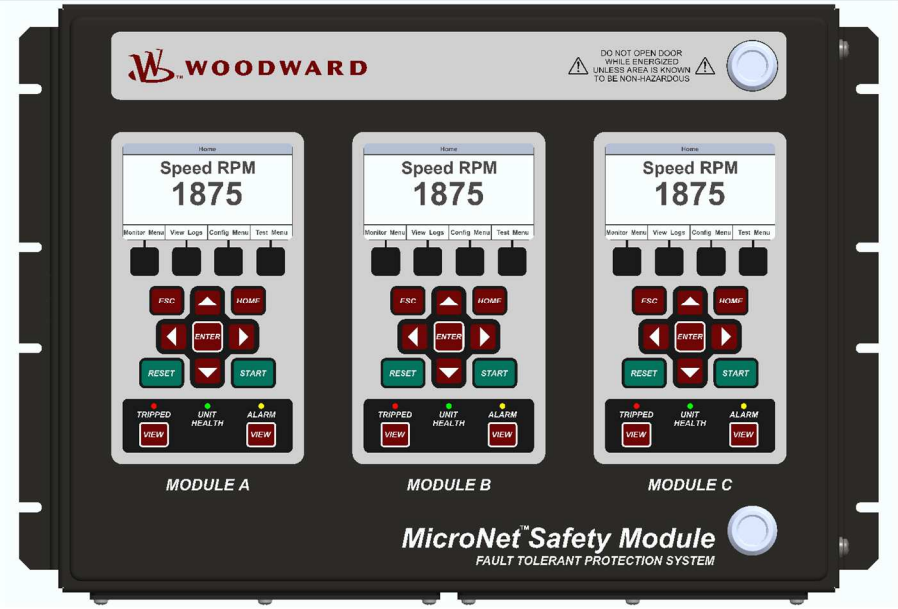
WOODWARD

Product Manual 26547V2
(Revision A, 1/2021)
Original Instructions



MicroNet™ Safety Module
Fault Tolerant Protection System

Optional Supplementary Information

Manual 26547 consists of 2 volumes (26547V1 & 26547V2)

Volume 2—Programming and Configuration

General Precautions

Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment.

Practice all plant and safety instructions and precautions.

Failure to follow instructions can cause personal injury and/or property damage.

Revisions

This publication may have been revised or updated since this copy was produced. To verify that you have the latest revision, check manual *26455*, *Customer Publication Cross Reference and Revision Status & Distribution Restrictions*, on the *publications page* of the Woodward website:

http://www.woodward.com

The latest version of most publications is available on the *publications page*. If your publication is not there, please contact your customer service representative to get the latest copy.

Proper Use

Any unauthorized modifications to or use of this equipment outside its specified mechanical, electrical, or other operating limits may cause personal injury and/or property damage, including damage to the equipment. Any such unauthorized modifications: (i) constitute "misuse" and/or "negligence" within the meaning of the product warranty thereby excluding warranty coverage for any resulting damage, and (ii) invalidate product certifications or listings.

Translated Publications

If the cover of this publication states "Translation of the Original Instructions" please note:

The original source of this publication may have been updated since this translation was made. Be sure to check manual *26455*, *Customer Publication Cross Reference and Revision Status & Distribution Restrictions*, to verify whether this translation is up to date. Out-of-date translations are marked with ⚠. Always compare with the original for technical specifications and for proper and safe installation and operation procedures.

Revisions— A bold, black line alongside the text identifies changes in this publication since the last revision.

Manual 26547V2

Contents

Illustrations and Tables

Warnings and Notices

Important Definitions

This is the safety alert symbol used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

- **DANGER** - Indicates a hazardous situation, which if not avoided, will result in death or serious injury.
- **WARNING** - Indicates a hazardous situation, which if not avoided, could result in death or serious injury.
- **CAUTION** - Indicates a hazardous situation, which if not avoided, could result in minor or moderate injury.
- **NOTICE** - Indicates a hazard that could result in property damage only (including damage to the control).
- **IMPORTANT** - Designates an operating tip or maintenance suggestion.

⚠WARNING

Overspeed / Overtemperature / Overpressure

The engine, turbine, or other type of prime mover should be equipped with an overspeed shutdown device to protect against runaway or damage to the prime mover with possible personal injury, loss of life, or property damage.

The overspeed shutdown device must be totally independent of the prime mover control system. An overtemperature or overpressure shutdown device may also be needed for safety, as appropriate.

⚠WARNING

Personal Protective Equipment

The products described in this publication may present risks that could lead to personal injury, loss of life, or property damage. Always wear the appropriate personal protective equipment (PPE) for the job at hand. Equipment that should be considered includes but is not limited to:

- **Eye Protection**
- **Hearing Protection**
- **Hard Hat**
- **Gloves**
- **Safety Boots**
- **Respirator**

Always read the proper Material Safety Data Sheet (MSDS) for any working fluid(s) and comply with recommended safety equipment.

⚠WARNING

Start-up

Be prepared to make an emergency shutdown when starting the engine, turbine, or other type of prime mover, to protect against runaway or overspeed with possible personal injury, loss of life, or property damage.

Electrostatic Discharge Awareness

NOTICE

Electrostatic Precautions

Electronic controls contain static-sensitive parts. Observe the following precautions to prevent damage to these parts:

- **Discharge body static before handling the control (with power to the control turned off, contact a grounded surface and maintain contact while handling the control).**
- **Avoid all plastic, vinyl, and Styrofoam (except antistatic versions) around printed circuit boards.**
- **Do not touch the components or conductors on a printed circuit board with your hands or with conductive devices.**

To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual *82715*, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules*.

Follow these precautions when working with or near the control.

1. Avoid the build-up of static electricity on your body by not wearing clothing made of synthetic materials. Wear cotton or cotton-blend materials as much as possible because these do not store static electric charges as much as synthetics.
2. Do not remove the printed circuit board (PCB) from the control cabinet unless absolutely necessary. If you must remove the PCB from the control cabinet, follow these precautions:
   - Do not touch any part of the PCB except the edges.
   - Do not touch the electrical conductors, the connectors, or the components with conductive devices or with your hands.
   - When replacing a PCB, keep the new PCB in the plastic antistatic protective bag it comes in until you are ready to install it. Immediately after removing the old PCB from the control cabinet, place it in the antistatic protective bag.

Regulatory Compliance

Regulatory Compliance information is contained in Manual 26547V1.

Chapter 9.
Front Panel Interface

Introduction

The front panel of the MicroNet™ Safety Module allows the user to view current values for any inputs, Alarm, Trip, and Event logs, current values of all logic including configured functions, and navigate through configured logic. The user can also reset a module, initiate start logic, initiate tests (including user defined tests), and configure Speed functions. This chapter defines the features and functions accessible through the Front Panel of the MicroNet Safety Module.

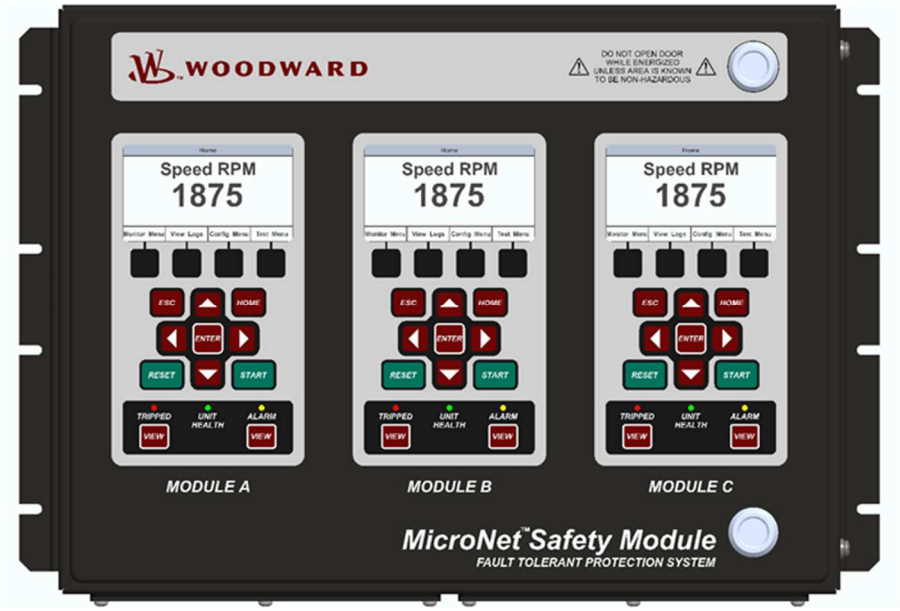


Figure 9-1. Gas Stop/Ratio Valve (typical; 3-inch shown)

There are four main views:

- **Monitor Menu**—View configuration settings, real time values, and status indications.
- **View Logs**—View all logged events with corresponding time stamps.
- **Config Menu**—Configure basic operation functions, overspeed, acceleration trip, etc. Complex user defined functionality is configured using the Programming and Configuration Tool (PCT).
- **Test Menu**—Perform system tests. Overspeed, Simulated Speed, Periodic Overspeed, and custom configured user-defined tests.

Screen Layout

Each screen on the MicroNet Safety Module modules follows a consistent layout pattern as shown in Figure 9-2.

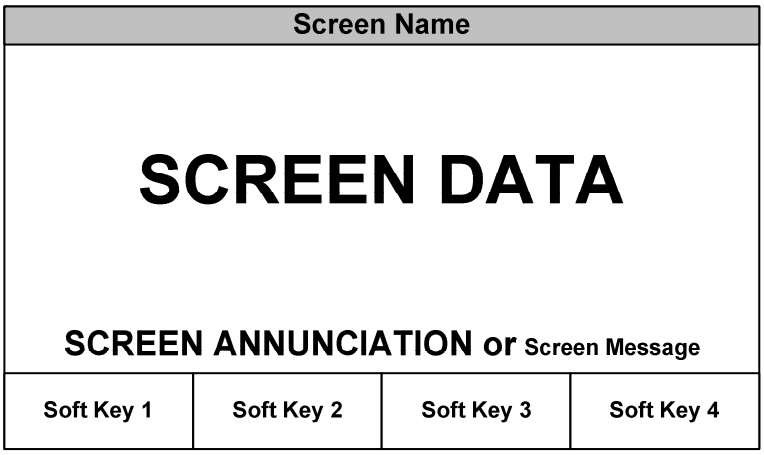


Figure 9-2. MicroNet Safety Module Screen

Screen Name – At the top of each screen is the “Screen Name” which identifies the type of data being displayed or the function being performed on that screen.

Screen Data – The middle or main body of each screen shows either data, a menu of selectable fields, or fields for entering data or passwords. Values in **BLUE font** are values that can change. **BLACK font** is used for static labels or values that can only change by changing the configuration.

> **Note:** In cases where there is too much information to show in the screen data field, a slider bar will appear on the right side to show that additional information can be accessed by using the UP/DN arrow keys.

Screen Annunciation or Message – Below the Screen Data, there is an area reserved for Messages to aid the user. If the screen is in one of the Monitor Menu screens and is just displaying data, this space is reserved to annunciate any alarm or trip messages. The alarm or trip messages are shown in a larger text and highlighted with either yellow or red, respectively. Otherwise this field is used to show user prompts to help with selection or entry of data.

Soft Keys – At the bottom of each screen are four (4) Soft Keys descriptions which are associated with the 4 keys immediately below them. Depending on the screen, the soft keys may be used to select different views, enter data such as setpoints or passwords, select from a list of options, or initiate a function such as performing a test or copying a module’s configuration.

Keypad Functions

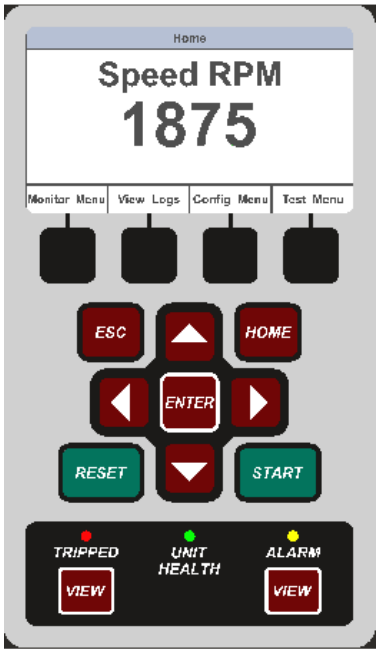


Figure 9-3. MicroNet Safety Module Faceplate

Unless defined otherwise for a screen, the keys have the following functions:

START	One source of the Start signal defined elsewhere in this manual.
RESET	One source of the Reset signal defined elsewhere in this manual.
Up Arrow	Navigate up through the menus or displayed pages.
Down Arrow	Navigate down through the menus or displayed pages.
Right Arrow	Scroll through the configurable Inputs and Logic menus
Left Arrow	Scroll through the configurable Inputs and Logic menus
ENTER	Select from the menu or edit a specific value in configuration.
VIEW	Displays the Trip Log or Alarm Log, respectively.
Tripped Indicator	Illuminates RED when a tripped condition exists.
Unit Health Indicator	Illuminates GREEN when there are no errors in the safety functionality. Illuminates RED if there is an error in the safety functionality. Off indicates a communication or power failure either to the display or to the module.
Alarm Indicator	Illuminates YELLOW when an Alarm condition exists.

Navigation

Selecting the Soft Keys below “Monitor Menu”, “View Logs”, “Config Menu”, and “Test Menu”, will bring up the associated menu for that category. Use the Up/Down arrows to navigate through the menu items, Select Enter to open the associated screen.

Home

On power-up, the “Home” page is displayed. The “Home” screen shows the sensed speed and provides access to the soft keys to select from the four main menus. Selecting “HOME” brings up the “Home” screen. Selecting “ESC” repeatedly navigates up through the menu hierarchy until the “Home” screen is displayed.

With an Alarm

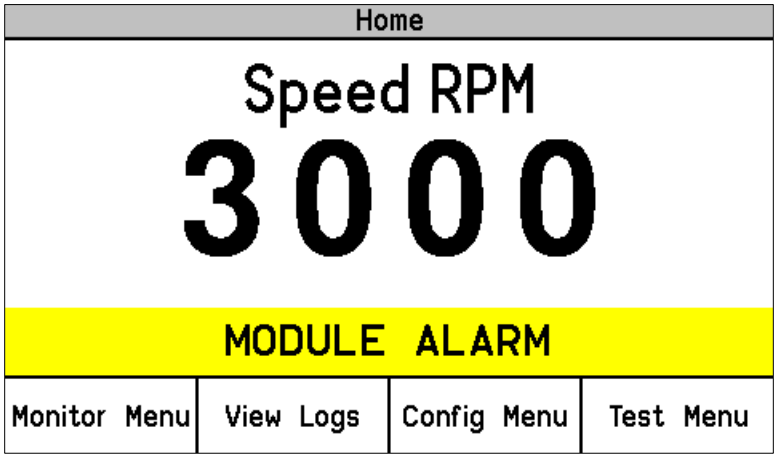


Figure 9-4. Home screen (with Alarm)

With a Trip

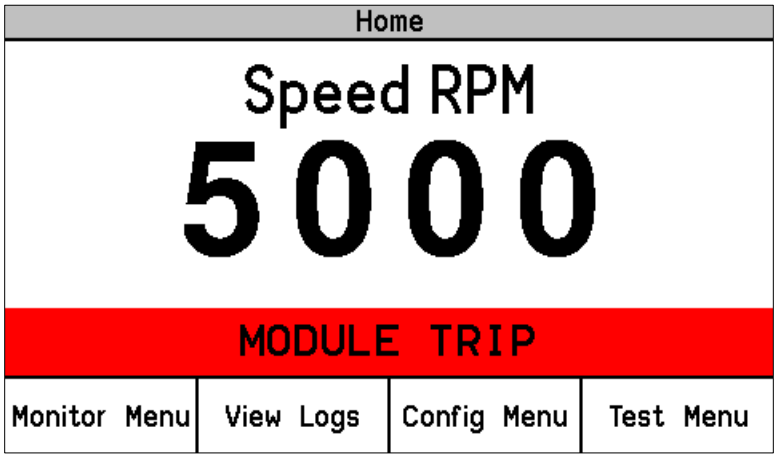


Figure 9-5. Home screen (with Trip)

Passwords

The MicroNet Safety Module utilizes two password levels, a Test Level Password and a Config Level Password. The same passwords are used by the Programming and Configuration Tool (PCT) and Front Panel.

The Test Level Password is required to:

- Initiate tests
- Reset logs (except for the Peak Speed/Acceleration Log)
- Change the Test Level Password

The Config Level Password provides access to any function that requires the Test Level Password. Additionally, the Config Level Password is required to:

- Change any program setting
- Download an application program file into a module
- Reset the Peak Speed/Acceleration Log.
- Change the Config Level Password

Each of these passwords meets NERC (North American Electric Reliability Corporation) cyber security requirements.

Password Entry

When prompted for a password, the screen below appears.

- The password is six characters long and can be configured using upper-and lower-case alpha characters, numeric characters, and some special symbols (#, @, !, <, etc.).
  - Use the “Aa 0-9 @” soft key to select upper case letters, lower case letters, numbers, or a list of usable special characters.
  - Use the “Value ▼” or “Value ▲” soft keys to change the highlighted value.
  - Use the “Cursor →” soft key to move the highlighted character to the right.
- Press the Enter Key after the password is selected. If the password is invalid, an error message will appear at the bottom of the screen; otherwise, the password is accepted, and the next screen provides access to the password change function.

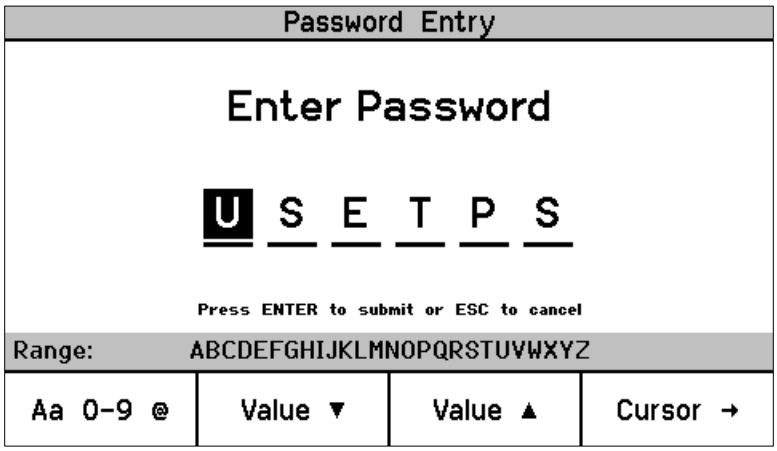


Figure 9-6. Password Entry Screen

Monitor Menu

From the “Monitor Menu” the user can view configuration settings, real time values, and status indications. When the “Monitor Menu” is selected from the soft keys, the following menu is shown:

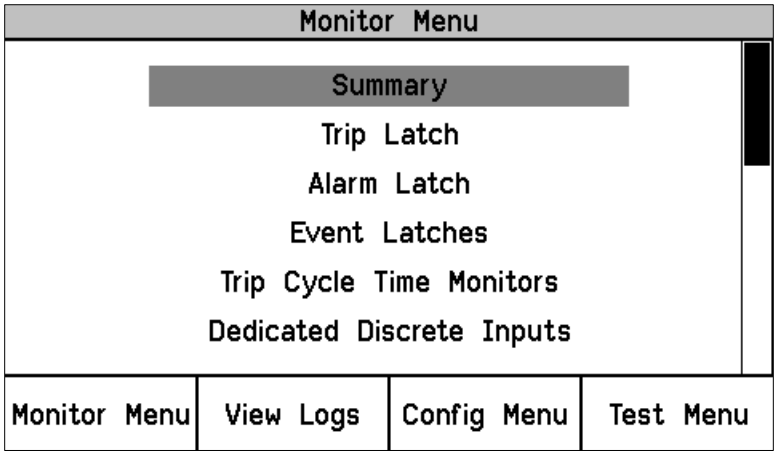


Figure 9-7. Monitor Menu

The “Up Arrow” and “Down Arrow” keys are used to highlight the desired sub-menu item. Pressing the “ENTER” key will open the highlighted item screen. The following items are available from the Monitor Menu:

- Summary
- Trip Latch
- Alarm Latch
- Event Latches
- Trip Cycle Time Monitors
- Dedicated Discrete Inputs
- Configurable Inputs
- Configurable Logic
- Programmable Relays
- Speed Input
- Speed Fail Timer
- Analog Output
- Modbus® *
- Date / Time
- System Status
- Module Information

*—Modbus is a trademark of Schneider Automation Inc.

Detailed information on the contents of these screens and examples follows:

Monitor Summary (Page 1)

- Speed—Current value of speed in rpm.
- Acceleration—Current value of acceleration in rpm/s.
- Overspeed Trip Setpoint—Current setting for overspeed trip in rpm.
- Speed Fail Override Status—Condition of the override.
- Analog Output—Current value of Analog Output in mA.
- Date—Current date.
- Time—Current time.

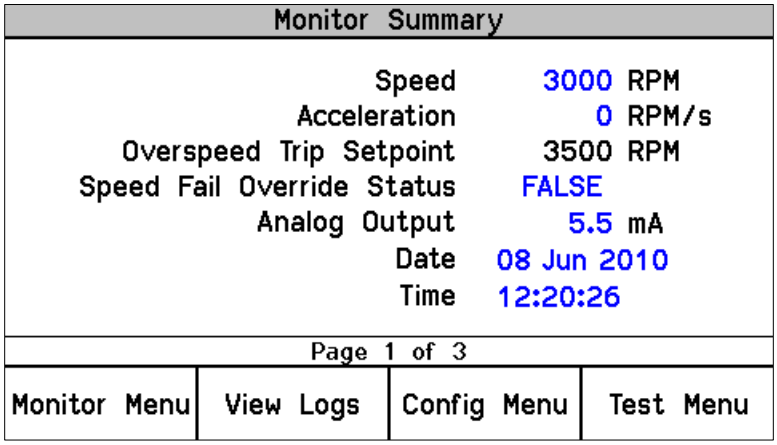


Figure 9-8. Monitor Summary (Page 1)

Monitor Summary (Page 2)

- Input—Number of the configurable input.
- Name—Application/customer name for that configurable input.
- Value—Current status. Analog value is based on the input scaling.
- Unit—Units configured for the input (PSI shown as example).

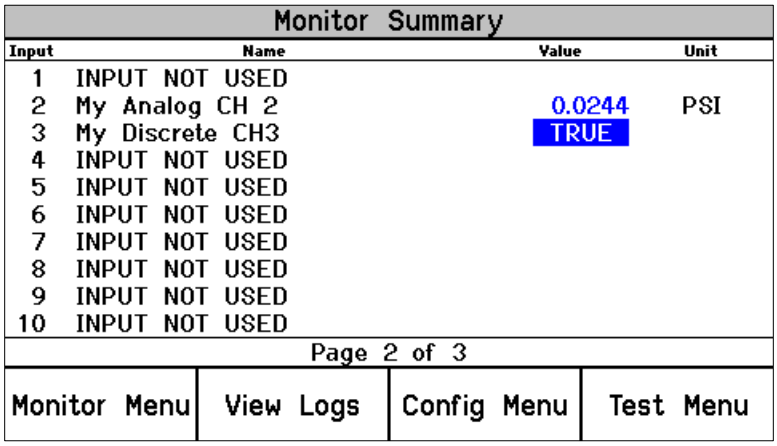


Figure 9-9. Monitor Summary (Page 2)

Monitor Summary (Page 3)

- Programmable Relay Status.

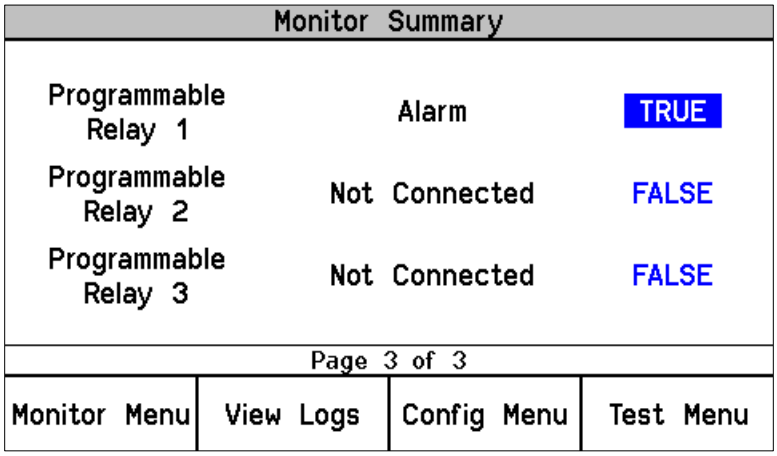


Figure 9-10. Monitor Summary (Page 3)

Monitor Trip Latch

Displays the status of any latched trip conditions and first out information. All trip conditions are latched and require a reset command to clear the fault indication.

The following trips are always displayed:

- Internal Fault Trip—Indicates a failure internal to the TPS. Additional details on the fault cause are provided in the PCT's Module Faults Log.
- Power Up Trip—Indicates a power-up condition was detected. Only provided if configured as de-energize to trip.
- Configuration Trip—Indicates new configuration settings were loaded into the module. Pressing the Reset button will clear the error.
- Parameter Error— Indicates a parameter error was detected, meaning there was a problem reading the settings out of the ProTech® non-volatile memory during initial startup. When this is true, the MicroNet Safety Module remains in a tripped state. The configuration must be re-loaded from the PCT and a power cycle is required to clear this error.
- Overspeed Trip—Indicates an overspeed trip.
- Speed Probe Open Wire—Indicates an open wire on the speed input. Only available when configured for passive probe type.

The following trips are displayed when configured:

- Overaccel Trip—Indicates an overacceleration trip. Speed Lost Trip—Indicates a sudden loss of speed.
- Speed Fail Trip—Indicates speed detected below the fail threshold.
- Speed Fail Timeout Trip—Indicates lack of speed detected during a start condition.
- Resettable Trip—Indicates a trip commanded by the resettable trip function's discrete input.
- Trip Latch xx or the "user-defined" Name for Trip Latch Number xx—Indicates a trip condition caused by the configured trip latch input.

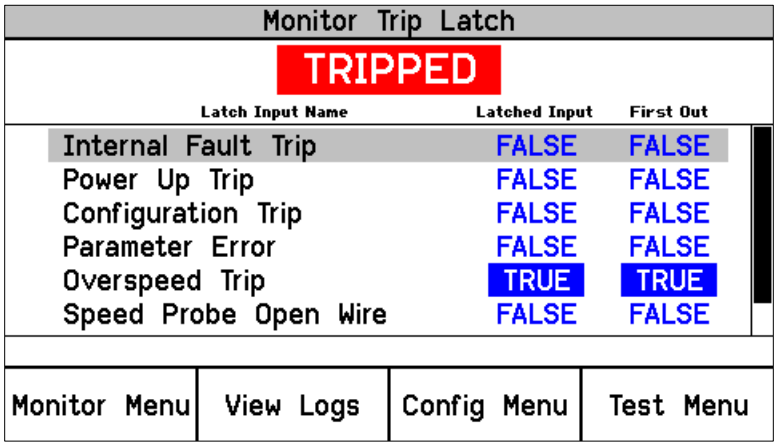


Figure 9-11. Monitor Trip Latch

Monitor Alarm Latch

Displays the status of any latched alarm conditions. All alarm conditions are latched and require a reset command to clear the fault indication. The following alarms are always displayed:

- Internal Fault Alarm—Indicates a failure internal to the TPS. Additional details on the fault cause are provided in the PCT's Module Faults Log.
- Configuration Mismatch—Modules do not have the same configuration.
- Power Supply 1 Fault—Out of range input power detected on Input #1.
- Power Supply 2 Fault— Out of range input power detected on Input #2.
- Tmp Overspeed Setpoint On—Temp Overspeed Setpoint Test Active.
- Manual Sim. Speed Test—Manual Simulated Speed Test Active.
- Auto Sim. Speed Test—Auto Simulated Speed Test Active.
- Periodic Ovrspd Test—Periodic Overspeed Test Active.

The following alarms are displayed when configured:

- Speed Lost Alarm —Indicates a sudden loss of speed.
- Speed Fail Alarm —Indicates speed detected below the fail threshold.
- User Defined Test 1-3—User Defined Test Active.
- Trip Time Mon 1-2 Alarm —Indicates Trip Cycle Time Monitor time exceeded.
- IRIG Signal Lost Alarm – Indicates the IRIG Time Synchronization Signal has been lost
- Alarm Latch xx or the “user-defined” Name for Alarm Latch Number xx —Indicates an alarm condition caused by the configured alarm latch input.

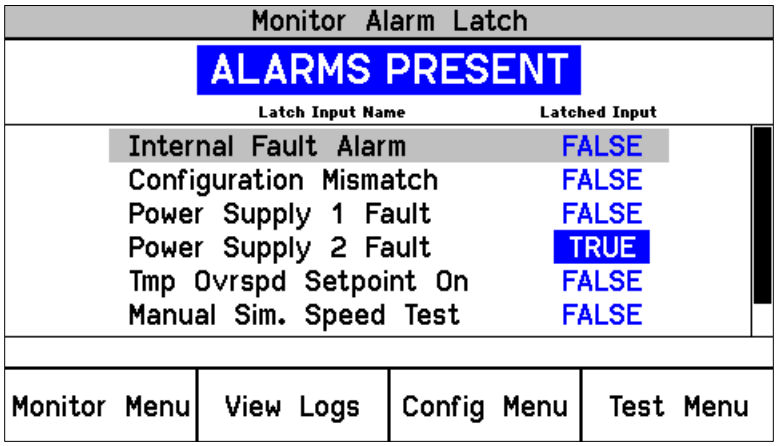


Figure 9-12. Monitor Alarm Latch

Monitor Event Latches

- Monitor configurable event latches—Shown with events present.

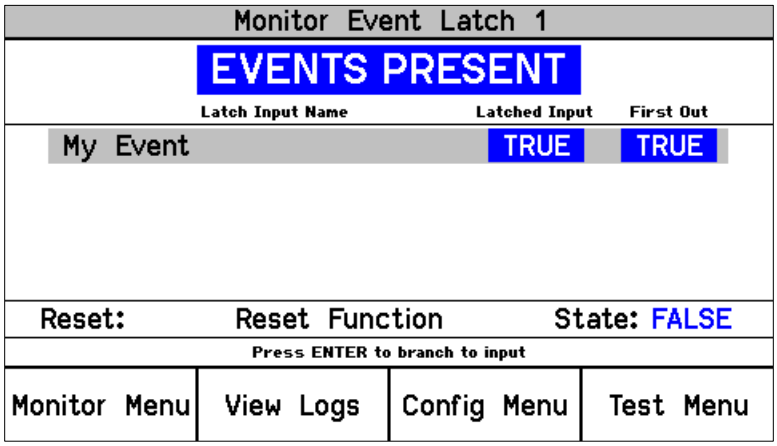


Figure 9-13. Monitor Event Latch

Monitor Trip Cycle Timer Monitors

- Monitor time between trip and acknowledgement of that trip.

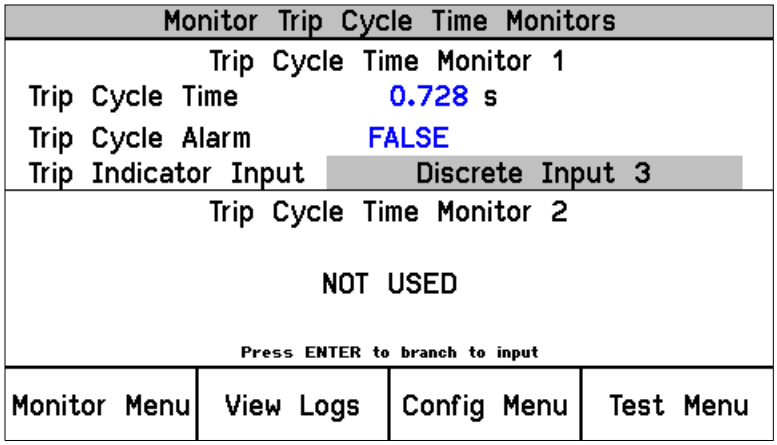


Figure 9-14. Monitor Trip Cycle Time Monitors

Monitor Dedicated Discrete Inputs

- Condition of the Start Reset and Speed Fail Override Inputs.
- Start Input—Start Input Active.
  Note: This is TRUE if either the Front Panel START key or the START discrete input are active.
- Reset Input—Reset Input Active.
- Speed Fail Override Input—Speed Fail Override Input Active.

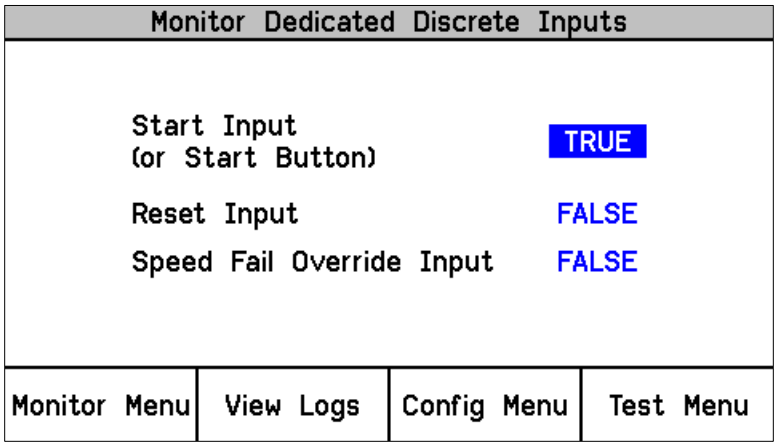


Figure 9-15. Monitor Dedicated Discrete Inputs

Monitor Configurable Inputs

- Monitor the configuration and status of the ten configurable inputs.

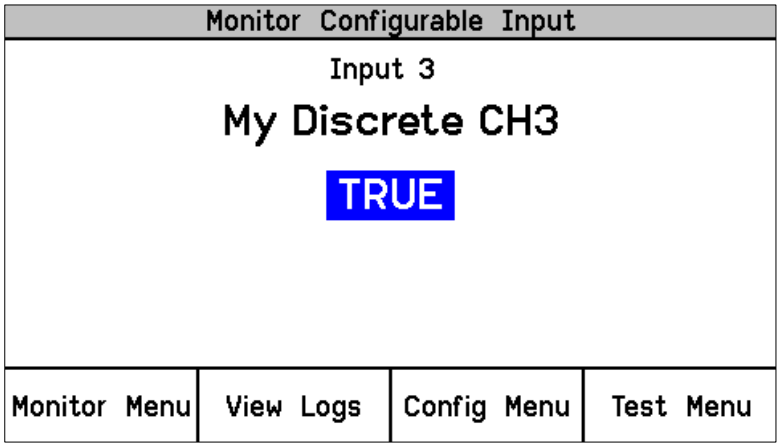


Figure 9-16. Monitor Configurable Inputs

Monitor Configurable Logic

- Monitor the configuration, setting, and status of configurable logic.
  In all the following screens, when an Input Source is highlighted and “Press ENTER to branch to input” appears in the screen message area, selecting “ENTER” will bring up the monitor screen associated with that source. Also, when an Input Source is highlighted, selecting “Up Arrow” or “Down Arrow” will highlight other inputs to the function.

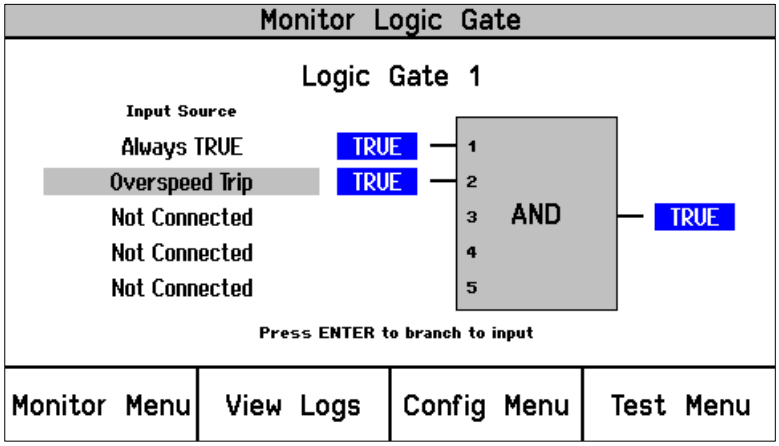


Figure 9-17. Monitor Logic Gates

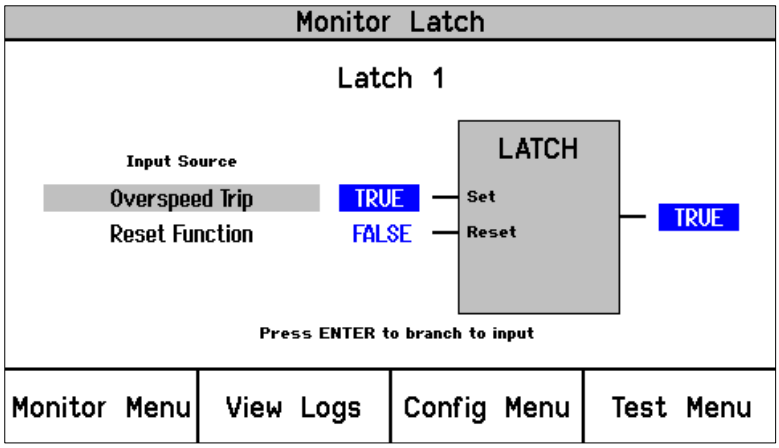


Figure 9-18. Monitor Latch

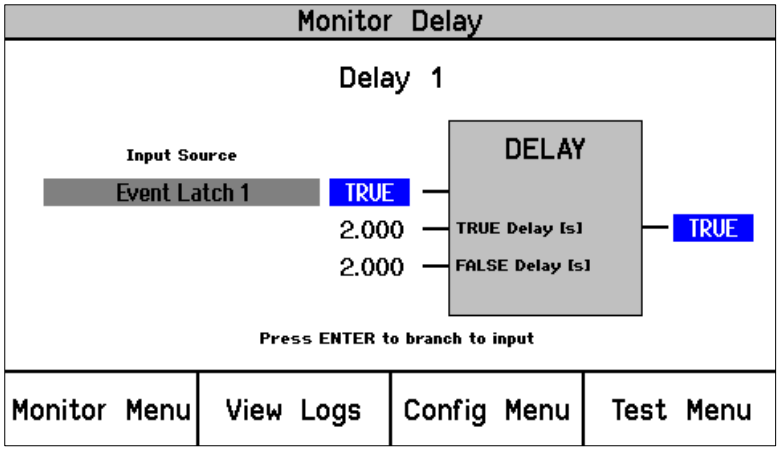


Figure 9-19. Monitor Delay

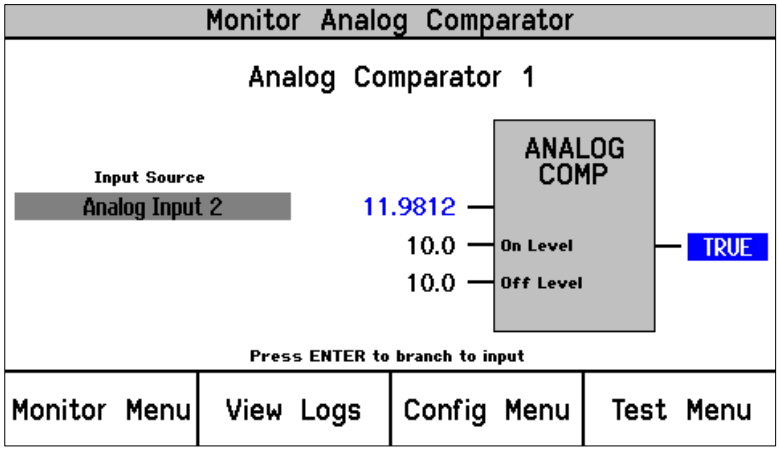


Figure 9-20. Monitor Analog Comparator

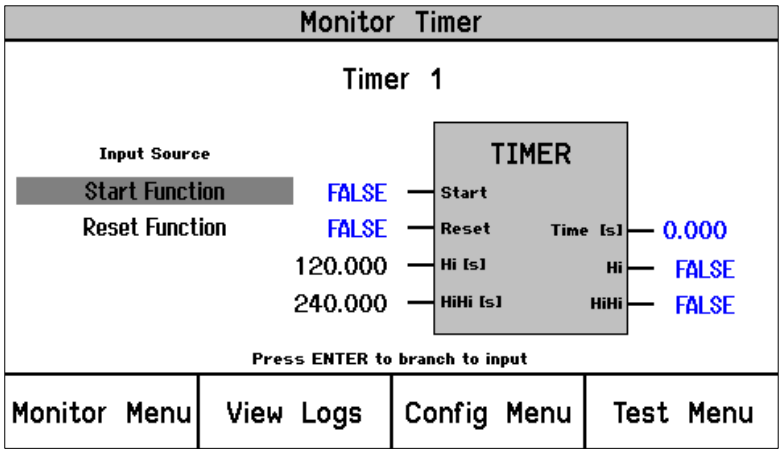


Figure 9-21. Monitor Timer

Monitor Programmable Relays

- Monitor the configuration, setting, and Status of the programmable relays.
  Note: the TRUE or FALSE indication represents the state of the signal driving the relay. Since the Polarity for the relay may be “Inverting” or “Non-Inverting”, this does not necessarily reflect the state of the relay.

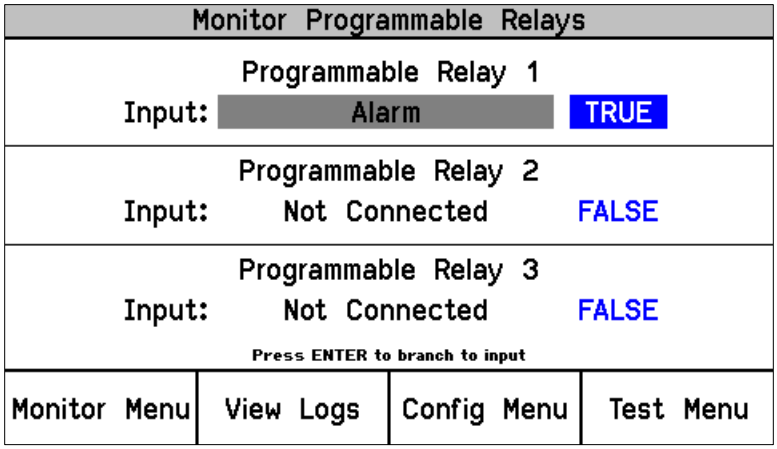


Figure 9-22. Monitor Programmable Relays

Monitor Speed Input

- Monitor speed and acceleration.

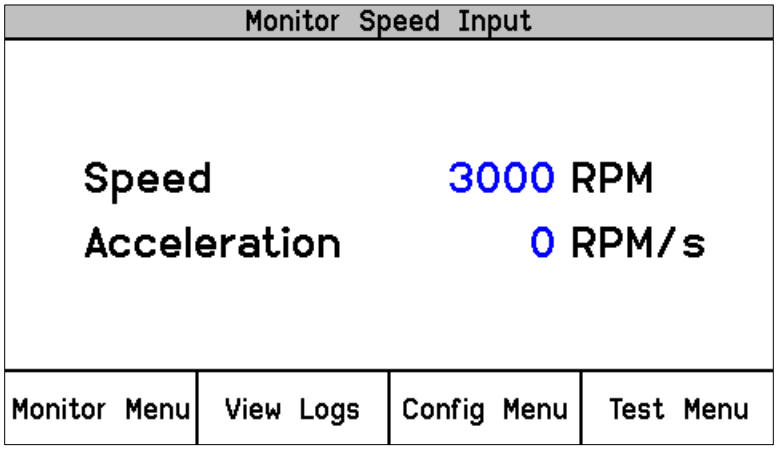


Figure 9-23. Monitor Speed Input

Monitor Speed Fail Timer

- Monitor speed fail timer.

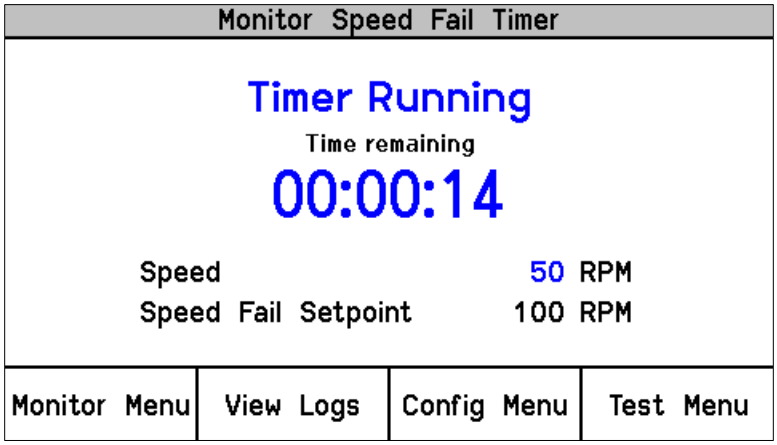


Figure 9-24. Monitor Speed Fail Timer

Timer Inactive: Timer not used or not started

Timer Running: Timer started, timer remaining displayed. Timer starts when the start button is pressed or the start discrete signal occurs.

Timer Expired: Indicates Timer reached zero

Note: The Speed Fail Timeout trip is reset by the reset command.
Note: If the speed fail timer is active, the Home screen will display the time remaining.

Monitor Analog Output

- Monitor speed and analog output value.

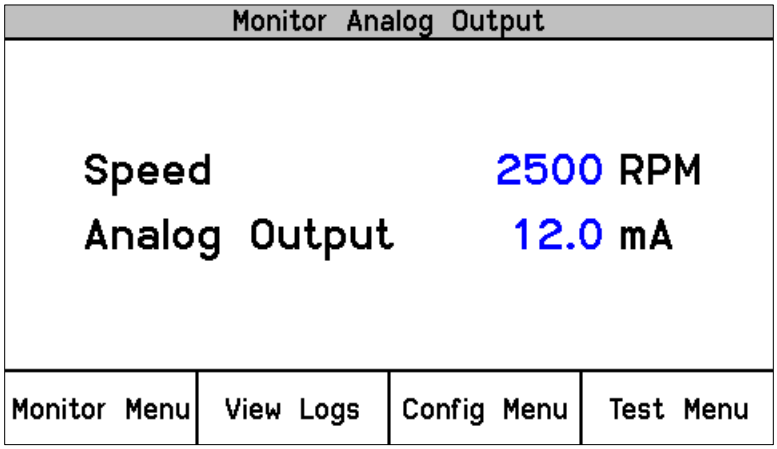


Figure 9-25. Monitor Analog Output

Monitor Modbus

- Monitor Modbus status.

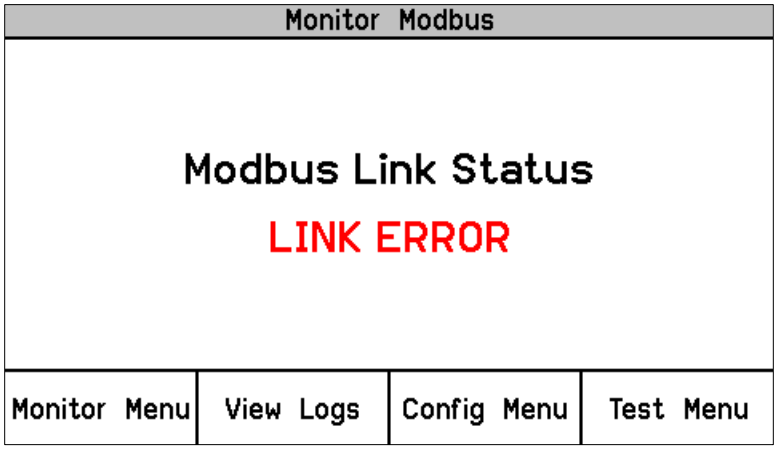


Figure 9-26. Monitor Modbus Status

Link OK: **Modbus** Link OK
Link Error: **Modbus** Link not operating properly

Monitor/Set Date & Time

The screen is used to monitor and set the current date and time. The date automatically accounts for leap year. The time setting must be re-set for all local time changes (e.g. daylight savings time).

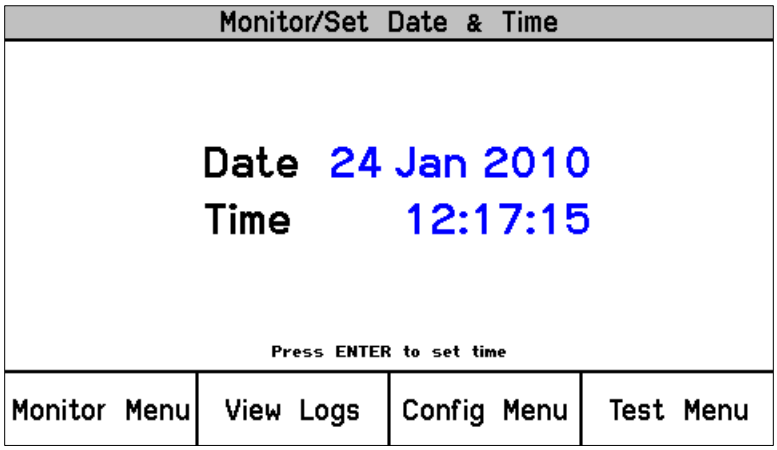


Figure 9-27. Monitor Date & Time

To set the Time and Date, press the “ENTER” key.

Figure 9-28. Set Date & Time

The field to be edited will be highlighted. Pressing the UP/DOWN/RIGHT/LEFT arrows will highlight other fields. Press ENTER to edit the highlighted item and use the soft keys as indicated to adjust the value to the desired value.

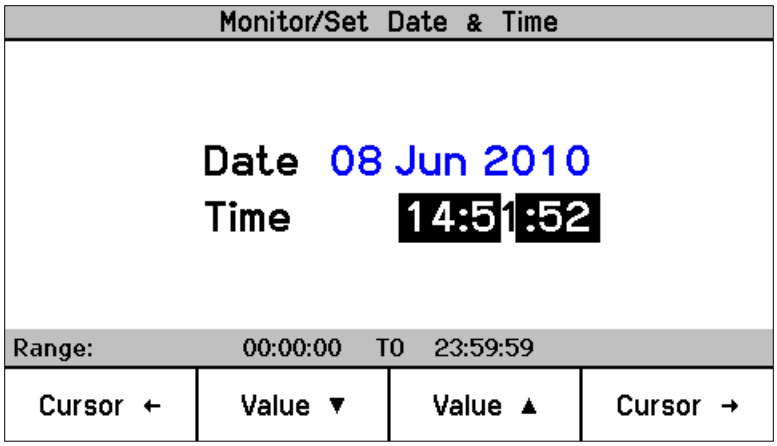


Figure 9-29. Set Date & Time

Select ENTER to save the change or ESC to return the value to its original value. Set other fields as required. After all changes have been made use the soft keys to either “Set Time” or “Cancel”.

Figure 9-30. Monitor/Set Date & Time

Selecting ESC is the same as “Cancel” and the time and date remain at the original values.

System Status

- Monitor the health status of all modules in the system.

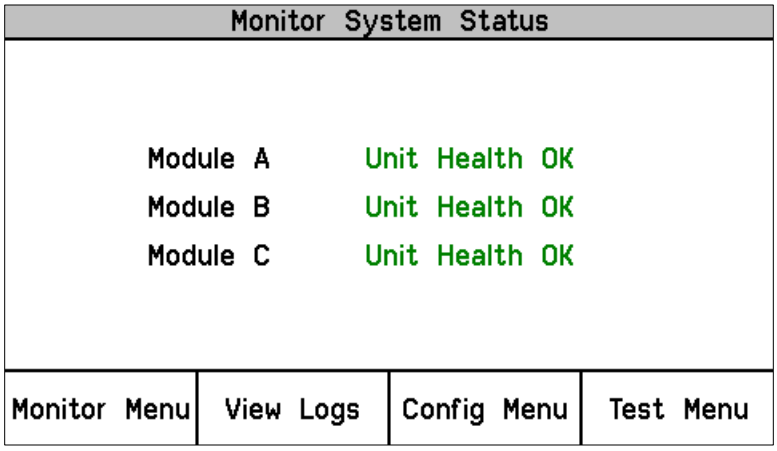


Figure 9-31. Monitor System Status

Unknown Status: Status is unknown possibly due to a communication failure with the front panel
Unit Health OK: Unit is running properly
Internal Alarm: An internal alarm is present. View the PCT Module Faults Log
Internal Error: An internal error is present. View the PCT Module Faults Log

Module Information

- Displays Product ID, Module S/N, and Software P/N and revision.

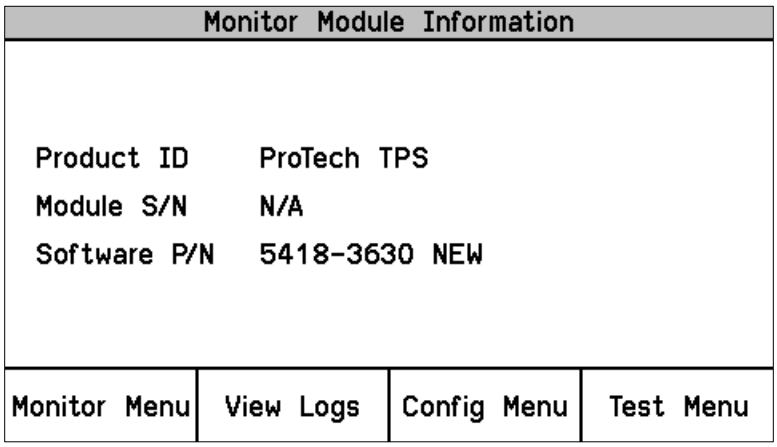


Figure 9-32. Monitor Module Information

View Logs

From the “View Logs” screens the user can view logged events with corresponding time stamps. Logged data can be viewed and exported to a file using the Programming and Configuration Tool (PCT).

The time stamps in the logs are based on the internal clock at the time of the event. Time stamps are not changed when the internal clock time is modified (e.g. time/date is set or a 24 Hr time sync command).

When the “View Logs” is selected from the soft keys, the following menu is shown:

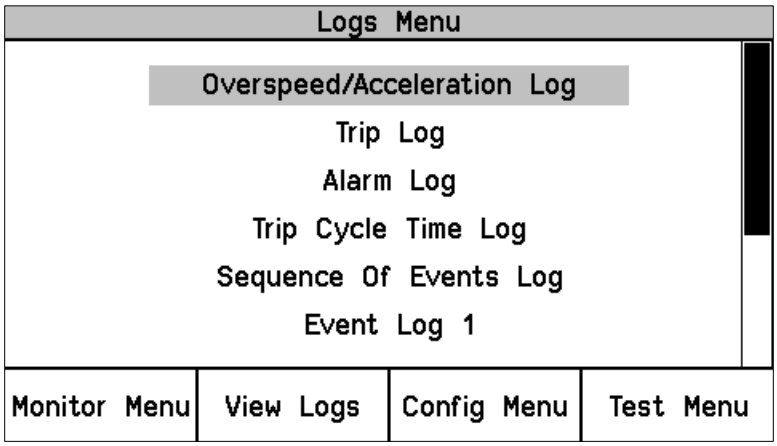


Figure 9-33. Logs Menu

The “Up Arrow” and “Down Arrow” keys are used to highlight the desired Log. Pressing the “ENTER” key will open the highlighted Log screen. The following items are available from the Logs Menu:

- Overspeed/Acceleration Log
- Trip Log
- Alarm Log
- Trip Cycle Time Log
- Sequence Of Events Log
- Event Log 1
- Event Log 2
- Event Log 3
- Peak Speed/Acceleration Log
- Reset Logs Menu

Detailed information on the contents of these screens and examples follows:

Overspeed/Acceleration Log

- Log of any overspeed or acceleration trip events.
- Displays the cause of a trip (Overspeed or Overaccelleration)
- Displays the date and time of the trip
- Displays the speed and acceleration at the time of the trip
- Displays the maximum speed and acceleration reached after the trip.
- Displays time and date stamp, actual values, and configured trip values.

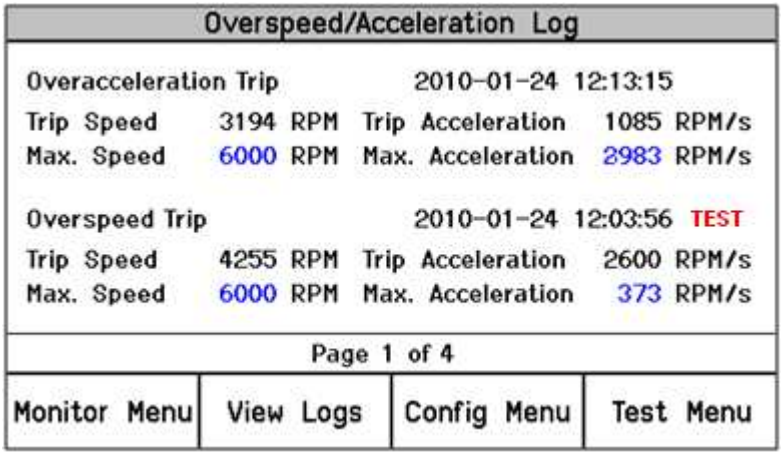


Figure 9-34. Overspeed/Overacceleration Log

TEST will appear next to the time in **RED** if the module was in test mode at the time of the trip.

Trip Log

- Log of any trip events. Displays event ID, time and date stamp, first out, and test information.

The first-out (FO) symbol indicates the event(s) that caused the trip. Events that occurred while a test mode was active are noted in the Test column. An example would be an overspeed trip that occurred during a periodic overspeed test.

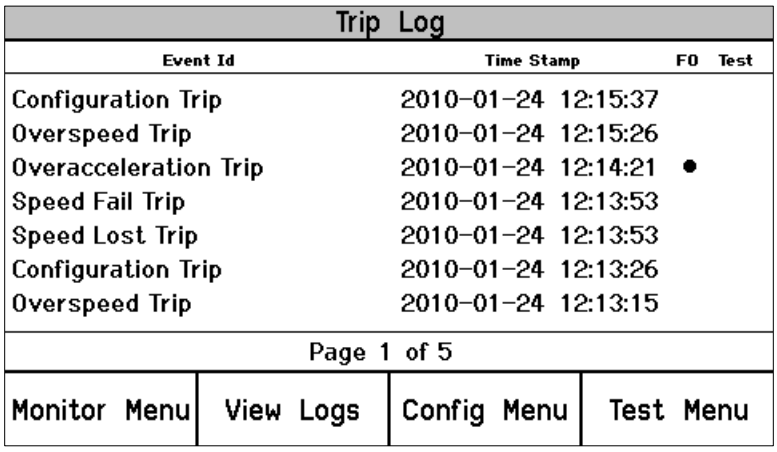


Figure 9-35. Trip Log

Alarm Log

- Log of any alarm events.
- Displays event ID, time and date stamp, and test information.

Events that occurred while a test mode was active are noted in the Test column. An example would be a periodic overspeed test.

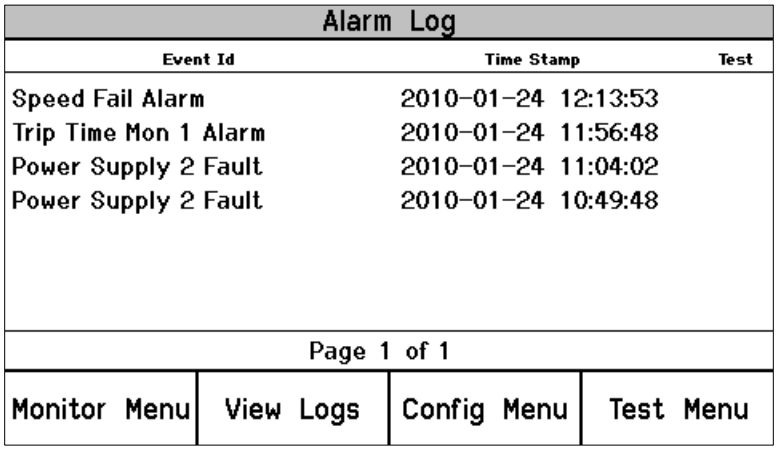


Figure 9-36. Alarm Log

Trip Cycle Time Log

- Log of any trip cycle time events, and the information for Trip Cycle Time Monitor 1 and 2.

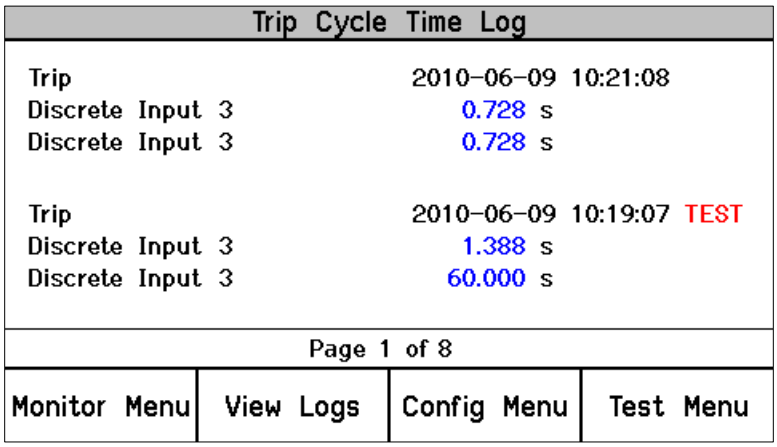


Figure 9-37. Trip Cycle Time Log

Sequence Of Events Log

- Log of any configured events with up to 1 ms resolution.
- Displays event ID, time and date stamp, and test information.

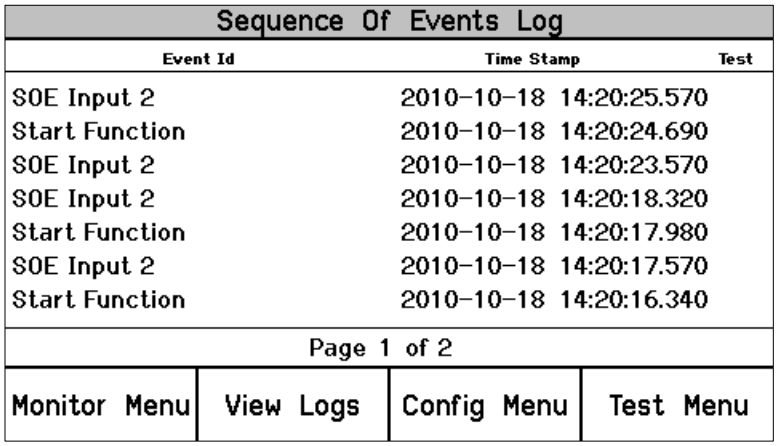


Figure 9-38. Sequence Of Events Log

Events Logs 1, 2 & 3

- Log of any configured events; displays event ID, time and date stamp, first out, and test information.

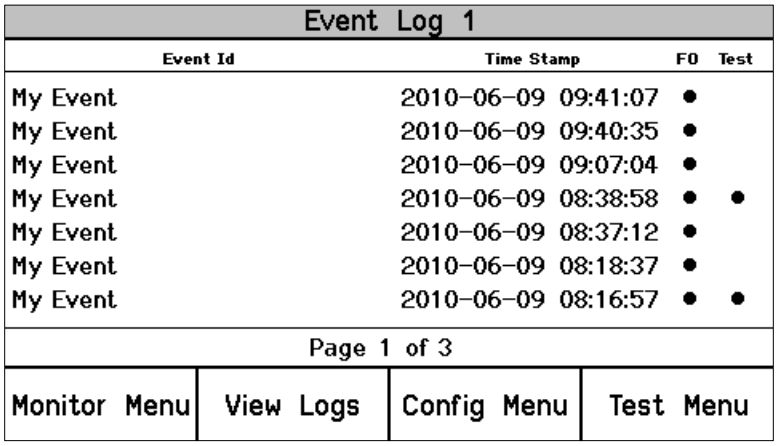


Figure 9-39. Event Log

Peak Speed/Acceleration Log

- Log of peak speed and acceleration recorded since the saved values were last cleared.

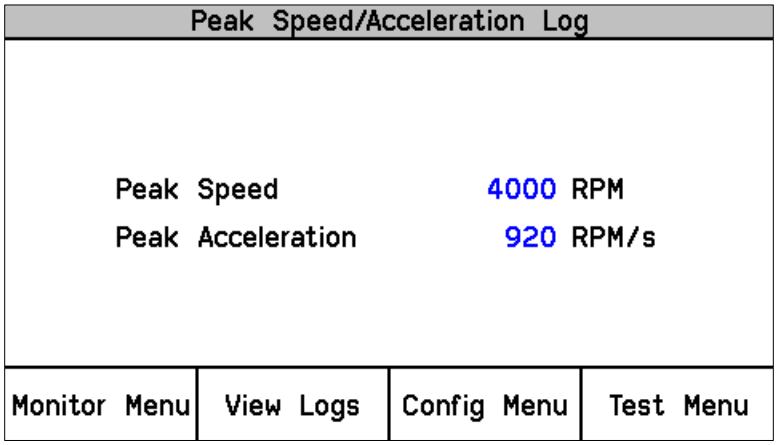


Figure 9-40. Peak Speed/Accel Log

Reset Logs

- Allows the user to reset All Logs (Trip, Alarm, Events, Sequence Of Events, Overspeed/Overacceleration, and Trip Cycle Time Monitor Logs), or just the Peak Speed/Acceleration log.

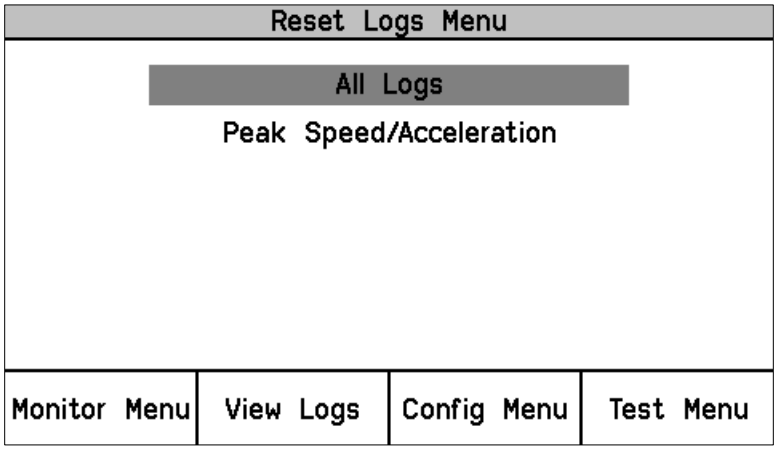


Figure 9-41. Reset Logs

Reset Log Procedure

1. Use the Up Down arrows to select reset “All Logs” or “Peak Speed/Acceleration” and press Enter.
2. At the Prompt to “Reset Logs?” or “Reset Peak Speed/Acceleration” , select Reset to continue, or Cancel to back out of this screen
3. If Reset is selected, the user will be prompted to enter a password. To reset All Logs, either the Test or Config level passwords may be entered. To reset Peak Speed/Acceleration, the Config Level Password must be entered
4. After the correct password is entered, press Enter to reset the log.

Configure Menu

The user can configure the standard values from the front panel, such as speed, acceleration, analog output scaling, etc. The Programming and Configuration Tool (PCT) must be used to configure custom logic, timers, latches, and events. The unit must be in a tripped condition for any configuration parameters to be changed whether the Front Panel or the PCT are used.

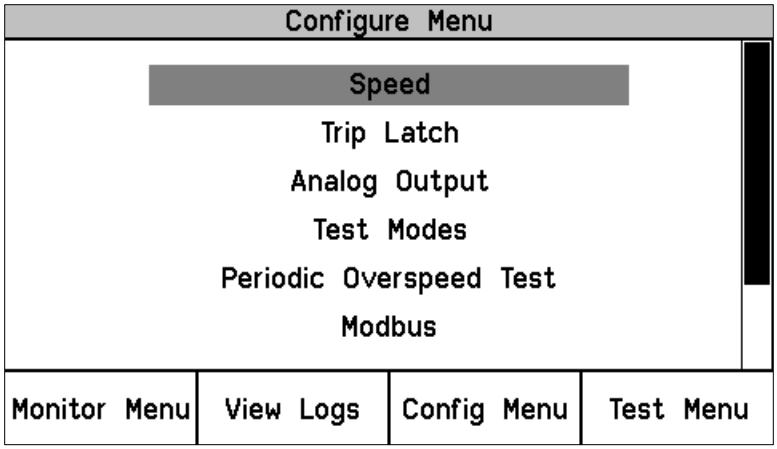


Figure 9-42. Configure Menu

Entering the Edit Mode from the Front Panel

When a value that can be edited is highlighted, the Screen Message “Press ENTER to Edit value” appears. If the module is not Tripped and ENTER is selected the Screen Message “**Module Not Tripped!**” appears briefly (for about 5 seconds). If the module is tripped and ENTER is selected, the Password Entry screen appears. When the correct Config Level Password is entered, the fields can be edited with the soft key selections.

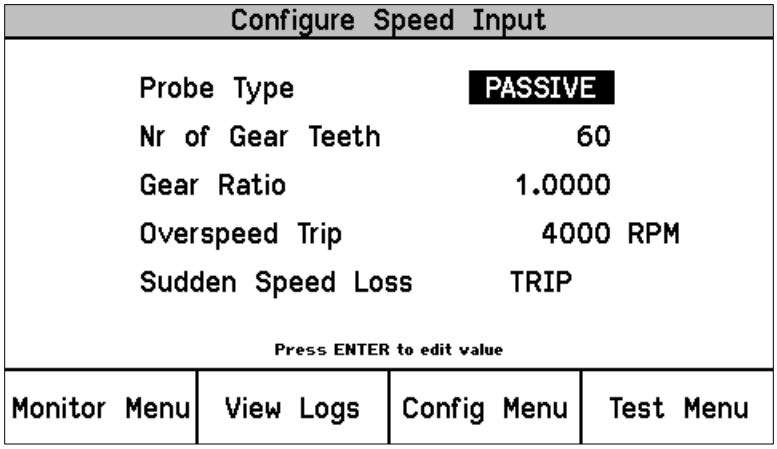


Figure 9-43. Configure Speed Input

Once a password has been successfully entered, it will remain in effect until the user exits the configuration menu tree.

Configuration Procedure

1. Module must be tripped to make any configuration changes.
2. Use the Up / Down function keys to select the category.
3. Use the Up / Down function keys to select the parameter.
4. Press Enter to edit a value and the password screen will appear.
5. Select the password for Config level, and press Enter.
6. The screen is now in edit mode. Using the soft keys, edit the desired value:
    a. Use the Cursor → key to move to the left.
    b. Use the value ▼or ▲ keys to change the highlighted value.
    c. Use the Cursor → key to move to the right.
7. Navigate within the Config Menu to other editable values using Front Panel UP/Down Keys and ESC / Enter keys to change pages.
8. After all desired parameters have been changed; press the Home key to exit Configure Mode.
9. If any parameters were changed in Configure Mode, the TPS will display a prompt “Save Configuration”. The options are:
    a. Save – to save any changes then display the Home screen
    b. Discard – to ignore any changes then display the Home screen
    c. Cancel – to go back to the last used configuration screen
    Note: This does not exit the configure mode so re-entering the Password will not be required if ENTER is selected to edit a value.

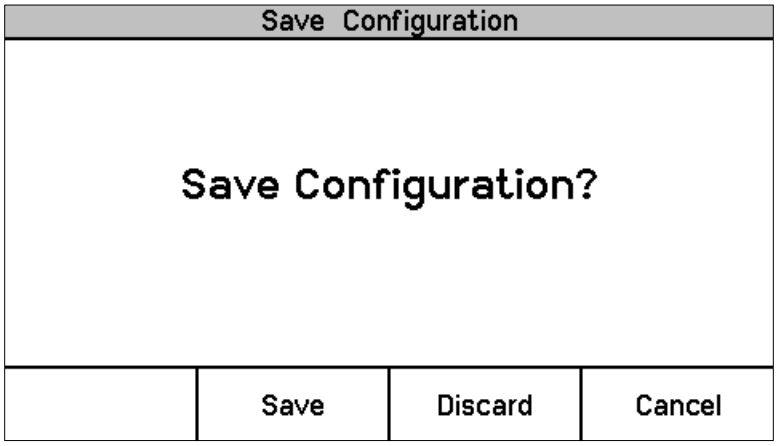


Figure 9-44. Save Configuration

Editing Values from the Front Panel

Once a valid password has been entered. The parameter is highlighted. If the parameter is a value or string, a cursor indicates which digit or character is being edited. The soft keys are used to change the digit or character and to move the cursor. The screen message is used to indicated valid ranges or to select from a list of options (i.e. ACTIVE or PASSIVE, TRIP or ALARM, DE_ENERGIZE TO TRIP OR ENERGIZE TO TRIP). Selecting ESC restores a value being edited to its last entered value.

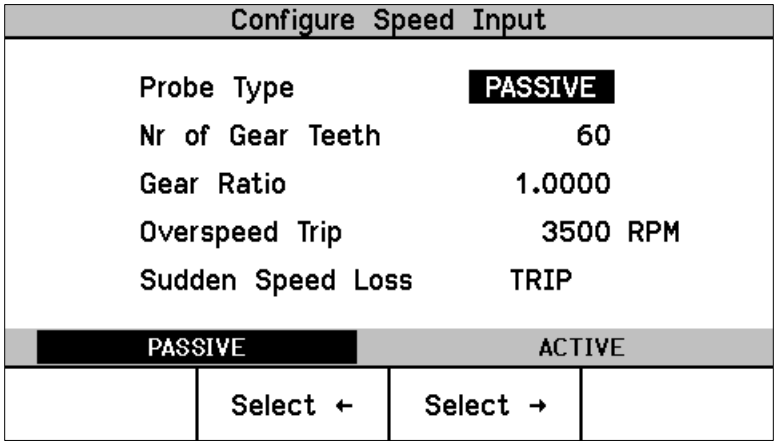


Figure 9-45 Configure Speed Input

If an attempt is made to adjust a value outside of its permitted range, the value is changed to its closest valid value and the message "**LIMIT REACHED**" appears briefly (for about 5 seconds) next to the Screen Message that indicates the valid range.

Configure Speed

- Set values for speed, acceleration, and start logic.

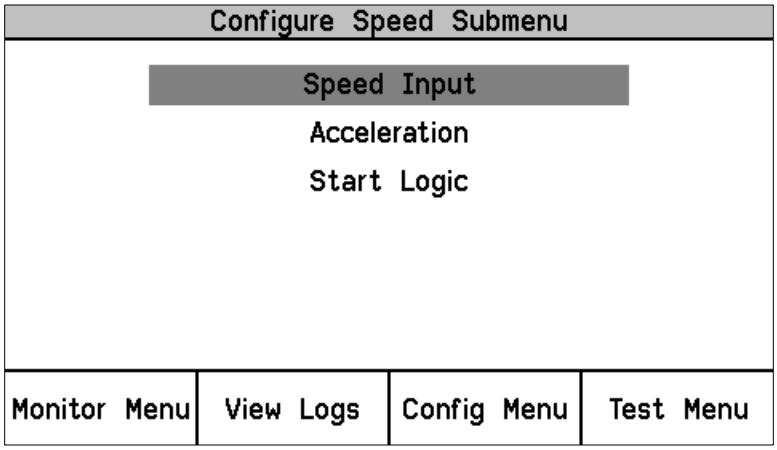


Figure 9-46. Configure Speed Submenu

- Configure Speed Input—Set the following parameters.

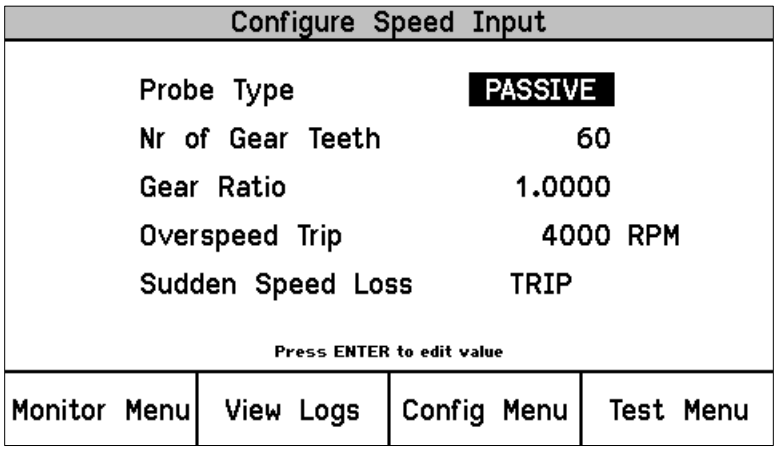


Figure 9-47. Configure Speed Input

- Configure Acceleration—Set the following parameters.

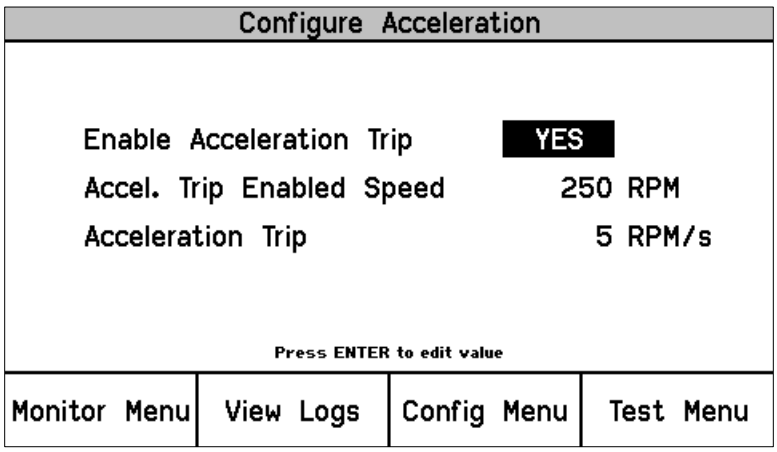


Figure 9-48. Configure Acceleration

- Configure Start Logic—Set the following parameters.

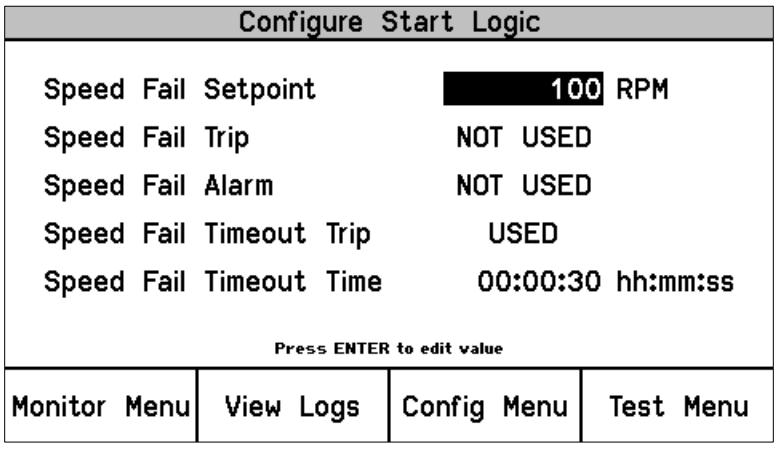


Figure 9-49. Configure Start Logic

Configure Trip Latch

- Set action of the Trip Latch (Energize or De-energize to Trip).

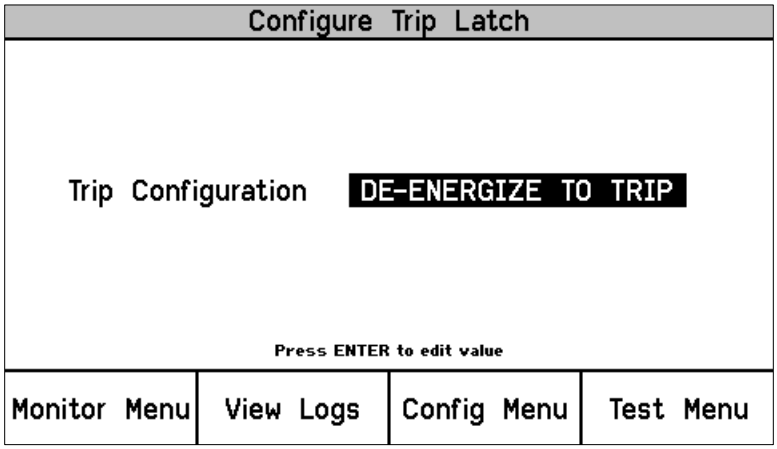


Figure 9-50. Configure Trip Latch

Configure Analog Output

- Scale the analog output to RPM.

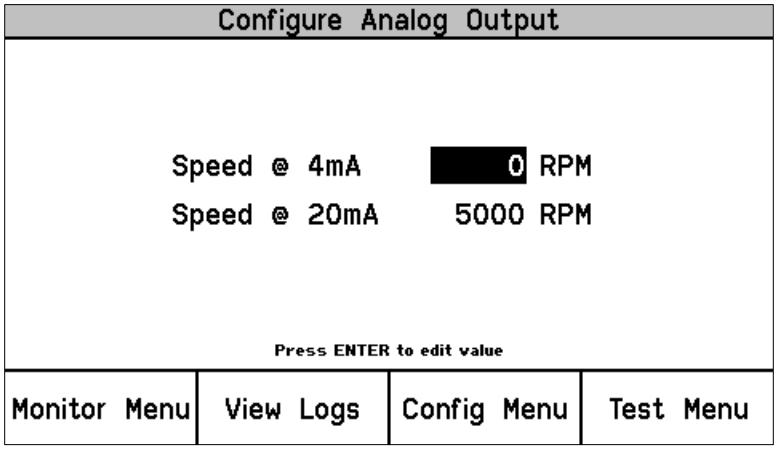


Figure 9-51. Configure Analog Output

Configure Test Modes

- Set parameters for internal test modes.
  - Temporary Overspeed Trip – The value that the overspeed trip setpoint will be changed to while the Temporary Overspeed Trip Test is active.
  - Temp Overspeed Trip Timeout - How long the unit will stay in this test mode, before aborting the test (0-30 minutes).
  - Simulated Speed Timeout - How long the unit will stay in the Auto or Manual Simulated Speed Test, before aborting the test (0-30 minutes).
  - Test Mode Interlock Disabled – NO, will prevent the test from being run when any other module is tripped. YES, will allow the user to run this test regardless if any other modules are tripped.

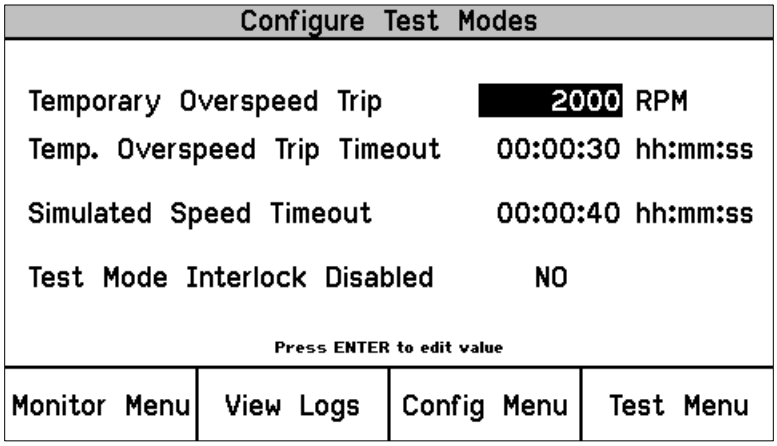


Figure 9-52. Configure Test Modes

Configure Periodic Overspeed Test

- Set parameters for Periodic Overspeed Test.
  - Periodic Test Enabled – YES, enables this test.
  - Test Interval – Sets automatic Interval of this test (0-999 days).
  - Operator Can Disable Test – Set to yes will allow the operator to disable this test from the front panel.

Note: This test can only be configured on Module A. Modules B and C automatically use Module A's settings.

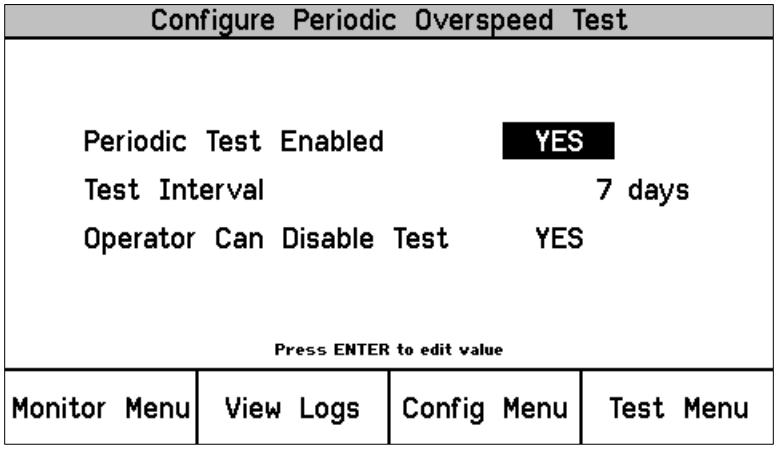


Figure 9-53. Configure Periodic Overspeed

Configure Modbus—Set Parameters for Modbus Communications

- The optional modes are RS-232 or RS-485.
  - Set BAUD rate, parity and slave address
  - Enable Write Commands: NO prevents Modbus data from using write commands, YES allows use of the commands
  - The write commands are Reset, User Defined tests 1 – 3, and Auto Simulated Speed Test.

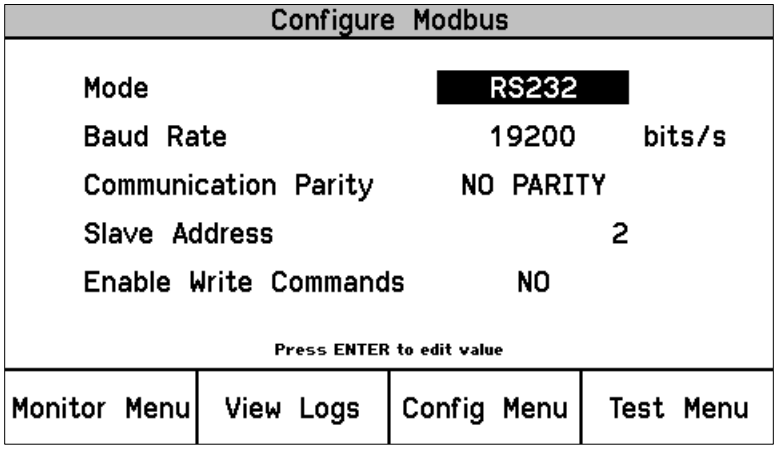


Figure 9-54. Configure Modbus

Configuration Management Menu

- Configuration Overview—CRC values for configurable parameters.
- Configuration Compare—User selects if this comparison feature is used or not. This feature continuously compares the configuration of the current module against the other two modules in the MicroNet Safety Module.
- Copy Configuration—Allows the user to copy the configuration in the current module to one or both other two modules in the MicroNet Safety Module.

The following are expected to be unique and are not included in the compare or copy functions:

- Configurable Input names and units
- Trip Latch names
- Alarm Latch names
- Event Latch names
- Modbus Slave Address

Note: Passwords are not considered part of the configuration.

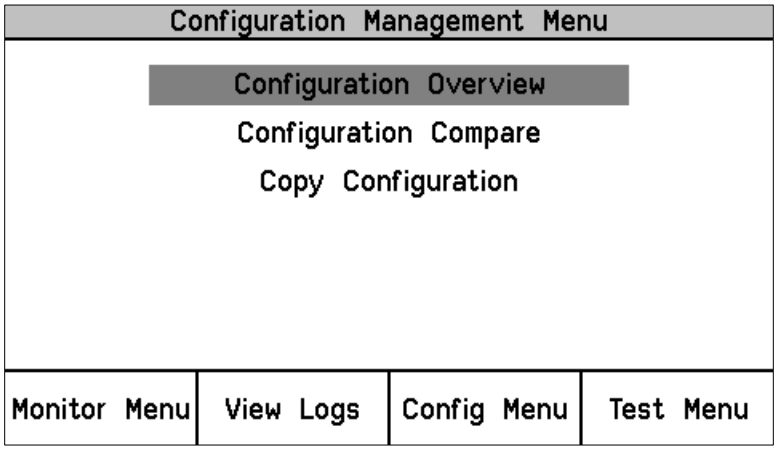


Figure 9-55. Configuration Management Menu

NOTICE

Before putting the MicroNet Safety Module into operation, verify that the same configuration is in all three modules. Use the Configuration Compare routine to confirm that this is true.

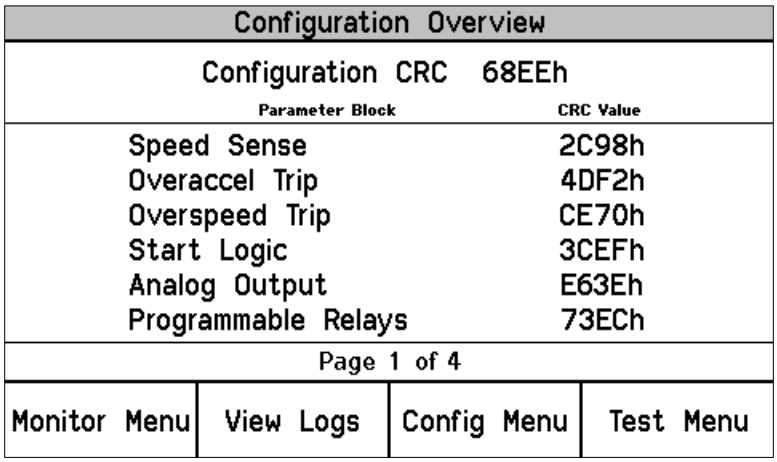


Figure 9-56. Configuration Overview

For additional details on the values displayed on this screen, refer to the Parameter Block Definitions in the Configuration Overview screen section of the Programming and Configuration Tool (PCT) chapter.

- Configuration Compare—User selects whether this comparison feature is USED or NOT USED. This routine compares the configuration of the current module against the other two modules in the MicroNet Safety Module and generates an alarm if there is a difference.

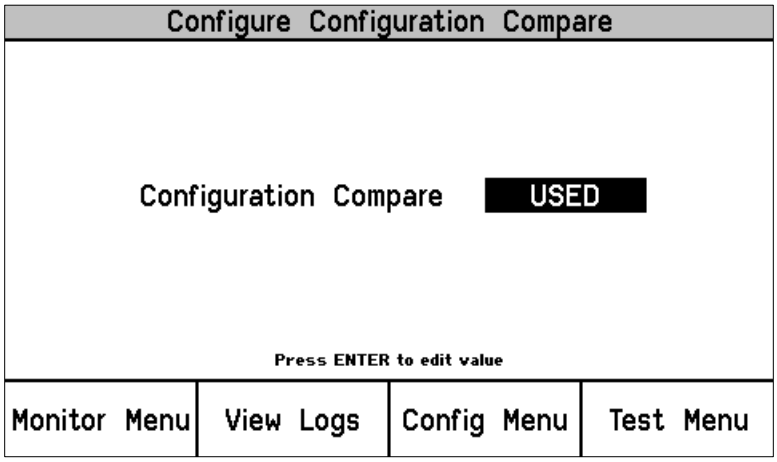


Figure 9-57. Configuration Compare

- Copy Configuration—Allows the user to copy the configuration in the current module to one or both of the other two modules in the MicroNet Safety Module.

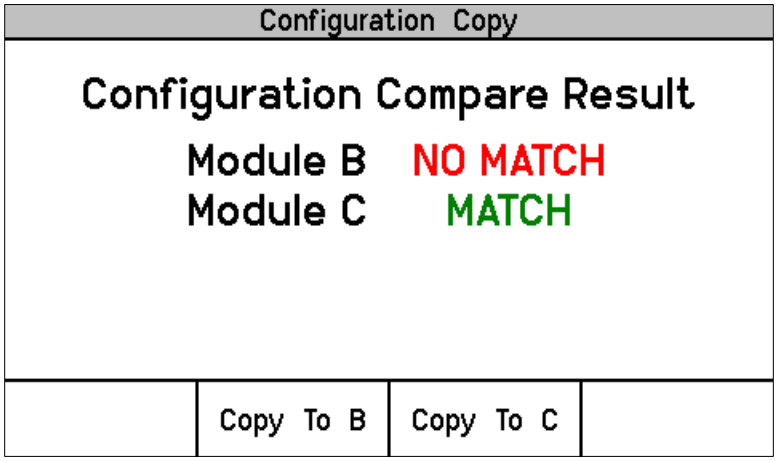


Figure 9-58. Configuration Copy

Configuration Copy Procedure

1. Configuration Compare must be configured to “Used” on the current module and the target module(s), for this routine to function.
2. If Configuration Compare is NOT USED on the current module, selecting Copy Configuration will bring up the message:

   Configuration Compare Disabled

   Configuration Copy is not available
3. If the Configuration Compare is NOT USED on the target module, its Configuration Compare Result will show as UNKNOWN and there will be no soft key option to copy to that module.
4. The Configuration Copy screen will display the current configuration status of the other two modules.
   a. Match – Indicates that the target module already has the same configuration as the current module.
   b. No Match – Indicates that the configurations do not match.
   c. Unknown – Indicates that the target module is not configured to use Configuration Compare so cannot be read or copied to or that the module is missing, powered off, or that the CAN communications to that module are not working.
5. The current module can be in a tripped, or un-tripped state
6. Any target modules must be in a tripped state to accept the configuration.
7. Press “Copy to _” for either of the other two modules.
8. Select the password for Config level, and press Enter.
9. Displays “Copying configuration to target…”.
10. Displays “Done saving target configuration”
11. The screen will show that the target module is now a Match.

IMPORTANT **The Configuration Copy does NOT copy user defined text associated with Inputs, Outputs, or Alarm, Trip, or Event Latches.**

Password Change Menu

- Allows the user to change the Test Level or Configuration Level passwords.
- The current password must be re-entered before any changes can be made.

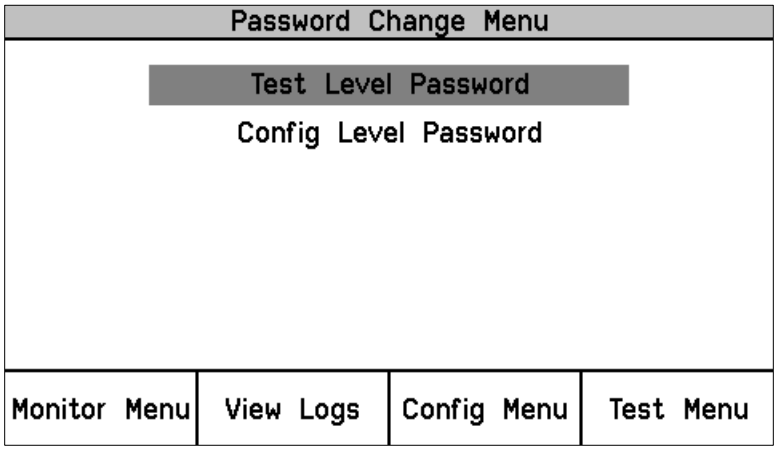


Figure 9-59. Password Change

Password Change Procedure

1. Select the Level of password to change.
2. At the Change Password prompt Select Yes to continue or Cancel to back out of this screen.
3. If changing the Test Level Password, either the current test or configure password may be entered. If changing the Config Level Password, the current configure password must be entered.
4. After successfully selecting the correct password, press Enter.
5. The user must now select the NEW password for that level.
   a. Use the Aa 0-9 @ soft key to select upper case letters, lower case letters, numbers, or a list of usable special characters.
   b. Use the value ▼or ▲ keys to change the highlighted value.
   c. Use the Cursor → key to move the highlighted character to the right.
6. Once the new password has been selected press Enter to save it.
7. A message will appear to confirm that the password has been changed.

IMPORTANT **There is no means to reset the password if it is forgotten. Units requiring a password reset must be returned to Woodward.**

Test Modes Menu

The Test Modes Menu provides access to all the MicroNet Safety Module tests. The user can initiate any configured test the front panel. The Test or Config Level password must be entered to start any of these tests except for the Lamp Test.

The system is equipped with several internal test routines to verify configurable logic and that parameters are working correctly. The test menu of the MicroNet Safety Module keypad contains following tests:

- **Temporary overspeed setpoint**
  This is an overspeed test with adjusted test speed setpoint executed with the real hardware speed signal from the rotating machine. The speed of the rotating machine must be raised within the allowed test time span in order to test trip action. If the overspeed setpoint is not exceeded within this time span, the overspeed test is aborted.

- **Manual simulated speed test**
  This is an overspeed test with the speed setpoint that is valid for the machine executed with a simulated speed signal from an internal frequency generator that initiates at the overspeed setpoint minus 100 rpm and must be manually raised within the allowed time span to above the overspeed setpoint in order to test the trip action. If the overspeed setpoint is not exceeded within this time span, the overspeed test is aborted.
- **Auto simulated speed test**
  This is an overspeed test with the speed setpoint that is valid for the machine executed with a simulated speed signal from an internal frequency generator that initiates at the overspeed setpoint minus 100 rpm and is automatically raised to above the overspeed setpoint in order to test the trip action. If the overspeed setpoint is not exceeded within the requested time span, the overspeed test is aborted.
- **Periodic overspeed test**
  The periodic overspeed test provides an auto simulated speed test at the configured test interval. Since module A initiates the test sequence, the periodic overspeed test can only be configured in module A.
- **User defined test 1**
- **User defined test 2**
- **User defined test 3**

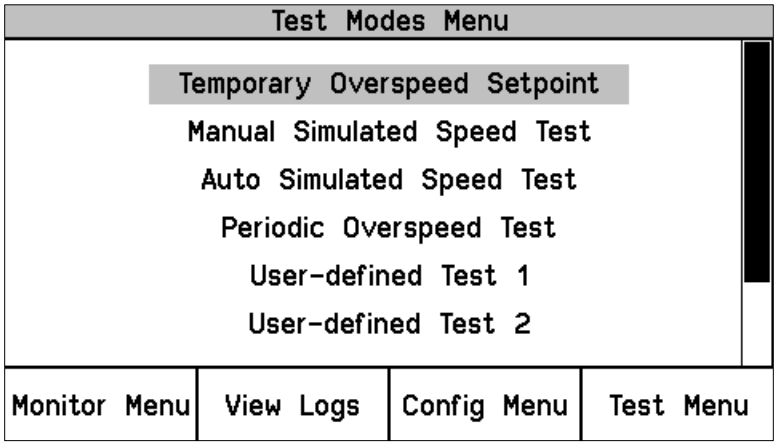


Figure 9-69. Test Modes Menu

In general, a test may not be started if any other module is tripped or in test or if the current module is tripped or in test. One exception to these rules is the Temporary Overspeed Trip Setpoint which can be applied to multiple modules or if another module is tripped. The other is the Lamp Test which can be applied to any module at any time without a password. If a test is not permitted, or aborted, the following messages explain the cause:

Module Already Tripped! Test Aborted – Indicates that the test cannot be started because the module is already tripped.

Test in Progress - Indicates that the test cannot be started because the module is already in the test mode.

Other Module Tripped! Test Aborted – Indicates that the test cannot be started or that a running test was aborted because another module is tripped.
NOTE: This test mode interlock can be disabled in the Test Modes Configuration of the PCT.

Other Module In Test Mode! Test Aborted. – Indicates that the test cannot be started because either of the other modules are in a test mode.

Note: The Test Mode Interlock can be disabled in the configurable software.

Temporary Overspeed Setpoint Test

- Temporary Overspeed Trip Setpoint—Trip setting for testing.
- Actual Speed—Current Actual Speed.
- Overspeed Trip Setpoint—Configured Actual Overspeed Setpoint.

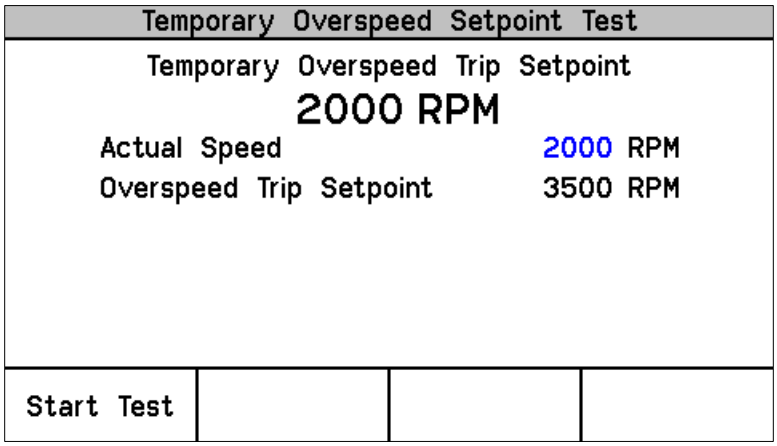


Figure 9-70. Temporary Overspeed Test

Temp. Overspeed Test Procedure

To configure this test, see Configure Test Modes Procedure in the section above. See Chapter 3 for a full description of this test.

1. Module cannot be tripped to run this test.
2. Press the Start Test softkey.
3. Select the password for Test or Config level.
4. To run the test press Apply, or press Cancel to exit..
5. The Temp Overspeed Trip Timer will be displayed and counting down.
6. The user can end the test and restore the Overspeed Trip Setpoint to the Configured Actual Overspeed Setpoint.
7. If the Timer expires before the test has ended, the unit will display a message Test Time Expired, and revert back to the Start test screen

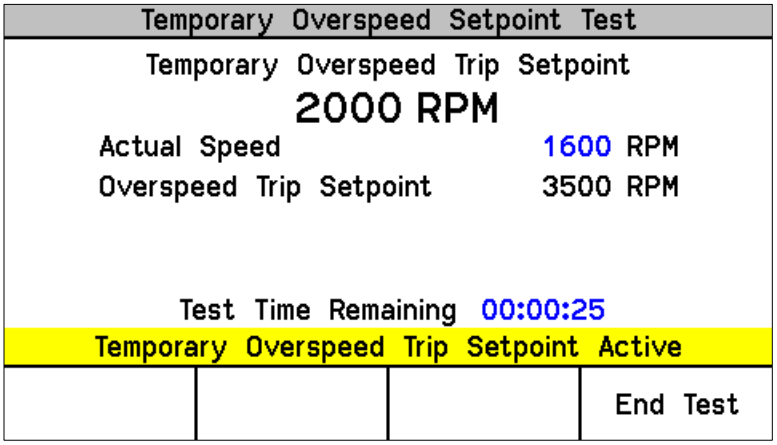


Figure 9-70. Temporary Overspeed Test

The following Messages may be seen on the Temp. Overspeed Threshold Test page:

At Least One Other Module Is Tripped! – This is only used for the Temporary Overspeed Trip as a warning that another module is tripped. It does not prohibit applying this test.

Temporary Overspeed Trip Setpoint Active - Indicates the Temporary Overspeed Trip Test is active (and the current speed is less that the Overspeed Trip Setpoint).

Speed > Overspeed Trip Setpoint! - Indicates the Temporary Overspeed Trip Test is active and the current speed is greater than the Overspeed Trip
Setpoint. When the test is ended by the user or when the Test Time is Expired, the module will trip.

Test Time Expired - Indicates the timer has reached zero.

Test Ended by Modbus - Indicates the test was ended by a Modbus command.

Simulated Speed Test

- Test Mode—Manual or Auto.
- Actual Speed—Current Actual Speed.
- Overspeed Trip Setpoint—Configured Actual Overspeed Setpoint.

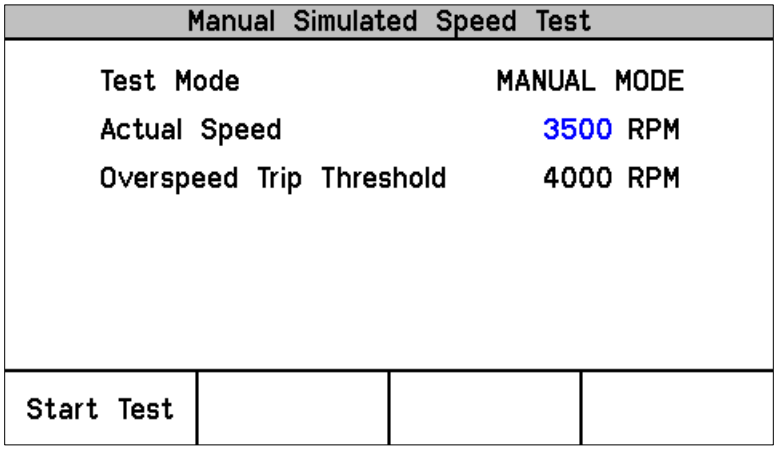


Figure 9-71. Manual Simulated Speed Test

Note: The resolution of the internal simulated speed decreases as frequency increases. The following table indicates a few spot frequencies. In the following table and graph, it is assumed that a 60 teeth gear is used with a gear ratio of 1, making frequency the same as RPM.

Table 9-1. 60 Teeth Gear with Gear Ratio of 1

RPM	Resolution (RPM)
6	9.5E-5
100	.0016
1000	0.16
10000	2.0
32000	20.5

The resolution of the internal frequency generator is described in the following graph. The discontinuities in the chart occur when different internal clock scaling occurs to optimize resolution.

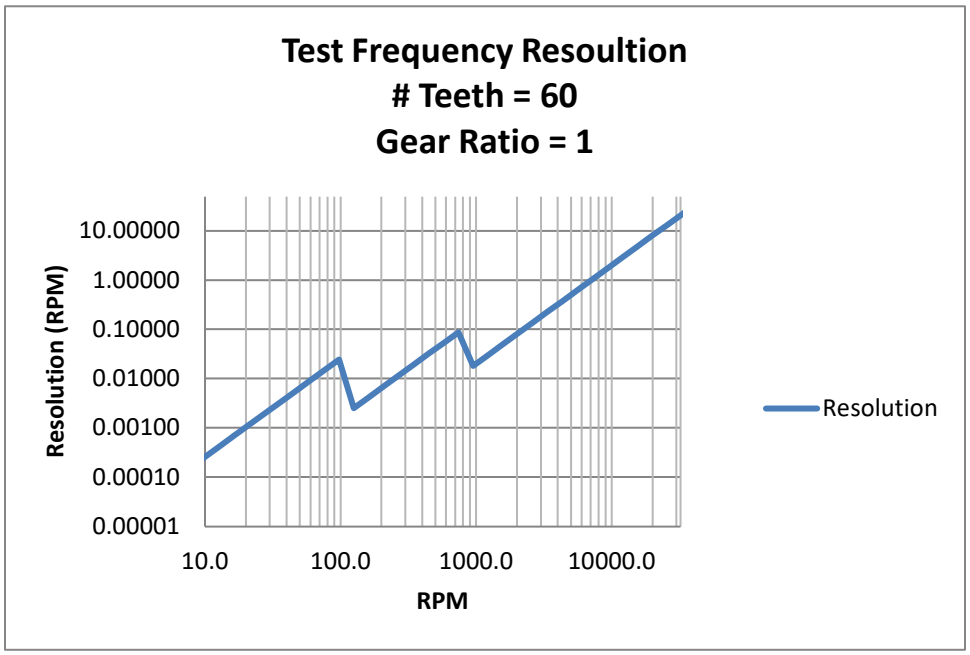


Figure 9-72. Test Frequency Resolution

The following Messages may be seen on the Manual Simulated Speed Test page:

Manual Simulated Speed Active - Indicates the Manual Simulated Speed Test is active.

Auto Simulated Speed Active - Indicates the Auto Simulated Speed Test is active.

Test Time Expired - Indicates the timer has reached zero.

Test Ended by Modbus - Indicates the test was ended by a Modbus command.

Simulated Speed Test (Auto or Manual) Procedure

To configure this test, see Configure Test Modes Procedure in the section above. See Chapter 3 for a full description of this test.

1. Module cannot be tripped to run this test.
2. Press the Start Test soft key.
3. Select the password for Test or Config level.
4. To run the test press Apply, or press Cancel to exit.
   a. Manual Mode
      i. The Simulated Speed Timeout counter will be displayed and counting down.
      ii. The user can use the value ▼or ▲ keys to change the simulated speed setting
      iii. If the simulated speed is raised above the trip point, the unit will switch to the Home screen with the Module Trip displayed.
      iv. Select End Test to Exit
      v. If the timer expires before a simulated trip occurs, the unit will display a message Test Time expired and revert back to the Start test Screen.
   b. Auto Mode
      i. The module will automatically start ramping the simulated speed up to the trip point
      ii. When the simulated speed exceeds the trip point, the unit will switch to the Home screen with the Module Trip displayed.
      iii. There is no timer in Auto mode.
      iv. Select End Test to Exit

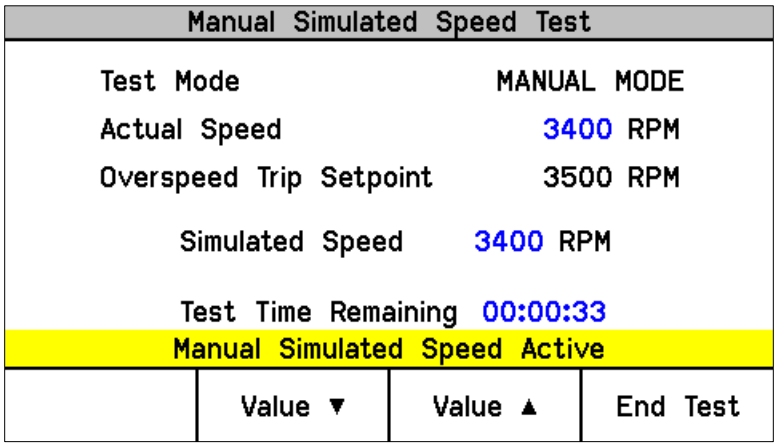


Figure 9-73. Manual Simulated Speed Test

Periodic Overspeed Test

- Displays time until the next test.
- Display results of last test.
- This test can only be configured on Module A.

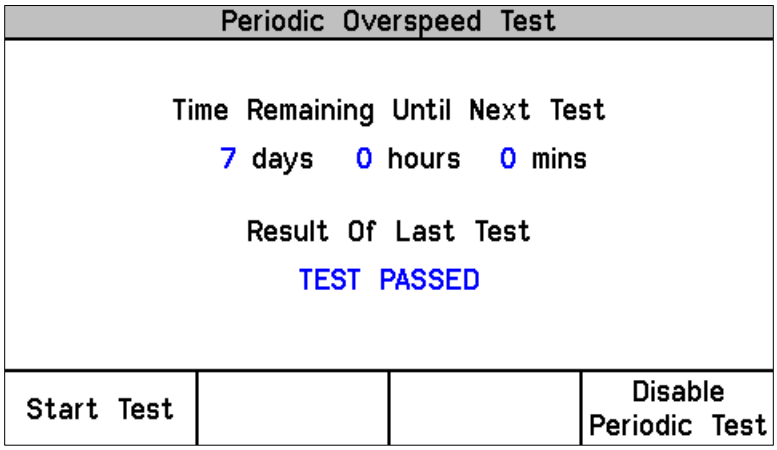


Figure 9-74. Periodic Overspeed Test

Result of Last Test can be:
TEST NOT STARTED, TEST PASSED, TEST FAILED, TEST NOT COMPLETED.

Periodic Overspeed Test Procedure

To configure this test, see Configure Periodic Overspeed Test Procedure in the section above. See Chapter 3 for a full description of this test.

1. No module can be tripped or in the test mode when this test is started.
2. Test can only be initiated on Module A.
3. Press the Start Test soft key.
4. Enter the Test or Config Level Password and select “ENTER”.
5. Once the correct password has been entered, press the Start Test soft key to initiate the test.
6. Module A will initiate the internal Overspeed Trip Test.
7. Periodic Overspeed test Active
8. If any module is tripped or placed in test, the Time Remaining Until Next Test timer will be prevented from counting below 1 hour. If the timer is already below 1 hour it will be increased to 1 hour.

9. If no other module is tripped.
    a. The test will run on Module A only
    b. Switch to the Home screen and display “Module Trip”.
    c. Automatically reset the module.
    d. Move on to Module B and repeat steps b and c.
    e. Move on to Module C and repeat steps b and c.
10. This test will repeat at the next configured interval.

The operator can disable the periodic test from the front panel of the module. When the Periodic test is Disabled, or if any module is in trip or test, the Time Remaining Until Next Test will be prevented from counting below 1 hour. If the timer is already below 1 hour it will be increased to 1 hour. When Enable Periodic Test is selected and no modules are tripped or in test, this function is removed.

User Defined Test 1, 2, & 3

User configured tests are described in chapter 3.

When one of these screens is selected, one of the following status messages will be shown:

NOT CONFIGURED

Test Not Started
Test Ended by:
    a. Front-Panel
    b. Test Timeout
    c. Configurable Logic

User-defined Test Procedure

To configure this test, see Configure User-defined Test Procedure in the section above. See Chapter 3 for a full description of this test.

1. No module can be tripped or in the test mode when this test is started.
2. Press the Start Test soft key.
3. Enter the Test or Config Level Password and select “ENTER”.
4. Once the correct password has been entered, the Message “**Start User-defined Test X*?**” will appear.
5. Press the “Start” soft key to initiate the test or “Cancel” to cancel the test.
6. The user defined test latch will be set and the associated logic executed.
7. During the test, the message **User-defined Test X* Active** and the Test Time Remaining timer, and the “End Test” soft key are shown.
8. If End Test is selected, the message **End Test Mode?** will be shown and the soft keys “Yes” and “No” will be shown. Selecting “Yes” will reset the User-defined Test Latch.
9. The test will be ended if the test timer reaches 00:00:00, if the “End Test” soft key is select, if the test is aborted by a Modbus command, or if the Configurable Logic resets the test.

* “X” indicates the number of the User-defined test - 1, 2, or 3

NOTICE

The logic behind the User-defined Test must be validated by the user for all possible modes of operation including normal test, test failure(s), or test abort(s).

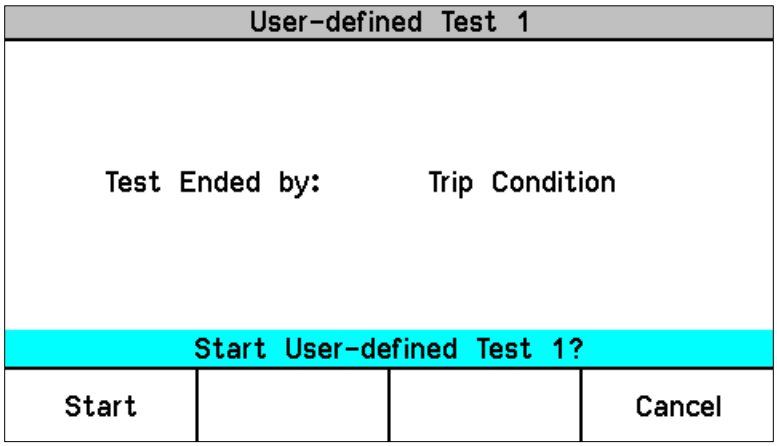


Figure 9-75. User Defined Test

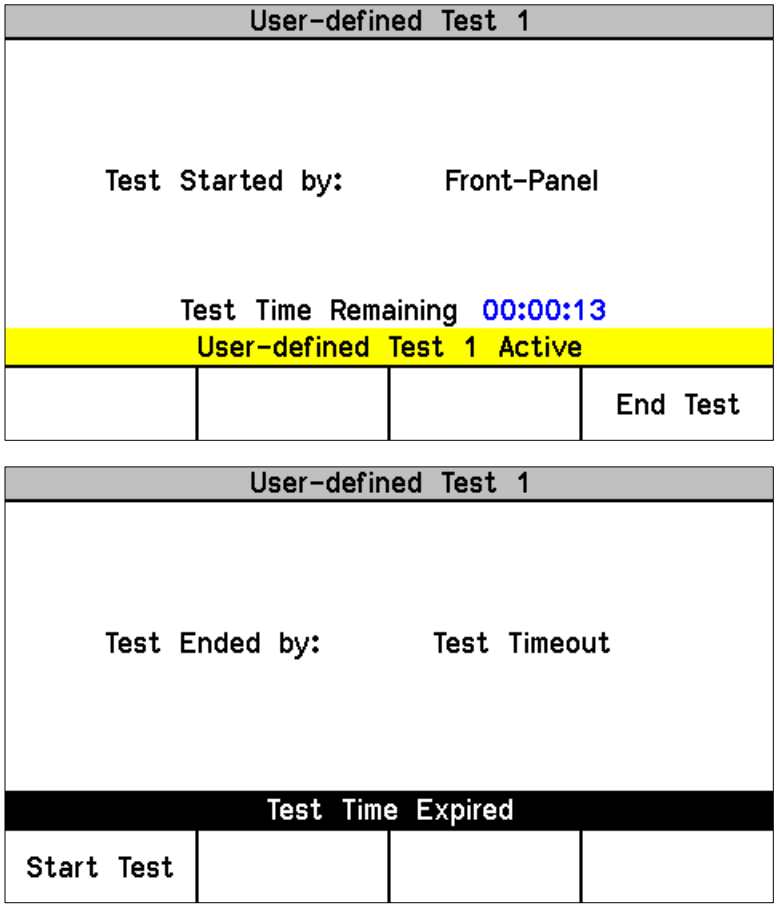


Figure 9-76. User Defined Test

Lamp Test

The Lamp Test is provided to verify front panel LED functionality. During the test, each LED is cycled off and through the provided color combinations listed below. The test can be repeated as needed. A cancel function is also available. No password is required to run the test.

Lamp Test Procedure

1. Select Start Test
   a. Tripped LED—Turns red.
   b. Unit Health LED—Turns red, then green.
   c. Alarm LED—Turns yellow.
2. When the test is complete, LEDs return to normal operation.

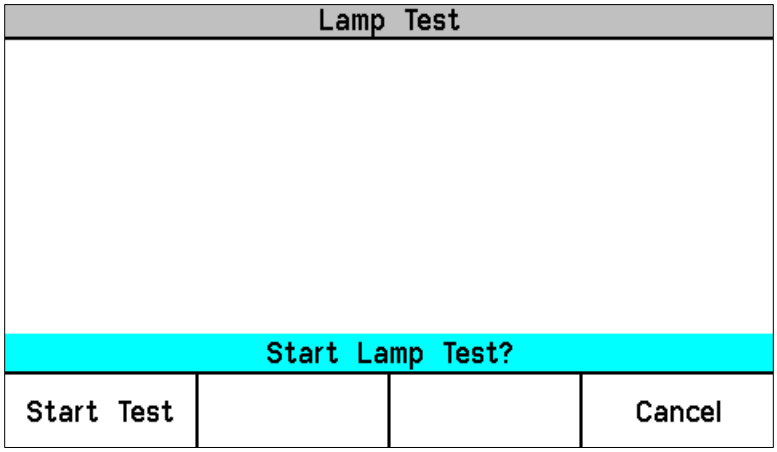


Figure 9-77. Lamp Test

Chapter 10.
Programming and Configuration Tool

General

Each MicroNet™ Safety Module module includes preset overspeed, over-acceleration, alarm latch, and trip latch functionality. It can be custom configured to meet a specific application through a module's front panel or the provided Programming and Configuration Tool (PCT).

A custom application program is required for use of any of the MicroNet Safety Module control's configurable inputs and outputs and related functionality. The MicroNet Safety Module includes a software based PCT that can be loaded onto a computer and used to:

- Create and change custom application programs
- Change overspeed and over-acceleration functionality settings
- Save application and configuration settings to a file
- Download application and configuration settings to each MicroNet Safety Module module
- Upload application and configuration settings from a MicroNet Safety Module module
- Upload and view stored logged files from a MicroNet Safety Module module

⚠WARNING **An unsafe condition could occur with improper use of these software tools. Only trained personnel should have access to these tools.**

A straight-through serial cable is used to allow the designated computer (with the PCT program loaded on it) to communicate with a MicroNet Safety Module. Refer to Figure 2-18 for cable-specific information.

The PCT consists of a combination of Woodward's "ToolKit" HMI (Human Machine Interface) software program and a special MicroNet Safety Module application file. Although the PCT is provided with each MicroNet Safety Module on an included software installation CD, it can also be uploaded from Woodward's Internet website (**www.woodward.com/software**).

The PCT is designed to allow off-line (while not connected to the MicroNet Safety Module) program and configuration settings to be generated, saved, then downloaded into a MicroNet Safety Module. On-Line (while connected to the MicroNet Safety Module) configuration settings can be manipulated. This is an example of a typical process to follow to program and/or make changes to the MicroNet Safety Module via the PCT:

1. Open ToolKit and select a .wset file to modify/edit or create a new one from SID specification defaults.
2. Create program logic or make changes to existing logic.
3. Save the .wset file to a directory on the computer.
4. Connect to the MicroNet Safety Module via the PCT connection wizard.
5. Download the saved .wset file to the MicroNet Safety Module module (module must be in tripped state).
6. Using the Config Menu's Configuration Management function copy the downloaded program to the other two MicroNet Safety Module modules.

Installation of the PCT

The MicroNet Safety Module control's PCT is a combination of Woodward's "Toolkit" software and a special MicroNet Safety Module application program.

Use the following installation procedure to install the PCT (Programming and Configuration Tool).
1. Locate/obtain MicroNet Safety Module PCT Installation CD provided with each MicroNet Safety Module. (Alternatively, the MicroNet Safety Module PCT can be downloaded from Woodward's Internet website [**www.woodward.com/software**]).
2. Run the installation program and follow all installation instructions.

Programming and Configuration Tool (PCT) Help

On-Line Programming and Configuration Tool (PCT) help is available and included with the installation of the Programming and Configuration Tool (PCT) product. Help can be accessed from the Programming and Configuration Tool (PCT) 'Help' menu located on the Main Window.

Levels of Operation of the Programming and Configuration Tool (PCT)

The MicroNet Safety Module Programming and Configuration Tool (PCT) can be used in different operating levels:
- Isolated from the MicroNet Safety Module (Off-Line)
- Test Level (On-Line)
- Config Level (On-Line)

Isolated level:
- A communication link between PC and MicroNet Safety Module is not required.
- Password is not required.
- The configuration file to be loaded into the MicroNet Safety Module can be created by the Programming and Configuration Tool (PCT).

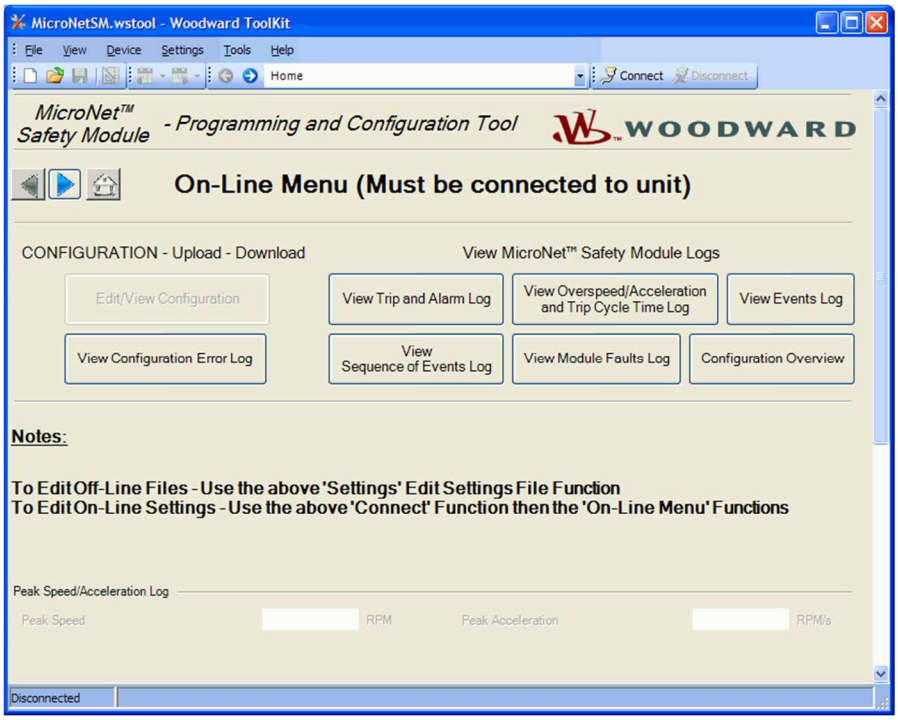
Test Level:
- A serial communication link must be established and operational.
- Password for Test Level is required.
- The configuration file to be loaded into the MicroNet Safety Module can be created by the Programming and Configuration Tool (PCT).
- The configuration file stored in the MicroNet Safety Module can be copied to the PC.
- Log files can be viewed or exported.
- All logs (except Peak Speed and Peak Acceleration) can be reset.

Config Level:
- A serial communication link must be established and operational.
- A password for Config Level is required.
- The configuration file stored in the MicroNet Safety Module can be copied to the PC.
- The configuration file created by the Programming and Configuration Tool (PCT), can be uploaded to the MicroNet Safety Module.
- Log files can be viewed, exported, or reset.
- On-Line configuration is enabled.

Using the Programming and Configuration Tool (PCT)

In order to use the MicroNet Safety Module Programming and Configuration Tool (PCT), the following actions must be executed:

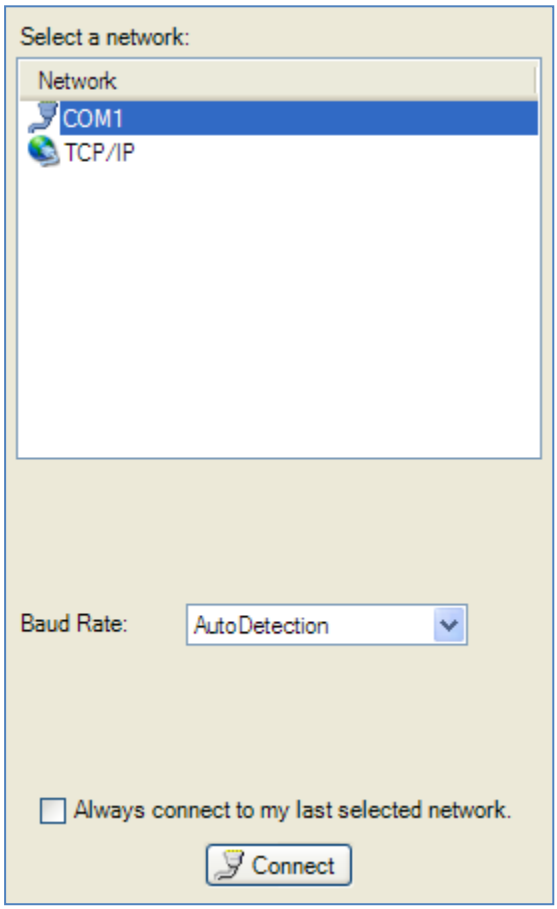
1. The correct Toolkit version is supplied with the Installer CD that is provided with the product and must be installed on a PC.
2. Run the Toolkit service tool by double-clicking on the file MicroNet Safety Module.wstool. The following introduction screen will be displayed on the PC.



The PCT is ready to be used in isolated level. In order to use the PCT in either Test or Config level, the following actions must be executed:

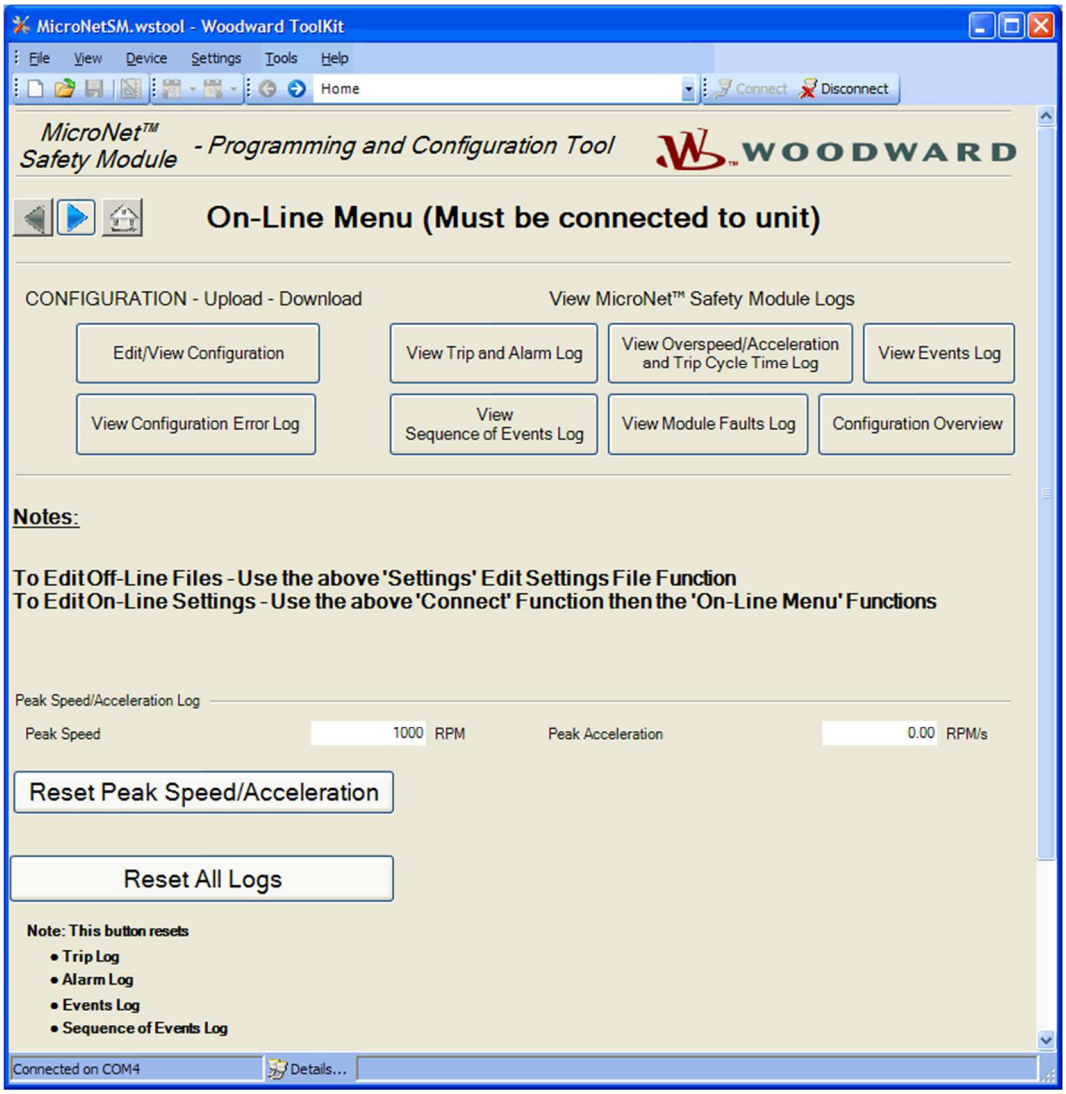
3. A serial interface cable must be installed between PC and one of the units of the MicroNet Safety Module. The serial cable must be wired as shown in Figure 2-19.

4. Establish communication by using the “connect” function. After pressing “Connect”, the following pop-up window appears which prompts you to select a network:



5. Select the Communication port that the serial interface cable is connected to and click on the Connect button in the pop-up window.
6. When the communication link is established, the following pop-up window appears:
7. Select either “Test Level”, or “Config Level”, and enter the associated Password for the selected level and log in. Select Close if Test or Config level functions are not required.
8. If the communication link cannot be established, the Programming and Configuration Tool (PCT) will continue to attempt to establish the communication link until the Disconnect Button is pressed.
9. After communication has been established, the MicroNet Safety Module Programming and Configuration Tool (PCT) provides two menu options:
   - On-Line Menu
   - Off-Line Menu

On-Line Menu



The On-Line menu provides seven buttons:

- Edit/View Configuration
- View Configuration Error Log
- View Trip and Alarm Log
- View Sequence of Events Log
- View Overspeed/Acceleration and Trip Cycle Time Log
- View Event Logs
- View Module Faults Log
- Configuration Overview

This menu is always available; however a communication link must be established before the information in the logs is available for monitoring.

When logged in at the appropriate Security Level, the following buttons are available also:

- Reset Peak Speed/Acceleration
- Reset All Logs

Selecting **Reset Peak Speed/Acceleration** button will clear the Peak Speed/Acceleration. The Reset All Logs button is only visible when logged in with Test Level permissions or higher. If desired, the logs can be cleared from the front panel user interface (see Logs Menu).

Selecting the **Reset All Logs** button will clear the Trip, Alarm, Overspeed /Acceleration and Trip Cycle Time, Sequence of Events, Event Log 1, Event Log 2 and Event Log 3 logs. The Reset All Logs button is only visible when logged in with Test Level permissions or higher. If desired, the logs can be cleared from the front panel user interface (see Logs Menu).

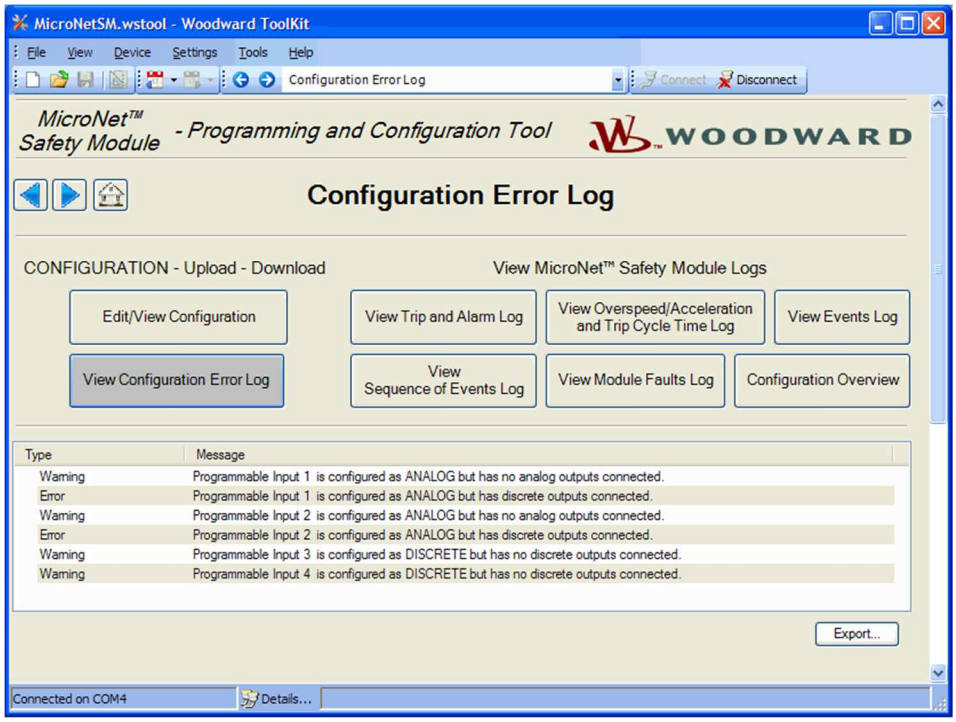
Home

Use this “Home” button to return to this On-Line Menu after any one of the five logs have been opened.

View Configuration Error Log

After selecting “View Configuration Error Log”, a list of all configuration faults of the configuration that have been loaded in the MicroNet Safety Module is displayed.

Note: If the configuration has not been changed since the last power cycle, configuration faults do not appear.

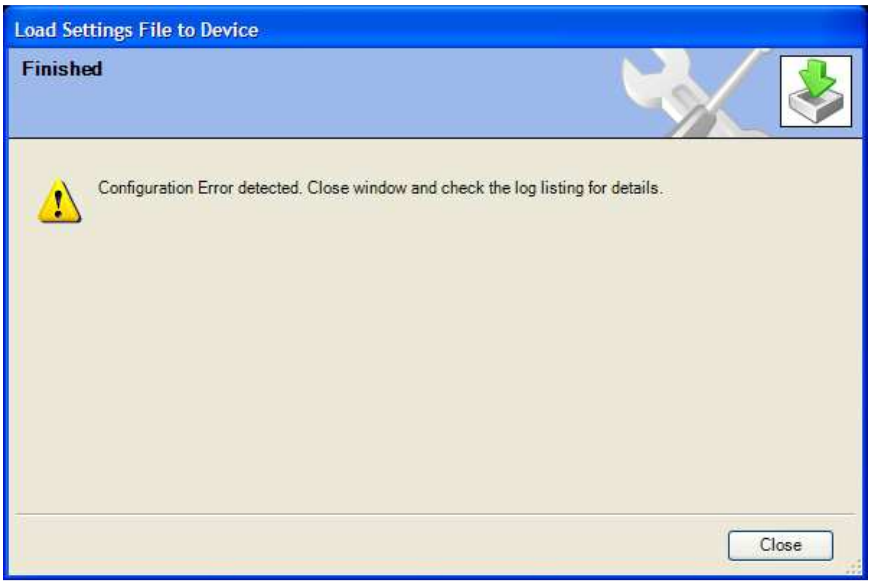


Configuration faults include warnings and/or errors.

If a configuration warning exists, the configuration is saved to the MicroNet Safety Module.

Configuration warnings can be logical or analog outputs from any function not connected.

If a configuration error exists, the configuration is not saved and the following screen appears when trying to upload the settings file to the MicroNet Safety Module.



All configuration errors must be resolved before a successful upload of the settings file can be completed. Configuration errors can include:

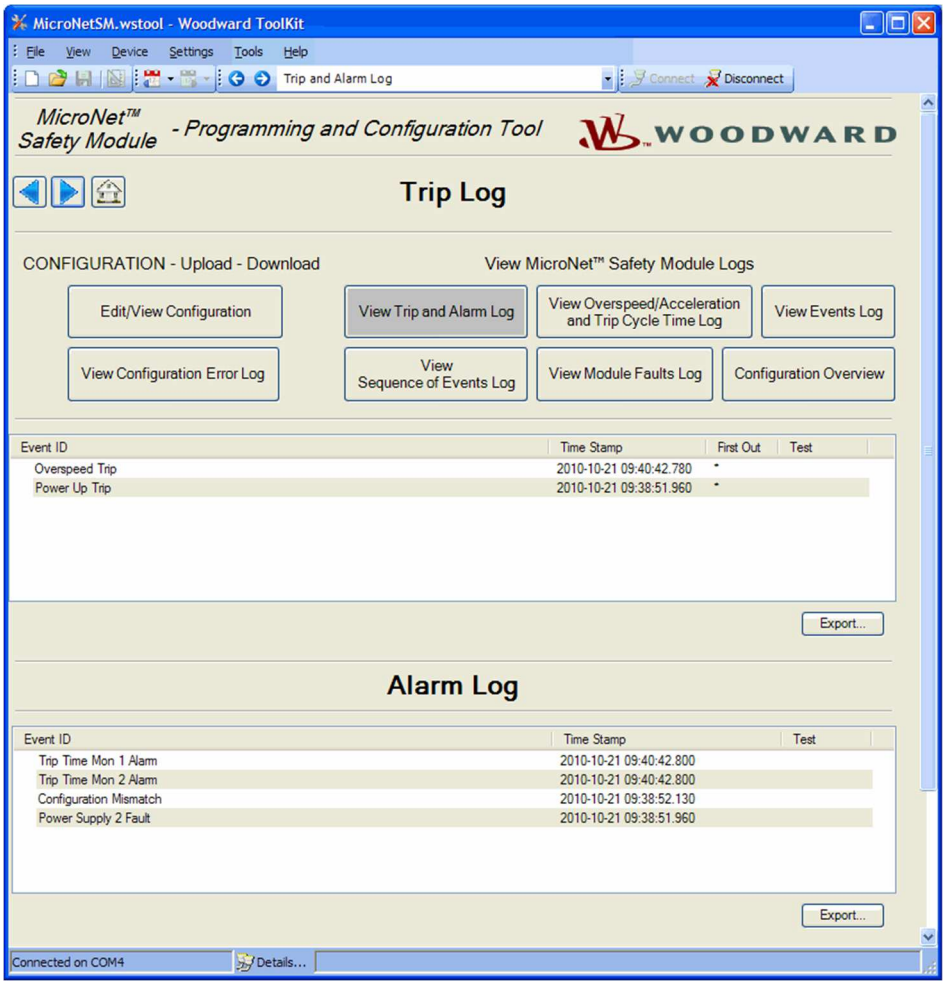
- Inputs configured as discrete inputs connected to comparators.
- Inputs configured as analog inputs connected to logical inputs.
- Inputs configured as “Not Used” but are connected to other components.

View Trip and Alarm Log

After selecting “View Trip and Alarm Log”, a list of all recent trips and/or alarms that have been detected and logged in the MicroNet Safety Module are displayed. Each log can contain up to 50 events. Logs can be cleared from the View Events Log screen or from the front panel user interface, with Test Level permissions or higher.

The list contains a description, the time stamp, first-out and/or test-mode indicators. The first-out indicator contains an asterisk (*) for the first detected fault condition(s) after the latch was cleared of all active faults. The test mode indication contains an asterisk (*) if the ProTech was in any of the test modes when the fault condition(s) occurred.

The logs can be saved to an html file using the Export button.



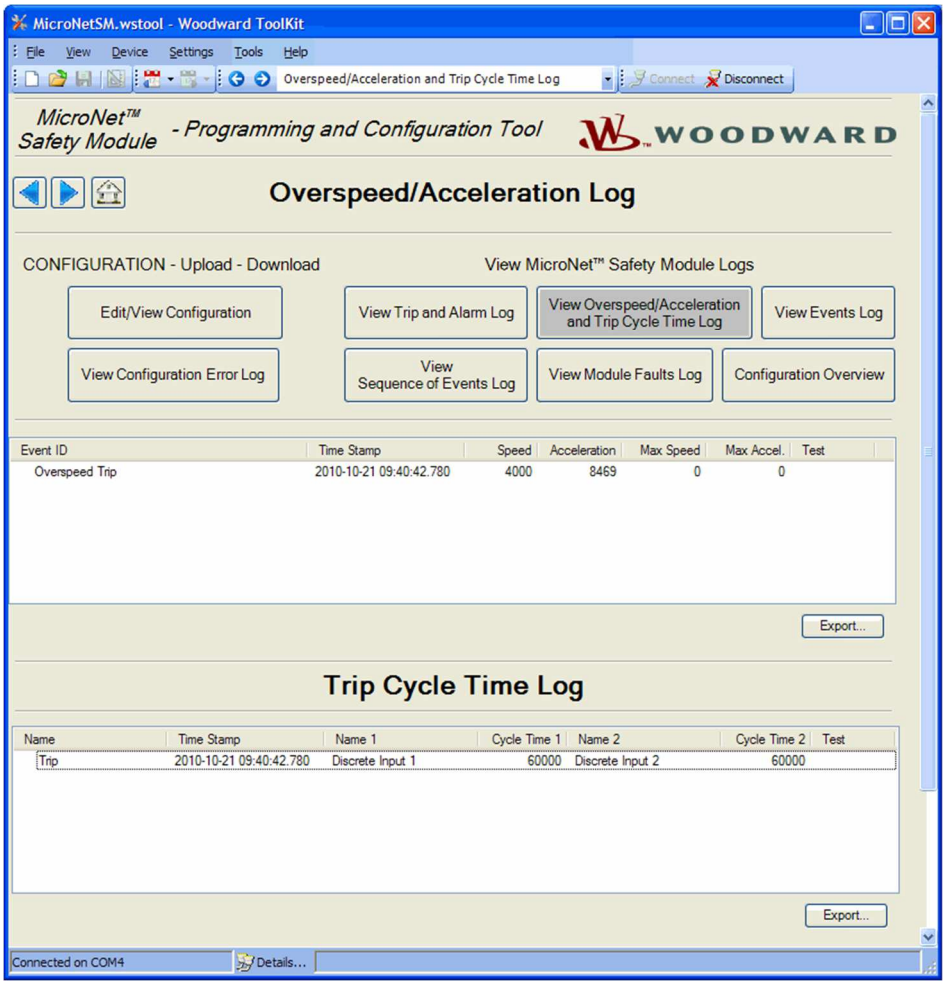
Log Timestamp

The time stamps in the logs are based on the internal clock at the time of the event. Time stamps are not changed when the internal clock time is modified (e.g. time/date is set or a 24 Hr time sync command).

View Overspeed/Acceleration and Trip Cycle Time Log

After selecting “View Overspeed/Acceleration and Trip Cycle Time Log”, two lists are displayed:

- A list of all recent overspeed trips and alarms that have been detected and logged in the ProTech is displayed. The maximum length of this list is 20 lines. The list contains a description, the timestamp, the actual speed when overspeed was detected, the acceleration when overspeed was detected, the maximum speed reached (after trip) and the maximum acceleration.
- A Trip Cycle Time Log which displays the time of the trip and the delay time to receive the trip feedback signal, when used. The cycle time is displayed in milliseconds.

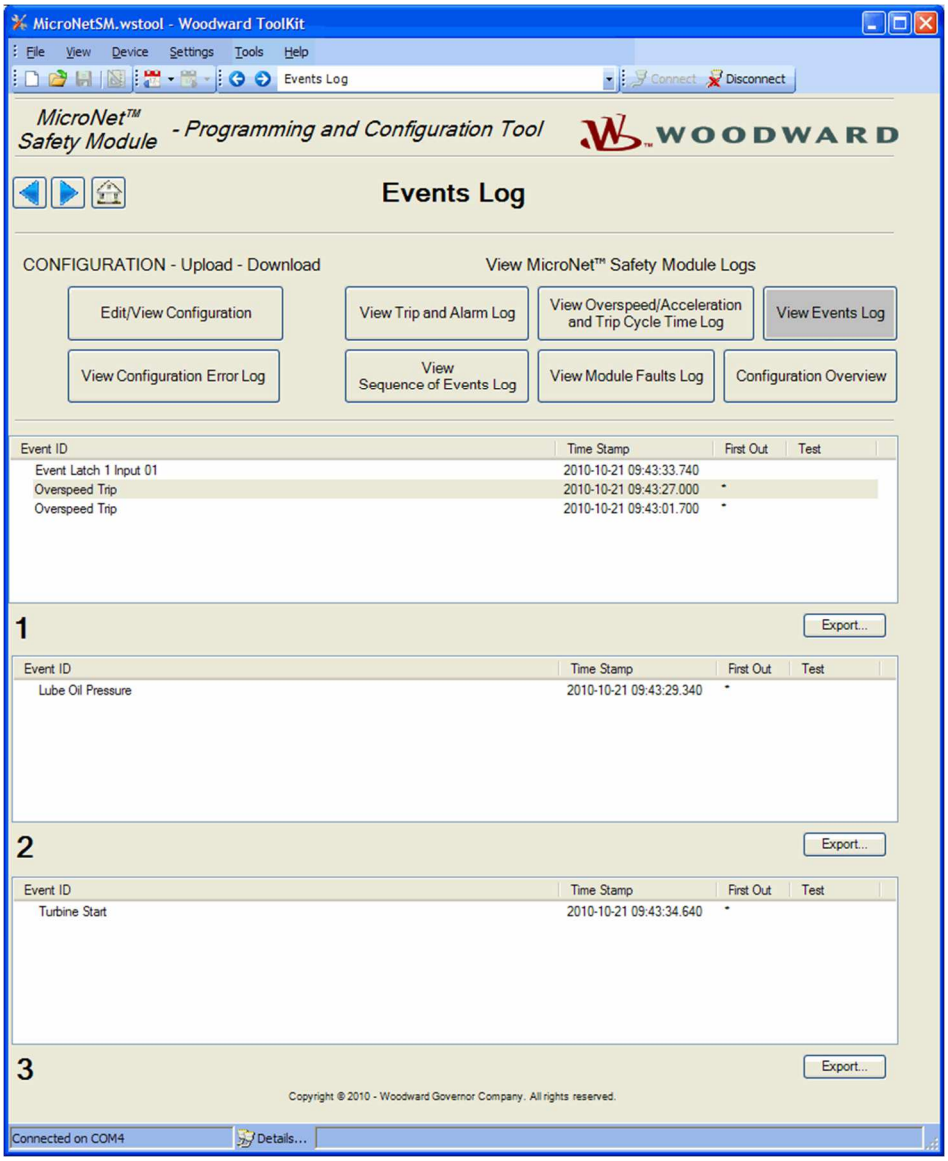


View Event Logs

It is possible to view the contents of the three event logs by selecting “Event Logs”. Each log can contain up to 50 events. Log inputs must be configured and displayed ‘names’ are user-configurable (see configuration of event logs).

The displayed log list contains a user-definable description (name), the time stamp of the event, first out indication and test mode indication. The first out indication contains an asterisk (*) for the first detected event(s) after the event latch was cleared of all active events. The test mode indication contains an asterisk (*) if the ProTech was in any of the test modes when the event occurred.

The logs can be saved to an html file using the Export button.



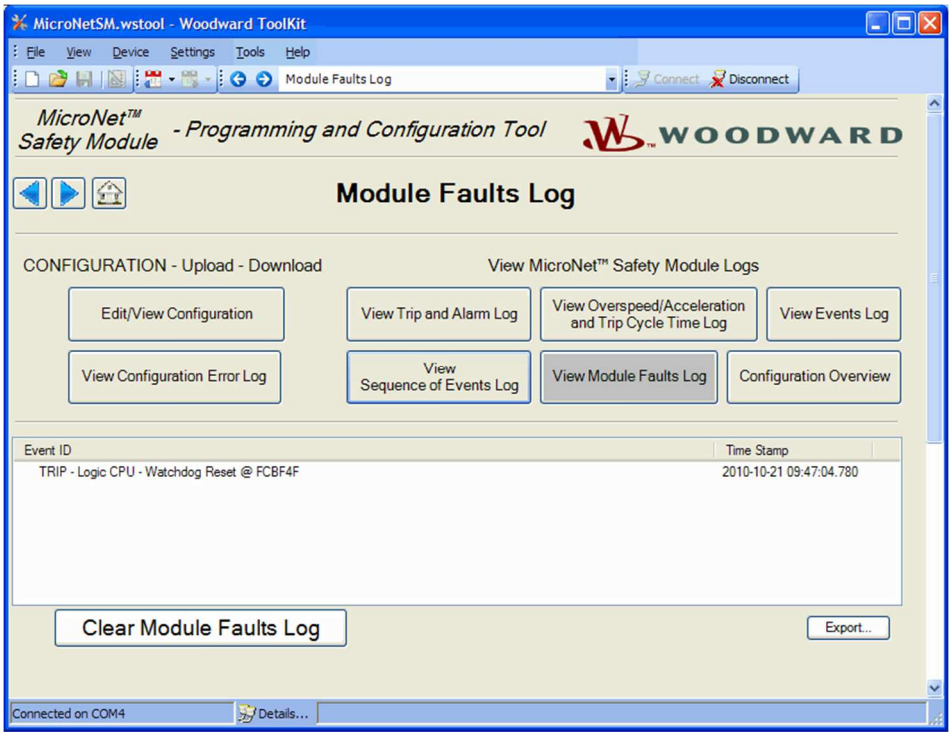
View Module Faults Log

It is possible to view additional details of Internal Fault Alarm and Trip conditions by selecting “View Module Faults Log”. The list contains a description containing type of fault (trip or alarm), fault originator (identify which CPU faulted: Logic, Comm or Display), fault type, fault source code address, and a time stamp of the fault.

Select the **Clear Module Faults Log** button to clear this log. This button is only visible with when logged in with Test Level permissions or higher.

The Module Faults Log is only available from the Programming and Configuration Tool (PCT), it is not displayed on the front panel user interface.

The log can be saved to an html file using the Export button.



Configuration Overview

The Configuration Overview screen shows CRC codes associated with the overall configuration and with individual (sub-component) configurations. The CRC is a value calculated from the configuration data, so that if the data changes, the CRC will change. CRC codes that do not match represent dissimilar configurations and matching CRC codes represent identical configurations.

Comparing CRCs between modules or before and after a software change can provide confirmation of where configurations are the same and to facilitate isolation of configuration changes.

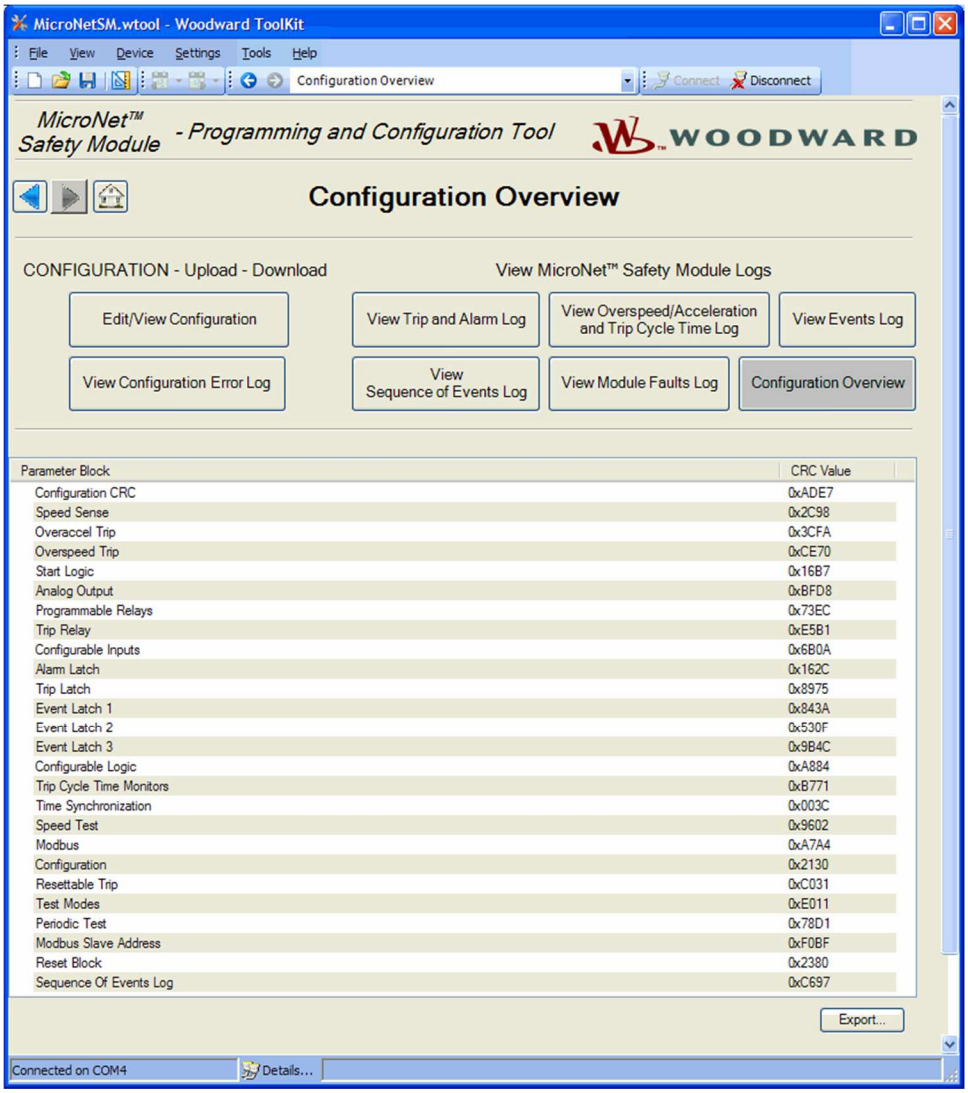
The CRC values are also displayed on the front panel user interface (see Configuration Overview).

The log can be saved to an html file using the Export button.

Parameter Block Definitions

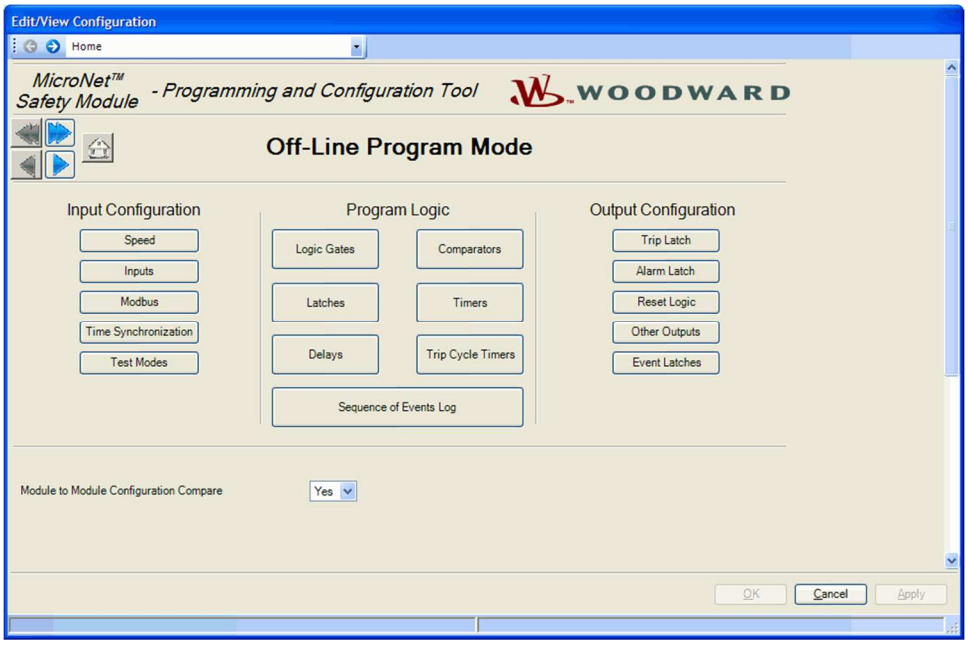
- **Configuration CRC**: CRC codes for the entire configuration individually listed below.
- **Speed Sense**: CRC codes of the following settings in the Configure Speed Input section on the Speed page: Probe Type, Nr of Gear Teeth, Gear Ratio, and Sudden Speed Loss.
- **Overaccel Trip**: CRC codes of the Configure Acceleration section on the Speed page.
- **Overspeed Trip**: CRC codes of the Overspeed Trip setting in the Configure Speed Input section on the Speed page.
- **Start Logic**: CRC codes of the Configure Start Logic section on the Speed page.
- **Analog Output:** CRC codes of Configure Analog Output settings on the Other Outputs page.
- **Programmable Relays:** CRC codes of Configure Discrete Outputs settings on the Other Outputs page.
-
- **Trip Relay:** CRC codes of Configure Trip Latch setting on the Trip Latch page.
- **Configurable Inputs:** CRC codes of programmable input settings (Programmable Inputs 1-10) on the Inputs page. This CRC does not include the user-definable input names or units.
- **Alarm Latch:** CRC codes of Alarm Latch settings (1-50) on the Alarm Latch page. This CRC does not include the user-definable input names.

- **Trip Latch:** CRC codes of Trip Latch settings (1-25) on the Trip Latch page, excludes the Trip Configuration (energize/de-energize) which is individually stored/displayed (see Trip Relay above). This CRC does not include the user-definable input names.
- **Event Latch 1:** CRC codes of Event Latch 1 settings on the Event Latches page. This CRC codes does not include the user-definable input names.
- **Event Latch 2:** CRC codes of Event Latch 2 settings on the Event Latches page. This CRC does not include the user-definable input names.
- **Event Latch 3:** CRC codes of Event Latch 3 settings on the Event Latches page. This CRC does not include the user-definable input names.
- **Configurable Logic:** CRC codes of the entire configurable logic (Gates, Latches, Delays, Unit Delays, Comparators, Timers, and User Defined Tests). This includes:
  - Gate settings (1-50) on the Logic Gates page.
  - Latch settings (1-10) on the Latches page.
  - Delay settings (1-15) on the Delays page.
  - Unit Delay settings (1-10) on the Unit Delays page.
  - Comparators settings (1-10) on the Comparators page.
  - Timers settings (1-15) on the Timers page.
  - User-defined Test settings (1-3) on the Test Modes page.
- **Trip Cycle Time Monitors:** CRC codes of the settings on the Trip Cycle Timers page.
- **Time Synchronization:** CRC codes of the settings on the Time Synchronization page. This setting, when used, will typically be unique for each module A, B, or C. As a result, this setting is included in the overall CRC but is not used in the configuration compare function (not copied or compared).
- **Speed Test:** CRC codes of the Temporary Overspeed Trip, Temporary Overspeed Trip Timeout, and Simulated Speed Timeout settings in the Configure Test Modes section of the Test Modes page. Note: see Test Modes CRC for Test Mode Interlock Disabled setting.
- **Modbus:** CRC codes of Configure Modbus settings on the Modbus page, excluding the Slave Address setting which has a separate CRC.
- **Configuration:** CRC codes of Module to Module Configuration Compare settings on the Home page of the Program Mode.
- **Resettable Trip:** CRC codes of Resettable Trip settings on the Reset Logic page.
- **Test Modes:** CRC codes of Test Mode Interlock Disabled setting on the Test Modes page.
- **Periodic Test:** CRC codes of Configure Periodic Overspeed Test settings on the Test Modes page.
- **Modbus Slave Address:** CRC codes of Modbus Slave Address setting on the Modbus page. This setting, when used, will typically be unique for each module A, B, or C. As a result, this setting is included in the overall CRC but is not used in the configuration compare function (not copied or compared).
- **Reset Block:** CRC codes of Configurable Reset Source setting on the Reset Logic page.
- **Sequence of Events Log:** CRC codes of Sequence of Events Log settings on the Sequence of Events Log page.


MicroNetSM.wtool - Woodward ToolKit
File View Device Settings Tools Help
Configuration Overview
Connect Disconnect
MicroNet™ Safety Module - Programming and Configuration Tool
WOODWARD
Configuration Overview
CONFIGURATION - Upload - Download
View MicroNet™ Safety Module Logs
Edit/View Configuration
View Trip and Alarm Log
View Overspeed/Acceleration and Trip Cycle Time Log
View Events Log
View Configuration Error Log
View Sequence of Events Log
View Module Faults Log
Configuration Overview
Parameter Block
CRC Value
Configuration CRC 0xADE7
Speed Sense 0x2C98
Overaccel Trip 0x3CFA
Overspeed Trip 0xCE70
Start Logic 0x16B7
Analog Output 0xBFD8
Programmable Relays 0x73EC
Trip Relay 0xE5B1
Configurable Inputs 0x6B0A
Alarm Latch 0x162C
Trip Latch 0x8975
Event Latch 1 0x843A
Event Latch 2 0x530F
Event Latch 3 0x9B4C
Configurable Logic 0xA884
Trip Cycle Time Monitors 0xB771
Time Synchronization 0x003C
Speed Test 0x9602
Modbus 0xA7A4
Configuration 0x2130
Resettable Trip 0xC031
Test Modes 0xE011
Periodic Test 0x78D1
Modbus Slave Address 0xF0BF
Reset Block 0x2380
Sequence Of Events Log 0xC697
Export...
Connected on COM4
Details...

Edit/View Configuration

After selecting “Edit/View Configuration”, all parameters can be set or changed and loaded to the device while the MicroNet Safety Module is operational. After selecting this button, the following screen is displayed.



A selection can be made for the parameters to be configured on-line. The changes have the same result as off-line configuration - changed parameters are immediately operational. In Off-Line configuration, parameters are only changed in a configuration file.

The Off-Line program mode has the following buttons on the “Home” screen:

- Speed
- Inputs
- Modbus
- Time Synchronization
- Test Modes
- Logic Gates
- Latches
- Delays
- Comparators
- Timers
- Trip Cycle Timers
- Sequence Of Events Log
- Trip Latch
- Alarm Latch
- Reset Logic
- Other Outputs
- Event Latches

These buttons can be used either in On-Line configuration or in Off-Line configuration. Reference the following paragraphs.

Configuration of the MicroNet Safety Module

IMPORTANT

Changing the configuration settings in the MicroNet Safety Module is permissible only in a trip condition. If the unit is not in trip condition, configuration changes are inhibited. If no trip condition is present, a power-up trip condition can be generated by a power supply cycle.

Changing the configuration settings in the MicroNet Safety Module is possible in two ways:

- Directly through the front panel of the MicroNet Safety Module
- By the Programming and Configuration Tool (PCT)

The changes that can be done via the front panel are limited to the following functions:

- Speed Probe Type
- Number of Gear Teeth
- Gear Ratio
- Overspeed Trip Setpoint
- Sudden Speed Loss Alarm/Trip
- Acceleration Trip Enable/Disable
- Accel trip Enabled Speed Setpoint
- Acceleration Trip Setpoint [rpm/s]
- Speed Fail Setpoint
- Speed Fail Trip Enable/Disable
- Speed Fail Alarm Enable/Disable
- Speed Fail Timeout Trip
- Speed Fail Timeout Time
- Trip Latch Energize/De-energize to Trip
- Analog Output 4 mA and 20 mA Settings
- Test Modes
- Periodic Overspeed Test
- Modbus Communication Parameters
- Configuration Compare and Copy Features
- Changing Passwords

All other configurations, including the ones that can be configured by the front panel, can only be implemented by use of the Programming and Configuration Tool (PCT). With the PCT, it is possible to do:

- On-Line configuration
- Off-Line configuration

On-Line Configuration

IMPORTANT

On-Line Configuration is only possible in Config Level:

- **A serial communication link must be established and operational.**
- **A password for Config Level is required.**

After selecting “Edit/View Configuration”, all parameters can be set or changed and loaded to the device while the MicroNet Safety Module is operational.

For on-line configuration, the following “Home” screen buttons are available:

- Speed
- Inputs
- Modbus
- Time Sync
- Test Modes
- Logic Gates
- Latches
- Delays
- Comparators
- Timers
- Trip Cycle Timers
- Sequence of Events Log
- Trip Latch
- Alarm Latch
- Reset Logic
- Analog and Discrete Outputs
- Event Latches

These buttons are only available if a serial communications link is established.

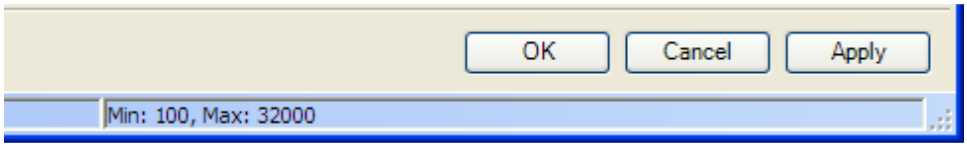
After selecting one of the buttons, a pop-up screen is displayed in which particular parameters for the selected function can be checked and modified if necessary.

For executing this configuration, see “Configuration Settings” in this chapter.

The right bottom corner of each sub-screen has three buttons and an information bar.

The information bar shows the minimum and maximum values that can be selected on the input field where the cursor is located.

In the example below (in the speed pop-up screen), if the cursor is located at the overspeed setting, the valid range of values is between 100 and 32000.



If a serial communication link is active, and Config level is active, and there are no configuration errors, then:

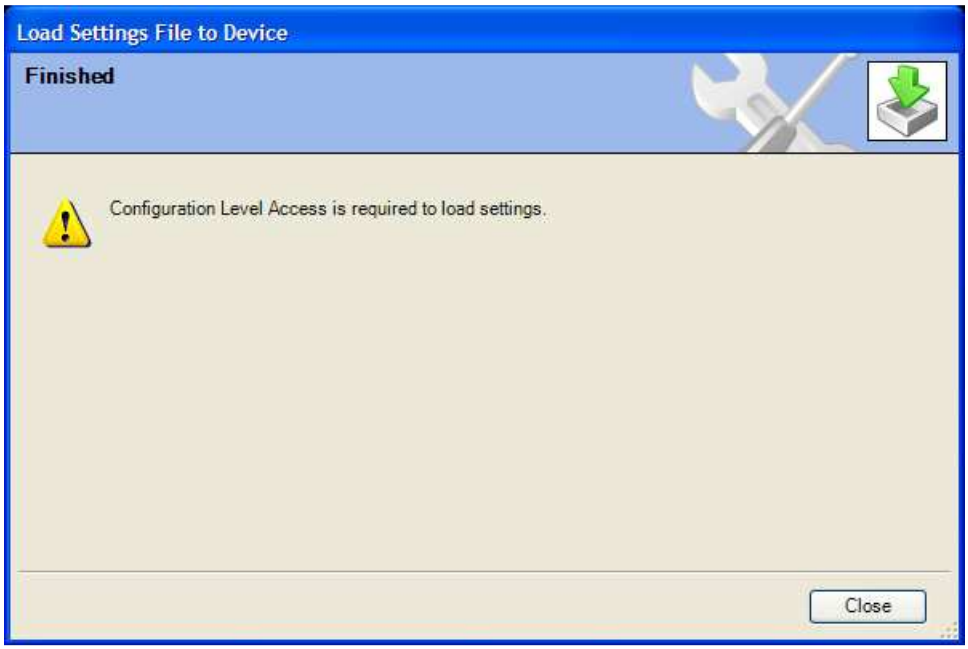
- After the OK or Apply button is pressed, the new configuration setting will immediately be uploaded to the MicroNet Safety Module.

If the new configuration setting is not immediately uploaded, there are three possibilities:

- Test level was selected.
- A configuration error is detected.
- MicroNet Safety Module module is not in trip condition.

Test level was selected

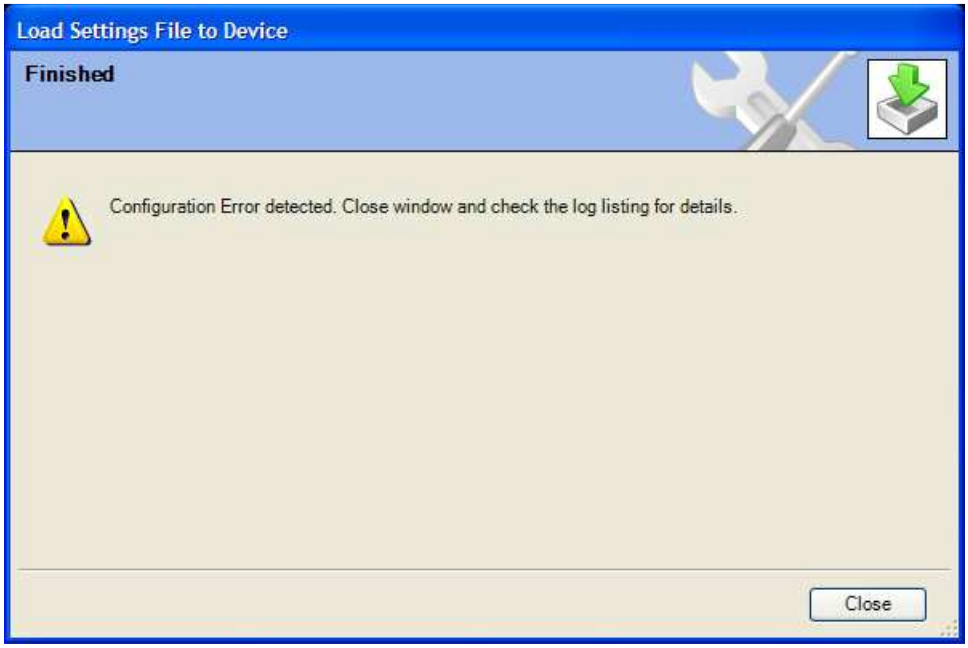
If test level was selected, the following pop-up window appears:



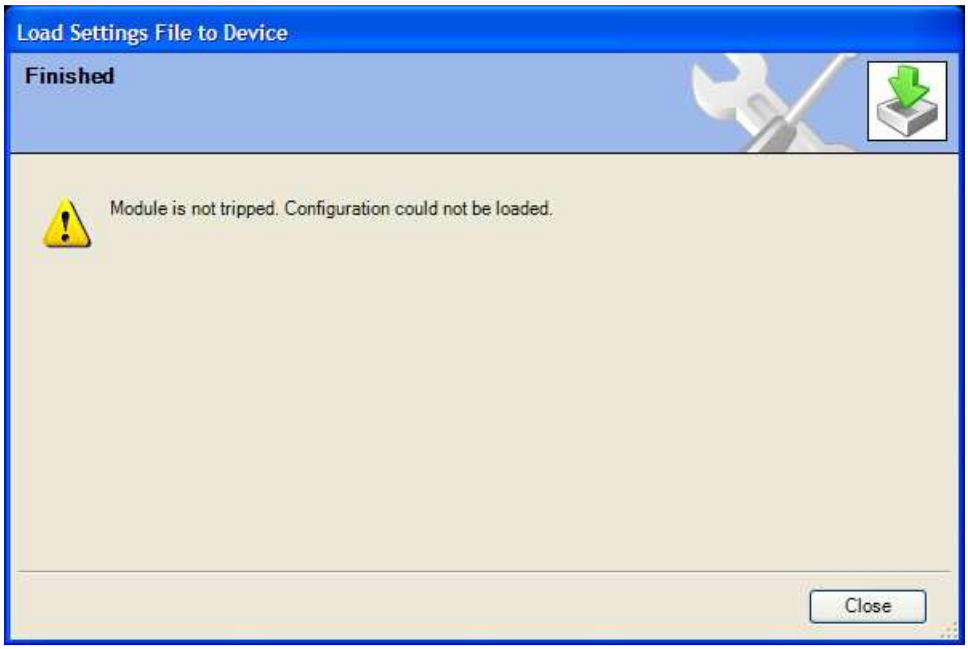
Now communication must be stopped and restarted using Config level. Once logged in at the Config level, configuration settings can be changed.

A configuration error is detected

If a configuration error is detected, the following pop up window appears:



MicroNet Safety Module module is not in a trip condition
If the MicroNet Safety Module module is not in a trip condition, the following pop-up window appears:



To load a configuration from a PC to a MicroNet Safety Module, the MicroNet Safety Module must be in a trip condition. If the unit is not in trip condition, uploading is inhibited. If no trip condition is present and the unit is configured as “De-energize to Trip”, a power-up trip condition can be established by cycling the power supply.

For configuration of all parameters, see “Configuration Settings” in this chapter.

Off-Line Configuration

With the Programming and Configuration Tool (PCT), a settings file can be created, modified, saved, loaded to, and retrieved from the MicroNet Safety Module.

Configuration can only be created or modified by the editing of the settings files that are transferred to or from the MicroNet Safety Module.

Creating the configuration settings in the MicroNet Safety Module:
1. Create the settings file.
2. Save the settings file on the PC.
3. Load the settings file from PC to the MicroNet Safety Module.

Modifying the configuration settings in the MicroNet Safety Module:
1. Copy the settings file from MicroNet Safety Module to a file on the PC.
2. Modify the settings file.
3. Save the settings file on the PC.
4. Load the settings file to the MicroNet Safety Module.

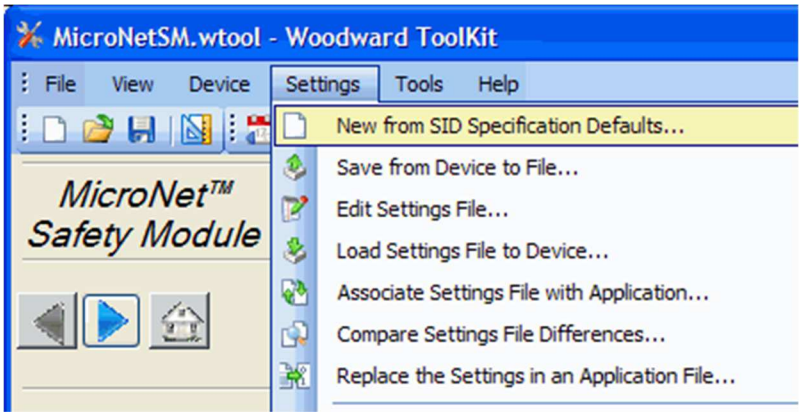
See **Drop-down Menu “Settings”** for information on how to create and modify configuration files.

Drop-down Menu “Settings”

The drop-down menu settings are used to create and modify the configuration files for the MicroNet Safety Module.

Configuration files can be created, modified, loaded, retrieved, compared, etc.

The following selections are available in the Drop-down Menu “Settings”:



Using the Programming and Configuration Tool (PCT) for preparation of the configuration file

When using the MicroNet Safety Module Programming and Configuration Tool (PCT) for preparation of the configuration file, in isolated level, following selections from the settings drop-down menu can be used:

- New from SID Specification Defaults
- Edit Settings File
- Compare Settings File Differences

Using the Programming and Configuration Tool (PCT) in Test Level

When using the MicroNet Safety Module Programming and Configuration Tool (PCT) in test level, the management of log files is active, and the following selections from the settings pull down menu can be used:

- New from SID Specification Defaults
- Save from Device to File
- Edit Settings File
- Compare Settings File Differences

Using the Programming and Configuration Tool (PCT) in Config Level

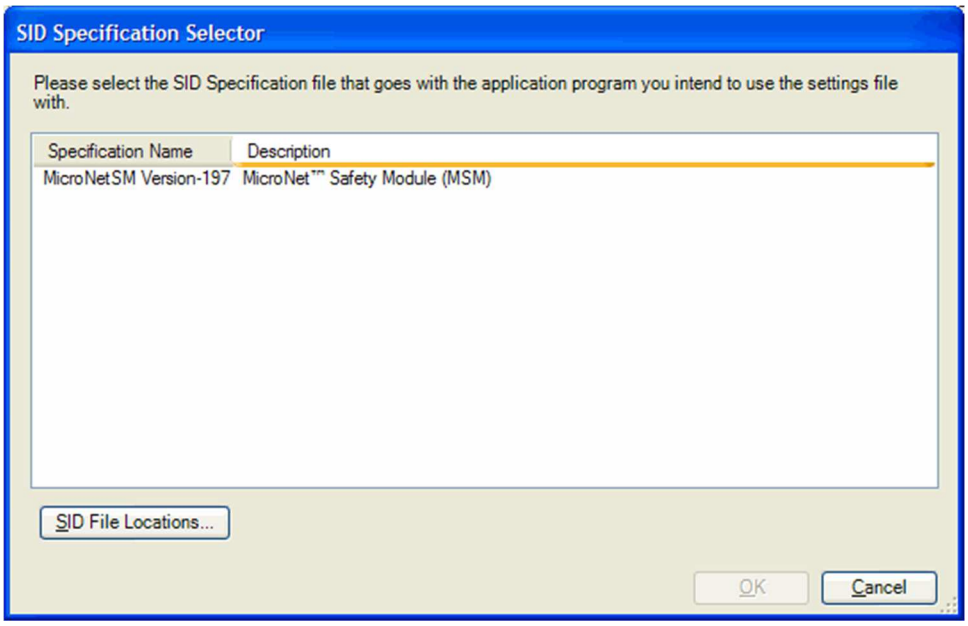
When using the MicroNet Safety Module Programming and Configuration Tool (PCT) in config level, the management of log files is active, and the following selections from the settings pull down menu can be used:

- New from SID Specification Defaults
- Save from Device to File
- Edit Settings File
- Load Settings File to Device
- Compare Settings file Differences

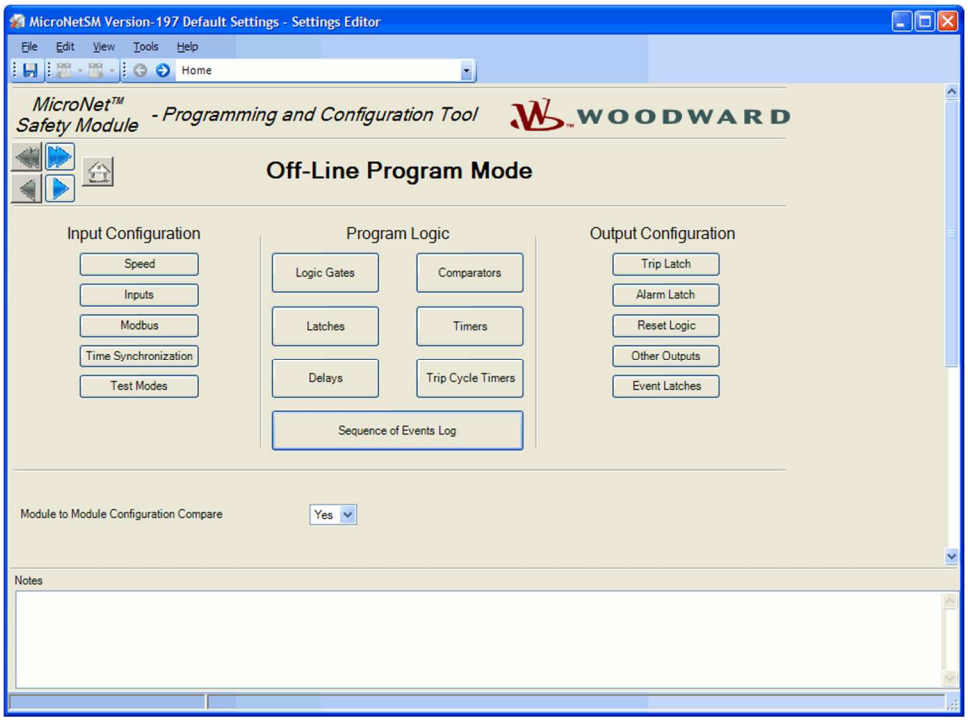
New from SID Specification Defaults

With the selection “New from SID Specification Defaults…”, under “Settings”, a new application with default settings can be started.

After clicking this selection, the following sub-window appears with a list of applications:



Select the appropriate file compatible with your ProTech software. If other Woodward applications are installed on your PC, a list of choices in addition to ProTech may appear in this list.



With this new window, a new configuration file for the MicroNet Safety Module can be created which means that:

- No logic is pre-programmed
- No Trip, Alarm or Event latches have been configured
- No inputs have been configured
- No test routines have been configured

For executing this configuration, see “Configuration Settings” in this chapter.

After the configuration is complete, the newly created settings file must be saved by using the drop-down menu “File”, followed by “Save As”.

Assign a file location and name, save the file on the PC and close the Settings Editor screen.

The settings files have a *.wset extension.

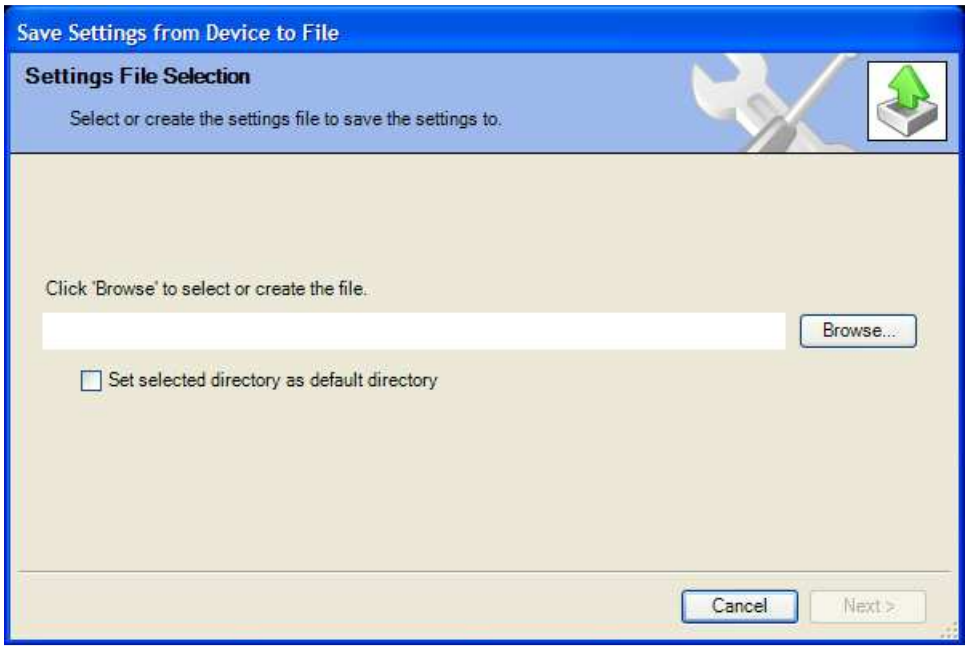
Once the file is saved, it can be uploaded to the MicroNet Safety Module by using pull down menu “Settings” followed by sub-selection “Load settings file to Device”.

Save from Device to File

In order to modify the configuration in the MicroNet Safety Module, either the settings file of the MicroNet Safety Module must be already available or a settings file must be created by loading the configuration data from the MicroNet Safety Module to a file on PC. With the selection “Save from Device to File”, a configuration file can be loaded from the MicroNet Safety Module to a settings file on a PC. A new file can be created or an existing file can be modified.

To save a setting file from the MicroNet Safety Module to a file, either the test or config level login is required.

After clicking this selection, the following sub-window appears:



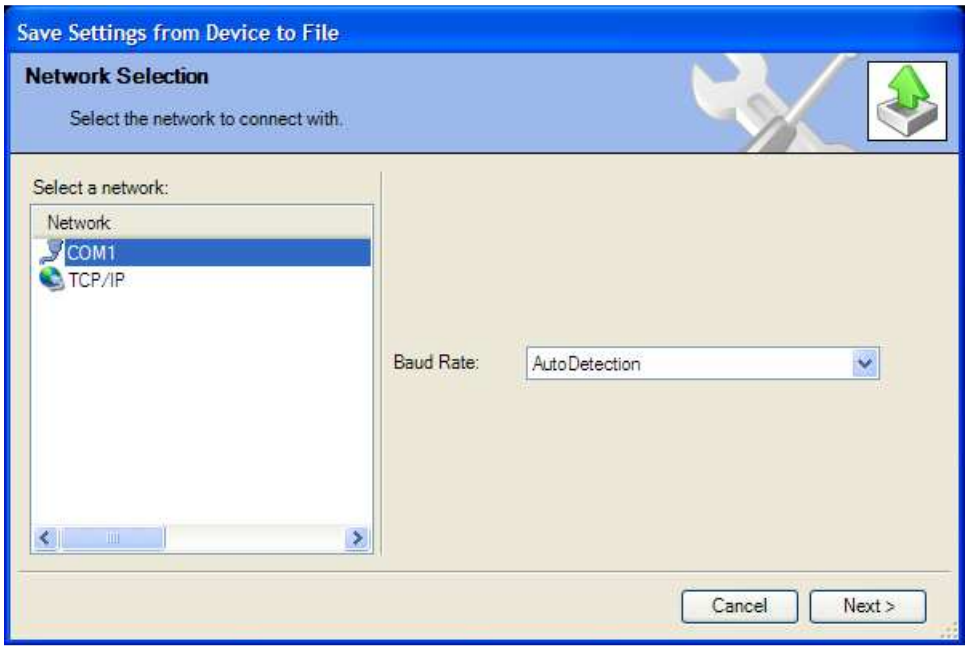
1. Use the Browse button to select the location and name of the settings file to be created or to be modified. The settings files have a *.wset extension.
2. Saving settings from device to file requires either the test or config level login. There are two valid conditions:
   - Serial communication was already established, and test level or config level was selected.
   - Serial communication was not yet established.

Serial communication was already established, and test level or config level was selected

3. If serial communication was already established, and test level or config level was selected, the transfer of the configuration file from the MicroNet Safety Module starts immediately.
4. The configuration file is ready to be modified by the MicroNet Safety Module Programming and Configuration Tool (PCT). See “Edit Setting File” in this chapter for information on how to modify the configuration file.

Serial communication was not yet established

5. If serial communication was not yet established, and after the filename is defined and the “Next” button is selected, the following pop-up screen appears. Select the appropriate network.



6. Highlight the communication port where the serial interface cable is connected to and click on the Next button in the pop-up window.

7. If a communications link is established, the following pop-up window appears:

8. Select “Config Level” security level in the drop down menu and enter the associated password for the selected level. After the password is entered, click on the Next button and the transfer of the configuration file from the MicroNet Safety Module to the PC file starts immediately.
9. The configuration file is ready to be modified by the MicroNet Safety Module Programming and Configuration Tool (PCT). See “Edit Setting File” below for information on how to modify the configuration file.
10. If the communication link cannot be established, the PCT will continue to attempt to establish the communication link until the Disconnect Button is selected.

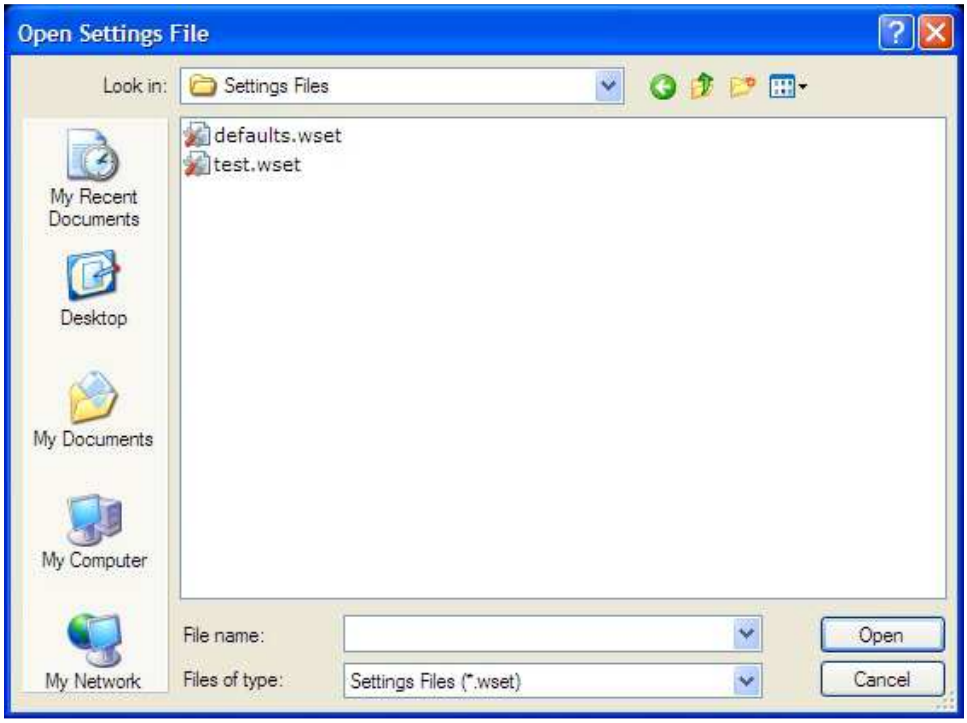
Edit Settings File

With this selection, an existing configuration file can be modified.

In order to modify the configuration in the MicroNet Safety Module, a file must be created (see “Save from Device to File” section), then modified (instructions in this section), and then re-loaded to the MicroNet Safety Module (see Load Settings File to Device).

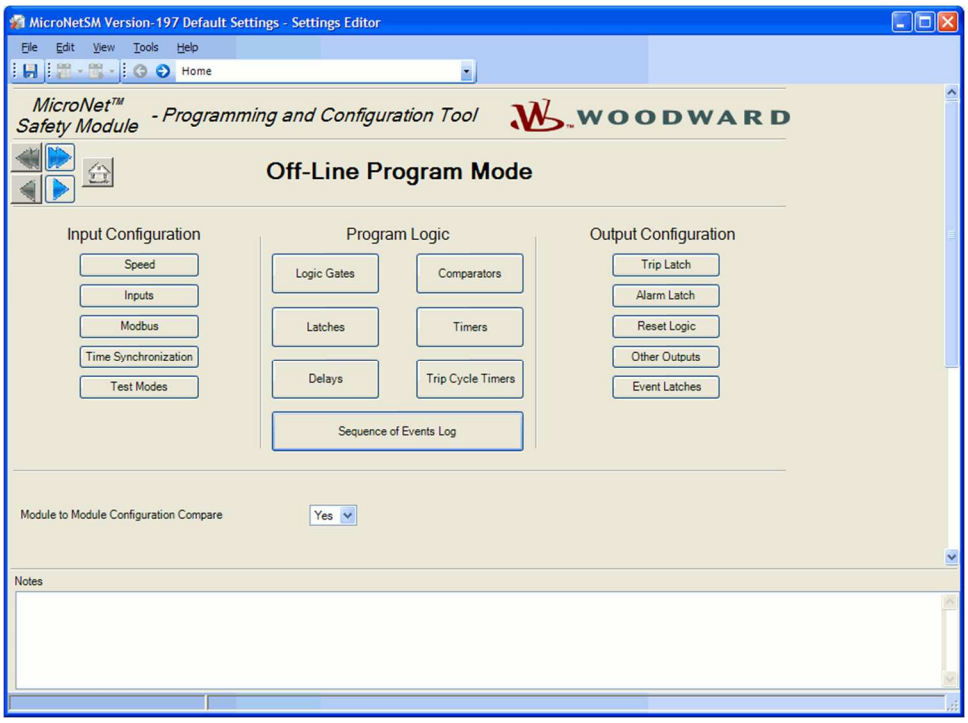
After clicking the selection “Edit Settings File” in the pull-down menu “Settings”, the following sub-window appears with a list of settings files.

The settings-files have extension *.wset.



If no settings files are available, a settings file must be created (New from SID Specification Defaults), or a settings file must be loaded from the MicroNet Safety Module to a PC (Save from Device to File).

After file selection, the Settings Editor window opens.



With this new window, the configuration file for the MicroNet Safety Module can be modified by using the left-right selection buttons or the drop down menu.

For off-line configuration, the following selections can be used:

- Speed
- Inputs
- Modbus
- Time Sync
- Test Modes
- Logic Gates
- Latches
- Delays
- Comparators
- Timers
- Trip Cycle Timers
- Sequence of Events Log
- Trip Latch
- Alarm Latch
- Reset Logic
- Analog and Discrete Outputs
- Event Latches

After the configuration is finished, the newly created settings file must be saved by using the drop down menu “File”, followed by “Save”, or “Save As”.

Assign a file location and name, and save the file, or overwrite the existing settings file on the PC, then close the Settings Editor screen.

The settings files have a *.wset extension.

Once the file is saved, it can be uploaded to the MicroNet Safety Module by using drop down menu Settings followed by sub-selection “Load settings file to Device”. For configuration of all particular parameters, see “Configuration Settings” in this chapter.

IMPORTANT

Before the Settings editor is closed, the newly created or modified settings file must be saved in order to have this file available for upload to the MicroNet Safety Module.

To save the created file, use the drop-down menu “File”.

Load Settings File to Device

In order for the newly created or modified settings to be applied to the MicroNet Safety Module, the saved settings file must be uploaded to the MicroNet Safety Module.

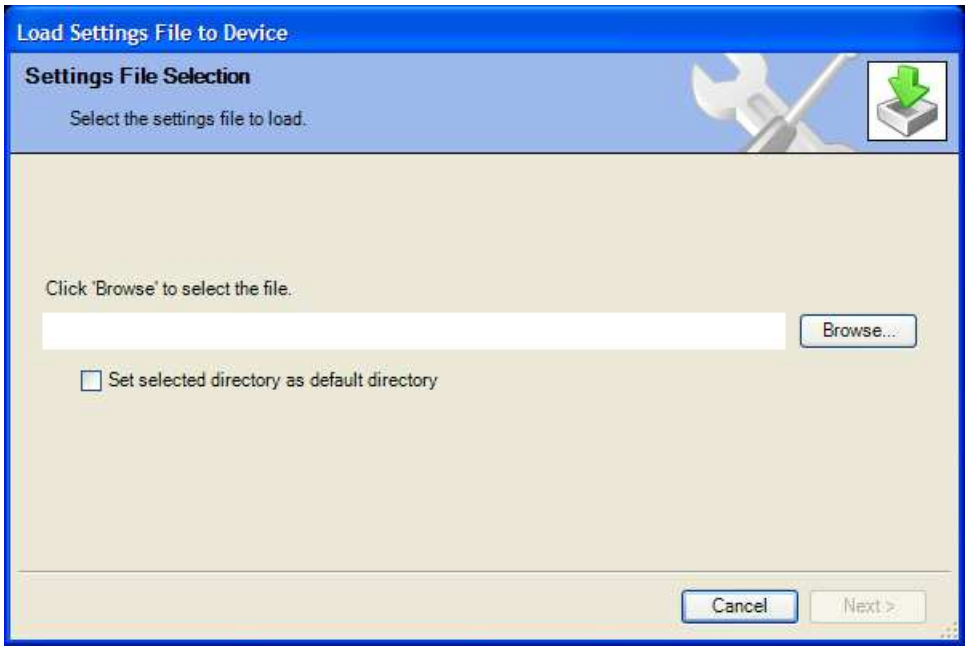
With the selection “Load Settings File to Device”, a configuration file can be loaded from the PC to the MicroNet Safety Module.

IMPORTANT

To save a settings file from the Device to a file, the Config security level is required. The Test security level is not sufficient.

To load a settings file to the Device, the MicroNet Safety Module must be in a trip condition. If the unit is not in a trip condition, uploading is inhibited. If no trip condition is present, a power-up trip condition can be established by cycling the power supply.

After clicking “Load Settings File to Device”, the following sub-window appears:



1. Use the Browse button to select the location and name of the settings file to be uploaded to the MicroNet Safety Module. The settings-files have a *.wset extension.
2. For uploads, Config level is required. Test level is not sufficient. There are three valid conditions:
   - Serial communication was already established, and config security level was selected.
   - Serial communication was already established, and test security level was selected.
   - Serial communication was not yet established.

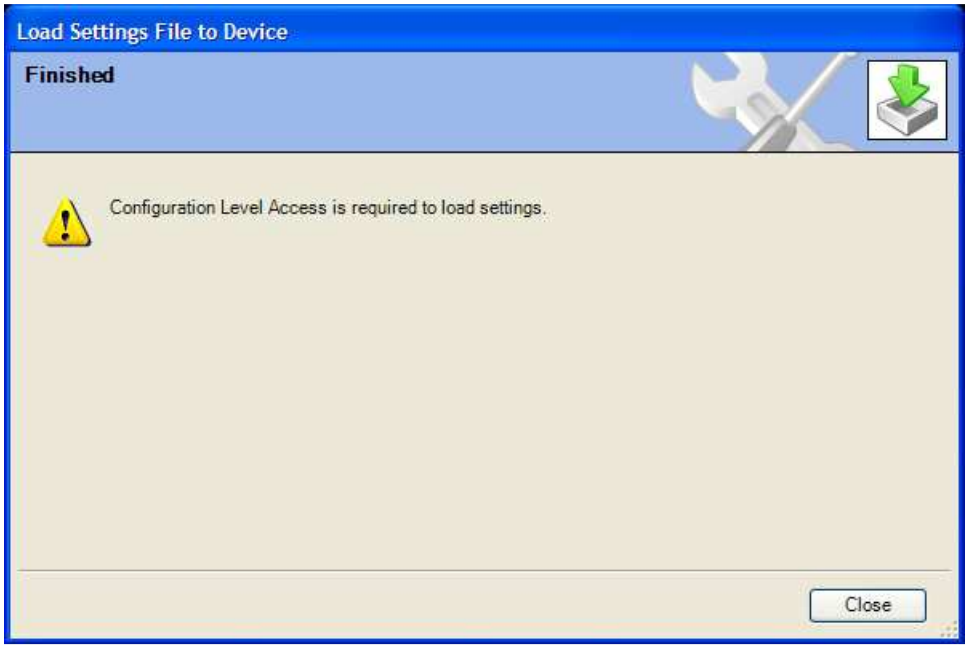
Serial communication was already established, and config security level was selected

3. If serial communication was already established and Config level was selected, and there are no configuration errors, the transfer of the configuration file to the MicroNet Safety Module starts immediately. For uploads, Config level is required. The Test level is not sufficient. If no trip condition exists, transfer is inhibited. A trip condition can be established by a power supply cycle.

If a configuration error exists, uploading of the configuration file is inhibited. All configuration errors must be resolved before a successful upload can be accomplished. See “View Configuration Error Log” in this chapter.

Serial communication was already established, and test security level was selected

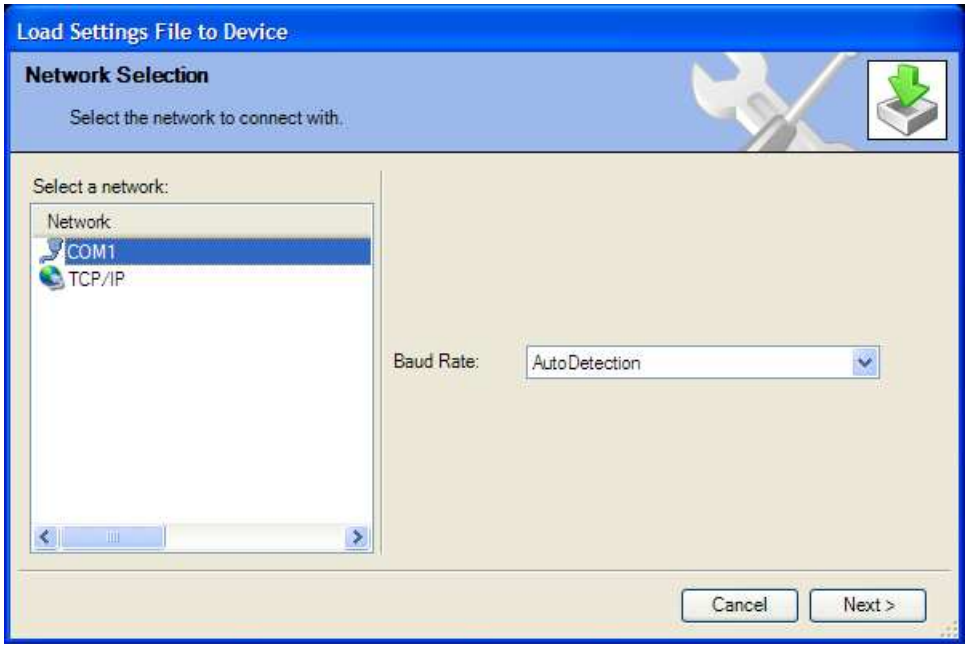
4. If serial communication was already established, and test level was selected, then the transfer of the configuration file to the MicroNet Safety Module cannot be established. For uploads, Config level is required. Test level is not enough. The following sub-window appears:



5. Use the disconnect button and reconnect utilizing the password for Config security level and restart the “Load Settings File to Device” procedure.

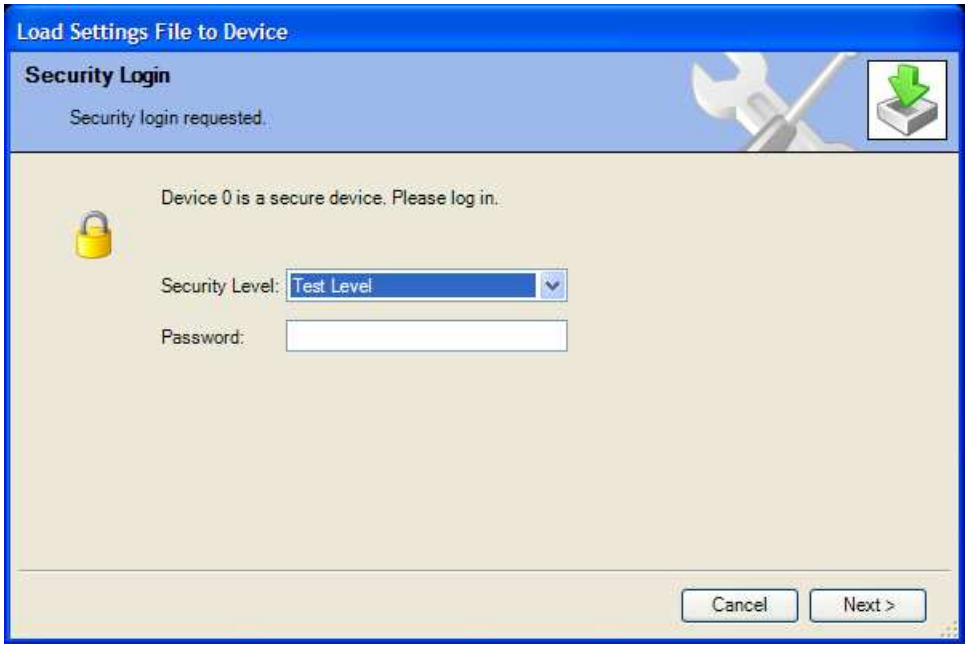
Serial communication was not yet established

6. If serial communication was not yet established, and after the filename is defined and the “Next” button is selected, the following pop-up screen appears that requests you to select a Network.



7. Highlight the communication port where the serial interface cable is connected to and click on the Next button in the pop-up window.

8. If a communications link is established, the following pop-up window appears:

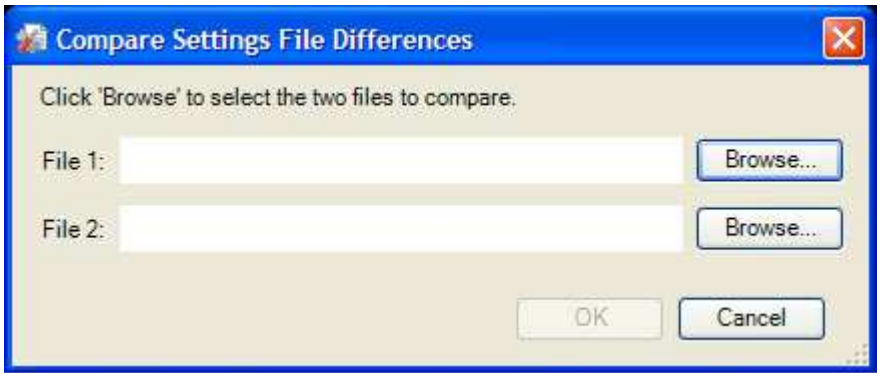


9. Select “Config Level”, and enter the associated password for the selected security level. After the password is entered, the transfer of the configuration file to the MicroNet Safety Module starts. For uploads, Config level is required. Test level is not sufficient. If no trip condition exists, transfer is inhibited. A trip condition can be established by cycling the power supply.
10. If the communication link cannot be established, the PCT will continue to attempt to establish the communication link until the disconnect button is used.

Compare Settings File Differences

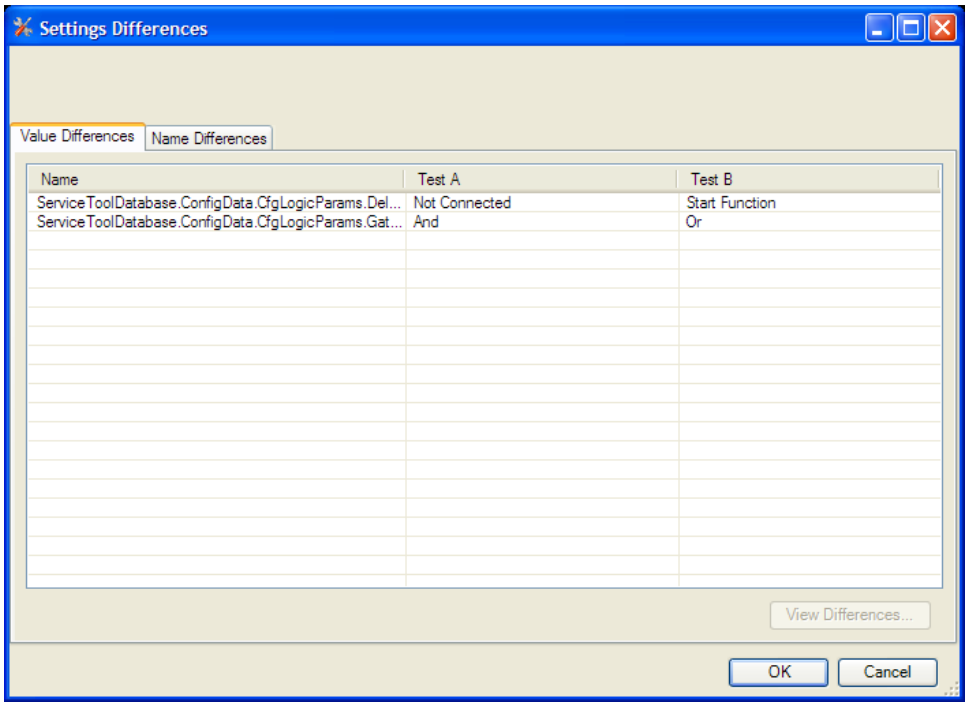
The MicroNet Safety Module Configuration Service Tool can compare two configuration files. By selecting “Compare Settings File Differences”, the files can be compared for differences in either values and/or names.

After clicking this selection, the following sub-window appears:



Select the files to be compared by clicking the appropriate Browse button and select the “OK” button.

The following sub-window is displayed, which shows all differences between the files:



If the configuration contents of a MicroNet Safety Module need to be compared with the configuration contents of a file, a configuration file of the contents of the MicroNet Safety Module must first be created by selecting “Save from Device to File”.

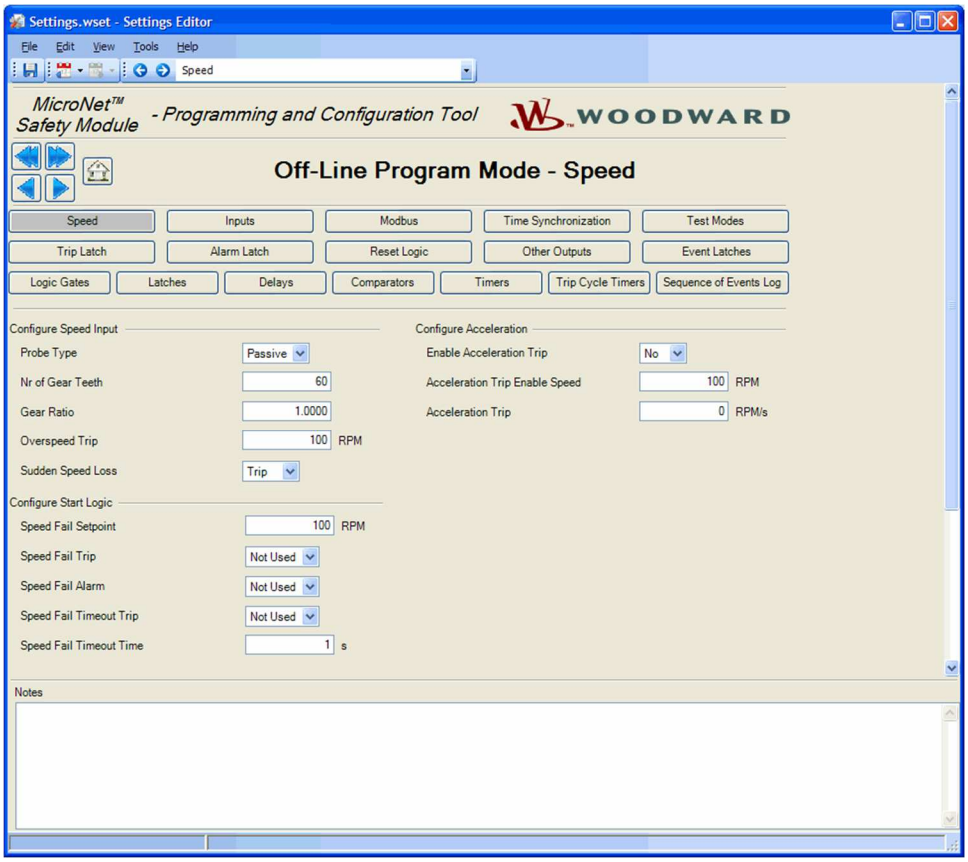
Configuration Settings

The parameter configuration of the MicroNet Safety Module can be modified by either on-line or off-line configuration. Once the communication link is established for on-line configuration, or the **settings editor** is active in off-line configuration, the following parameters can be configured by using the selection buttons in the settings editor:

- Speed
- Inputs
- Modbus
- Time Sync
- Test Modes
- Logic Gates
- Latches
- Delays
- Comparators
- Timers
- Trip Cycle Timers
- Sequence of Events Log
- Trip Latch
- Alarm Latch
- Reset Logic
- Analog and Discrete Outputs
- Event Latches

Speed

If the “Speed” button is selected, the following screen is displayed:



The following parameters can be set:

Configure Speed Input

- **Probe Type:** Select speed probe type. Valid values: passive or active.
- **Nr of Gear Teeth:** Set the number of teeth on the gear that the speed sensor is mounted. Valid values: 1-320
- **Gear Ratio:** Set the ratio of the sensed-to-actual speed (sensor wheel/shaft speed). Valid values: 0.1-10
- **Overspeed Trip:** Speed setpoint for an overspeed trip. Valid values: 0-32000 rpm. Frequency equivalent must not exceed 32000 Hz (configuration error).
- **Sudden Speed Loss:** Select action to take when a sudden speed loss is detected. Valid values: trip or alarm

Configure Acceleration

- **Enable Acceleration Trip:** Set to yes to use this function. Valid values: yes or no.
- **Acceleration Trip Enable Speed:** Speed setpoint at which over-acceleration trip is active. Below this speed the acceleration trip is not active. Valid values: 0-32000 rpm.
- **Acceleration Trip:** Over-acceleration trip setpoint in rpm/second. Valid values: 0-25000 rpm/s.

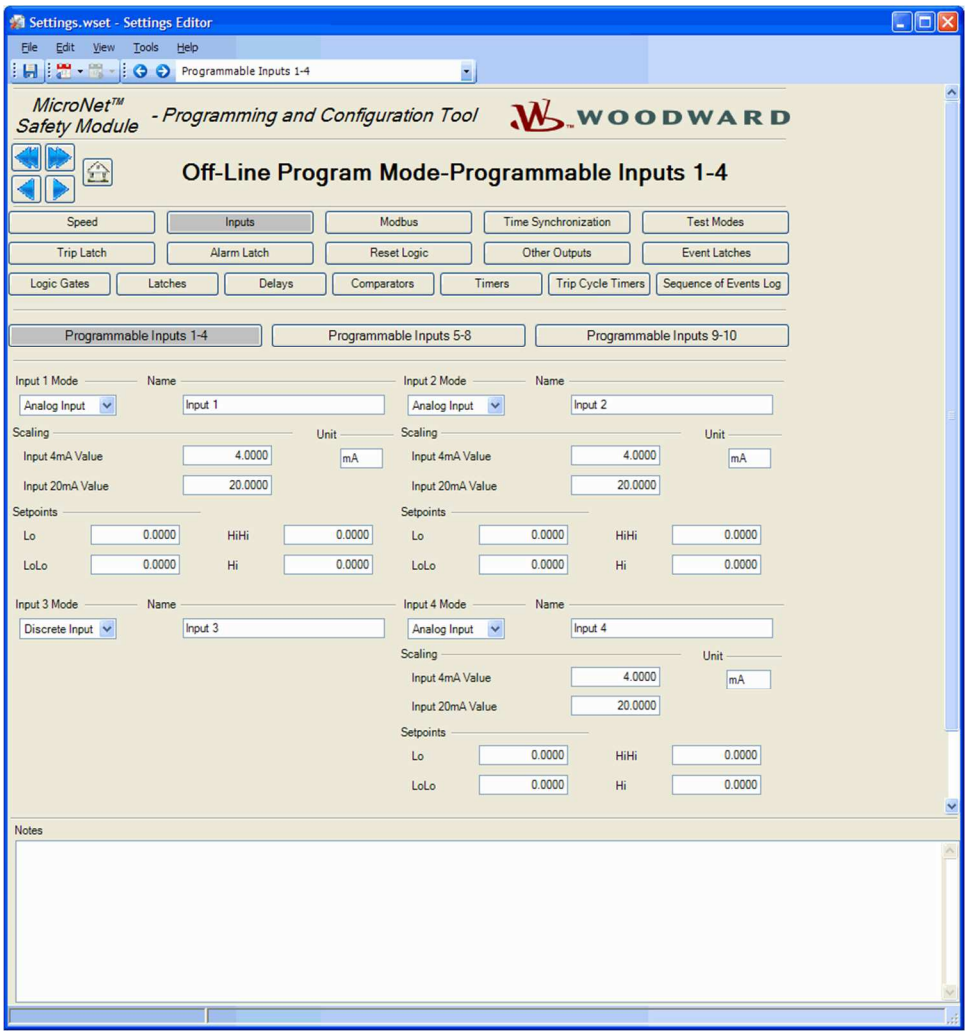
Configure Start Logic

- **Speed Fail Setpoint:** Speed setpoint below which the speed signal is considered failed. Valid values: 0-25000 rpm
- **Speed Fail Trip:** When Used, this trip is activated when speed is below the Speed Fail Setpoint and the Speed Fail Override discrete input is not closed. Valid values: Not Used or Used
- **Speed Fail Alarm:** When Used, this alarm is activated when speed is below the Speed Fail Setpoint. Valid values: Not Used or Used
- **Speed Fail Timeout Trip:** When Used, this trip is activated if speed is below Speed Fail Setpoint when the Speed Fail Timeout Time expires. Valid values: Not Used or Used
- **Speed Fail Timeout Time:** Max time for speed to exceed the Speed Fail Setpoint after a ‘start’ command. This setting is used in conjunction with the Speed Fail Timeout Trip. Valid values: 1-28800 seconds

Inputs

Each of the three modules of the MicroNet Safety Module has 10 configurable inputs that can be configured for either analog or discrete input.

When “Inputs” is selected, the following screen is displayed:

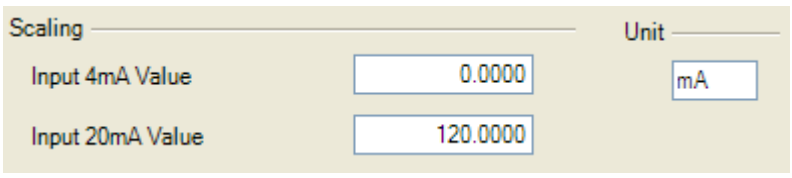


Inputs can be configured using the Programmable Inputs 1-4, 5-8 and 9-10 screens and the options include:

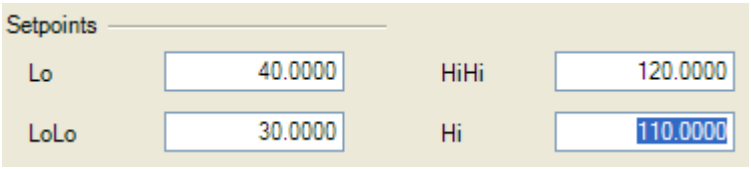
- Not Used
- Discrete Input
- Analog input

Each input can have a name assigned by using the name field. This name is displayed on the front panel on the analog input monitoring screens. The text name for inputs is for reference only and is not used for configuring inputs in ToolKit.

Analog inputs have fields for scaling and assigning engineering units.



Analog Inputs have fields for assigning low and high setpoints for trips, alarms, events, or any status, or enable purposes.



In order to establish that the low and high setpoints have any effect, these setpoints must be configured as an input in a trip latch, alarm latch, event latch, or any logic gate.

If a discrete input is not used as an input in any other function, the Configuration Error Log will indicate a warning.

If an input is used as input to a comparator while this input is configured to be a discrete input, the Configuration Error Log will indicate an error and the configuration cannot be uploaded to the MicroNet Safety Module.

If none of the results of an analog input are used as an input in any other function, the Configuration Error Log will indicate an alarm.

If any result from the analog input is used, either the analog value or one of the setpoints, then the configuration is regarded correct and no alarm will be displayed in the Configuration Error Log.

If the analog result from the analog input is used as an input for a Boolean (logical) function like a logic gate, delay, etc, the Configuration Error Log will show an error and the configuration cannot be loaded to the MicroNet Safety Module.

The following fields are available for each configurable input:

Configure Input

- **Input Mode:** Selects the input usage. Valid values: Not Used, Analog Input, or Discrete Input
- **Name:** User-defined name for the input. Valid values: up to 24 characters

Configure Scaling (only visible if Input Mode is Analog)

- **Input 4 mA Value:** Scaling value for the input, in user-defined units, corresponding to 4 mA. Valid values: -999999 to 999999
- **Input 20 mA Value:** Scaling value for the input, in user-defined units, corresponding to 20 mA. Valid values: -999999 to 999999
- **Unit.** User-defined units for the input. Valid values: up to 7 characters

Configure Setpoints (only visible if Input Mode is Analog)

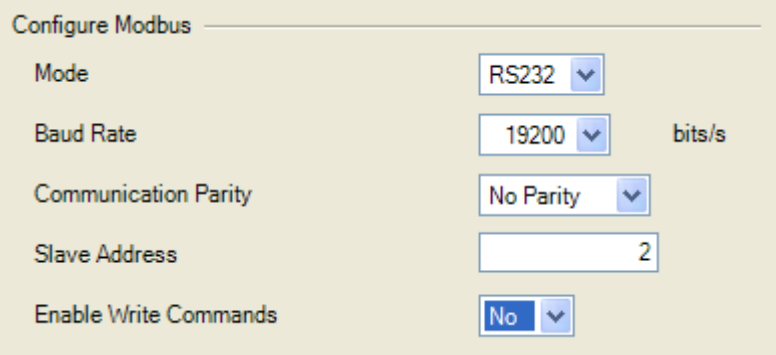
- **Lo:** Lo input level setting, in user-defined units, below which the Analog Input Lo indication is active. Valid values: -999999 to 999999
- **LoLo:** LoLo input level setting, in user-defined units, below which the Analog Input LoLo indication is active. Valid values: -999999 to 999999
- **Hi:** Hi input level setting, in user-defined units, above which the Analog Input Hi indication is active. Valid values: -999999 to 999999
- **HiHi:** HiHi input level setting, in user-defined units, above which the Analog Input HiHi indication is active. Valid values: -999999 to 999999

NOTICE

It is highly recommended that the setpoints are used as an integrity check of the analog input signal. These setpoints can be used to detect signals that are out of range of normal operating limits.

Modbus

The parameters for Modbus communication can be set in the “Modbus Interface” menu. Modbus utilizes a master/slave network protocol. The MicroNet Safety Module is always a “slave”.



The following fields are available:

Configure Modbus settings

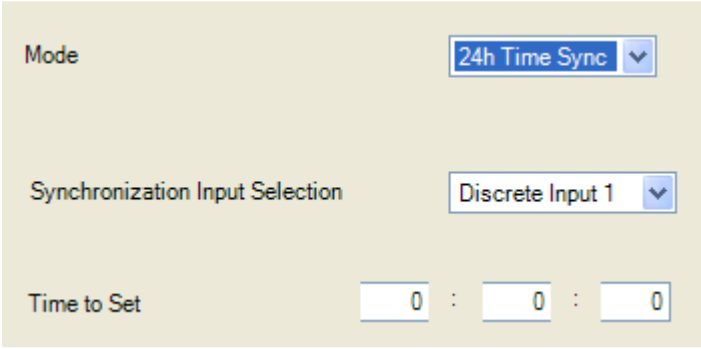
- **Mode:** Select the serial communication mode. Valid values: RS-232 or RS-485
- **Baud Rate:** Sets the serial data rate. Valid values: 19200, 38400, 57600, or 115200 bits/second
- **Communication Parity:** Sets the serial parity. Valid values: No Parity, Even Parity, or Odd Parity
- **Slave Address:** Unique identifier for this module. If all three modules are connected, each will need a unique identifying address. Valid values: 1-247
- **Enable Write Commands:** Set to yes to allow Modbus commands to be written to the ProTech (e.g. Reset, Initiate User-def Test 1) – see Monitor and Control section in Modbus chapter. When set to no, Modbus becomes a monitor-only interface. Valid values: yes or no

Time Synchronization

The internal clock of the MicroNet Safety Module can be synchronized to external devices using a discrete input (24h Time Sync) or using the IRIG-B Time Synchronization protocol (IRIG-B).

- **Mode:** Select the time sync mode. Valid values: Not Used, 24h Time Sync or IRIG-B.
- **Synchronization Input Selection:** Selects the discrete input used for synchronizing time. Only appears when Mode is set to 24h Time Sync. Valid values: Discrete Input 1-10
- **Time to Set:** Time of day to be set when commanded by the discrete input. Only appears when Mode is set to 24h Time Sync. Displayed hh:mm:ss, 24-hour format. Valid values: 0-23 for hours, 0-59 for minutes, and 0-59 for seconds.

If 24-hour time-sync is selected, additional input fields appear for the selection of a discrete input for synchronization pulse and the set time.



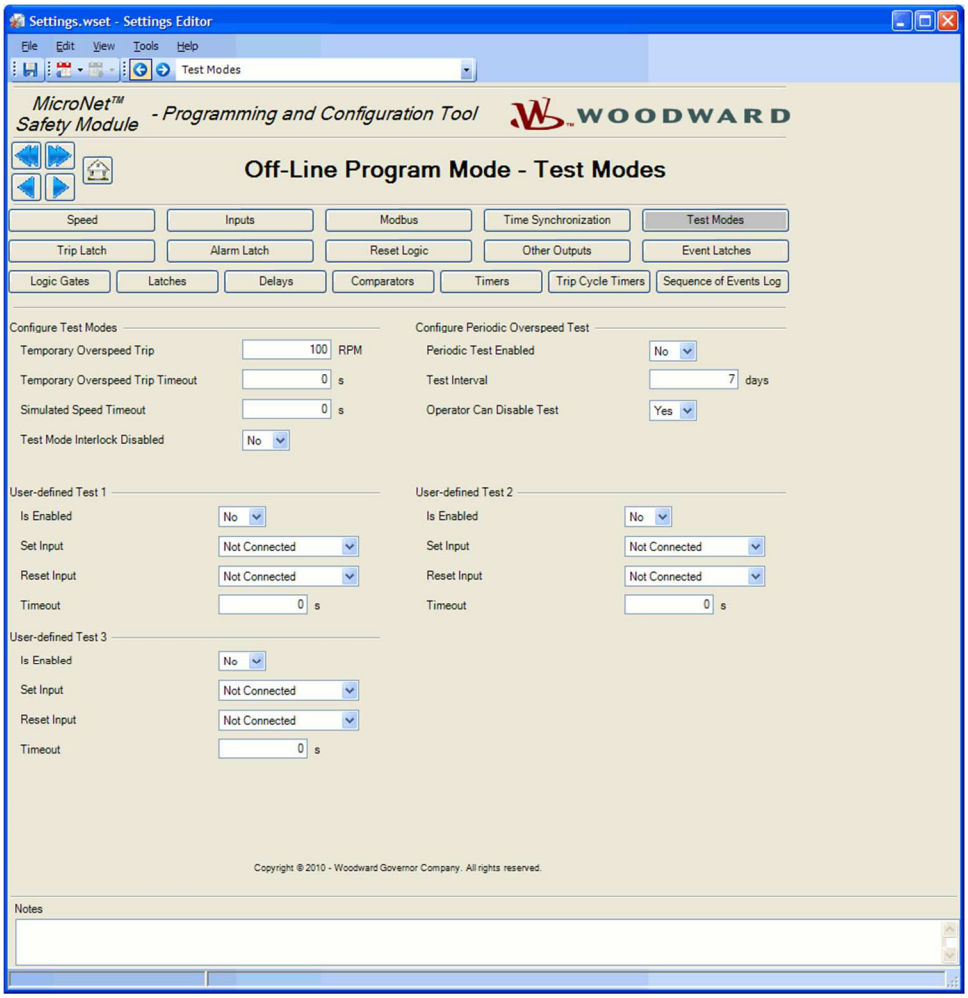
Test Modes

The system is equipped with several internal test routines to verify configurable logic and that parameters are working correctly. The test menu of the MicroNet Safety Module keypad contains following tests:

- **Temporary overspeed setpoint**
  This is an overspeed test with adjusted test speed setpoint executed with the real hardware speed signal from the rotating machine. The speed of the rotating machine must be raised within the allowed test time span in order to test trip action. If the overspeed setpoint is not exceeded within this time span, the overspeed test is aborted.
- **Manual simulated speed test**
  This is an overspeed test with the speed setpoint that is valid for the machine executed with a simulated speed signal from an internal frequency generator that initiates at the overspeed setpoint minus 100 rpm and must be manually raised within the allowed time span to above the overspeed setpoint in order to test the trip action. If the overspeed setpoint is not exceeded within this time span, the overspeed test is aborted.
- **Auto simulated speed test**
  This is an overspeed test with the speed setpoint that is valid for the machine executed with a simulated speed signal from an internal frequency generator that initiates at the overspeed setpoint minus 100 rpm and is automatically raised to above the overspeed setpoint in order to test the trip action. If the overspeed setpoint is not exceeded within the requested time span, the overspeed test is aborted.
- **Periodic overspeed test**
  The periodic overspeed test provides an auto simulated speed test at the configured test interval. Since module A initiates the test sequence, the periodic overspeed test can only be configured in module A.
- **User defined test 1**
- **User defined test 2**
- **User defined test 3**
- **Lamp test**
  The lamp test verifies the front panel LED functionality by cycling through the color combinations. When the test is started, the following sequence is followed.
  1. Tripped, Unit Health, and Alarm LEDs are turned **off** for 1 second.
  2. Tripped LED is on and **red**, Unit Health LED is on and **red**, and Alarm LED is on and **yellow** for 1 second.
  3. Unit Health LED turns **green** for one second.
  4. Tripped, Unit Health, and Alarm LEDs are turned **off** for 1 second.
  5. LEDs return to displaying their active state based on operating conditions.

  The test can be repeated as needed. A cancel option is also provided to cancel the test or to return to the previous test modes screen.

When “Test Modes” is selected, the following screen is displayed:



The following fields are available:

Configure Test Modes settings

- **Temporary Overspeed Trip:** Overspeed setpoint setting for overspeed tests with actual turbine speed signal. Valid values: 0-32000 rpm and frequency equivalent must not exceed 32000 Hz (configuration error).
- **Temporary Overspeed Trip Timeout:** Sets the time allowed to raise the actual turbine speed above the temporary overspeed setpoint in order to test the trip action. If the overspeed setpoint is not exceeded within this time span, the overspeed test is aborted. Valid values: 0-1800 seconds
- **Simulated Speed Timeout:** Sets the maximum time allowed during the Manual Simulated Speed Test. If the overspeed setpoint is not exceeded within this time span, the overspeed test is aborted. Valid values: 0-1800 seconds
- **Test Mode Interlock disable:** Set to yes to disable the interlock. Normally this is set to No, however, disabling the interlock may be desirable during commissioning to facilitate testing while the other modules are tripped. Valid values: Yes or No

Configure Periodic Overspeed Test settings

- **Periodic Test Enabled:** Set to yes to use the function. Valid values: Yes or No
- **Test Interval:** Interval time for the periodic test (how often it runs). Valid values: 1-999 days
- **Operator can disable test:** Set to yes to permit test intervention. Test disable command options are available from the front panel. When set to no, the test cannot be manually stopped. Valid values: Yes or No

User-defined Test settings

- **Is Enabled:** Set to yes to use the function. Valid values: Yes or No
- **Set input:** Selection to start the user-defined test. Valid values: *(see selection list below)*
- **Reset input:** Selection to stop the user-defined test. Valid values: *(see selection list below)*
- **Timeout:** Max test time setting. The test will abort after the timeout expires. Valid values: 0-1800 seconds

User-defined Test Input selections

- Not Connected
- Reset Function
- Discrete Input 1-10
- Analog Comparator 1-10
- Logic Gate 1-50
- Latch 1-10
- Delay 1-15
- Timer 1-15 HiHi
- Timer 1-15 Hi
- Unit Delay 1-10

Logic Gates

There are 50 Logic gates available that can be used to create customized logic. These gates can each be custom defined by a selection from following functions:

- AND
- NAND
- OR
- NOR
- XOR
- XNOR
- NOT

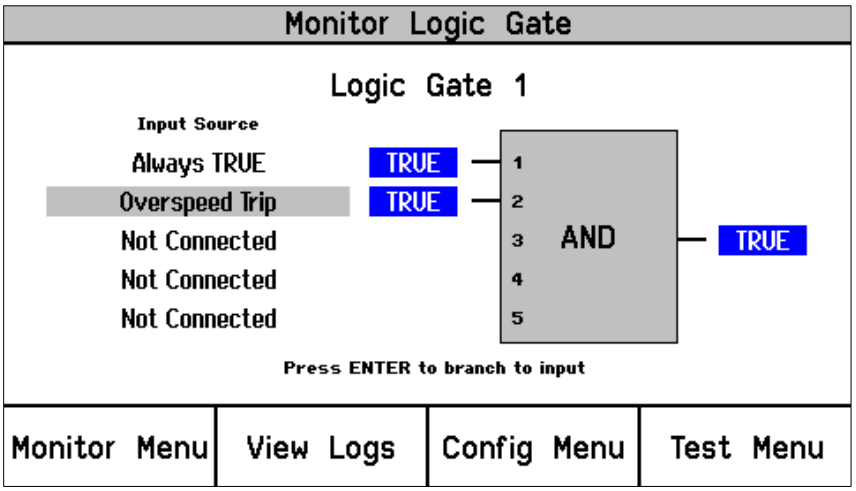
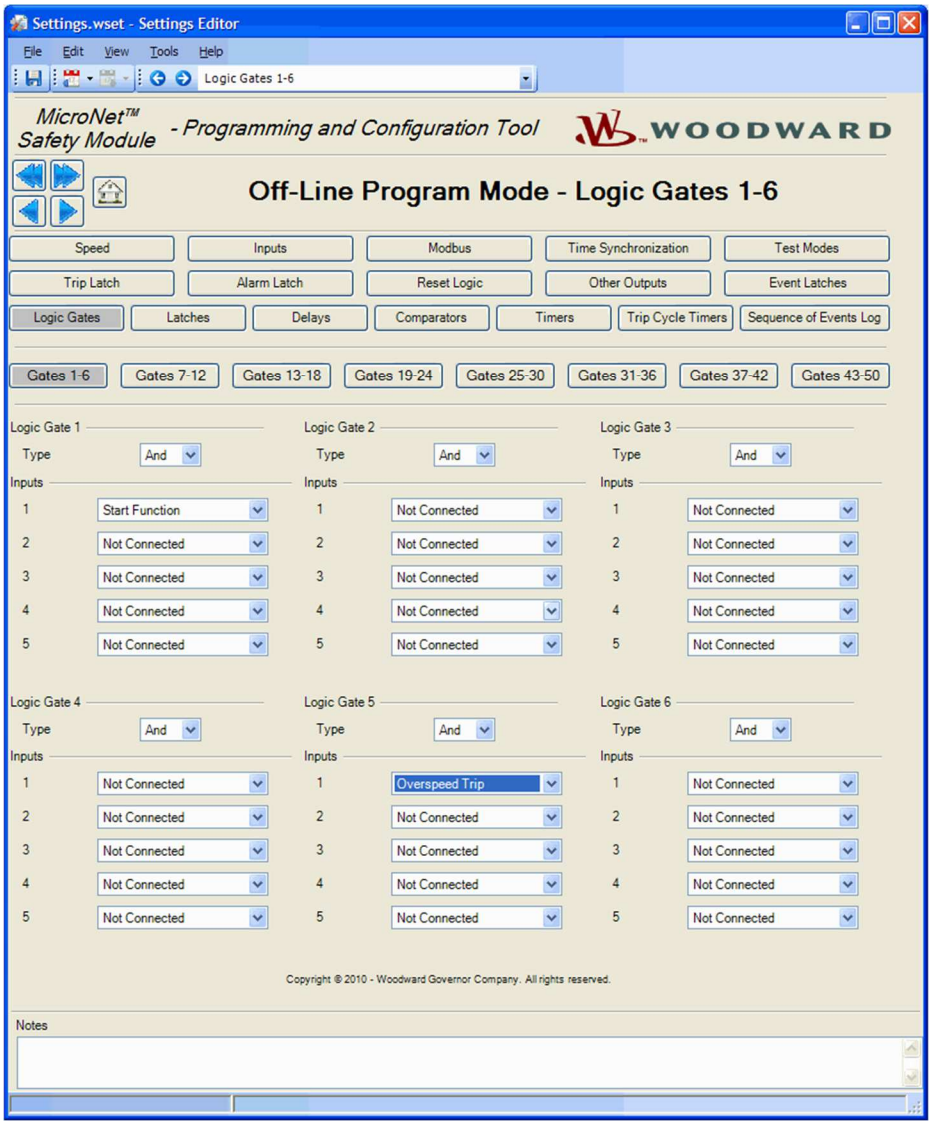
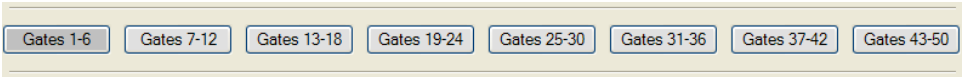


Figure 10-1. Logic Gate Monitor screen (front panel)

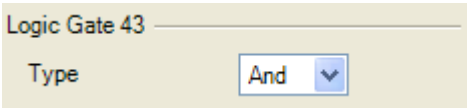
When “Logic Gates” is selected in the settings editor, the following screen is displayed:



Specific gates can be selected by the buttons near the top of the page.



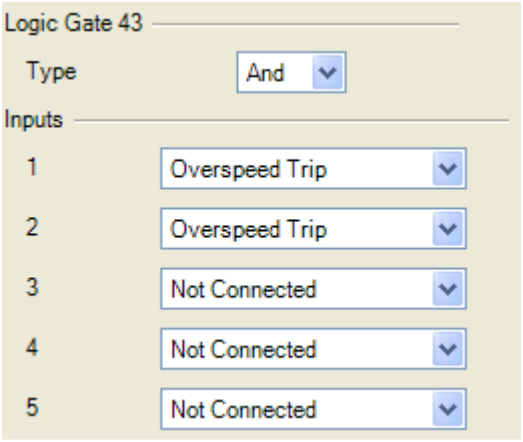
The function of the gates can be selected by the Type selection input field.



- AND, OR, NAND, and NOR gates can have up to five inputs.
- XOR, and XNOR gates have two inputs.
- NOT gates have one input.

In each input selection field, the origin of the signal can be entered. These inputs can be any function result from another gate, or from an analog input alarm setpoint, or a timer, etc.

For this purpose, all functions like logic gates, timers, inputs, etc are numbered which allow easy referencing of logic gate inputs to outputs from other functions. An example of how inputs are numbered is shown below:



A complete listing of the input selections is provided below (see Logic Gate Input selections table). For additional details on each selection refer to section on Configurable Logic Selection Definitions.

If the result of a logic gate is not used as an input in any other function, the Configuration Error Log will indicate a warning.

If Inputs configured as analog input are connected to the logic gate, the Configuration Error Log will indicate an error and uploading of the configuration file will not be possible.

Table 10-2. Logic Gate Input selections

Not Connected	Periodic Ospd Test Active	Latch 1-10
Always FALSE	User Defined Test 1-3	Delay 1-15
Always TRUE	Configuration Mismatch	Timer 1-15 HiHi
Start Function	Speed Fail Alarm	Timer 1-15 Hi
Reset Function	Trip	Unit Delay 1-10
Speed Fail Override	Alarm	Trip Time Mon 1 Alarm
Overspeed Trip	Event Latch 1-3	Trip Time Mon 2 Alarm
Overacceleration Trip	Analog Input 1-10 HiHi	Power Up Trip
Speed Fail Trip	Analog Input 1-10 Hi	Internal Fault Trip
Speed Fail Timeout	Analog Input 1-10 Lo	Internal Fault Alarm
Speed Lost Alarm	Analog Input 1-10 LoLo	Configuration Trip
Speed Lost Trip	Analog In 1-10 Range Err	Resettable Trip Input
Speed Probe Open Wire	Discrete Input 1-10	Power Supply 1 Fault
Tmp Ovrspd Setpoint On	Analog Comparator 1-10	Power Supply 2 Fault
Man Simulated Speed Active	Logic Gate 1-50	Parameter Error
Auto Test Speed Active		

Latches

There are ten latches (set/reset flip-flops) available that can be used to create an output available for trips, alarms, or any logical function. The latch is reset dominant, meaning the output is false if the reset input is true regardless of the set input.

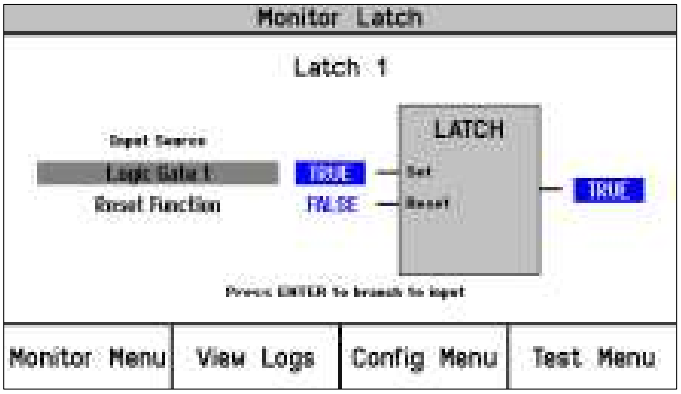
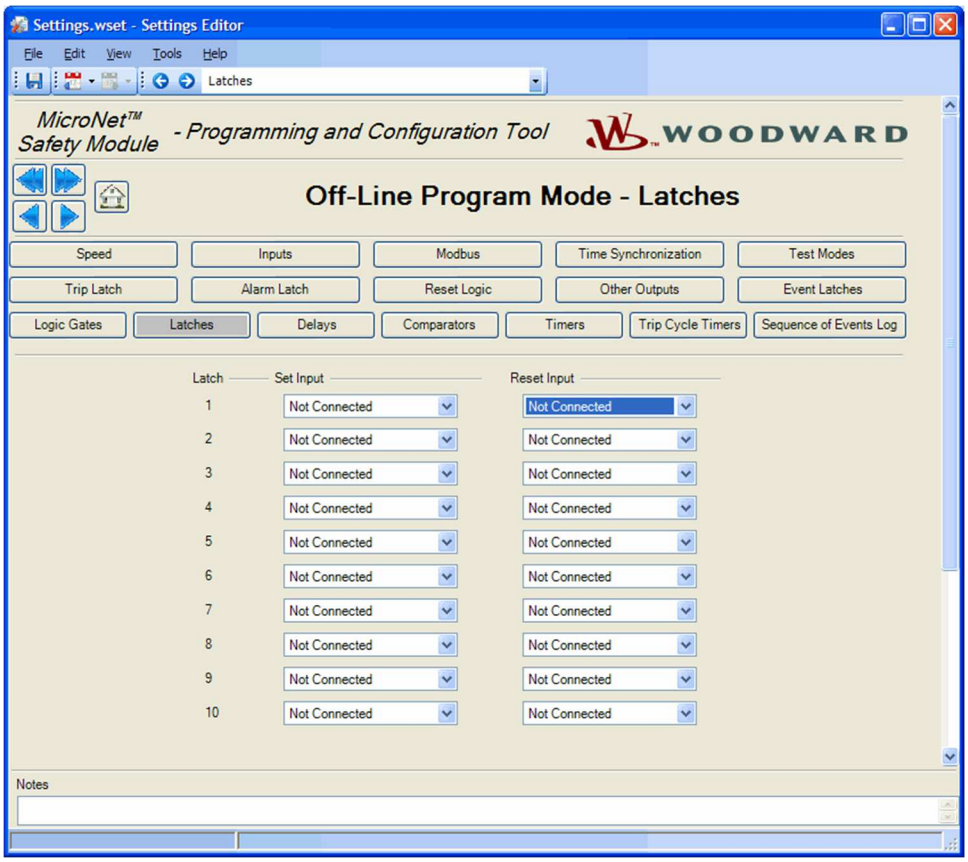


Figure 10-2. Latch Monitor screen (front panel)

When “Latches” is selected in the settings editor or config menu, the following screen is displayed:



Latch settings

- **Set Input.** Selection for the reset-dominant latch block set input. The set and reset inputs for each latch can be any function result from another gate or from an analog input alarm setpoint, a timer, etc. Valid values: *(see Logic Gate Input selection list)*
- **Reset Input.** Selection for the reset-dominant latch block reset input. Valid values: *(see Logic Gate Input selection list)*

If the result of a latch is not used as an input in any other function, the Configuration Error Log will indicate a warning. If Inputs configured as analog input are connected to the latch, the Configuration Error Log will indicate an error and uploading of the configuration file will not be possible.

Delays

There are 15 Delay functions (timers) available that can be used to create an output available for trips, alarms, or any logical function. Each delay function can have a pickup time and a drop-off time (delay in switching from False to True, delay in switching from True to False).

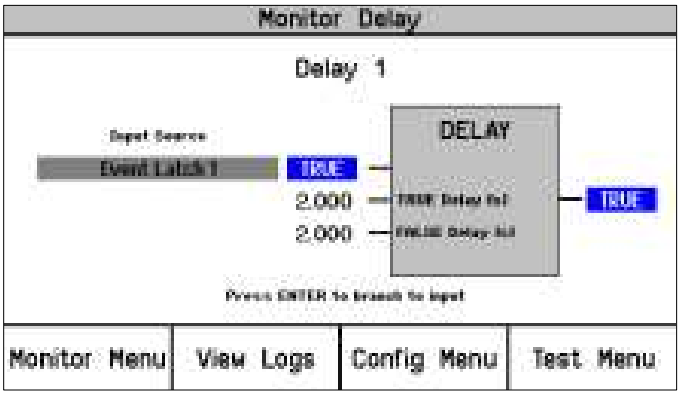
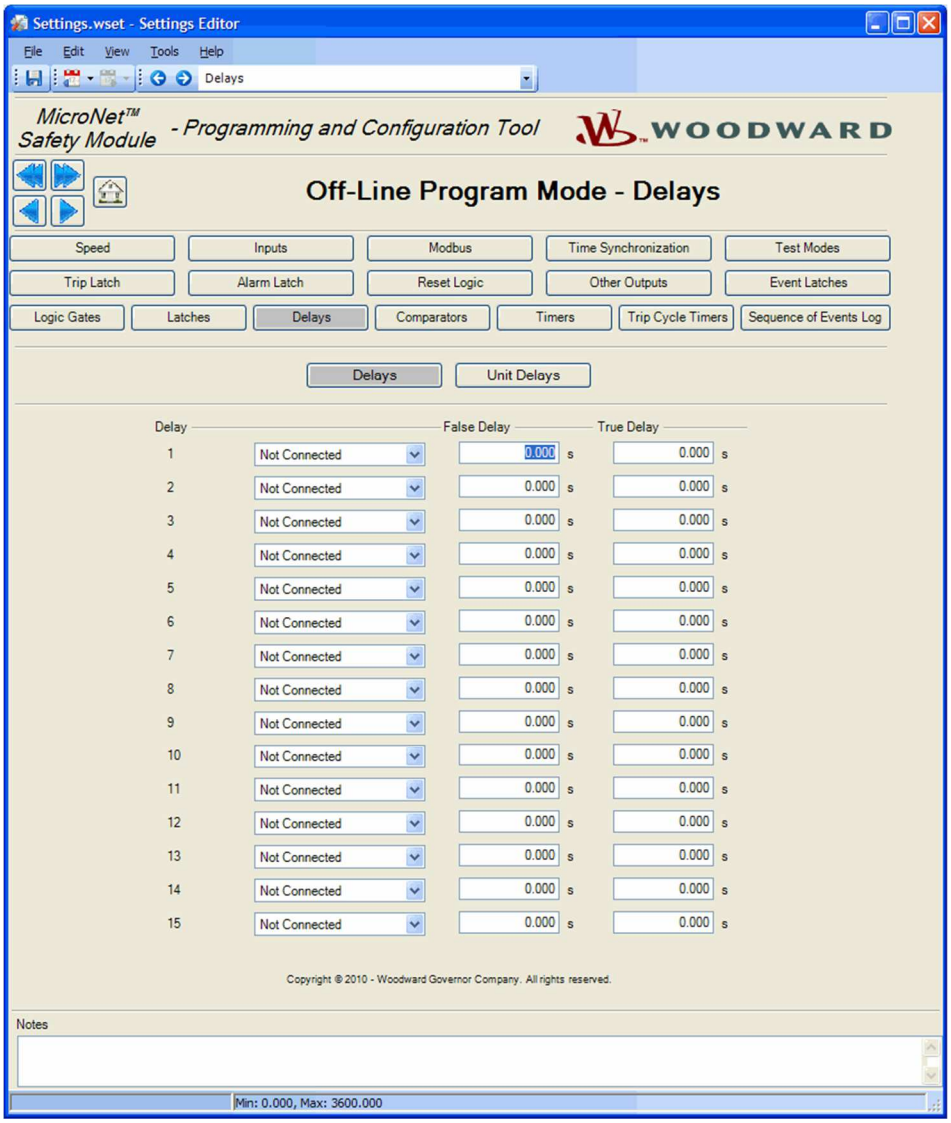


Figure 10-3. Delay Monitor screen (front panel)

When “Delays” is selected in the settings editor or the Config menu, the following screen is displayed:



The delay requires that the input be true for a configurable True Delay Time before the output changes state to true, and that the input be false for a configurable False Delay Time before the output changes state to false.

The input field for each delay can be any function result from another gate or from an analog input alarm setpoint, or a timer, etc. For this purpose, all functions like logic gates, timers, inputs, etc are numbered. Referencing logic gate inputs to outputs from other functions is done by this numbering.

The False delay field defines the drop-off time (delay switching from True to false). The True delay field defines the pick-up time (delay switching from False to True).

Delay settings

- **Input:** Selection for the block input. Valid values: *(see Logic Gate Input selection list)*
- **False Delay:** Time delay that the input must remain false before the output goes false. The minimum detectable resolution is 4 ms. Valid values: 0-3600 seconds
- **True Delay:** Time delay that the input must remain true before the output goes true. The minimum detectable resolution is 4 ms. Valid values: 0-3600 seconds

If the result of a delay is not used as an input in any other function, the Configuration Check Error Log will show a warning.

If inputs configured as ‘analog input’ are connected to the delay function, the Configuration Check Error Log will show an error and uploading of the configuration file will not be possible.

Unit Delays

Ten-unit delay blocks are available to break loops detected in the configurable logic by forcing a specific execution order. The output of the unit delay equals the input of the block the last time it was executed.

If any block input is connected to its output or if a loop is detected, the Configuration Check Error Log will show an error and uploading of the configuration file will not be possible. Properly inserting a unit delay block in the loop will enforce program execution and satisfy the loop check algorithm.

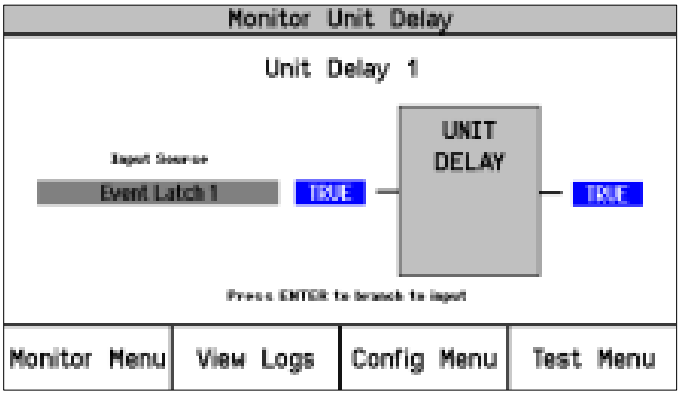


Figure 10-4. Unit Delay Monitor screen (front panel)

When “Unit Delays” is selected, the following screen is displayed:

Unit Delay Settings

- **Input.** Selection for the block input. The input field for each unit delay can be any function result from another gate or from an analog input alarm setpoint, or a timer, etc. .Valid values: *(see Logic Gate Input selection list)*

Comparators

There are ten comparators available that can be used to create an output available for trips, alarms, or any logical function.

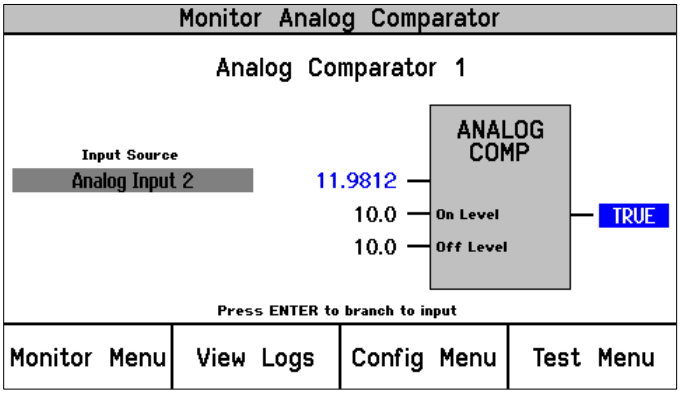
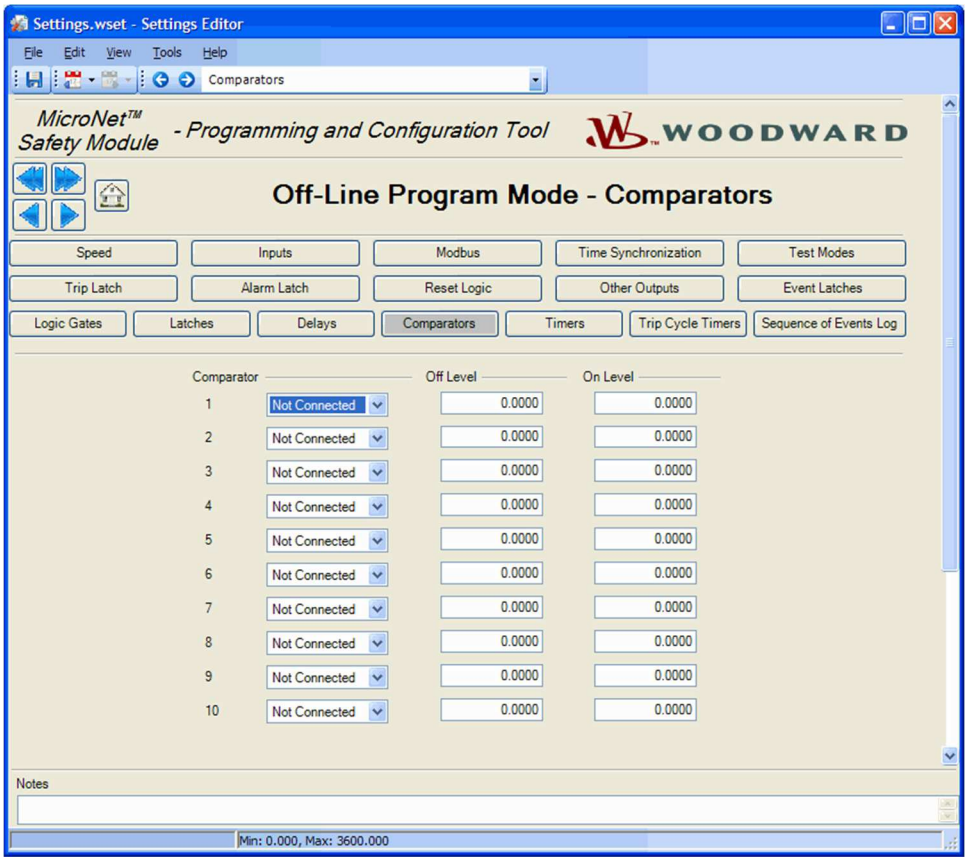


Figure 10-5. Comparator Monitor screen (front panel)

When “Comparators” is selected, the following screen is displayed:



The block input is compared to fixed on and off values. The values entered have the same scaling as the connected analog input (speed is in rpm and acceleration is in rpm/s).

The difference between ON-level and OFF-level can be used to create hysteresis.

If ON-level is greater than the OFF-level, the output becomes TRUE when the input is higher than the ON-level and goes FALSE when the input becomes less than OFF-level.

If ON-level is less than the OFF-level, the output becomes TRUE when the input is less than the ON-level and goes FALSE when the input becomes higher than OFF-level.

If On-level equals OFF-level, there is no hysteresis and the output becomes TRUE when the input is higher than the ON-level and goes FALSE when the input becomes less than ON-level.

Comparator Settings

- **Input.** Selection for the block input. Valid values: Speed, Acceleration, or Analog Input 1-10.
- **Off Level**. Comparator OFF value, in engineering units.
  Valid values: -999999 to 999999
- **On Level**. Comparator ON value, in engineering units.
  Valid values: -999999 to 999999

If the result of a comparator is not used as an input in any other function, the Configuration Error Log will indicate a warning.

If inputs configured as ‘discrete input’ are connected to the comparator, the Configuration Error Log will indicate an error and uploading will be inhibited.

Timers

Fifteen timers are available. Each timer has a start input, a reset input, an elapsed time output, a Hi setpoint reached output, and a HiHi setpoint reached output. The timer counts up while the start input is true.

The elapsed time output is reset to zero and the Boolean outputs (Hi and HiHi) set false when the reset input is true. The start input is ignored whenever the reset input is true. For example, if the reset input is set to true, and the start input is set to true, the timer remains reset. If the reset input changes to false with the start input still true, the timer will start.

The output value is displayed in milliseconds and can be viewed on the front panel or over Modbus as well as the status of the Hi and HiHi outputs.

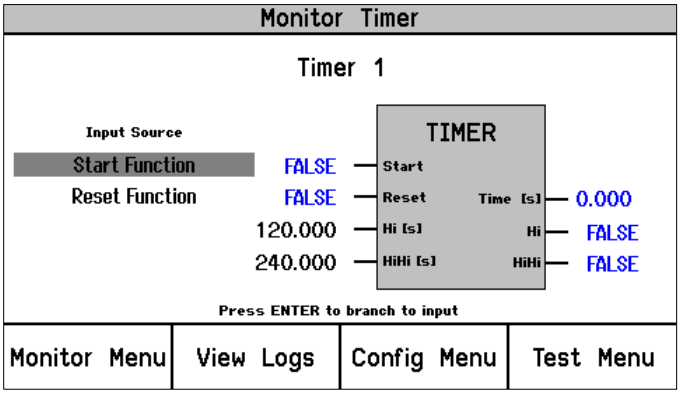
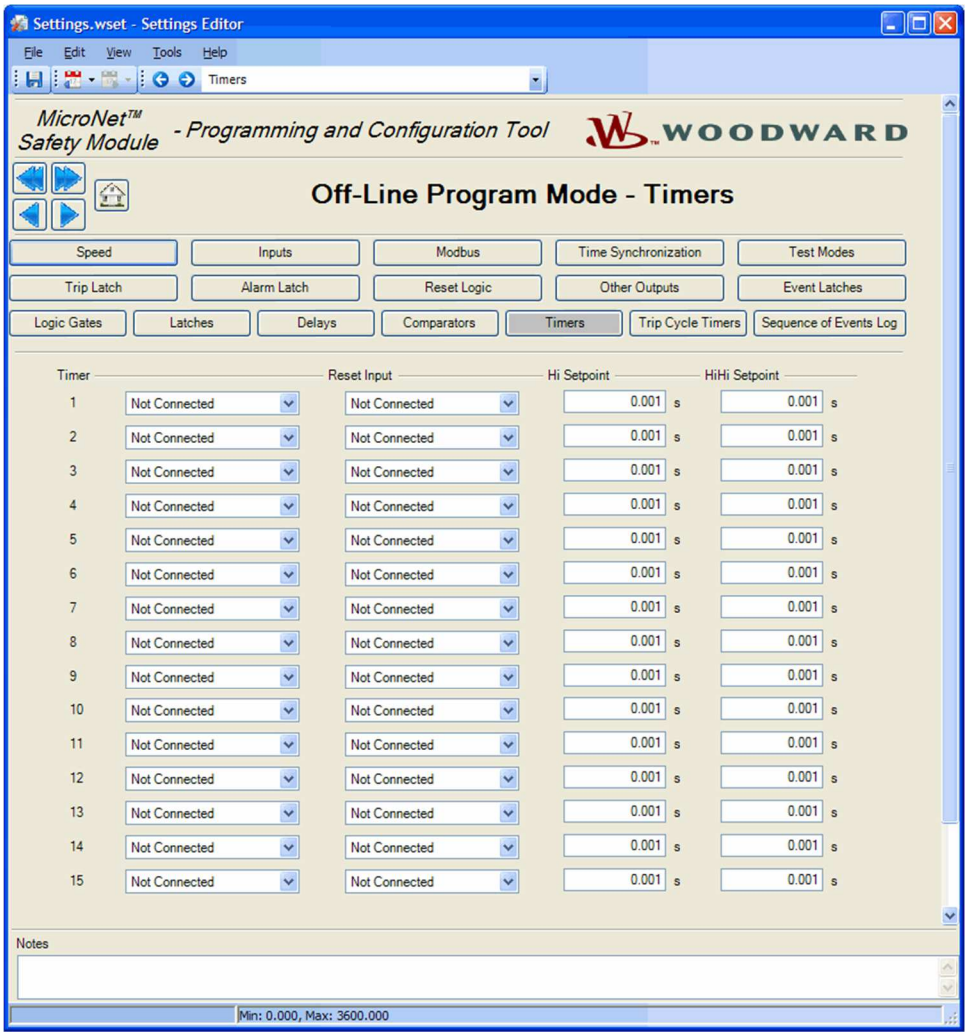


Figure 10-6. Timer Monitor screen (front panel)

When “Timers” is selected in the settings editor or config menu, the following screen is displayed:



The Start input field and the Reset Input field for each timer can be any function result from another gate or from an analog input alarm setpoint, or a timer, etc.

The Hi and HiHi setpoint setpoints are user configurable. The Hi Setpoint setpoint field defines the time delay until the Hi output becomes True. The HiHi Setpoint field defines the time delay until the HiHi output becomes True.

Timer settings

- **Start Input.** Selection for the timer start input. Valid values: *(see Logic Gate Input selection list)*
- **Reset Input.** Selection for the timer reset input. Valid values: *(see Logic Gate Input selection list)*
- **Hi Setpoint**. Accumulated time setting for the timer block Hi output.
  The minimum detectable resolution is 4 ms. Valid values: 0-3600 seconds
- **HiHi Setpoint**. Accumulated time setting for the timer block HiHi output.
  The minimum detectable resolution is 4 ms. Valid values: 0-3600 seconds

If the result of a timer is not used as an input in any other function, the Configuration Error Log will indicate a warning.

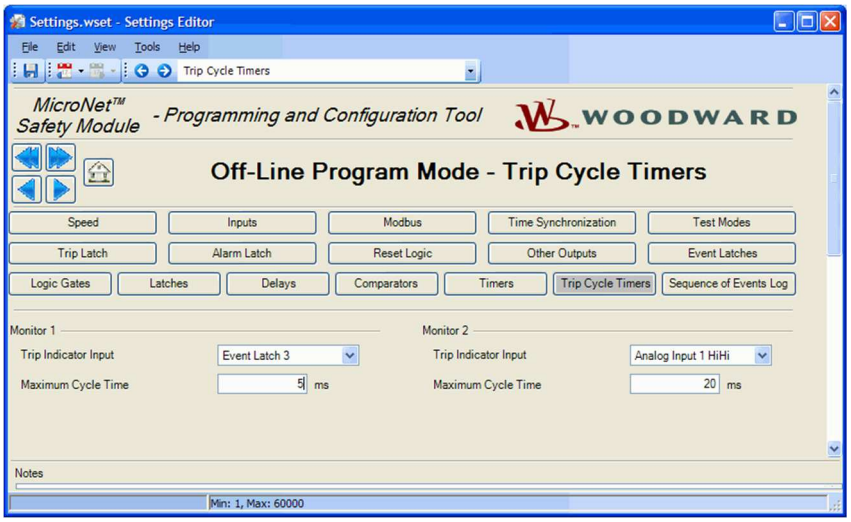
To use a timer, both Start and Reset input must be configured to a value other than ‘Not Connected’ otherwise the Configuration Error Log will indicate an error and uploading of the configuration file will not be possible.

Trip Cycle Timers

A trip cycle timer is a function that measures the time from a trip event until the trip is confirmed by an input (for instance trip and throttle valve limit switch), or by any internally created logic function. An Alarm is indicated if the time is expired before the feedback confirmation is received. There are two trip cycle timers available.

The trip cycle time is measured in milliseconds and shown in Monitor mode on the MicroNet Safety Module display.

When “Trip Cycle Timers” is selected in the settings editor or in the config menu, the following screen is displayed:



The Trip Indicator input field has to be connected to the signal that is used for the trip feedback confirmation (for example, a trip valve limit switch). This trip Indicator input field for each timer can be any function result from a discrete input, another gate, or from an analog input alarm setpoint, etc.

Trip Cycle Timer settings

- **Trip Indicator Input.** Selection for the indicator feedback.

Valid values:

Trip Cycle Time Monitor Input selections

Not Connected
Event Latch 1-3
Analog Input 1-10 HiHi
Analog Input 1-10 Hi
Analog Input 1-10 Lo
Analog Input 1-10 LoLo
Discrete Input 1-10
Analog Comparator 1-10
Logic Gate 1-50
Latch 1-10
Delay 1-15
Timer 1-15 HiHi
Timer 1-15 Hi
Unit Delay 1-10
Resettable Trip Input

- **Maximum Cycle Time**. The Maximum Cycle Time defines the time allowed between a trip occurrence and the feedback confirmation. This value is expressed in milliseconds. Valid values: 1-60000 ms

The output of the Trip Cycle Monitor is automatically connected to the Alarm Latch, user connection is not required.

Sequence of Events Log

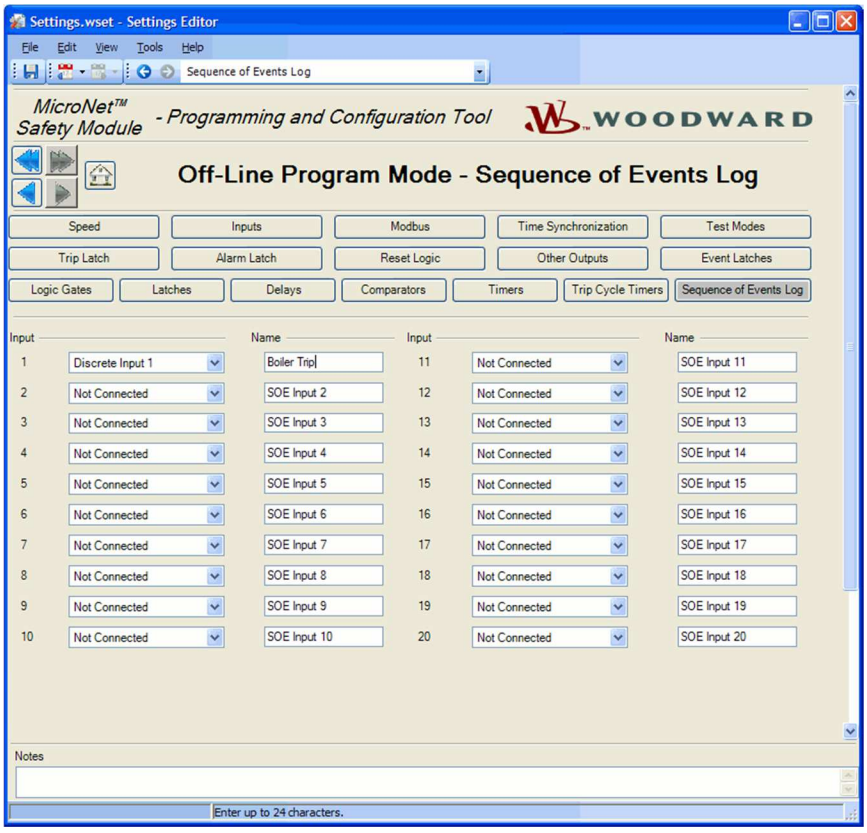
The Sequence of Events Log allows the user to log events with a resolution of up to 1 ms. This resolution is only achieved when IRIG-B time synchronization is enabled and when capturing Configurable Discrete Inputs. Other inputs will be captured with their respective update rate, for example 4 ms for the Configurable Logic inputs.

The Sequence of Events Log logs any configured input's state transition from false to true with a user-configurable event ID, a time and date stamp and a test mode indicator. The test mode indicator shows if the event occurred while the module was executing a test.

Unlike the Trip, Alarm or Event Latches, the Sequence of Events Log does not provide an output for connection to other configurable logic blocks. It only logs the state of its inputs.

Each of the Sequence of Events Log's 20 user-configurable inputs can be assigned from discrete inputs or configurable logic. The user can assign a description to each user-configurable input by just replacing the default text, where the description can have up to 24 alphanumeric characters maximum.

When the Sequence of Events Log button is selected, the following screen is displayed:



In the example above, Sequence of Events Log input #1 is connected to Discrete Input 1. The name is Boiler Trip.

The Sequence of Events Log is reset by the Reset All Logs button on the Home Page.

Trip Latch

The output of the Trip Latch goes true if any of its inputs are true. Once the output of the trip latch is true, it remains true until the trip reset function occurs and all inputs are false. The output of the trip latch drives the trip voter relays.

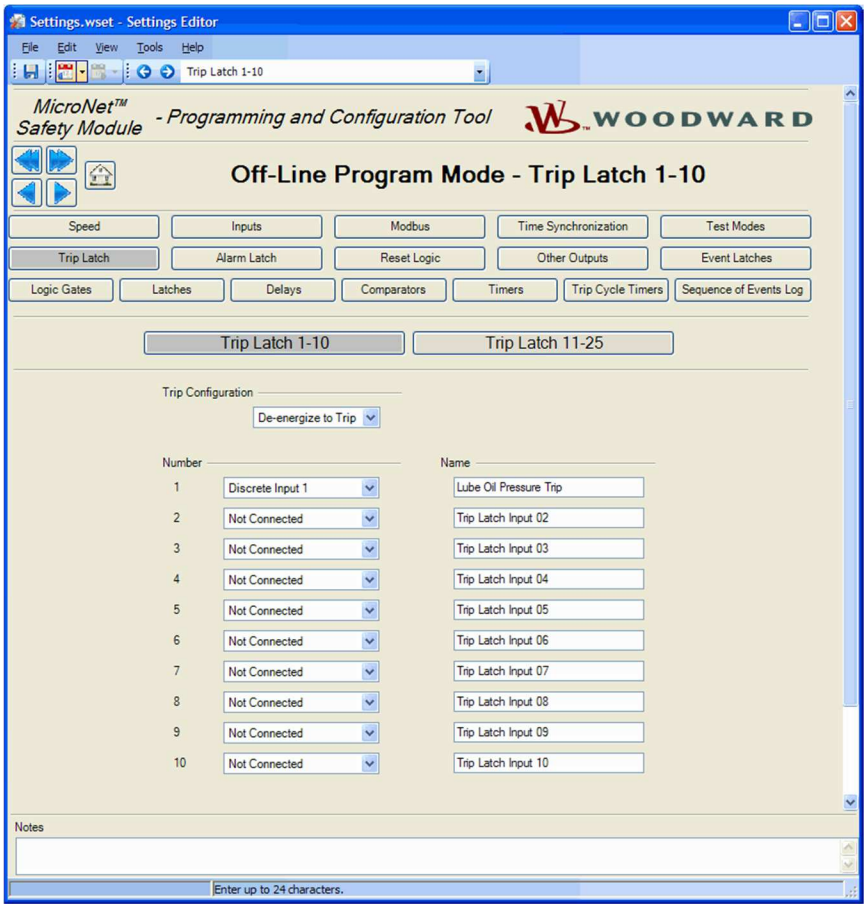
The trip voter relays can be configured to energize for trip or de-energize for trip, which can be selected by entering the particular selection in the trip configuration input field.

The inputs of this trip latch are 11 fixed trip causes and can be expanded with up to 25 programmable trip causes. The fixed trip causes are:

- **Power-up Trip:** At power up, the unit always starts in trip condition which can be reset. This trip cause is always enabled and cannot be inhibited.
- **Internal Module Fault:** This trip cause is active if any fault is detected by the internal diagnostic logic.
- **Overspeed Trip:** This trip cause is always enabled and cannot be inhibited.
- **Speed Fail Trip:** This trip cause can be enabled or disabled in the configuration screen of the speed inputs.
- **Speed Lost Trip:** This trip cause can be disabled (set to Alarm) in the configuration screen of the speed inputs.
- **Speed Probe Open Wire Trip:** Open wire detection is only possible if MPU speed probes are used.
- **Speed Fail Timeout Trip:** This trip cause can be enabled or disabled in the configuration screen of the speed inputs.
- **Over-acceleration Trip:** This trip cause can be enabled or disabled in the configuration screen of the speed inputs.
- **Configuration Trip:** Indicated during a configuration save.
- **Parameter Error Trip:** This trip cause is active if settings are not correctly read out of EEPROM.
- **Resettable Trip Input:** This trip cause can be enabled or disabled in the configuration screen of the Reset inputs.

In addition, 25 trip causes can be programmed. These trip causes can be either from discrete inputs, comparators, latches, logic gates, etc. The user can assign a description to each user-configurable input by just replacing the default text, where the description can have up to 24 alphanumeric characters maximum. This description will show on the MicroNet Safety Module screen when the corresponding trip cause is active.

When the Trip Latch button is selected, the following screen is displayed:



In the example above, programmable trip latch input #1 is connected to Discrete Input 1. The name is Lube Oil Pressure Trip.

Alarm Latch

The output of the Alarm Latch goes true if any of its inputs are true. Once the output of the Alarm latch is true, it remains true until the trip reset function occurs and all inputs are false. The output of the alarm latch is connected by default to programmable relay 1.

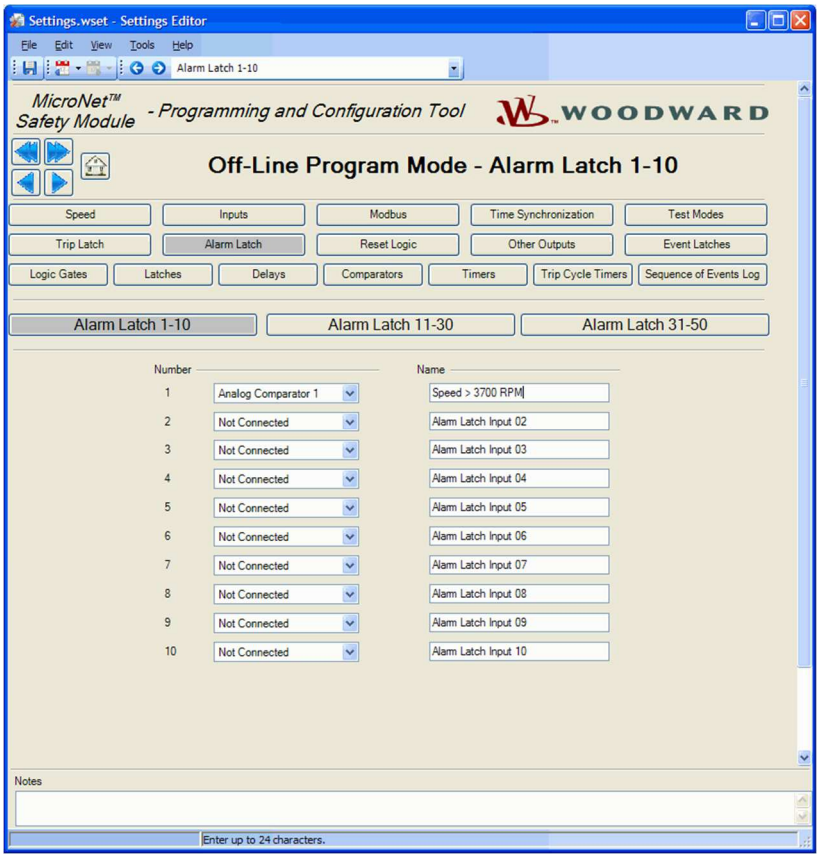
The alarm latch provides up to 50 user-configurable inputs.

These inputs can be from discrete inputs, comparators, latches, Logic gates, etc, by using the selector menu (black triangle)

The user can assign a description to each user-configurable input by just replacing the default text, where the description can have up to 24 alphanumeric characters maximum.

This description will show on the MicroNet Safety Module screen when the corresponding alarm cause is active.

When Alarm Latch is selected, the following screen is displayed:



In the example above, programmable Alarm Latch Input #1 is connected to Analog Comparator 1. The name is: Speed > 3700 RPM.

Reset Logic

This screen facilitates configuration of the configurable reset command and a resettable trip input.

Configurable Reset Command

The “Reset Logic” screen allows selecting additional reset inputs for resetting the alarm and trip latches.

By using this selection, the reset can be established not only by the Reset button on the MicroNet Safety Module keypad, but also by an external function or by a function created in logic.

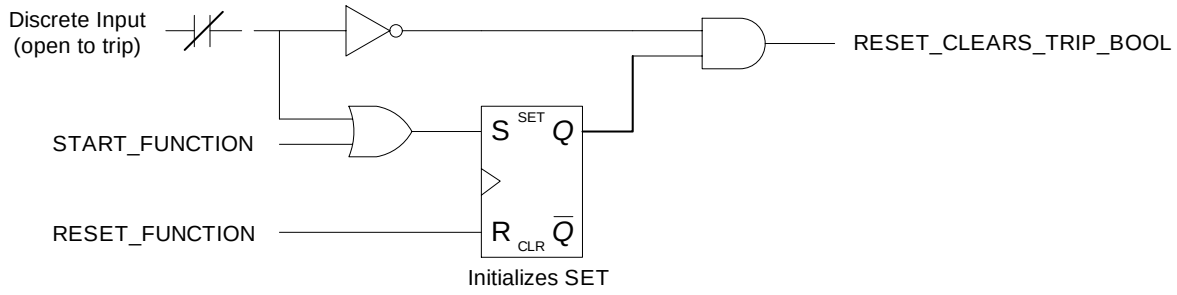
To do so, the extra reset source can be entered in the input field for the configurable reset source, or by setting Mode = Used and assigning one of the discrete inputs to input field “Reset Input Selection”.

Resettable Trip Input

The “Reset Logic” screen allows selecting an input to the trip latch that has been pre-configured to provide a resettable trip feature. With this feature, the ProTech trip output can be reset while this trip input is still commanding a trip. Example use of this function is MicroNet Safety Module product connection into a turbine trip string as an input and output, as a latch-up prevention.

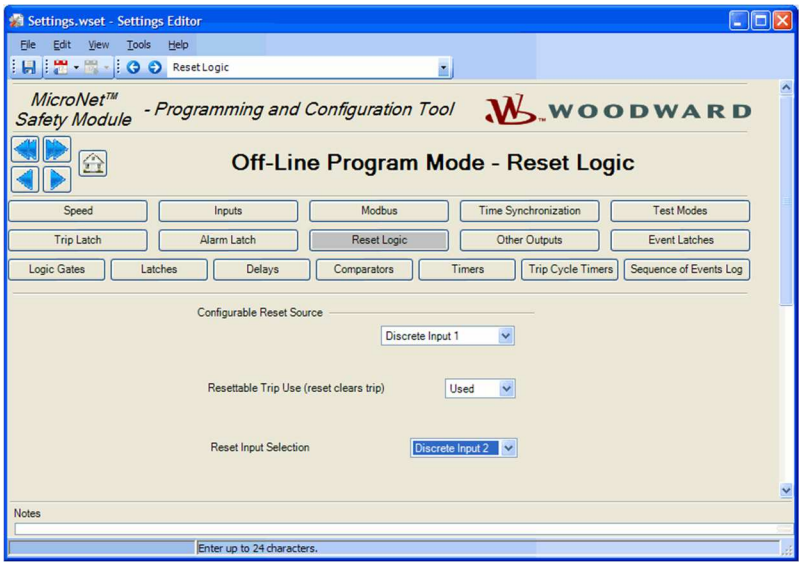
When set to 'Used', the Resettable Trip Function is automatically connected into the Trip Latch. While this trip input is active (commanding a trip; open discrete input), the ProTech trip output can be reset.

If the discrete input closes and then re-opens after the reset, a trip shall be re-activated. If the discrete input closes and then re-opens prior to a reset, the trip shall remain active (and not clear and re-appear).



Resettable Trip Logic

When “Reset Logic” is selected, the following screen is displayed:



Configurable Reset Source

- **Input:** Selection for the configurable reset input. Valid values: *(see Logic Gate Input selection table)*

Resettable Trip

- **Resettable Trip Use (reset clears trip):** Set to Used to enable this function. Valid values: Not Used or Used
- **Input Selection:** Selection for the configurable reset input
  Valid values: *Discrete Input 1-10*

The output of the Resettable Trip function is automatically connected to the Trip Latch, user connection is not required. The output of the Resettable Trip function is available for connection to other blocks in the configurable logic.

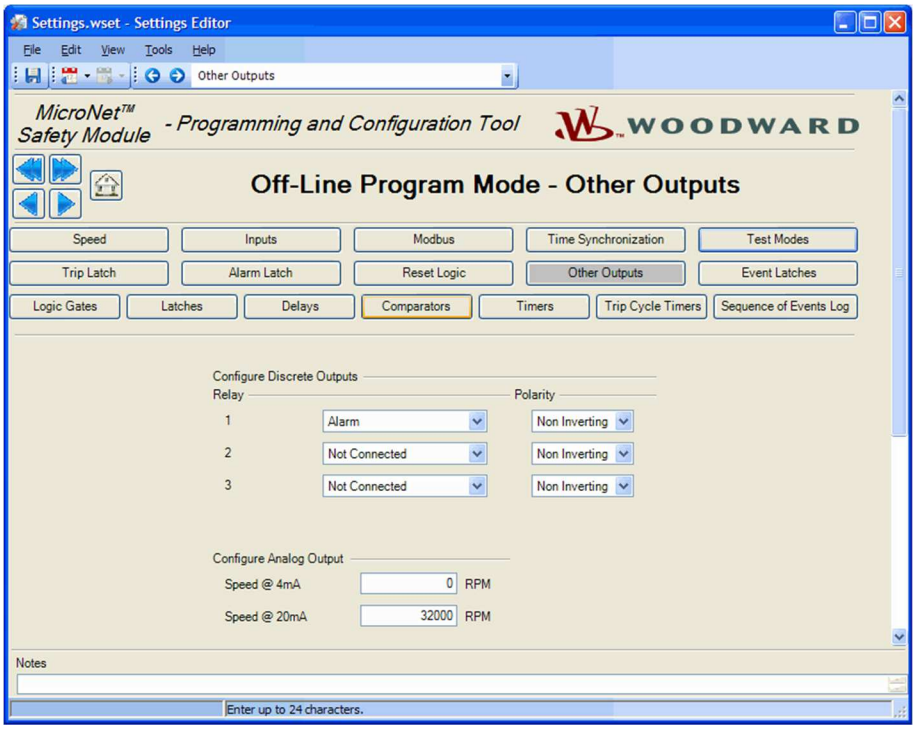
Other Outputs

Each unit has three configurable relay outputs and one 4–20 mA analog output.

The analog output is a 4–20 mA signal proportional with measured speed of which scaling can be adjusted using the 4 mA value and 20 mA value input fields.

The relay outputs can be connected to any discrete signal inside the MicroNet Safety Module. Including the discrete inputs.

When “Other Outputs” is selected, the following screen is displayed:



Configure Discrete Outputs

- **Relay Input:** Selection for the configurable reset input. Valid values: *(see Logic Gate Input selection table)*
- **Polarity:** Output inversion option. Valid values: Non-Inverting or Inverting

Configure Analog Output

- **Speed @ 4 mA:** The speed value at min (4 mA) for scaling the analog output. Valid values: 0-32000 RPM
- **Speed @ 20 mA:** The speed value at max (20 mA) for scaling the analog output. Valid values: 0-32000 RPM

Event Latches

Three event latches are available. Each event latch has up to 25 user-configurable inputs. The output of the event latch goes true if any input is true. These inputs can be either from discrete inputs, comparators, latches, logic gates, etc.

The user can assign a description to each user-configurable input, by just replacing the default text, where the description can have up to 24 alphanumeric characters maximum. This description will show on the MicroNet Safety Module screen when the corresponding event has occurred.

Once the output of the event latch is true, it remains true until its reset input becomes true and all inputs are false.

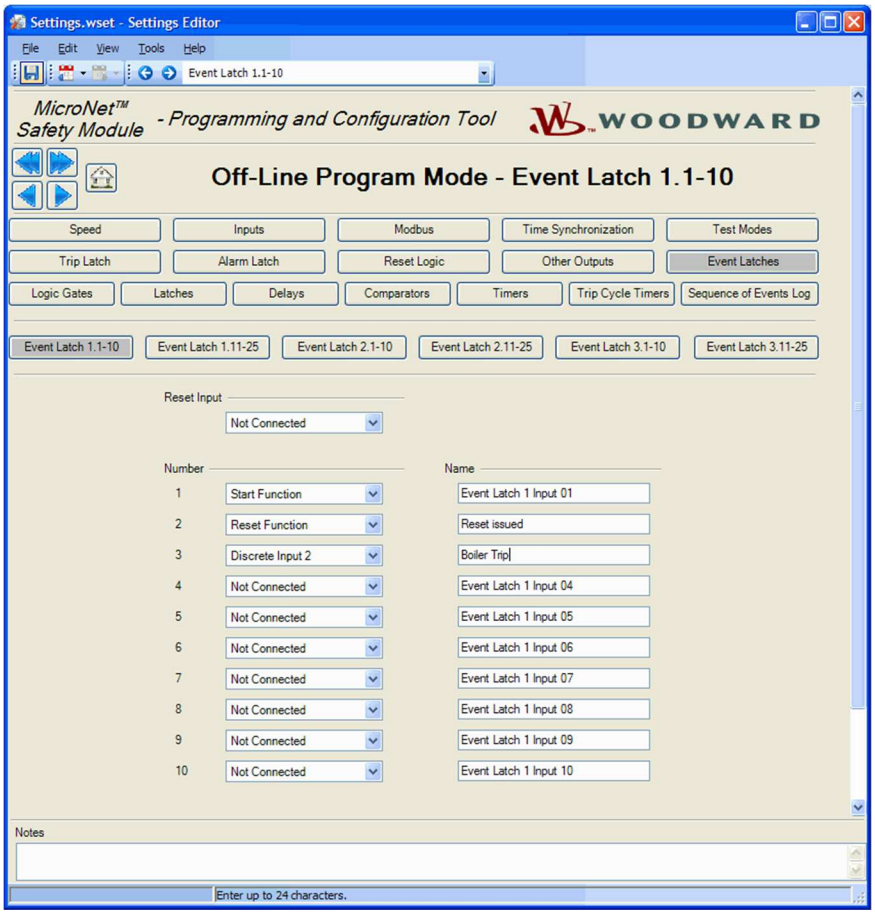
The typical connection for the reset input is the ‘Reset Function’ however other connection options can be selected by entering any signal in the reset input field.

Each input has an associated first-out Boolean output that is true if that input became true when the output of the trip latch was false.

Once true, the first-out Boolean values remains true until the event latch output becomes false.

The first-out Boolean values are available on Modbus and the front panel display. They are not available as inputs to the configurable logic blocks or the programmable relays.

When “Event Latches” is selected, the following screen is displayed:



In the example above, configurable event latch input #2 is connected to speed lost alarm, and input #3 is connected to discrete input 2. And the description is Boiler trip.

Configurable Logic Selection Definitions

The following table provides a definition of the input selections available in the configurable logic.

Table 10-3. Input Selections in the Configurable Logic Definitions

Selection Identifier	Description of selection
Not Connected	This is the setting to be selected for an input that is not used. NOTE: If a block is not to be used, its inputs should be “Not Connected”, otherwise a configuration warning will be generated.
Always FALSE	Sets the value of the input to a fixed setting of FALSE.
Always TRUE	Sets the value of the input to a fixed setting of TRUE.
Start Function	Start function output. This is a short pulse that goes true on the rising edge of a start command (front panel or discrete input) and is automatically set back to false 4 ms later.
Reset Function	Reset function output. This is a short pulse that goes true on the rising edge of a reset command (front panel or discrete input) and is automatically set back to false 4 ms later.
Speed Fail Override	Speed Fail Override discrete input status indication. True when the input is high and false when low.

Selection Identifier	Description of selection
Overspeed Trip	Overspeed indication. True when speed is above the overspeed setpoint and false otherwise.
Overacceleration Trip	Over acceleration indication. True when acceleration is above the acceleration trip setpoint and speed is above the accel trip enabled speed.
Speed Fail Trip	Speed Fail Trip indication. True when the speed lost trip condition is detected. Remains true until cleared by a reset.
Speed Fail Timeout	Speed Fail Timeout indication. This is a short pulse that goes true when the condition is detected and is automatically set back to false 4 ms later.
Speed Lost Alarm	Speed Lost Alarm indication. True when the speed lost trip condition is detected. Remains true until cleared by a reset.
Speed Lost Trip	Speed Lost Trip indication. True if a speed lost trip is detected. Remains true until cleared by a reset.
Speed Probe Open Wire	Speed Probe Open Wire indication. True while an open wire is detected.
Tmp Ovrspd Setpoint On	Tmp Ovrspd Setpoint On indication. True while the test is in the Active state.
Man Simulated Speed Active	Man Simulated Speed Active indication. True while the test is in the Active state.
Auto Test Speed Active	Auto Test Speed Active indication. True while the test is in the Active state.
Periodic Ospd Test Active	Periodic Ospd Test Active indication. True while the test is in the Active state.
User Defined Test 1-3	User Defined Test 1, 2, or 3 active indication. True while the specified User Defined Test is in the Active state.
Configuration Mismatch	Configuration Mismatch indication as determined by the module-to-module configuration compare function.
Speed Fail Alarm	Speed Fail Alarm indication. True if a speed fail alarm is detected.
Trip	Trip Latch output. True if any trip is detected. Remains true until cleared by a reset.
Alarm	Alarm Latch output. True if any alarm is detected. Remains true until cleared by a reset.
Event Latch 1-3	Event Latch 1, 2, or 3 output. True if any events in the specific Event Latch is detected and latched. Remains true until cleared by a reset.
Analog Input 1-10 HiHi	Analog Input HiHi output. This output is true when the input current is above the HiHi setting and false when at or below.
Analog Input 1-10 Hi	Analog Input Hi output. This output is true when the input current is above the Hi setting and false when at or below.
Analog Input 1-10 Lo	Analog Input Lo output. This output is true when the input current is below the Lo setting and false when at or above.
Analog Input 1-10 LoLo	Analog Input LoLo output. This output is true when the input current is below the LoLo setting and false when at or above.
Analog In 1-10 Range Err	Analog Input Range Error output. This output is true when the input current is above 22 mA or below 2 mA.
Discrete Input 1-10	Discrete input status indication. True when the input is high and false when low.
Analog Comparator 1-10	Comparator block output.
Logic Gate 1-50	Logic Gate block output.
Latch 1-10	Latch block output.

Selection Identifier	Description of selection
Delay 1-15	Delay block output.
Timer 1-15 HiHi	Timer block HiHi output.
Timer 1-15 Hi	Timer block Hi output.
Unit Delay 1-10	Unit Delay block output.
Trip Time Mon 1 Alarm	Trip Cycle Time Monitor 1 output. True when the trip cycle time alarm condition is detected. Remains true until a reset is commanded.
Trip Time Mon 2 Alarm	Trip Cycle Time Monitor 2 output. True when the trip cycle time alarm condition is detected. Remains true until a reset is initiated.
Power Up Trip	Power up trip indication. This is a short pulse that transitions to true on power-up only if configured as de-energize to trip and is automatically set back to false 4 ms later.
Internal Fault Trip	Indicates an internal fault trip condition was detected. When this is true, the product remains in a tripped state. A power cycle is required to clear this error.
Internal Fault Alarm	Indicates an internal fault alarm condition was detected. When this is true, the MicroNet Safety Module remains in an alarm state. A RESET or power cycle is required to clear this error.
Configuration Trip	Indicates the product is tripped as a result of loading new configuration settings. This indication is true while loading and goes false when the configuration load is completed (either successfully or failed/error).
Resettable Trip Input	Output from the Resettable trip function to the trip latch. True means trip.
Power Supply 1 Fault	Output from the power supply fault detection function to the alarm latch. True means alarm.
Power Supply 2 Fault	Output from the power supply fault detection function to the alarm latch. True means alarm.
Parameter Error	Indicates a parameter error was detected, meaning there was a problem reading the settings out of the EEPROM. When this is true, the MicroNet Safety Module remains in a tripped state. A power cycle is required to clear this error.

Configuration of Custom Logic

Custom logic can be built by combining logical functions like comparators, latches, gates, etc. The results of this logic can be used to cause a trip or alarm by using these results as inputs to the trip-latches, etc., or can be connected to one of the relay outputs.

Connecting outputs (results) from one function to inputs of other functions always has to be defined by entering in the input fields of functions a reference to another function.

Before you start entering custom logic, Woodward recommends you make a logic diagram and keep this diagram in the documentation files. Woodward also recommends keeping the diagrams up to date after a modification in custom logic. Reconstruction of the logic interconnections from the configuration files after-the-fact is possible, but time consuming.

IMPORTANT **The customer is responsible for fully testing their logic configuration.**

IMPORTANT **The custom logic uses a non-latching 'one-shot' on the start and reset functions. If a condition needs to remain latched that is initiated by either start or reset function, a latch must be used.**

MicroNet Safety Module Configuration Checks

When a settings file is loaded to the device, the values are checked in the control. Configuration **Warnings** are provided for detected configuration issues that are questionable and should be verified. A Configuration Error indicates a problem in the settings file that needs correcting. If a configuration error is detected during a settings file load, the file load is aborted, and the values are discarded. Detection of configuration warnings will not preclude a settings file load operation.

IMPORTANT **Configuration Checks are only detecting customer input values such as limits, required values, syntax errors, etc. Configuration Checks are not detecting functional safety settings. All functional safety and operation settings need to be verified for the specific site application to ensure the system response meets the customer requirements.**

Configuration Check Message Summary

1. Error – <*block identifier*> has unconfigured inputs.
2. Error – <*block identifier*> has improper inputs configured.
3. Error – <*block identifier*> is used but has no inputs configured.
4. Error – <*block identifier*> has outputs connected but no inputs configured.
5. Error – <*block identifier*> is not used but has outputs connected.
6. Error – <*block identifier*> is configured as not used but has outputs connected.
7. Error – <*block identifier*> is configured as analog but has discrete outputs connected.
8. Error – <*block identifier*> is configured as discrete but has analog outputs connected.
9. Error – <*block identifier*> is in a circular configuration loop.
10. Warning – <*block identifier*> is used but has no outputs connected.
11. Warning – <*block identifier*> is configured but has no outputs connected.
12. Warning – <*block identifier*> is configured as analog but has no analog outputs connected.
13. Warning – <*block identifier*> is configured as discrete but has no discrete outputs connected.
14. Error – <*block identifier*> is set to an invalid or out-of-range value.
15. Error - Proposed configuration contains data that is invalid (out-of-range).

Configuration Check Definitions

1

Text:	Error – <*block identifier*> has unconfigured inputs.
Condition:	The identified block has inputs that are not configured. The following configurations will trigger this error: 1. AND, NAND, OR, NOR, XOR or XNOR gate with less than two inputs configured. 2. Latch or Timer block without both inputs configured.
Example 1:	*Error – Logic Gate 1 has unconfigured inputs.* Logic Gate 1 input is configured as an AND block but has only 1 input configured (2+ are required).
Example 2:	*Error – Latch 2 has unconfigured inputs.* One of the inputs (Set or Reset) on the logic Latch 2 block is not configured .

2

Text:	Error - <*block identifier*> has improper inputs configured.
Condition:	The identified block has inputs that are improperly configured. The following configurations will trigger this error: 1) XOR or XNOR gate with inputs 3, 4 or 5 connected. 2) NOT gate with inputs 2, 3, 4 or 5 connected.
Examples:	*Error - Gate 1 has improper inputs configured.* a) Gate 1 is type XOR connected to Gate 2 but Gate 1's input 3 is configured (must be inputs 1 & 2, inputs 3-5 are not valid for this block type). b) Gate 1 is a NOT connected to Gate 2 but Gate 1's input 2 is configured (must be input 1).

3

Text:	Error – <*block identifier*> is used but has no inputs configured.
Condition:	The identified function is configured as used but the block inputs are not configured. This error applies to the resettable trip function.
Example:	*Error – Resettable Trip is used but has no inputs configured.* The Resettable Trip function is configured as 'Used' but the function's input is not configured.

4

Text:	Error - <*block identifier*> has outputs connected but no inputs configured.
Condition:	The identified block has inputs that are not configured but has connected outputs. This error applies to the Trip Cycle time monitor, Event Latches, and all configurable logic blocks.
Example 1:	*Error - Gate 1 has outputs connected but no inputs configured.* Gate 1 is connected to Gate 2 but Gate 1's inputs are set to Not Used.
Example 2:	*Error - Latch 3 has outputs connected but no inputs configured.* Latch 3 is connected to another block but Latch 3's Reset input is set to Not Used.
Example 3:	*Error - Event Latch 2 has outputs connected but no inputs configured.* *Event Latch 2* is connected to another block but *Event Latch 2*'s Reset input is set to Not Used or no event inputs are configured.

Note: The exception to this check is User-Defined Test which is allowed to be used and unconfigured since it can be started and stopped from Modbus or the Front Panel.

5

Text:	Error – <*block identifier*> is not used but has outputs connected.
Condition:	The identified function is configured as 'Not Used' but has connected outputs. This error applies to the User Defined Test, Over-acceleration, and Resettable trip.
Example 1:	*Error – Over-Accel Trip is not used but has outputs connected.* The over-acceleration trip is connected to another block but the function is not configured for use.
Example 2:	*Error – Resettable Trip is not used but has outputs connected.* Resettable Trip is connected to other logic but Resettable Trip is configured as 'Not Used'.

6

Text:	Error – <*block identifier*> is configured as not used but has outputs connected.
Condition:	The identified analog/discrete input is configured as 'Not Used' but has connected outputs.
Example:	*Error – Programmable Input 10 is not used but has outputs connected.* Delay 1 input is configured as 'Input 10 discrete' but Programmable Input 10 is configured as 'Not Used'.

7

Text:	Error – <*block identifier*> is configured as analog but has discrete outputs connected
Condition:	The identified analog/discrete input is configured as an analog input but has an output connected to the discrete input function.
Example:	*Error – Input 3 is analog but has discrete outputs connected.* Delay 1 input is configured as 'Input 3 discrete' but Input 3 is configured as an analog input.

8

Text:	Error – <*block identifier*> is configured as discrete but has analog outputs connected.
Condition:	The identified analog/discrete input is configured as an discrete input but has an output connected to an analog input function.
Example:	*Error – Input 4 is discrete but has analog outputs connected.* Trip Latch input 1 is configured as 'Input 4 Hi Hi' but Input 4 is configured as a discrete input.

9

Text:	Error – <*block identifier*> is in a circular configuration loop
Condition:	A loop has been detected in the configuration. The identified block is one of the blocks in this loop. Only one loop at a time is and each block in the detected loop is identified. A Unit Delay (Z^{-1} equivalent) must be inserted in the loop to provide a break in the loop.
Example:	*Error – Logic Gate 14* is in a circular configuration loop. *Error – Logic Gate 15* is in a circular configuration loop. *Error – Logic Gate 16* is in a circular configuration loop. The configuration of the identified blocks creates a loop that needs to be resolved. A Unit Delay block is required to break this loop.
Example 2:	*Error – Logic Gate 34* is in a circular configuration loop. Logic Gate 34 output is directly connected to its input, creating a loop. A Unit Delay block is required between the output and the input to break this loop.

10

Text:	Warning – <*block identifier*> is used but has no outputs configured.
Condition:	The identified block has inputs that are configured but has no connected outputs. This error applies to the Trip Cycle Time Monitor function and the Event Latches.
Example:	*Warning – Trip Cycle Mon 1 is used but has no outputs configured.* The Trip Cycle Time Monitor 1 function is configured as 'Used' but the block output is not connected to any other blocks.

11

Text:	Warning – <*block identifier*> is configured but has no outputs connected.
Condition:	The identified block has inputs that are configured but has no connected outputs. This error applies to all configurable logic blocks.
Example:	*Error – Logic Block 3 is configured but has no outputs connected.* Logic Block 3 is of type AND with 2 inputs configured but the block output is not connected to any other blocks.

12

Text:	Warning – <*block identifier*> is configured as analog but has no analog outputs connected.
Condition:	The identified analog/discrete input is configured as analog but none of the block's analog output indications are connected.

13

Text:	Warning – <*block identifier*> is configured as discrete but has no discrete outputs connected.
Condition:	The identified analog/discrete input is configured as discrete but input's discrete indication is not connected to any other block inputs.

14

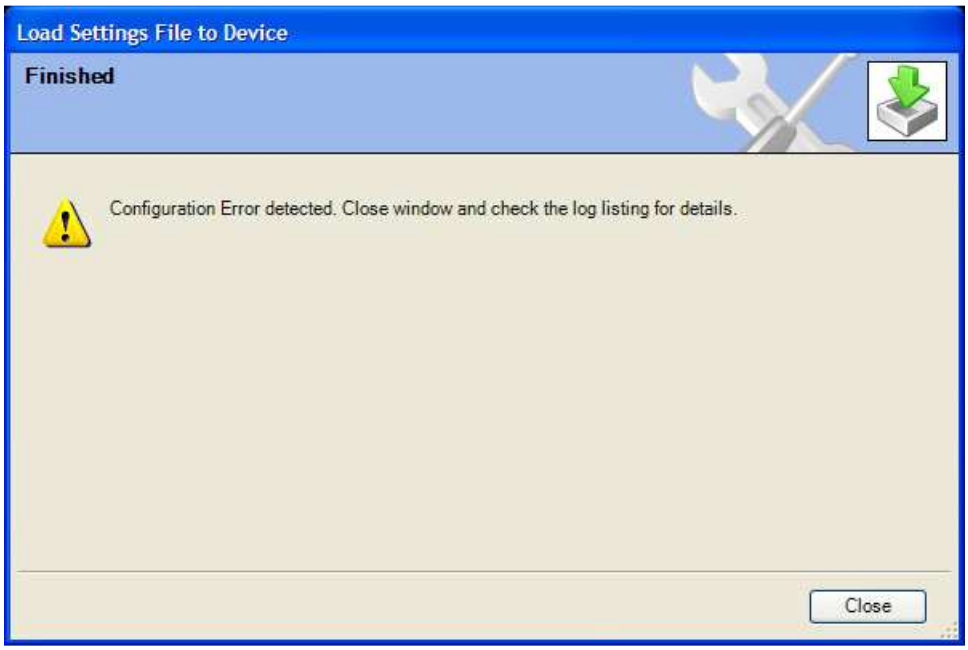
Text:	Error – <*block identifier*> is set to an invalid or out-of-range value.
Condition:	The identified block has inputs that are configured to values that are not allowed or are out of range. This error applies to the Overspeed Trip Setting and the Temporary Overspeed Trip Setting. These settings are not permitted to exceed the input frequency range of 32 KHz.

15

Text:	Error – Proposed configuration contains data that is invalid (out-of-range).
Condition:	A setting has been detected that is out of the range allowed. This error condition needs to be corrected in the Programming and Configuration Tool (PCT) and should be reported to Woodward for correction.

Error Messages and Solutions

Configuration Error



If a configuration error exists, the Configuration Error Log must be reviewed. See “View Configuration Error Log” section in this chapter.

Note: The configuration check is performed by the MicroNet Safety Module after a settings file is loaded to the ProTech. The PCT must be connected to the MicroNet Safety Module to see this log. The results are stored in volatile memory so a power cycle would clear this log.

Chapter 11.
Example Applications

This chapter describes sample safety applications.

Example 1—Steam Turbine Driving a Generator

The installation contains the following equipment:

- Steam turbine
- Generator
- Turning gear
- Lube oil tank
- AC lube oil pump
- Emergency DC lube oil pump
- A vibration monitoring system

The following safety provisions must be provided:

- One 2-o-o-3 safety trip block that dumps the hydraulic oil pressure to the main trip valve in case of emergency stop.
- Overspeed protection
- Emergency lube oil pump control
- Vibration and axial displacement protection
- Zero speed detection for turning gear clutch permission
- Lube oil low supply pressure protection
- bearing high temperature protection

For the purpose of these safety provisions, the following sensors are installed:

- 3 MPU speed sensors
- 1 proximity sensor for zero-speed detection
- A number of vibration and displacement sensors
- 3 lube oil supply pressure transmitters (4–20 mA)
- Simplex temperature transmitters for the bearings (4–20 mA)
- Voltage sensors on the dual redundant voltage supply for the trip valve block

Requirements

- Trip action
  - Overspeed
    Turbine speed exceeds 3950 rpm
  - Overacceleration
    Turbine acceleration exceeds 50 rpm/s while speed is more than 3700 rpm.
  - Trip request from Vibration and axial displacement monitoring system
  - Lube Oil Pressure Low Low **AND** No zero speed
  - 2-o-o-3 speed sensor failure.
  - Any bearing temperature High High

- Overrides
  - Speed sensor failure override
    Override removed after minimum speed detected, or 60 seconds after override input is removed.

- Alarms
  - Turbine speed exceeds 3700 rpm (overacceleration trip imminent)
  - Alarm from Vibration and axial displacement monitoring system (Discrete Input)
  - Health status from Vibration and axial displacement monitoring system (Discrete Input)
  - Zero speed sensor failure (Logic)
  - Any Speed sensor failure
  - Any lube oil supply pressure sensor failure
  - Any temperature sensor failure
  - Lube oil pressure Low
  - Any bearing temperature High
  - Trip Valve Supply Voltage Failure

- Events

- Run Command to Emergency Lube Oil Pump
  - Lube Oil Pressure Low **AND** No zero speed (latched)

- Stop Command to Emergency Lube Oil Pump
  - Manual action

- Turning Gear Clutch Enable
  - Zero speed detected plus delay **AND** No zero speed sensor failure

- Test sequences
  - Weekly MicroNet™ Safety Module overspeed test on each TPS module
  - Weekly Trip valve test on each TPS module

- Speed Readout
  - One simplex 4–20 mA signal from Unit A

- Input Redundancy

Overspeed:	Sensors triple	Processing Triple
Zero speed:	Sensor Simplex	Processing Triple
Lube Oil Press:	Sensors Triple	Processing Triple
Discretes from Vibration Monitor:	Contact Simplex	Processing Triple
Pressure sensors Trip Block	Sensors Simplex	Processing Triple
Temperature sensors	Sensors Simplex	Processing Dual
Valve supply voltage Fail	Contact Simplex	Processing Simplex

I/O Allocation

Prog Relay #1	= Clutch Enable	
Prog Relay #2 and #3	= Emergency Pump	
Input #1	= Discrete input	= Zero speed detection Proximiter
Input #2	= Analog Input	= Lube Oil Pressure
Input #3	= Discrete Input	= Trip from Vibration system
Input #4	= Discrete Input	= Alarm from Vibration system
Input #5	= Discrete Input	= Healthy from Vibration system
Input #6	= Analog Input	= Pressure in leg A of trip block (Unit B: leg B, Unit C: leg C)
Input #7	= Analog Input	= Pressure in leg B of trip block (Unit B: leg C, Unit C: leg A)
Input #8	= Analog Input	= Pressure in leg C of trip block (Unit B: leg A, Unit C: leg B)
Input #9 (Unit A, B)	= Analog Input	= Temperature inlet end bearing (Dual Redundant)
Input #10 (Unit A, B)	= Analog Input	= Temperature Exhaust end bearing (Dual Redundant)
Input #9 (Unit C)	= Discrete Input	= Valve supply voltage failure (Simplex)

Wiring Diagrams

- Trip valve block control circuit
- Trip valve block pressure check circuit
- Turning gear enable output
- Emergency pump MCC
- Proximiter
- Vibration monitor system
- Lube oil pressure sensors
- speed override signal
- Temperature sensor

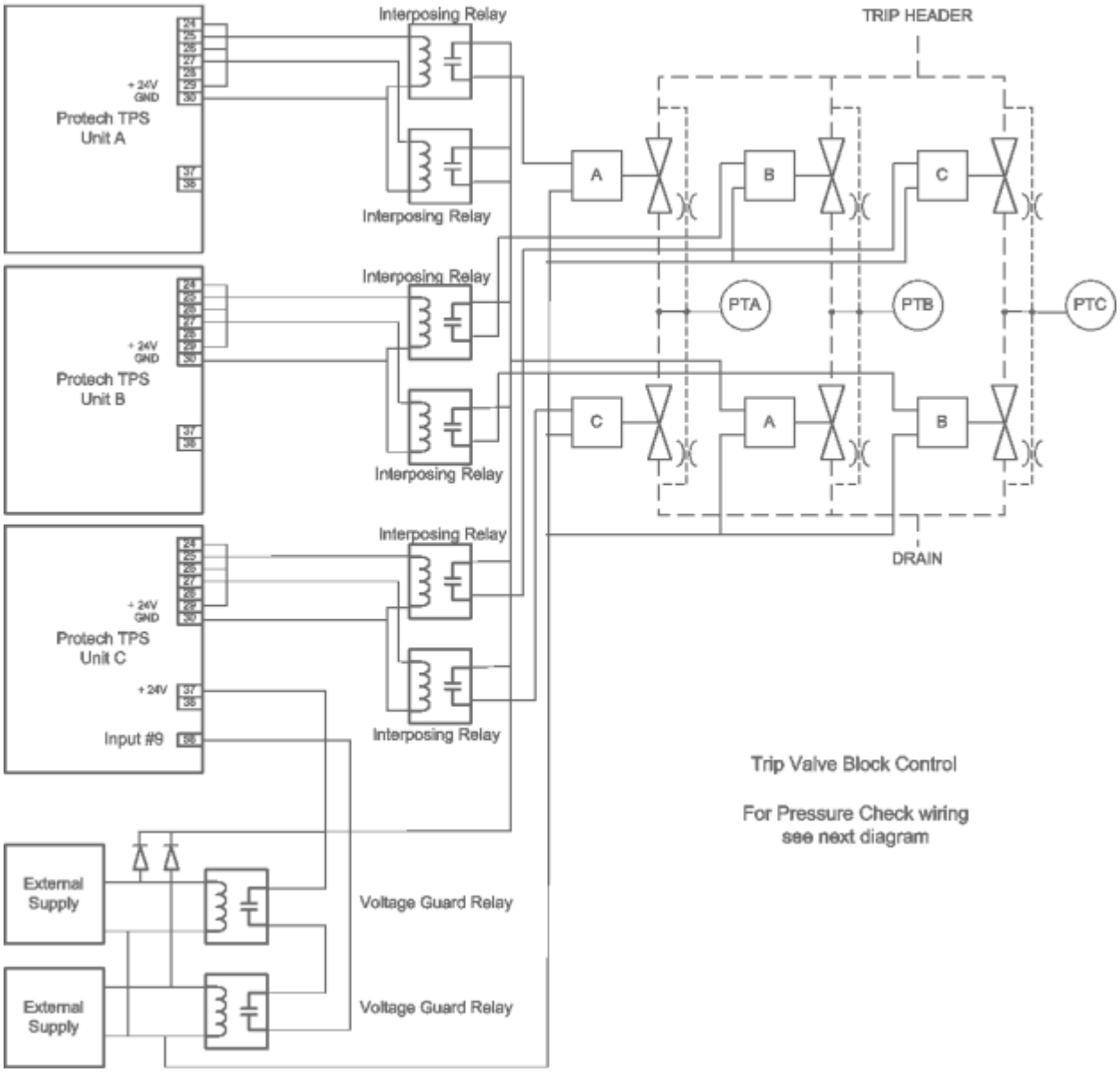


Figure 11-1. Trip Valve Block Control Circuit

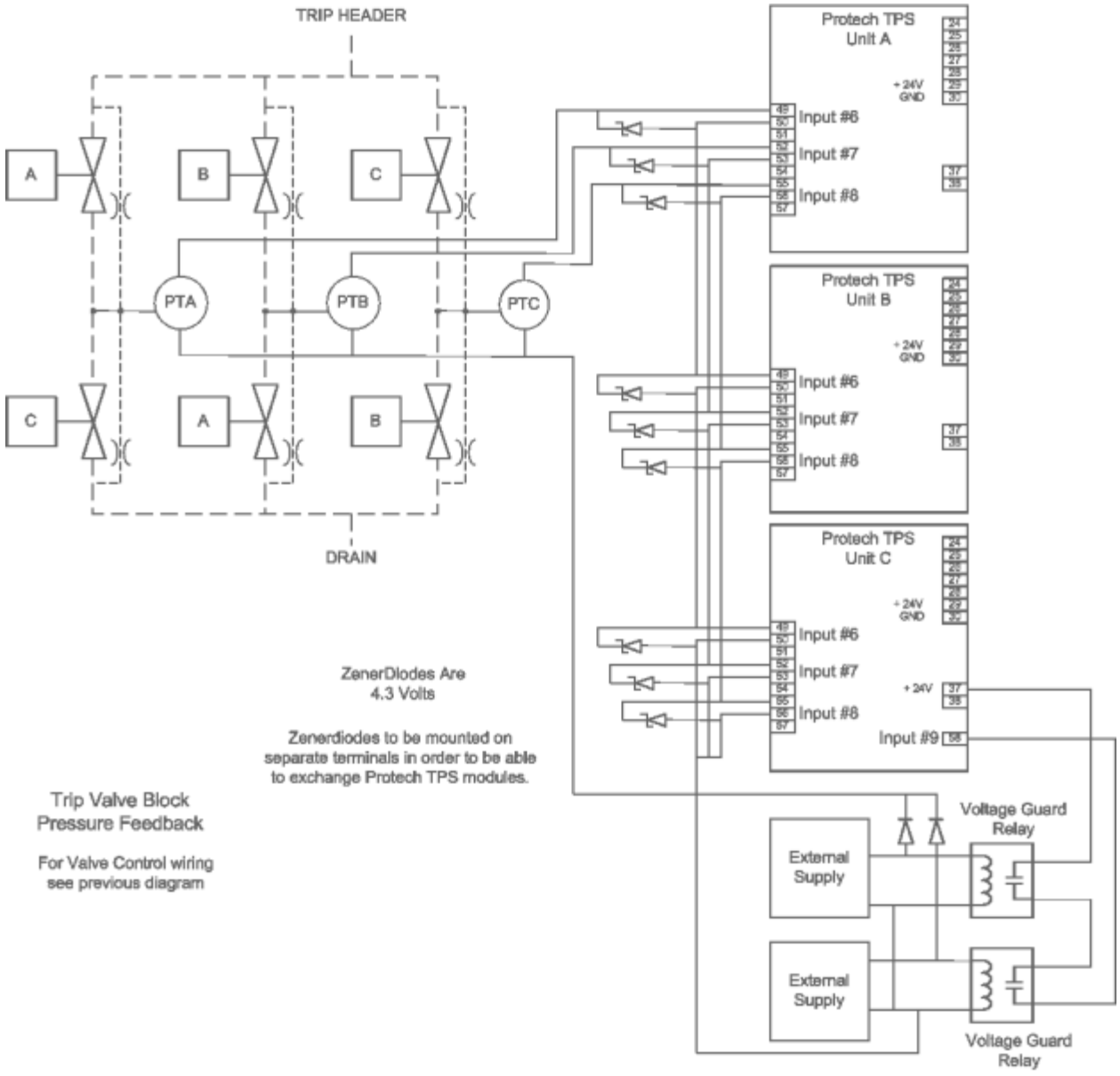


Figure 11-2.Trip Valve Block Pressure Check Circuit

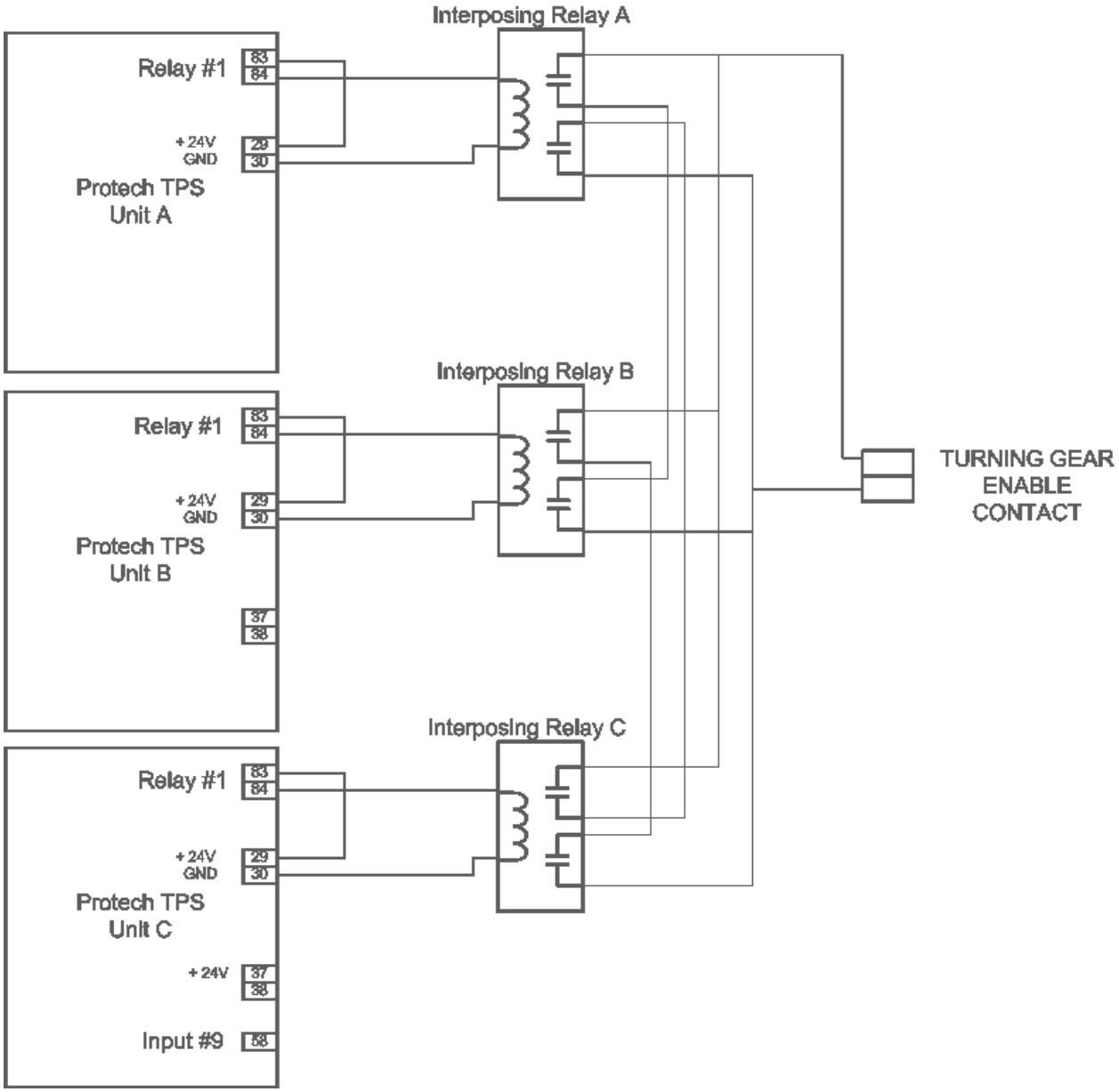


Figure 11-3. Turning Gear Enable Output

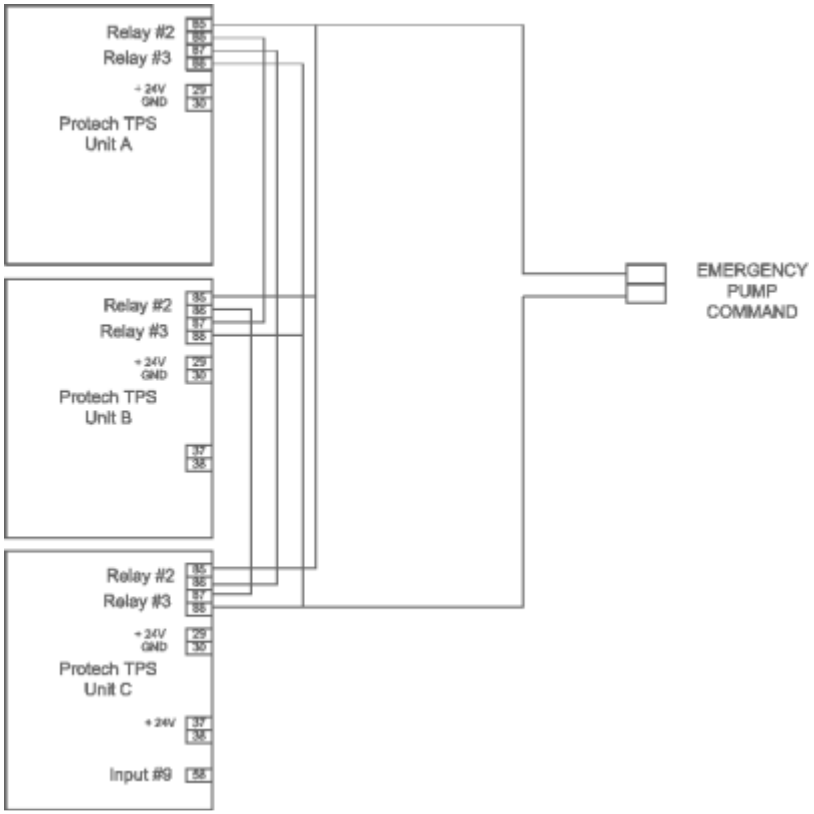


Figure 11-4. Emergency Pump MCC

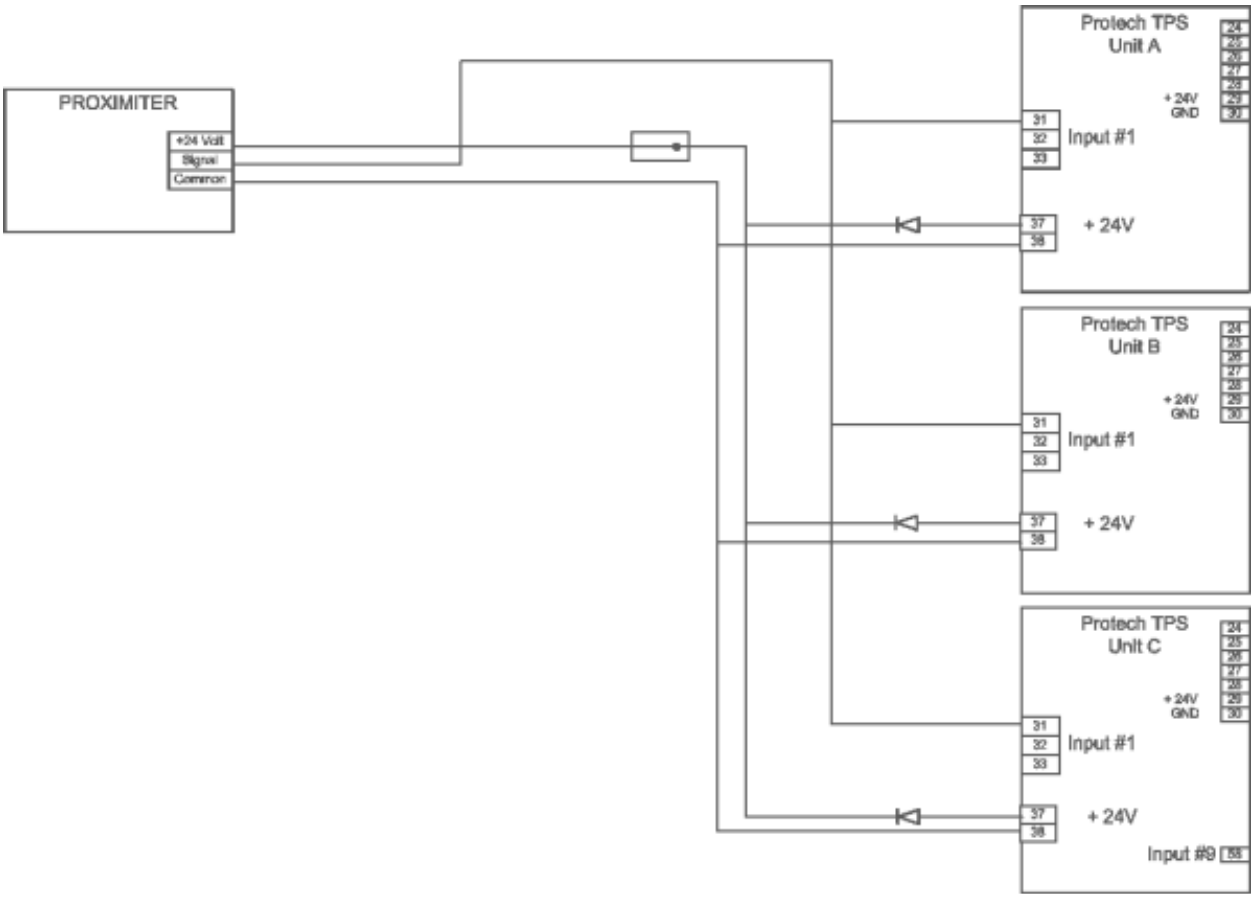


Figure 11-6. Zero Speed Detection Proximiter

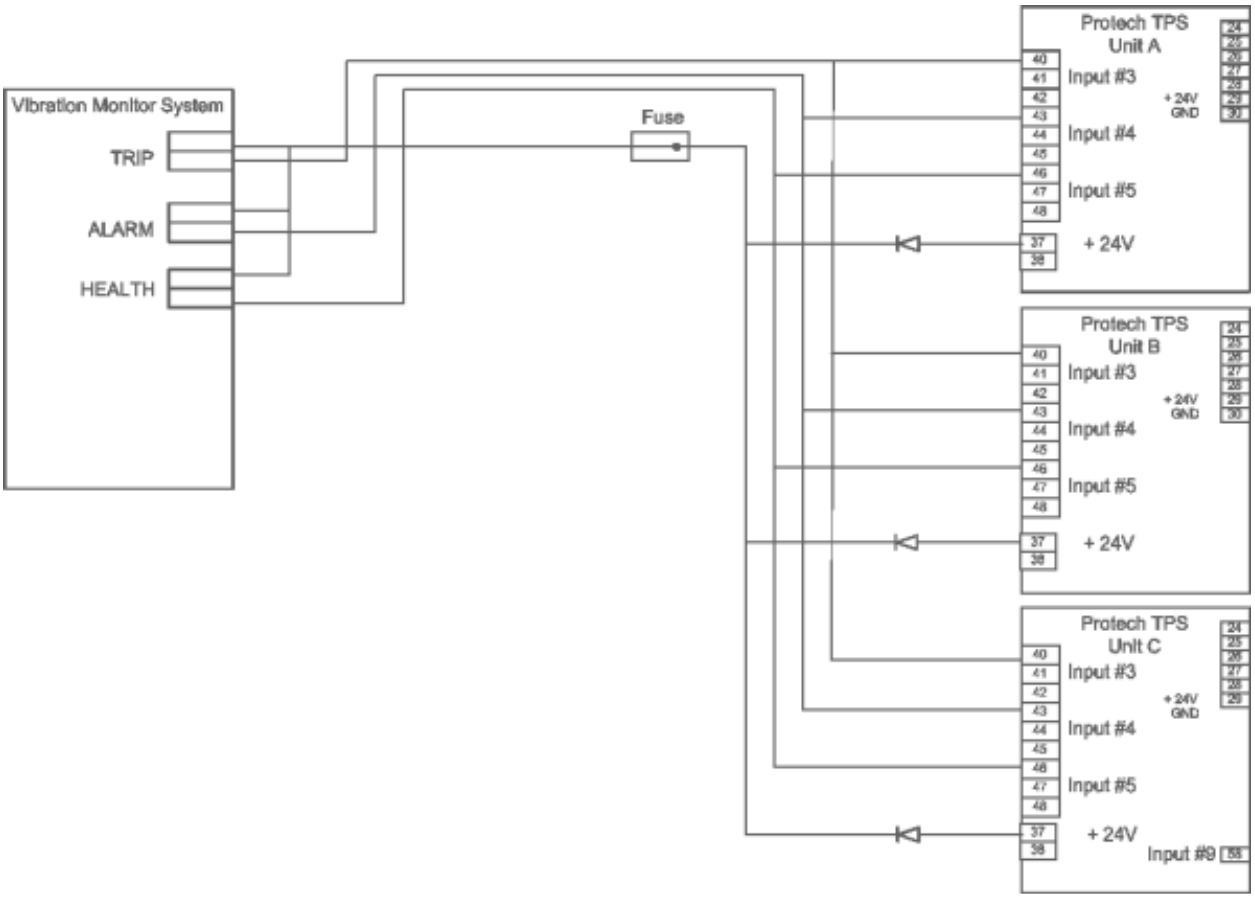


Figure 11-7. Vibration Monitor System

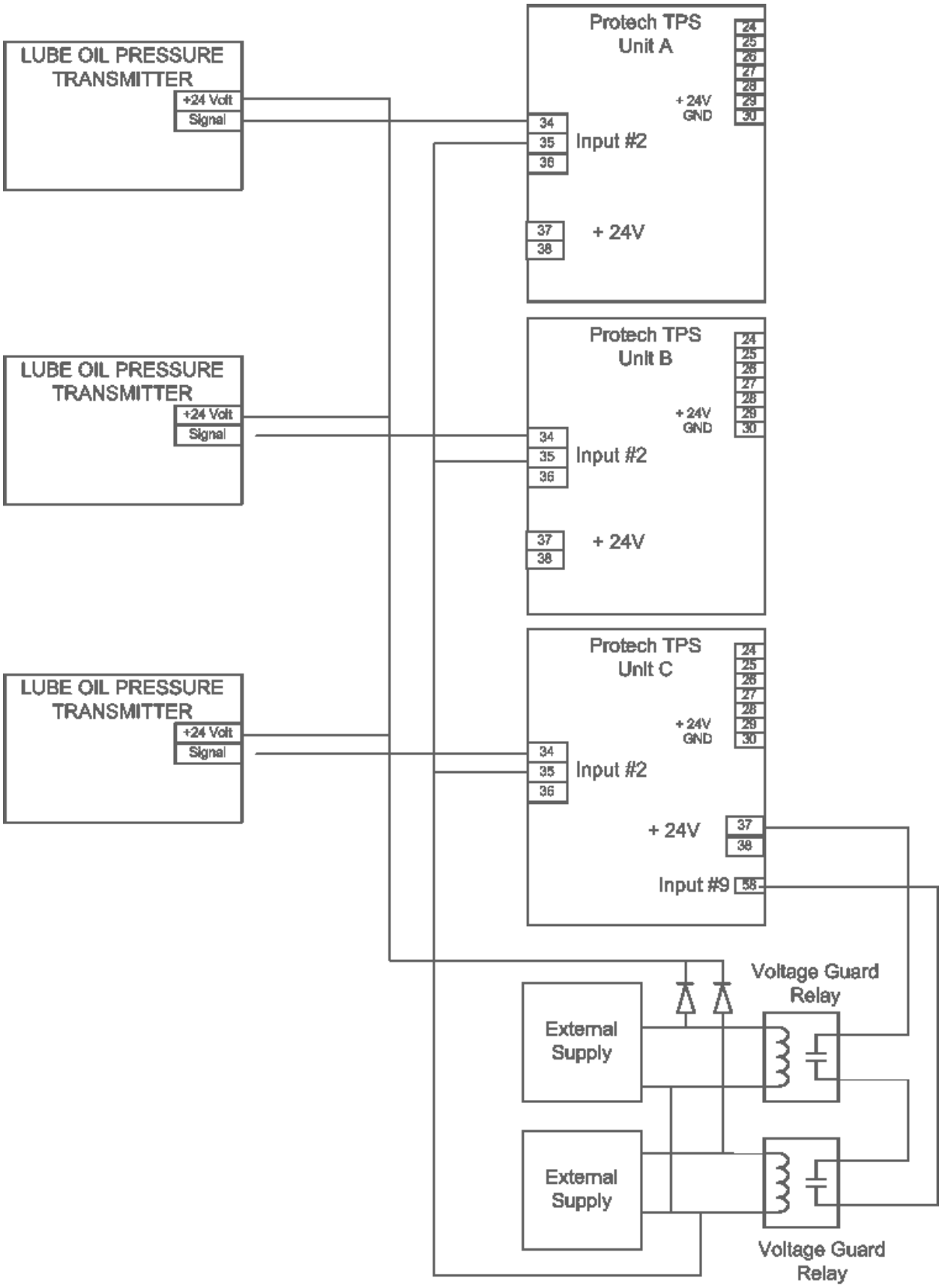


Figure 11-8. Lube Oil Pressure

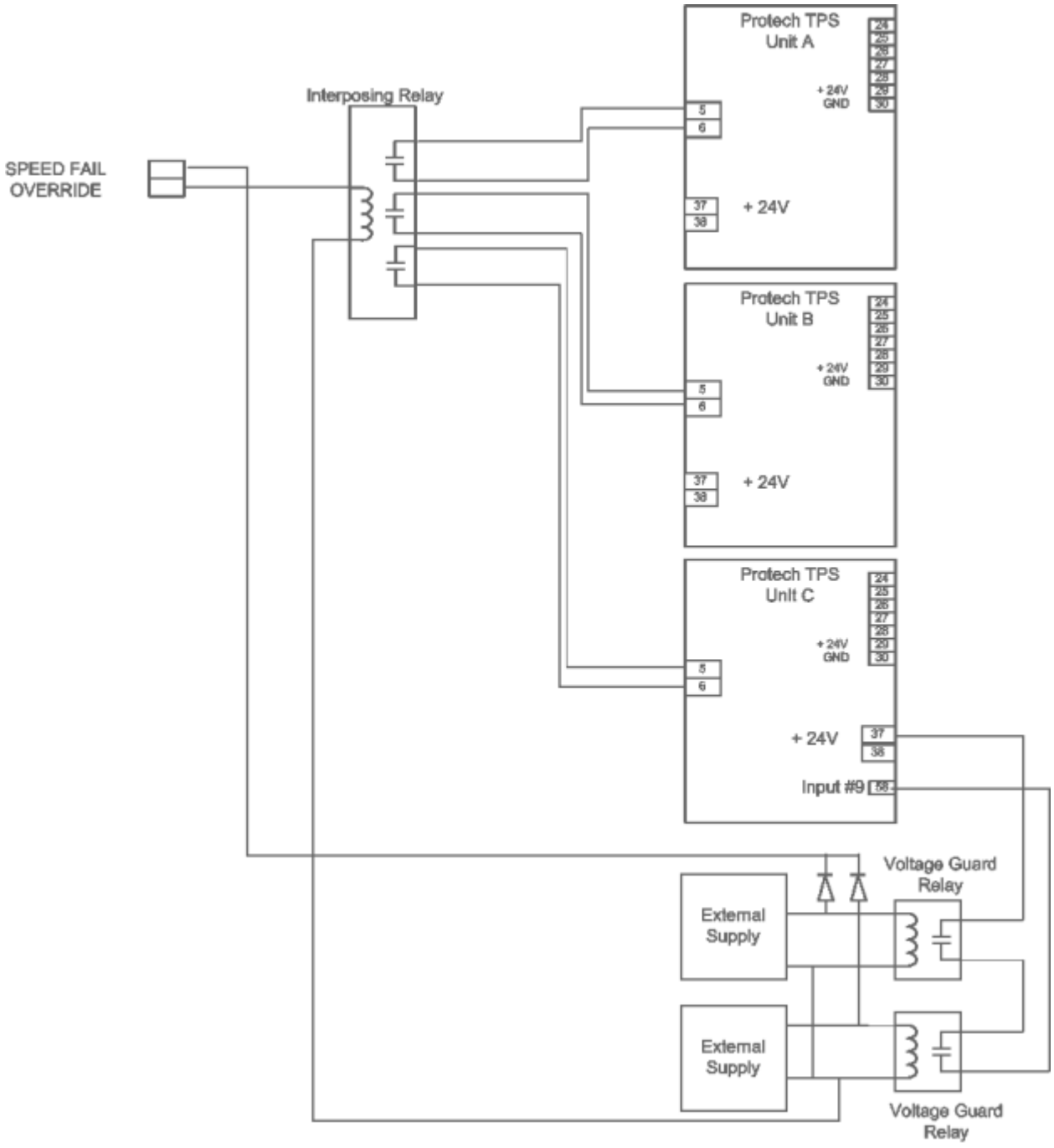


Figure 11-9. Speed Fail Override

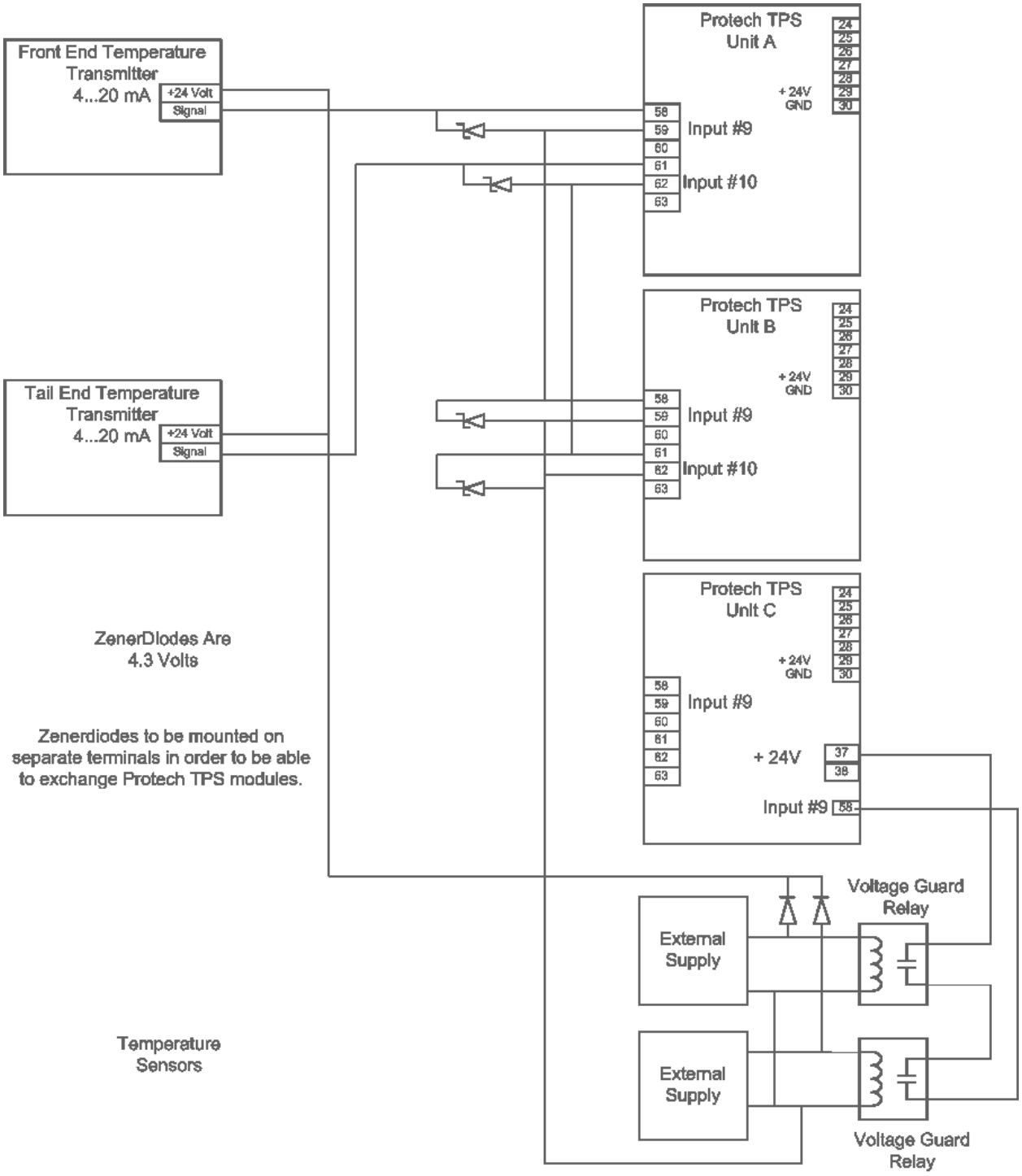
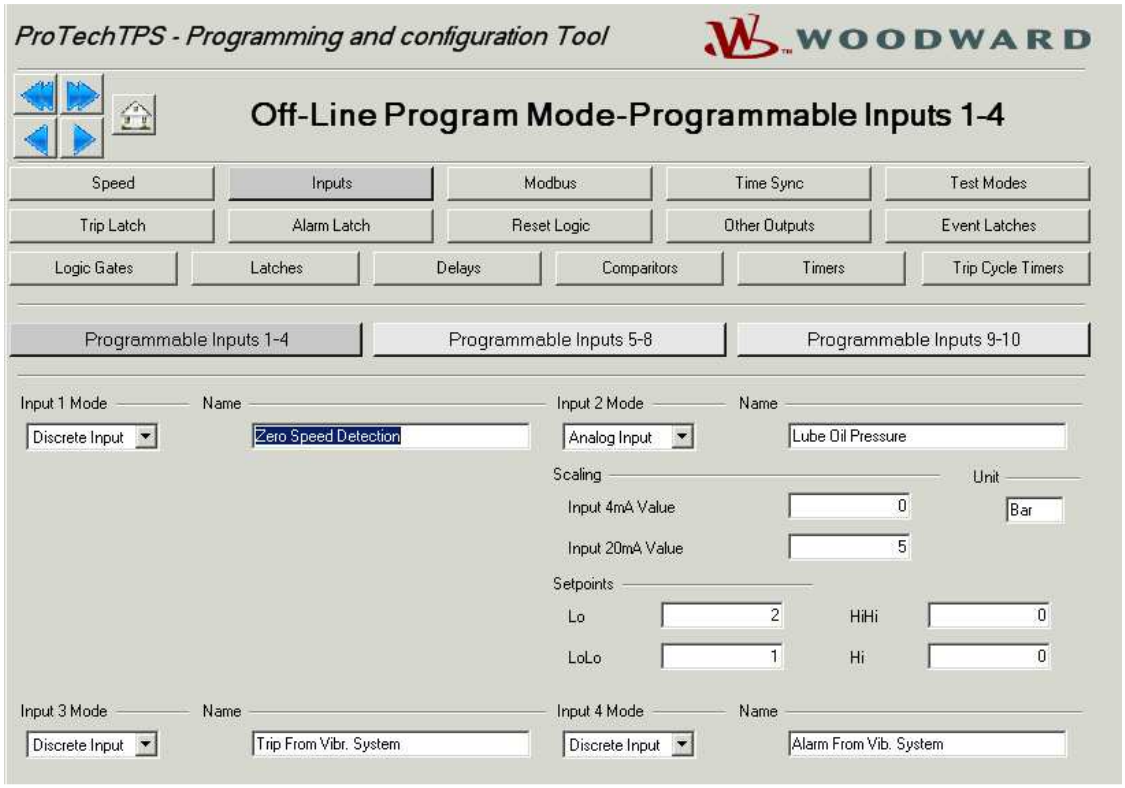


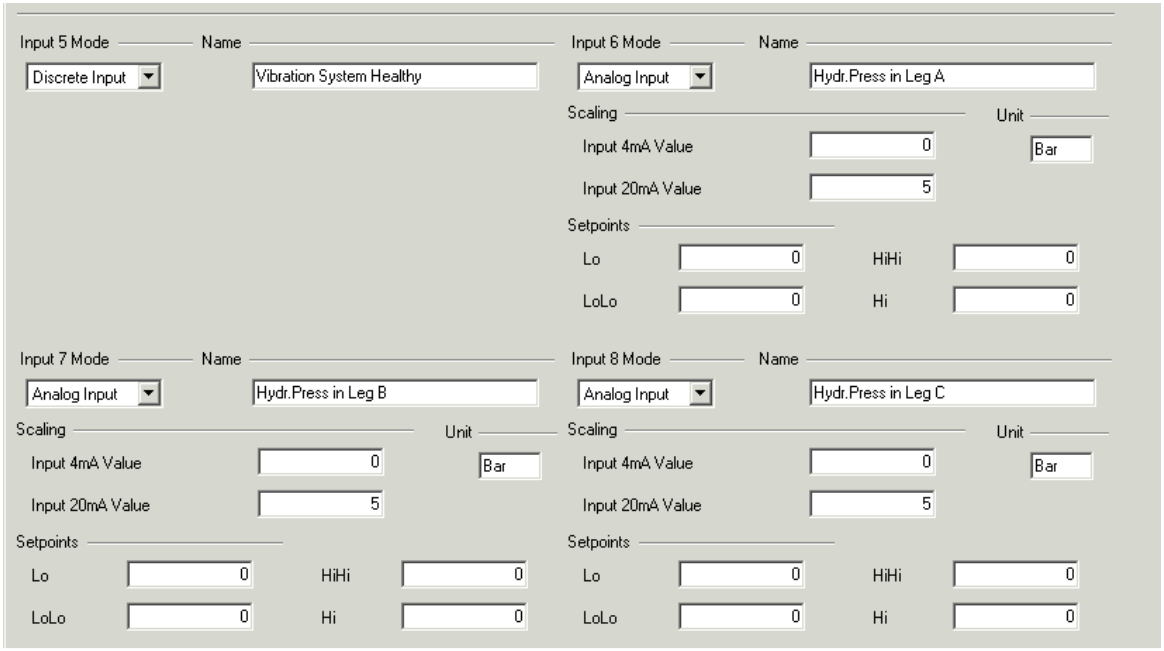
Figure 11-10. Temperature Sensors

Configuration Sheet

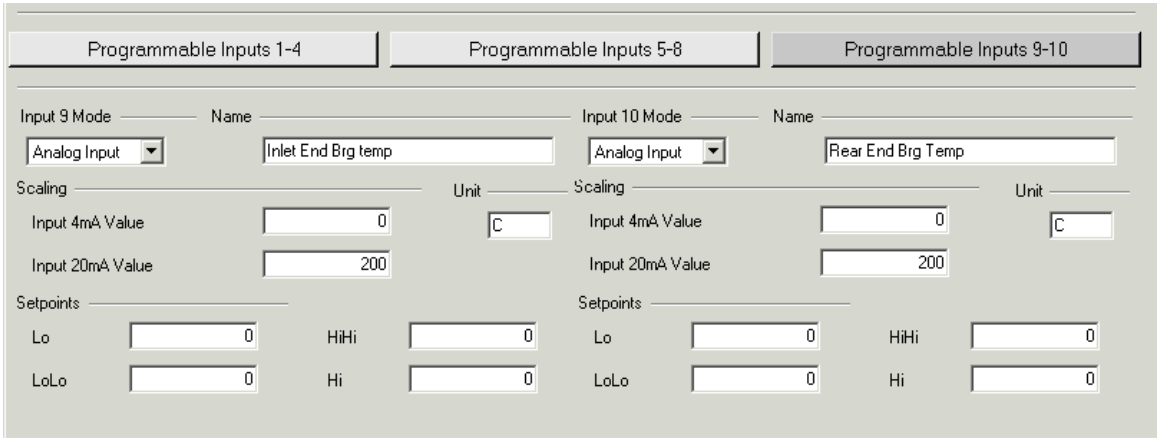
- Inputs
- Outputs
- Speed
- Trip Latch
- Alarm Latch
- Event Latch
- Comparators
- Logic Gates
- Latches
- Delays
- Timers

Inputs

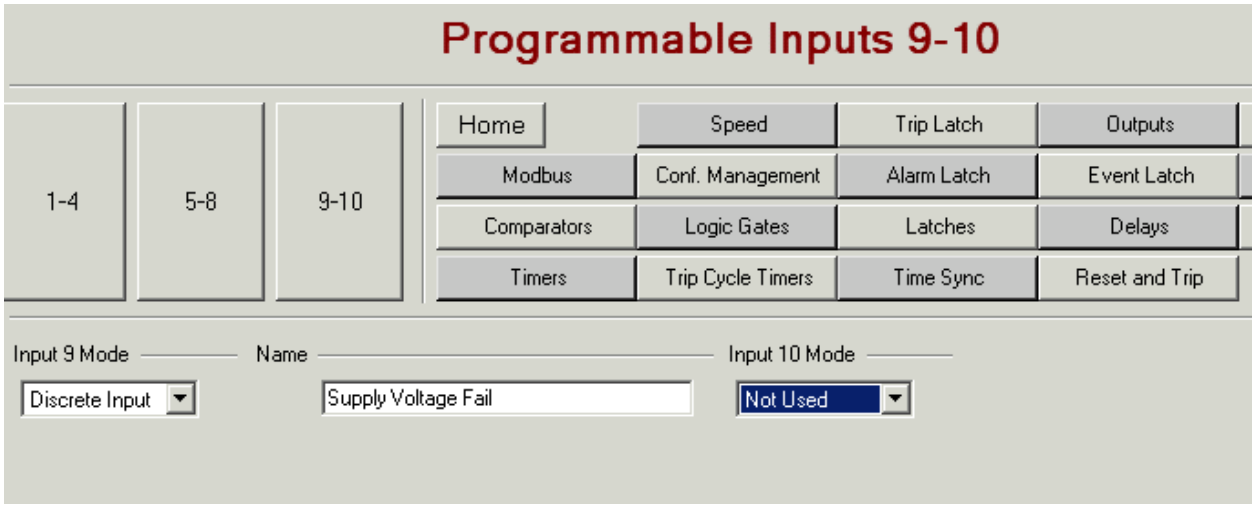




Inputs 9 and 10 for Unit A and B

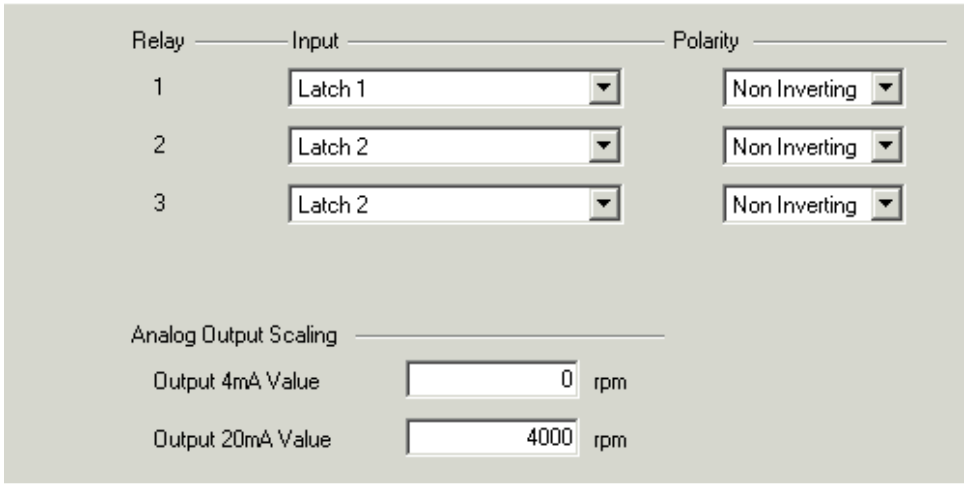


Inputs 9 and 10 for Unit C

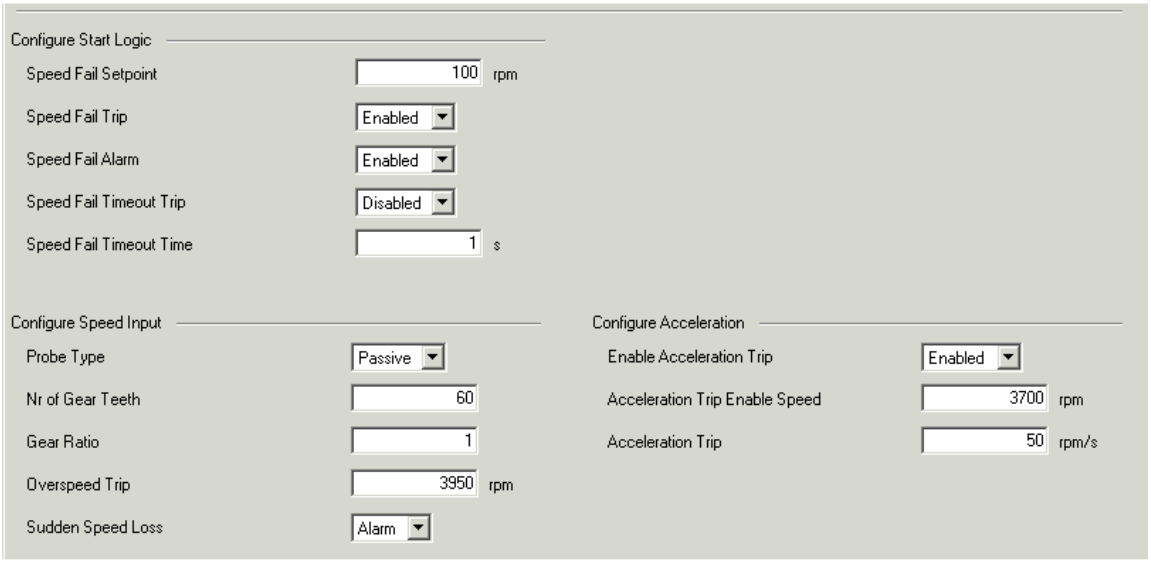


Outputs

Relay #1 = Latch 1 = Turning Gear Enable
Relay #2 = Latch 2 = Emergency Pump Control
Relay #3 = Latch 2 = Emergency Pump Control



Speed

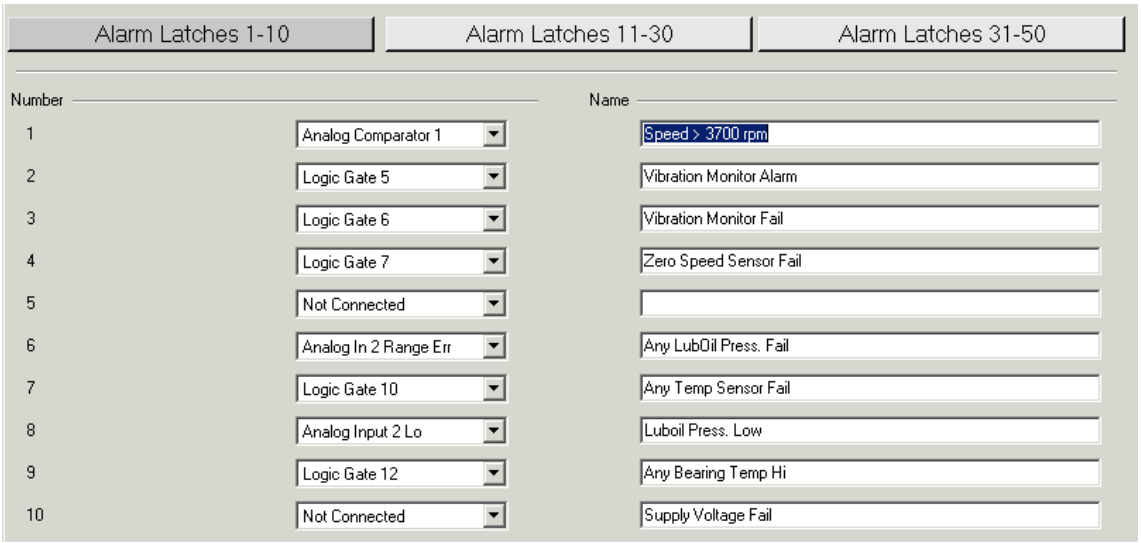


Trip Latch

Logic Gate 1 = Trip request from Vibration Monitoring System
Logic Gate 2 = Lube Oil Pressure Low Low And No zero speed
Logic Gate 3 = Any Bearing Temperature High High

Alarm Latch

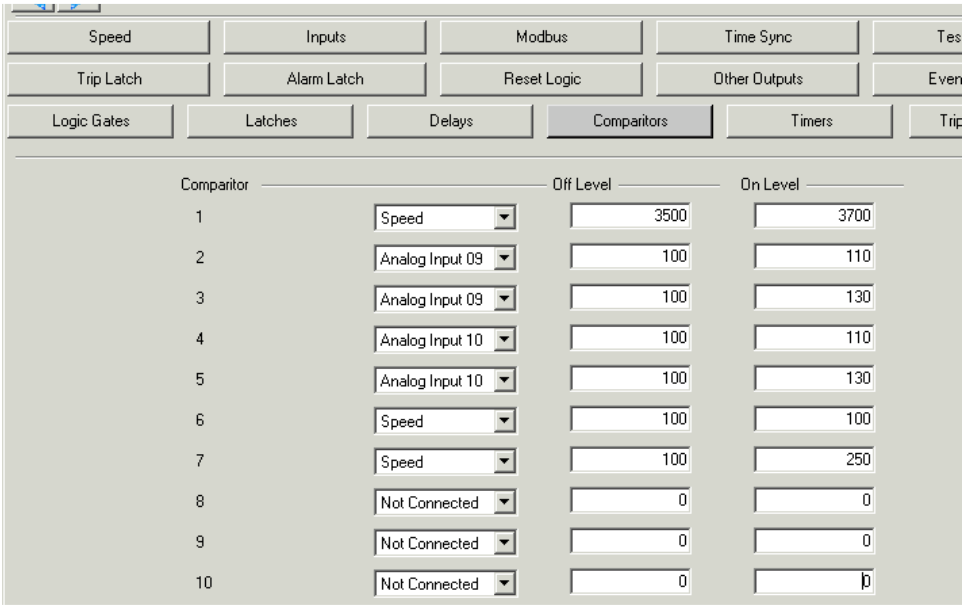
Comparator 1 = Speed > 3700 rpm
Logic Gate 5 = Vibration Monitor Alarm
Logic Gate 6 = Vibration Monitor Fail
Logic Gate 7 = Zero speed sensor Fail
Logic Gate 8 = Any speed sensor Fail
Logic Gate 9 = Any Lube Oil Pressure sensor Fail
Logic Gate 10 = Any Temperature sensor Fail
Logic Gate 11 = Lube Oil Pressure Low
Logic Gate 12 = Any Bearing Temp High
Logic Gate 13 = Supply Voltage Fail



Event Latch

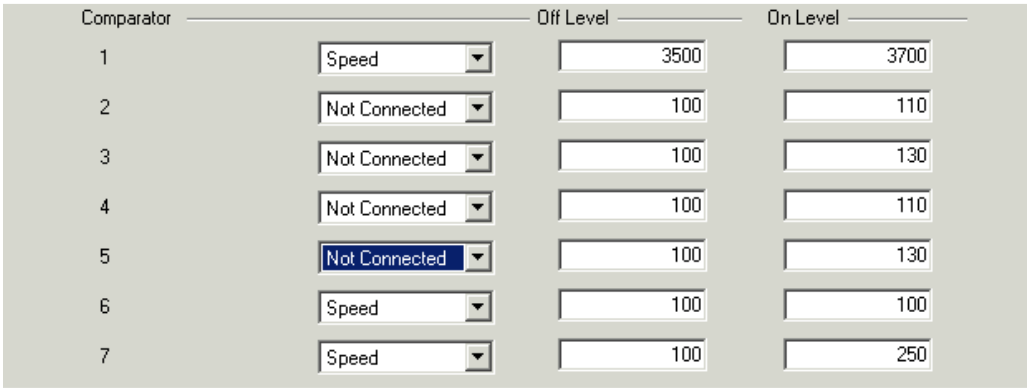
Comparators for units A and B.

Comparator 1 = speed > 3700
Comparator 2 = Bearing Temp #1 > 110 deg. C
Comparator 3 = Bearing Temp #1 > 130 deg. C
Comparator 4 = Bearing Temp #1 > 110 deg. C
Comparator 5 = Bearing Temp #1 > 130 deg. C
Comparator 6 = Speed > 100
Comparator 7 = speed > 250



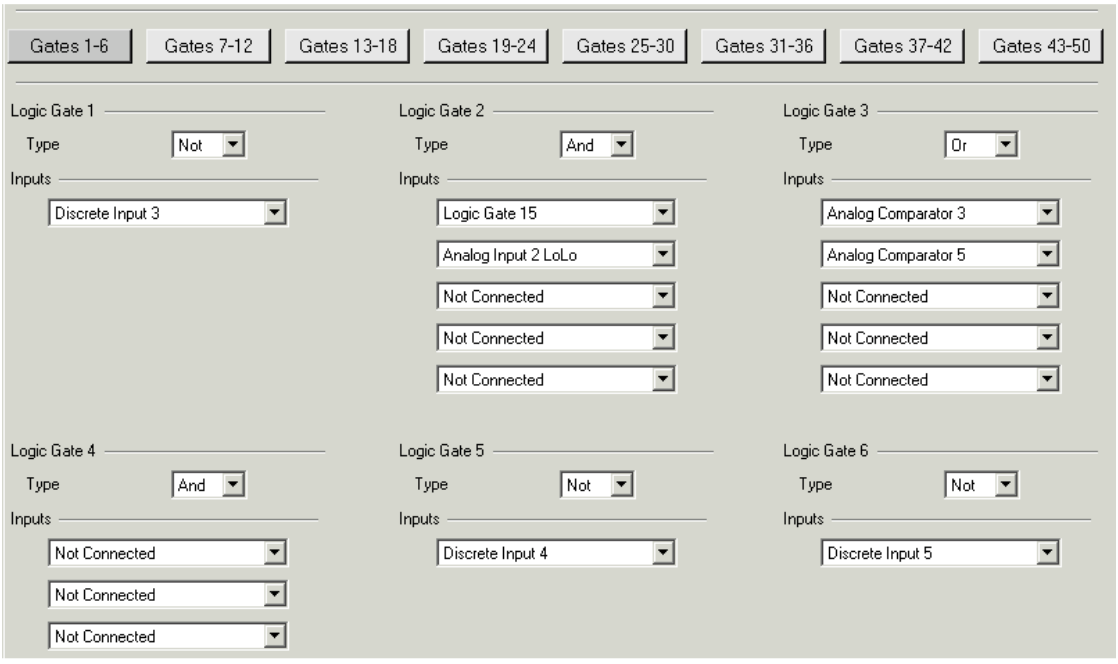
Comparators for unit C.

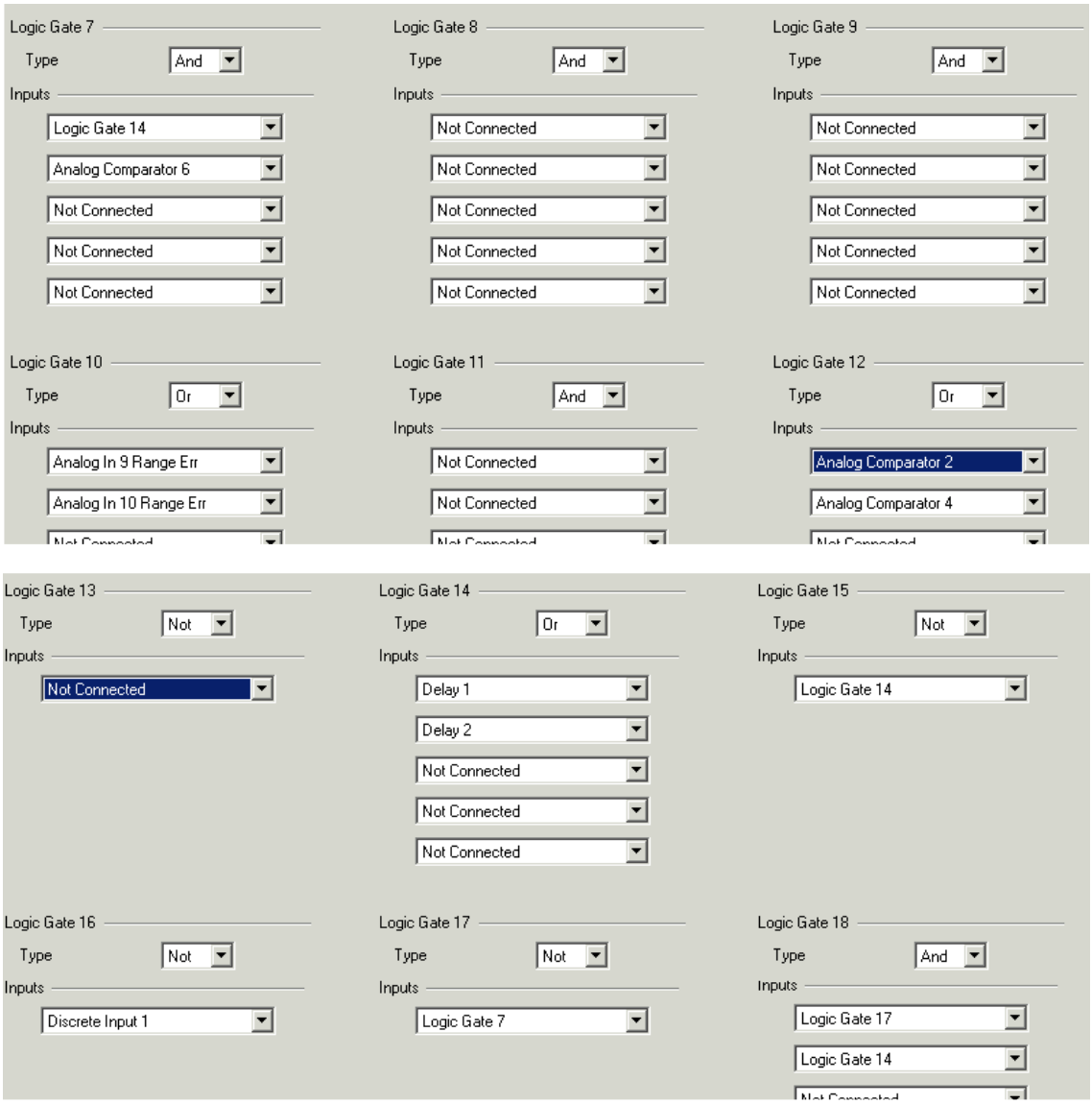
Comparator 1 = speed > 3700
Comparator 6 = speed > 100
Comparator 7 = speed > 250



Logic Gates

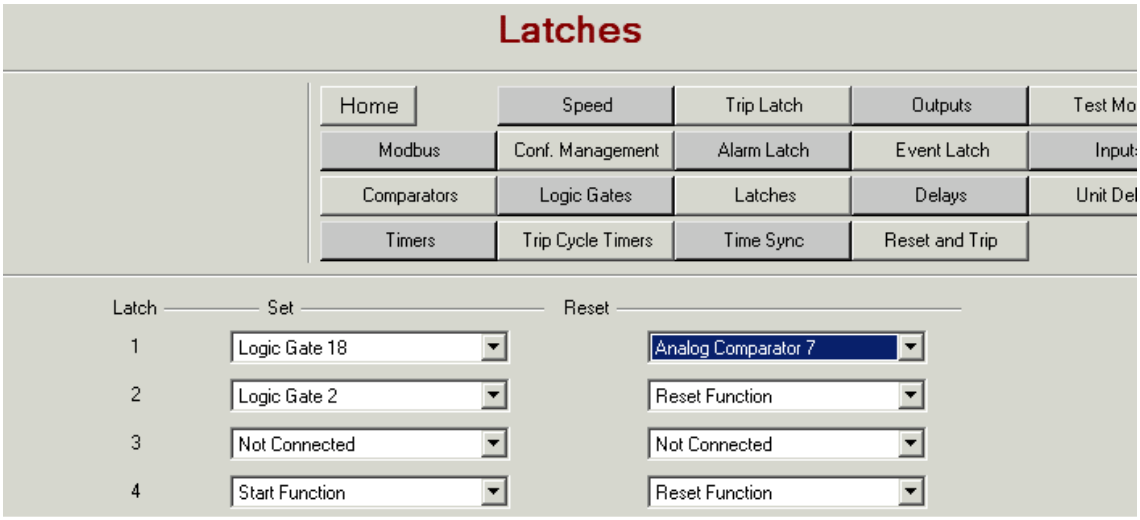
- Logic Gate 1 = Trip from Vibration System.
- Not Gate on input 3 because trip from vibration system is open contact.
- Logic Gate 2 = Lube Oil Pressure Low Low And No zero speed
- AND gate on Logic Gate 15 (no zero speed) and input #2 (lube oil pressure Lo Lo).
- Logic Gate 3 = Any Bearing Temperature High High
- OR gate on comparator 3 and comparator 5
- Logic Gate 4 = Spare
- Logic Gate 5 = Vibration Monitor Alarm
- Not Gate on input 4 because Alarm from vibration system is open contact.
- Logic Gate 6 = Vibration Monitor Fail
- Not Gate on input 5 because Healthy from vibration system is open contact if not healthy.
- Logic Gate 7 = Zero speed sensor Fail
- AND gate on zero speed (Gate 14) AND Comparator 6 (speed > 100)
- Logic Gate 8 = Spare
- Logic Gate 9 = Spare
- Logic Gate 10 = Any Temperature Sensor Fail
- OR gate on Analog In 9 Range Err and Analog In 10 Range Err (This configuration only on Units A and B)
- Logic Gate 11 = Spare
- Logic Gate 12 = Any Bearing Temp Hi
- OR gate on comparator 2 and comparator 4
- Logic Gate 13 = Supply Voltage Fail
- NOT gate on Discrete Input 9 (On unit C only)
- Logic Gate 14 = Zero speed
- OR gate on delay 1 and delay 2
- Logic Gate 15 = Not zero speed
- NOT gate on Logic Gate 14.
- Logic Gate 16 = Inverter on Discrete input #1 (zero speed detection)
- Logic gate 17 = No zero-speed sensor failure
- Not gate on Logic Gate 7
- Logic Gate 18 = Zero speed detected, and no sensor fail
- AND gate on gate 17 and gate 14.




Logic Gate 7
Type
And
Inputs
Logic Gate 14
Analog Comparator 6
Not Connected
Not Connected
Not Connected
Logic Gate 8
Type
And
Inputs
Not Connected
Not Connected
Not Connected
Not Connected
Not Connected
Logic Gate 9
Type
And
Inputs
Not Connected
Not Connected
Not Connected
Not Connected
Not Connected
Logic Gate 10
Type
Or
Inputs
Analog In 9 Range Err
Analog In 10 Range Err
Logic Gate 11
Type
And
Inputs
Not Connected
Not Connected
Logic Gate 12
Type
Or
Inputs
Analog Comparator 2
Analog Comparator 4
Logic Gate 13
Type
Not
Inputs
Not Connected
Logic Gate 14
Type
Or
Inputs
Delay 1
Delay 2
Not Connected
Not Connected
Not Connected
Logic Gate 15
Type
Not
Inputs
Logic Gate 14
Logic Gate 16
Type
Not
Inputs
Discrete Input 1
Logic Gate 17
Type
Not
Inputs
Logic Gate 7
Logic Gate 18
Type
And
Inputs
Logic Gate 17
Logic Gate 14

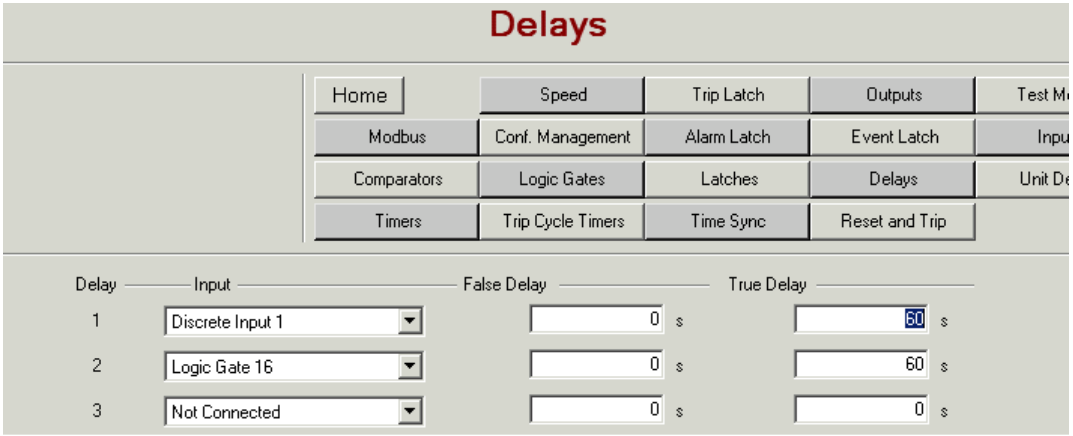
Latches

Latch 1 = Turning gear enable.
Set at zero speed detected (logic Gate 18), Reset if speed > 250 (Comparator 7).
Latch 2 = Emergency Pump on
Set on logic gate 2, Reset after manual Reset action



Delays

Delay 1 = 60 seconds on Discrete input 1 (Proximiter has been high for 60 seconds)
Delay 2 = 60 seconds on Logic Gate 16 (Proximiter has been low for 60 seconds)



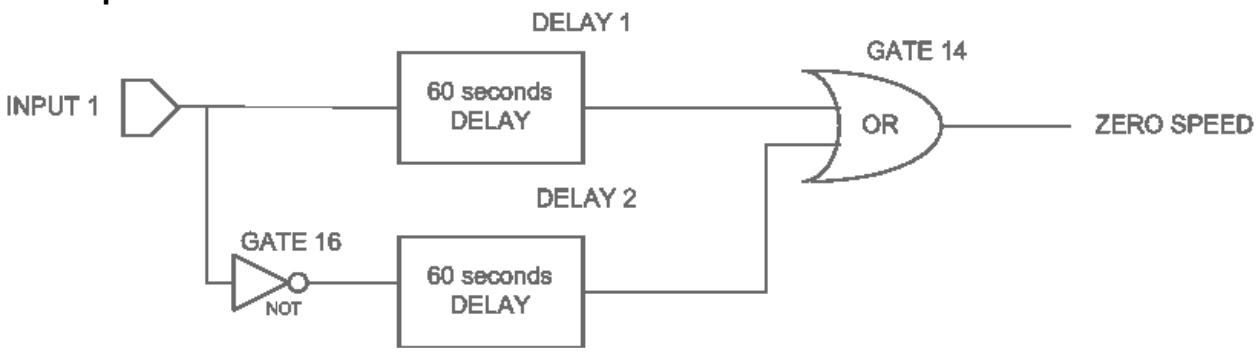
Timers

There are no Timers programmed.

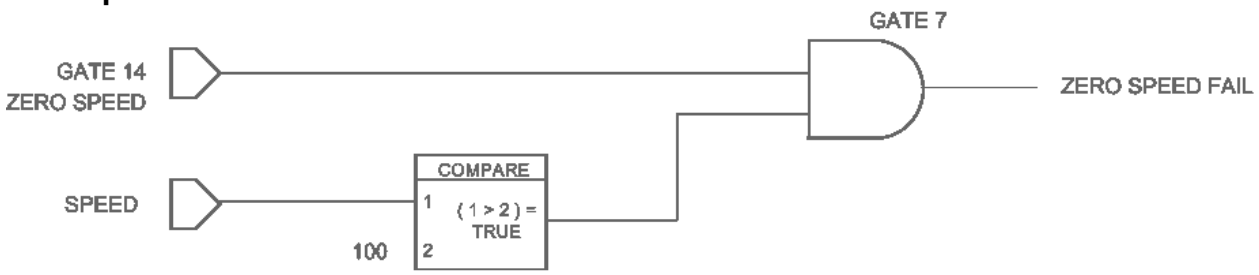
Logic Diagram

- Zero speed Detection
- Zero speed detector failure
- Zero speed and no zero speed failure
- Turning gear permissive
- Trip valve block test logic.

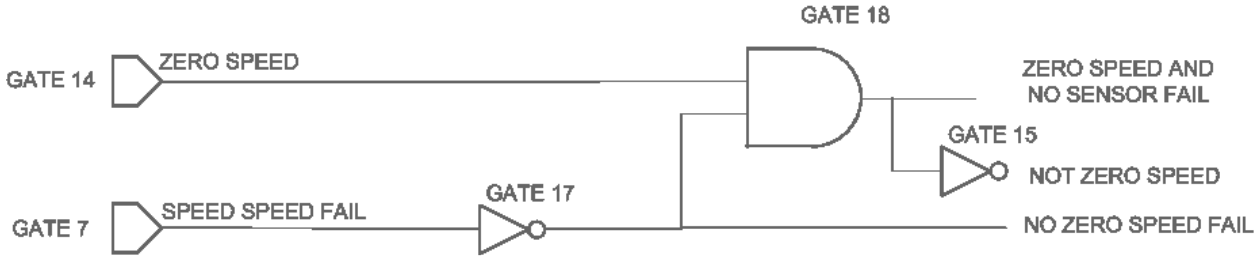
Zero Speed Detection



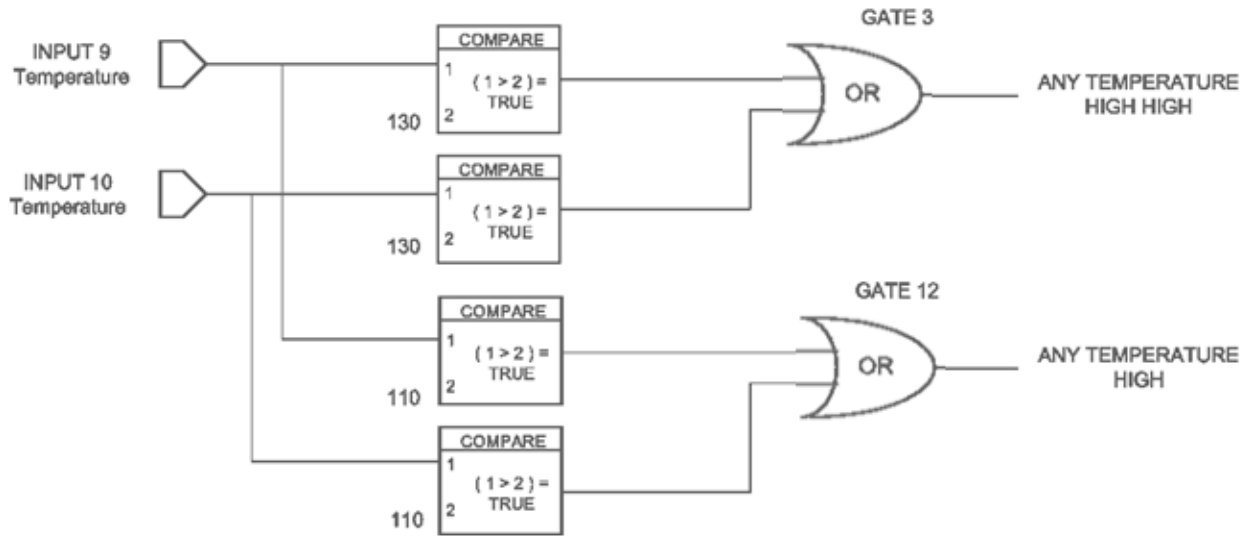
Zero Speed Detector Failure



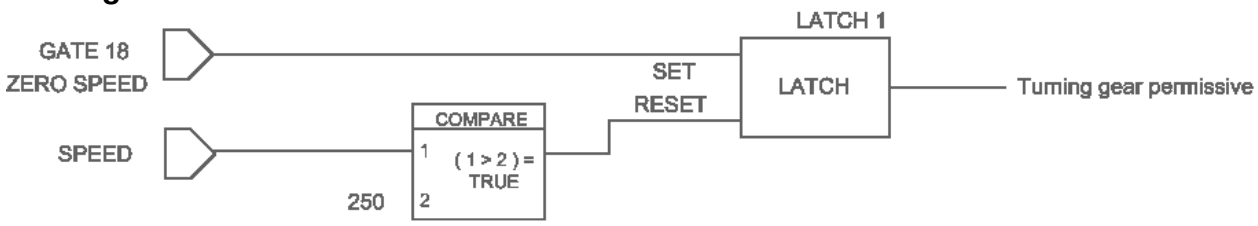
Zero Speed and No Sensor Failure



Any Temperature High / Any Temperature High High



Turning Gear Permissive



Chapter 12.
Configuration Worksheet

ProTech Part Number:_____ Date:_____
ProTech Serial Number:_____
Site/Application:_____

		Module A	Module B	Module C
SPEED	Probe Type	Active / Passive	Active / Passive	Active / Passive
	No. Gear Teeth			
	Gear Ratio			
	Overspeed Trip	rpm	rpm	rpm
	Sudden Speed Loss	Trip / Alarm	Trip / Alarm	Trip / Alarm
ACCELERATION	Enable	Yes / No	Yes / No	Yes / No
	Acceleration Trip Enable Speed	rpm	rpm	rpm
	Acceleration Trip	rpm/sec	rpm/sec	rpm/sec
START LOGIC	Speed Fail Setpoint	rpm	rpm	rpm
	Speed Fail Trip	Used / Not Used	Used / Not Used	Used / Not Used
	Speed Fail Alarm	Used / Not Used	Used / Not Used	Used / Not Used
	Speed Fail Timeout Trip	Used / Not Used	Used / Not Used	Used / Not Used
	Speed Fail Timeout Time	sec	sec	sec
TRIP LATCH	Trip Configuration	Energize-To-Trip / De-Energize- To-Trip	Energize-To-Trip / De-Energize-To-Trip	Energize-To-Trip / De-Energize-To-Trip
ANALOG OUTPUT	Speed @ 4 mA	rpm	rpm	rpm
	Speed @ 20 mA	rpm	rpm	rpm

TEST MODES	**Configure Test Modes**			
	Temporary Overspeed Trip	rpm	rpm	rpm
	Temporary Overspeed Trip Timeout	sec	sec	sec
	Simulated Speed Timeout	sec	sec	sec
	Test Mode Interlock Disabled	Yes / No	Yes / No	Yes / No
	User Defined Test 1			
	Is Enabled	Yes / No	Yes / No	Yes / No
	Timeout	sec	sec	sec
	Set Input			
	Reset Input			
	User Defined Test 2			
	Is Enabled	Yes / No	Yes / No	Yes / No
	Timeout	sec	sec	sec
	Set Input			
	Reset Input			
	User Defined Test 3			
	Is Enabled	Yes / No	Yes / No	Yes / No
	Timeout	sec	sec	sec
	Set Input			
	Reset Input			

PERIODIC OVERSPEED TEST	Enabled	Yes / No	Yes / No	Yes / No
	Test interval	days	days	days
	Operator Can Disable Test	Yes / No	Yes / No	Yes / No

		Module A	**Module B**	**Module C**
MODBUS	Mode	RS-232 / RS-485	RS-232 / RS-485	RS-232 / RS-485
	Baud Rate	19200 / 38400 / 57600 / 115200	19200 / 38400 / 57600 / 115200	19200 / 38400 / 57600 / 115200
	Communication Parity	No Parity / Even Parity / Odd Parity	No Parity / Even Parity / Odd Parity	No Parity / Even Parity / Odd Parity
	Slave Address			
	Enable Write Commands	Yes / No	Yes / No	Yes / No
CONFIGURATION MANAGEMENT	Configuration Compare	Used / Not Used	Used / Not Used	Used / Not Used

PROGRAMMABLE INPUTS	**Input 1 Mode**	Not Used / Analog / Discrete	Not Used / Analog / Discrete	Not Used / Analog / Discrete
	Input 1 Analog Mode Settings Name: _____	Units: _____ 4 mA value: _____ 20 mA value: _____ LoLo setpt :_____ Lo setpt :_____ Hi setpt :_____ HiHi setpt : _____	Units: _____ 4 mA value: _____ 20 mA value: _____ LoLo setpt :_____ Lo setpt :_____ Hi setpt :_____ HiHi setpt : _____	Units: _____ 4 mA value: _____ 20 mA value: _____ LoLo setpt :_____ Lo setpt :_____ Hi setpt :_____ HiHi setpt : _____
	Input 2 Mode	Not Used / Analog / Discrete	Not Used / Analog / Discrete	Not Used / Analog / Discrete
	Input 2 Analog Mode Settings Name: _____	Units: _____ 4 mA value: _____ 20 mA value: _____ LoLo setpt :_____ Lo setpt :_____ Hi setpt :_____ HiHi setpt : _____	Units: _____ 4 mA value: _____ 20 mA value: _____ LoLo setpt :_____ Lo setpt :_____ Hi setpt :_____ HiHi setpt : _____	Units: _____ 4 mA value: _____ 20 mA value: _____ LoLo setpt :_____ Lo setpt :_____ Hi setpt :_____ HiHi setpt : _____
	Input 3 Mode	Not Used / Analog / Discrete	Not Used / Analog / Discrete	Not Used / Analog / Discrete
	Input 3 Analog Mode Settings Name: _____	Units: _____ 4 mA value: _____ 20 mA value: _____ LoLo setpt :_____ Lo setpt :_____ Hi setpt :_____ HiHi setpt : _____	Units: _____ 4 mA value: _____ 20 mA value: _____ LoLo setpt :_____ Lo setpt :_____ Hi setpt :_____ HiHi setpt : _____	Units: _____ 4 mA value: _____ 20 mA value: _____ LoLo setpt :_____ Lo setpt :_____ Hi setpt :_____ HiHi setpt : _____
	Input 4 Mode	Not Used / Analog / Discrete	Not Used / Analog / Discrete	Not Used / Analog / Discrete
	Input 4 Analog Mode Settings	Units: _____ 4 mA value: _____	Units: _____ 4 mA value: _____	Units: _____ 4 mA value: _____

	Name: ______________	20 mA value: ______ LoLo setpt :________ Lo setpt :__________ Hi setpt :__________ HiHi setpt : ________	20 mA value: ______ LoLo setpt :________ Lo setpt :__________ Hi setpt :__________ HiHi setpt : ________	20 mA value: ______ LoLo setpt :________ Lo setpt :__________ Hi setpt :__________ HiHi setpt : ________
	Input 5 Mode	Not Used / Analog / Discrete	Not Used / Analog / Discrete	Not Used / Analog / Discrete
	Input 5 Analog Mode Settings Name: ______________	Units: ____________ 4 mA value: ________ 20 mA value: ______ LoLo setpt :________ Lo setpt :__________ Hi setpt :__________ HiHi setpt : ________	Units: ____________ 4 mA value: ________ 20 mA value: ______ LoLo setpt :________ Lo setpt :__________ Hi setpt :__________ HiHi setpt : ________	Units: ____________ 4 mA value: ________ 20 mA value: ______ LoLo setpt :________ Lo setpt :__________ Hi setpt :__________ HiHi setpt : ________
	Input 6 Mode	Not Used / Analog / Discrete	Not Used / Analog / Discrete	Not Used / Analog / Discrete
PROGRAMMABLE INPUTS	Input 6 Analog Mode Settings Name: ______________	Units: ____________ 4 mA value: ________ 20 mA value: ______ LoLo setpt :________ Lo setpt :__________ Hi setpt :__________ HiHi setpt : ________	Units: ____________ 4 mA value: ________ 20 mA value: ______ LoLo setpt :________ Lo setpt :__________ Hi setpt :__________ HiHi setpt : ________	Units: ____________ 4 mA value: ________ 20 mA value: ______ LoLo setpt :________ Lo setpt :__________ Hi setpt :__________ HiHi setpt : ________

PROGRAMMABLE INPUTS	**Input 7 Mode**	Not Used / Analog / Discrete	Not Used / Analog / Discrete	Not Used / Analog / Discrete
	Input 7 Analog Mode Settings Name: _____	Units: _____ 4 mA value: _____ 20 mA value: _____ LoLo setpt :_____ Lo setpt :_____ Hi setpt :_____ HiHi setpt : _____	Units: _____ 4 mA value: _____ 20 mA value: _____ LoLo setpt :_____ Lo setpt :_____ Hi setpt :_____ HiHi setpt : _____	Units: _____ 4 mA value: _____ 20 mA value: _____ LoLo setpt :_____ Lo setpt :_____ Hi setpt :_____ HiHi setpt : _____
	Input 8 Mode	Not Used / Analog / Discrete	Not Used / Analog / Discrete	Not Used / Analog / Discrete
	Input 8 Analog Mode Settings Name: _____	Units: _____ 4 mA value: _____ 20 mA value: _____ LoLo setpt :_____ Lo setpt :_____ Hi setpt :_____ HiHi setpt : _____	Units: _____ 4 mA value: _____ 20 mA value: _____ LoLo setpt :_____ Lo setpt :_____ Hi setpt :_____ HiHi setpt : _____	Units: _____ 4 mA value: _____ 20 mA value: _____ LoLo setpt :_____ Lo setpt :_____ Hi setpt :_____ HiHi setpt : _____
	Input 9 Mode	Not Used / Analog / Discrete	Not Used / Analog / Discrete	Not Used / Analog / Discrete
	Input 9 Analog Mode Settings Name: _____	Units: _____ 4 mA value: _____ 20 mA value: _____ LoLo setpt :_____ Lo setpt :_____ Hi setpt :_____ HiHi setpt : _____	Units: _____ 4 mA value: _____ 20 mA value: _____ LoLo setpt :_____ Lo setpt :_____ Hi setpt :_____ HiHi setpt : _____	Units: _____ 4 mA value: _____ 20 mA value: _____ LoLo setpt :_____ Lo setpt :_____ Hi setpt :_____ HiHi setpt : _____
	Input 10 Mode	Not Used / Analog / Discrete	Not Used / Analog / Discrete	Not Used / Analog / Discrete
	Input 10 Analog Mode Settings	Units: _____ 4 mA value: _____	Units: _____ 4 mA value: _____	Units: _____ 4 mA value: _____

	Name: _____	20 mA value: _____ LoLo setpt :_____ Lo setpt :_____ Hi setpt :_____ HiHi setpt : _____	20 mA value: _____ LoLo setpt :_____ Lo setpt :_____ Hi setpt :_____ HiHi setpt : _____	20 mA value: _____ LoLo setpt :_____ Lo setpt :_____ Hi setpt :_____ HiHi setpt : _____

TIME SYNCHRONIZATION	Mode	Not Used / 24h Time Sync	Not Used / 24h Time Sync	Not Used / 24h Time Sync

TRIP CYCLE TIMERS	**Monitor 1**			
	Trip Indicator Input			
	Max Cycle Time	ms	ms	ms
	Monitor 2			
	Trip Indicator Input			
	Max Cycle Time	ms	ms	ms

RESET LOGIC	Configurable Reset Source	Used / Not Used	Used / Not Used	Used / Not Used
	Resettable Trip Use (reset clears trip)	Non Inverting / Inverting	Non Inverting / Inverting	Non Inverting / Inverting
		Module A	**Module B**	**Module C**
OTHER OUTPUTS	**Relay Output 1**			
	Relay Driver Function			
	Polarity	Non Inverting / Inverting	Non Inverting / Inverting	Non Inverting / Inverting
	Relay Output 2			
	Relay Driver Function			
	Polarity	Non Inverting / Inverting	Non Inverting / Inverting	Non Inverting / Inverting
	Relay Output 3			
	Relay Driver Function			
	Polarity	Non Inverting / Inverting	Non Inverting / Inverting	Non Inverting / Inverting

Revision History

Changes in Revision A—

- Installed an Important Box on Page 103

Released

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