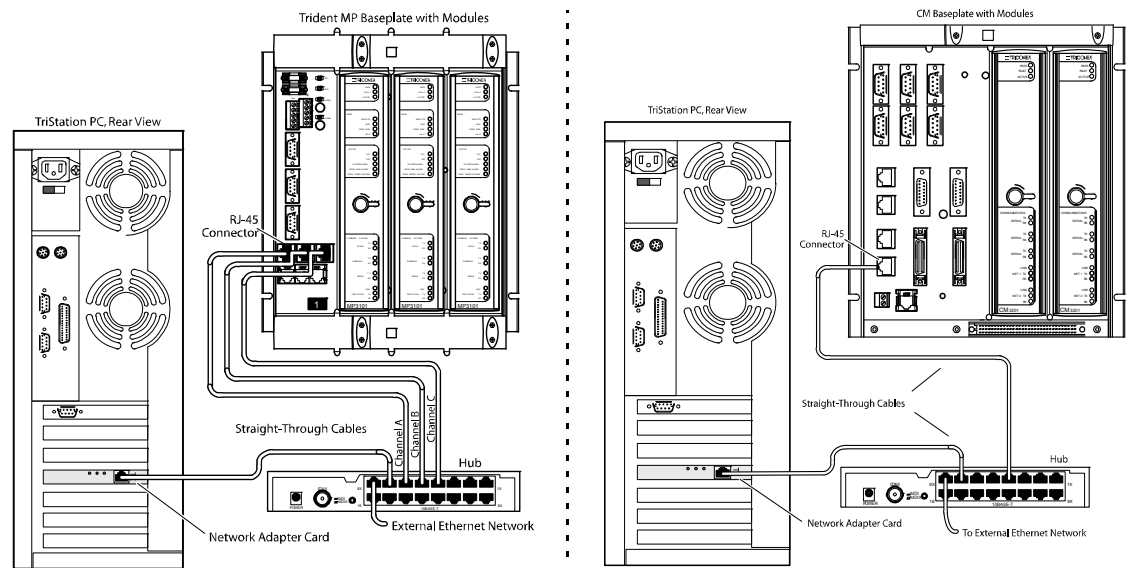
Figure 39 Connecting the TriStation PC to a Trident or Tri-GP 2.x/3.x MP (left) or CM (right) Using a Hub

Configuring the TriStation 1131 Network Connection

This procedure explains how to configure a Trident or Tri-GP 2.x/3.x network connection to a TriStation PC.

Before you begin this procedure, you must determine the IP address to use for the communication module or MP. If the connection goes through a gateway or a router, you also need IP addresses for those devices. Typically, you can get the necessary IP addresses from your network administrator or Information Technology department. See Setting Trident or Tri-GP Controller IP Addresses on page 521.

Procedure

1   Expand the Controller tree, and double-click Configuration.

2   On the Configuration tree, click TriStation Communication.

3   Specify these properties on the TriStation Communication screen.

Property	Action
Select Connection	Select the Network Connection check box.
Node Number	Enter the number specified on the address plug on the MP baseplate.
Node Name	Enter a name that contains eight or fewer characters to identify the Trident or Tri-GP controller.

Property	Action
IP Address	Enter the IP address for the CM/CIM or MP network port you will be connecting to. Each node has seven connection options:
	• Left MP
	• Middle MP
	• Right MP
	• Left CM/CIM - NET 1
	• Left CM/CIM - NET 2
	• Right CM/CIM - NET 1
	• Right CM/CIM - NET 2
	The default IP address is 192.168.255.*n*, where *n* is the node number of the controller. The default IP address is for connection to the Left MP only.
	To use the default IP address, click the browse ... button, and in the dialog box that appears, select the IP address for the node you are configuring.
	Note: Your own IP addresses for other MP and CM/CIM modules cannot be used for connecting to the controller until the control program—with the IP address configuration—has been downloaded to the controller at least once, using the Download All Command. See Connecting to the Trident or Tri-GP 2.x/3.x Controller for the First Time on page 483 for more information.
TriStation UDP Port Number	Specify the UDP port to use for the connection to a Trident or Tri-GP 2.x/3.x controller with a CM/CIM installed. The default is 1502.
	This must be the same value as the TriStation UDP Port Number property in the CM/CIM Setup dialog box.
	Required only for a connection to a Trident or Tri-GP 2.x/3.x node with a CM/CIM installed.

Note   The data displayed on this screen is used by TriStation 1131 only to connect to a Trident or Tri-GP communication port. The data that you enter will not be downloaded to the Trident or Tri-GP controller.

4   Do one of the following:

- If the TriStation PC is connected to the CM/CIM, go to step 5.

- If the TriStation PC is connected to the MP, go to step 8.

5   On the Configuration tree, expand Hardware Allocation, double-click CM or CIM, and then click Setup.
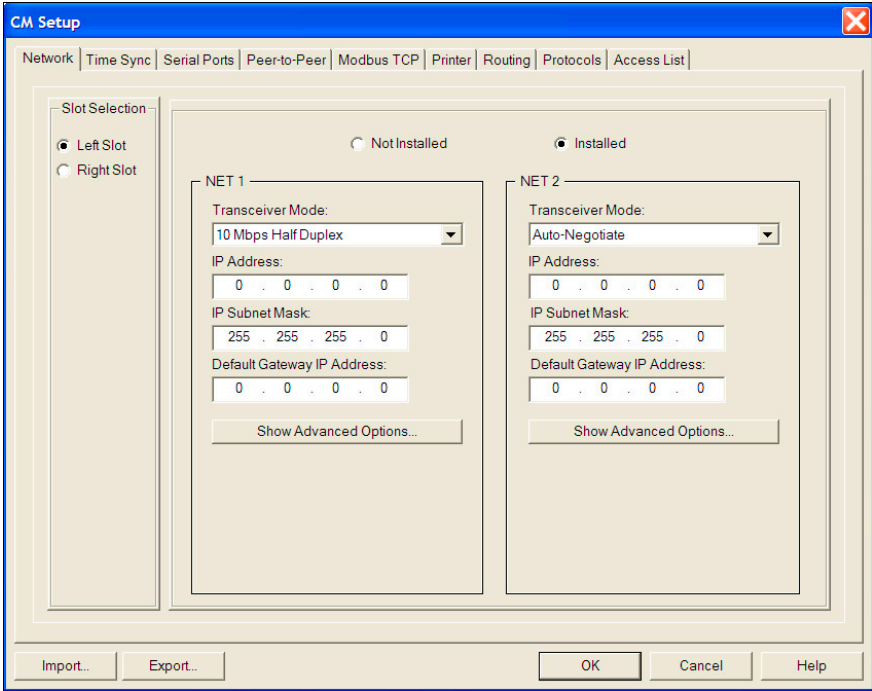
6 On the Network tab of the CM/CIM Setup dialog box, specify these properties for the NET 1 or NET 2 port, depending on which is connected to the TriStation PC.

Property	Action
Slot Selection	Select Left Slot or Right Slot, depending on which slot contains the module that is connected to the TriStation PC.
Installed	Select this property for all installed modules.
IP Address	If using a default IP address, leave blank.
	If not, enter the IP address that identifies the controller on the network. This must be the same IP address entered on the TriStation Communication screen.
IP Subnet Mask	If using a default IP Subnet Mask, leave blank.
	Otherwise, get the subnet mask from your network administrator.
Default Gateway IP Address	If the CM connection to the TriStation PC goes through a default gateway, enter the IP address of the gateway.

7 Go to step 13.

8 On the Configuration tree, expand Hardware Allocation, and then double-click the Main Processors (MP/IOP1).

9 In the Properties dialog box, click Setup.

10 In the MP Setup dialog box, click the Network Ports tab.
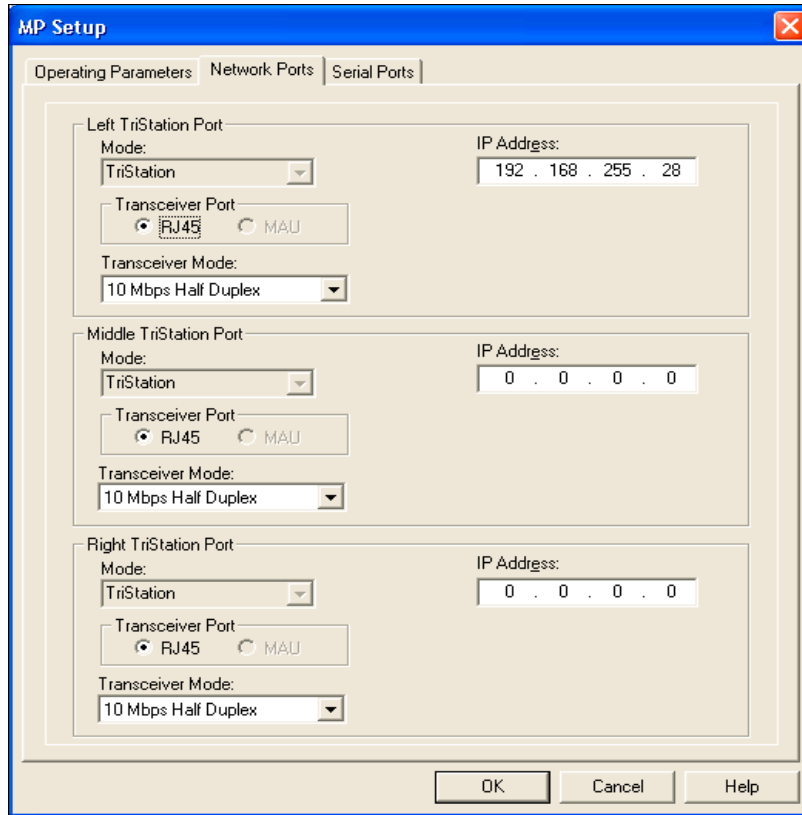
11   For the port that is physically connected to the TriStation PC (Left, Middle, or Right) specify the Transceiver Mode to match the installed hardware.

12   Specify the IP address for the port. This must be the same IP address entered on the TriStation Communication screen in step 3.

13   Click OK to save your changes.

Specifying the Trident or Tri-GP Default Connection Type

This procedure explains how to specify the default connection setting in the Connect To dialog box, which appears when you establish communication between a TriStation PC and a controller. The connection setting—Network, Serial, or Main Processor Connection—is an initial setting and can be changed when you use the Connect command.

Procedure

1 Expand the Configuration tree, double-click Configuration, and then click TriStation Communication.

2 Verify that the Network Connection Setup (for a network connection), Main Processor Connection Setup (for a MP connection), or TriStation PC (for a serial connection) properties are correctly configured.

See the following for additional information:

- Connecting to the Trident or Tri-GP Controller via a Serial Connection on page 484

- Connecting to the Trident or Tri-GP Controllervia a Network Connection on page 489

3 Under Default Connection, select one of the following:

- Network Connection

- Main Processor (for Trident 1.x only)

- Serial Connection (for Trident or Tri-GP 2.x/3.x only)

The next time you establish communication between the TriStation PC and the Trident or Tri-GP controller, the default connection setting you selected will be used.

Note If only one connection type is selected under Select Connections, the default connection is automatically set based on it, and cannot be changed.

Controlling Access to the CM or CIM

The CM and CIM both feature an *access control list* that gives you the ability to control who can access communication module resources through the module's network ports, and each user's level of access. The access control list is available only with the following controllers:

- Trident and Tri-GP 2.x

- Trident and Tri-GP 3.x

Note   The information in this section does not apply to Trident 1.x systems.

Topics include:

What Are Communication Module Resources?

A *resource* is any service or information provided by the communication module through the supported communications protocols. Examples of these resources include:

- Access to the controller via TriStation 1131 (ability to perform a Download Changes or Download All).

- Access to Trident or Tri-GP diagnostic information via the Enhanced Diagnostic Monitor.

- Access to information provided in applications such as SOE Recorder or DDE Server that use the TSAA protocol.

- Access to any other applications that use the TSAA protocol.

- Access to the Trident or Tri-GP 3.x controller via OPC UA.

CAUTION   By default, TSAA clients have write access to the NET 1 and NET 2 ports on Trident or Tri-GP 2.x/3.x communication modules. Depending on your configuration, this may create a security issue. To disable write access by TSAA clients, you **must** enable and configure the access control list.

How Is Access Controlled?

Access is controlled via client IP addresses. You can control access for a single IP address (one client), or for a group of IP addresses (a group of clients).

If you want to group clients into a single access list entry, they must be physically separated in a sub-network, and a *network address mask* must be used to group them in the access list. A network address mask of 255.255.255.255 restricts an access list entry so that it applies only to the specific IP address identified in the entry. A network address mask of 255.255.255.0 applies an access list entry to *any* client on the same subnet as the IP address identified in the entry. Other network address masks may also be used, depending on your network structure.

For example, if you want two clients with IP addresses of 192.168.1.134 and 192.168.1.65 to share the same access permissions, and there are no other clients on the same subnet, you can group them in the access list by setting the IP address for a single entry as 192.168.1.*x* and the network address mask to 255.255.255.0.

For each IP address or group of IP addresses, you can set the access level, the protocols the client can use to access the communication module, and the network ports the client can use to access the communication module.

What Are Access Levels?

There are three levels of access:

- **Deny Access:** Prevents all access to resources provided by the communication module. Connections to the Trident are not allowed.

- **Read Only**: Allows client to connect to the Trident or Tri-GP, and view information provided via the communication module. Does not allow the client to change any settings or perform certain commands.

- **Read/Write**: Full access. Allows client to view information provided by the communication module, change settings, and perform all commands (including Download Changes or Download All for TriStation 1131).

Access levels are configured by adding entries to the access control list. A maximum of 10 entries can be provided in the access list.

The same access level is applied to all selected protocols in a single access control list entry. If you want to provide different access levels for a selected client depending on which protocol they are using, you will need to create two separate entries in the access control list, one for each protocol.

Access levels apply to *all* users using the PC assigned the IP address entered in the access control list. This means if multiple users are using the same PC, they will all have the same access rights. For example, every user using TriStation 1131 on a PC with a particular IP address would have the same access rights to the communication module. Individual user access should be controlled via workstation security; communication module access is controlled only at the IP address level.

Once you enable client access control by selecting the Enable Access List check box, you **must** configure at least one client with TriStation Read/Write access before you can save the configuration.

This ensures you will be able to connect to the Trident or Tri-GP again after your next download, and allows you to make further changes to the application running on the controller, including changes to the access control list.

If necessary, you can also connect via a TriStation serial connection to reconfigure the access control list. See Connecting to the Trident or Tri-GP Controller via a Serial Connection on page 484.

Note If you are using the TSAA and/or TriStation protocols, you must enable and use access list control to manage read/write access to specific ports. If you are using the serial and/or Modbus TCP protocols, you can also use the Port Write Enabled property to manage read/write access to specific ports. See Port Write Enabled on page 674.

Sample Access Control List and Resulting Access Control

The following table is a sample access control list, with the access control scenarios that would result if enabled on a Trident or Tri-GP 3.x CIM.

Table 41   Sample Trident or Tri-GP CIM Access Control List

Entry	IP Address	Subnet Mask	Protocol	Network	Access Level	Resulting Access Control Sc
1	206.216.1.12	255.255.255.0	TriStation	NET 2	Read/Write	A client with an IP address of 20 client on the same subnet) attem CIM using the TriStation protoc granted Read/Write access.
2	206.216.1.12	255.255.255.0	TSAA	NET 1	Read Only	A client with an IP address of 20 client on the same subnet) attem CIM using the TSAA protocol o granted Read Only access.
3	192.168.1.05	255.255.255.255	TriStation	NET 1 NET 2	Deny Access	A client with an IP address of 19 to access the CIM using the TriS NET 1 or NET 2 would be denie
4	192.168.1.09	255.255.255.255	TSAA OPC UA	NET 1 NET 2	Deny Access	A client with an IP address of 19 to access the CIM using TSAA o or NET 2 would be denied acces
5	192.168.1.05	255.255.255.0	TriStation	NET 2	Read Only	A client with an IP address of 19 client on the same subnet) attem CIM using TriStation on NET 2 Read Only access.[a]
6	192.168.1.05	255.255.255.0	TSAA	NET 2	Read Only	A client with an IP address of 19 client on the same subnet) attem CIM using the TSAA protocol o granted Read Only access. [b]
7	192.168.1.09	255.255.255.0	TriStation TSAA OPC UA	NET 2	Read/Write	A client with an IP address of 19 client on the same subnet) attem CIM using TriStation, TSAA, or would be granted Read/Write a
8	0.0.0.0	0.0.0.0	All	All	Deny Access	Access is denied for all IP addre entries 1–7, using any protocol on NET
9	NULL	NULL	NULL	NULL	NULL	None

a. If a client with the specific IP address of 192.168.1.05 attempts to access the CIM using the TriStation protocol on NET 2, the CIM will deny acc CIM evaluates the access control list beginning from the top, and continuing through the list until it encounters an entry that applies to the IP access. In this case, entry 3 specifically denies access to a client with the IP address of 192.168.1.05, so the CIM will deny access and not evalua

b. If a client with the specific IP address of 192.168.1.05 attempts to access the CIM using the TSAA protocol on NET 2, the CIM will deny access. specifically denies access to a client with the IP address of 192.168.1.05, so the CIM will deny access and not evaluate the list any further.

Configuring the Access Control List

This section describes how to enable access control on the CM or CIM and configure the access control list for your selected clients. This does not apply to Trident 1.x systems.

When configuring the access control list, take care to organize your entries so that the most specific are at the top, and the least specific are at the bottom. The last entry in the list should be used to define the access level for unspecified clients.

The communication module evaluates the access control list from top (Entry 1) to bottom (Entry 10). The first match that the communication module makes (between the client's network parameters and those listed in an access control list entry) determines which entry is used to authorize or deny access. If no match is found, the communication module automatically denies all access.

Once you have enabled access control and configured the access control list, you must perform a Download Changes for the access control to take effect.

Note   After a Download Changes or Download All has been performed so that access control on the communication module is enabled, all *existing* connections will remain connected, even if the client's access has been changed to Read Only or Deny Access. The new access levels will not take effect until the client disconnects and attempts to reconnect.

Procedure

1   Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2   Double-click the CM or CIM, and then click Setup in the Item Properties dialog box.

The CM Setup or CIM Setup dialog box appears.

3   Click the Access List tab.
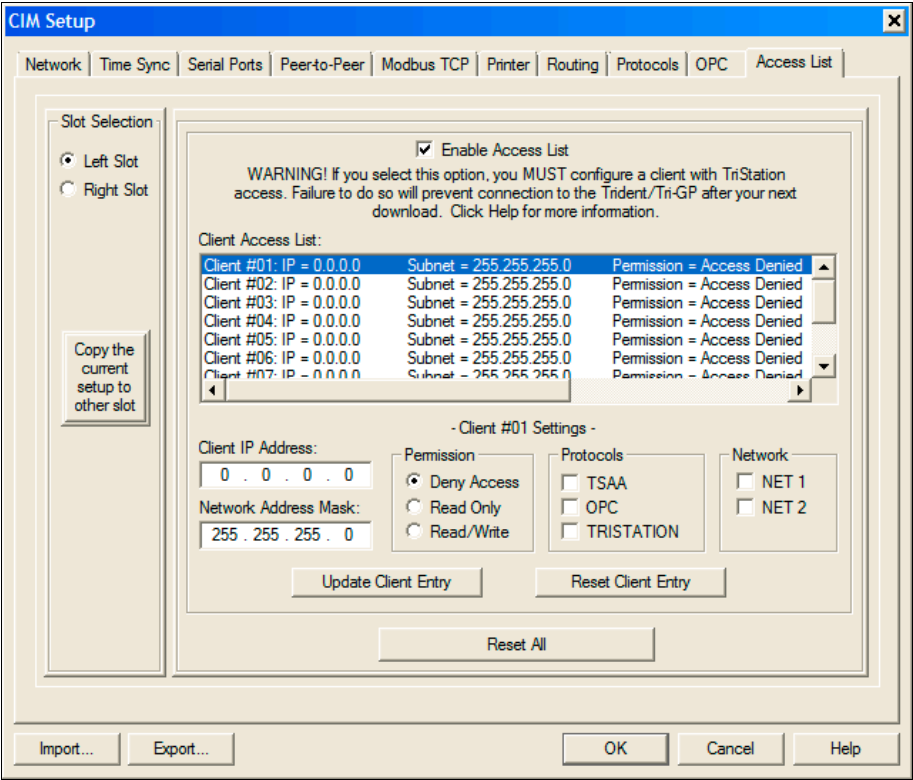
4 Specify these properties.

Property	Action
Slot Selection	Select the slot where the module you want to configure an access control list for is installed.

In most cases, you should create identical access control lists for the modules in both slots. |
| Enable Access List Command | Click to enable access control for this communication module. If cleared, access control will be disabled and all users can access communication module resources. The default is cleared. |
| Client Access List | Click on the entry for the client you want to configure or change. |
| Client IP Address | Specify the IP address of the client that you want to allow, restrict, or deny access to the communication module.

Can be used in conjunction with the Client IP Subnet Mask property to create groups of IP addresses with the same access levels. |

Property	Action
Client IP Subnet Mask	This property allows you to group IP addresses, so that you can create a single entry in the access control list for all IP addresses on the subnet.
	If needed, enter the IP address for the subnet. The default is 255.255.255.0.
Permission	Click the level of access to the communication module you want to provide for the selected client.
	If the application includes safety-critical outputs, you should not set this property to Read/Write.
	Note: Read Only is not supported for OPC UA on the Trident/Tri-GP CIM.
Protocol	Select the protocol(s) that the selected client can use to access the communication module.
Network	Select the network(s) on which the selected client can access the communication module.

5   Click Update Client Entry to save the settings for the selected client.

6   Repeat steps 4 and 5 for each client to be included in the access control list.

Note   If necessary, click Reset Client Entry to reset the settings for the *selected* client to the default, unconfigured state. Click Reset All to reset *all* entries in the access control list to the default, unconfigured state.

7   If a communication module is installed in the right slot, do one of the following:

- In most cases, you should configure identical access control lists for the modules in both slots. To do so, click Copy Current Setup to Other Slot.

- To configured different access control lists for the modules in the right and left slots, repeat steps 4 through 6 for the module installed in the right slot.

8   Click OK to save your changes.

Configuring Trident or Tri-GP Controller Printing

A Trident or Tri-GP controller can print brief ASCII text messages if a communication port is connected to a printer and the TriStation 1131 application includes standard print function blocks.

Print messages are typically used for alarms, status, and maintenance. A sample alarm message might include the name of an analog input point, its time stamp and value, and a statement that the value is out of range. If the Trident or Tri-GP system includes numerous controllers or is connected to a DCS, alarms are typically displayed on an operator workstation.

To print from a Trident or Tri-GP controller, you must connect a communication module network port to a print server that is connected to a printer; configure these devices in the TriStation 1131 project; and use print function blocks in the TriStation 1131 application.

Topics include:

Effect of Printing on Scan Time

Each time a message is printed, the print function blocks in the TriStation 1131 application are executed and the scan time increases. Typically, the print function blocks are subject to conditional execution, which means they are not executed every scan. When you set the scan time in TriStation 1131, make sure it includes the execution time for all conditional statements in the application.

If the scan time is not long enough, the execution of all conditional statements (when the conditions are True) could result in scan-time overruns. You can minimize this problem by limiting the amount of printer output. An alternative is to use a PC event logger such as the Triconex SOE Recorder. For more information, see the *SOE Recorder User's Guide.*

Devices for Trident or Tri-GP Controller Printing

At a minimum, the printing devices you can use with a Trident or Tri-GP controller are an HP JetDirect®-compatible print server and a line printer for ASCII text. You can also use a router or a hub.

Print Server and Cables

A print server that is connected to a Trident or Tri-GP communication module must use the HP JetDirect print protocol and operate at speeds of 10 or 100 megabits per second. Standard communication cables are suitable for this connection.

You can purchase communication cables from other manufacturers. You must purchase print servers elsewhere because Invensys does not supply them. Black-box cables and Hewlett-Packard® print servers are examples of dependable network printing devices.

Invensys has tested these Hewlett-Packard print servers and can recommend them.

- HP JetDirect Ex Plus
- HP JetDirect 500X Series, model J3265A

Printers

You must select a printer that is compatible with your print server. The Trident or Tri-GP controller prints ASCII text only, which does not include formatting or graphics, so a Centronics-compatible printer is adequate. Laser printers are also suitable.

For more information, see the *Communication Guide for Trident Systems*.

Directly Connecting a Trident or Tri-GP CM or CIM to Printing Devices

This procedure explains how to directly connect a Trident or Tri-GP communication module (CM or CIM) to an HP JetDirect-compatible print server and printer.

You can use standard communication cables for these connections.

Procedure

1   If the print server and printer packages have installation programs, install them on the TriStation PC.

2   Follow the instructions, and run the diagnostic routines if available.

    You do not need the printer drivers that came with the packages.

3   Connect the printer to the print server, and connect the print server to a CM/CIM Ethernet port (NET 1 or NET 2).
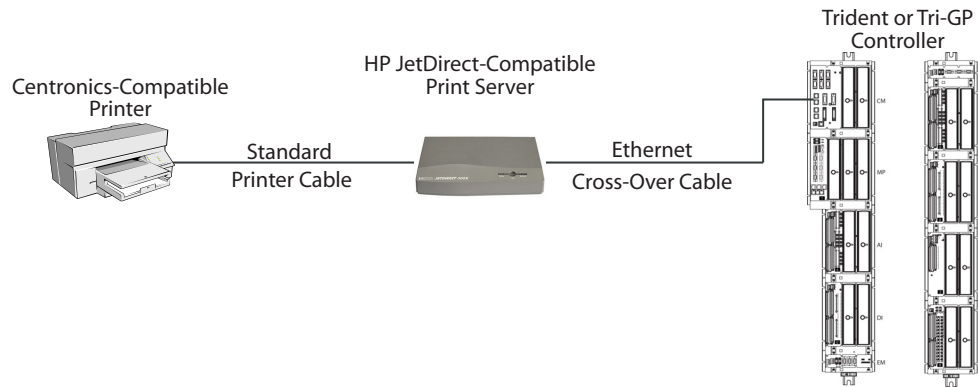
Figure 40 Connecting a Trident or Tri-GP Communication Module to a Printer and Print Server

Connecting a Trident or Tri-GP CM or CIM to Printing Devices Using a Hub

This procedure explains how to connect a Trident or Tri-GP communication module (CM or CIM) to an HP JetDirect-compatible print server and printer by using a hub. You can use standard communication cables for these connections.

You do not need to install the printer drivers that may have come with the print server and printer packages.

Procedure

1 If the print server and printer packages have installation programs, copy the programs to the TriStation PC.

2 Follow the instructions that came with the packages, and run the diagnostic routines, if available.

3 Connect the printer to the print server, and connect the print server to a hub. Connect the hub to a CM/CIM Ethernet port (NET 1 or NET 2).
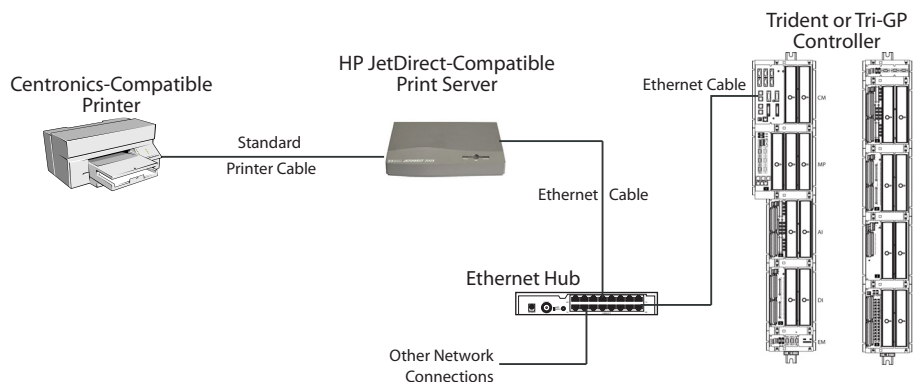
Figure 41 Connecting the Trident or Tri-GP CM/CIM to a Print Server and Printer Using a Hub

Configuring a Trident or Tri-GP CM or CIM for Printing Devices

These procedures explain how to configure a Trident or Tri-GP CM or CIM port that is connected to a print server and printer.

Network port configuration options differ depending on the target system version configured for the project. Use the procedure that applies to your Trident or Tri-GP system version:

For more information about the target system version, see

Procedure for Trident 1.x Controllers

1   Expand the Controller tree, and double-click Configuration.

2   On the Configuration tree, expand Hardware Allocation, double-click CM (COM: CM), and then click Setup.
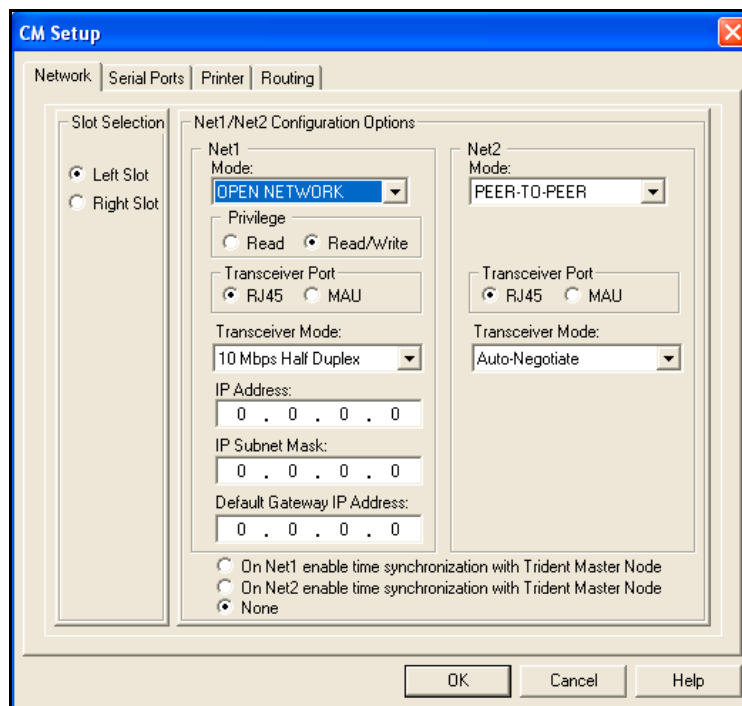
3   Specify these properties on the CM Setup Network tab.

Property	Action
Slot Selection	Select Left Slot or Right Slot depending on where the CM is installed on the baseplate.
Mode	For the NET 1 or NET 2 port, whichever is connected to the printer, select the Open Network mode.

4 Click the Printer tab.
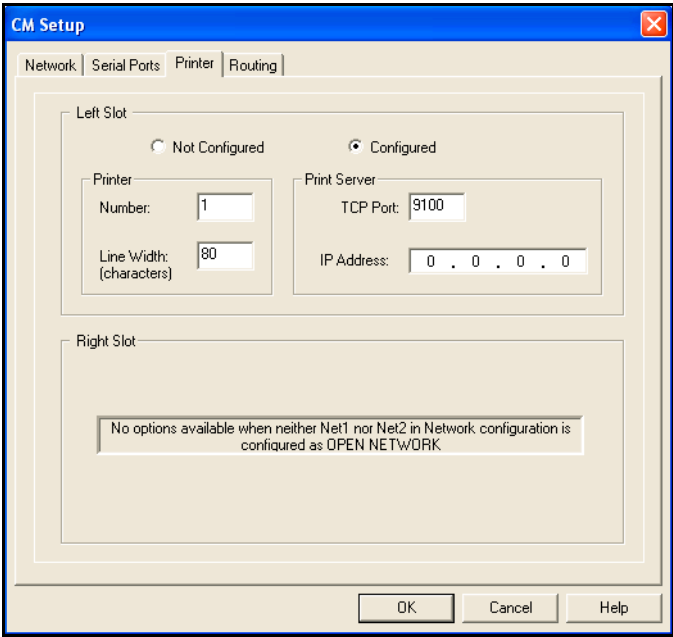
5 Specify these properties on the CM Setup Printer tab.

Property	Action
Not Configured or Configured	Select Configured for the slot in which the CM is installed.
Printer Number	Enter a number from 1 to 10. This must be the same number that is declared for the PRINTER parameter in print function blocks.
Line Width	Enter the maximum printable line width for your printer, based on the manufacturer's specifications. The most typical line widths are 80 characters and 132 characters.
TCP Port Number	Enter the TCP/IP Port number that was defined by the manufacturer of the print server.
IP Address	Enter the 32-bit IP address of the print server on the network. If the print server is not on the same subnet as the controller, you must specify the destination address on the Routing tab of the CM Setup dialog box.

6 Click OK to save the configuration.

Procedure for Trident or Tri-GP 2.x/3.x Controllers

1 In TriStation, open your project, expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the CM or CIM, and then click Setup in the Item Properties dialog box.

The CM Setup or CIM Setup dialog box appears.

3   Click the Printer tab.

4   Specify these properties for the module installed in the Left Slot.

Property	Action
Printer Number	Enter the number for the printer; can only be 5 or 10. Both slots cannot have the same printer number. The default is 0, meaning a printer is not configured. This must be the same number that is declared for the PRINTER parameter in print function blocks.
Line Width	Enter the number of characters to be printed on a line. The valid range is 80–132 characters. The default is 80 characters.
TCP Port Number	Enter the number of the TCP port for the print server. The default is 9100 for an HP printer.
Network	Click the network that the print server is connected to. The default is NET 1.
IP Address	Enter the IP address of the print server.

5   If a module is also installed in the Right Slot, repeat step 4 for that module.

6   Click OK to save the configuration.

About Function Blocks for Printing

A TriStation 1131 application must use print function blocks to send messages to a printer.

Each print function block has a PRINTER parameter which specifies the port number where the printer cable is connected.

- For the Trident 1.x controller, the valid range is 1 through 10.
- For the Trident or Tri-GP 2.x/3.x controller, the PRINTER parameter must be 5 or 10. The Left and Right CM/CIM ports cannot have the same PRINTER parameter.
- The PRINTER parameter must be the same number as is defined in TriStation 1131.

Each time a message is printed, the print function blocks in the TriStation 1131 application are executed and the scan time increases.

This table lists the print function blocks in the Trident/Tri-GP library.

Print Function Block	Purpose
PRINT_BOOL	Prints a three-character field containing either Off or On.
PRINT_CDT	Prints the current date and time.
PRINT_CRLF	Prints a new line (carriage return and line feed).
PRINT_CTOD	Prints the current time of day.
PRINT_DINT	Prints a DINT value.
PRINT_REAL	Prints a REAL value.
PRINT_STRING	Prints a string of text.
PRINTR_FLUSH	Clears the print buffer.

See the *TriStation 1131 Libraries Reference* for more detailed information about the print function blocks.

Setting Trident or Tri-GP Controller IP Addresses

When communication between a TriStation PC and a Trident or Tri-GP controller occurs over a network, the IP address of the controller must be specified on the communication module.

If the controller is not part of a larger network, it may be possible to use the default IP address set when the TriStation 1131 project is downloaded (assuming the correct node number and default IP address are specified in the project).

Note   The Trident or Tri-GP 2.x/3.x default IP address applies to the Left MP only. See Connecting to the Trident or Tri-GP 2.x/3.x Controller for the First Time on page 483 for more information.

If you cannot use a default address, there are other ways to set an IP address on a network. All begin with asking the network administrator for the intended IP addresses. The easiest way is to use a Reverse ARP (RARP) server that has been programmed in advance with the intended addresses. Other ways include temporary connection of the TriStation PC to a non-Ethernet module during downloading.

All the procedures for setting the IP address are based on the assumption that the controller includes at least one communication module with an Ethernet port connected to a network.

To use the procedures, you should know how to:

- Connect the Trident or Tri-GP controller to a network

- Connect the TriStation PC to the controller

- Configure the TriStation 1131 project with the node number of the controller and the IP address

For more information, see the *Communication Guide for Trident Systems*.

Note   Typically, Triconex controllers are located on their own subnet which is connected to a larger network such as a DCS. Your network administrator can set up the subnet for compatibility with the Triconex default IP addresses and can program any routers that lie between the DCS and the Triconex subnet with addressing information about the Triconex controllers.

Topics include:

- Using the Default IP Address for TriStation Communication on page 522

- Setting an IP Address Using a RARP Server on page 524

- Setting a Trident or Tri-GP Controller IP Address Using an MP Connection on page 525

- Setting a Trident 1.x Controller IP Address Using a CM Connection on page 526

- Specifying a Trident or Tri-GP CM/CIM Default Gateway on page 527

- Specifying a Trident or Tri-GP CM/CIM for Network Routing on page 527

- Testing a Network Connection on page 528

Using the Default IP Address for TriStation Communication

This procedure explains how to use the default IP address for network communication between a controller and a TriStation PC.

Note If you have a Trident or Tri-GP 2.x/3.x controller, the default IP address applies only to the Left MP network port. See Connecting to the Trident or Tri-GP 2.x/3.x Controller for the First Time on page 483 for more information.

Procedure

1 Do one of the following, depending on your Trident or Tri-GP system version:

   - Connect the Trident 1.x controller to the network using the NET 1 or NET 2 port on the CM.

   - Connect the Trident or Tri-GP 2.x/3.x controller to the network using the Left MP network port.

2 Power up the controller.

3 Do one of the following, depending on your Trident or Tri-GP system version:

   - Connect the TriStation PC to the network (all versions)

   - Connect the TriStation PC directly to an Ethernet port on the CM using a cross-over cable (Trident 1.x)

   - Connect the TriStation PC to the Left MP network port using a cross-over cable (Trident or Tri-GP 2.x/3.x)

4 In the TriStation 1131 project, expand the Controller tree, double-click Configuration, and then click TriStation Communication.

5 On the TriStation Communication screen, verify the IP Address is:

   - 192.168.1.1 (Trident 1.x CM NET 1)

   - 192.168.2.2 (Trident 1.x CM NET 2)

   - 192.168.255.n, where n is the node number of the controller (Trident or Tri-GP 2.x/3.x Left MP)

   If the Trident 1.x controller includes two communication modules, the default address applies to both modules.

   Note The Left CM and Right CM use the same 48-bit physical MAC address and cannot be connected to the same network.

6 On the Controller tree, click Configuration.

7 Expand Hardware Allocation, and then do one of the following:

   - (Trident 1.x) Click the slot where the communication module is installed, and then click Setup. If a communication module is not installed, insert a communication module, and then click Setup.

   - (Trident or Tri-GP 2.x/3.x) Double-click the MP, click Setup, and then click the Network Ports tab.

8   In the Setup dialog box, enter the same IP address specified on the TriStation Communication screen.

If the Trident 1.x controller includes a redundant communication module, enter the same IP address for the other slot.

9   On the Controller tree, click the Controller Panel. From the Commands menu, click Connect.

10   Wait about 40 seconds for the module to reset and become active.

When the module is active, the Active indicator is green.

11   On the Commands menu, click Download All to download the TriStation 1131 project to the controller.

12   On the TriStation PC, from the Start menu, click the MS-DOS Command Prompt.

13   Type the command *ping* followed by the IP address to be tested.

For example, for an IP address of 206.32.216.43, enter this:

```
ping 206.32.216.43
```

If the network connection is made, the reply includes the IP address followed by byte and time information.

If the connection is not okay, the reply is Request timed out.

Note   If you receive a Request timed out reply, check your network cable and port connections to verify they are securely connected, verify your configuration settings are correct, and then retry the ping command.

Setting an IP Address Using a RARP Server

This procedure explains how to set the IP address of a communication module using a RARP server on the local network. To use this procedure, the network administrator must program the RARP server with the intended IP address for the controller. If this is not possible, use another method to set the IP address.

Procedure

1   Give the network administrator the MAC address, which is:

    40-00-00-00-x-03 (where x is the Trident or Tri-GP controller node number).

2   Ask the network administrator for the IP address that is to be used for the controller.

3   Connect the controller to the network through a network port on the communication module.

4   Power up the controller.

    During initialization, the communication module sends a request to the RARP server for an IP address that has been mapped to its own 48-bit MAC address.

    Note   The Left CM and Right CM use the same 48-bit physical MAC address and cannot be connected to the same network.

5   On the TriStation PC, from the Start menu, click the MS-DOS Command Prompt.

6   Enter the command *ping* followed by the IP address to be tested. For example, for an IP address of 206.32.216.43, enter this:

    ```
    ping 206.32.216.43
    ```

    If the network connection is made, the reply includes the IP address followed by byte and time information.

    If the connection is not okay, the reply is Request timed out.

    Note   If you receive a Request timed out reply, check your network cable and port connections to verify they are securely connected, verify your configuration settings are correct, and then retry the ping command.

7   Connect the TriStation PC to the network, or directly to a network port on the CM or CIM.

8   In the TriStation 1131 project, expand the Controller tree, click Configuration, and then click TriStation Communication.

9   On the TriStation Communication screen, specify the Node Number of the controller and the intended IP address.

10 On the Commands menu, click Connect. Wait until the connection is made.

11 On the Commands menu, click Download All to download the TriStation 1131 project to the controller.

Setting a Trident or Tri-GP Controller IP Address Using an MP Connection

This procedure explains how to set the IP address of the Trident or Tri-GP controller by initially connecting the TriStation PC to an MP port and downloading the TriStation 1131 project. After the address is set, you can disconnect the TriStation PC from the MP port, and reconnect it to a network port on the CM or CIM.

Note If you have a Trident or Tri-GP 2.x/3.x controller, the default IP address applies only to the Left MP network port. See Connecting to the Trident or Tri-GP 2.x/3.x Controller for the First Time on page 483 for more information.

Procedure

1 Ask the network administrator for the IP address to be used for the controller.

2 Connect the TriStation PC to a TriStation port on the MP Baseplate.

3 Connect the controller to the network through a network port on the CM or CIM.

4 In the TriStation 1131 project, configure the following:

   • The MP and CM/CIM ports

   • The node name and node number of the controller

   • The intended IP address

5 Power up the controller.

6 On the Controller tree, click Controller Panel.

7 On the Command menu, click Connect To.

8 On the Connect To screen, click Main Processor Module Port and Left, Middle, or Right for the MP port to which the TriStation cable is connected.

9 After connecting to the controller, download the TriStation 1131 project.

   The CM initializes (resets) and accepts the IP address you specified in the TriStation 1131 project.

10 On the TriStation PC, from the Start menu, click the MS-DOS Command Prompt.

11 Enter the command *ping* followed by the IP address to be tested. For example, for an IP address of 206.32.216.43, enter this:

   ```
   ping 206.32.216.43
   ```

   If the network connection is made, the reply includes the IP address followed by byte and time information.

   If the connection is not okay, the reply is Request timed out.

12 If the IP address is set, you can disconnect the TriStation PC from the MP port, and connect it to a network port on the CM/CIM or to the network.

Setting a Trident 1.x Controller IP Address Using a CM Connection

This procedure explains how to set the IP address for a Trident 1.x CM by temporarily configuring a default IP address for the CM, and assigning a default IP address to the TriStation PC.

Procedure

1 Ask the network administrator for the IP address to be used for the CM.

2 Connect the Trident controller to the network using a network port (NET 1 or NET 2) on the CM.

3 Connect the TriStation PC to a network port on the CM, using a direct or network connection.

4 On the TriStation PC, use Windows procedures to set the IP address of the PC to either of the following:

   • 192.168.1.x if the PC is physically connected to a NET 1 port, where x is any unused host number.

   • 192.168.2.x if the PC is physically connected to a NET 2 port, where x is any unused host number.

5 Wait for the TriStation PC to reset.

6 Open the TriStation 1131 project.

7 Expand the Configuration tree, click Configuration, and then click TriStation Communication.

8 Specify the node name, node number, and the default IP address of the controller.

9 Use the Network tab on the CM Setup screen to specify the intended IP address for the Ethernet port that is connected to the network.

10 Power up the Trident controller.

11 On the Controller tree, click Controller Panel. On the Command menu, click Connect To.

12 On the Connect To screen, click the Serial Port option and the COM port to which the TriStation cable is connected.

13 Verify that Communication Module Port is selected and the default IP address is displayed.

14 Connect to the controller and download the TriStation 1131 project. Wait for the download to complete.

   After the download is complete, TriStation 1131 displays the message, Connection failed. The default IP address you specified in the node definition is invalid, and the intended IP address of the CM is set.

15 On the TriStation PC, use Windows procedures to set the IP address of the PC to its actual address on the network.

16 On the TriStation PC, from the Start menu, click the MS-DOS Command Prompt.

17 Enter the command *ping* followed by the IP address to be tested.

For example, for an IP address of 206.32.216.43, enter this:

```
ping 206.32.216.43
```

If the network connection is made, the reply includes the IP address followed by byte and time information. If the connection is not okay, the reply is Request timed out.

18   In the TriStation 1131 project, change the default IP address to the newly set IP address of the TriStation Communication screen.

19   Use the Controller Panel to reconnect the TriStation 1131 project to the controller.

20   After the IP address is set on the network, you must reconfigure the IP address in the TriStation 1131 project, and assign a valid IP address to the TriStation PC.

Specifying a Trident or Tri-GP CM/CIM Default Gateway

This procedure explains how to set the address of a default gateway for a controller that must communicate with devices on another network. A default gateway is a router that forwards all messages not addressed to stations within the local subnet.

Procedure

1   Expand the Controller tree and double-click Configuration.

2   On the Configuration tree, click Hardware Allocation to display the modules that are configured for this system.

3   Double-click the CM or CIM icon to open the Properties dialog box, and click Setup to display the configuration options for the CM or CIM.

4   On the Network tab, select Left Slot or Right Slot depending on which CM or CIM you are configuring.

5   Do one of the following:

   •   If you have a Trident 1.x controller, for NET 1 or NET 2 (depending on which one is connected the network), select Open Network from the list under Mode.

   •   If you have a Trident or Tri-GP 2.x/3.x controller, go to the next step.

6   In Default Gateway IP Address, enter the IP address of the default gateway that is connected to the local subnet.

7   Click OK to save your changes.

Specifying a Trident or Tri-GP CM/CIM for Network Routing

This procedure explains how to specify routes to destinations outside the local network for controllers that do not have access to a default gateway.

Each route must include an IP address for the destination, a subnet mask, and a gateway address.

Procedure

1   Expand the Controller tree and double-click Configuration.

2   On the Configuration tree, click Hardware Allocation to display the modules that are configured for this system.

3   Double-click the CM or CIM icon to open the Properties dialog box, and click Setup to display the configuration options for the CM or CIM.

4   Do one of the following:

   • For a Trident or Tri-GP 2.x/3.x controller, click the Routing tab. For each route you need to specify, enter an IP address in Destination IP Address, Destination IP Subnet Mask, and Destination Gateway IP Address, and then click Update Destination.

   • For a Trident 1.x controller, click the Routing tab and enter an IP address under Destination Address, Subnet Mask, and Gateway Address for each route that you need to specify.

5   Click OK to save your changes.

Testing a Network Connection

This procedure explains how to test a connection from a CM or CIM to a network by using the ping command from an MS-DOS command prompt.

The test is performed on the TriStation PC. Before doing the test, you must have set the IP address of the communication module on the network.

Procedure

1   On the TriStation PC, from the Start menu, click the MS-DOS Command Prompt.

2   Type the command *ping* followed by the IP address to be tested. For example, for an IP address of 206.32.216.43, enter this:

```
ping 206.32.216.43
```

If the network connection is made, the reply includes the IP address followed by byte and time information.

If the connection is not okay, the reply is Request timed out.

7

Implementation

Overview

This figure shows the main steps for implementing an application, which is the last step in a TriStation 1131 project.

```
                    ┌──────────────────────┐
                    │  Set Up the Project  │
                    └──────────────────────┘
                               │
                               ▼
                    ┌──────────────────────┐
                    │     Develop the      │
                    │     Application      │
                    └──────────────────────┘
                               │
                               ▼
          ┌──────────────────────────────────┐
          │ ┌──────────────────────┐         │
          │ │    Test with the     │         │
          │ │      Emulator        │         │
          │ └──────────────────────┘         │
  ┌────────────┐          │                  │
  │ Fix Errors │          ▼                  │
  └────────────┘    ╱◇◇◇◇◇◇◇◇◇╲              │
       │      Yes  ◇  Errors?  ◇──────────────┘
       └──────────◇◇◇◇◇◇◇◇◇◇◇◇◇
                       │
                      No
                       ▼
            ┌──────────────────────┐
            │    Configure the     │
            │      Controller      │
            └──────────────────────┘
                       │
                       ▼
            ┌──────────────────────┐
            │  Set Up TriStation   │
            │    Communication     │
            └──────────────────────┘
                       │
                       ▼
            ┌──────────────────────┐       ┌──────────────────────────────────┐
            │    Implement on      │       │ - Test application on emulator     │
            │    the Controller    │  ══▶  │ - Test application on offline system│
            └──────────────────────┘       │ - Commission the application       │
                                           │ - Maintain the application         │
                                           └──────────────────────────────────┘
```
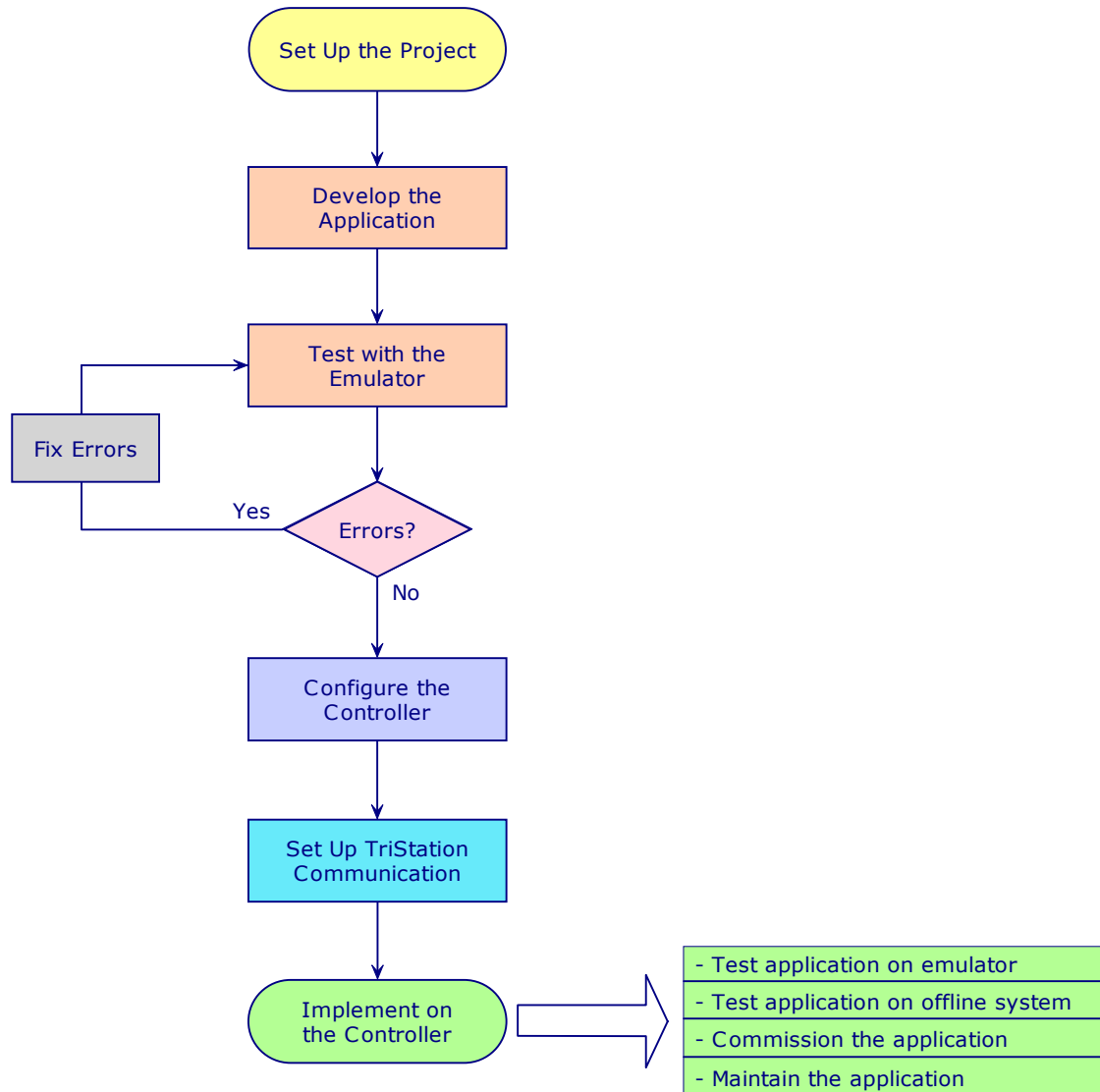
Implementation Steps

This list includes steps for testing and maintaining an application.

	Step	See
☐	Test on the Emulator	• Using the Triconex Emulator for Testing on page 533 • The *Triconex Emulator User's Guide*.
☐	Test on the controller	• Preparing to Download to the Controller on page 534 • Downloading to the Controller on page 535 • Verifying the Download to the Controller on page 538 • Monitoring Variables on the Controller on page 540 • Monitoring the Program Execution on page 541 • Adding Annotation for Variables on page 542 • Determining the Scan Surplus on page 543 • Setting the Scan Time for a Downloaded Application on page 544 • Displaying Hardware Allocation Exceptions on page 546
☐	Maintain an application	• Steps for Downloading Changes on page 548 • Planning and Controlling Changes on page 549 • Commands Required with Application Changes on page 550 • Disabling Points on page 552 • Forcing Points on page 556 • Using the Download Changes Command on page 557 • Using the Download All Command on page 559

Controlling the Operational Mode

This section describes the operational modes available on a controller. Although the functionality is the same for Tricon, Trident, and Tri-GP controllers, the method of executing the mode may be different. This table describes the mode and method.

Table 42   Tricon, Trident, and Tri-GP Controller Operational Modes

Mode	Description
Run	Controller runs the downloaded application with read-only capability.
	Attempts to write to program variables by TriStation 1131, Modbus masters, or external devices are rejected; however, an application may call gated access functions to enable external writes during a designated window of time. For more information, see the GATDIS and GATENB function blocks in the *TriStation 1131 Libraries Reference*.
	• For Tricon controllers, the keyswitch must be set to RUN and the Run command used.
	• For Trident and Tri-GP controllers, the Run command must be used and the Set Programming Mode option must be set to Disable Programming Control Operations.
Program	Controller allows application loading, verification, and write access.
	Allows Download All and Download Changes commands from TriStation 1131. Also allows writes to program variables by Modbus masters and external devices.
	• For Tricon controllers, the keyswitch must be set to PROGRAM.
	• For Trident and Tri-GP controllers, the Set Programming Mode option must be set to Enable Programming and Control Operations. (This is the default setting.)
Halt	Controller stops running the application and retains the values of tagnames.
	• For Tricon controllers, the Halt command is used.
	• For Trident and Tri-GP controllers, the Halt command or the SYS_APP_HALT function can be used.
Stop	Controller stops reading inputs, forces non-retentive digital and analog outputs to zero, and halts the application.
	Retentive outputs return to the value they had before the Stop was issued. Stop mode is recommended for installation and service of process-related equipment, but is not required for service of the controller.
	• For Tricon controllers, the keyswitch must be set to STOP.
	• For Trident and Tri-GP controllers, the Stop command must be used.
Remote	Controller runs the downloaded application and allows writes to program variables by TriStation 1131, Modbus masters, and external devices.
	Download All and Download Changes by TriStation 1131 are not allowed.
	• For Tricon controllers, the keyswitch must be set to REMOTE.
	• For Trident and Tri-GP controllers, Remote mode is set programmatically by enabling write access using the SYS_SET_REMOTE_WRT_ENBL function block in a program.

Using the Triconex Emulator for Testing

The Triconex Emulator software allows you to emulate, execute, and test TriStation 1131 applications without connecting to a Tricon, Trident, or Tri-GP controller.

Using the Emulator, you can test your applications in an offline environment, without exposing your online processes to potential application errors.

The latest version of the Emulator is installed with TriStation 1131; however, because the Emulator is a separate application from TriStation 1131, you can update it at any time without having to re-install TriStation 1131.

You access the Emulator via the Emulator Control Panel in TriStation 1131. Using the Emulator, you can emulate the following Triconex controller modules, communication modes, and TriStation 1131 application features:

- Tricon Communication Module (TCM)
- Trident or Tri-GP Communication Module (CM)
- Trident or Tri-GP Communications Integration Module (CIM)
- TSAA protocol communication, including support for DDE and SOE clients, and multicasting (DDE clients only)
- Sequence of Events (SOE) blocks, data generation, and response
- Modbus TCP Master and Slave communication
- Peer-to-Peer (including Enhanced Peer-to-Peer) communication over UDP
- Process alarm function blocks
- System status function blocks for MP and I/O modules, including system state transitions
- Disabling of points
- Download Changes and Download All commands

⚠ **WARNING**   Do not have the Emulator Control Panel open at the same time as you are connected to a controller. Connecting to both the Emulator and a controller simultaneously could result in commands meant for the Emulator being sent to the controller, or vice-versa.

For detailed information and instructions for testing your application using the Triconex Emulator, see the *Triconex Emulator User's Guide*, included on the TriStation 1131 CD, or available from the Invensys Global Customer Support website.

Controller Testing

This section explains how to test on the controller, which is usually done when the controller is physically connected to field instruments either in a test facility that simulates the system (Factory Acceptance Test), or at the site while the control process is offline (Site Acceptance Test).

The logical hardware configuration in TriStation 1131 must be completed and must match the physical configuration.

Topics include:

- Preparing to Download to the Controller on page 534
- Downloading to the Controller on page 535
- Verifying the Download to the Controller on page 538
- Monitoring Variables on the Controller on page 540
- Monitoring the Program Execution on page 541
- Adding Annotation for Variables on page 542
- Determining the Scan Surplus on page 543
- Setting the Scan Time for a Downloaded Application on page 544
- Displaying Hardware Allocation Exceptions on page 546

Preparing to Download to the Controller

The Download All command is used to load an application to the controller. Before you begin the download process, please take note of the following:

- The *first time* you connect to the Trident 2.x/3.x or Tri-GP controller to download your application, you **must** connect either via a serial connection or via the Left MP, using the default IP address. See Connecting to the Trident or Tri-GP 2.x/3.x Controller for the First Time on page 483 for more information.

- If the target system version configured for the project does not match the system version of the Tricon, Trident (2.x/3.x only; does not apply to 1.x systems), or Tri-GP controller you are trying to connect to, you will be unable to connect to the controller. The target system version specified in the project must be the same as the system version of your controller.

  For instructions on changing the target system version in your project, see Configuring the Tricon Target System Version on page 298 or Configuring the Trident or Tri-GP Target System Version on page 365.

- Performing a Download All operation will cause the CIM's OPC UA server to temporarily cease communication and restart. Existing OPC clients will be disconnected, and will need to reconnect to the OPC UA server once the download is complete.

Downloading to the Controller

This procedure explains how to use the Download All command to load an application to the controller. A best practice is to rebuild the application before downloading it.

This procedure can be used for testing when the controller is connected to simulation field devices or the control process is offline. This procedure can also be used to run the application when the control process is online.

Procedure

1 Open the Controller workspace, expand the Configuration tree, and double-click the Controller Panel.

2 On the Commands menu, click Connect .

The Connect To dialog box shows the default communication setting.
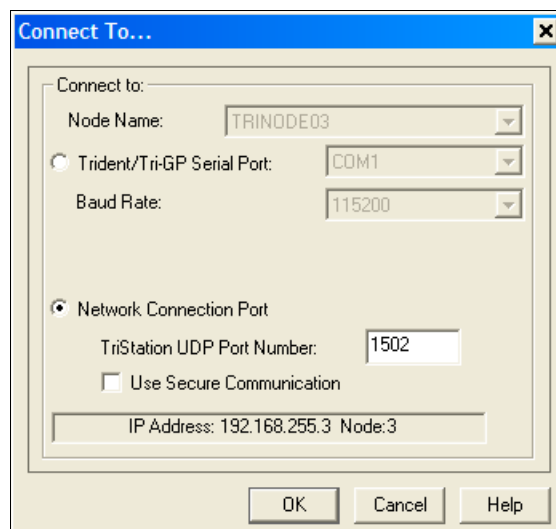
3 If needed, change the connection type and then click OK.

For more information, see Specifying the Tricon Default Connection Type on page 458 or Specifying the Trident or Tri-GP Default Connection Type on page 506.

> **Note** If you enabled secure communication on the Trident or Tri-GP 3.x Operating Parameters screen, the default connection type will automatically use secure communication to connect to the controller if a CIM is installed. If you do not want to use secure communication for this connection, clear the Use Secure Communication check box. See Secure Communication on page 271 for more information.

4 Enter the connection password if required.

5 Do one of the following:

- For Tricon controllers, ensure the keyswitch is turned to PROGRAM. This is the factory setting.

- For Trident or Tri-GP controllers, ensure the mode is Enable Programming and Control Operations. This is the default setting. (To view this setting, on the

Commands menu, click Set Programming Mode, and then click Enable Programming and Control Operations.)

6 On the Commands menu, click Download All ⬇.

7 To start the application, click Run ▶.

8 Do one of the following:

- For Tricon controllers, turn the keyswitch to RUN (to start the program on the controller) or to REMOTE (to start the program and allow external devices to write to tagnames or aliases).

- For Trident or Tri-GP controllers, set the mode to Run and disable Download commands by doing this: On the Commands menu, click Set Programming Mode, and then click Disable Programming and Control Operations.

Changes to the Project Version and State After Downloading to the Controller

Downloading to the controller changes the project's downloaded version and, if a Download All was performed, its download state.

Note See the *Triconex Emulator User's Guide* for detailed information about the impact of downloading to the Emulator on the project's version.

Changes to the Project's Downloaded Version

After the download to the controller is complete, the major or minor downloaded version of your project is incremented. (For example, in version 3.7, the major version is 3 and the minor version is 7.)

- A Download All operation increments the major version, and resets the minor version to 0.

- A Download Changes operation increments the minor version.

Project version changes made due to download operations can be viewed in the Project History dialog box. See View Project History Command on page 738.

Note Performing a download to the Emulator changes the downloaded version for the Emulator, but not the downloaded version for the controller. A project that has not yet been downloaded to the controller, but has been downloaded to the Emulator, will have a project version of 0.0.x, where x is the EmulatorCount value.

Project Version Rules

The project's downloaded version is different for the Emulator and the controller.

- The *controller downloaded project version* is the last version of the project file (.pt2) downloaded to the controller. The version is provided in the format **major.minor** (for example, in version 3.7, the major version is 3 and the minor version is 7).

- The *Emulator downloaded project version* is the last version of the project file (.pt2) downloaded to the Emulator. The version is provided in the format **major.minor.EmulatorCount** (for example, in version 3.7.12, the major version is 3, the minor version is 7, and the EmulatorCount is 12).

  — The major.minor version is the same as the last controller downloaded project version.

  — The EmulatorCount value is incremented sequentially after either a Download All or a Download Changes to the Emulator.

Changes to the Project Download State

After a Download All to the controller is complete, the download state of the project is changed to the Download Changes state.

Downloading a project to the Emulator changes the project's downloaded version (by incrementing the EmulatorCount value), but it does not change the project's download state.

The project state displayed in the Status Bar applies only to the controller; it has no impact on the project's ability to be downloaded to the Emulator. However, the Download Changes command will not be enabled for the Emulator until you have performed a Download All of the project on the Emulator at least once. Thus, it is possible that a project is in the Download All state for the controller, but can still be downloaded to the Emulator using the Download Changes command.

When the controller is in the Download Changes state, all rules that pertain to projects in the Download Changes state will apply (see Commands Required with Application Changes on page 550).

Note   Using the Change State to Download All command will change the download state for both the controller AND the Emulator to Download All. See Change State to Download All Command on page 579.

Verifying the Download to the Controller

Once you've downloaded your application to the controller, you may want to verify that the program elements on the controller are the same as those in the TriStation 1131 project. You can perform this *download verification* manually, or you can enable automatic download verification, so that verification occurs after every Download All or Download Changes operation.

Note   To enable automatic download verification, see Specifying Automatic Download Verification on page 41.

Download verification can be a useful troubleshooting tool, assisting you in determining if there are errors in specific application POUs.

During the download verification process, TriStation 1131 retrieves the program elements from both the controller and the project file, and then performs a binary comparison. Each comparison results in a pass or fail status message. The following items are compared:

Element	Description
Project versions	Compares the project version on the controller to the project version in the project file.
Control program status	Compares the following control program elements: • Program version • Program name • Download time
System variables	Compares the configured system variables on the controller to those in the project file.
I/O address	Compares the I/O point addresses on the controller to those configured in the project file.
Module configuration	Compares the modules configured in the controller to those in the project file's hardware allocation.
Symbol table and conversion table	Compares internal application information on the controller to the information in the project file.
Programs	Compares each program in the project's Implementation list to the corresponding project on the controller. Once each individual program is compared, an overall program verification status message appears.
Functions	Compares the function data on the controller to the functions configured in the project file.
Program information	Compares the program information on the controller to the same information in the project file.
Certificate table	Compares the certificate data on the controller with the certificate data in the project file. Applies only to Trident or Tri-GP 3.x controllers with a CIM installed.

Note   Because the SOE configuration contains dynamic data, SOE configuration information is not compared during the verification process.

Procedure

1 Connect to the controller and download an application, as described in Preparing to Download to the Controller on page 534.

2 Once the download is complete, remain connected to the controller.

3 On the Commands menu, click Download Verifier.

   Note   The Download Verifier command is available only while you are connected to a controller.

The verification process starts immediately and a progress bar appears. As each program element is verified, a pass/fail message appears in the Message View area.

Download verification is complete when an overall "download verification pass/fail" message appears.

Monitoring Variables on the Controller

This procedure explains how to monitor and enable or disable variables while the application is running on the controller.

CAUTION Monitoring and disabling variables should only be done if the controller is not connected to a live system or if maintenance is being performed.

Procedure

1 Connect to the controller and download an application, as described in Preparing to Download to the Controller on page 534.

2 Drag the function blocks and variables you want to monitor to the sheet.

3 On the Commands menu, click Run ▶ or Single Step ▶ .

   Note When you click Single Step, the application executes for one scan only. As a result, Modbus Master and Peer-to-Peer behavior can be unpredictable when Single Step is applied.

4 To enable or disable a variable, double-click the variable and click Enable or Disable.
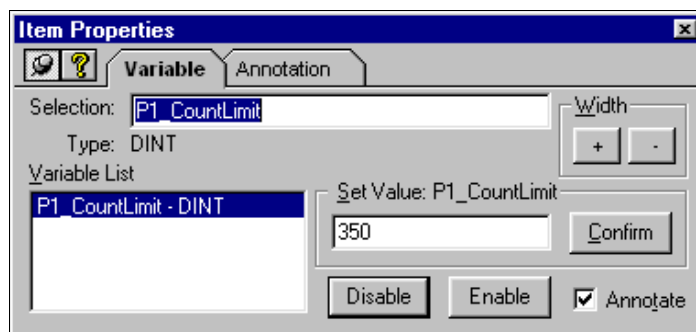
5 Continue testing, as needed.

Note While monitoring variables on the controller, you may occasionally see a question mark (?) instead of the variable's actual value. This is normal and should resolve itself within the next few scans. The question mark appears only when TriStation does not know the actual value of the variable. This can occur in situations when the list of variables is being updated (for example, when you've scrolled down the variables list, or resized the sheet view) and TriStation 1131 does not have enough communications bandwidth to display all the new values in one scan.

Monitoring the Program Execution

This procedure explains how to display the program execution, which shows the program executing on the controller.

Procedure

1   Connect to the controller and download an application, as described in Preparing to Download to the Controller on page 534.

2   On the controller tree, expand Programs, and click the program you want to test.

3   Click Display Program Document ⊞ᴾᶠ .

4   To view the program execution, on the Commands menu, click Run ▶ or Single Step

ℕ .

> **Note**   When you click Single Step, the program executes for one scan only. As a result, Modbus Master and Peer-to-Peer behavior can be unpredictable when Single Step is applied.

5   To quit running the program, click Disconnect ◀▌ .
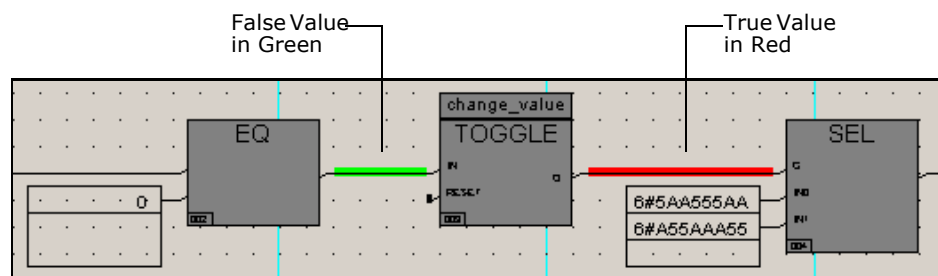
Figure 42   Sample Program Running on the Controller

Note   While monitoring the program execution, you may notice that although you have enabled color monitoring, colors are not appearing for the BOOL inputs and outputs on the logic sheet. This typically occurs when you are monitoring large programs with many tagnames.

If TriStation 1131 does not have enough communications bandwidth to display all the data being sent by the controller, color monitoring will be unavailable.

Adding Annotation for Variables

This procedure explains how to add an annotation to a variable, which allows you to specify information displayed while the program is executing. The annotation can include text and macros.

Procedure

1 Connect to the controller and download an application, as described in Preparing to Download to the Controller on page 534.

2 On the Commands menu, click Run ▶ .

3 If needed, drag variables to be tested onto the sheet.

4 Double-click a variable, and select the Annotate check box on the Variable tab.
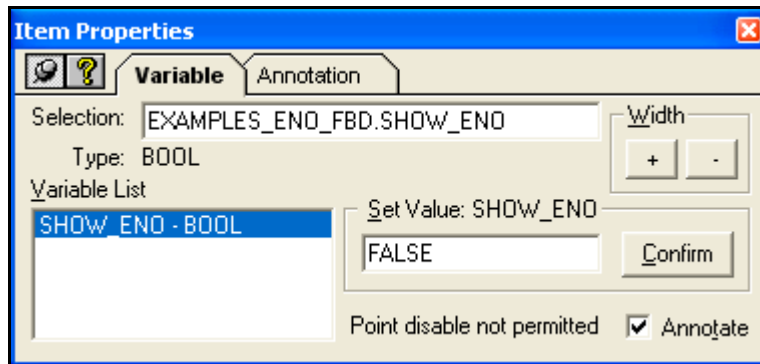
5 Click the Annotation tab.
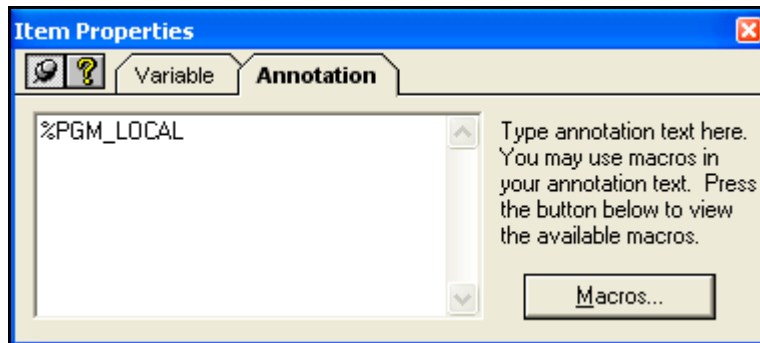
6 Click the Macros button to change the macro identified with the annotation.

7 To copy a macro, click the macro name and press Ctrl+C. To paste the macro, close the Edit Macros dialog box, click in the Annotation area, and press Ctrl+V. You can also enter text with the macros.

8 Continue testing, as needed.

Determining the Scan Surplus

This section explains how to determine the scan surplus, which indicates whether the actual scan time required to execute the application uses less time or more time than the requested scan time in the project. The actual scan time will always be equal to or greater than the requested scan time.

- When the actual time is equal to the requested time, the scan surplus is positive, which means the scan time setting can be decreased.

- When actual time is more than the requested time, the scan surplus is negative, which means the scan time should be increased to ensure that communication errors do not occur.

For more information, see Setting the Scan Time for a Downloaded Application on page 544.

The calculated scan surplus is an average based on the last 100 scans. The Triconex Enhanced Diagnostic Monitor (sold separately) displays information to determine scan surplus, including the Requested Scan Time, Actual Scan Time, and Scan Surplus for an application. For more information, see the *Enhanced Diagnostic Monitor User's Guide*.

Positive Scan Surplus

A positive scan surplus means the application executes in less time than the requested scan time. For example, if the requested scan time is 150 milliseconds, and the actual scan time is 100 milliseconds, there is a positive scan surplus of 50 milliseconds.

- If the surplus is 20 milliseconds or 10 percent of the actual scan time, do nothing.

- If the surplus is greater than 20 milliseconds or 10 percent of the actual scan time, decrease the number for the scan time. In this example, the scan time could be set to 130 milliseconds.

Note   Even when the actual scan time is less than the requested scan time, the Actual Scan Time displayed in the Enhanced Diagnostic Monitor will always appear as the same as the Requested Scan Time. In this case, you should use the value displayed for the Scan Surplus to determine if you can reduce your requested scan time.

Negative Scan Surplus

A negative scan surplus means the actual scan time is greater than the requested scan time. For example, if the requested scan time is 150 milliseconds, and the actual scan time is 200 milliseconds, there is a negative scan surplus of 50 milliseconds.

- If the surplus is negative, increase the number for the requested scan time by the negative amount plus 20 milliseconds. In this example, the scan time should be set to 220 milliseconds.

Scan Surplus and Process Alarms

It is possible for an application to report a positive scan surplus, but to have a scan overrun (a negative scan surplus) when simultaneous process alarms are generated in a single scan. This is because the scan surplus is averaged over 100 scans.

If many simultaneous alarms are generated during a single scan, then a scan overrun will occur for that scan. However, if alarms do not occur every scan, the average scan surplus may still be positive.

For more information about the impact of process alarms on scan time, see Effect of Process Alarms on Scan Time on page 214.

Process Safety Time Requirements

You should determine the *Process Safety Time* (PST) required by the application. The PST is the period of time during which the process could shift from a safe operating condition to a dangerous condition. The scan time for an application should be half the PST. For example, a burner management system has a PST of 1 second, which means the scan time should be 500 milliseconds.

Setting the Scan Time for a Downloaded Application

This procedure explains how to set the scan time for a downloaded application running in the controller. (The Emulator does not provide real-time information on scan time.) This should be done if the scan time set in the project is less than the actual scan time required to run the application. For more information, see Determining the Scan Surplus on page 543.

Note For information about how process alarms can impact the scan time, see Effect of Process Alarms on Scan Time on page 214.

If you need a faster scan time than the low end of the range, you must redesign the application or the process.

Procedure

1 Connect to the controller and download an application, as described in Preparing to Download to the Controller on page 534.

2 On the Commands menu, click Set Scan Time.

This is the Tricon 3008 screen.   This is the Trident or Tri-GP screen.
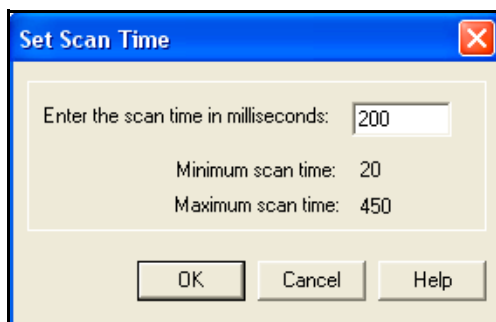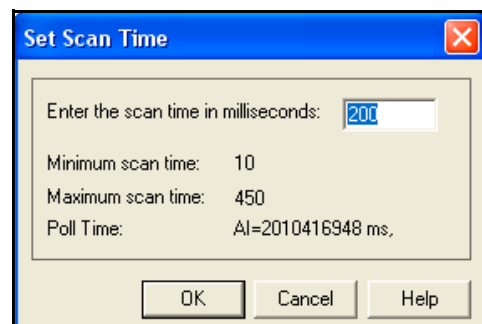
3 Specify this property on the Set Scan Time screen.

Property	Action
Enter the scan time in milliseconds	Enter the number of milliseconds for the scan time used while the application is running in the controller. The number must be in the minimum to maximum range. • For Tricon 3006/3007, the range is 20 to 500 milliseconds. • For Tricon 3008, the range is 20 to 450 milliseconds. • For Trident or Tri-GP, the range is 10 to 450 milliseconds. The minimum must be equal to or larger than the poll times. This setting does not affect the requested scan time for the project. To change the requested scan time in the project, you must set the scan time on the Implementation screen.

Note To guarantee that the controller provides a deterministic response time, the scan time should always be set to a value **greater than** the I/O poll time (the maximum time needed by the controller to obtain data from the input modules). You can view the I/O poll time on the System Overview screen in the Enhanced Diagnostic Monitor (sold separately). For more information, see the *Enhanced Diagnostic Monitor User's Guide*.

4 Click OK to save your changes.

Displaying Hardware Allocation Exceptions

This procedure explains how to display hardware allocation exceptions, which indicate that the hardware configuration in the project does not match the physical hardware configuration.

Procedure

1   Connect to the controller and download an application, as described in Preparing to Download to the Controller on page 534.

If the logical and physical configurations do not match, the Hardware Allocation Exception dialog box appears.
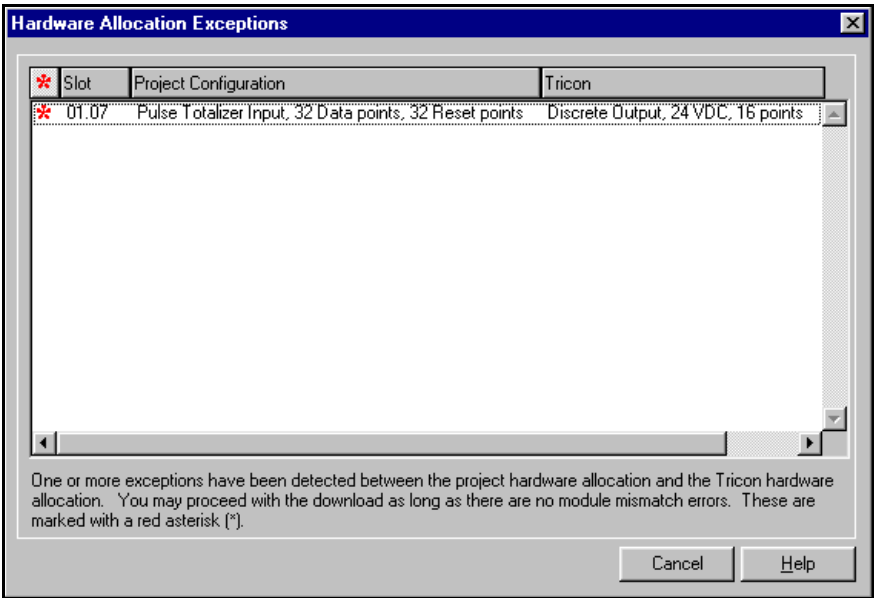
2   Differences identified with an asterisk must be fixed in the project before the application can be downloaded. Other differences may allow you to download the application.

Identifier	Description
Asterisk (*)	A red asterisk identifies a module mismatch, which means the module specified in the hardware configuration for the project is different from the module in the physical system. This error must be fixed by changing the hardware configuration in the project.
Empty slot	An empty slot error indicates either of these: • The hardware configuration specifies a module that is empty in the controller. • The controller contains a module that is not included in the hardware configuration. The application can be downloaded.

Maintenance

This section explains how to plan and manage changes to an application running on a controller attached to a live system.

⚠ **WARNING**   Changing a safety-critical application that is running on a controller should be avoided because an error in the application could cause a trip or unpredictable behavior.

Topics include:

Steps for Downloading Changes

This list includes steps for making changes to an application running on a controller.

⚠️ **WARNING**

- For a safety-critical application running on a live system, you must use extreme caution because a configuration error in the changed application could cause unpredictable behavior or a trip.
- When a Download Changes command is issued, the scan time is doubled for one scan immediately following the command. For example, if the normal scan time is 100 ms, the scan following a Download Changes would be 200 ms.

	Step	See
☐	Verify the TriStation 1131 software is correctly installed.	• Verifying the TriStation 1131 Installation on page 9
☐	Plan for the change.	• Planning and Controlling Changes on page 549.
☐	Determine whether a Download All or Download Changes is required.	• Commands Required with Application Changes on page 550.
☐	Review the hardware configuration. If needed, correct the hardware configuration to match the physical configuration.	• See the Hardware Module Configuration report. See Generating Reports on page 86.
☐	Compare the current project with the last downloaded.	• Compare Project to Last Download Command on page 586
☐	Test on the Emulator.	• Using the Triconex Emulator for Testing on page 533
☐	Ensure the scan time has a surplus.	• Determining the Scan Surplus on page 543
☐	Download the changed application.	• Using the Download Changes Command on page 557. • Using the Download All Command on page 559
☐	Backup the project and copy it to another storage medium.	• Backup Project Command on page 574

Planning and Controlling Changes

This section describes recommended procedures for planning and controlling changes to an existing application. All changes to an application should be controlled by a change control board or the equivalent, and should comply with strict control procedures.

Recommended Procedure

1 Generate a change request defining all changes to the application and the reasons for the changes, then obtain approval for the changes from the board.

2 Develop a specification for changes, including a test specification, then obtain approval for the specification from the board.

3 Make the appropriate changes to the application, including those related to design, operation, or maintenance documentation.

4 Verify the application in the controller matches the last downloaded application. See Verify Last Download to the Controller Command on page 735. If the applications do not match, contact Invensys support.

5 Print the Hardware Module Configuration report to compare the current configuration with the last one downloaded to the controller.

6 Print all user documents and thoroughly check all changed networks in each document to ensure the changes do not affect other parts of the application.

7 Test the new application on the Emulator and write a test report.

8 Review and audit all changes and the test results with the board.

9 When approved by the board, download the changes to the controller.

10 Save the downloaded application and back up the appropriate files on a CD or other storage medium.

11 Archive two copies of the .pt2 (project) file and all associated documentation.

Commands Required with Application Changes

After an application is downloaded to a controller or the Emulator, the state is set to accept changes to the project which are allowed with the Download Changes command. If a change requires the Download All command, it is either disabled or a message advises you to change the state or cancel the change. For example, a program cannot be deleted unless the state is changed to Download All (see Change State to Download All Command on page 579).

This table identifies whether a Download All or Download Changes command is required.

Table 43   Commands Required with Changes

Component	Command Required
Chassis	Download All: Required if a chassis is added, deleted, or the type is changed.
Functions and function blocks	Download All: Required if a function or function block is modified or deleted.
	Download Changes: Allowed if a function or function block is added.
IP Address	Download Changes: Allowed, but not advised, if the IP address of a communication module is changed.
Library elements	Download Changes: Allowed, but only if the library (or selected library elements, for partial changes) being added, updated, or deleted does not change function blocks that have already been downloaded to the controller.
	Download All: Required if the library (or selected library elements) being added, updated, or deleted changes function blocks that have already been downloaded to the controller.
Memory allocation	Download All: Required if memory allocation is increased.
Modules	Download All: Required if modules are deleted or moved in the configuration.
	Download Changes: Allowed if a module is added and the chassis has empty slots, and there is sufficient memory allocated for the points.
Node Number	Download All: Required if the address plug and node number configuration are changed.
Number of Send or Receive function blocks	Download All: Required if the number of send or receive function blocks is increased or decreased.
Operating Parameters	Download All: Required if the Allow Disabling of Points property is changed.
	Download Changes: Allowed if these properties are changed: Disable Remote Changes to Outputs, Password Required for Connection, Restart on Power-Up (Trident or Tri-GP only), Scan Time, and Use Local Time.
Programs	Download All: Required if a program is deleted from an application.
	Download Changes: Allowed if a program is added to an application and there is sufficient memory.

Table 43   Commands Required with Changes *(continued)*

Component	Command Required
Tagnames	Download Changes: Allowed if tagnames are added, modified, or deleted. Tagnames can also be disconnected or connected to different points, if there is enough memory allocated for the required point types. Points must be enabled.
Target System Version	Download All: Required if the target system version is changed (upgrade or downgrade), unless you are converting a project created in a version of TriStation 1131 prior to 4.6.
	Download Changes: Allowed if you are changing the target system version while converting a project created in a version of TriStation 1131 prior to 4.6.
Variables	Download All: Required if changes to the Data Type or Alias Type require additional memory allocation.
	Download Changes: Allowed if changes to the Data Type does *not* require additional memory allocation. Points must be enabled. Also allowed if the variable Name, Description, or Initial Value is added or changed. Allowed, but not advised, if changes are made to the Point Type, Alias Type, or Alias Number of a memory variable; these changes will re-initialize the point to its configured initial value, or 0 if no initial value is defined.

Chapter 7

Implementation

Disabling Points

This section explains how to disable points (tagnames) on an application running on a controller, which should be used with care. When a point is disabled, inputs from field instruments or the application running on the controller do not change the value of the point.

Disabling points is typically used when field instruments need to be replaced or repaired.

Once a point is disabled:

- If the point is a physical input, field instruments cannot write to it. (The application cannot write to it by definition, once the point is configured as an input.)

- If the point is a physical output, the application cannot write to it.

- If the point is a memory point, the application cannot write to it.

- The value in the point when it was disabled is held. If desired, you can force the point to a specific value (see Forcing Points on page 556).

- External hosts (Modbus Masters, etc.) can still write directly into the disabled point if the point is:

  — A memory read/write aliased tagname and the controller is write-accessible (the keyswitch is in PROGRAM or REMOTE mode, or in RUN mode with gate access).

  — An output point *and* the "Disable Remote Changes to Outputs" property on the Operating Parameters screen is not selected.

- Changes to the controller's keyswitch position will not affect the point or re-enable it.

CAUTION If a disabled point is configured to allow external write access, you must ensure that external hosts do not write to the point and change the point's value while it is disabled. If this occurs, the point will be updated to the value written by the external host, which may result in undesirable consequences.

Note Disabling points on the controller is completely separate from disabling points on the Emulator. Points that are disabled in the program running on the Emulator will NOT also be disabled in the application that is currently running on (or will be downloaded to) the controller.

For Tricon 9.x controllers, a maximum of 64 points can be disabled at any one time. For Tricon 10.x controllers, a maximum of 256 points can be disabled. There is no maximum to the number of points that can be disabled for Trident or Tri-GP controllers; however, disabled points are not recorded and are cleared after a power cycle.

When you disable one or more points, the number of disabled points output parameter (POINTS_DISABLED) in the TR_PROGRAM_STATUS (Tricon) or SYS_MP_EXT_STATUS (Trident or Tri-GP) function block is updated. Additionally, the alarm state for disabled points is also changed to TRUE in the TR_SHUTDOWN (Tricon) or SYS_SHUTDOWN (Trident or Tri-GP) function block. See the *TriStation 1131 Libraries Reference* for more information about these function blocks.

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The disabling (and subsequent re-enabling) of points is saved to the TriStation 1131 Project History. To view information about when a point was disabled—and who disabled it—from the Project menu, select View Project History.

In order to disable points from TriStation 1131, the Allow Disabling of Points property must be selected on the Operating Parameters screen. See Setting Tricon Operating Parameters on page 295 or Setting Trident or Tri-GP Operating Parameters on page 361 for more information.

> ⚠️ **WARNING**
>
> - A project should not contain disabled points unless there is a specific reason for disabling them, such as initial testing or maintenance.
> - Disabling points can increase the scan time.
> - Enabling the Allow Disabling of Points property can increase the scan time, regardless of whether any points are actually disabled.

If power to the controller is lost, upon restoration of power and a controller restart, disabled points will behave as follows:

Point Type	Value Upon Power Restore and Restart
Memory (Discrete, Integer, Real)	• Non-Retentive Point: Initial value (if initialized) or zero (if not initialized). • Retentive Point: Value that was in the point just before the loss of power.
Input (Discrete, Integer, Real)	Value that was in the point just before the loss of power. **Note:** An initial value and the retentive attribute are not applicable to input points.
Output (Discrete, Integer)	• Non-Retentive Point: Initial value (if initialized) or zero (if not initialized). This value is used until the first calculated value is available. • Retentive Point: Value that was in the point just before the loss of power. This value is used until the first calculated value is available.

Note The above behavior also applies to non-disabled points, with the following exception: For a non-disabled input point, the value upon power restore and restart will be zero (0).

Topics include:

- Disabling Points on the Controller on page 554
- Viewing Disabled Points on page 554
- Re-enabling Disabled Points on page 554

Disabling Points on the Controller

This procedure describes how to disable points in a program running on the controller.

Points are automatically re-enabled if you perform a Download All. Disabled points are retained if you perform a Download Changes operation.

Procedure

1 Expand the Configuration tree, and click Controller Panel.

2 On the Commands menu, click the Connect command, and enter the connection password if required.

Note If the target system version configured for the project does not match the system version of the controller you are trying to connect to, you will be unable to connect to the controller. See Configuring the Tricon Target System Version on page 298 or Configuring the Trident or Tri-GP Target System Version on page 365.

3 Double-click a point to be disabled, and click Disable.

Only one point can be disabled at a time.

4 If prompted, enter a comment (using 100 characters or less) that describes why this point was disabled, and then click OK. The comment will be placed in the project history.

Note Entering a comment is optional. You will be prompted to enter a comment only if the corresponding option was selected in the Project Options dialog box. See Specifying Forced Points Options on page 39.

5 Repeat steps 3 and 4 until all desired points have been disabled.

Viewing Disabled Points

You can view a list of all disabled points on the controller, including each point's tagname, location, and Modbus alias. Individual points in the list can be selected and enabled.

The application must be running on the controller in order to view the list of disabled points.

Procedure

1 Click Run ▶ to execute the application on the controller.

2 From the Commands menu, select List Disabled Points.

3 If desired, select the points you want to enable, and then click OK.

Re-enabling Disabled Points

Note Points that have been disabled can be re-enabled individually or all at once. You can also enable points from the List of Disabled Points dialog box. See Viewing Disabled Points on page 554.

To enable points individually:

1   Click Run ▶ to execute the application on the controller.

2   Double-click the point to be enabled, and click Enable.

3   If prompted, enter a comment (using 100 characters or less) that describes why this point was re-enabled, and then click OK. The comment will be placed in the project history.

   Note   Entering a comment is optional. You will be prompted to enter a comment only if the corresponding option was selected in the Project Options dialog box. See Specifying Forced Points Options on page 39.

4   Repeat steps 3 and 4 until all desired points have been enabled.

To enable all disabled points at once:

1   Click Run ▶ to execute the application on the controller.

2   From the Commands menu, select Enable All Disabled Points.

3   When asked to confirm the operation, click Yes.

   All points that are currently disabled on the controller are re-enabled.

Forcing Points

This section explains how to force points (tagnames) on an application running on a controller, which should be used with care. *Forcing a point* is the act of putting a value into a point that has been disabled.

When a point is disabled, inputs from field instruments or the application running on the controller do not change the value of the point. Once you have disabled a point, you can then force the point to a specific value by entering that value in the point's Tagname Properties dialog box.

Note For information about how forced points behave after a power failure/restart, see Disabling Points on page 552.

Disabling and forcing points is typically used during maintenance operations, when field instruments need to be replaced or repaired. For example, a digital output point drives a solenoid/valve, which is normally energized during operation. When the solenoid requires maintenance, the digital output point is disabled and then forced to the OFF state. This allows maintenance personnel to safely disconnect the field device and perform the required maintenance function.

Points can also be disabled and forced during factory or site acceptance testing (FAT/SAT), when input conditions are set by disabling and forcing the input points because the field devices have not yet been wired and connected to the controller. If a portion of your process is offline, some points may remain in the disabled/forced state for a long period of time.

Note Forcing points on the controller is completely separate from forcing points on the Emulator. Points that are forced to a value in the program running on the Emulator will NOT also be forced to the same value in the application that is currently running on (or will be downloaded to) the controller.

Forced points are saved to the TriStation 1131 Project History. To view information about when a point was forced, the value it was forced to, and the user who forced the value, from the Project menu, select View Project History.

This procedure describes how to force points in a program running on the controller.

Procedure

1 Disable the point as described in Disabling Points on page 552.

2 Double-click the point to be forced, opening the Item Properties dialog box for the point.

3 In the Set Value field, enter the value you want to force the point to use, and click Confirm.

   Only one point can be forced at a time.

4 If prompted, enter a comment (using 100 char caters or less) that describes why this point was forced, and then click OK. The comment will be placed in the project history.

   Note Entering a comment is optional. You will be prompted to enter a comment only if the corresponding option was selected in the Project Options dialog box. See Specifying Forced Points Options on page 39.

Using the Download Changes Command

This procedure explains how to use the Download Changes command to download changes to an application that has been downloaded and is running on a controller. For information on changes that are allowed with this command, see Download Changes Command on page 607.

These warnings should be reviewed before proceeding.

⚠ WARNING

- Changing a safety-critical application that is running on a controller should be avoided because an error in the application could cause a trip or unpredictable behavior.

- If the application has a negative Scan Surplus, do not use the Download Changes command because it could cause a trip or unpredictable behavior.

- When a Download Changes command is issued, the scan time is doubled for one scan immediately following the command.

- If a memory variable's Point Type, Alias Type, or Alias Number is changed, using the Download Changes command re-initializes the variable to its configured initial value, or 0 if no initial value is defined.

- If the IP Address is changed, the Fault indicator on the communication module turns on during the reset, which temporarily compromises the TMR status of the controller.

- If an I/O module is added, the TMR status of the controller is temporarily compromised for as much as 8 to 16 scans. For more information, see Adding an I/O Module below.

- If the AI module type for models 3703 or 3704 is changed, the TMR status of the controller is temporarily compromised for as much as 8 to 16 scans.

- If the DO module type for models 3611, 3613, 3614, 3615, or 3617 is changed, the TMR status of the controller is temporarily compromised for as much as 8 to 16 scans.

- If the resolution type on model 3720 and 3721 AI modules is changed, all input points on the module will change. A change from high to low resolution (or vice-versa) results in a value change by a factor of four. Additionally, if field power monitoring is changed from On to Off (or vice-versa), all input points on the module will temporarily change to 0 for 1-2 scans. See Configuring a Tricon AI Single-Ended or Differential Module on page 312 for more information.

- For Trident and Tri-GP controllers, a Download Changes command will be rejected by the controller if the application's symbol table is greater than 1 MB in size. See Declaring Tagnames on page 179 for more information about reducing the size of the symbol table.

- If in doubt about the effect of this command, contact Technical Support.

Adding an I/O Module

If the application uses the following function blocks, the changed application should include logic to accommodate the behavior.

- For Tricon controllers, the IOMAIN and IOBAD parameters of the TR_MP_STATUS function block turn off.

- For Trident or Tri-GP controllers, the parameters for the SYS_IO_STATUS, SYS_IOP_STATUS, and SYS_SYSTEM_STATUS function blocks turn off.

For more information, see the Tricon, Trident, or Tri-GP *Safety Considerations Guide*.

Procedure

1 Expand the Configuration tree, and double-click the Controller Panel.

2 On the Commands menu, click Connect ⬚ , and enter the connection password if required.

   Note   If the target system version configured for the project does not match the system version of the controller[1] you are trying to connect to, you will be unable to connect to the controller. See Configuring the Tricon Target System Version on page 298 or Configuring the Trident or Tri-GP Target System Version on page 365.

3 On the Commands menu, click Download Changes ⬚ .

   The changes are made while the application is running.

   If the download failed, review the error messages on both the Controller and Application tabs to determine the source of the failure.

---

1. Except for Trident 1.x controllers, which do not use the target system version.

Using the Download All Command

This procedure explains how to use the Download All command to download a changed application to a controller. For information on changes that require this command, see Download All Command on page 606.

See Changes to the Project Version and State After Downloading to the Controller on page 536 for information on the impact of performing a Download All operation on a controller.

Notes If you have configured process alarms in your application (see Alarms on page 200), TriStation 1131 will verify that you have updated the process alarms program before downloading your application.

For Trident and Tri-GP controllers, a Download Changes command will be rejected by the controller if the application's symbol table is greater than 1 MB in size. See Declaring Tagnames on page 179 for more information about reducing the size of the symbol table.

> ⚠ **WARNING**   Using the Download All command requires the current application running on the controller to be halted.

Procedure

1   Expand the Configuration tree, and double-click the Controller Panel.

2   On the Commands menu, click Connect ⬛ .

   Note   If the target system version configured for the project does not match the system version of the controller[2] you are trying to connect to, you will be unable to connect to the controller. See Configuring the Tricon Target System Version on page 298 or Configuring the Trident or Tri-GP Target System Version on page 365.

3   If needed, change the connection setting. Click OK.

4   If required, enter the connection password.

5   If needed, change the state to Download All. On the Commands menu, click Change State to Download All.

6   Click Halt to stop the application.

7   For Tricon controllers, turn the keyswitch to PROGRAM.

8   For Trident or Tri-GP controllers, ensure the mode is Enable Programming and Control Operations, by doing this:

   •   On the Commands menu, click Set Programming Mode, and then click Enable Programming and Control Operations. (This is the default setting.)

9   Click Download All ⬛ .

   If the download failed, review the error messages on both the Controller and Application tabs to determine the source of the failure.

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2.   Except for Trident 1.x controllers, which do not use the target system version.

10 Click Run ▷ to start the application running on the controller.

11 For Tricon controllers, turn the keyswitch to RUN.

A

Commands and Properties

This appendix provides descriptions of TriStation 1131 commands and properties.

Active

See Alarm Attributes on page 562.

Add File Command

The Add File command adds a custom Help file to the TriStation 1131 Help menu. A maximum of 32 customized HTML Help files (.chm) may be added to the TriStation 1131 Help menu.

Applies To

Application

Location

Help menu > Options > Add or Remove Custom Help Files

Add Program to Execution List Command

The Add Program to Execution List command places the cursor inside the Program Execution List box, which allows you to enter or select a program to be added to the list.

Applies To

Application

Location

Application tree > Implementation > Edit menu

Alarm Attributes

The Alarm Attributes properties are used to configure process alarms. Each alarm type (Deviation, Level, Rate-of-Change, Trip) has a set of attributes to be configured. The available attributes differ depending on the type of alarm you are configuring. While most attributes can accept either a constant (fixed) value or a tagname, some attributes can accept only one or the other. For more information, see Configuring Alarm Attributes on page 201.

The alarm attributes are automatically connected to the corresponding input in the appropriate alarm function block when the process alarms program is created.

This table identifies the available alarm attributes, and the alarm types they correspond to.

Table 44   Alarm Attributes

Attribute	Description	Applicable Alarm Types
Active	Specifies the alarm state. Must be TRUE, FALSE, or a BOOL tagname.	LVL, DEV, ROC, TRP
Alarm Status	Specifies the current alarm state, alarm condition, and process condition.	LVL, DEV, ROC, TRP
Automatic Reset	Configures the alarm sequence as follows: • If Automatic Reset = FALSE and Alarm Ringback = FALSE, then the manual reset sequence is initiated. • If Automatic Reset = FALSE and Alarm Ringback = TRUE, then the ringback sequence is initiated. • If Automatic Reset = TRUE, then the automatic reset sequence is initiated, regardless of the Alarm Ringback status. Resets the alarm automatically when an alarm goes inactive. Must be TRUE, FALSE, or a BOOL tagname.	LVL, DEV, ROC, TRP
Bypass	Specifies if the alarm is bypassed. Must be TRUE, FALSE, or a BOOL tagname.	LVL, DEV, ROC, TRP
Bypass Request	Specifies whether or not a client can request a bypass for this alarm. Must be TRUE, FALSE, or a BOOL tagname.	LVL, DEV, ROC, TRP
Command Accepted	Specifies whether a command has been accepted by the alarm function block. Must be TRUE, FALSE, or a BOOL tagname.	LVL, DEV, ROC, TRP
Command ID	Specifies which function block will execute the command specified by Command In.	LVL, DEV, ROC, TRP

Table 44   Alarm Attributes *(continued)*

Attribute	Description	Applicable Alarm Types
Command In	An integer that indicates an acknowledge or manual reset command from the operator, as follows: • 6 = Acknowledge • 12 = Manual reset • Other = Do nothing	LVL, DEV, ROC, TRP
Deadband	Specifies the difference between the alarm limit and the input value before an alarm goes inactive. Used for hysteresis.	LVL, DEV, ROC
Disable Request	Specifies whether or not a client can disable the alarm. Must be TRUE, FALSE, or a BOOL tagname.	LVL, DEV, ROC, TRP
First Out	Specifies the first alarm (in a specified set of alarms) that goes active. Must be an integer.	LVL, DEV, ROC, TRP
High Active	If true, the alarm condition is High High or High.	LVL, DEV, ROC
High High Active	If true, the alarm condition is High High.	LVL, DEV, ROC
High High Limit	High High process condition limit.	LVL, DEV, ROC
High High Severity	High High alarm severity.	LVL, DEV, ROC
High Limit	High process condition limit.	LVL, DEV, ROC
High Severity	High alarm severity.	LVL, DEV, ROC
ID	Specifies the unique identifier for the alarm function block.	LVL, DEV, ROC, TRP
Low Active	If true, the alarm condition is Low.	LVL, DEV, ROC
Low Limit	Low process condition limit.	LVL, DEV, ROC
Low Low Active	If true, the alarm condition is Low Low or Low.	LVL, DEV, ROC
Low Low Limit	Low Low process condition limit.	LVL, DEV, ROC
Low Low Severity	Low Low alarm severity.	LVL, DEV, ROC
Low Severity	Low alarm severity.	LVL, DEV, ROC
Ringback	When ringback is enabled, if an alarm is triggered but then returns to normal without being acknowledged, it enters the ringback state. The ringback state requires a manual reset of the alarm to return the state to normal. Must be TRUE, FALSE, or a BOOL tagname.	LVL, DEV, ROC, TRP
Setpoint	Specifies the value from which the deviation alarm will be generated. Must be an integer.	DEV

Table 44   Alarm Attributes *(continued)*

Attribute	Description	Applicable Alarm Types
Shift Change Request	Specifies whether or not shift change functionality is enabled for this alarm. When enabled, alarms that were acknowledged before a shift change will need to be acknowledged again by the new operator(s). Must be TRUE, FALSE, or a BOOL tagname.	LVL, DEV, ROC, TRP
Source ID	Specifies the unique ID for communication via the OPC UA protocol interface. Assigned automatically when the process alarms program is generated. If you are not using OPC UA, you must set this value to 0 (zero).	LVL, DEV, ROC, TRP
Time Delay	Specifies the amount of time (in seconds) before an alarm will go ACTIVE after detection of a process condition change from normal to abnormal. The default is 0 seconds.	LVL, DEV, ROC, TRP
Trip Level	Specifies which level (True or False) results in a trip alarm. • The process condition is abnormal if Source = Trip Level. • The process condition is normal when Source ≠ Trip Level. Must be TRUE, FALSE, or a BOOL tagname.	TRP
Trip Severity	Specifies the severity number for the trip alarm. Severities are defined in the OPC UA communications protocol. Must be an integer.	TRP
Unbypass Request	Specifies whether or not a client can request an unbypass for this alarm. Must be TRUE, FALSE, or a BOOL tagname.	LVL, DEV, ROC, TRP

For more detailed information about these attributes, see Configuring a Level, Deviation, or ROC Alarm on page 202 and Configuring a Trip Alarm on page 207.

Applies To

Input and memory points; process alarms

Location

Application tree > Tagname Declarations > Declaration tab > Alarm Settings > Tag Configuration dialog box

Alarm Function Block

The Alarm Function Block property specifies the name of the process alarm function block associated with an alarm configured for a tagname.

A default name is created automatically by TriStation 1131 using the name of the tagname you are configuring the alarm for, and the alarm type. For example, if your tagname is named "PV_1047", the function block name for a trip alarm will be generated as "PV_1047_TRIPAlm".

You can change this name, as long as the name does not exceed 31 characters.

See also Alarm Attributes on page 562.

Applies To

Input and memory points; process alarms

Location

Application tree > Tagname Declarations > Declaration tab > Alarm Settings > Tag Configuration dialog box

Alarms SOE Block Number

The Alarms SOE Block Number property specifies the block number used when alarm events are retrieved by SOE Recorder or an OPC UA client. For more information on using SOE Recorder, see the *Triconex SOE Recorder User's Guide.*

For OPC UA configuration, must be unique for each CIM installed in a system. The default value is 0 (alarms are not configured). If you have alarms configured in your application you **must** enter an SOE block number; you cannot use the default value of 0.

Applies only to the model 3211 and 3211S2 CIM.

Applies To

Sequence of Events (SOE), OPC communication

Location

Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CIM Setup > OPC tab

Alarm Status

See Alarm Attributes on page 562.

Alias Number

The Alias Number property identifies the range of five-digit alias numbers that can be assigned to the point. For Trident or Tri-GP controllers, the alias number can be set within a default range or within a larger allowable range.

This table identifies Tricon, Trident, and Tri-GP controller alias ranges.

Table 45   Alias Number Information

Bin	Data Type	Variable Type	Message Type	Tricon Range	Trident/ Tri-GP Default Range	Trident/ Tri-GP Allowable Range	Bin Size
0	BOOL	Output	Read/Write	00001 - 02000	00001 - 04999	00001 - 09999	2048
1	BOOL	Memory	Read/Write	02001 - 04000	05000 - 09999	00001 - 09999	2016
2	BOOL	Input	Read	10001 - 12000	10001 - 14999	10001 - 19999	4096
3	BOOL	Memory	Read	12001 - 14000	15000 - 19999	10001 - 19999	2016
4	DINT	Input	Read	30001 - 31000	30001 - 32499	30001 - 39999	1024[a]
5	DINT	Memory	Read	31001 - 32000	32500 - 34999	30001 - 39999	1000
6	REAL	Input	Read	32001 - 32120	35000 - 37499	30001 - 39999	120
7	REAL	Memory	Read	33001 - 34000	37500 - 39999	30001 - 39999	1000
10	DINT	Output	Read/Write	40001 - 40250	40000 - 42499	40001 - 49999	512
11	DINT	Memory	Read/Write	40251 - 41000	42500 - 44999	40001 - 49999	750
12	REAL	Memory	Read/Write	41001 - 42000	45000 - 49999	40001 - 49999	1000

a.   For Tricon controllers only: While this bin size is 1024 points, only 1000 points are available to be aliased. The remaining 24 points will be unaliased, because the alias range reserved for DINT input points is 30001 through 31000.

For more information about how alias numbers are assigned, see Assigning an Alias Number, Alias Type, and Physical Address on page 181.

Applies To

Communication

Location

Application tree > Tagnames > Item Properties > Point Assignment tab

Alias Type

The Alias Type property identifies whether the memory point has an alias number and whether the point is read or read/write. Settings include:

- **Unaliased**: Means the point cannot be read or written to.
- **Read aliased**: Means the point can be read by an external device. If specified, you can accept the default alias, or enter a number for the alias.
- **Read/write aliased**: Means the point can be read or written by an external device. If specified, you can accept the default alias, or enter a number for the alias.

Applies To

Communication

Location

Application tree > Tagnames > Item Properties > Point Assignment tab

Alignment

The Alignment property specifies how the text for an annotation or comment is aligned in the comment box; either left, center, or right. The default is left.

Applies To

Comments

Locations

- Item Properties > Comment tab
- Project menu > Project Options > Annotations tab

Allow Disabling of Points

The Allow Disabling of Points property specifies whether points can be disabled from the TriStation PC. A TriStation PC cannot write to disabled points, however, external devices such as Modbus masters can write to disabled points unless you disable external device writes.

This property can be changed only when your project is in the Download All state. The default is cleared, which means points cannot be disabled from the TriStation PC.

Once you have changed this property (by selecting or clearing the check box), you must perform a Download All to apply your changes to the controller. TriStation 1131 will automatically rebuild the application before it is downloaded. See Building or Rebuilding an Application on page 286 and Using the Download All Command on page 559.

Applies To

Memory and Output Points

Locations

- Tricon Controller tree > Configuration > Operating Parameters
- Trident or Tri-GP Controller tree > Configuration > MP Setup > Operating Parameters tab

Allow Expired Certificate

The Allow Expired Certificate property specifies you want to allow secure connections to Trident or Tri-GP 3.x controllers even if the TriStation server and/or client certificate is expired.

If a certificate expires, and this option is not selected, you will be unable to connect to the controller via a network connection. In this case, you will have to connect via a serial connection, or perform a Download All operation to download a new certificate.

Applicable only to TriStation or Enhanced Diagnostic Monitor connections to Trident/Tri-GP 3.x systems with a CIM installed. Does not apply to OPC UA client/server certificates.

The default is cleared, which means expired certificates cannot be used for secure communication.

Applies To

Secure communication

Location

Trident or Tri-GP 3.x Controller tree > Configuration > MP Setup > Operating Parameters tab

Allow Partial Changes to Libraries

The Allow Partial Changes to Libraries property specifies whether you can make changes to selected elements in an existing library without having to add, update, or delete the entire library. Partial library changes are defined as:

- Adding individual elements to an existing library.
- Updating individual elements in an existing library.
- Deleting individual elements from an existing library.

All partial changes must be compatible with the other elements in the library.

Applies To

Libraries

Locations

- Application tree > right-click Library Documents > Manage command
- Project menu > Library > Manage command

Allow Unsecured Session

The Allow Unsecured Session property specifies whether OPC UA clients can connect to the Trident/Tri-GP 3.x CIM's OPC UA server without a certificate (an unsecured session). If this check box is not selected, OPC UA clients will be allowed to connect only with a certificate (a secured session).

The default is cleared, which means only secure sessions are allowed.

Location

Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CIM Setup > OPC tab

Annotate

The Annotate property specifies whether to add an annotation, which is similar to a comment, to a variable. If selected, an annotation box is attached to the bottom of an input, output, input/output, or local variable. You can change the size of the annotation box.

An annotation can include any of the following:

- The monitor value (value of the variable as the configuration executes)
- The default macro for the particular type of variable
- Other standard macros
- User-modified macros
- Text that you type in

The default is cleared, which means an annotation is not included. If Annotate is cleared, no properties are available to view when the application is run on the controller or Emulator.

Applies To

Variables

Location

Item Properties > Constant tab

Annotation on by Default

The Annotation on by Default property specifies whether to automatically add annotation boxes to variables used with a program or function block.

Annotations allow you to include information that is displayed at the bottom of an input, output, input/output, or local variable. If you enable annotation for the project, the annotation display is automatically added to all the variables in the project.

The default is cleared, which means annotation is not automatically added.

Applies To

Variables

Location

Project menu > Project Options > Annotations tab

Append Sheet Command

The Append Sheet command adds a new logic sheet *after* the sheet currently being viewed. You must enter a title for the new sheet before it will be added.

Applies To

Logic sheets

Location

Sheets menu

Application Type

The Application Type property determines whether an application element (program, function, function block, or tagname) is used with safety, control, or safety and control applications.

The default is Control.

Table 46   Application Types

Setting	Description
Safety	An application that is designed to take a process to a safe state when predetermined conditions are violated. Also referred to as an Emergency Shutdown System (ESD), Safety Instrumented System (SIS), and Safety Interlock System.
	Applies to programs and tagnames.
Control	An application that controls a process. Cannot be used in Safety programs.
	Applies to programs, functions, function blocks, and tagnames.
Safety or Control	An application that includes a mixture of safety and control components.
	Applies to functions and function blocks.

Applies To

Programs, Functions, Function Blocks, and Tagnames

Locations

- Item Properties > Application tab
- Declarations > Application tab

Apply Command

The Apply command allows you to save and apply changes you have entered. For example, if you enter an initial value of 2 for a BOOL tagname and click Apply, a message indicates that the value and data type are not compatible.

Applies To

Validation of application elements

Location

Item Properties > Constants or Point Assignment tab

Area

The Area property allows you to select the Area that the selected tagname is located in. You create the list of Areas to match the physical location of equipment and alarms in your plant.

Applies To

Alarms, tagnames

Locations

- Project menu > Manage Area, Equipment, and SIF Lists dialog box
- Application tree > Tagnames > Item Properties > Location tab

Associated Private Key Command

The Associated Private Key command allows you to associate a private key with a certificate. You must associate a private key with a certificate in order for it to be used for secure communication.

Applies To

Certificates

Location

Application tree > Certificates folder > Right-click a certificate

Auto Indent Command

The Auto Indent Command toggles to allow you to use automatic indentation or set your own indentation in Structured Text code.

Applies To

ST programs and functions

Location

Auto Indent button, or View menu

Auto Name Command

The Auto Name command names more than one variable or constant according to a pattern that you specify. You can specify a name, starting value, and incremental value. You can also specify the order in which to apply the names to the selected elements.

Properties include:

- Formatted Name on page 626
- Start Value and Increment on page 714
- Name Order on page 659

Applies To

Variables

Locations

- Auto Name button, or Tools menu
- Item Properties > Constants or Selected tab
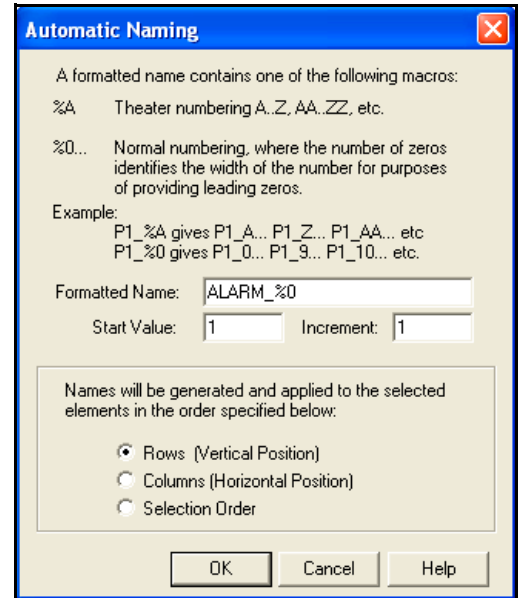
Auto Scroll Delay

The Auto Scroll Delay property specifies how many milliseconds to delay scrolling while scrolling through the Structured Text.

Applies To

ST Language

Location

View menu > Set Editor Options

Automatic Reset

See Alarm Attributes on page 562.

Backup Project Command

The Backup Project command saves a copy of the open project elements and settings, and creates a backup file named <*project_name*>.bt2.

Procedure

1 On the File menu, click Backup Project.

2 Specify the folder to save the file to. Use the suggested name or specify a new one. The file extension (.bt2) does not have to be included in the name.

3 Click Save.

Applies To

Project

Location

File menu

Base Address

For Tricon controllers, the Base Address property specifies the block address for the Tricon HIM based on the Data Hiway memory map. Must be an integer between 5 and 31; the default is 5.

Applies To

Tricon HIM

Location

Tricon Controller tree > Configuration > HIM Setup

Baud Rate

The Baud Rate property specifies the data transmission speed. Settings include:

- For Tricon EICM: 19200, 9600, 4800, 2400, or 1200.

- For Tricon TCM: 115200, 57600, 38400, 19200, 9600, 4800, 2400, or 1200.

- For Trident 1.x CM: 115200, 57600, 38400, 19200, 9600, 2400, or 1200.

- For Trident/Tri-GP 2.x and later CM: 115200, 57600, 38400, 19200, 9600, 4800, 2400, or 1200.

- For Trident/Tri-GP 3.x and later CIM: 115200, 57600, 38400, 19200, 9600, 4800, 2400, or 1200.

The default is 9600.

Applies To

Tricon EICM, Tricon TCM, Trident MP, Trident/Tri-GP CM, Trident/Tri-GP CIM

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > EICM Setup
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Serial Ports tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Serial Ports tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM Setup > Serial Ports tab
- Controller tree > Configuration > TriStation Communication
- Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > MP Setup > Serial Ports tab
- Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Serial Ports tab

Block Collection

See SOE Block Collection Mode on page 708 and SOE Block Collection Type on page 708.

Block Type

See SOE Block Type on page 709.

Border

The Border property specifies whether to include a border around an annotation or comment box. The border property can be specified for the project, or for individual annotations and comments.

Options include None, Single, and Double. The default is Single.

Applies To

Annotations, Comments

Locations

- Item Properties > Comment tab
- Project menu > Project Options > Annotations tab

Build Application Command

The Build Application command builds an application by compiling programs in the execution list that have been modified since the last time they were compiled. The command then links the object code, library routines, and configuration elements to create an executable application.

Each successive time you use the Build Application command, it compiles and links only documents and items that have changed since the last build.

After using the Build Application command several times, you should use the Rebuild Application command. A rebuild compiles and links all documents and items in the application, not just the ones that have changed since the last build.

Applies To

Application

Location

 Build Application button, or Project menu

Bypass

See Alarm Attributes on page 562.

Bypass Request

See Alarm Attributes on page 562.

Category

The Category property specifies a name for a category that can be associated with documents (programs, functions, function blocks, and data types). By adding a category name, you can sort elements by type.

Applies To

Documents

Location

Right-click a document > Document Properties > Summary tab

Cause Effect Matrix Support

The Cause Effect Matrix Support properties specify whether and how a function or function block can be used in a CEM program. For user-defined functions, function blocks, and data types, you can specify the setting. (For TriStation 1131 Library elements, the setting cannot be changed.) Settings include:

- Supports use in cause rows with ... inputs
- Supports use in effect columns with ... outputs
- Supports use in intersections
- Supports application defined states

The default is cleared for all options.

Applies To

Functions and function blocks used in CEM programs

Location

Application tree > right-click a function or function block > click Attributes tab

Cause Header Functions On by Default

The Cause Header Functions On by Default property specifies whether an input and function column are automatically included in the cause header when a CEM program is created. The default is cleared.

Applies To

CEM programs

Location

Tools menu > TriStation 1131 Options > CEM Editor tab

CEM Editor Options

The CEM Editor Options properties specify the initial settings used when a CEM program is created. Settings on individual CEM programs can be changed by setting the CEM Element Options on page 578. Properties include:

- Cause Header Functions On by Default on page 577
- Effect Header Functions On by Default on page 611
- Intersection Functions On by Default on page 639
- Default Number of Cause Rows on page 596
- Default Number of Effect Columns on page 596

Applies To

CEM programs

Location

Tools menu > TriStation 1131 Options > CEM Editor tab

CEM Element Options

The CEM Element Options properties specify the settings for a specific CEM program. For information on specifying initial properties, see Specifying CEM Element Options on page 154. Properties include:

- Enable Cause Header Functions on page 614
- Enable Effect Header Functions on page 615
- Enable Intersection Functions on page 616
- Enable Floating Text in Intersection Cells on page 616
- Evaluation Options on page 620

Applies To

CEM programs

Location

Open a CEM program > click the Document menu > click Options

CEM Monitor Colors

The CEM Monitor Colors property specifies the colors to display for cause, effect, and intersection cells in a CEM program. These colors are used when the application is run on the controller or Emulator.

The default for True is red. The default for False is white.

Applies To

CEM programs

Location

Project menu > Project Options > Monitor Colors tab

Change Colors Command

The Change Colors command displays a color palette that allows colors to be used when an element is displayed on a logic sheet.

Applies To

Project elements

Location

Tools menu > TriStation 1131 Options > Drawing Colors tab

Change Owner Command

The Change Owner command allows you to change the owner of a document. Normally, the owner of a document is the user who created it.

Applies To

Programs and functions

Location

Right-click an element > Item Properties > Change Owner

Change State to Download All Command

The Change State to Download All command changes the download state of the project so that the Download All command can be used when the application is downloaded.

Using this command changes the download state for both the controller AND the Emulator to Download All.
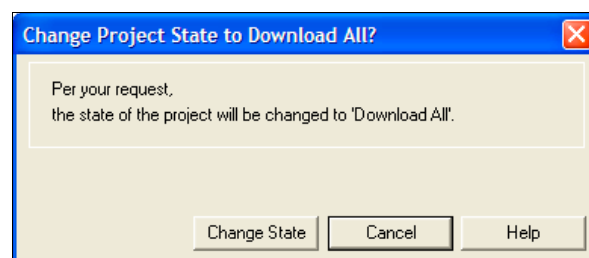
This command also sets the downloaded version for the controller and the Emulator to the same version number, whichever of the two was greater. See Downloaded Version on page 609.

Once the state has been changed to Download All, you cannot perform a Download Changes command until a Download All has been completed.

You cannot reverse this command. Before changing the state, you may want to make a backup copy of the application so that you can use it if you decide that a Download All command is not needed.

This command is only available after an application has been downloaded to the controller or the Emulator. If the project is opened in a newer version of TriStation 1131, this dialog box may be displayed to indicate that changes, such as adding new libraries, will require a Download All.

⚠ **WARNING**   The Download All command should not be used if the application on the controller is running on a live system. If needed, the system should be taken offline while the download is done.

Applies To

Downloaded application

Location

Project menu

Choose Another Tagname Command

The Choose Another Tagname command allows you to select a tagname and specify a different tagname to replace it. If there is more than one occurrence of the selected tagname, all occurrences are changed to the specified name.

Applies To

Tagnames in FBD editor

Location

FBD editor > right-click a tagname in the Tagname Declarations tree
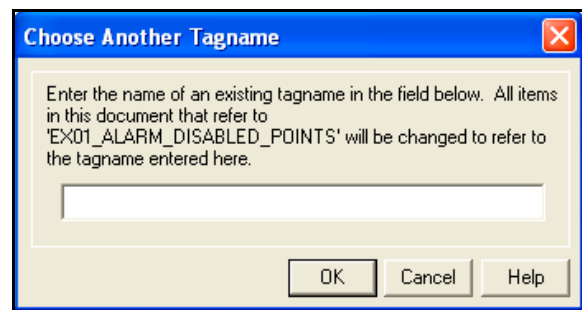
Clear History Command

The Clear History command deletes the history of actions, which is a listing of all changes made to a project. Each item includes the date, element, user, action, and comment for the change.

Applies To

Project

Location

Project menu

Client IP Address

The Client IP Address property specifies the IP address of the client that you want to allow, restrict, or deny access to a communication module. Also see IP Address on page 640.

Can be used in conjunction with the Client IP Subnet Mask property to create groups of IP addresses with the same access levels.

Does not apply to the following communication modules:

- Tricon ACM, HIM, EICM, NCM, or SMM

- Tricon model 4351/4352 TCMs
- Trident 1.x CMs

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Access List tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Access List tab
- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > CM Setup > Access List tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Access List tab

Client IP Subnet Mask

The Client IP Subnet Mask property allows you to group IP addresses, so that you can create a single entry in the communication module's access control list for all IP addresses on the subnet.

Does not apply to the following communication modules:

- Tricon ACM, HIM, EICM, NCM, or SMM
- Tricon model 4351/4352 TCMs
- Trident 1.x CMs

See also IP Subnet Mask on page 641.

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Access List tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Access List tab
- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > CM Setup > Access List tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Access List tab

Client Protocols

The Protocols property in the communication module's access control list specifies the protocol(s) that the selected client can use to access the TCM, CM, or CIM.

Does not apply to the following communication modules:

- Tricon ACM, HIM, EICM, NCM, or SMM
- Tricon model 4351/4352 TCMs
- Trident 1.x CMs

Table 47   Client Access Protocols

Protocol	Description
TSAA	Stands for Triconex System Access Application, which is a protocol that enables client/server communication between Triconex controllers and PCs. OPC Server and DDE Server use TSAA protocol to exchange data with Triconex controllers. TSAA protocol can be used to write programs for accessing controller tagnames.
OPC	OLE for Process Control. • For Tricon 10.x, the OPC protocol is supported on NET 2 only, and applies only to model 4353 or 4354 TCMs. • For Trident/Tri-GP 3.x, the OPC UA protocol is supported on both NET 1 and NET 2, and applies only to model 3211 or 3211S2 CIMs.
TriStation	A Triconex master/slave protocol in which the master (a TriStation 1131 PC) communicates with the slave (a Triconex controller) over an Ethernet network.

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Access List tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Access List tab
- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > CM Setup > Access List tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Access List tab

Close Project Command

The Close Project command closes an open project and prompts you to save it if changes have been made.

Applies To

Project

Location

File menu

Coil Tool Command

The Coil Tool Command allows you to add a coil, which represents the state of an output variable.

Applies To

LD program or function

Location

- Coil Tool button
- Tools menu > Select Tools

Coil Type

The Coil Type property represents the output state of a coil used in an LD program or function.

Table 48   Coil Type Symbols and Descriptions

Coil Type	Symbol	Description
Normal (Momentary)	( )	The state of the left link is copied to the associated Boolean variable and to the right link.
Negated (Momentary)	(/)	The inverse of the state of the left link is copied to the associated Boolean variable and to the right link.
Positive Transition	(P)	The state of the associated Boolean variable is On from one evaluation to the next if the left link changes from Off to On.
Negative Transition	(N)	The state of the associated Boolean variable is On from one evaluation to the next if the left link changes from On to Off.
Set (Latch)	(S)	The associated Boolean variable is set to On if the left link is in the On state and remains On until reset by the RESET coil.
Reset (Unlatch)	(R)	The associated Boolean variable is reset to Off if the left link is in the On state and remains Off until set by the SET coil.

Applies To

LD program or function

Location

Item Properties > Selected tab

Command Accepted

See Alarm Attributes on page 562.

Command ID

See Alarm Attributes on page 562.

Command In

See Alarm Attributes on page 562.

Comment Tool

The Comment Tool allows you to draw a text box for a non-executable comment, and then type text inside the box.

Applies To

Logic sheets in user documents, test sheets in the Controller and Emulator Panels

Locations

- Comment Tool button
- Application tree > User Documents tree > Tools menu > Select Tool command
- Configuration tree > Controller or Emulator Panel > Tools menu > Select Tool command

Communication Command

The Communication command displays the Communication screen on the Controller tree.

Applies To

Communication

Locations

- Communication button
- Controller tree > View menu > Go to > Communication

Communication Modules (CMs) for Modbus

The Communication Modules (CMs) for Modbus property defines the communication module you want the Emulator to get Modbus configuration information from.

The Modbus configuration from the selected communication module will be used by the Emulator so that you can test your Modbus functionality using emulated nodes.

Only one Modbus configuration can be used by the Emulator. If redundant communication modules are installed in a single logical slot, you must select the physical communication module (LEFT or RIGHT) with the configuration you want to use. The default is LEFT.

If no CM modules are listed, you have not configured any communication modules for Modbus communication in your project.

Applies To

Emulator

Location

Project menu > Project Options > Emulator Options tab

Communication Modules (CMs) for Peer-to-Peer

The Communication Modules (CMs) for Peer-to-Peer property defines the communication module you want the Emulator to get Peer-to-Peer configuration information from.

The Peer-to-Peer configuration from the selected communication module will be used by the Emulator so that you can test your Peer-to-Peer functionality using emulated nodes.

Only one Peer-to-Peer configuration can be used by the Emulator. If redundant communication modules are installed in a single logical slot, you must select the physical communication module (LEFT or RIGHT) with the configuration you want to use. The default is LEFT.

If no CM modules are listed, you have not configured any communication modules for Peer-to-Peer communication in your project.

Applies To

Emulator

Location

Project menu > Project Options > Emulator Options tab

Compare Project to Last Download Command

The Compare Project to Last Download command allows you to compare the changes made in the new application to-be-downloaded with the application already downloaded to a controller. You can view the comparison online, or print a report. Differences between the project and the downloaded application are identified with a red asterisk (*).

This report should be run for all safety applications.

Click each tab to compare differences. A red asterisk marks differences.
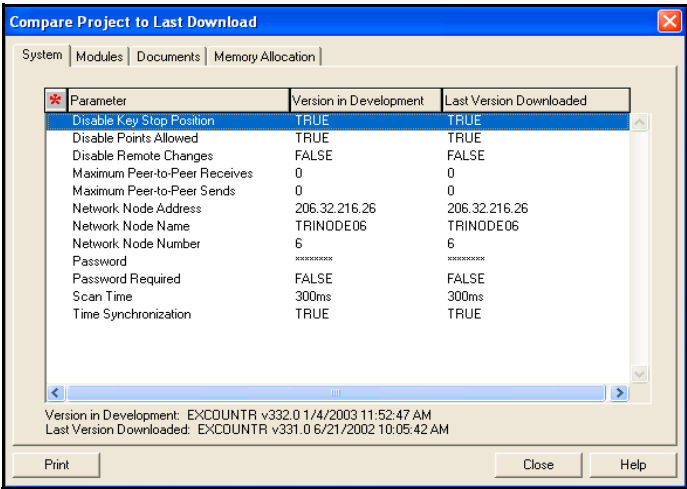
Applies To

Application and configuration elements

Location

Project menu

Compile Command

The Compile command compiles the selected document and displays any errors.

Applies To

Programs, functions, and function blocks

Locations

- Compile button
- Document menu

Compile All User Documents Command

The Compile All User Documents command compiles all the user-created documents in a project.

Applies To

Application

Location

Project menu

Compiler Warning When Right Power Rail is Missing

The Compiler Warning When Right Power Rail is Missing property specifies whether to display a warning if the right rail is missing on a Ladder Diagram program. The default is cleared, which means a warning is not displayed if the right rail is missing.

Applies To

Ladder Diagram programs

Location

Tools menu > TriStation 1131 Options > LD Editor tab

Connect Command

The Connect command attempts to connect the TriStation PC to the controller or Emulator, depending on whether the command is issued from the Controller or Emulator Panel.

When issued from the Controller Panel, you can change some default connection settings.

Table 49   Connect Properties for Communication Modules

Communication Module	Properties that can be set
Tricon EICM or NCM	Serial or Network port settings.
Tricon TCM	Serial or Network port settings, TriStation UDP Port Number, and Baud Rate (for serial connection only).
Trident 1.x MP or CM	Serial or Network port settings.
Trident/Tri-GP 2.x MP or CM	Serial or Network port settings, TriStation UDP Port Number.
Trident/Tri-GP 3.x MP, CM, or CIM	Serial or Network port settings, TriStation UDP Port Number.

Applies To

Communication modules, controller

Locations

- Connect button
- Controller or Emulator Panel > Command menu

Contact Command

The Contact command allows you to add a contact to a Ladder Diagram. After adding a contact, you can specify the Contact Type.

Applies To

Ladder Diagrams

Locations

- Contact Tool button
- Tools menu > Select Tools

Contact Type

The Contact Type property specifies the type of a contact used in a Ladder Diagram.

Table 50   Contact Type Symbols and Descriptions

Contact Type	Symbol	Description
Normally Open	— | | —	The state of the left link is copied to the right link if the state of the Boolean variable is On.
Normally Closed	— | / | —	The state of the left link is copied to the right link if the state of the Boolean variable is Off.
Positive Transition	— | P | —	The state of the right link is On from one evaluation to the next when the associated variable changes from Off to On while the state of the left link is On.
Negative Transition	— | N | —	The state of the right link is On from one evaluation to the next when the associated variable changes from On to Off while the state of the left link is On.

Applies To

Contacts in Ladder Diagram programs

Location

Item Properties > Variable tab > Contact Type area

Continuous Refresh Command

The Continuous Refresh command continuously displays the current values of variables on test sheets or on the program document display. The default is On.

Applies To

Controller or Emulator Panel

Locations

- Continuous Refresh button
- Controller tree > Controller or Emulator Panel > Commands menu

Copy Command

The Copy command copies the selected items from the current tree or sheet and places them on the clipboard.

Applies To

- Test sheets and elements in Controller or Emulator Panel
- User documents and elements on logic sheets

Locations

- Copy button
- Edit menu

Copy Current Setup to Other Serial Ports Command

The Copy Current Setup to Other Serial Ports command copies the settings for the selected serial port to the other serial ports on the MP.

Applies To

Trident or Tri-GP MP serial ports

Location

Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > MP Setup > Serial Ports tab

Copy Current Setup to Other Slot Command

The Copy Current Setup to Other Serial Slot command copies the access control list configuration for the communication module in the selected slot to the corresponding communication module installed in the other slot. This ensures that both communication modules have identical access control lists (recommended).

Does not apply to the following communication modules:

- Tricon ACM, HIM, EICM, NCM, or SMM
- Tricon model 4351/4352 TCMs
- Trident 1.x CMs

Applies To

Tricon TCM, Trident/Tri-GP 2.x CM, and Trident/Tri-GP 3.x CM or CIM access control lists

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Access List tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Access List tab
- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > CM Setup > Access List tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Access List tab

Create or Update the Process Alarms Program Command

The Create or Update the Process Alarms Program command generates a read-only structured text program that associates tagname alarm properties with the corresponding alarm function blocks.

Note   This "ProcessAlarms_Auto_Gen_" program is automatically generated (or updated) and added to the Implementation list each time you build the application; this command allows you to manually generate or regenerate the program.

If the "ProcessAlarms_Auto_Gen_" program does not already exist, it is created. If the program already exists, selecting this command updates the existing program with any changes you made to the alarm configuration.

Applicable only if you have configured tagnames with process alarms in your application.

Applies To

Projects; alarms

Location

Project menu > Create/Update Process Alarm Program

Current Version

The Current Version property identifies the current version of the project under development. This is how the version is determined:

- The version of a newly created project is 0.0.
- If it is changed and saved after being downloaded to the controller, the minor number is increased by 1. For example, 1.1.

- If the state is changed to Download All, the major number is increased by 1 and the minor number is changed to 0. For example, version 1.1 is changed to 2.0.

Applies To

Projects

Location

Project menu > Project Description

Cut Command

The Cut command deletes the selected items from the current tree or sheet and places them on the clipboard, erasing the previous clipboard contents.

Applies To

Test sheets and elements in Controller and Emulator Panels
User documents and elements on logic sheets

Location

Cut button, or Edit menu

Data Bits

The Data Bits property specifies whether the data format includes 7 or 8 data bits. To set this property, you must use Modbus slave or Modbus slave ASCII protocol. The default is 8 bits.

Applies To

Tricon EICM, Tricon TCM, Trident/Tri-GP CM, Trident/Tri-GP CIM

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > EICM Setup
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Serial Ports tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Serial Ports tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM Setup > Serial Ports tab
- Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Serial Ports tab

Data Files

The Data Files property specifies the path name for documents including user libraries, configuration files, and custom report templates. The default path name and file extension is:

- **Windows XP/2003:** `C:\Documents and Settings\All Users\Application Data\Triconex\TriStation 1131 4.10.1\Data`.

- **Windows Server 2008 and Windows 7:** `C:\Program Data\Triconex\TriStation 1131 4.10.1\Data`.

Applies To

Project

Location

Tools menu > TriStation 1131 Options > Directories tab

Data Type

The Data Type property specifies the kind of data that can be stored in the variable. For more information about TriStation 1131 data types, see Appendix B, Data Types. This table identifies the data types available for variables.

Table 51   Variable Data Types

Variables	Data Types
Tagnames	BOOL, DINT, REAL
Constants and local variables	DATE, DT, DWORD, INT, LREAL, STRING, TIME, TOD
	User-defined data types—such as arrays, structures, and enumerations that you have defined in structured text—can also be selected as data types in local variable declarations. However, you must successfully compile your user-defined data type before it will appear in the Data Type list.

Applies To

Constants, local variables, and tagnames

Location

Item Properties > Constant or Declaration tab

Deadband

See Alarm Attributes on page 562.

Declarations Command

The Declarations command displays a dialog box that allows you to declare an input, output, in/out, local, or tagname declaration. Variables must be declared to be used in programs and functions.

Applies To

Variables

Location

Double-click a variable or right-click the Tagname Declarations folder

Default Colors Command

The Default Colors command returns the colors of drawing items to the default colors. The color settings on your PC affect the default colors. This table describes the drawing items for which colors can be changed.

Table 52   Drawing Item Default Colors

Drawing Item	Default Color
Element background	Medium gray
Element text and border	Black
Selected element background	Dark blue
Selected element text	White
Sheet background	White
Sheet background (read-only documents)	Medium gray
Zone division lines	Medium gray

Applies To

Logic sheets in user documents
Test sheets in Controller and Emulator Panels

Location

Tools menu > TriStation 1131 Options > Drawing Colors tab

Default Connection

The Default Connection property specifies the initial setting used when the Connect dialog box is displayed.

This setting can be changed in the Connect dialog box before connecting to the controller. This property is only available when both types of connections are selected in the Select Connections area.

Default settings are:

- For Tricon, Trident 2.x/3.x, and Tri-GP controllers, the default is Network Connection.
- For Trident 1.x controllers, the default is Main Processor.

Applies To

Application, controller, modules

Location

Configuration tree > TriStation Communication

Default Gateway IP Address

The Default Gateway IP Address property specifies the IP address of the gateway to which the controller is connected. The default gateway address must be part of the subnet.Typically, this is the IP address of the network router. This address can be obtained from your network administrator or Information Technology department.

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > ACM Setup
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Network and Routing tabs
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Network and Routing tabs
- Tricon Controller tree > Configuration > Hardware Allocation > TCM Setup > Network and Routing tabs
- Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Network and Routing tabs

Default Language

The Default Language property specifies the programming language to use initially when creating a user document. The default is Function Block Diagram.

Options include:

- Function Block Diagram
- Ladder Diagram
- Structured Text
- Cause Effect Matrix

Applies To

User documents

Location

Project menu > Project Options > Language tab

Default Macros or Text

The Default Macros or Text property specifies a default macro or text to include with a variable in a program, function, or function block.

Variable	Program Defaults	Function Defaults
Tag Refs	%PGM_TAGNAME	
Local variables	%PGM_LOCAL	%FB_LOCAL
I/O variables	%PG_IO	%FB_IO

Default Macros for Annotations

The default macros used with annotations vary depending on the element and variable type.

For example, the %PGM_TAGNAME macro expands to include the tagname (P1.WATER_LOW), location on controller (03.04.13), and alias number (10018).

Table 53   Default Macros for Annotation

Macro Name	Default Value	Used With	Sample Expanded Macro
%PGM_TAGNAME	%TAG_MEMORYADDRESS% TAG_ALIAS	Program Externals	P1.WATER_LOW 03.04.13 10018
%PGM_LOCAL	%WHERE_USED	Program Locals	PROCESS_COUNT 1(C7) 3(D5) 4(A2)
%FB_INPUT	<no default>	Function Inputs	<no default>
%FB_OUTPUT	<no default>	Function Outputs	<no default>
%FB_IO	<no default>	Function Inputs/Output	<no default>
%FB_LOCAL	<no default>	Function Locals	<no default>

Macros Used in the Default Macros

Macros beginning with %TAG cannot be modified.

Table 54   %TAG Macros Used in the Default Macros

Macro Name	Description
%PGM_TAGNAME	The name of the point to which the program variable is connected.

Table 54 %TAG Macros Used in the Default Macros *(continued)*

Macro Name	Description
%TAG_MEMORY ADDRESS	The location of the point to which the program variable is connected. This only applies to physical input and output points and is displayed in this format: • *For Tricon controllers*: CC.SS.PP; where CC is the chassis, SS is the slot, and PP is the point. For memory points, an empty string is returned. • *For Trident or Tri-GP controllers*: ii.ss.pp; where ii is the I/O processor number, ss is the module baseplate address plug number, and pp is the point number.
%TAG_ALIAS	The Modbus alias of the point to which the program variable is connected. If the point has no alias, an empty string is returned.

Applies To

Annotations and Comments

Location

Item Properties > Annotation or Comment tab > Macros button

Default Number of Cause Rows

The Default Number of Cause Rows property specifies the number of rows added when a matrix is created using the CEM editor. The default is 22.

Applies To

CEM programs

Location

Tools menu > TriStation 1131 Options > CEM Editor tab

Default Number of Effect Columns

The Default Number of Effect Columns property specifies the number of columns added when a program (matrix) is created using the CEM editor. The default is 25.

Applies To

CEM programs

Location

Tools menu > TriStation 1131 Options > CEM Editor tab

Delete Command

The Delete command deletes the selected item.

Applies To

Project elements

Location

Edit menu

Delete (Certificate) Command

In the Certificates folder, the Delete command allows you to remove a certificate so it can no longer be used for secure communication. You must download your application to the controller for the certificate to also be removed from the CIM.

Applies To

Certificates

Location

Application tree > Certificates folder > Right-click a certificate

Delete Columns Command

The Delete Columns command displays a dialog box that allows you to specify the number of columns to delete in a CEM program and the beginning column position.

Applies To

CEM programs

Locations

- Delete Columns button
- Edit menu

Delete Rows Command

The Delete Rows command displays a dialog box that allows you to specify the number of rows to delete and the beginning row position.

Applies To

CEM programs

Locations

- Delete Rows button
- Edit menu

Delete Sheet Command

The Delete Sheet command removes the currently displayed logic sheet from a program, function, or function block.

Applies To

Logic sheets

Location

Sheets menu

Delete Unreferenced Tagnames Command

The Delete Unreferenced Tagnames command removes tagnames that are not used in programs or functions.

Applies To

Tagnames

Location

Application tree > Tagname Declarations

Description

The Description property specifies descriptive text about the selected item. The maximum number of characters is 131, which can include A to Z, and 0 to 9. The underscore character (_) can also be used, but not as the first character in the description. To include this text in an annotation or comment, use the %DESCRIPTION macro.

Applies To

Project elements

Locations

- Item Properties > Selected or Declarations tab
- Project menu > Security > New or Modify > Add User or Modify User

Destination Gateway IP Address

The Destination Gateway IP Address property specifies the IP address of the gateway device which is used if the controller is not on the same subnet as other devices.

Applies To

Communication

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Network and Routing tabs
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Network and Routing tabs
- Tricon Controller tree > Configuration > Hardware Allocation > TCM Setup > Network and Routing tabs
- Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Routing tab

Destination IP Address

The Destination IP Address property specifies an IP address which is used if the controller is not on the same subnet as other devices.

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Routing tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Routing tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM Setup > Routing tab
- Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Routing tab

Destination IP Subnet Mask

The Destination IP Subnet Mask property specifies the binary pattern that is matched with the IP address to turn part of the host ID address field into a field for subnets.

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Routing tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Routing tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM Setup > Routing tab
- Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Routing tab

Destination UDP Port

The Destination UDP Port property specifies the port number for other controllers on a Peer-to-Peer network.

Applies To

Peer-to-Peer communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Peer-to-Peer tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Peer-to-Peer tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM Setup > Peer-to-Peer tab
- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > CM Setup > Peer-to-Peer tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Peer-to-Peer tab

Differential AI Input Type

The Differential AI Input Type property specifies the input type for an analog input point. Only available with AI model 3721. Options include:

- Unipolar: 0 to 5 volts with 6% over-range.
- Bipolar: -5 to 5 volts with 6% under-range and over-range.

For detailed range information, see Resolution Type on page 686.

The default is Unipolar.

Applies To

Analog input points

Location

Controller tree > Configuration > Hardware Allocation > Differential AI Setup

Directories

See:

- Data Files on page 592
- Project Files on page 679
- Temporary Files on page 719

Disable OVD on All Modules Command

For Tricon controllers, the Disable OVD on All Modules command disables Output Voter Diagnostics (OVD) on the points of all digital output modules in a controller (except Supervised DO modules, which cannot have OVD disabled). The application must be running on a controller to use this command.

For Trident or Tri-GP controllers, OVD is disabled for individual points by using the SYS_OVD_INHIBIT function. For more information, see the *TriStation 1131 Libraries Reference*.

The default OVD state is enabled for all digital output points.

⚠ **WARNING** A safety application may not disable the output voter diagnostic.

Applies To

Application

Location

Controller tree > Controller Panel > Commands menu

Disable OVD on Module... Command

For Tricon controllers, the Disable OVD on Module... command disables Output Voter Diagnostics (OVD) for all points on specified digital output modules in the controller. The application must be running on a controller to use this command.

OVD cannot be disabled for points on a Supervised Digital Output module.

For Trident or Tri-GP controllers, OVD is disabled for individual points by using the SYS_OVD_INHIBIT function. For more information, see the *TriStation 1131 Libraries Reference*.

The default OVD state is enabled for all digital output points.

⚠ **WARNING** A safety application may not disable the output voter diagnostic.

Applies To

Application, modules

Location

Controller tree > Controller Panel > Commands menu

Disable Programming and Control Operations

Trident or Tri-GP controllers only. See Set Programming Mode Command on page 698.

Disable Remote Changes to Outputs

The Disable Remote Changes to Outputs property specifies whether external devices can write to output points in the TriStation 1131 application. If selected, external devices cannot write to output points regardless of the settings for other properties. You should select this check box if the application includes safety-critical outputs. The default is selected, which means output points cannot be changed by external devices.

Applies To

Application

Locations

- Tricon Controller tree > Configuration > Operating Parameters
- Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > MP Setup > Operating Parameters tab

Disable Request

See Alarm Attributes on page 562.

Disable Scaling

For Trident or Tri-GP controllers, the Disable Scaling property specifies whether REAL numbers are scaled to integers when they are transmitted from the controller. For Tricon controllers, this option is not available because REAL values are always scaled. The default is cleared, which means real numbers are not scaled.

When selected, two consecutive 16-bit aliases are assigned to each REAL tagname so that IEEE 754 single-precision, floating-point representation is used. This option is available because Modbus has a 16-bit size limitation. Only the first alias of the two is displayed in the Modbus Alias field of the Declaration tab.

When cleared, only one alias is used.

Applies To

Modbus communication

Location

Application tree > Tagname Declarations> Item Properties > Scaling tab

Disable Stop on Keyswitch

For Tricon controllers, the Disable Stop on Keyswitch property specifies whether to logically disable the STOP position of the keyswitch on the Tricon Main Chassis so that the application is not stopped if the key is turned to the STOP position. If selected, setting the keyswitch to STOP does not halt the application.

The default is cleared, which means that the application is stopped if the keyswitch is turned to STOP.

Applies To

Application

Location

Controller tree > Configuration > Operating Parameters

Disconnect Command

The Disconnect command disconnects an application from the controller or Emulator.

Applies To

Communication

Locations

- Disconnect button
- Controller tree > Controller or Emulator Panel > Commands menu

Display Program Document Command

The Display Program Document command allows you to monitor the execution (power flow) of an FBD program or LD program while an application is emulated in TriStation 1131 or run online on a controller.

You can perform monitoring using the default colors or custom colors, which you can change online using the Project Options command. After changing the monitor colors, you must perform a Download Changes for the new colors to take effect.

Applies To

Programs

Locations

- Display Program Document button
- Controller tree > Controller or Emulator Panel > Commands menu

Display Report Command

The Display Report command displays a selected report.

Applies To
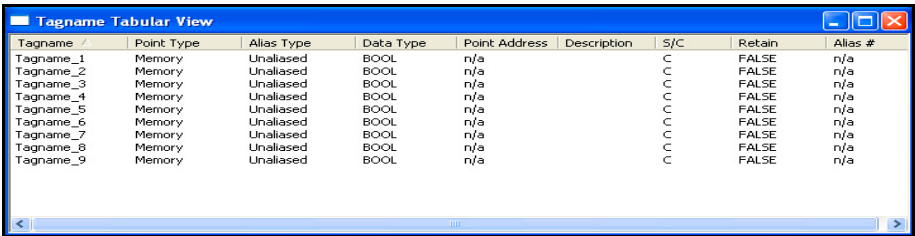
Reports

Location

Project tree > Report viewer toolbar

Display Tabular View Command

The Display Tabular View command displays tagnames in a table format, which allows you to change multiple tagnames at a time. To make sorting and changing easier, you can also change the columns that are displayed and the order in which they are displayed.

Properties include: tagname, point type, alias type, data type, point address, description, S/C (safety or control), retain (Retentive), alias #, Min Span, Max Span, Group 1, Group 2, and initial value.

Applies To

Tagnames

Location

Application tree > right-click Tagname Declarations folder

DO Point Options

The DO Point Options property specifies the type of fault detection used for the point. Each point can be specified with one of these options. Available only with the Tricon model 3625 Digital Output Module.

Table 55   DO Point Options

Option	Description
Not Used	Fault detection is the same as for Non-Supervised points, except reporting of benign field fault conditions is suppressed.
	Points configured as Not Used *will* be energized if the application commands them on.
Non-Supervised	Fault detection includes:
	• Detection of all internal faults, including those in the output circuitry.
	• Detection of external faults associated with the field device or wiring—limited to loss of field power and shorted loads under most conditions.
	Non-Supervised is the default.
Supervised	Fault detection includes:
	• Detection of all internal faults, including those in the output circuitry.
	• Detection of all external faults associated with field device or wiring, such as, loss of power, shorted loads, open loads, and so on.

Applies To

Tricon DO Points

Location

Controller tree > Configuration > Hardware Allocation > DO Setup

Document Access

The Document Access property specifies whether the document can be read, read and written to (changed), or is locked. Settings include:

- Read: Any user can read the document, which means it can be viewed.
- Read/Write: Any user can read or change the document. (Default)
- Lock: Only users with the same or higher security level can read and write the document.

Applies To

Programs, functions, function blocks, and data types

Location

Right-click a document > Properties > Summary tab

Document Type

The Document Type property specifies whether a document is a program, function, function block, or data type.

Applies To

Document

Location

Project menu > New Document

Double Space

The Double Space property specifies whether to display double spaces between the terminals (inputs and outputs) on a function or function block, which provides additional space for annotations and comments. This setting specifies spacing on an individual function or function block.

CAUTION If you select Double Space after input and output variables have been attached to the function or function block, the variables will have to be reattached.

The default is cleared, which means the terminals are single spaced.

Applies To

Functions and function blocks

Location

Item Properties > Function tab > Terminals > Double Space

Double Space Function (Block) Terminals by Default

The Double Space Function Block Terminals property specifies whether to display double space between the terminals (inputs and outputs) on a function or function block, which allows space for annotations and comments. This setting affects all new functions and function blocks created in a project.

The default is cleared, which means the terminals are single spaced by default.

Applies To

Functions and function blocks

Location

Tools menu > TriStation 1131 Options > FBD Editor tab and LD Editor tab

Download All Command

The Download All command downloads an application to the controller or Emulator.

⚠ **WARNING**   A Download All command requires that the application on the controller is halted.

Table 56   Download All Required

Component	Description
Chassis	Required if adding, changing (the type), or deleting a chassis.
	To avoid a Download All after the initial download, include the maximum number of chassis in the application before downloading the application.
Functions and function blocks	Required if changing or deleting a function or function block.
Library elements	Required if changing (adding, updating, deleting) library elements that have already been downloaded to a controller.
Memory allocation	Required if changing memory allocation.
Modules	Required if moving or deleting modules in the configuration.
Node Number	Required if changing the address plug and node number configuration.

Table 56   Download All Required *(continued)*

Component	Description
Number of Send or Receive function blocks	Required if increasing or decreasing the number of send or receive function blocks.
Operating Parameters	Required if changing the Allow Disabling of Points property.
Programs	Required if changes to a program exceed available memory. Required if deleting a program.
Tagnames	Required if importing tagnames from an Excel or database file. Required if changes to tagnames require additional memory allocation.
Target System Version	Required if the target system version is changed (upgrade or downgrade), unless you are converting a project created in a version of TriStation 1131 prior to 4.6.
Variables	Required if changes to variables require additional memory allocation.

Applies To

Application

Locations

- Download All button
- Controller > Controller or Emulator Panel > Commands menu

Download Changes Command

The Download Changes command downloads changes made to an application, while an application is running on the controller or Emulator.

⚠ WARNING	• Changing a safety-critical application that is running on a controller should be avoided because an error in the application could cause a trip or unpredictable behavior. • For additional warnings, see Using the Download Changes Command on page 557.

Table 57   Download Changes Allowed

Element	Description
Functions and function blocks	Allowed if adding a function or function block, but not if changing or deleting an existing function or function block.
IP Address	Allowed, but not advised, if the IP address of a communication module is changed.
Modules	Allowed if adding a module to an empty slot, which has sufficient memory allocated for the points. Not allowed if moving or deleting modules.
Library elements	Allowed if changing (adding, updating, deleting) library elements that have not yet been downloaded to a controller.

Table 57   Download Changes Allowed *(continued)*

Element	Description
Operating Parameters	Allowed if changing these properties: • Disable Remote Changes to Outputs • Password Required for Connection • Restart on Power-Up (Trident or Tri-GP only) • Scan Time • Use Local Time
Programs	Allowed if adding or changing a program and there is sufficient memory. Not allowed if deleting a program.
Tagnames	Allowed if adding, changing, or deleting tagnames. Tagnames can also be disconnected or connected to different points, if there is enough memory allocated for the required point types. Points must be enabled.
Target System Version	Allowed if you are changing the target system version (upgrade or downgrade) while converting a project created in a version of TriStation 1131 prior to 4.6.
Variables	Allowed if changing variable properties does *not* require additional memory allocation. Allowed, but not advised, if changes are made to the Point Type, Alias Type, or Alias Number of a memory variable; these changes will re-initialize the variable to its configured initial value, or 0 if no initial value is defined. If the Initial Value is changed, the value is not used until the application is stopped and restarted. Points must be enabled.

Applies To

Application changes

Locations

• Download Changes button
• Controller tree > Controller or Emulator Panel > Commands menu

Download Verifier Command

The Download Verifier command verifies that the program elements on the controller are the same as those in the TriStation 1131 project. During the download verification process, TriStation 1131 retrieves the program elements from both the controller and the project file, and then performs a binary comparison. Each comparison results in a pass or fail status message.

Applies To

Projects

Location

Commands menu

Downloaded Version

The Downloaded Version property identifies the version of the application (project) that is downloaded and running on the controller or Emulator.

- If you are currently connected to the controller, the version shown here is for the controller, even if the last download was to the Emulator.

- If you are currently connected to the Emulator, the version shown is for the Emulator, even if the last download was to the controller.

- If you are not connected to the Emulator or the controller, the version shown here is for the last download (which may be either the Emulator or the controller).

Use the to see the complete list of downloaded version changes.

When the Change State to Download All command is used, the downloaded version for the controller and the Emulator are set to the same version number, which will be the next major revision of the two current downloaded versions. For example, if the Emulator's downloaded version was 3.2, and the controller's downloaded version was 4.1, the downloaded version for BOTH the controller and Emulator is set to 5.0 (the next larger major revision of the two).

Applies To

Projects

Location

Project menu

Drawing Item

The Drawing Item property specifies the colors to use to with elements on logic sheets.

Applies To

Logic sheets

Location

Tools menu > TriStation 1131 Options > Drawing Colors tab

Drop Command

The Drop command drops all the logic elements enclosed by the comment box so they are not part of the comment. To drop, double-click the comment box, click the Pickup/Drop tab, and click Drop.

Applies To

Comments

Location

Item Properties > Pickup/Drop tab

Edit...Macros Commands

The Edit Document Macros, Edit Project Macros, and Edit Sheet Macros commands allow you to specify text for macros that can be used in annotations and comments.

Applies To

Documents

Location

Document, Project, and Sheets menu

Edit Sheet Title Command

The Edit Sheet Title command displays a dialog box that allows you to enter a title for the logic sheet.

Applies To

Logic sheets

Location

Sheets menu

Edit Title Block Command

The Edit Title Block command displays a dialog box that allows you to add information to the title block that is used when the CEM program is printed.

Applies To

CEM programs

Location

Sheets menu

Edit/View Source Command

The Edit/View Source command displays the source code for the selected element. The source code can be edited only for user-created functions and function blocks.

Applies To

CEM programs

Location

Application tree > User Documents > open a CEM program > right-click in the FBD Network

Effect Header Functions On by Default

The Effect Header Functions On by Default property specifies whether an output and function column are automatically included in the effect header when a CEM program is created. The default is cleared.

Applies To

CEM programs

Location

Tools menu > TriStation 1131 Options > CEM Editor tab

Emulator File Generation

The Emulator File Generation property defines the files to be generated each time you download an application to the Emulator.

- Select the BT2 check box if you want a backup project file (.BT2) generated (not recommended).
- Select the SOE check box if you want an SOE definition file (.SOE) generated. If you want to be able to test your SOE configuration with the Emulator, you must select this option.

The selected file(s) are generated in the same directory where the TriStation 1131 project is located. The default setting is for the files to not be generated.

Applies To

Emulator

Location

Project menu > Project Options > Emulator Options tab

Emulator Timeout

The Emulator Timeout property specifies the timeout value for the connection to the Emulator.

During a Download All or Download Changes operation on the Emulator, the processing time required for applications with a very large number of variables (symbols) may exceed the default Emulator timeout value of 4 seconds.

If you receive a "download aborted" message when downloading an application to the Emulator, increase the Emulator timeout value and then try downloading again.

In most cases, you should not have to change this value. The default timeout value should be adequate for the majority of applications.

The valid range is from 0 to 65,535 seconds. The default is 4 seconds.

Applies To

Emulator

Location

Project menu > Project Options > Emulator Options tab

EN/ENO

The EN/ENO property specifies whether to include EN (an input parameter) and ENO (an output parameter) in the function.

- For the FBD language, the parameters are optional.
- For the LD language, the parameters are required.

Usage

- If EN/ENO is visible on any function in a network, then EN/ENO must be visible on every function in the network.
- If there is more than one function with EN/ENO visible in a network, then for every function except the last function, you must connect the ENO output directly to the EN input of the next function.
- You must not connect an ENO output to more than one EN input.

Parameter	Description
EN	An input parameter that enables invocation of the function and carries power from the left power rail. • If True, the function was called and ENO indicates whether the function detected an error. • If False, the function was not called and the value of ENO is set to False.
ENO	An output parameter that indicates whether the function detected an error and connects either to the EN input of the next function or to the ground rail. • If True, the function did not detected any errors. • If False, the function detected an error, and evaluation of the network stops—the return value is not written to any variable.

Applies To

Functions

Location

Item Properties > Function tab

Enable Access List Command

The Enable Access List command turns on user access control for the communication module, so that access control list settings are used to determine which IP addresses can access the communication module, and whether that access is read-only, read/write, or denied.

Does not apply to the following communication modules:

- Tricon ACM, HIM, EICM, NCM, or SMM
- Model 4351/4352 Tricon Communication Modules (TCMs)
- Trident 1.x CMs

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Access List tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Access List tab
- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > CM Setup > Access List tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Access List tab

Enable Alarm

The Enable Alarm property specifies if a process alarm is enabled for the selected tagname.

If the check box is cleared, an alarm will not be added to the process alarms program, and no alarm will be configured, even if you have specified alarm attributes.

See also Alarm Attributes on page 562.

Applies To

Input and memory points; process alarms

Location

Application tree > Tagname Declarations > Declaration tab > Alarm Settings > Tag Configuration dialog box

Enable All Disabled Points Command

The Enable All Disabled Points command enables all disabled points on an application running on the controller.

Applies To

Application, tagnames

Location

Configuration tree > Controller or Emulator Panel > Commands menu

Enable Cause Header Functions

The Enable Cause Header Functions property specifies whether an input and function column are included in a cause header of a CEM program. The default is cleared, which means cause header functions are not included.

Applies To

CEM programs

Location

Application tree > open a CEM program > Document menu > Options

Enable Color Monitoring

The Enable Color Monitoring property specifies whether color is used when the application is run on the controller or Emulator. The default is cleared, which means that color monitoring is not used.

Applies To

Programs

Location

Document Properties > Attributes tab

Enable Communication with Tricon V8 and V9 Peer-to-Peer Systems on NET 1

The Enable Communication with Tricon V8 and V9 Peer-to-Peer Systems on NET 1 property specifies whether communication is enabled with these systems on the NET 1 port.

Applies To

Peer-to-Peer communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Peer-to-Peer tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Peer-to-Peer tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM Setup > Peer-to-Peer tab

Enable Communication with Tricon V8, Tricon V9, and Trident v1 Peer-to-Peer Systems

The Enable Communication with Tricon V8, Tricon V9, and Trident v1 Peer-to-Peer Systems property specifies whether communication is enabled with these systems on the selected port (NET 1 or NET 2). By default, Peer-to-Peer communication with these systems is disabled.

Available on Trident and Tri-GP 2.x systems only.

Applies To

Peer-to-Peer communication

Location

Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > CM Setup > Peer-to-Peer tab

Enable Effect Header Functions

The Enable Effect Header Functions property specifies whether an output and function column are included in an effect header of a CEM program.

The default is cleared, which means effect headers are not included.

Applies To

CEM programs

Location

Application tree > open a CEM program > Document menu > Options

Enable EN/ENO Terminals on Functions by Default

The Enable EN/ENO Terminals on Functions by Default property specifies whether to automatically include EN (BOOL input) and ENO (BOOL output) parameters that detect and isolate errors in FBD and LD logic.

The default is cleared, which means EN/ENO terminals are not automatically included.

Applies To

Functions

Location

Tools menu > TriStation 1131 Options > FBD Editor tab

Enable Floating Text in Intersection Cells

The Floating Text Functions property allows the name of the function or function block to be displayed in a neighboring cell of the CEM matrix if it is empty. This may be useful if the name of the function or function block is long. The default is cleared.

Applies To

CEM programs

Location

Application tree > open a CEM program > Document menu > Options

Enable Intersection Functions

The Intersection Functions property specifies whether a function column is included in the intersection of a CEM matrix. The default is cleared, which means intersection functions are not included.

Applies To

CEM programs

Location

Application tree > open a CEM program > Document menu > Options

Enable Macro Editing

The Enable Macro Editing property specifies whether you can change the value for a user-modifiable macro.

User-modifiable macros are identified with a pencil graphic on the Edit Macros screen.

The default is cleared, which means the macro value cannot be changed.

Applies To

Annotations and Comments

Location

Item Properties > Style tab

Enable Multiple Writes

The Enable Multiple Writes property specifies whether a tagname can be written to multiple times from programs in the application. If this property is not selected and the tagname is written to more than once, an error is displayed when the program is compiled.

The default is cleared, which means the tagname can only be written to once in an application.

Applies To

Tagnames

Location

Application tree > double-click a tagname > Point Assignment tab

Enable OVD on All Modules Command

For Tricon controllers, the Enable OVD on All Modules command enables Output Voter Diagnostics (OVD) on the points of all digital output modules in a controller.

The default OVD state is enabled for all digital output points.

⚠ WARNING   A safety application may not disable the output voter diagnostic.

Applies To

Application, modules

Location

Tricon Controller tree > Controller Panel > Commands menu

Enable OVD on Module... Command

For Tricon controllers, the Enable OVD on Module... command enables Output Voter Diagnostics (OVD) for all points on specified digital output modules in the controller. The default OVD state is enabled for all digital output points.

Applies To

Application, modules

Location

Tricon Controller tree > Controller Panel > Commands menu
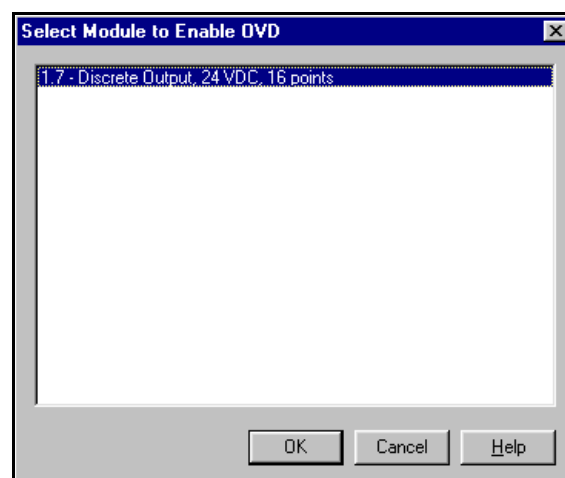
Enable Programming and Control Operations

For Trident or Tri-GP controllers only. See Set Programming Mode Command on page 698.

Enable Time Synchronization with External Source

See Time Synchronization on page 721.

Enable Tricon Node Time Synchronization

For Tricon controllers, the Enable Tricon Node Time Synchronization property enables the controller to participate in time synchronization across the Peer-to-Peer network as a Triconex Time Synchronization master or slave node.

The default value is cleared, which means the controller will not synchronize time across the Peer-to-Peer network. See also Time Synchronization on page 721.

Applies To

Communication

Location

Controller tree > Configuration > Operating Parameters

Enable Trident/Tri-GP Node Time Synchronization

For Trident 2.x/3.x or Tri-GP controllers, the Enable Trident/Tri-GP Node Time Synchronization property enables the controller to participate in time synchronization across the Peer-to-Peer network as a Triconex Time Synchronization master or slave node.

The default value is selected, which means the controller will synchronize time across the Peer-to-Peer network. See also Time Synchronization on page 721.

Note   This value cannot be changed in TriStation 1131 4.10.1.

Applies To

Peer-to-Peer communication, time synchronization

Location

Trident 2.x/3.x or Tri-GP Controller tree > Configuration > Hardware Allocation > MP Setup > Operating Parameters tab

Enable UCN Test Mode

For Tricon controllers, the Enable UCN Test Mode property specifies whether UCN test mode is enabled on the Tricon SMM module. The default is cleared.

Applies To

Tricon SMM

Location

Tricon Controller tree > Configuration > Hardware Allocation > SMM Setup

Enabled Features

The Enabled Features property specifies whether to allow programs, functions, function blocks, data types, and multiple program to be created in the project. Options include:

- Programs
- Functions
- Function Blocks
- Data Types
- Multiple Programs

The default is all options are selected, which means all options are enabled.

Applies To

Programs, functions, function blocks, data types, multiple programs

Location

Project menu > Project Options > Language tab

Enhanced Security

The Enhanced Security property sets the project-level security setting to Enhanced. When selected, Windows *and* TriStation 1131 user authentications are required to log in.

See also Standard Security on page 714.

Applies To

User security

Location

Project menu > Security > Security dialog box > Security Setting tab

Enlarge Font Size Command

The Enlarge Font Size command increases the size of the font for the entire ST program or function.

Applies To

ST programs and functions

Location

- Larger Font button
- View menu

Equipment

The Equipment property allows you to select the line of equipment that the selected tagname is located in. You create the list of Equipment to match the physical location of equipment and alarms in your plant.

Applies To

Alarms, tagnames

Locations

- Project menu > Manage Area, Equipment, and SIF Lists dialog box
- Application tree > Tagnames > Item Properties > Location tab

Evaluation Options

The Evaluation Options property specifies how a matrix is evaluated when it includes multiple intersections between a cause and effect. The evaluation can be based on AND or OR logical processing. The default is OR.

OR Evaluation

If the matrix is based on an energize-to-trip system, such as a fire suppression system, an OR evaluation is typically used because the normal state of inputs is False. If one of the inputs changes to True, the related outputs also change to True.

AND Evaluation

If the matrix is based on a de-energize-to-trip (fail-safe) system, an AND evaluation is typically used because the normal state of inputs is True. If one of the inputs changes to False, the related outputs also change to False. This is why it is typically used with systems that are designed to be fail-safe.

Applies To

CEM programs

Location

Application tree > open a CEM program > Document menu > Options

Exactly Once

The Exactly Once setting indicates that each function block instance should be executed exactly once per scan because the function block contains internal data that must be updated exactly once per scan.

For user-defined function blocks, you can specify this setting. For Triconex Library function blocks, the setting cannot be changed.

Applies To

Library and user-defined function blocks

Location

Document Properties > Usage tab

Exit Command

The Exit command closes the current project and quits the TriStation 1131 application.

Applies To

Project

Location

Edit menu

Expand Macros

The Expand Macros property specifies whether the values or the name of the macro displays. If selected, the value displays. For example, the macro %DATE_CREATED displays the month, day, and year when the project was created. The default is cleared, which means the name, not the value, of the macro is displayed.

Applies To

Annotations and Comments

Location

Item Properties > Style tab

Export Command

The Export command specifies a database or text file to export points to. If the file is to be imported back to TriStation 1131, the filename must be eight characters or less.

Applies To

Tagnames

Location

Right-click the Tagname Declarations folder

Export (TCM, CM, or CIM Configuration) Command

In the TCM Setup, CM Setup, or CIM Setup dialog box, the Export command exports the TCM, CM, or CIM configuration to an XML file.

Does not apply to model 4351/4352 TCMs, or Trident 1.x CMs.

See also Import (TCM, CM, or CIM Configuration) Command on page 634.

Applies To

TCM, CM, and CIM configuration

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup
- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > CM Setup
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CM or CIM Setup

Export Destination

The Export Destination property specifies the destination to use when exporting a report file. Settings include Disk file and Microsoft Mail. The default is Disk file.

Applies To

Reports

Location

Export Report button on Project tree > Reports toolbar

Export Format

The Export Format property specifies the format to use when exporting a report file. Formats include:

- Acrobat Format (PDF)
- Character-separated values
- Comma-separated values (CSV)
- Excel 5.0 (XLS)
- Excel 5.0 (XLS) (Extended)
- Excel 7.0 (XLS)
- Excel 7.0 (XLS) (Extended)
- Excel 8.0 (XLS)
- Excel 8.0 (XLS) (Extended)
- Paginated Text
- Rich Text (Exact) Format
- Tab-separated text
- Tab-separated values
- Text
- Word® for Windows document
- XML

The default is PDF.

Applies To

Reports

Location

Export Report button on Project tree > Reports toolbar

Export Report Command

The Export Report command exports the viewed report to a file format and destination you specify.

Applies To

Reports

Location

Export Report button on Project tree > Reports toolbar

Export with Alarm Attributes Command

The Export with Alarm Attributes command specifies a database or text file to export points to, with process alarm attributes included. If the file is to be imported back to TriStation 1131, the filename must be eight characters or less.

Applies To

Tagnames

Location

Right-click the Tagname Declarations folder

False Color

See Monitor Display Options on page 657.

False State Name

See Monitor Display Options on page 657.

Fatal Severity

See System Events Severity on page 717.

FBD Editor Options

The FBD Editor options include:

- Double Space Function (Block) Terminals by Default
- Enable EN/ENO Terminals on Functions by Default
- Left-Handed Wire Tool

Applies To

Functions and function blocks

Location

Tools menu > TriStation 1131 Options > FBD Editor tab

Field Power

For Trident or Tri-GP controllers, the Field Power property specifies whether field power is connected to the Pulse Input Baseplate for use by the field sensors. The default is cleared, which means that field power is absent.

Setting	Description
Field Power Absent	Select if field power is not connected to the PI Baseplate. This setting is typically chosen if all the field sensors are passive.
Field Power Present	Select if field power is connected to the PI Baseplate. This setting is typically chosen if some or all the sensors are active.

Applies To

Trident or Tri-GP Pulse Input or Enhanced Pulse Input Setup

Location

Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > PI or EPI Setup

Field Power Monitoring

For Tricon controllers, the Field Power Monitoring property specifies whether the module should monitor the 24V field power (also known as loop power) at the external termination panel. When field power monitoring is on, the module will report when field power at the term panel goes in or out of range.

Available only with the model 3720 and 3721 Analog Input Modules. Applicable *only* if you are using a term panel that passes field power to the module. The default is Off.

If you are not using a term panel that passes field power to the module, you must select Off. If you select On, and the term panel does not support field power monitoring, you will see Field Power faults on the module.

Applies To

AI Modules

Location

Tricon Controller tree > Configuration > Hardware Allocation > Single-Ended and Differential AI Setup

Find In Application Command

The Find In Application command finds the specified text by searching through the entire application (project). Click the Options button to further narrow the search.

Applies To

Application elements

Location

Edit menu

Find Text Command

The Find Text command finds the specified text in the current program, function, or function block. Click the Options button to narrow the search. If you select items on a sheet first, this command will search for the specified text only in the selected items.

Applies To

Application elements

Location

Edit menu

Find Text Options

The Find Text Options dialog box allows you to narrow the search for text on a specific element or in an application.

Applies To

Application elements

Locations

- Find Text button
- View menu
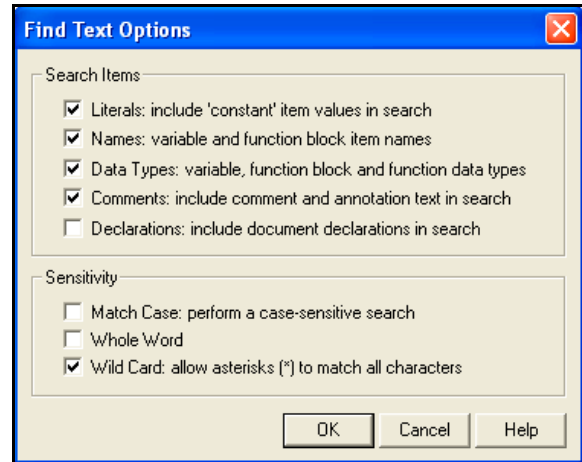
First Out

See Alarm Attributes on page 562.

Formatted Name

The Formatted Name property specifies a pattern to use when naming variables or tagnames. The pattern includes:

- Text: The text used as the base for the name. Should be 25 characters or less, to ensure you do not exceed the 31-character limit on tagname and variable names.

- Macro: The numbering scheme to use as an increment.

  — For theater numbering (A to Z, and AA to ZZ), use %A.

  — For normal numbering, (0-nnn), use %0.

For example, ALARM_%0 would result in names of ALARM_1 through ALARM_nnn. ALARM_%A would result in ALARM_A ... ALARM_Z, depending on the start and increment value, and the number of variables.

Applies To

Comments and variables in user documents

Locations

- Item Properties > Auto Name > Auto Name button
- Tools menu > Auto Name Selected Items
- Application tree > Tagname Declarations > right-click, select New Tagnames

Font Size

The Font Size property specifies the size of the font displayed for Structured Text code.

Applies To

ST Language

Location

View menu > Set Editor Options

FP Ordering

The FP Ordering property specifies which 16-bit section of a 32-bit floating point number is read first.

- High 16 Bits First: the 16 *most* significant bits of the floating point number (the first 16) are read first.
- Low 16 Bits First: the 16 *least* significant bits of the floating point number (the last 16) are read first.

The default value is Low 16 Bits First.

Note On Trident/Tri-GP 2.x controllers only, if you select Modbus Master as the communication protocol, this property is automatically set to High 16 Bits First and cannot be changed.

Applies To

Modbus communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Serial Ports and Modbus TCP tabs
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Serial Ports and Modbus TCP tabs
- Tricon Controller tree > Configuration > Hardware Allocation > TCM Setup > Serial Ports and Modbus TCP tabs
- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > CM Setup > Serial Ports and Modbus TCP tabs
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Serial Ports and Modbus TCP tabs

Function Variables

See Default Macros or Text on page 595.

Full Name

The Full Name property specifies the name of the user.

Applies To

User Security

Location

Project menu > Security > Users tab > Modify button

Function Block Command

The Function Block command allows you to add multiple function blocks at the same time to a program. If a function block has not been selected, a dialog box allows you to select the function block.

Applies To

Programs

Locations

- Function Block button
- Tools menu > Select Tool > Function Blocks

General Monitor Colors

The General Monitor Colors property specifies the colors to display for the value of BOOL variables and wires. The default for True is red. The default for False is green.

Applies To

Tagnames

Location

Project menu > Project Options > Monitor Colors tab

Generate Alarm When a Certificate Expires

The Generate Alarm When Certificate Expired property specifies if you want to be alerted when a certificate used for secure communication expires.

When selected, the fault LEDs on the MPs will turn ON when a certificate has expired, or is close to expiring. An alarm event will also appear in the Enhanced Diagnostic Monitor.

Applicable to Trident/Tri-GP 3.x systems with a CIM installed only.

Applies To

Secure communication

Location

Trident or Tri-GP 3.x Controller tree > Configuration > MP Setup > Operating Parameters tab

Global Positioning System Installed

For Tricon controllers, the Global Positioning System Installed property specifies whether a GPS interface is installed. The default is cleared, which means GPS is not installed.

Applies To

Tricon communication, Time Synchronization

Location

Tricon Controller tree > Configuration Panel > NCM Setup

Go To Cell Command

The Go To Cell command allows you to go to a specific row and column in the matrix.

Applies To

CEM programs

Location

Application tree > User Documents > Programs > open a CEM program > Edit menu

Group 1 and Group 2

The Group 1 and Group 2 properties specify group names to use for tagnames. Group names allow you to categorize tagnames by a name you define. Group 2 is subordinate to group 1. All the tagnames in a group must be of the same data type. The name can be a maximum of 63 characters.

Applies To

Tagnames

Location

Tagname Declarations > Declaration tab

Halt Command

The Halt command stops the execution of an application in the controller or Emulator. In Halt mode, tagnames retain the values they had in the scan during which the application was halted. For Tricon controllers, the Halt command is used. For Trident or Tri-GP controllers, the Halt command or the SYS_APP_HALT function can be used.

Applies To

Application

Locations

- Halt button
- Configuration tree > Controller or Emulator Panel > Commands menu

Handshake

The Handshake property specifies whether to use signals to establish a valid connection. With hardware handshake, a separate wire sends a signal when the receiving device is ready to receive the signal, which ensures that a device transmits data only when the other device is ready to receive it.

- On the Tricon EICM, the switch settings determine whether handshaking is allowed.
- On the Tricon TCM, the Trident/Tri-GP 2.x/3.x CM, or Trident/Tri-GP 3.x CIM, the setting is configured on the Serial Ports tab.
- On the Trident 1.x CM, the setting of the Transceiver Mode property determines whether hardware handshake is valid.

The default is None, which means hardware handshake is not used. Settings include:

Setting	Description
Hardware	Select for: • Any 2-wire configuration (required) • A multi-point configuration that uses the RS-485 transceiver mode (required) • A point-to-point configuration that uses an external modem with RS-232 transceiver mode (optional)
None	Select for configurations that do not allow or require Hardware Handshake.

Used with RS-232 Transceiver Mode

With the Handshake property set to Hardware, the Trident or Tri-GP CM asserts the Request to Send (RTS) signal when it has a message to transmit. The CM begins transmission when it receives a Clear to Send (CTS) signal from the Modbus master. The Trident or Tri-GP CM ignores all characters unless the Modbus master asserts the Data Carrier Detect (DCD) signal. This settings allows the Modbus master to use half-duplex modems.

With the Handshake property set to None (typically for point-to-point connections), the Trident or Tri-GP CM asserts RTS at all times and ignores CTS and DCD. In other words, the CM

transmits characters even if the receiving device is not ready. This could result in an overrun state, and the characters would have to be re-transmitted.

Used with RS-485 Transceiver Mode

With the Handshake property set to Hardware, the Trident or Tri-GP CM enables its RS-485 transmit driver only when it is sending data. Use this setting for all single-pair networks and for slave ports in two-pair, multi-point networks.

With the Handshake property set to None, the Trident or Tri-GP CM enables its RS-485 transmit driver at all times. Use this setting for a Modbus slave port in a two-pair, point-to-point network.

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > EICM Setup
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Serial Ports tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Serial Ports tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM Setup > Serial Ports tab
- Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > MP Setup > Serial Ports tab
- Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > CM Setup > Serial Ports tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CIM Setup > Serial Ports tab

Hardware Allocation Command

The Hardware Allocation command displays the Hardware Allocation screen in the Controller tree.

Applies To

Configuration

Locations

- Hardware Allocation button
- View menu

Hide Causes Unrelated to Effects Command

The Hide Causes Unrelated to Effects command hides causes on a CEM program that are not related to an effect.

Applies To
CEM programs

Location
View menu

Hide Effects Unrelated to Causes Command

The Hide Effects Unrelated to Causes command hides effects on a CEM program that are not related to a cause.

Applies To
CEM programs

Location
View menu

High Active / High High Active

See Alarm Attributes on page 562.

High Limit / High High Limit

See Alarm Attributes on page 562.

High Severity / High High Severity

See Alarm Attributes on page 562.

Highest TCP Port Number

The Highest TCP Port Number property specifies the highest port number the communication module can use for outgoing TCP connections. Allows the communication module to operate behind a firewall that has implemented port restrictions.

For most networks, the default setting should be sufficient.

Applicable only for:

- Modbus/TCP and OPC ports on TCMs installed in Tricon 10.3 and later systems.
- Modbus/TCP ports on CMs installed in Trident or Tri-GP 2.x and later systems.

- Modbus/TCP ports on CIMs installed in Trident or Tri-GP 3.x and later systems.

Note If this setting is misconfigured, Modbus TCP and/or OPC will be unable to connect. If this occurs, reset the value to the default setting to fix the problem and re-enable Modbus TCP and/or OPC. If you need to use this feature, please contact Invensys Technical Support for assistance with configuring this setting.

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Network tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Network tab
- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > CM Setup > Network tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Network tab

Horizontal Network Divider Command

The Horizontal Network Divider command allows you to place a horizontal divider on a logic sheet to divide networks.

Applies To

FBD logic sheets

Locations

- Horizontal Network Divider button
- Tools menu > Select Tool

ID

See Alarm Attributes on page 562.

IDLE State

IDLE is an application state which indicates that the TriStation PC is connected to a controller or the Emulator, but the application has not been downloaded.

Applies To

Application

Location

Controller tree > Controller or Emulator Panel > Title bar

Import Command

The Import command provides a wizard that allows you to specify the fields to import, and how to link them to tagname properties.

Applies To

Tagnames

Location

Right-click the Tagname Declarations folder

Import (Certificate) Command

In the Certificates folder, the Import command allows you to select and add a new certificate for use with secure communication.

Applies To

Certificates

Location

Application tree > Right-click a Certificates folder

Import (TCM, CM, or CIM Configuration) Command

In the TCM Setup, CM Setup, or CIM Setup dialog box, the Import command imports all settings from a previously exported TCM, CM, or CIM configuration XML file.

Does not apply to model 4351/4352 TCMs, or Trident 1.x CMs.

See also Export (TCM, CM, or CIM Configuration) Command on page 622.

Applies To

TCM, CM, and CIM configuration

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup
- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > CM Setup
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CM or CIM Setup

Include Alarm Attributes

The Include Alarm Attributes property specifies whether to include the process alarms attributes when you import or update tagname properties.

Applies To

Tagnames

Location

Right-click the Tagname Declarations folder > Import Wizard > Select Data Source screen

Include Monitor Value in Annotation

The Include Monitor Value in Annotation property specifies whether to display the value of the variable in the annotation. The default is cleared, which means the value is not displayed in the annotation.

Applies To

Variables

Location

Item Properties > Annotation tab

Info Severity

See System Events Severity on page 717.

Initial Value

The Initial Value property specifies the beginning value assigned to a variable on the first scan of the application. The value can be changed with a Download Changes command, however, the value is not used until a *first scan* which is not issued with the Download Changes command.

A first scan occurs under any of these conditions:

- The Download All and the Run command are issued
- The Halt command and the Run command are issued
- The application is restarted after a power failure

To identify whether a first scan has occurred, use the TR_SCAN_STATUS (Tricon) or SYS_SYSTEM_STATUS (Trident/Tri-GP) function blocks.

In programs, only local variables are assigned an initial value. In functions and function blocks, all variables are assigned an initial value. The value is either the value declared for the property or zero. If you have selected a user-defined Data Type for a local variable, you cannot assign an initial value to the variable.

Applies To

Tagnames, Variables

Location

Application tree > Tagname Declarations > Declaration tab

Insert Columns Command

The Insert Columns command displays a dialog box that allows you to insert columns in a CEM program.

Applies To

CEM programs

Locations

- Insert Columns button
- Edit menu

Insert From File Command

The Insert From File command displays an Open dialog box that allows you to select a file to be inserted in the ST program or function.

Applies To

ST programs and functions

Location

Edit menu

Insert Input Variable Command

The Insert Input Variable command inserts an input variable to a logic sheet.

Applies To

CEM, FBD, and LD functions

Locations

- Input Variable Tool button
- Edit menu

Insert In/Out Variable Command

The Insert In/Out Variable command inserts an in/out variable to a logic sheet. In Structured Text language, VAR IN/OUT are added to the code, not inserted by a command.

Applies To

FBD and ST functions and function blocks

Locations

- In/Out Variable Tool button
- Edit menu

Insert Local Variable Command

The Insert Local Variable command inserts a local variable to a logic sheet.

Applies To

CEM, FBD, and LD programs

Locations

- Local Variable Tool button
- Edit menu

Insert Output Variable Command

The Insert Output Variable command inserts an input variable to a logic sheet.

Applies To

FBD and LD functions

Locations

- Input Variable Tool button
- Edit menu

Insert Module Command

The Insert Module command displays a dialog box that allows you to select a module to add to the configuration.

Applies To

Hardware configuration

Locations

- Insert Module button (on Trident or Tri-GP Configuration toolbar)
- Tricon Configuration tree > Hardware Allocation > double-click slot
- Trident or Tri-GP Configuration tree > Hardware Allocation > MP/IOP1 > Tools menu

Insert Rows Command

The Insert Rows command displays a dialog box that allows you to insert rows in a CEM program.

Applies To

CEM programs

Locations

- Insert Rows button
- Edit menu

Insert Sheet Command

The Insert Sheet command adds a new logic sheet *before* the sheet currently being viewed. You must enter a title for the new sheet before it will be added.

Applies To

Logic sheets

Location

Sheets menu

Insert Tagname Declaration Command

The Insert Tagname Declaration command inserts a tagname declaration to the program.

Applies To

FBD and LD programs

Locations

- Tagname Declaration Tool button
- Edit menu

Internal State

The Internal State setting means each function block instance may have an internal state which is remembered from one execution to the next and from one scan to the next. There are no restrictions on usage of a function block labeled internal state; that is, you can execute the function block instance more than once per scan, or you can skip scans.

For user-defined function blocks, you can specify this setting. For Triconex Library function blocks, the setting cannot be changed.

Applies To

Library and user-defined function blocks

Location

Document Properties > Usage tab

Intersection Functions On by Default

The Intersection Functions On by Default property specifies whether a function column is automatically included in the intersection when a matrix is created. The default is cleared.

Applies To

CEM programs

Location

Tools menu > TriStation 1131 Options > CEM Editor tab

Invert Input

The Invert Input property specifies whether to invert the value of a BOOL input that is connected to a function or function block. If selected, the value for the input is changed to the opposite value when the function or function block is executed. For example, if the value is True it is changed to False. The default is cleared, which means the input value is not inverted.

When an input is inverted, a small circle (referred to as a fiducial) is displayed on the input terminal of the function.

Applies To

BOOL input points

Location

Function and function blocks
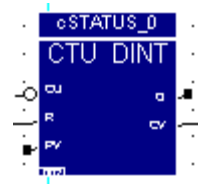
Invert Input/Output

The Invert Input/Output property specifies whether to invert the value of a BOOL input/output that is connected to a function block. If selected, the value for the input/output is changed to the opposite value when the function block is executed. For example, if the value is True it is changed to False. The default is cleared, which means the input value is not inverted.

When an input/output is inverted, a small circle (referred to as a fiducial) is displayed on the input terminal of the function.
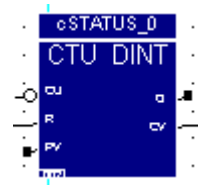
Applies To

BOOL input points

Location

Function blocks

Invert Output

The Invert Output property specifies whether to invert the value of a BOOL
output that is connected to a function or function block. If selected, the value for
the output is changed to the opposite value when the function is executed. For
example, if the value is True it is changed to False. The default is cleared, which
means the output value is not inverted.
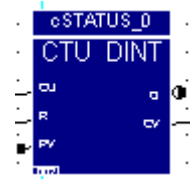
When an output is inverted, a small circle (referred to as a fiducial) is displayed
on the output terminal of the function.

Applies To

BOOL output points

Location

Functions and function blocks

IP Address

The IP Address property specifies a unique 32-bit address of a computer attached to a network.
A network uses IP addresses to route messages to their destinations.

An IP address is formatted as four numbers separated by periods, where each number can be
zero to 255. An example is 1.160.10.240.

Every client and server in a network requires an IP address, which is either permanently or
dynamically assigned at startup. The defaults are as follows:

- **ACM/NCM**: 192.168.1.<*node number*>
- **TCM**: 192.168.0.<*node number*> for NET 1; 192.168.1.<*node number*> for NET 2
- **Trident 1.x**: 0.0.0.0
- **Trident 2.x/3.x or Tri-GP**: 192.168.255.<*node number*> for Left MP network port only;
  0.0.0.0 for all other MP and CM/CIM network ports

Note   The highest and lowest IP addresses in a subnet (addresses where the last number is 0
or 255, such as 192.168.55) are reserved for broadcast messaging and cannot be used as
a valid IP address for a Triconex communication module.

Applies To

Communication

Locations

- Controller tree > Configuration > Communication
- Tricon Controller tree > Configuration > Hardware Allocation > ACM or NCM Setup
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Network, Peer-to-Peer, Modbus TCP, and Printer tabs
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Network, Peer-to-Peer, Modbus TCP, and Printer tabs
- Tricon Controller tree > Configuration > Hardware Allocation > TCM Setup > Network, Peer-to-Peer, Modbus TCP, and Printer tabs
- Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Network or Printer tab
- Trident 2.x/3.x or Tri-GP Controller tree > Configuration > Hardware Allocation > MP Setup > Network Ports tab

IP Subnet Mask

The IP Subnet Mask property specifies a binary pattern that is matched with the IP address to turn part of the host ID address field into a field for subnets.

- For Tricon ACM and TCM, see your network administrator.
- For Tricon NCM, do not change the default setting which is eight zeroes.
- For Trident or Tri-GP CM or CIM, see your network administrator.

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > ACM and NCM Setup
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Network and Routing tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Network and Routing tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM Setup > Network and Routing tab
- Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Network and Routing tab

Item Properties Command

The Item Properties command displays an Item Properties dialog box, which varies depending on the item currently selected.

Applies To

Chassis, modules, tagnames, variables

Locations

- Item Properties button
- View menu

Language

The Language property specifies the language to be used for the program, function, function block, or data type. Settings include:

- Function Block Diagram
- Ladder Diagram
- Structured Text
- Cause Effect Matrix

Applies To

Programs, functions, function blocks, and data types

Location

Project menu > New Document

LD Editor Options

The LD Editor Options include:

- Compiler Warning When Right Power Rail is Missing on page 587
- Double Space Function (Block) Terminals by Default on page 606
- Left-Handed Link Tool on page 642

Left-Handed Link Tool

The Left-Handed Link Tool specifies whether to have the link tool configured for left-handed use for LD programs. The default is cleared, which means the right-handed link tool is used.

Applies To

Ladder Diagrams

Location

Tools menu > TriStation 1131 Options > LD Editor tab

Left-Handed Wire Tool

The Left-Handed Wire Tool specifies whether to have the wire tool configured for left-handed use for FBD programs.

The default is cleared, which means the right-handed tool is used.

Applies To

Project

Location

Tools menu > TriStation 1131 Options > FBD Editor tab

Line Width

The Line Width property specifies the number of characters per line. The default is 80.

Applies To

Project

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Printer tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Printer tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM Setup > Printer tab
- Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Printer tab

Link Command

The Link command draws a horizontal or vertical link between power rails and logic elements. The direction of the link determines how it is evaluated in the logic.

Link Direction	Description
Horizontal	Transmits the state of the element on its immediate left to the element on its immediate right. The state represents the Inclusive OR of the On states of the horizontal links on its left side.
Vertical	Intersects one or more horizontal link elements on each side. The state is copied to all attached horizontal links on its right, but is not copied to attached horizontal links on its left. • Is Off if the states of all attached horizontal links to its left are Off. • Is On if the state of one or more attached horizontal links to its left is On.

Applies To

LD programs

Locations

- Link Tool button
- Tools menu > Select Tools

List Disabled Points Command

The List Disabled Points command displays a list of all disabled points on a controller, so that individual points can be selected and enabled. To use this command, the application must be running on the controller.

Applies To

Tagnames

Location

Controller tree > Controller Panel > Commands menu

Loc

The Loc property displays the coordinates for the location of an element in terms of cause row and effect column in a CEM program. For example, C01 identifies cause 1 and C02E02 identifies the intersection of cause 2 and effect 2.

Applies To

CEM programs

Location

Application tree > open a CEM program > Variable Detail Table

Location

The Location property specifies the location of the tagname based on the position in the Tricon chassis, Trident system, or Tri-GP system. The address is a three-part number in this format: CC.SS.PP

Identifier	Description
CC	Stands for Tricon chassis, or Trident/Tri-GP I/O Processor (IOP).
SS	Stands for slot (Tricon), or baseplate (Trident/Tri-GP).
PP	Stands for point number.

For example, 01.02.23 is the address for point 23, on the module in slot 2, in chassis 1.

Applies To

Tagnames

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > DO and PI Setup
- Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > PI or EPI Setup

Log On As New User Command

The Log On As New User command allows you to save and close the current project and log on as a different user. You are prompted on whether to save project elements.

Applies To

Project

Location

File menu

Logon Name

The Logon Name property specifies the identifier used to log on to the TriStation 1131 project.

Applies To

User access

Location

Project menu > Security > Users tab > New or Modify button

Low Active / Low Low Active

See Alarm Attributes on page 562.

Low Limit / Low Low Limit

See Alarm Attributes on page 562.

Low Severity / Low Low Severity

See Alarm Attributes on page 562.

Lowest TCP Port Number

The Lowest TCP Port Number property specifies the lowest port number the communication module can use for outgoing TCP connections. Allows the communication module to operate behind a firewall that has implemented port restrictions. For most networks, the default setting should be sufficient. Applicable only for:

- Modbus/TCP and OPC ports on TCMs installed in Tricon 10.3 and later systems.
- Modbus/TCP ports on CMs installed in Trident or Tri-GP 2.x and later systems.
- Modbus/TCP ports on CIMs installed in Trident or Tri-GP 3.x and later systems.

Note   If this setting is misconfigured, Modbus TCP and/or OPC will be unable to connect. If this occurs, reset the value to the default setting to fix the problem and re-enable Modbus TCP and/or OPC. If you need to use this feature, please contact Invensys Technical Support for assistance with configuring this setting.

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Network tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Network tab
- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > CM Setup > Network tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Network tab

Macros Command

The Macros command displays macros that can be included in an annotation or comment. You can specify whether to display macros available by Project, Document, or Sheet.

To copy, click the macro and press Ctrl+C. To paste, close the Edit Macro dialog box, click in the Comment area, and press Ctrl+V.

Applies To

Comments and variables

Locations

- Document, Project, and Sheets menus
- Annotation tab (tagnames and variables)
- Comments tab (comments)

Main Processor Connection Setup

For Trident 1.x, the Main Processor Connection Setup property specifies which MP is connected to the TriStation PC. The options are Left, Middle, and Right. The default is left.

Applies To

TriStation communication

Location

Trident 1.x Controller tree > Configuration > TriStation Communication

Major Severity

See System Events Severity on page 717.

Manage Sheets Command

The Manage Sheets command displays a screen that allows you to manage logic sheets.

These commands are on the Sheets Manager screen:

Command	Action
Append	Adds a new sheet after an existing sheet.
Insert	Adds a new sheet before an existing sheet
Delete	Delete the selected sheet.
Title	Allows you to edit the title of the current sheet. The sheet title is displayed in the title block, the window caption bar and the Window Menu list.
Go To	Click a sheet to be displayed, and then click Go To.

Applies To

Logic sheets

Location

Sheets menu

Manage Views Command

The Manage Views command allows you to save, load, and remove views of a CEM program. These commands are on the View Manager screen.

Command	Action
Load	Click a view and click Load to have it displayed.
Save	Click to save the view currently displayed.
Remove	Click a view and click Remove to delete the view from the list.
Restore All Defaults	Click to restore the current view to show all causes and effects.
Close	Click to close the View Manager screen.
Cancel	Click to cancel the action.

Applies To

CEM programs

Location

View menu

Management Port Number

The Management Port Number property identifies the UDP port number used for the Enhanced Diagnostic Monitor's connection to the TCM, Trident 2.x/3.x CM, or Tri-GP CM communication status information. The default number is 1510. Cannot be the same as the TriStation or TSAA port numbers.

This must be the same value as the Management UDP Port Number property in the Enhanced Diagnostic Monitor's Network Configuration dialog box. For more information, see the *Enhanced Diagnostic Monitor User's Guide*.

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC or TCM/B Setup > Protocols tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A Setup > Network tab
- Trident or Tri-GP 2.x/3.x Controller tree > Configuration > Hardware Allocation > CM Setup > Protocols tab

Master Logical Port

The Master Logical Port property specifies the logical port number that the TriStation 1131 application uses with Modbus Master Functions to access the port. Must be unique for each TCM, Trident 2.x/3.x CM, Tri-GP CM, or Trident/Tri-GP 3.x CIM installed in a system. This property is only available for Modbus Master.

For TCM and the CIM, the valid range is 1-32. For Trident 2.x/3.x or Tri-GP CM, the valid range is 1-15.

Applies To

Modbus Communication

Location

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Modbus TCP and Serial Ports tabs
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Modbus TCP and Serial Ports tabs
- Tricon Controller tree > Configuration > Hardware Allocation > TCM Setup > Modbus TCP and Serial Ports tabs
- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > CM Setup > Modbus TCP and Serial Ports tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Modbus TCP and Serial Ports tab

Max Field

For Trident or Tri-GP controllers, the Max Field property specifies the maximum range for power, based on volts on the Pulse Input or Enhanced Pulse Input Module. The default is 33 volts.

Applies To

Trident or Tri-GP Pulse Input or Enhanced Pulse Input Module

Location

Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > PI or EPI Setup

Maximum Number of Peer-to-Peer Receives

The Maximum Number of Peer-to-Peer Receives property specifies the maximum number of Receive function blocks for each TriStation 1131 application.

- For Trident and Tri-GP 3.x controllers, the maximum value of Peer-to-Peer Receives can be set to 100.

- For Trident 2.x and earlier, Tri-GP 2.x, and Tricon controllers, the maximum value of Peer-to-Peer Receives can be set to 50.

To conserve memory and minimize scan time, set this number as low as possible. However, if you plan to add Receive function blocks in the future, specify the anticipated maximum to avoid having to perform a Download All later.

When you build the application, TriStation 1131 calculates how many Peer-to-Peer Receives are being used. During the Download All operation, TriStation 1131 adds 20% to this calculation to determine the number of Receives to be configured. (For example, if 10 Sends are being used, TriStation 1131 will configure 12 Receives.)

This number set for Receive and Send does not have to be the same. The default is 0.

Applies To

Peer-to-Peer communication

Location

Application tree > Implementation > Peer-to-Peer Configuration

Maximum Number of Peer-to-Peer Sends

The Maximum Number of Peer-to-Peer Sends property specifies the maximum number of Send function blocks for each TriStation 1131 application.

- For Trident and Tri-GP 3.x controllers, the maximum value of Peer-to-Peer Sends can be set to 100.

- For Trident 2.x and earlier, Tri-GP 2.x, and Tricon controllers, the maximum value of Peer-to-Peer Sends can be set to 50.

To conserve memory and minimize scan time, set this number as low as possible. However, if you plan to add Send function blocks in the future, specify the anticipated maximum to avoid having to perform a Download All later.

When you build the application, TriStation 1131 calculates how many Peer-to-Peer Sends are being used. During the Download All operation, TriStation 1131 adds 20% to this calculation to determine the number of Sends to be configured. (For example, if 10 Sends are being used, TriStation 1131 will configure 12 Sends.)

The number set for Send and Receive does not have to be the same. The default is 0.

Applies To

Peer-to-Peer communication

Location

Application tree > Implementation > Peer-to-Peer Configuration

Maximum RPM

The Maximum RPM property specifies the revolutions per minute for the device attached to the Pulse Input Module. The number must be a positive floating point value. The default is 30,000.

Applies To

Tricon Pulse Input Module

Location

Tricon Controller tree > Configuration > Hardware Allocation > Pulse Input Setup

Maximum Speed

The Maximum Speed property specifies the speed for the device attached to the Pulse Input Module. The number must be a positive floating point value. The default is 30,000.

Applies To

Tricon Pulse Input Module

Location

Tricon Controller tree > Configuration > Hardware Allocation > Pulse Input Setup

Maximum Value (Engineering Unit Range)

The Maximum Value (Engineering Unit Range) property identifies the maximum value for the engineering unit range used by OPC UA; must be greater than the minimum value.

Any value outside of the specified range will cause the OPC UA server to clamp its value to the specified range and report a status code of "Uncertain_EngineeringUnitsExceeded".

The maximum value and default value is 2147483647.

Applies to Trident or Tri-GP 3.x or later projects only. This property appears in Trident 1.x/2.x or Tri-GP 2.x projects, but has no meaning for those controller versions.

Applies To

Tagnames with DINT data types

Location

Application tree > Tagname Declarations > Scaling tab (in Trident or Tri-GP projects only)

Maximum Value (Max Span)

The Maximum Value (Max Span) property identifies the maximum value for the range to scale a REAL tagname to an integer; must be greater than the minimum value.

The maximum value and default value is 32,767. (For Honeywell, the maximum value is 9,999.)

Applies To

Tagnames with REAL data types

Location

Application tree > Tagname Declarations > Scaling tab

Memory Allocation Command

The Memory Allocation command displays the Memory Allocation screen in the Controller tree.

Applies To

Configuration

Locations

- Memory Allocation button
- View menu

Message Options Command

The Message Options command allows you to specify the type of messages to be sent between the TriStation PC and controller, and is generally used to troubleshoot problems.

The default for all options is cleared.

Applies To

Troubleshooting problems

Location

Configuration tree > Controller Panel > Tools menu > Message Options
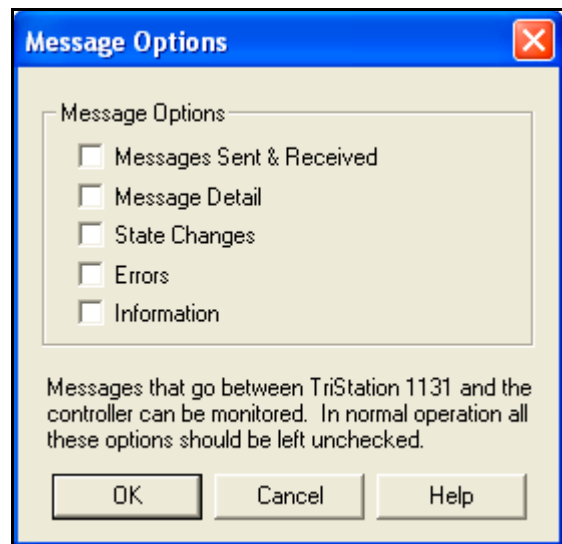
Message View Command

The Message View button displays a message area at the bottom of the TriStation 1131 screen. Tabs in the area allow you to display information for Application, Controller, Find Results, and Compare Results. You can toggle the Message View On or Off.
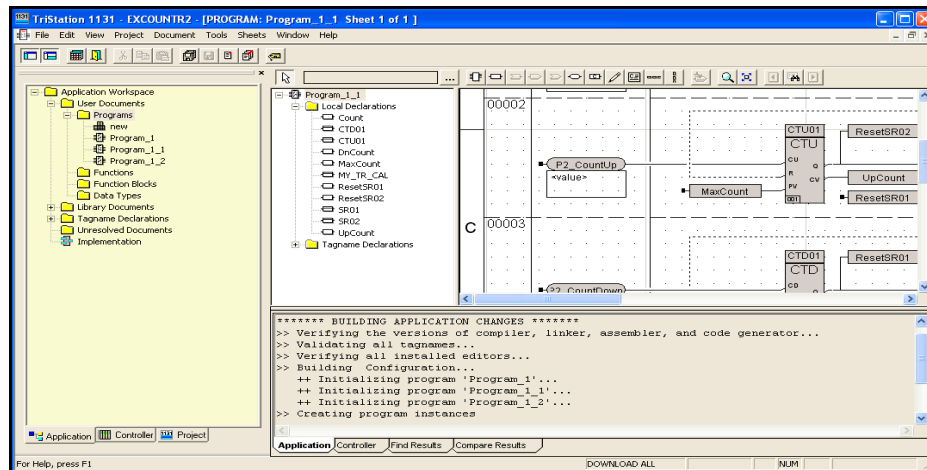
Applies To

View

Locations

- Message View button
- View menu > Messages

Min Field

For Trident or Tri-GP controllers, the Min Field property specifies the minimum range for power, based on volts for the Pulse Input or Enhanced Pulse Input Module. The default is 0 volts.

Applies To

Trident or Tri-GP Pulse Input or Enhanced Pulse Input Module

Location

Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > PI or EPI Setup

Minimum Value (Engineering Unit Range)

The Minimum Value (Engineering Unit Range) property identifies the minimum value for the engineering unit range used by OPC UA; must be less than the maximum value.

Any value outside of the specified range will cause the OPC UA server to clamp its value to the specified range and report a status code of "Uncertain_EngineeringUnitsExceeded".

The minimum value and default value is -2147483648.

Applies to Trident or Tri-GP 3.x or later projects only. This property appears in Trident 1.x/2.x or Tri-GP 2.x projects, but has no meaning for those controller versions.

Applies To

Tagnames with DINT data types

Location

Application tree > Tagname Declarations > Scaling tab (in Trident or Tri-GP projects only)

Minimum Value (Min Span)

The Minimum Value (Min Span) property identifies the minimum value for the range used to scale a REAL tagname to an integer; must be less than the maximum value.

The minimum value and default value is -32,768. (For Honeywell, the maximum value is 9,999.)

Applies To

Tagnames with REAL data types

Location

Application tree > Tagname Declarations > Scaling tab

Minor Severity

See System Events Severity on page 717.

Modbus (Minimum and Maximum) Range

The Modbus (Minimum and Maximum) Range property specifies the minimum and maximum limits of values communicated via serial ports. This property is used with the Minimum Value (Engineering Unit Range) and Maximum Value (Max Span) to communicate REAL values using Modbus or Honeywell protocol.

- The minimum value is -32,768; the default is 0.
- The maximum value is 32,767; the default is 32,767.
- For Honeywell, the minimum is 0; the maximum is 9,999.

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > EICM Setup
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Serial Ports tab
- Tricon Controller tree > Configuration > Hardware Allocation >TCM/A or TCM/B Setup > Serial Ports tab

- Tricon Controller tree > Configuration > Hardware Allocation > TCM Setup > Serial Ports tab
- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > MP and CM Setup > Serial Ports tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > MP, CM or CIM Setup > Serial Ports tab

Modbus Slave Address

The Modbus Slave Address property specifies the number of the Modbus slave device which is connected to the Modbus master. This property is only available if using Modbus slave, and master/slave protocols. If using Modbus master protocol, the address of the slave is specified in the Modbus Read and Write function blocks.

The address can be from 1 to 247; the default is 1.

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > EICM Setup
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Serial Ports tab
- Tricon Controller tree > Configuration > Hardware Allocation >TCM/A or TCM/B Setup > Serial Ports tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM Setup > Serial Ports tab
- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > MP and CM Setup > Serial Ports tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > MP, CM or CIM Setup > Serial Ports tab

Mode

The Mode property specifies the type of communication, which can support one or more communication protocols.

Table 58   Communication Modes

Modes	Supported Protocols
Open Network	TriStation, TSAA, OPC, DDE, and printer protocol
Peer-to-Peer	Peer-to-Peer and Time Synchronization
TriStation	TriStation

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > NCM Setup
- Trident 1.x Controller tree > Configuration > Hardware Allocation > MP and CM Setup > Network tab
- Trident 2.x/3.x or Tri-GP Controller tree > Configuration > Hardware Allocation > MP Setup > Network tab

Model

The Model property specifies the model of Main Processor installed in the Tricon, Trident, or Tri-GP controller that the project will be downloaded to.

- For Tricon system versions 9.5.x, 9.51.x, or 9.52.x, select 3006/N, 3007.
- For Tricon system versions 9.6 and later, select 3008.
- For Trident system versions 1.2 and later, select 3101.
- For Tri-GP system versions 2.x and later, select 3101S2.

Note   TriStation 1131 4.10.1 does not support Tricon system versions 9.4.x and earlier, or Trident system versions 1.1 and earlier. For a list of TriStation 1131 versions compatible with your controller, see the applicable Tricon, Trident, or Tri-GP *Product Release Notice* (available on the Invensys Global Customer Support website).

See also Target System Version on page 718.

Applies To

Project

Locations

- File menu > New Project or > Select Main Processor
- File menu > Open Project > Select Main Processor

- Tricon, Trident, or Tri-GP Controller tree > Configuration > Hardware Allocation > Replace MPs

Modify Banner Message Command

The Modify Banner Message command allows you to customize the security banner that appears each time you start TriStation 1131.

Applies To

User security

Location

Edit menu

Monitor Display Options

The Monitor Display Options include properties that specify the names and colors for BOOL variables. The display options can help an operator identify alarm conditions at a glance.

These options are used only when the tagname is displayed in SOE Recorder. For more information, see the *Triconex SOE Recorder User's Guide*.

Properties include:

Property	Description
True State Name	Specifies the name to display for a variable in the true state. The default is TRUE.
False State Name	Specifies the name to display for a variable in the false state. The default is FALSE.
True Color	Determines the color used to display the true state of a variable. The default is red.
False Color	Determines the color used to display the false state of a variable. The default is Green.

Applies To

BOOL values

Location

Application tree > Tagname Declarations > Item Properties > Display tab

Monitor Value on by Default

The Monitor Value on by Default property specifies whether to display the value of the variable when the program or function block is executed. The default is cleared, which means the monitor does not display the value of the variable.

Applies To
Variables

Location
Project menu > Project Options > Annotations tab

Move Behind Logic Elements

The Move Behind Logic Elements property moves a selected comment box behind a logic element. This affects the appearance of the logic sheet only; it does not affect the execution of the logic element. The default is cleared.

Applies To
Annotations and Comments

Location
Item Properties > Style tab

Multicast IP Address

See TSAA Multicast IP Address on page 728.

Name

The Name property specifies an identifier or description for an element.

Feature	Description
Restrictions	The name must begin with an alpha character (A to Z) and can include up to 31 alphanumeric characters (A to Z, and 0 to 9), including the underscore (_) character. Letters are not case-sensitive.
Version Numbers	Names of documents include a version number at the end of the name. The number includes a major number, which is always 1 and a minor number, which changes when the document is changed, saved, and closed.

Applies To
Variables, Contacts, Coils

Location
Item Properties

Name Order

The Name Order property specifies how automatic naming is applied to the selected variables. Settings include:

- Rows—Names are applied vertically, from left to right.
- Columns—Names are applied horizontally, from top to bottom.
- Selection order—Names are applied based on the order in which they were selected.

Applies To

Comments and variables in user documents

Locations

- Item Properties > Auto Name > Auto Name button
- Tools menu > Auto Name Selected Items

Network

The Network property specifies the network port—NET 1 or NET 2—on the communication module that the selected external device is connected to.

Applies only to the following communication modules:

- TCM
- Trident or Tri-GP 2.x CM
- Trident or Tri GP 3.x CM or CIM

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup
- Tricon Controller tree > Configuration > Hardware Allocation > TCM Setup
- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > CM Setup
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CM or CIM Setup

New Document Command

The New Document command opens a dialog box that allows you to specify the type of document to create and the type of language to use.

Applies To

Application

Location

Project menu

New Project Command

The New Project command creates a new project.

Applies To

Project

Location

File menu

New Tagname Command

The New Tagname command opens a screen that allows you to specify a new tagname.

Applies To

Tagnames

Locations

- Project menu
- Application tree > right-click Tagname Declarations

New Tagnames Command

The New Tagnames command opens a screen that allows you to create multiple tagnames based on a naming scheme. Properties include:

- Formatted Name on page 626
- Start Value and Increment on page 714
- Name Order on page 659

Applies To

Tagnames

Locations

- Project menu
- Application tree > right-click Tagname Declarations

NIC Index

The NIC Index property specifies the index position of the network interface card in the TriStation PC.

To determine the NIC index:

1   Open the Control Panel and click the System icon.

2   On the Hardware tab, click Device Manager, and then expand the Network Adapters tree.

3   Starting with zero, count down the list of adapter cards to the one that is connected to the TriStation PC. For example, if your adapter card is fifth in the list, its index position is 4.

Applies To

Communication

Location

Trident 1.x Controller tree > Configuration > TriStation Communication

Node Name

The Node Name property specifies the name for a Triconex controller, which can be a default name or a user-defined name. The default names are TRINODE01 through TRINODE31.

Applies To

Communication

Location

Controller tree > Configuration > TriStation Communication

Node Number

The Node Number property specifies a number for a Triconex controller, which must be the same as on the switch setting (Tricon) or the address plug (Trident or Tri-GP). The numbers can be from 1 to 31 for Tricon controllers, or from 1 to 63 for Trident or Tri-GP controllers.

Applies To

Communication

Location

Controller tree > Configuration > TriStation Communication

Number of Days Before an Alarm Is Generated

The Number of Days Before an Alarm Is Generated property specifies how many days prior to certificate expiration an alarm will sound. You can enter from 0 to 255 days. If you enter 0, an alarm will sound immediately upon certificate expiration. The default is 1 day.

For example, if you want to be warned one week before a certificate is due to expire, enter 7. To be warned one month prior to certificate expiration, enter 30.

Available only if you also selected the Generate Alarm When a Certificate Expires property.

Applicable to Trident/Tri-GP 3.x systems with a CIM installed only.

Applies To

Secure communication

Location

Trident or Tri-GP 3.x Controller tree > Configuration > MP Setup > Operating Parameters tab

Number of Extended Block

For Tricon controllers, the Number of Extended Block property specifies a pair of HIM blocks consisting of a base block and a secondary block (which is offset from the six-bit block address by 32). The default is 4. For more information, see the *HIM User's Guide*.

Applies To

Tricon HIM

Location

Tricon Controller tree > Configuration > Hardware Allocation > HIM Setup

Number of Gear Teeth

For Trident or Tri-GP controllers, the Number of Gear Teeth property specifies the number of gear teeth that are counted in each revolution for the Pulse Input or Enhanced Pulse Input Module. The Point Options property must be specified as RPM to enable this property. The default is 60.

Applies To

Trident or Tri-GP Pulse Input or Enhanced Pulse Input Module

Location

Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > PI or EPI Setup

Number of Inputs

The Number of Inputs property specifies the number of inputs to include with the function. Only extensible functions, which are functions that can include additional inputs, have this property.

For more information, see the *TriStation 1131 Libraries Reference*.

Applies To

Functions

Location

Item Properties > Function tab

Number of Instances

The Number of Instances property specifies how many instances of the Emulator you want available at any one time.

If this option is set to Multiple, more than one instance of the Emulator can be running at the same time. If this option is set to Single, only one instance of the Emulator can be running at any one time.

The default is Single.

Applies To

Emulator

Location

Project menu > Project Options > Emulator Options tab

OFFLINE State

The OFFLINE state is an application state which indicates the application is not connected to the Emulator or to a controller.

Applies To

Application

Location

Controller tree > Controller or Emulator Panel > Title bar

On NET 1 Enable Time Synchronization

See Time Synchronization on page 721

On NET 2 Enable Time Synchronization

See Time Synchronization on page 721.

Only Once

The Only Once setting means each instance of a function block should be executed only once per scan, but does not need to be executed every scan. This means the function block has internal data that does not need to be updated on every scan, but should not be updated *more than once* per scan. For user-defined function blocks, you can specify this setting. For Triconex Library function blocks, the setting cannot be changed.

Applies To

Library and user-defined function blocks

Location

Document Properties > Usage tab

OPC System Events Severity

See System Events Severity on page 717.

Open Document Command

The Open Document command opens an existing document.

Applies To

Application

Location

Project menu

Open Point Alarm Threshold

The Open Point Alarm Threshold property specifies the number of ohms above which values are alarmed as an open load. This option is only available if the points are supervised. Typical threshold values are 480 to 3,200 ohms. The available range is 0 to 65,535 ohms. The default is 2,400 ohms. Available only with the model 3625 Digital Output Module.

Applies To

Tricon DO points

Location

Tricon Controller tree > Configuration > Hardware Allocation > DO Setup

Open Project Command

The Open Project command allows you to specify an existing project to open.

CAUTION TriStation 1131 projects must always be run from a local drive. Projects may be saved to a network drive for backup purposes, but you must copy the project to your local drive before you open it in TriStation 1131.

Applies To

Project

Location

File menu

Operation Type

The Operation Type property specifies whether the security selection is for controller operations or TriStation 1131 operations. Depending on the selection, different operations are displayed.

Applies To

Project

Location

Project menu > Security command > Privileges tab

Operations

The Operations property specifies TriStation 1131 and controller operations that can be assigned a security level. These tables describe the operations and default settings for security levels.

Table 59   Controller Operations

Operation	Description	Default Level
Change point values	Permits use of the Set Value command for variables in the Controller and Emulator Panels.	1
Download All	Permits use of the Download All command in the Controller and Emulator Panels.	1
Download Changes	Permits use of the Download Changes command in the Controller and Emulator Panels.	1
Enable and disable points	Permits points to be disabled in the Controller Panel.	1
Change state to Download All	Permits state to be changed from Download Changes to Download All.	1

Table 59   Controller Operations *(continued)*

Operation	Description	Default Level
Halt and run mismatched application	Permits use of the Halt, Download All, and Run commands when the project executing in the controller does not match the application that is currently open in TriStation 1131.	1
Halt application	Permits use of the Halt command in the Controller and Emulator Panels.	1
Modify configuration	Permits use of the Configuration editor and the Build Element, Build Configuration, and Rebuild Configuration commands.	1
Modify Controller Panel	Permits use of the Controller Panel.	1
Open Configuration	Permits the Configuration editor to be opened.	1
Open Controller Panel	Permits use of the Controller Panel.	1–2
Pause and Single Step application	Permits use of the Pause and Single Step commands in the Controller or Emulator Panel.	1
Run Application	Permits use of the Run command in the Controller or Emulator Panel.	1
Set Operating Parameters	Permits the operating parameters to be set.	1
Open Emulator Panel	Permits use of the Emulator Panel.	1–3

Table 60   TriStation 1131 Operations

Type	Operation	Description	Default Level
Elements	Change Access Attributes	Permits changes to Access Attributes property, which allows Read Only, Read/Write, or Lock status.	1–3
	Change Owner	Permits using the Change Owner command to change the owner of a document.	1–3
	Modify control elements	Permits creating, modifying, and deleting programs, functions, and function blocks which are defined for control applications.	1–5
	Modify safety elements	Permits creating, modifying, and deleting programs, functions, and function blocks which are defined for safety applications.	1–5
	View elements	Permits viewing of programs, functions, and function blocks.	1–9

Table 60   TriStation 1131 Operations *(continued)*

Type	Operation	Description	Default Level
Libraries	Export	Permits exporting project documents to a shared library.	1–2
	Import	Permits importing shared libraries.	1–2
Printing	Print reports	Permits printing of reports.	1–9
	Update report database	Permits use of the Update Data command.	1–5
Project	Change Project Options	Permits changes to properties in Project Options.	1–3
	Change state to Download All	Permits use of Change State to Download All command.	1–2
	Clear history logs	Permits use of the Clear History command.	1–2
Security	Add/Modify Users	Permits adding, modifying, and deleting users if the user has equal or higher privileges than the selected user.	1–2
	Change level descriptions	Permits changes to the names associated with security levels.	1–2
	Change level privileges	Permits changes to the privileges associated with security levels if the user has equal or higher privileges than the selected user.	1–2
Workbench	Change TriStation Options	Permits changes to properties in TriStation Options.	1–2

Applies To

Security

Location

Project menu > Security > Privileges tab

Organize Command

The Organize command allows you to organize the data types, functions, and function blocks in the TriStation 1131 Libraries in these ways:

Property	Description
By Library	Organizes by the library where the elements are located.
By Type	Organizes by Functions and Data Types. This is the default selection.
By Category	Organizes by the typical usage. For example, Arithmetic, Data Type, Counter, and so on.
By Name	Organizes alphabetically by name.

Applies To

TriStation 1131 Library data types, functions, and function blocks

Location

Application tree > right-click the Library Documents folder

Parity

The Parity property indicates whether to use parity checking, which is a way to detect data communication errors on the transmitted data. Odd and Even parity counts the number of 1 bits in a one-byte data item then sets the parity bit (9th bit) to 0 or 1 to result in an Odd or Even total number of 1 bits. Mark and Space parity (also called high/low parity) set the parity bit to 1 or 0 regardless of the number of 1 bits in the data item.

Settings include:

Property	Description
Odd	Sets the parity bit to 0 or 1 to make the total number of 1 bits odd.
Even	Sets the parity bit to 0 or 1 to make the total number of 1 bits even.
Mark	Sets the parity bit to 1 for each data item.
Space	Sets the parity bit to 0 for each data item.
None	Deletes the parity bit.

The default is Odd.

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Serial Ports tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Serial Ports tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM Setup > Serial Ports tab
- Tricon Controller tree > Configuration > Hardware Allocation > EICM Setup
- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > Trident MP or CM Setup > Serial Ports tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > Trident MP, CM, or CIM Setup > Serial Ports tab

Password

The Password property specifies a code required to access the project or to perform certain operations in the project.The default is PASSWORD.

Applies To

Security

Locations

- Controller tree > Configuration > Operating Parameters
- Project menu > Security command > Users tab > Add or Modify button

Password Required for Connection

The Password Required for Connection property specifies whether a password is required to connect to the controller. If selected, you must enter a password. This setting takes effect after the application is downloaded to the controller.

The default is cleared, which means a password is not required.

If selected, a dialog box displays that requires the password to be entered before the connection can be attempted.

Applies To

Security

Locations

- Controller tree > Configuration > Operating Parameters
- Project menu > Security command > Users tab > Add or Modify button

Paste Command

The Paste command puts the current contents of the clipboard onto the current sheet.

Applies To

Editing

Locations

- Paste button
- Edit menu

Pause Command

The Pause command pauses the execution of an application in the controller or the Emulator. If an application is paused, the Run command must be used to resume execution.

Applies To

Application

Locations

- Pause button
- Configuration tree > Controller or Emulator Panel > Commands menu

Peer-to-Peer Time Synchronization Enabled

The Peer-to-Peer Time Synchronization Enabled property determines whether the Triconex Time Synchronization protocol is used to synchronize time with controllers on the network.

Applies to TCM models 4351 and 4352 only.

Applies To

Communication

Location

Tricon Controller tree > Configuration > Hardware Allocation > TCM Setup > Time Sync tab

Permission

The Permission property specifies the level of access to the communication module for the selected client IP address. If the application includes safety-critical outputs, you should not set this property to Read/Write.

Setting	Description
Deny Access	Prevents all access to resources provided by the TCM, CM, or CIM. Connections to the controller are not allowed.
Read	Allows client to connect to the controller and view information provided via the TCM, CM, or CIM. Does not allow the client to change any settings or perform certain commands.
Read/Write	Full access. Allows client to view information provided by the TCM, CM, or CIM; change settings; and perform all commands (including Download Changes or Download All for TriStation 1131). This access level should only be provided to trusted clients.

Does not apply to the following communication modules:

- Tricon ACM, HIM, EICM, NCM, or SMM
- Tricon model 4351/4352 TCMs
- Trident 1.x CMs

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Access List tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Access List tab
- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > CM Setup > Access List tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Access List tab

Physical Address

The Physical Address property specifies the physical point location on an input or output module. The address is a three-part number in this format: CC.SS.PP

Identifier	Description
CC	Stands for Tricon chassis, or Trident/Tri-GP I/O Processor (IOP).
SS	Stands for slot (Tricon), or baseplate (Trident/Tri-GP).
PP	Stands for point number.

For example, 01.02.23 is the address for point 23, on the module in slot 2, in chassis 1.

Applies To

Input and output tagnames

Location

Application tree > Tagname Declarations > Item Properties > Point Assignment tab

Pickup Command

The Pickup command picks up all the elements enclosed by the comment box so they are considered part of the comment and ignored by the compiler.

To pick up, move the comment box so it entirely covers the elements to be captured. Resize the box if needed. To drop, double-click the comment box, click the Pickup/Drop tab, and click Drop.

Applies To

Comments

Location

Item Properties > Pickup/Drop tab

Point Assignment

The Point Assignment properties specify whether the point uses an alias, and whether the point has a physical or local address.

Properties include:

- User alias: A number that can be assigned if the point is a Read or Read/Write Alias.
- Default alias: A number is automatically assigned if the point is a Read or Read/Write Alias.
- No alias: Means the point is input, output, or an unaliased memory point.

Applies To

Tagnames

Location

Tagname References > Item Properties > Point Assignment tab

Point Options

The Point Options properties specify options on a Pulse Input or Enhanced Pulse Input Module. Settings include:

- Maximum RPM on page 650
- Maximum Speed on page 651
- Number of Gear Teeth on page 662
- Scale Factor on page 692

Applies To

Pulse Input or Enhanced Pulse Input Setup

Location

Controller tree > Configuration > Hardware Allocation > Pulse Input or EPI Setup

Point Type

The Point Type property specifies the type of tagname. Settings include Input, Output, and Memory.

Applies To

Tagnames

Location

Item Properties > Point Assignment tab

Port Selection

The Port Selection property specifies the port to be configured. The default is port 1 or Left.

Table 61   Protocols Available with Specific Ports

Module	Selections
Tricon EICM	Ports 1–4 and 6–9: TriStation, Debug, Modbus Slave, Modbus Master, and Modbus Master Slave.
	Ports 5 and 10: Printer.
Tricon TCM	Ports 1–3 and 6: Modbus Slave RTU, Modbus Slave ASCII, Modbus Master, and GPS.
	Ports 4 and 9: Modbus Slave ASCII, Modbus Slave RTU, Modbus Master, and TriStation.
	Ports 5 and 10: Printer.
Trident MP	Left, Middle, and Right: Modbus Slave RTU.
Tri-GP MP	Left, Middle, and Right: Modbus Slave RTU.
Trident 1.x CM	Ports 1–3 and 6–8: Modbus Slave ASCII, Modbus Slave RTU, Modbus Master, Modbus Master/Slave.
Trident 2.x/3.x CM and CIM	Ports 1-3: Modbus Slave RTU, Modbus Slave ASCII, Modbus Master.
	Port 3: TriStation.
Tri-GP CM and CIM	Ports 1-3: Modbus Slave RTU, Modbus Slave ASCII, Modbus Master.
	Port 3: TriStation.

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > EICM Setup
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Serial Ports tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Serial Ports tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM Setup > Serial Ports tab
- Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > MP Setup > Serial Ports tab
- Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > CM Setup > Serial Ports tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CIM Setup > Serial Ports tab

Port Write Enabled

The Port Write Enabled property provides a fast and easy way to manage port security if you do not want to configure an access control list (see Controlling Access to the TCM on page 459).

Select this property to allow writes to the selected port. The default value is cleared, meaning the port is read-only.

Available for the following:

- Modbus TCP and serial protocols on Tricon 10.1 and later systems
- Modbus TCP and serial protocols on Trident/Tri-GP 2.x and later systems
- TSAA protocol on Tricon 10.1 and 10.2 systems only

Note   Projects converted from earlier versions of TriStation 1131 will have the default value automatically set for this property, so that ports configured for TSAA, Serial Modbus Slave, and TCP Modbus Slave will be read-only until selected otherwise.

Does not apply to the following communication modules:

- Tricon ACM, HIM, EICM, NCM, or SMM
- Tricon model 4351/4352 TCMs
- Trident 1.x CMs

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Serial Ports and Modbus TCP tabs
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Serial Ports and Modbus TCP tabs (*Tricon 10.3 and later*)
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A Setup > Network, Serial Ports and Modbus TCP tabs (*Tricon 10.1 and 10.2 only*)
- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > CM Setup > Serial Ports and Modbus TCP tabs
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Serial Ports and Modbus TCP tabs

Precision

The Precision property specifies the number of decimals to use with a REAL point that has been scaled. The default is 0.

Applies To

Tagnames with REAL data types

Location

Application tree > Tagname Declarations > Item Properties > Scaling tab

Prevent Restart Following Fatal Error

The Prevent Restart Following Fatal Error property specifies whether the Trident or Tri-GP MPs should restart automatically after a fatal error occurs.

When this property is selected, if the MP detects a fatal error, it will shut down without a restart attempt, requiring user intervention to restart the MP. This will cause the controller to go to either DUAL or SINGLE mode.

Applicable to Trident/Tri-GP 2.x and later systems only. The default is cleared (the MPs will automatically restart after a fatal error).

Note   The default restart behavior described above applies to Trident 1.x systems, but cannot be changed.

Applies To

Trident 2.x/3.x or Tri-GP controllers

Locations

- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > MP Setup > Operating Parameters tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > MP Setup > Operating Parameters tab

Previous Sheet Command

The Previous Sheet command displays the previous logic sheet.

Applies To

Logic sheets

Locations

- Previous Sheets button
- Sheets menu

Print Command

The Print command prints the logic sheet, function block, or report displayed in the current window.

Applies To

Logic Sheets, Function Blocks, Reports

Locations

- Print button
- Edit menu

Print All Command

The Print All command allows you to print multiple documents at one time. You have the ability to select which documents you want to print.

Applies To

Logic Sheets, Module Configuration, Library Documents, Functions, Function Blocks, Reports, Project History, Users, Programs, Tagnames

Location

Edit menu

Print Preview Command

The Print Preview command displays the sheets to be printed.

Applies To

Logic Sheets, Reports

Location

Edit menu

Print Report Command

The Print Report command allows you to print the selected report.

Applies To

Reports

Locations

- Print Report button
- Edit menu

Printer Number

The Printer Number property specifies the number used in the Printer parameter declared for the print function blocks in the TriStation 1131 project.

- For Trident 1.x, the value must be from 1 to 10.
- For the following communication modules, the value must be either 5 or 10:
  - TCM
  - Trident or Tri-GP 2.x CM
  - Trident or Tri-GP 3.x CM or CIM

Applies To

Project

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Printer tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Printer tab
- Tricon Controller tree > Configuration > Hardware Allocation >TCM Setup > Printer tab
- Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > CM Setup > Printer tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CIM Setup > Printer tab

Privilege

The Privilege property specifies whether Read or Read/Write access is allowed by external devices. You should set this property to Read, if the application includes safety-critical outputs.

Setting	Description
Read	An external device cannot write to any point, regardless of the settings for other properties. This is the default for Tricon ACM.
Read/Write	Other properties may need to be set to enable write access. See Disable Remote Changes to Outputs on page 602. This is the default for Tricon NCM and Trident 1.x CM.

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > ACM Setup
- Tricon Controller tree > Configuration > Hardware Allocation > NCM Setup
- Trident 1.x Controller tree > Configuration > Hardware Allocation > CM Setup > Network tab

Program Execution List

The Program Execution List property identifies the programs included in the application. Programs can be added, deleted, or moved up and down in order.

Applies To

Application

Location

Application tree > Implementation > Execution List

Program Command

The Program command allows you to implement or change an application in these ways:

- Perform a Download All or Download Changes
- Disable points
- Change the values of points

For Tricon controllers, the Program command is set by turning the keyswitch to PROGRAM.

For Trident or Tri-GP controllers, the Program command is set with the Set Programming Mode command in the Controller Panel, or the SYS_SET_APP_LOCK function in a program.

Applies To

Application, controller

Locations

- Tricon keyswitch on PROGRAM
- Trident or Tri-GP Configuration tree > Controller Panel > Set Programming Mode command
- Trident or Tri-GP Application tree > Programs > SYS_SET_APP_LOCK function

Prohibit Writes

For Tricon controllers, the Prohibit Writes property specifies whether to deny Honeywell workstations from writing to the application running on the Tricon controller. The default is cleared, which means Honeywell workstations can write to memory and output tagnames.

Applies To

Tricon HIM Module

Location

Tricon Controller tree > Configuration > Hardware Allocation > HIM Setup

Project Description Command

The Project Description command displays information about the project including the file name and location, current and downloaded version, and controller type.

Applies To

Project

Location

Project menu

Project Files

The Project File property specifies the path name for documents including projects and related files. The default path name and file extension is:

- **Windows XP/2003:** `C:\Documents and Settings\All Users\Application Data\Triconex\TriStation 1131 4.10.1\Projects`
- **Windows Server 2008 and Windows 7:** `C:\Program Data\Triconex\TriStation 1131 4.10.1\Projects`

Applies To

Project

Location

Tools menu > TriStation 1131 Options > Directories tab

Protocol

The Protocol property specifies the communication protocol used with the port. This table describes the protocols available with specific communication modules.

Table 62   Communication Module Available Protocols

Protocol	Description	Communication Module
GPS	Controller receives time synchronization via the Global Positioning System.	TCM
Modbus Slave	Controller acts as a slave to a Modbus master.	Tricon EICM
Modbus Slave ASCII	Controller acts as a slave to a Modbus master with data sent in pairs of ASCII characters.	• TCM • Trident/Tri-GP CM • Trident/Tri-GP CIM
Modbus Slave RTU	Controller acts as a slave to a Modbus master with data sent in 8-bit binary characters.	• TCM • Trident/Tri-GP MP • Trident/Tri-GP CM • Trident/Tri-GP CIM

Table 62   Communication Module Available Protocols *(continued)*

Protocol	Description	Communication Module
Modbus TCP Slave Net	Controller acts as a slave to a Modbus master on an open network.	• TCM • Trident 2.x/3.x CM • Tri-GP CM • Trident/Tri-GP CIM
Modbus Master	Controller acts as a Modbus master.	• Tricon EICM • TCM • Trident/Tri-GP CM • Trident/Tri-GP CIM
Modbus TCP Master	Controller acts as a Modbus master on an open network.	• TCM • Trident 2.x/3.x CM • Tri-GP CM • Trident/Tri-GP CIM
Modbus Master/Slave	Controller acts as a Modbus master or slave.	• Tricon EICM • Trident/Tri-GP CM
Peer-to-Peer	Controller communicates with other controllers on an open network.	• Tricon NCM • TCM • Trident/Tri-GP CM • Trident/Tri-GP CIM
TriStation	Controller communicates with a TriStation PC. The NCM/TCM/Trident 1.x CM communicates on an open network. The EICM/TCM/Trident 2.x CM/Tri-GP CM/Trident CIM/Tri-GP CIM connect on a serial port.	• Tricon EICM • Tricon NCM • TCM • Trident/Tri-GP CM • Trident/Tri-GP CIM

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > EICM and NCM Setup
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Serial Ports and Modbus TCP tabs
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Serial Ports and Modbus TCP tabs
- Tricon Controller tree > Configuration > Hardware Allocation > TCM Setup > Serial Ports and Modbus TCP tabs
- Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > MP and CM Setup
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CIM Setup

Protocols

The Protocols property specifies the protocol(s) that a selected client can use to access a communication module: TriStation, OPC, and/or TSAA. Configured in the communication module's access control list.

The OPC protocol is supported only by model 4353 or 4354 TCMs, and model 3211 or 3211S2 CIMs. Additionally, the TSAA protocol is supported only on NET 1 for model 4353 and 4354 TCMs.

Does not apply to the following communication modules:

- Tricon ACM, HIM, EICM, NCM, or SMM
- Tricon model 4351/4352 TCMs
- Trident 1.x CMs

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Access List tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Access List tab
- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > CM Setup > Access List tab
- Trident or Tri-GP 2.x/3.x Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Access List tab

Pulses Per Revolution

For Trident or Tri-GP controllers, the Pulses Per Revolution property specifies the number of pulses per revolution of the measuring shaft for the Pulse Input or Module. The default is 1.

Applies To

Tricon or Tri-GP Pulse Input Module

Location

Tricon or Tri-GP Controller tree > Configuration > Hardware Allocation > Pulse Input Setup

Rate Type

The Rate Type property specifies how the Pulse Input or Enhanced Pulse Input Module is to measure pulse inputs. Settings include:

- Speed: Used for pulses measured in seconds, minutes, or hours.(Default)

- RPM: Used for pulses measured in the number of revolutions per minute of the shaft that connects a gear to the rotating equipment.

Applies To

Pulse Input or Enhanced Pulse Input Module

Location

Controller tree > Configuration > Hardware Allocation > Pulse Input or EPI Setup

Read Only Command

The Read Only command toggles between read only and edit in Structured Text programs and functions.

Applies To

ST programs and functions

Locations

- Read Only button
- View menu

Rebuild Application Command

The Rebuild Application command builds an application by compiling all documents required by the programs in the execution list, then linking all the object code, library routines, and configuration information to form an executable application.

Applies To

Application

Location

Project menu

Redo Command

The Redo command reverses the last Undo command. You must use this command before other editing is done or the changes cannot be redone.

Applies To

Programs, functions, and function blocks

Location

Edit menu

Reduce Font Size Command

The Reduce Font Size command reduces the size of the font for the entire ST program or function.

Applies To

ST programs and functions

Locations

 • Reduce Font Size button, or View menu

Redundant Mode

For Tricon controllers, the Redundant Mode property specifies whether there is a redundant Tricon ACM module in the installation. The default is cleared, which means not redundant.

Applies To

Tricon ACM Module

Location

Tricon Controller tree > Configuration > Hardware Allocation > ACM Setup

Refresh Command

The Refresh command replaces the data on a report that is currently displayed with data from the reports database. If project changes are made, you must first update the report database, and then click Refresh.

Applies To

Reports

Location

 Refresh button on Project tree > Default Reports or User Reports folder

Remote Access to Aliased Tagnames

The Remote Access to Aliased Tagnames property specifies whether external devices using the TSAA client/server protocol can write to output tagnames (points) that have aliases. (Read access is always allowed for input, memory, and output points.)

This property must be used for DDE communication and can be used for OPC, TSAA, and Peer-to-Peer communication.

In addition to setting this property, these properties must be set:

- The Disable Remote Changes to Outputs property on the Trident or Tri-GP MP Operating Parameters screen must be cleared. The default is selected.

- The Privilege property must be set to Read/Write (Trident 1.x CM only).
- The access control list is configured to allow read/write access for TSAA clients (Trident or Tri-GP 2.x/3.x CMs or CIMs only).

Applies To

Tagnames for outputs

Location

Trident or Tri-GP MP > Item Properties > Module tab

Remote Access to All Tagnames

The Remote Access to All Tagnames property specifies whether external devices using the TSAA client/server protocol have read/write access to all tagnames (points) whether or not they have aliases. This property can be used for OPC, TSAA, and Peer-to-Peer communication.

In addition to setting this property, these properties must be set:

- The Disable Remote Changes to Outputs property on the Trident or Tri-GP MP Operating Parameters screen must be cleared. The default is selected.
- The Privilege property must be set to Read/Write (Trident 1.x CM only).
- The access control list is configured to allow read/write access for TSAA clients (Trident or Tri-GP 2.x/3.x CMs or CIMs only).

Applies To

Application

Location

Trident or Tri-GP MP > Item Properties > Module tab

Remote Mode

The Remote mode enables external (remote) devices to have read/write access to aliases in an application running on a controller.

- For Tricon controllers, Remote mode is set by turning the keyswitch to REMOTE.
- For Trident or Tri-GP controllers, Remote mode is set programmatically by enabling write access with the SYS_SET_REMOTE_WRT_ENBL function block in a program.

The default is not enabled, which means external devices are not allowed to write to aliases.

Applies To

Application, controller, tagnames

Locations

- Tricon keyswitch set to REMOTE
- Trident or Tri-GP Application tree > Library Documents > Functions

Remove File Command

The Remove File command removes a custom Help file from the TriStation 1131 Help menu. A maximum of 32 customized HTML Help files (.chm) may be added to the TriStation 1131 Help menu.

Applies To

Application

Location

Help menu > Options > Add or Remove Custom Help Files

Remove Invalid Items (Red X'd)

The Remove Invalid Items (Red X'd) command removes, from all test sheets, any invalid elements (each marked with a red X) that may be left over from previous builds or editing.

Applies To

Test sheets in the Emulator and controller

Location

Configuration tree > Controller or Emulator Panel > Tools menu

Remove Private Key Command

The Remove Private Key command allows you to remove a private key from a certificate.

Applies To

Certificates

Location

Application tree > Certificates folder > Right-click a certificate

Replace Command

The Replace command searches and replaces specified text in programs, functions, function blocks, or variable names

If you select items on a sheet first, this command will search and replace the specified text only in the selected items.

Applies To

Editing
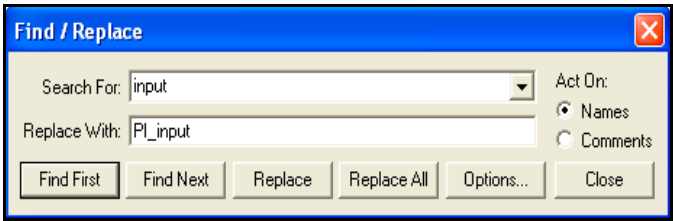
Locations

• Replace Text button
• File menu

Replace Private Key Command

The Replace Private Key command allows you to replace an existing private key associated with a certificate.

Applies To

Certificates

Location

Application tree > Certificates folder > Right-click a certificate

Resolution Type

The Resolution Type property specifies the resolution for the Tricon Single-Ended and Differential AI Modules (models 3720 and 3721 only). The Single-Ended AI uses unipolar input.

Types include:

• Standard Resolution: Data resolution is 12 bits.
• High Resolution: Data resolution is 14 bits.

The default is Standard Resolution.

The value returned is based on the input voltage, the resolution type, and the module type. This table identifies the ranges and returns.

Table 63   Resolution Type Ranges and Returns

Input (volts)	Standard Resolution (Unipolar Input)	High Resolution (Unipolar Input)	High Resolution (Bipolar Input)
<-5.3	32767 (out-of-range under)	-32767 (out-of-range under)	-32767 (out-of-range under)

Table 63   Resolution Type Ranges and Returns *(continued)*

Input (volts)	Standard Resolution (Unipolar Input)	High Resolution (Unipolar Input)	High Resolution (Bipolar Input)
-5.3	32767 (out-of-range under)	-32767 (out-of-range under)	-17366 (under-range)
-5	32767 (out-of-range under)	-32767 (out-of-range under)	-16383 (minimum range)
< 0	32767 (out-of-range under)	-32767 (out-of-range under)	—
0	0 (minimum range)	0 (minimum range)	0 (minimum range)
5	4095 (maximum range)	16383 (maximum range)	16383 (maximum range)
5.3	4341 (over-range)	17366 (over-range)	17366 (over-range)
>5.3	32767 (out-of-range over)	32767 (out-of-range over)	32767 (out-of-range over)

Applies To

AI Modules

Location

Tricon Controller tree > Configuration > Hardware Allocation > Single-Ended and Differential AI Setup

Restart on Power Up

For Trident or Tri-GP controllers, the Restart on Power Up property specifies whether the controller automatically restarts on power up. The default is cleared, which means the controller is not automatically restarted on power up.

Applies To

Trident or Tri-GP MP

Location

Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > MP Setup > Operating Parameters tab

Restore Command

The Restore command returns the previous settings for the item, if the Apply command has not been used. For example, if you changed the default values for a property such as the Initial Value, you can go back to the defaults by clicking Restore.

Applies To

Project elements

Location

Item Properties

Restore Project Command

The Restore Project command allows you to open a backup file named *project_name*.BT2. You can then save the file to a name with a project file extension, such as *project_name*.PT2.

Applies To

Project

Location

File menu

Retentive

The Retentive property specifies whether the value of a memory point is retained if a power failure occurs. If selected, when the system is powered up the memory point uses the value it had prior to the power failure. Only memory points can be specified as retentive. For input and output points, the value retained after a power failure is either zero or the value set for the Initial Value property. The default is cleared, which means the value is not retained.

Applies To

Memory points

Location

Application tree > Tagname Declarations > Item Properties > Declaration tab

Right Power Rail Command

The Right Power Rail command allows you to place a right power rail on a logic sheet to delimit the LD network. The right power rail has an undefined status, and can be explicit or implicit.

The left power rail is automatically included when a new logic sheet is created. The first element in every network must be linked to the left power rail, which is considered On at all times.

To change the height of the rail, double-click the rail and use the + or – buttons.

Applies To

LD logic sheets

Locations

• Right Power Rail button
• Tools menu > Select Tools

Ringback

See Alarm Attributes on page 562.

Roll Backward or Forward Command

The Roll Backward or Forward command displays all the project changes made since the last save, and allows you to roll backward or forward to a specific change.

After the project is saved, the changes are incorporated and the listing is cleared.

Applies To

Project

Location

Edit menu
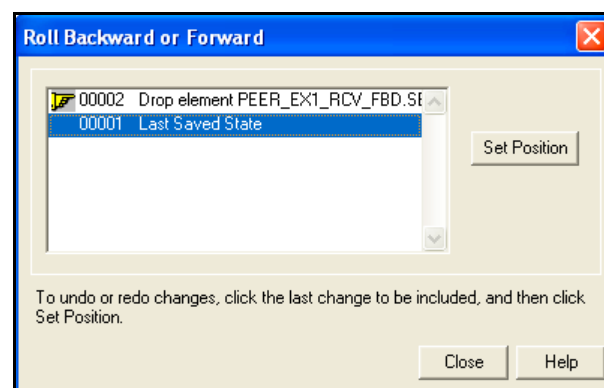
Routing Configuration

The Routing Configuration property displays the Destination Gateway IP Address, IP Subnet Mask, and Default Gateway IP Address for the node.

Applies To

Communication

Locations

*   Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Routing tab
*   Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Routing tab
*   Tricon Controller tree > Configuration > Hardware Allocation > TCM Setup > Routing tab
*   Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > CM Setup > Routing tab
*   Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Routing tab

Run Command

The Run command executes an application in the controller or Emulator. Programs to be executed must be included on the Program Execution List.

*   For Tricon controllers, the Run command is only available when the keyswitch is set to the RUN or PROGRAM mode. The Run command is unavailable if the keyswitch is set to STOP or REMOTE.

*   For Trident or Tri-GP controllers, the Run command is unavailable if the SYS_APP_HALT function is set to halt execution programmatically.

Applies To

Application, programs

Locations

*   Run button
*   Configuration tree > Controller or Emulator Panel > Commands menu

RUNNING State

The RUNNING state is an application state which indicates the application is downloaded and running in the controller or Emulator.

Applies To

Application

Location

Controller tree > Controller or Emulator Panel > Commands menu or Title bar

Save As Command

The Save As command saves a project under a different name or folder.

CAUTION TriStation 1131 projects must always be saved to a local drive. Projects may be saved to a server or network drive for backup purposes, but you must copy the project to your local drive before you open it in TriStation 1131.

Applies To

Project

Location

File menu

Save Element Command

The Save Element command saves an open element.

Applies To

Project

Location

Save Element button, or File menu

Save History Command

The Save History command exports the project history log to a text file. Each item includes the date, element, user, action, and comment for the change.

Applies To

Project

Location

Project menu

Save Implementation

The Save Implementation command saves the changes made to the Implementation area, which includes the Execution List, SOE Configuration, and Peer-to-Peer Configuration.

Applies To

Project

Location

File menu

Save Project Command

The Save Project command saves an open project.

CAUTION TriStation 1131 projects must always be saved to a local drive. Projects may be saved to a server or network drive for backup purposes, but you must copy the project to your local drive before you open it in TriStation 1131.

Applies To

Project

Locations

- Save Project button
- File menu

Save View Command

The Save View command saves a view of a matrix, which is a display of a selected portion of the matrix. You can create a view by hiding or showing columns and rows on the matrix, either by using menu commands or by dragging columns and rows on the matrix. Saving the view allows you to load it anytime.

Applies To

CEM programs

Location

Application tree > open a CEM program > View menu

Scale Factor

The Scale Factor property specifies how to convert pulse input signals into engineering units. The default is 1. The number must be a positive real number.

This table shows the correct scale factor to use for converting pulse input signals into seconds, minutes, and hours.

To Convert	Set Scale to
Pulses per second	0.016667
Pulses per minute	1.000000 (default)
Pulses per hour	60.000000

Speed Measurement

This formula converts speed measurement to different engineering units. The default is pulses per minute.

Speed =(Pulses /Minute) x Scale

RPM Measurement

This formula scales RPM measurements under special circumstances. For example, the Scale Factor property can be used to adjust the RPM measurement when the measuring shaft rotates at a different rate from the output shaft.

Speed =((Pulses /Minute)/Number of Gear Teeth) x Scale

Applies To

Pulse Input Configuration

Location

Controller tree > Configuration Panel > Hardware Allocation > Pulse Input Setup

Scan Time

The Scan Time property specifies the requested number of milliseconds for a scan (execution of the application) on the controller. The number is requested before an application is built. After the application is built and downloaded, the controller determines an actual scan time range and uses the specified scan time if it falls within these limits.

CAUTION When a Download Changes command is issued, the scan time is doubled for one scan immediately following the command. For example, if the normal scan time is 100 ms, the scan following a Download Changes would be 200 ms.

The controller determines a valid range for the scan time based on these operations:

- Reads inputs
- Executes the application
- Processes messages
- Writes outputs

If the application is running, the scan time can be set to a number different from the requested number without downloading the application. To determine what the actual, requested and surplus scan times are, see the Enhanced Diagnostic Monitor (sold separately).

- For Tricon controllers (3006/3007 MP), the maximum scan time is 500 milliseconds.
- For Tricon controllers (3008 MP), the maximum scan time is 450 milliseconds.
- For Trident or Tri-GP controllers, the maximum scan time is 450 milliseconds.

For all controllers, the default is 200 milliseconds.

Applies To

Application

Location

Application tree > Implementation > Execution List

Search Text Command

The Search Text command allows you to search for text in a report.

Applies To

Reports

Location

 Search Text button

Security Command

The Security command opens the Security dialog box, which allows user access to be created and modified.

Applies To

User security

Locations

- Security button
- Project menu

Security Level

The Security Level property specifies the level of security for the user. Settings include:

- Level 01 is the highest security level
- Level 10 is the lowest security level

Each level allows access to its own operations and the operations associated with all lower levels. For example, a user with security level 03 has access to operations for security levels 04, 05, 06, 07, 08, 0,9 and 10.

Applies To

Security

Location

Project menu > Security command > Users tab

Select for Secure Communication Command

The Select for Secure Communication command allows you to designate the certificate you want to use for secure communication between the TriStation PC and the Trident or Tri-GP 3.x controller.

Only a certificate in the TriStation > Client folder can be enabled for secure communication.

Applies To

Certificates

Location

Application tree > Certificates > TriStation > Client > Right-click a certificate

Select Function Block Command

The Select Function Block command displays a dialog box that allows you to select a function block to add to a program.

Applies To

Programs

Locations

- Select Function Block Element button
- Tools menu > Select Tool > Function Block

Select Network Contents Command

The Select Network Contents command selects all the elements in a network for the current document. You must select at least one element (input, output variable) before using this command.

Applies To

Editing

Location

Edit menu

Select Sheet Contents Command

The Select Sheet Contents command selects all the elements on the current logic sheet.

Applies To

Editing

Location

Edit menu

Selection Tool

The Selection Tool command changes the cursor to a selection tool, which allows you to select elements.

Applies To

Logic sheets in user documents, test sheets in Emulator and controller

Locations

- Selection Tool button
- Tools menu > Select Tool

Serial Port

The Serial Port property specifies the port on the TriStation PC that is connected to the controller.

Applies To

Communication

Location

Controller tree > Configuration tree > TriStation Communication

Set Calendar Clock Command

The Set Calendar Clock command sets the controller clock to the TriStation PC time. Before using the Set Calendar Clock command, you should ensure the PC is set to the correct local time.

This command changes both the clock time and the time zone on the controller so that it matches the clock time and time zone set on the TriStation PC.

Note   On the Tricon controller, if you want to change only the time zone location, you can also use the Set Time Zone command (see page 698).

When you download and run a TriStation 1131 application, the controller automatically sets its clock to the TriStation PC time. If the accuracy of the controller clock degrades over time, you can reset the clock while the application is running, without having to download again.

Procedure

1   On the TriStation PC, right-click the time icon in the message bar or open the Date/Time dialog box from the Control Panel.

2   Ensure the PC is set to the correct local time.

3   Open the TriStation 1131 project that is running in the controller.

4   On the Configuration tree, double-click the Controller Panel.

5   On the Commands menu, click Connect, and then click Set Calendar Clock.

6   Click Yes when asked whether to set the calendar clock to the current configuration.

Applies To

Controller

Location

Configuration tree > Controller Panel > Commands menu

Set Editor Options Command

The Set Editor Options command specifies how to set tabs, font size, and auto-scroll delay. Properties include:

- Tabs on page 717
- Font Size on page 627
- Auto Scroll Delay on page 573

Applies To

ST Language

Location

View menu

Set Programming Mode Command

For Trident or Tri-GP controllers, the Set Programming Mode command specifies whether changes to the application are allowed. To use this command, the application must be downloaded to the controller.

Setting	Description
Enable Programming and Control	Allowed changes include: Download Changes and Download All commands, changing the values of variables, changing scan time, and changing the operational mode.
Disable Programming and Control	Prohibits all changes to the application.

The Set Programming Mode command is unavailable if the SYS_SET_APP_LOCK function has been set to prohibit (lock out) changes programmatically. The default setting is Enable Programming and Control.

Applies To

Application, controller

Location

Trident or Tri-GP Controller tree > Controller Panel > Commands menu

Set Scan Time Command

The Set Scan Time command specifies, in milliseconds, how often the Emulator or controller performs a scan. Changing the scan time on the Set Scan Time screen does not change the scan time for the project. To change the time for the project, you must set the time on the Execution List.

The minimum time is determined by the controller after the application is downloaded. The maximum time is determined by the type of controller. The scan time must be within the minimum and maximum range.

- For Tricon 3006/3007 MPs, the maximum is 500 milliseconds.
- For Tricon 3008 MPs, the maximum time is 450 milliseconds.
- For Trident or Tri-GP controllers, the maximum is 450 milliseconds.

For Trident or Tri-GP controllers, you can set the scan time between the minimum and maximum times. The scan time must be larger than the AI and DI poll times.

Applies To

Application

Location

Configuration tree > Controller or Emulator Panel > Commands menu

Set Time Zone Command

The Set Time Zone command sets the Tricon controller clock to the time zone you select. Before using the Set Time Zone command, you should ensure the PC is set to the correct local time zone.

Note This command applies to the Tricon controller only. To change the time zone on the Trident or Tri-GP controller, see Set Calendar Clock Command on page 696.

When you perform a Download All and run a TriStation 1131 application, the Tricon controller automatically sets its time zone location to the time zone defined in the TriStation PC. However, if you perform a Download Changes operation, the time zone is not set automatically. Use this command to manually set or change the time zone on the Tricon controller.

Procedure

1   On the TriStation PC, right-click the time icon in the message bar or open the Date/Time dialog box from the Control Panel.

2   Ensure the PC is set to the correct local time zone.

3   Open the TriStation 1131 project that is running in the controller.

4   On the Configuration tree, double-click the Controller Panel.

5   On the Commands menu, click Connect, and then click Set Time Zone.

6   Click Yes when asked whether to set the time zone to the current configuration.

Applies To

Controller

Location

Tricon Configuration tree > Controller Panel > Commands menu

Set Value

The Set Value property specifies the value for the variable during testing on the controller or Emulator. To ensure the value is valid for the data type, click Confirm when specifying the value on the Variable tab.

Applies To

Variables on test sheets in the Controller and Emulator Panels

Location

Item Properties > Variable tab

Setpoint

See Alarm Attributes on page 562.

Shared Read

The Shared Read property specifies whether a program can read a tagname that is a different Application type. For example, if the tagname is a Control type, it cannot be read by a Safety program unless Shared Read is checked. The default is cleared, which means that programs can only read tagnames that have the same Application type.

Applies To

Tagnames

Location

Application tree > Tagname Declarations > Item Properties > Declaration tab

Sheets Menu

The Sheets menu includes commands that allow you to change the properties of logic sheets, which provide the workspace for developing programs, functions, and function blocks. The Sheets menu includes these commands:

Command	Description
Sheet Title	Edits the title of the current sheet. The sheet title is displayed in the title block, the window caption bar, and the Window Menu list.
Edit Sheet Macros	Allows you to change the text associated with macros which are identified by a pencil icon.
Next Sheet	Displays the next sheet.
Previous Sheet	Displays the previous sheet.
Append Sheet	Adds a new sheet *after* an existing sheet.
Insert Sheet	Adds a new sheet *before* an existing sheet.
Delete Sheet	Deletes the selected sheet.
Manage Sheets	Allows you to append, insert, and delete sheets. Also allows you to change the sheet title and to display (go to) the selected sheet.
Select Sheet Template...	Includes the following sheet templates: • Sheet A — 8.5" x 11" • Sheet B — 11" x 17" (default) • Sheet C — 17" x 22" • Sheet D — 22" x 34"

Applies To

Logic sheets in user documents, test sheets in Controller and Emulator Panels

Locations

• Sheet Manager button, or Sheets menu

Shift Change Request

See Alarm Attributes on page 562.

Shorted Point Alarm Threshold

The Shorted Point Alarm Threshold property specifies the number of ohms below which values are alarmed as a shorted load. This option is only available if the points are supervised. Typical threshold values are 10 to 48 ohms. The available range is 0 to 65,535 ohms. The default is 10 ohms. Available only with the model 3625 Digital Output Module.

Applies To

Tricon DO points

Location

Tricon Controller tree > Configuration > Hardware Allocation > DO Setup

Show Causes for Selected Effect Command

The Show Causes for Selected Effects command displays the causes of all selected effects in a CEM program.

Applies To

CEM programs

Location

View menu

Show Effects for Selected Causes Command

The Show Effects for Selected Causes command displays the effects of all selected causes in a CEM program.

Applies To

CEM programs

Location

View menu

Show Grid Command

The Show Grid command toggles on and off to show or hide dotted grid lines.

Applies To

FBD and LD programs and functions

Location

View menu

Show IEC Representation

The Show IEC Representation command toggles between displaying the IEC (International Electro-Technical Commission) representation and the TriStation 1131 graphical view.

Applies To

FBD and LD programs and functions

Location

View menu

Show Network Numbers Command

The Network Number command toggles on and off to show or hide network numbers.

Applies To

FBD and LD programs and functions

Location

View menu

Show Line Numbers Command

The Show Line Numbers command toggles to display or show line numbers in a ST program or function.

Applies To

ST programs and functions

Locations

- Line Numbers button
- View menu

Show Zones Command

The Zones command toggles on and off to show or hide network zone lines.

Applies To

FBD and LD programs and functions

Location

View menu

SIF

The SIF property allows you to select the safety instrumented function that the selected tagname is located in. You create the list of SIFs to match the physical location of equipment and alarms in your plant.

Applies To

Alarms, tagnames

Locations

- Project menu > Manage Area, Equipment, and SIF Lists dialog box
- Application tree > Tagnames > Item Properties > Location tab

Signal Delays

The Signal Delays property adjusts the timing of data transmission to Modbus devices that use hardware handshake, which is a method of ensuring devices are ready to receive data. Signal delays adjust the timing for CTS and RTS signals for Modbus devices that have slow throughput or other limitations.

The RTS (Request to Send) signal opens and closes the data transmission channel. The RTS pre-delay setting specifies the number of milliseconds to wait before the data is transmitted.

The CTS (Clear to Send) signal indicates the transmitting station that it is ready to receive data. The CTS Pre-delay setting specifies the number of milliseconds to keep the channel open after data is transmitted.
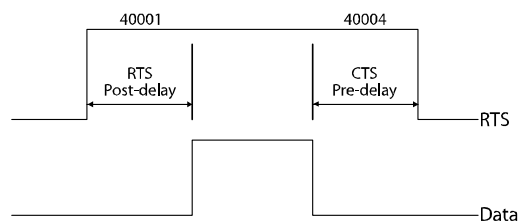
The settings can be from 0 to 10,000 milliseconds; the default is 0.

Setting Signal Delays for Tricon EICM

Signal delays are set by using the MBWRITE function blocks in a program.

Procedure

1   Set the Handshake property to Hardware on the Tricon EICM Setup screen.

2   Add an MBWRITE function block for each type of delay (CTS and RTS) you want to specify.

3   Specify these parameters in the function block.

Parameter	Action
Alias	For CTS, enter 40001. For RTS, enter 40004.
Port	Enter the EICM port number.
Station	Enter the slave station address.
D01	Enter the delay in milliseconds; 0 to 10,000.

Applies To

Modbus Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > EICM Setup
- Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > CM Setup > Serial Ports tab

Single Step Command

The Single Step command executes a single scan of the application in the controller or Emulator.

Applies To

Application

Locations

- Single Step button
- Configuration tree > Controller or Emulator Panel > Commands menu

Size/Alignment Command

The Size/Alignment command includes commands that specify whether to increase or decrease the size of the element and how to align the element.

The commands apply actions to the other elements using the currently selected element as the reference. For example, the Same Width command changes all other elements to the same width as the selected element.

The subcommands include:

• Same Width	• Align Left	• Align Bottom	• Space Across
• Same Height	• Align Right	• Center Horizontally	• Space Down
• Same Size	• Align Top	• Center Vertically	

Applies To

Comments, constants, variables

Location

Right-click an element

Size/Hide Columns Command

The Size/Hide Columns command displays a dialog box that allows you to specify the font size and hide or unhide the columns.

Applies To

CEM programs

Locations

- Size/Hide Columns button
- View menu

Size/Hide Comment Column Command

The Size/Hide Comment Column command displays a dialog box that allows you to specify the font size and hide or unhide the comment.

Applies To

CEM programs

Location

View menu

Size/Hide Rows Command

The Size/Hide Rows command displays a dialog box that allows you to specify the font size and hide or unhide the rows.

Applies To

CEM programs

Locations

- Size/Hide Rows button
- View menu

Slot Selection

The Slot Selection property specifies the physical slot where the communication module you want to configure is installed.

Slot selection rules for the TCM:

- If the TCM you are configuring is installed in the COM slot, you must select the Left slot.
- If the TCM is installed in any other available logical slot, you can select either the Left or Right slot.
- Each logical slot can hold two TCMs—one in the left physical slot, and one in the right physical slot. A TCM can be configured in the right slot only if a TCM in the left slot has already been configured.
- If you have configured TCMs in both the left and right slots, and then you uninstall the TCM in the left slot, you will no longer be able to change the configuration of the TCM installed in the right slot. You must re-install a TCM in the left slot before you can modify the configuration of the TCM in the right slot.

Slot selection rules for the Trident/Tri-GP 2.x and later CM or CIM:

- The logical COM slot can hold two CM/CIMs—one in the Left physical slot, and one in the Right physical slot.
- A CM/CIM can be configured in the Right slot only if a CM/CIM in the Left slot has already been configured.
- If you have configured CM/CIMs in both the left and right slots, and you then uninstall the CM/CIM in the left slot, you will no longer be able to change the configuration of the CM/CIM installed in the right slot. You must re-install a CM/CIM in the left slot before you can modify the configuration of the CM/CIM in the right slot.

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup
- Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Network and Routing tabs

SNTP Master IP Address

The SNTP Master IP Address property specifies the IP Address for the master node using the Simple Network Time Protocol.

Applies To

Time synchronization

Locations

- Tricon Controller tree > Configuration > Hardware Allocation >TCM/OPC Setup > Time Sync tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Time Sync tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM Setup > Time Sync tab
- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > CM Setup > Time Sync tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Time Sync tab

SNTP Master Network

The SNTP Master Network property specifies the network on which the master node is located.

Applies To

Time synchronization

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Time Sync tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Time Sync tab
- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > CM Setup > Time Sync tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Time Sync tab

SOE Block

The SOE Block property identifies a data structure in the MP memory. The block header contains the block type, the buffer size, and a list of the event variables assigned to the block. The buffer stores the event entries, each containing a time stamp and one or more data entries.

There are 16 SOE blocks. For more information, see the *Triconex SOE Recorder User's Guide.*

Applies To

Sequence of Events (SOE)

Locations

- Application tree > Implementation > SOE Configuration
- Controller tree > Configuration > Hardware Allocation > HMM Setup

SOE Block Assignments

The SOE Block Assignments property specifies the SOE blocks that the tagname is assigned to for purposes of collecting SOE data. For more information, see the *Triconex SOE Recorder User's Guide.*

Applies To

Sequence of Events (SOE)

Location

Application tree > Implementation > SOE Configuration > double-click the row for the tagname

SOE Block Collection Mode

The SOE Block Collection Mode property specifies the collection mode for the block. Primary blocks are collected by an instance of SOE Recorder running in Primary mode. Redundant blocks are copies of an existing Primary block, and are collected only by an instance of SOE Recorder running in Redundant mode.

Each Primary block can have only one Redundant block. The default is Primary. For more information, see the *Triconex SOE Recorder User's Guide.*

Applies To

Sequence of Events (SOE)

Location

Application tree > Implementation > SOE Configuration tree > double-click a block

SOE Block Collection Type

The SOE Block Collection Type property specifies the event collection behavior type for the block.

Automatic blocks are automatically collected by an instance of SOE Recorder running in either Primary or Redundant mode. Manual blocks are collected by an external DCS or an instance of SOE Recorder running in Custom mode. The default is Automatic.

For more information, see the *Triconex SOE Recorder User's Guide.*

Applies To

Sequence of Events (SOE)

Location

Application tree > Implementation > SOE Configuration tree > double-click a block

SOE Block Name

The SOE Block Name property specifies the name of the SOE block. For more information, see the *Triconex SOE Recorder User's Guide.*

Applies To

Sequence of Events (SOE)

Location

Application tree > Implementation > SOE Configuration tree > double-click a block

SOE Block Number

The SOE Block Number property specifies the block number used when events are retrieved by SOE Recorder or an OPC client. For more information on using SOE Recorder, see the *Triconex SOE Recorder User's Guide.*

For OPC configuration, must be unique for each TCM or CIM installed in a system. The default value is 0 (not configured). Applies only to the following communication modules:

- Model 4353 and 4354 TCM
- Model 3211 and 3211S2 CIM

Applies To

Sequence of Events (SOE), OPC communication

Locations

- Application tree > Implementation > SOE Configuration
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Protocols tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CIM Setup > OPC tab

SOE Block Type

The SOE Block Type property specifies how the events are saved, discarded, or cleared from the buffer. Types include: External, First Out, History, Modified External, OPC, and Unassigned. The default is Unassigned.

There are 16 SOE blocks available. Blocks 1 through 14 can use any combination of External, First Out, History, or OPC types. Blocks 15 and 16 are modified external blocks that are reserved for use with the Safety Manager Module (SMM).

For more information, see the *Triconex SOE Recorder User's Guide*.

External

The External Block Type setting is typically used when an external device, such as a Foxboro or Honeywell DCS or PC running SOE Recorder, is retrieving events from a controller on a continual basis. When events are collected by the external device, event data is cleared from the block. When the buffer is full, new event entries are discarded.

First Out

The First Out Block Type setting is typically used to retrieve the first and subsequent events that led to a trip. When the buffer is full, the Main Processors change the block's status from collecting to stopped. New events are discarded.

History

The History Block Type setting is typically used to monitor current events in an SOE Recorder application. An external device can collect events at any time, however, the collection does not clear the block. If the TriStation 1131 application does not clear and restart recording, the oldest event entries are overwritten when the buffer is full.

Modified External

The Modified External Block Type setting is used for event retrieval with the Safety Manager Module (SMM). The SMM is the Triconex communication interface with the Honeywell Universal Control Network (UCN), which is one of the principal networks of the Honeywell TCD 3000 Distributed Control System. Only blocks 15 and 16 can be specified as Modified External.

OPC

The OPC Block Type setting is typically used to retrieve process alarms events from OPC UA clients. It is supported for use only with the CIM. If the block size is not large enough, process alarm events may be lost. When the buffer is full, new process alarm events are discarded.

Applies To

Sequence of events (SOE)

Location

Application tree > Implementation > SOE Configuration tree > Blocks

SOE Buffer Size

The SOE Buffer Size property specifies the size of the buffer in the SOE block, based on the number of events.The buffer stores the event entries, each containing a 8-byte time stamp and one or more 8-byte data entries. The maximum number is 20,000 events (320,000 bytes); the default is 0. The maximum buffer size across *all* blocks is 60,000 events (1 MB).

You cannot change the SOE Buffer Size while the project is in the Download Changes state. You must change the project state to Download All prior to changing the size of the SOE buffer.

Applies To

Sequence of Events (SOE)

Location

Application tree > Implementation > SOE Configuration tree > Blocks

SOE Dead Time

Defines the length of time (in seconds) after a transition, before a subsequent transition will be reported. Once a transition on the selected point has occurred, any subsequent transitions will be reported only after the dead time interval has elapsed.

A longer dead time interval is better able to prevent the higher-level SOE application from being flooded with events, but it also means there is a higher chance of losing subsequent transition events.

The available range is 0 to 250 sec, with an accuracy of 10 msec or less. The default is 0, meaning any subsequent transition will generate an event as long as the previous transition on the same point has been collected and cleared. It does **not** mean that every transition on the same point will generate an event, as a transition on the same point that occurs too soon—before the previous event is cleared—may be missed.

Applies To

Trident or Tri-GP HRDI Module, Sequence of Events (SOE)

Location

Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > HRDI Setup

SOE Severity

The SOE Severity property specifies the severity (priority) level for SOE system events retrieved by an OPC client. The default is 500.

Applies only to the following communication modules:

- Model 4353 and 4354 TCM
- Model 3211 and 3211S2 CIM

Applies To

Sequence of Events (SOE), OPC communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Protocols tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CIM Setup > OPC tab

SOE Trigger State

Determines if SOE is enabled for a selected point on the HRDI module. When SOE is enabled, the module will time stamp and record point transitions for the selected point.

- **Disabled**: SOE is not enabled for the point. Point transitions will not be reported.
- **Rising**: SOE is enabled for the point. Point transitions will be reported when the Boolean value changes from False to True (0 to 1).
- **Falling**: SOE is enabled for the point. Point transitions will be reported when the Boolean value changes from True to False (1 to 0).
- **Rising/Falling**: SOE is enabled for the point. Point transitions will be reported for both Rising and Falling changes (False to True, *or* True to False).

The default is Disabled.

Applies To

Trident or Tri-GP HRDI Module, Sequence of Events (SOE)

Location

Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > HRDI Setup

SOE Trigger Time

Defines the number of milliseconds (with an accuracy of 1 msec or less) a signal must be stable before its change in state (transition) causes the reporting of an event. Also known as the *debounce period*.

A longer trigger time results in a longer debounce period, so that pulse widths that fall within the debounce period will not be reported as an event.

The available range is 0 to 250 msec.

- If any trigger with a pulse width larger than x msec needs to be reported as an event, then enter x-1 msec.
- If any trigger with a pulse width smaller than x msec needs to be filtered out (not reported as an event), then enter x+1 msec.

The default is 0, meaning there is no debounce period:

- A trigger with a pulse width larger than 1 msec will always generate an event.
- A trigger with a pulse width smaller than 1 msec may or may not generate an event.

Applies To

Trident or Tri-GP HRDI Module, Sequence of Events (SOE)

Location

Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > HRDI Setup

Sort by Group

The Sort by Group property organizes the tagnames table in an hierarchical list, where tagnames are organized according to the groups they are assigned to. This table, with information about the tagnames and system variables configured in the project, is downloaded to the TCM/OPC's embedded OPC server during a Download All or Download Changes operation. The sort order controls how the information is displayed in the OPC client.

Applicable only if a model 4353 or 4354 Tricon Communication Module (TCM) is installed in the Tricon controller.

Applies To

Tagnames (OPC)

Location

Project menu > Project Options > Download Options tab

Sort by Tagname

The Sort by Tagname property organizes the tagnames table alphabetically, in a single, non-hierarchical list, regardless of their group assignments.

This table, with information about the tagnames and system variables configured in the project, is downloaded to the TCM/OPC's embedded OPC server during a Download All or Download Changes operation. The sort order controls how the information is displayed in the OPC client.

Applicable only if a model 4353 or 4354 Tricon Communication Module (TCM) is installed in the Tricon controller.

Applies To

Tagnames (OPC)

Location

Project menu > Project Options > Download Options tab

Source ID

See .

Space Saver

The Space Saver property means a single instance can be executed more than once per scan to reduce memory usage and increase performance.

Note   If a function block is not a space saver, using the same function block instance more than once on a function block diagram results in a WF0031 warning—whereas there is no such warning for a space saver function block.

- For user-defined function blocks, you can specify this setting.
- For Triconex Library function blocks, the setting cannot be changed.

Applies To

Library and user-defined function blocks

Location

Function Blocks > Document Properties > Usage tab

Standard Security

The Standard Security property sets the application-level security setting to Standard. When selected, a user name and password is required to open TriStation 1131. No other user authentication is required. This is the default setting.

See also Enhanced Security on page 619.

Applies To

User security

Location

Project menu > Security > Security dialog box > Security Setting tab

Start Value and Increment

The Start Value property specifies the beginning letter or number to use when naming multiple variables or tagnames. The Increment property specifies the number to increase each time a variable or tagname is named. The default value is 1 for both properties.

Applies To

Comments and variables in user documents
Input, output, and memory points

Locations

- Item Properties > Auto Name > Auto Name button
- Tools menu > Auto Name Selected Items
- Application tree > Tagname Declarations > right-click, select New Tagnames

Stop Bits

The Stop Bits property specifies whether to transmit 1 bit or 2 bits after each character to notify the receiving computer that the transmission of a byte of data is complete. The default is 1 bit.

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > EICM Setup
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Serial Ports tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Serial Ports tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM Setup > Serial Ports tab
- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > MP and CM Setup > Serial Ports tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > MP, CM, or CIM Setup > Serial Ports tab

Stop Mode

Stop mode stops the TriStation 1131 application from reading field inputs and forces non-retentive digital and analog outputs to zero. Retentive outputs retain the values they had before the application was halted.

Stop mode is useful for installation and service of external equipment, but is not required for service of the controller. Before using the stopping the application, the Halt command should be used to halt the application.

- For Tricon controllers, Stop mode is set by turning the keyswitch to the STOP position.
- For Trident or Tri-GP controllers, Stop mode is set by using the SYS_APP_HALT function in a program.

Applies To

Application, controller

Locations

- Tricon keyswitch set to STOP
- Trident or Tri-GP Controller tree > Controller Panel > Commands menu
- Trident or Tri-GP Application tree > Library Documents > Functions

Supports Application Defined States

The Supports Application Defined States property specifies whether to allow user-defined functions to include a variable that stores application states.

If included, the variable stores application states and is evaluated in the same way as the cause, intersection, and effect internal variables. The default is cleared, which means not enabled.

Application state inputs and outputs must be a DWORD data type 32-bit string.

Applies To

Functions, function blocks

Location

Document menu > Item Properties > Attributes tab

Supports Use in Cause Rows with... Inputs

The Supports Use in Cause Rows with... Inputs property specifies whether a specific user-defined function can be used in a cause row. Invensys-supplied functions do not have to be enabled. The default is cleared, which means not enabled.

Applies To

Functions, function blocks

Location

Document menu > Item Properties > Attributes tab

Supports Use in Effect Columns With... Outputs

The Supports Use in Effect Columns with... Outputs property specifies whether a specific user-defined function can be used in an effect column. Invensys-supplied functions do not have to be enabled. The default is cleared, which means not enabled.

Applies To

Functions, function blocks

Location

Document menu > Item Properties > Attributes tab

Supports Use in Intersections

The Supports Use in Intersections property specifies whether a specific user-defined function can be used in an intersection. Invensys-supplied functions do not have to be enabled. The default is cleared, which means not enabled.

Applies To

Functions, function blocks

Location

Document menu > Item Properties > Attributes tab

System Events Severity

The System Events Severity properties identify the severity levels of the different types of system events (Info, Minor, Major, and Fatal) available through the communication module's embedded OPC server.

The severity level identifies the urgency or priority of an event, where 1 is the lowest and 1000 is the highest. Enter 0 to prevent the OPC server from sending event notifications for the selected event type.

Applies only to the following communication modules:

- Model 4353 and 4354 TCM
- Model 3211 and 3211S2 CIM

Applies To

OPC communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Protocols tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CIM Setup > OPC tab

Tabs

The Tabs property specifies the number of tab settings used in the Structured Text code. The default is 8.

Applies To

ST Language

Location

View menu > Set Editor Options

Tagname

The Tagname property specifies the name of an input, output, or memory point. The name comes from the use of tags tied to field points. In TriStation 1131, it generally refers to points.

Tagnames can include up to 31 alphanumeric (A to Z and 0 to 9) characters and the underscore (_) character. Tagnames cannot begin with an underscore.

Applies To

Input, output, and memory points

Location

Application tree > Tagname Declarations > Declaration tab

Target System Version

The Target System Version property specifies the version of the controller that the project will be downloaded to. It also determines which controller features and modules can be configured in a project. The target system version is configured when you create a project, or when you convert a project from a previous version of TriStation 1131.

When changing the target system version, you cannot be connected to the controller.

Changing the target system version requires a Download All. You cannot change the project's target system version while the project is in the Download Changes state.

Applies To

Project

Locations

- File menu > New Project or > Select Main Processor
- File menu > Open Project > Select Main Processor
- Tricon, Trident, or Tri-GP Controller tree > Configuration > Hardware Allocation > Replace MPs
- Tricon, Trident, or Tri-GP Controller tree > Operating Parameters

TCP Port Number

The TCP Port property specifies a port number used by a network device in a Modbus configuration, OPC UA configuration, or by a printer. There are no reserved TCP port numbers, and duplicate port numbers are allowed in a Modbus configuration.

- For a Modbus TCP port, the default is 502.

- For the Trident/Tri-GP 3.x CIM OPC UA server, the default is 4840.

- For a printer connected to one of the following communication modules, the default is 9100:

  - Tricon TCM

  - Trident or Tri-GP 2.x/3.x CM

  - Trident or Tri-GP 3.x CIM

- For the Trident 1.x CM, the TCP Port property specifies a port number specified by a printer manufacturer. This information should be available with the printer instructions. The default is blank.

- An HP JetDirect print server with one port uses port number 9100.

- An HP JetDirect print server with three ports uses port numbers 9100, 9101, and 9102.

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Printer and Modbus TCP tabs
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Printer and Modbus TCP tabs
- Tricon Controller tree > Configuration > Hardware Allocation > TCM Setup > Printer and Modbus TCP tabs
- Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Printer tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CIM Setup > OPC tab

TCP Port Restrictions

See

Temporary Files

The Temporary Files property specifies the path name for documents which include temporary files created by TriStation 1131 or other utilities. The default path name is:

- **Windows XP/2003:** `C:\Documents and Settings\All Users\Application Data\Triconex\TriStation 1131 4.10.1\Temp`

- **Windows Server 2008 and Windows 7:** `C:\Program Data\Triconex\TriStation 1131 4.10.1\Temp`

Applies To

Project

Location

Tools menu > TriStation 1131 Options > Directories tab

Terminal

The Terminal property displays the names of the input and output terminals for the function or function block included with the selected cause, intersection, or effect. Extensible functions do not have terminal names.

Applies To

CEM programs

Location

Variable Detail Table

Terminals

See Double Space on page 605 and EN/ENO on page 612.

Termination Options

The Termination Options property specifies whether resistors are used to terminate the Modbus cable connections. This option is only available with RS-485 Transceiver Mode.

Options include:

- None: The cables are not terminated. This is the default.
- Resistor: Resistors are used at each end of the cables.
- Pull-Up/Pull-Down Resistors: Pull-up/pull-down resistors are used.
- All: Both pull-up/pull-down and standard resistors are used.

Applies To

Modbus communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Serial Ports tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Serial Ports tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM Setup > Serial Ports tab
- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > CM Setup > Serial Ports tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Serial Ports tab

Text Size

The Text Size property specifies the point size for the text; from 3 to 24 points.

The defaults are: A=6, B=8, C=10, and D=10.

Applies To

Comments

Locations

- Properties > Comment tab
- Project menu > Project Options > Annotations tab

Time After Trip

The Time After Trip property specifies the number of minutes after the trip to continue collecting events for the trip snapshot. The minimum is two minutes; the maximum is 10 minutes. The default is two minutes.

Applies To

SOE

Location

Application > Implementation > double-click SOE Configuration branch

Time Before Trip

The Time Before Trip property specifies the number of minutes before the trip to begin collecting events for the trip snapshot. The minimum is two minutes; the maximum is 10 minutes. The default is two minutes.

Applies To

SOE

Location

Application > Implementation > double-click SOE Configuration branch

Time Delay

See Alarm Attributes on page 562.

Time Synchronization

The Time Synchronization properties specify whether and how time is synchronized for the controller. Depending on the controller, the following properties can be specified. The default is cleared, which means time synchronization is not used.

Controller	Property
Tricon ACM	On NET 1 enable time synchronization with external source
Tricon ACM	On NET 2 enable time synchronization with Tricon Master Node
Tricon NCM	On NET 1 enable time synchronization with Tricon Master Node
Tricon SMM	Enable time synchronization with external source
Tricon TCM	See Time Synchronization Configuration on page 722.
Trident 1.x CM	On NET 1 enable time synchronization with Trident Master Node
	On NET 2 enable time synchronization with Trident Master Node

Controller	Property
Trident or Tri-GP 2.x/3.x CM	See Time Synchronization Configuration on page 722.
Trident or Tri-GP 3.x CIM	See Time Synchronization Configuration on page 722.

Applies To

Controller

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > ACM, NCM, SMM, TCM Setup
- Trident 1.x Controller tree > Configuration > Hardware Allocation > CM Setup > Network tab
- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > CM Setup > Time Sync tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Time Sync tab

Time Synchronization Configuration

The Time Synchronization Configuration property specifies the type of synchronization to be performed by the following communication modules:

- Tricon TCM
- Trident or Tri-GP 2.x/3.x CM
- Trident or Tri-GP 3.x CIM

These options are available.

Option	Description
None	No time synchronization.
GPS	Time synchronization based on the GPS interface and one TCM module. Not available on the Trident /Tri-GP CM or CIM.
GPS Redundant	Time synchronization based on the GPS interface and two TCM modules. Not available on the Trident /Tri-GP CM or CIM.
SNTP Redundant	Simple Network Time Protocol with two TCMs. Not available on the Trident /Tri-GP CM or CIM.
SNTP	Simple Network Time Protocol with one TCM, CM, or CIM.
Peer-to-Peer	Triconex Time Synchronization based on the master node in the Peer-to-Peer network.

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Time Sync tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Time Sync tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM Setup > Time Sync tab
- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > CM Setup > Time Sync tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Time Sync tab

Toggle Terminal Inverter Command

The Toggle Terminal Inverter command toggles the inversion state of an input or output terminal on the selected function or function block. When the terminal is inverted, a small circle appears at the terminal connection.

Applies To

CEM programs

Location

Application tree > open a CEM program > right-click in the FBD Network

Transceiver Mode

The Transceiver Mode property specifies the type of physical connection.

Ethernet Port Settings

For TCM, Trident CM, or Tri-GP CM Ethernet ports, settings include:

- Auto-Negotiate (Tricon TCM, Trident CM, or Tri-GP CM on NET 2, only)
- 10 Mbps Half Duplex
- 10 Mbps Full Duplex
- 100 Mbps Half Duplex (Tricon TCM, Trident CM, or Tri-GP CM on NET 2, only)
- 100 Mbps Full Duplex (Tricon TCM, Trident CM, or Tri-GP CM on NET 2, only)

Note   If you have a model 4352, 4352A, 4352B, or 4354 TCM with fiber connectors, you must select 100 Mbps as the communication mode. These TCMs cannot negotiate the connection speed or connect at 10 Mbps.

If you have a model 4353 TCM, you cannot select 10 Mbps as the communication mode on NET 2. Connections to the TCM's embedded OPC server can be made only at 100 Mbps.

For Trident or Tri-GP CIM Ethernet ports, settings include:

- Auto-Negotiate
- 100 Mbps Full Duplex

Choosing the Appropriate Ethernet Port Setting

- If Auto-Negotiate is selected, the module will connect at either 10 Mbps (TCM or CM only) or 100 Mbps, depending on the speed of the connection. All communication modules (except the Trident 1.x CM) will always negotiate to Half Duplex.
- If Half Duplex is selected, only one network peer can transmit at a time. If you have a network hub, you must select Half Duplex.
- If Full Duplex is selected, both network peers can transmit at the same time. This setting is typically used only for applications with high-bandwidth requirements. If you have a switch, you can select Full Duplex or Half Duplex.

Serial Port Settings

For Serial Ports, settings include:

- RS-232 for point-to-point communication over distances up to 50 feet
- RS-485 for multi-point communication over distances up to 4,000 feet

RS-232 Transceiver Mode with Handshake

Hardware handshake is a method for controlling the flow of serial communication between two devices which uses a separate wire to send a signal when the receiving device is read to receive the signal. Hardware handshake can be used with Tricon TCM, Trident CM/CIM, and Tri-GP CM/CIM.

With the Handshake property set to Hardware, the communication module asserts the Request to Send (RTS) signal when it has a message to transmit. The communication module begins transmission when it receives a Clear to Send (CTS) signal from the Modbus master. The communication module ignores all characters unless the Modbus master asserts the Data Carrier Detect (DCD) signal. This settings allows the Modbus master to use half-duplex modems.

With the Handshake property set to None (typically for point-to-point connections), the communication module asserts RTS at all times and ignores CTS and DCD. In other words, the communication module transmits characters even if the receiving device is not ready. This could result in an overrun state, and the characters would have to be re-transmitted.

RS-485 Transceiver Mode with Handshake

With the Handshake property set to Hardware, the communication module enables its RS-485 transmit driver only when it is sending data. Use this setting for all single-pair networks and for slave ports in two-pair, multi-point networks.

With the Handshake property set to None, the communication module enables its RS-485 transmit driver at all times. Use this setting for a Modbus slave port in a two-pair, point-to-point network.

RS-485 cannot be used for a TriStation serial connection on TCM port 4, Trident 2.x CM port 3, or Tri-GP CM port 3.

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Network and Serial Ports tabs
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Network and Serial Ports tabs
- Tricon Controller tree > Configuration > Hardware Allocation > TCM Setup > Network and Serial Ports tabs
- Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > MP Setup > Serial Ports tab
- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > CM Setup > Network and Serial Ports tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Network and Serial Ports tab

Transceiver Port

For Trident 1.x, the Transceiver Port property specifies the type of connection to be used for the port. Settings include RJ-45 and MAU. The default is RJ-45.

Applies To

Communication

Location

Trident 1.x Controller tree > Configuration > Hardware Allocation > CM Setup > Network tab

Triggering Mode

For Trident or Tri-GP controllers, the Triggering Mode property specifies where the input signal is triggered. For asymmetrical waveforms, select the option that corresponds to the sharper edge. Settings include Rising Edge and Falling Edge.

The default is Rising Edge.

Applies To

Trident or Tri-GP Pulse Input or Enhanced Pulse Input Module

Location

Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > PI Setup or EPI Setup

Trip Level

See Alarm Attributes on page 562.

Trip Severity

See Alarm Attributes on page 562.

Trip State

The Trip State property specifies the value on which to begin collecting events.

Applies To

SOE

Location

Application tree > Implementation > SOE Configuration

Trip Tagname

The Trip Tagname property specifies the tagname (variable) that identifies whether a trip has occurred.

Applies To

SOE

Location

Application tree > Implementation > SOE Configuration

TriStation Port Number

The TriStation Port Number property identifies the UDP port number used for the TriStation connection to the following communication modules:

- TCM
- Trident or Tri-GP 2.x CM
- Trident or Tri-GP 3.x CM or CIM

The default number is 1502.

Cannot be the same as the Management, Peer-to-Peer, or TSAA port numbers; or 1505, 1506, 1507, 1508. See UDP Base Port Number on page 730 for the list of reserved values.

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC or TCM/B Setup > Protocols tab
- Tricon Controller tree > Configuration > Hardware Allocation >TCM or TCM/A Setup > Network tab
- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > CM Setup > Protocols tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Protocols tab

TriStation UDP Port Number

The TriStation UDP Port Number property identifies the UDP port number used for the TriStation connection to the following communication modules:

- Trident or Tri-GP 2.x CM
- Trident or Tri-GP 3.x CM or CIM

The default number is 1502.

Cannot be the same as the Management or TSAA port numbers. See UDP Base Port Number on page 730 for the list of reserved values.

Applies To

Communication

Location

Trident or Tri-GP Controller tree > TriStation Communication

True Color

See Monitor Display Options on page 657.

True State Name

See Monitor Display Options on page 657.

TSAA Multicast IP Address

The TSAA Multicast IP Address property specifies the IP address that TSAA multicasts should be sent to. The default is 0.0.0.0 (IP multicasting is disabled).

Bin data and/or SOE data available messages will be sent to the specified address, so that all members of the group will receive the data.

Note TSAA IP multicasting is available only with Tricon 10.3 and later systems, Trident 2.x and later systems, or Tri-GP systems. Because NET 2 is reserved for OPC communication, the TSAA protocol is available only on NET 1 for model 4353 and 4354 TCMs. Additionally, your network hardware (such as routers) must also support multicasting. See your Network Administrator or IT department for more information.

See also Update Rate on page 731.

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Protocols tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Protocols tab
- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > CM Setup > Protocols tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Protocols tab

TSAA Port Number

The TSAA Port Number property identifies the UDP port number used with TSAA client/server network communication. The default number is 1500.

For communication with DDE Server and SOE Recorder clients, the UDP port configured in those applications must match the TSAA Port Number configured in TriStation 1131. Cannot be the same as the Management or TriStation port numbers. See UDP Base Port Number on page 730 for the list of reserved values.

Additionally, because NET 2 is reserved for OPC communication, the TSAA protocol is available only on NET 1 for model 4353 and 4354 TCMs.

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC or TCM/B Setup > Protocols tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A Setup > Network tab
- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > CM Setup > Protocols tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Protocols tab

Type Over Command

The Type Over command toggles between typing over and inserting characters in a Structured Text program or function.

Applies To

ST programs and functions

Locations

`Ov`
- Type Over button
- View menu

UCN Node Number

For Tricon controllers, the UCN Node Number property specifies an number on the Tricon SMM, which can be any odd number from 1 to 63. Even numbers are used for hot-spare module communication. The default is 1.

Applies To

Tricon SMM

Location

Tricon Controller tree > Configuration > Hardware Allocation > SMM Setup

UDP Base Port Number

The UDP Base Port Number property specifies the UDP port number for the controller where the TriStation 1131 application is to be run. This number identifies the controller in a Peer-to-Peer network.

Entering 0 as the UDP port number disables Peer-to-Peer over UDP/IP on the network. The default is 1503 on both NET 1 and NET 2 (meaning Peer-to-Peer is enabled on both ports).

UDP port numbers do not need to be unique, as long as the IP addresses for each port is unique. For example, you can assign 1600 as the TriStation UDP port number on NET 1, and 1600 as the Peer-to-Peer UDP port number on NET 2, because the ports are on separate networks. However, you cannot assign 1600 as the TriStation UDP port number on NET 1, and 1600 as the Peer-to-Peer port number on NET 1, because the ports are on the same network.

Because NET 2 is reserved for OPC communication, the Peer-to-Peer and TSAA protocols are available only on NET 1 for model 4353 and 4354 TCMs.

The following values are reserved:

Reserved Value(s)	Protocol	Notes
1500	TSAA	Can be changed via configuration
1502	TriStation	Can be changed via configuration
1503–1504	Peer-to-Peer	Can be changed via configuration
1505–1508	Firmware download	Cannot be changed; for Invensys use only
1510	Management	Can be changed via configuration
1–1023	—	Reserved by the Internet Assigned Numbers Authority (IANA)

Also see Management Port Number on page 648, TriStation Port Number on page 727, and TSAA Port Number on page 728.

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Peer-to-Peer tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Peer-to-Peer tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM Setup > Network tab
- Tricon Controller tree > Configuration > TriStation Communication
- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > CM Setup > Peer-to-Peer tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Peer-to-Peer tab

Unbypass Request

See Alarm Attributes on page 562.

Undo Command

The Undo command reverses the last action performed when editing a program, function, or function block.

Applies To

Editing

Location

Edit menu

Update Rate

The TSAA Multicast Update Rate property specifies the update rate, in milliseconds, for TSAA IP multicasting.

Bin data and/or SOE data available messages will be sent to the multicast IP address at the specified update rate (for example, by default, bin data will be multicast every 1000ms).

TSAA IP multicasting is available only with Tricon 10.3 and later systems, Trident 2.x and later systems, or Tri-GP systems. See also TSAA Multicast IP Address on page 728.

Applies To

Communication

Locations

- Tricon Controller tree > Configuration > Hardware Allocation > TCM/OPC Setup > Protocols tab
- Tricon Controller tree > Configuration > Hardware Allocation > TCM/A or TCM/B Setup > Protocols tab
- Trident or Tri-GP 2.x Controller tree > Configuration > Hardware Allocation > CM Setup > Protocols tab
- Trident or Tri-GP 3.x Controller tree > Configuration > Hardware Allocation > CM or CIM Setup > Protocols tab

Update Reports Database Command

The Update Reports Database command copies project information to a database used when reports are generated.

Applies To

Reports

Location

Project tree > right-click the Default Reports or User Reports folder

Update Selected Function Cells Command

The Update Selected Function Cells command updates selected out-of-date elements which are marked with a red X in the active window.

Applies To

CEM programs

Location

Tools menu

Usage

The Usage property specifies how function blocks can be used in a function or function block. For library function blocks, the options determine the usage and cannot be changed. For user-defined function blocks, the settings can be specified. Settings include:

- Exactly Once on page 621
- Only Once on page 664
- Space Saver on page 713
- Internal State on page 638

Applies To

Library and user-defined function blocks

Location

Document Properties > Usage tab

Use Local Time

The Use Local Time property specifies whether to use local time or universal time. The default is selected, which means local time is used.

Applies To

Application

Location

Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > MP > Setup > Operating Parameters tab

Use Secure Communication

The Use Secure Communication property specifies whether secure communication is enabled between the Trident or Tri-GP 3.x controller and TriStation 1131.

When this option is selected, the default connection type will automatically use secure communication to connect to the controller. The default is cleared (secure communication is not enabled).

Applicable to Trident/Tri-GP 3.x systems with a CIM installed only.

Applies To

Secure communication

Location

Trident or Tri-GP 3.x Controller tree > Configuration > MP Setup > Operating Parameters tab

Validate Only Command

The Validate Only command analyzes your project settings and current controller configuration to determine the modifications that will be made to the project if you change to the selected target system version. Results of the validation appear in the Messages pane.

Applies To

Project

Location

Controller tree > Configuration > Hardware Allocation > Replace MPs

Value

The Value property specifies the value for the constant. To ensure the value agrees with the Data Type, click Apply.

Applies To

Constants

Location

Properties > Constant tab

Value Range to Scale an Integer

The Value Range to Scale an Integer properties specify how a REAL number is scaled to an integer so it can be transmitted using Modbus protocol, which does not use REAL numbers. The values set for the scale range are used with the Modbus minimum and maximum range to derive an integer value that represents the real value.

Properties include:

- Minimum Value (Engineering Unit Range) on page 653
- Maximum Value (Max Span) on page 651
- Precision on page 675
- Disable Scaling on page 602

Applies To

Points with REAL data types

Location

Application tree > Tagname Declarations > Scaling tab

Var/Const

The Var/Const property displays the names of the variables connected to the terminals of the function or function block in a CEM program. Only user-defined variables are displayed. Internal variables are hidden.

Applies To

CEM programs

Location

Application tree > open a CEM program > Variable Detail Table

Var Type

The Var Type property specifies the type of variable. Types include:

Type	Description
Input	A variable which provides a value to a program, function, or function block. Must be connected to a point.
Output	A variable which returns the result of a program, function, or function block. Must be connected to a point.
In/Out	A variable which is used as both an input and output variable. Must be connected to a point.
Local	A variable used for internal logic. Cannot be connected to a point.
Tagname	A variable that references a point. Also known as a *global variable*.

Applies To

Variables

Location

Properties > Declarations tab

Verify Last Download to the Controller Command

The Verify Last Download to the Controller compares the application that was last downloaded to the controller with the application running on the controller. If there is a difference, you should contact Invensys support.

Applies To

Application

Location

Controller tree > Controller Panel > Commands menu

Verify Password

The Verify Password property allows you to enter the password a second time to verify it is the same as entered for the Password property.

Applies To

User access, Security

Location

Project menu > Security command > Users tab > Add or Modify button

Verify Version Command

The Verify Version command compares the version of the selected library in the project with the most current version available. If the version in the project is out of date, you are prompted to update it. Only libraries located in the default library directory are verified.

Applies To

Libraries

Location

Application tree > right-click Library Documents > Manage command

Vertical Network Divider Command

The Vertical Network Divider command allows you to place a vertical divider on a logic sheet to divide networks.

Applies To

FBD logic sheets

Locations

- Vertical Network Divider button
- Tools menu > Select Tool

View Details Command

The View Details command allows you to view detailed information about a certificate, such as the serial number, issuer, expiration date, and more.

Applies To

Certificates

Location

Application tree > Right-click a certificate

View Download History Command

The View Download History command displays version information for each download for the current project, which is a list of the elements affected for the last Download All and subsequent Download Changes commands. The history is cleared and restarted with each Download All command.

These properties are displayed on the Download History screen.
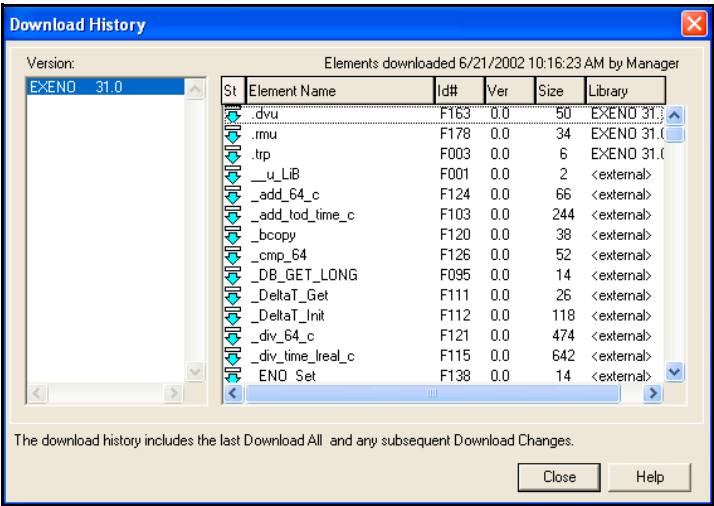
Property	Description
St	An icon that indicates the status of the element. An arrow indicates that the element was included in a Download All operation; an ellipsis (...) means it was included in a Download Changes operation.
Element Name	The name of the program, function, or function block.
ID#	A system-generated identification for the program or function.
Ver	The version of the element.
Size	The size of the element in bytes.
Library	The library the element is included in.

Applies To

Project

Location

Project menu

View Intermediate FBD Command

The View Intermediate FBD command displays source code that is generated in the Function Block Diagram language when the CEM program is compiled.

Applies To

CEM programs

Location

Document menu

View Intermediate ST Command

The View Intermediate ST command displays source code that is generated when the program is compiled. You can copy the source code by using the Write to File command on the Edit menu.

Applies To

Programs, Functions, and Function Blocks

Location

Document menu

View Manager Command

The View Manager command allows you to save, load, or remove views of a CEM matrix.

Applies To

CEM programs

Location

View menu

View Project History Command

The View Project History command displays an audit trail of user access and modification of the project.

This history is automatically generated during project development.

Click the Save History button to export the project history to a text file.

Date	User	Element	Action	Comment
3/18/2010 3:28:37 AM	Manager	PROJECT	Login	D:\WA\TS113
3/18/2010 3:29:25 AM	Manager	PROJECT	Saved 35.0	Build configura
3/18/2010 3:29:26 AM	Manager	PROJECT	Saved 35.0	Closing Project
3/18/2010 11:47:00 PM	Manager	PROJECT	Login	D:\WA\TS113
3/18/2010 11:47:07 PM	Manager	PROJECT	Saved 35.0	Build configura
3/18/2010 11:47:07 PM	Manager	PROJECT	Saved 35.0	Closing Project
3/23/2010 1:26:12 AM	Manager	PROJECT	Login	D:\WA\TS113
3/23/2010 1:27:00 AM	Manager	PROJECT	Saved 35.0	Build configura
3/23/2010 1:27:00 AM	Manager	PROJECT	Saved 35.0	Closing Project
3/24/2010 4:05:17 AM	Manager	PROJECT	Login	D:\WA\TS113
3/24/2010 4:05:29 AM	Manager	PROJECT	Saved 35.0	Build configura
3/24/2010 4:05:29 AM	Manager	PROJECT	Saved 35.0	Closing Project
3/29/2010 11:20:53 AM	Manager	PROJECT	Login	C:\Documents
3/29/2010 1:33:41 PM	Manager	PROJECT	Download All 34.0.0	Emulator: Emul
3/29/2010 1:33:44 PM	Manager	PROJECT	Saved 35.0	Build configura
3/29/2010 1:47:47 PM	Manager	A31001L	Point forced to 50	Emulator: Force

Clear History   Save History   Close   Help

Applies To

Project

Locations

- Project History button
- Project menu

Width

The Width property specifies the width (horizontal space) of the variable or constant symbol. By selecting either the plus (+) or the minus (-) buttons, you can expand or shrink the width of the variable symbol so you can use a longer name or fit the symbol into a smaller space.

Applies To

Variables

Location

Properties > Selected tab

Wire Tool Command

The Wire tool command provides a pointer tool to a connect logic elements in FBD programs.

The signal flow is from an output of one function block, through a wire, to an input of a second function block.

Settings include:

- **Normal:** The first function block is always evaluated before the second function block. For example, the first function block writes the value and the second function block reads the value. Represented by a solid line.

- **Feedback:** The first function block is always evaluated after the second function block. Typically used to tie the output of a function block to an input of the same function block—so that the value of the output is used to "feed" it "back" to the input. Also useful for delaying a write from the first function block until after the second function block has read a value. Represented by a dashed line.

The default is Normal. To set, double-click the wire and select either Normal or Feedback.

Note   Attempting to create a feedback loop without using the feedback wire will cause an error.

Applies To

FBD programs

Locations

- Wire Tool button
- Tools menu > Select Tool

Wire Type

The Wire Type property specifies the type of wire used for serial communication.

Settings include:

- 2-Wire (half duplex) if using one pair of wires for Modbus reads and writes. (Only available when the Transceiver Mode property is set to RS-485.)

- 4-Wire (full duplex) if using two pairs of wires—one pair for Modbus reads and the other pair for Modbus writes. (Trident or Tri-GP MP serial ports must use this setting.)

The default is 4-Wire.

Applies To

Serial ports

Location

Trident or Tri-GP Controller tree > Configuration > Hardware Allocation > MP or CM Setup > Serial Ports tab

Workspace View Command

The Workspace View command toggles to display or hide the Application and Controller workspace tree.

Applies To

TriStation 1131 workspace

Locations

- Workspace View button
- View menu

Write To File Command

The Write To File command displays a dialog box that allows you to specify a file name and location to save ST code as a text file.

Applies To

ST programs, ST functions, and intermediate ST for all programs and functions

Location

Edit menu

Zoom Command

The Zoom command enlarges or decreases the view of an element.

Standard settings are: 50%, 75%, 100%, and 200%. You can also enter a number or click Zoom To Fit to size the elements to fit the current window. You can enlarge the view of elements on a logic sheet by:

- Using the Zoom button or Zoom command from the View menu

- Double-clicking an empty area to see a Zoom Selection view.

Applies To

Logic sheets for user documents, test sheets for Controller and Emulator Panels

Locations

- Zoom button
- View menu
- Double-click an empty area in a logic sheet
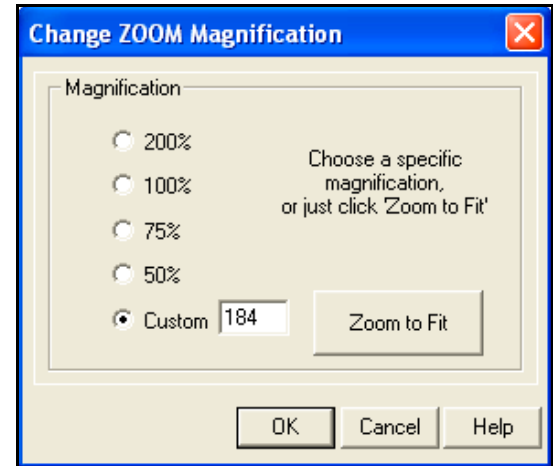
Zoom To Fit Command

The Zoom To Fit command toggles between a large and small view of the logic sheet.

Applies To

Logic sheets for user documents, test sheets for the Controller and Emulator Panels

Locations

- Zoom To Fit button
- View menu
- Double-click an empty area in a logic sheet

Zoom To Region

The Zoom To Region command allows you to zoom into a region of the sheet.

Procedure

1   On the View menu, click Zoom to Region.

The cursor changes to a cross-bar.

2   Select the region to view by dragging the cross-bar across the area.

The region is magnified.

Applies To

FBD and LD editors

Location

View menu

B

Data Types

Overview

Data types, which adhere to the IEC 61131-3 standard, specify the type of data used for the following:

- Constants
- Tagname declarations and references
- Local, input, output, and I/O variables

Elementary Data Types

An elementary data type specifies the size and characteristics of most data used in a program, function, or function block and the operations that can be applied to the data.

This table describes the elementary data types and how they can be used.

Table 64   Elementary Data Types and Usage

Data Type	Description	Tagnames	Constants and Local Variables
BOOL	A Boolean, 1 bit in length	✓	✓
DATE	A specific date		✓
DINT	A double integer, 32 bits in length	✓	✓
DT	A specific date and time		✓
DWORD	A double word, 32 bits in length		✓
INT	An integer, 16 bits in length		✓
LREAL	A long real number, 64 bits in length		✓
REAL	A real number, 32 bits in length	✓	✓
STRING	A sequence of up to 132 alphanumeric characters delimited by single quotes		✓
TIME	A period of time (duration) expressed in days, hours, minutes, seconds, or milliseconds		✓
TOD	A specific time of day		✓

Only three data types can be declared as controller *points*: BOOL, DINT, and REAL. These variables point to hardware addresses in the controller and are accessible to all programs in a project.

BOOL Data Type

A BOOL data type is one bit in length and has two possible values: false (0) or true (1).

Attribute	Description
Keyword/type	BOOL
Description	Boolean
Size	1 bit
Default value	False (0)
Lower limit	False (0)
Upper limit	True (1)
Result if intermediate value is less than lower limit	N/A
Result if upper limit is less than intermediate value	Intermediate Value MOD 2

Application Notes

- Can be used in Safety or Control applications.
- Can be used in CEM Cause, Effect, and Intersection cells.

DATE Data Type

A DATE data type refers to a specific date expressed as the year, month, and day.

Attribute	Description
Keyword/type	DATE
Description	Date
Size	64 bits
Syntax	D#CCYY-MM-DD
Default value	D#1970-01-01
Lower limit	D#1970-01-01
Upper limit	D#2029-12-31
Result if intermediate value is less than lower limit	Invalid date
Result if upper limit is less than intermediate value	Invalid date

Application Notes

- Can be used in Safety or Control applications.
- Can be used in CEM Cause, Effect, and Intersection cells.

DINT Data Type

A DINT data type is a double integer, 32 bits in length.

Attribute	Description
Keyword/type	DINT
Description	Double integer
Size	32 bits
Default value	0
Lower limit	–2**31
Upper limit	2**31–1
Result if intermediate value is less than lower limit	–2**31 or V modulo 2**32
Result if upper limit is less than intermediate value	2**31–1 or V modulo 2**32

Note   If the intermediate conversion value is out of range (for example, when converting LREAL to DINT), the return value is the smallest or greatest double integer.

Application Notes

- Can be used in Safety or Control applications.
- Can be used in CEM Cause, Effect, and Intersection cells.

DT Data Type

A DT data type represents a date and time of day. To specify the time of day, you can use fractions (FFF) of a second. Values are stored internally in microseconds and displayed in the TriStation 1131 Controller Panel in milliseconds.

A DT data type cannot be used as a program input or output.

Attribute	Description
Keyword/type	DT
Description	Date and time of day
Size	64 bits

Syntax	DT#CCYY-MM-DD-HH:MM:SS
	  or
	DT#CCYY-MM-DD-HH:MM:SS.FFF
	  or
	DATE_AND_TIME#CCYY-MM-DD-HH:MM:SS

Default value	DT#1970-01-01-00:00:00
Lower limit	DT#1970-01-01-00:00:00

Attribute	Description
Upper limit	DT#2029-12-31-23:59:59.999
Result if intermediate value is less than lower limit	Invalid date
Result if upper limit is less than intermediate value	Invalid date

Application Notes

- Can be used in Safety or Control applications.
- Can be used in CEM Cause, Effect, and Intersection cells.

DWORD Data Type

A DWORD data type is a double word, 32 bits in length. The result is always in the range from 0 to 16#FFFFFFFF. If the intermediate value is out of range, then the result is the least-significant 32 bits of the intermediate value. For example, if you shift 16#FFFFFFFF to the left once, the intermediate value is 16#1FFFFFFFE and the result is 16#FFFFFFFE.

A DWORD data type cannot be used as a program input or output.

Attribute	Description
Keyword/type	DWORD
Description	Double word
Size	32 bits
Default value	0
Lower limit	0
Upper limit	16#FFFFFFFF
Result if intermediate value is less than lower limit	N/A
Result if upper limit is less than intermediate value	V and 16#FFFFFFFF

Application Notes

- Can be used in Safety or Control applications.
- Can be used in CEM Cause, Effect, and Intersection cells.

INT Data Type

An INT data type is an integer, 16 bits in length. Arithmetic operators ADD, SUB, and MUL are implemented with 32-bit arithmetic and the container for INT is 32 bits. The ADD, SUB, and MUL operations do not check the range of results and can have resultant values out of the specified range (–32768 and +32767). For example, using the SUB function to subtract 1 from -32768 results in –32769 (clearly out of range) without clearing ENO or reporting a BADPARAM error. However, an out-of-range value does display "Inv INT" on the Controller Panel.

To verify that output values from these functions are within range, connect the output terminal to the INT_TO_DINT function, which converts the integer output to double integer and does a range check for the integer output.

An INT data type cannot be used as a program input or output.

Attribute	Description
Keyword/type	INT
Description	Integer
Size	32 bits
Default value	0
Lower limit	$-2**15$
Upper limit	$2**15-1$
Result if intermediate value is less than lower limit	InvINT
Result if upper limit is less than intermediate value	InvINT

Application Notes

- Can be used in Safety or Control applications.
- Can be used in CEM Cause, Effect, and Intersection cells.

LREAL Data Type

An LREAL data type is 64 bits in length and has 15 decimal digits of precision. In TriStation 1131, the LREAL data type follows the IEC-559 Standard floating-point format.

An LREAL data type cannot be used as a program input or output.

Attribute	Description
Keyword/type	LREAL
Description	Long-real number
Size	64 bits
Default value	0.0
Most positive number	1.7976931348623158 e +308

Attribute	Description
Least positive number	4.9406564584124654 e –324
Least negative number	– 4.9406564584124654 e –324
Most negative number	–1.7976931348623158 e +308
Result if intermediate value is less than lower limit	–Infinity or HUGE
Result if upper limit is less than intermediate value	+Infinity or HUGE

Gradual Underflow for LREAL Data Types

In PCs and controllers, the floating-point implementation includes a standard feature called *gradual underflow* that extends the range for an LREAL number and gradually changes the precision as values approach zero.

This table compares the values obtained when gradual underflow is not present, to the values obtained when it is present.

Without Gradual Underflow	With Gradual Underflow
The smallest positive number that can be stored in an LREAL variable is: 2^{-1022} = 2.2250738585072014E–308.	The smallest positive number that can be stored in an LREAL variable is: 2^{-1074} = 4.9406564584124654E–324.
The precision changes abruptly from 17 digits to 0 digits when the value changes from a number greater than 2^{-1023} to a number less than 2^{-1023}.	The precision changes gradually from 17 digits to 1 digit as the value changes from 2^{-1023} to 2^{-1074}.
The maximum relative error changes abruptly from 2^{-53} to 1 when the value changes from a number greater than 2^{-1023} to a number less than 2^{-1023}.	The maximum relative error changes gradually from 2^{-53} to 1 as the value changes from 2^{-1023} to 2^{-1074}.
For values from 2^{-1075} to 2^{-1022}, the maximum absolute error equals the value.	For values from 2^{-1075} to 2^{-1022}, the maximum absolute error is a constant 2^{-1075}.

This table shows how the precision changes as LREAL numbers approach zero.

If $|x|$ Is Greater Than:	Then the Precision Is Greater Than:
5.0E–308	17 digits
5.0E–309	16 digits
5.0E–310	15 digits
.	.
.	.
.	.
5.0E–322	3 digits
5.0E–323	2 digits
5.0E–324	1 digits

If |*x*| Is Greater Than:	Then the Precision Is Greater Than:
0.0	0 digits

Absolute error is the absolute value of x – a, where *x* is the exact value and *a* is the actual value stored.

Relative error is the absolute value of (x – a)/x, where *x* is the exact value and *a* is the actual value stored.

This table shows how gradual underflow affects absolute error and relative error as LREAL numbers approach zero.

Range	Maximum Absolute Error	Maximum Relative Error
$0 < |x| \leq 2^{-1075}$	$|x|$	1
$2^{-1075} < |x| \leq 2^{-1022}$	2^{-1075}	$2^{-1075} / |x|$
$2^{-1022} \leq |x| < 2^{1024} - 2^{972}$	$2^{-53} * |x|$	2^{-53}

Application Notes

- Can be used in Safety or Control applications.
- Can be used in CEM Cause, Effect, and Intersection cells.

REAL Data Type

A REAL data type is 32 bits in length and has 6 decimal digits of precision. In TriStation 1131, the REAL data type follows the IEC-559 Standard Floating-Point format.

Attribute	Description
Keyword/type	REAL
Description	Real number
Size	32 bits
Default value	0.0
Most positive number	3.402823466 e +38
Least positive number	1.401298464 e –45
Least negative number	–1.401298464 e 45
Most negative number	–3.402823466 e +38
Result if intermediate value is less than lower limit	–Infinity or HUGE
Result if upper limit is less than intermediate value	+Infinity or HUGE

Gradual Underflow for REAL Data Types

In PCs and safety controllers, the floating-point implementation includes a standard feature called *gradual underflow*. This feature extends the range of a REAL number and gradually changes the precision as values approach zero.

This table compares the values obtained when gradual underflow is not present, to the values obtained when it is present.

Without Gradual Underflow	With Underflow
The smallest positive number that can be stored in a REAL variable is: 2^{-126} = 1.175494351E-38.	The smallest positive number that can be stored in a REAL variable is: 2^{-149} = 1.401298464E-45.
The precision changes abruptly from 7 digits to 0 digits when the value changes from a number greater than 2^{-127} to a number less than 2^{-127}.	The precision changes gradually from 7 digits to 1 digit as the value changes from 2^{-127} to 2^{-149}.
The maximum relative error changes abruptly from 2^{-24} to 1 when the value changes from a number greater than 2^{-127} to a number less than 2^{-127}.	The maximum relative error changes gradually from 2^{-24} to 1 as the value changes from 2^{-127} to 2^{-149}.
For values from 2^{-150} to 2^{-126}, the maximum absolute error equals the value.	For values from 2^{-150} to 2^{-126}, the maximum absolute error is a constant 2^{-150}.

This table shows how the precision changes as numbers approach zero.

If $|x|$ Is Greater Than:	Then the Precision Is Greater Than:
1.5E-39	7 digits
1.5E-40	6 digits
1.5E-41	5 digits
1.5E-42	4 digits
1.5E-43	3 digits
1.5E-44	2 digits
1.5E-45	1 digits
0.0	0 digits

Absolute error is the absolute value of x – a, where x is the exact value and a is the actual value stored.

Relative error is the absolute value of (x – a)/x, where x is the exact value and a is the actual value stored.

This table shows how gradual underflow affects absolute error and relative error as REAL numbers approach zero.

Range	Maximum Absolute Error	Maximum Relative Error
$0 < |x| \leq 2^{-150}$	$|x|$	1
$2^{-150} < |x| \leq 2^{-126}$	2^{-150}	$2^{-150} / |x|$
$2^{-126} \leq |x| < 2^{128} - 2^{103}$	$2^{-24} * |x|$	2^{-24}

Application Notes

- Can be used in Safety or Control applications.
- Can be used in CEM Cause, Effect, and Intersection cells.

STRING Data Type

A STRING data type is an alphanumeric sequence, up to 132 characters in length, which is delimited by single quotation marks ('). The count of 132 characters does not include the null terminator or the single quotation mark.

A STRING data type cannot be used as a program input or output.

Attribute	Description
Keyword/type	STRING
Description	Character string
Size	136 bytes
Default Value	Empty string (two single quotation marks not separated by any characters)
Lower limit	0 characters
Upper limit	132 characters
Result if intermediate value is less than lower limit	Truncated string
Result if upper limit is less than intermediate value	N/A

Application Notes

- Can be used in Safety or Control applications.
- Can be used in CEM Cause, Effect, and Intersection cells.

TIME Data Type

A TIME data type refers to a period of time (duration) in days, hours, minutes, seconds, and milliseconds. The range is ± 9999 years and the precision is 0.1 milliseconds.

A TIME data type cannot be used as a program input or output.

Attribute	Description
Keyword/type	TIME
Description	Duration
Size	64 bits
Syntax	TIME#11d
	or
	TIME#22.2h
	or
	TIME#33.3m
	or
	TIME#44.4s
	or
	TIME#55.5ms
	or
	TIME#11d22h33m44s55.5ms
	or
	T#11d22h33m44s55.5ms
	or
	T#44.4s
Default value	TIME#0S
Lower limit	TIME#-3652134d
Upper limit	TIME#3652134d
Result if intermediate value is less than lower limit	Inv Time
Result if upper limit is less than intermediate value	Inv Time

Application Notes

- Can be used in Safety or Control applications.
- Can be used in CEM Cause, Effect, and Intersection cells.

TOD Data Type

A TOD data type refers to a specific time of day expressed in hours, minutes, seconds, and fractions (FFF) of a second. The precision is 0.001 seconds.

A TOD data type cannot be used as a program input or output.

Attribute	Description
Keyword/type	TOD
Description	Time of day
Size	64 bits
Syntax	TOD#HH:MM:SS
	or
	TOD#HH:MM:SS.FFF
	or
	TIME_OF_DAY#HH:MM:SS
Default value	TOD#00:00:00
Lower limit	TOD#00:00:00
Upper limit	TOD#23:59:59.999
Result if intermediate value is less than lower limit	V modulo 24 hours
Result if upper limit is less than intermediate value	V modulo 24 hours

Application Notes

- Can be used in Safety or Control applications.
- Can be used in CEM Cause, Effect, and Intersection cells.

Generic Data Types

Generic data types, identified by the prefix ANY, are used exclusively in the functions and function blocks that are available in the TriStation Standard Library.

If a function specifies a generic data type for an argument, then the argument type must be one of the data types represented by that generic data type. If a function specifies one generic data type for more than one argument, then all such arguments must have the same data type.

For example, the function ADD specifies type ANY_NUM for all arguments and the return value. You can add two double integers, or two integers, or two long real numbers, or two real numbers, but you cannot add a real number to a long real number.

The TriStation generic data types are based on the IEC 61131-3 standard. The hierarchy for them is shown in this figure.
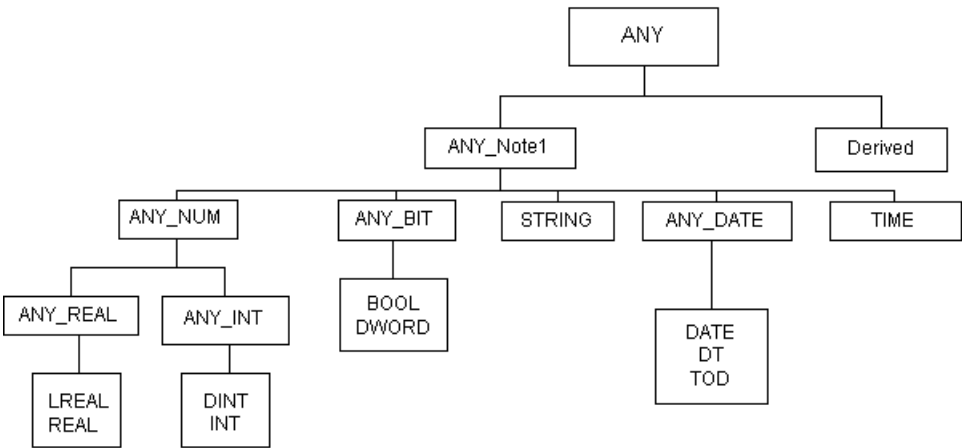
Figure 43   Generic Data Types Hierarchy

This table lists the meaning of each generic data type and the standard data types it represents.

Table 65   Generic Data Types

Data Type	Standard Data Type Represented
ANY	Any of the standard data types: BOOL, DATE, DINT, DT, DWORD, INT, LREAL, REAL, STRING, TIME, TOD, or Derived
ANY_NUM	Any number: DINT, INT, LREAL, or REAL
ANY_REAL	Any real number: LREAL or REAL
ANY_INT	Any integer: DINT or INT
ANY_BIT	Any bitwise data type: BOOL or DWORD
ANY_DATE	Any date or time of day or both: DATE, DT, or TOD
ANY_NOTE1	Any elementary data type: BOOL, DATE, DINT, DT, DWORD, INT, LREAL, REAL, STRING, TIME, or TOD. Note that each of these types is ordered so that values of the same type can be compared (see functions EQ, GE, GT, LE, LT, NE, MIN, and MAX).

C

TCM Model 4351/4352 Configuration

Overview

If you have an older model 4351 or 4352 TCM installed in your system, some of the configuration options are different than those for later model TCMs (models 4351A, 4352A, 4351B, 4352B, 4353, and 4354).

Note   Model 4351 and 4352 TCMs can be installed only in Tricon 10.0.x systems. Tricon 10.1 and later systems do not support the model 4351 and 4352 TCMs.

The procedures in this appendix apply specifically to configuring the ports on the model 4351 or 4352 TCM, and should be followed in place of the TCM configuration procedures provided in Chapters 3 and 5 of this guide.

If you have a model **4351A, 4352A, 4351B, 4352B, 4353, or 4354** TCM, *do not* use the procedures in this appendix. You should instead use the information found in the following sections:

- Configuring TCM Ports on page 324
- Using a Tricon TCM to Synchronize Time on page 349
- Configuring a Tricon TCM Port for Printing on page 470

Configuring TCM Ports

A single Tricon 10.0.x system supports a maximum of four TCMs, which must reside in two logical slots.

- Model 4351 and 4352 TCMs can be installed only in Tricon 10.0.x systems.

- Model 4351/4352 TCMs cannot be installed in a system that also has 4351A/4352A or 4351B/4352B TCMs installed, even if they are installed in different chassis.

- Model 4351/4352 TCMs cannot be installed in Tricon 9.x or earlier systems, or in Tricon 10.1.x and later systems.

See the *Planning and Installation Guide for Tricon v9-v10 Systems* for detailed TCM installation guidelines. For more detailed compatibility information, please see the *Product Release Notice* for your Tricon system version.

TCM models 4351 (Copper)/4352 (Fiber) support the following protocols on network and serial ports.

Protocol	Network Ports	Serial Ports
TriStation	NET 2	Port 4
TSAA (UDP/IP)	NET 2	—[a]
Peer-to-Peer (UDP/IP)	NET 1	—
Peer-to-Peer (DLC)	NET 1	—
Modbus Slave (ASCII or RTU)	—	Any port
Modbus Master (RTU)	—	Any port
Modbus Master or Slave (TCP)	NET 2	—
GPS Time Synchronization	—	Port 1
Triconex Time Synchronization via DLC or UDP/IP	NET 1	
SNTP Triconex Time Synchronization	NET 2	—
Network Printing using Jet Direct	NET 2	—

a. — means the protocol is not available on this port.

Note   Invensys recommends configuring a serial connection to the TCM first, because it is less complex and easier to successfully connect to the TCM through the serial port.

Once you have successfully connected to the TCM and downloaded the initial configuration to the Tricon, you can go back and configure the more complex network connection, without worrying about losing the ability to communicate with the controller altogether.

To configure specific types of ports, see these topics:

- Configuring TCM Peer-To-Peer Ports on page 765
- Configuring TCM Network Ports on page 763
- Configuring TCM Peer-To-Peer Ports on page 765
- Configuring TCM Modbus TCP Ports on page 767
- Configuring TCM Routing on page 769

For additional information on configuring the TCM, see these topics:

- Using a Tricon TCM to Synchronize Time on page 771 for instructions on configuring the TCM to synchronize time.
- Configuring a Tricon TCM Printer Port for Printing on page 776 for instructions on configuring the TCM for use with a printer.

Changing TCM Models

Once TCM ports have been configured, *but prior to downloading the configuration to the controller*, you can change the existing TCM model to a different model TCM without losing your port settings (see Inserting and Removing Tricon Modules on page 311).

Only the following model changes will retain your port settings:

- 4351 to 4352
- 4352 to 4351

Any other TCM model changes will result in all port settings being reset to their default values.

However, once the configuration has been downloaded to the controller, you cannot change the TCM model installed in the Tricon system without downloading a new configuration.

Configuring TCM Serial Ports

This procedure explains how to configure serial ports on a Tricon TCM.

Procedure

1 Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the slot where the TCM module is installed and then click Setup.

The TCM Setup dialog box appears.

3 Click the Serial tab.

4 Specify these properties.

Property	Action
Port Selection	Click the port to be configured. Ports can be configured only for a slot with an installed module.
Protocol	Select the communication protocol for the port: • All ports can use Modbus Master, Modbus Slave ASCII, Modbus Slave RTU. • Only port 1 can use GPS. This port is automatically configured for GPS when you enable time synchronization. See Using a Tricon TCM to Synchronize Time on page 771. • Only port 4 can use TriStation.

Property	Action
Port Write Enabled	Available only if Modbus Slave (ASCII or RTU) is selected as the communication protocol. Select this check box if you want to allow Modbus writes to this slave port. The default is cleared (the port is read-only).
Modbus Slave Address	If you selected Modbus Slave RTU or ASCII, enter the number of the Modbus slave device. The default is 1.
Baud Rate	Enter the communication rate for the port. The default is 9600.
Data Bits	Select 8 or 7 bits. The default is 8. Available only with Modbus Slave ASCII.
Stop Bits	Select 1 or 2 bits. The default is 1 bit.
Parity	Select the type of parity for the port. The default is Odd.
Transceiver Mode	Select RS-485 or RS-232. The default is RS232. On port 4 when TriStation is selected as the protocol, RS-485 is not available.
Handshake	Select None or Hardware; the default is None.
Termination Options	Select the type of termination used with cables. Only available with RS-485 Transceiver Mode. The default is None.
FP Ordering	Select the order to be used with floating point numbers. Determines whether the most significant bits in a32-bit address are the first 16 (high) or the last 16 (low). The default is Low 16 Bits First.
Modbus (Minimum and Maximum) Range	Enter the minimum and maximum values to be used for the Modbus data range. The default minimum is 0. The default maximum is 32,767.
Master Logical Port	Enter the port number that the TCM will use in the Modbus Master functions to access the port. Only available for Modbus Master.

5   Click OK to save your changes.

Note   Even if port 4 is set to Not Configured (the default value), it can still be used to connect to the Tricon controller via TriStation. This is useful when you are unable to connect via a network connection.

Configuring TCM Network Ports

This procedure explains how to configure network ports on a Tricon TCM.

Procedure

1 Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the slot where the TCM module is installed and then click Setup.

The TCM Setup dialog box appears.

3 Specify these properties on the Network tab.

Property	Action
Slot Selection	Select the slot where the TCM module you want to configure is installed.
Not Installed, Installed	Click Installed to enable configuration of the module. Clicking Not Installed resets all options to their default state and makes them unavailable for configuration. The default is Not Installed.
Enable Network	Select the check box to enable the network port to be configured.

Property	Action
Transceiver Mode	Select the communication mode.
	For a model 4352 with fiber connectors, the default is 100 Mbps Half Duplex. This TCM cannot negotiate the connection speed or connect at 10 Mbps.
	For a model 4351, the default is Auto-Negotiate.
IP Address	Enter the IP Address for the port. NET 1 and NET 2 cannot use the same IP address. The default for NET 1 is 192.168.1.0; for NET 2 is 192.168.1.1.
	The highest and lowest IP addresses in a subnet (addresses where the last number is 0 or 255, such as 192.168.55) are reserved for broadcast messaging and cannot be used as a valid IP address.
IP Subnet Mask	If needed, enter the IP address for the subnet. The default is 255.255.255.0.
Default Gateway IP Address	If needed, enter the IP address for the default gateway. The default is 0.0.0.0. Typically, this is the IP address of the network router.
	The default gateway address must be part of the subnet.
TriStation Configuration: UDP Port Number	The UDP port to use for the TriStation connection. The default is 1502. See UDP Base Port Number on page 730 for additional information.
TSAA Configuration: UDP Port Number	The UDP port to use for TSAA connections, including DDE Server, SOE Recorder, and OPC Server. The default is 1500. See UDP Base Port Number on page 730 for additional information.
Port Write Enabled	Select this check box if you want to allow TSAA writes to the network ports. Applies to all TSAA connections on these ports. The default is cleared (the ports are read-only).

4 Click OK to save your changes.

Note Changes to TCM IP addresses are not effective until the existing connection is closed and a new connection is opened. Once a connection is opened, it remains open until you close it, even if the IP address is changed via a Download Changes operation.

Configuring TCM Peer-To-Peer Ports

This procedure explains how to configure the IP address for controllers communicating on a Peer-to-Peer network through a Tricon TCM.

Procedure

1 Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the slot where the TCM module is installed and then click Setup.

The TCM Setup dialog box appears.

3 Click the Peer-to-Peer tab.

4 Under Slot Selection, select the module (slot) you want to configure Peer-to-Peer ports for.

5 Select a node (controller), and specify these properties.

Property	Action
Destination UDP Port	Enter the UDP port number for each controller to be communicated with on the Peer-to-Peer network. This must be the same number that the controller uses as its UDP Base Port Number.
IP Address	Enter the IP address for the controller.

6 Click Update to apply the new settings for the selected node.

7 Repeat steps 4 through 6 for each node to be included in the network.

Note If necessary, click Reset All to reset *all* node settings for the selected slot to their default, unconfigured state.

8 Once all nodes have been configured, specify these properties (applicable to all nodes on the Peer-to-Peer network).

Property	Action
UDP Base Port Number	Enter the UDP base port number for the controller. Enter 0 to disable Peer-to-Peer over UDP/IP on the network. The default is 1503. UDP port numbers must be unique. See UDP Base Port Number on page 730 for reserved values.
Enable Communication with Tricon V8 and V9 Peer-to-Peer Systems on NET 1	Select the check box to enable communication with Tricon version 8 and 9 systems. The default is cleared. Available only for a module installed in the left slot.

9 Click OK to save your changes.

Configuring TCM Modbus TCP Ports

This procedure explains how to configure Modbus TCP ports on a Tricon TCM, which enables Modbus communication through network ports.

Procedure

1   Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2   Double-click the slot where the TCM module is installed and then click Setup.

The TCM Setup dialog box appears.

3   Click the Modbus TCP tab.

4   Under Slot Selection, select the module (slot) you want to configure Modbus TCP ports for.

5   Select a port and specify these properties.

Property	Action
Protocol	Select the communication protocol for the port. Options include Modbus TCP Master and Modbus TCP Slave Net.
Port Write Enabled	Available only if Modbus TCP Slave is selected as the communication protocol. Select this check box if you want to allow Modbus writes to this slave port. The default is cleared (the port is read-only).
Master Logical Port	Enter the number of the Modbus Master node. Available only with Modbus TCP Master protocol. Must be unique for each TCM installed in a system.

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Property	Action
TCP Port Number	Enter the number for the TCP port. The default is 502.
IP Address	If the port uses Modbus Master protocol, enter the IP address of the slave node.
	If the port uses Modbus Slave protocol, enter either of these:
	• To accept communication from any Modbus Master, leave the IP address as 0.0.0.0.
	• To accept communication only from a defined Modbus Master, enter the specific master IP address.
FP Ordering	Select the ordering to use for floating point numbers.
Modbus (Minimum and Maximum) Range	Enter the minimum and maximum for the modbus data range. Available only with Modbus TCP Slave Net.

6 Click OK to save your changes.

Configuring TCM Routing

This procedure explains how to configure routing on a Tricon TCM. Up to 10 different routes can be configured for each module.

Procedure

1 Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the slot where the TCM module is installed and then click Setup.

The TCM Setup dialog box appears.

3 Click the Routing tab.
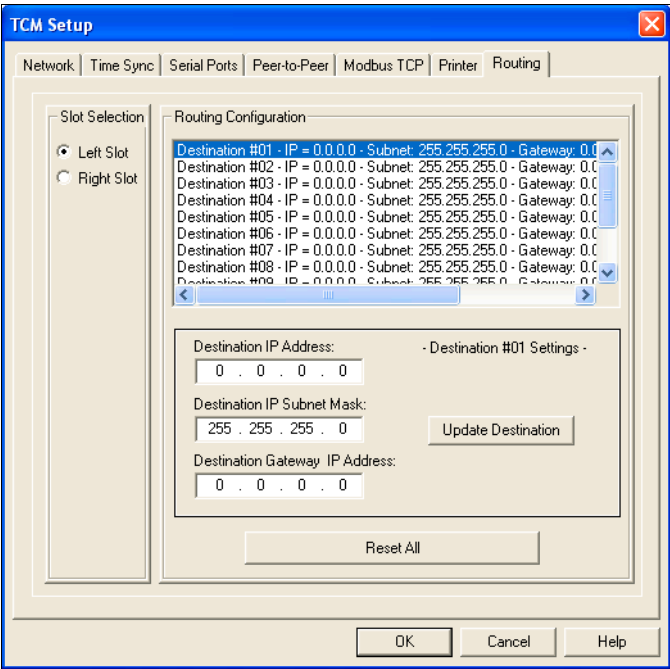
4 Select the module (slot) you want to configure routing for.

5 Select a destination route and then specify these properties.

Property	Action
Destination Gateway IP Address	Enter the IP address which is used if the controller is not on the same subnet as other devices.
Destination IP Subnet Mask	Enter the IP address of the subnet mask.
	If the gateway address is on NET 2, then the subnet mask must be the same as the NET 2 subnet mask defined on the Network tab. If the gateway address is on NET 1, then the subnet mask must be the same as the NET 1 subnet mask defined on the Network tab. See Configuring TCM Network Ports on page 763.

Property	Action
Destination Gateway IP Address	Enter the IP address of the gateway to which the controller is connected. The gateway address must always be on NET 1 or NET 2.

6 Click Update Destination to apply the settings. If necessary, click Reset All to reset all destination settings for the selected slot to their default, unconfigured state.

7 Click OK to save your changes.

Using a Tricon TCM to Synchronize Time

This procedure explains how to enable time synchronization on a TCM. Time synchronization can be enabled using the following protocols:

- GPS
- SNTP
- Triconex Time Synchronization via DLC or UDP/IP on a Peer-to-Peer network

In a redundant network of Tricon controllers that each have two TCMs installed, you can implement redundant time synchronization by configuring time synchronization for both TCM modules (both left and right slots). Time synchronization can be enabled only for a single logical slot.

If the TCM is installed in the COM slot, you configure time synchronization only for the left slot (there is no redundancy when installed in the COM slot).

Topics include:

Configuring GPS Time Synchronization on the TCM

This procedure explains how to configure a TCM to enable time synchronization through the Global Positioning System (GPS) by using the Trimble Acutime Gold Smart GPS Antenna. For information on installing the kit, see *Triconex Application Note #43*, available on the Invensys Global Customer Support (GCS) website.

CAUTION To ensure the accuracy of GPS time adjustments, the Tricon clock must be set to within 10 minutes of the correct local time.

If the TCM is in a Peer-to-Peer network, it can also be used as the master node for time synchronization of other controllers on the network. In this configuration, the master node TCM synchronizes time with the GPS, and any slave nodes on the Peer-to-Peer network synchronize their time with the master TCM. In this way, all nodes on the Peer-to-Peer network are synchronized with GPS time.

If the TCM is acting as a slave node on a Peer-to-Peer network, it *cannot* be configured for GPS time synchronization. Slave nodes synchronize their time *only* to the master node on the Peer-to-Peer network, and reject all other time change requests.

GPS time synchronization uses Serial Port 1 on the TCM.

Procedure

1 Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the slot where the TCM module is installed and then click Setup. The TCM Setup dialog box appears.

3 Click the Time Sync tab.
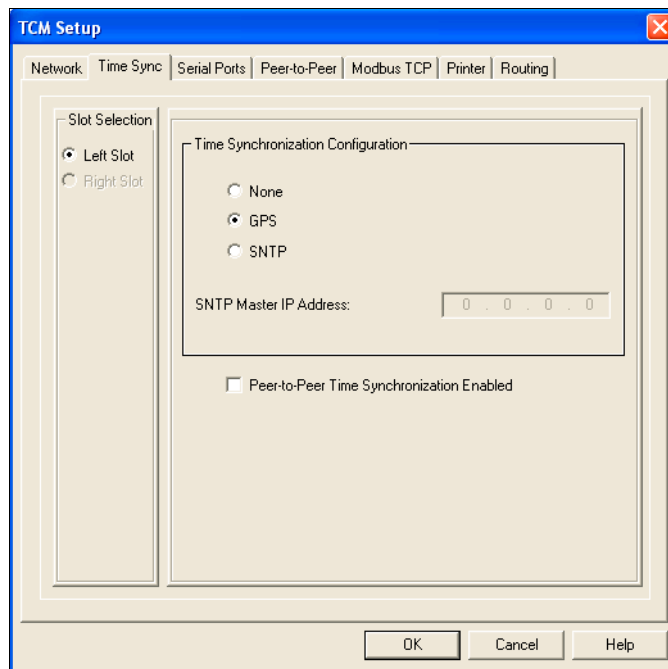
4 Under Slot Selection, click Left Slot. You must configure the module in the left slot first.

5 Under Time Synchronization Configuration, select GPS.

If you previously configured Port 1 to use a Modbus protocol, selecting GPS will reset Port 1 to use the GPS protocol. See Configuring TCM Peer-To-Peer Ports on page 765 for more information.

6 (Optional) If you have a redundant TCM installed in the right slot, under Slot Selection, click Right Slot, and then select GPS Redundant.

> **Note**   The module in the right slot can be configured only if it has been installed (see Configuring TCM Network Ports on page 763) and if the module in the left slot has already been configured for GPS time synchronization.

7 Click OK to save your changes.

Enabling the TCM as a Master Node for Triconex Time Synchronization (Optional)

If you also want the TCM to be able to act as a master node for time synchronization of other controllers on a Peer-to-Peer network (using Triconex Time Synchronization) do the following:

1 In the Configuration tree, click Operating Parameters (see Setting Tricon Operating Parameters on page 295).

2 Select the Enable Tricon Node Time Synchronization check box.

Configuring SNTP Time Synchronization on the TCM

This procedure explains how to configure TCM time synchronization to an SNTP server.

If the TCM is in a Peer-to-Peer network, it can also be used as the master node for time synchronization of other controllers on the network. In this configuration, the master node TCM synchronizes time with the SNTP server, and any slave nodes on the Peer-to-Peer network synchronize their time with the master TCM. In this way, all nodes on the Peer-to-Peer network are synchronized with SNTP time.

If the TCM is acting as a slave node on a Peer-to-Peer network, it *cannot* be configured for SNTP time synchronization. Slave nodes synchronize their time *only* to the master node on the Peer-to-Peer network, and reject all other time change requests.

Note   SNTP time synchronization is less accurate than GPS time synchronization. Because the SNTP server resides on a PC, network load issues or PC performance can result in delays in processing time update requests from the Tricon controller.

Procedure

1   Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2   Double-click the slot where the TCM module is installed and then click Setup. The TCM Setup dialog box appears.

3   Click the Time Sync tab.

4   Under Slot Selection, click Left Slot. You must configure the module in the left slot first.

5   Select these properties.

Property	Action
Time Synchronization Configuration	Select SNTP. The default is None.
SNTP Master IP Address	Enter the IP address of the SNTP server to synchronize time with.

6 (Optional) If you have a redundant TCM installed in the right slot, under Slot Selection, click Right Slot, and then select these properties.

Property	Action
Time Synchronization Configuration	Select SNTP Redundant.
SNTP Master IP Address	Enter the IP address of the SNTP server to synchronize time with.

Note   The module in the right slot can be configured only if it has been installed (see Configuring TCM Network Ports on page 763) and if the module in the left slot has already been configured for SNTP time synchronization.

7 Click OK to save your changes.

Enabling the TCM as a Master Node for Triconex Time Synchronization (Optional)

If you also want the TCM to be able to act as a master node for time synchronization of other controllers on a Peer-to-Peer network (using Triconex Time Synchronization) do the following:

1 In the Configuration tree, click Operating Parameters (see Setting Tricon Operating Parameters on page 295).

2 Select the Enable Tricon Node Time Synchronization check box.

Configuring Triconex Time Synchronization on the TCM

In a Peer-to-Peer network, Triconex Time Synchronization can be used to synchronize time across controllers on a network. The controller with the lowest node number serves as the master node.

The master node can also synchronize its time with a GPS or an SNTP server. In this configuration, the master node synchronizes time with the GPS or SNTP server, and any slave nodes on the Peer-to-Peer network synchronize their time with the master node. In this way, all nodes on the Peer-to-Peer network are synchronized with GPS or SNTP time.

Configuring a Master or Slave Node

This procedure describes how to configure the TCM as a master or slave node on the Peer-to-Peer network when GPS or SNTP time synchronization is **not** being used.

If you want the master node to synchronize to a GPS or SNTP server, use the procedures in the these sections:

- Configuring GPS Time Synchronization on the TCM on page 771
- Configuring SNTP Time Synchronization on the TCM on page 773

Procedure

1 Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2 Double-click the slot where the TCM module is installed and then click Setup. The TCM Setup dialog box appears.

3 Click the Time Sync tab.

4 Under Time Synchronization Configuration, select None.

5 Select the Peer-to-Peer Time Synchronization Enabled check box to enable Triconex Time Synchronization across the Peer-to-Peer network.

6 Click OK to save your changes.

7 In the Configuration tree, click Operating Parameters (see Setting Tricon Operating Parameters on page 295).

8 Select the Enable Tricon Node Time Synchronization check box.

This allows the controller to participate as a master node in time synchronization across the Peer-to-Peer network.

Configuring a Tricon TCM Printer Port for Printing

This procedure explains how to configure a Tricon TCM port that is connected to a Centronics-compatible printer. You do not need the printer driver that may have come with the printer package. See Configuring Tricon Controller Printing on page 465 for more information about printing from the Tricon controller.

Procedure

1   Expand the Controller tree, double-click Configuration, and expand Hardware Allocation.

2   Double-click the slot where the TCM module is installed and then click Setup.

    The TCM Setup dialog box appears.

3   Click the Printer tab.
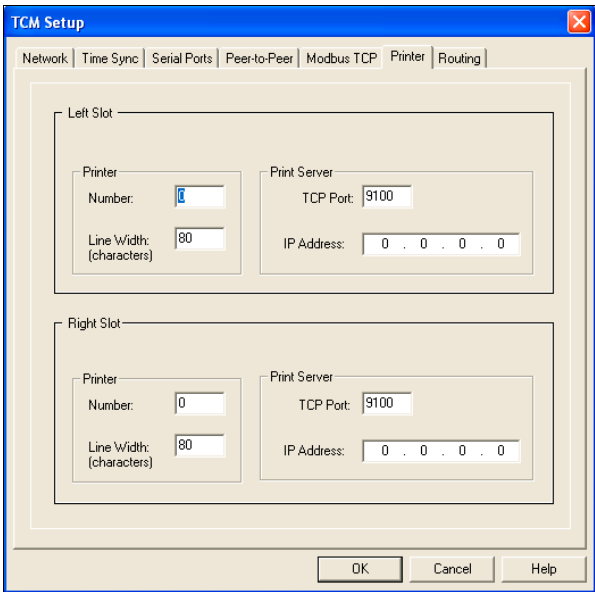
4   Specify these properties for the module installed in the Left Slot.

Property	Action
Printer Number	Enter the number for the printer; can only be 5 or 10. The default is 0, meaning a printer is not configured.
Line Width	Enter the number of characters to be printed on a line. The default is 80 characters.
TCP Port Number	Enter the number of the TCP port for the print server. The default is 9100 for an HP printer.
IP Address	Enter the IP address of the printer server.

5   If a module is also installed in the Right Slot, repeat step 4 for that module.

6   Click OK to save your changes.

D

Reserved Names

Names Reserved by TriStation 1131

This section lists all names reserved by TriStation 1131. These reserved names cannot be used to name user accounts, variables, tagnames, custom function block names, programs, or program instances.

Names are not case-sensitive. For example, TriStation 1131 reserves all of the following names:

- AT, At, aT, at

TriStation 1131 Reserved Names	
.*	AT
_*	ATAN
ABS	BECOMES
ACOS	BLINK
ACTION	BLINK_I
ADD	BLINK_R
AIN	BOOL
AIN_BP	BOOL_TO_BYTE
AIN_BP12	BOOL_TO_DWORD
AIN_HR	BOOL_TO_STRING
AND	BOOL_TO_WORD
ANY	BY
ANY_BIT	BYTE
ANY_DATE	BYTE_TO_BOOL
ANY_INT	BYTE_TO_DWORD
ANY_NOTE1	BYTE_TO_WORD
ANY_NUM	C##B
ANY_REAL	C##F#
AOUT	CASE
AOUT_BP12	CEIL
ARRAY	CHK_ERR
ARRAY32_BOOL	CLR_ERR
ARRAY32_DINT	CONCAT
ARRAY32_REAL	CONCAT_DT
ASIN	CONCAT_STRING
ASSIGN	CONFIGURATION

TriStation 1131 Reserved Names *(continued)*	
CONSTANT	DATE_AND_TIME
COS	DDEC
CSCHED	DEBUG_MODVARS
CSCHED_I	DELETE
CSCHED_R	DINC
CTD	DINT
CTU	DINT_TO_DWORD
CTUD	DINT_TO_INT
D_ADD	DINT_TO_LREAL
D_CMP	DINT_TO_REAL
D_CMPE	DINT_TO_SINT
D_DIV	DINT_TO_STRING
D_DTOF	DINT_TO_UDINT
D_DTOI	DINT_TO_UINT
D_DTOLL	DINT_TO_USINT
D_DTOQ	DIV
D_DTOU	DO
D_DTOULL	DPFABS
D_FEQ	DT
D_FGE	DT_TO_DATE
D_FGT	DT_TO_TOD
D_FLE	DWORD
D_FLT	DWORD_TO_BOOL
D_FNE	DWORD_TO_BYTE
D_ITOD	DWORD_TO_DINT
D_LLTOD	DWORD_TO_WORD
D_MUL	E##B
D_NEG	E##C##B
D_QTOD	E##C##F
D_SUB	E##F#
D_ULLTOD	ELSE
D_UTOD	ELSIF
DATE	EN

TriStation 1131 Reserved Names *(continued)*	
END_ACTION	F_FLT
END_CASE	F_FNE
END_CONFIGURATION	F_FTOD
END_FOR	F_FTOI
END_FUNCTION	F_FTOLL
END_FUNCTION_BLOCK	F_FTOQ
END_IF	F_FTOU
END_PROGRAM	F_FTOULL
END_REPEAT	F_ITOF
END_RESOURCE	F_LLTOF
END_STEP	F_MUL
END_STRUCT	F_NEG
END_TRANSITION	F_QTOF
END_TYPE	F_SUB
END_VAR	F_TRIG
END_WHILE	F_ULLTOF
ENO	F_UTOF
EQ	FALSE
ERRNO	FDEC
EXIT	FINC
EXP	FIND
EXPFLTR	FLOOR
EXPT	FOR
EXTERN	FP_ROUND
F_ADD	FPFABS
F_CMP	FROM
F_CMPE	FUNCTION
F_DIV	FUNCTION_BLOCK
F_EDGE	GASDETR
F_FEQ	GATDIS
F_FGE	GATENB
F_FGT	GE
F_FLE	GETDELTA_DINT

TriStation 1131 Reserved Names *(continued)*	
GETDELTA_REAL	LESSEQUAL
GETDELTAT	LIMIT
GETTIMER	LINEMNTR
GREATEREQUAL	LINT
GT	LN
IDENT	LOG
IF	LOOPDETR
INFINITY_LREAL	LPT05BUF
INFINITY_REAL	LPT10BUF
INITIAL_STEP	LREAL
INSERT	LREAL_TO_DINT
INT	LREAL_TO_INT
INT_TO_DINT	LREAL_TO_REAL
INT_TO_LREAL	LREAL_TO_SINT
INT_TO_REAL	LREAL_TO_UDINT
INT_TO_SINT	LREAL_TO_UINT
INT_TO_STRING	LREAL_TO_USINT
INT_TO_UDINT	LSX_CLEAR_ALL_FAULTS
INT_TO_UINT	LSX_DI_POINT
INT_TO_USINT	LSX_II_POINT
INTERNAL	LSX_RI_POINT
INTGTOR	LT
INTGTOR_R	LWORD
ISFINITE_LREAL	MAX
ISFINITE_REAL	MBCTRL
ISNAN_LREAL	MBREAD_BOOL
ISNAN_REAL	MBREAD_DINT
L_EDGE	MBREAD_REAL
LE	MBREAD_REAL_TRD
LEADLAG	MBWRITE_BOOL
LEADLAG_R	MBWRITE_DINT
LEFT	MBWRITE_REAL
LEN	MBWRITE_REAL_TRD

TriStation 1131 Reserved Names *(continued)*	
MEDSEL	PRINT_CRLF
MID	PRINT_CTOD
MIN	PRINT_DINT
MINUS_INFINITY_LREAL	PRINT_REAL
MINUS_INFINITY_REAL	PRINT_STRING
MOD	PRIORITY
MOVE	PRNTR_FLUSH
MUL	PROGRAM
MUX	R_EDGE
NAN_LREAL	R_TRIG
NAN_REAL	READ_ONLY
NE	READ_WRITE
NEG	READ_WRT
NIL	REAL
NOT	REAL_TO_DINT
NOTEQUAL	REAL_TO_INT
NUMBITS	REAL_TO_LREAL
NUMBITS_DWORD	REAL_TO_SINT
OF	REAL_TO_UDINT
ON	REAL_TO_UINT
OR	REAL_TO_USINT
OVDDISABLE	REPEAT
OVDENABLE	REPLACE
PACK16	REPORT_BAD_PARAM
PACK32	REPORTBADPARAM
PAGE_EJECT	RESOURCE
PERDEV	RETAIN
PID	RETURN
PID_R	RIGHT
POLY4	ROL
POLY5	ROR
PRINT_BOOL	RS
PRINT_CDT	RTC

TriStation 1131 Reserved Names *(continued)*	
SCALE	SYS_DI16_AI16_STATUS
SEL	SYS_DI32_STATUS
SEMA	SYS_DO16_STATUS
SET_ERR	SYS_EPI06_STATUS
SHL	SYS_HRDI32_STATUS
SHR	SYS_II_POINT
SIN	SYS_IO_STATUS
SINGLE	SYS_IOP_STATUS
SINT	SYS_MP_EXT_STATUS
SINT_TO_DINT	SYS_MP_RESET_PORTS
SINT_TO_INT	SYS_MP_STATUS
SINT_TO_LREAL	SYS_OVD_INHIBIT
SINT_TO_REAL	SYS_PI06_STATUS
SINT_TO_UDINT	SYS_RI_POINT
SINT_TO_UINT	SYS_RO32_STATUS
SINT_TO_USINT	SYS_SDO16_STATUS
SOECLR	SYS_SERIAL_PORT
SOESTAT	SYS_SET_APP_LOCK
SOESTOP	SYS_SET_PROG_ALARM
SOESTRT	SYS_SET_REMOTE_WRT_ENBL
SQRT	SYS_SHUTDOWN
SR	SYS_SYSTEM_STATUS
STEP	SYS_VOTE_MODE
STRING	TAN
STRUCT	TASK
SUB	TCJ_CONV
SYS_AI32_STATUS	TCK_CONV
SYS_AO04_STATUS	TCNX_BD
SYS_APP_HALT	TDD_I
SYS_CLEAR_FLTS	TDD_R
SYS_CM_STATUS	TDE_I
SYS_CRITICAL_IO	TDE_R
SYS_DI_POINT	THEN

TriStation 1131 Reserved Names *(continued)*	
TIME	TR_SLOT_STATUS
TIME_OF_DAY	TR_URCV_BOOL
TIME_TO_LREAL	TR_URCV_DINT
TIME_TO_SECS	TR_URCV_DINT_32
TIME_TO_SECS_REAL	TR_URCV_REAL
TIMEADJ	TR_URCV_REAL_32
TIMESET	TR_USEND_BOOL
TMR	TR_USEND_DINT
TMR_I	TR_USEND_DINT_32
TMR_R	TR_USEND_REAL
TO	TR_USEND_REAL_32
TOD	TR_VOTE_MODE
TOF	TRANSITION
TOGGLE	TRUNC_*_TO_*
TON	TRUNC_LREAL_TO_DINT
TP	TRUNC_LREAL_TO_INT
TP_I	TRUNC_LREAL_TO_SINT
TP_R	TRUNC_LREAL_TO_UDINT
TRUE	TRUNC_LREAL_TO_UINT
TR_64_POINT_STATUS	TRUNC_LREAL_TO_USINT
TR_CALENDAR	TRUNC_REAL_TO_DINT
TR_CHASSIS_STATUS	TRUNC_REAL_TO_INT
TR_CRITICAL_IO	TRUNC_REAL_TO_SINT
TR_LOG_EVENT	TRUNC_REAL_TO_UDINT
TR_LOG_EVENT_DINT	TRUNC_REAL_TO_UINT
TR_LOG_EVENT_DWORDS	TRUNC_REAL_TO_USINT
TR_MP_STATUS	TSCHED
TR_PEER_STATUS	TSCHED_I
TR_POINT_STATUS	TSCHED_R
TR_PORT_STATUS	TYPE
TR_PROGRAM_STATUS	UDINT
TR_SCAN_STATUS	UDINT_TO_DINT
TR_SHUTDOWN	UDINT_TO_INT

TriStation 1131 Reserved Names *(continued)*	
UDINT_TO_LREAL	VAR_TEMP
UDINT_TO_REAL	WHILE
UDINT_TO_SINT	WITH
UDINT_TO_UINT	WORD
UDINT_TO_USINT	WORD_TO_BOOL
UINT	WORD_TO_BYTE
UINT_TO_DINT	WORD_TO_DWORD
UINT_TO_INT	X_OF_N
UINT_TO_LREAL	XOR
UINT_TO_REAL	
UINT_TO_SINT	
UINT_TO_UDINT	
UINT_TO_USINT	
ULINT	
UNPACK16	
UNPACK32	
UNTIL	
UPTO	
USINT	
USINT_TO_DINT	
USINT_TO_INT	
USINT_TO_LREAL	
USINT_TO_REAL	
USINT_TO_SINT	
USINT_TO_UDINT	
USINT_TO_UINT	
VAR	
VAR_ACCESS	
VAR_EXTERNAL	
VAR_GLOBAL	
VAR_IN_OUT	
VAR_INPUT	
VAR_OUTPUT	

Names Reserved by SQL

This section lists names that should not be used to name data files when exporting tagnames to Microsoft Excel (.xls) files. Using a reserved name results in the following error message:
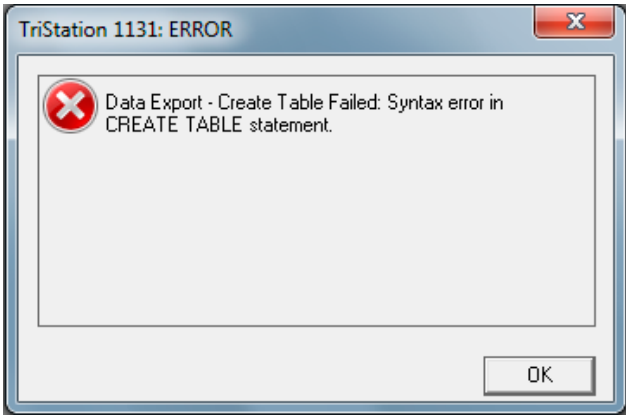
If you receive this error message when exporting tagnames to Microsoft Excel files, check the list to see if the name used is reserved. If the name is reserved, use a different name for exporting tagnames.

For information on how to export tagnames, see Importing and Exporting Tagnames on page 215.

Names are not case-sensitive. For example, all of the following words are reserved:

- AS, As, aS, as

SQL Reserved Names	
ABSOLUTE	AT
ACTION	AUTHORIZATION
ADA	AVG
ADD	BEGIN
ALL	BETWEEN
ALLOCATE	BIT
ALTER	BIT_LENGTH
AND	BOTH
ANY	BY
ARE	CASCADE
AS	CASCADED
ASC	CASE
ASSERTION	CAST

SQL Reserved Names *(continued)*	
CATALOG	DECLARE
CHAR	DEFAULT
CHAR_LENGTH	DEFERRABLE
CHARACTER	DEFERRED
CHARACTER_LENGTH	DELETE
CHECK	DESC
CLOSE	DESCRIBE
COALESCE	DESCRIPTOR
COLLATE	DIAGNOSTICS
COLLATION	DISCONNECT
COLUMN	DISTINCT
COMMIT	DOMAIN
CONNECT	DOUBLE
CONNECTION	DROP
CONSTRAINT	ELSE
CONSTRAINTS	END
CONTINUE	END-EXEC
CONVERT	ESCAPE
CORRESPONDING	EXCEPT
COUNT	EXCEPTION
CREATE	EXEC
CROSS	EXECUTE
CURRENT	EXISTS
CURRENT_DATE	EXTERNAL
CURRENT_TIME	EXTRACT
CURRENT_TIMESTAMP	FALSE
CURRENT_USER	FETCH
CURSOR	FIRST
DATE	FLOAT
DAY	FOR
DEALLOCATE	FOREIGN
DEC	FORTRAN
DECIMAL	FOUND

SQL Reserved Names *(continued)*	
FROM	LEFT
FULL	LEVEL
GET	LIKE
GLOBAL	LOCAL
GO	LOWER
GOTO	MATCH
GRANT	MAX
GROUP	MIN
HAVING	MINUTE
HOUR	MODULE
IDENTITY	MONTH
IMMEDIATE	NAMES
IN	NATIONAL
INCLUDE	NATURAL
INDEX	NCHAR
INDICATOR	NEXT
INITIALLY	NO
INNER	NONE
INPUT	NOT
INSENSITIVE	NULL
INSERT	NULLIF
INT	NUMERIC
INTEGER	OCTET_LENGTH
INTERSECT	OF
INTERVAL	ON
INTO	ONLY
IS	OPEN
ISOLATION	OPTION
JOIN	OR
KEY	ORDER
LANGUAGE	OUTER
LAST	OUTPUT
LEADING	OVERLAPS

SQL Reserved Names *(continued)*	
PAD	SQL
PARTIAL	SQLCA
PASCAL	SQLCODE
POSITION	SQLERROR
PRECISION	SQLSTATE
PREPARE	SQLWARNING
PRESERVE	SUBSTRING
PRIMARY	SUM
PRIOR	SYSTEM_USER
PRIVILEGES	TABLE
PROCEDURE	TEMPORARY
PUBLIC	THEN
READ	TIME
REAL	TIMESTAMP
REFERENCES	TIMEZONE_HOUR
RELATIVE	TIMEZONE_MINUTE
RESTRICT	TO
REVOKE	TRAILING
RIGHT	TRANSACTION
ROLLBACK	TRANSLATE
ROWS	TRANSLATION
SCHEMA	TRIM
SCROLL	TRUE
SECOND	UNION
SECTION	UNIQUE
SELECT	UNKNOWN
SESSION	UPDATE
SESSION_USER	UPPER
SET	USAGE
SIZE	USER
SMALLINT	USING
SOME	VALUE
SPACE	VALUES

SQL Reserved Names *(continued)*
VARCHAR
VARYING
VIEW
WHEN
WHENEVER
WHERE
WITH
WORK
WRITE
YEAR
ZONE

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