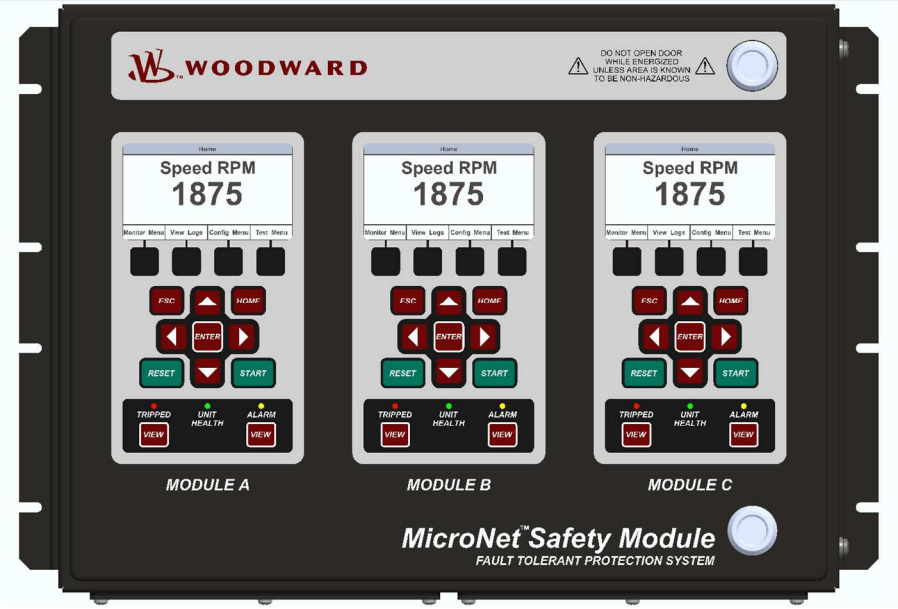
Released

Product Manual 35060V2
(Revision A, 1/2021)
Original Instructions



MicroNet™ Safety Module With Math Enhancements

Manual 35060 consists of 2 volumes (35060V1 & 35060V2)

Volume 2-

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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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 Out-of-date translations are marked with ⚠.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 35060V2

Contents

The following are trademarks of Woodward, Inc.:
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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.

IMPORTANT

External wiring connections for reverse-acting controls are identical to those for direct-acting controls.

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.

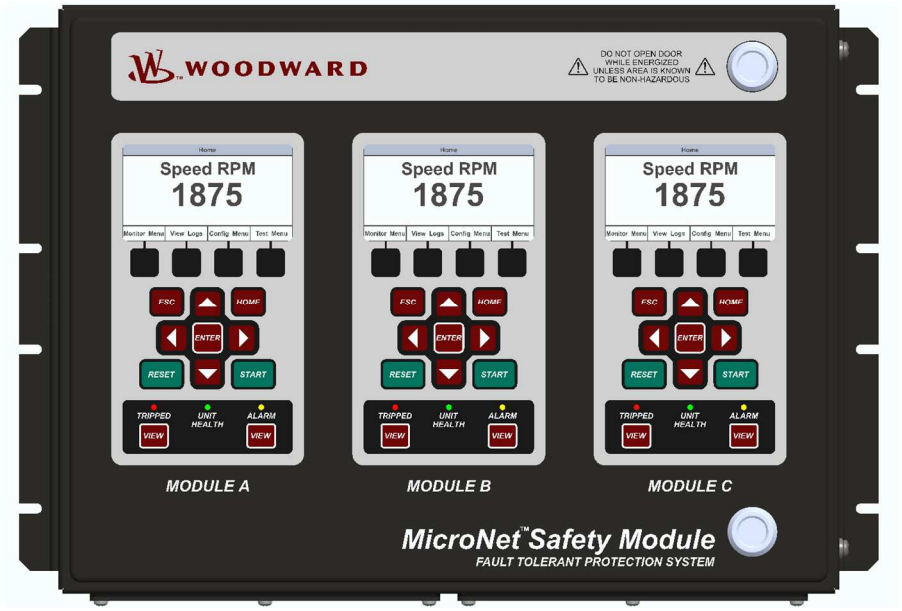


Figure 9-1. MicroNet Safety Module Front Panel

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.

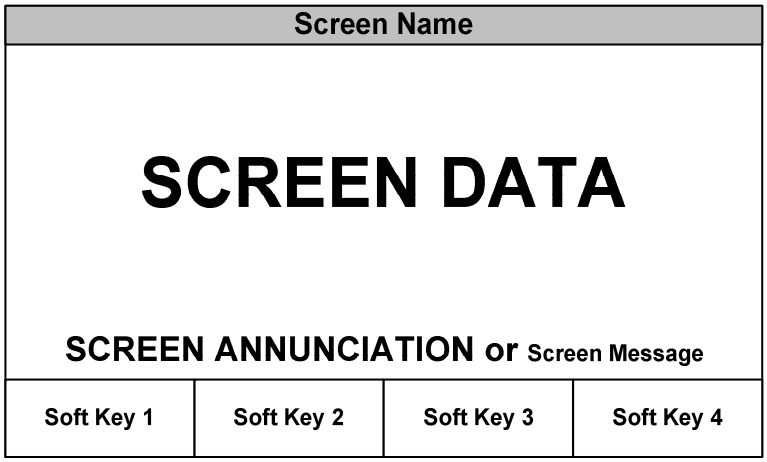


Figure 9-2. MicroNet Safety Module Screen

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 four 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

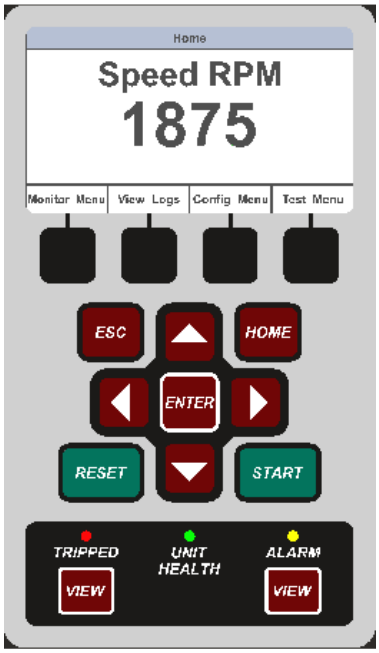


Figure 9-3. MicroNet Safety Module Faceplate

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

Table 9-1. Function Key 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, Configuration, 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)

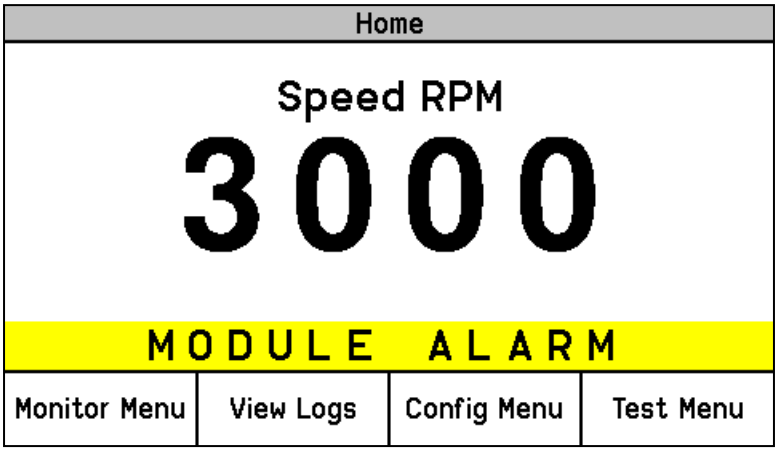


Figure 9-4. Home screen (with Alarm)

Home Screen Page (with a Trip condition indicated)

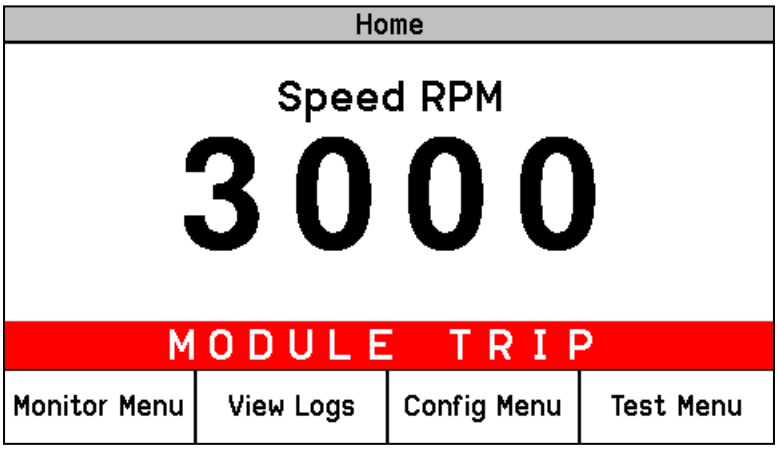


Figure 9-5. Home screen (with Trip)

Passwords

The MicroNet Safety Module utilizes two password levels, a Test Level Password and a Configuration 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 Configuration Level Password provides access to any function that requires the Test Level Password. Additionally, the Configuration 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 Configuration Level Password.

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

Password Entry Screen

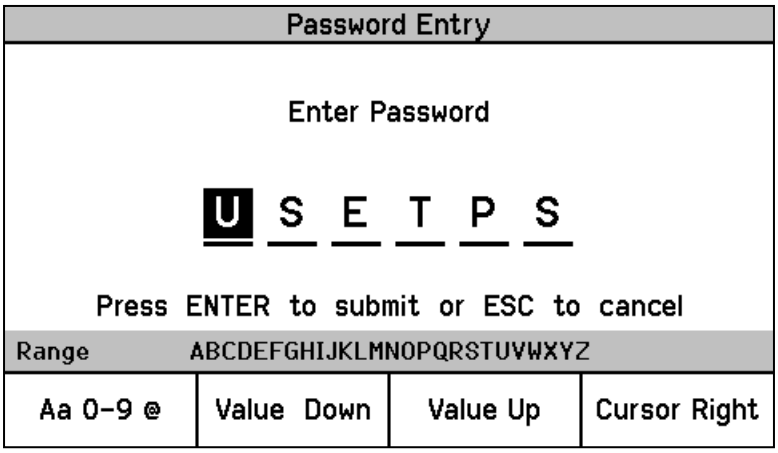


Figure 9-6. Password Entry Screen

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 Configuration 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:

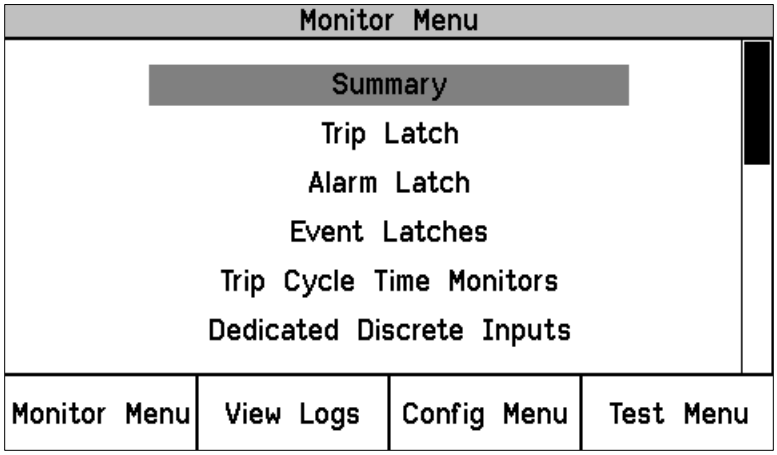


Figure 9-7. Monitor Menu

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
- Start Input Sharing
- Reset Input Sharing
- Speed Fail Override Input Sharing
- Analog Output
- Modbus
- Date / Time
- System Status
- Module Information

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

Monitor Summary (Page 1)

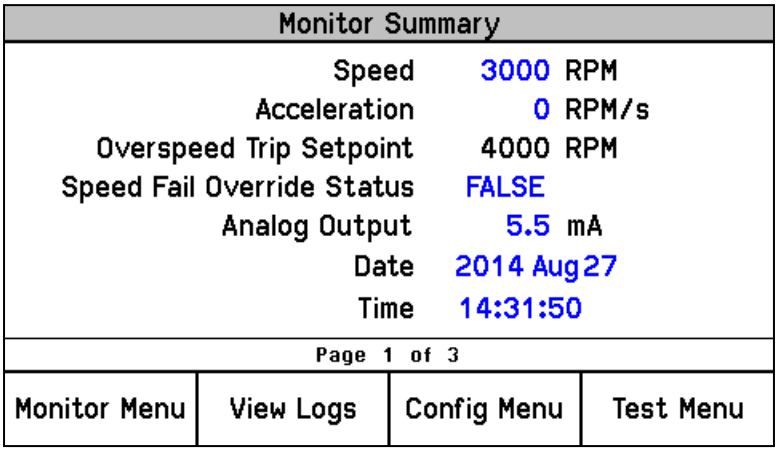


Figure 9-8. Monitor Summary (Page 1)

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)

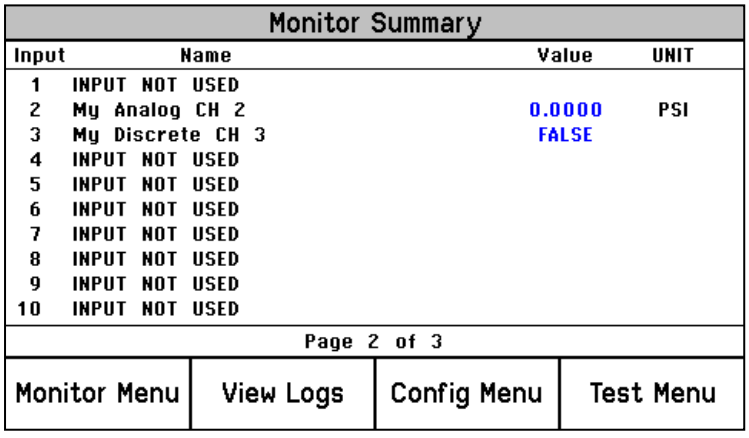


Figure 9-9. Monitor Summary (Page 2)

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)

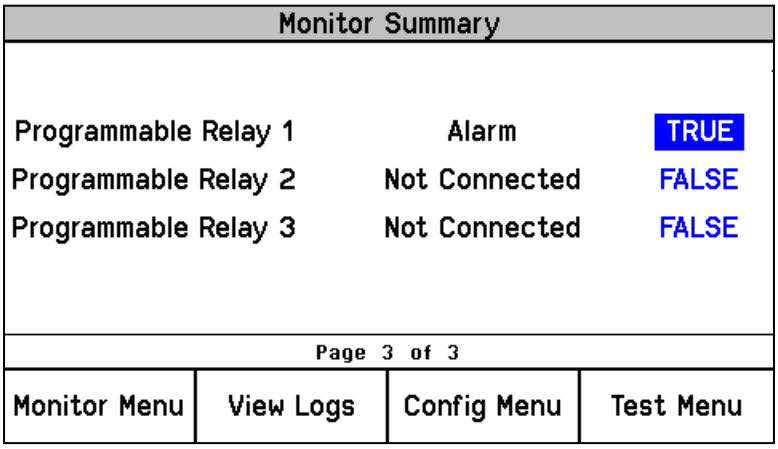


Figure 9-10. Monitor Summary (Page 3)

This page provides information on the programmable relays. It displays the source of the relay command as well as the output on/off status (true/false).

Monitor Trip Latch Page

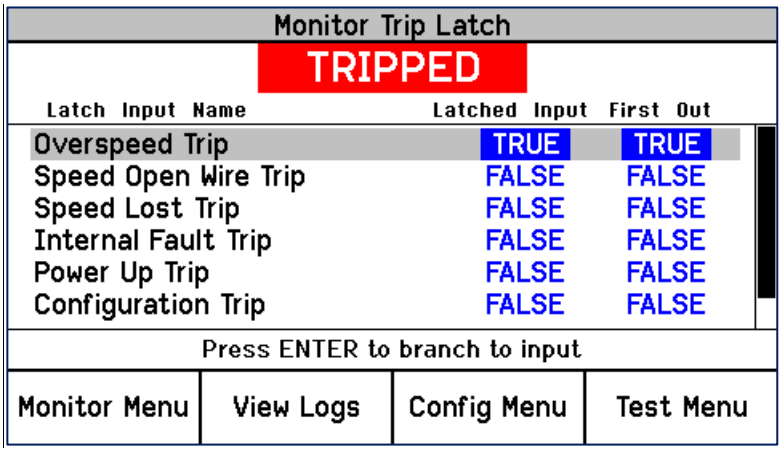


Figure 9-11. Monitor Trip Latch

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 MSM. 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 MSM 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 an instantaneous speed loss event. Only provided if the module's Speed Input is configured for use. A Sudden Speed Loss event is detected when zero speed is sensed (no edges on the speed input) and during the previous 4 millisecond scan a value above the sudden speed loss threshold setting (default 200 rpm) 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 a trip condition caused by the configured trip latch input.

Monitor Alarm Latch Page

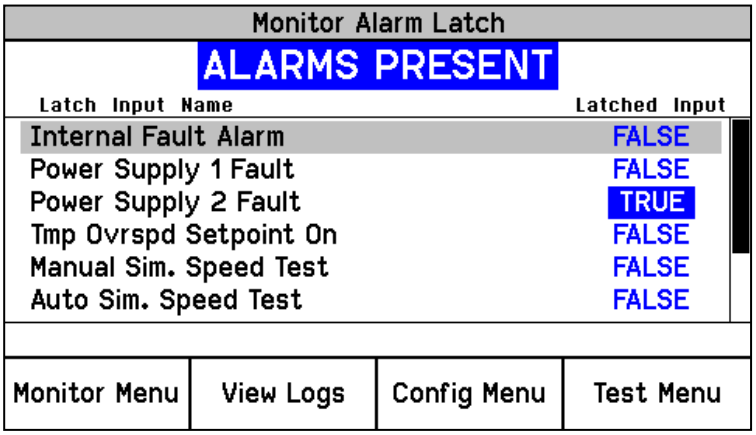


Figure 9-12. Monitor Alarm Latch

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 MSM. 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 instantaneous 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.
- **Auto Sequence Test Timeout:** Indicates the test did not continue to the next module because it timed out waiting for a Start/Continue signal.
- **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

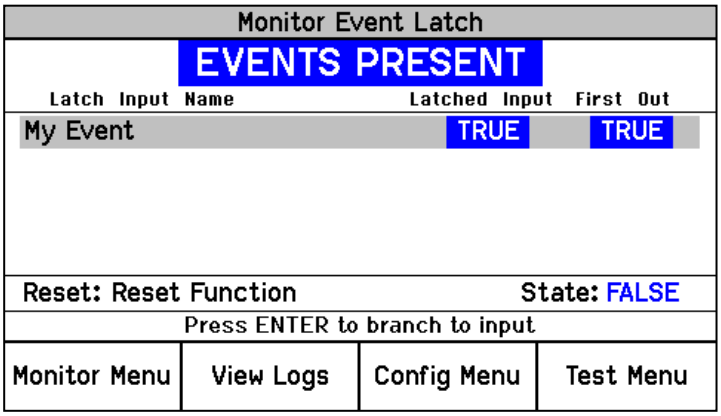


Figure 9-13. Monitor Event Latch

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

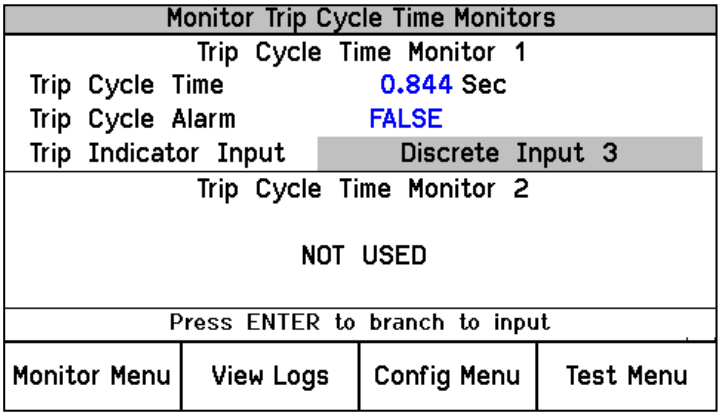


Figure 9-14. Monitor Trip Cycle Time Monitors

This page provides information on the Trip Cycle Time Monitors. This function monitors the time between a trip until a user-defined trip indicator input is true and is used to monitor the performance of the trip system. A Trip Cycle Time Log is also available which records the last 20 trips.

- **Trip cycle Time**: Time between the trip and the acknowledgement of the trip by the Trip Indicator Input. If the event has not occurred in10x this maximum cycle time (up to a maximum of 60 seconds), then the trip cycle time will be set to 60 seconds and ‘Max Limit’ will be displayed.
- **Trip Cycle alarm:** The state of the Trip Cycle Time alarm. True when the configured maximum cycle time is exceeded prior to a positive indication on the Trip Indicator Input. If, after a trip, the Trip Indicator Input is received within the configured maximum time, then the Trip Cycle Alarm will be False.

- **Trip Indicator Input:** The input used to acknowledge the trip. The Trip indicator could be configured to be a limit switch which indicates a trip valve has closed or a pressure comparison that indicates that the system or part of the trip system has actuated.

Monitor Dedicated Discrete Inputs Page

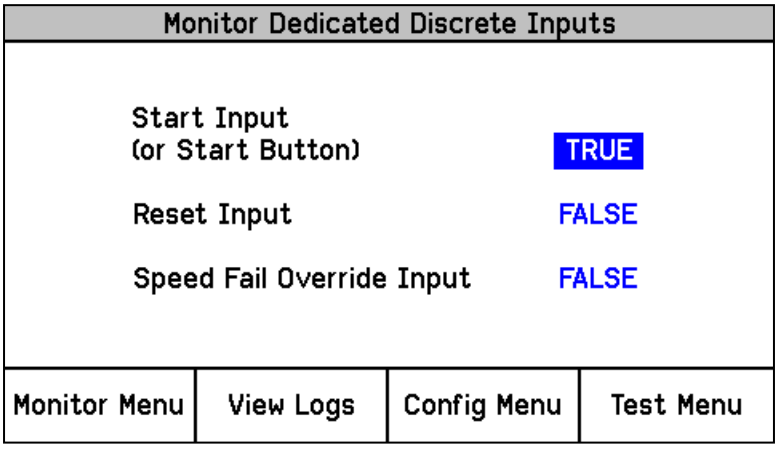


Figure 9-15. Monitor Dedicated Discrete Inputs

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

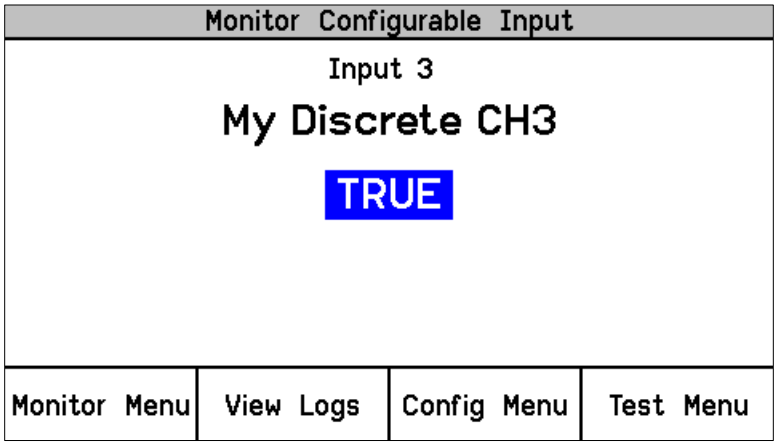


Figure 9-16. Monitor Configurable Inputs - Discrete

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

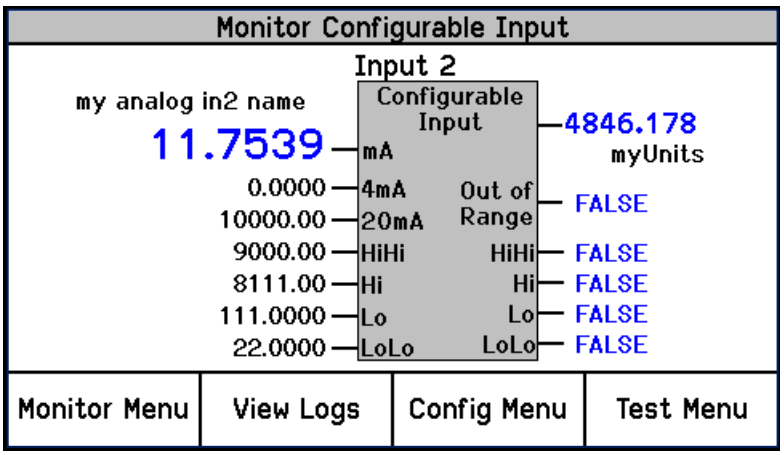


Figure 9-17. Monitor Configurable Inputs - Analog

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

- **Input x:** Indicates which input (1-10).

The block inputs (left side of block):

- **Name:** Indicates the username of the input.
- **Input (mA):** Indicates the value of the input in user units.
- **4mA:** Indicates the setting of the value at 4mA.
- **20mA:** Indicates the setting of the value at 20mA.
- **HiHi:** Indicates the setting of the HiHi configurable point.
- **Hi:** Indicates the setting of the Hi configurable point.
- **Lo:** Indicates the setting of the Lo configurable point.
- **LoLo:** Indicates the setting of the LoLo configurable points.

The block outputs (right side of block):

- **Output:** Indicates the value of the input in user units.
- **Units:** Indicates the user units.
- **Out of Range:** Indicates True if the input is out of range (<2mA or >22mA).
- **HiHi:** Indicates True if the input is above the HiHi configurable point.
- **Hi:** Indicates True if the input is above the Hi configurable point.
- **Lo:** Indicates True if the input is below the Lo configurable point.
- **LoLo:** Indicates True if the input is below the LoLo configurable points.

Monitor Configurable Logic Menu

From the “Monitor Configurable Logic Menu” the user can view settings, real time values, and status indications of the logic blocks. When “Configurable Logic” is selected from the Monitor Menu, the following menu is shown:

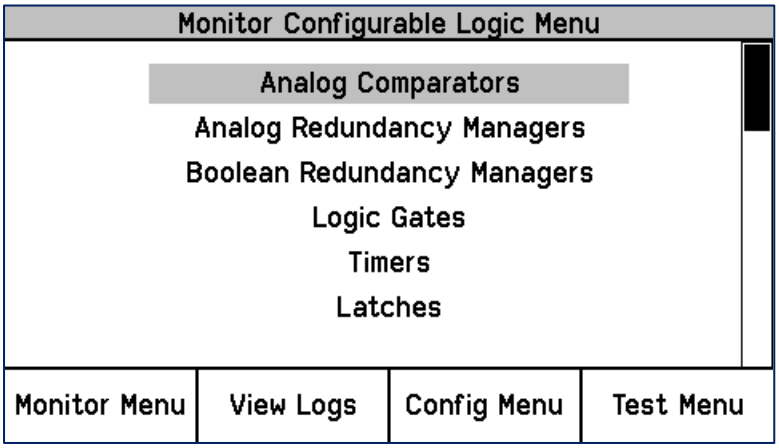


Figure 9-18 Monitor Configuration Logic Menu

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:

Table 9-2. Monitor Menu Items

Analog Comparators	Lags	Switch
Analog Redundancy Managers	Difference Detection	Curve
Boolean Redundancy Managers	Constant	Analog Unit Delay
Logic Gates	Add	Peak Hold
Timers	Negate	Counter
Latches	Multiply	Pulse Detector
Delays	Divide	Event Filter
Unit Delays		

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.
- **Black screen value:** Indicates user configurable values.

Monitor Analog Comparator

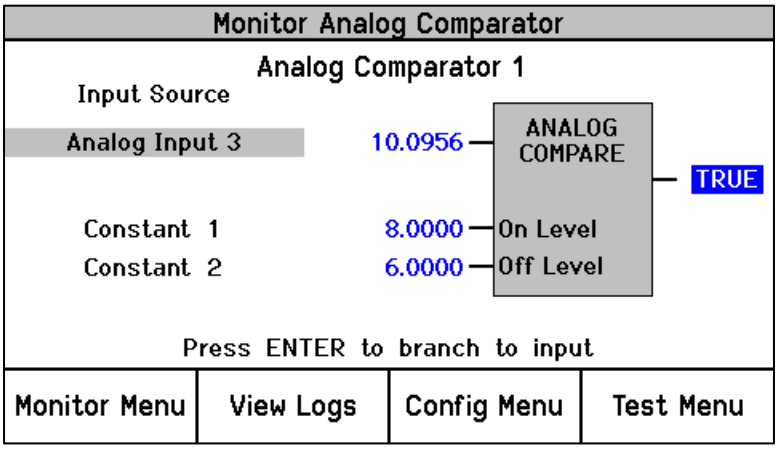


Figure 9-19. Monitor Analog Comparator

This page provides users information on the Analog Comparator blocks.

- **Analog Comparator x:** Identifies the block (1-15).

The block inputs (left side of block):

- **Input Source:** Indicates the input selection.
- **Input:** Indicates the value of the input in user units.
- **On Level:** Indicates the On Level setting.
- **Off Level:** Indicates the Off Level setting.

The block output (right side of block) indicates the value of the output. The functionality depends on the On and Off level thresholds.

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.

Monitor Analog Redundancy Manager

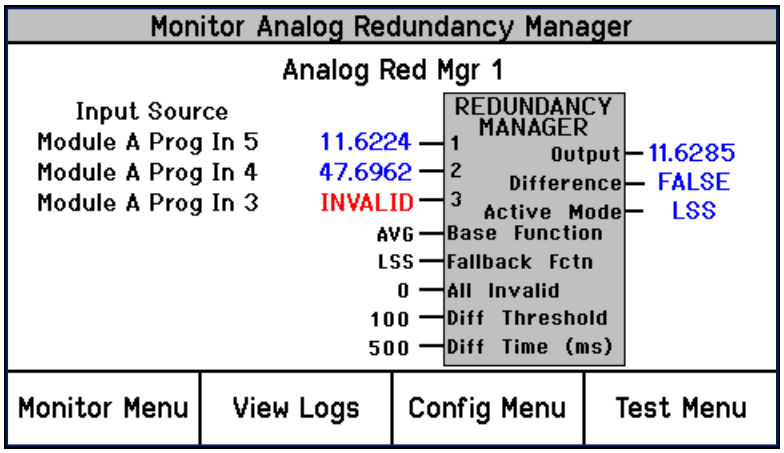


Figure 9-20. Monitor Analog Redundancy Manager

This page provides users information on the Analog Redundancy Manager blocks.

- **Analog Red Mgr x:** Identifies the Analog Redundancy Manager (1-15).

The block inputs (left side of block):

- **Input Source:** Indicates the input selections.
- **Input:** Indicates the values of the inputs in user units. An indication of 'INVALID' means the input is not considered valid. Causes for this indication include incorrectly configured (e.g. discrete in), loss of signal between modules, configuration change of the input scaling, or signal out of range (failed). A reset may be required to restore the signal.
- **Base Function:** Indicates the configured function when all inputs are valid (3 good inputs).
- **Fallback Function:** Indicates the configured function when 2 inputs are valid (2 good inputs).
- **All Invalid:** Indicates the configured function when all inputs are invalid (no good inputs). Note that with one valid/good input, that good input signal is used as the output.
- **Difference Threshold:** Indicates the Difference Limit setting.
- **Difference Time (ms):** Indicates the Difference Time setting.

The block outputs (right side of block):

- **Output:** Indicates the value of the output in user units. The Active Mode indicates the signal selection criteria.
- **Difference:** Indicates the value of the difference detection output. True when valid inputs exceed the difference threshold for longer than the difference delay time. False when the difference is less than the threshold for 3x the delay time.
- **Active Mode:** Indicates the currently active redundancy mode (MEDIAN, HSS, LSS, or AVERAGE) used to set the output.

Monitor Boolean Redundancy Manager

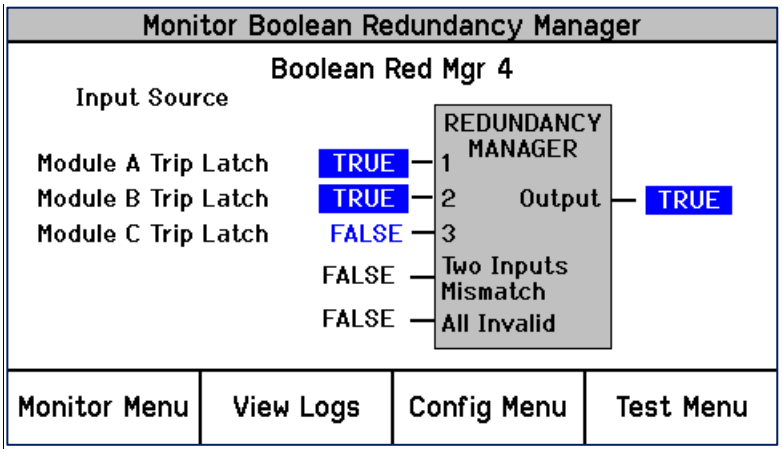


Figure 9-21. Monitor Boolean Redundancy Manager

This page provides users information on the Boolean Redundancy Manager blocks.

- **Boolean Red Mgr x:** Identifies the Boolean Redundancy Manager (1-15).

The block inputs (left side of block):

- **Input Source:** Indicates the input selections.
- **Input:** Indicates the value of the inputs.
- **Two Inputs Mismatch:** Indicates the Two Inputs Mismatch Output setting.
- **All Invalid:** Indicates the Output with No Valid Inputs setting.

The block output (right side of block):

- **Output:** Indicates the value of the output which depends on the number of valid inputs. With 3 valid inputs the output is true when 2 out of 3 inputs are true and false otherwise. With 2 valid inputs the output is true if both inputs are true. If the inputs are different, the output will be same as the Two Inputs Mismatch setting. With 1 valid input the output will equal that valid input. With no valid inputs the output will be equal to the All Invalid setting.

Monitor Logic Gate

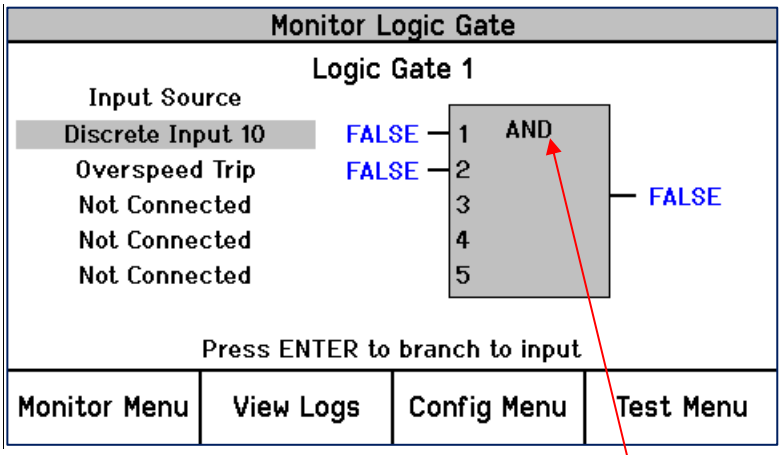


Figure 9-22. Monitor Logic Gates

This page provides users information on the Logic Gate blocks.

- **Logic Gate x:** Identifies the logic gate (1-50).
- **Block type:** Identifies the gate type configuration.

The block inputs (left side of block):

- **Input Source:** Indicates the input selections (1-5).
- **Input:** Indicates the value of the inputs (1-5).

The block output (right side of block):

- **Output:** Indicates the value of the output which varies with the configured block function (e.g. AND, OR, NOT, etc) as well as the number of inputs. A 2-input logic table example is provided below for reference.

Table 9-3. A-2 Input Logic Table

Inputs		Outputs					
A	**B**	**AND**	**NAND**	**OR**	**NOR**	**XOR**	**XNOR**
0	0	0	1	0	1	0	1
0	1	0	1	1	0	1	0
1	0	0	1	1	0	1	0
1	1	1	0	1	0	0	1

Monitor Timer

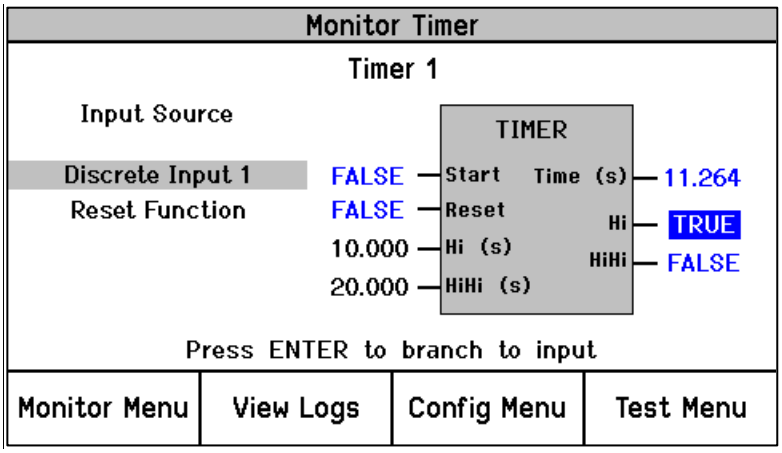


Figure 9-23. Monitor Timer

This page provides users information on the Timer blocks.

- **Timer x:** Indicates which input (1-5).

The block inputs (left side of block):

- **Input Source:** Indicates the input selection.
- **Start:** Indicates the value of the input. When True, the timer's time is accumulated.
- **Reset:** Indicates the value of the reset input. When True, the timer's time is set to zero and the outputs (Hi and HiHi) are set to false.
- **Hi (s):** Indicates the Hi Setpoint value in seconds.
- **HiHi (s):** Indicates the HiHi Setpoint value in seconds.

The block outputs (right side of block):

- **Time (s):** Indicates the value of the elapsed time in seconds.
- **Hi:** Indicates the accumulated time has exceeded the Hi time threshold. A Reset is required to clear this output.
- **HiHi:** Indicates the accumulated time has exceeded the HiHi time threshold. A Reset is required to clear this output.

Monitor Latch

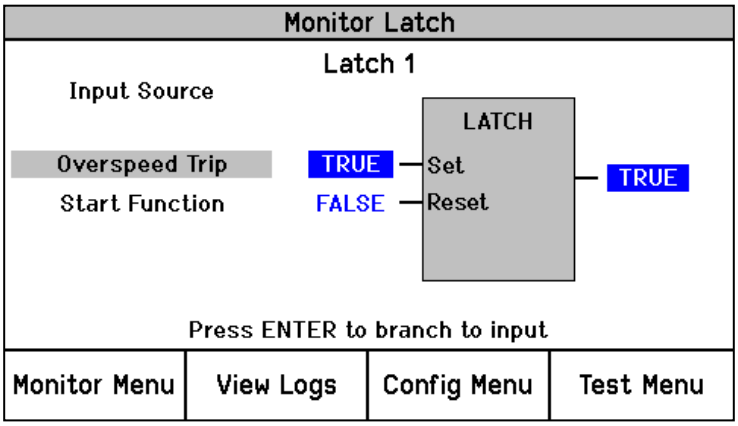


Figure 9-24. Monitor Latch

This page provides users information on the Latch blocks.

- **Latch x:** Identifies the latch (1-10).

The block inputs (left side of block):

- **Input Source:** Indicates the input selection.
- **Set:** Indicates the value of the input.
- **Reset:** Indicates the value of the input.

The block output (right side of block):

- **Output:** False when Reset is true (reset dominant). Latches true when Set goes true and stays true until reset goes true.

Monitor Delay

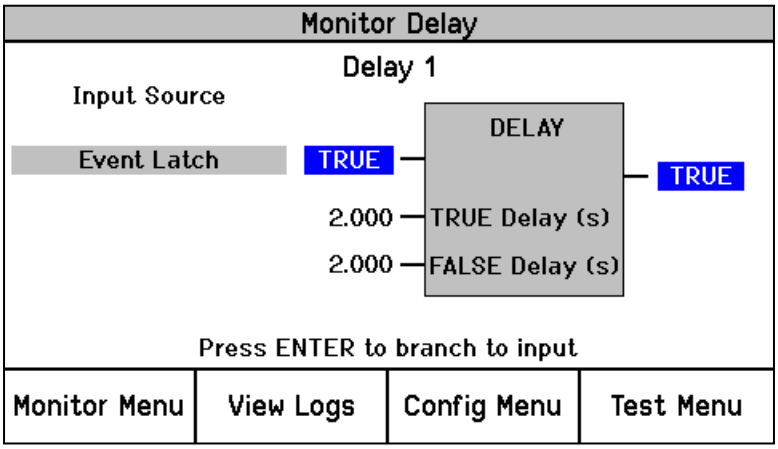


Figure 9-25. Monitor Delay

This page provides users information on the Delay blocks.

- **Delay x:** Identifies the delay (1-15).

The block inputs (left side of block):

- **Input Source:** Indicates the input selection.
- **Input:** Indicates the value of the input.
- **TRUE Delay (s):** Indicates the delay in switching from False to True.
- **FALSE Delay (s):** Indicates the delay in switching from True to False.

The block output (right side of block):

- **Output:** Indicates the value of the output.

Monitor Unit Delay

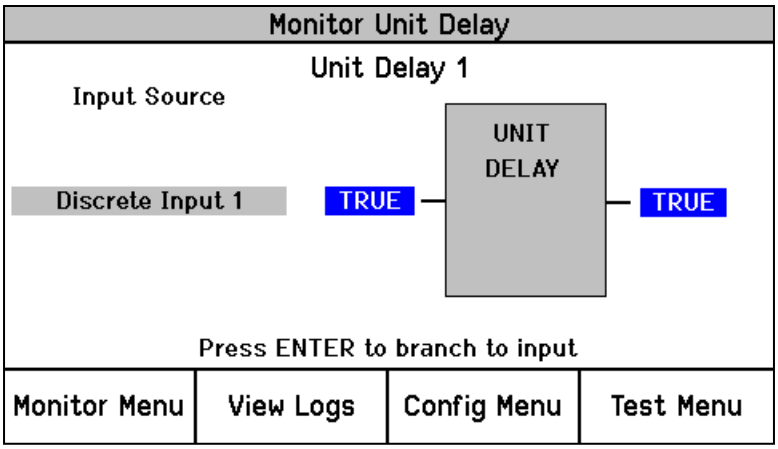


Figure 9-26. Monitor Unit Delay

This page provides users information on the Unit Delay blocks.

- **Unit Delay x:** Identifies the unit delay (1-10).

The block input (left side of block):

- **Input Source:** Indicates the input selection.
- **Input:** Indicates the value of the input.

The block output (right side of block):

- **Output:** Indicates the value of the output.

Monitor Lag

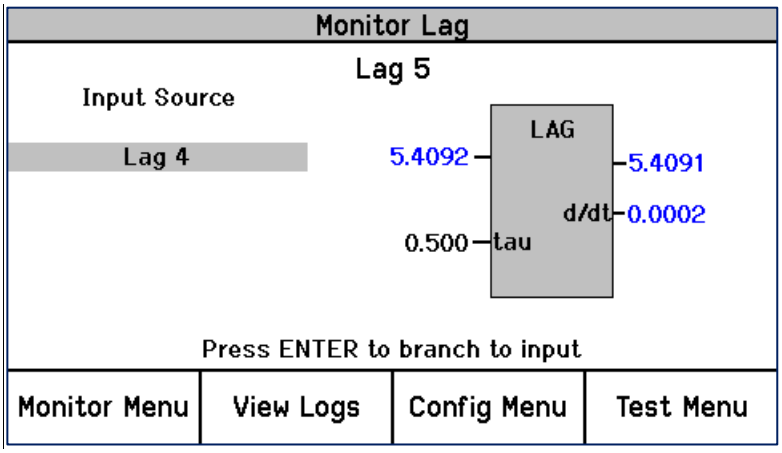


Figure 9-27. Monitor Lag

This page provides users information on the Lag blocks.

- **Lag x:** Identifies the lag (1-10).

The block inputs (left side of block):

- **Input Source:** Indicates the input selection.
- **Input:** Indicates the value of the input in user units.
- **Tau:** Indicates the lag tau setting, in seconds.

The block outputs (right side of block):

- **Output:** Indicates the value of the output in user units.
- **d/dt (derivative):** Indicates the derivative value (the rate of change with respect to time) of the output in user units.

Monitor Difference Detection

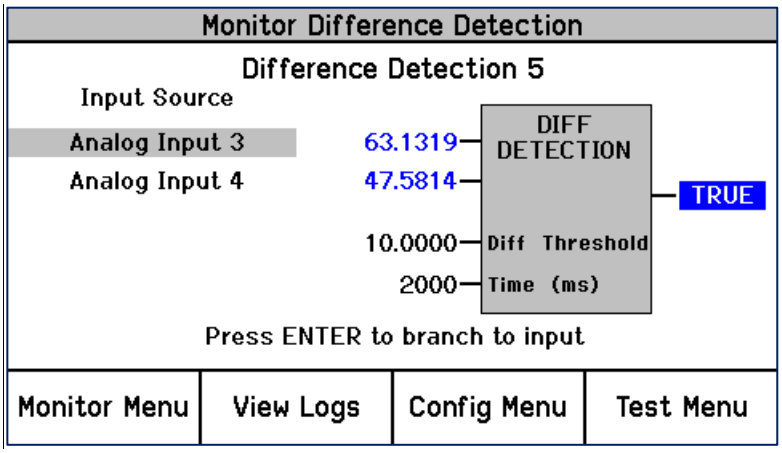


Figure 9-28. Monitor Difference Detection

This page provides users information on the Difference Detection blocks.

- **Diff Detection x:** Identifies the difference detection block (1-10).

The block inputs (left side of block):

- **Input Source:** Indicates the input selection.
- **Input:** Indicates the value of the input in user units.
- **Diff Threshold:** Indicates the On Level setting.
- **Time (ms):** Indicates the delay time setting in milliseconds.

The block output (right side of block):

- **Output:** True when the difference of the two inputs exceeds the threshold for longer than the delay time. False when the difference is less than the threshold for 3x the delay time.

Monitor Constant

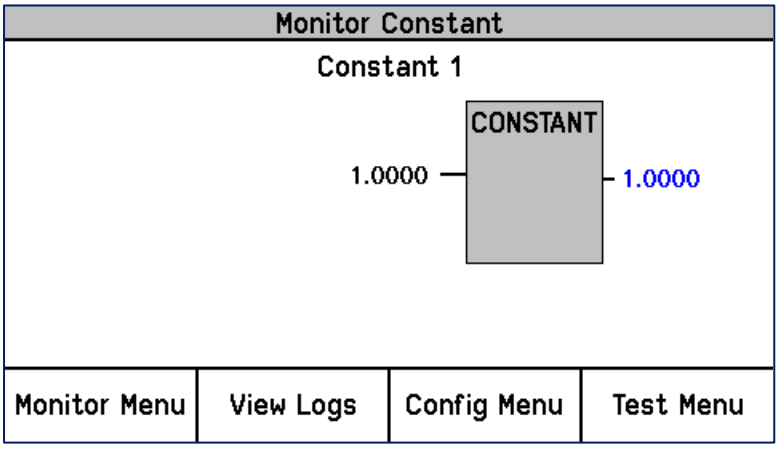


Figure 9-29. Monitor Constant

This page provides users information on the Constant blocks.

- **Constant x:** Identifies the constant block (1-20).

The block inputs (left side of block):

- **Input:** Indicates the value of the input in user units.

The block output (right side of block):

- **Output:** Indicates the value of the output in user units.

Monitor Add

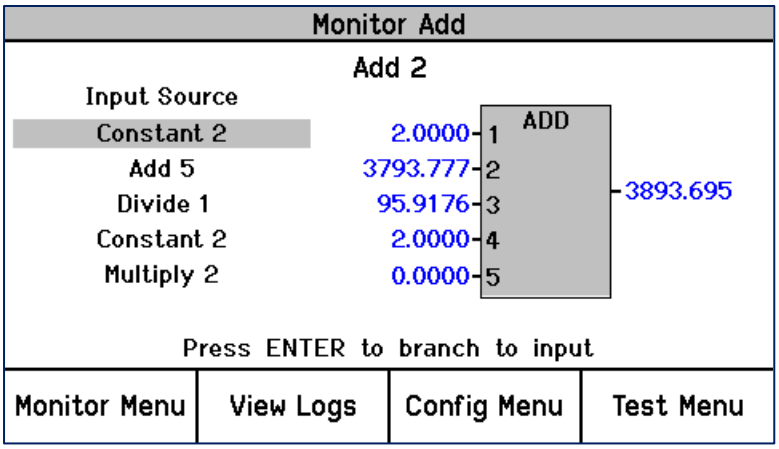


Figure 9-30. Monitor Add

This page provides users information on the Add blocks.

- **Add x:** Identifies the Add block (1-5).

The block inputs (left side of block):

- **Input Source:** Indicates the input selection.
- **Input:** Indicates the value of the input in user units.

The block output (right side of block):

- **Output:** Indicates the value of the output in user units.

Monitor Negate

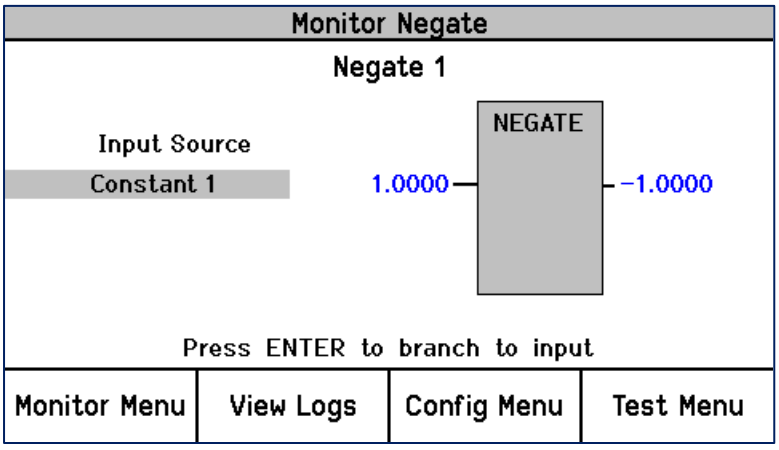


Figure 9-31. Monitor Negate

This page provides users information on the Negate blocks.

- **Negate x:** Identifies the negate block (1-10).

The block inputs (left side of block):

- **Input Source:** Indicates the input selection.
- **Input:** Indicates the value of the input in user units.

The block output (right side of block):

- **Output:** Indicates the value of the output in user units.

Monitor Multiply

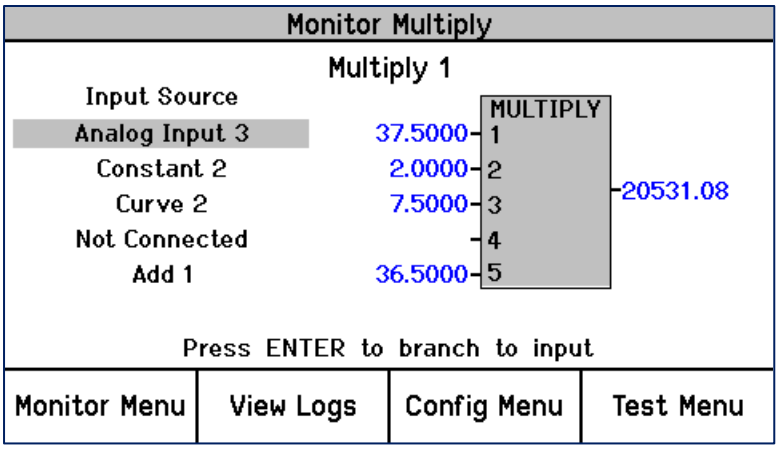


Figure 9-32. Monitor Multiply

This page provides users information on the Multiply blocks.

- **Multiply x:** Identifies the Multiply block (1-5).

The block inputs (left side of block):

- **Input Source:** Indicates the input selection.
- **Input:** Indicates the value of the input in user units.

The block output (right side of block):

- **Output:** Indicates the value of the output in user units.

Monitor Divide

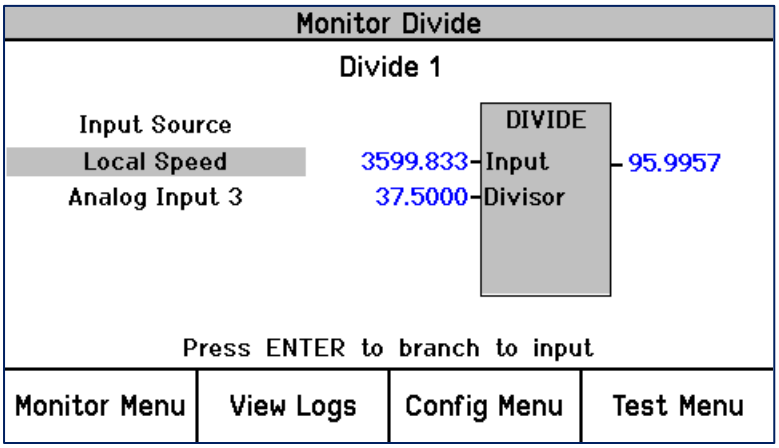


Figure 9-33. Monitor Divide

This page provides users information on the Divide blocks.

- **Divide x:** Identifies the Divide block (1-5).

The block inputs (left side of block):

- **Input Source:** Indicates the input selection.
- **Input:** Indicates the value of the input in user units.

The block output (right side of block):

- **Output:** Indicates the value of the output in user units.

Monitor Switch

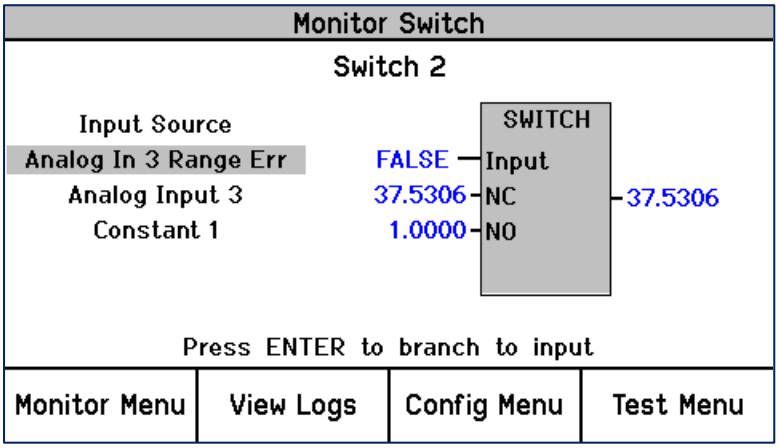


Figure 9-34. Monitor Switch

This page provides users information on the Switch blocks.

- **Switch x:** Identifies the Switch block (1-10).

The block inputs (left side of block):

- **Input Source:** Indicates the input selection.
- **Input:** Indicates the value of the input selector.
- **NC:** Indicates the value of the normally closed switch input in user units.
- **NO:** Indicates the value of the normally open switch input in user units.

The block output (right side of block):

- **Output:** Indicates the value of the output in user units which is based on the Input selector. When the block's Input is True the NO signal is selected, otherwise the NC input is selected.

Monitor Curve

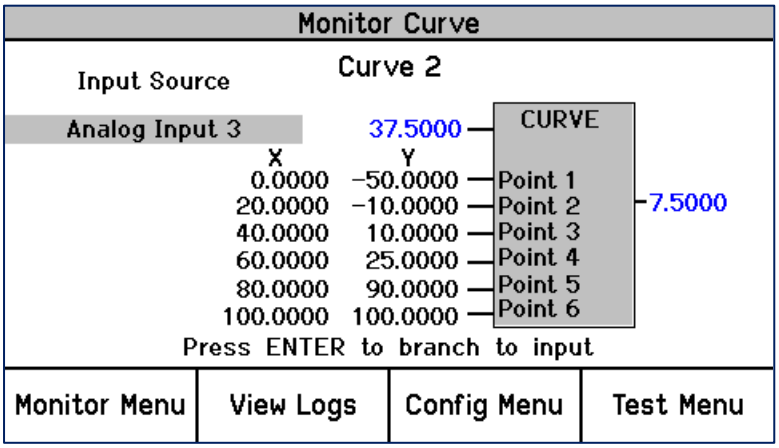


Figure 9-35. Monitor Curve

This page provides users information on the Curve blocks.

- **Curve x:** Identifies the Curve block (1-2).

The block inputs (left side of block):

- **Input Source:** Indicates the input selection.
- **Input:** Indicates the value of the input in user units.
- **Points 1-6, X & Y:** The values of the curve settings are provided.

The block output (right side of block):

- **Output:** Indicates the value of the output in user units. The curve is interpolated between points and is limited at the endpoints.

Monitor Analog Unit Delay

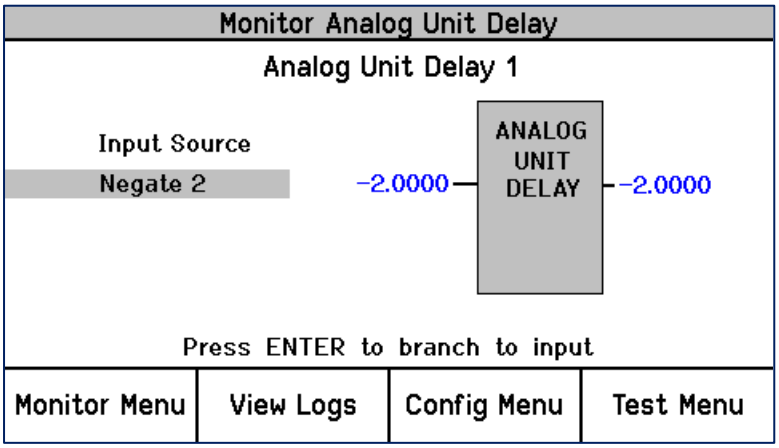


Figure 9-36. Monitor Analog Unit Delay

This page provides users information on the Analog Unit Delay blocks.

- **Analog Unit Delay x:** Identifies the Analog Unit Delay block (1-10).

The block input (left side of block):

- **Input Source:** Indicates the input selection.
- **Input:** Indicates the value of the input in user units.

The block output (right side of block):

- **Output:** Indicates the value of the output in user units.

Monitor Peak Hold

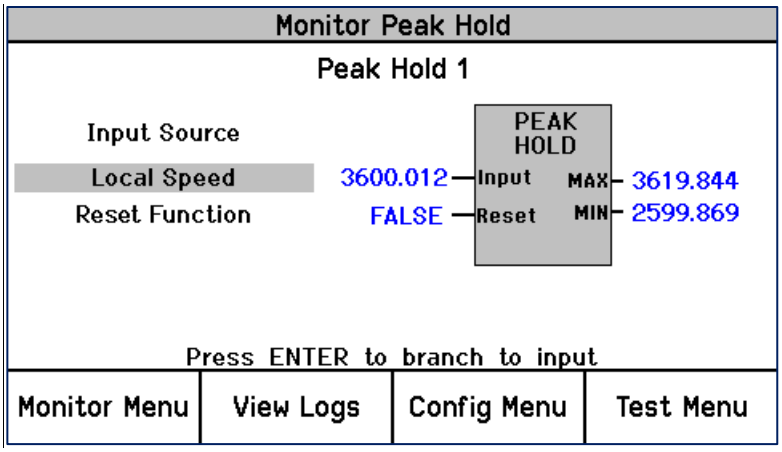


Figure 9-37. Monitor Peak Hold

This page provides users information on the Peak Hold blocks.

- **Peak Hold x:** Identifies the Peak Hold block (1-10).

The block inputs (left side of block):

- **Input Source:** Indicates the input selection.
- **Input:** Indicates the value of the input in user units.
- **Reset:** Indicates the value of the reset input. When true, the MAX and MIN outputs are set to the current input value.

The block outputs (right side of block):

- **Max:** Indicates the maximum/highest value of the monitored input since the last reset.
- **Min:** Indicates the minimum/lowest value of the monitored input since the last reset.

Monitor Counter

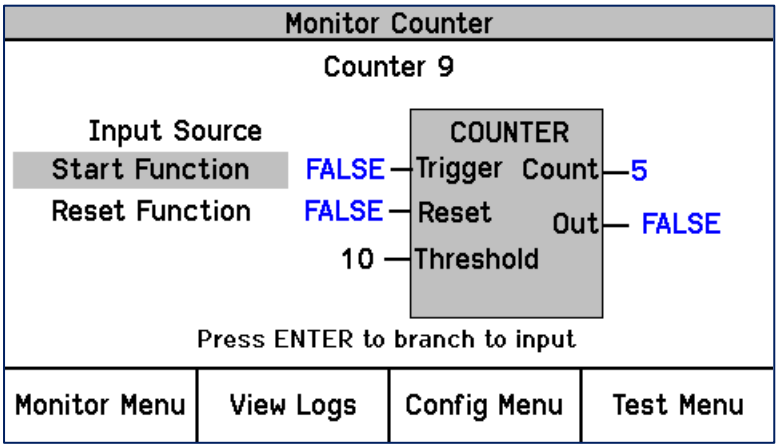


Figure 9-38. Monitor Counter

This page provides users information on the Counter blocks.

- **Counter x:** Identifies the Counter block (1-10).

The block inputs (left side of block):

- **Input Source:** Indicates the input selection.
- **Trigger:** Indicates the value of the trigger input. The block's Count value increments when the Trigger input transitions from false to true.
- **Reset:** Indicates the value of the reset input. When true, the Count out is set to zero and block comparison output (Out) is set to false.
- **Threshold:** Indicates the value of the threshold setting.

The block outputs (right side of block):

- **Count:** Indicates the numbers of times the Trigger input transitioned from false to true. This value is held at 0 as long as the Reset input is true.
- **Output:** True when the count value is greater than or equal to the Threshold and latched until reset.

Monitor Pulse Detect

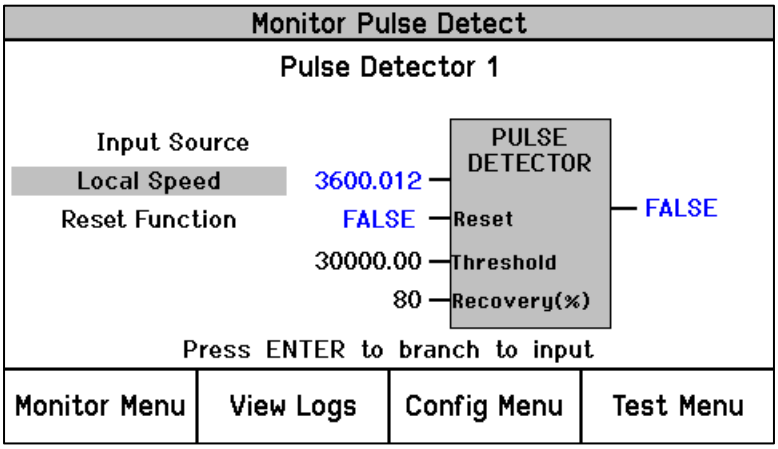


Figure 9-39. Monitor Pulse Detect

This page provides users information on the Pulse Detect blocks.

- **Pulse Detect x:** Identifies the Pulse Detect block (1-5).

The block inputs (left side of block):

- **Input Source:** Indicates the input selection.
- **Input:** Indicates the value of the input in user units.
- **Reset:** When true, the output is set to false and all internal states are cleared. Any previously active states/conditions become inactive and any retained highest value is cleared.
- **Threshold:** Indicates the Threshold setting in user units. When the input goes above the threshold the block becomes active. The input is continuously sampled, retaining the highest value which is then used to determine the block output (based on the Recovery setting).
- **Recovery (%):** Indicates the Recovery setting as a percentage.

The block outputs (right side of block):

- **Output:** Indicates the value of the output. True when the input has gone above the Threshold and subsequently dropped Recovery from its peak percent (e.g. 80% below max value reached). Requires a Reset input to clear this output (return to false).

Monitor Event Filter

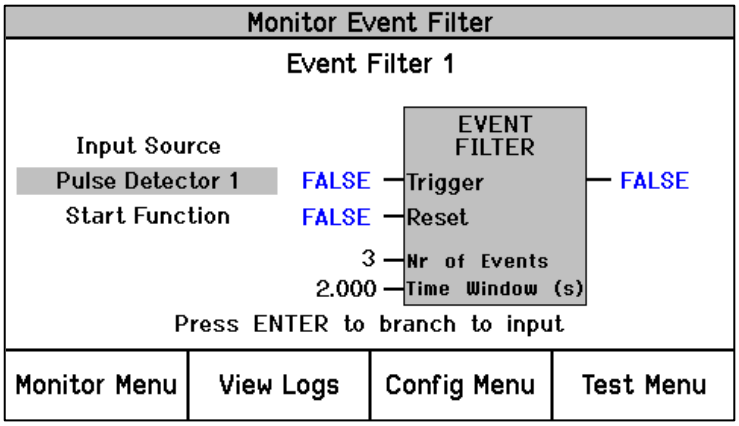


Figure 9-40. Monitor Event Filter

This page provides users information on the Event Filter blocks.

- **Event Filter x:** Identifies the Event Filter block (1-5).

The block inputs (left side of block):

- **Input Source:** Indicates the input selection.
- **Trigger:** Indicates the value of the input. Time stamps the event when Trigger transitions from false to true.
- **Reset:** When true, the output is set to false and all internal states/counts are cleared.
- **Nr of Events:** Indicates the number of events setting.
- **Time Window (s):** Indicates the time window setting, in seconds.

The block output (right side of block):

- **Output:** True when the block has determined that the configured number of trigger events have occurred within the window timeframe. Requires a Reset input to clear this output (return to false).

Monitor Programmable Relays

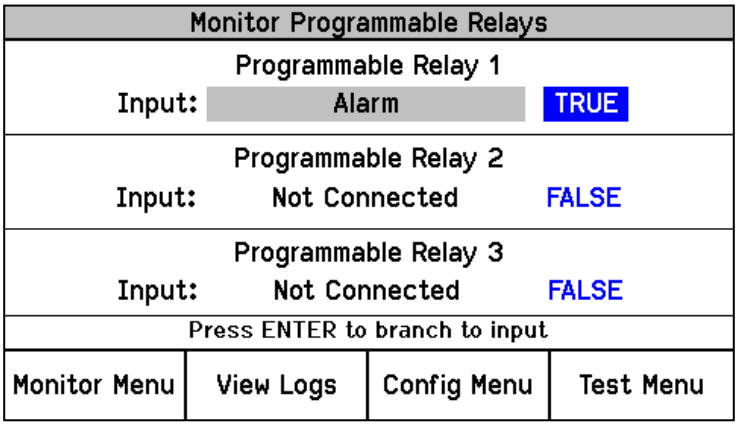


Figure 9-41. Monitor Programmable Relays

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

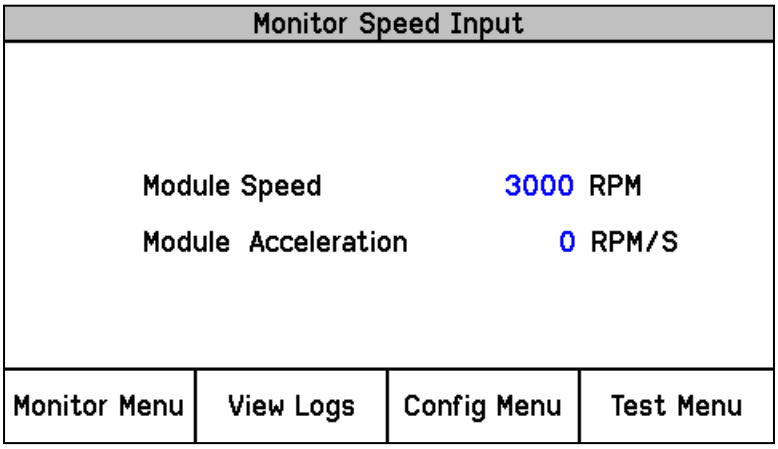


Figure 9-42. Monitor Speed Input

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

- **Speed**: Indicate the sensed/calculated speed being sensed by the module's input speed channel.
- **Acceleration**: Indicates the module's calculated acceleration.

Monitor Speed Redundancy Manager Page

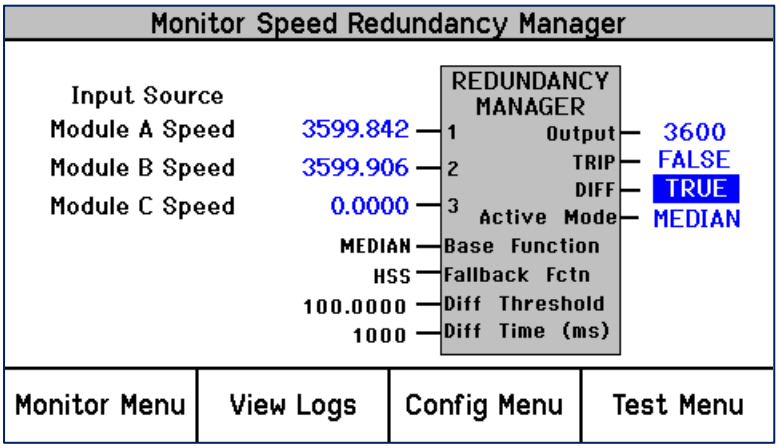


Figure 9-43. Speed Redundancy Manager

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.

The block inputs (left side of block):

- **Input Source:** Indicates the input selection.
- **Input:** Indicates the values of the inputs in RPM. An indication of 'INVALID' means the input is not considered valid. Causes for this indication include incorrectly configured, loss of signal between modules, configuration change of the probe type, or signal failed. A reset may be required to restore the signal.
- **Base Function:** Indicates the configured function when all inputs are valid (3 good inputs).
- **Fallback Function:** Indicates the configured function when 2 inputs are valid (2 good inputs).
- **Diff Threshold:** Indicates the Difference Limit setting, in RPM.
- **Diff Time (ms):** Indicates the Difference Time setting, in milliseconds.

The block outputs (right side of block):

- **Output:** Indicates the value of the output in RPM from a Median, HSS, or LSS calculation on the inputs. The Active Mode indicates the signal selection criteria.
- **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:** Indicates the value of the difference detection output. True when valid inputs exceed the difference threshold for longer than the difference delay time. False when the difference is less than the threshold for 3x the delay time.
- **Active Mode:** Indicates the redundancy mode (MEDIAN, HSS, or LSS) used to set the output.

Monitor Acceleration Redundancy Manager Page

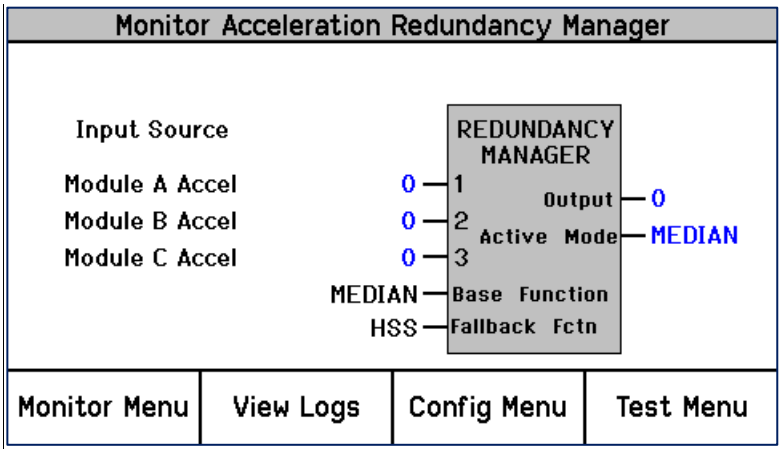


Figure 9-44. Acceleration Redundancy Manager

This page provides users with a screen from which to monitor the Acceleration Redundancy Manager functional logic's inputs, outputs, and current logic state.

The block inputs (left side of block):

- **Input Source:** Indicates the input selection.
- **Input:** Indicates the values of the inputs in RPM/second. An indication of 'INVALID' means the input is not considered valid. Causes for this indication include incorrectly configured, loss of signal between modules, configuration change of the probe type, or signal failed. A reset may be required to restore the signal.
- **Base Function:** Indicates the configured function when all inputs are valid (3 good inputs).
- **Fallback Function:** Indicates the configured function when 2 inputs are valid (2 good inputs).

The block output (right side of block):

- **Output:** Indicates the value of the output in RPM/second from a Median, HSS or LSS calculation on the inputs. The Active Mode indicates the signal selection criteria.
- **Active Mode:** Indicates the redundancy mode (MEDIAN, HSS, or LSS) used to set the output.

Monitor Speed Fail Timer Page

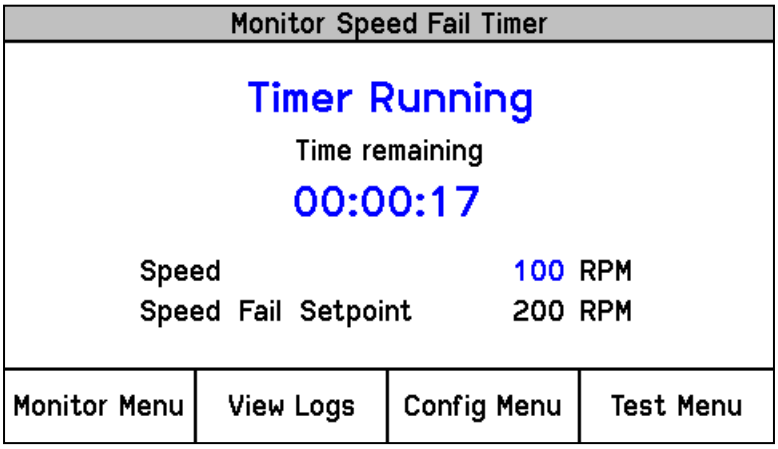


Figure 9-45. Monitor Speed Fail Timer

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 (Home)

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

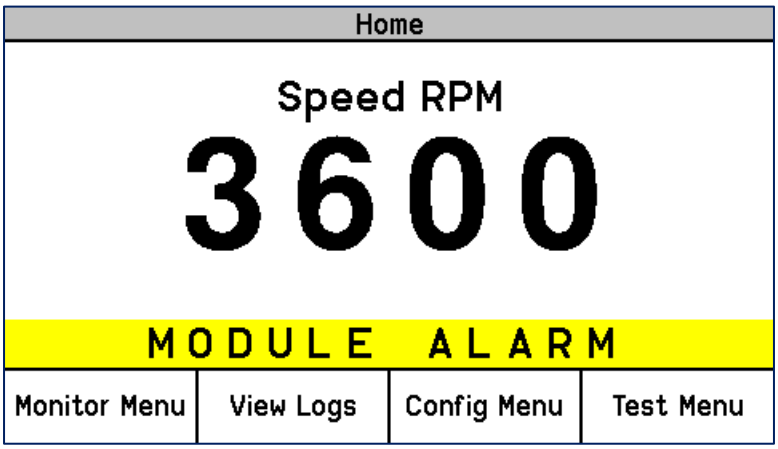


Figure 9-46. Monitor Speed Readout (HOME)

Monitor Start Input Sharing

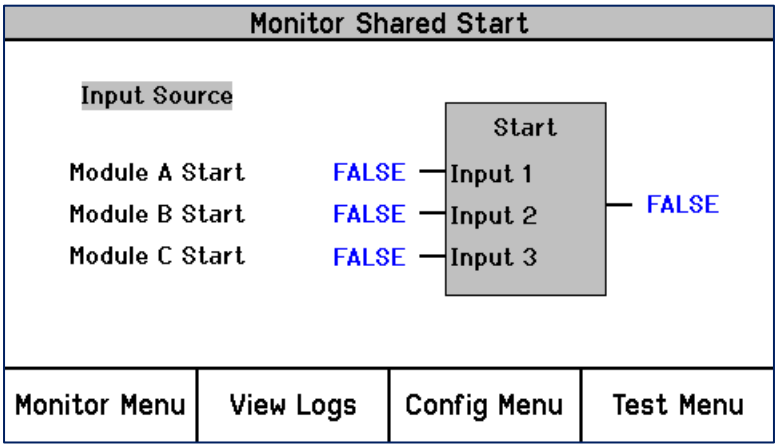


Figure 9-47. Monitor Start Input Sharing

This page provides users information on the Start Input Sharing.

The block input (left side of block):

- **Input Source:** Indicates the input selection.
- **Input 1, 2 & 3:** Indicates the value of the input.

The block output (right side of block):

- **Output:** Indicates the value of the output.

Monitor Reset Input Sharing

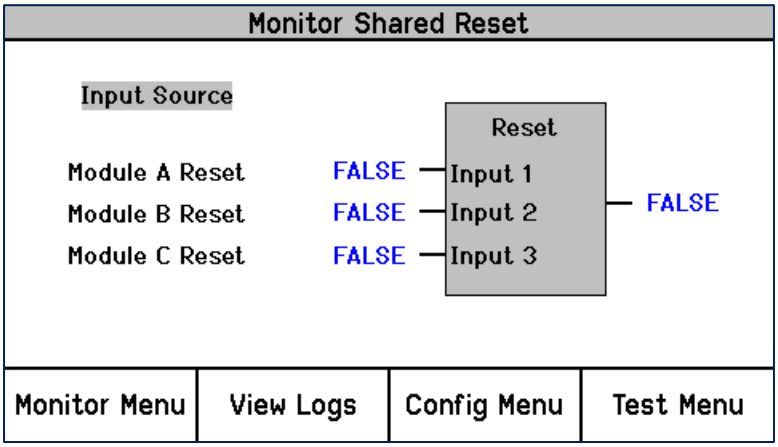


Figure 9-48. Monitor Reset Input Sharing

This page provides users information on the Reset Input Sharing.

The block input (left side of block):

- **Input Source:** Indicates the input selection.
- **Input 1, 2 & 3:** Indicates the value of the input.

The block output (right side of block):

- **Output:** Indicates the value of the output.

Monitor Speed Fail Override Input Sharing

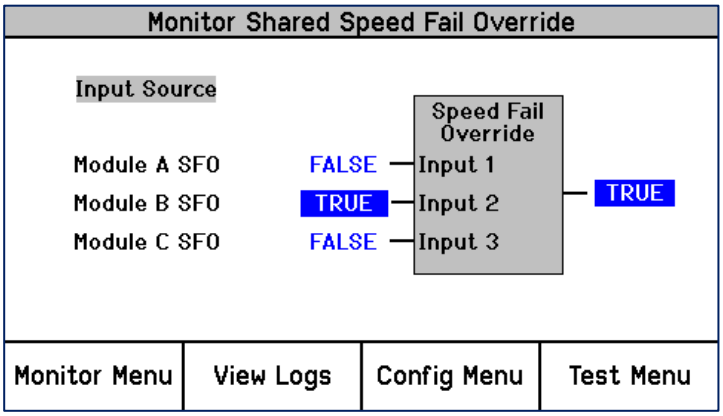


Figure 9-49. Monitor SFO Input Sharing

This page provides users information on the Speed Fail Override (SFO) Input.

The block input (left side of block):

- **Input Source:** Indicates the input selection.
- **Input 1, 2 & 3:** Indicates the value of the input.

The block output (right side of block):

- **Output:** Indicates the value of the output.

Monitor Analog Output Page

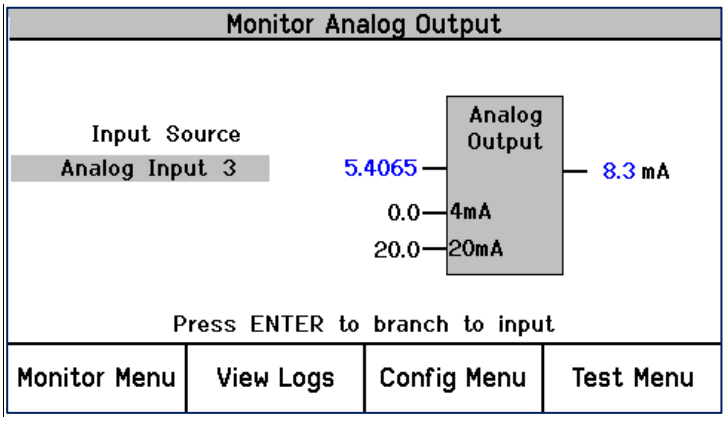


Figure 9-50. Monitor Analog Output

This page provides users with a screen from which to monitor the analog output.

The block inputs (left side of block):

- **Input Source:** Indicates the input selection.
- **Input:** Indicates the values of the input in user units.
- **4mA:** The 4mA output scaling setting, in user units. When the input is at this value, the output will be 4 milliamps.
- **20mA:** The 20mA output scaling setting, in user units. When the input is at this value, the output will be 20 milliamps.

The block output (right side of block):

- **Output:** Indicates the value of the output in milliamps. Note that this is a commanded value, not a measured read-back.

Monitor Modbus Page

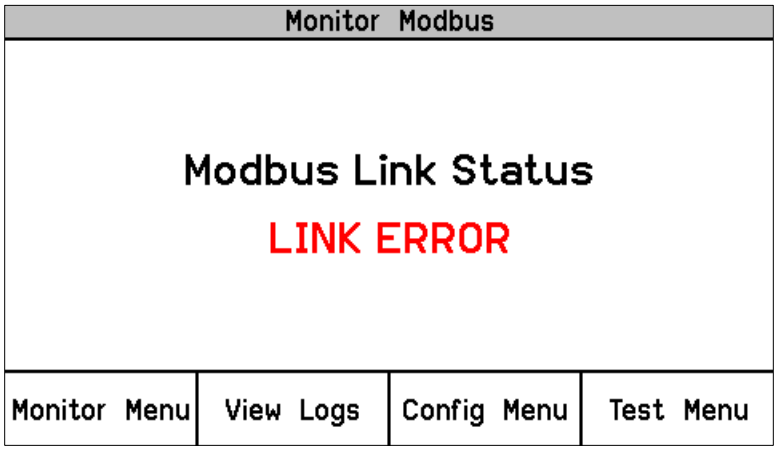


Figure 9-51. Monitor Modbus Status

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

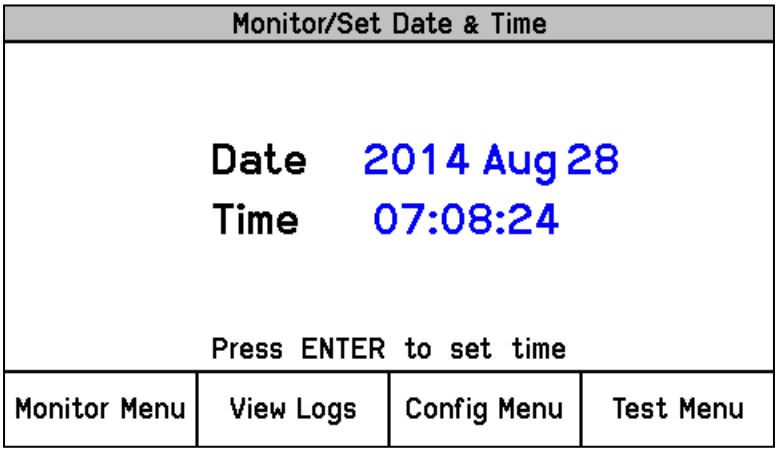


Figure 9-52. Monitor/Set Date & Time

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 (e.g. daylight savings time).

Time & Date Change Procedure

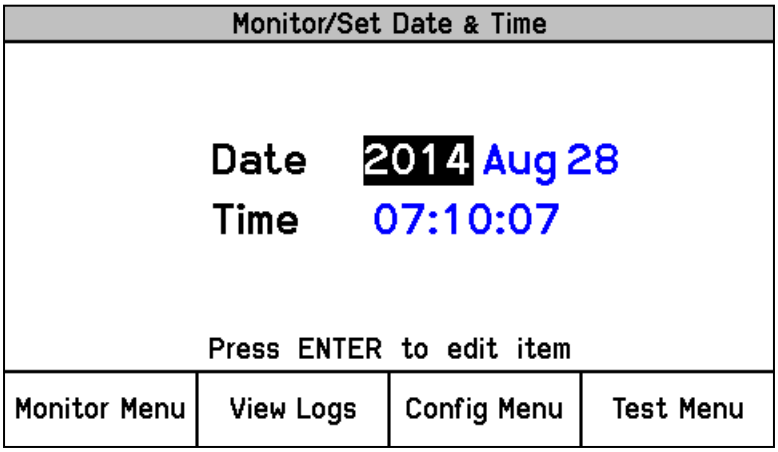


Figure 9-53. Set Date & Time

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.

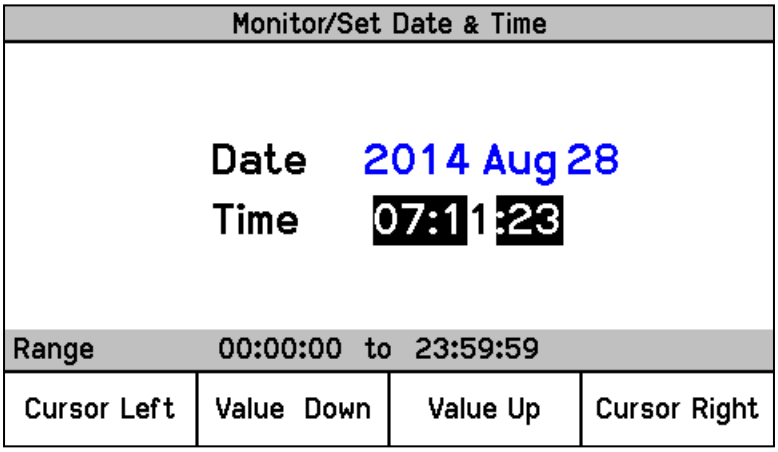


Figure 9-54. Set Date & Time

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.

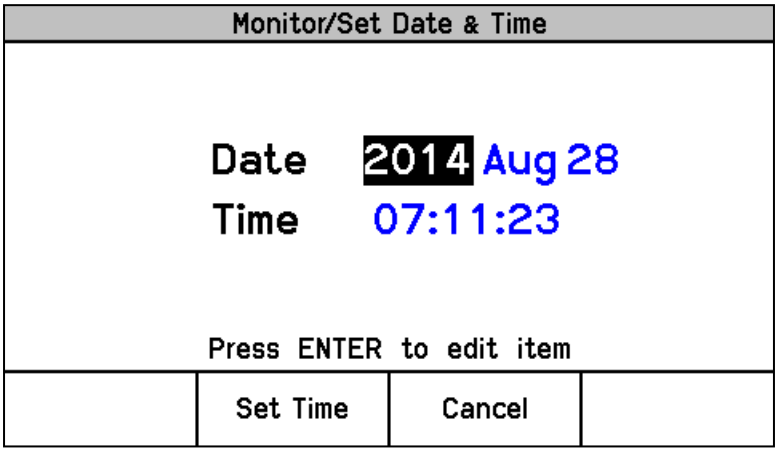


Figure 9-55. Set Date & Time

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

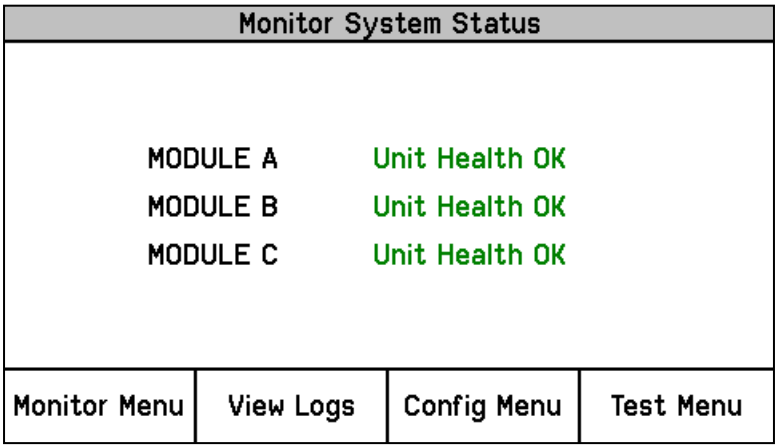


Figure 9-56. Monitor System Status

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

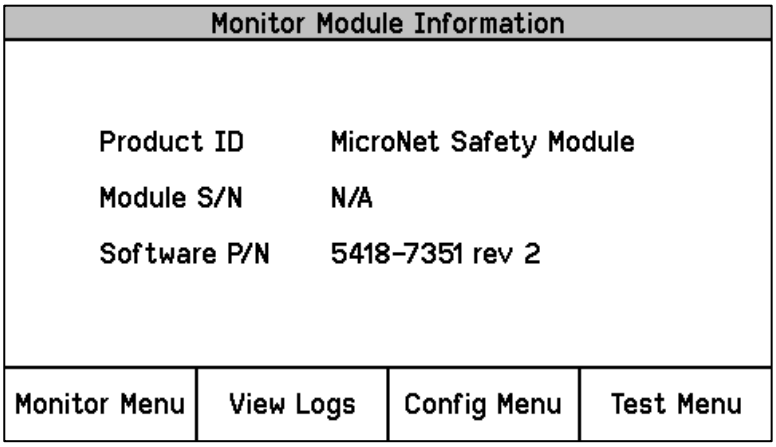


Figure 9-57. Monitor Module Information

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:

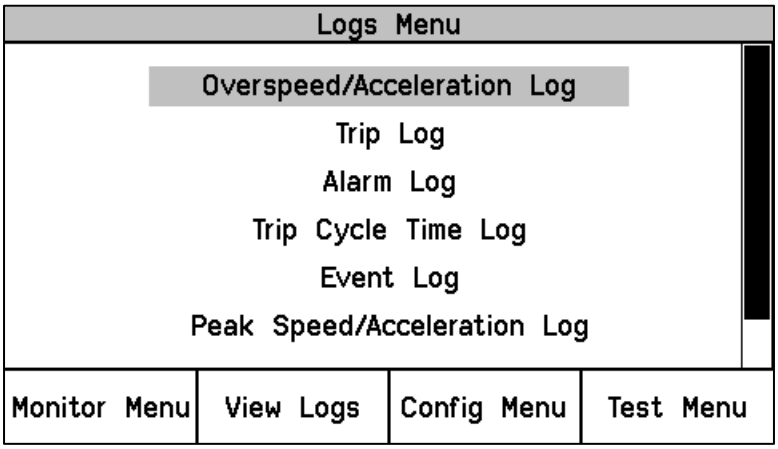


Figure 9-58. Logs Menu

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

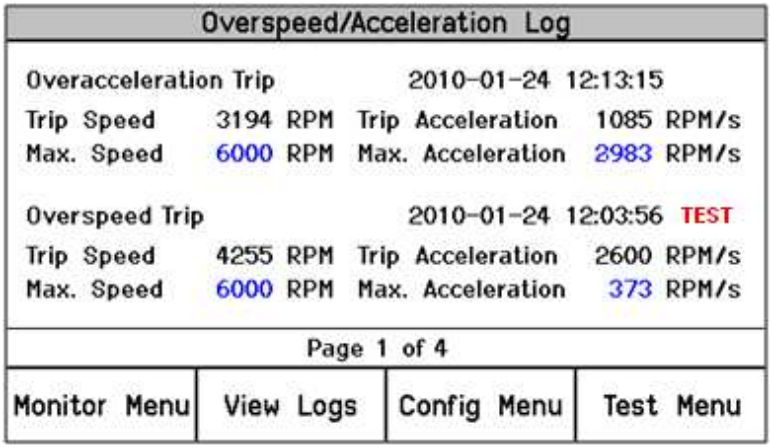


Figure 9-59. Overspeed/Over-acceleration Log

This page displays a log of the last 20 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

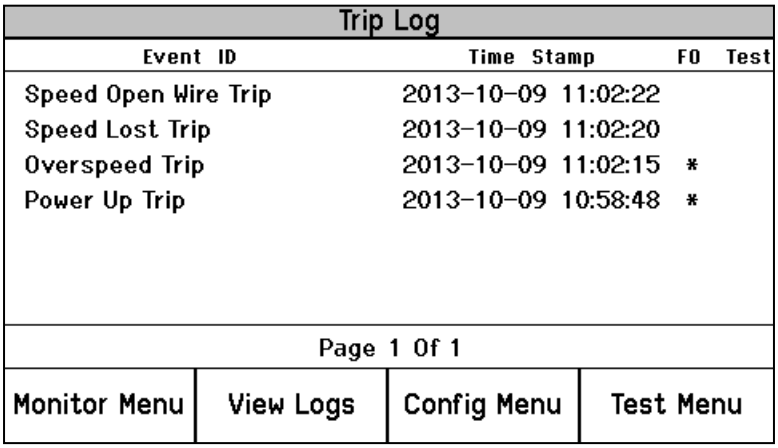


Figure 9-60. Trip Log

This page displays a log of the last 50 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

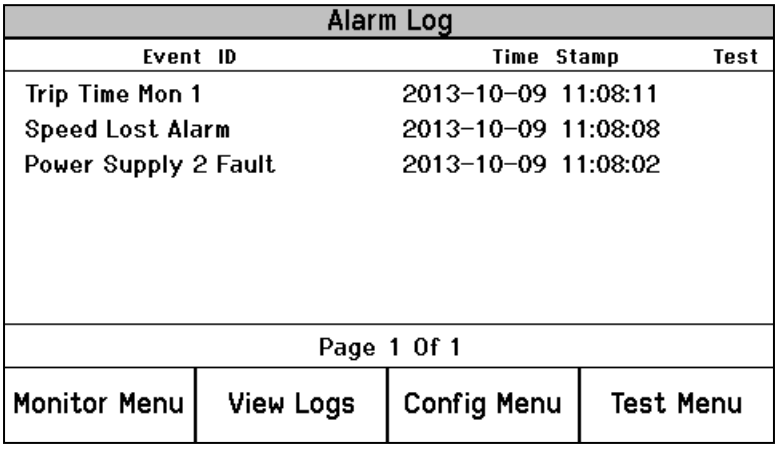


Figure 9-61. Alarm Log

This page displays a log of the last 50 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

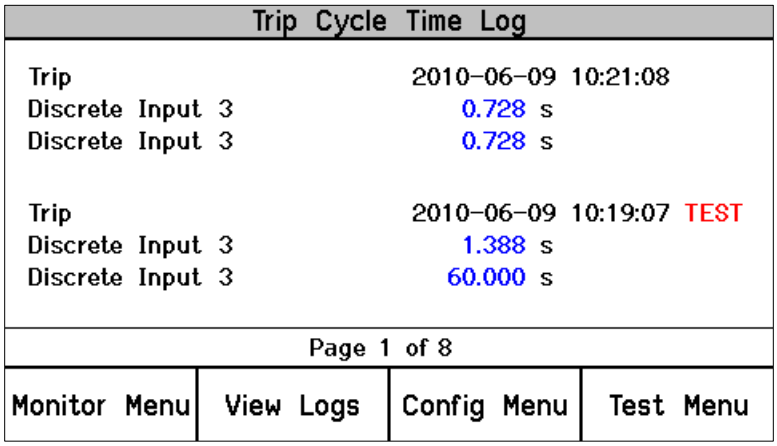


Figure 9-62. Trip Cycle Time Log

This page displays a log of the last 20 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. A time of 60 seconds will be displayed if the cycle time exceeds 10X the configured alarm threshold. If the monitor is not used, the time will display 'NO DATA'.
- 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

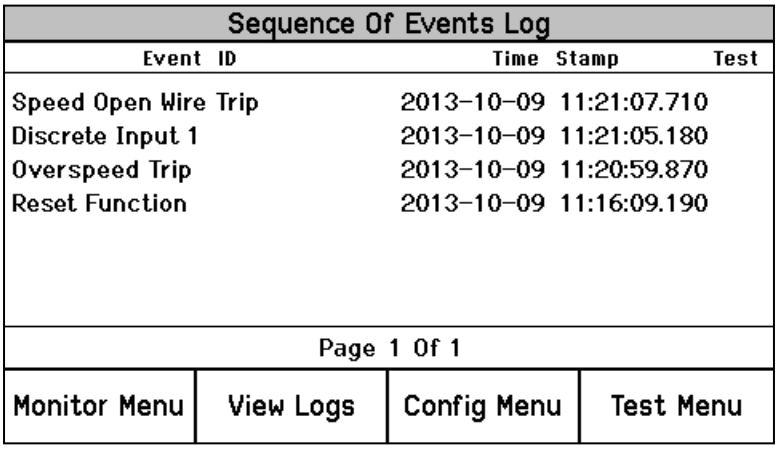


Figure 9-63. Sequence of Events Log

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

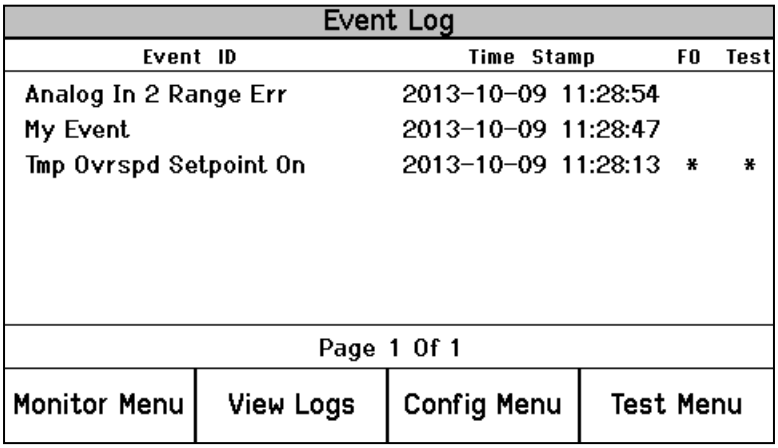


Figure 9-64. Event Log

This page displays a log of the last 50 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

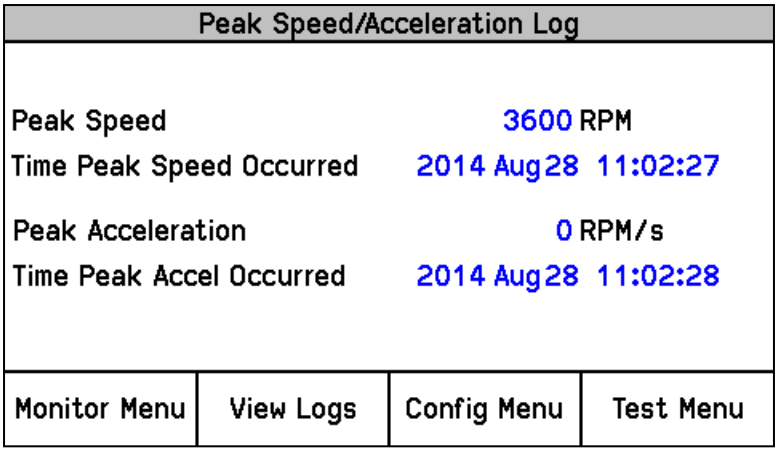


Figure 9-65. Peak Speed/Accel Log

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

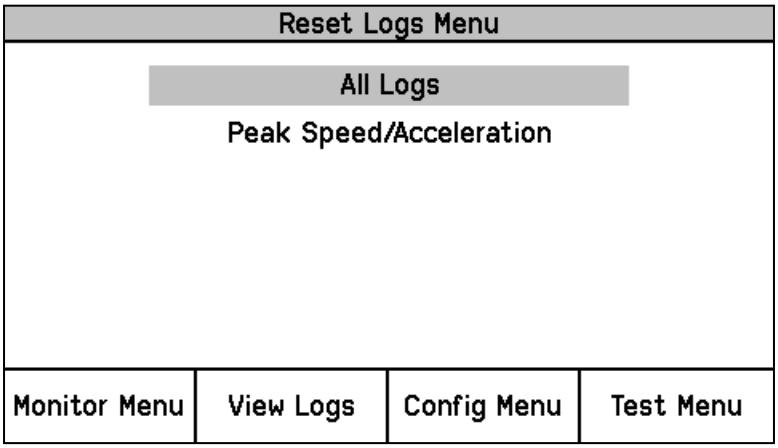


Figure 9-66. Reset Logs

This page allows the user to reset All Logs (Trip, Alarm, Event, Trip Cycle Time, 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 Configuration level passwords may be entered. To reset Peak Speed/Acceleration, the Configuration 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, start logic, test modes, etc. The Programming and Configuration Tool (PCT) or ProTech GAP tool must be used to configure analog/discrete inputs, custom logic, and configurable latch inputs.
2. Configure one module from its front panel keypad or programming tool and copy the saved configuration file to the other two modules.
3. Use the programming tool software program, either PCT or GAP, 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 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.

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

Table 10-1. Front Panel Functions

Speed Input settings	**Start Logic settings**	**Reset Input Sharing**
Speed Probe Type	Speed Fail settings	**Start Input Sharing**
Number of Gear Teeth	Speed Fail Timeout settings	**Speed Fail Override Input Sharing**
Gear Ratio	**Speed Redundancy Manager**	**Test Mode settings**
Overspeed Trip Setpoint [RPM]	Input Selections	**Auto-Sequence Test settings**
Sudden Speed Loss Action	Function selections	**Modbus Communication settings**
Speed Loss Threshold [RPM	Difference alarm settings	**Power Supply 1 & 2 Alarms [No/Yes]**
Acceleration settings	**Acceleration Redundancy Manager**	**Display settings**
Acceleration Trip Enabled	Input Selections	Home Screen on Trip Option
Accel Trip Enable Speed	Function selections	Home Screen selection
Accel Trip Threshold	**Trip settings**	Language Selection
Acceleration Filter	Energize/De-energize to Trip	Displayed Speed Filter
	Latching/Non-Latching	**Configuration Compare and Copy Features**
	Trip is Alarm [No/Yes]	**Passwords**

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 Configuration 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.

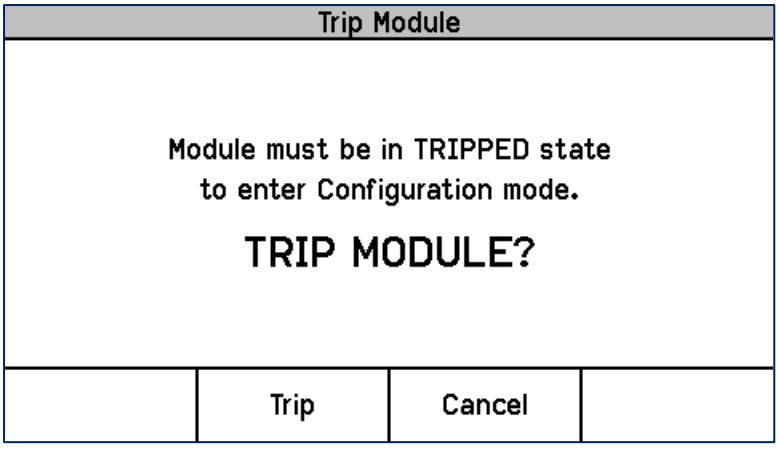


Figure 10-1. Trip Module Prompt

Configure Menu Page

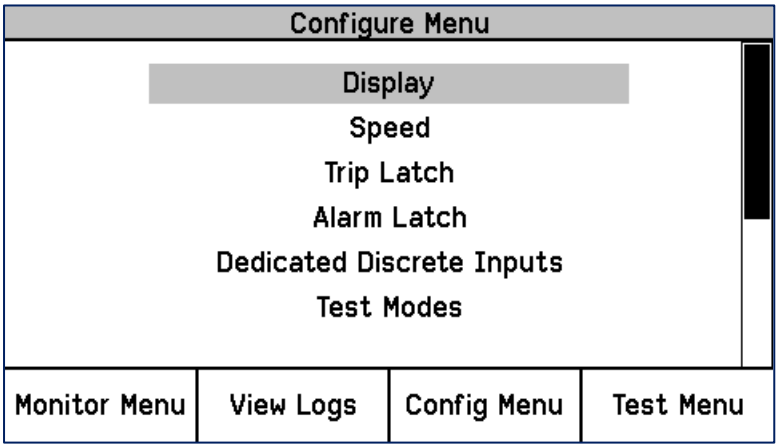


Figure 10-2. Configure Menu

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

- **Display:** This page is used to set the language as well as configure the modules screen action when a trip occurs and what page is the Home page.
- **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.
- **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.
- **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.
- **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 "Configuration 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 Left" 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 Configuration 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.

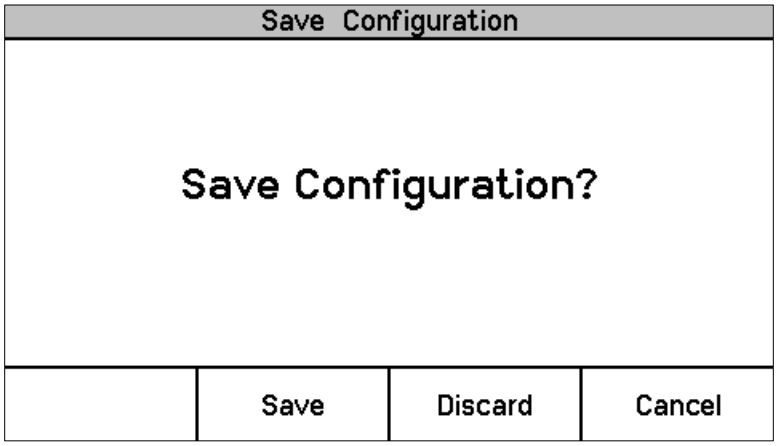


Figure 10-3. Save Configuration

Configure Display Page

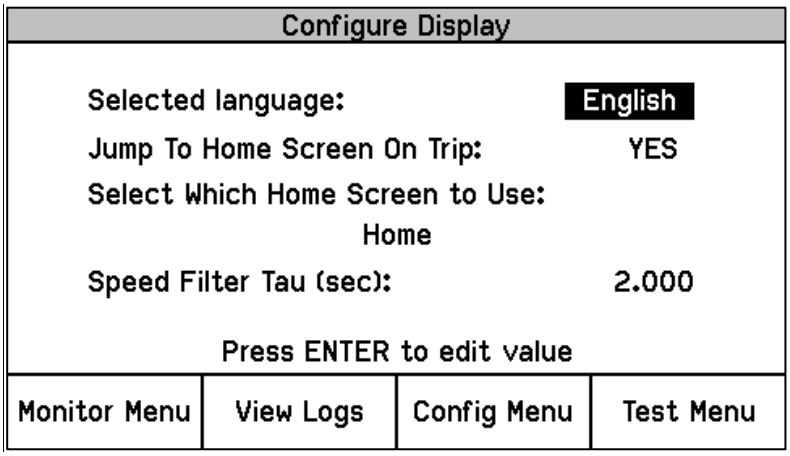


Figure 10-4. Configure Display

This page is used to configure the front panel display settings including language selection, speed filtering, and home screen options.

- **Selected Language:** Used to select the language. The selected language is retained through a power cycle. Valid values: English or Chinese.
- **Home Screen On Trip Option:** This setting is used to configure the action of the display upon sensing a 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.
- **Select Which Home Screen to Use:** 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 10-2. Configuration Display Valid Values

Home	Analog Output	Unit Delay 1-10
Monitor Summary	Modbus	Analog Redundancy Manager 1-15
Monitor Summary Config Inputs	Date & Time	Boolean Redundancy Manager 1-15
Monitor Summary Prog Relays	System Status	Lag 1-10
Trip Latch	Module Information	Difference Detection 1-15
Alarm Latch	Overspeed/Acceleration Log	Add 1-5
Event Latch	Trip Log	Negate 1-10
Trip Cycle Time Monitors	Alarm Log	Multiply 1-5
Dedicated Discrete Inputs Configurable Inputs 1-10 Programmable Relays	Trip Cycle Time Log	Divide 1-5
Speed Input	Analog Comparator 1-15	Switch 1-10
Speed Redundancy Manager	Logic Gate 1-50	Curve 1-2
Accel Redundancy Manager	Event Log	Analog Unit Delay 1-10
Speed Fail Timer	Peak Speed/Acceleration Log	Counter 1-10
Start Input Sharing	Timer 1-5	Peak Hold 1-10
Reset Input Sharing	Latch 1-10	Pulse Detect 1-5
Speed Fail Ovrd Input Sharing	Delay 1-25	Event Filter 1-5

- **Speed Filter Tau (sec):** Used to set the amount of filtering on the speed displayed on the Home screen. The speed displayed has a single-pole filter. This setting defines the tau value for this filter, in seconds. If an unfiltered value is desired, a setting of 4ms should be used (Input=Output). Note that this setting only affects the display on one screen (Home), active speed used within the device is not affected by this setting. Valid values: 0.004-10.

Configure Speed Submenu Page

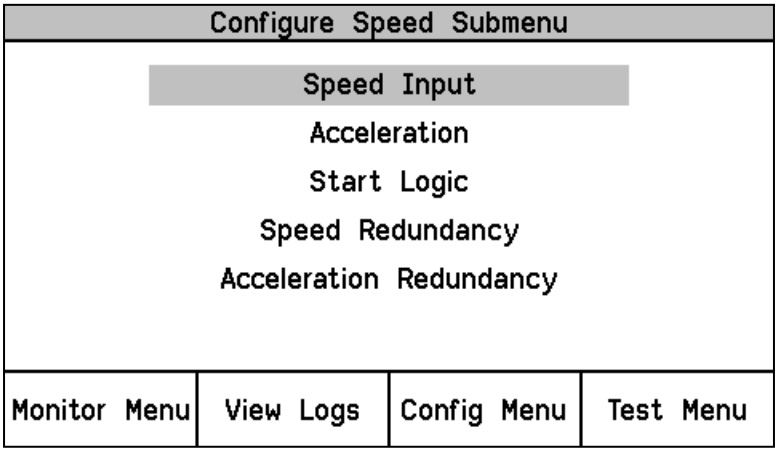


Figure 10-5. Configure Speed Submenu

- **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

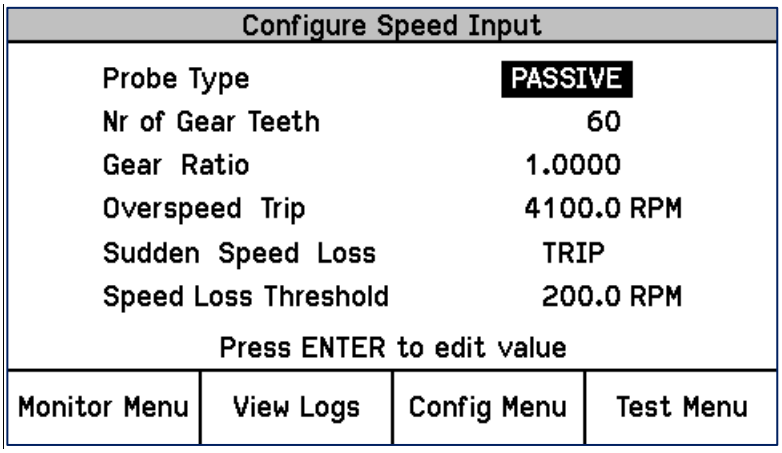


Figure 10-6. Configure Speed Input

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: 0-80000 rpm. Frequency equivalent must not exceed 32000 Hz (configuration error).
- **Sudden Speed Loss:** Used to set the desired action when an instantaneous speed loss is detected on the local speed input. Valid values: TRIP, ALARM, or NOT USED.

  If used and this function detects zero speed (no edges detected on the speed input) where the previous sensed/sampled speed level was over the Speed Loss Threshold, an alarm or trip command will be given. This function is typically used to detect a failed speed sensor.

  IMPORTANT — Sudden speed loss is based on the local module speed input. If set to 'trip', an instantaneous loss of the module's speed input would result in a trip regardless if the speed redundancy manager is used.

- **Speed Loss Threshold:** Sets the speed threshold value for detecting a lost speed signal. The action used is determined by the Sudden Speed Loss (trip/alarm/not used) setting. This threshold should be set to a value above the speed signal drop-out to allow differentiation between a normal speed roll-down after a trip condition verses a sudden/instantaneous loss of speed signal. Valid values: 1-1000 rpm.

  IMPORTANT — When speed is used in any redundancy manager (Speed RM, Accel RM, or Analog RM), changes to the speed settings (probe type, number of teeth, or gear ratio) will automatically force the signal to an 'invalid' state on all 3 modules (A,B, and C). While 'invalid', that signal is removed from the voting selection and requires a reset command to restore it.

Configure Acceleration Page

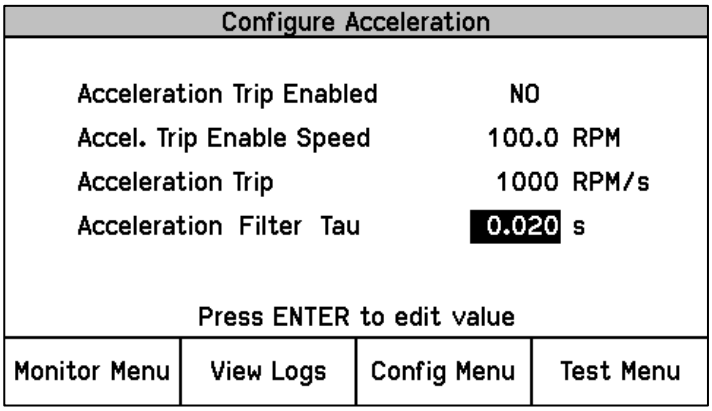


Figure 10-7. Configure Acceleration

This page is used to configure the Acceleration Trip function.

- **Enable Acceleration Trip:** Used to enable or disable the 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: 0-80000 rpm.

- **Acceleration Trip:** Used to set the over-acceleration trip setpoint in rpm/second. Valid values: 0-25000 rpm/s.
- **Acceleration Filter Tau (sec):** The acceleration signal is filtered using a single-pole filter. This input defines the tau value for this filter, in seconds. If an unfiltered value is desired, a setting of 2ms should be used (Input=Output). Valid values: 0.002-10.

Configure Start Logic Page

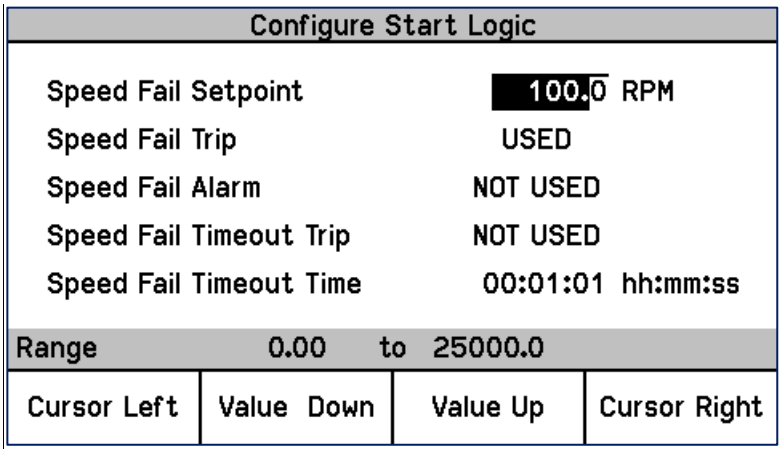


Figure 10-8. Configure Start Logic

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 alarm 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 second to 8 hours (28800 seconds).

Configure Speed Redundancy Manager Page

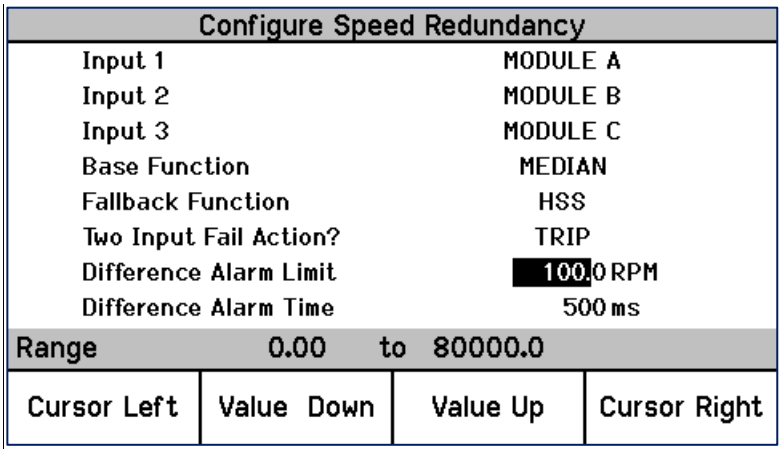


Figure 10-9. Configure Speed Redundancy Manager

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. When set to No Trip, the unit will use the one remaining valid input. Valid values: TRIP or NO TRIP.
- **Difference Alarm Threshold:** Used to set the amount the speeds are allowed to differ before the Difference Alarm is set. Valid values: 0–80000 rpm.
- **Difference Alarm Time:** Used to set the time the Speed Difference Alarm is allowed to exist before the difference alarm is set. Valid values: 4–10000 milliseconds.

Configure Acceleration Redundancy Manager Page

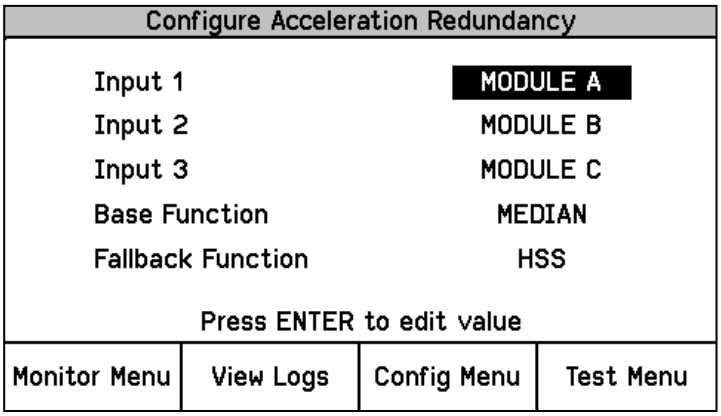


Figure 10-10. Configure Acceleration Redundancy Manager

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

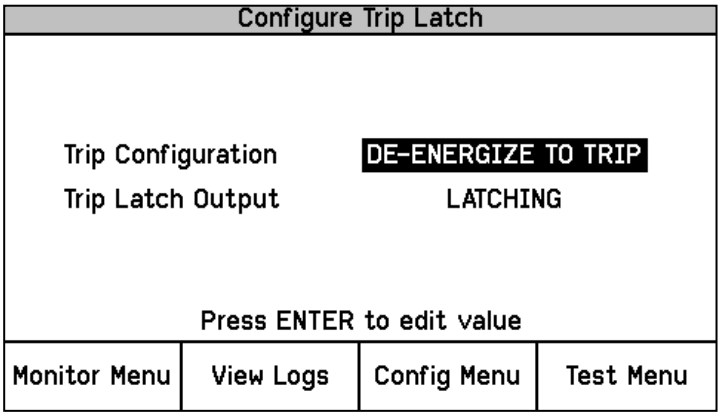


Figure 10-11. Configure Trip Latch

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

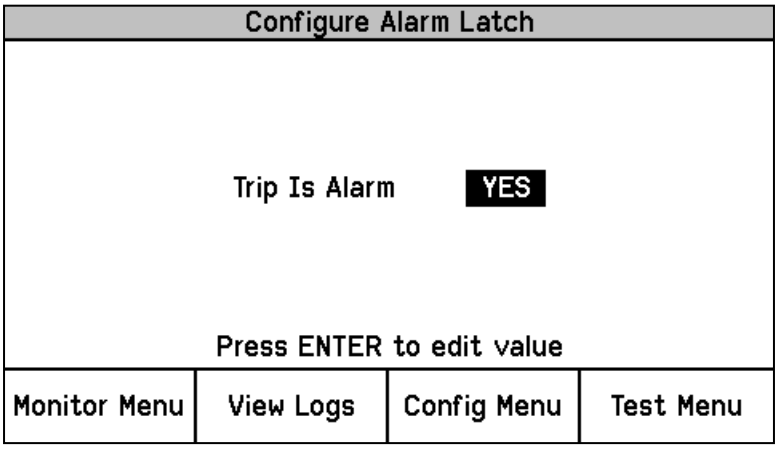


Figure 10-12. Configure Alarm Latch

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.

Configure Dedicated Discrete Submenu Page

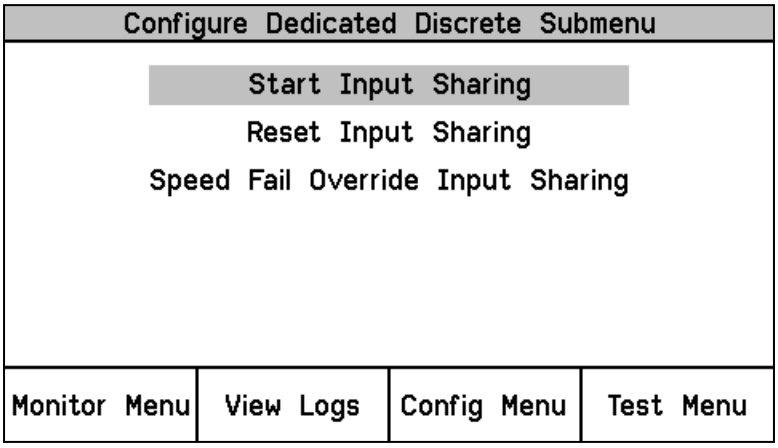


Figure 10-13. Configure Dedicated Discrete Submenu

- **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

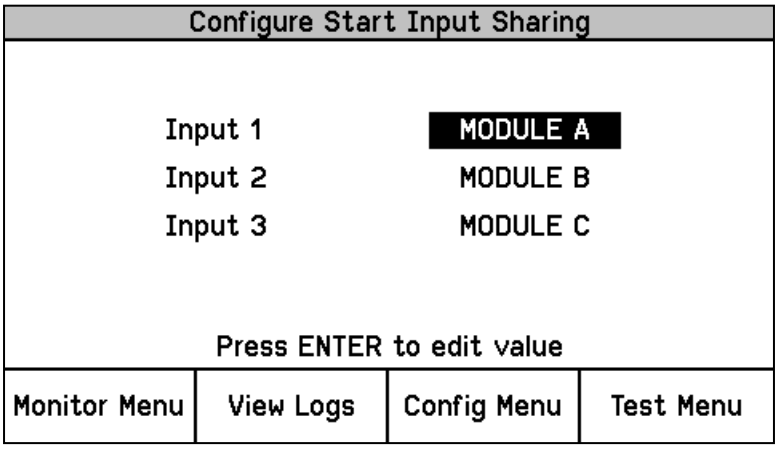


Figure 10-14. Configure Start Input Sharing

This page is used to configure the other modules that 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

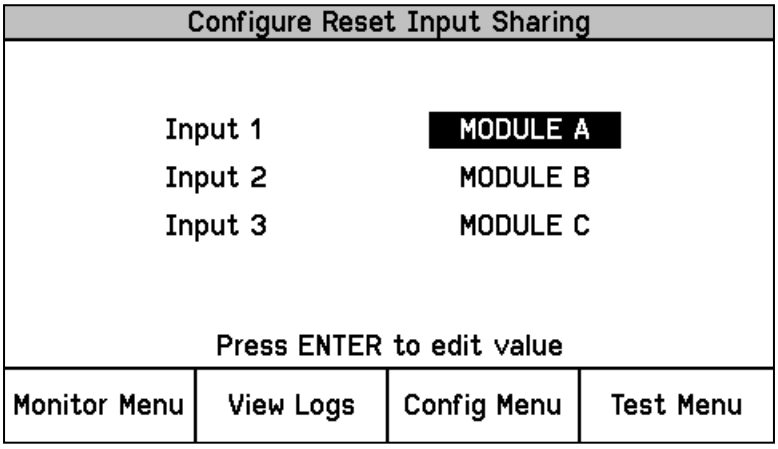


Figure 10-15. Configure Reset Input Sharing

This page is used to configure the other modules that 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

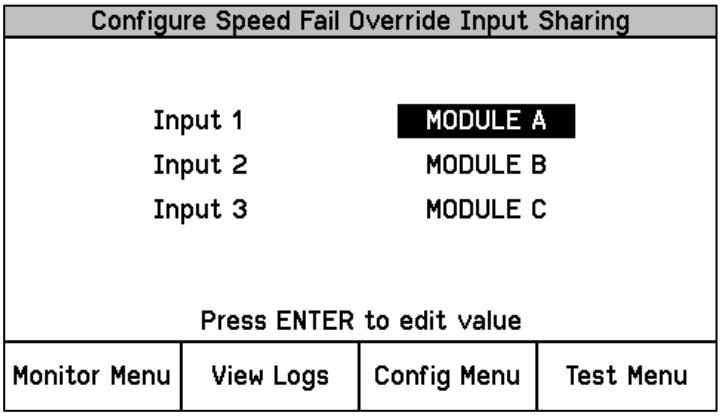


Figure 10-16. Configure Speed Fail Override Input Sharing

This page is used to configure the other modules that 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 Test Modes Page

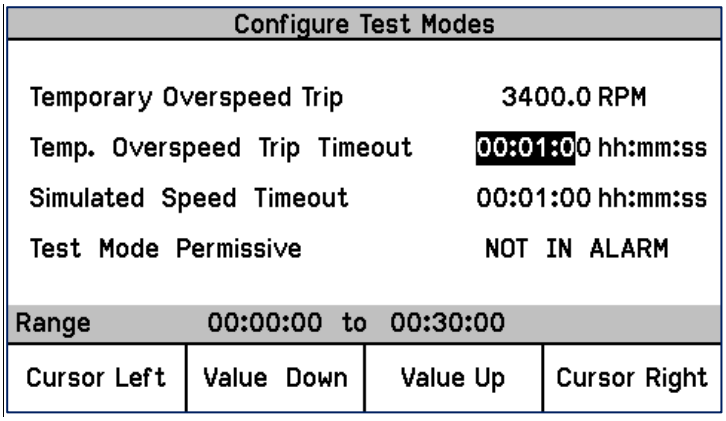


Figure 10-17. Configure Test Modes

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: 0-80000 rpm.
- **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:
  0-30 minutes.
- **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. This applies to the Temporary Overspeed Test and the Auto or Manual Simulated Speed Tests. It does not apply to the auto-sequence 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

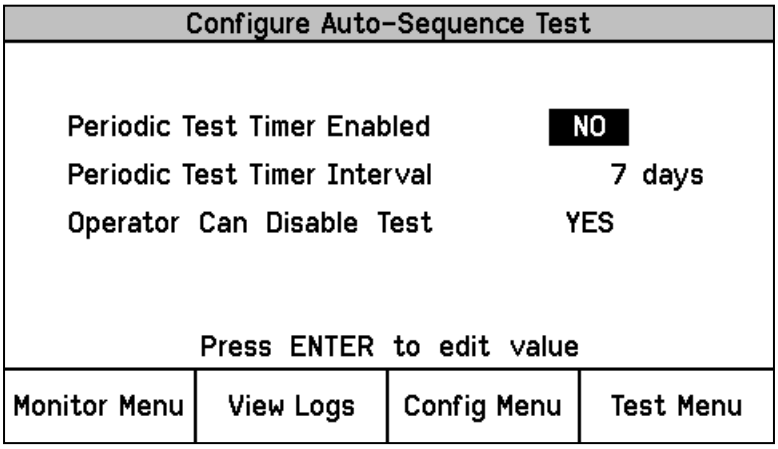


Figure 10-18. Configure Auto-Sequence Test

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. When set to ‘no’ the Auto-Sequence Test is not run, however the Auto-Sequence Test can still be initiated either manually, from the front panel, or programmatically using logic commands. 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, either periodically (timer) or programmatically (logic commands). 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.

NOTES

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

2) The auto sequence test mode requires all modules to be not tripped, not in alarm, and not running a test.

3) This test can also be started using configurable logic commands. This option can only be configured using configuration tools, either PCT or GAP.

Configure Modbus Page

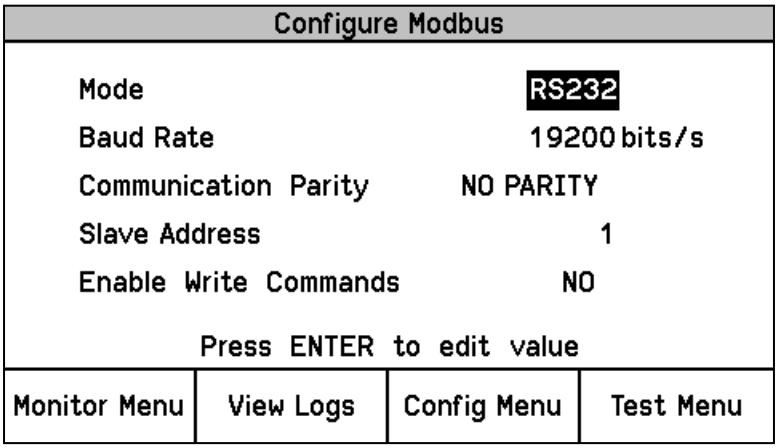


Figure 10-19. Configure Modbus

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 MSM (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

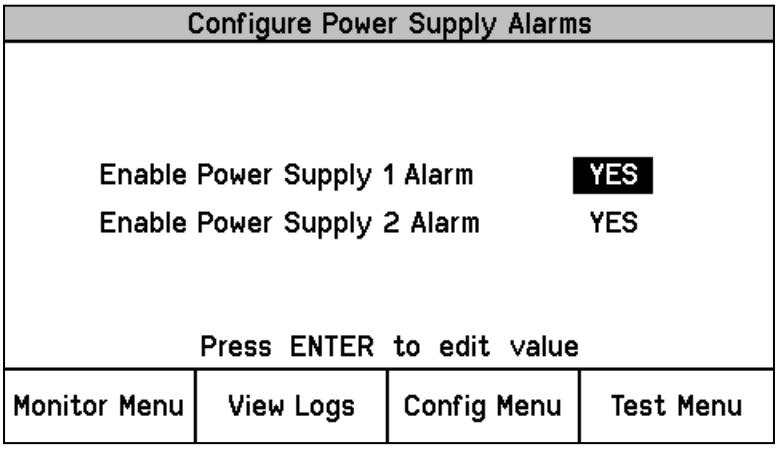


Figure 10-20. Configure Power Supply Alarms

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, in the event that two redundant power sources are not available, users can disable either alarm.

Configuration Management Menu Page

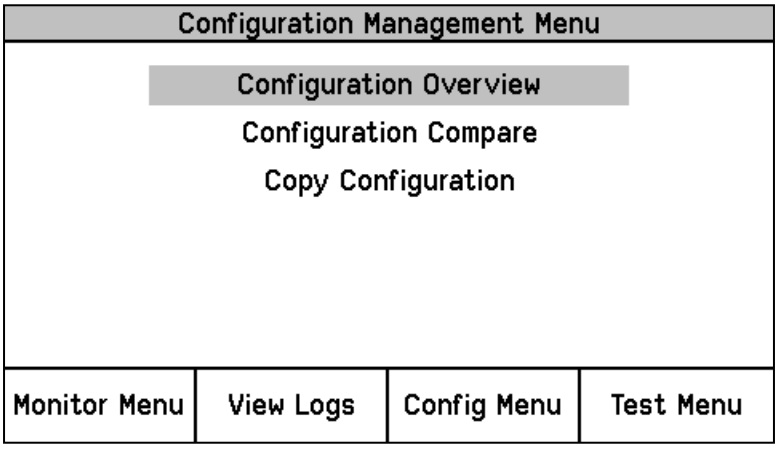


Figure 10-21. Configuration Management Menu

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

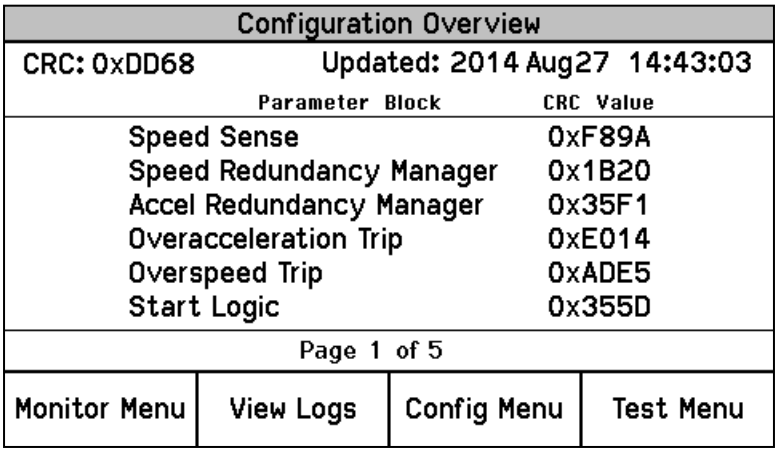


Figure 10-22. Configuration Overview

This page displays the saved setting file's Cyclic Redundancy Check (CRC) values. CRC values are calculated on functionally different blocks to make it easy to verify if specific settings has or has not been changed.

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 it encompasses the entire configuration, including settings that are expected to be different between modules. See exclusion details in the Configure/Copy Exclusions section below.

Comparing CRCs between modules before and after a settings 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 Configuration Overview screen section of the Programming and Configuration Tool (PCT) chapter.

Configure Compare/Copy Exclusions

The configuration compare and configuration copy functions intentionally exclude a few settings that are expected to vary from module-to-module. These are listed below. When executing a configuration copy from the front panel, these excluded settings are not copied. Similarly, the configuration compare does not include these settings in the comparison.

The settings that are excluded include:

- Passwords
- Display settings
  - Home Screen
  - Jump to Home Screen on Trip
  - Selected Language
  - Speed Filter Tau
- Modbus Slave Address
- Programmable Input names & units
- Alarm Latch names
- Trip Latch names
- Event Latch names

Configure Configuration Compare Page

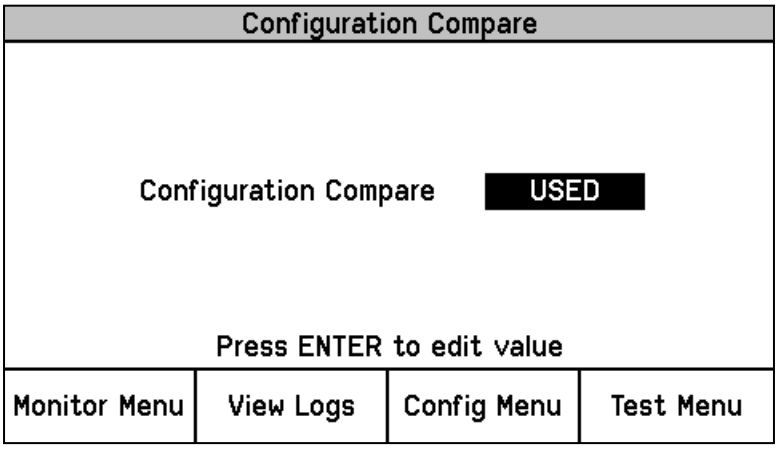


Figure 10-23. Configuration Compare

This page is used to configure the 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.

  Note: 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 CRC for specific blocks between modules and will not alarm when the overall CRC's are different. This is because the module's overall CRC calculation can be different between modules as the Home Screen setting, Home Screen on Trip setting, Language, Speed Filter, Password settings, and Modbus slave addresses are expected to be different between modules.

Configuration Copy Page

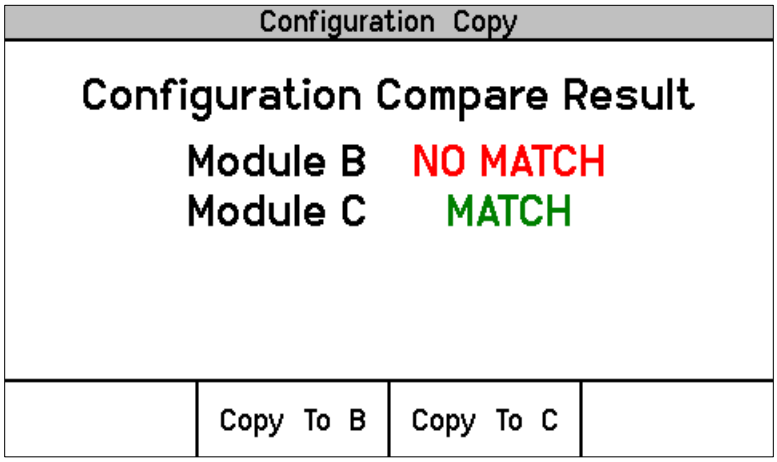


Figure 10-24a. Configuration Copy

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 Module modules. This copy function copies all configuration file settings except the Display settings, Password settings, Modbus slave address setting, and all user-configured names and units (Alarm Latch names, Trip Latch names, Event Latch names, Programmable Input names & units).

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.

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. Note that this compare does not include the settings that are expected to be different (display, Modbus slave, passwords, username strings).
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 enabled or that the module is missing, powered off, or the module-to-module CAN communications network is not functioning.

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:

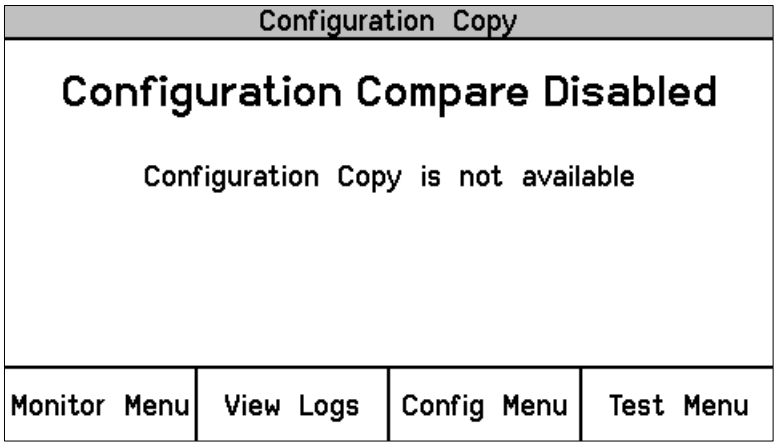


Figure 10-24b. Configuration Copy

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 TEST 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

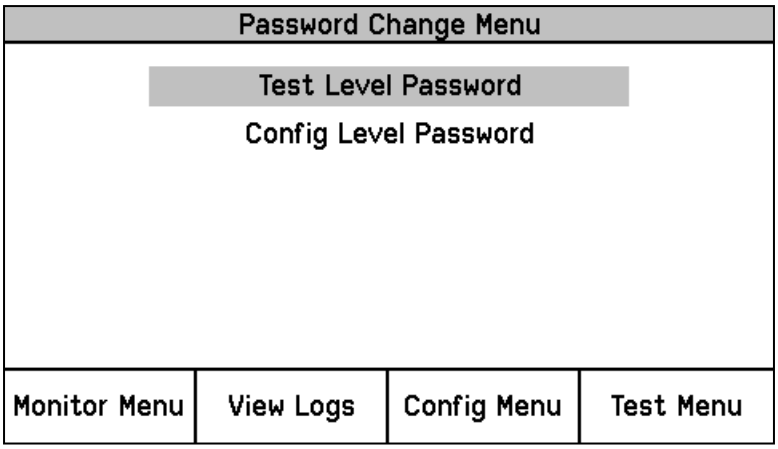


Figure 10-25. Password Change

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 Configuration Level password).
  - Change a module’s Test Level Password.

- **Configuration Level Password:** This setting is used to set the Configuration 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 Configuration Level Password.

Both the Test and Configuration 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 Configuration 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 Up" or "Value Down" 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 Configuration 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 of the MicroNet Safety Module tests. The user can initiate any configured test the front panel. The Test or Configuration Level password must be entered to start any of these tests except for the Lamp Test.

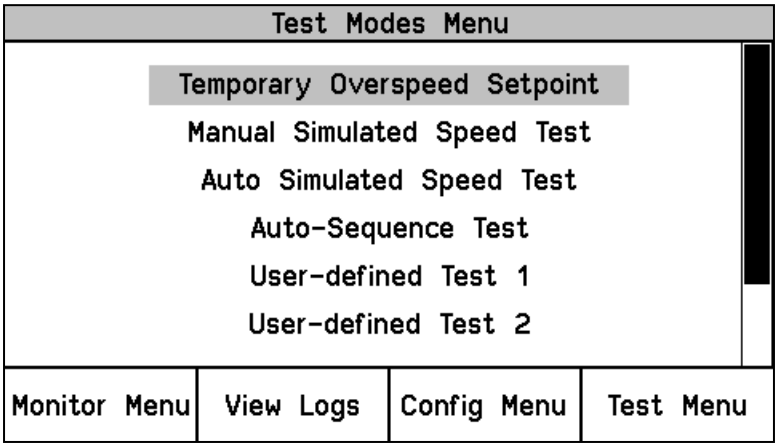


Figure 11-1. Test Modes Menu

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

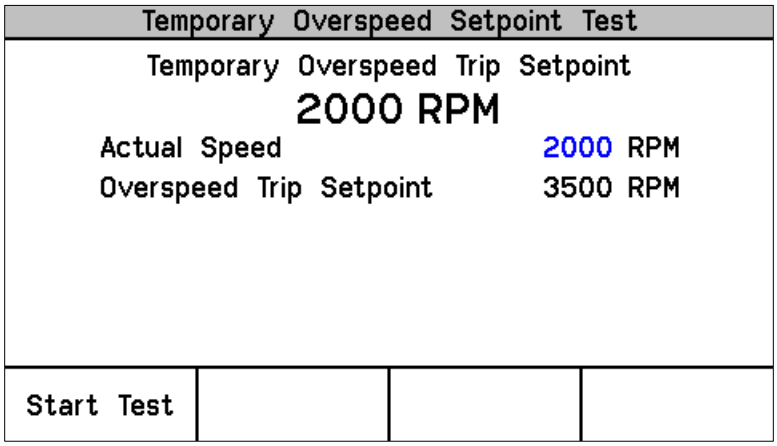


Figure 11-2a. Temporary Overspeed Test

- **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.

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 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 and 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 back to the Start test screen.

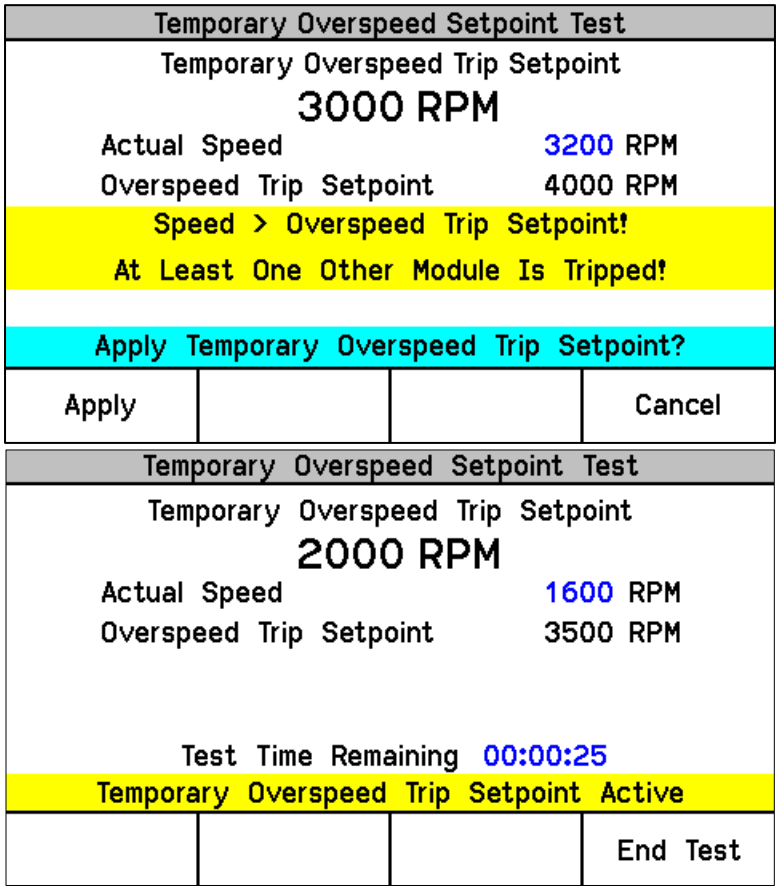


Figure 11-2b. Temporary Overspeed Test

The following Messages may be seen on the Temporary Overspeed Setpoint Test page:

At Least One Other Module Is Tripped!: This message warns the user that another module is in a tripped state. This message does not prohibit applying this test.

Speed > Overspeed Trip Setpoint!: This message warns the user that the current speed is greater than the Overspeed Trip Setpoint. 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).

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

Manual Simulated Speed Test

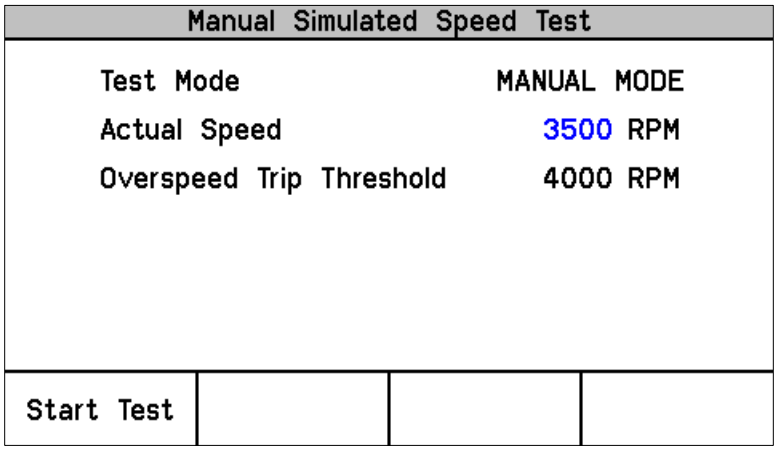


Figure 11-3. Manual Simulated Speed Test

- **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.

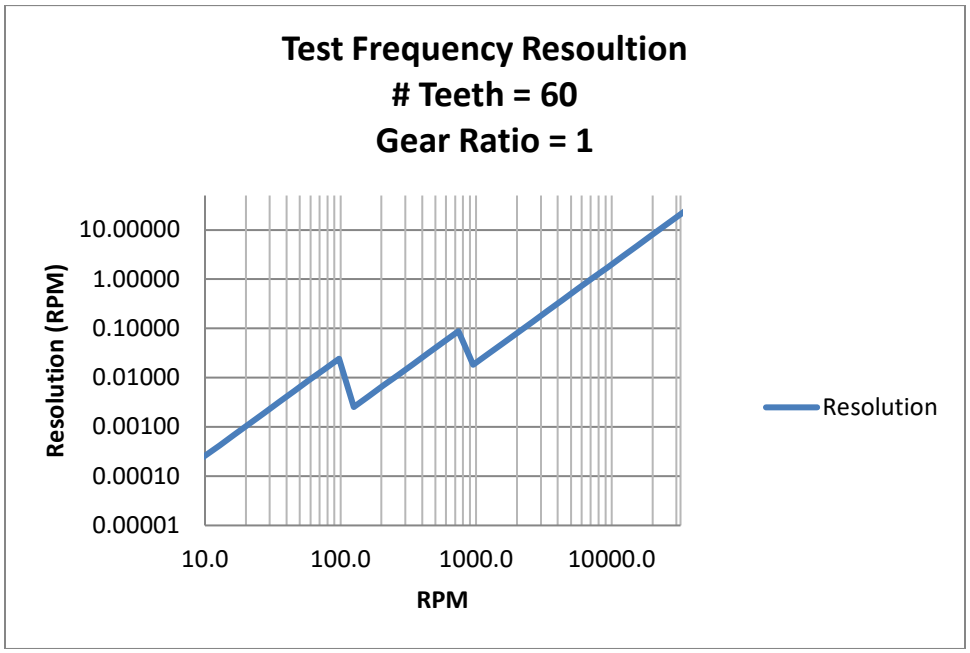


Figure 11-4. Test Frequency Resolution

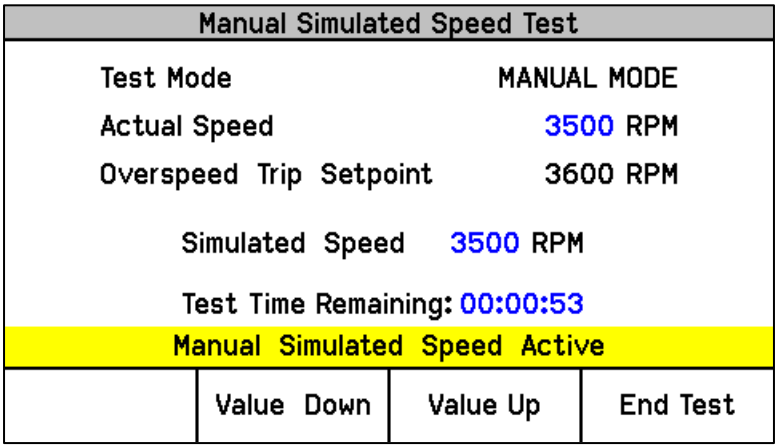


Figure 11-5. Manual Simulated Speed Test Screen

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.
   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 and also switch the module’s input speed channel back to sensing actual rotating equipment speed.
   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 and also switch the module’s input speed channel back to sensing actual rotating equipment speed.
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. The input speed channel will be sensing actual rotating equipment speed again.
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

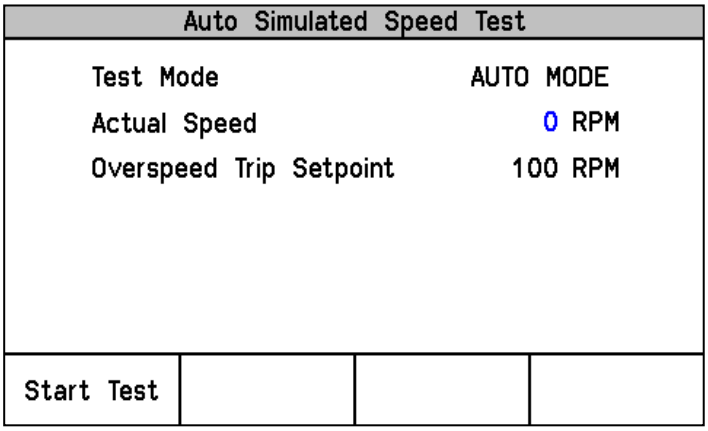


Figure 11-6. Auto Simulated Speed Test Screen

- **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 input speed channel will be switched back to sensing actual rotating equipment speed.

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 Ended by Modbus: This message indicates the test was ended by a Modbus command.

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.

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.
   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.
   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 and also switch the module's input speed channel back to sensing actual rotating equipment speed.
   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 and also switch the module's input speed channel back to sensing actual rotating equipment speed.
   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 and also switch the module's input speed channel back to sensing actual rotating equipment speed.
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. The input speed channel will be sensing actual rotating equipment speed again.
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

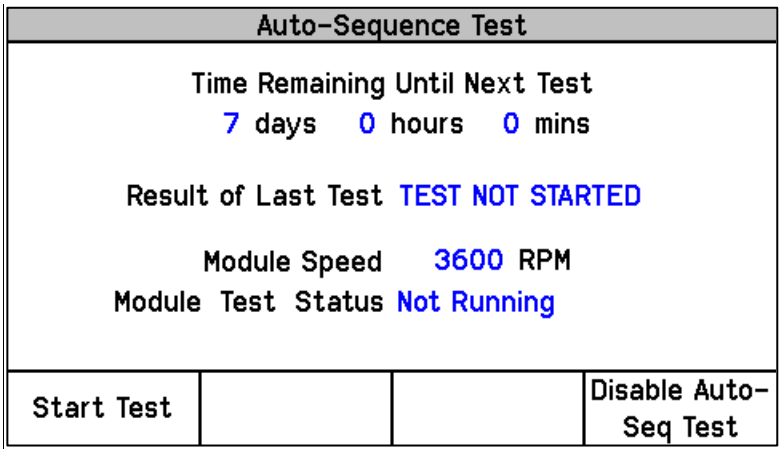


Figure 11-7. Auto-Sequence Test

- **Time Remaining Until Next Test:** Displays the time until the next Auto-Sequence test will be started.
- **Result Of Last Test:** Displays the result of last Auto-Sequence test. Result of Last Test can be:
  - **TEST PASSED:** Displayed when the complete test has been run successfully on all 3 modules (A, B, and C).
  - **TEST RUNNING:** This message is displayed during the test sequence, while it is executing.
  - **TEST FAILED:** Displayed when the test did not successfully detect an overspeed trip on one of the modules. The sequence aborts when any of the modules fails this test.
  - **TEST NOT COMPLETED:** Indicates the test did not complete its' test sequence. Causes for this indication include: test timeout (no continue issued), test stopped or aborted, interlock failed (alarm or trip caused test to stop/abort).
  - **TEST NOT STARTED:** Indicates the test has not been run on this unit since the last power cycle.

- **Module Test Status:** Displays the status of each module. Module Test Status can be:
  - **Not Running:** Indicates the "Auto Simulated Speed Test" is not running on this module.
  - **Running Test:** Indicates the "Auto Simulated Speed Test" is running on this module.
  - **Trip Reset:** Indicates the "Auto-Sequence Test" is resetting this module.
  - **Test Next Module:** Indicates testing is being transferred to the next module.
  - **Wait for Start Input:** Indicates this module is waiting for the Start input to go true. This module must see a true level before the configurable timer times out for the test to start.

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 module's 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. One exception is that the Start input can be configured differently on modules B and C if it is desired to use a different signal to pause the test between modules. Optionally this test can be initiated from module A's front panel or periodically if the Periodic Test Timer function is enabled.

Test Details

The test can be initiated by command (from front panel or logic) and at a configured time interval. To initiate a test, all modules must have all alarms and trip conditions cleared. The test will be inhibited if any unit is in an alarm or trip state. To initiate the test from logic, a Start input and Continue Timeout must be configured using the PCT. See chapter 13 "Test Modes".

Once initiated, module speed changes to the internal function generated speed, starting at 100 rpm below the overspeed trip threshold and ramping up until an overspeed trip event occurs on A. The module speed input is re-activated, and the trip output is cleared after 3 seconds. After another 10 seconds the same test is initiated on module B. If the inter-module halt is enabled, module B will wait for a true on the Start input. The Start is level triggered so it can be set to true before the test on A is complete and there will only be a 10 second delay between tests. If halt is not used, then the sequence continues without any intervention. After module B trips then the same test is initiated on module C, again after a 10 second inter-module test delay. If the inter-module halt is enabled, then module C will wait for a true on the Start input. If halt is not used, then the sequence continues without any intervention. After Module C trips and subsequently resets, the test is complete.

While in a test active state, a module alarm is indicated. When using the halt option, a failure to continue before the timeout expires will abort the test and issue a timeout alarm. If a nonrelated trip or alarm occurs during the test, then the test will be aborted. If a module sequence test is unsuccessful (i.e. an overspeed trip doesn't occur), the test is aborted.

Once initiated the Result Of Last Test shows Test Running. The status changes to Test Passed if the entire sequence was successful, otherwise it will display Not Completed or Failed.

The operator can disable the Auto Sequence test from the front panel of the module. When the Auto Sequence test 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 Auto Sequence Test is enabled again and no modules are in trip, alarm, or test, this limit on the timer will no longer be in effect.

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. Additionally the test routine can be started from a logic connection.
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, 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. Module A will trip on the simulated overspeed test, then after 3 seconds reset back to its non-tripped state. A 10 second inter-module test delay is applied before continuing.
6. If all test permissives are met (no module in a tripped or alarmed state) and module B start/continue condition is met (if halt is used), then module B will perform an Auto Simulated Speed Test.
7. Module B will trip on the simulated overspeed test, then after 3 seconds reset back to its non-tripped state. A 10 second inter-module test delay is applied before continuing.
8. If all test permissives are met (no module in a tripped or alarmed state) and module C start/continue condition is met (if halt is used), then module C will perform an Auto Simulated Speed Test.
9. Module C will be reset back to its non-tripped state.
10. 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.
11. 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.

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

User Defined Test 1, 2, & 3

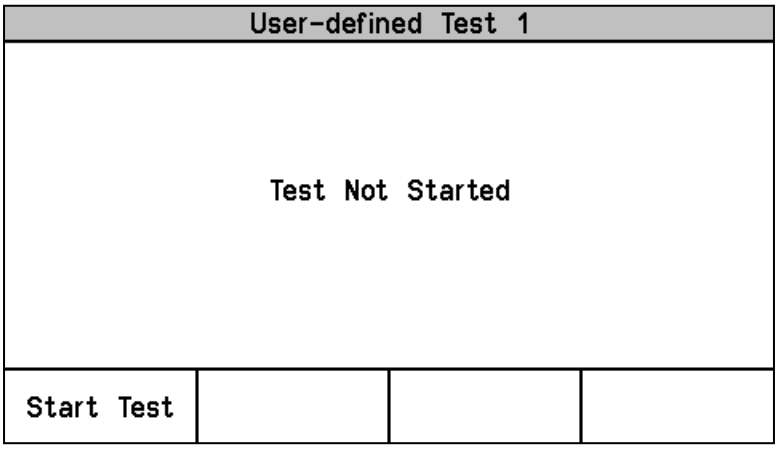


Figure 11-8a. User Defined Test

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

- NOT CONFIGURED
- Test Not Started
- Test Started by:
  - Front-Panel
  - Configurable Logic
  - MODBUS
- Test Ended by:
  - Front-Panel
  - Configurable Logic
  - MODBUS
  - Test Timeout
  - Trip Condition
  - Other Module Trip (only if Test Mode Permissive is set to “Not Tripped” or “Not in Alarm”)
  - 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, 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).**

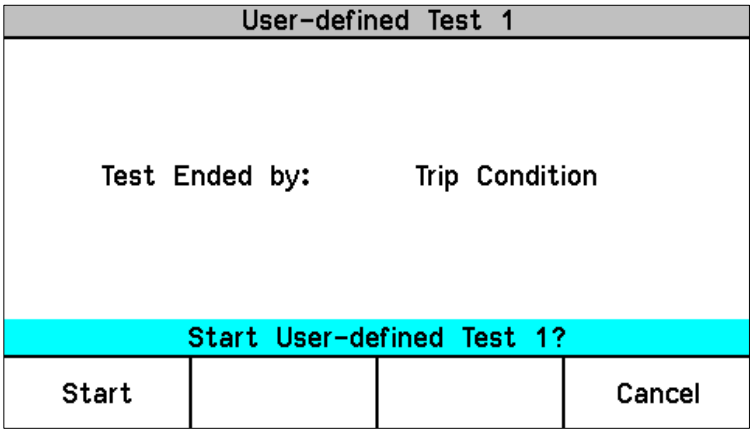


Figure 11-8b. User Defined Test

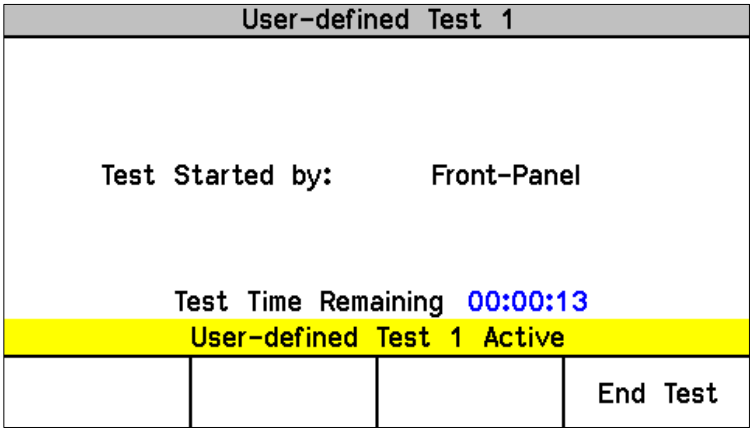


Figure 11-8c. User Defined Test

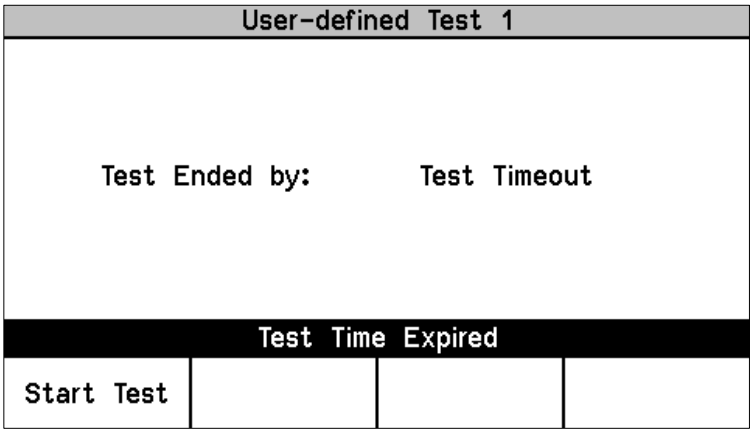


Figure 11-8d. User Defined Test

Lamp Test

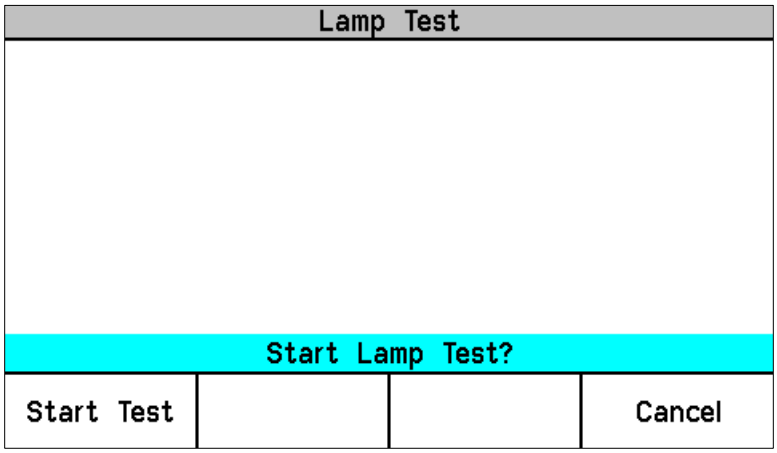


Figure 11-9. Lamp Test

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:

With the exception of "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 (MSM) 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 MSM 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 MSM module.
- Download application and configuration settings from a MSM module.
- Download and view stored logged files from a MSM 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 MSM module (module must be in a tripped state).
8. Using the Configuration Menu's Configuration Management function, if desired, copy the uploaded program to the other two MicroNet Safety Module 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.

System Default Font

A display settings default larger than 100% will cause some data on the Service Tool to be displayed incorrectly. Data will be cut off or not fit in the defined area. This setting is provided as part of the computer's Control Panel settings (see Make text and other items larger or smaller).

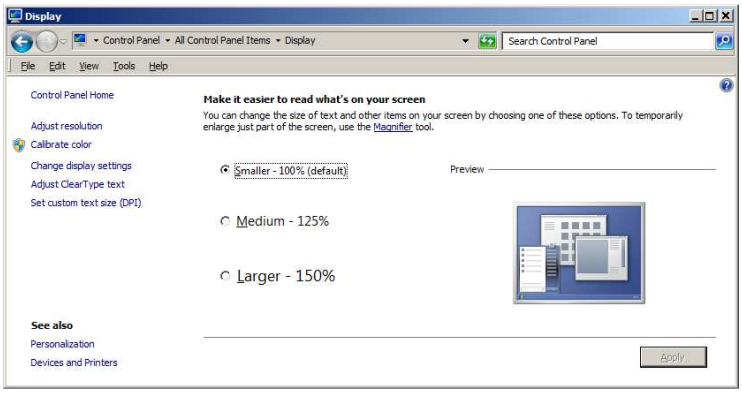


Figure 12-1. Control Panel Settings – Display

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)
- Configuration 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, exported.
- All logs (except Peak Speed and Peak Acceleration) can be reset.

Configuration Level:

- A serial communication link must be established and operational.
- A password for Configuration 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 MicroNetSM.wstool. The following introduction screen will be displayed on the PC.

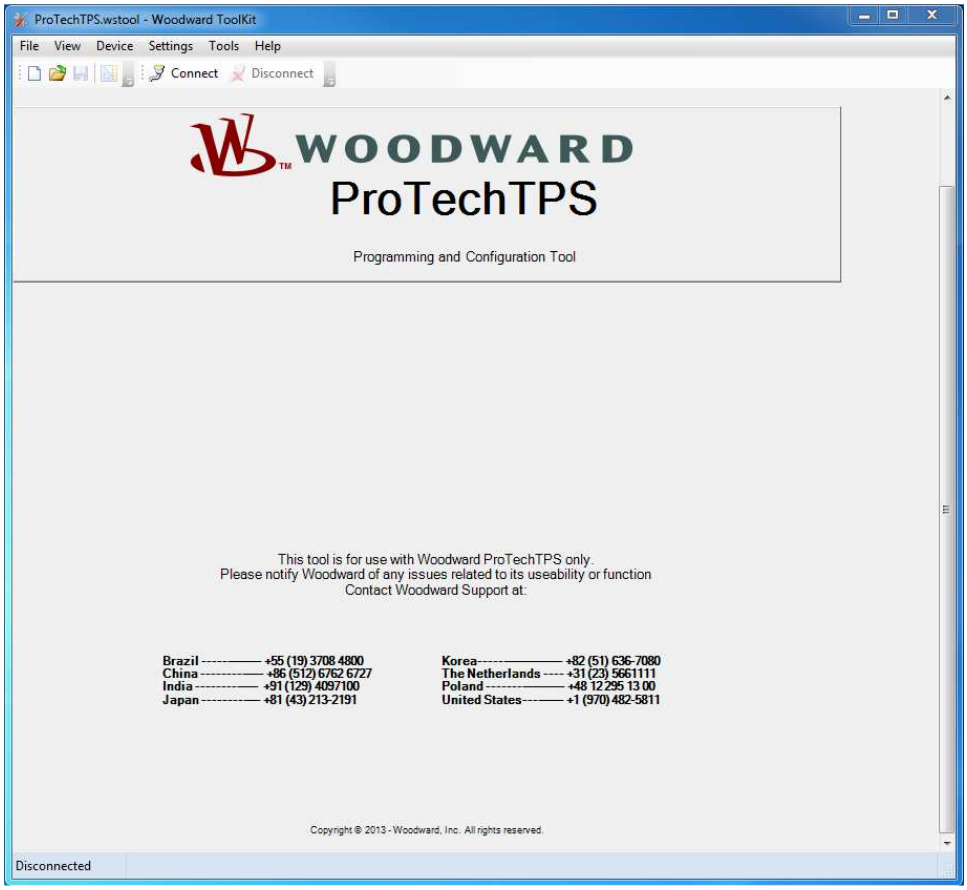


Figure 12-2. MicroNet Safety Module PCT unconnected screen

The PCT is ready to be used in isolated level. In order to use the PCT in either Test or Configuration 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:

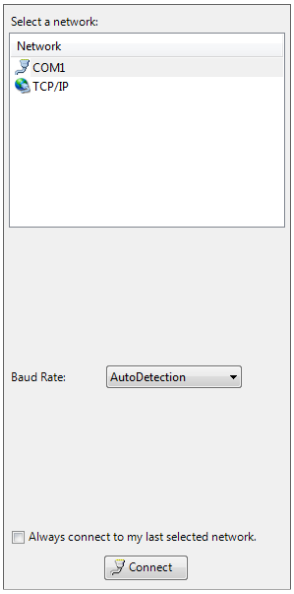


Figure 12-3. Connect options window

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:

Figure 12-4. Security Login window

7. Select either “Test Level” or “Configuration Level” and enter the associated Password for the selected level and log in. Select Close if Test or Configuration 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 On-Line Menu is displayed. This window provides access to the MSM Logs. Additionally, it can be used to monitor or change device configuration.

On-Line Menu

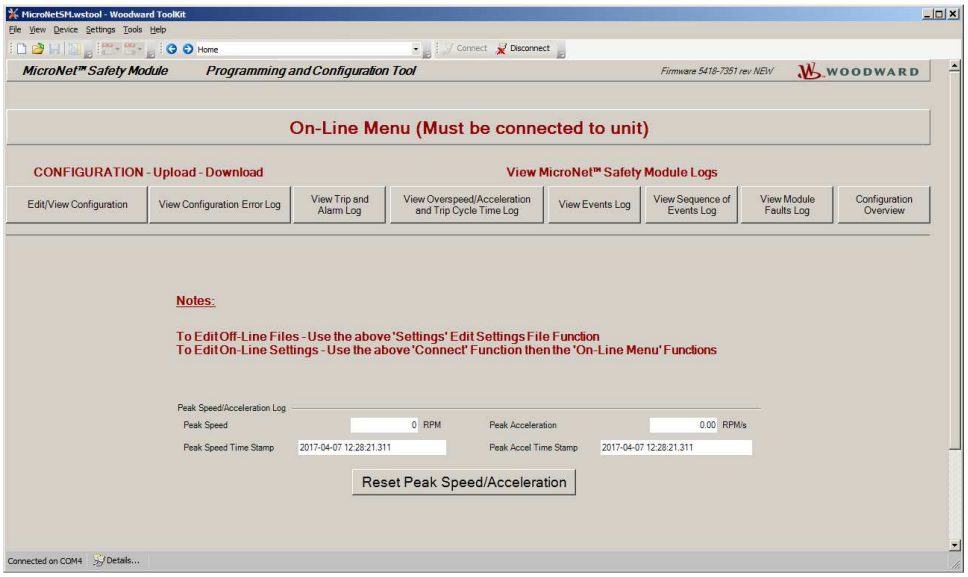


Figure 12-5. On-Line window

The On-Line menu provides seven buttons:

- Edit/View Configuration
- View Configuration Error Log
- View Trip and Alarm Log
- View Sequence of Events Log
- View Overspeed/Acceleration and Trip Cycle Time Log
- View 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 Configuration Level permissions. If desired, the logs can be cleared from the front panel user interface (see Logs Menu).

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.

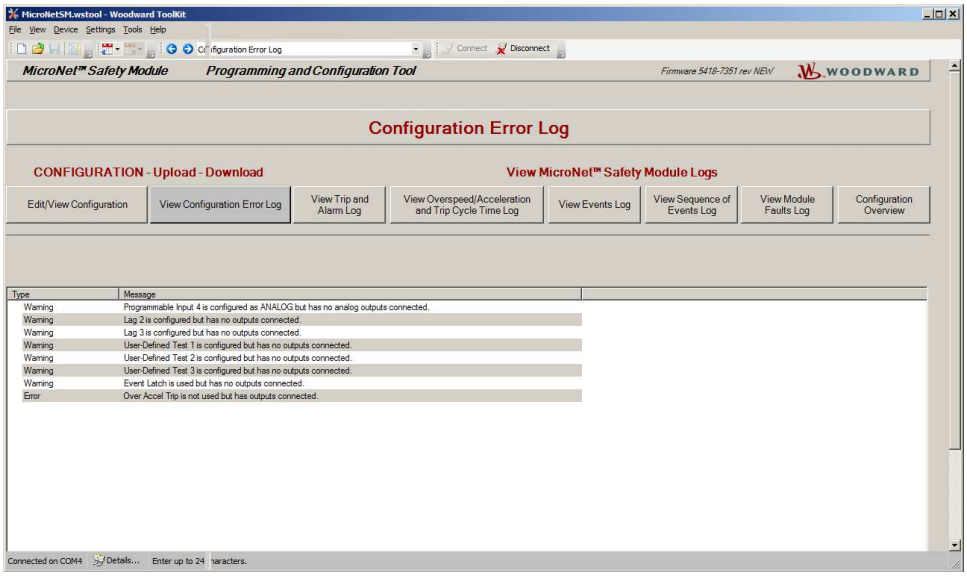


Figure 12-6. Configuration Error Log

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.

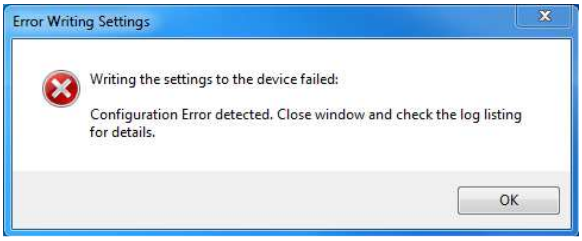


Figure 12-7. Configuration Error Warning

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).

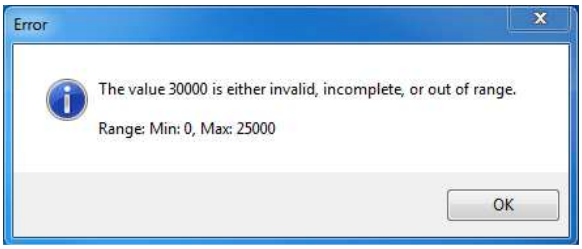


Figure 12-8. Example Data Entry Error

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, retaining the most recent once the maximum is reached. 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.

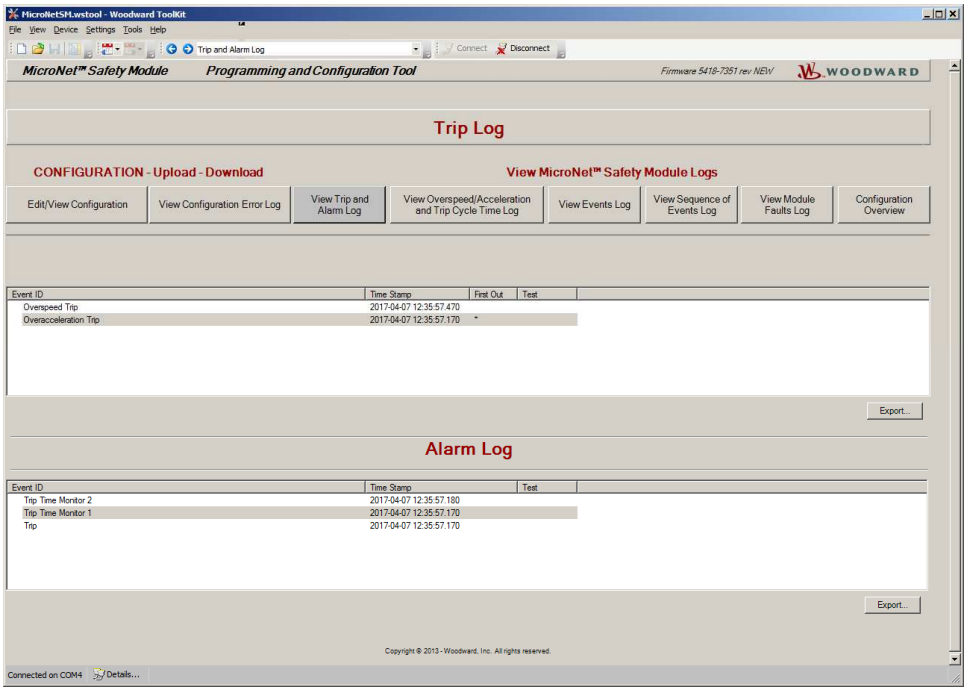


Figure 12-9. Trip and Alarm Logs

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 MSM was in any of the test modes when the fault condition(s) occurred.

Selecting the Reset Logs button will clear the Trip, Alarm, Overspeed / Acceleration, Trip Cycle Time, and Events 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). Be aware that this function will not reset any faults, it simply clears the contents of the logs in the device.

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

IMPORTANT: Be aware that the ‘Reset Logs’ button clears the contents of ALL the logs, with the exception of the module faults and Peak Speed/Acceleration log. Selecting this function will permanently erase this information in the MicroNet Safety Module device.

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 MSM is displayed. The maximum length of this list is 20 lines, retaining the most recent once the maximum is reached. 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.

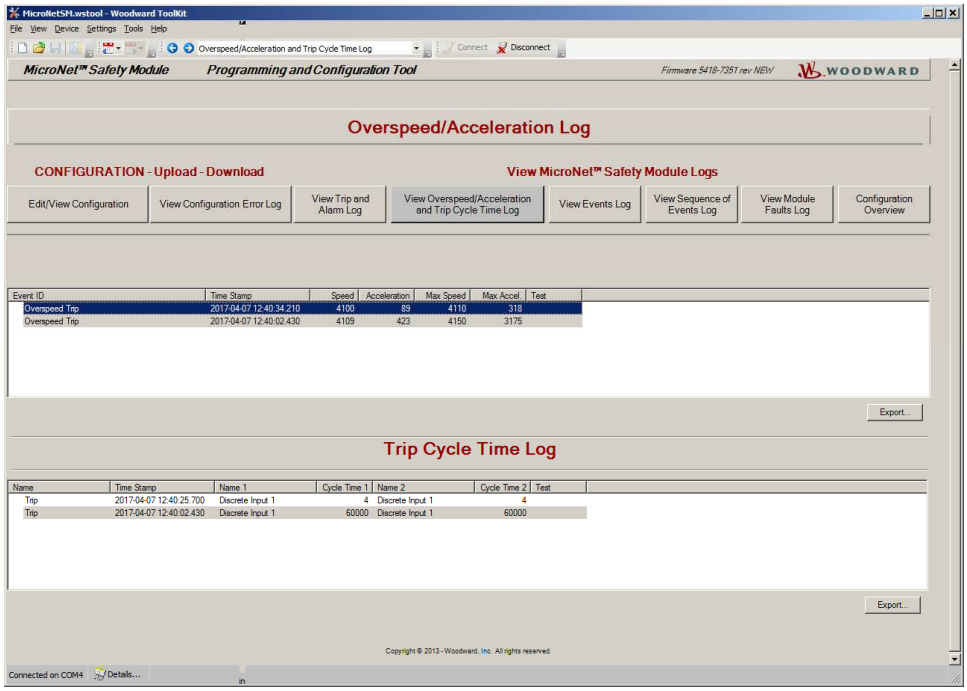


Figure 12-10. Overspeed and Trip Cycle Time Logs

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, retaining the most recent once the maximum is reached. 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 MSM was in any of the test modes when the event occurred.

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

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).

IMPORTANT

Be aware that the 'Reset Logs' button clears the contents of ALL the logs, except for the module faults log and Peak Speed/Acceleration log. Selecting this function will permanently erase this information in the MicroNet Safety Module device.

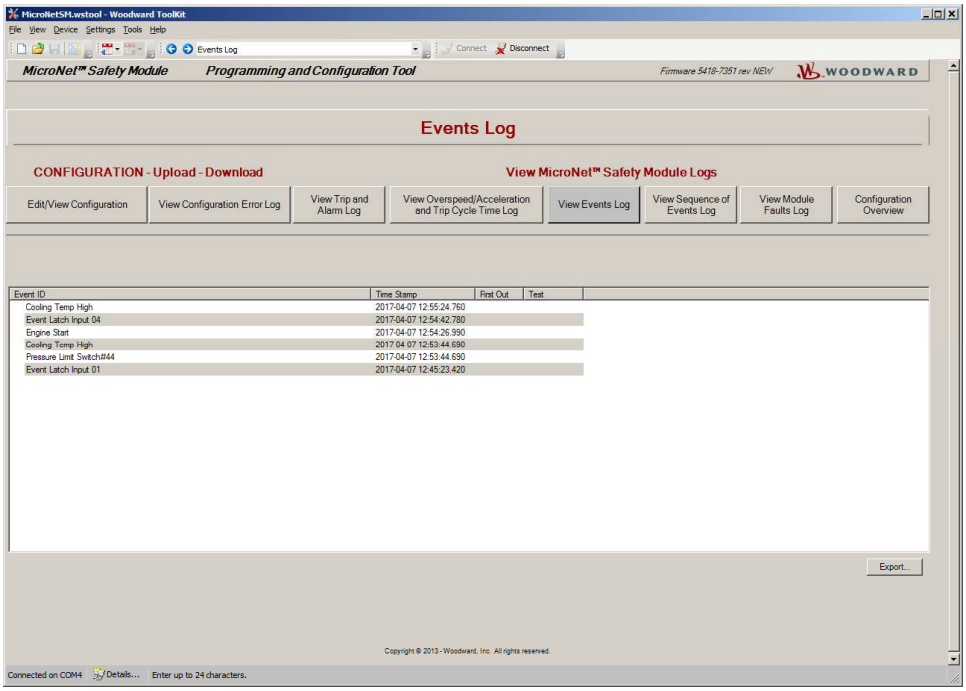


Figure 12-11. Events Log

View Sequence of Events Log

After selecting "View Sequence of 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 120 events, retaining the most recent once the maximum is reached. Log inputs must be configured and displayed 'names' are user-configurable (see configuration of Event Log).

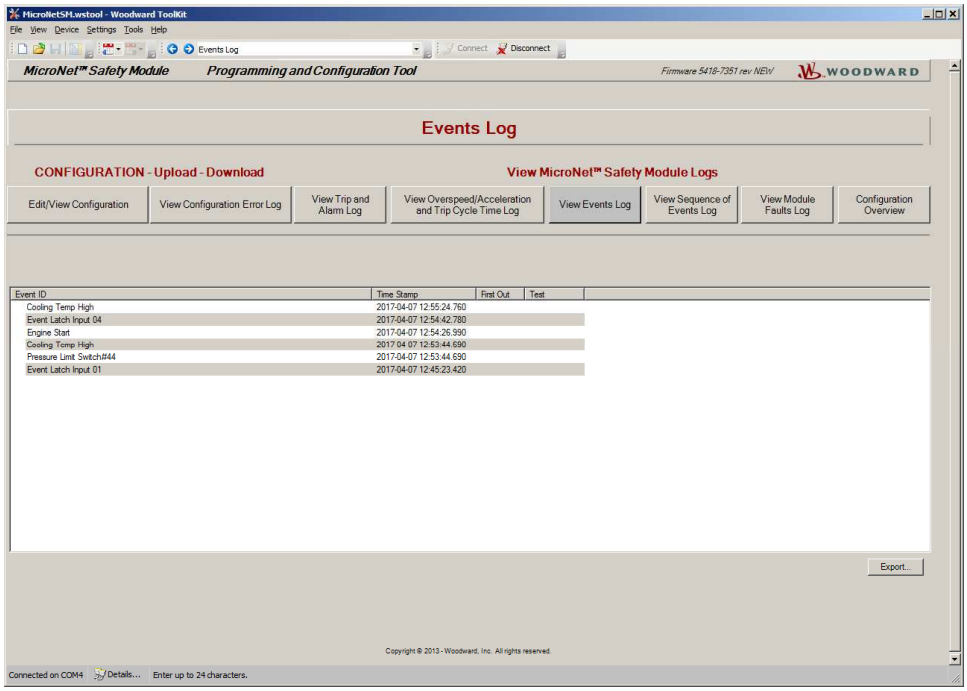
The displayed log list contains a user-definable description (name), the time stamp of the event, and test mode indication. The test mode indication contains an asterisk (*) if the MSM was in any of the test modes when the event occurred.

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

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).

IMPORTANT

Be aware that the 'Reset Logs' button clears the contents of ALL the logs, except for the module faults log and Peak Speed/Acceleration log. Selecting this function will permanently erase this information in the MicroNet Safety Module device.



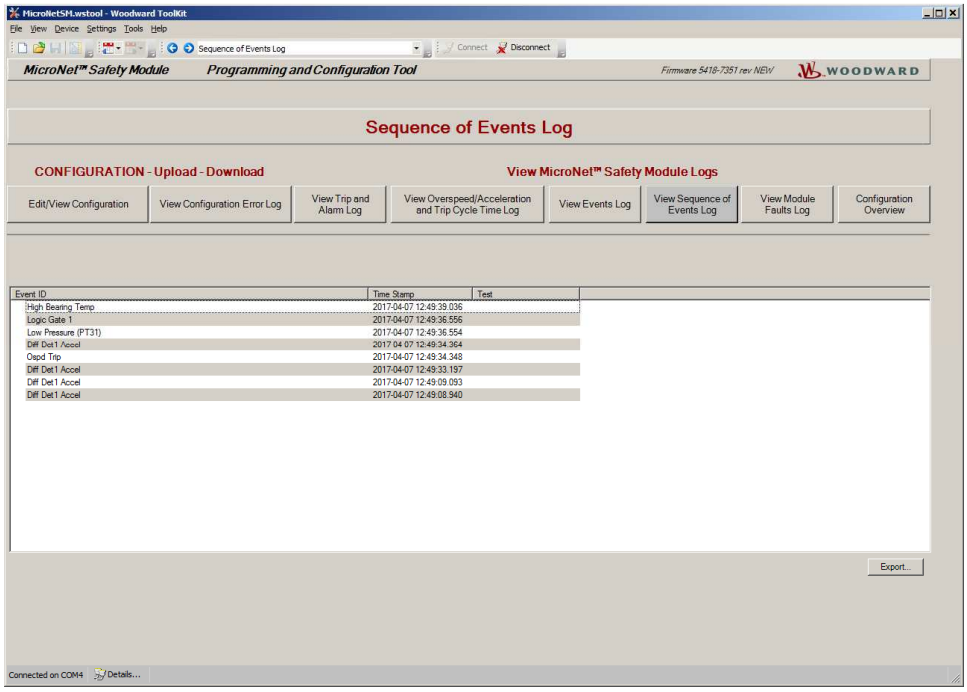


Figure 12-12. Sequence of Events Log

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 log contains a historical listing of all Internal Fault Alarm and Internal Fault Trip conditions that have been detected since the last time the module fault log was cleared. The log contains a description containing the type of fault (trip or alarm), fault originator (CPU identifier: Logic, Comm, or Display), fault type, fault source code address, and a time stamp of the fault.

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.

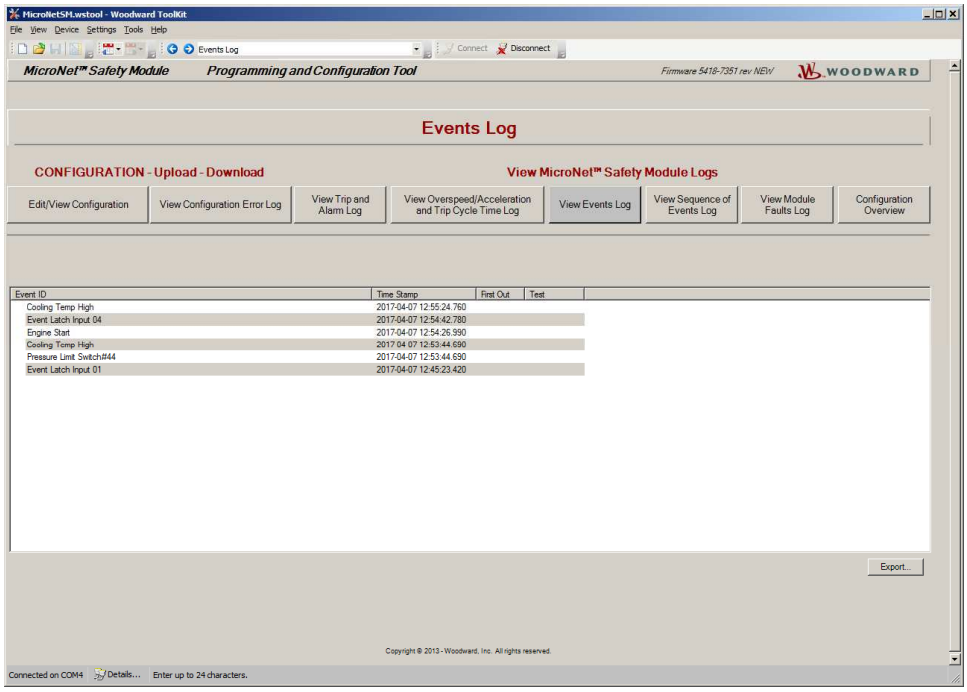
Select the **Clear Module Faults Log** button to clear this log. This button is only visible with when logged in with Test Level permissions or higher.

IMPORTANT

Be aware that clearing the log will not reset any faults, it simply clears the contents of the log. It is advisable to record the contents of the Module Faults Log (screen capture or Export) prior to clearing as it contains information to aid in factory troubleshooting of the fault cause.

⚠WARNING

Clearing of the Module Faults Log should not be performed if any internal faults are currently active. Doing so will erase valuable troubleshooting information.



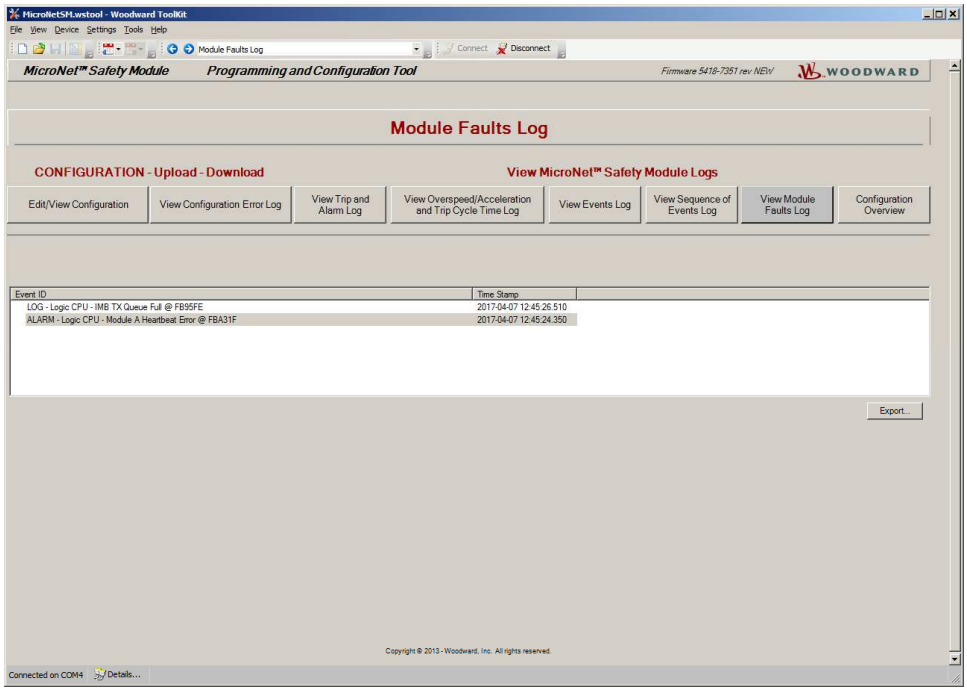


Figure 12-13. Module Faults Log

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.

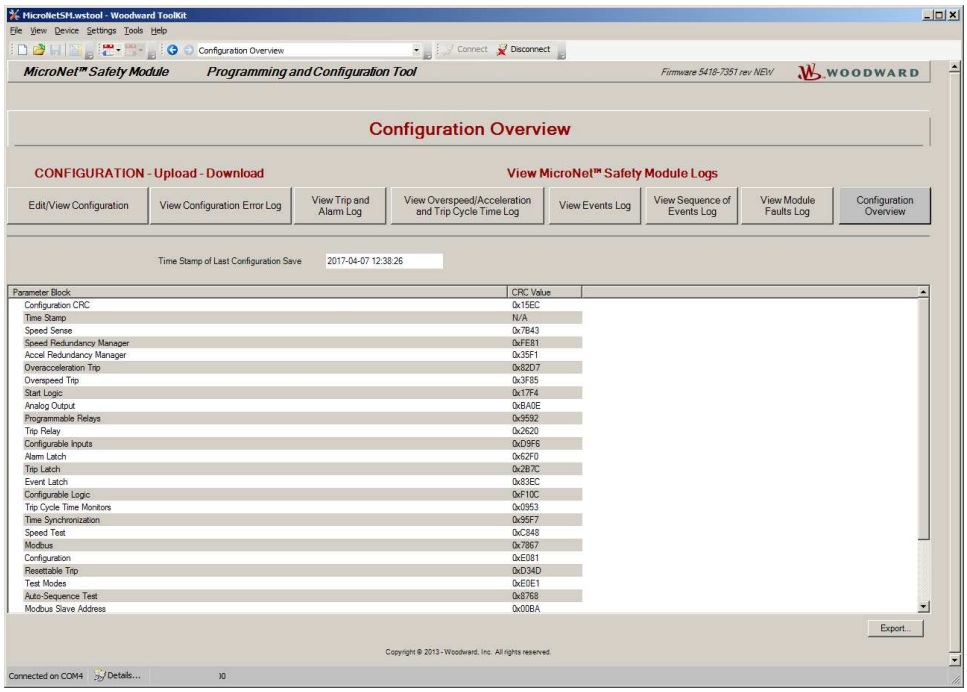


Figure 12-14. Configuration CRC Table

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 screens).

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. It encompasses ALL settings, including those that are expected to be unique module-to-module and are excluded from the configuration compare (*see Configuration Compare/Save Exclusions for a summary as well as details 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.
- **Overacceleration 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 (Analog Logic, Boolean Logic, and User Defined Tests). This includes:
  - Logic Gate settings (1-50) on the Logic Gates page.
  - Analog Comparators settings (1-15) on the Comparators page.
  - Analog Redundancy Manager settings (1-15).
  - Boolean Redundancy Manager settings (1-15).
  - Timer settings (1-5) on the Timers page.
  - Latch settings (1-10) on the Latches page.
  - Delay settings (1-10) on the Delay page.
  - Unit Delay settings (1-10) on the Unit Delay page.
  - Lag settings (1-10) on the Lag page.
  - Difference Detection settings (1-15) on the Difference Detection page.
  - Constant settings (1-20) on the Constant page.
  - Add settings (1-5) on the Addition page.
  - Negate settings (1-10) on the Negation page.
  - Multiply settings (1-5) on the Multiply page.
  - Divide settings (1-5) on the Division page.
  - Switch settings (1-10) on the Switches page.
  - Curve settings (1-2) on the Curves page.

  - Analog Unit Delay settings (1-10) on the Analog Unit Delay page.
  - Peak Hold settings (1-10) on the Peak Hold page.
  - Counter settings (1-10) on the Counters page.
  - Pulse Detector settings (1-5) on the Pulse Detection page.
  - Event Filter settings (1-5) on the Event Filter 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 Resettable Trip 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 Alarm Latch page.
- **Display Configuration:** CRC code of the Display Configuration settings on the Display Settings page. When used, these settings 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. These include the Reset Input Sharing on the Reset Logic page, the Start Input Sharing, and the Speed Fail Override Input Sharing on the Start Logic page.
- **Sequence of Events Log:** CRC code of the Sequence of Events Log settings on the Sequence of Events Log page.

Configuration Monitoring (View)

To view the settings in the device, select “Edit/View Configuration”. This opens a window which contains all parameters in the MicroNet Safety Module device.

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.

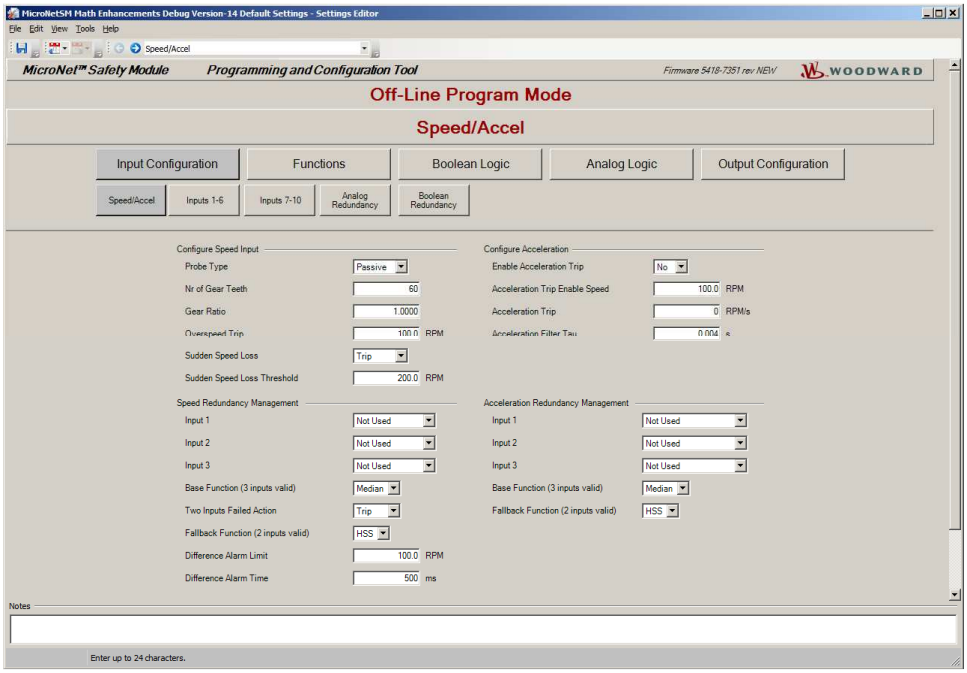


Figure 12-15. Configuration Settings window

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 program mode has the following screen selections:

Table 12-1. Program Mode Screen Selections

Input Configuration:	**Boolean Logic:**	**Analog Logic:**
Speed/Accel	Start Logic	Lags
Inputs 1-6	Logic Gates	Difference Detection
Inputs 7-10	Latches	Math Functions
Analog Redundancy 1-8	Delays	Constant
Analog Redundancy 9-15	Comparators	Negation
Boolean Redundancy 1-8	Timers	Addition
Boolean Redundancy 9-15	Trip Cycle Timers	Subtraction
	Pulse Detection	Multiplication
Functions:	Event Filter	Division
Display Settings	Sequence of Event Log	Curves
Configuration Compare		Switches
Test Modes	**Output Configuration:**	Counters
Time Sync	Trip Latch	Analog Unit Delay
Modbus	Alarm Latch	Peak Hold
	Reset Logic	
	Resettable Trip	
	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 MicroNet Safety Module:
- Using the MicroNet Safety Module front panel. (see Chapter 10 for details)
- Using the Programming and Configuration Tool (PCT).

All configuration options, 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 (connected to MSM, with interactive download available)
- Off-Line configuration (isolated from MSM, not connected)

On-Line Configuration

IMPORTANT

On-Line Configuration is only possible in Configuration Level:
- **A serial communication link must be established and operational.**
- **A password for Configuration Level is required.**

After selecting “Edit/View Configuration”, a new window opens containing all parameters and their current value in the device. For information on each configuration setting, see chapter 13 “Configuration using the PCT’. These can be viewed or set/changed and loaded back into the device while the MicroNet Safety Module is operational.

The allowable value range for a setting is displayed on the lower-left corner of the main menu. The information bar (Fig 12-12) 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 trip setting, the valid range of values is between 0 and 80000.

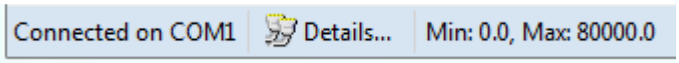


Figure 12-17. Settings Range indication

The right bottom corner of the configuration window has three buttons. These are the options available for the settings window. Selecting 'Cancel' will close the window and do nothing (no changes made to MSM settings). The 'OK' and 'Apply' buttons become active when any setting change is detected. Selecting 'Apply' will attempt to load the settings to the device and keep the configuration window open. Selecting 'OK' will attempt to load the settings to the device and close the configuration window.

When the OK or Apply button is pressed, the new configuration settings will be uploaded to and checked by the MSM. If permissives are met and the configuration is valid, the new configuration settings will immediately be used by the MSM. If a configuration error is detected, the settings will not be applied. They are completely ignored. Errors will need to be corrected and then a setting reload attempted. Configuration warnings (as opposed to errors) will not prevent a settings load. The Configuration Error Log will display the configuration validity messages, both warnings and errors. For more information see the Configuration Checks section later in this chapter and in Chapter 13.

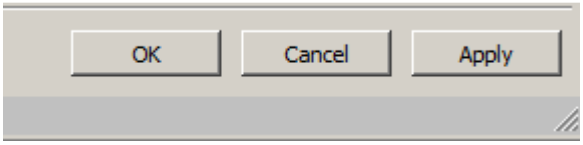


Figure 12-18. Settings Options

PROGRAMMING HINT: It is advisable to select the 'Edit/View Configuration' from the Configuration Error Log screen. Then position the configuration window to allow monitoring of both the configuration error log and the configuration window, space permitting. This will facilitate viewing of any configuration issues immediately when selecting the 'Apply' button. It will also make it easier to see the adjustment range of analog settings (in lower-left corner of log window).

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 is not in a trip condition.

Test Level was selected

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

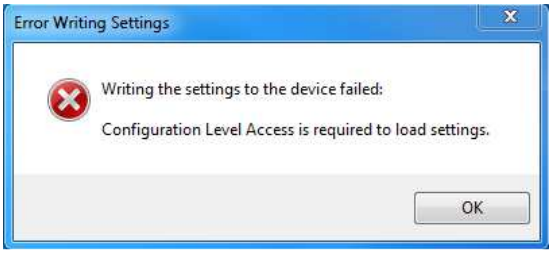


Figure 12-19. Test Level Selected Error Warning

Communication must be stopped and restarted using Configuration Level. Once logged in at the Configuration Level, configuration settings can be changed.

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

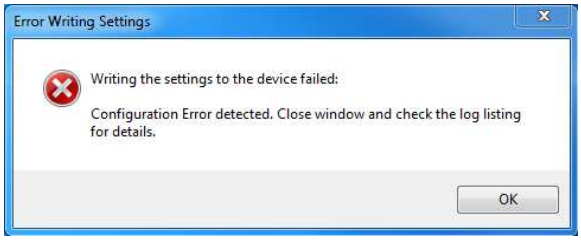


Figure 12-20. Configuration Error Detected Warning

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:

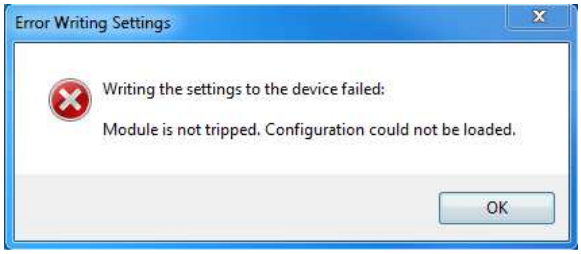


Figure 12-21. Module Not Tripped Error Warning

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 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.

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

Configuration Checks

When a settings file is loaded to the device, the values are checked in the control. The Configuration Log displays issues detected in the configuration. There are 2 types of issues, warning and errors. 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.

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" are used to create and modify the configuration files for the MicroNet Safety Module.

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

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

Figure 12-22. ToolKit Settings Drop-Down Menu

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 are 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 Configuration Level

When using the MicroNet Safety Module Programming and Configuration Tool (PCT) in Configuration Level, the management of log files are 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:

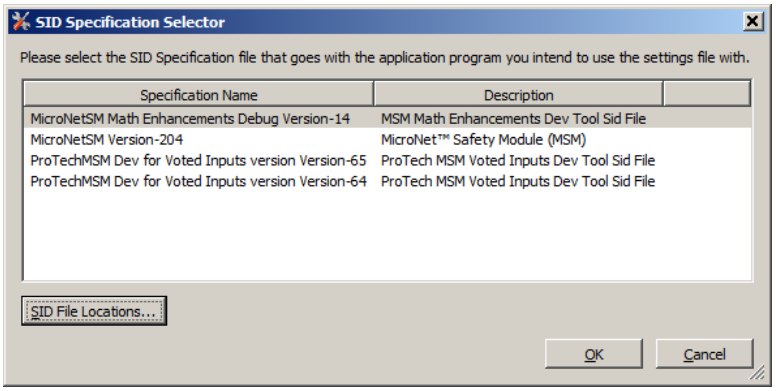


Figure 12-23. SID Specification Selector Applications List

Select the appropriate file compatible with your MSM software. If other Woodward applications are installed on your PC, a list of choices in addition to MSM 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 details on each configuration setting, see chapter 13 ‘Configuration Using the PCT’.

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 the 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 Configuration Level login is required. After clicking this selection, the following sub-window appears:

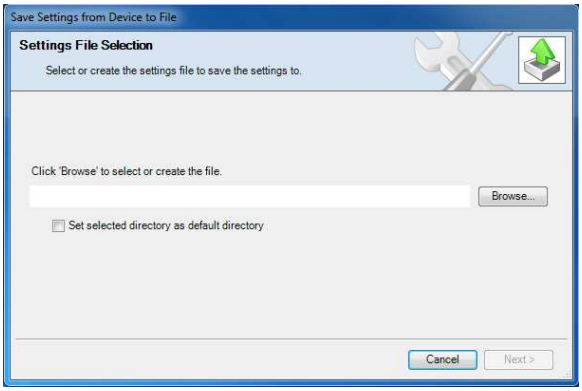


Figure 12-24. Settings File Selection

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 Configuration Level login. There are two valid conditions:
   - Serial communication was already established, and Test Level or Configuration Level was selected.
   - Serial communication was not yet established.

Serial communication was already established, and Test Level or Configuration Level was selected

3. If serial communication was already established and Test Level or Configuration 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.

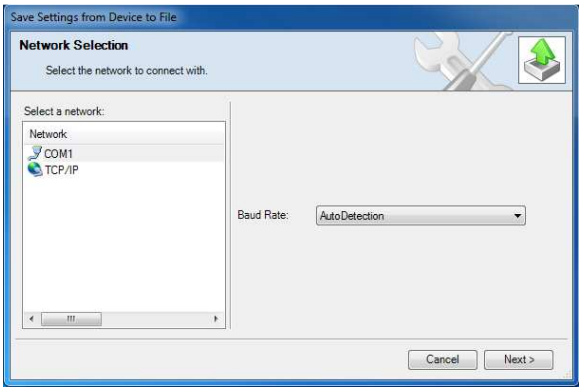


Figure 12-25. Network Selection

6. Highlight the communication port where the serial interface cable is connected and click on the Next button in the pop-up window.
7. If a communications link is established, the following pop-up window appears:

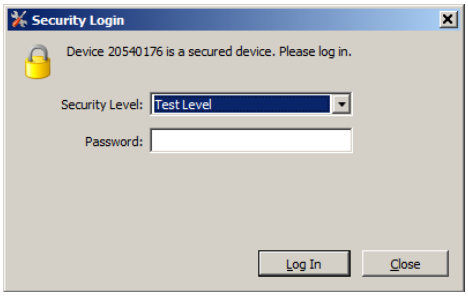


Figure 12-26. Security Login

8. Select “Test Level” or “Configuration 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), 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 “Settings” menu, the following sub-window appears with a list of settings files. The settings-files have extension *.wset.

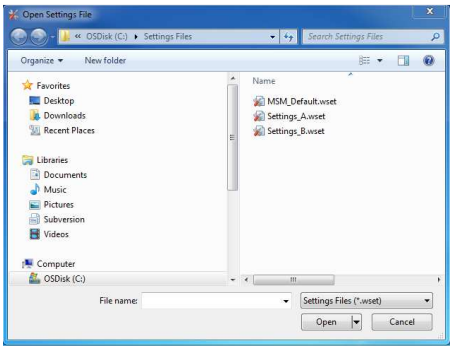


Figure 12-27. Open Settings File

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.

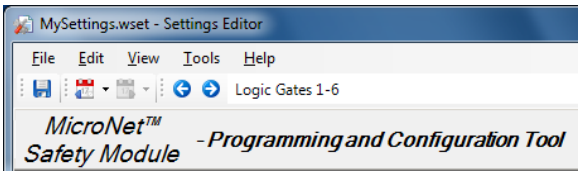


Figure 12-28. Settings Editor Tools Ribbon

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 then 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 the drop-down menu “Settings” followed by sub-selection “Load settings file to Device”. For configuration of all 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 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:

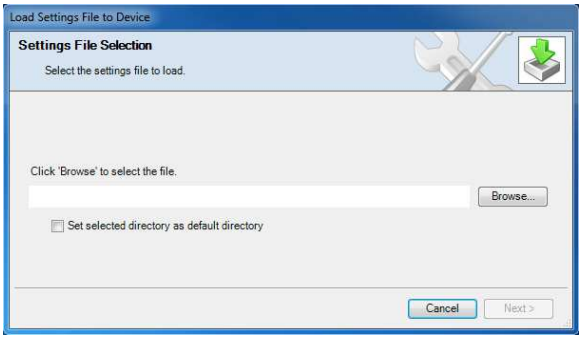


Figure 12-29. Load Settings File – File Selection

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, Configuration Level is required. Test Level is not enough. There are three valid conditions:
   - Serial communication was already established, and Configuration 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 Configuration Level was selected

3. If serial communication was already established and Configuration Level was selected and there are no configuration errors, the transfer of the configuration file to the MicroNet Safety Module starts immediately. For uploads, Configuration Level is required. Test Level is not enough. 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, Configuration Level is required. Test Level is not enough. The following sub-window appears:

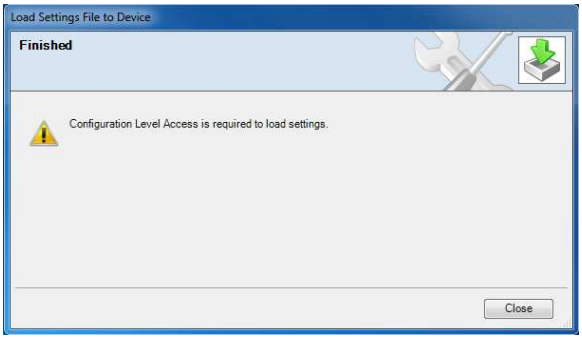


Figure 12-30. Configuration Level Access Warning Window

5. Use the disconnect button and reconnect utilizing the password for Configuration 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 and requests you to select a Network.

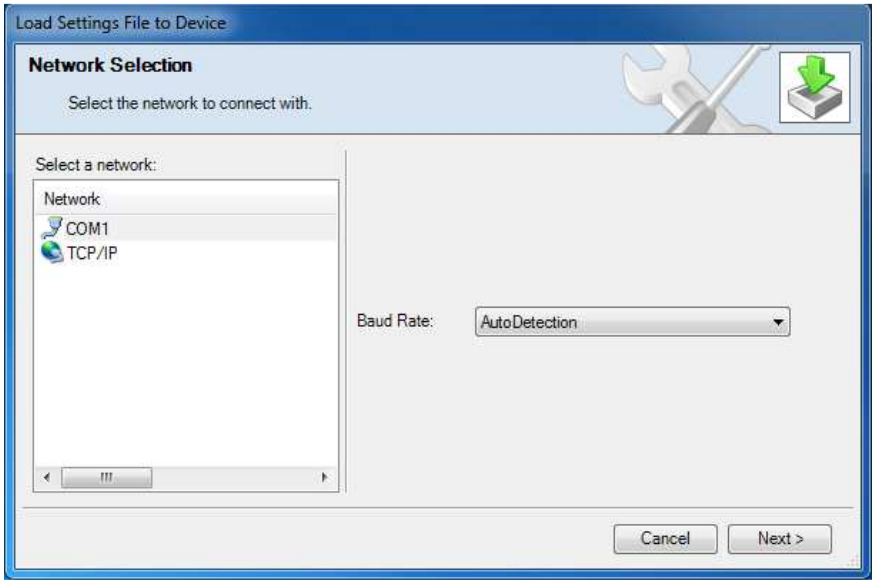


Figure 12-31. Network Selection

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:

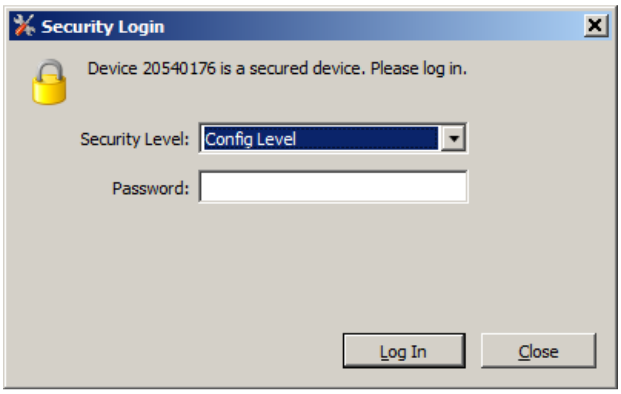


Figure 12-32. Security Login

9. Select “Configuration 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, Configuration 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:

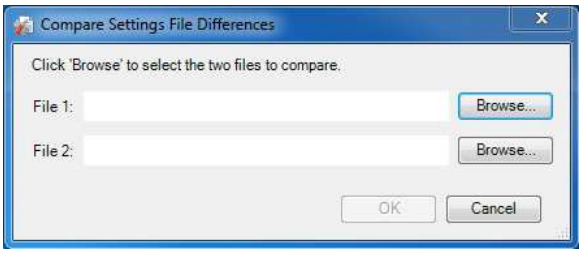


Figure 12-33. Compare Settings File – File Selection

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:

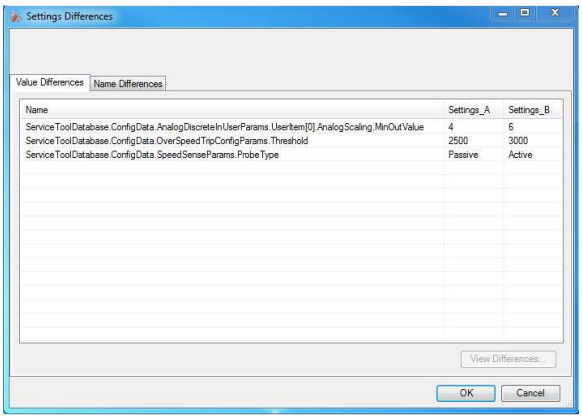


Figure 12-34. File Differences Display

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”.

Chapter 13.
Configuration Using the PCT

Introduction

This chapter provides details on the configuration screens and settings provided when using the Programming and Configuration Tool (PCT). Refer to Chapter 12 for general PCT information including setup, operation, on-line, and off-line configuration.

Off-line configurations can be created or modified at any time. For safety purposes, on-line changes are only allowed when a module is in its “tripped” state.

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.

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 13-1 Configuration Overview

Input Configuration:	**Boolean Logic:**	**Analog Logic:**
Inputs	Start Logic	Lags
Speed/Accel	Logic Gates	Difference Detection
Redundancy Management	Latches	Math Functions
Functions:	Delays	Constant
Display	Unit Delays	Negation
Configuration Compare	Comparators	Addition
Test Modes	Timers	Subtraction
Time Sync	Trip Cycle Timers	Multiplication
Modbus	Pulse Detection	Division
Output Configuration:	Event Filter	Curves
Trip Latch	Sequence of Events Log	Switches
Alarm Latch		Counters
Reset Logic		Analog Unit Delay
Resettable Trip		Peak Hold
Other Outputs		
Event Latch		

Input Configuration

The Input Configuration screen provides sub-screens for configuration of speed, acceleration, configurable inputs 1-10, analog redundancy management, and Boolean redundancy management.

Speed and Acceleration

The speed/Accel screen provides configuration of the speed input, overspeed and speed loss settings, speed redundancy, acceleration, and acceleration redundancy functions. When “Speed/Accel” is selected, the following screen is displayed:

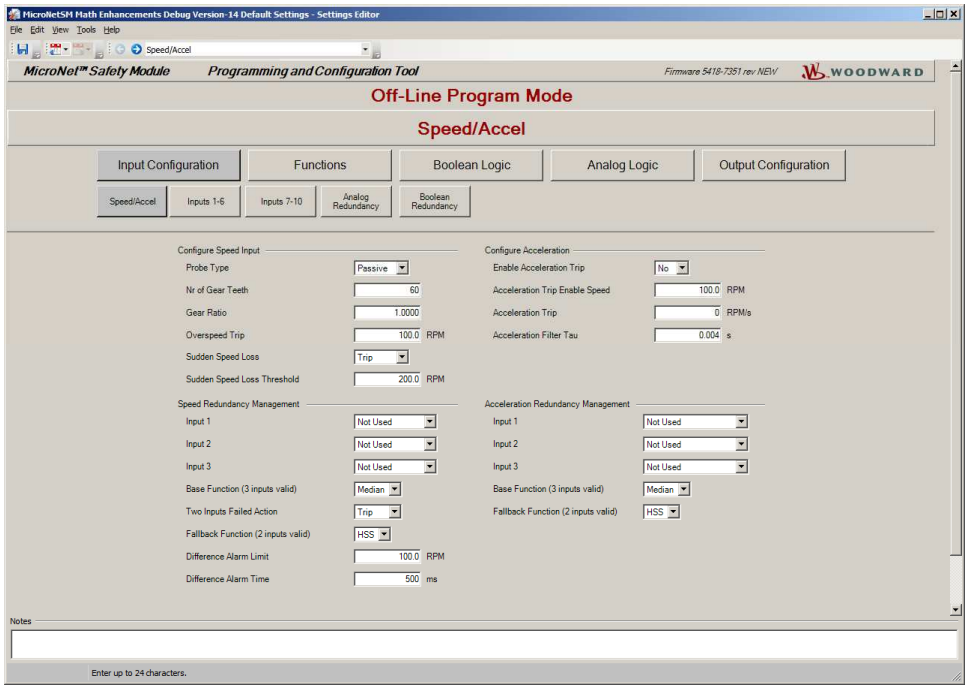


Figure 13-1 Speed and Accel Configuration

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: 0-80000 rpm. Frequency equivalent must not exceed 32000 Hz (configuration error).
- **Sudden Speed Loss:** Select action to take when an instantaneous speed loss is detected. A sudden speed loss is an instantaneous loss of speed of the module’s local speed input. The algorithm is: If the previous speed was above the speed loss threshold and the current speed is 0 then a Sudden Speed Loss is annunciated, if used. Speed is updated on every zero crossing and 0 frequency is detected by no zero crossings on the speed input for 2 seconds. Valid values: Trip, Alarm, or Not Used.

IMPORTANT

Sudden speed loss is based on the local module speed input. If set to ‘Trip’, an instantaneous loss of the module’s speed input would result in a trip, regardless if a speed redundancy manager is used.

- **Sudden Speed Loss Threshold:** Speed setpoint for the sudden speed loss function. Valid values: 1-1000 rpm.

IMPORTANT

Potential Impact of Speed Input Configuration Changes:
When speed is used in any redundancy manager (Speed RM, Accel RM, or Analog RM), changes to the speed settings (probe type, number of teeth, or gear ratio) will automatically force the signal to an 'invalid' state on all 3 modules (A,B,C). While 'invalid', that signal is removed from the voting selection and requires a reset command to restore it.

The speed sensing outputs are automatically connected internally to the speed signal and alarm/trip logic but are also available for connection to other logic blocks. These outputs include speed, overspeed, speed loss, and open wire indications. See also the Start Logic section for additional speed fail detection and diagnostics.

Speed Redundancy Management (RM)

A speed redundancy manager is available which can be used to select speed from any input module (A, B, C). When configured, it automatically provides a voted scheme on up to 3 different speed signals. The output selection (voting) action is configurable, with predefined and selectable functionality for 3/2/1 signal outputs. For example, with 3 good/valid signals the action can be configured to use the median value, highest value, or lowest value. Another selection is provided for the speed selection with two good signals (highest, lowest). When only one good signal is available, the option is provided to either trip or continue to run using that remaining good speed signal. A trip is issued with no valid speed signal.

When the speed redundancy manager is used, the following internal functions use the voted speed signal: Overspeed trip, Speed Fail Trip, and Speed Fail Timer. Local speed is always used for Speed Fail Alarm and Speed Lost (i.e. sudden speed loss).

The speed redundancy manager provides the following outputs, which are automatically connected internally to the speed signal and alarm/trip logic but are also available for connection to other logic blocks.

- **Output:** Analog signal. Speed selection is based on the number of valid/good inputs and the configured action. An Active Mode is provided on the front panel to indicate the currently active signal selection criteria (MEDIAN, HSS, or LSS).
- **Difference:** Boolean signal. Indicates the value of the difference detection output. True when valid inputs exceed the difference threshold for longer than the difference delay time. False when the difference is less than the threshold for 3x the delay time.
- **Input 1-3 Invalid:** Boolean signal (x3). Indicates the input is not valid and has been removed from the voting scheme. A reset is required to restore an invalid signal.
- **Speed RM Trip:** Boolean signal. Set true when block issues a trip command. True with no valid inputs or with two failed inputs and configured to trip.

Speed or Accel Input Invalid Indications

An input becomes invalid if the shared signal is not available, which can be caused by a speed signal in test mode, by a changed configuration (speed input setting changed), by an improper configuration (speed not used), or by an inter-module communications issue. When an input is determined to be invalid, that input is not used by the redundancy manager. To restore an input that is no longer invalid, a reset is required. Note that the input 'invalid' Boolean signals are available to other logic blocks, however an alarm latch connection is automatically (internally) provided for any speed inputs.

Speed Redundancy Management (RM) Settings:

- **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 can differ before the Difference Alarm is set. Valid values: 0-80000 rpm.
- **Difference Alarm Time:** The time the speed difference limit can exist before the Difference Alarm is set. This function is executed every 4 ms. Valid values: 4-10000 milliseconds.

If all inputs to the Speed Redundancy Management (Speed RM) are set to Not Used, then this function is not used. If at least 1 input is configured (a value other than Not Used), then the voted output is automatically used internally in the speed logic. If only 1 input is configured, the Configuration Log will indicate a warning. The configuration is allowed, but this warning is intended to draw attention and make sure this is intended. If any Speed RM output is connected to another function but none of the inputs to this function are configured, the Configuration Log will indicate an error and uploading of the configuration will not be possible. Connection of the Speed RM Input x Invalid indication requires the corresponding input to be configured.

Configure Acceleration settings

- **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: 0-80000 rpm.
- **Acceleration Trip:** Over-acceleration trip setpoint in rpm/second. Valid values: 0-25000 rpm/s.
- **Acceleration Filter Tau (sec):** The acceleration signal is filtered using a single-pole filter. This input defines the tau value for this filter, in seconds. If an unfiltered value is desired, a setting of 2ms should be used (Input=Output). Valid values: 0.002-10.

The acceleration sensing outputs are automatically connected internally to the alarm/trip logic but are also available for connection to other logic blocks. These outputs include acceleration and over-acceleration indications.

Acceleration Redundancy Management

An acceleration redundancy manager is available which can be used to select acceleration from any input module (A, B, or C). When configured, it automatically provides a voted scheme on up to 3 different signals. The output selection (voting) action is configurable, with predefined and selectable functionality for 3/2/1 signal outputs. For example, with 3 good/valid signals, the action can be configured to use the median value, highest value, or lowest value. Another selection is provided for the selection with two good signals (highest, lowest). When only one good signal is available, that remaining good signal is used.

The acceleration redundancy manager provides the following outputs. The Output is automatically used for the over-acceleration trip, when used. This output, as well as the local module acceleration are available for connection to other logic blocks. The ‘Accel RM Input x Invalid’ indication is not automatically connected to the alarm latch and must be user-configured, if desired. When a speed redundancy manager is used, the ‘Invalid’ indications from that function block would typically provide failure indications (since acceleration is based on speed).

- **Output**: Analog signal. Acceleration selection is based on the number of valid/good inputs and the configured selection criteria.
- **Input 1-3 Invalid:** Boolean signal (x3). Indicates the input is not valid and has been removed from the voting scheme. A reset is required to restore an invalid signal.

Acceleration Redundancy Management settings

- **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.

If the Acceleration Redundancy Management (Accel RM) is configured (at least 1 input), then the voted output is automatically used internally in the acceleration logic. If only 1 input is configured, the Configuration Log will indicate a warning. If any Accel RM output is connected to another function but none of the inputs to this function are configured, the Configuration Log will indicate an error and uploading of the configuration will not be possible. Connection of the Accel RM Input x Invalid indication requires the corresponding input to be configured.

Inputs (Programmable Inputs 1-10)

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:

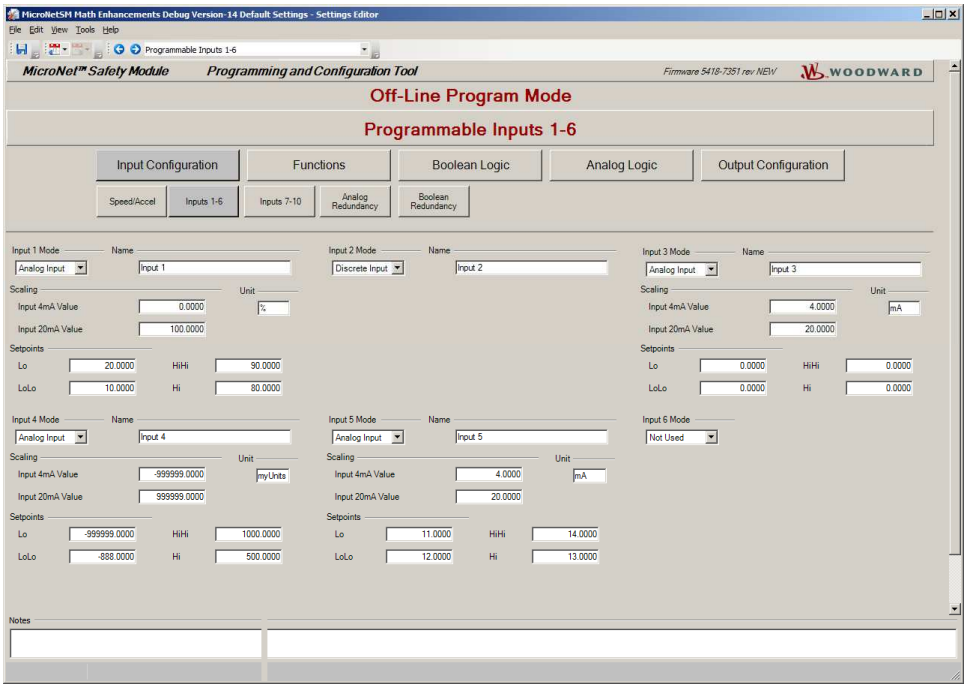


Figure 13-2 Programmable Inputs Configuration

Inputs can be configured using the Programmable Inputs 1-6 and 7-10 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.

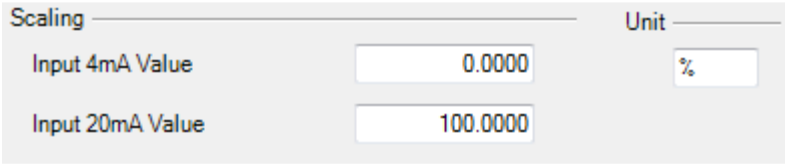


Figure 13-3 Input Scaling

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

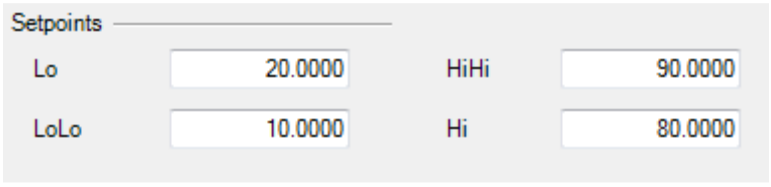


Figure 13-4 Input Threshold Limits

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.

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: -999999 to +999999.
- **Input 20 mA Value:** Scaling value for the input, in user-defined units, corresponding to 20 mA. Valid values: -999999 to +999999.
- **Unit:** User-defined units for the input. Valid values: up to 7 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: -999999 to +999999.
- **LoLo:** LoLo input level setting, in user-defined units, below which the Analog Input LoLo indication is active. Valid values: -999999 to +999999.
- **Hi:** Hi input level setting, in user-defined units, above which the Analog Input Hi indication is active. Valid values: -999999 to +999999.
- **HiHi:** HiHi input level setting, in user-defined units, above which the Analog Input HiHi indication is active. Valid values: -999999 to +999999.

Valid signals must be configured. This validity is checked when the settings are loaded to the device. A summary of the configurable input validity checks is provided below.

Not Used Input
If the input is configured as not used and any signal from this input is connected to another logic block, the Configuration Log will show an error and the configuration cannot be loaded to the MicroNet Safety Module.

Discrete Input
If this input is configured as a discrete input and is not used as an input in any other function, the Configuration Log will indicate a warning. If configured as a discrete input and any analog functions are connected to other blocks (e.g. analog input or HiHi), the Configuration Log will indicate an error and the configuration cannot be uploaded to the MicroNet Safety Module.

Analog Input
If none of the results of an analog input are used as an input in any other function, the Configuration Log will indicate a warning. If any result from the analog input is used (i.e. either the analog value or any one of the setpoint thresholds, excluding the Range Error) then the configuration is regarded correct and no alarm will be displayed in the Configuration 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 Log will show an error and the configuration cannot be loaded to the MicroNet Safety Module.

IMPORTANT

If a configurable input is used in any analog redundancy manager, changes to the scaling settings (value at 4mA or value at 20mA) will automatically force that signal to an 'invalid' state on all three modules (A, B, and C). While 'invalid', that signal is removed from the voting selection and requires a reset command to restore it.

Analog Redundancy

There are 15 analog redundancy manager blocks available, with each providing a voting scheme on up to three different shared signals. The output selection (voting) action is configurable, with predefined and selectable functionality for 3/2/1/0 signal outputs. For example, with three good/valid signals the action can be configured to use the median value, average value, highest value, or lowest value. Another selection is provided for the action with two good signals (highest, lowest, or average). When only one good signal is available, that signal is used. Lastly with no good signals, the default failed output setting is used.

Each analog redundancy manager provides the following outputs, which are available for connection to other logic blocks. To use any of these signals, they must be connected to another logic block. Unlike speed and acceleration, no automatic internal connections are provided for these blocks. For example, if an alarm is desired, an Alarm Latch input must be configured (e.g. Analog RM 1 Input 1 Invalid).

- **Output:** Analog signal. Block output based on the number of valid/good inputs and the configured action. An Active Mode is provided on the front panel to indicate the currently active signal selection criteria.
- **Difference:** Boolean signal. Indicates the value of the difference detection output. True when valid inputs exceed the difference threshold for longer than the difference delay time. False when the difference is less than the threshold for 3x the delay time.
- **Input 1-3 Invalid:** Boolean signal (x3). Indicates the input is not valid and has been removed from the voting scheme. A reset is required to restore an invalid signal.

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

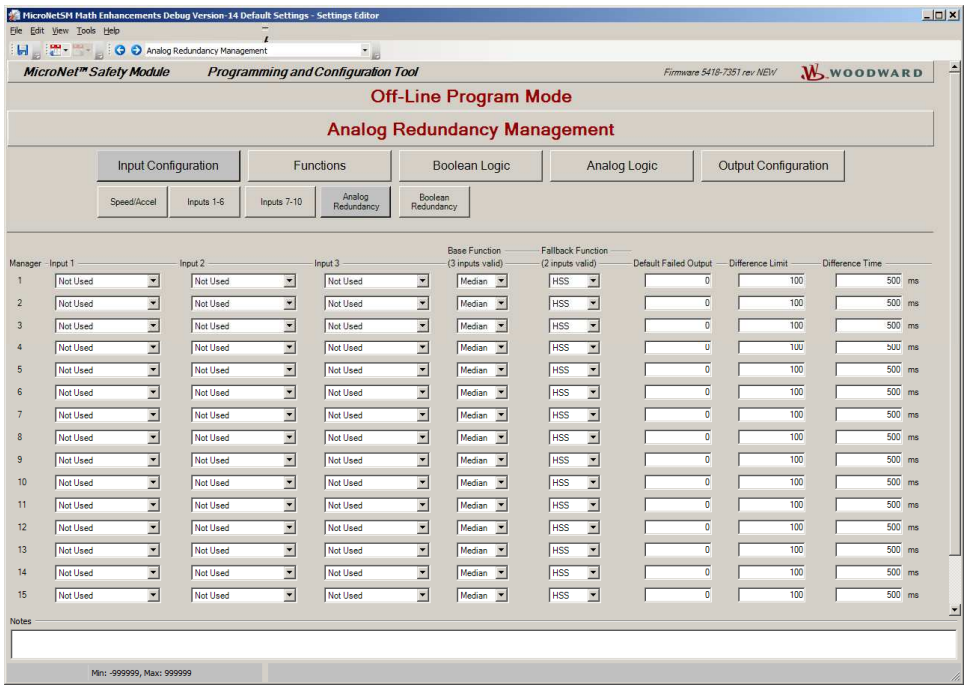


Figure 13-5 Analog Redundancy Manager

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

- **Input 1-3:** Select the analog input signals for the redundancy manager. To use this function block at least one input is required. Valid values:

Table 13-2. Analog Redundancy Manager Input 1-3 Valid Values

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

- **Base Function (3 inputs valid):** Select the redundancy mode. Valid values: 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. Valid values: HSS, LSS, or Average.
- **Default Failed Output:** Select a value that the output should go to when no inputs are valid. Valid values: -999999 to +999999.
- **Difference Limit:** The amount the inputs are allowed to differ before the Difference indication is set. Valid values: 0-999999 rpm.
- **Difference Time:** The time the difference limit is allowed to exist before the Difference indication is set. This function is executed every 8 ms. Valid values: 0-10000 milliseconds.

If any input is set to a value other than Not Connected and no outputs of the analog redundancy manager are used as an input in any other function, the Configuration Log will indicate a warning. If any output of a redundancy manager is connected to another function but none of the inputs to this function are configured, the Configuration Log will indicate an error and uploading of the configuration will not be possible.

Invalid Input Indications
When an input is determined to be invalid, that input is not used by the redundancy manager. To restore an input that is no longer invalid, a reset is required. Each Boolean redundancy manager has 3 'invalid input' outputs available (one for each input), allowing connection to other Boolean logic blocks.

An input becomes invalid for any of the following situations:

- Input out of range (<2mA or >22mA)
- Shared signal not available (improper configuration, inter-module communications issue)
- Scaling on the input has been modified (settings changed)

NOTICE

Connection of redundancy manager 'invalid' input indications to an alarm latch input is recommended for all critical logic.

Boolean Redundancy

There are 15 Boolean redundancy manager blocks available, each provides a voting scheme on up to three different shared Boolean (true/false) signals. The voting action is dependent on the number of good/valid inputs and on the configuration settings.

Table 13-3. Boolean Redundancy Valid Inputs and Block Output

Number of Valid inputs	Block Output
3 good inputs	uses 2 out of 3 voting
2 good inputs (with same input value)	uses input value (2 out of 2 voting)
2 good inputs (with different input values)	uses the 'Two Input Mismatch Output' user setting
1 good input	uses the value of the good input
No good inputs	uses the 'Output with No Valid Inputs' user setting

Each Boolean redundancy manager provides the following outputs, which are available for connection to other logic blocks. To use any of these signals, they must be connected to another logic block. Unlike speed and acceleration, no automatic internal connections are provided for these blocks. For example, if an alarm is desired, an Alarm Latch input must be configured (e.g. Boolean RM 1 Input 1 Invalid).

- **Output:** Boolean signal. Block output based on the number of valid/good inputs and the configured action.
- **Input 1-3 Invalid:** Boolean signal (x3). Indicates the input is not valid and has been removed from the voting scheme. A reset is required to restore an invalid signal.

When “Boolean Redundancy 1-8” is selected in the settings editor or config menu, the following screen is displayed:

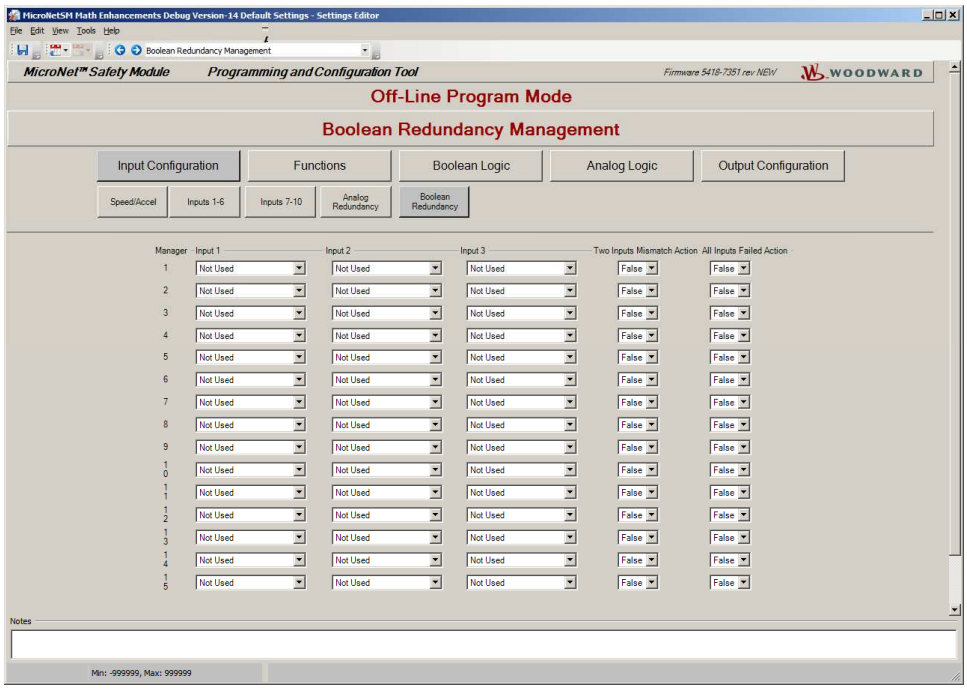


Figure 13-6 Boolean Redundancy Manager

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

- **Input 1-3:** Select the Boolean input signals for the redundancy manager. To use this function block at least one input is required. Valid values:

Table 13-3. Boolean Redundancy Manager Input 1-3 Valid Values

Not Used	Module B Trip Latch	Module C Trip Latch
Module A Trip Latch	Module B Alarm Latch	Module C Alarm Latch
Module A Alarm Latch	Module B Input 1-10	Module C Input 1-10
Module A Input 1-10	Module B Reset	Module C Reset
Module A Reset	Module B Start	Module C Start
Module A Start	Module B Speed Fail Override	Module C Speed Fail Override
Module A Speed Fail Override		

- **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.

If any input is set to a value other the Not Used and none of the outputs of the redundancy manager are used as an input in any other function, the Configuration Log will indicate a warning. If any output of a redundancy manager is connected to another function but none of the inputs to this function are configured, the Configuration Log will indicate an error and uploading of the configuration will not be possible.

Invalid Input Indications

An input becomes invalid if the shared signal is not available, which can be caused by an improper configuration or an inter-module communications issue. When an input is determined to be invalid, that input is not used by the redundancy manager. To restore an input that is no longer invalid, a reset is required.

NOTICE

Connection of redundancy manager 'invalid' input indications to an alarm latch input is recommended for all critical logic.

Functions Configuration

The Functions screen provides sub-screens for configuration of the display settings, configuration compare function, test modes settings, time sync settings and Modbus settings.

Display Settings (Home and Language)

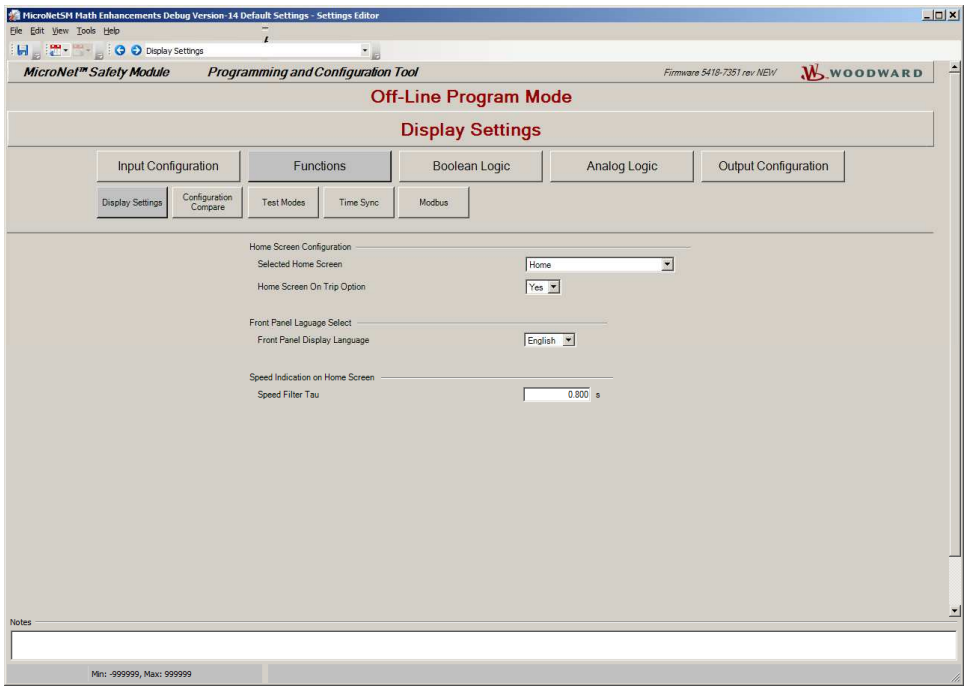


Figure 13-7 Display Configuration

The following parameters can be set:

Home Screen Configuration

- **Selected Home Screen:** Set the screen you want displayed when the “Home” screen button is pressed. Valid Values:

Table 13-4. Home Screen Valid Values

Home	Speed Fail Ovrd Input Sharing	Unit Delay 1-10
Monitor Summary	Analog Output	Analog Redundancy Manager 1-15
Monitor Summary Config Inputs	Modbus	Boolean Redundancy Manager 1-15
Monitor Summary Prog Relays	Date & Time System Status	Lag 1-10
Trip Latch	Module Information	Difference Detection 1-15
Alarm Latch	Overspeed/Acceleration Log	Add 1-5
Event Latch	Trip Log	Negate 1-10
Trip Cycle Time Monitors	Alarm Log	Multiply 1-5
Dedicated Discrete Inputs	Trip Cycle Time Log	Divide 1-5
Configurable Inputs 1-10	Sequence of Events Log	Switch 1-10
Programmable Relays	Event Log	Curve 1-2
Speed Input	Peak Speed/Acceleration Log	Analog Unit Delay 1-10
Speed Redundancy Manager	Analog Comparator 1-15	Counter 1-10
Accel Redundancy Manager	Logic Gate 1-50	Peak Hold 1-10
Speed Fail Timer	Timer 1-5	Pulse Detect 1-5
Start Input Sharing	Latch 1-10	Event Filter 1-5
Reset Input Sharing	Delay 1-25	

- **Home Screen On Trip Option:** This setting is used to configure the action of the display upon sensing a 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.

Front Panel Language Configuration

- **Language Select:** Set the language. Valid values: English or Chinese.

Home screen speed filter

- **Speed Filter Tau (sec):** Used to set the amount of filtering on the speed displayed on the Home screen. The speed displayed has a single-pole filter. This setting defines the tau value for this filter, in seconds. If an unfiltered value is desired, a setting of 4ms should be used (Input=Output). Note that this setting only affects the display on one screen (Home), active speed used within the device is not affected by this setting. Valid values: 0.004-10.

Configuration Compare

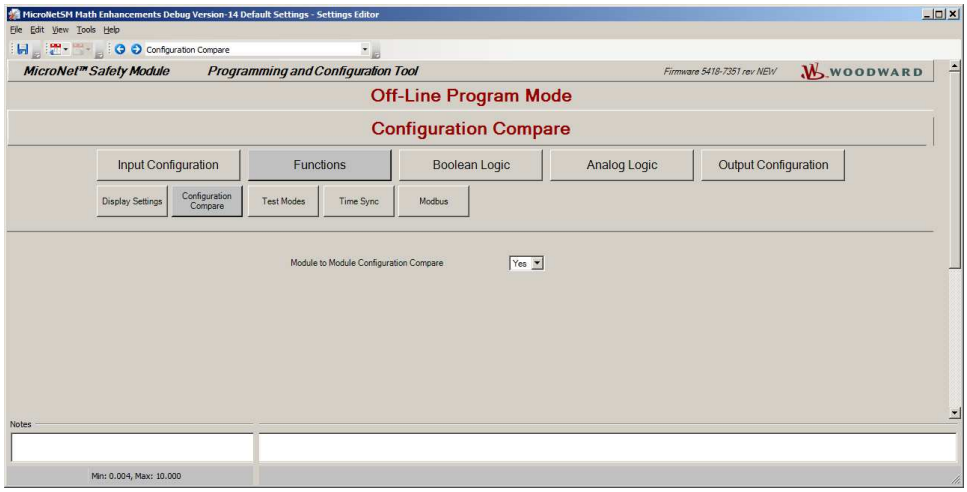


Figure 13-8 Configuration Compare

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

- **Module to Module 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: Yes or No.

  If each of the modules is deliberately configured differently to meet a specific application's requirements, then this setting should be set to No.

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, Language, Speed Filter, Password settings, and Modbus slave addresses are expected to be different between modules. Additionally, all user-configured names and units (Alarm Latch names, Trip Latch names, Event Latch names, Programmable Input names & units) are expected to be different and are not included either.

When enabled, the configuration mismatch alarm is automatically connected internally to the alarm latch but is also available for connection to other logic blocks.

If the output of a configuration mismatch is connected to another function but the function is not enabled, the Configuration Log will indicate an error and uploading of the configuration will not be possible.

Test Modes

The system is equipped with several internal test functions to verify configurable logic and that parameters are working correctly. The test menu contains the 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.
- **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 an 'End Test' option is provided to cancel the test.

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

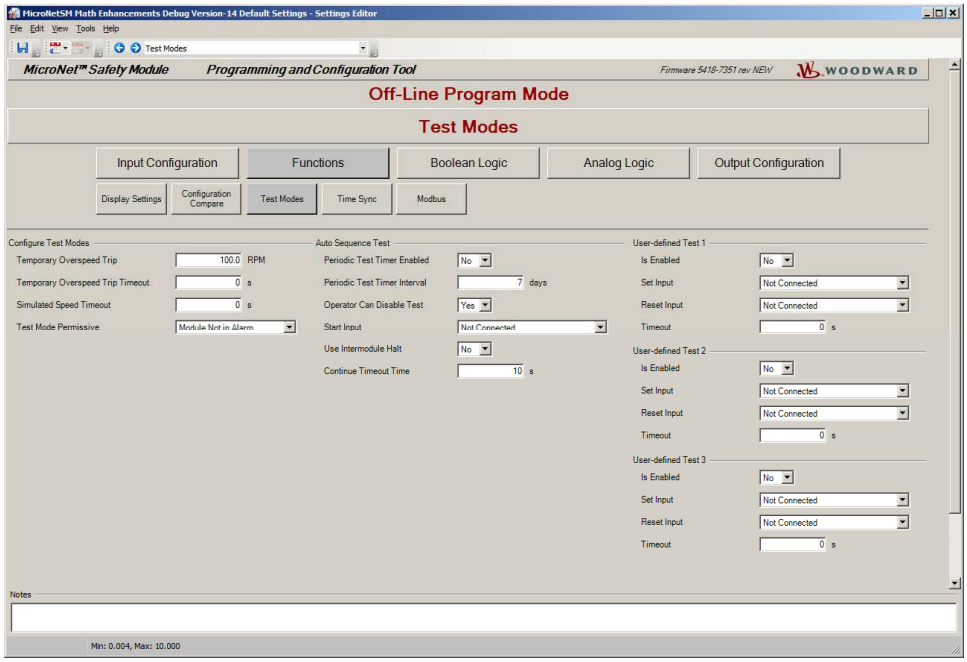


Figure 13-9 Test Modes Configuration

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, used while the Temporary Overspeed Trip Test is active. Valid values: 0-80000 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:** Sets the desired permissive level. This permissive function is used to prevent a test routine from running when another module is tripped, in alarm, or in a test mode. This applies to the User-Defined Test and the Auto or Manual Simulated Speed Tests. It does not apply to the Temporary Overspeed Test or Auto-Sequence Test.

Selection choices are:

- o **No Inter-module Permissive:** Test will run even if another module is tripped, in alarm, or in a test mode.
- o **Module Not Tripped:** Test will only run if other modules are not tripped and not in a test mode.
- o **Module Not In Alarm:** Test will only run if other modules are not tripped, not in alarm, and not in a test mode.

The test active indications are automatically connected internally to the alarm latch but are also available for connection to other logic blocks. The following outputs are provided: Temporary Overspeed Setpoint On (active), Manual Simulated Speed Active, and Auto Simulated Speed Active.

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". The auto sequence test mode requires all modules to be not tripped, not in alarm and not running a test.

- **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. When set to 'no' the periodic test is not run, however the auto-sequence test can still be initiated either manually from the front panel or programmatically using logic commands. Valid values: Yes or No.
- **Periodic Test Timer Interval:** If timer is enabled, 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:** 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. This setting is used to allow operators/users to temporarily disable the Auto-Sequence Test function from being performed either periodically (timer) or programmatically (logic commands). The test disable/enable command option is available from Module A's front panel Auto-Sequence Test operation screen. Valid values: Yes or No.
- **Start Input:** Selection to programmatically start the Auto-Sequence Test. This input is edge sensitive on module A and level sensitive on modules B & C. Valid values: (*see selection list below).*
- **Use Inter-module Halt:** Set to yes to have the module wait for a Start Input level of true before continuing test on that module. Only valid when Start Input is used/configured. Valid values: Yes or No.
- **Continue Timeout Time:** The amount of time to wait for the test Start Input signal on modules B and C. Only valid when Inter-module Halt is used. Valid values: 0-28800 seconds.

Table 13-5. Auto-Sequence Test Start Input Selections

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

The periodic test timer and disable settings are configured on module A. If a programmatic test is desired, then the Start Input is also configured on module A. The inter-module halt settings are set on modules B & C. These are the Use Inter-module Halt, Start Input, and Continue Timeout Time. The system is designed to work with the inter-module halt settings the same (however they don't have to be) on all three modules so Configuration Compare can be used.

Indications for Auto Sequence Test Active and Auto Sequence Timeout are automatically connected internally to the alarm latch but is also available for connection to other logic blocks.

To use the Inter-module Halt, the Start Input must be configured to a value other than 'Not Connected'. If this condition is not met, the Configuration Log will indicate an error and uploading of the configuration will not be possible.

User-defined Tests

- **Is Enabled:** Set to yes to use the function. Valid values: Yes or No.
- **Set Input:** Selection to programmatically start the user-defined test. Triggered on a rising edge. Valid values: *(see selection list below).*
- **Reset Input:** Selection to programmatically 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 13-6. User-defined Test Input Selections

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

The User-Defined Test Active is automatically connected internally to the alarm latch but the logic for the test itself must be implemented by the user. The user-defined test active indications (1, 2, and 3) are also available for connection to other logic blocks.

To use a User-Defined Test, the 'Is Enabled' must be set to 'yes' and additional logic added to perform the desired test. If programmatic start/stop are desired, the Enabled must be 'yes' and both inputs (Set and Reset) must be configured to a value other than 'Not Connected'. If a user-defined test is configured and the output is not used as an input in any other function, the Configuration Log will indicate a warning. If the output of a test is connected to another function but the function is not enabled, the Configuration Log will indicate an error and uploading of the configuration will not be possible.

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:

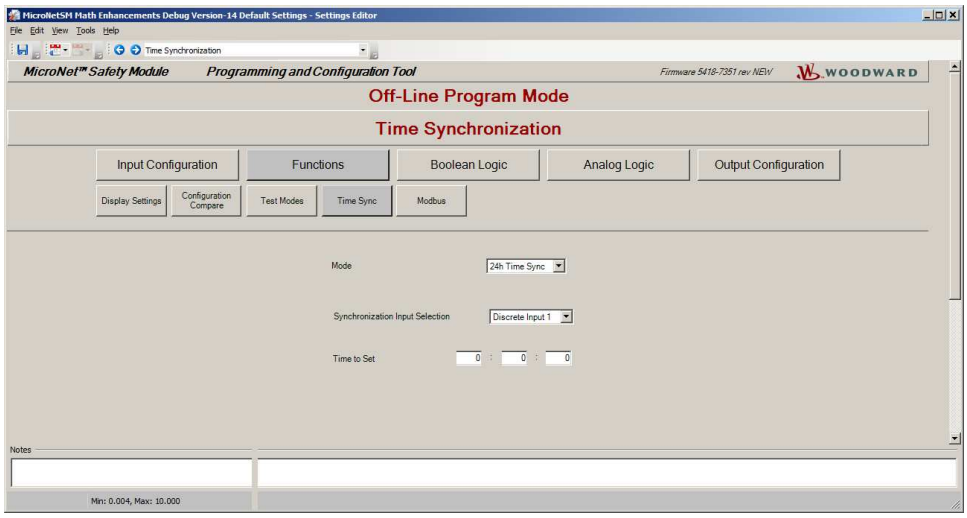


Figure 13-10 Time Sync Configuration

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.

Modbus

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

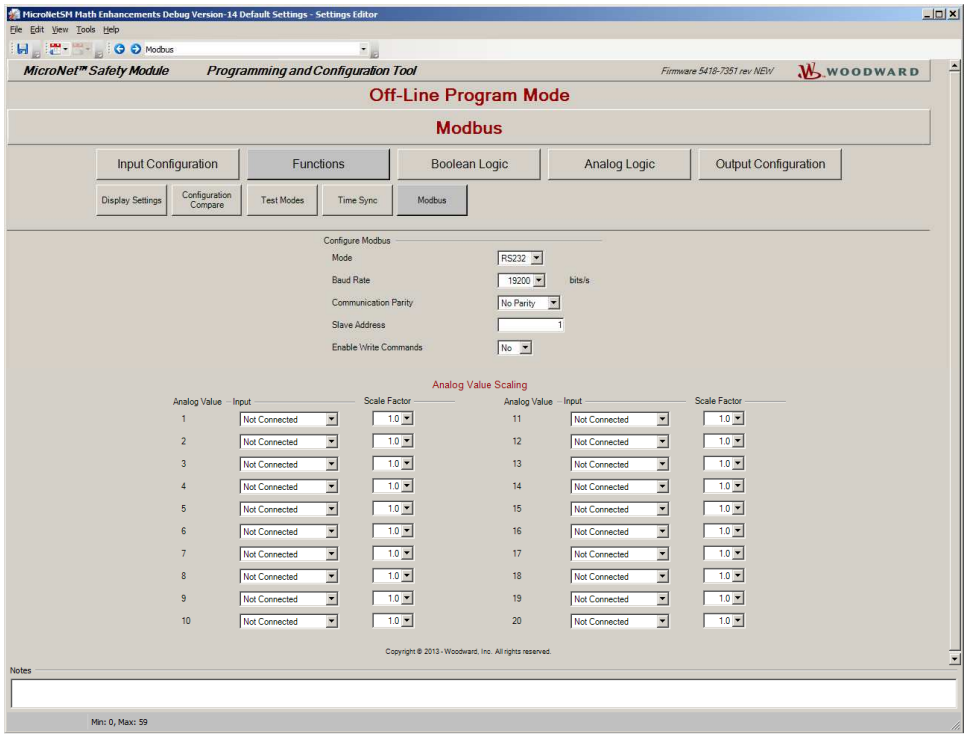


Figure 13-11 Modbus Configuration

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: RS232 or RS485.
- **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 MSM (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.

Settings for Modbus Register (analog) Reads 01-20

- **Input:** Select the analog signal to scale. The value in the specified register will be the signal multiplied by the selected Scale Factor. On the receiving end, the signal will need to be divided by the scale factor. Valid values: *(see Analog Function Input Selections list, Table 13-10)*
- **Scale Factor:** Sets the scale factor the input is multiplied by before being loaded into the associated Modbus register. Valid values: 0.001, 0.01, 0.1, 1.0, 10, 100, or 1000. Default 1.0

Boolean Logic Configuration

The Boolean Logic Configuration screen provides sub-screens for configuration of the configurable logic involving Boolean (digital, true/false) signals. This includes the start logic, logic gates (AND, OR, NOT, etc.), latches, delays, comparators, timers, trip cycle timers, pulse detectors, and event filters.

For most configured Boolean input selections, the options available include the output of every logic block or function that is of type Boolean. The values are shown below in Table 13-7.

Table 13-7. Boolean Function Input Selections

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

A description of each of the Boolean function logic connections is provided in Chapter 3. In general, the function must be configured for use as a permissive for the indication to go true. An attempted connection to an un-used function will result in a configuration error when loading settings to the device.

Start Logic

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

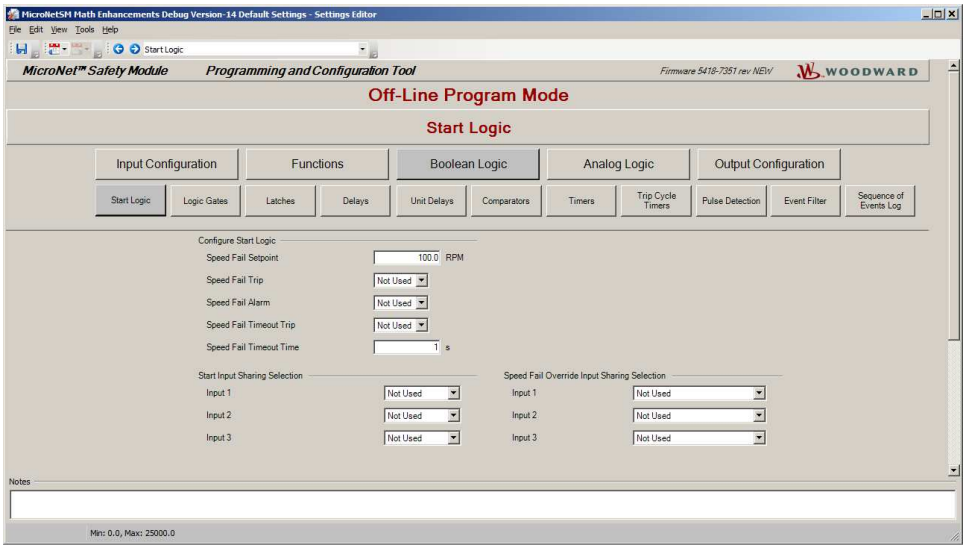


Figure 13-12 Start Logic Configuration

The following parameters can be set:

Configure Start Logic

- **Speed Fail Setpoint:** Speed setpoint below which the speed signal is considered failed. This is the threshold used in the Speed Fail Alarm, Speed Fail Trip and Speed Fail Timeout selection below. 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 local speed is below the Speed Fail Setpoint. This function is only available when the module’s speed probe is passive or active (probe type cannot be Not Used). 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.

When used, the speed fail outputs are automatically connected internally to the alarm/trip logic but are also available for connection to other logic blocks. These outputs include the Speed Fail Alarm, Speed Fail Trip, and Speed Fail Timeout Trip indications.

To use any of the speed fail diagnostics, a speed must be available on the module. If speed is not configured, the Configuration Log will indicate an error and uploading of the configuration will not be possible. For Speed Fail Alarm, local speed is required (speed probe type cannot be ‘Not Used’). For Speed Fail Trip and Speed Fail Timeout Trip, speed must be configured using either the speed redundancy manager or local speed. If the output of any speed fail diagnostic is connected to another function but the required inputs are not configured (e.g. Speed Fail Trip and Speed Probe Type), the Configuration Log will indicate an error and uploading of the configuration will not be possible.

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.

To use the shared Start or shared Speed Fail Override function, at least one input must be configured to a value other than ‘Not Used’. If only one input is configured, the Configuration Log will indicate a warning. If shared start or shared speed fail override is connected to another function but no inputs are configured, the Configuration Log will indicate an error and uploading of the configuration will not be possible.

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

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

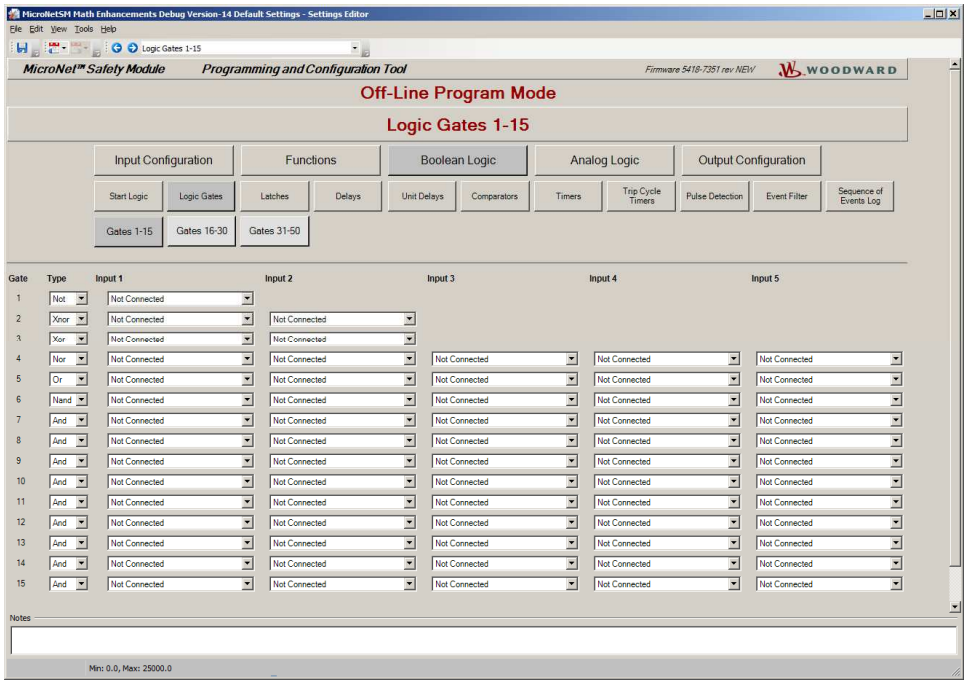


Figure 13-13 Logic Gate Configuration

Specific gates can be selected by the buttons near the top of the page (Gate 1-15, Gate 16-30, Gate 31-50). 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.

A complete listing of the input selections is provided, see Table 13-7 Boolean Function Input Selections table. For additional details on each selection refer to section on “Logic Connections and Selection Options” in chapter 3.

If any gate input is set to a value other the Not Connected and the output of a gate is not used as an input in any other function, the Configuration Log will indicate a warning. If the output of a Logic Gate is connected to another function but the proper number of inputs is not configured (see table above), the Configuration Log will indicate an error and uploading of the configuration will not be possible.

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.

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

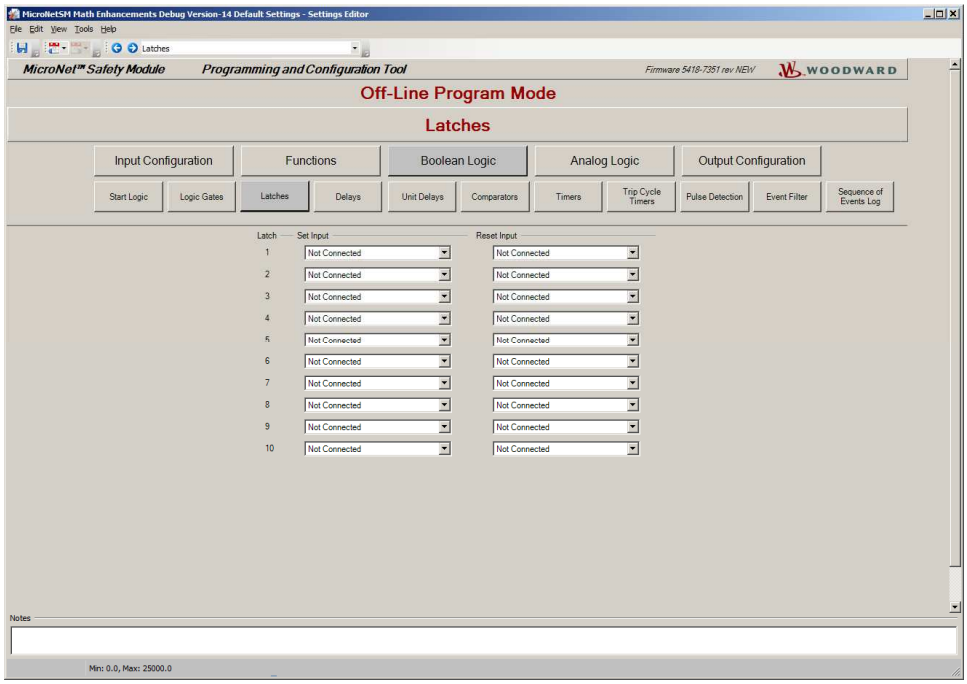


Figure 13-14 Latch Configuration

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 Boolean Function Input Selections list, Table 13-7).*
- **Reset Input:** Selection for the reset-dominant latch block reset input. Valid values: *(see Boolean Function Input Selections list, Table 13-7).*

To use a latch, both inputs (Set and Reset) must be configured to a value other than ‘Not Connected’. If a latch is configured and the output is not used as an input in any other function, the Configuration Log will indicate a warning. If the output of a latch is connected to another function but both inputs (Set and Reset) are not configured, the Configuration 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).

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

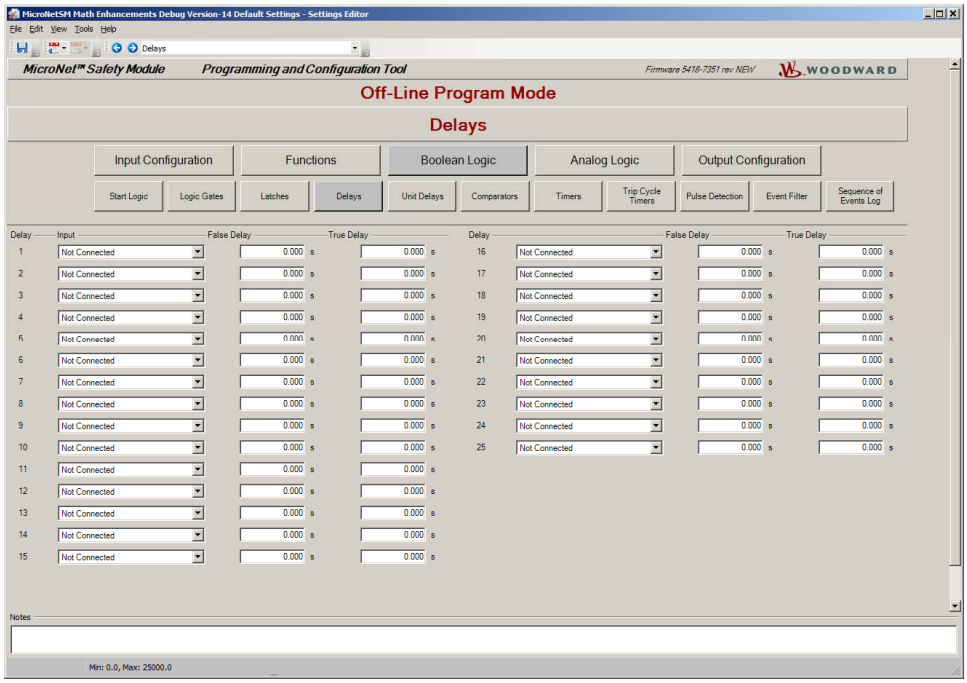


Figure 13-15 Delay Configuration

Delay settings

- **Input:** Selection for the block input. Valid values: *(see Boolean Function Input Selections list, Table 13-7).*
- **False Delay:** Time delay that the input must remain false before the output goes false. The minimum detectable resolution is 8 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 8 msec. Valid values: 0-3600 seconds.

If the input is set to a value other than Not Connected and the output of a delay is not used as an input in any other function, the Configuration Log will indicate a warning. If the output of a delay is connected to another function but the input is not configured, the Configuration 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.

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

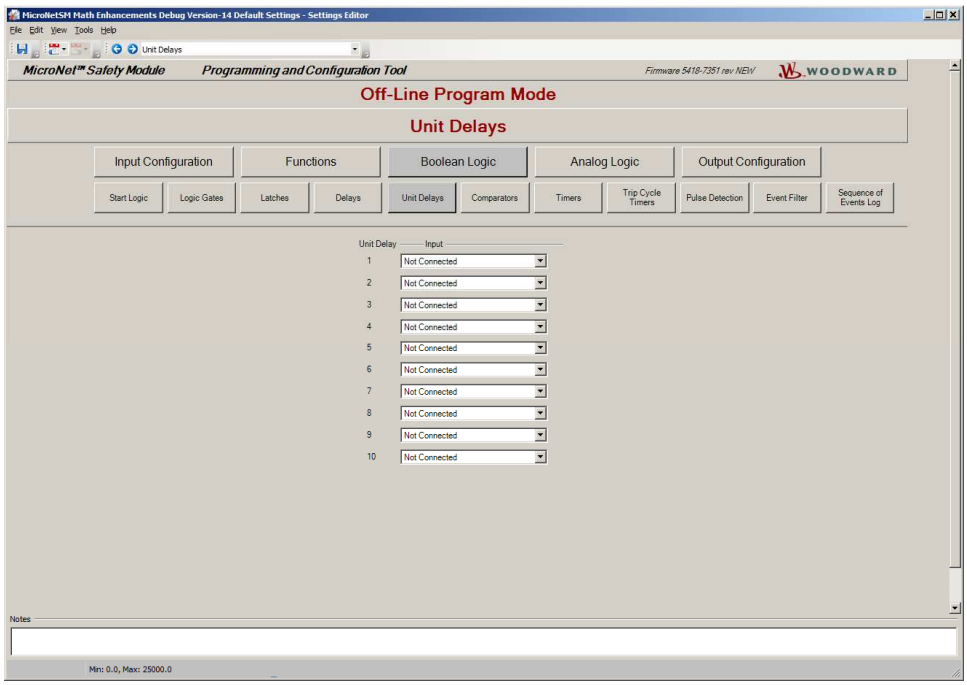


Figure 13-16 Unit Delay Configuration

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 Boolean Function Input Selections list, Table 13-7).*

If the input is set to a value other than Not Connected and the output of a unit delay is not used as an input in any other function, the Configuration Log will indicate a warning. If the output of a unit delay is connected to another function but the input is not configured, the Configuration Log will indicate an error and uploading of the configuration will not be possible.

Comparators

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

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

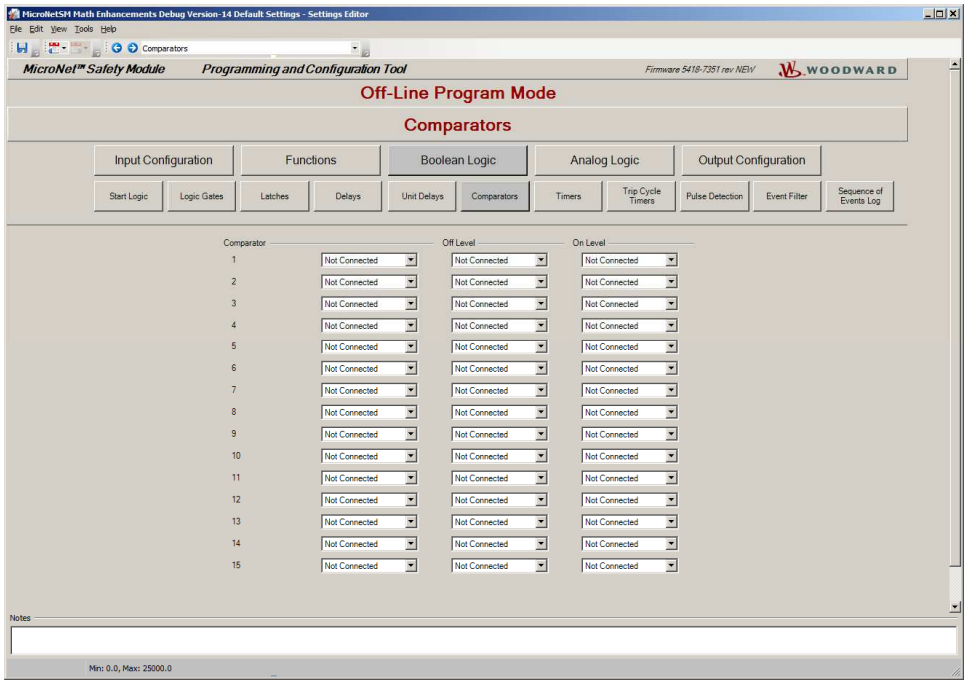


Figure 13-17 Comparator Configuration

The block input is compared to on and off values. The on/off values 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: *(see Analog Function Input Selections list, Table 13-10).*
- **Off Level:** Comparator OFF value, in engineering units. Valid values: *(see Analog Function Input Selections list, Table 13-10).*
- **On Level:** Comparator ON value, in engineering units. Valid values: *(see Analog Function Input Selections list, Table 13-10).*

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

Timers

There are five 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.

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

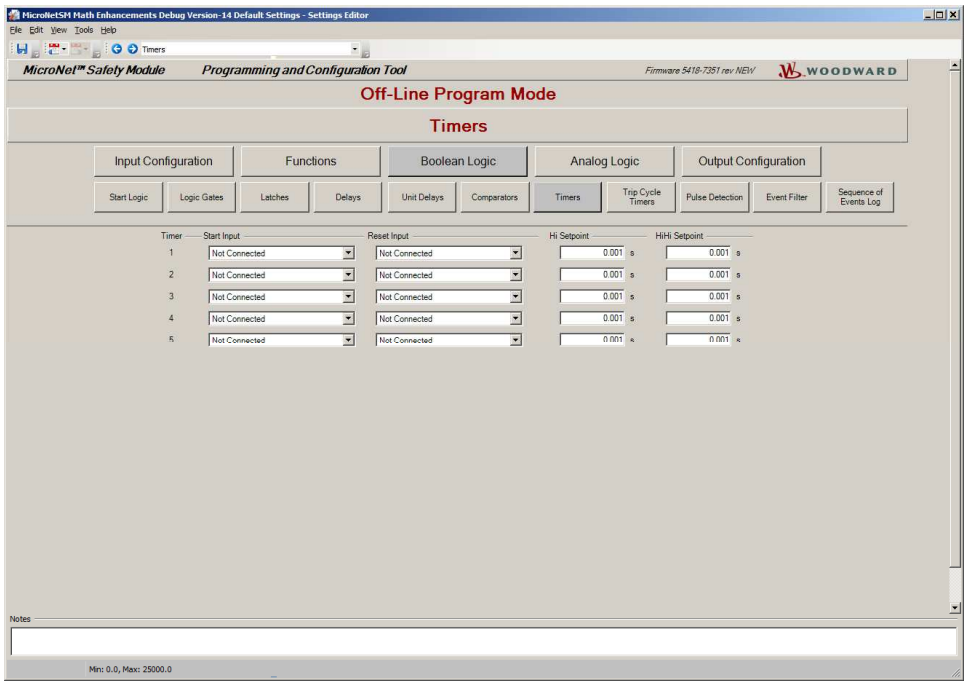


Figure 13-18 Timer Configuration

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 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 Boolean Functions Input Selections list, Table 13-7).*
- **Reset Input:** Selection for the timer reset input. Valid values: *(see Boolean Function Input Selections list, Table 13-7).*
- **Hi Setpoint:** Accumulated time setting above which the timer block Hi output will go true and stay true until a reset is asserted. The minimum detectable resolution is 8 msec. Valid values: 0-3600 seconds
- **HiHi Setpoint:** Accumulated time setting above which the timer block HiHi output will go true and stay true until a reset is asserted. The minimum detectable resolution is 8 msec. Valid values: 0-3600 seconds

To use a Timer, both inputs (Start and Reset) must be configured to a value other than 'Not Connected'. If a timer is configured and neither of the outputs (Hi or HiHi) are used as an input in any other function, the Configuration Log will indicate a warning. If the output of a timer is connected to another function but both inputs (Start and Reset) are not configured, the Configuration Log will indicate an error and uploading of the configuration will not be possible.

Pulse Detection

There are five Pulse Detection blocks. These can be used to monitor analog signals and is used to detect a rise in value followed by a drop. The output indicates a pulse was detected. This can be used in conjunction with a counter block (to monitor the number of pulses) or an event filter (to determine if an excessive number of events occurred within a specific sliding-window timeframe).

When "Pulse Detectors" is selected in the settings editor or configuration menu, the following screen is displayed:

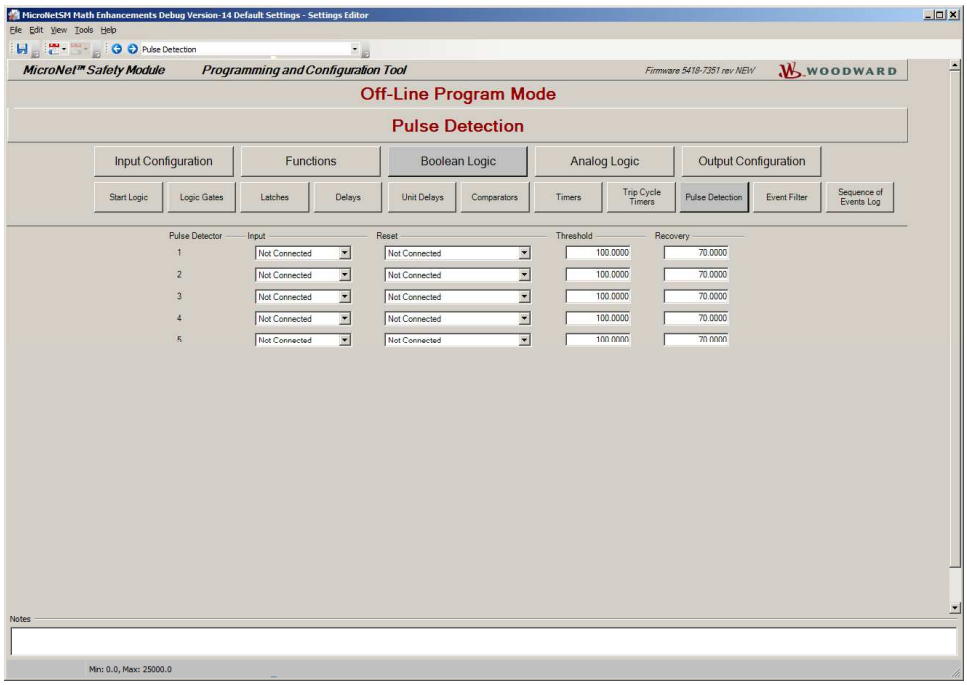


Figure 13-19 Pulse Detection Configuration

The Pulse Detector output goes TRUE when the input has gone above the Threshold and has dropped Recovery percent from its peak. The output stays true until the Reset input goes true.

Pulse Detector settings

- **Input:** Selection for the monitored input. Valid values: *(see Analog Function Input Selections list, Table 13-10).*
- **Reset:** Selection for the reset input. The Reset input is dominant and when true, sets the output to false and clears the internally captured peak value. Valid values: *(see Boolean Function Input Selections list, Table 13-7).*
- **Threshold:** An input value above this threshold activates the block function. Valid values: -999999 to 999999.
- **Recovery (%):** Setting for the percentage drop from its internally captured peak value to trigger the output. Valid values: 0-100 %

To use a Pulse Detector, both inputs (Input and Reset) must be configured to a value other than 'Not Connected'. If a Pulse Detector is configured and the output is not used as an input in any other function, the Configuration Log will indicate a warning. If the output of a Pulse Detector is connected to another function but both inputs (Input and Reset) are not configured, the Configuration Log will indicate an error and uploading of the configuration will not be possible.

Event Filter

There are five Event Filter blocks. These are used to provide an indication that an excessive number of events have occurred within the defined window of time. The time window is a sliding window (not fixed). Every event is time stamped, with the end of the window occurring at the most recent event. The difference between the most recent and oldest time stamps (based on the number of events used) is compared to the configured time window to determine if excessive events occurred.

When "Event Filter" is selected in the settings editor or configuration menu, the following screen is displayed:

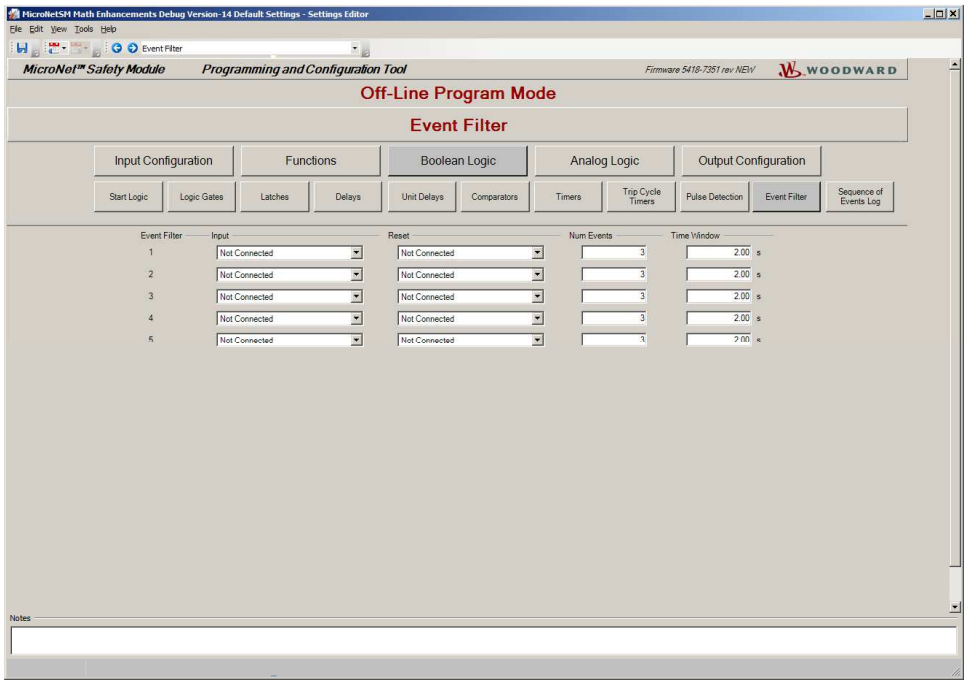


Figure 13-20. Event Filter Configuration

Event Filter settings

- **Input:** Selection for the input. Valid values: *(see Boolean Function Input Selections list, Table 13-7).*
- **Reset Input:** Selection for the reset input. The Reset input is dominant and when true, sets the output to false and clears the internally captured timing values. Valid values: *(see Boolean Function Input Selections list, Table 13-7).*
- **Num Events:** Sets the number of events that will trigger a true output if they occur within the configured time window. Valid values: 2-10
- **Time Window:** Sets the window of time within which the number of triggered events is monitored, in seconds. If the number of events is exceeded, the output will go true and stay true until a Reset is issued. Valid values: 0.25-60 seconds

To use an Event Filter, both inputs (Input and Reset) must be configured to a value other than 'Not Connected'. If an event filter is configured and the output is not used as an input in any other function, the Configuration Log will indicate a warning. If the output of an event filter is connected to another function but both inputs (Input and Reset) are not configured, the Configuration Log will indicate an error and uploading of the configuration 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 configuration menu, the following screen is displayed:

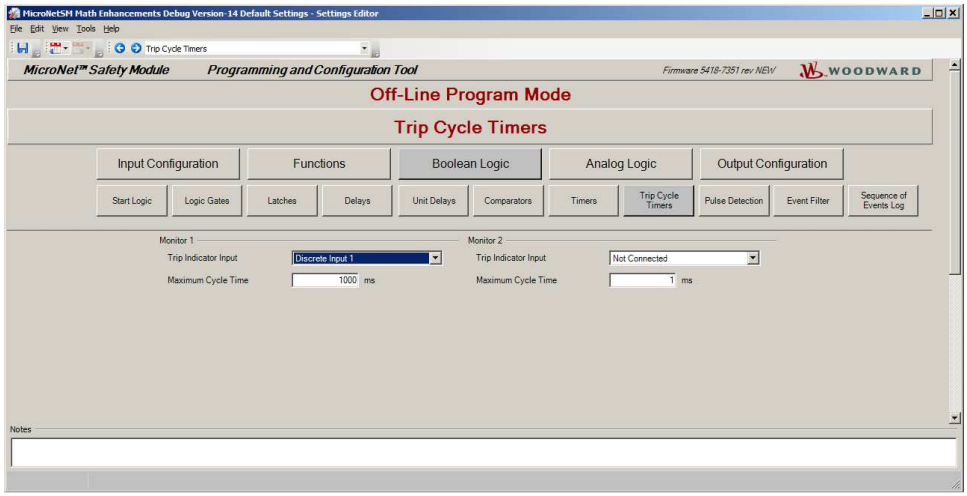


Figure 13-21. Trip Cycle Timer Configuration

The Trip Indicator input field must 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:

Table 13-8. Trip Cycle Timer Settings Valid Values

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

- **Maximum Cycle Time**: The Maximum Cycle Time defines the time allowed between a trip occurrence and the feedback confirmation, in milliseconds. The trip cycle timer function is executed every 4 ms. 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, 8 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.

Twenty 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:

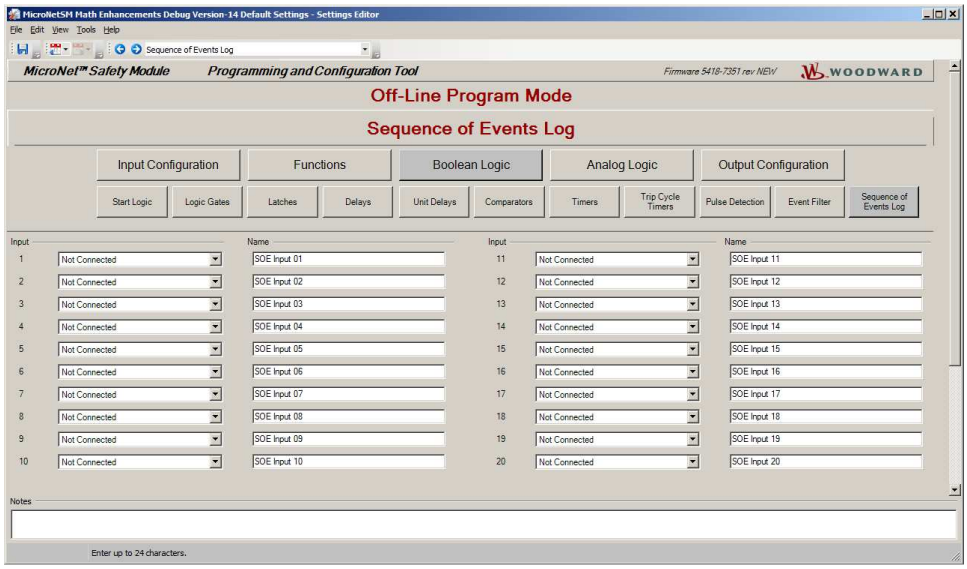


Figure 13-22. Sequence of Events Log

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:

Table 13-9. Selection for the Log Input Valid values

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

- **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).

Analog Logic Configuration

The Analog Logic Configuration screen provides sub-screens for configuration of the logic blocks that handle analog signals. For most configured analog input selections, the options available include the output of every logic block that is of type analog. The values are shown below in Table 13-10.

Table 13-10. Analog Function Input Selections

Not Connected	Not Connected	Lag d/dt 1-10
Speed	Add 1-5	Switch 1-10
Speed RM	Negate 1-10	Analog Unit Delay 1-10
Acceleration	Multiply 1-5	Peak Hold Min 1-10
Acceleration RM Analog Input 1-10	Divide 1-5	Peak Hold Max 1-10
Analog RM 1-15	Curve 1-2	Counter 1-10
Constant 1-20	Lag 1-10	

Lags

There are 10 Lag blocks available for filtering analog signals. Each Lag function implements a single-pole filter and has a configurable time constant. The lag block provides two outputs, the filtered output and a derivative of the output. The derivative (d/dt) is the rate of change with respect to time, based on the filtered output. A lag tau setting of 4ms provides no filtering (output=input), if an unfiltered derivative value is desired.

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

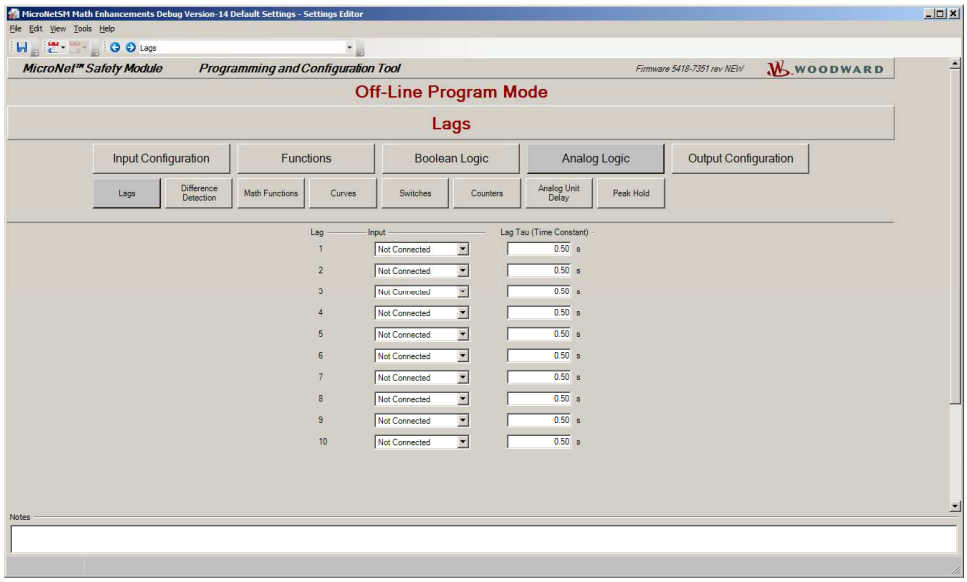


Figure 13-22 Lag Configuration

Lag Settings

- **Input:** Selection for the block input. Valid values: *(see Analog Function Input Selections list, Table 13-10).*
- **Lag Tau (Time Constant):** Selection for the filter time constant. This also affects the block derivative (d/dt) output, as the derivative is based on the block output which is filtered. A value of 0.004 provides no filtering, the output will equal the input. Valid values: 0.004 to 10 seconds.

If the input is set to a value other than Not Connected and the output of a lag (either the lag output or the d/dt output) is not used as an input in any other function, the Configuration Log will indicate a warning. If the output of a lag is connected to another function but the input is not configured, the Configuration Log will indicate an error and uploading of the configuration will not be possible.

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 must be above the threshold for the time delay before the output goes true.

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

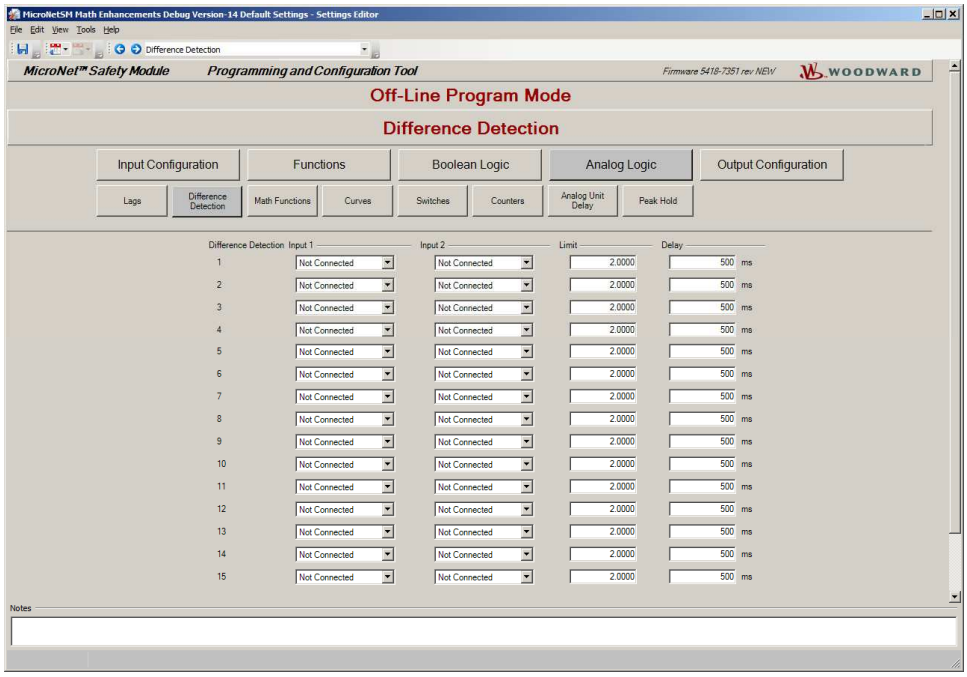


Figure 13-23 Difference Detection Configuration

Difference Detection Settings

- **Input 1 & 2:** Selection for the block input. Valid values: *(see Analog Function Input Selections list, Table 13-10).***Limit:** Selection for the difference limit. Valid values: 0 to 999999.
- **Delay:** Selection for the delay. Valid values: 0 ms to 10000 ms.

To use a Difference Detection, both inputs (Input 1 and 2) must be configured to a value other than ‘Not Connected’. If a Difference Detection is configured and the output is not used as an input in any other function, the Configuration Log will indicate a warning. If the output of a Difference Detection is connected to another function but both inputs are not configured, the Configuration Log will indicate an error and uploading of the configuration will not be possible.

Math Functions

The Math Function screen provides sub-screens for configuration of the basic math blocks: constants, addition, subtraction (negate), multiplication and division.

Constant

There are 40 Constant blocks available to provide a constant value to other analog logic blocks. Example used to facilitate a divide by 2 or multiply by 100. Each Constant block has a configurable analog value.

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

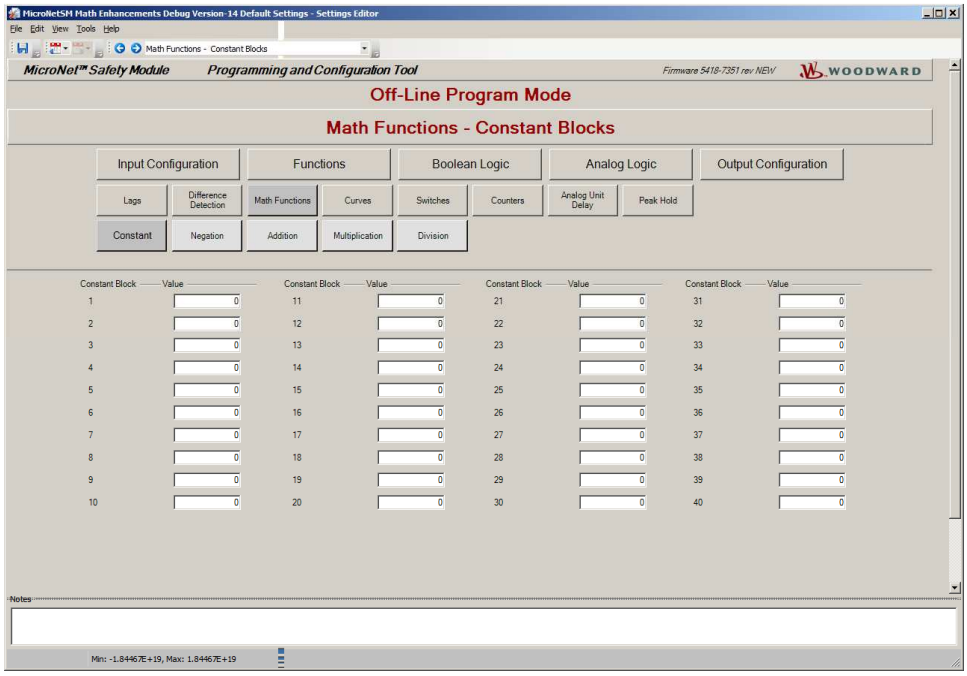


Figure 13-24 Constant Configuration

Constant Block settings

Input: Setting for the constant. Valid values: -999999 to 999999.

Negation

There are 10 Negate blocks available to facilitate a subtraction function. Each Negate block has a configurable input that can be connected to any analog logic signal.

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

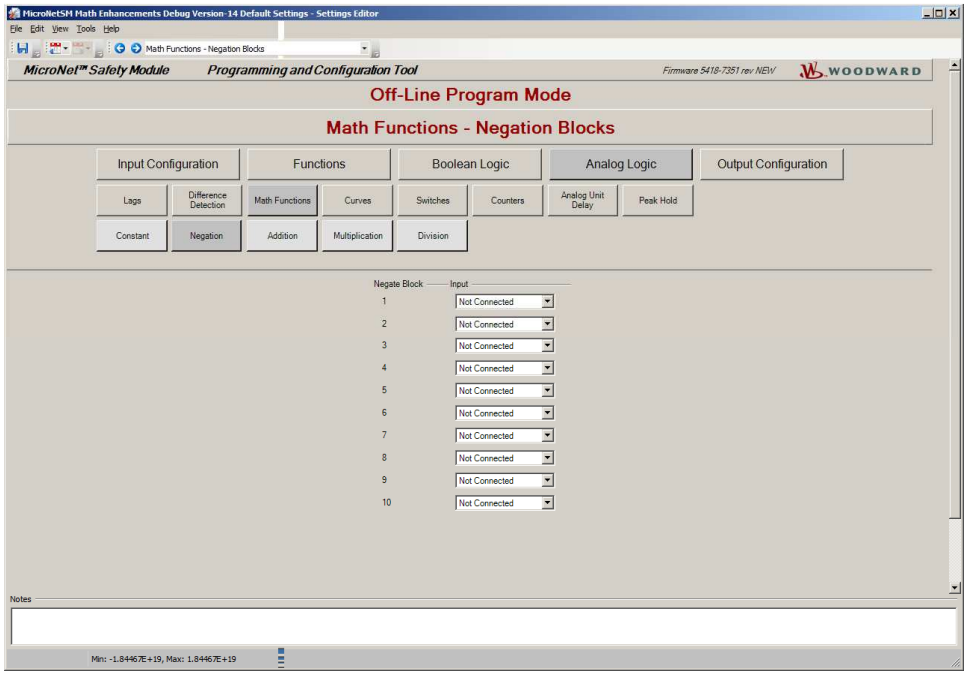


Figure 13-25 Negate Configuration

Negate Block settings

Input: Selection for the block input. The negate block provides the negative value of the selected input. Valid values: (see Analog *Function Input Selections list, Table 13-10).*

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

Addition

There are five Add blocks available for adding analog signals. The add block has up to 5 configurable inputs that can be connected to any analog logic signal.

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

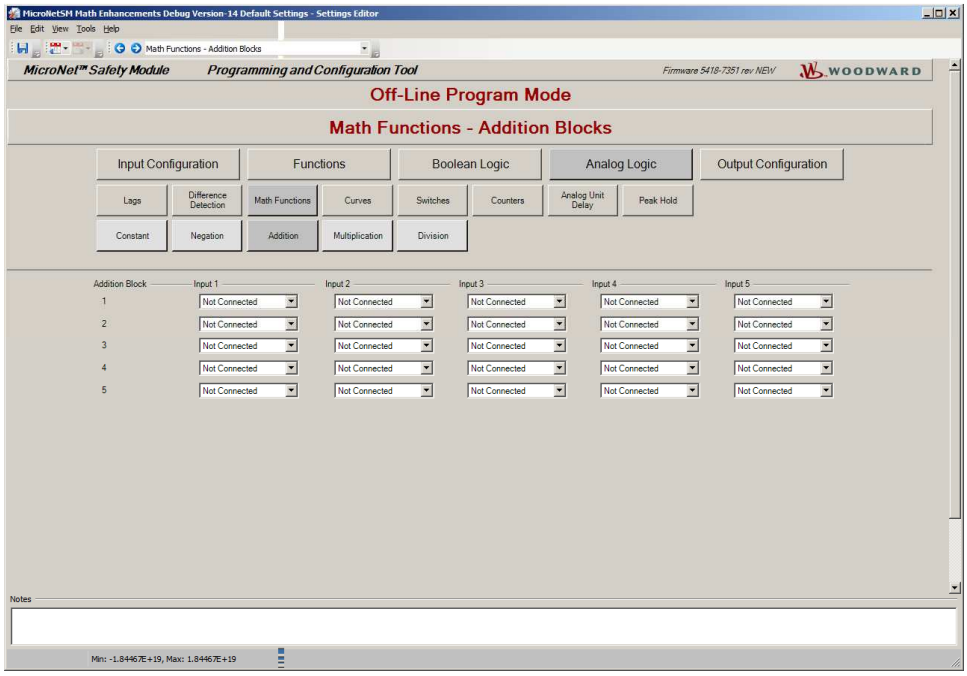


Figure 13-26 Add Configuration

Add settings

Input 1-5: Selection for the block input. The add block provides a summation of the selected inputs. Valid values: *(see Analog Function Input Selections list, Table 13-10).*

To use an add block, at least two inputs must be configured to a value other than ‘Not Connected’. If an add block is configured and the output is not used as an input in any other function, the Configuration Log will indicate a warning. If the output of an add block is connected to another function but at least 2 inputs are not configured, the Configuration Log will indicate an error and uploading of the configuration will not be possible.

Multiplication

There are five Multiply blocks available for multiplying values of analog signals. Each block has up to 5 configurable inputs that can be connected to any analog logic signal.

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

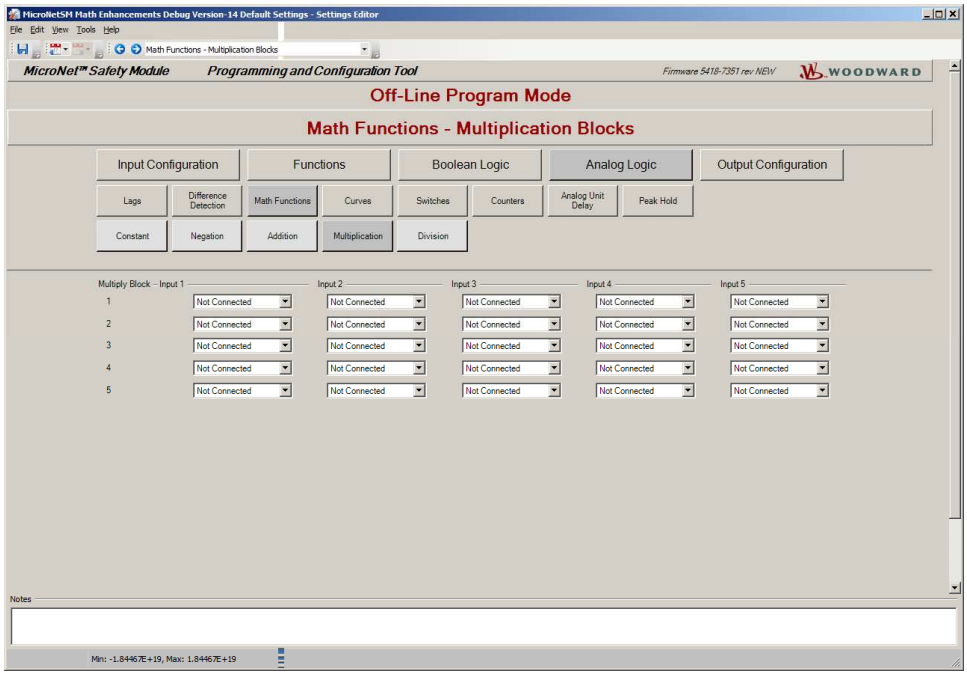


Figure 13-27 Multiply Configuration

Multiply settings

Input 1-5: Selection for the block input. The multiply block provides a product of the selected inputs. Valid values: *(see Analog Function Input Selections list, Table 13-10).*

To use a multiply, at least two inputs must be configured to a value other than ‘Not Connected’. If a multiply is configured and the output is not used as an input in any other function, the Configuration Log will indicate a warning. If the output of a multiply is connected to another function but both inputs are not configured, the Configuration Log will indicate an error and uploading of the configuration will not be possible.

Division

There are five Divide blocks available for dividing values of analog signals.

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

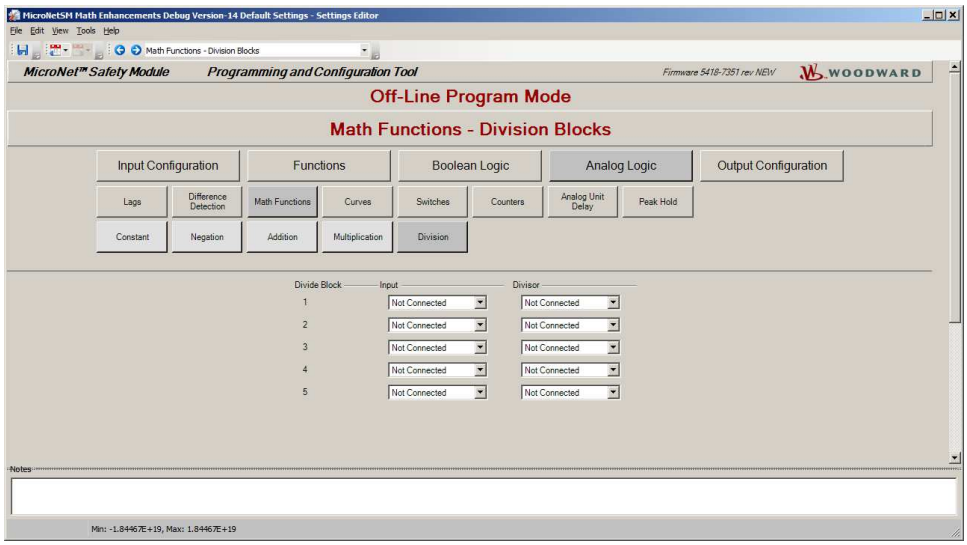


Figure 13-28 Divide Configuration

Divide settings

- **Input:** Selection for the block input. The block output is the input divided by the divisor. Valid values: *(see Analog Function Input Selections list, Table 13-10).*
- **Divisor:** Selection for the block divisor input. Valid values: *(see Analog Function Input Selections list, Table 13-10).*

To use a divide, both inputs (Input and Divisor) must be configured to a value other than ‘Not Connected’. If a divide is configured and the output is not used as an input in any other function, the Configuration Log will indicate a warning. If the output of a divide is connected to another function but both inputs are not configured, the Configuration Log will indicate an error and uploading of the configuration will not be possible.

Curves

There are two curve blocks that provide a 2-dimensional look-up (polynomial) function to an analog signal. Each curve has up to 6 configurable breakpoints. The curve output is based on the configured input. It uses the X & Y settings to determine the value. If the input is equal to an X-input breakpoint, the output will be the Y-breakpoint value. Between breakpoints the value is interpolated. At the endpoints the value is limited. Below the Breakpoint 1 X-value, the output is the Breakpoint 1 Y-value. Likewise above the highest X-value the output is set to the highest Y-value. The number of breakpoints is configurable.

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

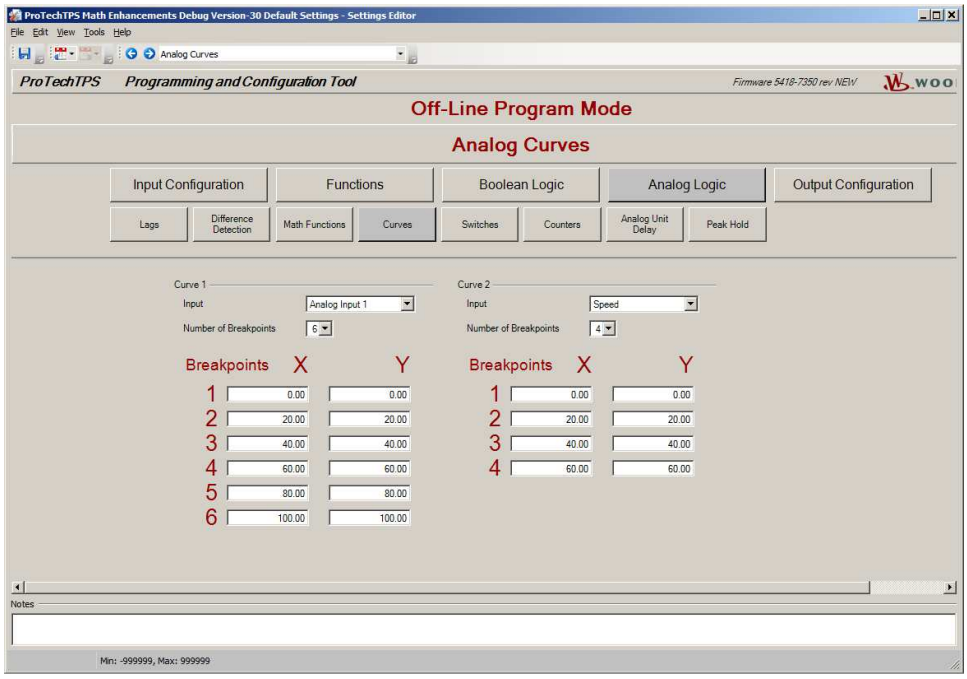


Figure 13-29 Curve Configuration

Curve Settings

- **Input:** Selection for the block input. Valid values: *(see Analog Function Input Selections list, Table 13-10).*
- **Number of Breakpoints:** Select the number of breakpoints to use. Valid values: 2 to 6.
- **X and Y breakpoint values:** Enter the values for the curve breakpoints. The X-values correspond to input breakpoints and Y-values are output values at the respective input value. Between points the output values are interpolated and beyond the X-inputs the output is limited. Valid values: -999999 to +999999. The X-values must be monotonically increasing (config error). There are no limitations on the Y-values.

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

Switches

There are 10 Switch blocks available for selecting between two analog signals. The switch outputs one of two analog Input values based on the status of the control input. Example usage: selecting a default value for a calculation if an analog input is failed.

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

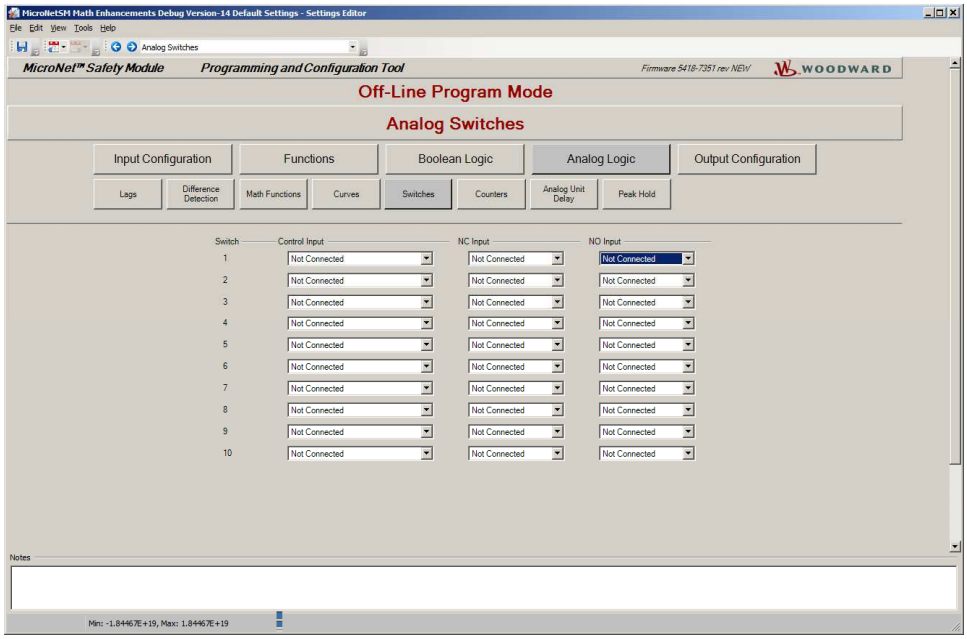


Figure 13-30 Switch Configuration

Switch Settings

- **Control Input:** This input selection determines the block output, it selects between the NC (normally-closed) and NO (normally-open) inputs. Valid values: *(see Boolean Function Input Selections list, Table 13-7).*
- **NC Input:** Selection for the block output when the switch Input is false. Valid values: *(see Analog Function Input Selections list, Table 13-10).*
- **NO Input:** Selection for the block output when the switch Input is true. Valid values: *(see Analog Function Input Selections list, Table 13-10).*

To use a switch, all three inputs must be configured to a value other than ‘Not Connected’. If a switch is configured and the output is not used as an input in any other function, the Configuration Log will indicate a warning. If the output of a switch is connected to another function but all three inputs are not configured, the Configuration Log will indicate an error and uploading of the configuration will not be possible.

Counters

There are 10 Counter blocks available for counting input events as well as comparing the number of events to a configured threshold value.

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

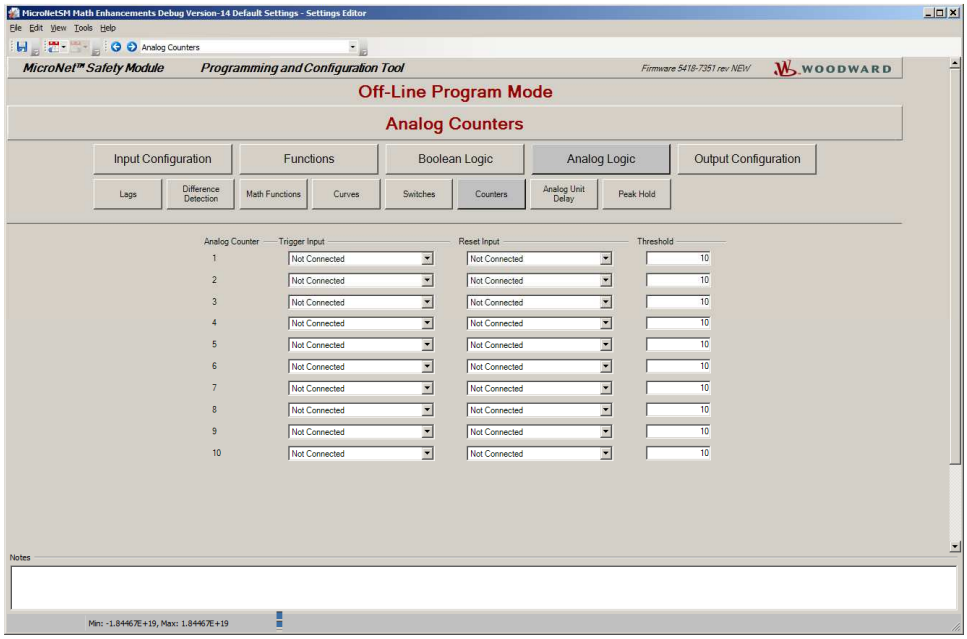


Figure 13-31 Counter Configuration

Counter Settings

- **Input:** Selection for the block input. For each rising edge input, the output count increments. Valid values: *(see Boolean Function Input Selections list, Table 13-7).*
- **Reset:** Selection for the block reset function. When true, sets the count value to zero and the threshold comparison to false. Valid values: *(see Boolean Function Input Selections list, Table 13-7).*
- **Threshold:** Selection for the threshold. When the count output is equal to or above this threshold, the output goes true and stays true until the block reset is applied. Valid values: 0 to 65535.

To use a counter, both inputs (Input and Reset) must be configured to a value other than ‘Not Connected’. If a counter is configured and the output is not used as an input in any other function, the Configuration Log will indicate a warning. If the output of a counter is connected to another function but both inputs (Input and Reset) are not configured, the Configuration Log will indicate an error and uploading of the configuration will not be possible.

Analog Unit Delay

There are 10 Analog Unit Delay blocks available to break loops detected in the configurable logic by forcing a specific execution order. The output of the Analog Unit Delay equals the input of the block the last time it was executed.

When “Analog Unit Delay” is selected in the settings editor or configuration menu, the following screen is displayed:

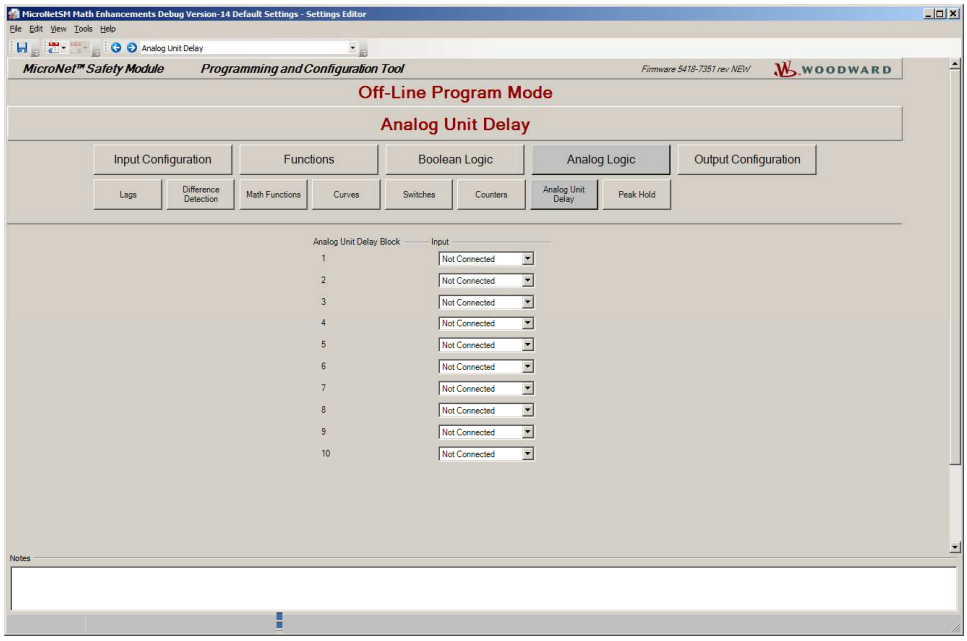


Figure 13-32 Analog Unit Delay Configuration

Analog Unit Delay Settings

Input: Selection for the block input. Valid values: *(see Analog Function Input Selections list, Table 13-10).*

If the input is set to a value other than Not Connected and the output of a block is not used as an input in any other function, the Configuration Log will indicate a warning. If the output of a unit delay is connected to another function but the input is not configured, the Configuration Log will indicate an error and uploading of the configuration will not be possible.

If the configuration check detects a loop in any analog signal path, insertion of an analog unit delay block will be required to determine proper block execution order and clear the configuration error.

Peak Hold

There are 10 Peak Hold blocks available for capturing and holding both maximum and minimum signal values. The input is monitored and the outputs are held until a reset command is received. The reset will clear the outputs, setting them to the current input value.

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

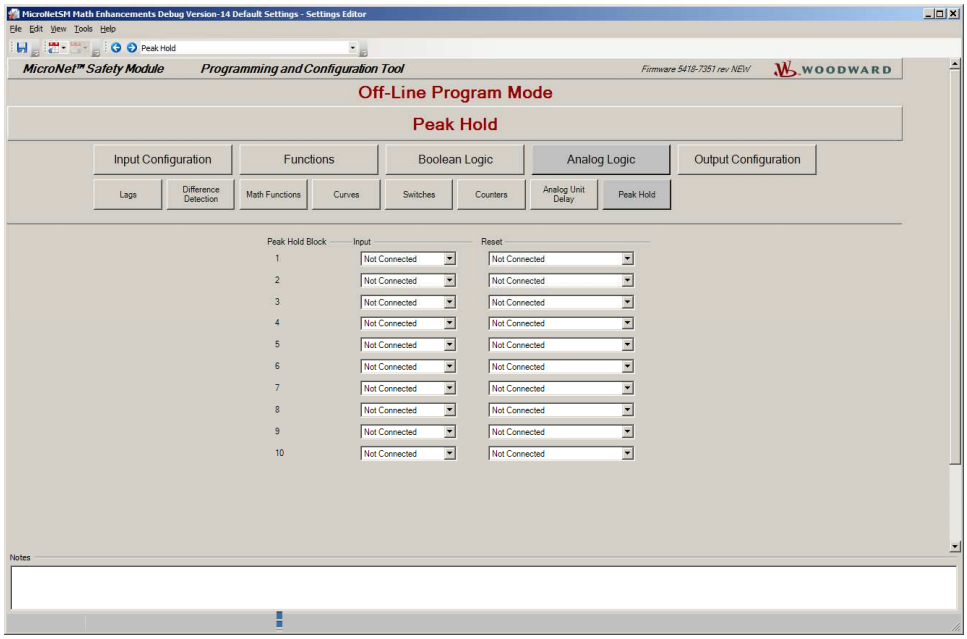


Figure 13-33 Peak Hold Configuration

Peak Hold Settings

- **Input:** Selection for the block input. Valid values: *(see Analog Function Input Selections list, Table 13-10).*
- **Reset:** Selection for the block reset function which clears min and max captured values, setting them to the current input value. Valid values: *(see Boolean Function Input Selections list, Table 13-7).*

To use a peak hold, both inputs must be configured to a value other than ‘Not Connected’. If a peak hold is configured and the output is not used (min or max) as an input in any other function, the Configuration Log will indicate a warning. If the output of a peak hold is connected to another function but both inputs are not configured, the Configuration Log will indicate an error and uploading of the configuration will not be possible.

Output Configuration

The Output Configuration screen provides sub-screens for configuration of the trip latch, alarm latch, event latch, analog output, relay outputs, reset logic and resettable trip function.

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:

- **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”.
- **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.

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:

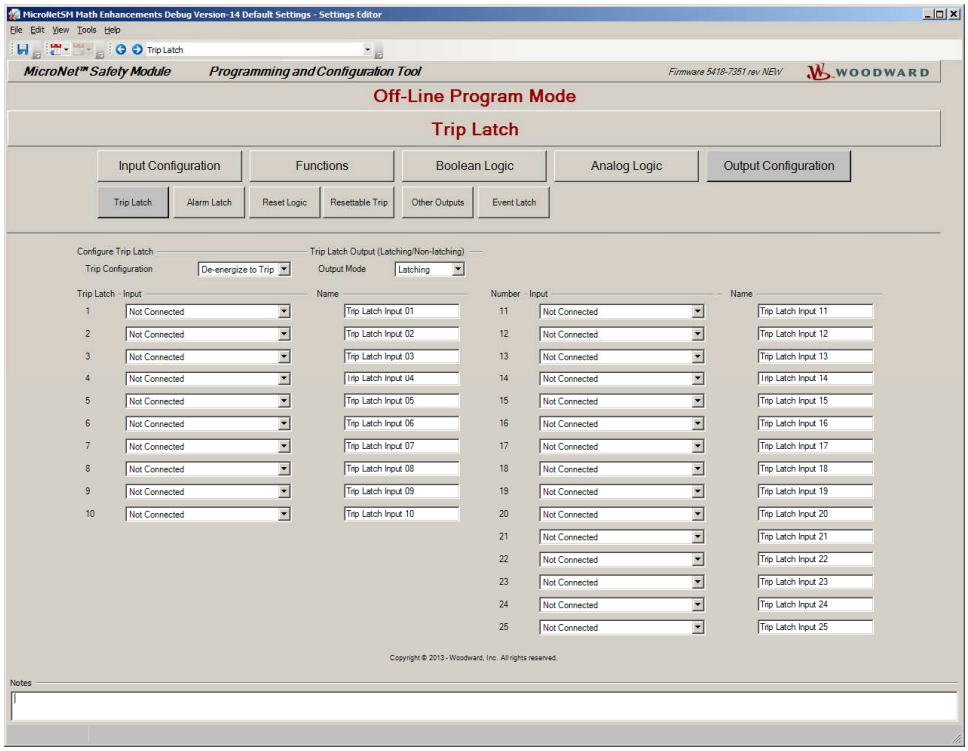


Figure 13-34 Trip Latch Configuration

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:

IMPORTANT

Applications requiring certification up to SIL3 must use the ‘de-energize to trip’ configuration option.

Table 13-11. Trip Latch Input Valid Values

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

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 Start input is used.
- **User-defined Test 1 Active Alarm:** This alarm cause is active if the User-defined Test 1 is running. It is only active and visible if this test is used.
- **User-defined Test 2 Active Alarm:** This alarm cause is active if the User-defined Test 2 is running. It is only active and visible if this test is used.
- **User-defined Test 3 Active Alarm:** This alarm cause is active if the User-defined 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:

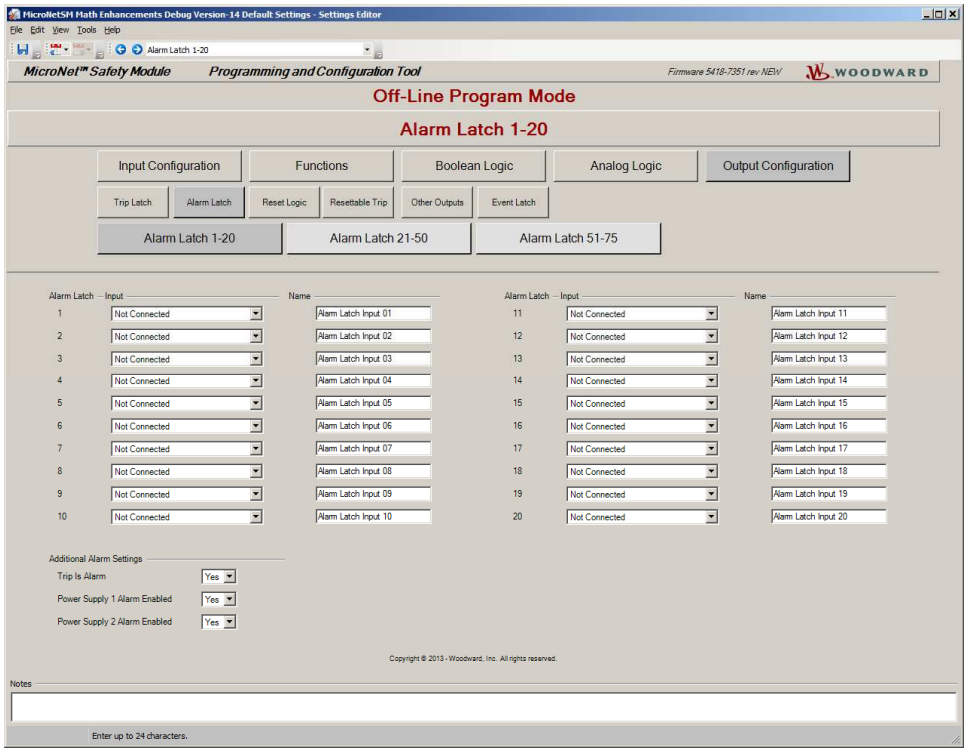


Figure 13-35 Alarm Latch Configuration

Configure Alarm Latch

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

Table 13-12. Alarm Latch Input Alarm Cause Valid Values:

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

Additional Alarm Settings

- **Trip is Alarm:** Select if a trip should also be an alarm. Valid values: Yes or No.
- **Power Supply 1 Alarm Enabled:** When used, this alarm is activated when power supply 1 output voltage is out of range. Valid values: Yes or No.
- **Power Supply 2 Alarm Enabled:** When used, this alarm is activated when power supply 2 output voltage is out of range. Valid values: Yes or No.

Reset Logic

This screen facilitates configuration of the configurable reset command.

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.

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

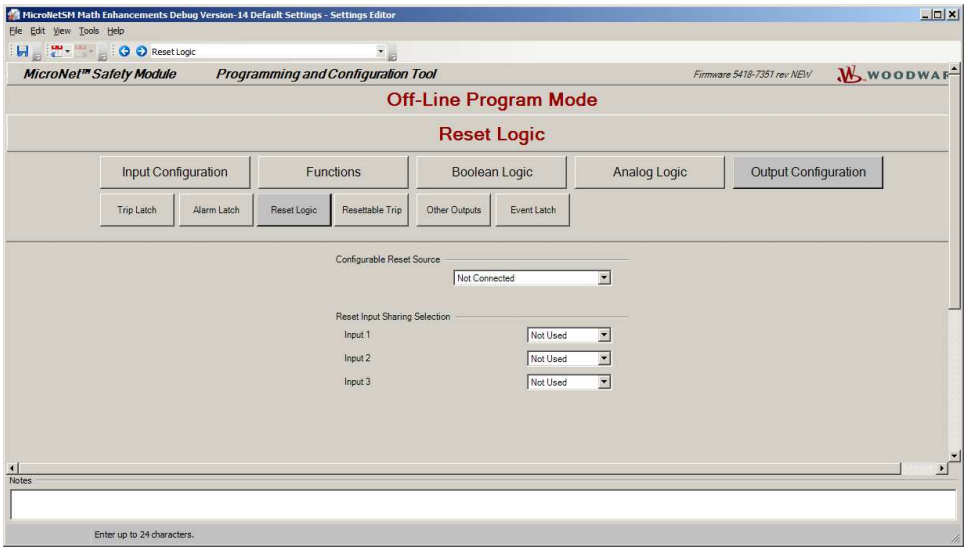


Figure 13-36 Reset Logic Configuration

Configurable Reset Source

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

Table 13-13. Configurable Reset Input Selections

Not Connected	Timer 1-5 HiHi	Boolean RM 1-15 Input 1-3 Invalid
Discrete Input 1-10	Timer 1-5 Hi	Difference Detection 1-15
Analog Comparator 1-15	Unit Delay 1-10	Counter 1-10
Logic Gate 1-50	Analog RM 1-15 Diff Detected	Event Filter 1-5
Latch 1-10	Analog RM 1-15 Input 1-3 Invalid	Pulse Detector 1-5
Delay 1-25	Boolean RM 1-15	

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.

To use the shared Reset function, at least one input must be configured to a value other than ‘Not Used’. If only one input is configured, the Configuration Log will indicate a warning. If the shared Reset is connected to another function but at least one input is not configured, the Configuration Log will indicate an error and uploading of the configuration will not be possible.

Resettable Trip

This screen facilitates configuration of the resettable trip input.

Trip Input Selection

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 MSM trip output can be reset while this trip input is still commanding a trip. Example use of this function is a 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 MSM 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).

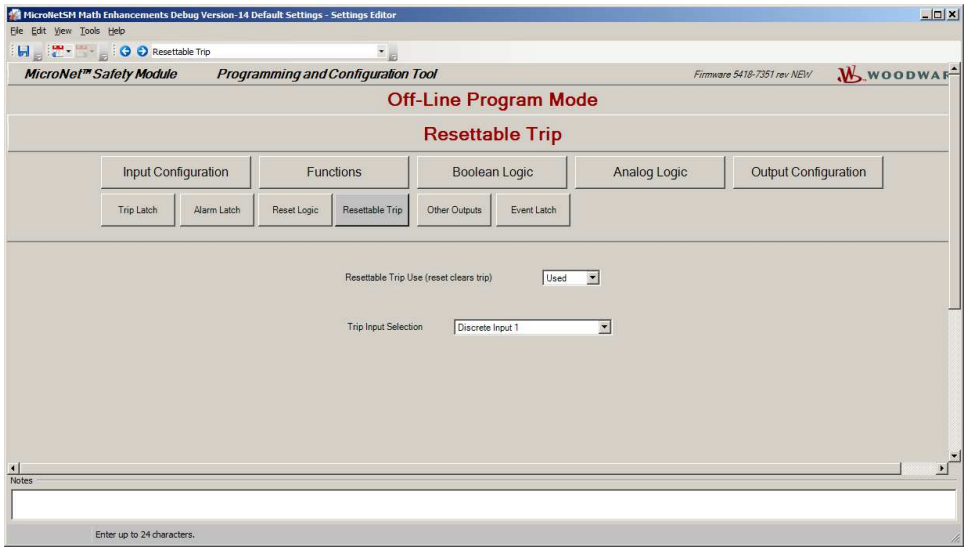


Figure 13-37 Resettable Trip Configuration

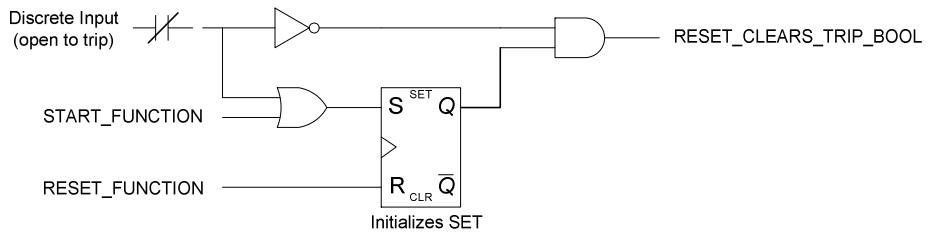


Figure 13-38. Resettable Trip Logic

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 trip input. Valid values: *(see Boolean Function Input Selections list, Table 13-7).*

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 configurable 4–20 mA analog output. The analog output source and scaling are configurable. 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 configuration menu, the following screen is displayed:

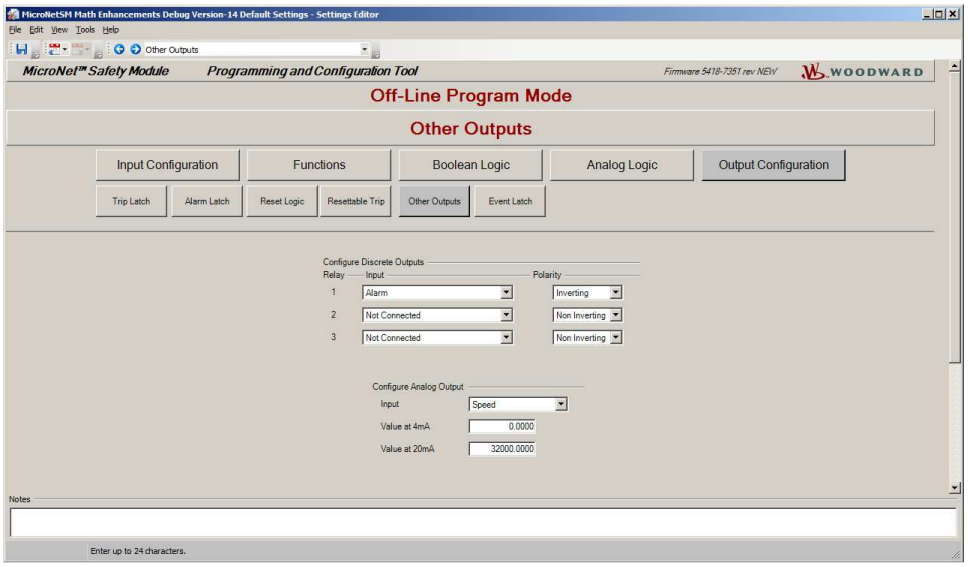


Figure 13-39 Other Outputs Configuration

Configure Discrete Outputs

- **Relay Input:** Selection for the configurable reset input. Valid values: *(see Boolean Function Input Selections list, Table 13-7).*
- **Polarity:** Output inversion option. Valid values: Non-Inverting or Inverting.

Configure Analog Output

- **Input:** Selection for the analog output. Valid values: *(see Analog Function Input selection, Table 13-10).*
- **Value @ 4 mA:** The value at min (4 mA) for scaling the analog output in user units. Valid values: -999999 to +999999 (user units).
- **Value @ 20 mA:** The value at max (20 mA) for scaling the analog output in user units. Valid values: -999999 to +999999 (user units).

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 configuration menu, the following screen is displayed:

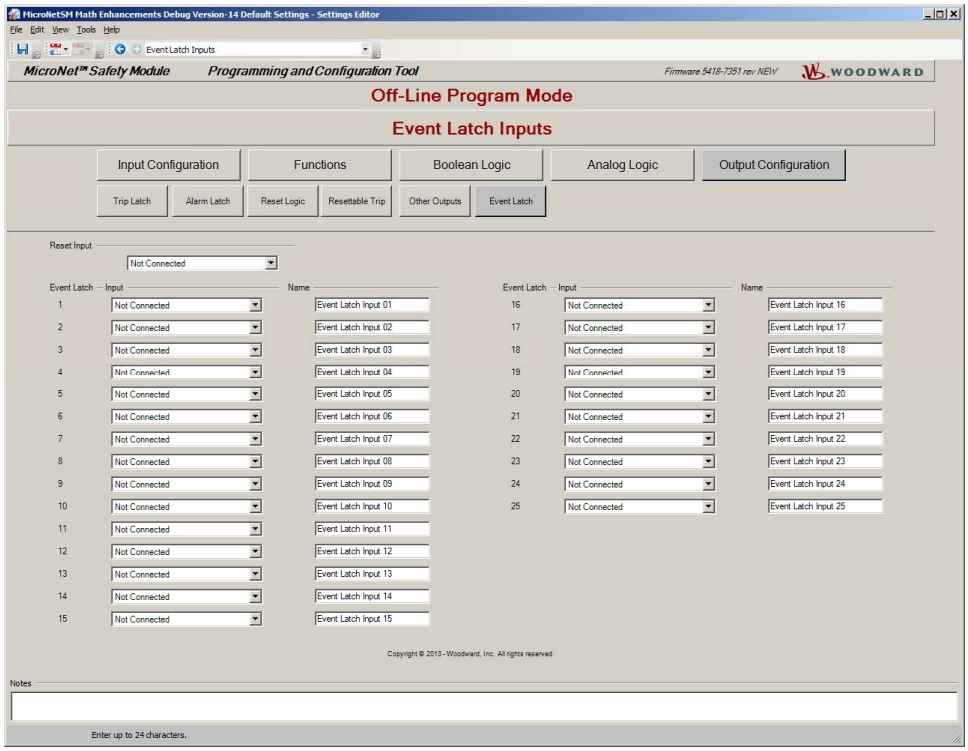


Figure 13-40 Event Latch Configuration

Configure Event Latch

- **Event Latch Input:** Select an event cause. Valid values: *(see Boolean Function Input Selections list, Table 13-7).*
- **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).

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

Table 13-14. Configuration Check Definitions

1

Text:	Warning – <*block name*> has unconfigured inputs.
Condition:	The identified block has inputs that are not configured. The following configurations will trigger this error: 1. Analog, Boolean, Speed, or Acceleration Redundancy Managers with less than two inputs connected. 2. User Defined Test with only one input connected. 3. Shared Reset, Shared Start or Shared Speed Fail Override with less than two inputs connected.
Example:	*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:	*Warning – <block name> is used but has no outputs connected.*
Condition:	*The identified block has inputs that are configured but has no connected outputs. This error applies to User Defined Test, Event Latch and Configurable Logic blocks (Addition, Analog Comparator, Analog RM, Analog Unit Delay, Boolean RM, Counter, Curve, Delay, Difference Detection, Division, Event Filter, Gate, Lag, Latch, Multiplication, Negation, Peak Hold, Pulse Detection, Switch, Timer, Unit Delay).*
Example 1:	*Error – Logic Gate 3 is configured but has no outputs connected.* *Logic Gate 3 is of type AND with 2 inputs configured but the block output is not connected to any other blocks.*

Example 2:	*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.*

3

Text:	*Warning – <block name> 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.*

4

Text:	*Warning – <block name> 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.*

5

Text:	Error – <*block name*> 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, XNOR, Add, Divide, Multiply, or Difference Detection block with less than two inputs configured. 2. Peak Hold, Analog Switch, Compare, Counter, Event Filter, Latch, Pulse Detector, or Timer with any input not connected. 3. Analog, Boolean, Speed, or Acceleration Redundancy Managers with the "Invalid" output connected to another block and the corresponding input is not connected. 4. Auto Sequence Test with Intermodule Halt used and the test Start input is not connected. 5. Event Latch with only one of (Reset Input, any Latch Input) not connected. 6. Resettable Trip is configured "Used" and the input is not connected.
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.

6

Text:	Error - <*block name*> 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. 3) User Defined Test is configured "Not Used" with inputs connected. 4) Speed Fail function is not used with the Speed Fail Trip, Speed Fail Alarm, or Speed Fail Timeout Boolean connected to another block.
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).

7

Text:	Error - <*block name*> 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 Speed Redundancy Manager, Acceleration Redundancy manager, Trip Cycle Time monitor, Event Latch, Shared Start, Shared Reset, Shared Speed Fail Override and configurable logic blocks *(Addition, Analog Comparator, Analog RM, Analog Unit Delay, Boolean RM, Counter, Curve, Delay, Difference Detection, Division, Event Filter, Gate, Lag, Latch, Multiplication, Negation, Peak Hold, Pulse Detection, Switch, Timer, Unit Delay)*.
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 and 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.*

8

Text:	Error – <*block name*> is not used but has outputs connected.
Condition:	The identified function is configured as 'Not Used' but has connected outputs. The following configurations will trigger this error: 1. Speed Input, Over-acceleration trip, Resettable Trip, Configuration Compare, Irig-B, Power Supply, or User Defined Test are set to "Not Used" or disabled with an output connected. 2. Speed Lost set to "Not Used" with Trip or Alarm connected, or set to "Alarm" with Trip connected, or set to "Trip" with Alarm connected. 3. Open Wire Trip connected with Speed Redundancy used or Open Wire Alarm connected with Speed Redundancy not used. 4. Open Wire Trip or Open Wire Alarm connected with Probe Type set to "Not Used" or "Active" 5. Power Up Trip connected with the Trip Latch configured to "Energize To Trip". 6. Speed Fail Alarm is connected and Probe Type or Speed Fail Alarm is set to "Not Used". 7. Speed Fail Trip is connected and Probe Type is set to "Not Used" with the Speed Redundancy Manager not used or Speed Fail Trip is set to "Not Used". Speed Fail Timer is connected and Probe Type is set to "Not Used" with the Speed Redundancy Manager not used or Speed Fail Timer is set to "Not Used".
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 enabled.
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'.

9

Text:	Error – <*block name*> 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'.

10

Text:	Error – <*block name*> 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.

11

Text:	Error – <*block name*> is configured as DISCRETE but has analog outputs connected.
Condition:	The identified analog/discrete input is configured as 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.

12

Text:	Error – <*block name*> 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 block (Unit Delay or Analog Unit Delay) must be inserted in the loop to provide a break in the loop.
Example 1:	*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 – Lag 3* is in a circular configuration loop. Lag 3 output is directly connected to its input, creating a loop. An Analog Unit Delay block is required between the output and the input to break this loop.

13

Text:	Error – <*block name*> has an invalid value.
Condition:	The identified block has an invalid configuration value. The following configurations will trigger this error: 1) When the X values for the Curve block are not monotonically increasing. 2) The calculated frequency equivalent of the RPM setting (i.e. (RPM*GearTeeth*GearRatio)/60) is greater than 32000. This applies to the Overspeed Trip Setting and the Temporary Overspeed Trip Setting.

14

Text:	Error – <*block name*> 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

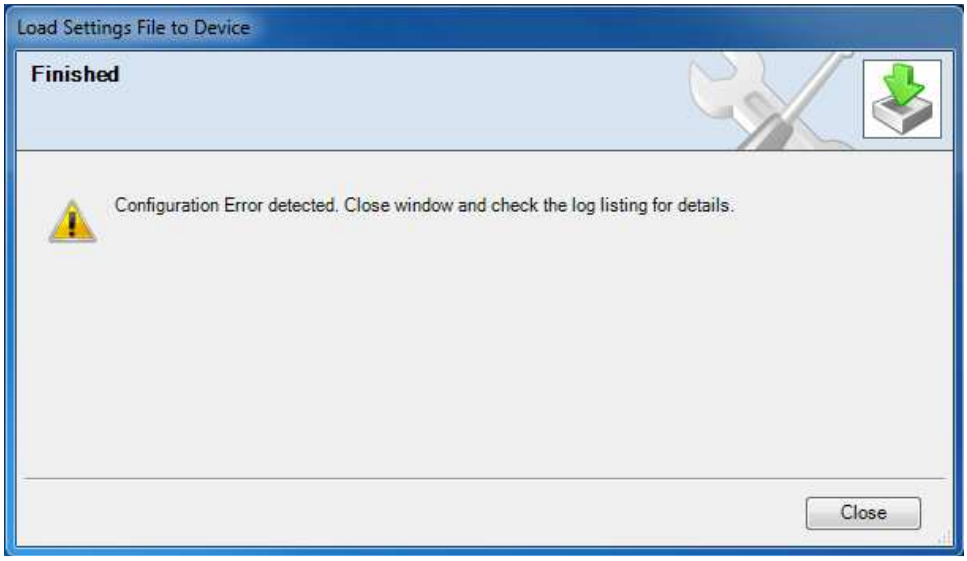


Figure 13-40 Configuration Error window

If a configuration error exists, the Configuration 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 MSM. 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 14.
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 ProTechTPS overspeed test on each TPS module
  - Weekly Trip valve test on each TPS module

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

- Input Redundancy

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

I/O Allocation

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

Wiring Diagrams

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

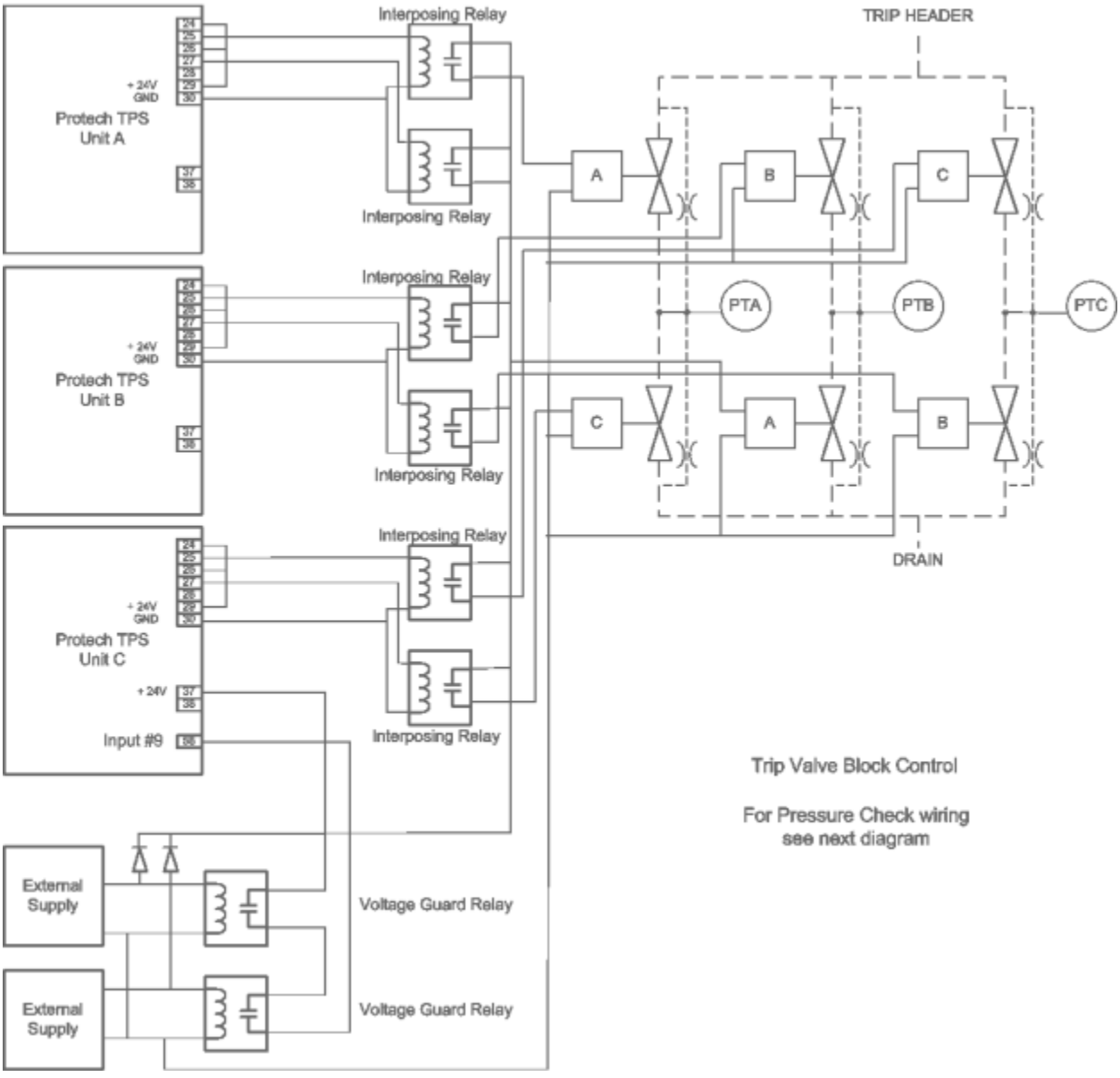


Figure 14-1. Trip Valve Block Control Circuit

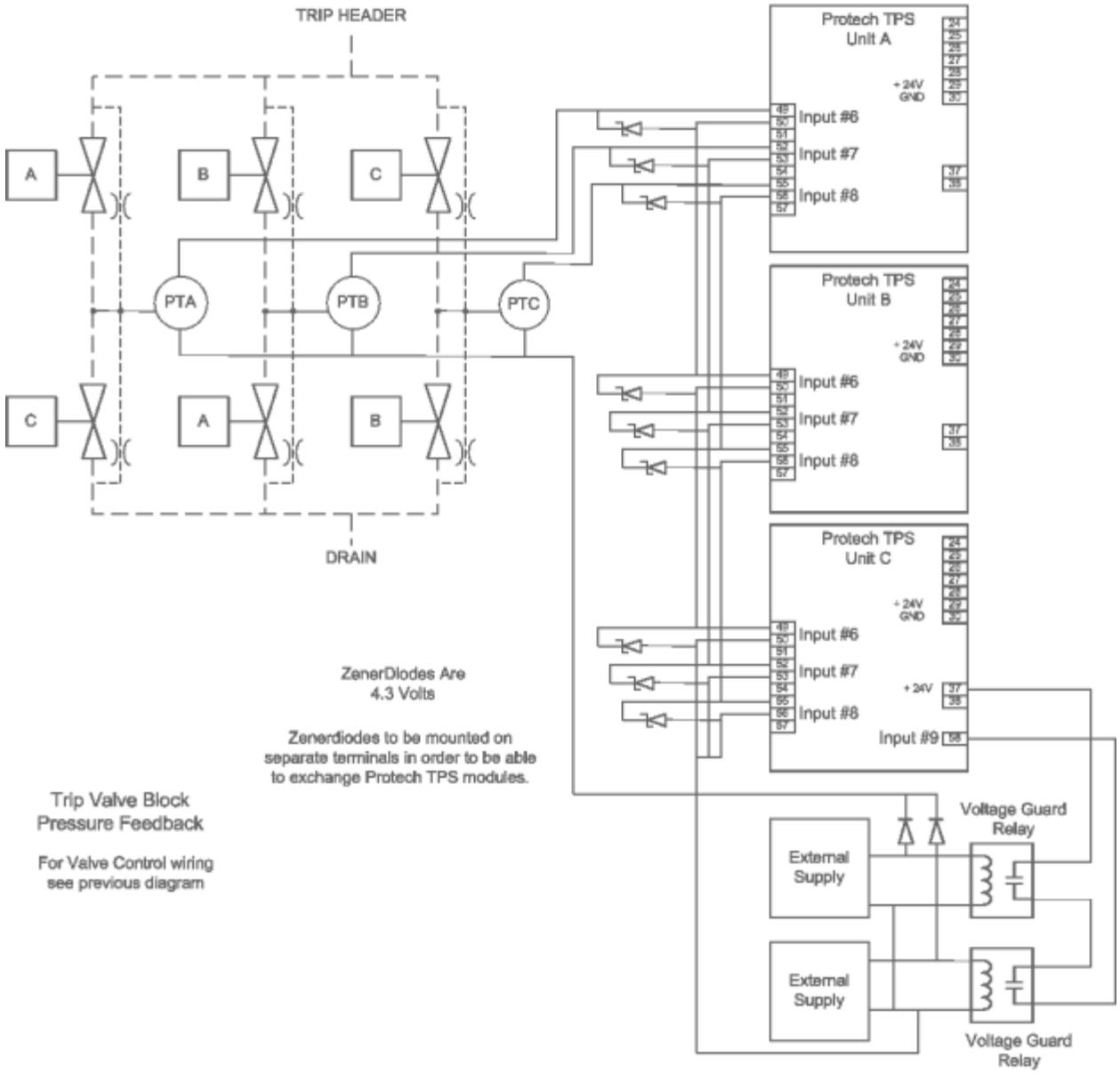


Figure 14-2. Trip Valve Block Pressure Check Circuit

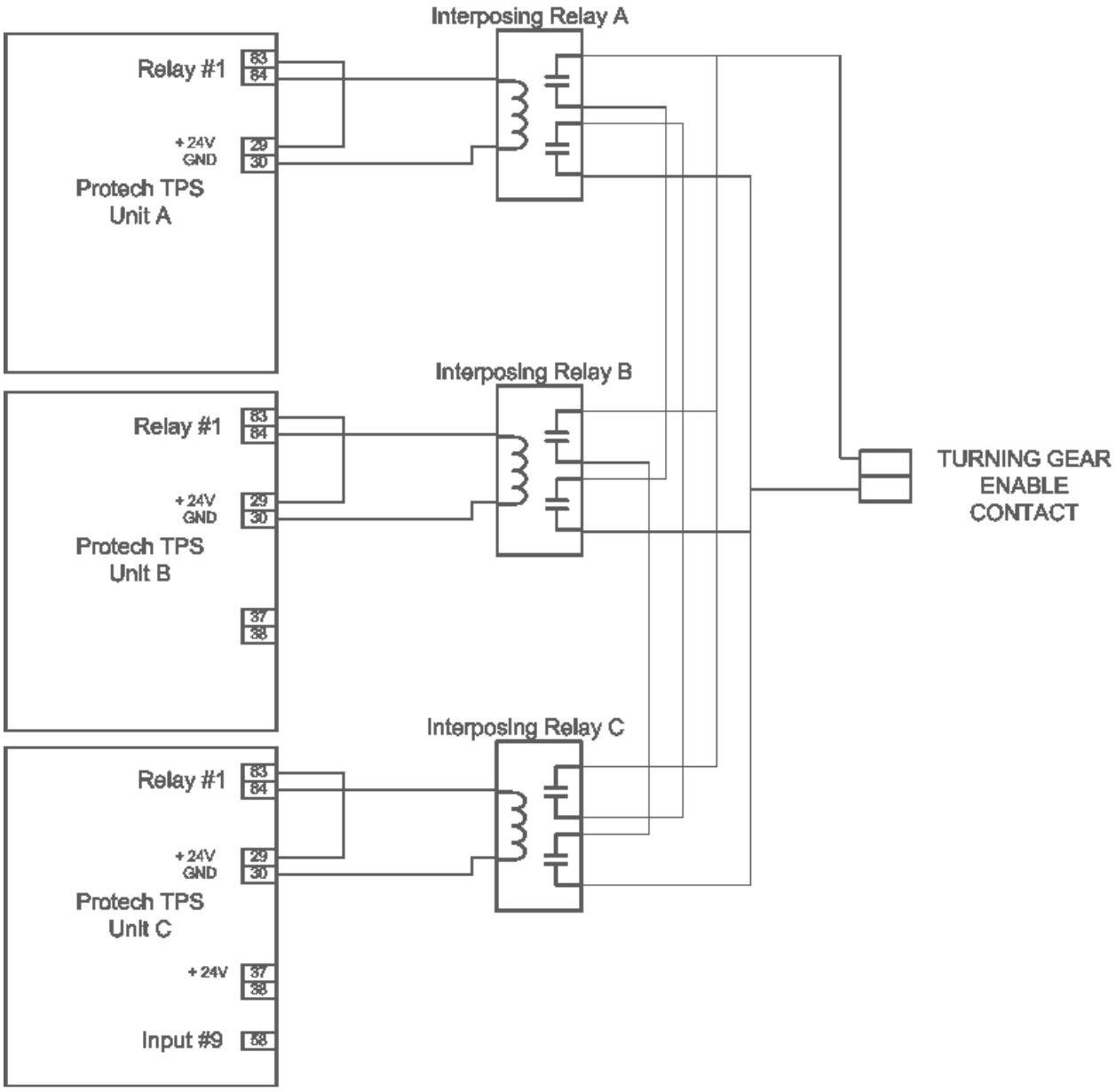


Figure 14-3. Turning Gear Enable Output

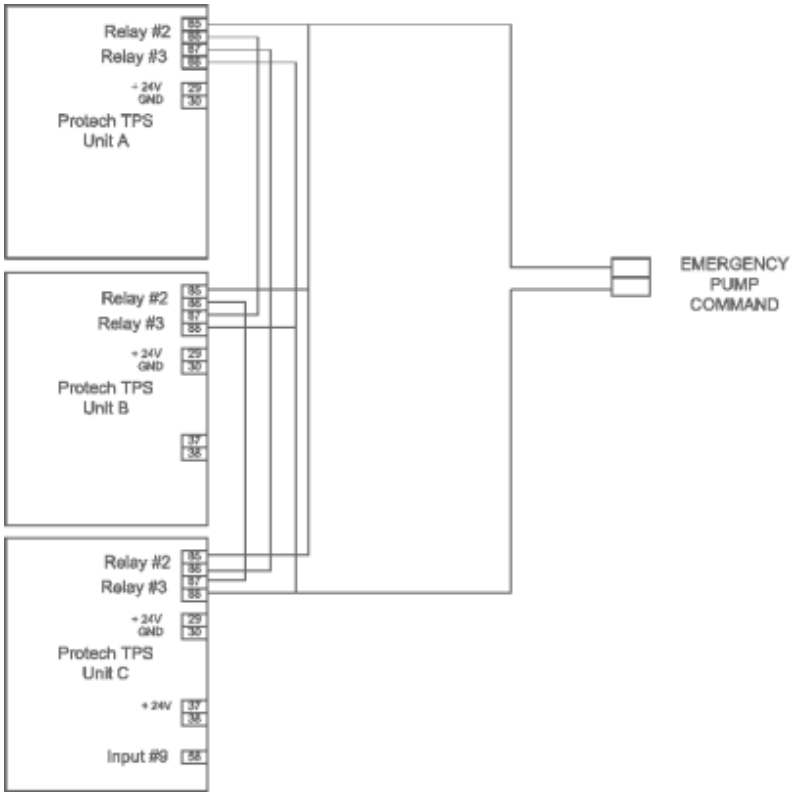


Figure 14-4. Emergency Pump MCC

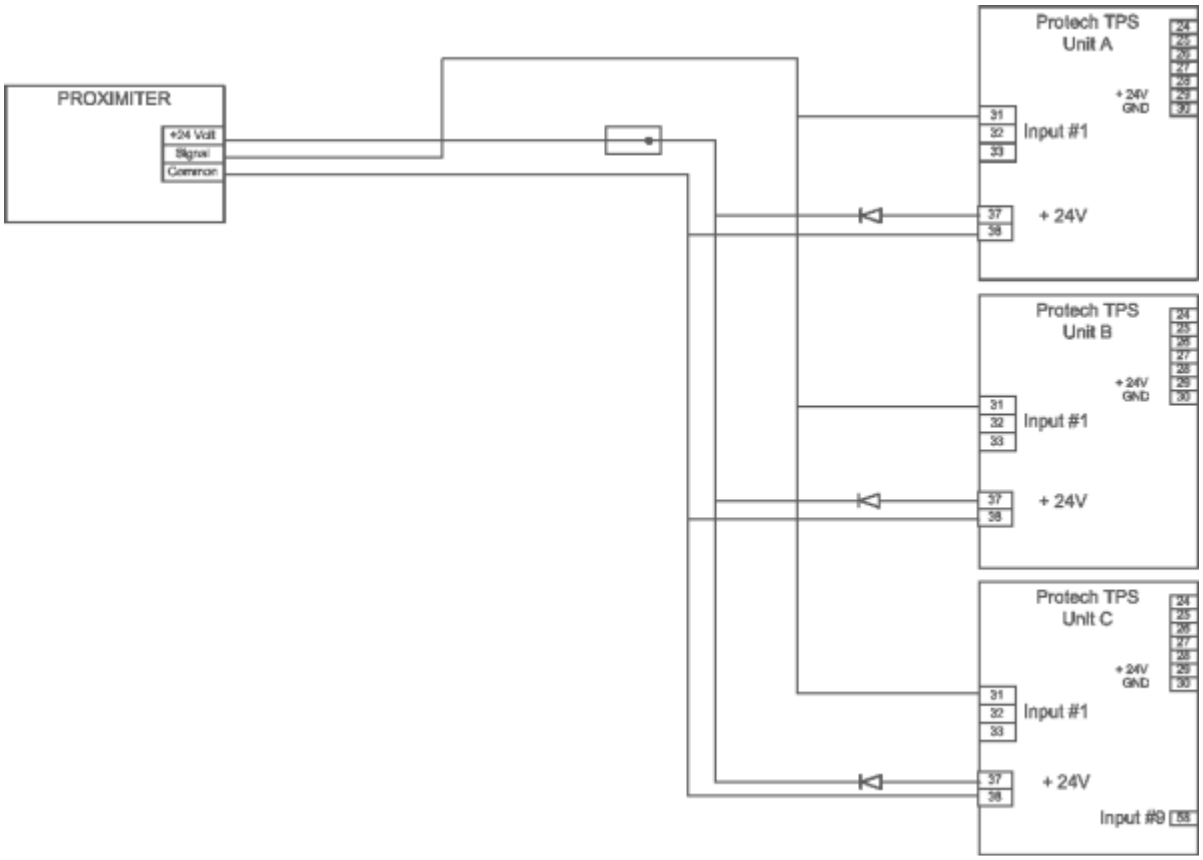


Figure 14-5. Zero Speed Detection Proximiter

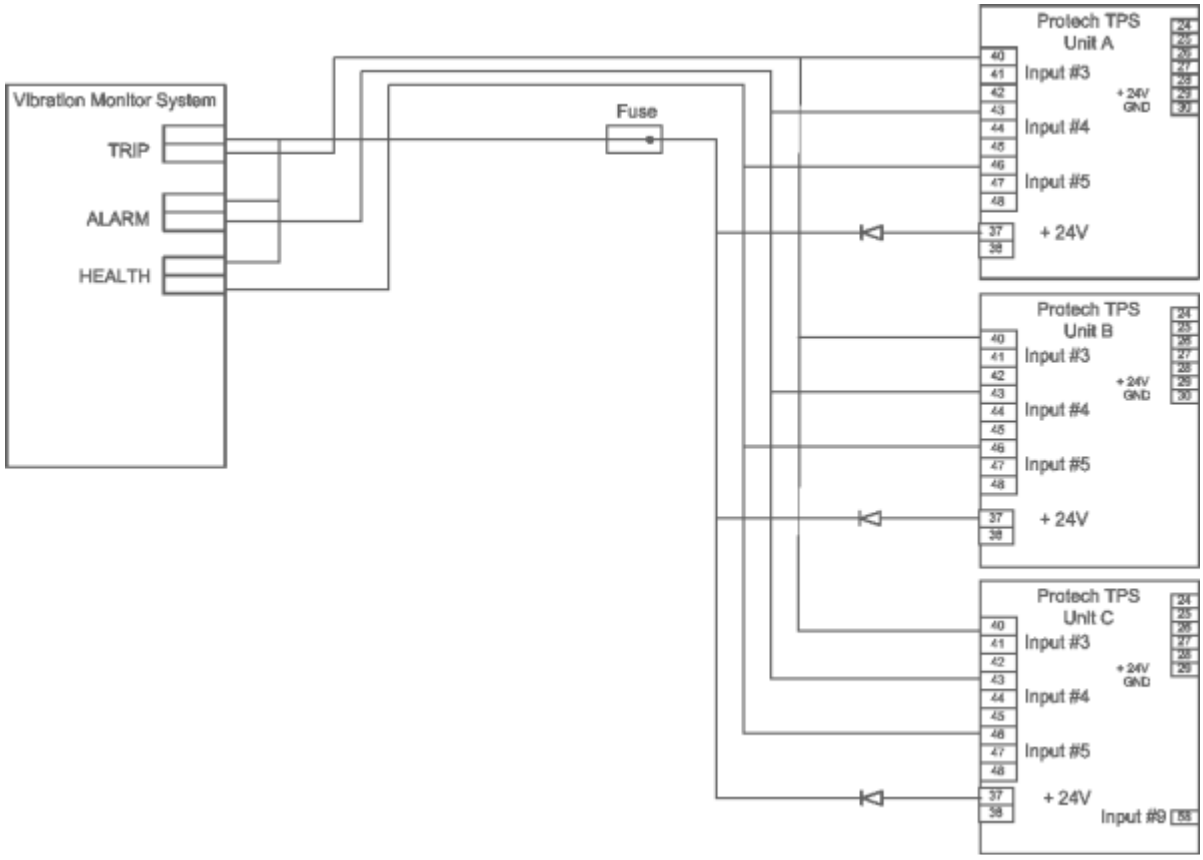


Figure 14-6. Vibration Monitor System

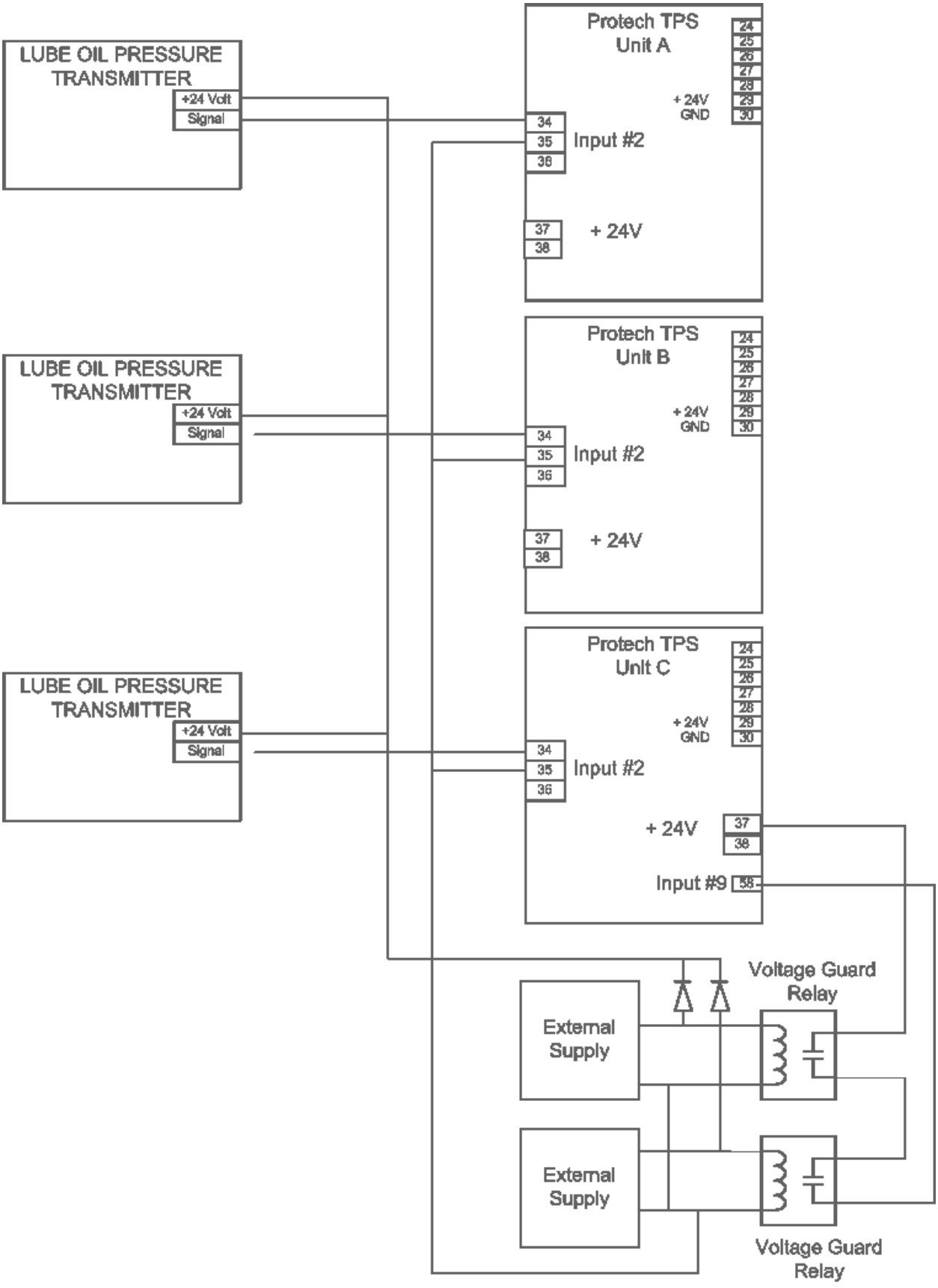


Figure 14-7. Lube Oil Pressure

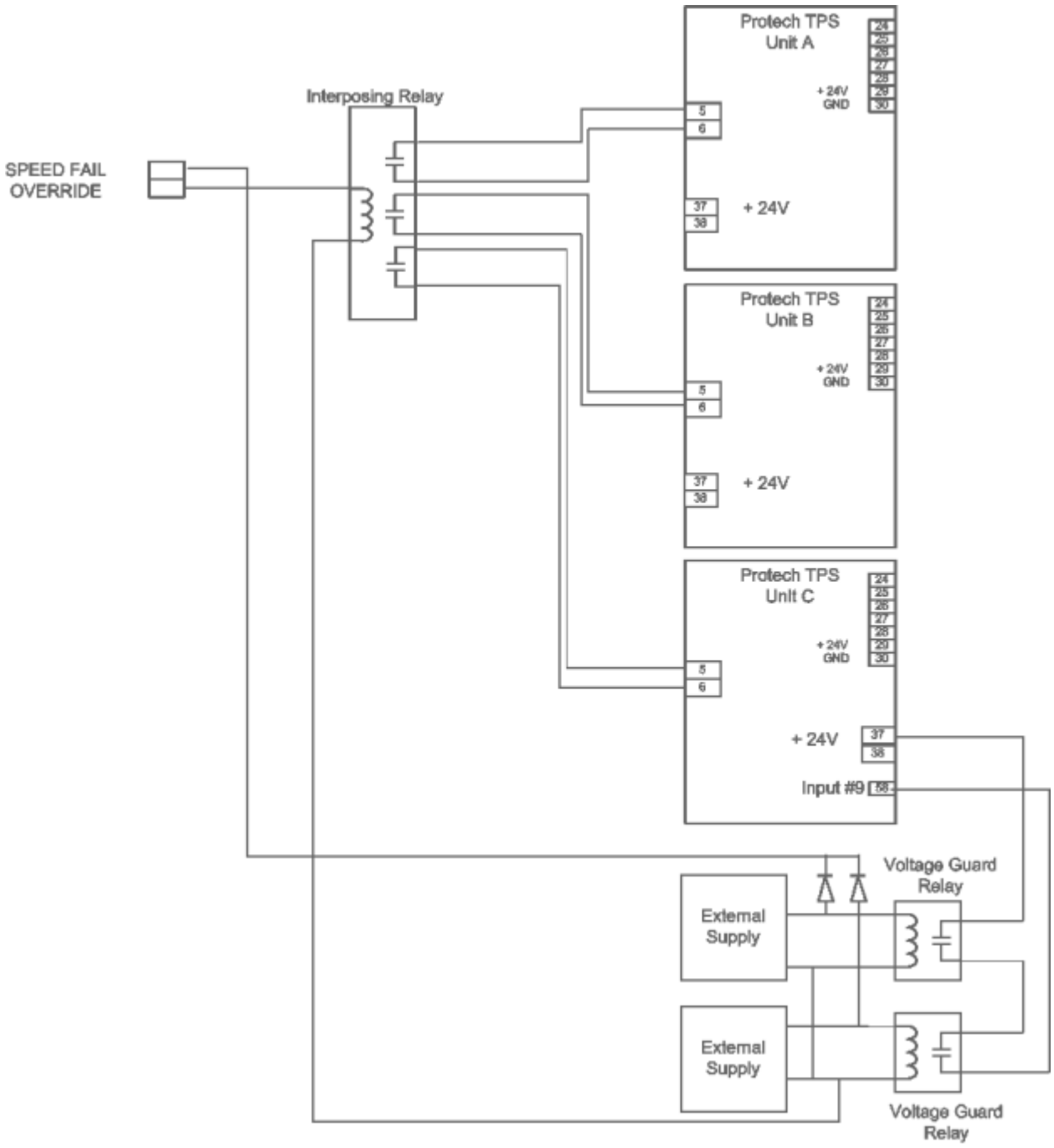


Figure 14-8. Speed Fail Override

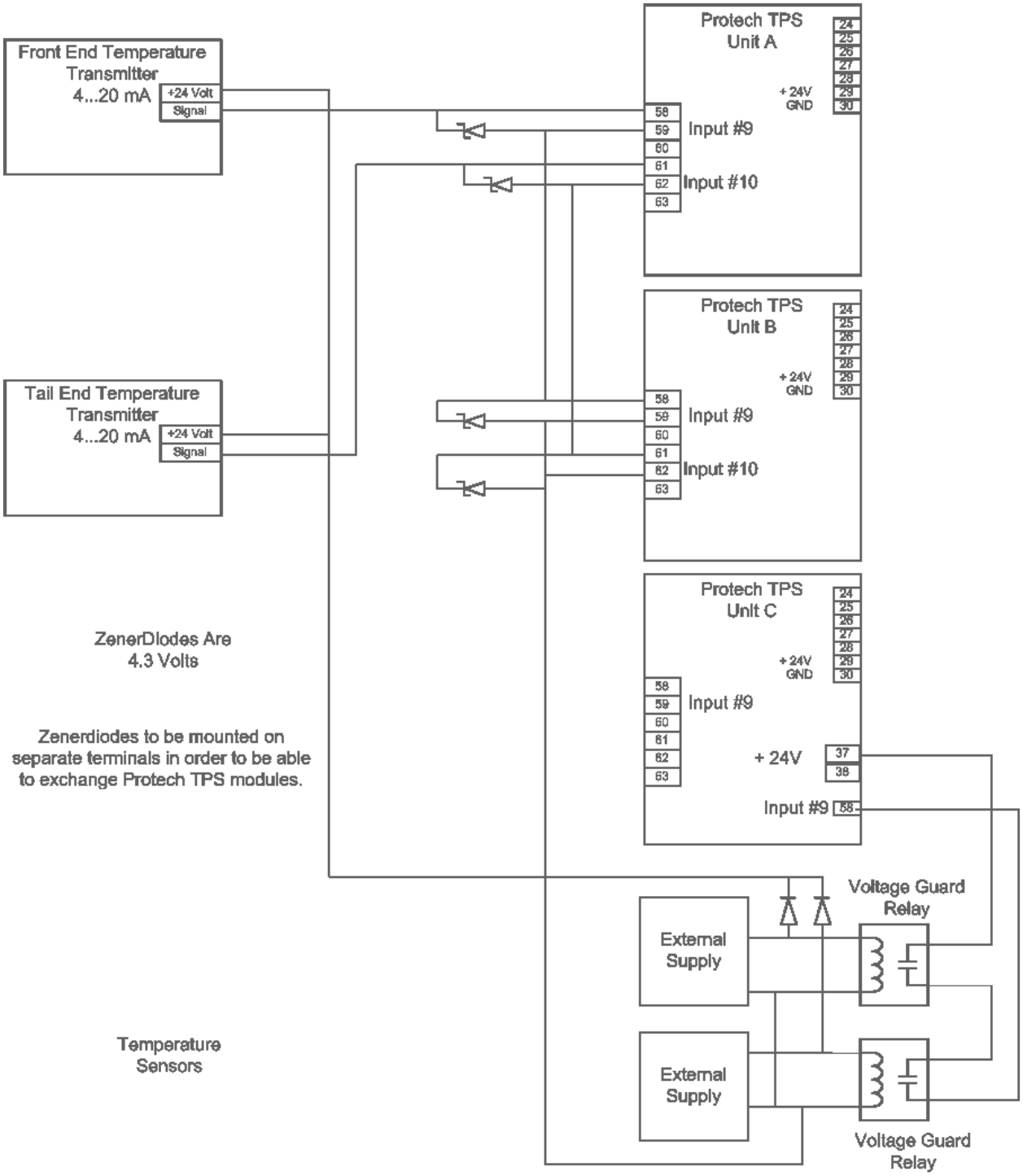


Figure 14-9. Temperature Sensors

Configuration Sheet

- Inputs
- Analog Redundancy
- Boolean Redundancy
- Start Logic
- Outputs
- Speed and Acceleration
- Auto Sequence Test
- Trip Latch
- Alarm Latch
- Constants
- Comparators
- Logic Gates
- Latches
- Delays
- Timers

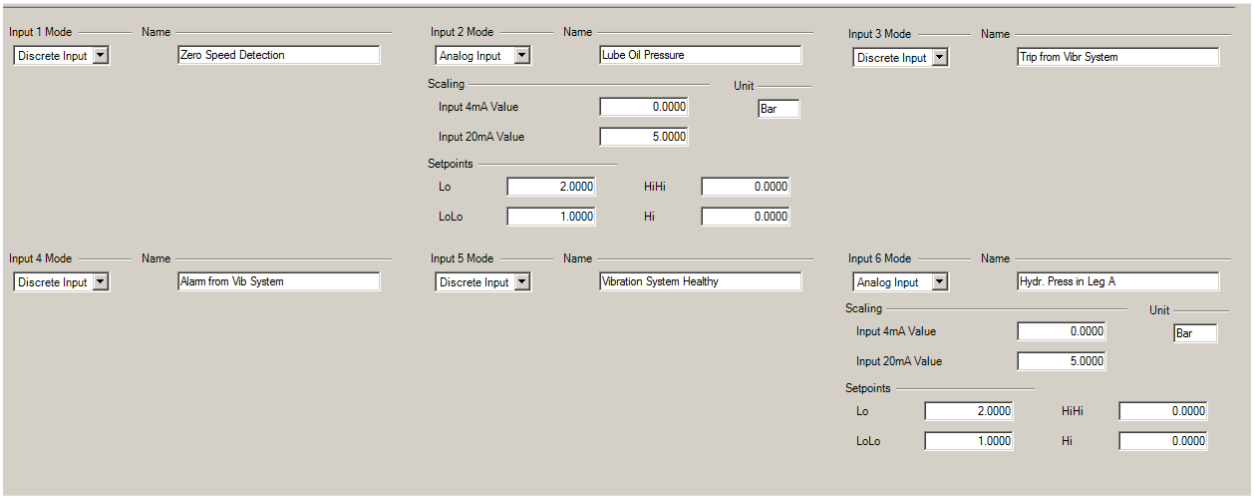


Figure 14-10. Inputs 1-6 (Units A, B, C)

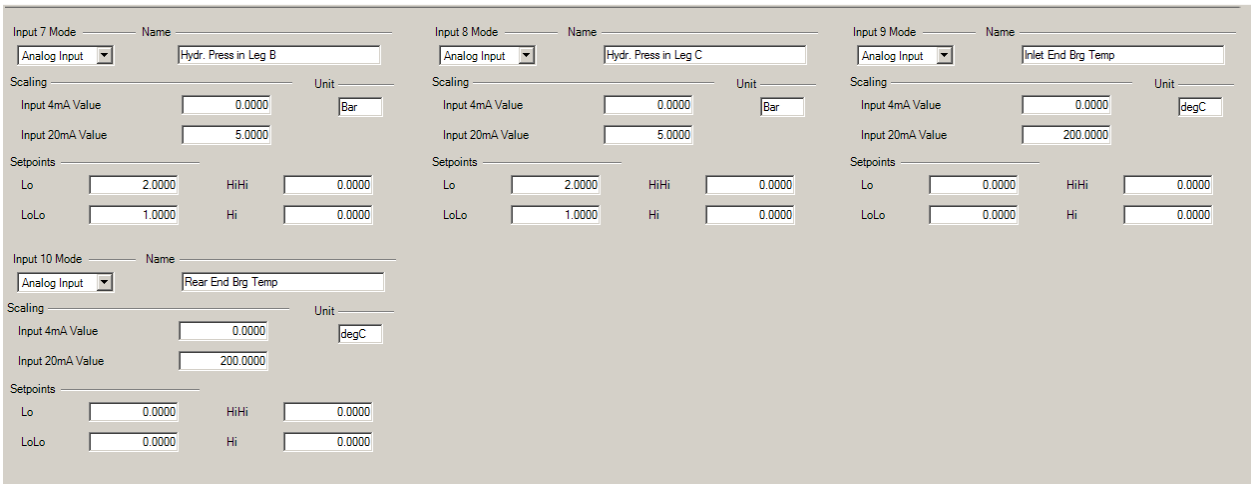


Figure 14-11. Inputs 7-10 (Units A&B)

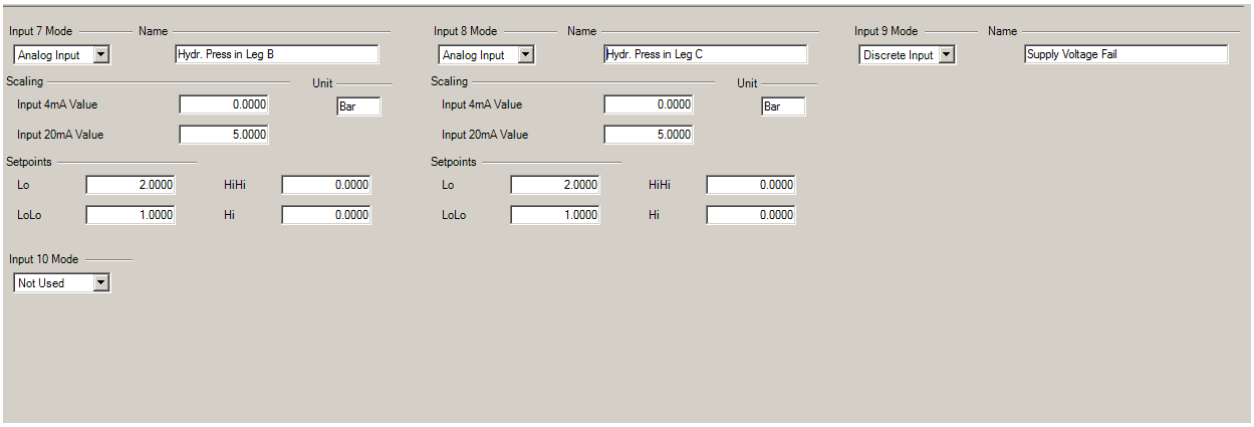


Figure 14-12. Inputs 7-10 (Unit C)

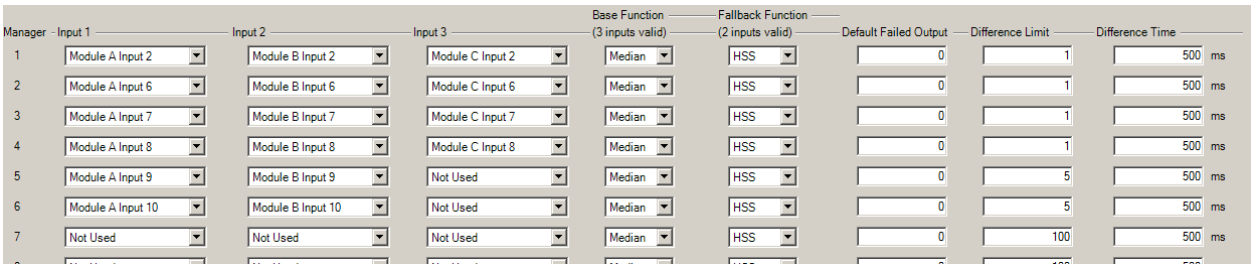


Figure 14-13 Analog Redundancy

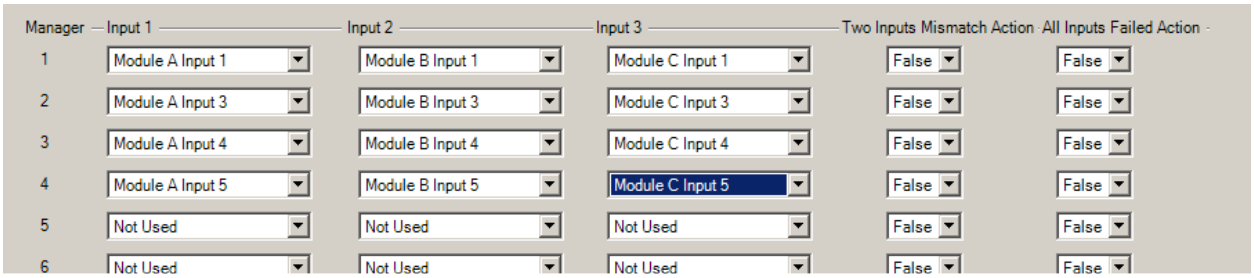


Figure 14-14 Boolean Redundancy

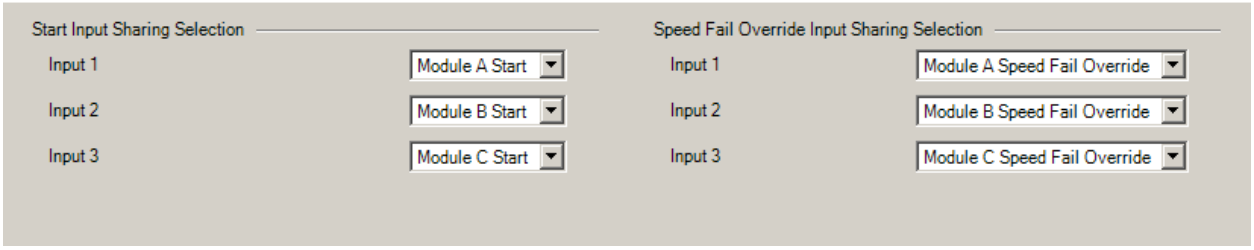


Figure 14-15 Start Logic– Shared SFO and Reset Inputs

Outputs

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

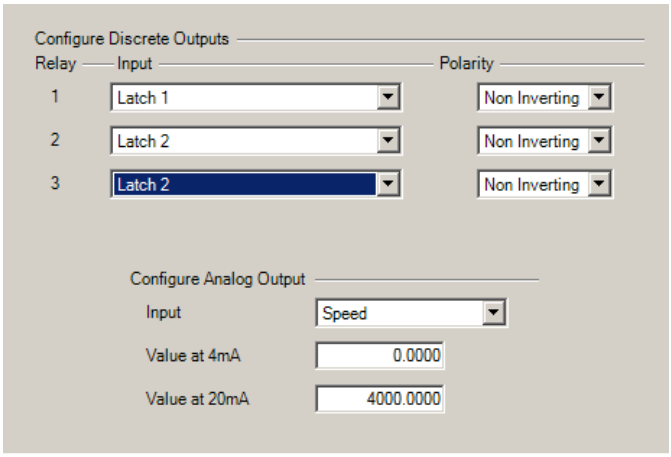


Figure 14-15. Outputs

Speed and Acceleration

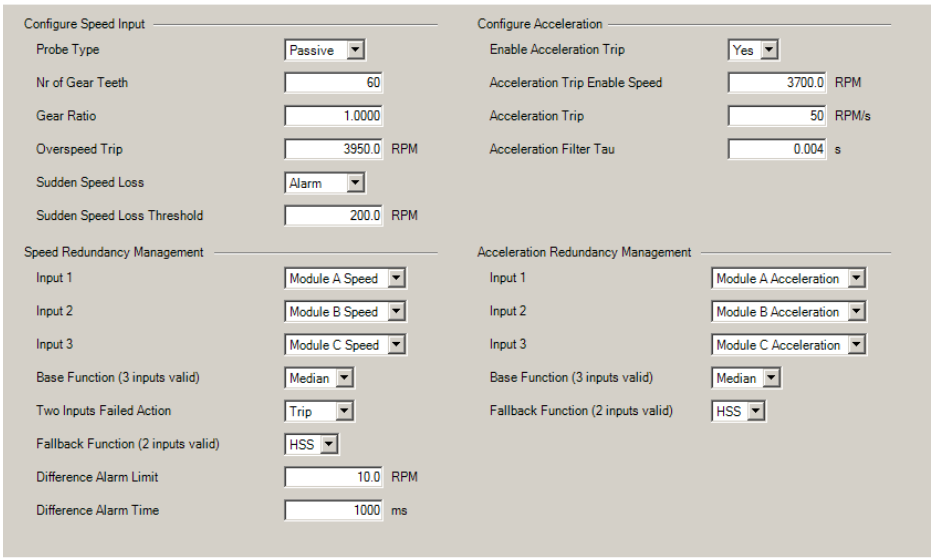


Figure 14-16. Speed and Acceleration

Auto Sequence Test

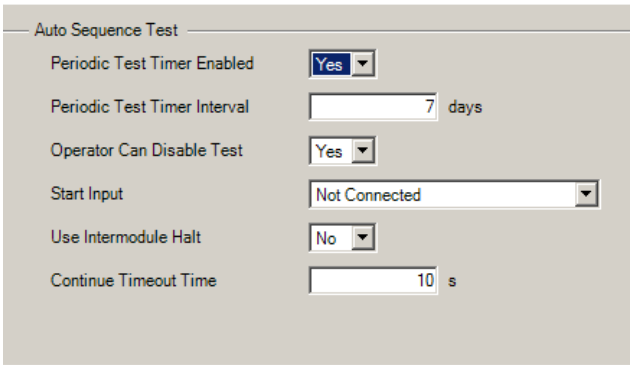


Figure 14-17. Auto Sequence (weekly) Test

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

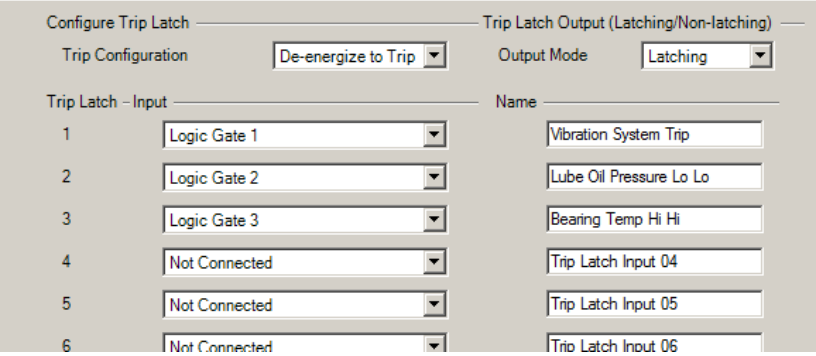


Figure 14-18. Trip Latch Screen

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 12 = Any Bearing Temp High
Comparator 9 = Lube Oil Pressure Low
Logic Gate 13 = Supply Voltage Fail (C only)
Analog RM 1 Difference Detected = Lube Oil Pressure difference detected
Analog RM 2 Difference Detected = Hydr Prs A difference detected
Analog RM 3 Difference Detected = Hydr Prs B difference detected
Analog RM 4 Difference Detected = Hydr Prs C difference detected
Analog RM 5 Difference Detected = Inlet Bearing Temp difference detected
Analog RM 6 Difference Detected = Rear Bearing Temp difference detected
Analog RM 1 Input1 Invalid = Lube Oil Pressure sensor A Fail
Analog RM 1 Input2 Invalid = Lube Oil Pressure sensor B Fail
Analog RM 1 Input3 Invalid = Lube Oil Pressure sensor C Fail
Analog RM 5 Input1 Invalid = Inlet Bearing Temp sensor A Fail
Analog RM 5 Input2 Invalid = Inlet Bearing Temp sensor B Fail
Analog RM 6 Input1 Invalid = Rear Bearing Temp sensor A Fail
Analog RM 6 Input2 Invalid = Rear Bearing Temp sensor B Fail

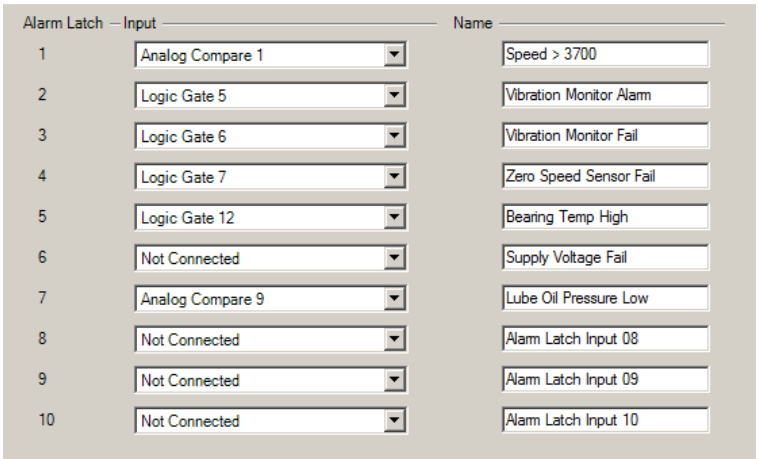


Figure 14-19a. Alarm Latch

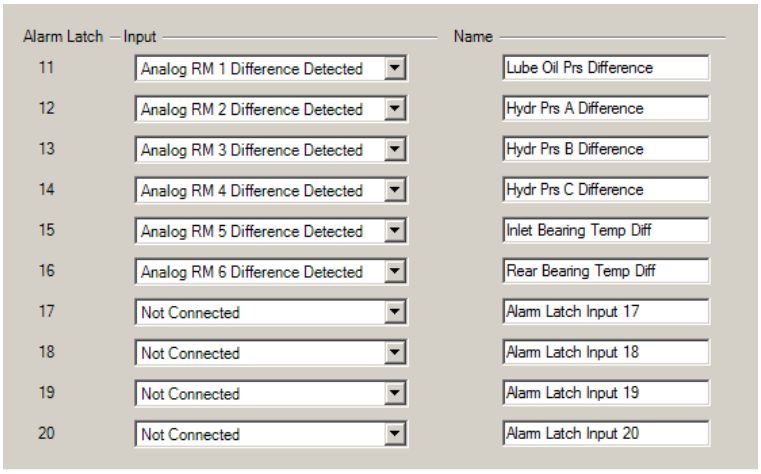


Figure 14-19b. Alarm Latch

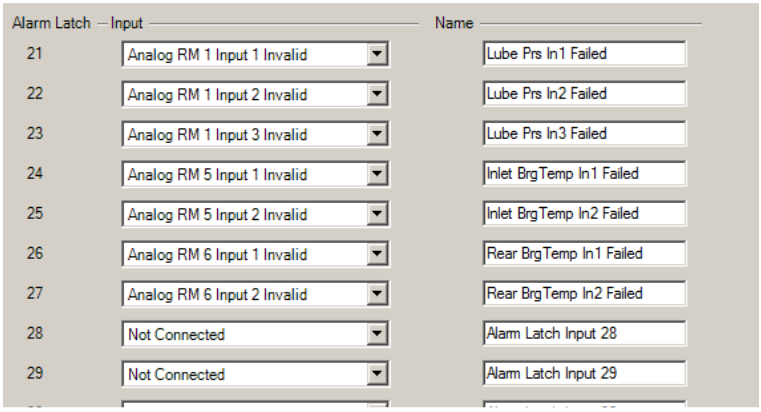


Figure 14-19c. Alarm Latch

Constants

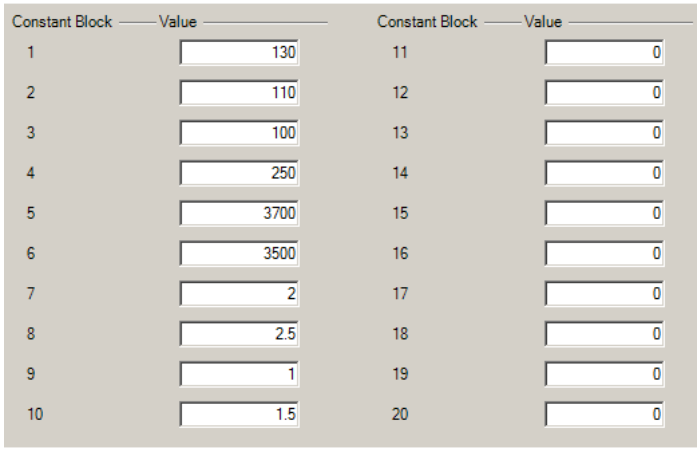
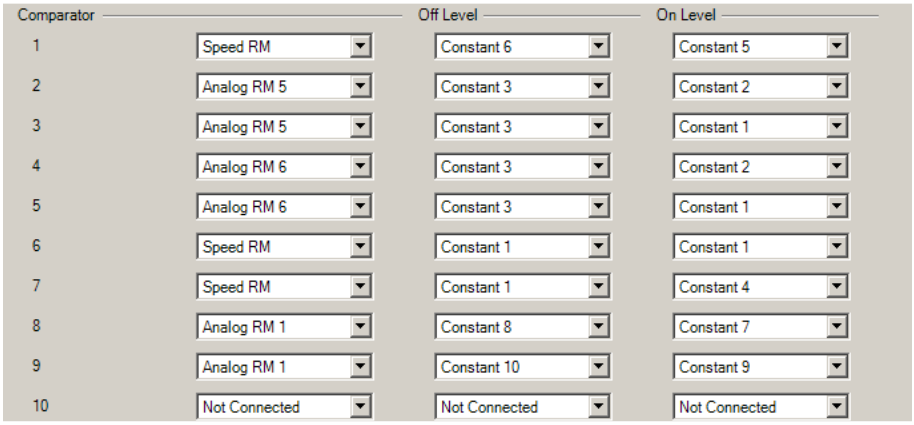


Figure 14-20. Constants

Comparators

Comparator 1 = speed > 3700
Comparator 2 = Bearing Temp #1 > 110 deg. C
Comparator 3 = Bearing Temp #1 > 130 deg. C
Comparator 4 = Bearing Temp #2 > 110 deg. C
Comparator 5 = Bearing Temp #2 > 130 deg. C
Comparator 6 = Speed > 100
Comparator 7 = Speed > 250
Comparator 8 = Lube Oil Pressure < 1 Bar (LoLo)
Comparator 9 = Lube Oil Pressure < 2 Bar (Lo)



Comparator		Off Level	On Level
1	Speed RM	Constant 6	Constant 5
2	Analog RM 5	Constant 3	Constant 2
3	Analog RM 5	Constant 3	Constant 1
4	Analog RM 6	Constant 3	Constant 2
5	Analog RM 6	Constant 3	Constant 1
6	Speed RM	Constant 1	Constant 1
7	Speed RM	Constant 1	Constant 4
8	Analog RM 1	Constant 8	Constant 7
9	Analog RM 1	Constant 10	Constant 9
10	Not Connected	Not Connected	Not Connected

Figure 14-21. Comparators

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 = Inverter on Discrete input #1 (zero speed detection)
- 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 = No zero speed sensor failure. Not gate on Logic Gate 7
- Logic Gate 9 = Zero speed detected and no sensor fail. AND gate on gate 17 and gate 14
- Logic Gate 10 = Spare
- 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.

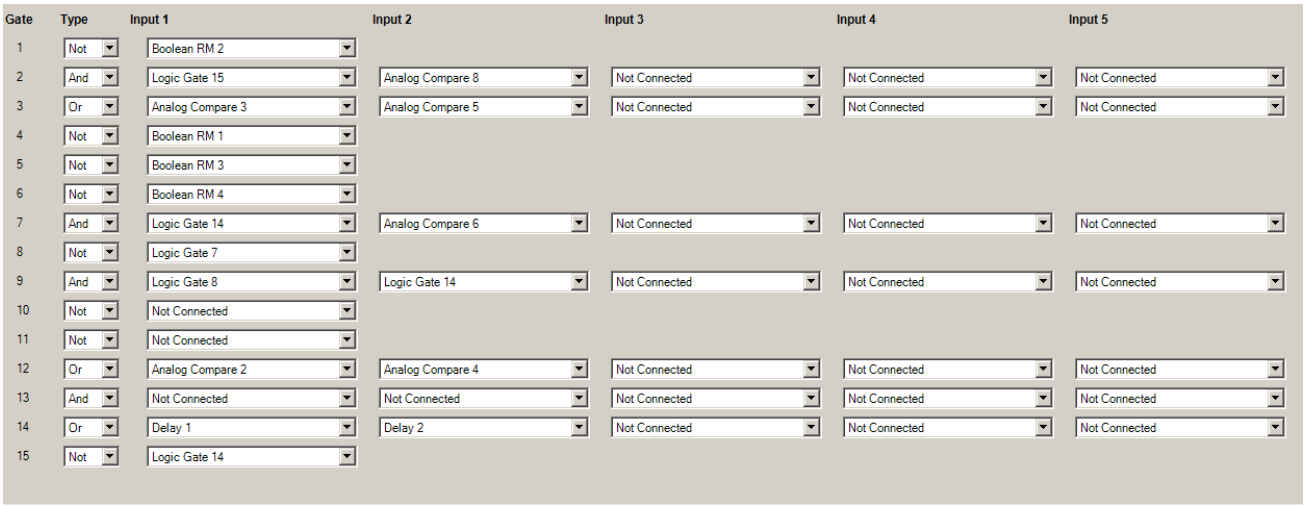


Figure 14-22. Logic Gates

Latches

Latch 1 = Turning gear enable. Set at zero speed detected (logic Gate 9), Reset if speed > 250 (Comparator 7).
Latch 2 = Emergency Pump on. Set on logic gate 2, Reset after manual Reset action

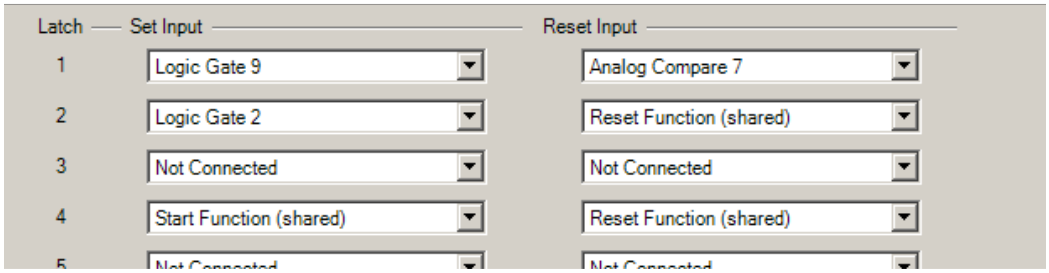


Figure 14-23. Latches

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)

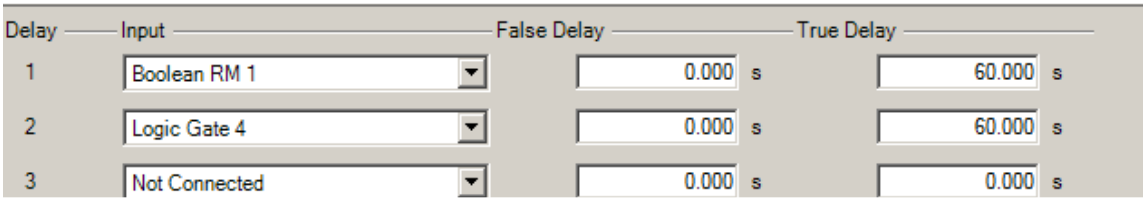


Figure 14-24. Delays

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.

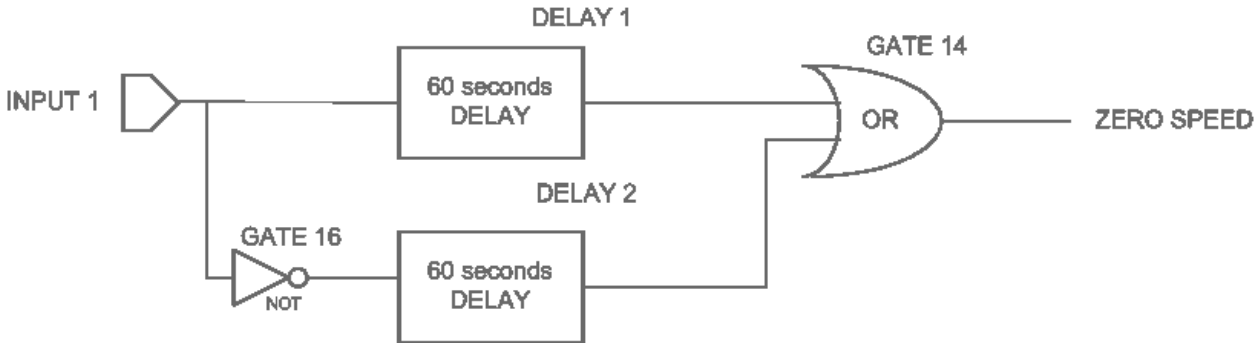


Figure 14-25. Zero Speed Detection

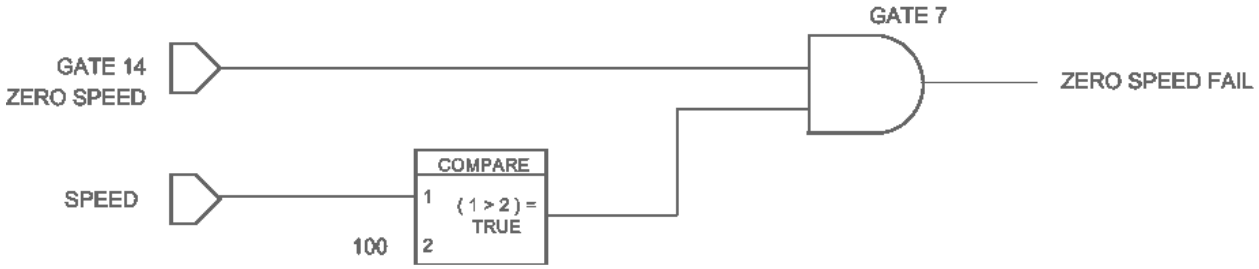


Figure 14-26. Zero Speed Detector Failure

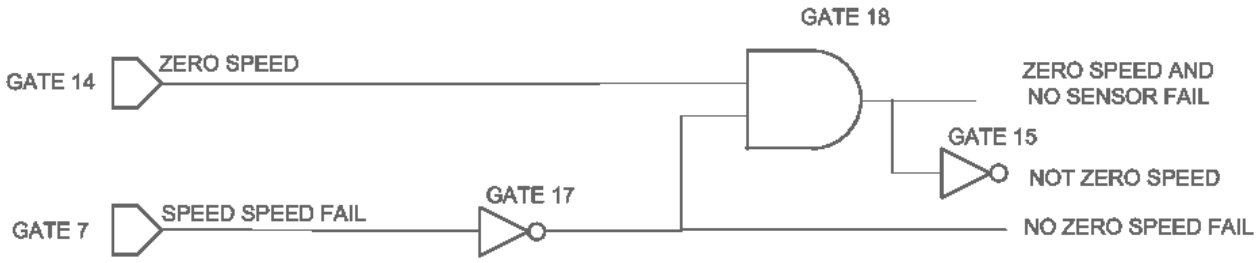


Figure 14-27. Zero Speed and No Sensor Failure

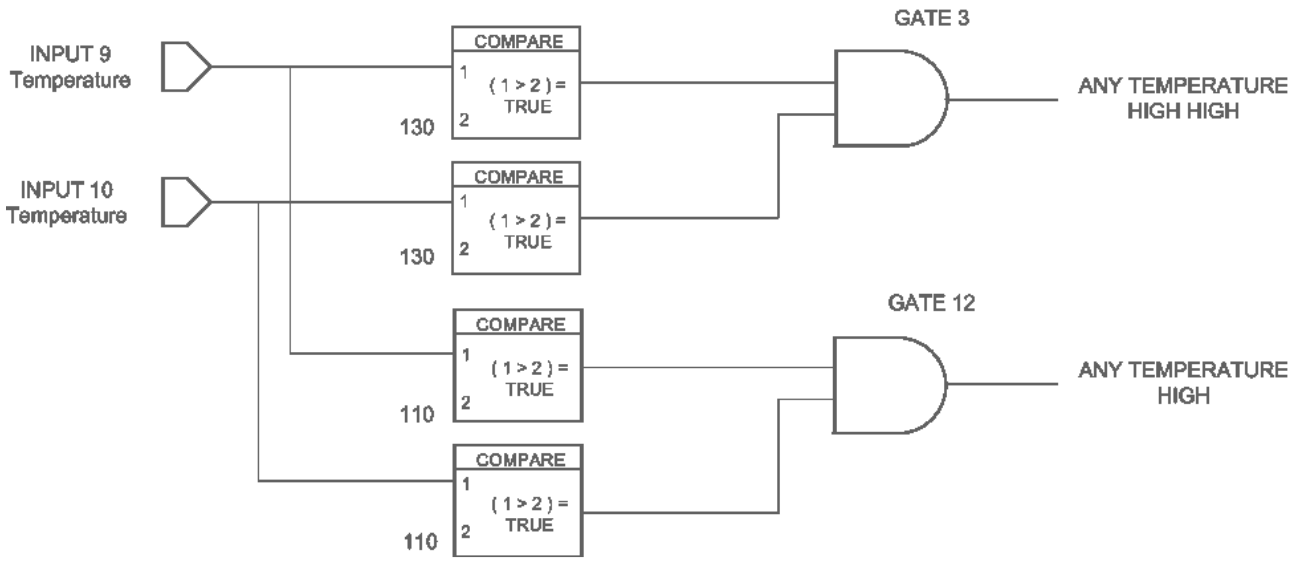


Figure 14-28.Any Temperature High / Any Temperature High High
(Blocks 3 & 12 are OR's not AND as shown)

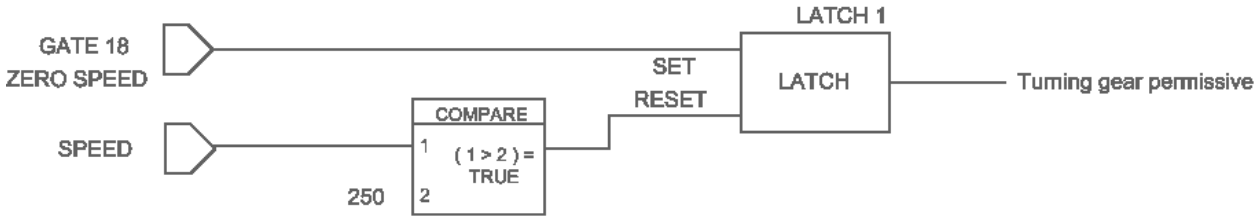


Figure 14-29. Turning Gear Permissive

Chapter 15.
MicroNet Safety Module Configuration Worksheet

MSM Part Number:_____ Date:_____

MSM Serial Number: _____

Site/Application: _____

CONFIGURATION FUNCTIONS (Minimum Required)

Configuration of the unit can be done directly on the front panel display or with the PCT software.

PASSWORD CHANGE:

Test Level Password _____

Config Level Password _____

	Parameter	Option/Range	Default	User Setting
SPEED INPUTS	Probe Type	Not Used / Passive / Active	Passive	
	No. Gear Teeth	1-320	60	
	Gear Ratio	0.10 – 10	1.0000	
	Overspeed Trip	100-80000 rpm	100	
	Sudden Speed Loss	Trip / Alarm / Not Used	Trip	
	Sudden Speed Loss Threshold	1 – 1000 rpm	200	
ACCELERATION	Enable Acceleration Trip	Yes / No	No	
	Accel. Trip Enabled Speed	0-80000 rpm	100	
	Acceleration Trip	0-25000 rpm/s	0	
	Acceleration Filter Tau	0.002-10 s	0.004	
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	0-80000 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	

	Parameter	Option/Range	Default	User Setting
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	
START LOGIC	Speed Fail Setpoint	0-25000 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)	
TRIP LATCH	Trip Configuration	De-Energize to Trip / Energize to Trip	De-Energize To Trip	
	Trip Latch Output	Latching / Non-Latching	Latching	
ALARM LATCH	Trip is Alarm	Yes/No	Yes	
TEST MODES	Temporary Overspeed Trip	0-80000 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 Inter-module Permissive / Module Not Tripped / Module Not In Alarm	Module Not In Alarm	
AUTO-SEQUENCE TEST (Module A)	Periodic Test Timer Enabled	Yes/No	No	
	Periodic Test Timer 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	
	Parity	No Parity / Even Parity / Odd Parity	No Parity	
	Slave Address	1-247	1	
	Enable Write Commands	Yes / No	No	

	Parameter	Option/Range	Default	User Setting
POWER SUPPLY ALARMS	Enable Power Supply #1 Alarm	Yes / No	Yes	
	Enable Power Supply #2 Alarm	Yes / No	Yes	
DISPLAY	Selected Language	English / Chinese	English	
	Selected Home Screen	All Pages	Home	
	Home Screen On Trip Option	Yes / No	Yes	
	Speed Filter Tau (sec)	0.004 to 10.0	0.8	
CONFIG COMPARE	Enable Configuration Compare	Yes / No	Yes	

Revision History

Revision A—

- Important box added above Table 13-14 within the MicroNet Safety Module Configuration Checks

Released

We appreciate your comments about the content of our publications.

Send comments to: icinfo@woodward.com

Please reference publication 35060V2.

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