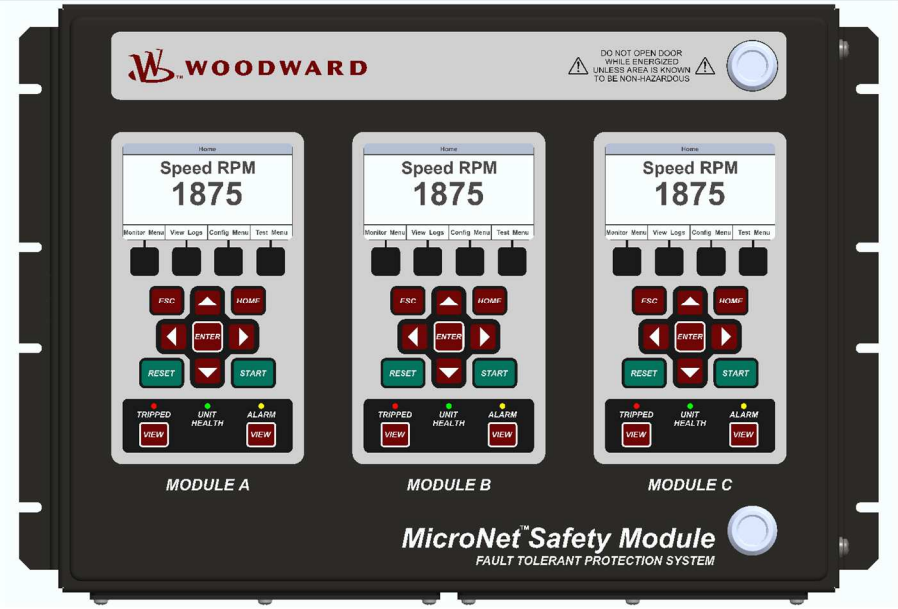
WOODWARD

Product Manual 26711V2
(Revision B, 1/2021)
Original Instructions



MicroNet™ Safety Module
Fault Tolerant Protection System
with Voted Inputs

Manual 26711 consists of 2 volumes (26711V1 & 26711V2)

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:

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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 Out-of-date translations are marked with ⚠.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 26711V2

Contents

The following are trademarks of their respective companies:
Modbus (Schneider Automation Inc.)

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

For Regulatory Compliance information, see 26711V1.

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.

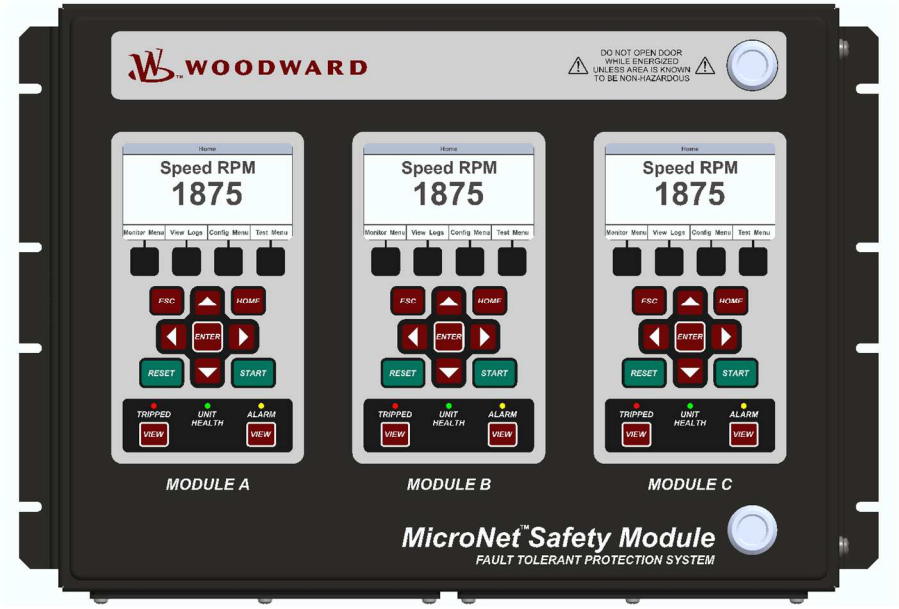


Figure 9-1. MicroNet Safety Module Front Panel

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, Auto-Sequence, 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.

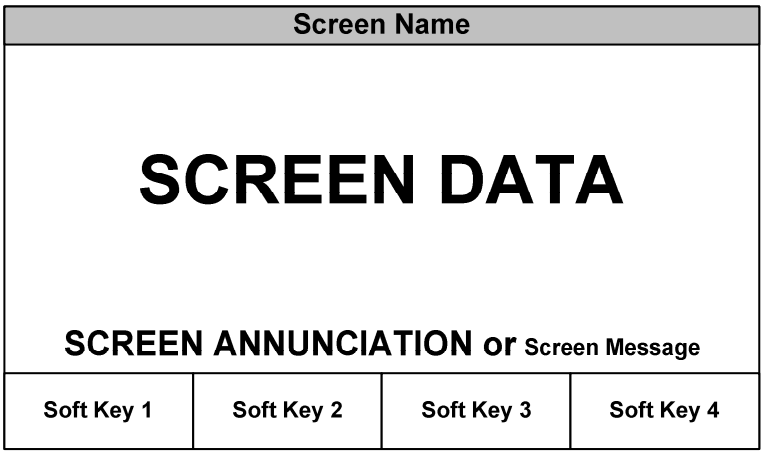


Figure 9-2. MicroNet Safety Module Screen

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

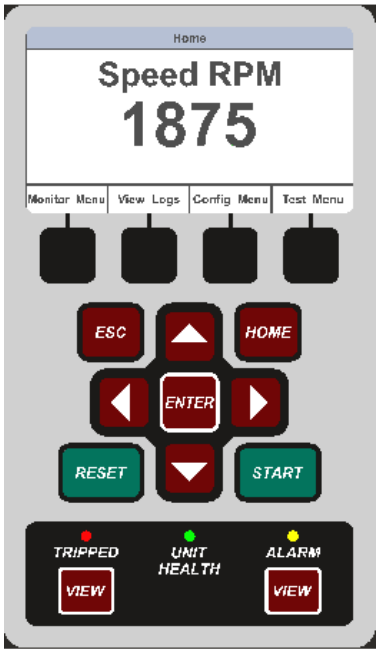


Figure 9-3. MicroNet Safety Module Faceplate

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

Table 9-1. Keypad Functions and Definitions

ESC	Navigates up one menu in the hierarchy of the selected menu tree. If modifying a value, ESC exits edit mode and restores the value without saving the changes.
HOME	Navigates to the Home screen.
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, each module displays its “Home” page. Depending on the module’s configuration, this Home Screen can be set to display any of the module’s screens. As shipped from the factory, the “Home” screen is defaulted to display the sensed speed screen and provides access via four soft keys to the other four main menus (Monitor, Log, Config, Test). Pressing the front panel’s “HOME” button displays the configured “Home” screen. Repeatedly pressing the front panel’s “ESC” button navigates up through the menu hierarchy until the “Home” screen is displayed.

Home Screen Page (with an Alarm condition indicated)

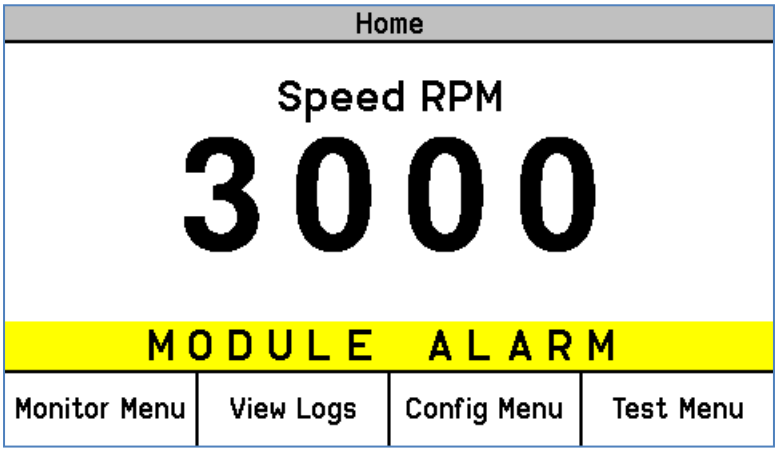


Figure 9-4. Home screen (with Alarm)

Home Screen Page (with a Trip condition indicated)

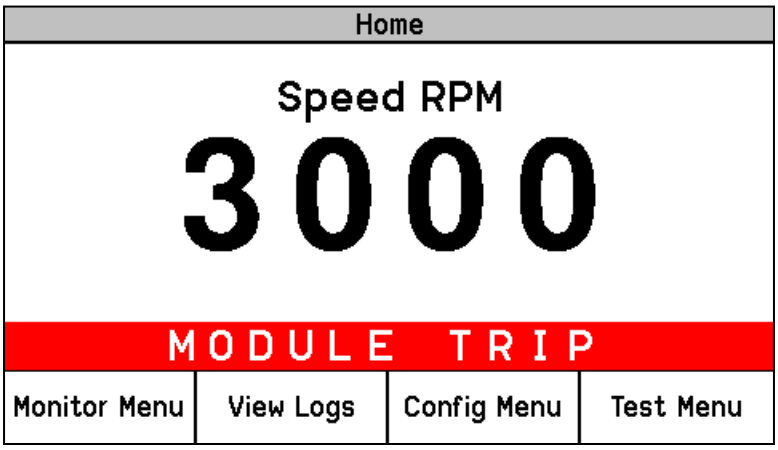


Figure 9-5. Home screen (with Trip)

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
- Upload configuration settings file into a module using the PCT
- 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 Screen

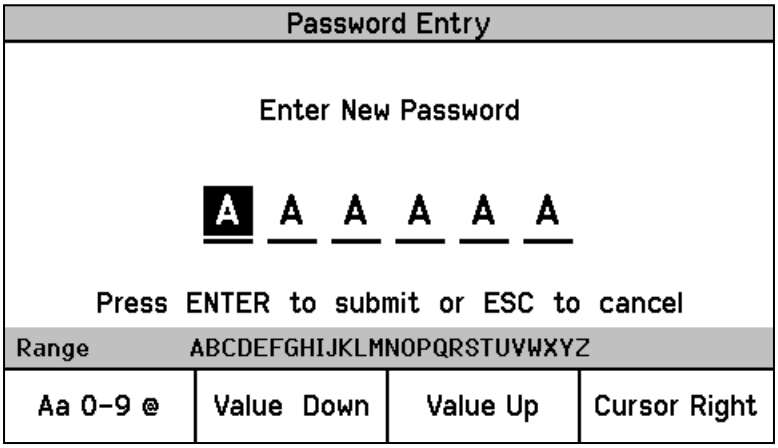


Figure 9-6. Password Entry Screen

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 Down” or “Value Up” soft keys to change the highlighted value.
  - Use the “Cursor Right” 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.

Default Test Level Password: AAAAAA (as shipped from factory)
Default Config Level Password: AAAAAA (as shipped from factory)

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:

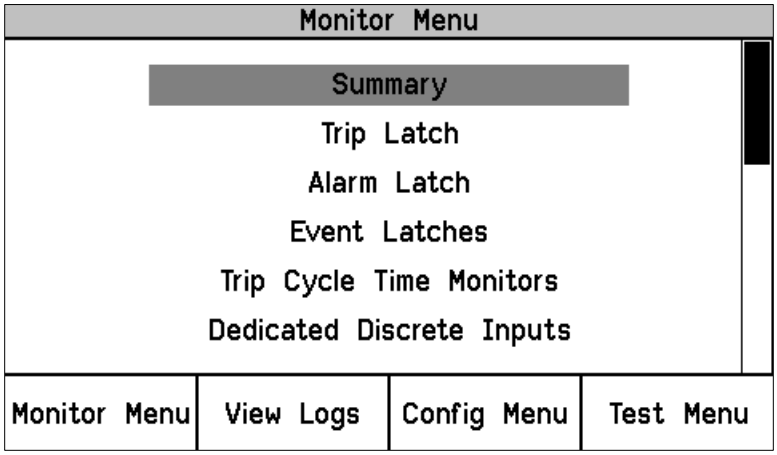


Figure 9-7. Monitor Menu

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 Redundancy Manager
- Accel Redundancy Manager
- Speed Fail Timer
- Speed Readout
- Analog Output
- Modbus
- Date / Time
- System Status
- Module Information

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

Monitor Summary (Page 1)

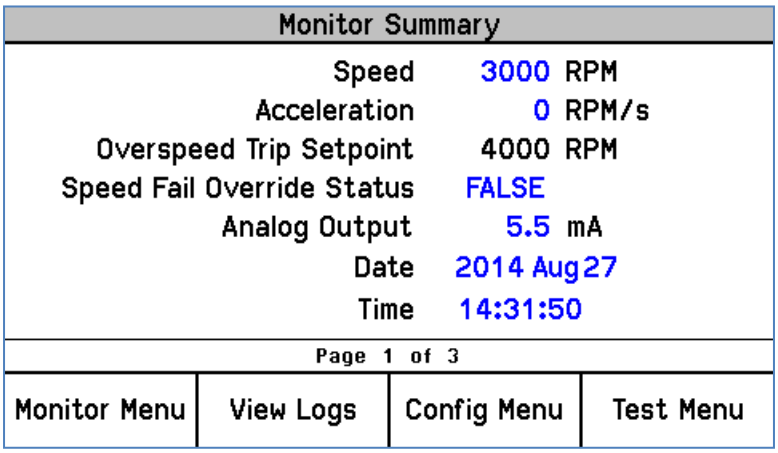


Figure 9-8. Monitor Summary (Page 1)

This page displays the module's sensed speed, sensed acceleration, and current state information. The following information is displayed:

- **Speed:** Displays the local module's sensed speed input in RPM
- **Acceleration:** Displays module's sensed speed input acceleration in rpm/second
- **Overspeed Trip Setpoint:** Displays configured Overspeed Trip Setpoint in rpm
- **Speed Fail Override Status:** Displays state of the speed fail override logic
- **Analog Output:** Displays current value of Analog Output in mA
- **Date:** Displays current date
- **Time:** Displays current time

Monitor Summary (Page 2)

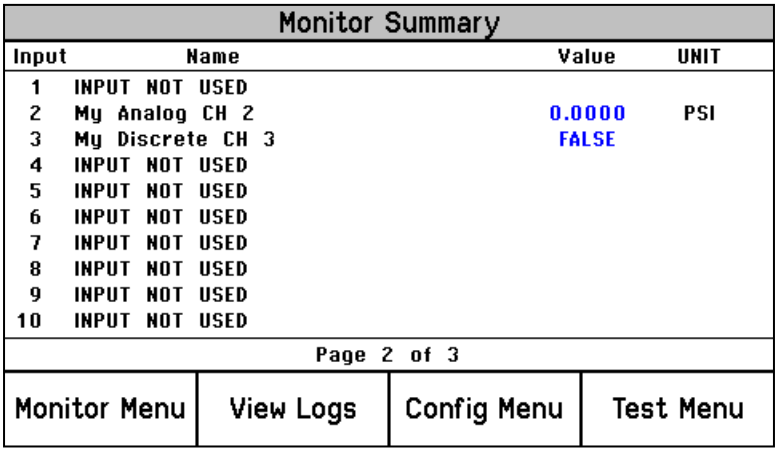


Figure 9-9. Monitor Summary (Page 2)

This page provides information on the 10 configurable inputs.

- **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)

Monitor Summary (Page 3)

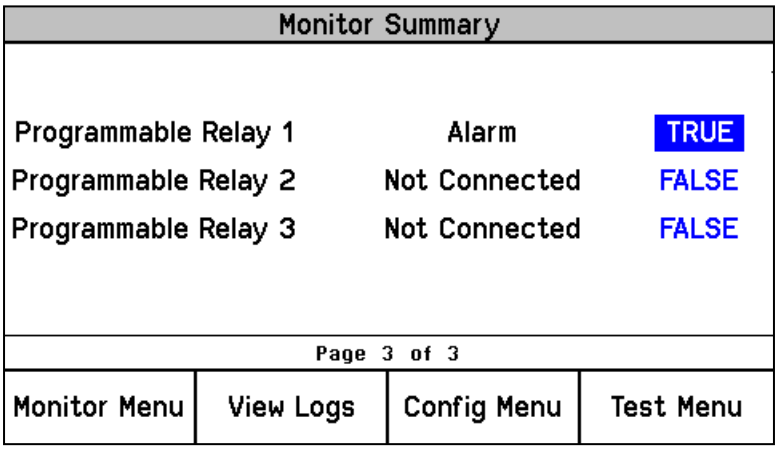


Figure 9-10. Monitor Summary (Page 3)

This page provides information on the programmable relays.

- Programmable Relay Status

Monitor Trip Latch Page

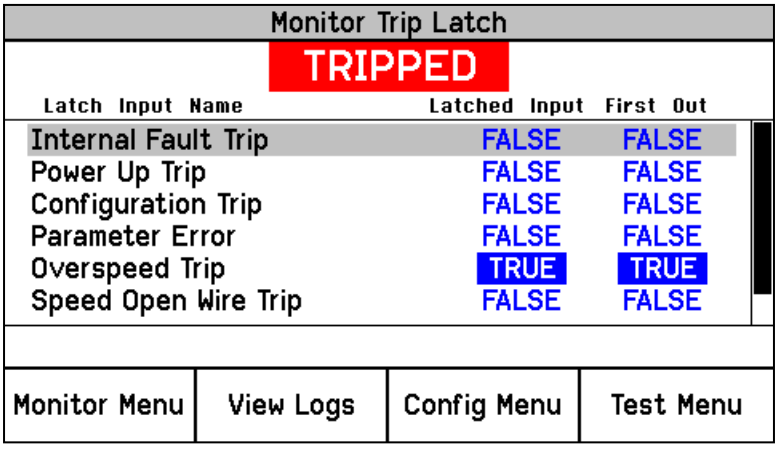


Figure 9-11. Monitor Trip Latch

This page displays the status of each Trip Latch input and indicates which input was sensed first (first out condition). If the trip latch is configured as LATCHING, trip conditions are latched and require a reset command to clear the fault indication.

The following trips are always enabled / active:

- **Internal Fault Trip:** Indicates a failure internal to the MicroNet Safety Module. Additional details on the fault cause are provided in the PCT's Module Faults Log.
- **Configuration Trip:** Indicates new configuration settings were loaded into the module or a trip was issued from the front panel to enter configuration mode. 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 MicroNet Safety Module 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.

The following trip functions are only active when configured for use:

- **Overspeed Trip:** Indicates an overspeed trip. Only provided if speed redundancy is used or the speed probe is configured for use.
- **Overaccel Trip:** Indicates an over-acceleration trip.
- **Power Up Trip:** Indicates a power-up condition was detected. Only provided if the trip latch is configured as de-energize to trip.
- **Speed Redundancy Manager Trip:** Indicates the Speed Redundancy Manager caused a trip.
- **Speed Probe Open Wire:** Indicates a broken wire or faulty speed probe has been detected. Only provided when configured for passive probe type and Speed Redundancy Manager is not configured. If the Speed Redundancy Manager is configured, the Open Wire detection will be indicated as a Speed Probe Open Wire Alarm instead of a Speed Probe Open Wire Trip.
- **Speed Lost Trip:** Indicates a sudden speed loss event. Only provided if the module's Speed Input is configured for use. A Sudden Speed Loss event is detected when 0 Hz is sensed and during the previous
4 millisecond scan a frequency above 200 Hz was sensed.
- **Speed Fail Trip:** Indicates speed was detected below the fail threshold. Only provided when the Speed Redundancy Manager is configured or the speed input is used.
- **Speed Fail Timeout:** Indicates lack of speed detected during a start condition. Only provided when the Speed Redundancy Manager is configured or the speed input is used.
- **Resettable Trip Input:** Indicates a trip from the Resettable Trip function.
- **Trip Latch xx or the "user-defined" Name for Trip Latch xx:** Indicates an trip condition caused by the configured trip latch input.

Monitor Alarm Latch Page

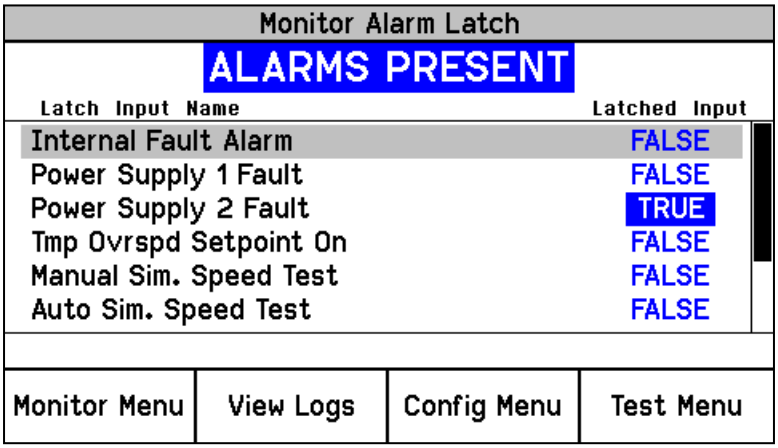


Figure 9-12. Monitor Alarm Latch

This page displays the status of each Alarm Latch input. All alarm conditions are latched and require a reset command to clear the fault indication. The following alarms are always active and displayed if sensed:

- **Internal Fault Alarm:** Indicates a failure internal to the MicroNet Safety Module. Additional details on the fault cause are provided in the PCT's Module Faults Log.
- **Tmp Overspeed Setpoint On:** Indicates that the Temp Overspeed Setpoint Test routine is enabled/active.
- **Manual Sim. Speed Test:** This alarm indicates that the Manual Simulated Speed Test routine is enabled/active.
- **Auto Sim. Speed Test:** Indicates that the Auto Simulated Speed Test routine is enabled/active.
- **Auto Sim. Speed Failed:** Indicates that the module's Auto Simulated Speed Test routine failed. This alarm will occur if module's input speed channel or internal frequency generator have failed.
- **Auto-Sequence Test:** Indicates that the Auto-Sequence Test routine is enabled/active.

The following alarms are displayed when configured:

- **Configuration Mismatch:** Indicates that the local module's configuration settings file does not match one of the other two module's configuration settings file.
- **Speed Lost Alarm:** Indicates that a sudden loss of speed was sensed and is typically used to indicate a failed active MPU speed sensor.
- **Speed Fail Alarm:** Indicates that speed is detected below the fail threshold. Only provided when the speed input is used.
- **Power Supply 1 Fault:** Indicates that the output voltage of Power Supply 1 is out of range.
- **Power Supply 2 Fault:** Indicates that the output voltage of Power Supply 2 is out of range.
- **Speed Probe Open Wire:** Indicates a broken wire or faulty speed probe has been detected. Only provided when configured for passive probe type and Speed Redundancy Manager is configured. If the Speed Redundancy Manager is not configured, the Open Wire detection will be indicated as a Speed Probe Open Wire Trip instead of a Speed Probe Open Wire Alarm.
- **Speed Redundancy Manager Input Difference:** Indicates the speed on any two inputs to the Speed redundancy Manager is greater than the configured threshold. Only provided when the Speed Redundancy Manager is configured.
- **Speed Redundancy Manager Input 1 Invalid:** Indicates speed signal #1 is invalid. A speed signal can be invalid for the following reasons—failed probe/wire, failed input channel, failed module-to-module network, failed module. Only provided when the module's Speed Redundancy Manager function block is configured for use.
- **Speed Redundancy Manager Input 2 Invalid:** Indicates speed signal #2 is invalid. A speed signal can be invalid for the following reasons—failed probe/wire, failed input channel, failed module-to-module network, failed module. Only provided when the module's Speed Redundancy Manager function block is configured for use.
- **Speed Redundancy Manager Input 3 Invalid:** Indicates speed signal #3 is invalid. A speed signal can be invalid for the following reasons—failed probe/wire, failed input channel, failed module-to-module network, failed module. Only provided when the module's Speed Redundancy Manager function block is configured for use.
- **User Defined Test 1:** Indicates User Defined Test 1 is Active.
- **User Defined Test 2:** Indicates User Defined Test 2 is Active.
- **User Defined Test 3:** Indicates User Defined Test 3 is Active.
- **Trip Time Mon 1 Alarm:** Indicates Trip Cycle Time Monitor 1 time exceeded the limit.
- **Trip Time Mon 2 Alarm:** Indicates Trip Cycle Time Monitor 2 time exceeded the limit.
- **Module Trip:** Indicates that the module's Trip Latch is in its "Tripped" state.
- **IRIG Signal Lost Alarm:** Indicates the IRIG Time Synchronization Signal has been lost.
- **Alarm Latch xx or the "user-defined" Name for Alarm Latch xx:** Indicates an alarm condition caused by the configured alarm latch input.

Monitor Event Latch Page

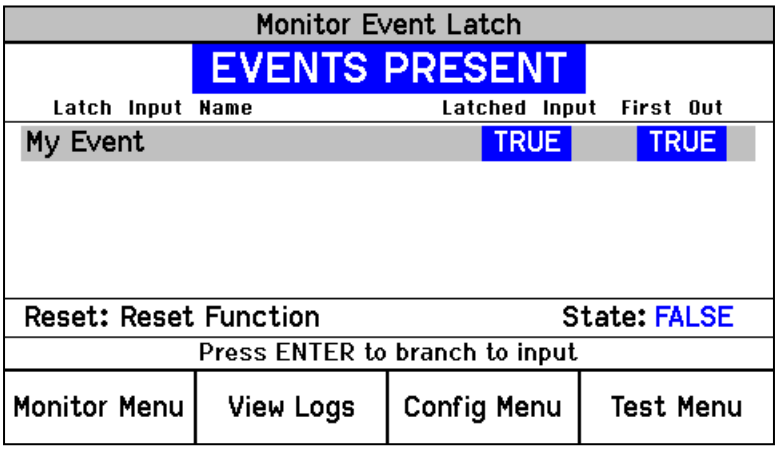


Figure 9-13. Monitor Event Latch

This page displays the status of each Event Latch input and indicates which input was sensed first (first out condition). All event conditions are latched and require a Reset to clear.

- **Latched Input Name:** User configurable name of the event input
- **Latched Input:** The latched input value of the event
- **First Out:** Indicates the event that caused the latch output to go true
- **Reset:** The user configurable function that resets the latch
- **State:** The state of the user configurable reset function

Monitor Trip Cycle Timer Monitors Page

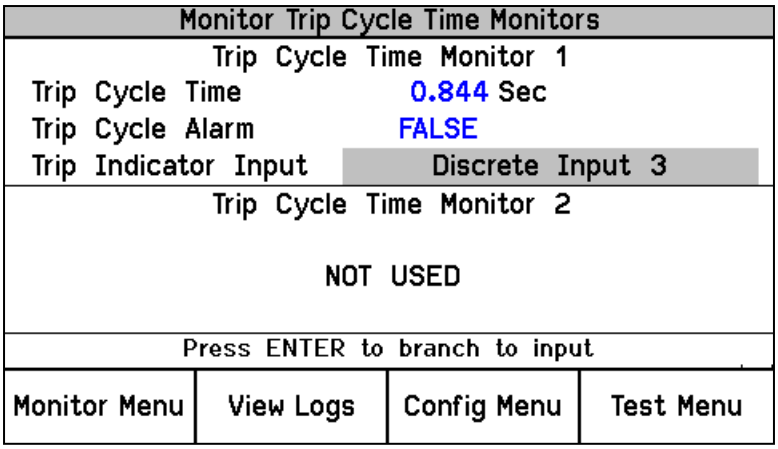


Figure 9-14. Monitor Trip Cycle Time Monitors

This page provides information on the Trip Cycle Time Monitors.

- **Trip cycle Time:** Time between the trip and the acknowledgement of the trip by the Trip Indicator Input.
- **Trip Cycle alarm:** The state of the Trip Cycle Time alarm.
- **Trip Indicator Input:** The input used to acknowledge the trip.

Monitor Dedicated Discrete Inputs Page

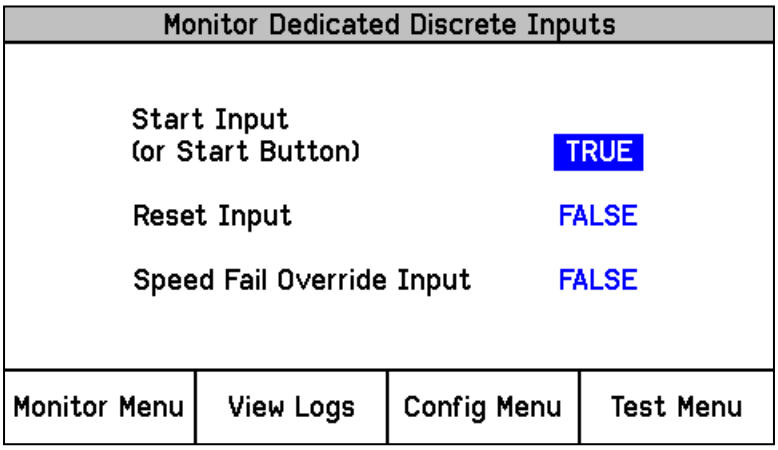


Figure 9-15. Monitor Dedicated Discrete Inputs

This page provides information for users to test and monitor the module's Start, Reset and Speed Fail Override discrete inputs.

- **Start Input:** Displays a TRUE value if the Front Panel START key is pressed or the START discrete input is active (closed contact input).
- **Reset Input:** Displays a TRUE value if the START discrete input is active (closed contact input).
- **Speed Fail Override Input:** Displays a TRUE value if the Speed Fail Override discrete input is active (closed contact input).

Monitor Configurable Inputs Page - Discrete

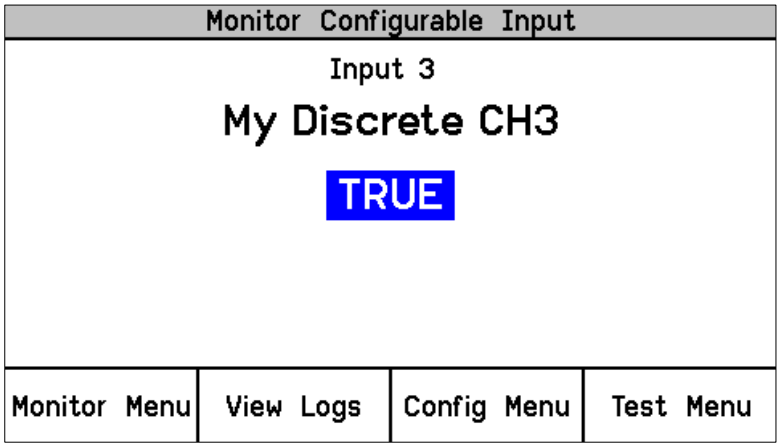


Figure 9-16a. Monitor Configurable Inputs - Discrete

This page provides users information on the module's ten configurable inputs.

- **Line 1:** Indicates which input (1-10).
- **Line 2:** Indicates the username of the input.
- **Line 3:** Indicates the state of the input (True or False).

Monitor Configurable Inputs Page - Analog

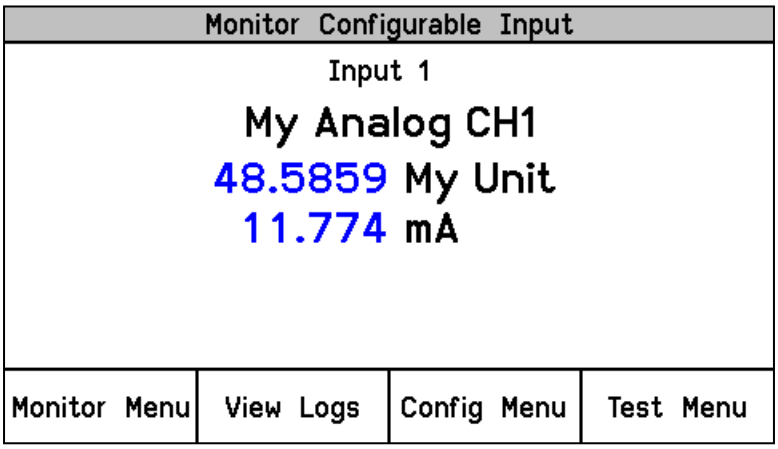


Figure 9-16b. Monitor Configurable Inputs - Analog

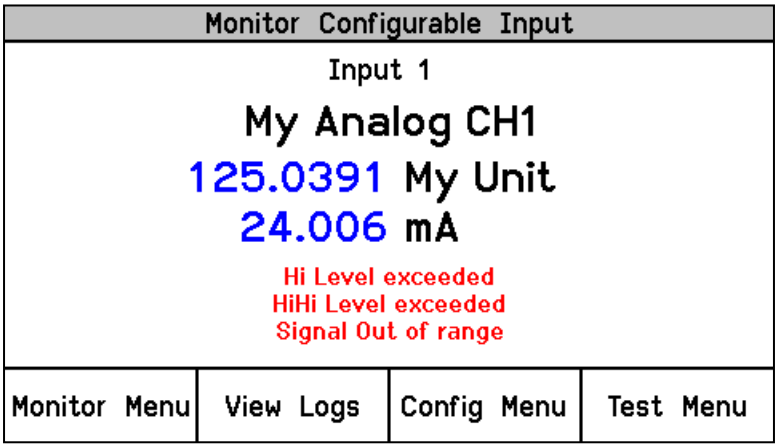


Figure 9-16c. Monitor Configurable Inputs - Analog

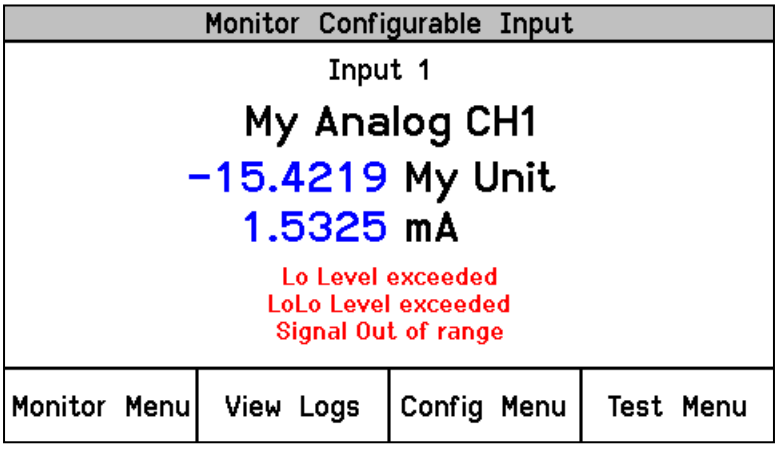


Figure 9-16d. Monitor Configurable Inputs - Analog

These pages provide users information on the module's ten configurable inputs.

- **Line 1:** Indicates which input (1-10).
- **Line 2:** Indicates the username of the input.
- **Line 3:** Indicates the value of the input in user units.

- **Line 4:** Indicates the current of the input in milliamps.
- **Lines 5-7:** Indicates if the input is above the Hi or HiHi configurable points, below the Lo or LoLo configurable points, or out of range.

Monitor Configurable Logic

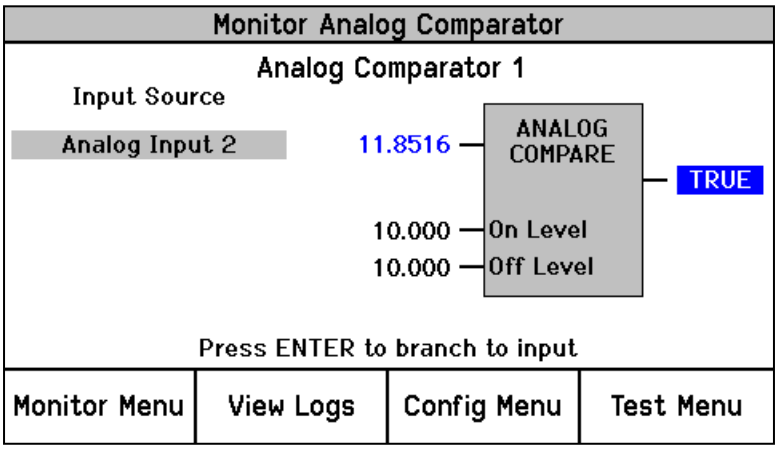


Figure 9-17. Monitor Analog Comparator

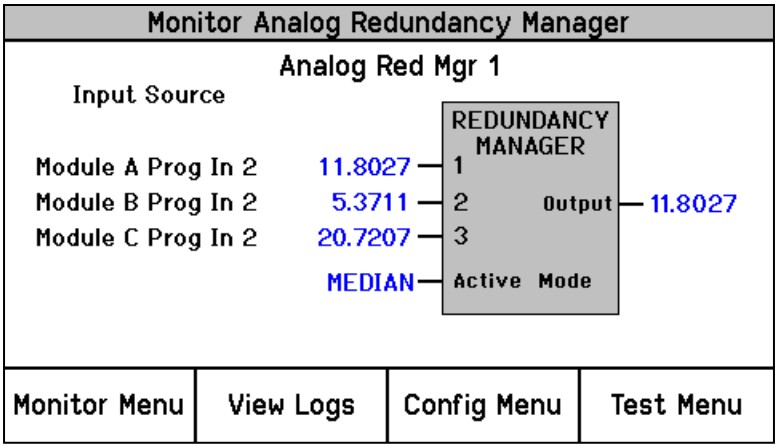


Figure 9-18. Monitor Analog Redundancy Manager

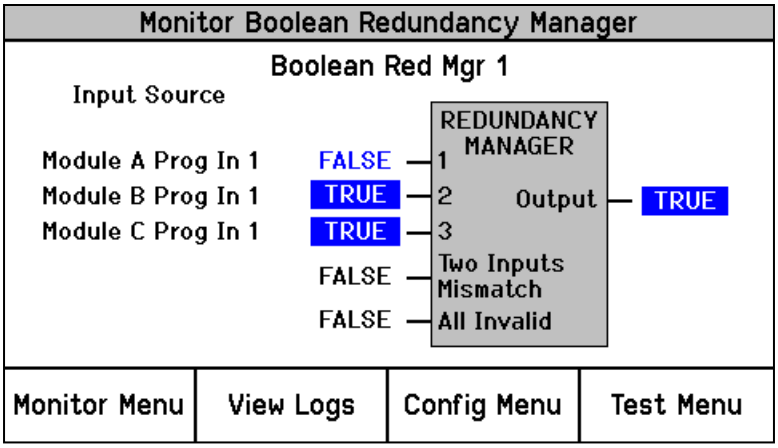


Figure 9-19. Monitor Boolean Redundancy Manager

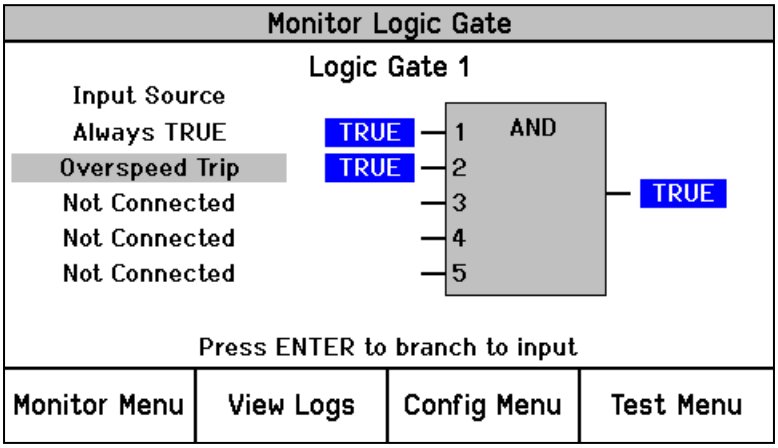


Figure 9-20. Monitor Logic Gates

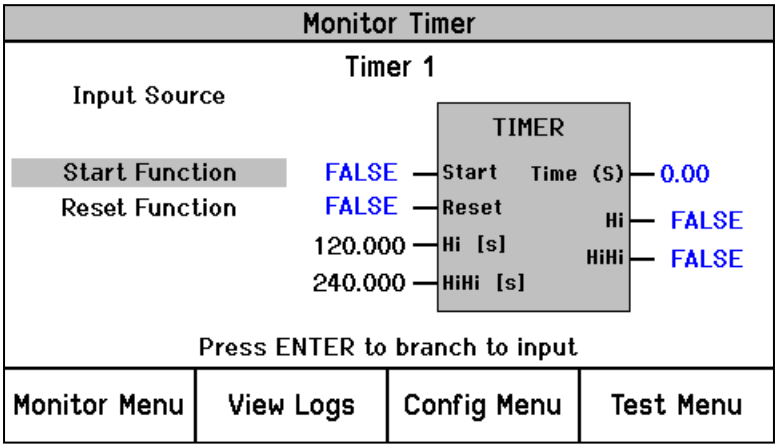


Figure 9-21. Monitor Timer

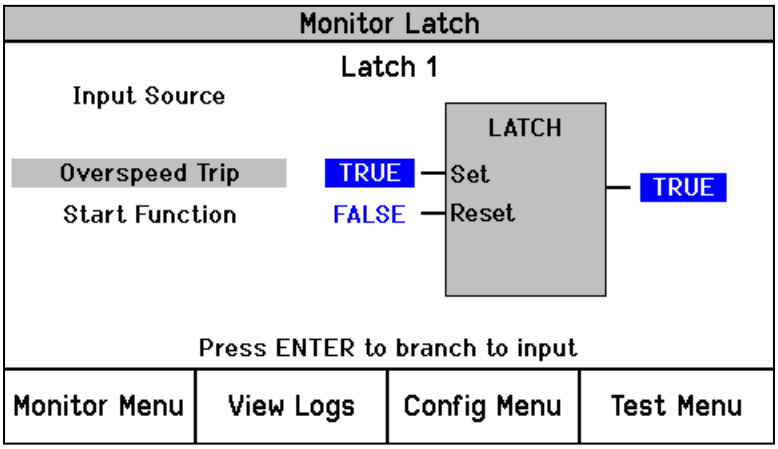


Figure 9-22. Monitor Latch

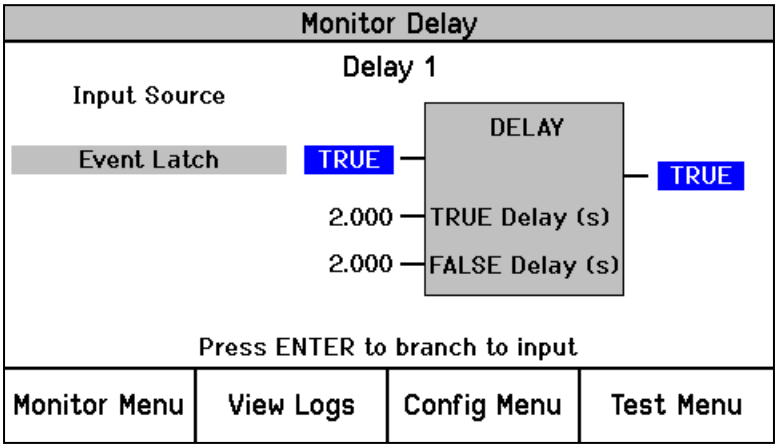


Figure 9-23. Monitor Delay

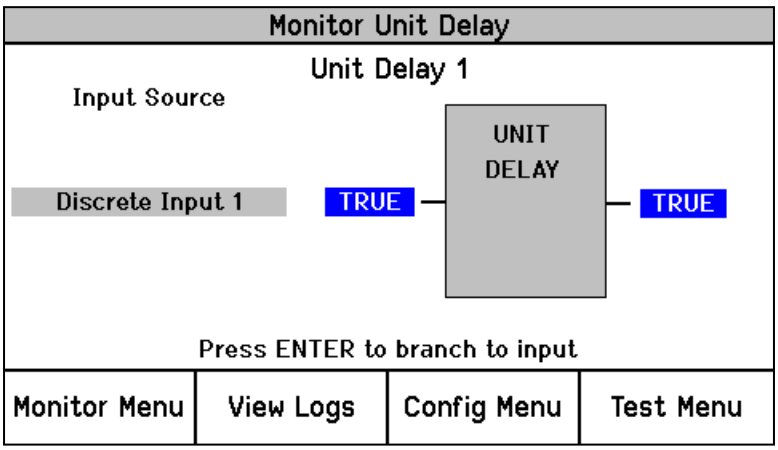


Figure 9-24. Monitor Unit Delay

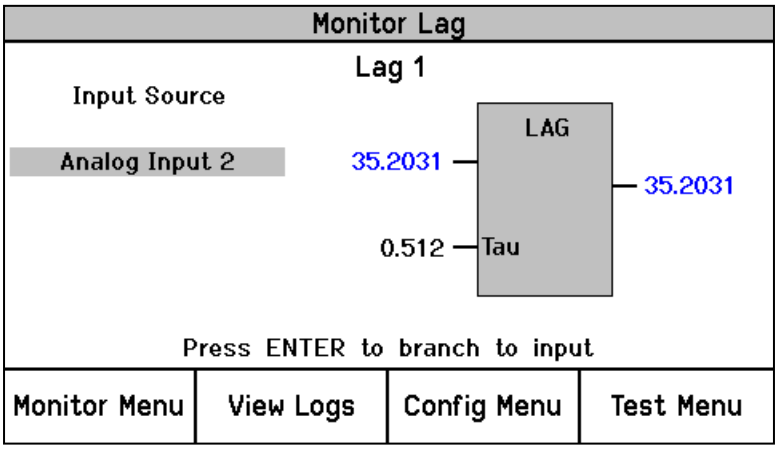


Figure 9-25. Monitor Lag

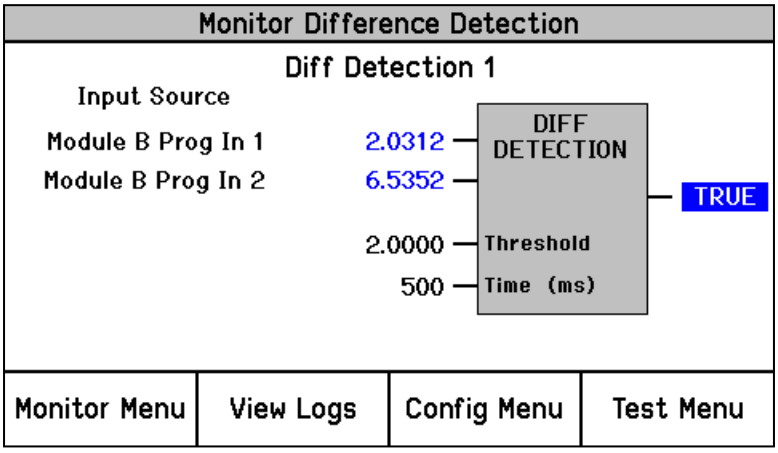


Figure 9-26. Monitor Difference Detection

These pages provide users information on the Configurable Logic blocks.

- **Input Source:** Indicates the source of the input. If “Press ENTER to branch to input” appears in the screen message area, pressing “ENTER” will bring up the monitor screen associated with that source. Pressing the “Up Arrow” or “Down Arrow” will highlight other inputs that can be branched to.
- **Blue screen value:** Indicates the dynamic value of block inputs and outputs. For the Analog Redundancy Manager, indicates the redundancy mode (MEDIAN, HSS, LSS or AVERAGE) used to set the output.
- **Black screen value:** Indicates user configurable values.

Monitor Programmable Relays

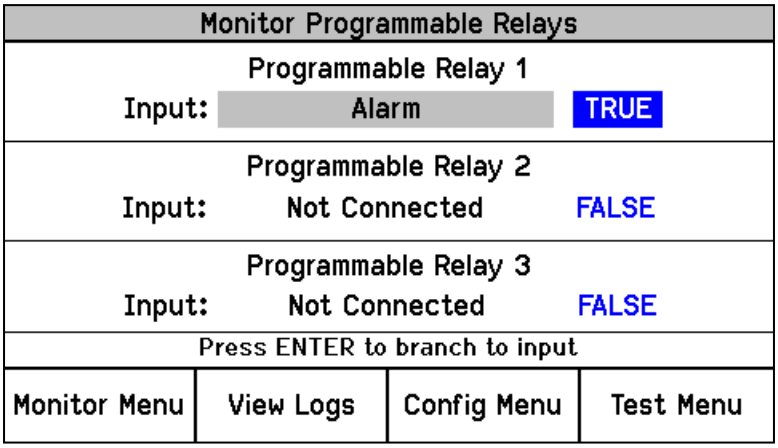


Figure 9-27. Monitor Programmable Relays

This page provides users information on the Programmable Relays.

- **Input:** Indicates what source the relay is connected to.
- **Blue screen value:** Represents the state (True or False) 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.

Monitor Speed Input Page

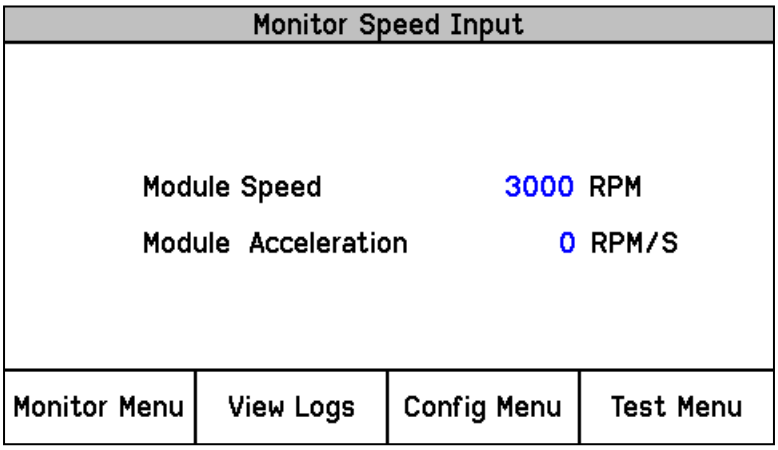


Figure 9-28. Monitor Speed Input

This page provides users information on the module's sensed speed and calculated acceleration values.

- **Speed**: This gauge displays the sensed/calculated speed being sensed by the module's input speed channel.
- **Acceleration**: This gauge displays the calculated acceleration.

Monitor Speed Redundancy Manager Page

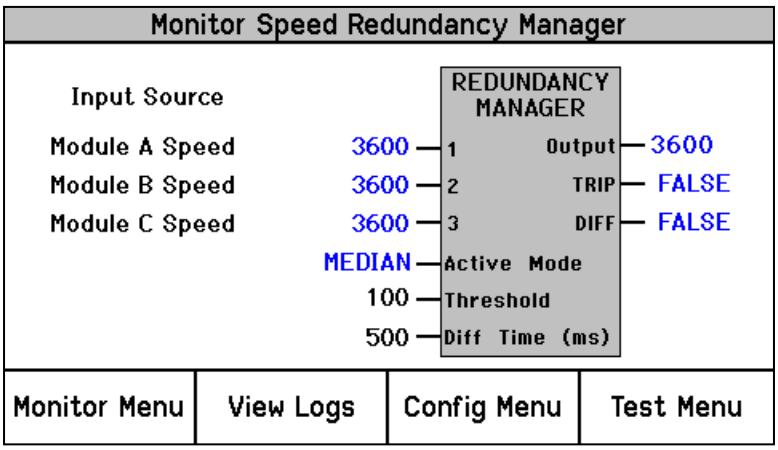


Figure 9-29. Speed Redundancy Manager

This page provides users with a screen from which to monitor the module's Speed Redundancy Manager functional logic's inputs, outputs, and current logic state. This screen is useful for validating system health and related logic operation.

- **Input Source:** Indicates the current speed value and where the value comes from. If the source is invalid, the word "INVALID" will appear in RED instead of the speed value**.**
- **Active Mode:** Indicates the redundancy mode(MEDIAN, HSS or LSS) used to set the output.
- **Diff Threshold:** The threshold for the "Diff Det" output.
- **Diff Time [ms]:** The time a difference must exist before setting "Diff Det" output to TRUE.
- **Output:** Result of a Median, HSS or LSS calculation on the inputs.
- **Trip:** TRUE if all of the used inputs have failed or if "Two Inputs Failed Action" is set to TRIP and two of the three used inputs have failed.
- **Diff Det:** TRUE if any two inputs are greater than Diff Threshold for Diff Time.

Monitor Acceleration Redundancy Manager Page

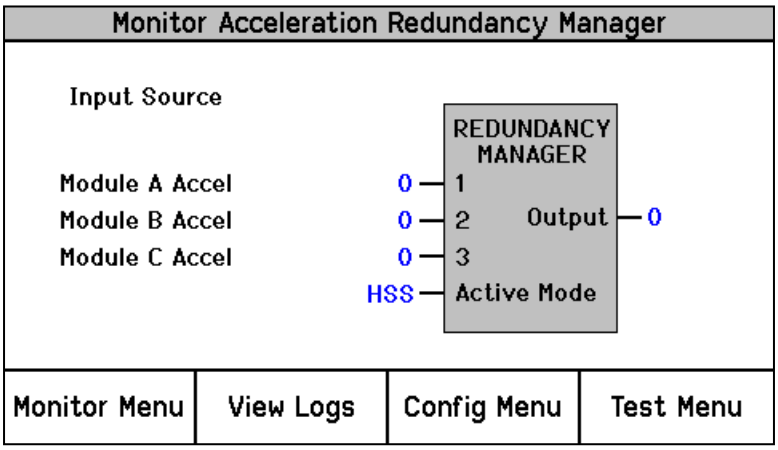


Figure 9-30. Acceleration Redundancy Manager

This page provides users with a screen from which to monitor the Acceleration Redundancy Manager functional logic's inputs, outputs, and current logic state. This screen is useful for validating system health and related logic operation.

- **Input Source:** Indicates the current speed value and where the value comes from. If the source is invalid, displays INVALID.
- **Active Mode:** Indicates the redundancy mode(MEDIAN, HSS or LSS) used to set the output.
- **Output:** Result of a Median, HSS or LSS calculation on the inputs.

Monitor Speed Fail Timer Page

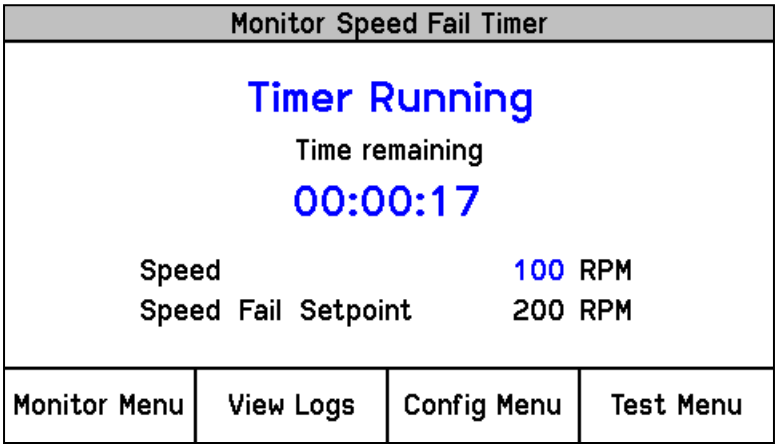


Figure 9-31. Monitor Speed Fail Timer

This page provides users information on the Speed Fail Timer function.

- **Timer Inactive:** This message indicates that the Speed Fail Timer function is not used or not started.
- **Timer Running:** This message indicates that the Speed Fail Timer is started and running. A "Time remaining gauge" is used to display the Speed Fail Timer value. The Speed Fail Timer function starts when the front panel START key is pressed or the module's Start discrete input first senses a closed contact state.
- **Timer Expired:** This message indicates that the Speed Fail Timer has reached its zero-time point.

  Note: The Speed Fail Timer function is reset by any reset command (front panel, discrete input or Modbus). If the Speed Fail Timer function is active, the Home screen will display the time remaining.

Speed Readout

This sub-menu item jumps to the “Home” page. This is useful when the home screen is configured to some page other than “Home”

Monitor Analog Output Page

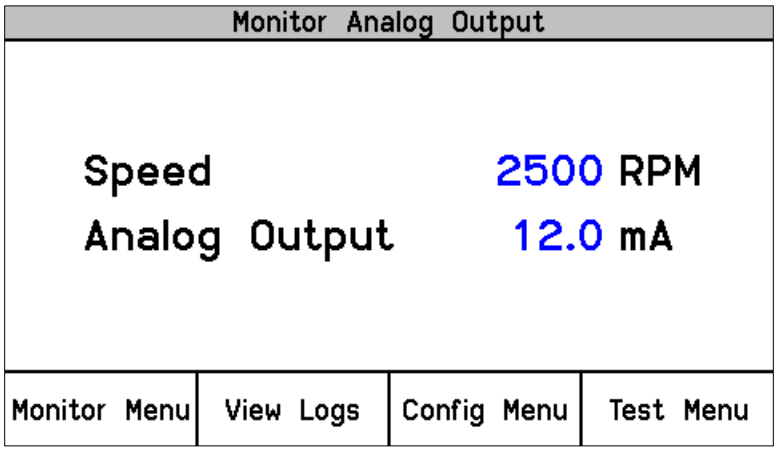


Figure 9-32. Monitor Analog Output

This page provides users information on the Speed Fail Timer function.

- **Speed:** This gauge displays the sensed/calculated speed being sensed by the module’s input speed channel.
- **Analog Output:** This gauge displays the current level being output from the module’s analog output channel.

Monitor Modbus Page

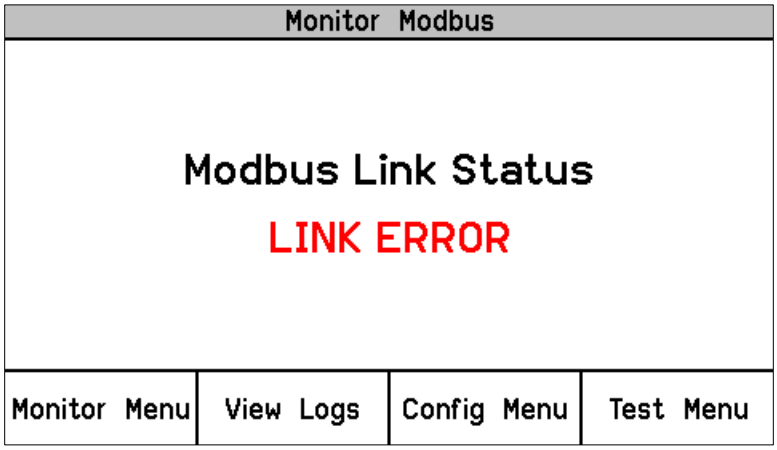


Figure 9-33. Monitor Modbus Status

This page provides users information on the status of the Modbus communications port.

- **Link OK:** This message indicates that Modbus requests are being received.
- **Link Error:** This message indicates that a Modbus request has not been received for 5 seconds.

Monitor/Set Date & Time Page

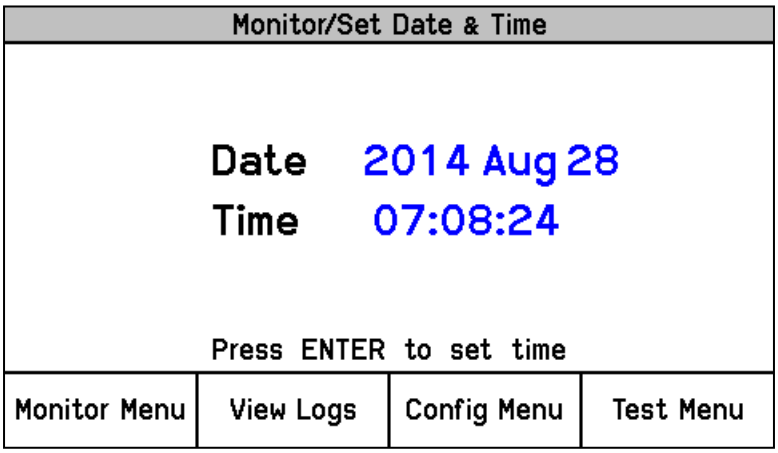


Figure 9-34. Monitor Date & Time

The page provides users the module's current date and time information and allows access for the setting of the modules time and date parameters. The module's time setting must be re-set for all local time changes (i.e. daylight savings time).

Time & Date Change Procedure

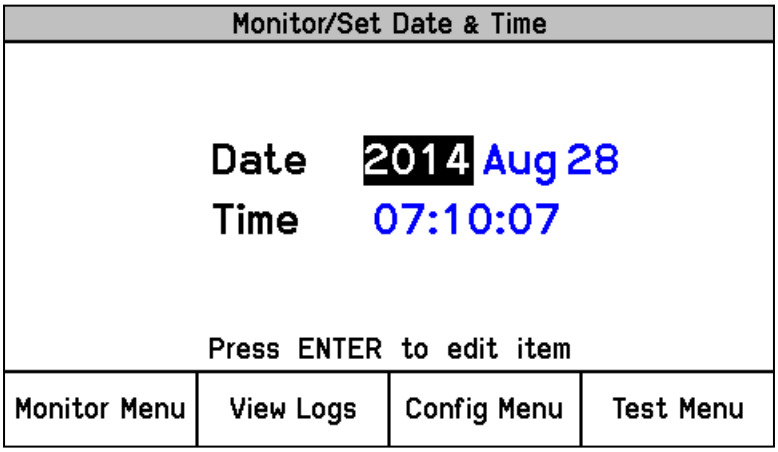


Figure 9-35a. Set Date & Time

1. From the Monitor/Set Date & time page press the "ENTER" key to edit/change the time or date settings. The field to be edited will then be highlighted.
2. Press the UP/DOWN/RIGHT/LEFT arrow keys to highlight the field to be edited.

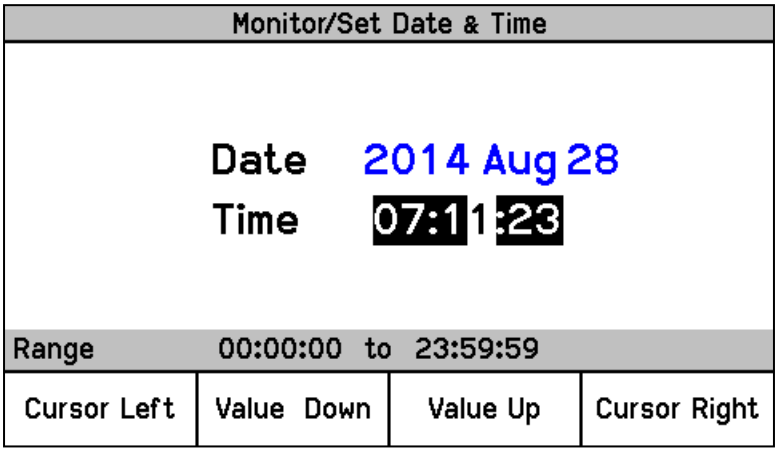


Figure 9-35b. Set Date & Time

3. Press the ENTER key to select the highlighted item to be edited and use the soft keys as indicated to adjust the value to the desired value.
4. Press the ENTER key to save the change or the ESC key to return the value to its original value.
5. Select and edit/change the other fields as required.

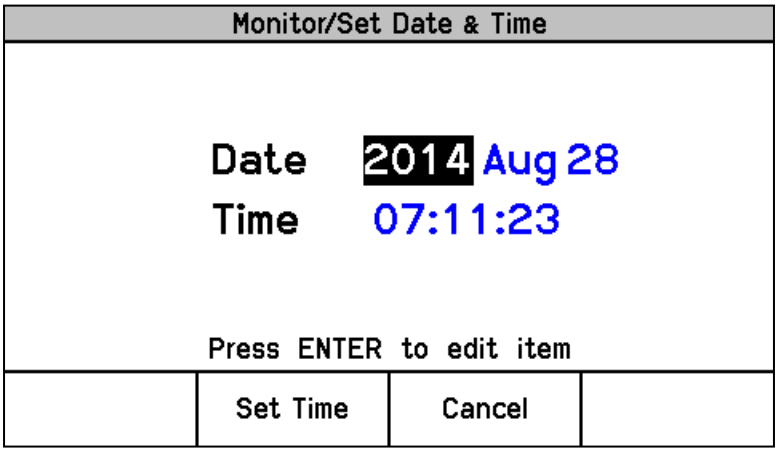


Figure 9-35c. Set Date & Time

6. Press the “Set Time” soft key to accept all date and time changes or press the “Cancel” soft key or the ESC key to reject all date and time changes.

Monitor System Status Page

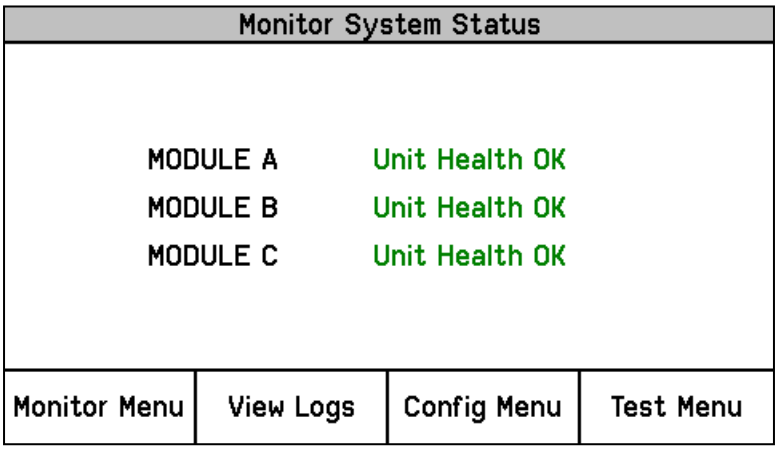


Figure 9-36. Monitor System Status

This page provides users the health status of all modules.

- **Unit Health Unknown:** This message indicates the status of the module is unknown due to one of the following reasons:
  - A module not properly installed.
  - A module to module network communication failure.
  - A front panel communication failure.
- **Unit Health OK:** This message indicates the module is operating properly.
- **Unit Health Bad:** This message indicates an internal module alarm is present due to one of the following reasons and should be repaired or replaced:
  - Module processor failure.
  - Module memory failure.
  - Module data bus failure.

Module Information Page

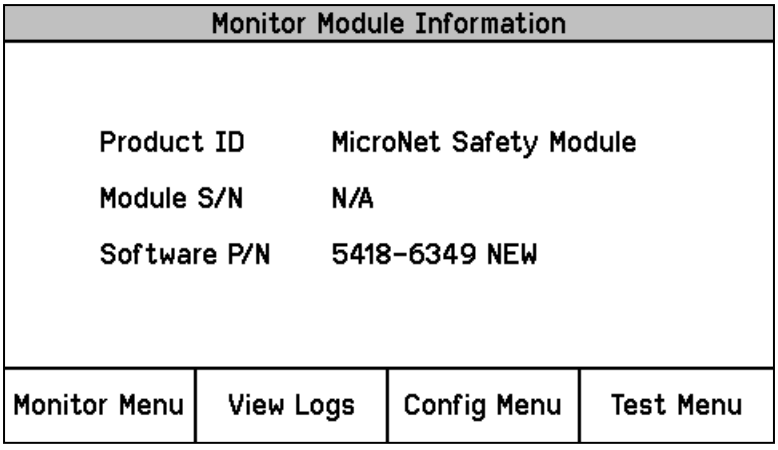


Figure 9-37. Monitor Module Information

This page displays the module's coded identification.

- **Product ID**: This gauge displays the module's hardware model.
- **Module S/N**: This gauge displays the module's hardware serial number.
- **Software P/N**: This gauge displays the module's software part number and revision.

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 (i.e. time/date is set).

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

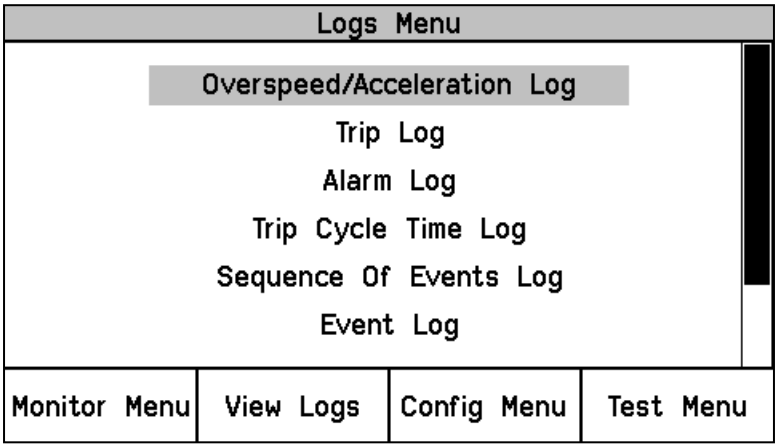


Figure 9-38. Logs Menu

From the screen press the “Up Arrow” and “Down Arrow” keys to highlight the desired Log screen to view. Pressing the “ENTER” key will then display the highlighted Log screen. The following log screens are available from the Logs Menu:

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

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

Overspeed/Acceleration Log Page

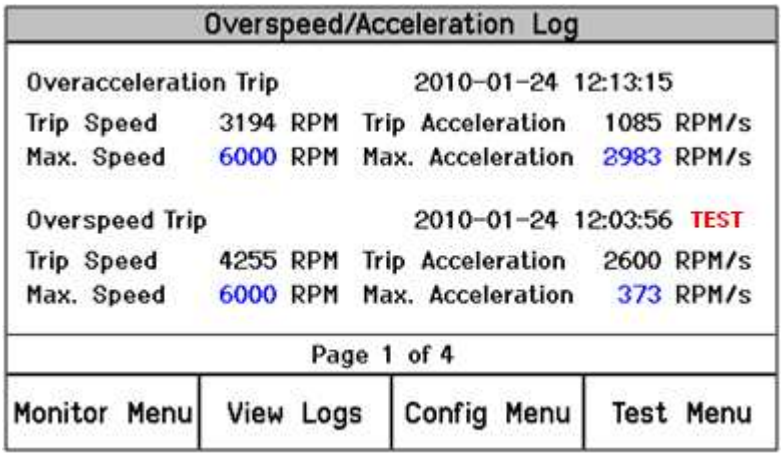


Figure 9-39. Overspeed/Over-acceleration Log

This page displays a log of all sensed and recorded overspeed or over-acceleration events and the associated information:

- Sensed speed and acceleration at the point of the event.
- Event date and time.
- Sensed maximum speed and acceleration reached after the trip.
- Indication if the module was in a test mode during the time the event was sensed and logged. The word “TEST” will appear next to the time in **RED** if the module was in test mode at the time of the logged event.

Trip Log Page

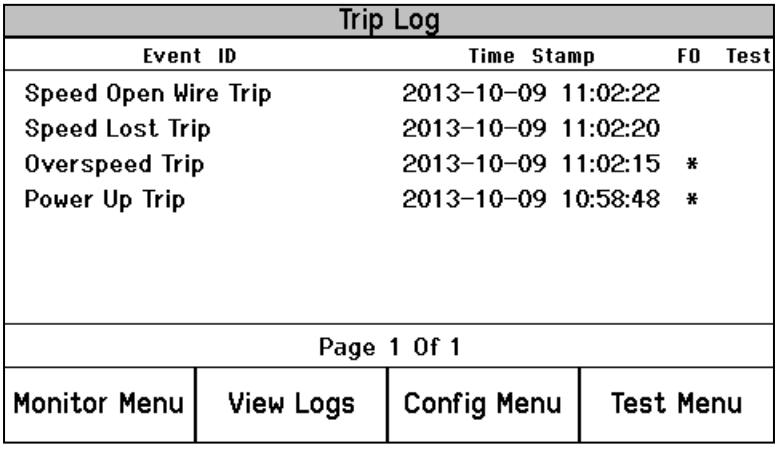


Figure 9-40. Trip Log

This page displays a log of all sensed and recorded trip events and the associated time and date stamp information.

First out indication and test information are indicated by a “●” symbol next to the recorded event in the respective column. A “●” symbol in the first-out (FO) column indicates the first event to cause the module to step to its tripped state. A “●” symbol in the Test column indicates that the event occurred while the module was in a test mode.

Alarm Log Page

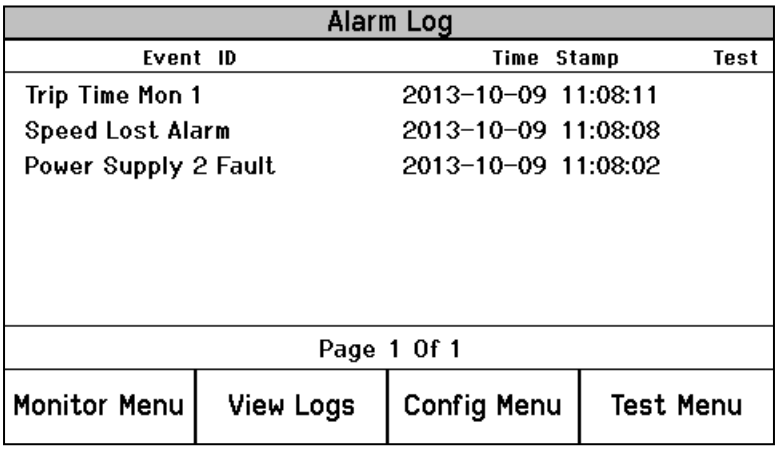


Figure 9-41. Alarm Log

This page displays a log of all sensed and recorded Alarm events and the associated time and date stamp information.

A "●" symbol in the Test column indicates that the alarm event occurred while the module was in a test mode.

Trip Cycle Time Log Page

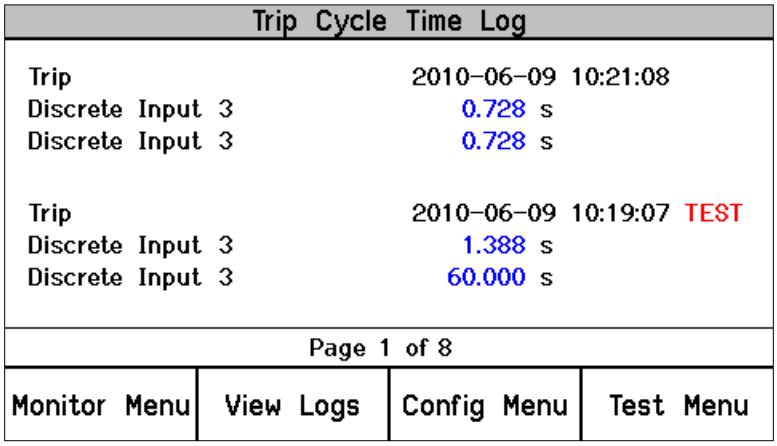


Figure 9-42. Trip Cycle Time Log

This page displays a log of all sensed and recorded Trip Cycle Time events and the associated information:

- Trip date and time.
- Time from the Trip event to the configurable input going true for Trip Cycle Time Monitor 1 and 2.
- Indication if the module was in a test mode during the time the event was sensed and logged. The word "TEST" will appear next to the time in **RED** if the module was in test mode at the time of the logged event.

Sequence of Events Log Page

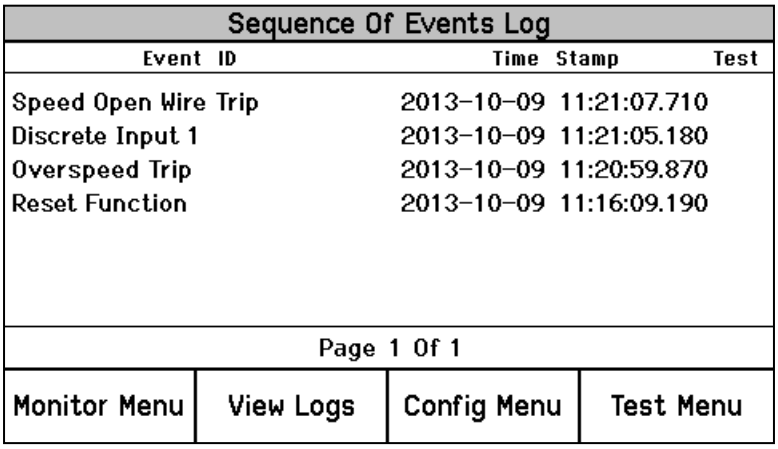


Figure 9-43. Sequence of Events Log

This page displays a log of configured events with up to 1 ms resolution and the associated time and date stamp information.

A "●" symbol in the Test column indicates that the event occurred while the module was in a test mode.

Event Log Page

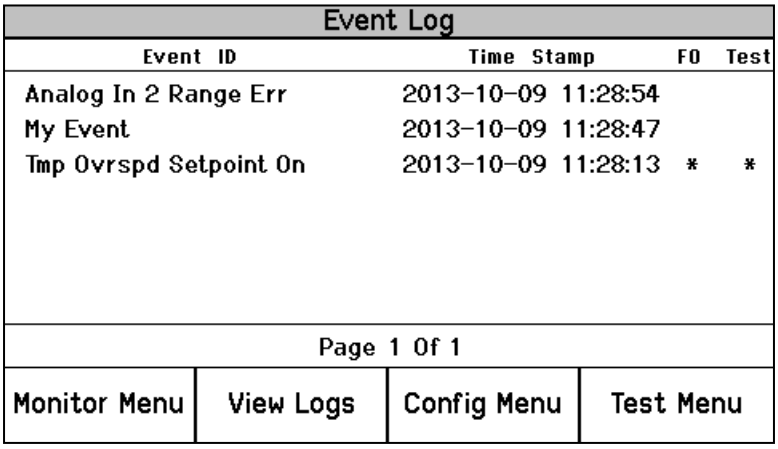


Figure 9-44. Event Log

This page displays a log of all sensed and recorded events and the associated time and date stamp information.

First out indication and test information are indicated by a "●" symbol next to the recorded event in the respective column. A "●" symbol in the first-out (FO) column indicates the first event to cause the event latch to go true. A "●" symbol in the Test column indicates that the event occurred while the module was in a test mode.

Peak Speed/Acceleration Log Page

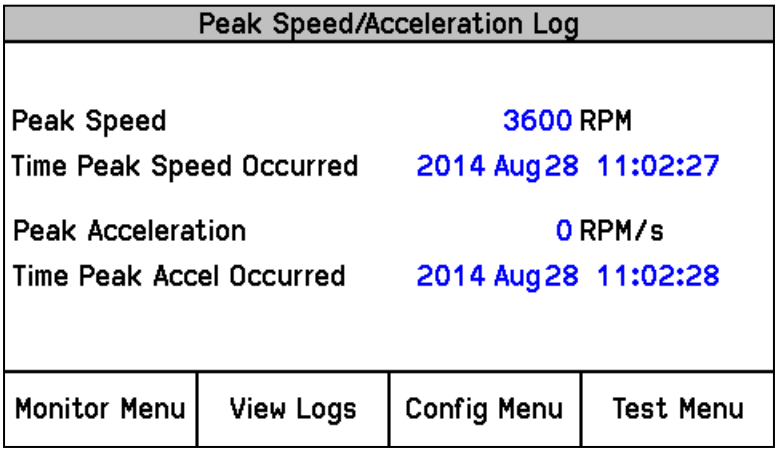


Figure 9-45. Peak Speed/Accel Log

This page displays a log of the peak sensed and recorded overspeed or over-acceleration levels sensed since the log was last reset and the associated time and date information.

Reset Logs Page

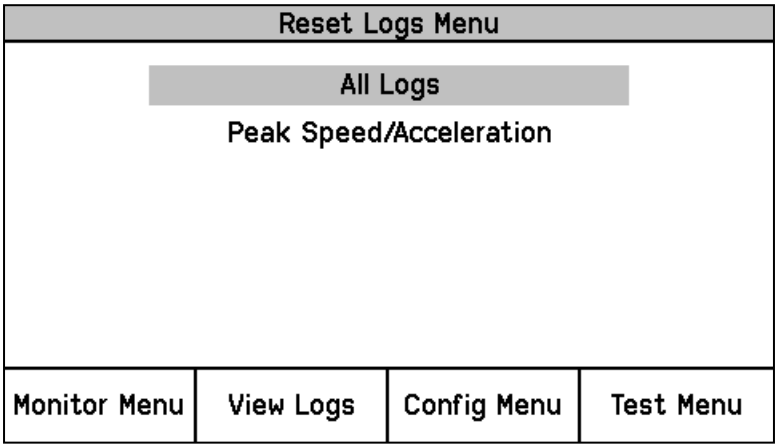


Figure 9-46. Reset Logs

This page allows the user to reset All Logs (Trip, Alarm, Event, Trip Cycle Time, Sequence Of Events, and Overspeed / Over-acceleration logs), or just the Peak Speed/Acceleration log.

Reset Log Procedure

1. Use the Up and Down arrows to select the “All Logs” or “Peak Speed/Acceleration” Reset function then press the ENTER key.
2. At the Prompt to “Reset Logs?” or “Reset Peak Speed/Acceleration”, press the Reset soft key to reset the respective logs or the Cancel soft key to exit this screen.
3. If the Reset soft key was pressed, 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 the Enter soft key to reset the log.

Chapter 10. Configuration of the MicroNet Safety Module via Front Panel

Introduction

Users can configure the MicroNet Safety Module using the following methods:

1. Configure each module separately from its front panel keypad. Only standard values can be configured from the front panel, such as speed, acceleration, analog output scaling, etc. The Programming and Configuration Tool (PCT) must be used to configure analog/discrete inputs, custom logic, and configurable latch inputs.
2. Configure one module from its front panel keypad or the PCT and copy the saved configuration file to the other two modules.
3. Use the provided PCT software program installed on a computer to create a configuration settings file then connect to one or all the modules and upload the configuration settings file to one module or all of the modules. Alternatively, if the configuration settings file is uploaded to only one module, the module-to-module “COPY” function can be used to copy the file to the other two modules.

For safety purposes a module must be in its “tripped” state to allow any configuration settings to be changed or downloaded.

IMPORTANT

Changing the configuration settings in the MicroNet Safety Module is permissible only in a trip condition. If the unit is not in a trip condition, configuration changes are inhibited. If no trip condition is present, the configuration save will ask if a trip is desired. A trip will only be allowed if the other modules are not tripped.

Editing Configuration Settings from the Front Panel

Once a valid password has been entered and the parameter setting is highlighted it can then be edited. If the parameter setting is a multi-digit value, a cursor indicates which digit or character is being edited. The front panel’s soft keys are used to change the respective 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 (e.g. ACTIVE or PASSIVE, TRIP or ALARM, DE_ENERGIZE TO TRIP OR ENERGIZE TO TRIP). After the correct parameter value has been edited pressing the ENTER key selects/accepts the edited parameter setting. Pressing the ESC key restores the value being edited back to its last entered value.

When a parameter setting that can be edited is highlighted, the Screen Message “Press ENTER to Edit value” appears. If the module is not Tripped and the ENTER key is pressed, the Screen Message “**Module must be in TRIPPED state to enter Configuration Mode. TRIP MODULE?**” appears and gives the user the option to TRIP or Cancel this request. If one of the other modules is already in a TRIPPED state then the unit will not accept the TRIP request, and a message of “Other modules must be running and not tripped” message will appear for a period of 5 seconds. If the module is in its Tripped state and the ENTER key is pressed, the Password Entry screen appears. When the correct Config Level Password is entered, the fields can be edited with the soft key selections.

Once a password has been successfully entered, it will remain in effect until the user exits the Configuration mode.

If an attempt is made to adjust a parameter setting outside of its permitted range, the value is changed to its closest valid value and the message “**LIMIT REACHED**” appears for 5 seconds.

Configure Menu Page

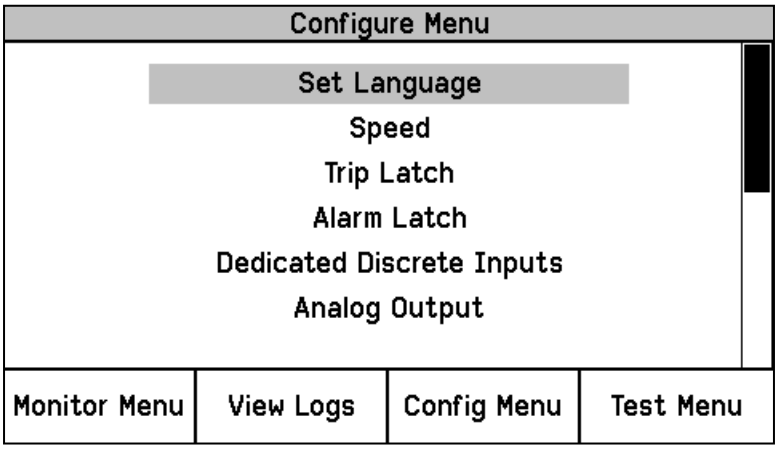


Figure 10-1. Configure Menu

Users can use the up or down scroll buttons to highlight the desired page then press the ENTER key to step to the selected page.

Configure Menu Page Descriptions

- **Set Language:** This page is used to select the language.
- **Speed:** This page is used to configure the module's Speed, Acceleration, Start Logic, Speed Redundancy, and Acceleration Redundancy settings.
- **Trip Latch:** This page is used to configure the module's Trip Latch function.
- **Alarm Latch:** This page is used to configure the module's Alarm Latch function.
- **Dedicated Discrete Inputs:** This page is used to configure the Reset, Start, and Speed Fail Override input sharing.
- **Analog Output:** This page is used to configure the module's Analog Output function.
- **Test Modes:** This page is used to configure the module's Test Routines.
- **Auto-Sequence Test:** This page is used to configure the Auto-Sequence Test Routine. This routine can only be configured from module A.
- **Configure Modbus:** This page is used to configure the module's Modbus communications.
- **Power Supply Alarms:** This page is used to configure the module's power supply alarm logic.
- **Display:** This page is used to configure the modules screen action when a trip occurs and what page is the Home page.
- **Configuration Management Menu:** This page is used to configure the module's Module-to-Module configuration settings, file comparison function and to access the module's CONFIGURATION COPY function.
- **Password Change Menu:** Used to configure the module's passwords.

Configuration Procedure

1. Module must be in its “tripped” state to make any configuration changes.
2. Select the “Config Menu” soft button.
3. Use the Up / Down function keys to select the desired category and press the ENTER key to select.
4. Use the Up / Down function keys to scroll to desired parameter setting then press the ENTER key to select.
5. If the module is not in the “Configuration” mode, the password entry screen will appear. Enter the configuration level password then press the ENTER key. See the password section of this manual for information on entering a password.
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 Down" or "Value Up: keys to change the highlighted value.
   c. Use the "Cursor Right" key to move to the right.
   d. Use "Select Left" or "Select Right" to select a different option.
7. Use the front panel’s UP/Down Keys and ESC / ENTER keys to navigate within all Config Menu pages to configure desired parameter settings.
8. After all desired parameters have been configured, press the HOME key to exit Configure Mode.
9. If any parameters were changed the module will display a “Save Configuration” screen (refer to below figure). At this point the user can press the respective soft button to choose the desired action:
   a. Save—This action saves any configuration changes, exits the configuration mode, then displays the Home screen.
   b. Discard—This action does not save any configuration changes, exits the Configuration mode, then displays the Home screen.
   c. Cancel—This action does not save any configuration changes, does not exit the Configuration mode, and displays the last viewed configuration screen.

NOTICE

Before putting the MicroNet Safety Module into operation, if the system had been designed such that all modules are required to have the exact same configuration it is recommended that the Configuration Compare routine be used to verify and confirm this is true.

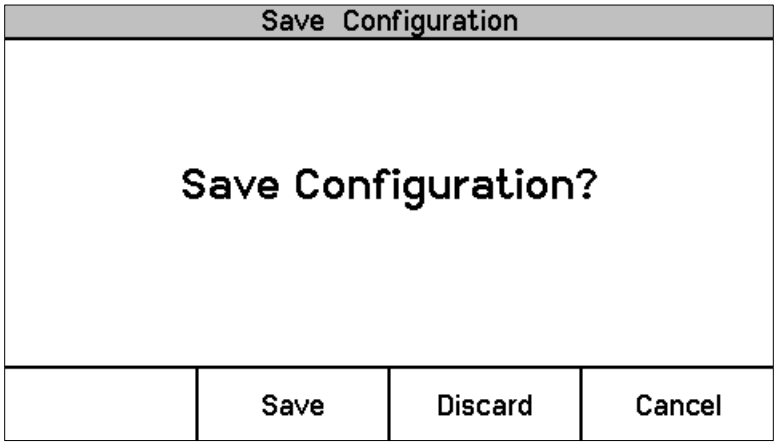


Figure 10-2. Save Configuration

Configure Language Page

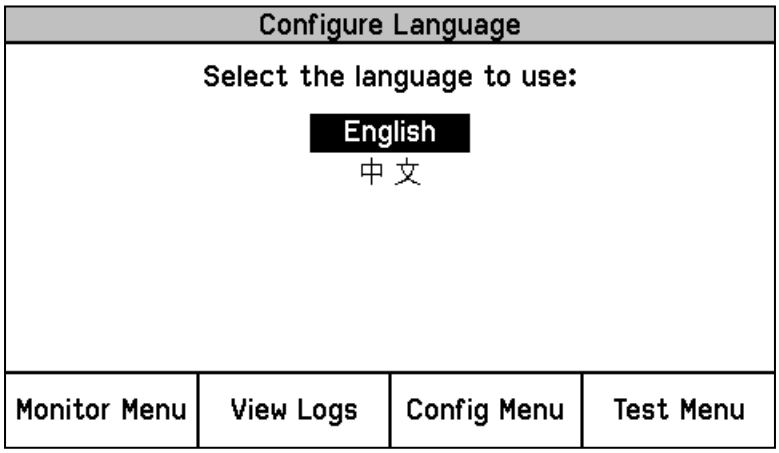


Figure 10-3. Configure Language

This page is used to configure the language used by the MicroNet Safety Module.

- **Select the Laguage to use:** Used to select the language. Language can only be configured from the front panel and cannot be configured from the Programming and Configuration Tool. The selected language is retained through a power cycle. Valid values: English or Chinese.

Configure Speed Submenu Page

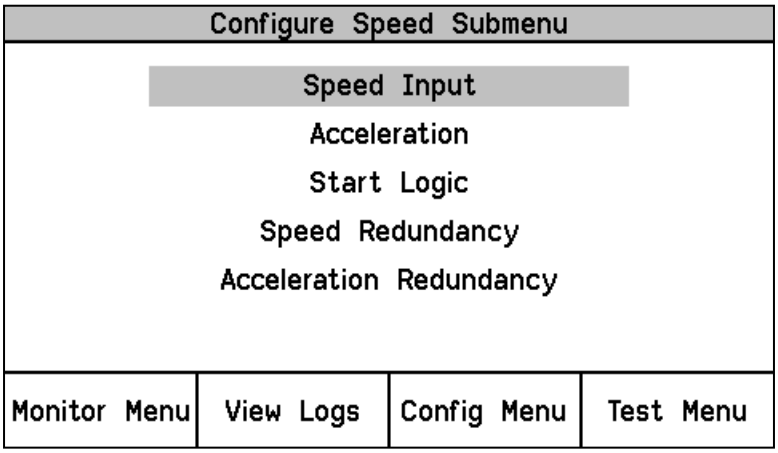


Figure 10-4. Configure Speed Submenu

- **Speed Input:** This page is used to configure the module's speed input and Overspeed Trip function settings.
- **Acceleration:** This page is used to enable and configure the module's over-acceleration trip function.
- **Start Logic:** This page is used to enable and configure the speed fail logic and speed fail override logic.
- **Speed Redundancy:** This page is used to configure the speed redundancy.
- **Acceleration Redundancy:** This page is used to configure the acceleration redundancy.

Configure Speed Input Page

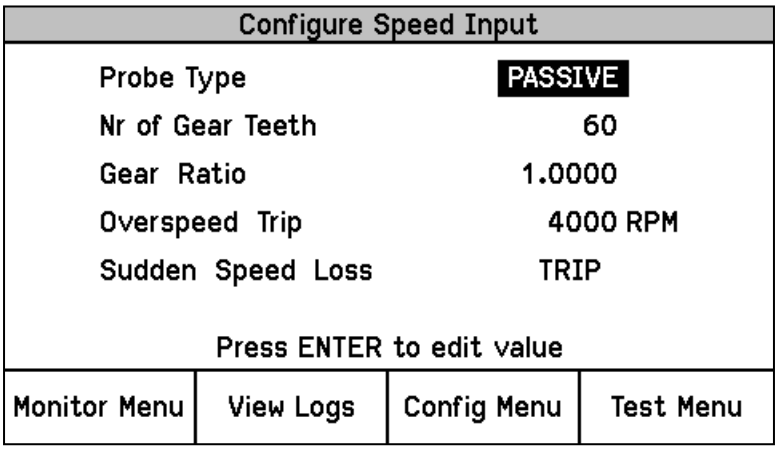


Figure 10-5. Configure Speed Input

This page is used to configure the Speed Input and Trip function.

- **Probe Type:** Used to select type of speed probe used. Valid values: NOT USED, PASSIVE, or ACTIVE.
- **Nr of Gear Teeth:** Used to set the number of teeth on the gear that the speed sensor is mounted. Valid values: 1-320.
- **Gear Ratio:** Used to set the ratio of the sensed-to-actual speed (sensor wheel/shaft speed). Valid values: 0.1-10.
- **Overspeed Trip:** Used to set the overspeed trip setpoint. Valid values: 0-32000 rpm. Frequency equivalent must not exceed 32000 Hz (configuration error).
- **Sudden Speed Loss:** Used to set the desired action when a sudden speed loss is detected. Valid values: TRIP or ALARM. If this function detects a frequency of 0 Hz and the previous sensed/sampled frequency level was over 100 Hz, then an alarm or trip command is given. This function is typically used to detect a failed speed sensor.

Configure Acceleration Page

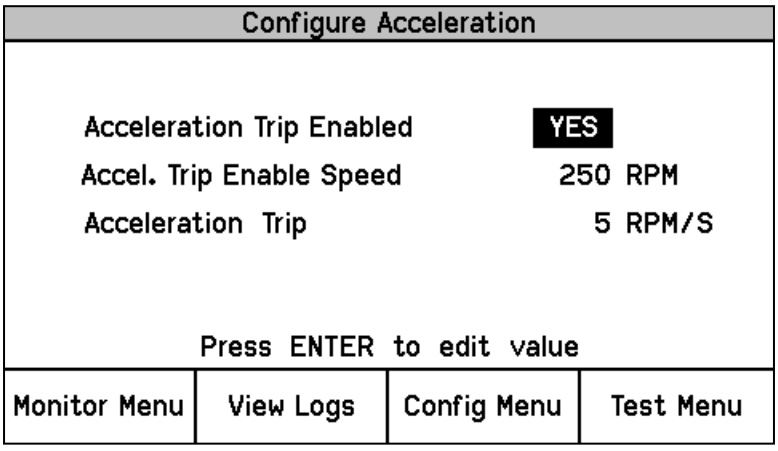


Figure 10-6. Configure Acceleration

This page is used to configure the Acceleration Trip function.

- **Enable Acceleration Trip:** Used to set to yes to enable Acceleration Trip function. Valid values: YES or NO.
- **Acceleration Trip Enable Speed:** Used to set the sensed speed level which the over-acceleration trip function is enabled / activated. Below this speed level the acceleration trip function is disabled. Valid values: 0-32000 rpm.
- **Acceleration Trip:** Used to set the over-acceleration trip setpoint in rpm/second. Valid values: 0-25000 rpm/s.

Configure Start Logic Page

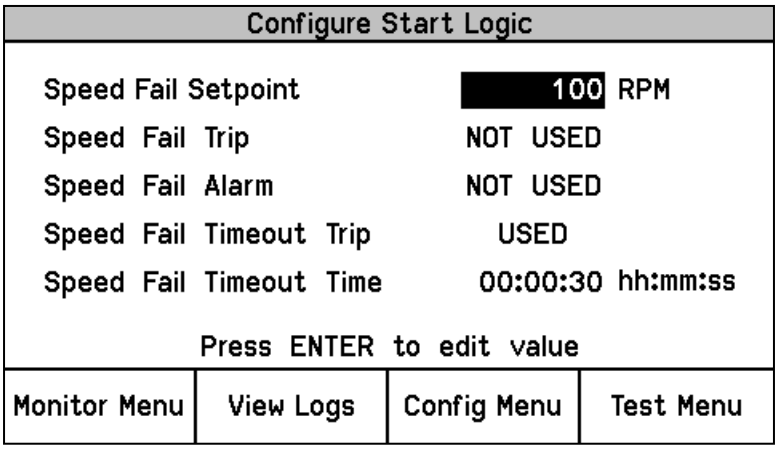


Figure 10-7. Configure Start Logic

This page is used to configure the Start Logic function.

- **Speed Fail Setpoint:** Used to set the speed setpoint below which the speed signal is considered failed. Valid values: 0-25000 rpm. This setpoint is used to detect a failed speed sensor.
- **Speed Fail Trip:** Used to enable the Speed Fail Trip function. When configured for “USED” action, a speed failed trip command will be given to the module’s Trip Latch function when speed is below the Speed Fail Setpoint and the Speed Fail Override discrete input is not closed. Valid values: NOT USED or USED. Typically used to detect a failed speed sensor.
- **Speed Fail Alarm:** Used to enable the Speed Fail Alarm function. When configured for “USED” action, a speed failed trip command will be given to the module’s Alarm Latch function when speed is below the Speed Fail Setpoint and the Speed Fail Override discrete input is not closed. Valid values: NOT USED or USED. Typically used to detect a failed speed sensor.
- **Speed Fail Timeout Trip:** Used to enable the Speed Fail Timeout Trip function. When configured for “USED” action, this function issues a trip command to the module’s Trip Latch function when speed is below Speed Fail Setpoint and the Speed Fail Timeout Time expires. Valid values: NOT USED or USED.
- **Speed Fail Timeout Time:** Used to set the period of time between when a “Start” command has been issued and a Speed Fail Timeout Trip command is given to the Trip Latch function. Valid values: 1-28800 seconds.

Configure Speed Redundancy Manager Page

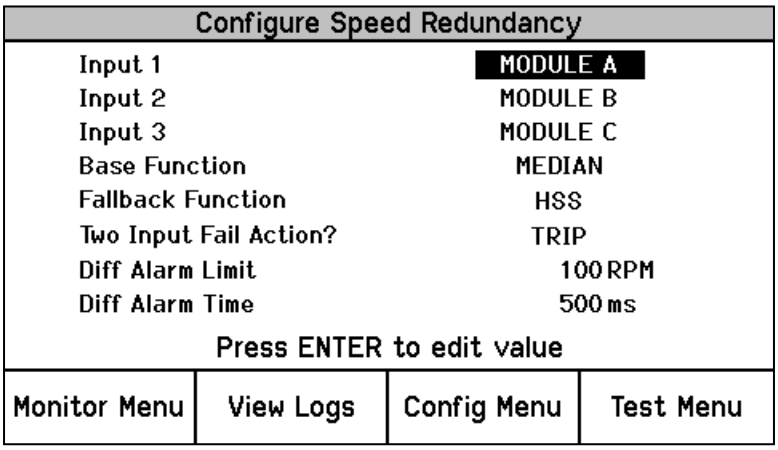


Figure 10-8. Configure Speed Redundancy Manager

This page is used to configure the Speed Redundancy Manager.

- **Input 1-3:** Used to specify the source of the speed signal. Valid values: MODULE A, MODULE B, MODULE C or NOT USED.
- **Base Redundancy Mode:** Used to select the criteria for redundancy. Valid values: MEDIAN, LSS (Low Signal Select), or HSS (High Signal Select).
- **Fallback Redundancy Mode:** Used to select the criteria for redundancy when only two of three speed signals are valid. Valid values: HSS or LSS.
- **Two Inputs Failed Action:** Used to select the action when two speed signals have failed. Valid values: TRIP or NO TRIP.
- **Difference Alarm Threshold:** Used to set the amount the speeds can differ before the Difference Alarm is set. Valid values: 0–32000 rpm.
- **Difference Alarm Time:** Used to set the time the Speed Difference Alarm can exist before the difference alarm is set. Valid values: 4–10000 milliseconds.

Configure Acceleration Redundancy Manager Page

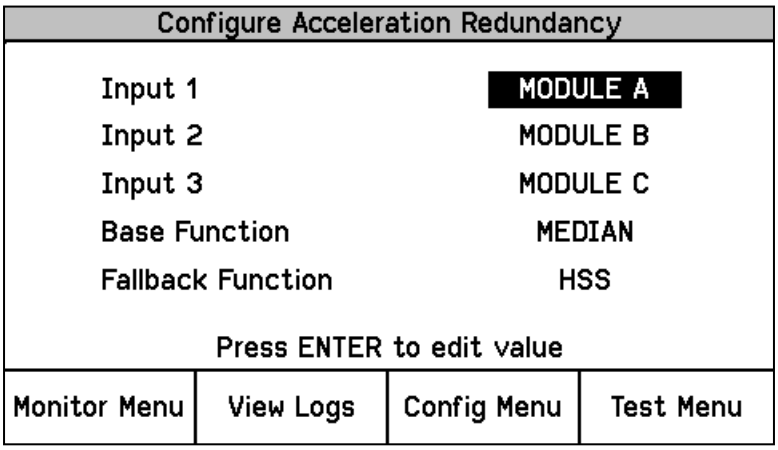


Figure 10-9. Configure Acceleration Redundancy Manager

This page is used to configure the Acceleration Redundancy Manager.

- **Input 1-3:** Used to specify the source of the acceleration signal. Valid values: MODULE A, MODULE B, MODULE C or NOT USED.
- **Base Redundancy Mode:** Used to select the criteria for redundancy. Valid values: MEDIAN, LSS (Low Signal Select), or HSS (High Signal Select).
- **Fallback Redundancy Mode:** Used to select the criteria for redundancy when only two of three acceleration signals are valid. Valid values: HSS or LSS.

Configure Trip Latch Page

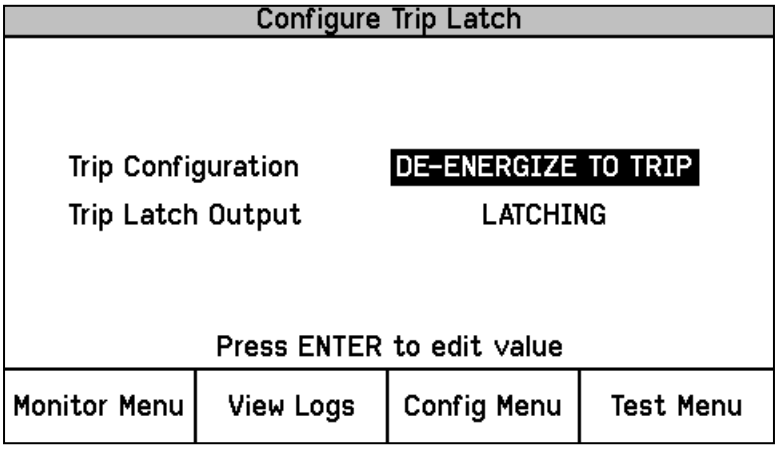


Figure 10-10. Configure Trip Latch

This page is used to configure the different actions of the Trip Latch function.

- **Trip Configuration**: This setting is used to change the action of the Trip Latch (ENERGIZE TO TRIP or DE-ENERGIZE TO TRIP).

- **Trip Latch Output:** This setting is used to configure how the trip latch output responds to a “Reset” command.
  - If configured for “LATCHING” action, the Trip Latch function will latch to a true state if any Trip Latch input signal goes true then back false. When configured for this action a “Reset” command must be given to reset (un-latch) the Trip Latch function’s output.
  - If configured for “NON-LATCHING” action, the Trip Latch function will not latch to a true state if any Trip Latch input signal goes true then back false. When configured for this action if all input signals to the Trip Latch function are false the latch output signal will be false. A Reset command is not required to change the Trip Latch’s output signal to its false state.

Configure Alarm Latch Page

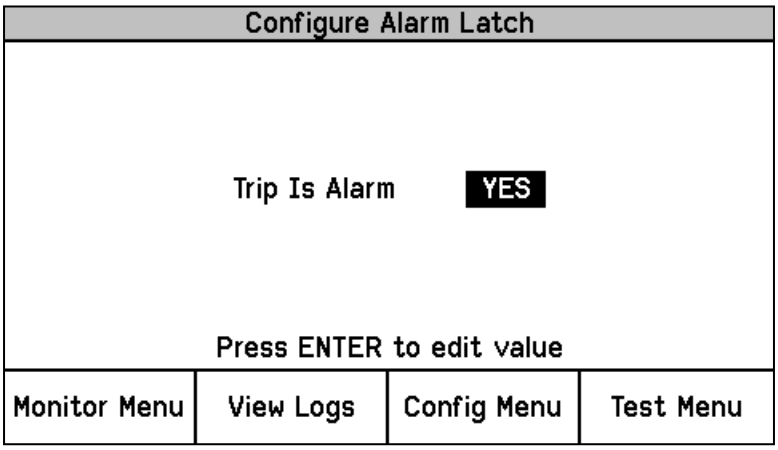


Figure 10-11. Configure Alarm Latch

This page is used to configure the Alarm Latch function.

- **Trip is Alarm:** This setting is used to include the module's trip state into the module's Alarm Latch logic. This capability allows any module trip to be indicated as a module Alarm condition also.

Configure Dedicated Discrete Submenu Page

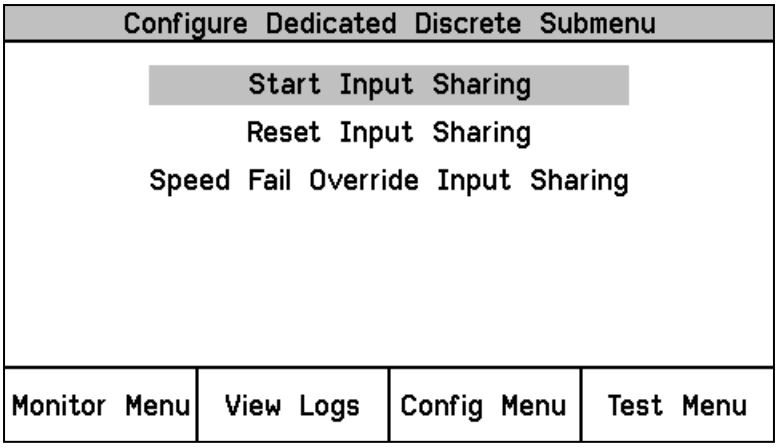


Figure 10-12. Configure Dedicated Discrete Submenu

- **Start Input Sharing:** This page is used to configure the start input sharing.
- **Reset Input Sharing:** This page is used to configure the reset input sharing.
- **Speed Fail Override Input Sharing:** This page is used to configure the speed fail override input sharing.

Configure Start Input Sharing Page

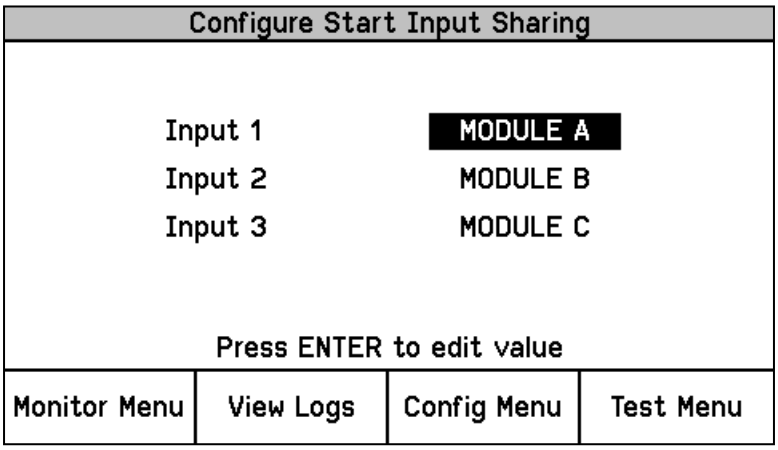


Figure 10-13. Configure Start Input Sharing

This page is used to configure what other modules can provide a Start signal.

- **Input 1-3:** Used to specify the source of the start signal. Valid values: MODULE A, MODULE B, MODULE C or NOT USED.

Configure Reset Input Sharing Page

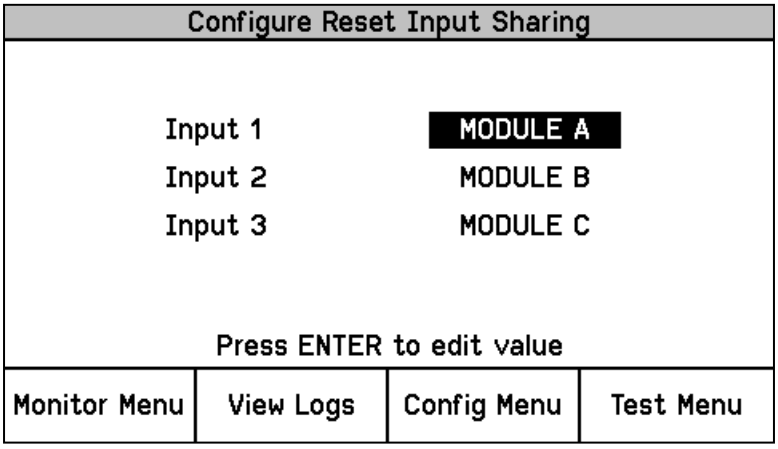


Figure 10-14. Configure Reset Input Sharing

This page is used to configure what other modules can provide a Reset signal.

- **Input 1-3:** Used to specify the source of the Reset signal. Valid values: MODULE A, MODULE B, MODULE C or NOT USED.

Configure Speed Fail Override Input Sharing Page

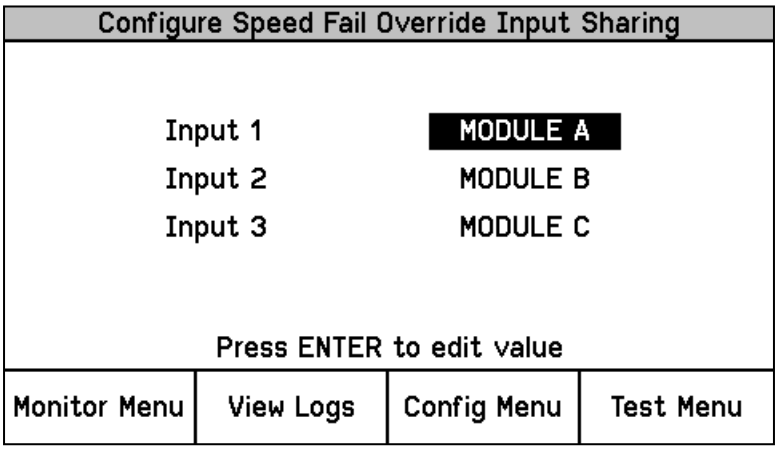


Figure 10-15. Configure Speed Fail Override Input Sharing

This page is used to configure what other modules can provide a Speed Fail Override signal.

- **Input 1-3:** Used to specify the source of the Speed Fail Override signal. Valid values: MODULE A, MODULE B, MODULE C or NOT USED.

Configure Analog Output Page

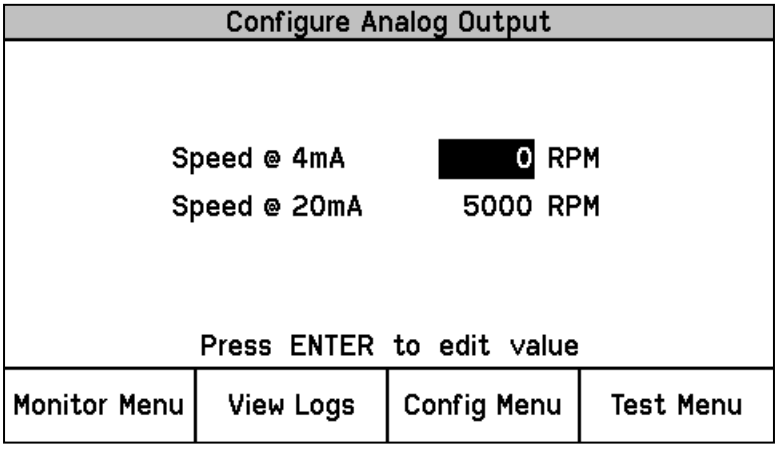


Figure 10-16. Configure Analog Output

This page is used to configure the module's analog output to the device (meter, DCS input, etc.) it is connected to.

- **Speed @ 4 mA:** This setting is used to configure the speed value which corresponds to the output's 4 mA current level. Valid values: 0-32000 RPM.
- **Speed @ 20 mA:** This setting is used to configure the speed value which corresponds to the output's 20 mA current level. Valid values: 0-32000 RPM.

Configure Test Modes Page

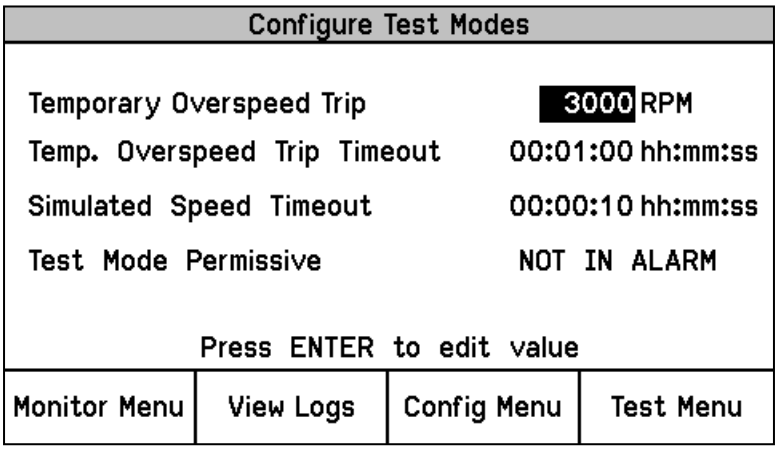


Figure 10-17. Configure Test Modes

This page is used to configure the module's Temporary Test mode, Auto/Manual Test mode timeout, and Test Mode Permissive.

- **Temporary Overspeed Trip:** This setting is used to set the Temporary Overspeed Trip Setpoint level that the overspeed trip setpoint will be changed to while the Temporary Overspeed Trip Test is active. Valid values: 0-32000.
- **Temp. Overspeed Trip Timeout:** This setting is used to set how long the module will stay in this test mode, before aborting the test. Valid values:
  0-1800 seconds.
- **Simulated Speed Timeout:** This setting is used to set how long the unit will stay in the Auto or Manual Simulated Speed Test, before aborting the test. Valid values: 0-30 minutes.
- **Test Mode Permissive:** This setting is used to prevent any of the module's overspeed test modes from being enabled when any module is in a tripped state, alarm state, or running a test. Valid choices are: "NONE" (i.e., No permissive), "NOT TRIPPED" (i.e., Module not tripped and not running a test), "NOT IN ALARM" (i.e., Module not tripped, not in alarm, and not running a test).

Configure Auto-Sequence Test Page

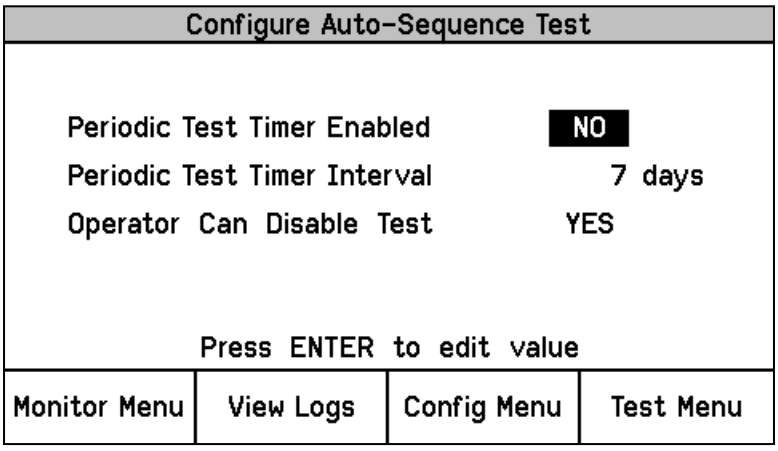


Figure 10-18. Configure Auto-Sequence Test

This page is used to configure the Auto-Sequence Test mode. Note that module “A” is the first module tested in this function, next is module “B”, then finally module “C”.

- **Periodic Test Timer Enabled:** This setting is used to enable the Auto-Sequence Test function to be performed on a periodic basis. When set to “Yes” the Auto-Sequence Test routine will be performed periodically based on the Periodic Test Timer interval setting. When enabled, this timer starts at power-up. Valid values: YES or NO.
- **Periodic Test Timer Interval:** This setting is used to set the time interval/period between when an Auto-Sequence Test function is periodically performed. Valid values: 1–999 days.
- **Operator can disable test:** This setting is used to allow operators/users to temporarily disable the Auto-Sequence Test function from being performed. The test disable/enable command options are available from the front panel’s Auto-Sequence Test operation screen. When this setting is set to “No” then an operator/user cannot manually disable this test from being performed. Valid values: YES or NO.

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

Configure Modbus Page

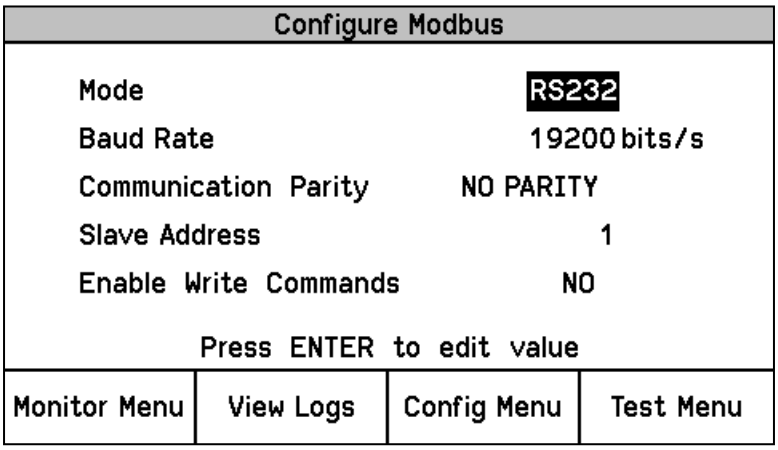


Figure 10-19. Configure Modbus

This page is used to configure the module’s Modbus communications port.

- **Mode:** This setting is used to select the serial communication mode used by the module’s serial communications port. Valid values: RS-232 or RS-485.
- **Baud Rate:** This setting is used to set the serial data rate used by the module’s serial communications port. Valid values: 19200, 38400, 57600, or 115200 bits/second.
- **Communication Parity:** This setting is used to enable and set the parity value used by the module’s serial communications port. Valid values: NO PARITY, EVEN PARITY, or ODD PARITY.
- **Slave Address:** This setting is used to set the unique slave address used by the module’s serial communications port. If all three modules are connected to the same network, each will require a unique address. Valid values: 1-247.
- **Enable Write Commands:** This setting is used to enable or disable Modbus “Write” commands to be written to the MicroNet Safety Module (e.g. Reset command, Initiate User-def Test 1 command, etc.). See Monitor and Control section in Modbus chapter for more information. When this setting is set to “NO”, the module’s serial Modbus communication port can only be used for monitoring values. Valid values: YES or NO.

Configure Power Supply Alarms Page

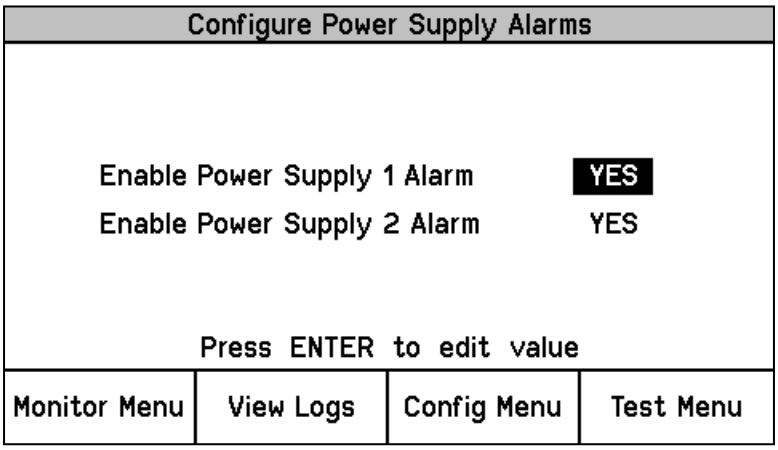


Figure 10-20. Configure Power Supply Alarms

This page is used to enable or disable the respective power supply input failed alarms.

- **Enable Power Supply 1 Alarm:** This setting is used to enable or disable the module's Failed Power Supply 1 Alarm. Valid values: YES or NO.
- **Enable Power Supply 2 Alarm:** This setting is used to enable or disable the modules Failed Power Supply 2 Alarm. Valid values: YES or NO.

For reliability purposes it is always recommended that two power sources be connected to each module . However, if two redundant power sources are not available, users can disable either alarm.

Configure Display Page

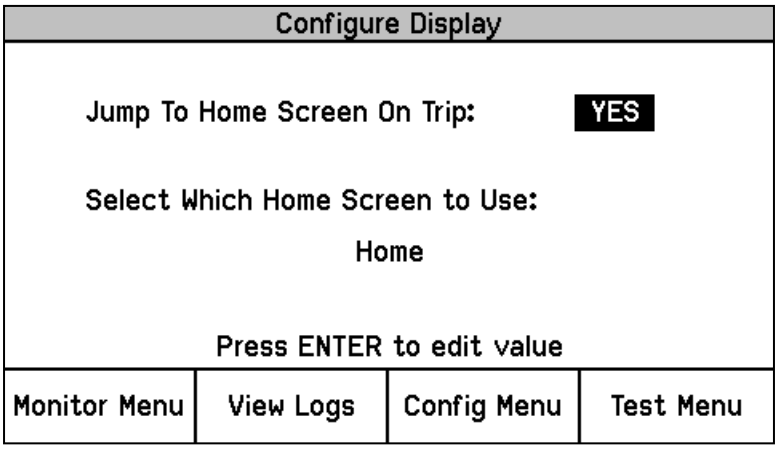


Figure 10-21. Configure Display

This page is used configure the Home screen action.

- **Home Screen On Trip Option:** This setting is used to configure the action of the display upon sensing an alarm or trip condition. If configured “Yes” the module’s display will automatically display the configured “Home Screen” upon sensing a trip condition. If configured “NO”, the module’s display will not change upon a sensed trip condition. During system troubleshooting it may be useful to temporarily set this setting to “NO” to allow other screens to be viewed during a trip event. Valid values: YES or NO.
- **Home Screen:** This setting is used to select the home screen. This is the screen the unit will display when a trip occurs if the above action is configured YES, when the HOME key is pressed, or when powered up. Valid values:

Table 10-1. Home Screen Valid Values

Home	System Status
Monitor Summary	Module Information
Monitor Summary Config Inputs	Overspeed/Acceleration Log
Monitor Summary Prog Relays	Trip Log
Trip Latch	Alarm Log
Alarm Latch	Trip Cycle Time Log
Event Latch	Event Latch
Trip Cycle Time Monitors	Peak Speed/Acceleration Log
Dedicated Discrete Inputs	Analog Comparator 1-15
Configurable Inputs 1-10	Logic Gate 1-50
Programmable Relays	Timer 1-5
Speed Input	Latch 1-10
Speed Redundancy Manager	Delay 1-25
Accel Redundancy Manager	Unit Delay 1-10
Speed Fail Timer	Analog Redundancy Manager 1-15
Analog Output	Boolean Redundancy Manager 1-15
Modbus	Lag 1-10
Date & Time	Difference Detection 1-15

Configuration Management Menu Page

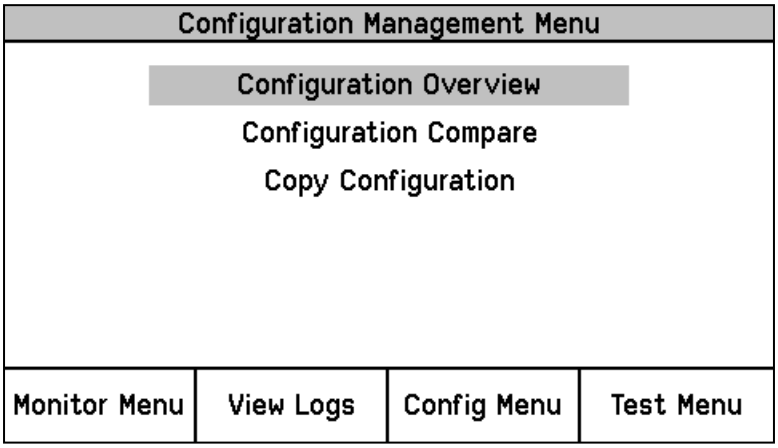


Figure 10-22. Configuration Management Menu

This page is used to select the Configuration Overview, Configuration Compare or the Copy Configuration pages.

- **Configuration Overview:** This page displays the saved setting file's CRC checksum values.
- **Configuration Compare:** This page allows users to enable or disable the Module to Module Configuration compare alarm.
- **Copy Configuration:** This page allows users to verify if the module's configuration settings file matches the other module's configuration settings files and allows the user to copy the configuration to another module.

Configuration Overview Page

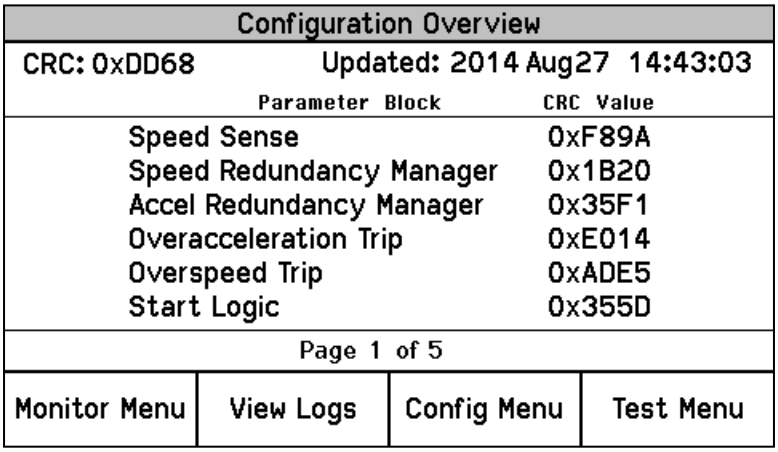


Figure 10-23. Configuration Overview

This page displays the saved setting file's Cyclic Redundancy Check (CRC) values used to verify the module's stored configuration settings file matches either the other modules' configuration settings file or the file saved onto or downloaded from the computer. The displayed CRC values can also be used to verify if specific logic has or has not been changed. If the module's CRC values are different, this indicates that the module's configuration settings are different.

The overall module's calculated CRC value is shown in the upper left corner of the Configuration Overview page and can be different between modules as the Home Screen setting, Home Screen on Trip setting, Password settings, and Modbus slave addresses are expected to be different between modules.

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

Note that passwords are not included in the configuration and are therefore not compared or copied between modules.

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.

Configure Configuration Compare Page

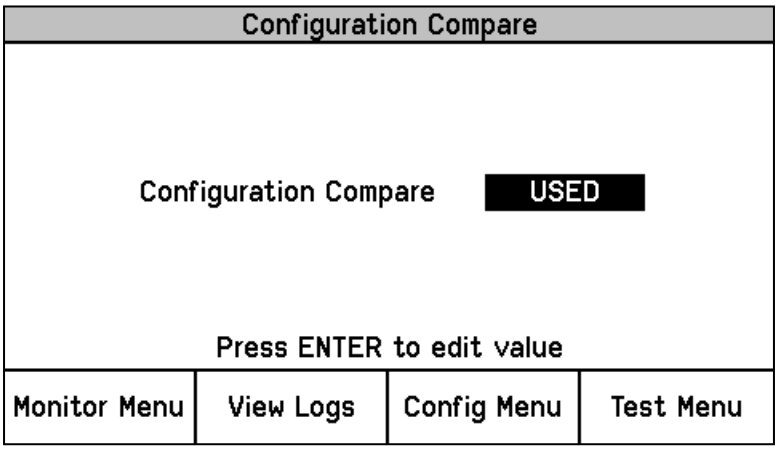


Figure 10-24. Configuration Compare

This page is used to configure module's configuration compare function.

- **Configuration Compare:** This setting is used to enable or disable the Module to Module Configuration compare alarm. When enabled/used this function compares the configuration of the current module against the other two modules and generates an alarm if there is a difference. Valid values: USED or NOT USED.

  If each of the modules is deliberately configured differently to meet a specific application's requirements, then this setting should be set to NOT USED.

The Configuration Compare function only compares the specific logic CRC calculations between modules and will not alarm when the overall CRC's are different between modules. This is because the module's overall CRC calculation can be different between modules as the Home Screen setting, Home Screen on Trip setting, Password settings, and Modbus slave addresses are expected to be different between modules.

Configuration Copy Page

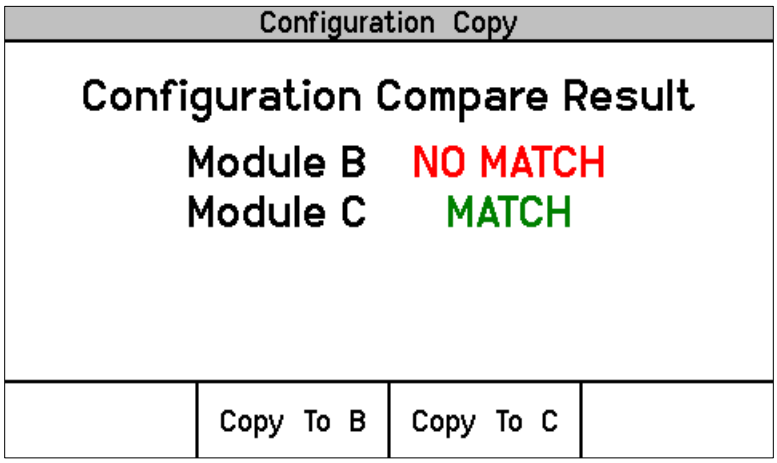


Figure 10-25a. Configuration Copy

This page allows users to verify if the module's configuration settings file matches the other module's configuration settings files and allows the user to copy the configuration to another module.

- **Copy to "X":** Allows users to copy a module's configuration settings file to one of the other two MicroNet Safety Modules. This copy function copies all configuration file settings except the Home Screen setting, Jump To Home Screen On Trip setting, Password settings, and Modbus slave address setting.

If the Configuration Compare function is configured to "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.

The Configuration Copy screen will display the current configuration status of the other two modules. The possible status indications are as follows:

a. **MATCH**—Indicates that the target module already has the same configuration as the current module.
b. **NO MATCH**—Indicates that the target module does not have the same configuration as the current module.
c. **UNKNOWN**—Indicates that the target module's Configuration Compare function is not enable, or that the module is missing, powered off, or the module-to-module CAN communications network is not functioning. Verify that the target module is in its tripped state to accept the configuration. Note that the current module can be either in its tripped, or not-tripped state during this procedure.

Configuration Copy Procedure

1. Verify that the Configuration Compare function is enabled on both the local and target module(s). If the Configuration Compare function is configured to "NOT USED" on the current module, selecting Copy Configuration will bring up the following screen:

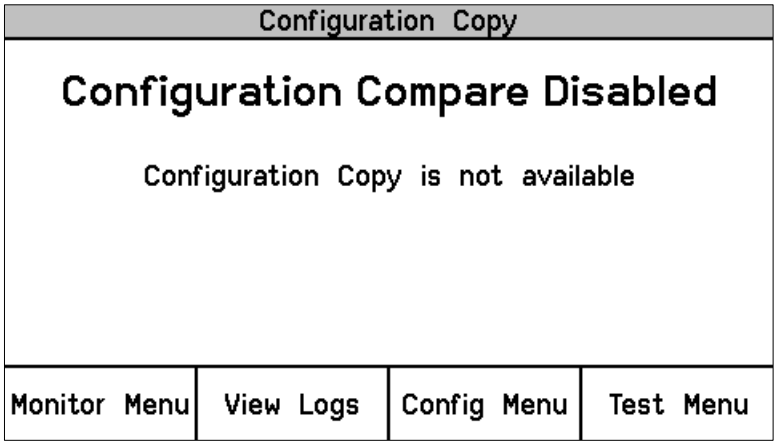


Figure 10-25b. Configuration Copy

2. Press the "Copy to X" soft button to initiate copy routine to the respective module.
3. When the Password Entry screen is displayed, enter the configuration level password and press the ENTER key.
4. The screen will then temporarily display a "Copying Configuration To Target…" message, then a "Done Saving Target Configuration" message.
5. The Configuration Copy page with then indicate a "MATCH" status between the local module's configuration settings files and the respective module that was copied to.

Password Change Menu Page

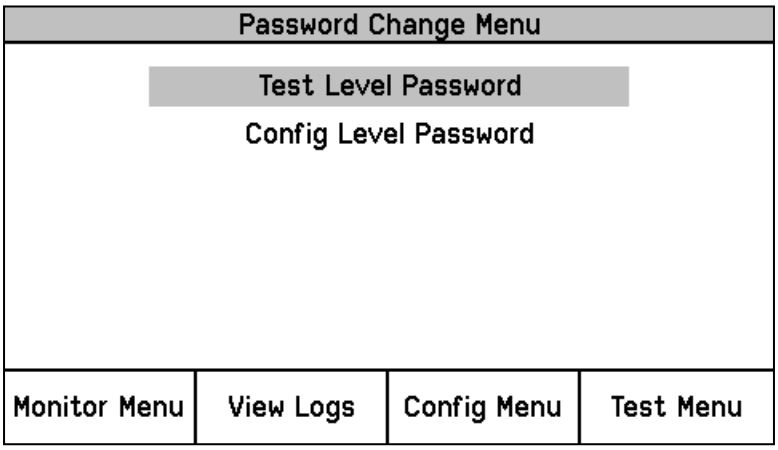


Figure 10-26. Password Change

This page is used to select either the Test or Configuration Level password configuration pages.

- **Test Level Password:** This setting is used to set the Test Level password which is required to be correctly entered before the following can be performed:
  - Initiate any module test from the front panel.
  - Reset any module's log file
    Note: The Peak Speed/Acceleration Log can only be reset with the Config Level password).
  - Change a module's Test Level Password.
- **Config Level Password:** This setting is used to set the Config Level password which is required to be correctly entered before the following can be performed:
  - Change any module configuration setting from the front panel.
  - Change any module configuration setting from the PCT program or upload a configuration file into a module.
  - Reset a module's Peak Speed/Acceleration Log.
  - Change a module's Config Level Password.

Both the Test and Config level passwords meet NERC (North American Electric Reliability Corporation) cyber security requirements.

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 entering the current password, press the ENTER key.
5. The user must now enter 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 Down"or "Value Up" keys to change the highlighted value.
   c. Use the "Cursor Right" key to move the highlighted character to the right.
6. Once the new password has been selected press the ENTER key to save it.
7. A message will appear to confirm that the password has been changed.

Default Test Level Password: AAAAAA (as shipped from factory)
Default Config Level Password: AAAAAA (as shipped from factory)

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

Chapter 11.
Test Routines

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.

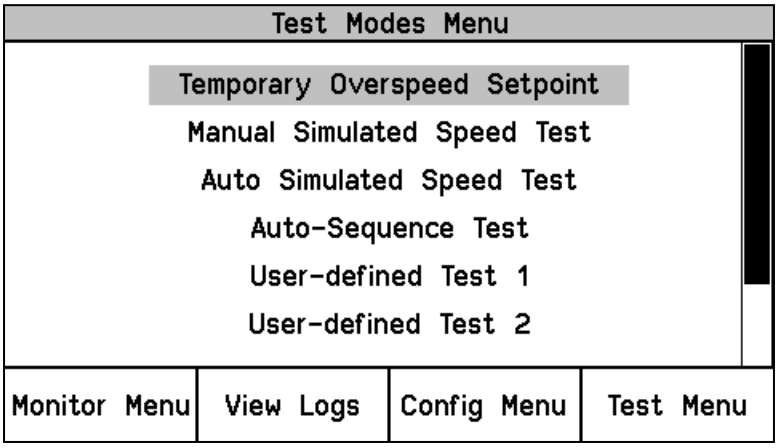


Figure 11-1. Test Modes Menu

The MicroNet Safety Module is equipped with several internal test routines to verify that the system is working correctly. The Test Modes Menu contains the following tests:

- **Temporary Overspeed Setpoint:** This page allows users to initiate the Temporary Overspeed Setpoint test function.
- **Manual Simulated Speed Test:** This page allows users to initiate the Manual Simulated Speed Test function.
- **Auto Simulated Speed Test:** This page allows users to initiate the Auto Simulated Speed Test function.
- **Auto-Sequence Test:** This page allows users to initiate the Auto-Sequence Test function.
- **User Defined Test 1, 2 & 3:** This page allows users to initiate custom test routines.
- **Lamp Test:** This page allows users to initiate the Lamp Test function.

Temporary Overspeed Setpoint Test

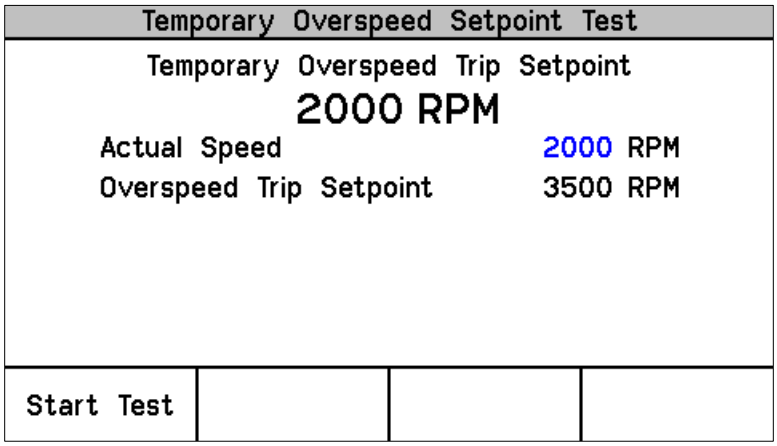


Figure 11-2a. Temporary Overspeed Test

- **Temporary Overspeed Trip Setpoint:** This gauge displays the configured Temporary Overspeed Trip Setpoint setting.
- **Actual Speed:** This gauge displays the sensed actual speed.
- **Overspeed Trip Setpoint:** This gauge displays the module's current Overspeed Setpoint.

This test function when enabled, temporarily sets/steps the module's overspeed setpoint to the configured "Temporary Overspeed Trip" setpoint level for the configured "Temp. Overspeed Trip Time-Out" period of time.

This setting can be set above or below the module's "Overspeed Trip" setting. If a secondary overspeed device is used which has an overspeed trip level that is above the MicroNet Safety Module's, then it may be desirable to use this function to temporarily raise the MicroNet Safety Module's overspeed trip setpoint above the secondary device for testing purposes.

If it is desired to not increase the monitored rotating equipment (turbine, generator or compressor) up to its actual overspeed trip level to validate the overspeed trip logic and associated trip circuitry/functions, the "Temporary Overspeed Setpoint" function can be used to temporarily lower the module's overspeed setpoint to or slightly above the rotating equipment's rated speed level. If set to slightly above the rotating equipment's rotating speed level, the rotating equipment speed can then be slightly raised until its speed is at or above the "Temporary Overspeed Setpoint" level and validate the related trip circuitry function for proper operation.

When this function is enabled, if the rotating equipment's speed is not taken above the "Temporary Overspeed Setpoint" level within the configured "Temp. Overspeed Trip Time-Out" time span, this test function is aborted, and the module's "Overspeed Trip" setpoint is set/stepped back to its normal "Overspeed Trip" level/setting. If during this time the rotating equipment's speed is taken above the "Temporary Overspeed Setpoint" level, the module's Overspeed Trip function will issue a trip command (tripping the module), and the Overspeed Trip setpoint will be set back to its normal "Overspeed Trip" level/setting.

Temporary Overspeed Test Procedure

1. Verify module is not in its tripped state.
2. From the Temporary Overspeed Setpoint Test screen, Press the "Start Test" soft key.
3. The "Enter Password" screen will appear. From this screen enter the "Test Level" password.
4. Press the "Apply" soft key to temporarily change the module's overspeed setpoint to the configured Temporary Overspeed Setpoint level or press the "Cancel" soft key to exit the screen.
5. The Temporary Overspeed Trip Timer screen will then be displayed including a "Test Time Remaining" timer.

A user can end this function at any time and restore the Overspeed Trip Setpoint to its normal level by pressing the “End Test” soft key.

If the “Test Time Remaining” timer expires before the test has ended, the unit will display a message “Test Time Expired” and will revert to the Start test screen.

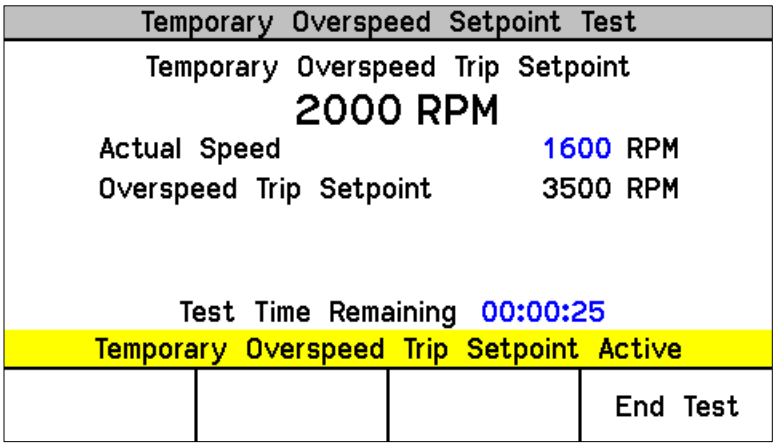


Figure 11-2b. Temporary Overspeed Test

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

At Least One Other Module Is Tripped!—This message is only displayed when the Temporary Overspeed Setpoint Test function is applied and warns the user that another module is in its tripped state. This message does not prohibit applying this test.

Temporary Overspeed Trip Setpoint Active—This message indicates the Temporary Overspeed Trip Test is active (and the current speed is less that the Overspeed Trip Setpoint).

Speed > Overspeed Trip Setpoint!—This message 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 Remaining” Timer has Expired, the module will trip.

Test Time Expired—This message indicates the “Test Time Remaining: timer has reached zero (expired).

Manual Simulated Speed Test

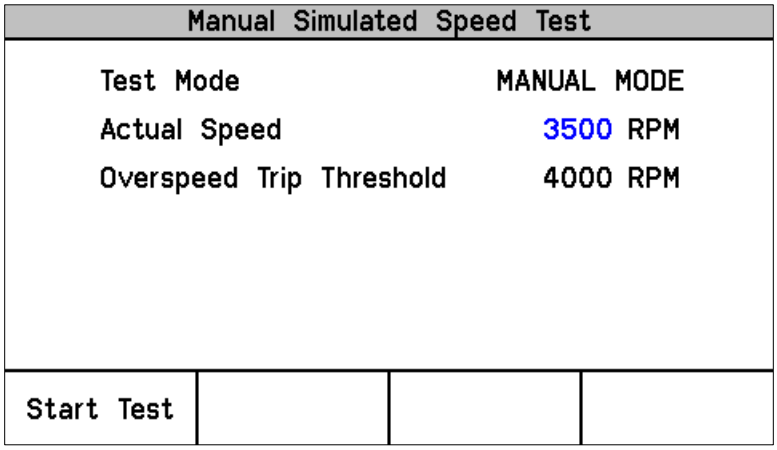


Figure 11-3. Manual Simulated Speed Test

- **Test Mode:** This gauge displays the test mode (MANUAL MODE).
- **Actual Speed:** This gauge displays sensed actual speed.
- **Overspeed Trip Setpoint:** This gauge displays the Configured Overspeed Trip setpoint.

This test switches the module's internal frequency generator into the module's input speed channel and sets the frequency to 100 rpm below the module's "Overspeed Trip" level setting. The user then must manually raise the module's frequency generator's simulated speed via the "Value Up" soft key above the Overspeed Trip setting causing the Overspeed Trip function to step the module to its trip state. This test validates operation of the module's input speed sensing circuitry, overspeed trip function, and output trip relay.

If the frequency generator's simulated speed level is not taken above the module's Overspeed Trip" setting within the configured "Simulated Speed Timeout" time span, this test will be aborted and the module's speed sensor input signal will be switched back into the module's speed channel.

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

Table 11-1. Simulated Speed Resolution

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.

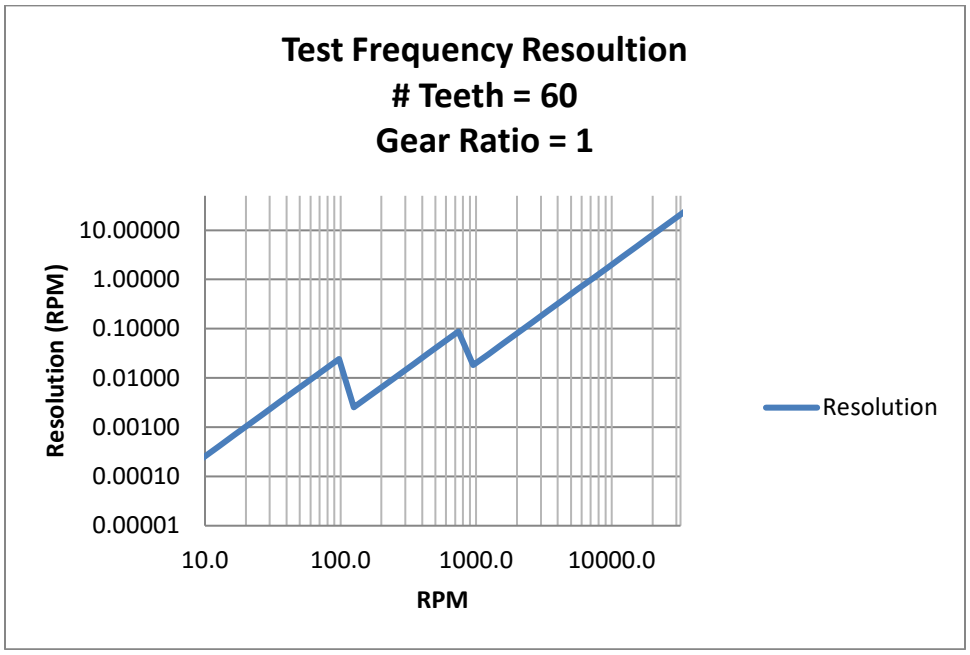


Figure 11-4. Test Frequency Resolution

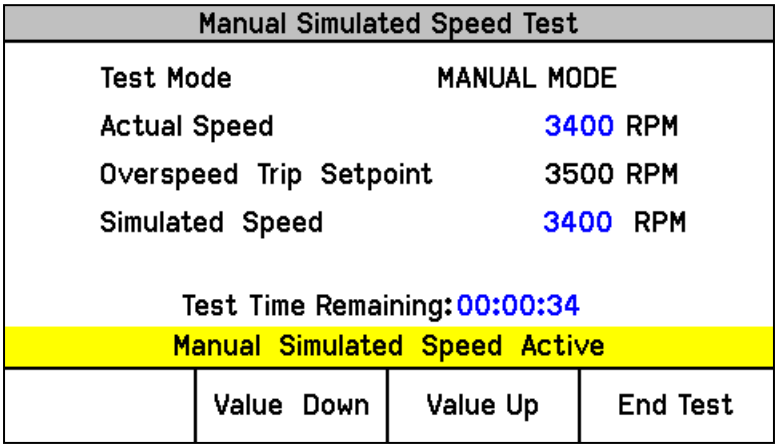


Figure 11-5. Manual Simulated Speed Test Screen

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

Manual Simulated Speed Active – This message indicates the Manual Simulated Speed Test is active.
Test Time Expired - This message indicates the "Test Time Remaining" timer has reached zero before the simulated speed level was raised above the Overspeed Trip setpoint.

Manual Simulated Speed Test Procedure

1. Verify no modules are in their Tripped or Alarmed state (depends on the configured Test Mode Permissive setting).
2. From the Manual Simulated Speed Test Screen, press the "Start Test" soft key.
3. The "Enter Password" screen will appear. From this screen enter the "Test Level" password.
4. Press the "Apply" soft key to initiate this test or press the "Cancel" soft key to exit the screen.
   a. The module's input speed channel is then switched from sensing actual rotating equipment speed to sensing the module's internal frequency generator which is automatically set to a simulated speed of 100 rpm below the module's "Overspeed Trip" level setting.
   b. The Simulated Speed Timeout counter will be displayed and will begin counting down.
5. Press the "Value Up" soft key to increase the frequency generator's simulated speed level up to or above the module's Overspeed Trip setpoint.
6. If the simulated speed signal is raised up to or above the trip point, the module's output "Trip Relay" will step to its tripped state and the module's display will switched to its "Home screen".
   a. If the screen's "End Test" soft key is pressed before the simulated speed is taken up to or above the Overspeed Trip setpoint, the module will revert back to the "Start Test" screen.
   b. If the "Test Time Remaining" timer expires before the simulated speed is taken up to or above the Overspeed Trip setpoint, the module will display a message "Test Time Expired and revert back to the "Start Test" screen.
7. Issue a RESET command from either the module's front panel, discrete input, or Modbus communications port to reset the module's output Trip Relay back to its non-tripped state. This command will also switch the module's input speed channel back to sensing actual rotating equipment speed and the module's display to its "Home screen".
8. Users can alternatively use/view the "Overspeed/Acceleration Log" screen to verify sensed tripped speed, maximum speed sensed during the event, sensed acceleration at trip point, and maximum acceleration sensed during event.

See "General Testing Notes" below for information on related messages and their meaning.

Auto Simulated Speed Test

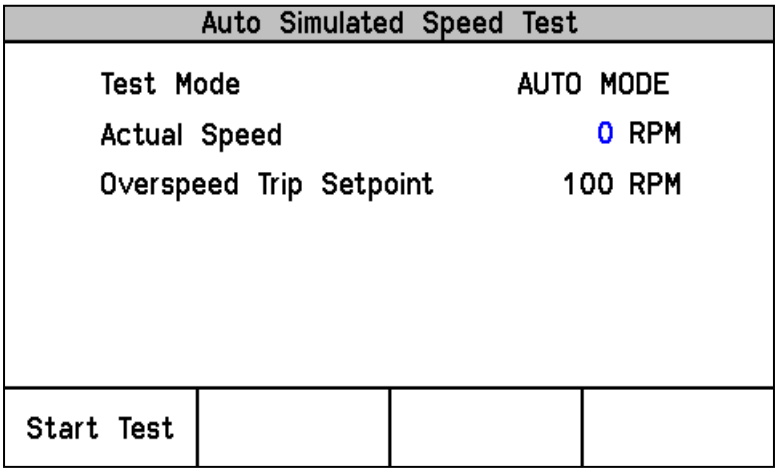


Figure 11-6. Auto Simulated Speed Test Screen

- **Test Mode:** This gauge displays the test mode (AUTO MODE).
- **Actual Speed:** This gauge displays sensed actual speed.
- **Overspeed Trip Setpoint:** This gauge displays the Configured Overspeed Trip setpoint.

This test switches the module's internal frequency generator into the module's input speed channel and sets the frequency to 100 rpm below the module's "Overspeed Trip" level setting. This test then automatically raises the module's frequency generator's simulated speed at a rate of 10 rpm/second until the Overspeed Trip function issues a trip command to step the module to its trip state. This test validates operation of the module's input speed sensing circuitry, overspeed trip function, and output trip relay.

If the frequency generator's simulated speed level does not reach the module's Overspeed Trip" setting within 12 seconds, this test will be aborted, and the module's speed sensor input signal will be switched back into the module's speed channel.

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

Auto Simulated Speed Active—This message indicates the Auto Simulated Speed Test is active.
Test Time Expired—This message indicates the 12 second timer has reached zero before the simulated speed level was raised above the Overspeed Trip setpoint.
Test Ended by Modbus—This message indicates the test was ended by a Modbus command.

Auto Simulated Speed Test Procedure

1. Verify no modules are in their Tripped or Alarmed state (depends on the configured Test Mode Permissive setting).
2. From the module's Auto Simulated Speed Test Screen, press the "Start Test" soft key or from Modbus communications (if write commands have been configured/enabled) give an "Initiate Auto Speed Test" command then a "Confirm Auto Speed Test" command.
    1. **Note:** This test routine can also be initiated by the Auto-Sequence Test routine (periodically or manually).
3. If the module's front panel is used to initiate this test then the "Enter Password" screen will appear. From this screen enter the "Test Level" password.
4. If the front panel is used to initiate this test then press the "Apply" soft key to initiate this test or press the "Cancel" soft key to exit the screen.
5. When this test routine is started (from front panel or Modbus) the module's input speed channel is then switched from sensing actual rotating equipment speed to sensing the module's internal frequency generator which is automatically set to a simulated speed of 100 rpm below the module's "Overspeed Trip" level setting.
    a. The internal frequency generator will then automatically ramp its simulated speed signal at a rate of 10 rpm/second up to and above the module's Overspeed Trip level setting.
    b. A 12 second timeout timer will start running.
6. If the modules frequency generator's simulated speed signal increases up to or above the module's Overspeed Trip level, the module's output "Trip Relay" will step to its tripped state and the module's display will switch to its "Home screen".
    a. If the screen's "End Test" soft key is pressed before the simulated speed is taken up to or above the Overspeed Trip setpoint, the module will revert back to the "Start Test" screen.
    b. If the 12 second timer expires before the simulated speed is taken up to or above the Overspeed Trip setpoint, the module will display a message "Test Time Expired and revert back to the "Start Test" screen.
    c. If a Modbus communications "Abort Auto Speed Test" command is given before the simulated speed is increased up to or above the Overspeed Trip setpoint, the module will revert back to the "Start Test" screen.
7. Issue a RESET command from either the module's front panel, discrete input, or Modbus communications port to reset the module's output Trip Relay back to its non-tripped state. This command will also switch the module's input speed channel back to sensing actual rotating equipment speed and the module's display to its "Home screen".
8. Users can alternatively use/view the "Overspeed/Acceleration Log" screen to verify sensed tripped speed, maximum speed sensed during the event, sensed acceleration at trip point, and maximum acceleration sensed during event.

See "General Testing Notes" below for information on related messages and their meaning.

Auto-Sequence Test

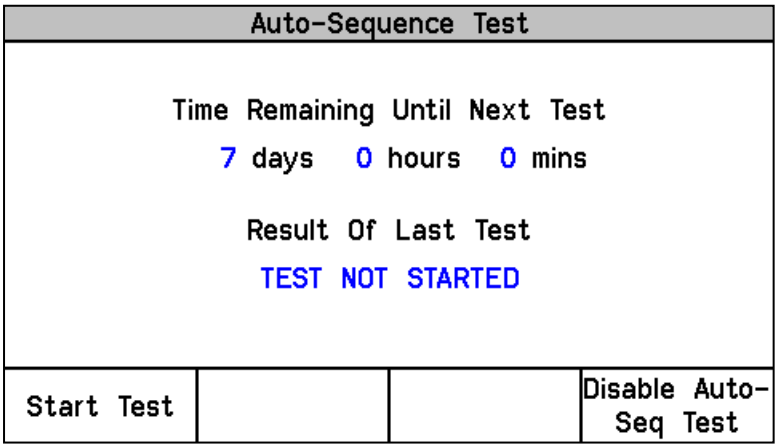


Figure 11-7. Auto-Sequence Test

- **Time Remaining Until Next Test:** This gauge displays the time until the next Auto-Sequence test will be started.
- **Result Of Last Test:** This gauge displays the result of last Auto-Sequence test. Result of Last Test can be:
  - **TEST NOT STARTED**
  - **TEST PASSED**
  - **TEST FAILED**
  - **TEST NOT COMPLETED**

This test routine tests modules A, B, & C in sequence by initiating each module's "Auto Simulated Speed Test" routine, starting with module A, then resetting each module back to its normal non-tripped state. Refer to the "Auto Simulated Speed Test" above for details regarding the "Auto Simulated Speed Test" routine. This test validates operation of all modules' input speed sensing circuitry, overspeed trip function, and output trip relay.

Since module A initiates the test sequence**,** this test can only be configured and initiated from module A. Optionally this test can be initiated from module A's front panel or periodically if the Periodic Test Timer function is enabled.

Auto-Sequence Test Procedure

To configure this test, see Configure Auto-Sequence Test Procedure in the section above.

1. Verify no modules are in their Tripped or Alarmed state. (The Test Mode Permissive setting does not apply to this test.)
2. From module A's Auto-Sequence Test Screen, press the "Start Test" soft key.
   a. Note: This test routine can also be initiated periodically if the Periodic Test Timer function is configured/enabled.
3. If the module's front panel is used to initiate this test then the "Enter Password" screen will appear. From this screen enter the "Test Level" password.
4. If the front panel is used to initiate this test then press the "Start Test" soft key to initiate this test or press the "Cancel" soft key to exit the screen.
5. Module A will then perform an Auto Simulated Speed Test.
6. Module A will be reset back to its non-tripped state.
7. If all test permissives are met (no module in a tripped or alarmed state), then module B will perform an Auto Simulated Speed Test.
8. Module B will be reset back to its non-tripped state.
9. If all test permissives are met (no module in a tripped or alarmed state), then module C will perform an Auto Simulated Speed Test.

10. Module C will be reset back to its non-tripped state.
11. If at any point the permissives are not met (any module in a tripped or alarmed state), one of the following messages will be displayed on the affected module: TEST NOT STARTED, TEST FAILED, or TEST NOT COMPLETED.
12. If this test was initiated by the “Periodic Test Timer” function, the “Time Remaining Until Next Test” time will be reset and start counting down once again.

Alternatively, an operator can disable or re-enable the Periodic Test Timer function from the front panel of module A. When this function is disabled, or if any module is in trip, alarm, 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 the Periodic Test Timer function is re-enabled and no modules are tripped, in alarm, or in a test mode, the Periodic Test Timer function will continue to operate as normal.

See “General Testing Notes” below for information on related messages and their meaning.

User Defined Test 1, 2, & 3

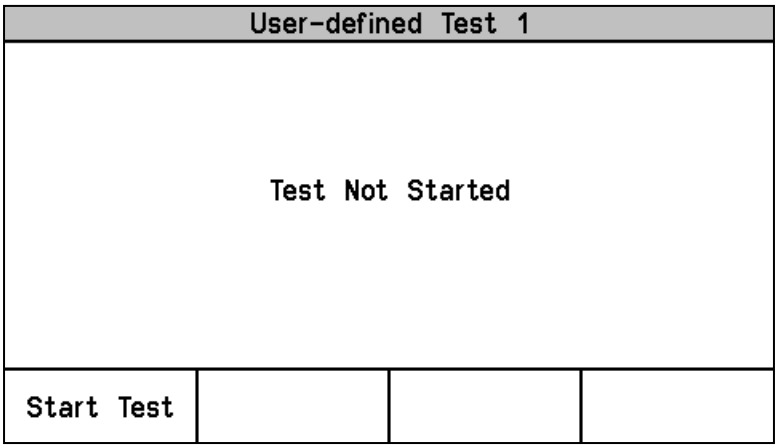


Figure 11-8a. User Defined Test

When the User-defined Test 1, 2, or 3 page is selected, one of the following status messages will be shown:

- NOT CONFIGURED
- Test Not Started
- Test Started by:
  a. Front-Panel
  b. Configurable Logic
  c. MODBUS
- Test Ended by:
  a. Front-Panel
  b. Configurable Logic
  c. MODBUS
  d. Test Timeout
  e. Trip Condition
  f. Other Module Trip (only if Test Mode Permissive is set to “Not Tripped” or “Not in Alarm”)
  g. Other Module Alarm (only if Test Mode Permissive is set to “Not in Alarm”)

User-defined Test Procedure

1. Verify no modules are in their Tripped or Alarmed state (depends on the configured Test Mode Permissive setting).
2. From the module's User-defined Test Screen, press the "Start Test" soft key or from Modbus communications (if write commands have been configured/enabled) give an "Initiate User-defined Test" command then a "Confirm User-defined Test" command or initiate through Configurable Logic.
3. If the module's front panel is used to initiate this test then the "Enter Password" screen will appear. From this screen enter the "Test Level" password.
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, 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

See "General Testing Notes" below for information on related messages and their meaning.

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), and test abort(s).

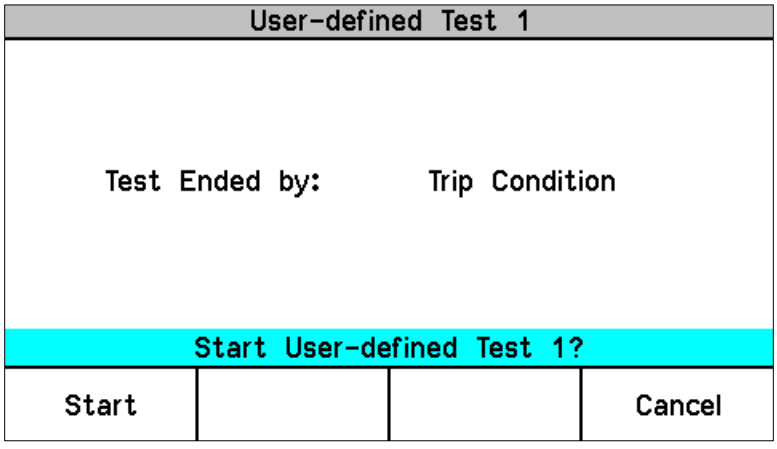


Figure 11-8b. User Defined Test

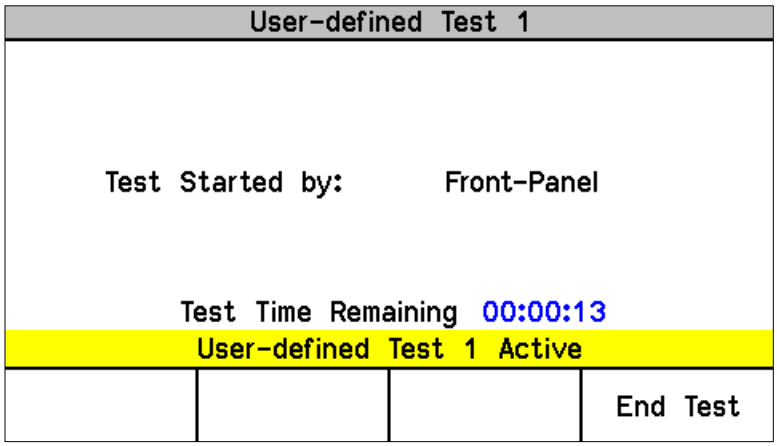


Figure 11-8c. User Defined Test

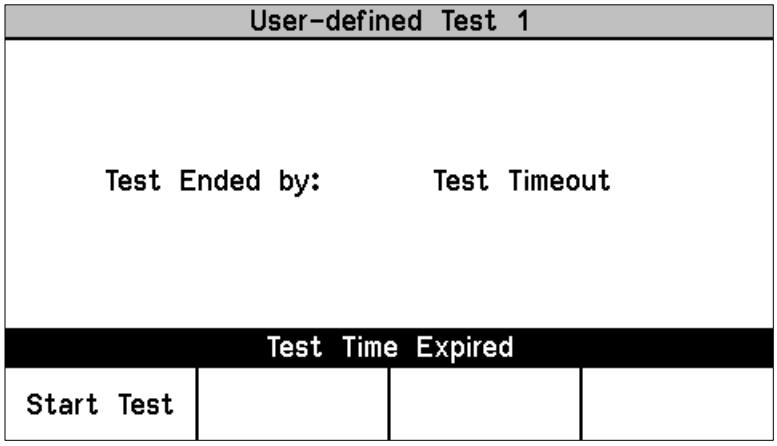


Figure 11-8d. User Defined Test

Lamp Test

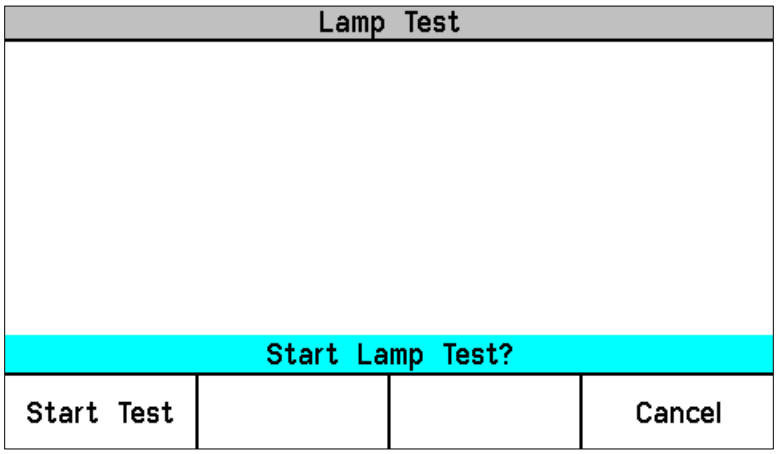


Figure 11-9. Lamp Test

This test provides a way for users to verify the front panel's LED functionality. When initiated this test routine cycles each front panel LED on and off and through the provided color combinations (listed below). The test can be repeated as needed. A cancel function is also available to halt this routine if desired. No password entry is required to run the test.

Lamp Test Procedure

1. From module's Lamp Test Screen, press the "Start Test" soft key.
   a. The Tripped, Unit Health, and Alarm LEDs are turned off for 1 second.
   b. Next the Tripped LED is on and red, Unit Health LED is on and red, and Alarm LED is on and yellow for 1 second.
   c. Next the Unit Health LED turns green for 1 second.
   d. Next the Tripped, Unit Health, and Alarm LEDs are turned off for 1 second.
2. When this test routine is complete, all LEDs return to their normal state.

General Testing Notes:

Except for "Temporary Overspeed Trip Setpoint Test" and "Lamp Test", the above tests cannot be initiated if any module is in its tripped or alarmed state (user configurable except for Auto-Sequence Test). If a user tries to initiate one of the above tests with any module in a tripped, alarmed, or test state, one of the following messages may be displayed:

Module Already Tripped! Test Aborted—This message indicates that the test cannot be started because the module is already tripped.

Module In Alarm! Test Aborted—This message indicates that the test cannot be started because the module is in an alarm condition.

Test in Progress—This message indicates that the test cannot be started because the module is already in a test mode.

Other Module Tripped! Test Aborted—This message indicates that the test cannot be started or that a running test was aborted because another module is tripped.

Other Module In Alarm! Test Aborted—This message indicates that the test cannot be started or that a running test was aborted because another module is in an alarm condition.

Other Module In Test Mode! Test Aborted—This message indicates that the test cannot be started because another module is in a test mode.

Chapter 12.
Programming and Configuration Tool

General

Users can configure the MicroNet™ Safety Module using the following methods:

- Configure each module separately from its front panel keypad. Only standard values can be configured from the front panel, such as speed, acceleration, analog output scaling, etc. The Programming and Configuration Tool (PCT) must be used to configure analog/discrete inputs, custom logic, and configurable latch inputs.
- Configure one module from its front panel keypad and copy the saved configuration file to the other two modules.
- Use the provided Programming and Configuration Tool software program installed on a computer to create a configuration settings file then connect to one or all the modules and upload the configuration settings file to one module or all of the modules. Alternatively, if the configuration settings file is uploaded to only one module, the module-to-module “COPY” function can be used to copy the file to the other two modules.

For safety purposes a module must be in its “tripped” state to allow any configuration settings to be changed or downloaded.

Each MicroNet™ Safety Module module includes preset overspeed, over-acceleration, alarm latch, and trip latch functionality. Users must then custom configure each module to meet the required application’s functionality 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.
- Upload application and configuration settings to each MicroNet Safety Module module.
- Download application and configuration settings from a MicroNet Safety Module module.
- Download 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.

Table 12-1. Service Port Specifications

Comm Type	RS-232
Baud Rate	115200
Isolation	Non-isolated
Signal Cable Length	Must be limited to 10 ft / 3 m
Cable Type	Standard off the shelf RS-232 cable

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 uploaded 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 the PCT and connect the computer to the desired module's RS-232 service port.
2. On the toolbar, click 'Connect' and connect to the MicroNet Safety Module via the PCT connection wizard.
3. Select the appropriate security level and enter the password, then click 'Log In'.
4. Under the 'Settings' menu, choose the desired task.
5. Select a .wset file to modify/edit or create a new one from default values.
6. Save the .wset file to a directory on the computer.
7. Under the settings menu, click 'Load Settings File to Device' to upload the saved .wset file to the MicroNet Safety Module (module must be in a tripped state).
8. Using the Config Menu's Configuration Management function, if desired, copy the uploaded program to the other two modules.

IMPORTANT **When uploading a configuration ".wset file" into a module, it is important to confirm that the correct settings file was loaded into the correct module.**

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) has three 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.

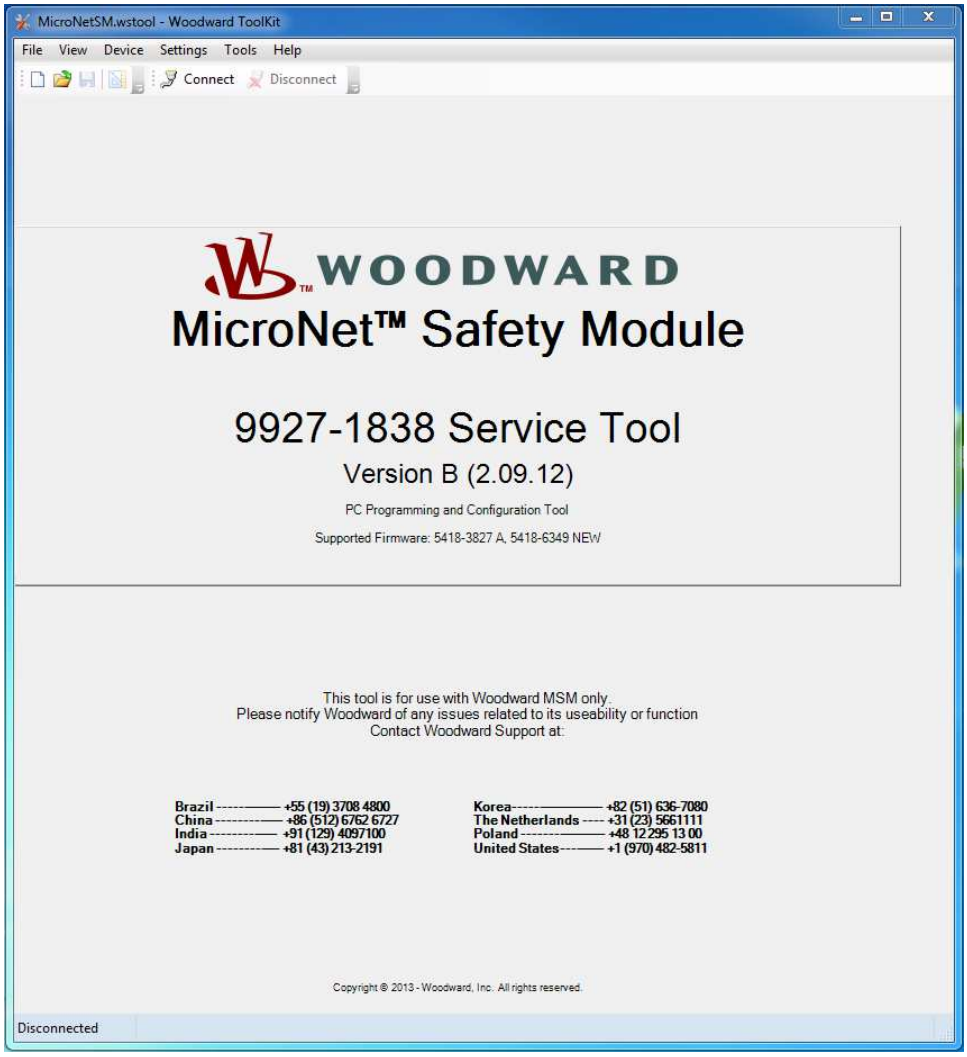
Config Level:

- 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:

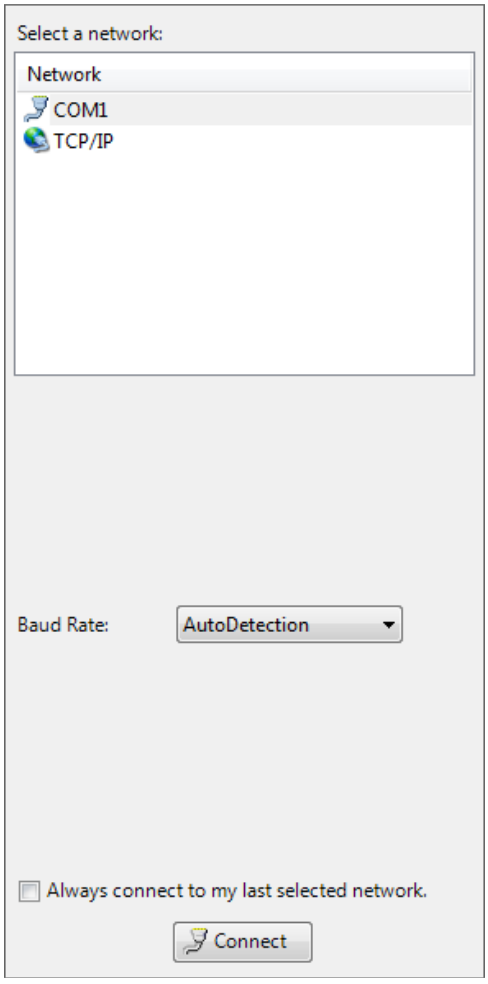
1. The correct Toolkit version is supplied with the Installer CD that is provided with the product and must be installed on a PC.
2. Run the Toolkit service tool by double-clicking on the file MicroNet Safety Module.wstool. The following introduction screen will be displayed on the PC.



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.

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

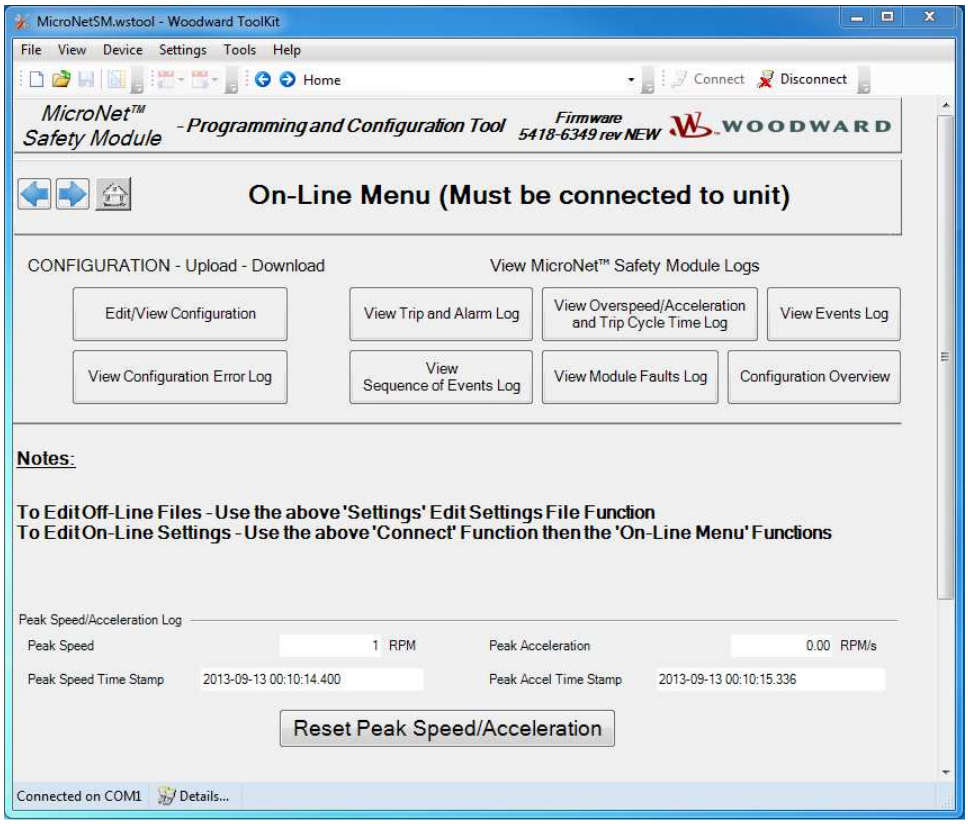


5. Select the Communication port that the serial interface cable is connected to and click on the Connect button in the pop-up window.
6. When the communication link is established, the following pop-up window appears:

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 eight 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 Events Log
- 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.

Selecting the **Reset Peak Speed/Acceleration** button will clear the Peak Speed/Acceleration. The Reset Peak Speed/Acceleration 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).

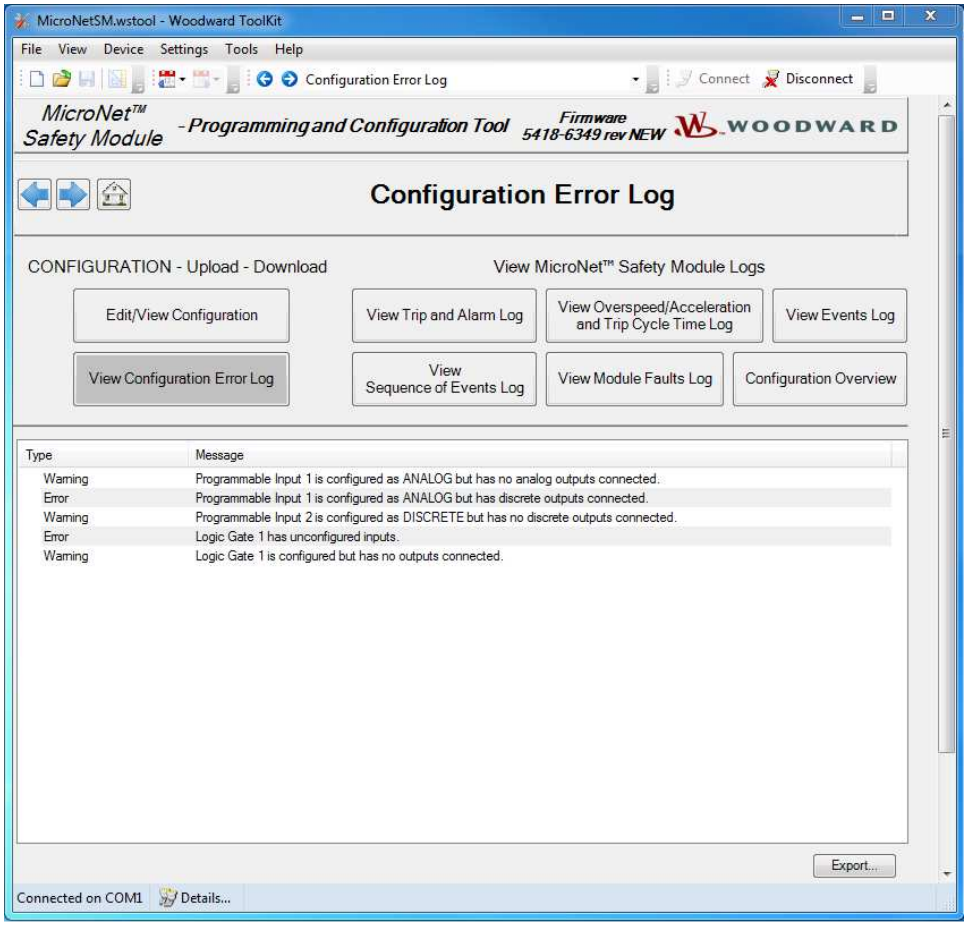
Home

The “Home” button  is used to return to this On-Line Menu after any one of the six logs has been opened.

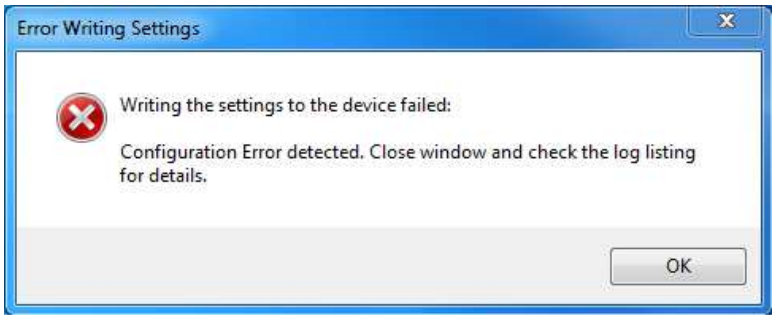
View Configuration Error Log

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.



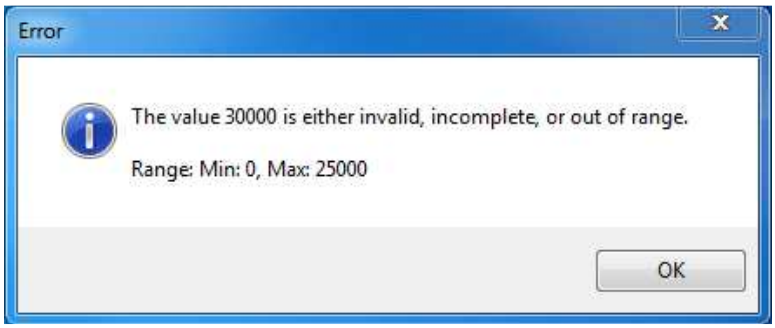
If a configuration error exists, the configuration is not saved and the following screen appears when trying to upload the settings file to the MicroNet Safety Module.



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

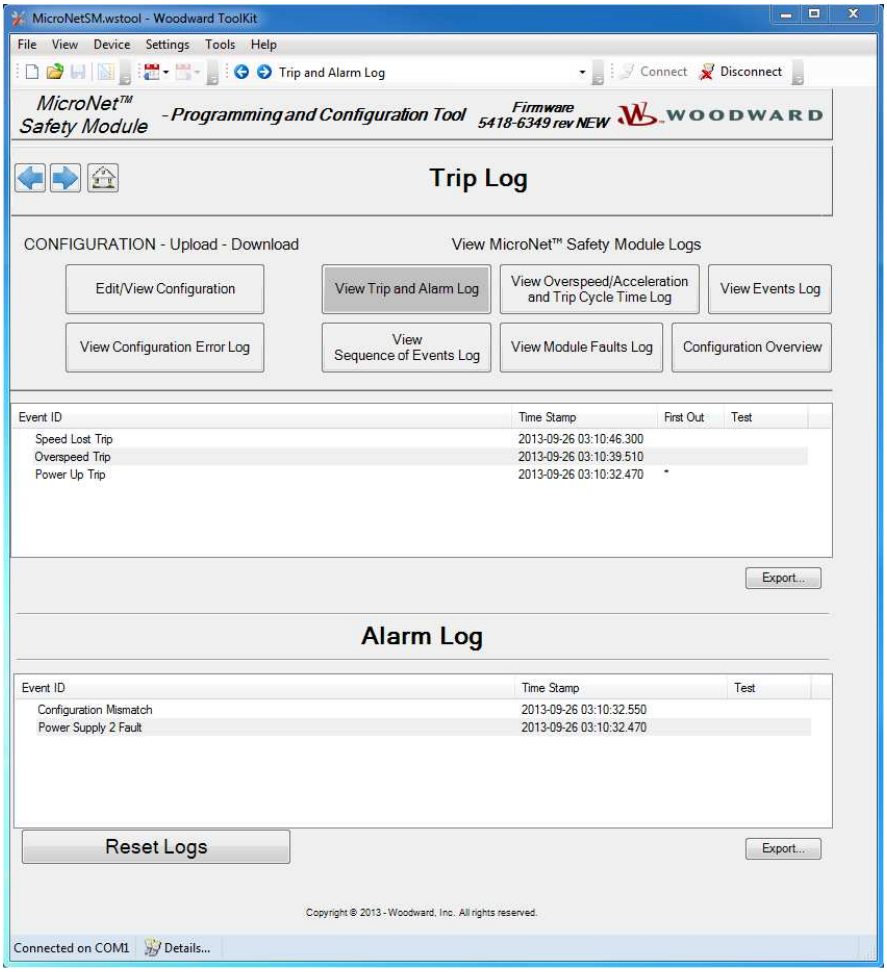
Data Entry Errors

When editing an existing settings file, or modifying the settings currently loaded in a MicroNet Safety Module, an error window is displayed if data entered is invalid, incomplete, or out-of-range (as shown in the example below).



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 Trip and Alarm Log screen or from the front panel user interface, with Test Level permissions or higher.



The log 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 MicroNet Safety Module was in any of the test modes when the fault condition(s) occurred.

Selecting the **Reset Logs** button will clear the Trip, Alarm and Overspeed/ Acceleration logs. The Reset 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).

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

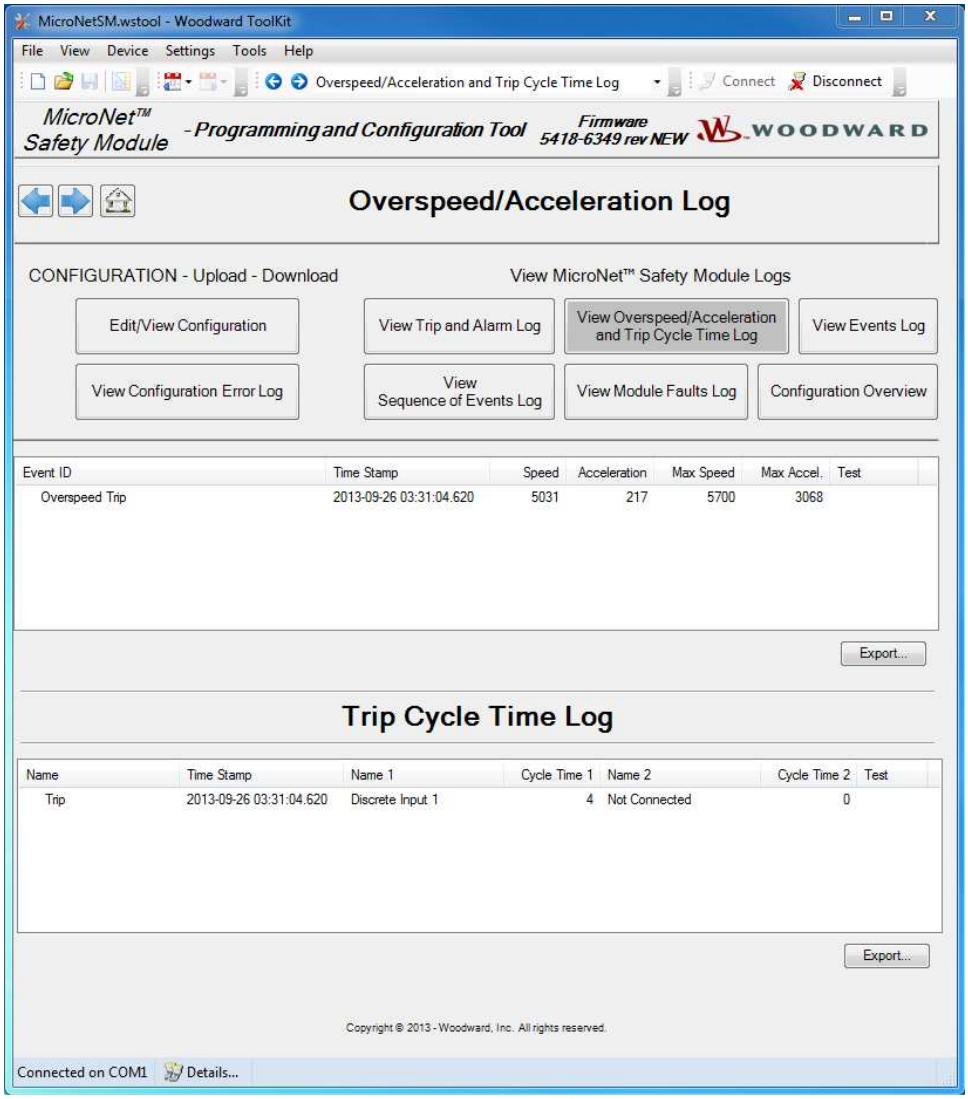
Log Timestamp
The time stamps in the logs are based on the internal clock at the time of the event. Time stamps are not changed when the internal clock time is modified (e.g. time/date is set or a 24 Hr time sync command).

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 MicroNet Safety Module 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 (after trip).
- 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.

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



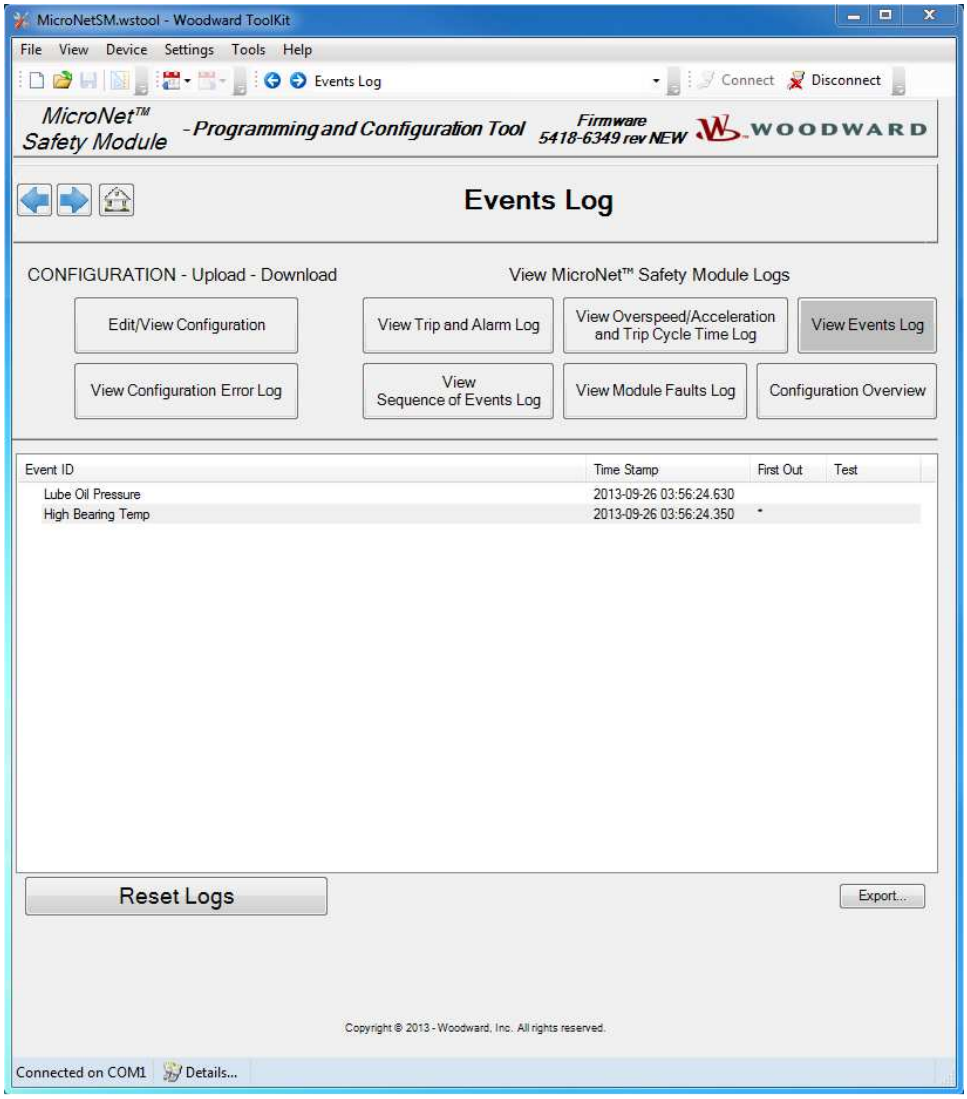
View Events Log

After selecting “View Events Log”, a list of all recent events that have been detected and logged in the MicroNet Safety Module are displayed. The log can contain up to 50 events. Log inputs must be configured and displayed ‘names’ are user-configurable (see configuration of Event Log).

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 MicroNet Safety Module was in any of the test modes when the event occurred.

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

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



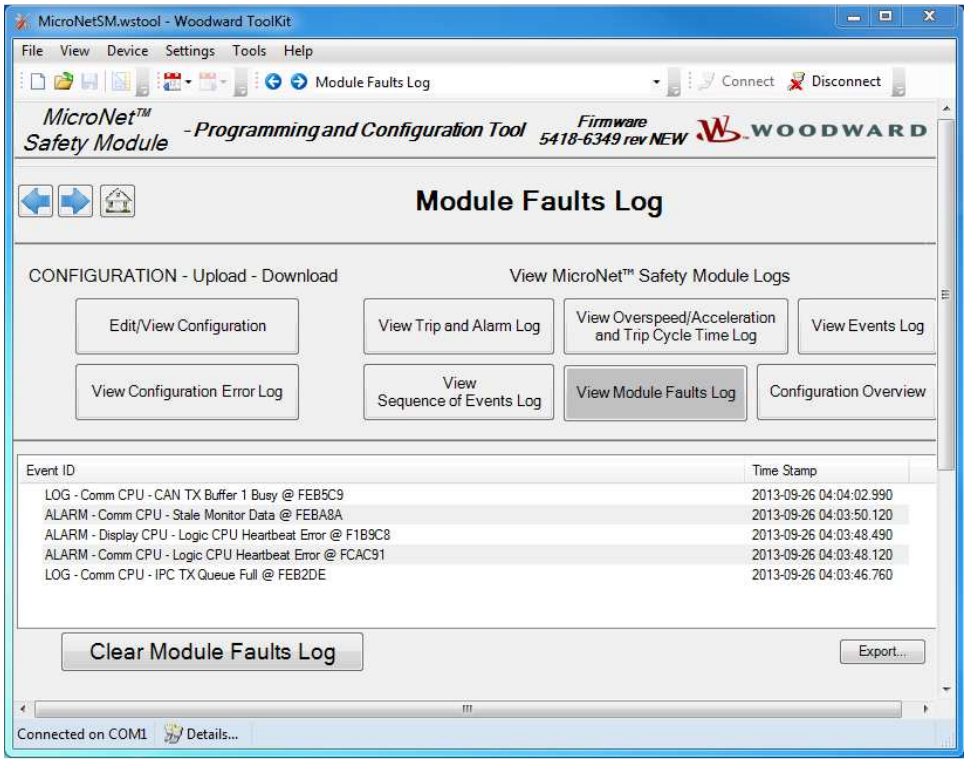
View Module Faults Log

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), and is not displayed on the front panel user interface.

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



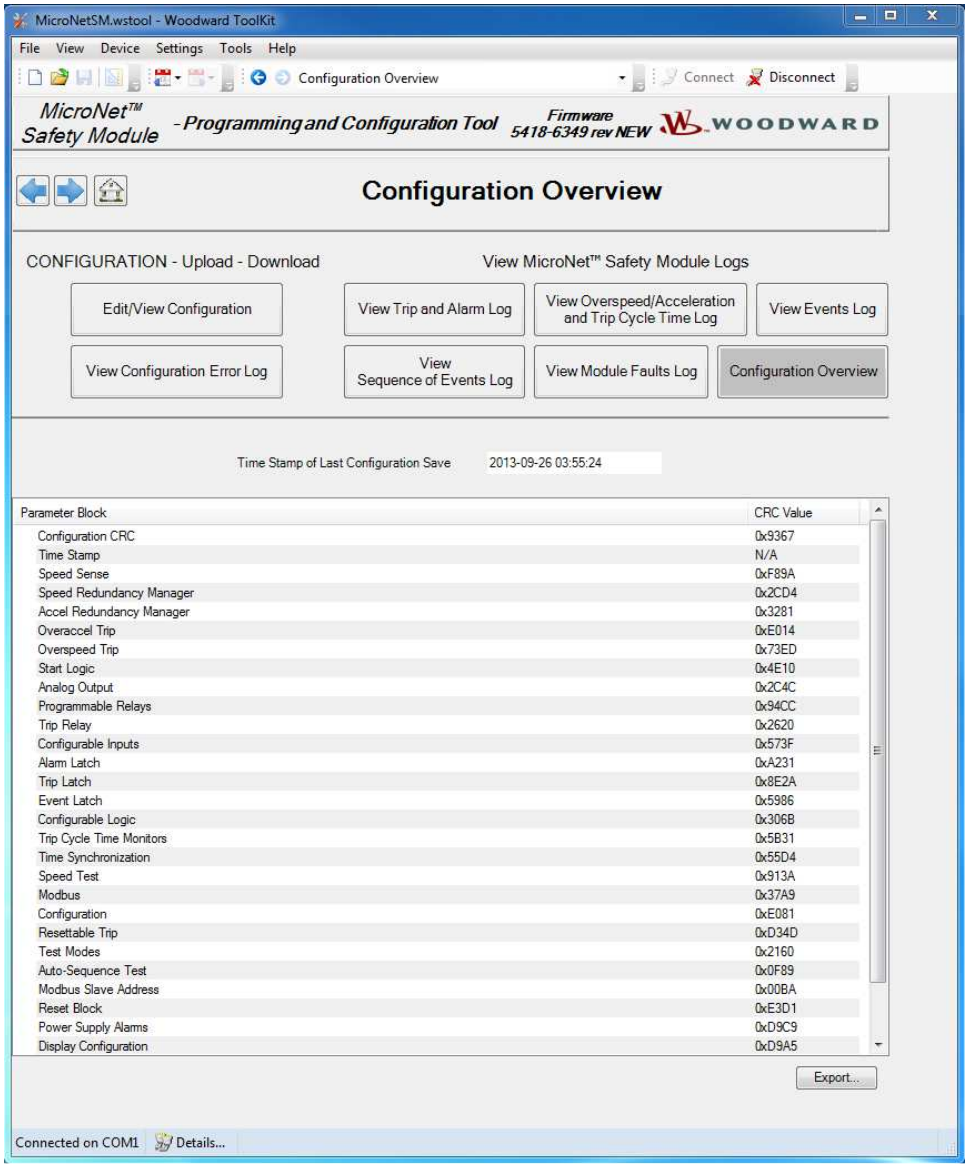
Configuration Overview

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 Management Menu/Configuration Overview screen).

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



Parameter Block Definitions

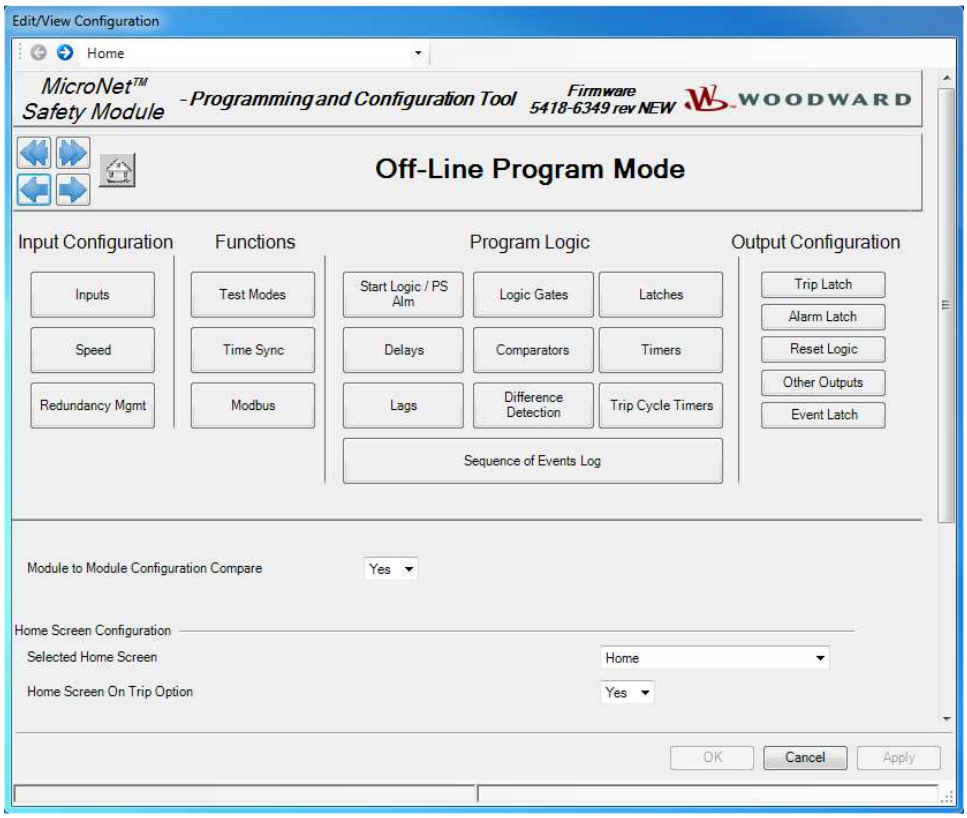
- **Configuration CRC**: CRC code for the entire configuration listed below.
- **Time Stamp**: No CRC is calculated. Time of the last configuration save.
- **Speed Sense**: CRC code of the following settings in the Configure Speed Input section on the Speed page: Probe Type, Nr of Gear Teeth, Gear Ratio, and Sudden Speed Loss.
- **Speed Redundancy Manager:** CRC code of the Speed Redundancy Manager on the Speed page.
- **Acceleration Redundancy Manager:** CRC code of the Acceleration Redundancy Manager on the Speed page.
- **Overaccel Trip**: CRC code of the Configure Acceleration section on the Speed page.
- **Overspeed Trip**: CRC code of the Overspeed Trip setting in the Configure Speed Input section on the Speed page.
- **Start Logic**: CRC code of the Configure Start Logic section on the Speed page.
- **Analog Output:** CRC code of the Configure Analog Output settings on the Other Outputs page.
- **Programmable Relays:** CRC code of the Configure Discrete Outputs settings on the Other Outputs page.
- **Trip Relay:** CRC code of the Configure Trip Latch setting on the Trip Latch page.
- **Configurable Inputs:** CRC code of the Configurable Inputs settings (Configurable Inputs 1-10) on the Inputs page. This CRC does not include the user-definable input names or units.

- **Alarm Latch:** CRC code of the Alarm Latch settings (1-75) on the Alarm Latch page. This CRC does not include the user-definable input names.
- **Trip Latch:** CRC code of the 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:** CRC code of the Event Latch settings on the Event Latch page. This CRC codes does not include the user-definable input names.
- **Configurable Logic:** CRC code of the entire configurable logic (Gates, Latches, Delays, Unit Delays, Comparators, Timers, Lags, Difference Detection, 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 (1-25) on the Delays page.
  - Unit Delay settings (1-15) on the Unit Delays page.
  - Comparators settings (1-15) on the Comparators page.
  - Timers settings (1-5) on the Timers page.
  - Lag settings (1-10) on the Lags page.
  - Difference Detection settings (1-15) on the Difference Detection page.
  - User-defined Test settings (1-3) on the Test Modes page.
- **Trip Cycle Time Monitors:** CRC code of the settings on the Trip Cycle Timers page.
- **Time Synchronization:** CRC code 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 code 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 Permissive setting.
- **Modbus:** CRC code of the Configure Modbus settings on the Modbus page, excluding the Slave Address setting which has a separate CRC.
- **Configuration:** CRC code of the Module to Module Configuration Compare settings on the Home page of the Program Mode.
- **Resettable Trip:** CRC code of the Resettable Trip settings on the Reset Logic page.
- **Test Modes:** CRC code of the Test Mode Permissive setting on the Test Modes page.
- **Auto-Sequence Test:** CRC code of the Configure Auto-Sequence Test settings on the Test Modes page.
- **Modbus Slave Address:** CRC code of the 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 code of the Configurable Reset Source setting on the Reset Logic page.
- **Power Supply Alarms:** CRC code of the Power Supply Alarms settings on the Start Logic / Misc page.
- **Display Configuration:** CRC code of the Display Configuration settings on the Home page of the Program Mode. These settings, when used, will typically be unique for each module A, B, or C. As a result, these settings are included in the overall CRC but not used in the configuration compare function (not copied or compared).
- **Shared Dedicated Disc In:** CRC code of the Shared Dedicated Disc In settings on the Discrete Inputs page.
- **Sequence of Events Log:** CRC code of the Sequence of Events Log settings on the Sequence of Events Log page.

Off-Line Menu

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 after OK or Apply is clicked. 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:

Input Configuration:
- Inputs
- Speed
- Redundancy Management

Functions:
- Test Modes
- Time Sync
- Modbus

Program Logic:
- Start Logic / PS Alm
- Logic Gates
- Latches
- Delays
- Comparators
- Timers
- Lags
- Difference Detection
- Trip Cycle Timers
- Sequence Of Events Log

Output Configuration:
- Trip Latch
- Alarm Latch
- Reset Logic
- Other Outputs
- Event Latch

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, the configuration save will ask if a trip is desired. A trip will only be allowed if the other modules are not tripped.

There are two options for changing the configuration settings in the MicroNet Safety Module:
- Using the MicroNet Safety Module front panel.
- Using 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 [Not Used/Passive/Active].
- Number of Gear Teeth [1-320].
- Gear Ratio [0.10-10.0].
- Overspeed Trip Setpoint [RPM].
- Sudden Speed Loss [Alarm/Trip].
- Enable Acceleration Trip [No/Yes].
- Acceleration Trip Enabled Speed [RPM].
- Acceleration Trip Setpoint [RPM/s].
- Speed Fail Setpoint [RPM].
- Speed Fail Trip [Not Used/Used].
- Speed Fail Alarm [Not Used/Used].
- Speed Fail Timeout Trip [Not Used/Used].
- Speed Fail Timeout Time.
- Speed Redundancy Manager.
- Acceleration Redundancy Manager.
- Trip Latch [Energize/De-energize to Trip].
- Trip Latch [Latching/Non-Latching].
- Trip is Alarm [No/Yes].
- Reset Input Sharing.
- Start Input Sharing.

- Speed Fail Override Input Sharing.
- Analog Output [4 mA and 20 mA Settings].
- Test Modes.
- Auto-Sequence Test.
- Modbus Communications.
- Power Supply 1 & 2 Alarms [No/Yes].
- Home Screen on Trip Option [No/Yes].
- Selected Home Screen.
- Configuration Compare and Copy Features.
- Passwords.

All other configurations, including the ones that can be configured by the front panel, can 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 screen buttons are available:

Input Configuration:
- Inputs
- Speed
- Redundancy Management

Functions:
- Test Modes
- Time Sync
- Modbus

Program Logic:
- Start Logic / PS Alm
- Logic Gates
- Latches
- Delays
- Comparators
- Timers
- Lags
- Difference Detection
- Trip Cycle Timers
- Sequence Of Events Log

Output Configuration:
- Trip Latch
- Alarm Latch
- Reset Logic
- Other Outputs
- Event Latch

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

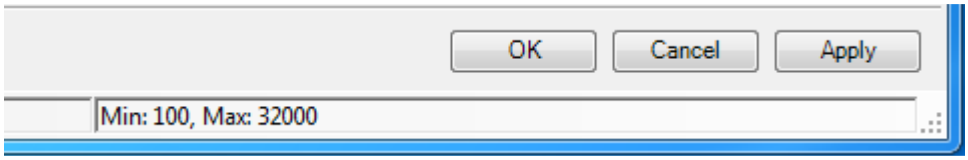
After selecting one of the buttons, a sub-screen is displayed in which particular parameters for the selected function can be checked and modified if necessary.

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 sub-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:

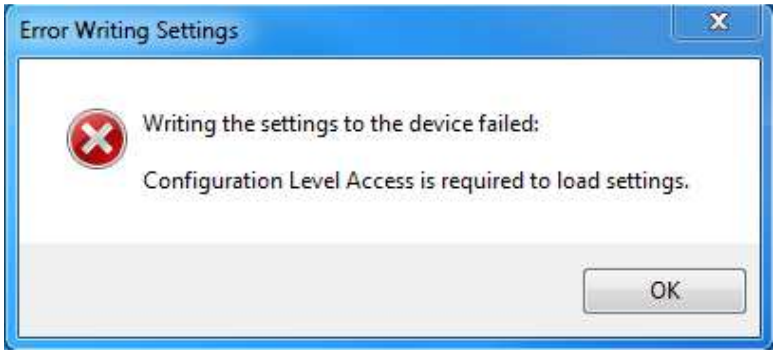
- After the OK or Apply button is pressed, the new configuration setting will immediately be uploaded to the MicroNet Safety Module.

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 a trip condition.

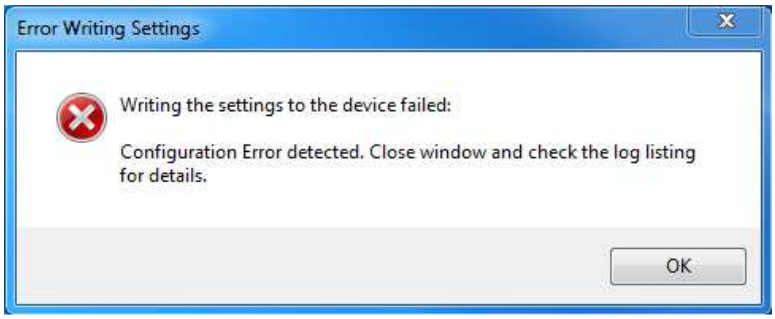
Test Level was selected

If Test Level was selected, the following pop-up window appears:



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, the configuration save will ask if a trip is desired. A trip will only be allowed if the other modules are not tripped.

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.

Creating the configuration settings in the MicroNet Safety Module:
1. Create the settings file.
2. Modify the settings file.
3. Save the settings file on the PC.
4. 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.

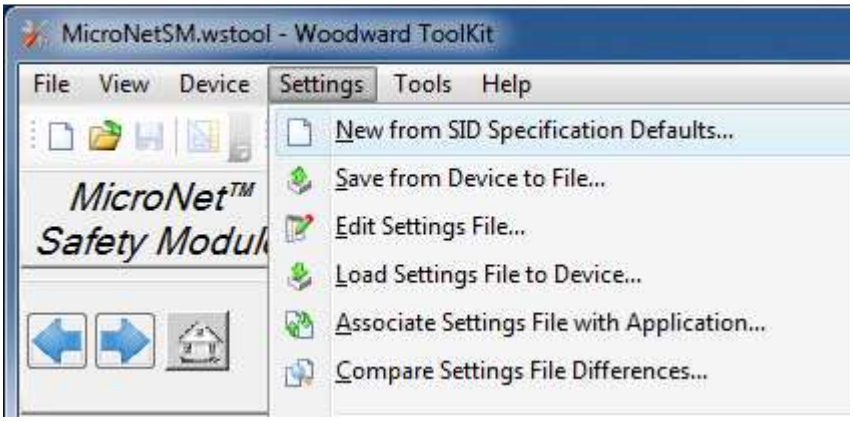
See **Drop-down Menu “Settings”** for information on how to create and modify configuration files.

Drop-down Menu “Settings”

The drop-down menu "Settings" is 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), the 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

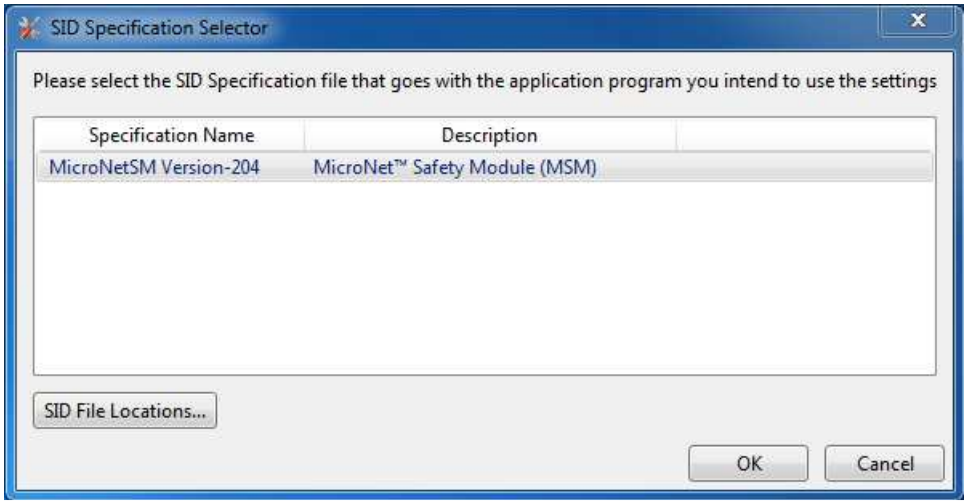
When using the MicroNet Safety Module Programming and Configuration Tool (PCT) in Config Level, the management of log files is active, and the following selections from the settings pull down menu can be used:

- 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.

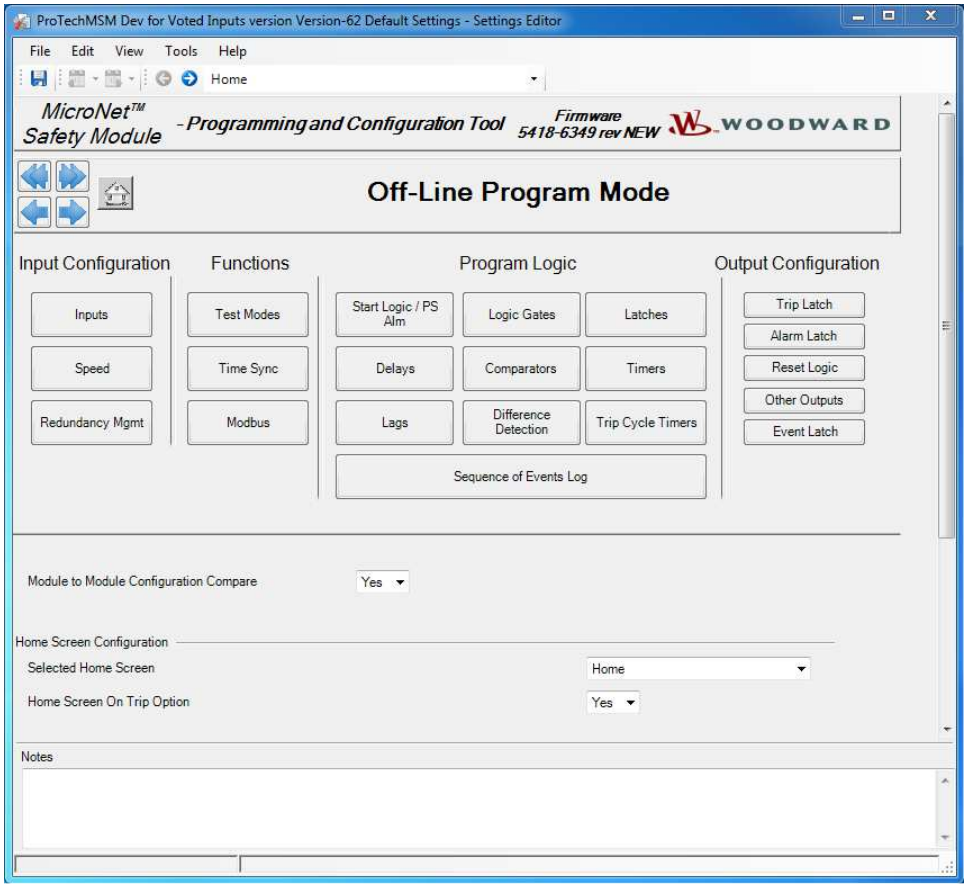
After clicking this selection, the following sub-window appears with a list of applications:



Select the appropriate file compatible with your MicroNet Safety Module software. If other Woodward applications are installed on your PC, a list of choices in addition to MicroNet Safety Module 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”. The settings files have a *.wset extension.

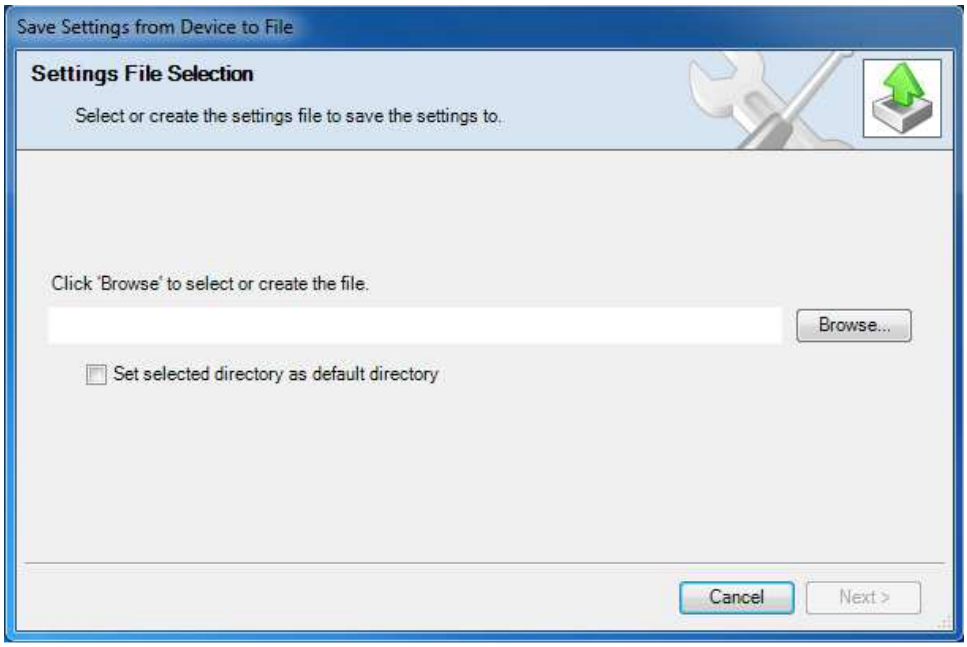
Assign a file location and name, save the file on the PC and close the Settings Editor screen.

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.



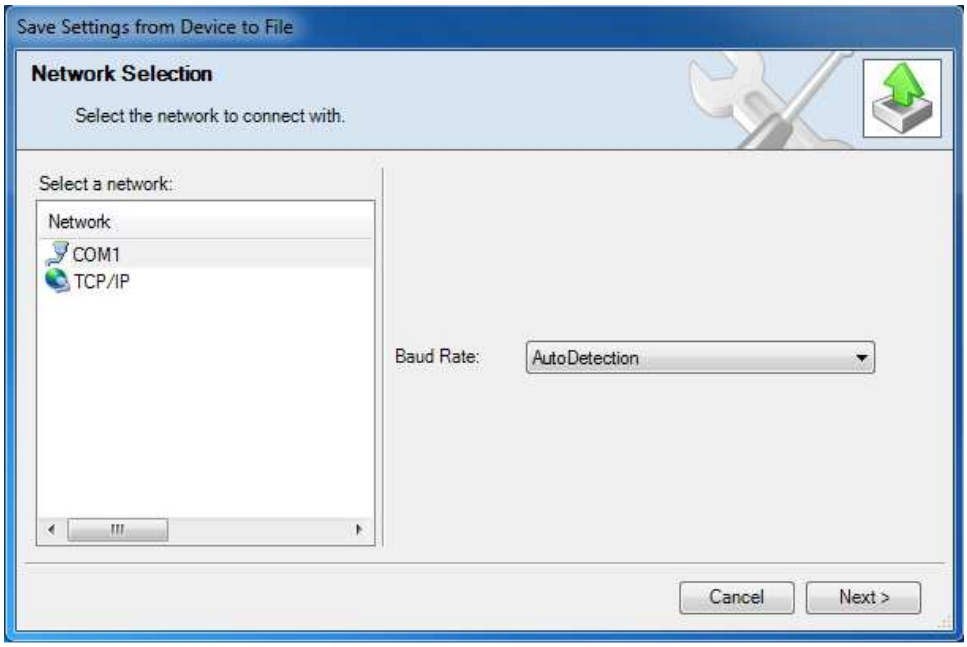
1. Use the Browse button to select the location and name of the settings file to be created or to be modified. The settings files have a *.wset extension.
2. Saving settings from device to file requires either the Test or Config Level login. There are two valid conditions:
   - Serial communication was 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

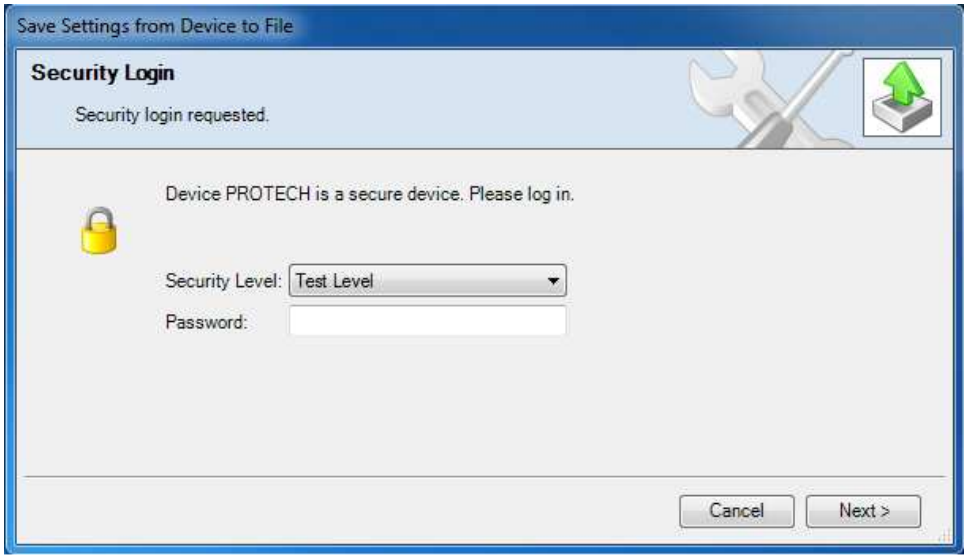
3. If serial communication was already established, and Test Level or Config Level was selected, the transfer of the configuration file from the MicroNet Safety Module starts immediately.
4. The configuration file is ready to be modified by the MicroNet Safety Module Programming and Configuration Tool (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.

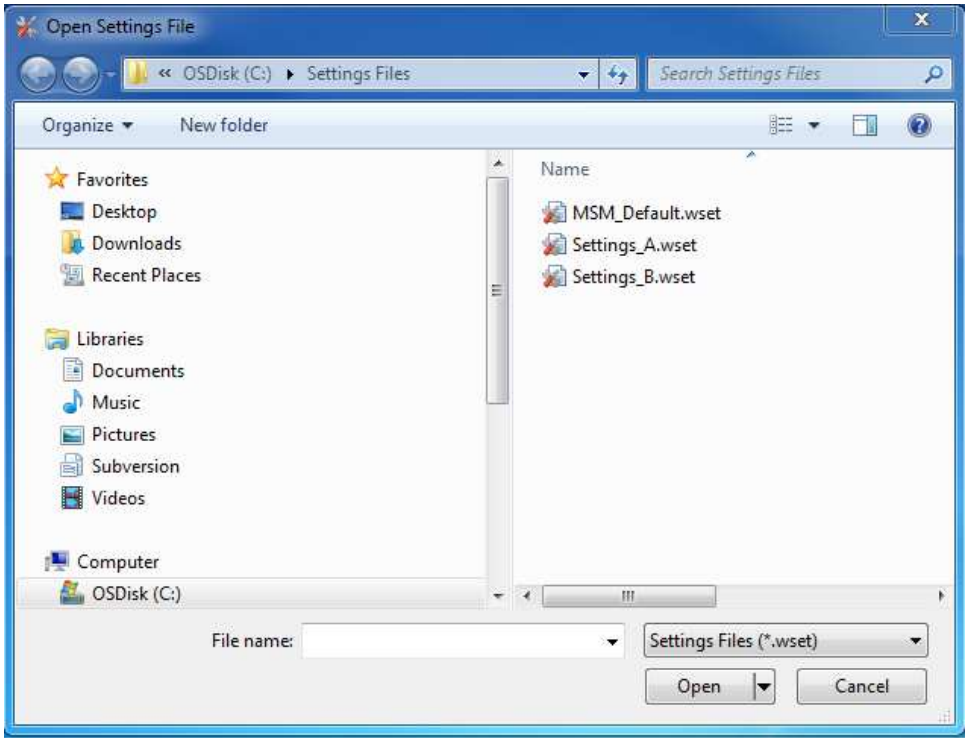
Edit Settings File

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).

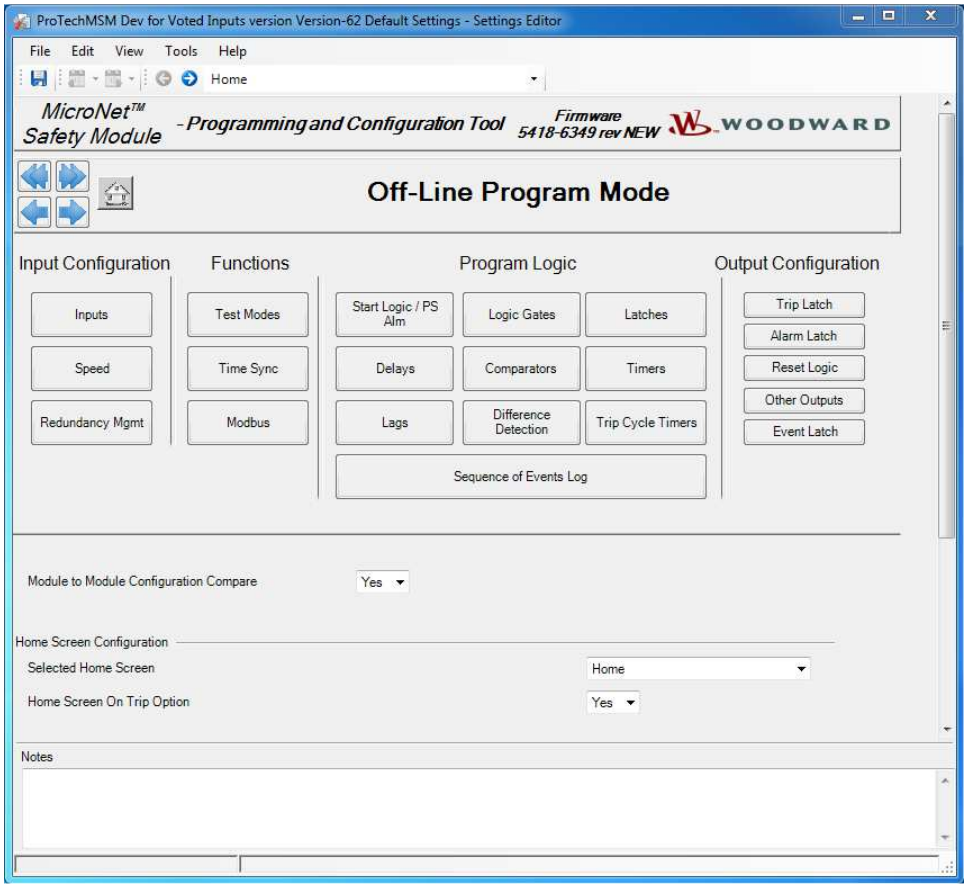
After clicking the selection “Edit Settings File” in the pull-down menu “Settings”, the following sub-window appears with a list of settings files.

The settings-files have extension *.wset.

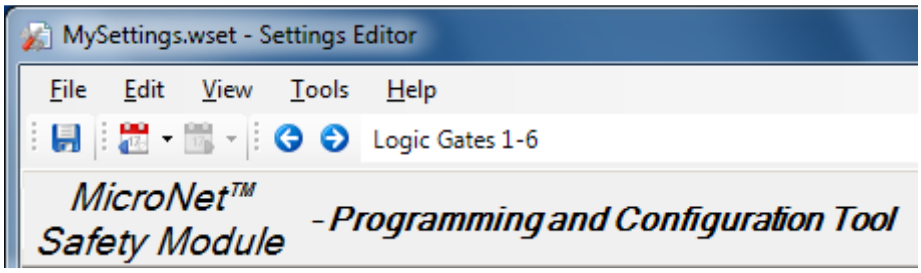


If no settings files are available, a settings file must be created (New from SID Specification Defaults), or a settings file must be loaded from the MicroNet Safety Module to a PC (Save from Device to File).

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:

Input Configuration:
- Inputs
- Speed
- Redundancy Management

Functions:
- Test Modes
- Time Sync
- Modbus

Program Logic:
- Start Logic / PS Alm
- Logic Gates
- Latches
- Delays
- Comparators
- Timers
- Lags
- Difference Detection
- Trip Cycle Timers
- Sequence Of Events Log

Output Configuration:
- Trip Latch
- Alarm Latch
- Reset Logic
- Other Outputs
- Event Latch

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

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.

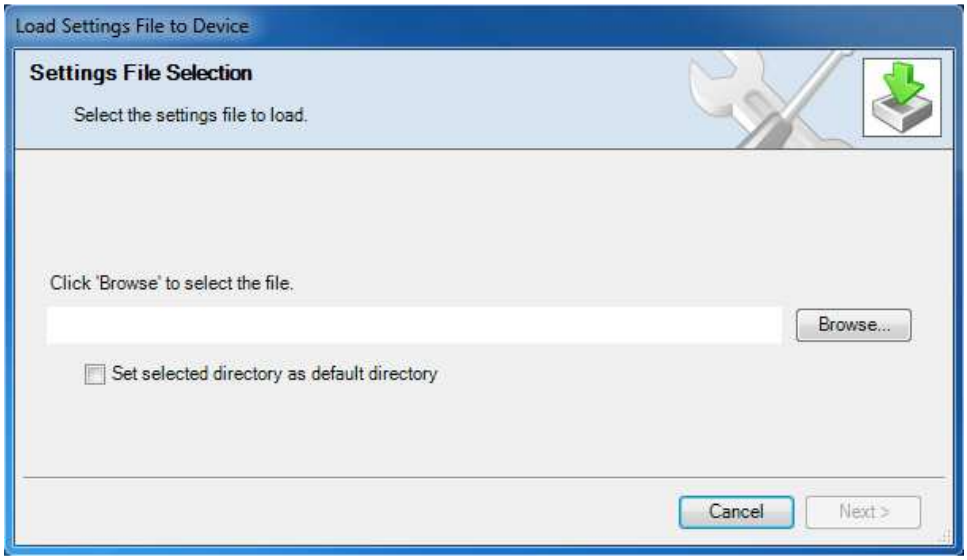
With the selection “Load Settings File to Device”, a configuration file can be loaded from the PC to the MicroNet Safety Module.

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, the configuration save will ask if a trip is desired. A trip will only be allowed if the other modules are not tripped.

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 Level was selected.
   - Serial communication was already established, and Test Level was selected.
   - Serial communication was not yet established.

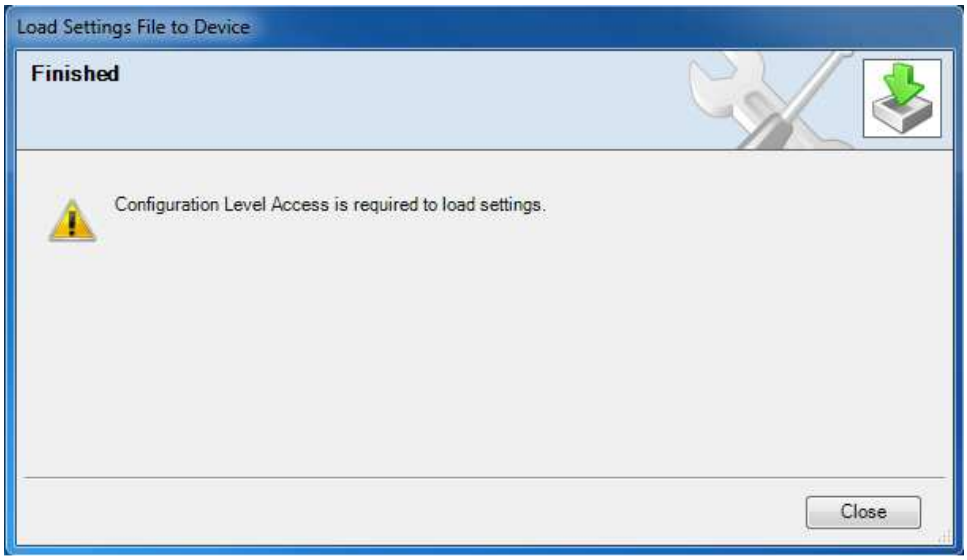
Serial communication was already established, and Config Level was selected

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. Test Level is not sufficient. If no trip condition exists, transfer is inhibited. The configuration save will ask if a trip is desired. A trip will only be allowed if the other modules are not tripped.

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 Level was selected

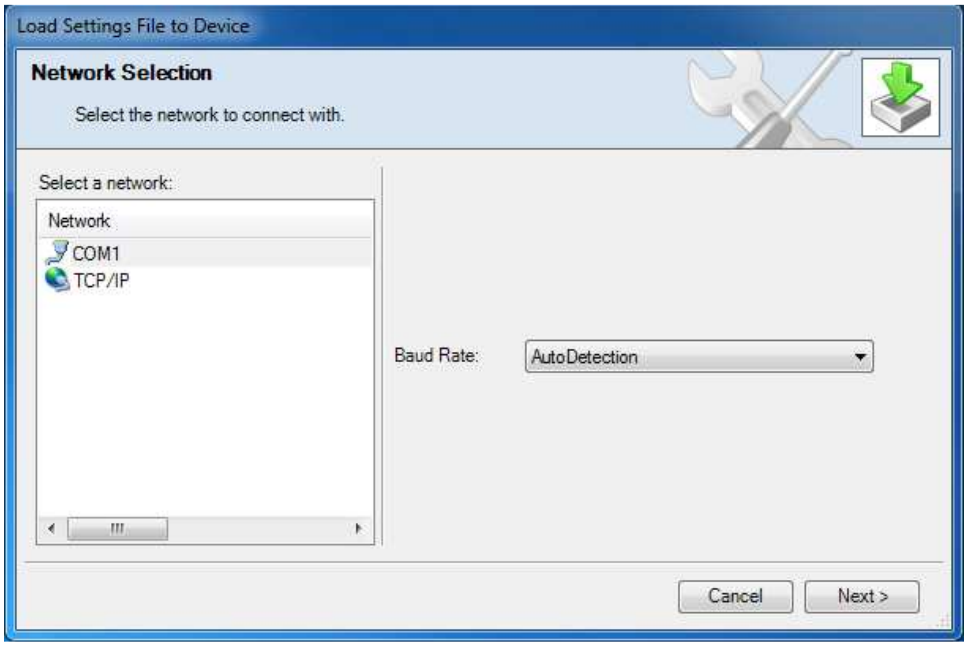
4. If serial communication was already established, and Test Level was selected, then the transfer of the configuration file to the MicroNet Safety Module cannot be established. For uploads, Config Level is required. Test Level is not sufficient. The following sub-window appears:



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

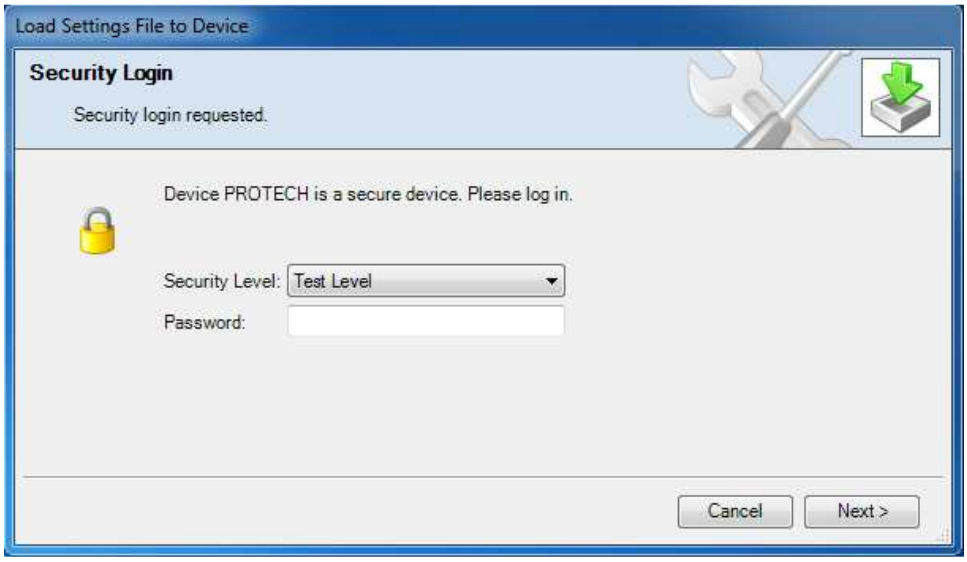
Serial communication was not yet established

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 and click on the Next button in the pop-up window.

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

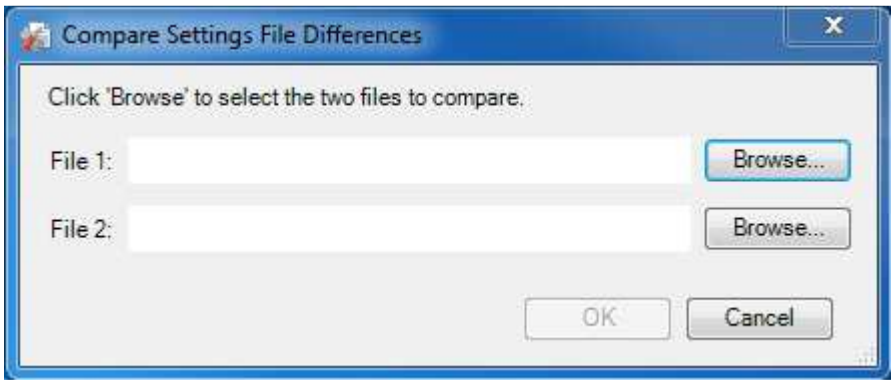


9. Select “Config Level” and enter the associated password for the selected security level. After the password is entered, the transfer of the configuration file to the MicroNet Safety Module starts. For uploads, Config Level is required. Test Level is not sufficient. If no trip condition exists, transfer is inhibited. The configuration save will ask if a trip is desired. A trip will only be allowed if the other modules are not tripped.
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

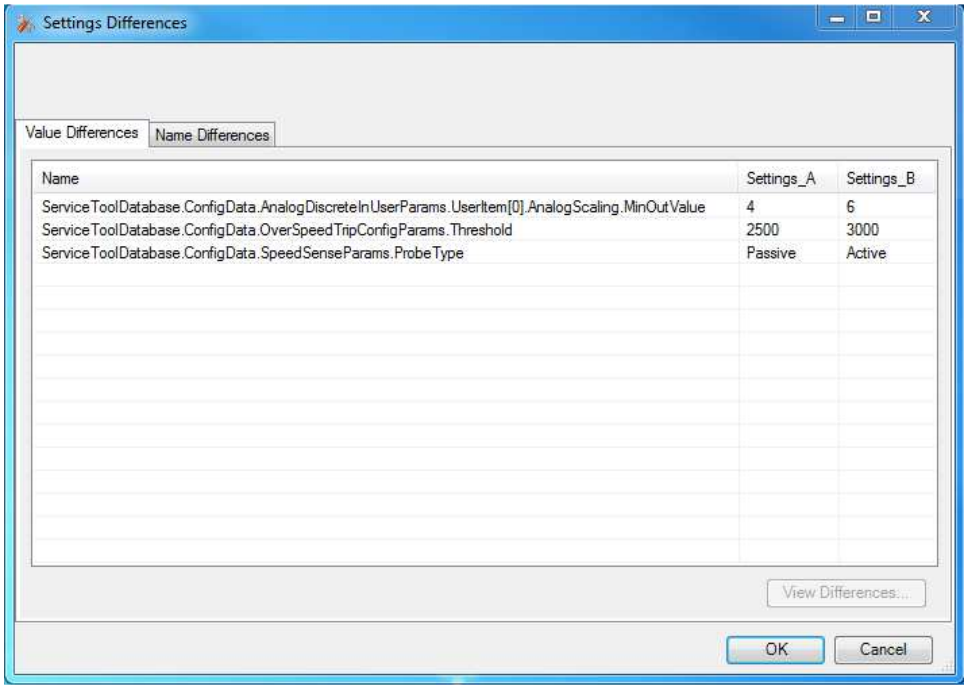
The MicroNet Safety Module Configuration Service Tool can compare two configuration files. By selecting “Compare Settings File Differences”, the files can be compared for differences in either values and/or names.

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:

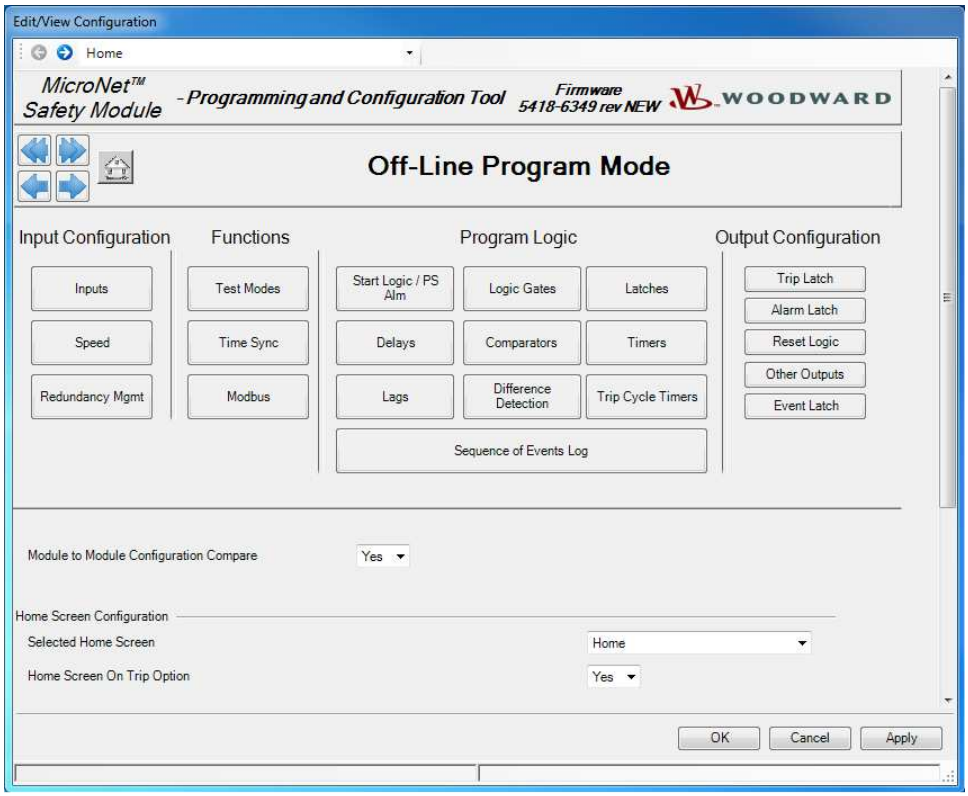
Table 12-2. Configuration Settings

Input Configuration:
- Inputs
- Speed
- Redundancy Management

Functions:
- Test Modes
- Time Sync
- Modbus

Output Configuration:
- Trip Latch
- Alarm Latch
- Reset Logic
- Other Outputs
- Event Latch

Program Logic:
- Start Logic / PS Alm
- Logic Gates
- Latches
- Delays
- Comparators
- Timers
- Lags
- Difference Detection
- Trip Cycle Timers
- Sequence of Events Log



The following parameters can be set:

Module Config Compare & Home Screen Functions

- **Module to Module Configuration Compare:** Set to “Yes” to have the module validate that its configuration file is identical to the other two modules’ configuration files. Valid values: No or Yes.
- **Selected Home Screen:** Set the screen you want displayed when the “Home” screen button is pressed. Valid Values:

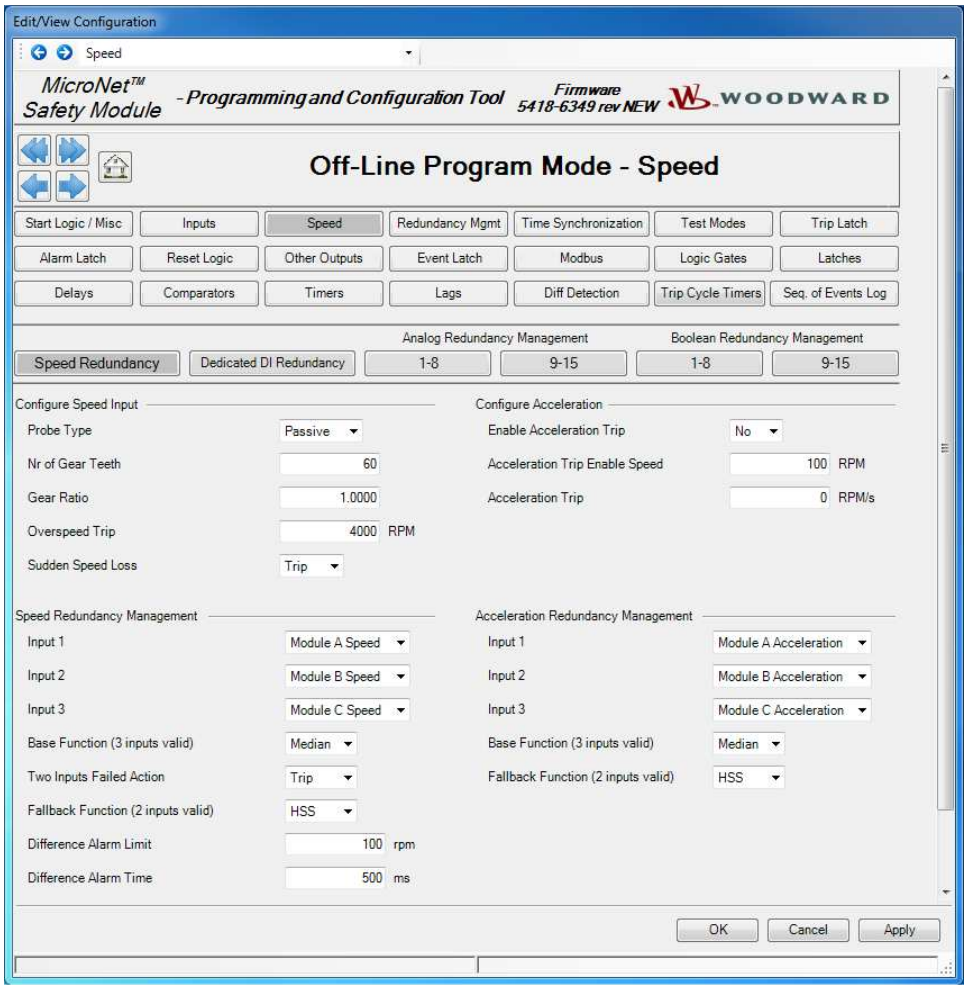
Table 12-3. Home Screen Valid Values

Home	Accel Redundancy Manager	Peak Speed/Acceleration Log
Monitor Summary	Speed Fail Timer	Analog Comparator 1-15
Monitor Summary Config Inputs	Analog Output	Logic Gate 1-50
Monitor Summary Prog Relays	Modbus	Timer 1-5
Trip Latch	Date & Time	Latch 1-10
Alarm Latch	System Status	Delay 1-25
Event Latch	Module Information	Unit Delay 1-10
Trip Cycle Time Monitors	Overspeed/Acceleration Log	Analog Redundancy Manager 1-15
Dedicated Discrete Inputs	Trip Log	Boolean Redundancy Manager 1-15
Configurable Inputs 1-10	Alarm Log	Lag 1-10
Programmable Relays	Trip Cycle Time Log	Difference Detection 1-15
Speed Input	Sequence of Events Log	
Speed Redundancy Manager	Event Latch Log	

- **Home Screen On Trip Option:** Set “Yes” to have the module switch to the “Home” screen on a sensing a trip condition. During system troubleshooting it may be useful to temporarily set this setting to “No” to allow other screens to be viewed during a trip event. Valid values: No or Yes.

Speed and Redundancy Management

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



The following parameters can be set:

Configure Speed Input

- **Probe Type:** Select speed probe type. Valid values: Not Used, 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. A sudden speed loss is an instantaneous loss of speed to guarantee that it will be detected. The algorithm is: If the previous speed frequency (NOT RPM) was above 200 and the current speed frequency is 0 then Sudden Speed Loss. Speed is updated on every zero crossing and 0 frequency is detected by no zero crossings on the speed input for 2 seconds.

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.

Speed Redundancy Management

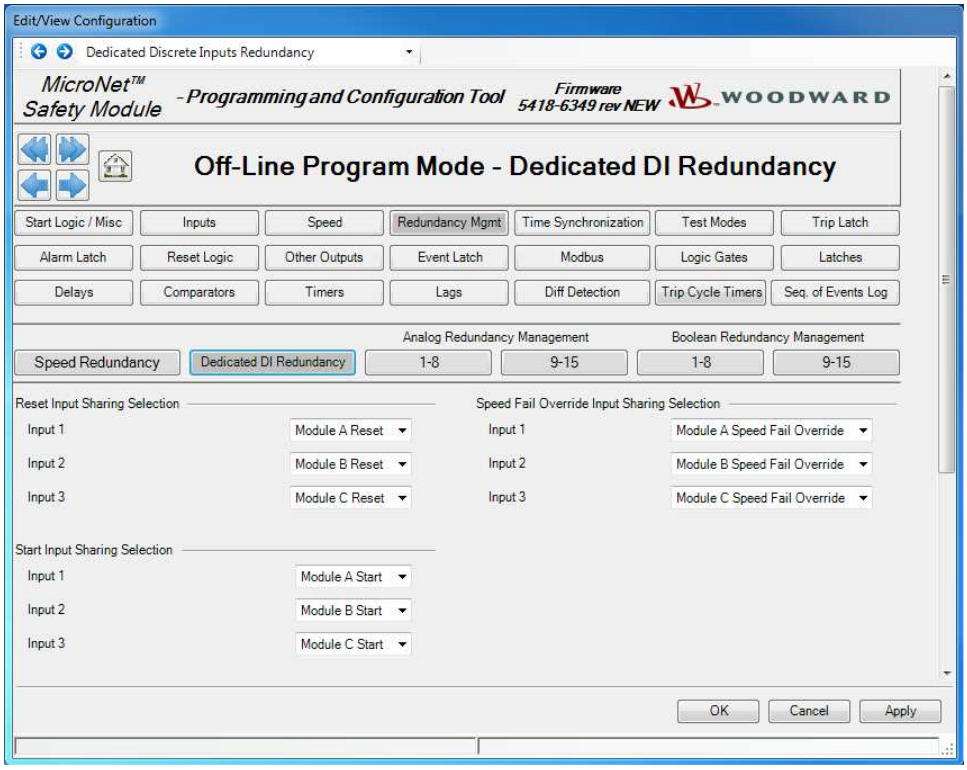
- **Input 1-3:** Select which modules will be supplying a speed signal to the redundancy manager. Selections are Module A Speed, Module B Speed, Module C Speed or Not Used.
- **Base Function (3 inputs valid):** Select the redundancy mode. Choices are Median, LSS (Low Signal Select), or HSS (High Signal Select).
- **Two Inputs Failed Action:** Selects the action when two speed signals have failed. Choices are Trip or No Trip.
- **Fallback Function (2 inputs valid):** Select the redundancy mode when only two of three speed signals are valid. Choices are HSS or LSS.
- **Difference Alarm Limit:** The amount the speeds are allowed to differ before the Difference Alarm is set. Valid values: 0-32000 rpm.
- **Difference Alarm Time:** The time the speed difference limit is allowed to exist before the Difference Alarm is set. Valid values: 4-10000 milliseconds.

Acceleration Redundancy Management

- **Input 1-3:** Select which modules will be supplying an acceleration signal to the redundancy manager. Selections are Module A Acceleration, Module B Acceleration, Module C Acceleration or Not Used.
- **Base Function (3 inputs valid):** Select the redundancy mode. Choices are Median, LSS (Low Signal Select), or HSS (high Signal Select).
- **Fallback Function (2 inputs valid):** Select the redundancy mode when only two of three speed signals are valid. Choices are HSS or LSS.

Redundancy Management

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



The following parameters can be set:

Reset Input Sharing Selection

- **Inputs 1-3:** This selection creates the “ORed” state for the dedicated discrete Reset input from each module. Selections are Module A Reset, Module B Reset, Module C Reset, or Not Used.

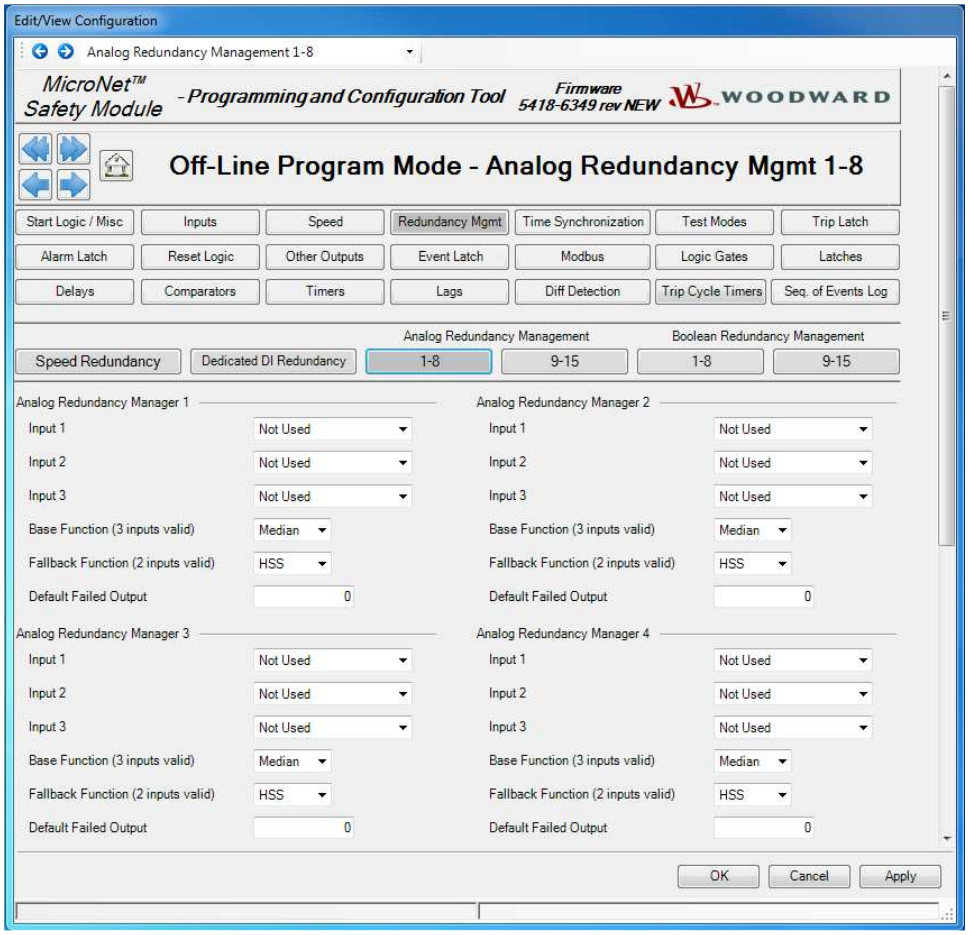
Start Input Sharing Selection

- **Inputs 1-3:** This selection creates the “ORed” state for the dedicated discrete Start input from each module. Selections are Module A Start, Module B Start, Module C Start, or Not Used.

Speed Fail Override Input Sharing Selection

- **Inputs 1-3:** This selection creates the “ORed” state for the dedicated discrete Speed Fail Override input from each module. Selections are Module A Speed Fail Override, Module B Speed Fail Override, Module C Speed Fail Override, or Not Used.

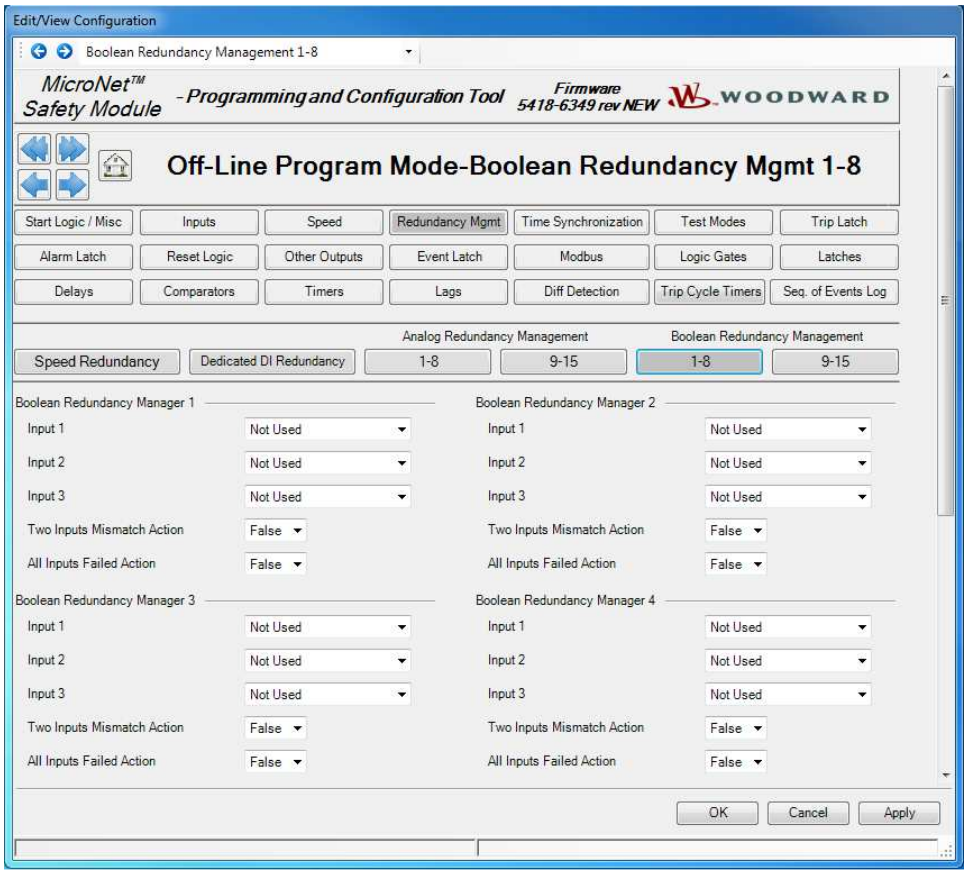
When “Analog Redundancy Management” is selected in the settings editor or config menu, the following screen is displayed:



The following parameters can be set for Analog Redundancy Managers 1-15:

- **Input 1-3:** Select the analog input signals for the redundancy manager.
- **Base Function (3 inputs valid):** Select the redundancy mode. Choices are Median, LSS (Low Signal Select), HSS (High Signal Select), or Average.
- **Fallback Function (2 inputs valid):** Select the redundancy mode when only two of three speed signals are valid. Choices are HSS, LSS, or Average.
- **Default Failed Output:** Select a value that the output should go to when no inputs are valid. Valid values: -32500 to +32500.

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



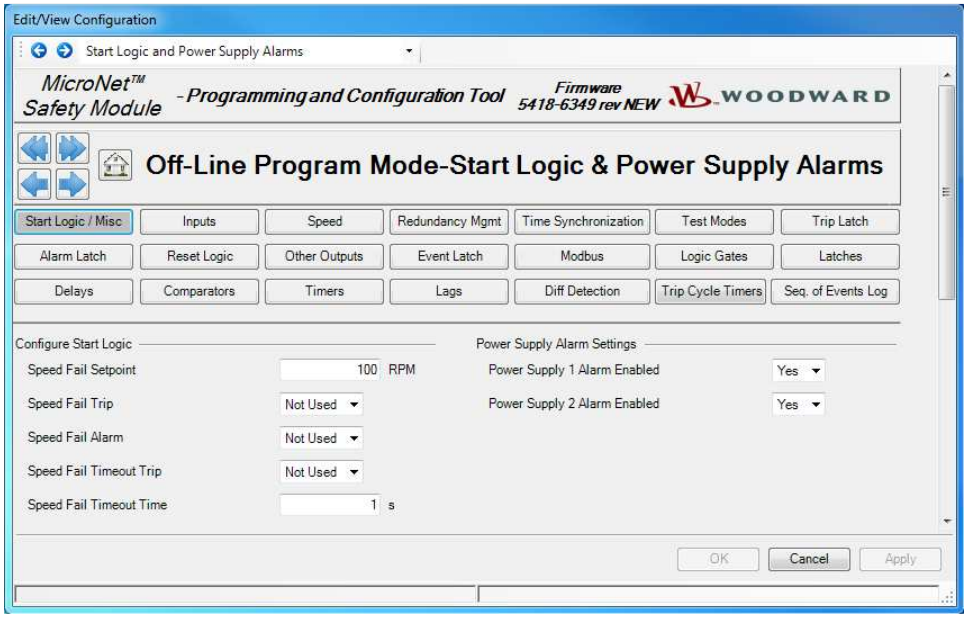
Two matching inputs (2oo3) will always determine the output. If only one input is valid, the output will always follow that input.

The following parameters can be set for Boolean Redundancy Managers 1-15:

- **Input 1-3:** Select the Boolean input signals for the redundancy manager.
- **Two Inputs Mismatch Output:** Select the output when only two inputs are valid and they don’t match. Valid values: True or False.
- **Output with No Valid Inputs:** Select the output when there are no valid inputs. Valid values: True or False.

Start Logic & Power Supply Alarms

When “Start Logic / PS Alm” is selected in the settings editor or config menu, the following screen is displayed:



The following parameters can be set:

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.

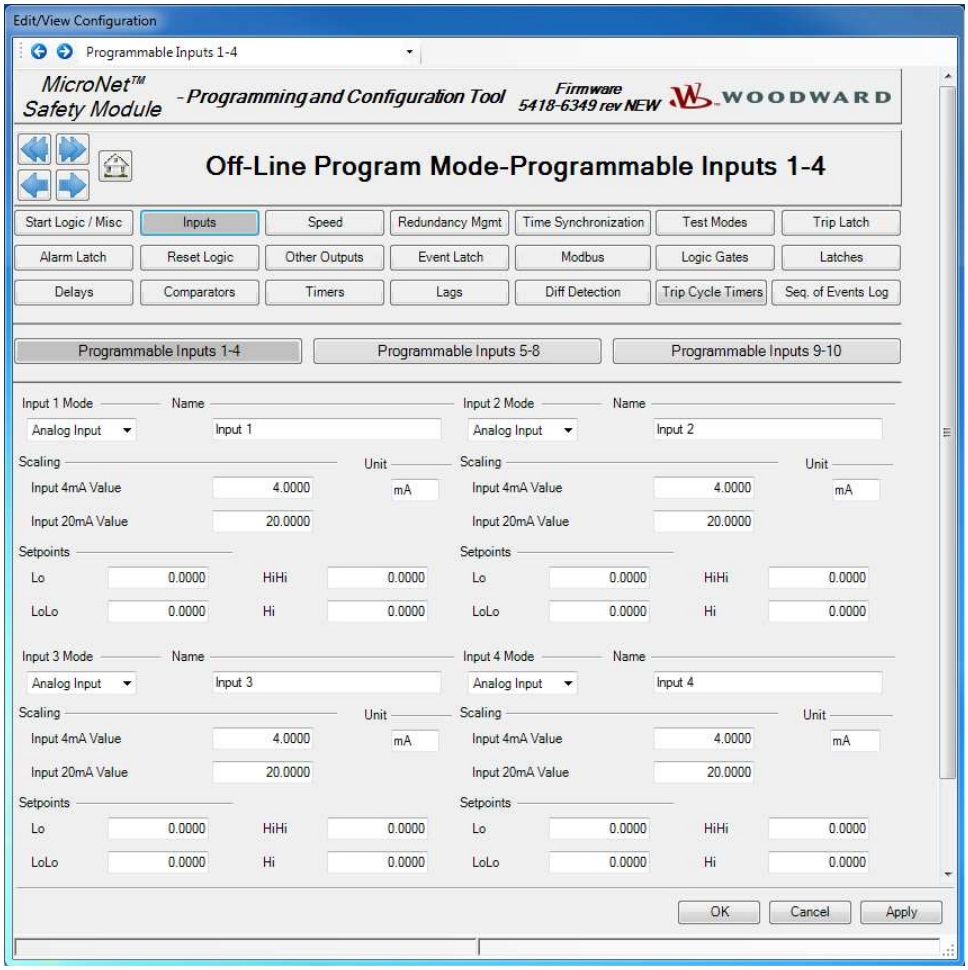
Power Supply Alarm Settings

- **Power Supply 1 Alarm Enabled:** When used, this alarm is activated when power supply 1 output voltage is out of range. Valid values: No or Yes.
- **Power Supply 2 Alarm Enabled:** When used, this alarm is activated when power supply 2 output voltage is out of range. Valid values: No or Yes.

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 in the settings editor or config menu, the following screen is displayed:

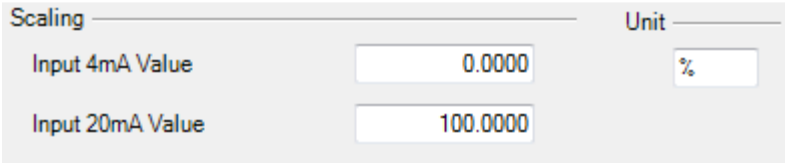


Inputs can be configured using the Programmable Inputs 1-4, 5-8 and 9-10 screens and the options include:

- Not Used
- Discrete Input
- Analog input

Each input can have a name and units assigned to it. The name and units are displayed on the front panel Summary and Configurable Input monitoring screens.

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 (i.e. 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 alphanumeric characters. Note: The entered name will only be displayed in English. If left blank, a default name will be displayed in the configured language (English or Chinese).

Configure Scaling (only visible if Input Mode is Analog)

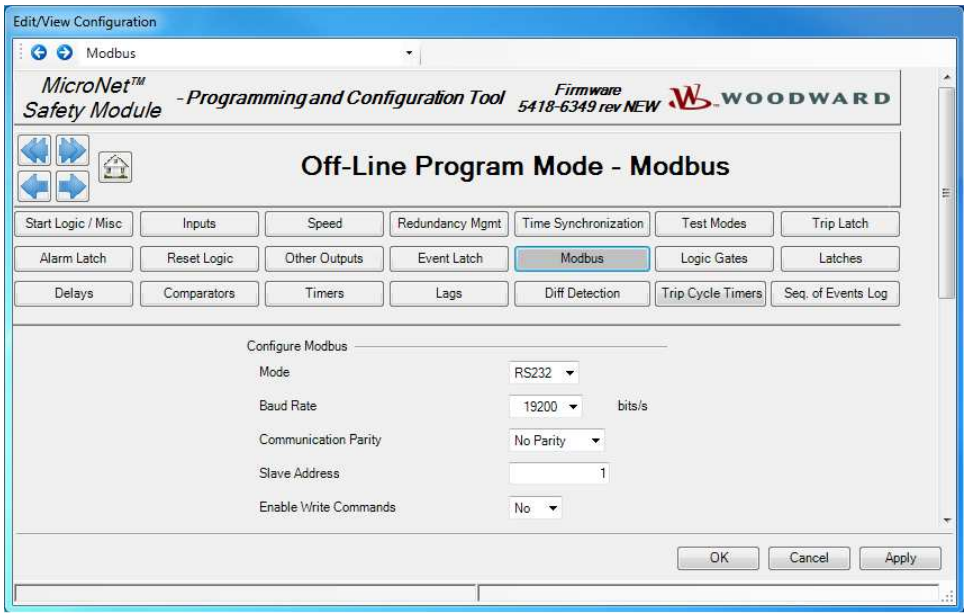
- **Input 4 mA Value:** Scaling value for the input, in user-defined units, corresponding to 4 mA. Valid values: -20000 to +20000.
- **Input 20 mA Value:** Scaling value for the input, in user-defined units, corresponding to 20 mA. Valid values: -20000 to +20000.
- **Unit:** User-defined units for the input. Valid values: up to 7 alphanumeric characters. Note: The entered units will only be displayed in English.

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: -20000 to +20000.
- **LoLo:** LoLo input level setting, in user-defined units, below which the Analog Input LoLo indication is active. Valid values: -20000 to +20000.
- **Hi:** Hi input level setting, in user-defined units, above which the Analog Input Hi indication is active. Valid values: -20000 to +20000.
- **HiHi:** HiHi input level setting, in user-defined units, above which the Analog Input HiHi indication is active. Valid values: -20000 to +20000.

Modbus

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



Modbus utilizes a master/slave network protocol. The MicroNet Safety Module is always a “Slave”.

The following parameters can be set:

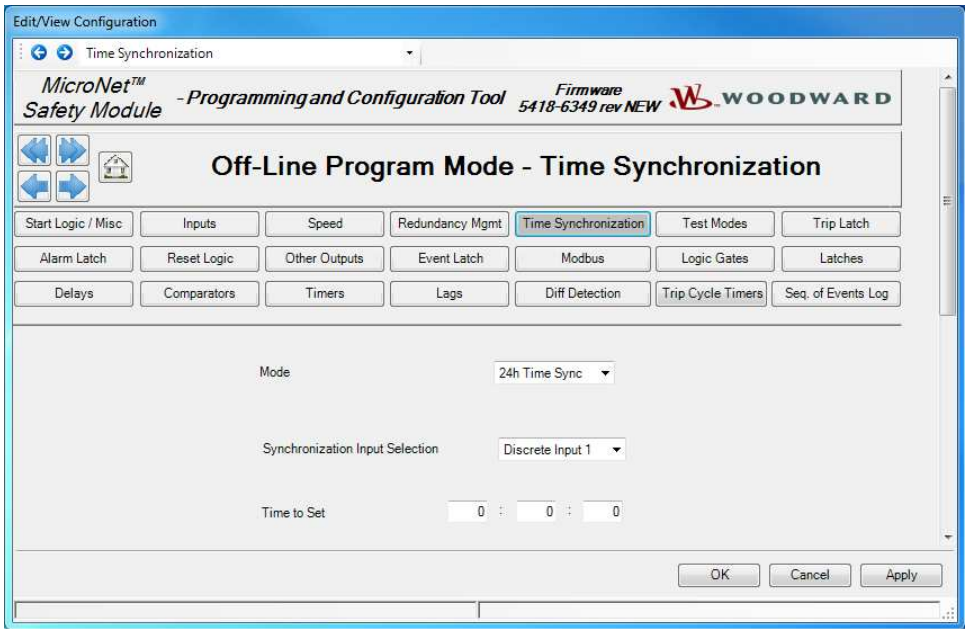
Configure Modbus

- **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 MicroNet Safety Module (e.g. Reset, Initiate User-def Test 1). See Monitor and Control section in the 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).

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



The following parameters can be set:

- **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.

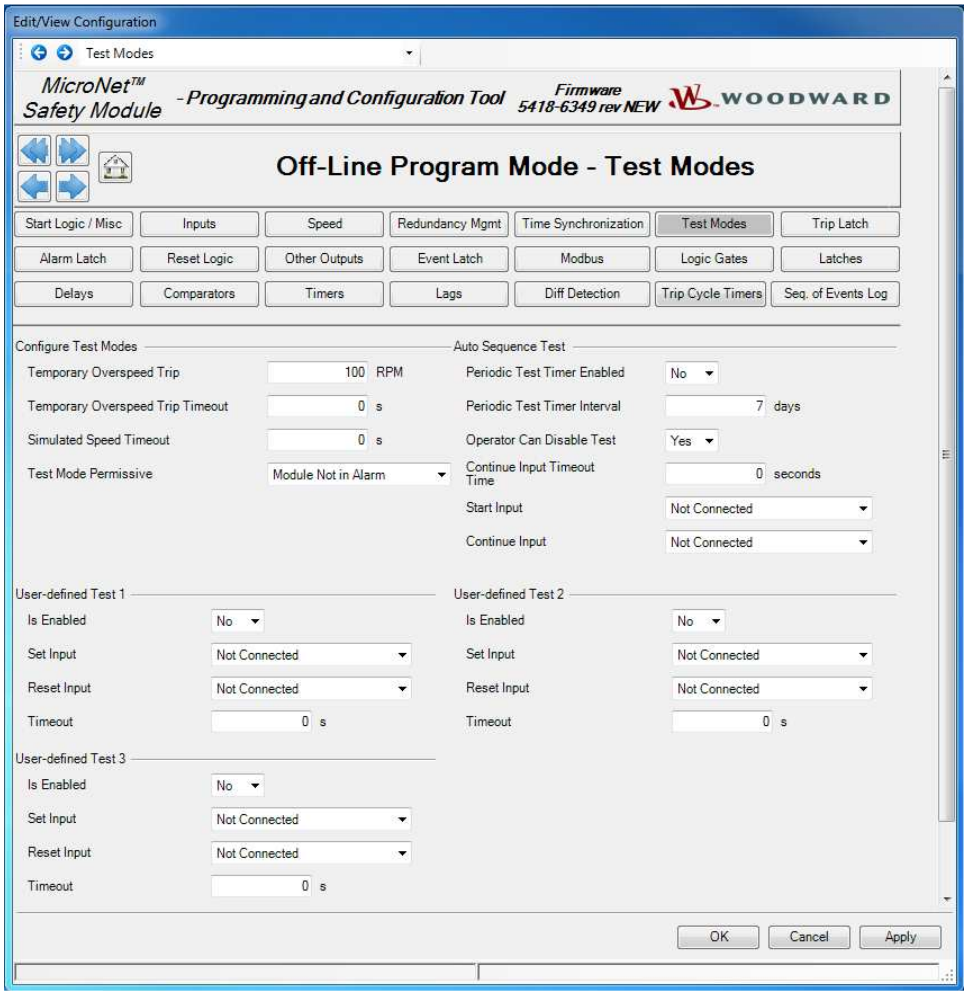
Test Modes

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

- **Temporary Overspeed Setpoint Test:** This is an overspeed test with an adjusted test speed setpoint. The test is 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 the 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 a simulated speed signal from an internal frequency generator. The simulated speed signal starts at the overspeed setpoint minus 100 rpm and must be manually raised within the allowed time span above the overspeed setpoint 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 a simulated speed signal from an internal frequency generator. The simulated speed signal starts 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.
- **Auto-Sequence Test:** This test function will automatically run the Auto Simulated Speed Test on all three modules at a configured test interval. Since module A initiates the test sequence, the Auto-Sequence test can only be configured on module A.

- **User Defined Test 1, 2 & 3:** These test functions allow a user to run custom test routines. If a test is not completed within the configurable time span, the test will be aborted.
- **Lamp Test:** The lamp test verifies the front panel LED functionality by cycling through the color combinations. The test can be repeated as needed and a cancel option is provided to cancel the test or to return to the previous test modes screen.

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



The following parameters can be set:

Configure Test Modes

- **Temporary Overspeed Trip:** Overspeed setpoint setting for overspeed tests with actual turbine or equipment 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 or equipment 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 Permissive:** This permissive function is used to prevent a test routine from running when another module is tripped, in alarm, or in a Test Mode. Selection choices are:
  - **No Inter-module Permissive:** Test will run even if another module is tripped, in alarm, or in a test mode.
  - **Module Not Tripped:** Test will only run if other modules are not tripped and not in a test mode.
  - **Module Not In Alarm:** Test will only run if other modules are not tripped, not in alarm, and not in a test mode.

Auto-Sequence Test

- **Periodic Test Timer Enabled:** Set to yes to use the function. Valid values: Yes or No.
- **Periodic Test Timer Interval:** Interval time for the Auto-Sequence 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.
- **Continue Input Timeout Time:** The amount of time to wait for the test Continue Input signal. Valid values: 0-28800 seconds.
- **Start Input:** Selection to start the Auto-Sequence Test. This input is edge sensitive. It is only valid for module A and is ignored for Modules B & C. Valid values: (*see selection list below).*
- **Continue Input:** Selection to indicate that the Auto-Sequence Test should continue to the next module. This input is level sensitive and is valid for Modules A, B & C. Note: If used on module C, the test will wait for the continue signal before successful completion on Module C. Valid values: (*see selection list below).*

Table 12-4. Auto-Sequence Test Input Selections

Not Connected	Timer 1-5 HiHi
Event Latch	Timer 1-5 Hi
Analog Input 1-10 HiHi	Unit Delay 1-10
Analog Input 1-10 Hi	Analog RM 1-15 Input 1-3 Invalid
Analog Input 1-10 Lo	Boolean RM 1-15
Analog Input 1-10 LoLo	Boolean RM 1-15 Input 1-3 Invalid
Analog Input 1-10 Range Err	Difference Detection 1-15
Discrete Input 1-10	Speed RM Input 1-3 Invalid
Analog Comparator 1-15	Speed RM Difference
Logic Gate 1-50	Speed RM Trip
Latch 1-10	Accel RM Input 1-3 Invalid
Delay 1-25	Resettable Trip Input

User-defined Tests

- **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.

Table 12-5. User-defined Test Input Selections

Not Connected	Timer 1-5 HiHi
Reset Function	Timer 1-5 Hi
Discrete Input 1-10	Unit Delay 1-10
Analog Comparator 1-15	Analog RM 1-15 Input 1-3 Invalid
Logic Gate 1-50	Boolean RM 1-15
Latch 1-10	Boolean RM 1-15 Input 1-3 Invalid
Delay 1-25	Difference Detection 1-15

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 the following functions:

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

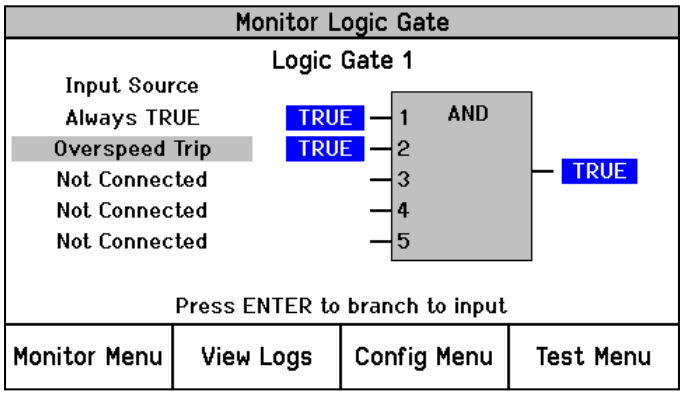
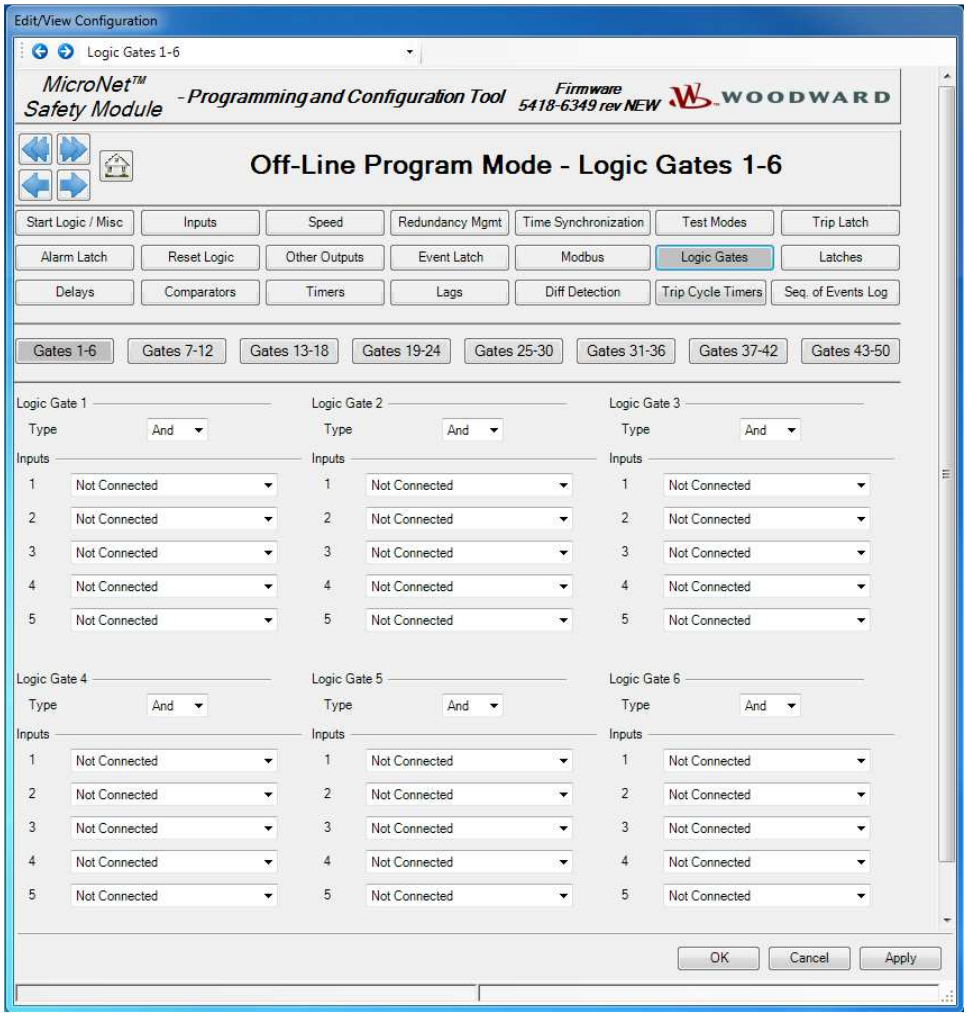


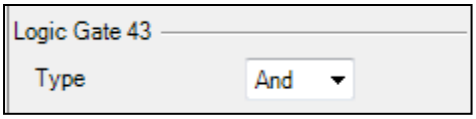
Figure 12-1. Logic Gate Monitor screen (front panel)

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



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

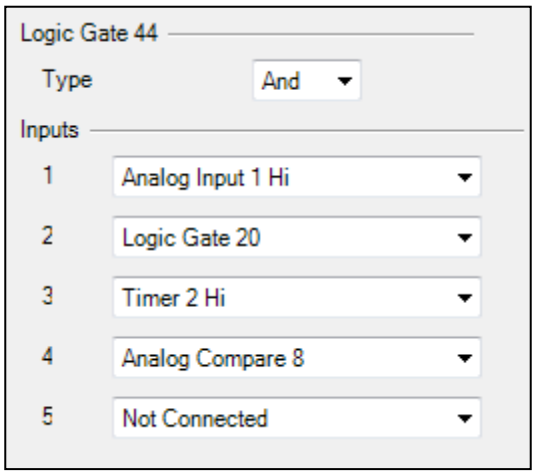
The function of the gates can be selected by the Type selection input field.



- 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 connected to any function output. (e.g. another gate, an analog input alarm setpoint, 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 functions and inputs are numbered is shown below:



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

If the output of a logic gate is not used as an input in any other function, the Configuration Error Log will indicate a warning. . If the output of a logic gate is connected to another function but none of the inputs are configured, the Configuration Error Log will indicate an error and uploading of the configuration will not be possible.

Table 12-6. Logic Function Input Selections

Not Connected	Analog Input 1-10 Lo
Always FALSE	Analog Input 1-10 LoLo
Always TRUE	Analog In 1-10 Range Err
Start Function	Discrete Input 1-10
Reset Function	Analog Comparator 1-15
Speed Fail Override	Logic Gate 1-50
Overspeed Trip	Latch 1-10
Over-acceleration Trip	Delay 1-25
Speed Fail Trip	Timer 1-5 HiHi
Speed Fail Timeout	Timer 1-5 Hi
Speed Lost Alarm	Unit Delay 1-10
Speed Lost Trip	Analog RM 1-15 Input 1-3 Invalid
Speed Probe Open Wire Trip	Boolean RM 1-15
Speed Probe Open Wire Alarm	Boolean RM 1-15 Input 1-3 Invalid
Temporary Ovrspd Setpoint On	Difference Detection 1-15
Manual Sim Speed Active	Speed RM Input 1-3 Invalid
Auto Sim Speed Active	Speed RM Difference
Auto Sim Speed Failed	Speed RM Trip
Auto-Sequence Test Active	Acceleration RM Input 1-3 Invalid
Auto-Seq Continue Timeout	Trip Time Monitor 1-2
User Defined Test 1-3	Power Up Trip
Configuration Mismatch	Internal Fault Trip
Speed Fail Alarm	Internal Fault Alarm
Trip	Configuration Trip
Alarm	Resettable Trip Input
Event Latch	Power Supply 1-2 Fault
Analog Input 1-10 HiHi	Parameter Error
Analog Input 1-10 Hi	Shared Data Rx Error 1-2

Latches

There are 10 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.

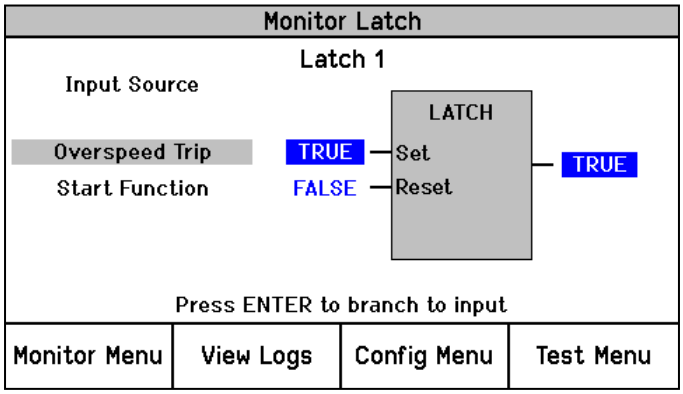
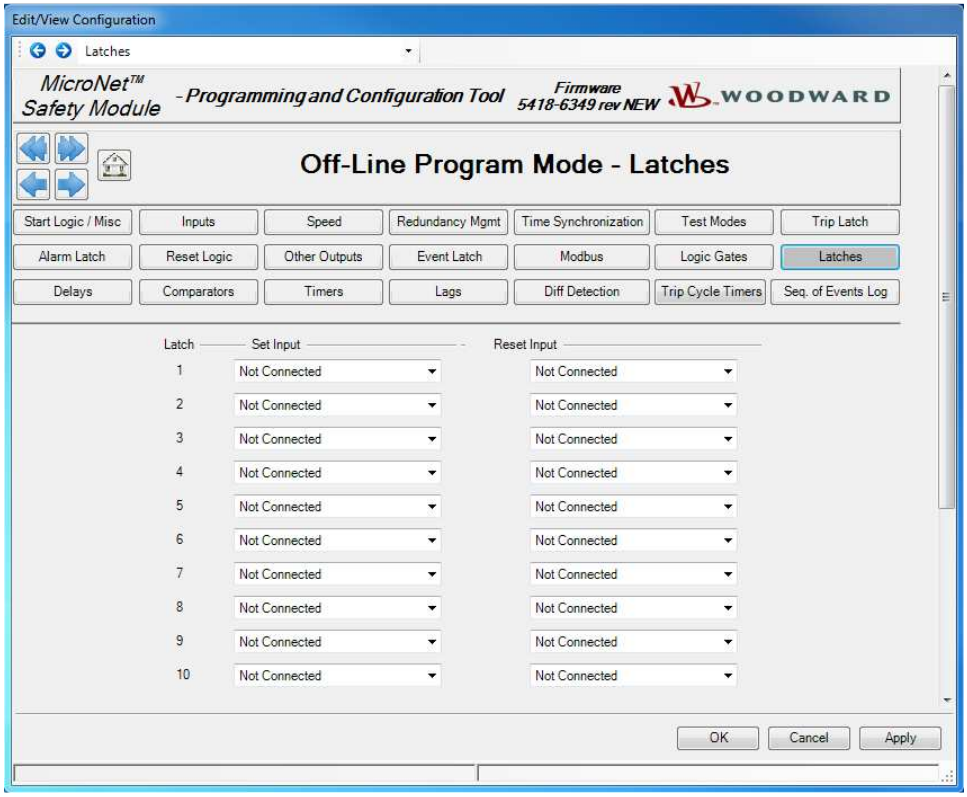


Figure 12-2. Latch Monitor screen (front panel)

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 output from another gate or from an analog input alarm setpoint, a timer, etc. Valid values: *(see Logic Function Input Selections list).*
- **Reset Input:** Selection for the reset-dominant latch block reset input. Valid values: *(see Logic Function Input Selections list).*

If the output of a latch is not used as an input in any other function, the Configuration Error Log will indicate a warning. If the output of a latch is connected to another function but none of the inputs are configured, the Configuration Error Log will indicate an error and uploading of the configuration will not be possible.

Delays

There are 25 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 (delay in switching from False to True) and a drop-off time (delay in switching from True to False).

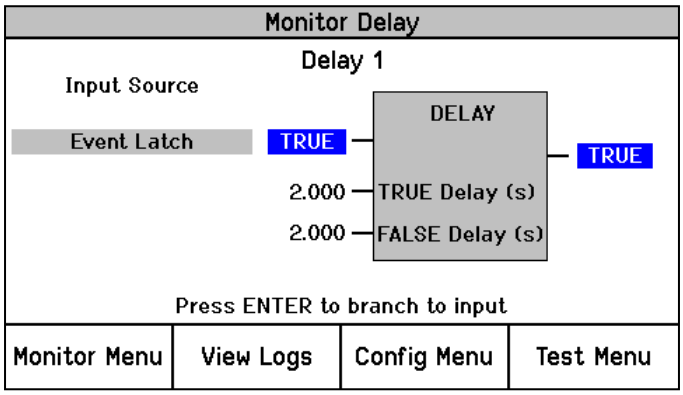
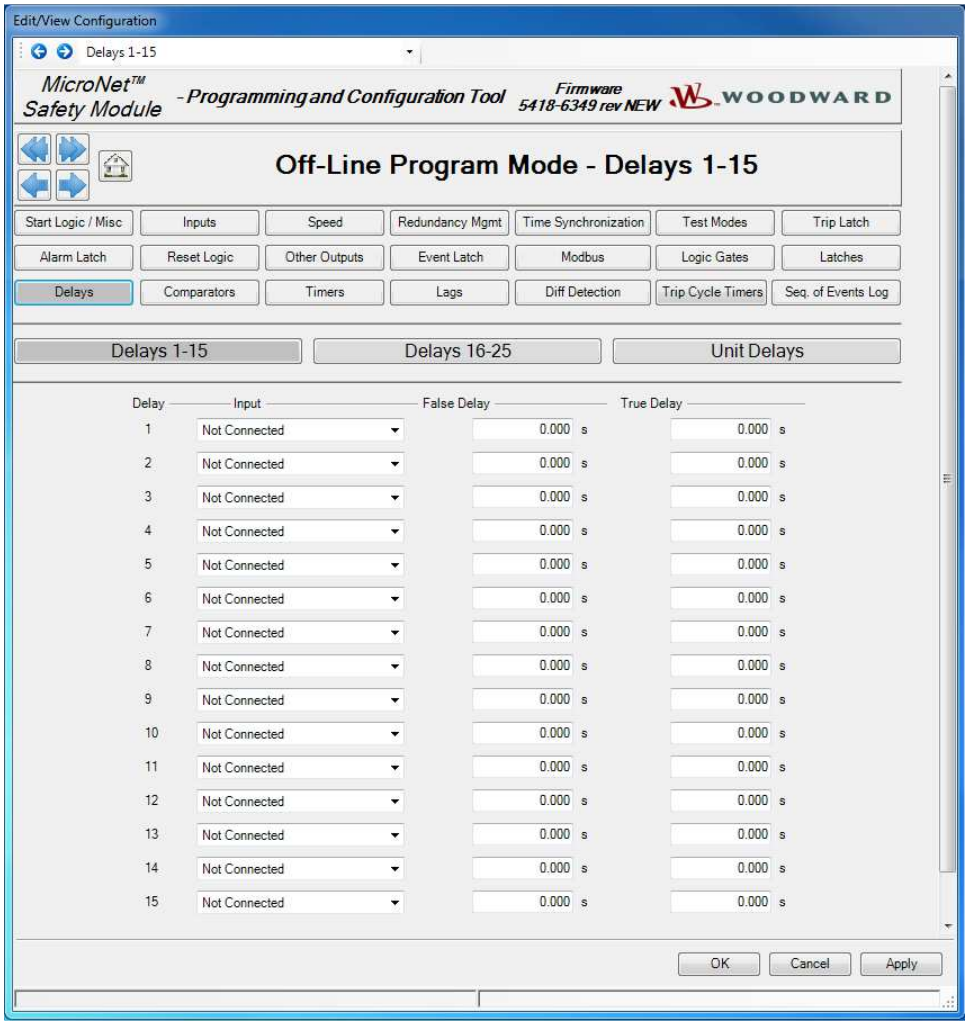


Figure 12-3. Delay Monitor screen (front panel)

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 Function Input Selections list).*
- **False Delay:** Time delay that the input must remain false before the output goes false. The minimum detectable resolution is 4 msec. 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 msec. Valid values: 0-3600 seconds.

If the output of a delay is not used as an input in any other function, the Configuration Check Error Log will show a warning. If the output of a delay is connected to another function but the input is not configured, the Configuration Error Log will indicate an error and uploading of the configuration will not be possible.

Unit Delays

There are 10-unit delay blocks 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.

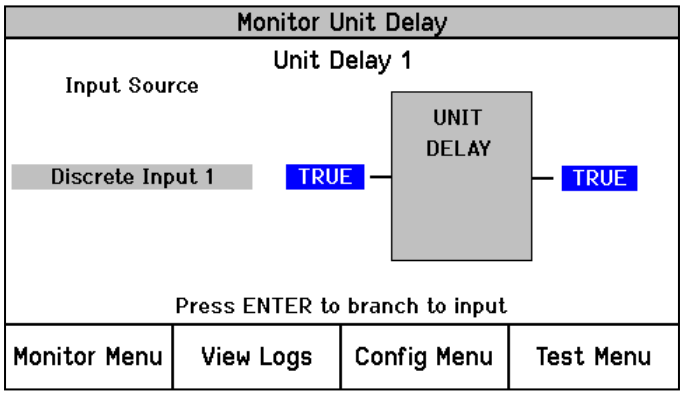
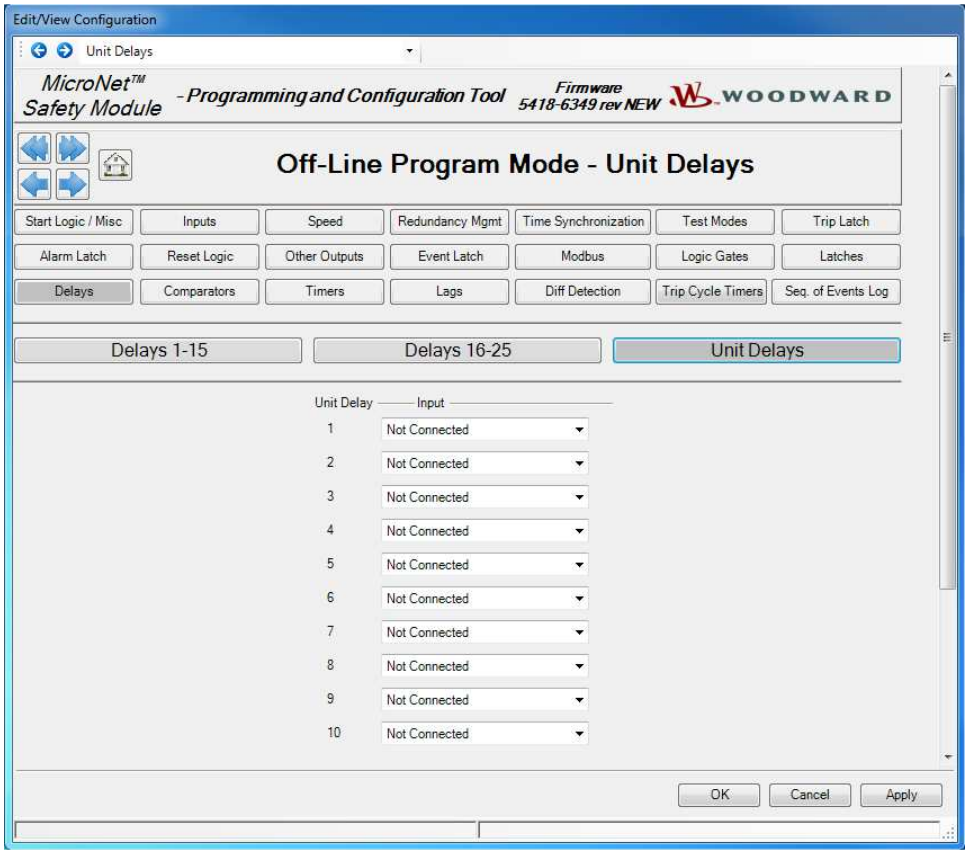


Figure 12-4. Unit Delay Monitor screen (front panel)

When “Unit Delays” is selected in the settings editor or config menu, 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 output from another gate or from an analog input alarm setpoint, or a timer, etc. Valid values: *(see Logic Function Input Selections list).*

Comparators

There are 15 comparators available that can be used to create an output available for trips, alarms, or any logical function.

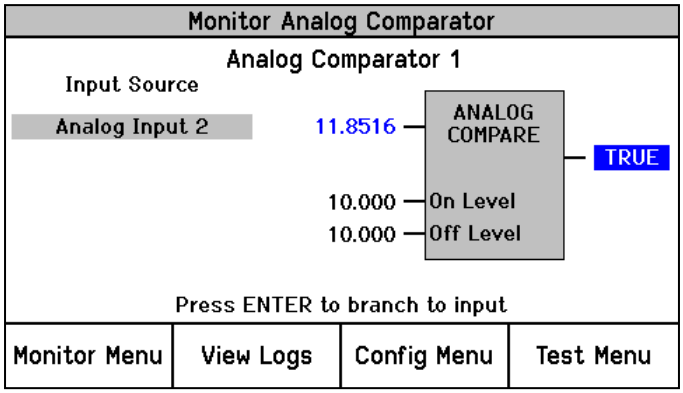
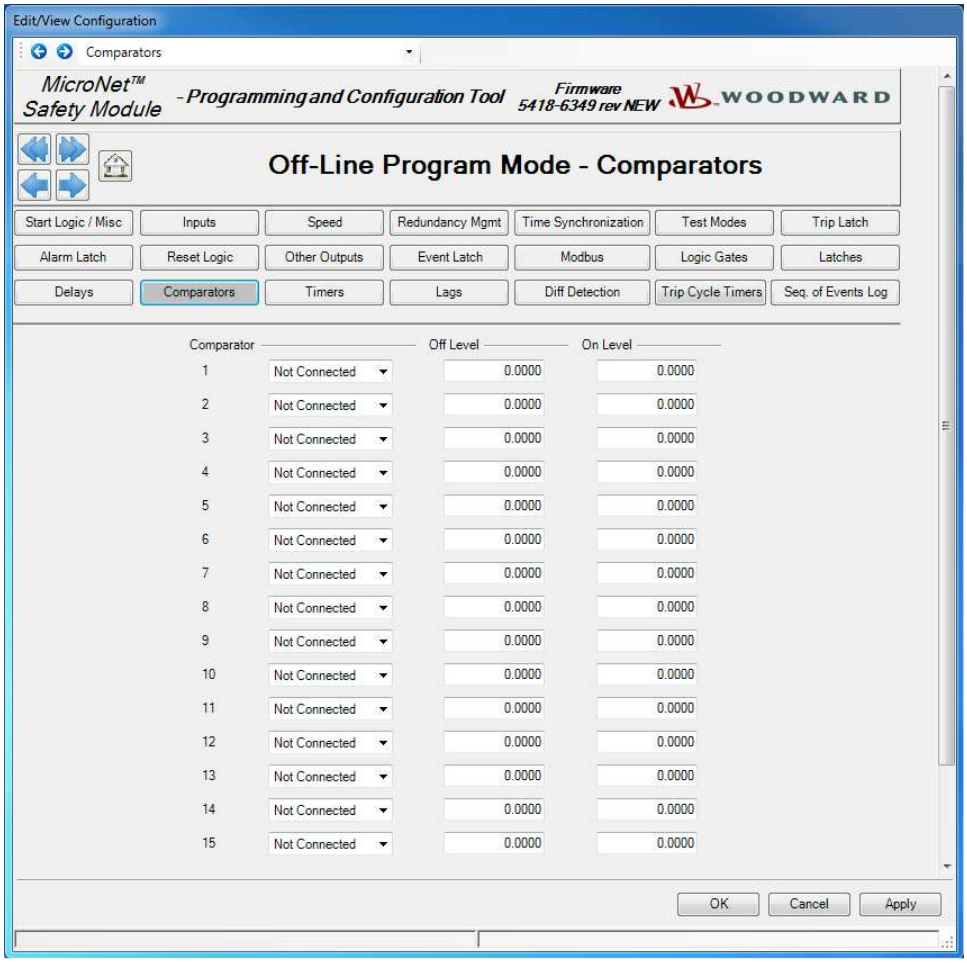


Figure 12-5. Comparator Monitor screen (front panel)

When “Comparators” is selected in the settings editor or config menu, 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 (e.g. 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 the 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 the OFF-level.

If the 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 the OFF-level.

If the ON-level equals the 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 the ON-level.

If the input is equal to the ON-level or OFF-level, the output does not change.

Comparator Settings

- **Input:** Selection for the block input. Valid values:

Not Connected	Acceleration RM
Speed	Analog Input 1-10
Speed RM	Analog RM 1-15
Acceleration	Lag 1-10.

- **Off Level:** Comparator OFF value, in engineering units.
  Valid values: -32500 to 32500.
- **On Level:** Comparator ON value, in engineering units.
  Valid values: -32500 to 32500.

If the output of a comparator is not used as an input in any other function, the Configuration Error Log will indicate a warning. If the output of a comparator is connected to another function but the input is not configured, the Configuration Error Log will indicate an error and uploading of the configuration will not be possible.

Lags

There are 10 Lag blocks available for filtering analog signals. Each Lag function has a configurable time constant.

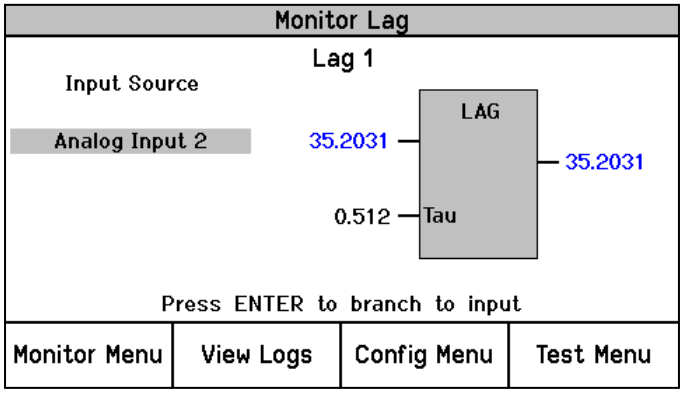
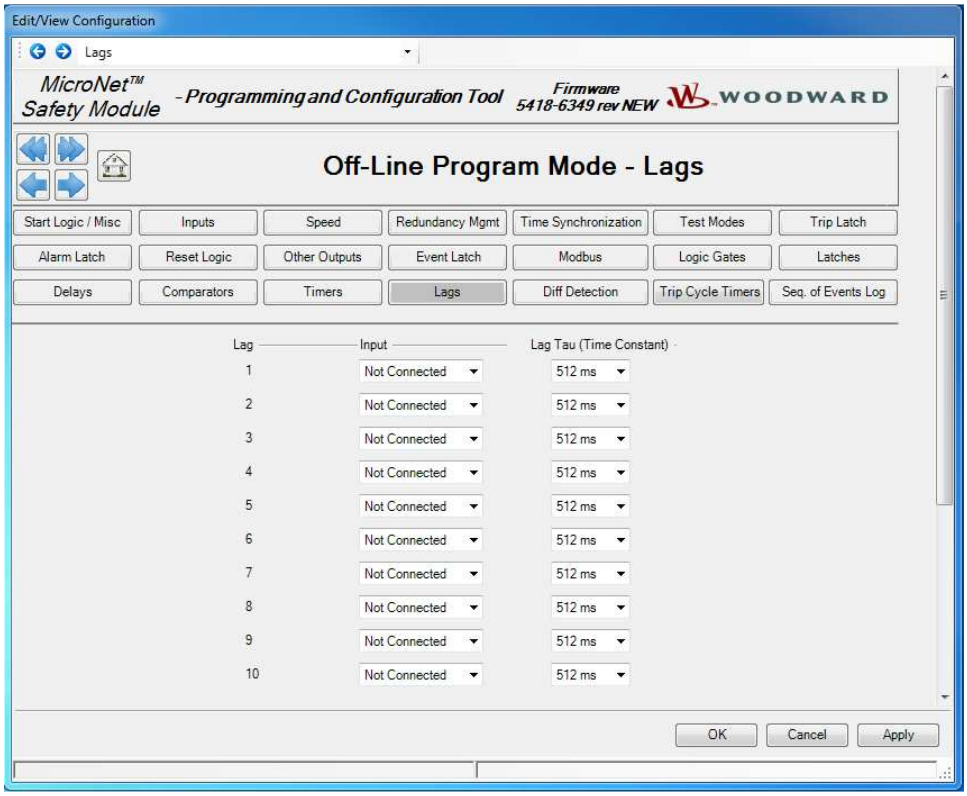


Figure 12-6. Lag Monitor Screen (Front Panel)

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



Lag Settings

- **Input:** Selection for the block input. Valid values:

Not Connected	Acceleration RM
Speed	Analog Input 1-10
Speed RM	Analog RM 1-15
Acceleration	Lag 1-10

- **Lag Tau (Time Constant):** Selection for the filter time constant. Valid values:

16 ms	512 ms
32 ms	1024 ms
64 ms	2048 ms
128 ms	4096 ms
256 ms	

Difference Detection

There are 15 Difference Detection blocks available that can be used to create an output available for trips, alarms, or any logical function. Each Difference Detection function has a difference threshold and a time delay. The difference has to be above the threshold for the time delay before the output goes true.

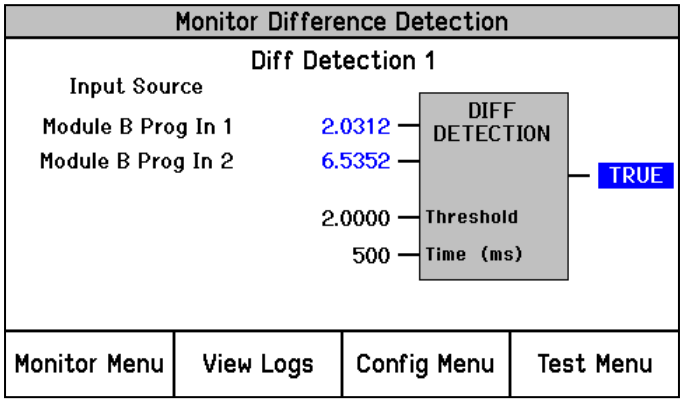
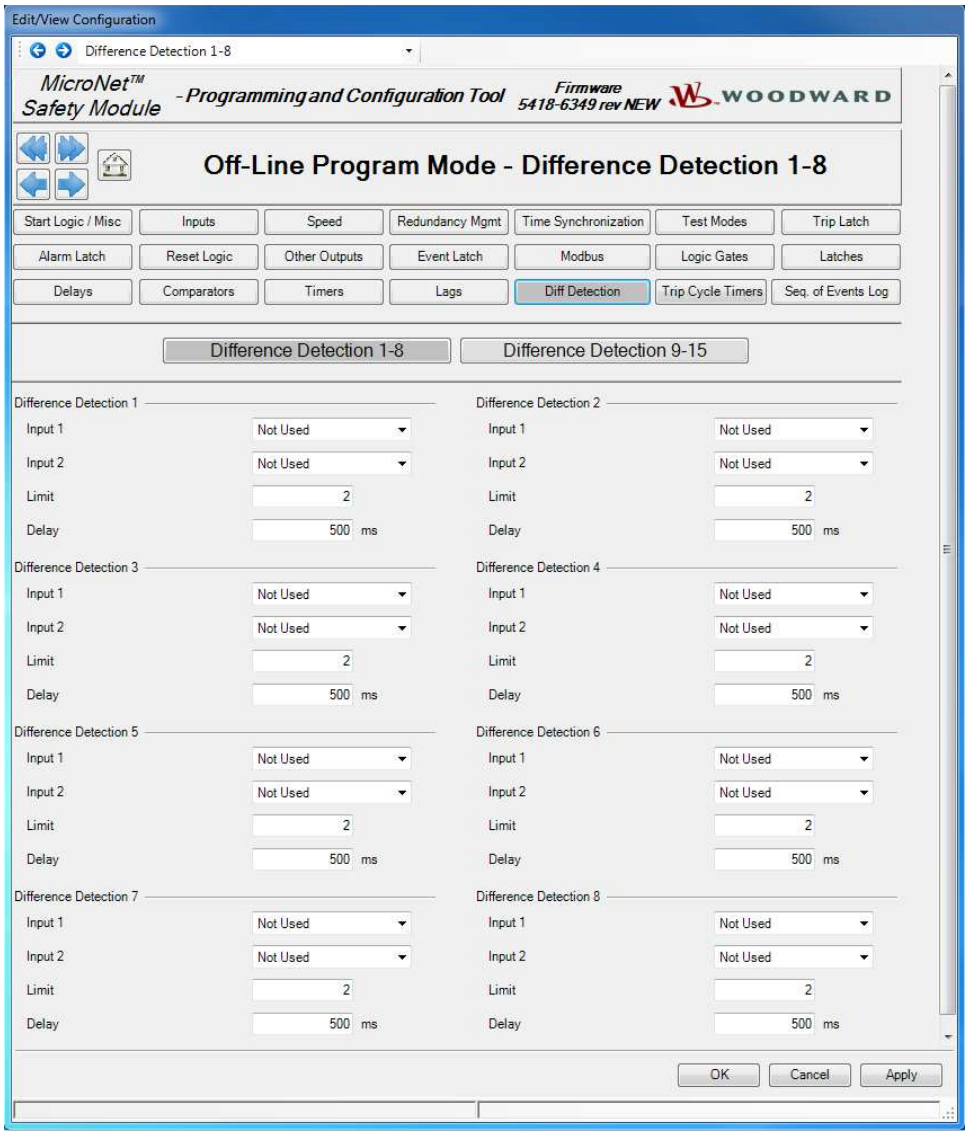


Figure 12-7. Difference Detection Monitor screen (front panel)

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



Difference Detection Settings

- **Input 1 & 2:** Selection for the block input. Valid values:

Not Used	Module B Speed
Module A Input 1-10	Module B Acceleration
Module A Speed	Module C Input 1-10
Module A Acceleration	Module C Speed
Module B Input 1-10	Module C Acceleration

- **Limit:** Selection for the difference limit. Valid values: 0 to 32500.
- **Delay:** Selection for the delay. Valid values: 4 ms to 10000 ms.

Timers

There are 5 timers 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.

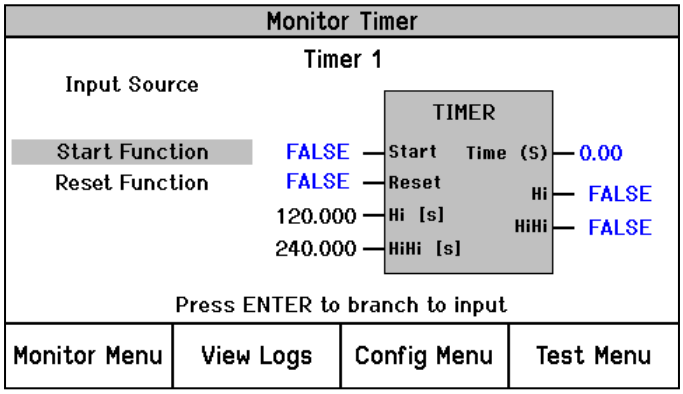
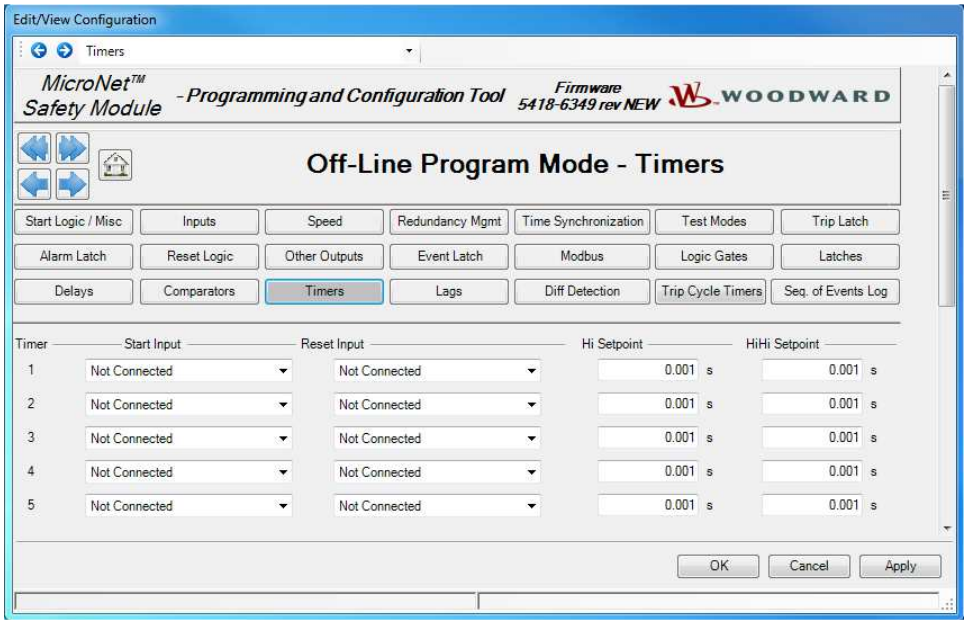


Figure 12-8. Timer Monitor screen (front panel)

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

If the output of a timer is not used as an input in any other function, the Configuration Error Log will indicate a warning. If the output of a timer is connected to another function but the input is not configured, the Configuration Error Log will indicate an error and uploading of the configuration will not be possible.

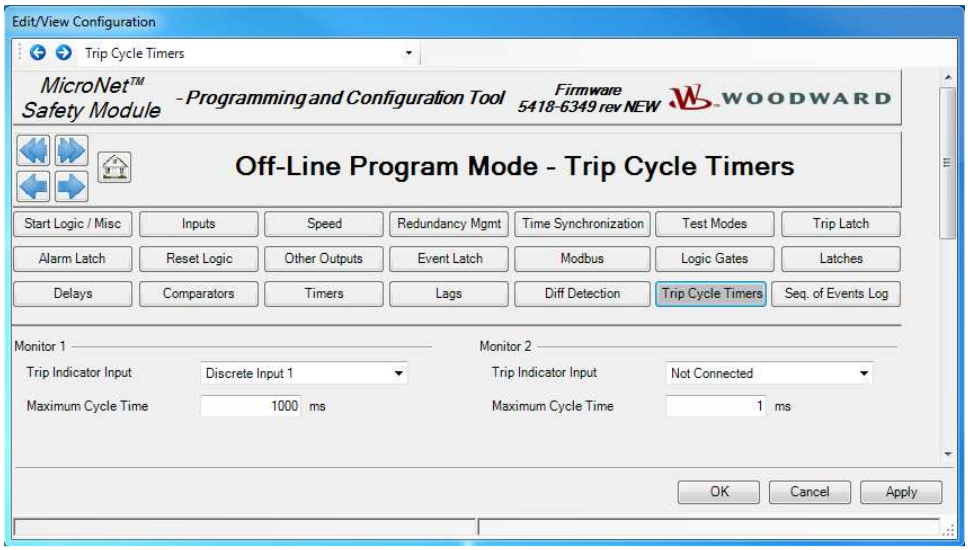
To use a timer, both Start and Reset inputs must be configured to a value other than ‘Not Connected’ otherwise the Configuration Error Log will indicate an error and uploading of the configuration file will not be possible.

Trip Cycle Timers

There are two trip cycle timers available. The trip cycle timer is a function that measures the time from a trip event until the trip is confirmed by an input (e.g. 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.

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:

Not Connected	Timer 1-5 HiHi
Event Latch	Timer 1-5 Hi
Analog Input 1-10 HiHi	Unit Delay 1-10
Analog Input 1-10 Hi	Analog RM 1-15 Input 1-3 Invalid
Analog Input 1-10 Lo	Boolean RM 1-15
Analog Input 1-10 LoLo	Boolean RM 1-15 Input 1-3 Invalid
Analog In 1-10 Range Err	Difference Detection 1-15
Discrete Input 1-10	Speed RM Input 1-3 Invalid
Analog Comparator 1-15	Speed RM Difference
Logic Gate 1-50	Speed RM Trip
Latch 1-10	Acceleration RM Input 1-3 Invalid
Delay 1-25	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

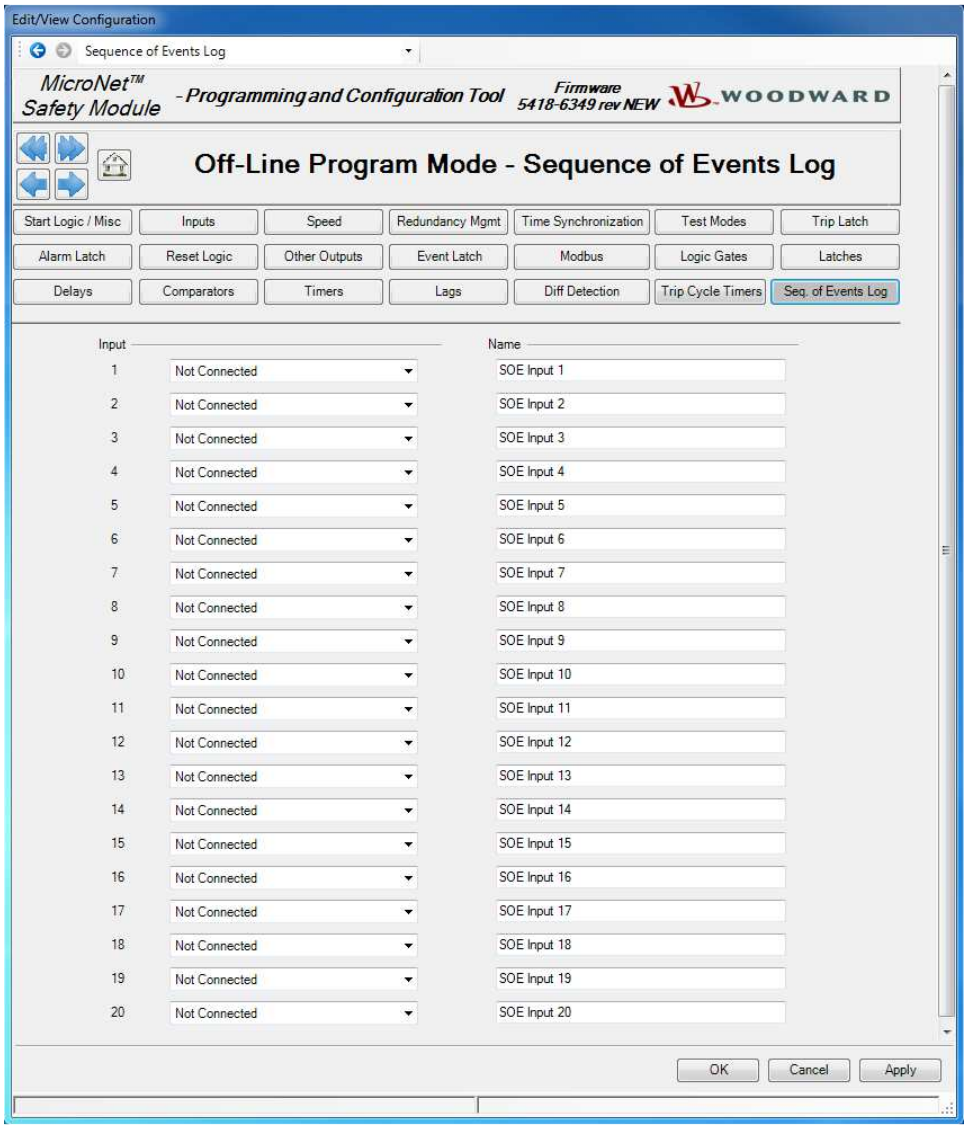
The Sequence of Events Log allows the user to log events with a resolution of up to 1 ms. This resolution is only achieved when IRIG-B time synchronization is enabled and when capturing Configurable Discrete Inputs. Other inputs will be captured with their respective update rate, for example, 4 ms for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

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.

20 user-configurable inputs can be assigned from discrete inputs or configurable logic blocks. 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 in the settings editor or in the config menu, the following screen is displayed:



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

Sequence of Events Log settings

- **Input:** Selection for the log input. Valid values:

Not Connected	Analog Input 1-10 LoLo
Always FALSE	Analog In 1-10 Range Err
Always TRUE	Discrete Input 1-10
Start Function	Analog Comparator 1-15
Reset Function	Logic Gate 1-50
Speed Fail Override	Latch 1-10
Overspeed Trip	Delay 1-25
Over-acceleration Trip	Timer 1-5 HiHi
Speed Fail Trip	Timer 1-5 Hi
Speed Fail Timeout	Unit Delay 1-10
Speed Lost Alarm	Analog RM 1-15 Input 1-3 Invalid
Speed Lost Trip	Boolean RM 1-15
Speed Probe Open Wire Trip	Boolean RM 1-15 Input 1-3 Invalid
Speed Probe Open Wire Alarm	Difference Detection 1-15
Temporary Ovrspd Setpoint On	Speed RM Input 1-3 Invalid
Manual Sim Speed Active	Speed RM Difference
Auto Sim Speed Active	Speed RM Trip
Auto Sim Speed Failed	Acceleration RM Input 1-3 Invalid
Auto-Sequence Test Active	Trip Time Monitor 1-2
Auto-Seq Continue Timeout	Power Up Trip
User Defined Test 1-3	Internal Fault Trip
Configuration Mismatch	Internal Fault Alarm
Speed Fail Alarm	Configuration Trip
Trip	Resettable Trip Input
Alarm	Power Supply 1-2 Fault
Event Latch	Parameter Error
Analog Input 1-10 HiHi	IRIG Signal Lost
Analog Input 1-10 Hi	Shared Data Rx Error 1-2
Analog Input 1-10 Lo	

- **Name:** Select the name of the input. Valid values: up to 24 alphanumeric characters. Note: The entered name will only be displayed in English. If left blank, the signal source name will be displayed in the configured language (English or Chinese).

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 for Energize to Trip or De-energize to Trip and the output of the trip latch can be configured for Latching or Non-Latching.

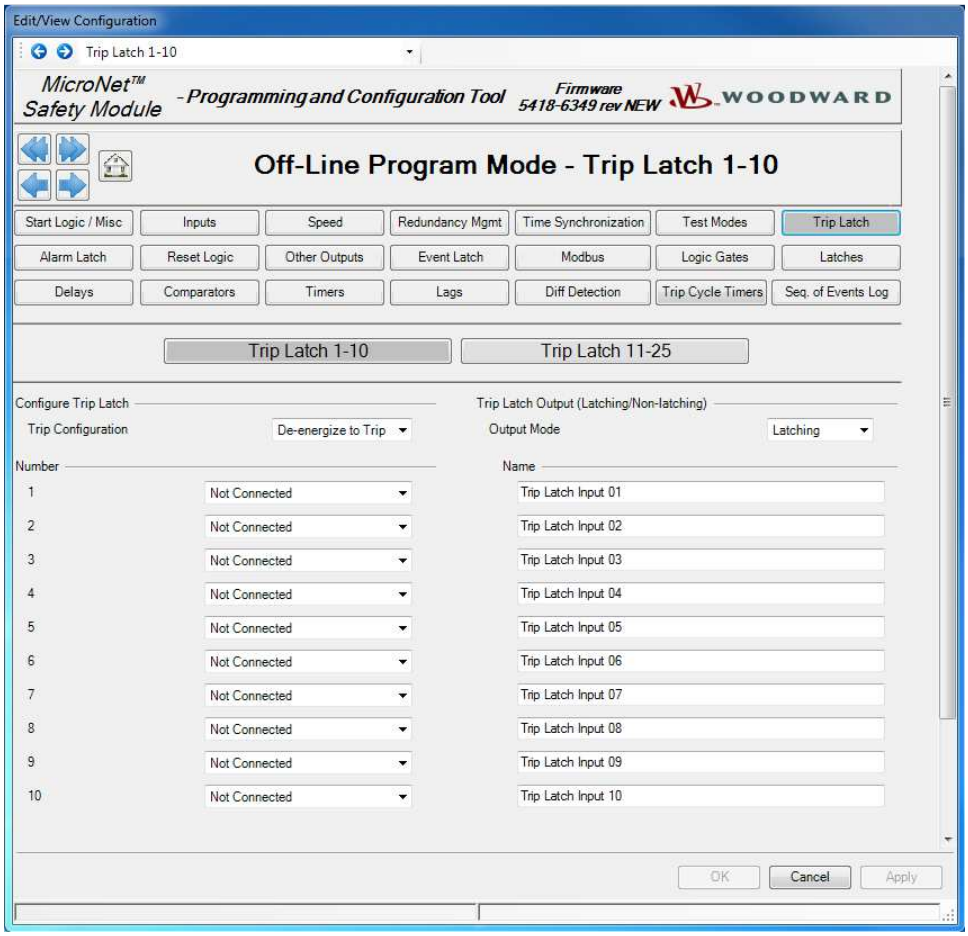
The inputs of this trip latch have 12 fixed trip causes. The fixed trip causes are:

- **Internal Module Fault:** This trip cause is active if a trip fault is detected by the internal diagnostic logic.
- **Power-up Trip:** At power up, the unit starts in a trip condition. This trip is only active and visible if the trip latch is configured for “De-energize to Trip”.
- **Configuration Trip:** This trip cause is active when a trip was issued from the front panel to enter configuration mode or a configuration is being saved.
- **Parameter Error Trip:** This trip cause is active if settings are not correctly read out of EEPROM.
- **Overspeed Trip:** This trip cause is only active and visible if the speed redundancy manager or the speed input is used.
- **Over-acceleration Trip:** This trip cause if only active and visible if it is enabled and the speed redundancy manager or the speed input is used.
- **Speed Redundancy Manager Trip:** This trip cause is only active and visible if the speed redundancy manager is used.

- **Speed Probe Open Wire Trip:** This trip cause is only active and visible if the speed input is configured “PASSIVE” and the speed redundancy manager is not used. (If the speed redundancy manager is used, Open Wire is an alarm)
- **Speed Lost Trip:** This trip cause is only active and visible if it is configured as a Trip and the speed input is used.
- **Speed Fail Trip:** This trip cause is only active and visible if it is configured as “Used” and the speed input is used or the speed redundancy manager is used.
- **Speed Fail Timeout Trip:** This trip cause is only active and visible if it is configured as “Used” and the speed input is used or the speed redundancy manager is used.
- **Resettable Trip Input:** This trip cause is only active and visible if it is configured as “Used”.

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 in the Name field. This description will show on the MicroNet Safety Module screen when the corresponding trip cause is active.

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



Configure Trip Latch

- **Trip Configuration:** Select the voter relay action when a trip occurs. Valid values: De-energize to Trip or Energize to Trip.
- **Output Mode:** Select the function of the Trip Latch. Latching: If an input to the latch goes true, that input stays true even if the source goes false. Non-latching: If an input to the latch goes true, that input will go false when the source goes false.
- **Trip Latch Input:** Select a trip cause. Valid values:

Not Connected	Discrete Input 1-10
Start Function	Analog Comparator 1-15
Speed Fail Override	Logic Gate 1-50
Speed Lost Alarm	Latch 1-10
Speed Probe Open Wire Alarm	Delay 1-25
Temporary Ovrspd Setpoint On	Timer 1-5 HiHi
Manual Sim Speed Active	Timer 1-5 Hi
Auto Sim Speed Active	Unit Delay 1-10
Auto Sim Speed Failed	Analog RM 1-15 Input 1-3 Invalid
Auto-Sequence Test Active	Boolean RM 1-15
Auto-Seq Continue Timeout	Boolean RM 1-15 Input 1-3 Invalid
User Defined Test 1-3	Difference Detection 1-15
Configuration Mismatch	Speed RM Input 1-3 Invalid
Speed Fail Alarm	Speed RM Difference
Alarm	Acceleration RM Input 1-3 Invalid
Event Latch	Trip Time Monitor 1-2
Analog Input 1-10 HiHi	Internal Fault Alarm
Analog Input 1-10 Hi	Power Supply 1-2 Fault
Analog Input 1-10 Lo	Shared Data Rx Error 1-2
Analog Input 1-10 LoLo	IRIG Signal Lost
Analog In 1-10 Range Err	

- **Name:** Select the name of the trip cause. Valid values: up to 24 alphanumeric characters. Note: The entered name will only be displayed in English. If left blank, the signal source name will be displayed in the configured language (English or Chinese).

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.

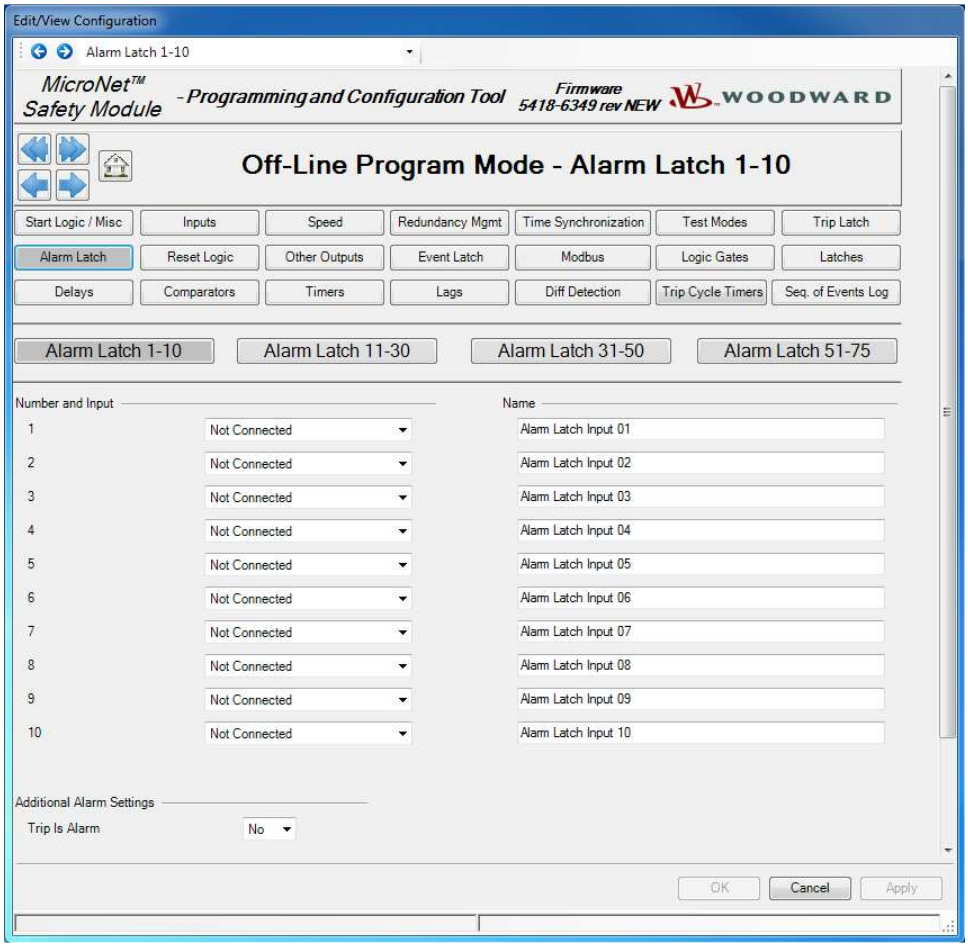
The inputs of this alarm latch have 23 fixed alarm causes. The fixed alarm causes are:

- **Internal Module Fault:** This alarm cause is active if an alarm fault is detected by the internal diagnostic logic.
- **Configuration Mismatch:** This alarm cause is active if the configuration is different from one of the other modules. It is only active and visible if Configuration Compare is enabled.
- **Power Supply 1 Fault:** This alarm cause is only active and visible if enabled.
- **Power Supply 2 Fault:** This alarm cause is only active and visible if enabled.
- **Speed Fail Alarm:** This alarm cause is only active and visible if configured and the speed input is used.
- **Speed Lost Alarm:** This alarm cause is only active and visible if configured and the speed input is used.
- **Speed Probe Open Wire Alarm:** This alarm cause is only active and visible if the speed input is configured “PASSIVE” and the speed redundancy manager is used. (If the speed redundancy manager is not used, Open Wire is a trip)
- **Speed Redundancy Manager Input Difference Alarm:** This alarm cause is only active and visible if the speed redundancy manager is used.
- **Speed Redundancy Manager Input 1 Invalid Alarm:** This alarm cause is only active and visible if the speed redundancy manager input 1 is used.
- **Speed Redundancy Manager Input 2 Invalid Alarm:** This alarm cause is only active and visible if the speed redundancy manager input 2 is used.

- **Speed Redundancy Manager Input 3 Invalid Alarm:** This alarm cause is only active and visible if the speed redundancy manager input 3 is used.
- **Temporary Overspeed Setpoint Active Alarm:** This alarm cause is active if the temporary Overspeed Setpoint Test is running.
- **Manual Simulated Speed Test Active Alarm:** This alarm cause is active if the Manual Simulated Speed Test is running.
- **Auto Simulated Speed Test Active Alarm:** This alarm cause is active if the Auto Simulated Speed Test is running.
- **Auto Simulated Speed Test Failed Alarm:** This alarm cause is active if the Auto Simulated Speed Test failed.
- **Auto-Sequence Speed Test Active Alarm:** This alarm cause is active if the Auto-Sequence Speed Test is running.
- **Auto-Sequence Speed Test Continue Timeout Alarm:** This alarm cause is active if the Auto-Sequence Speed Test Continue Timer timed out. It is only active and visible if the Continue input is used.
- **User-define Test 1 Active Alarm:** This alarm cause is active if the User-define Test 1 is running. It is only active and visible if this test is used.
- **User-define Test 2 Active Alarm:** This alarm cause is active if the User-define Test 2 is running. It is only active and visible if this test is used.
- **User-define Test 3 Active Alarm:** This alarm cause is active if the User-define Test 3 is running. It is only active and visible if this test is used.
- **Trip Cycle Time 1 Monitor Alarm:** This alarm cause is active if Trip Cycle Time 1 Monitor timer timed out. It is only active and visible if this monitor is used.
- **Trip Cycle Time 2 Monitor Alarm:** This alarm cause is active if Trip Cycle Time 2 Monitor timer timed out. It is only active and visible if this monitor is used.
- **IRIG Signal Lost:** This alarm cause is active and visible if the Time Synchronization Mode is set to IRIG-B.
- **Trip Alarm:** This alarm cause is active if the trip latch output is true. It is only active and visible if “Trip is Alarm” is configured true.

In addition, 75 alarm causes can be programmed. These alarm causes can be 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 in the Name field. This description will show on the MicroNet Safety Module screen when the corresponding alarm cause is active.

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



Configure Alarm Latch

- **Alarm Latch Input:** Select an alarm cause. Valid values:

Not Connected	Logic Gate 1-50
Start Function	Latch 1-10
Speed Fail Override	Delay 1-25
Overspeed Trip	Timer 1-5 HiHi
Over-acceleration Trip	Timer 1-5 Hi
Speed Fail Trip	Unit Delay 1-10
Speed Fail Timeout	Analog RM 1-15 Input 1-3 Invalid
Speed Lost Trip	Boolean RM 1-15
Speed Probe Open Wire Trip	Boolean RM 1-15 Input 1-3 Invalid
Trip	Difference Detection 1-15
Event Latch	Speed RM Trip
Analog Input 1-10 HiHi	Acceleration RM Input 1-3 Invalid
Analog Input 1-10 Hi	Power Up Trip
Analog Input 1-10 Lo	Internal Fault Trip
Analog Input 1-10 LoLo	Configuration Trip
Analog In 1-10 Range Err	Resettable Trip Input
Discrete Input 1-10	Parameter Error
Analog Comparator 1-15	Shared Data Rx Error 1-2

- **Name:** Select the name of the alarm cause. Valid values: up to 24 alphanumeric characters. Note: The entered name will only be displayed in English. If left blank, the signal source name will be displayed in the configured language (English or Chinese).
- **Trip is Alarm:** Select if a trip should also be an alarm. Valid values: No or Yes.

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 an additional reset input 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.

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 MicroNet Safety Module’s 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 MicroNet Safety Module 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).

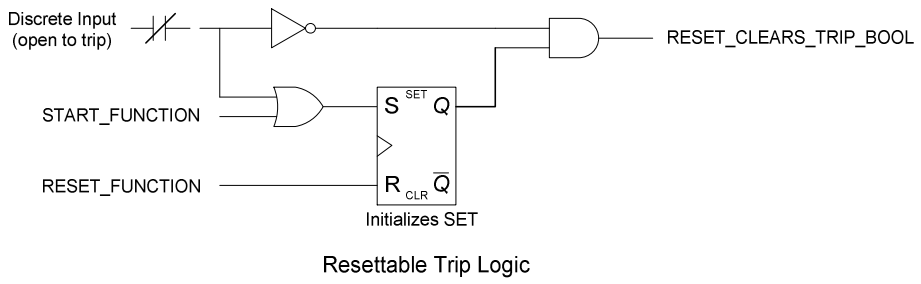
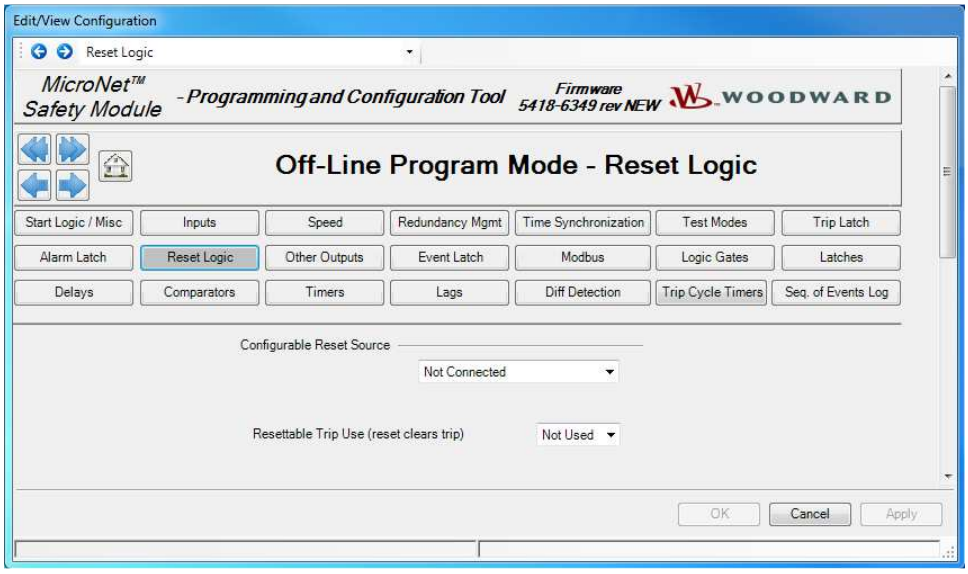


Figure 12-9. Resettable Trip Logic

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



Configurable Reset Source

- **Input:** Selection for the configurable reset input. Valid values:

Not Connected	Timer 1-5 Hi
Discrete Input 1-10	Unit Delay 1-10
Analog Comparator 1-15	Analog RM 1-15 Input 1-3 Invalid
Logic Gate 1-50	Boolean RM 1-15
Latch 1-10	Boolean RM 1-15 Input 1-3 Invalid
Delay 1-25	Difference Detection 1-15
Timer 1-5 HiHi	

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.

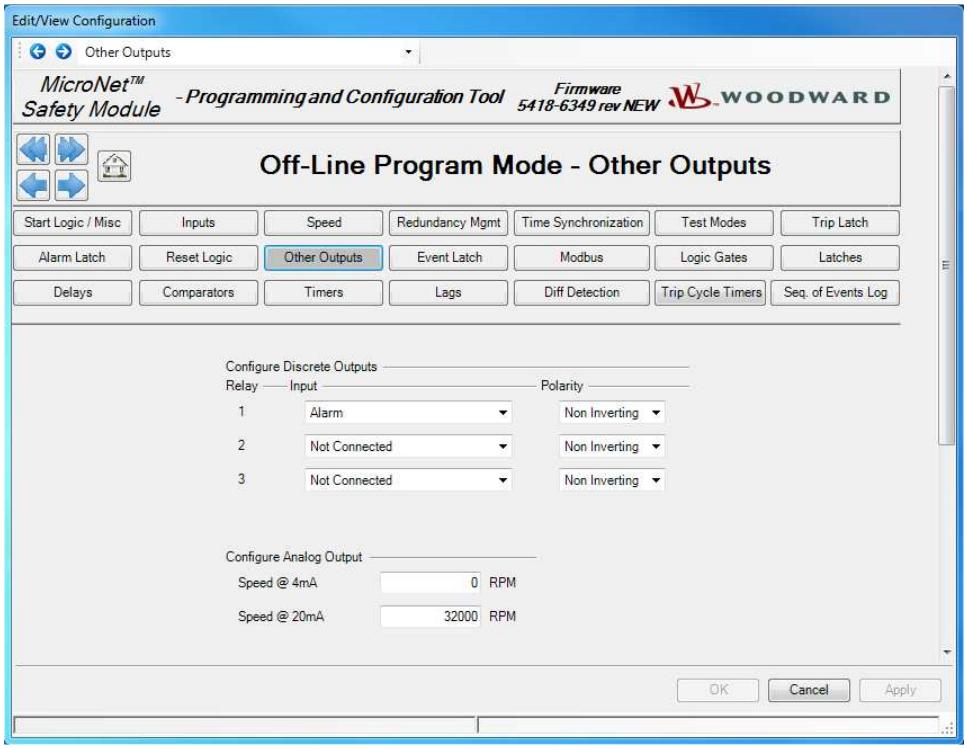
Other Outputs

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 in the settings editor or config menu, the following screen is displayed:



Configure Discrete Outputs

- **Relay Input:** Selection for the configurable reset input. Valid values: *(see Logic Function 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 Latch

The 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. 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.

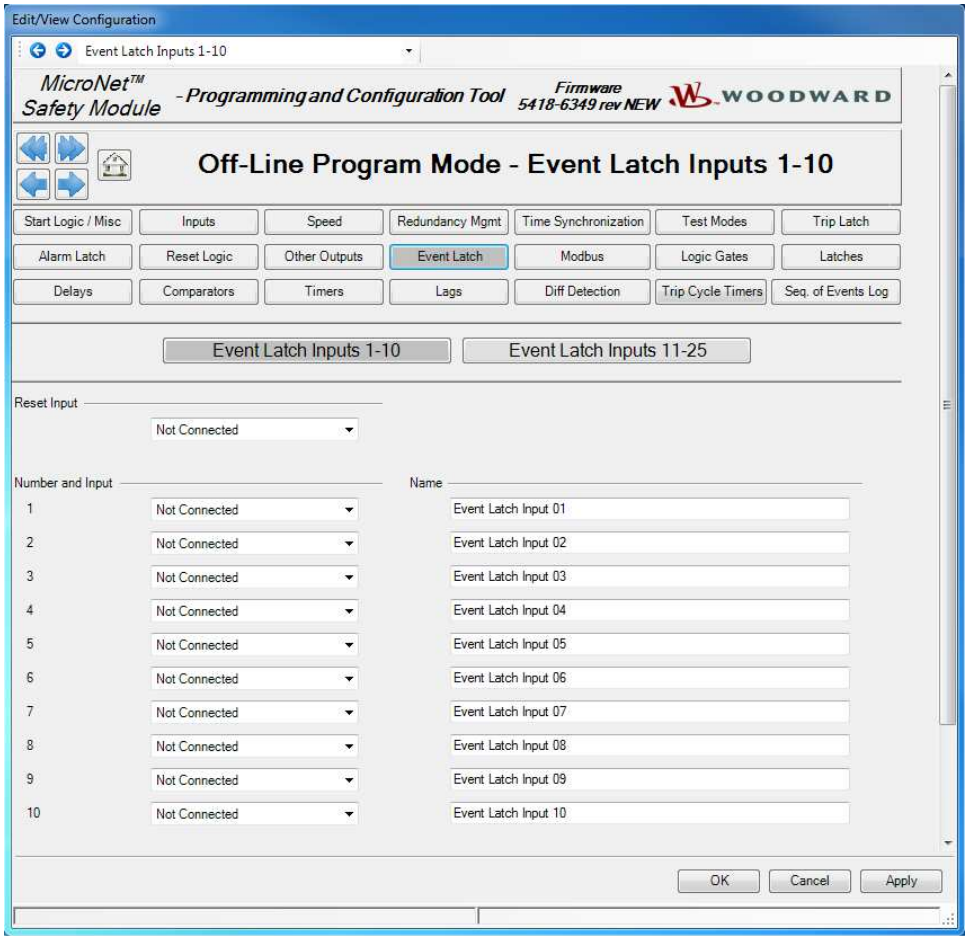
The typical connection for the reset input is the ‘Reset Function’ however other connection options can be selected by entering any signal in the Reset Input field.

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 remain 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 in the settings editor or config menu, the following screen is displayed:



Configure Event Latch

- **Event Latch Input:** Select an event cause. Valid values: *(see Logic Function Input selection table).*
- **Name:** Select the name of the event cause. Valid values: up to 24 alphanumeric characters. Note: The entered name will only be displayed in English. If left blank, the signal source name will be displayed in the configured language (English or Chinese).

Configurable Logic Selection Definitions

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

Table 12-7. Definition of Configurable Logic Input Selections

Selection Identifier	Description of selection
Not Connected	This is the setting to be selected for an input that is not used.
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. Momentarily (16 ms) true on the rising edge of a start command (front panel or discrete input).
Reset Function	Reset function output. Momentarily (8 ms) true on the rising edge of a reset command (front panel or discrete input).
Speed Fail Override	Speed Fail Override discrete input status indication. True when the input is high and false when low.
Overspeed Trip	Overspeed indication. True when speed is above the overspeed setpoint and false otherwise.
Over-acceleration Trip	Over-acceleration indication. True when acceleration is above the acceleration trip setpoint and speed is above the acceleration trip enabled speed and false otherwise.
Speed Fail Alarm	Speed Fail Alarm indication. True when speed is not above the threshold and false otherwise. Overridden if Speed fail Override is active or the Speed Fail Timer is running.
Speed Fail Trip	Speed Fail Trip indication. True when speed is not above the threshold and false otherwise. Overridden if Speed fail Override is active.
Speed Fail Timeout	Speed Fail Timeout indication. After the Speed Fail Timer expires, true when speed is not above the threshold and false otherwise.
Speed Lost Alarm	Speed Lost Alarm indication. True when a speed lost condition is detected. Remains true until cleared by a reset or until speed is detected.
Speed Lost Trip	Speed Lost Trip indication. True when a speed lost condition is detected. Remains true until cleared by a reset or until speed is detected.
Speed Probe Open Wire Alarm	Speed Probe Open Wire Alarm indication. True while an open wire is detected and speed redundancy is used.
Speed Probe Open Wire Trip	Speed Probe Open Wire Trip indication. True while an open wire is detected and speed redundancy is not used.
Temporary Ovrspd Setpoint On	Temporary Ovrspd Setpoint On indication. True while the test is in the Active state.
Manual Simulated Speed Test Active	Manual Simulated Speed Test Active indication. True while the test is in the active state.
Auto Simulated Speed Test Active	Auto Simulated Speed Test Active indication. True while the test is in the active state.
Auto Simulated Speed Test Failed	Auto Simulated Speed Test Failed indication. Momentarily true if the module did not trip during the test.
Auto-Sequence Test Active	Auto-Sequence Test Active indication. True while the test is in the Active state.
Auto-Sequence Test Continue Timeout	Auto-Sequence Test Continue Timeout indication. Momentarily true if the Continue signal did not occur before the timer timed out.
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.

Selection Identifier	Description of selection
Configuration Mismatch	Configuration Mismatch indication as determined by the module-to-module configuration compare function. True if there is a mismatch and false otherwise.
Trip	Trip Latch output. True if any trip is detected. Remains true until cleared by a reset if configured as Latching.
Alarm	Alarm Latch output. True if any alarm is detected. Remains true until cleared by a reset.
Event Latch	Event Latch output. True if any event is detected. 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 at or above 22 mA or at or below 2 mA and false otherwise.
Discrete Input 1-10	Discrete input status indication. True when the input is above the guaranteed on value of 12 volts. False when the input is below the guaranteed off value of 6 volts.
Analog Comparator 1-15	Comparator block output. True when the input is above the threshold and false otherwise.
Logic Gate 1-50	Logic Gate output.
Latch 1-10	Latch output.
Delay 1-25	Delay output.
Timer 1-5 HiHi	Timer HiHi output. True if the time is at or greater than the threshold and false otherwise.
Timer 1-5 Hi	Timer Hi output. True if the time is at or greater than the threshold and false otherwise.
Unit Delay 1-10	Unit Delay output.
Analog RM 1-15 Input 1-3 Invalid	Analog Redundancy Manager output. True if the corresponding input is invalid. Remains true until cleared by a reset.
Boolean RM 1-15	Boolean Redundancy Manager output.
Boolean RM 1-15 Input 1-3 Invalid	Boolean Redundancy Manager output. True if the corresponding input is invalid. Remains true until cleared by a reset.
Difference Detection 1-15	Difference Detection block output.
Speed RM Input 1-3 Invalid	Speed Redundancy Manager output. True if the corresponding input is invalid. Remains true until cleared by a reset.
Speed RM Difference	Speed Redundancy Manager output. True if the difference between any two inputs is greater than the Diff Threshold for Diff Time and false otherwise.
Speed RM Trip	Speed Redundancy Manager output. True if all used inputs have failed or if “Two Inputs Failed Action” is set to TRIP and two of the three used inputs have failed and false otherwise.
Acceleration RM Input 1-3 Invalid	Acceleration Redundancy Manager output. True if the corresponding input is invalid. Remains true until cleared by a reset.

Selection Identifier	Description of selection
Trip Time Mon 1 Alarm	Trip Cycle Time Monitor 1 output. True if the trip cycle time was greater than the threshold. Remains true until cleared by a reset.
Trip Time Mon 2 Alarm	Trip Cycle Time Monitor 2 output. True if the trip cycle time was greater than the threshold. Remains true until cleared by a reset.
Power Up Trip	Power up trip indication. This trip is issued during power-up when the trip latch is configured for de-energize to trip. Remains true until cleared by a reset.
Internal Fault Trip	Indicates an internal fault trip condition was detected. When this is true, the Unit Health is red and 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. Remains true until cleared by a reset.
Configuration Trip	Indicates the product is tripped as a result of changing configuration settings. This indication is true while loading a new configuration or if a trip was issued to enter configuration mode.
Resettable Trip Input	Output from the Resettable Trip function.
Power Supply 1 Fault	Output from the power supply fault detection. True when Power Supply 1 is bad and false otherwise.
Power Supply 2 Fault	Output from the power supply fault detection. True when Power Supply 2 is bad and false otherwise.
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.
IRIG Signal Lost	Indicates the IRIG-B time signal is not being received.
Shared Data Rx Error 1	True if data from another module is bad and false otherwise. The conditions for true are: Signal on A is true when data from B is bad. Signal on B is true when data from A is bad. Signal on C is true when data from A is bad.
Shared Data Rx Error 2	True if data from another module is bad and false otherwise. The conditions for true are: Signal on A is true when data from C is bad. Signal on B is true when data from C is bad. Signal on C is true when data from B is bad.

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.

MicroNet Safety Module GAP Programming Tool

There is also a GAP Programming Tool available for configuring logic in the MicroNet Safety Module. Refer to manual 26712 for more information.

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 – <*block identifier*> 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. 3. Speed Redundancy Manager with less than two inputs configured. 4. Acceleration Redundancy Manager with less than two 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 .
Example 3:	*Warning - Speed Redundancy Mgr has unconfigured inputs.* The Speed Redundancy Manager block but has only 1 input configured. This is valid but could be a configuration mistake.

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 Speed Input, 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

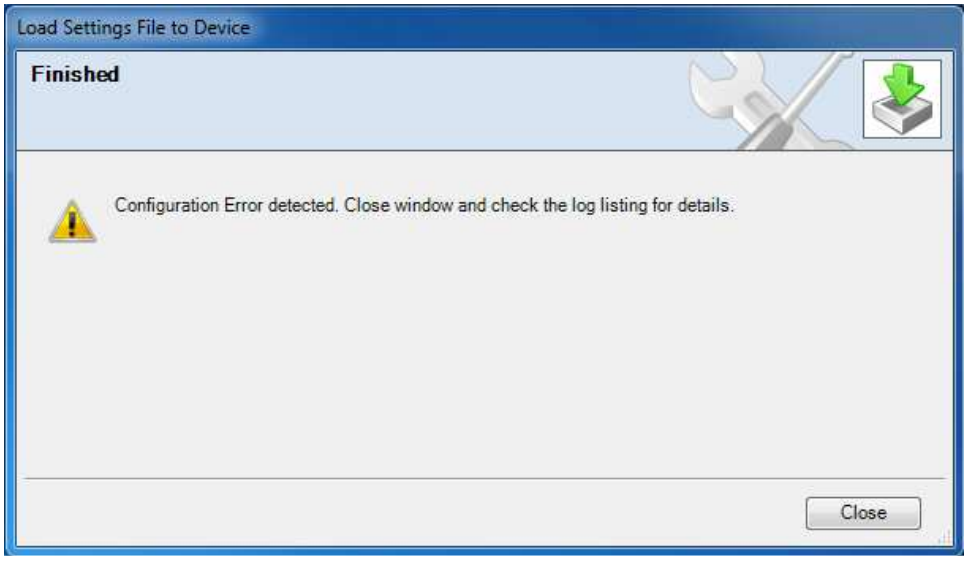
Text:	Error – <*block identifier*> is set to an invalid or out-of-range value.
Condition:	The identified block has inputs that are configured to values that are not allowed or are out of range. This error applies to the Overspeed Trip Setting and the Temporary Overspeed Trip Setting. The calculated frequency equivalent of the RPM setting (i.e. (RPM*GearTeeth*GearRatio)/60) is greater than 32000.

15

Text:	Error – <*block identifier*> 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 while a settings file is loaded to the MicroNet Safety Module. If there is an error, the settings are not changed. 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 13.
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
  - Over-acceleration
    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 (over-acceleration 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 MSM module
  - Weekly Trip valve test on each MSM 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

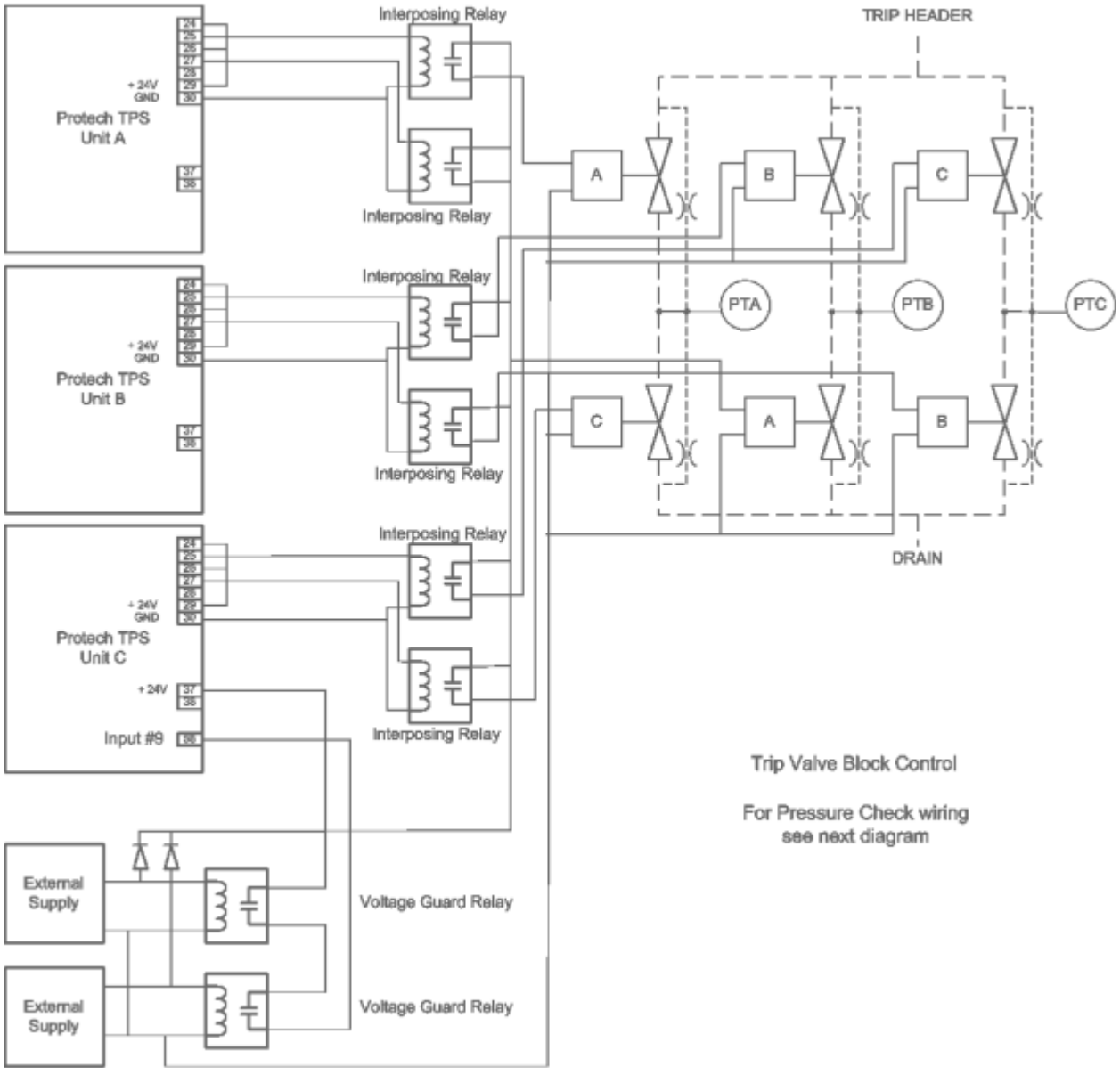


Figure 13-1. Trip Valve Block Control Circuit

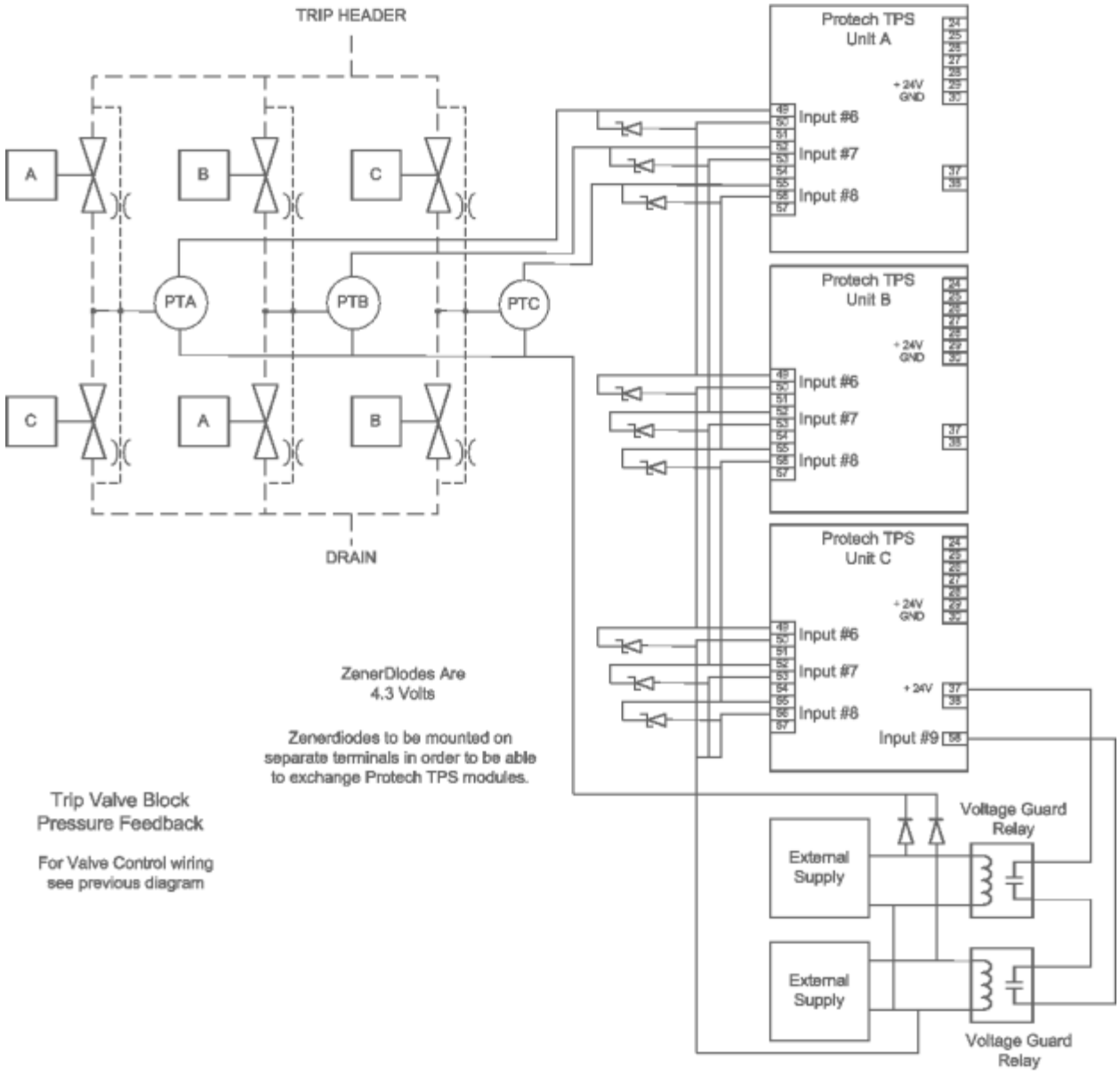


Figure 13-2. Trip Valve Block Pressure Check Circuit

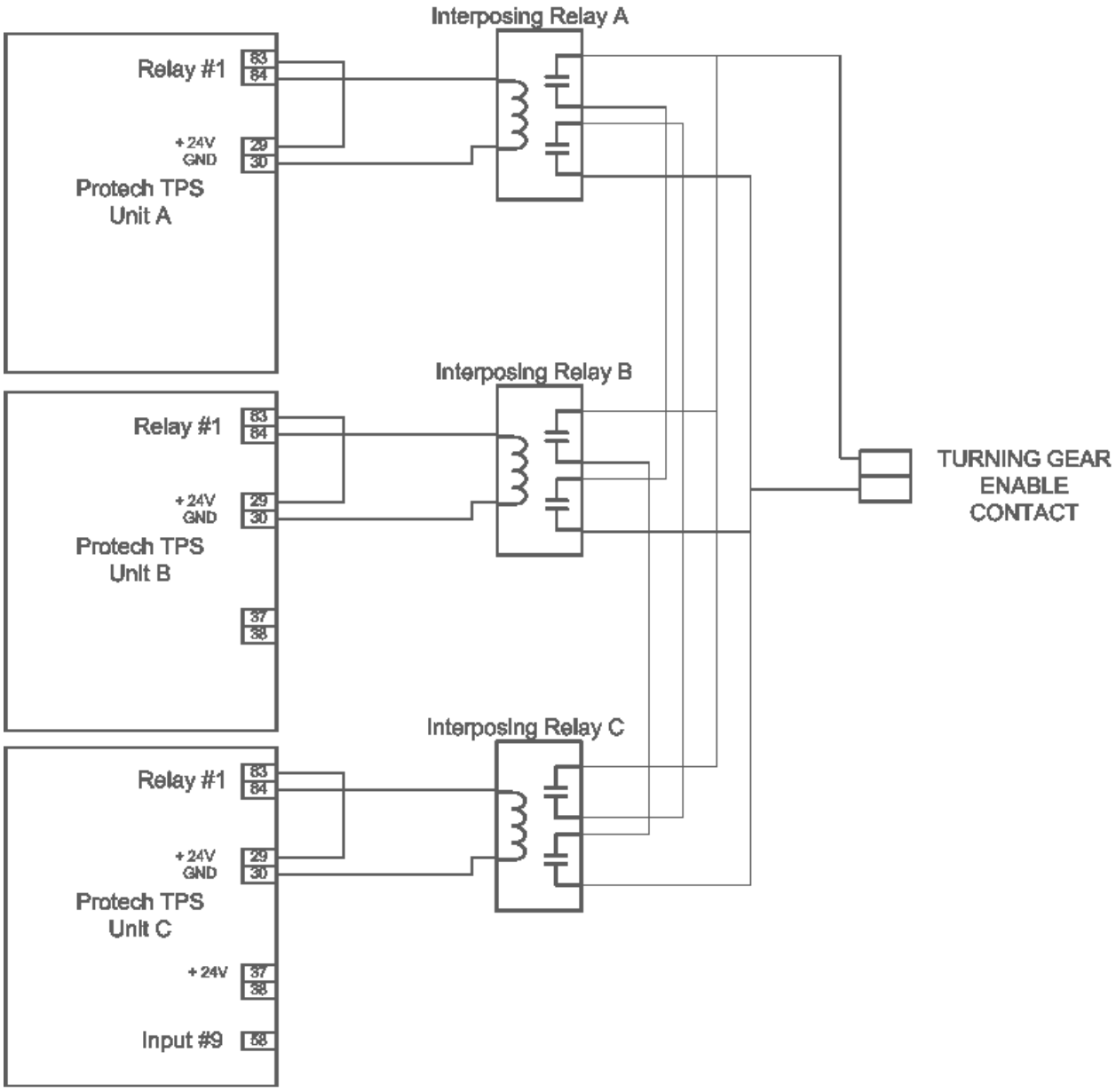


Figure 13-3. Turning Gear Enable Output

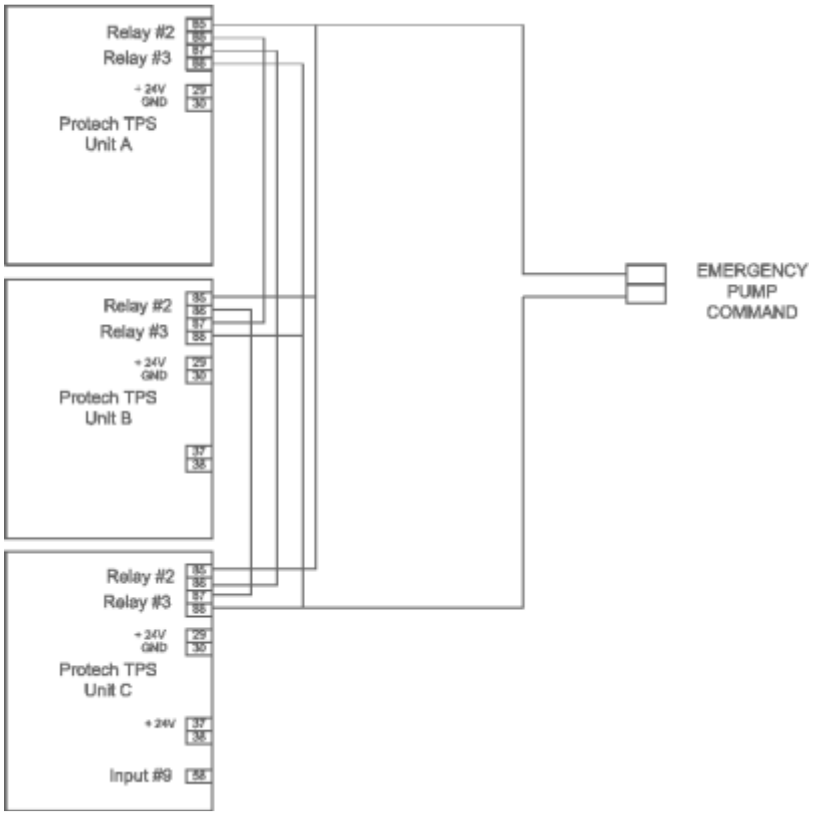


Figure 13-4. Emergency Pump MCC

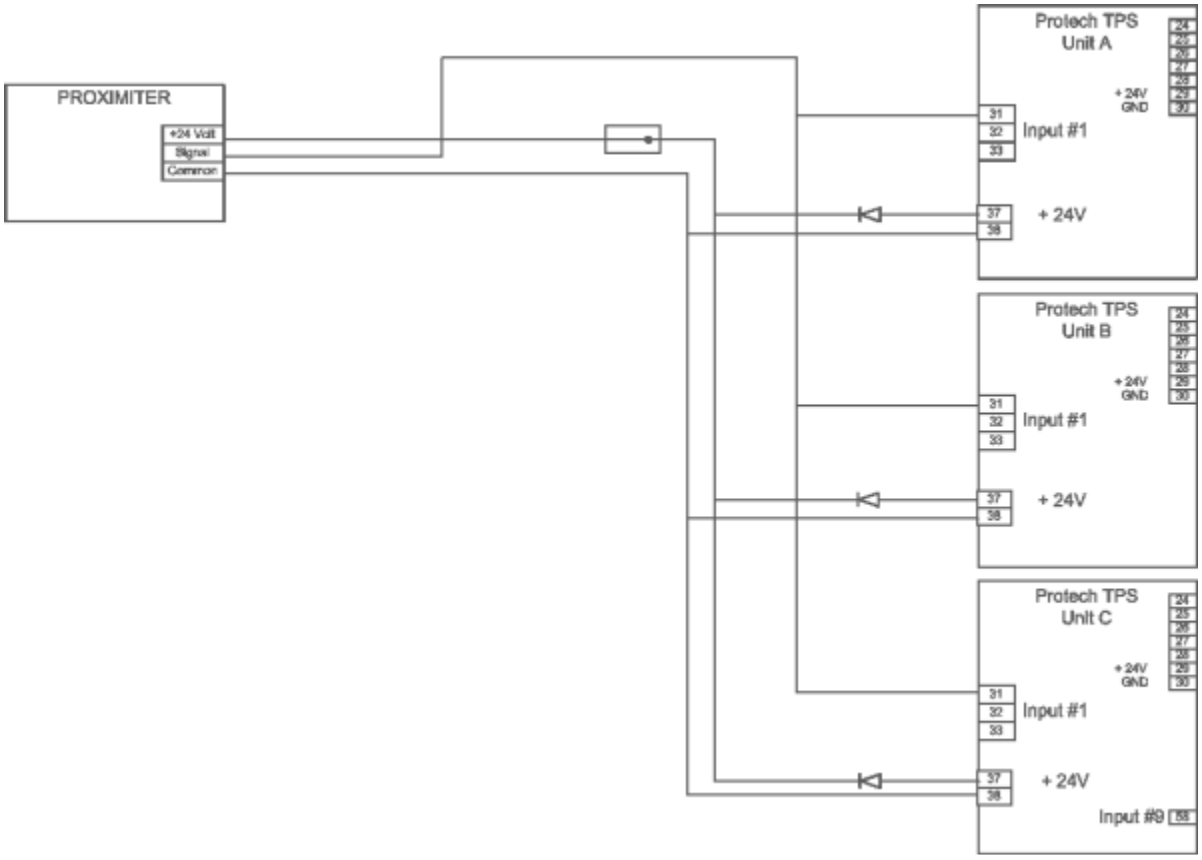


Figure 13-5. Zero Speed Detection Proximiter

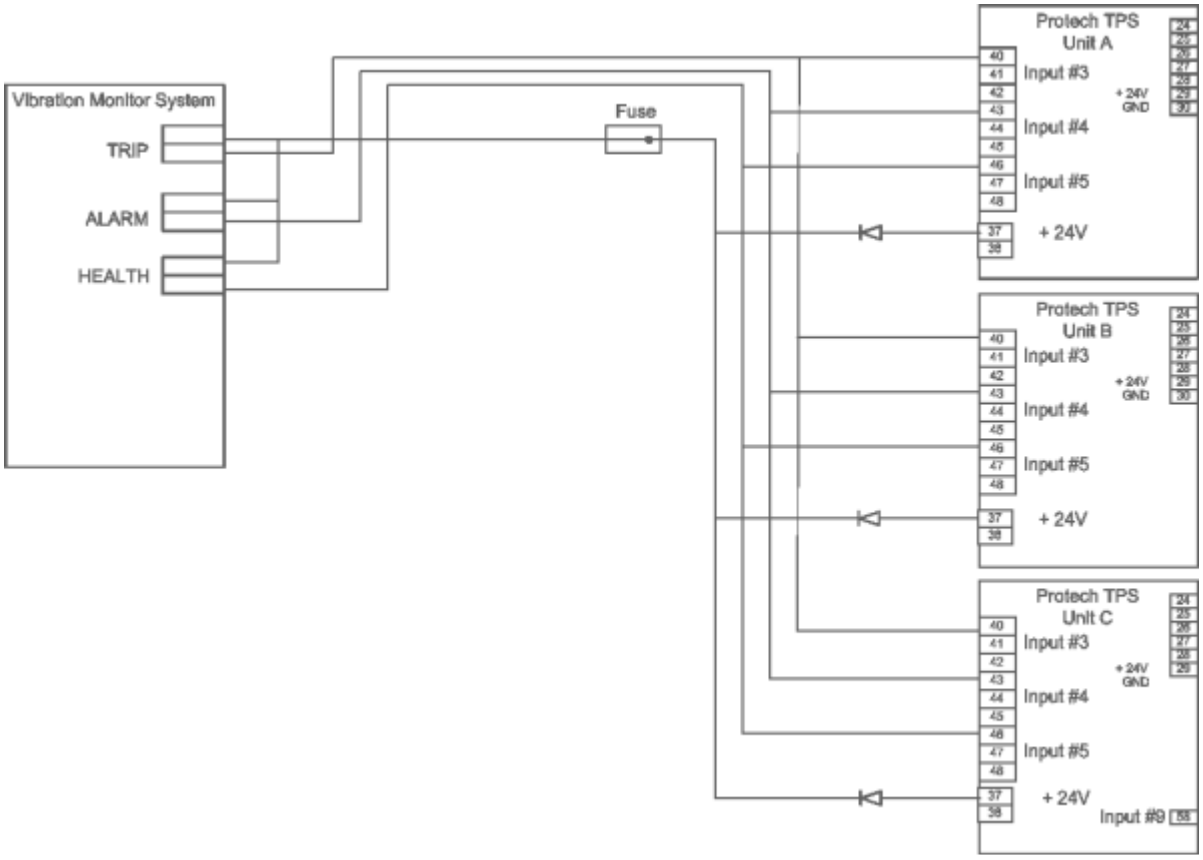


Figure 13-6. Vibration Monitor System

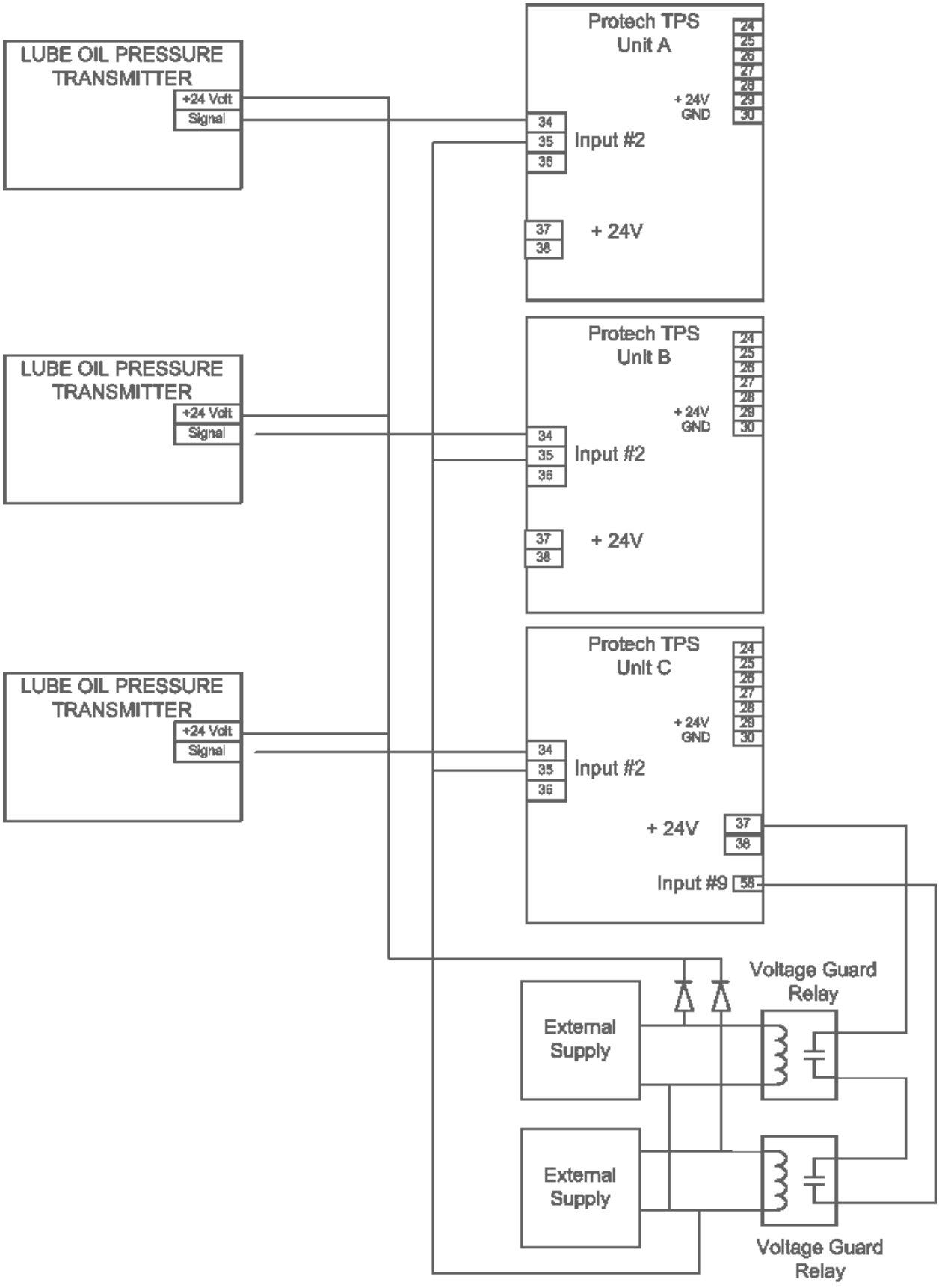


Figure 13-7. Lube Oil Pressure

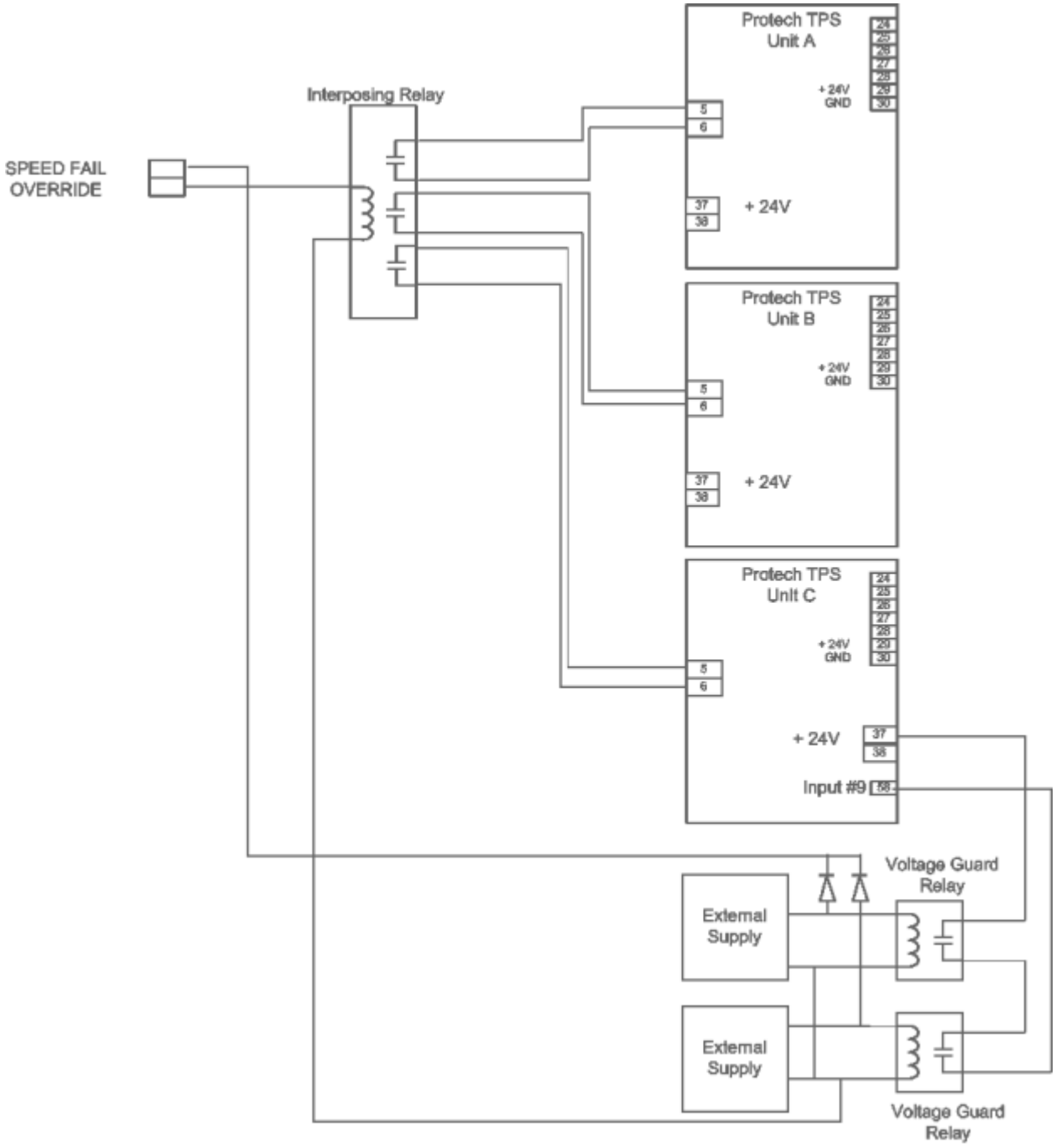


Figure 13-8. Speed Fail Override

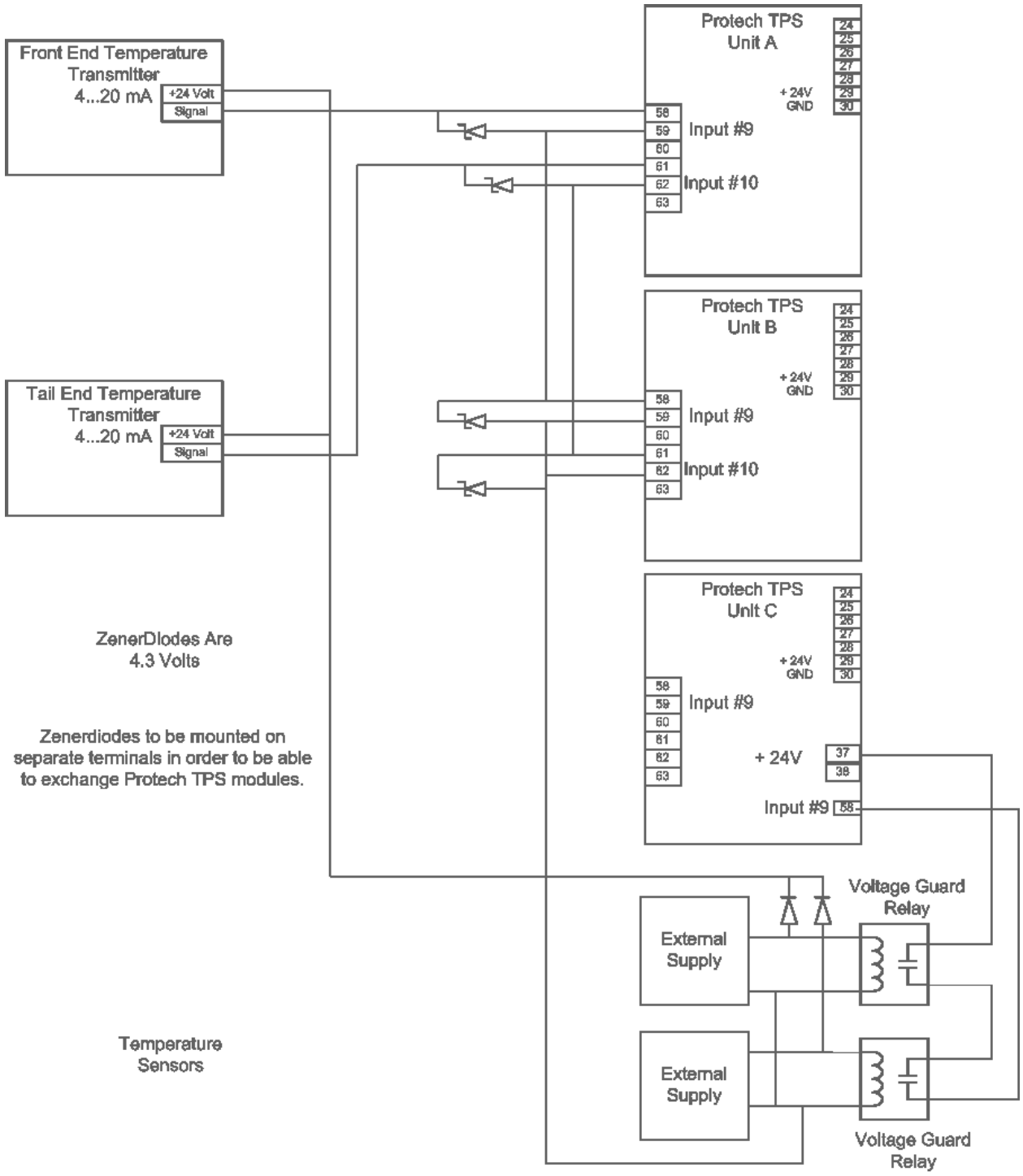
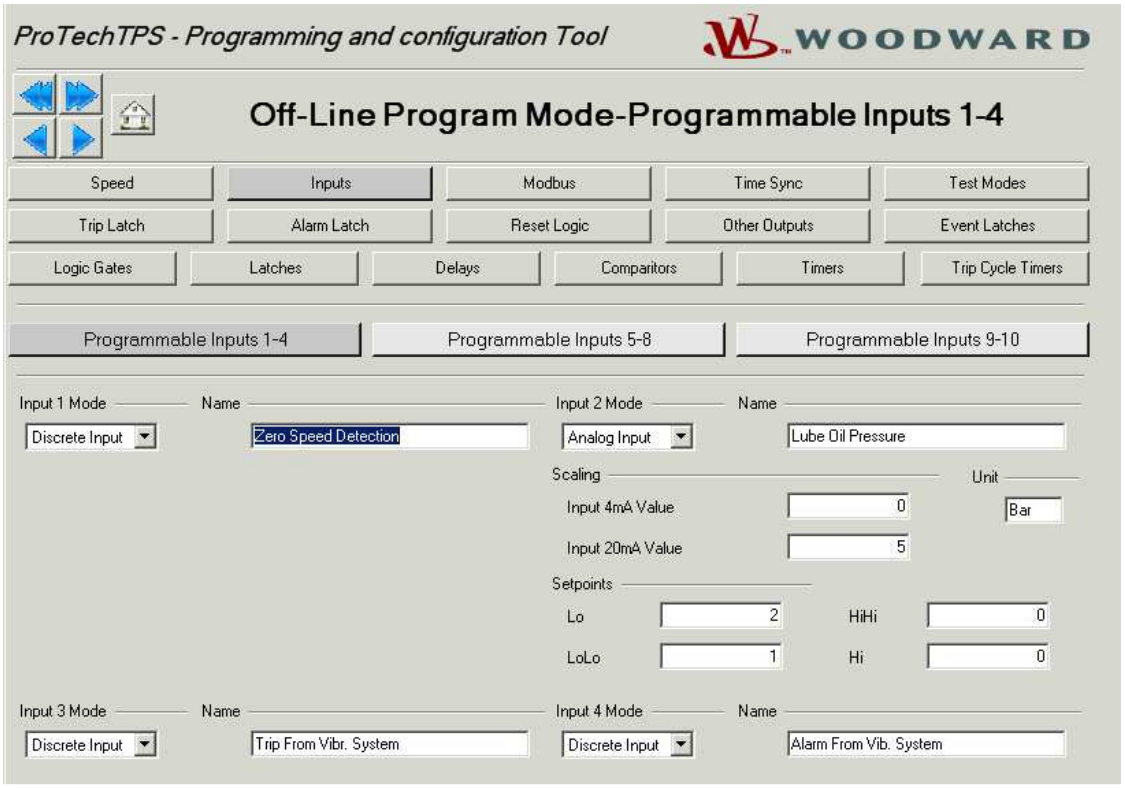


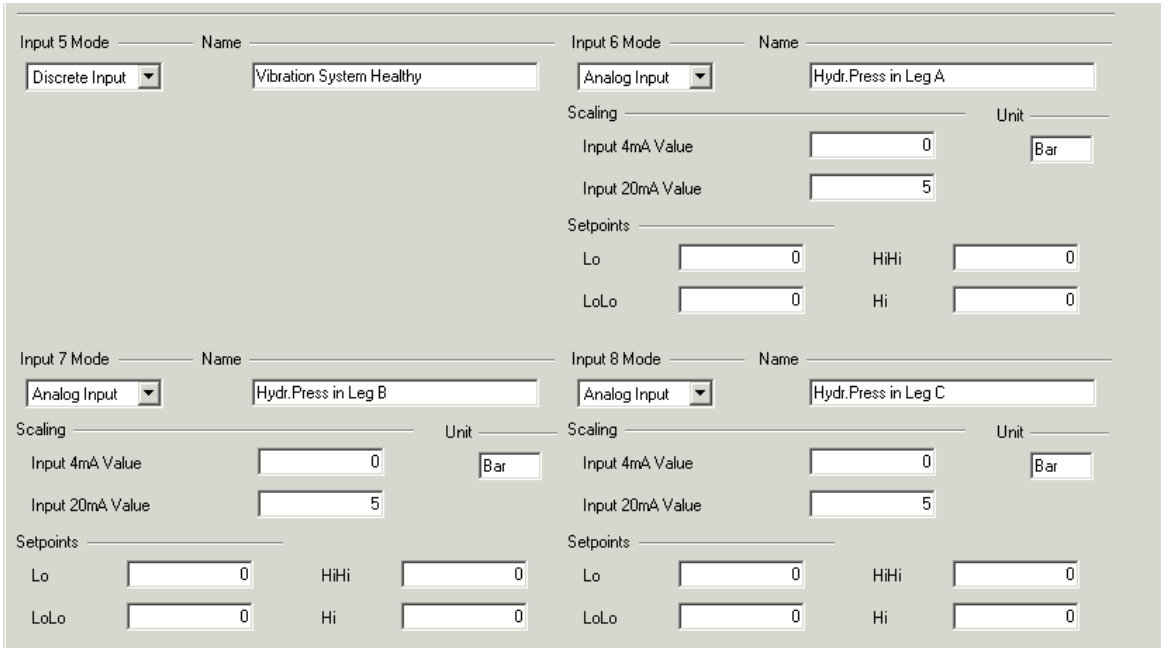
Figure 13-9 Temperature Sensors

Configuration Sheet

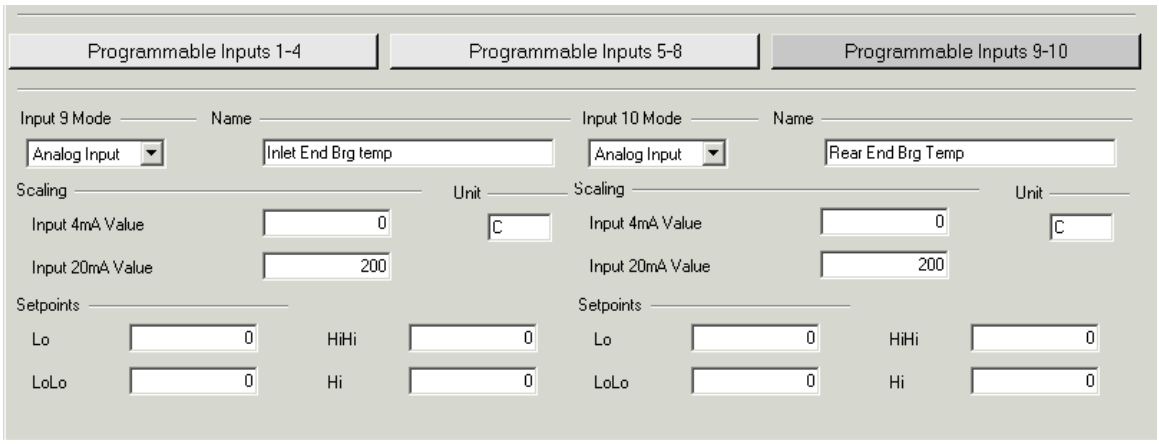
- Inputs
- Outputs
- Speed
- Trip Latch
- Alarm Latch
- Event Latch
- Comparators
- Logic Gates
- Latches
- Delays
- Timers

Inputs

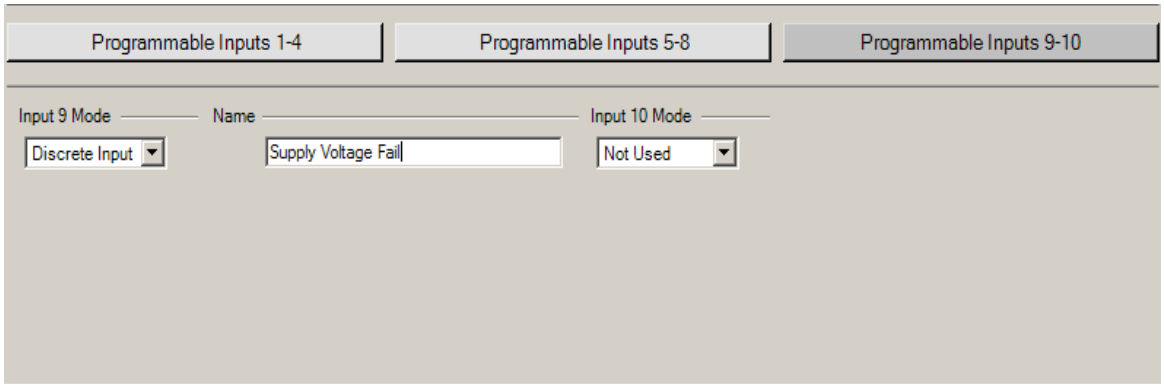




Inputs 9 and 10 for Unit A and B

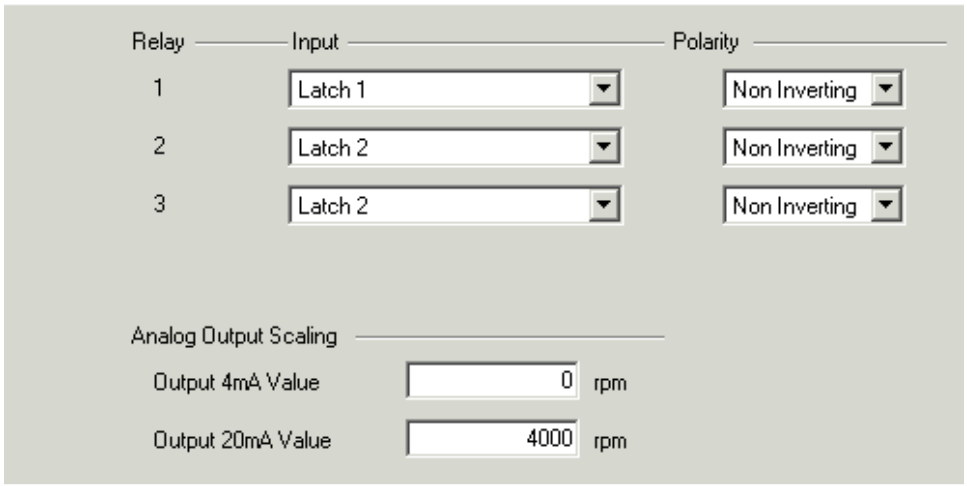


Inputs 9 and 10 for Unit C

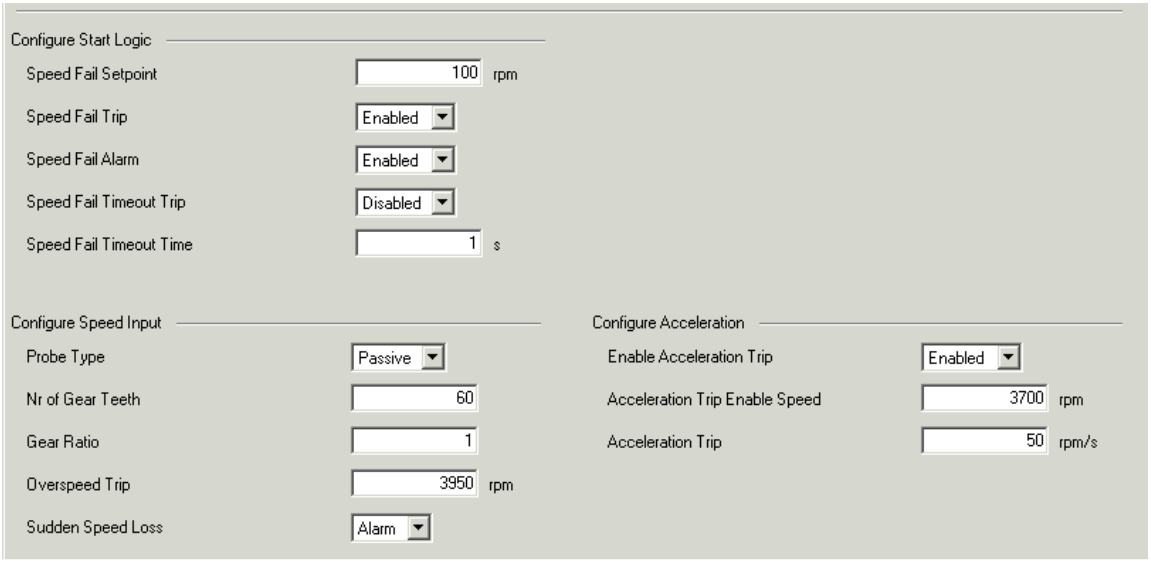


Outputs

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

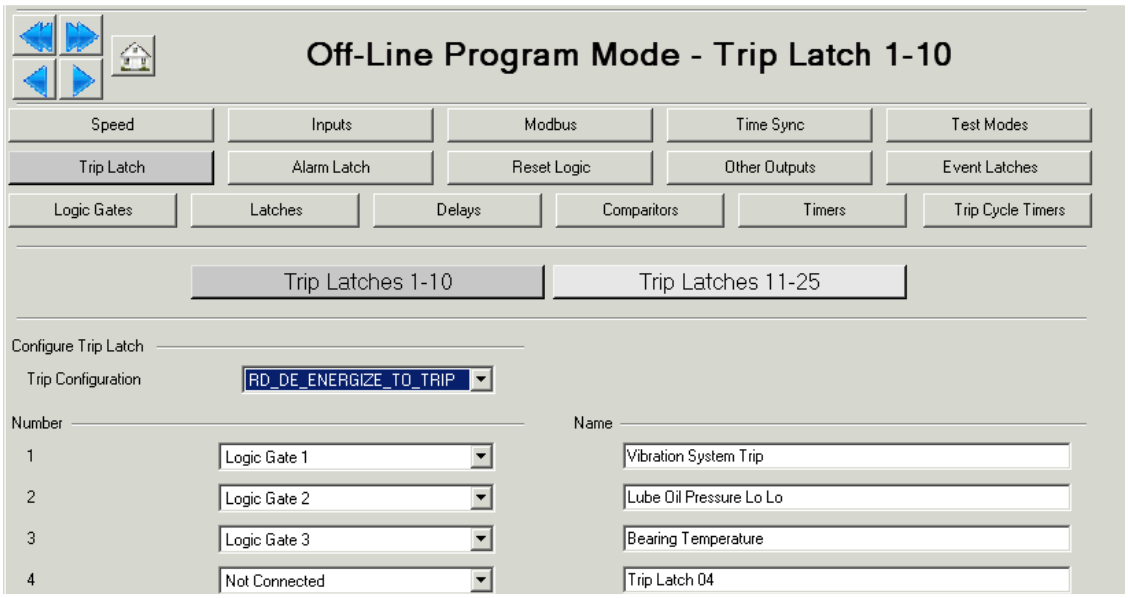


Speed



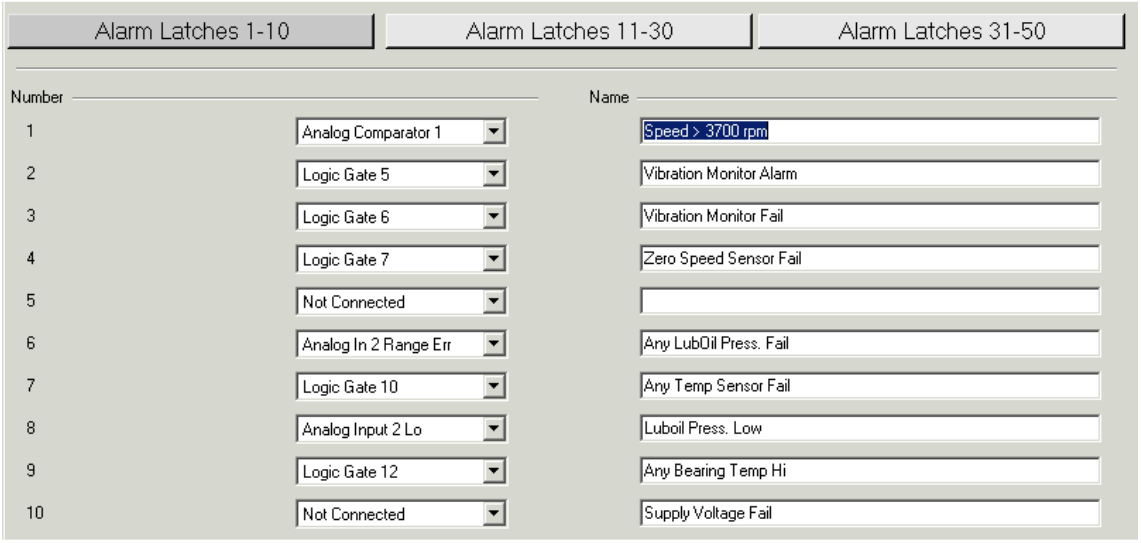
Trip Latch

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



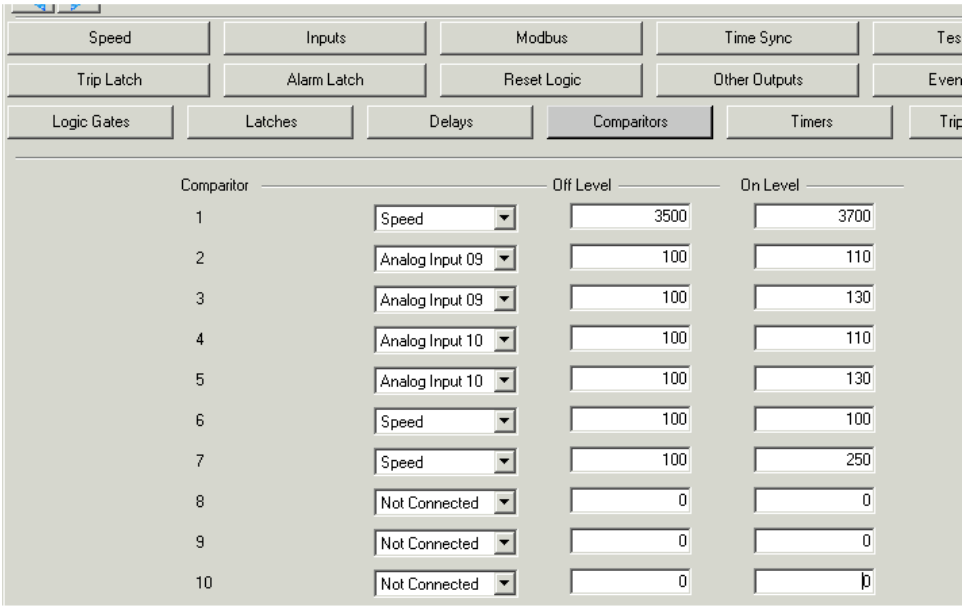
Alarm Latch

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

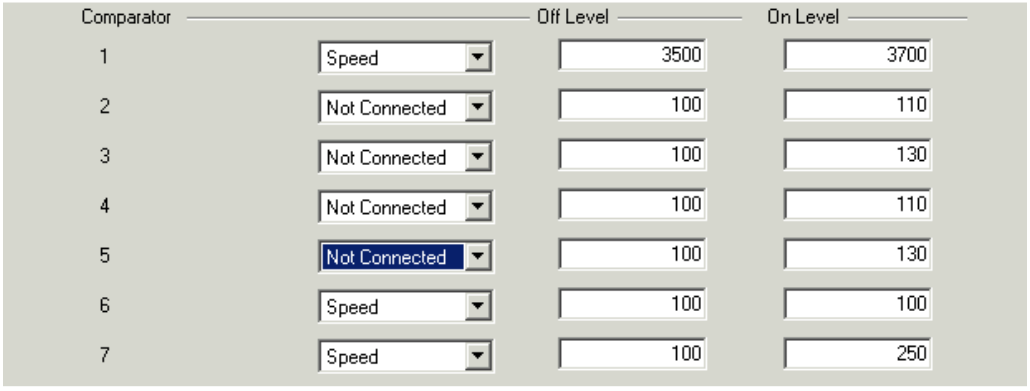


Event Latch

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

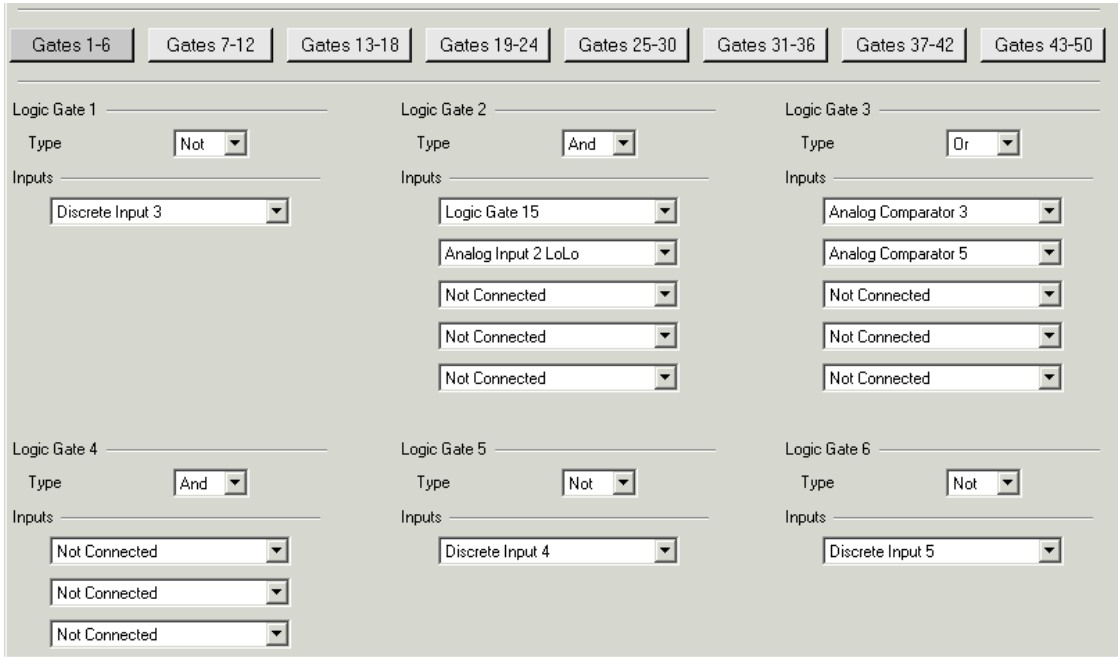


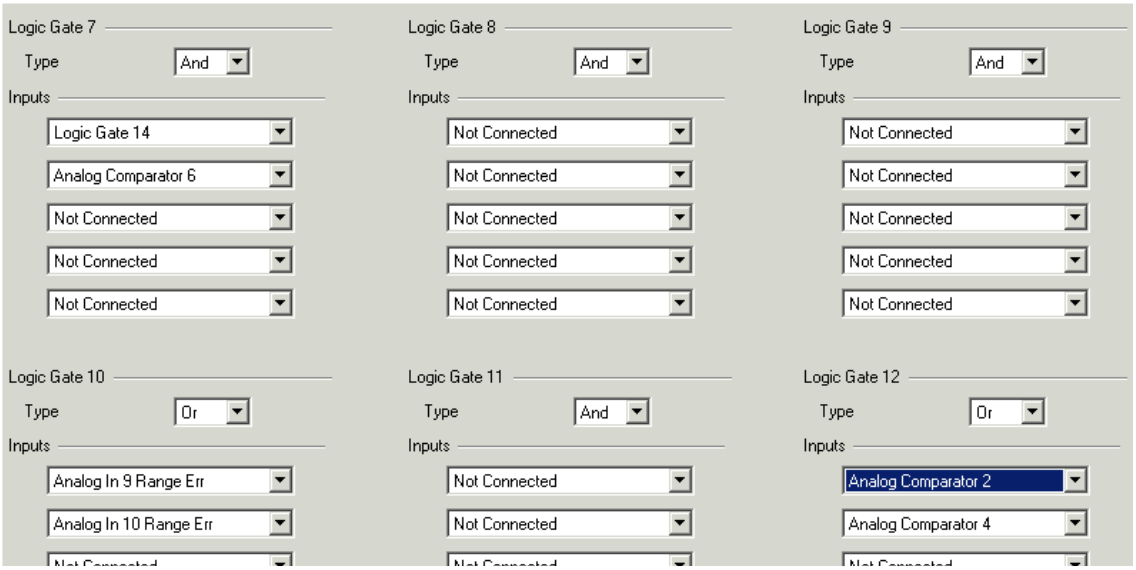
Comparators for unit C.
Comparator 1 = speed > 3700
Comparator 6 = speed > 100
Comparator 7 = speed > 250

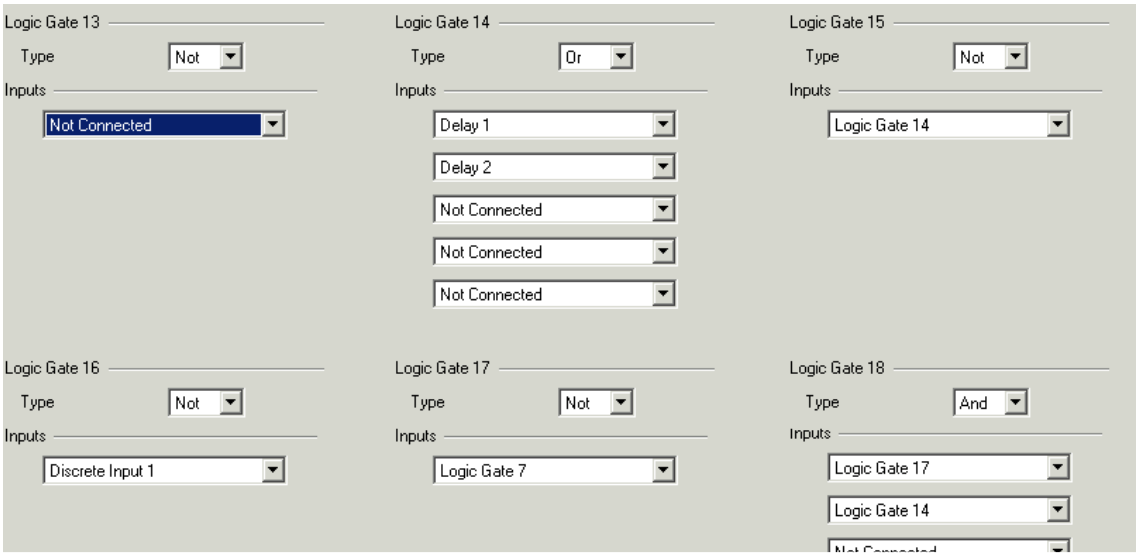


Logic Gates

- 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.

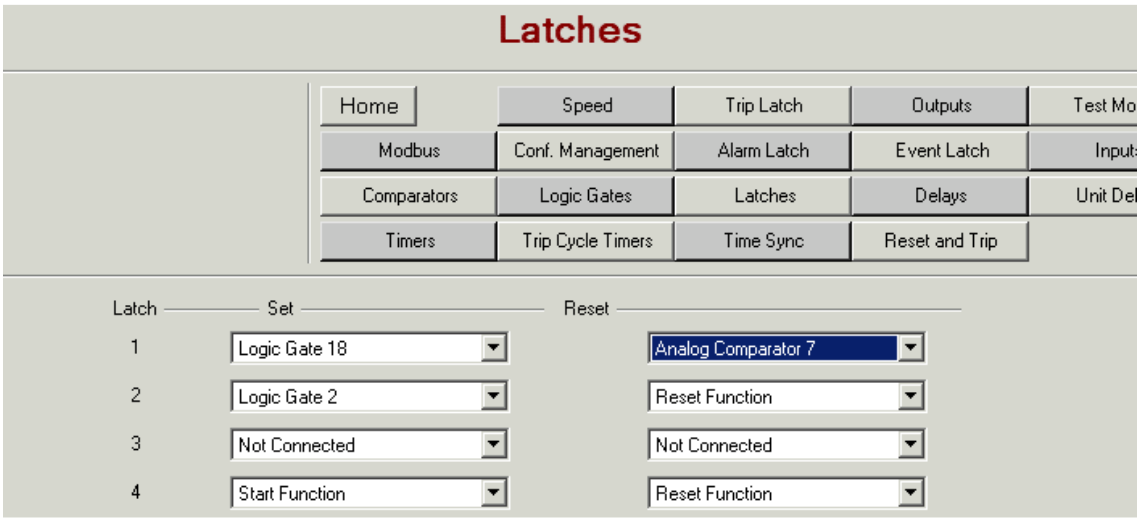

Gates 1-6
Gates 7-12
Gates 13-18
Gates 19-24
Gates 25-30
Gates 31-36
Gates 37-42
Gates 43-50
Logic Gate 1
Type
Not
Inputs
Discrete Input 3
Logic Gate 2
Type
And
Inputs
Logic Gate 15
Analog Input 2 LoLo
Not Connected
Not Connected
Not Connected
Logic Gate 3
Type
Or
Inputs
Analog Comparator 3
Analog Comparator 5
Not Connected
Not Connected
Not Connected
Logic Gate 4
Type
And
Inputs
Not Connected
Not Connected
Not Connected
Logic Gate 5
Type
Not
Inputs
Discrete Input 4
Logic Gate 6
Type
Not
Inputs
Discrete Input 5


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

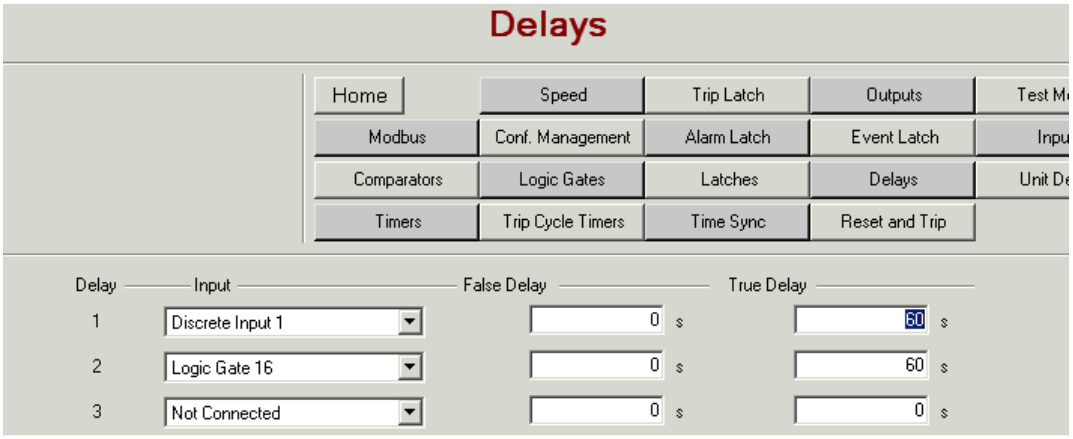


Latches

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

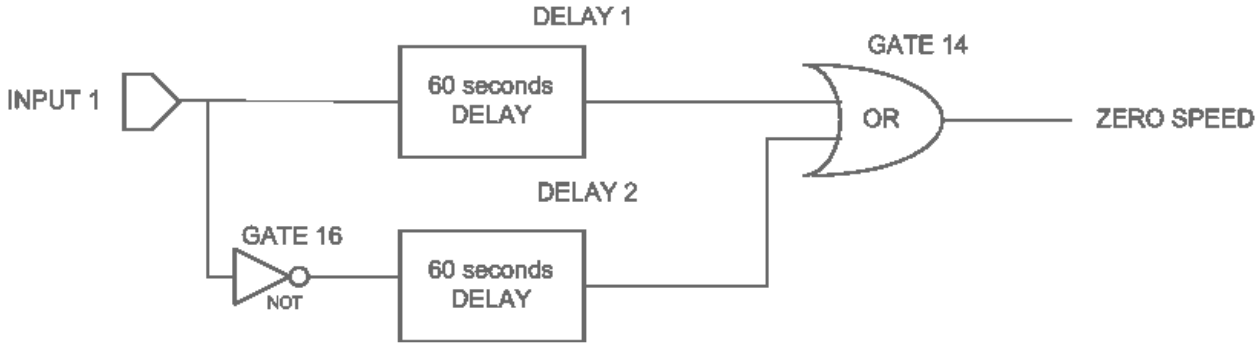


Figure 13-10. Zero Speed Detection

Zero Speed Detector Failure

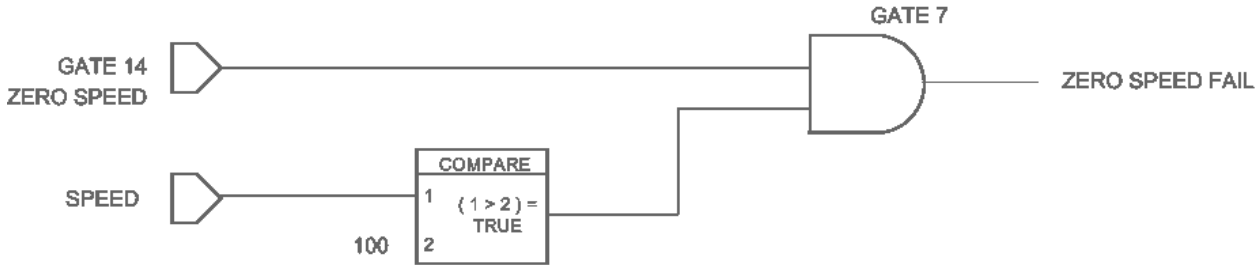


Figure 13-11. Zero Speed Detector Failure

Zero Speed and No Sensor Failure

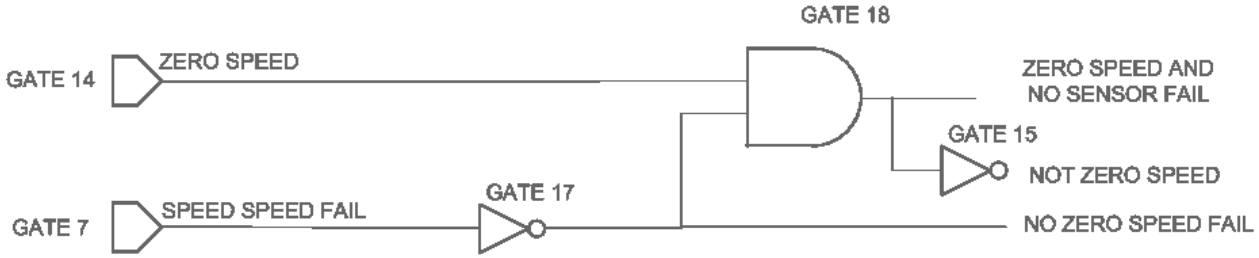


Figure 13-12. Zero Speed and No Sensor Failure

Any Temperature High / Any Temperature High High

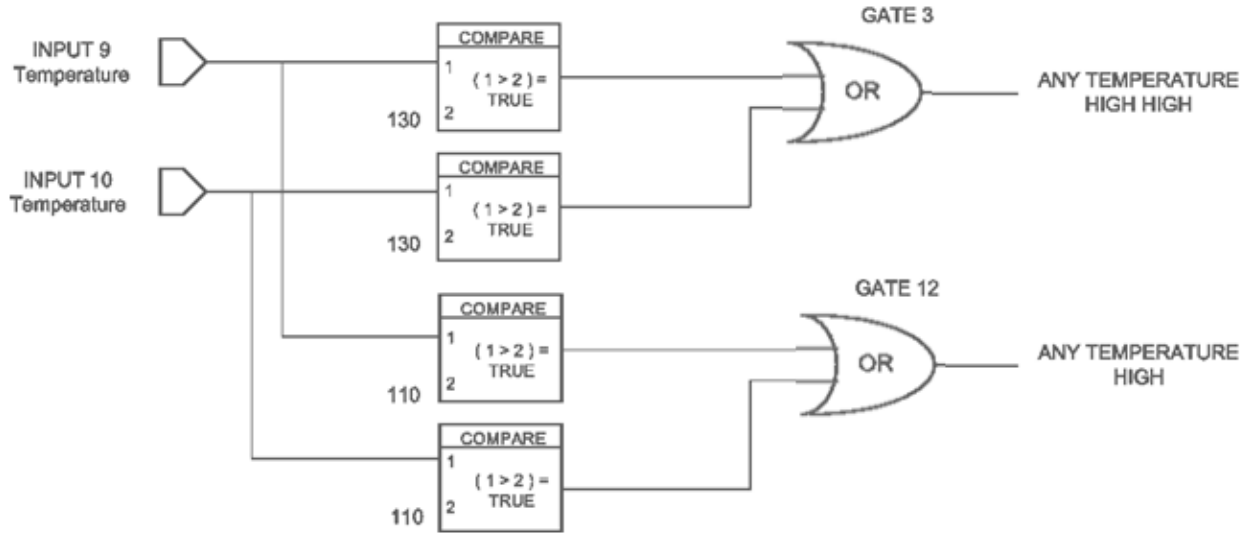


Figure 13-13. Any Temperature High / Any Temperature High High

Turning Gear Permissive

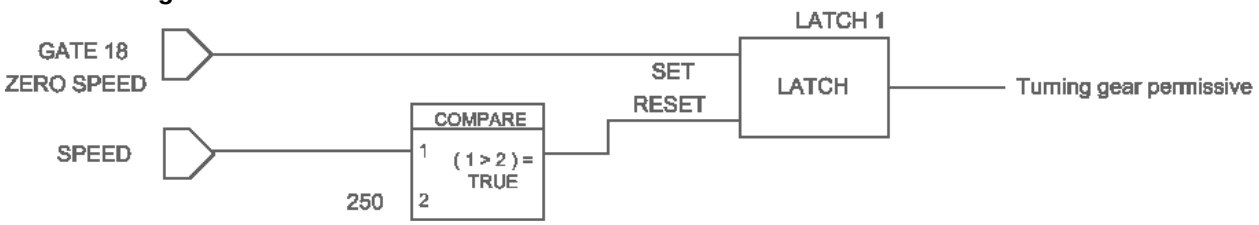


Figure 13-14. Turning Gear Permissive

Chapter 14.
Configuration Worksheet

MicroNet Safety Module Part Number:_____ Date:_____

MicroNet Safety Module Serial Number:_____

Site/Application:_____

CONFIGURATION FUNCTIONS AVAILABLE FROM THE FRONT PANEL

Complete configuration of the unit can be done from the Programming and Configuration Tool or the GAP Programming Tool.

	Parameter	Options / Range	Default	User Setting
SPEED	Probe Type	Not Used Active Passive	Passive	
	No. Gear Teeth	1 - 320	60	
	Gear Ratio	0.10 - 10	1.000	
	Overspeed Trip	100 - 3200	100	
	Sudden Speed Loss	Trip Alarm	Trip	
ACCELERATION	Enable Accel. Trip	Yes / No	No	
	Acceleration Trip Enable Speed	0 - 32000 rpm	100	
	Acceleration Trip	0 – 25000 rpm/s	0	
START LOGIC	Speed Fail Setpoint	0 – 025000 rpm	100	
	Speed Fail Trip	Used Not Used	Not Used	
	Speed Fail Alarm	Used Not Used	Not Used	
	Speed Fail Timeout Trip	Used Not Used	Not Used	
	Speed Fail Timeout Time	00:00:01 to 08:00:00	00:00:01 (hh:mm:ss)	

	Parameter	Options / Range	Default	User Setting
SPEED REDUNDANCY MANAGER	Input 1	Not Used Module A Speed Module B Speed Module C Speed	Not Used	
	Input 2	Not Used Module A Speed Module B Speed Module C Speed	Not Used	
	Input 3	Not Used Module A Speed Module B Speed Module C Speed	Not Used	
	Base Function (3 inputs valid)	Median HSS LSS	Median	
	Two Inputs Failed Action	Trip No Trip	No Trip	
	Fallback Function (2 inputs valid)	HSS LSS	HSS	
	Difference Alarm Limit	0 – 32000 rpm	100	
	Difference Alarm Time	4 – 10000 ms	500	
ACCELERATION REDUNDANCY MANAGER	Input 1	Not Used Module A Accel. Module B Accel. Module C Accel.	Not Used	
	Input 2	Not Used Module A Accel. Module B Accel. Module C Accel.	Not Used	
	Input 3	Not Used Module A Accel. Module B Accel. Module C Accel.	Not Used	
	Base Function (3 inputs valid)	Median HSS LSS	Median	
	Fallback Function (2 inputs valid)	HSS LSS	HSS	
TRIP LATCH	Trip Configuration	Energize To Trip De-Energize To Trip	De-Energize To Trip	
	Trip Latch Output	Latching Non-Latching	Latching	

ALARM LATCH	Trip is Alarm	Yes / No	Yes	

DEDICATED DISCRETE INPUTS	Reset Input Sharing	Not Used Module A Reset Module B Reset Module C Reset	Not Used	
	Start Input Sharing	Not Used Module A Start Module B Start Module C Start	Not Used	
	Speed Fail Override Input Sharing	Not Used Module A SFO Module B SFO Module C SFO	Not Used	

	Parameter	Options / Range	Default	User Setting
ANALOG OUTPUT	Speed @ 4 mA	0 – 32000 rpm	0	
	Speed @ 20 mA	0 – 32000 rpm	32000	
TEST MODES	Temporary Overspeed Trip	0 – 32000 rpm	100	
	Temporary Overspeed Trip Timeout	00:00:00 to 00:30:00	00:00:00 (hh:mm:ss)	
	Simulated Speed Timeout	00:00:00 to 00:30:00	00:00:00 (hh:mm:ss)	
	Test Mode Permissive	No Permissive Not Tripped Not In Alarm	Not In Alarm	
AUTO-SEQUENCE TEST (Module A)	Enabled	Yes / No	No	
	Test interval	1 to 999 days	7	
	Operator Can Disable Test	Yes / No	Yes	
MODBUS	Mode	RS-232 RS-485	RS-232	
	Baud Rate	19200 38400 57600 115200	19200	
	Communication Parity	No Parity Even Parity Odd Parity	No Parity	
	Slave Address	1 - 247	1	
	Enable Write Commands	Yes / No	No	
POWER SUPPLY ALARMS	Enable Power Supply 1 Alarm	Yes / No	Yes	
	Enable Power Supply 2 Alarm	Yes / No	Yes	

DISPLAY	Selected Home Screen	All Pages	Home	
	Jump to Home Screen On Trip	Yes / No	Yes	

CONFIGURATION MANAGEMENT	Configuration Compare	Used Not Used	Used	

PASSWORD CHANGE –

Test Level Password _____

Config Level Password _____

Revision History

Changes in Revision B—

- Added an Important box on pg. 137

Changes in Revision A—

- Updated screen shots and Configure Language information

Released

We appreciate your comments about the content of our publications.

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Please reference publication 26711V2.

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