

11.0 Alarm Functions

The powerful alarm functions in the MAQ®20 Data Acquisition System provide essential monitoring and warnings to ensure optimum process flow and fail-safe applications. Alarms have the following parameters which can be configured:

Alarm Enable

Enables the Alarm on a given channel provided that the Alarm Configuration Register has a valid configuration. Set the bit corresponding to the given channel to a 1 to enable the alarm. If the Alarm Configuration register for the given channel does not have a valid value, the write will be ignored and the Alarm Enable bit will remain 0. Write a 0 to the bit corresponding to the given channel to disable the alarm and clear any alarms that have tripped.

Alarm Configuration

Selects Tracking or Latching alarms for a given channel and selects which limits trip the alarm - High, Low, High-High or Low-Low. There is a register for each channel. The value written to this register is the sum of the codes for the Alarm Type and Alarm Limits. Refer to Section 12.0 for the specific codes. If an invalid value is written to this register, the value will be ignored and the last valid value that the register contained will be kept. If a 0 is written to the register, the Alarm Enable register for the channel will be set to 0 and alarms that the channel has tripped will be cleared.

Tracking alarms follow the value of the input signal and reset automatically when the signal comes back into the valid range specified by the limit and deadband. Latching alarms trip when the signal exceeds the alarm condition and remain set until reset by the user.

High Limit

Sets the value for the High limit in counts. Alarm status is stored in a register.

Low Limit

Sets the value for the Low limit in counts. Alarm status is stored in a register.

High Low Deadband

Used for the High and/or Low limits to prevent false tripping or alarm chatter for noisy signals. Deadband is the region less than the High limit or greater than the Low limit, measured in counts, which the signal must traverse through before the alarm is reset after being tripped.

High-High Limit

Sets the value for the High-High limit in counts. Alarm status is stored in a register.

Low-Low Limit

Sets the value for the Low-Low limit in counts. Alarm status is stored in a register.

High-High Low-Low Deadband

Used for the High-High and/or Low-Low limits to prevent false tripping or alarm chatter for noisy signals. Deadband is the region less than the High-High limit or greater than the Low-Low limit, measured in counts, which the signal must traverse through before the alarm is reset after being tripped.

See Figure 7 below for graphical representations of alarm parameters and functionality.

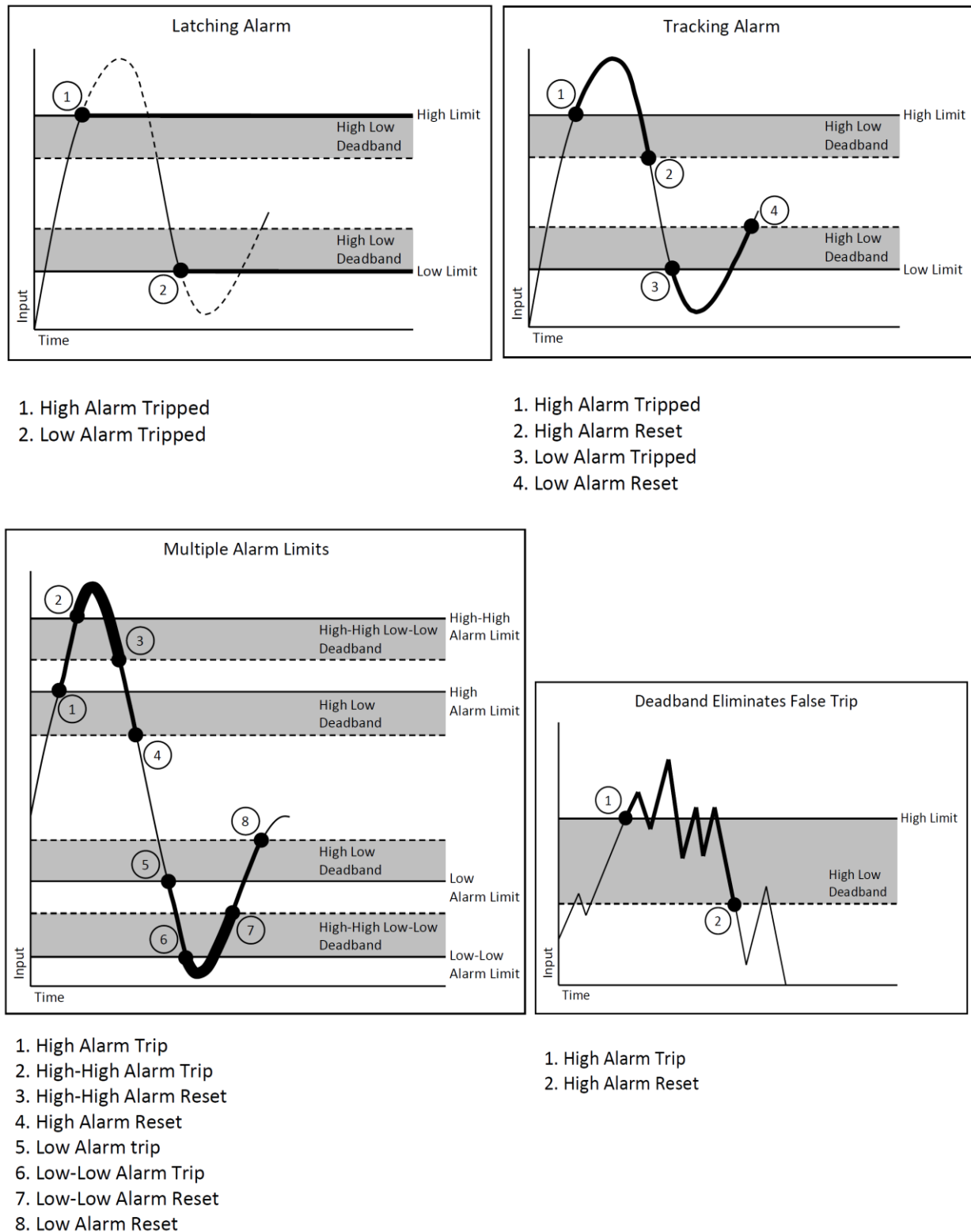


Figure 7: Alarm Parameters and Functionality

12.0 Setting and Monitoring Alarms

The Address Map for the MAQ20-xTC Type x Thermocouple Input Modules is found at the end of this manual. An excerpt from the Address Map is shown below. Alarm parameters are stored in registers at addresses 700 – 999.

NOTE: When a module is registered in a system, addresses are offset by $2000 * R$, where R is the Registration Number. Refer to Section 9.0 for further details on Registration Number.

Address Range 700 - 999 : Alarm Configuration						
Start Address	Read/Write	Number of Registers	Contents	Description	Data Range	Data type
700	R/W	1	Alarm Status, Low-Low	To clear a Latched alarm write a 0 to the corresponding channel bit.	0 to 65,535	INT16
701	R/W	1	Alarm Status, Low	To clear a Latched alarm write a 0 to the corresponding channel bit.	0 to 65,535	INT16
702	R/W	1	Alarm Status, High	To clear a Latched alarm write a 0 to the corresponding channel bit.	0 to 65,535	INT16
703	R/W	1	Alarm Status, High-High	To clear a Latched alarm write a 0 to the corresponding channel bit.	0 to 65,535	INT16
704	R/W	1	Alarm Enable	1 = Enabled 0 = Disabled	See below	INT16
710	R/W	8	Alarm Config	Alarm Configuration	See below	INT16
730	R/W	8	High Limit	High Alarm Limit	See Table 4	INT16
750	R/W	8	Low Limit	Low Alarm Limit	See Table 4	INT16
770	R/W	8	High Low DB	Deadband for High Low Alarm	See Table 4	INT16
790	R/W	8	High-High Limit	High-High Alarm Limit	See Table 4	INT16
810	R/W	8	Low-Low Limit	Low-Low Alarm Limit	See Table 4	INT16
830	R/W	8	High-High Low-Low DB	Deadband for High-High Low-Low Alarm	See Table 4	INT16

Alarms are configured by writing a code to the register at address $710 + 2000 * R$ and then enabled and disabled by writing a 1 or 0 to the register at address $704 + 2000 * R$. Alarm Status is stored in registers at address range 700 – 703, offset by $2000 * R$. The code written to address $710 + 2000 * R$ is the sum of a number representing the type of alarm and a number representing the alarm limits to be monitored.

Alarm Configuration Value = Alarm Type Code + Alarm Limit Code

Alarm Type	Code	Alarm Limit	Code
Tracking	1000	Low Limit	100
Latching	2000	High Limit	200
		High Low Limit	300
		Low-Low Limit	400
		High-High Limit	500
		High-High Low-Low Limit	600

If the Alarm Configuration Value = 0, the Alarm is Off (Disabled). The Alarm for a given channel cannot be turned On (Enabled) until a valid, non-zero value is written to the Alarm Configuration register.

Example: A MAQ20-KTC module with serial number 1234567-89 is installed in a system and has been assigned a Registration Number of 3. Set up the module to have a Tracking Alarm on Channel 1 with a High limit of 3000 counts, a Low limit of 500 counts and a Deadband of 100 counts.

The MAQ20-KTC module with s/n 1234567-89 has an address offset of $2000 * 3 = 6000$

Write to register address $6000 + 711 = 6711$ a value of $1000 + 300 = 1300$ to set a Tracking Alarm with High Low limits

Write to register address $6000 + 731 = 6731$ a data value of 3000 to set the High limit

Write to register address $6000 + 751 = 6751$ a data value of 500 to set the Low limit

Write to register address $6000 + 771 = 6771$ a data value of 100 to set the Deadband for the High and Low limits

Write to register address $6000 + 704 = 6704$ the equivalent of bit code 0000 0010 = 3 to enable the alarm on Channel 1

When an alarm condition is reached as specified by the above parameters, the Alarm Status registers are written in response to the events and the red LED on the module is lit.

Read register address $6000 + 701 = 6701$ to view the status of the Low Alarm.

If bit code 0000 0010 = 3 is read, a Low Alarm has occurred on Channel 1.

Read register address $6000 + 702 = 6702$ to view the status of the High Alarm