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Multipoint Analog Alarm (MAA)

Multipoint Alarming with the NCS NET Concentrator System

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Multipoint Analog Alarm (MAA)

Designed specifically for demanding industrial applications, the Multipoint Analog Alarm -MAA provides an easy way to program and operate alarm functions using the real-time signal capabilities of the NET Concentrator System® (NCS). With it, you can implement simple alarms and configure them without being a PLC programmer.

A full NCS station with the -MAA option can have as many as 60 inputs, 32 alarms and eight physical relay outputs. Each of the 32 alarms can have a single input and a single relay output. A relay can be activated by a single alarm, multiple alarms or by all 32 alarms if desired.

All alarming functionality is implemented within the NCS station and is local to the process. Then if you want to share all that data with a SCADA, RTU or other host system you can do so with the three independent communications ports. The two RS-485 ports support MODBUS RTU and the Ethernet port supports MODBUS/TCP. The MAA alarm functionality is not dependent upon communications back to a host so its integrity is high.
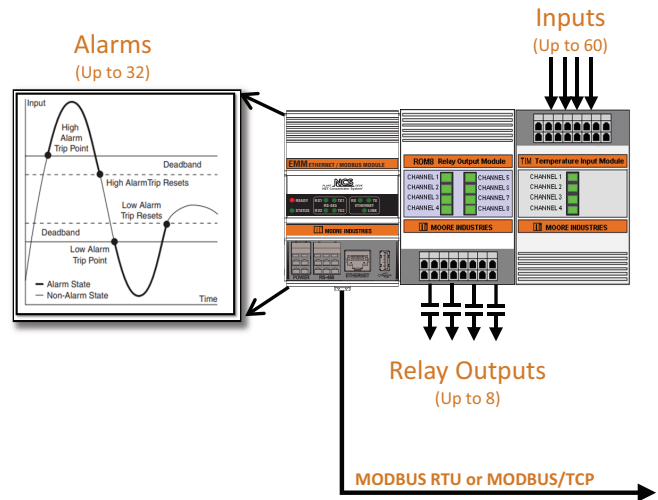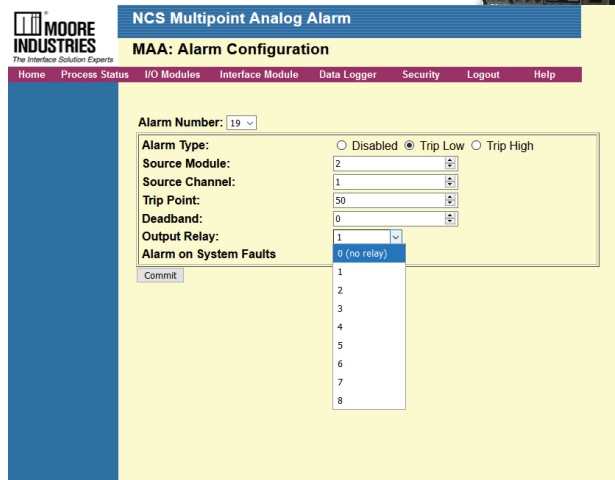

Figure 1 - NCS with –MAA option for Multipoint Alarming Applications. Configure up to 32 Alarms and assign them to relay outputs.

The NCS with the Multipoint Analog Alarm -MAA option allows you to implement simple alarms and configure them without being a PLC programmer.

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Features

▶ Provides 32 individually configurable trip alarms. Each alarm can source an analog input channel (either Temperature Input Module (TIM) or Analog Input Module (AIM)), and can be configured to trip high or low.

▶ Alarms can be assigned to any of the eight relays on the Relay Output Module (ROM), where they can be common or point specific.

▶ Configure alarms using a simple web page and transfer and save configurations using a Windows based utility program.

▶ The NCS is a field proven platform for multipoint alarming applications. With remote I/O installations spanning the globe, the NCS can handle the most critical applications in the harshest environments:

 ▶ Class I, Div 2 certified and it tolerates ambient operating temperatures of -40 to +85°C.
 ▶ It measures many process variable types: thermocouples, RTDs, mV, potentiometers, resistance, voltage, current and discrete inputs and relay outputs.
 ▶ Channel-to-channel and input and output isolation of 500Vrms prevents ground loops.
 ▶ Each input and output has its own microprocessor and A/D or D/A. Should a chip ever fail you only lose one point.
 ▶ Analog inputs and outputs are high resolution, 20-bit and 18-bit respectively.
 ▶ All modules are RFI/EMI protected.

NCS Station Configuration Examples

Basic NCS Station

Figure 2 – A basic NCS station for use with the MAA option.

Figure 2 shows the most basic physical configuration of hardware to implement multipoint alarming. The Ethernet MODBUS/Interface Module (EMM) is the communication module retrieving process data from connected input modules, executing the alarm functions and writing the alarms to the relays, while also providing the MODBUS communications back to optional host.

The ROM used by the -MAA is always in Module position #1. The ROM has eight relays with 2A contacts, either NO or NC.

A member of this basic configuration is an input module. The one shown in Figure 2 is the TIM, which can measure inputs like thermocouples, RTDs, mV, resistance and potentiometers. If the TIM is not appropriate for your application you might use the AIM, which powers and measures transmitter currents and other voltage inputs.

⚙ 16-module NCS Station

Figure 3 – An NCS station with the maximum number of 16 I/O modules

Figure 3 shows an NCS station with 16 I/O modules, the maximum size of an NCS station configuration. Once one NCS Station is full, if you need more points, start another station with another EMM.

The -MAA feature uses the EMM and the ROM module located in the first position of this maximum-size station, plus any of the analog inputs or outputs. For alarm purposes you may be using points from a TIM, AIM or Analog Output Module (AOM). Since 32 alarms are available, up to 32 inputs or outputs within this station can be assigned to each alarm: one analog input or analog output per alarm.

Any of the inputs and outputs that are not used in the alarm system are there for the purposes of traditional I/O for the host device(s). Discrete Input Modules (DIM), and ROMs not in the first position will bring discrete inputs in and send relay outputs out for the HOST systems.

⚙ Configuring Alarms

The EMM used in the NCS station has an embedded web server with easy to use web pages that makes alarm configuration simple and fast.

⚙ MAA Alarm Configuration page

Figure 4 – The Alarm configuration box that appears on the MAA Alarm Configuration page.

Each of the 32 Alarms can be configured from this page. In Figure 4 the **Alarm Number** at the top shows that alarm number 1 is selected in the dropdown. If you want to configure alarm 17, simply select 17.

The **Alarm Type** line allows you to designate the selected alarm as Disabled if it is unused, or set it to Trip Low or Trip High. The input to the alarm is configured by selecting the input's **Source Module** number (from 2 to 16) and **Source Channel** number (from 1 to 4).

Alarms always use the relays located in the ROM mounted in the first module position. Using the dropdown for **Output Relay** for each alarm, simply select 1 through 8 to assign a relay. If you select Relay 0, no hardware relay is used, but the

alarm can still be read as a state change in the MODBUS register (see **MAA Alarm State Page**, below).

Trip Point and **Deadband** are configured in Engineering Units. The same EGUs used for the input are assigned to the alarm.

Should you want to make your alarm true if there is an internal NCS System Fault, you can enable that feature by checking the **Alarm on System Faults** check box. In this case, the alarm is true if the process condition is true or a System Fault is true. Each configuration is saved when you click the **Commit** button that appears beneath the settings box. Your alarm configuration is stored in Battery Backed RAM, protecting it from power loss.

⚙ MAA System Status page

The MAA System Status page indicates whether any alarm is active. Checking the **Enabled** checkbox for **Configuration Lock** locks alarm configurations, preventing accidental configuration changes. To make any configuration changes, the user must first uncheck the Configuration Lock **Enabled** checkbox.

MAA Version:	Version 1.0.6
MAA Status:	An alarm has tripped
	An alarm is active
	The configuration is locked
Configuration Lock:	
Default Configuration	☑ Enabled

Figure 5 – The MAA System Status page showing the Configuration Lock feature.

You can also reset all alarm configurations to factory default by clicking the Default Configuration button that appears beneath Configuration Lock. Once Default Configuration is chosen, all alarms will be Disabled as shown in Figure 6.

Alarm Number: 3 ▽	**Guest User, Read Only**
Alarm Type:	◉ Disabled ○ Trip Low ○ Trip High
Source Module:	2
Source Channel:	1
Trip Point:	50.000000
Deadband:	0.000000
Output Relay:	1 ▽
Alarm on System Faults	☐

Figure 6 – The Alarm Configuration page shows the Alarm Type has been changed to Disabled.

MAA Alarm State page

The MAA Alarm State page shows the status of each of the 32 Alarms using three indicators:

▶ **Alarm Disabled**
▶ **Alarm Tripped.** Alarm Is Active.
▶ **OK** (meaning the Alarm is configured but NOT Tripped/Active)

Alarm 1 Status:	OK
Alarm 2 Status:	OK
Alarm 3 Status:	OK
Alarm 4 Status:	Alarm Disabled
Alarm 5 Status:	Alarm Disabled
Alarm 6 Status:	Alarm Disabled
Alarm 7 Status:	Alarm Disabled
Alarm 8 Status:	Alarm Disabled

Figure 7 – the MAA Alarm Status page displaying multiple alarm states.

MAA Configuration Transfer Utility

The MAA Configuration Transfer Utility is a simple to use utility that is included for free with any NCS with the –MAA option. It permits you to export the MAA configuration parameters into a CSV file.

	A	B	C	D	E	F	G	H	I
1	MAA Configuration Transfer Utility Version 1.00.00								
2	Thu Nov 07 10:29:28 2019								
3	Serial Number: 2524850								
4	Alarm	Alarm	Source	Source	Output	Trip Point	Deadband	Enunicate	System
5	Number	Mode	Module	Channel	Relay				Fault
6	1	2	2	1	1	75	0	1	
7	2	0	2	1	1	50	0	0	
8	3	2	2	1	1	75	0	1	
9	4	0	2	1	1	50	0	0	
10	5	2	2	1	1	50	0	0	
11	6	0	2	1	1	50	0	0	
12	7	0	2	1	1	50	0	0	
13	8	0	2	1	1	50	0	0	
14	9	0	2	1	1	50	0	0	
15	10	0	2	1	1	50	0	0	
16	11	0	2	1	1	50	0	0	
17	12	0	2	1	1	50	0	0	
18	13	0	2	1	1	50	0	0	
19	14	0	2	1	1	50	0	0	

Figure 8 – An example of the alarm configuration CSV file, exported using the MAA Configuration Transfer Utility.

Once you have all the MAA parameters in CSV file format, you can save the MAA configuration file as a backup of your alarm parameters which you can reload to the NCS when necessary using the transfer utility. To save time updating configurations, you can also change the parameters and reload the parameters back into the NCS. If you need help, just email the configuration to Moore Industries to get support assistance.

Host Communications

All of the MAA configuration parameters can be changed from a MODBUS RTU or MODBUS/TCP Host using standard MODBUS commands, assuming you have the proper security credentials. If you do not need a physical relay output for one or more alarms, you can set the relay assignment to 0 and still read the state change as a MODBUS register. Each alarm has a 16-bit MODBUS register which indicates:

▶ Configuration error
▶ Alarm disabled
▶ Alarm Tripped
▶ Alarm in Deadband
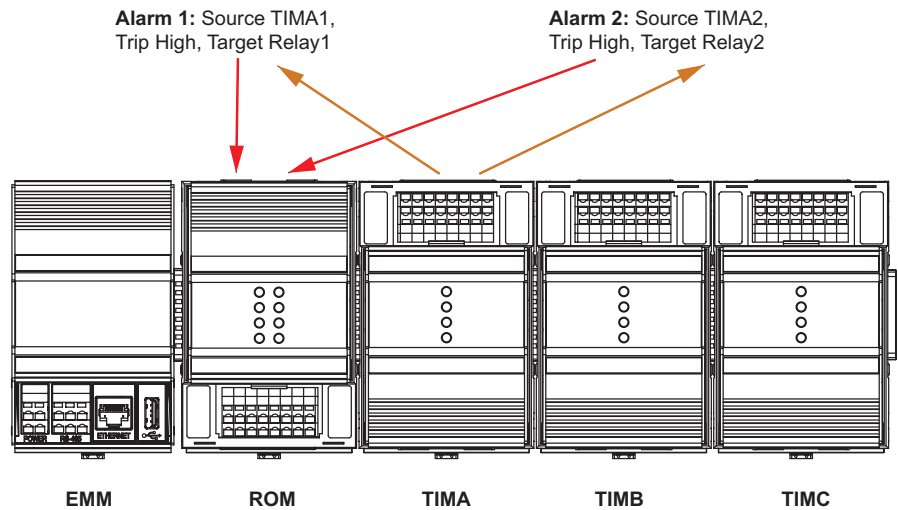▶ Alarm Active
▶ System Fault Active
▶ Input Fault Active

The -MAA feature has 32 Alarms and eight physical relays. If your application requires unique identification of each of the 32 alarms via MODBUS RTU or MODBUS/TCP communication with your host system, contact us for specific MODBUS memory map locations.
For alternative alarming applications not handled with this -MAA NCS feature please consult with us and custom programs can be written to meet your specific requirements.
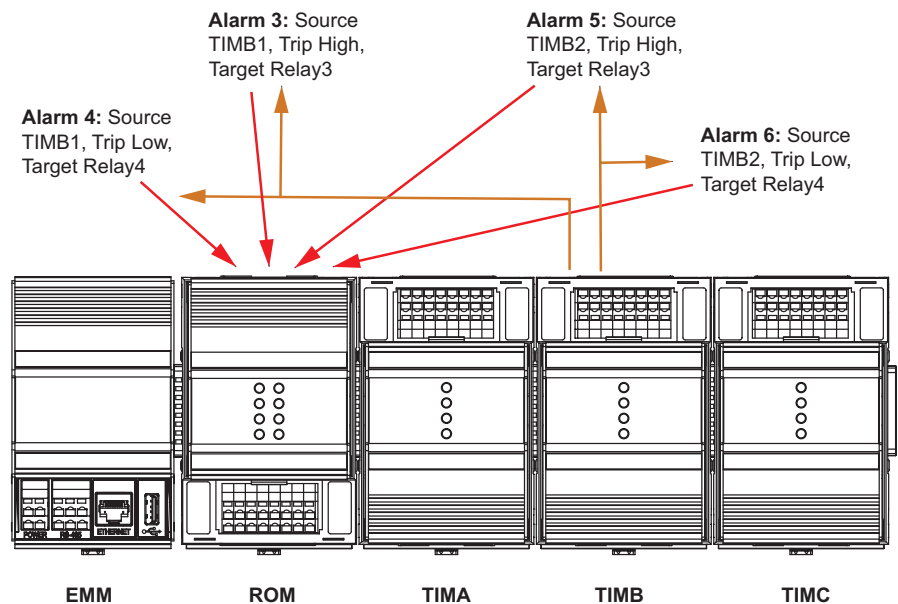
MAA Application Examples

Alarms 1 and 2:

In this example, there are two alarms, each requiring a dedicated relay output: one input tied to one alarm tied to unique relay. Each input has its own alarm, and each Alarm drives a unique Relay.

Alarm 1: Source TIMA1, Trip High, Target Relay1

Alarm 2: Source TIMA2, Trip High, Target Relay2

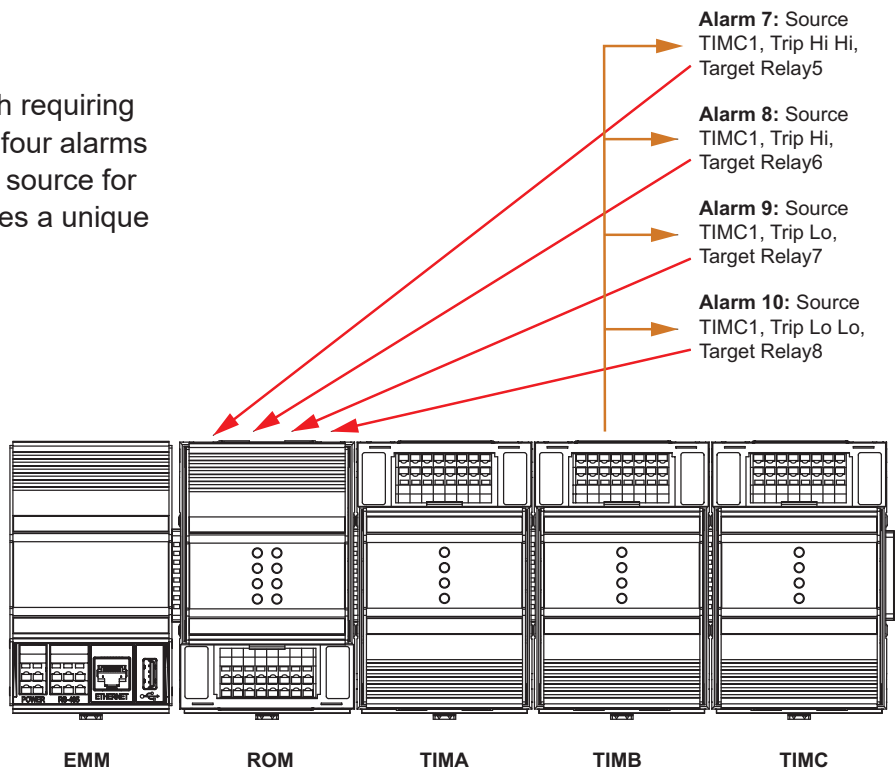EMM   ROM   TIMA   TIMB   TIMC

Alarms 3 through 6

This example shows four alarms driving shared relay outputs: one input tied to two alarms tied to shared relays. Each input is the source for two alarms, and the alarms share the relays.

Alarm 3: Source TIMB1, Trip High, Target Relay3

Alarm 5: Source TIMB2, Trip High, Target Relay3

Alarm 4: Source TIMB1, Trip Low, Target Relay4

Alarm 6: Source TIMB2, Trip Low, Target Relay4

EMM   ROM   TIMA   TIMB   TIMC

⚙ Alarms 7 through 10

In this example there are four alarms, each requiring a dedicated relay output: one input tied to four alarms tied to four unique relays. One input is the source for four separate alarms, and each alarm drives a unique relay.

Alarm 7: Source TIMC1, Trip Hi Hi, Target Relay5

Alarm 8: Source TIMC1, Trip Hi, Target Relay6

Alarm 9: Source TIMC1, Trip Lo, Target Relay7

Alarm 10: Source TIMC1, Trip Lo Lo, Target Relay8

EMM   ROM   TIMA   TIMB   TIMC

NCS Flexibility Enables More Alarm Logic

The NCS with -MAA option accomplishes the goal of creating an extremely simple multipoint alarm. However, the NCS system is so flexible that -MAA option permits you to configure even more sophisticated alarm logic.

Host Initiated Alarm

If your alarm strategy includes the need to have the Host initiate a relay trip you can do so. An AOM channel can be a source for an alarm. The Host can write an appropriate value to the AOM channel and the preconfigured alarm will trip the assigned relay.

Discrete Field Signal-based Alarm

Should your alarm strategy require tripping a relay based upon the state of a discrete field signal, you can do so. Wire the discrete to an input channel on the TIM and configure it as a 2-wire resistance input type. We have the ability to scale this as a binary 0 & 1. Configure your alarm to be High with a Trip Point of 0.75 and assign the appropriate relay.

Order an NCS with the -MAA Option

To order the Multipoint Analog Alarm on an NCS, visit the NCS EMM -MAA catalog page and request a quote or download the NCS data sheet for more details on the NCS system. Easier still, just give us a call at 800-999-2900 in the US or any of our international sales offices listed below, or send an email to info@miinet.com.