

Analogue Module Programming

The Analogue Module is identified by the letter “Q” followed by the module number (eg. Q01). It serves to interface analogue quantities such as temperatures or other variable levels into the 3000/4000 system. The module provides 4 analogue inputs, two on/off type zones without tamper/fault monitoring and four Auxiliary outputs.

The Analogue Module may be programmed such that when an analogue level exceeds or drops below a pre-programmed trigger point an alarm/seal/tamper event is generated. The current analogue value of each input can also be viewed in scaled units at any Terminal or remotely via an externally connected device.

The method by which the state of the Input varies in relation to the Input value is dependent upon the “Calibration String” and the mode in which the device or sensor is operating. This is described in more detail below.

A small hysteresis applies to each Trigger Point to avoid “state chatter”.

Important Note: Serial Temperature Sensors or other devices **MUST** be connected to the analogue Inputs, and the correct Jumper links set, before the module is powered up. The action of powering up the module with the sensors attached will allow the Analogue Module to detect the type of sensor connected.

Calibration Strings.

The Calibration String is chosen to allow arbitrary, 4 digit scaled values to be chosen for each analogue Input. The Calibration String also takes into account rounding errors and resolution in order to keep introduced errors to a minimum. Scaled value must be chosen as four significant digits with a choice of 0, 1, 2 or 3 decimal places. This should allow adequate choice of values in engineering units.

The Calibration string is read as follows: ABCCCCCCCCC

A = Mode selection. 0, 1, 2, 3, 4 or 5.

B = Decimal places for display.

C = Calibration string for particular device, measurement range, etc.

e.g. The Calibration String used for the Serial Temperature Sensor in Mode2 with 2 digit display and temperature range of 0 to 31.5 degrees is: 2214FA000000

Operational Modes.

Mode 0 is used for Analogue sensor devices providing 0 - 5V or 4 - 20mA current loop output.

Modes 1, 2 and 3 are used with the Serial Temperature Sensor and are essentially the same in operation. i.e:

- Only the “Trigger 1” value can be programmed for each zone.
- Zone is in Alarm when temperature is above the Trigger 1 value, but below the upper limit.
- Zone is Sealed when temperature is below the Trigger 1 value, but above the lower limit.
- Zone is in Tamper when temperature is outside the lower or upper limits.
- A calibration string is required for each Zone you intend to process, regardless of whether or not a sensor is physically connected to the Zone.

The difference between Modes 1, 2 and 3 is the number of Zones assigned to each Temperature Sensor:

In Mode 1, each Temperature Sensor is assigned 1 Zone Input.

In Mode 2, each Temperature Sensor is assigned 2 Zone Inputs.

In Mode 3, each Temperature Sensor is assigned 4 Zone Inputs.

Modes 4 and 5 are used with the Serial Temperature Sensor and provide 2 Trigger values for each zone.

The difference between the two modes is the temperature range available.

Each of the 6 Modes are detailed on the following pages.

Mode “0”

In this mode each Sensor is attached to one analogue Input. The Input utilises one positive Trigger Point and operates on a positive scale from 0 to 5 volts. Alternatively, any analogue quantity can be interfaced to the Analogue Module provided it is translated to a 0-5 volt full scale deflection at the analogue input. (eg. For a 0-20mA current loop, this is achieved using a 250 ohm resistor.)

The status of the Input varies as follows:-

Input Status	Unit Value Range
Tamper	< 2
Seal	2 to Trigger Value
Alarm	Trigger Value to 253
Tamper	> 253

The tamper state should only ever be used to indicate a fault condition.

A hysteresis of ± 1 unit has been implemented at the Trigger Value.

Each Analogue Module can accommodate up to 4 Devices each using a single Mode “0” Input.

Mode “1”

This mode is specifically designed for the 994089 Serial Temperature Sensor. In this mode each Sensor is attached to one analogue Input allowing for 4 individual Temperature Sensors to be connected to the Module. This means that 4 separate temperatures can be displayed &/or processed via a single Analogue Module. (Qxx:Z01 to Qxx:Z04)

Each analogue Input utilises one positive Trigger Value and operates on a positive temperature scale of **0° to 31° Celsius**.

Note: Ensure the jumpers on the Analogue Module have been set correctly for use with the 994089 Serial Temperature Sensor and the sensor is connected before power up of the Analogue Module. (Refer to the Analogue Module Installation Instructions for details).

The status of the Input varies as follows:-

Input Status	Temp Range
Tamper	< 0.5°
Seal	0.5° to Trigger Value
Alarm	Trigger Value to 31°
Tamper	> 31.5°

The tamper state should only ever be used to indicate a fault condition.

In this Mode, each Analogue Module can accommodate up to 4 independent Serial Temperature Sensors.

Mode “2”

This mode is specifically designed for the 994089 Serial Temperature Sensor. Mode 2 uses one Sensor attached to Input 1 and/or Input 3 and allows for 2 Inputs to utilize a single Sensor. The Sensor connected to Input 1 will have it's value automatically mirrored to Input 2. (Qxx:Z01 and Qxx:Z02 will register the same temperature) The Sensor connected to Input 3 will have it's value automatically mirrored to Input 4. (Qxx:Z03 and Qxx:Z04 will register the same temperature)

This configuration allows two trigger points per Temperature Sensor with two independent Zone Inputs representing the two Trigger points. e.g.

- 1) The trigger points could be used as a HIGH Trigger and a LOW Trigger to control an air-conditioner on and off.
- 2) The trigger points could be used to provide two different functions from a single Sensor. One Zone could trigger at 24 degrees to turn airconditioning on , while the other Zone could trigger at 16 degrees to turn a heater on.

NOTE: Ensure the jumpers on the Analogue Module have been set correctly for use with the 994089 Serial Temperature Sensor and the sensor is connected before power up of the Analogue Module. (Refer to the Analogue Module Installation Instructions for details).

The status of the Inputs vary as follows:-

Input Status	Temp Range
Tamper	< 0.5°
Seal	0.5° to Trigger Value
Alarm	Trigger Value to 31°
Tamper	> 31.5°

The tamper state should only ever be used to indicate a fault condition.

In this manner, each Analogue Module can accommodate up to 2 Serial Temperature Sensors, each using 2 Mode “2” Inputs. (Inputs are paired with each temperature sensor utilising Inputs 1&2 and Inputs 3&4 respectively.)

Mode “3”

This mode is specifically designed for the 994089 Serial Temperature Sensor. Mode 3 uses one Sensor attached to Input 1 and allows for 4 Inputs to utilize a single Sensor. The Sensor connected to Input 1 will have it's value automatically mirrored to Inputs 2, 3 & 4. (Qxx:Z01, Qxx:Z02, Qxx:Z03 and Qxx:Z04 will all register the same temperature).

This configuration allows four trigger points per Temperature Sensor. e.g.

- 1) Two of the trigger points (e.g. Set to 18 degrees and 25 degrees) could be used to control air-conditioning and/or heating appliances, while the other two trigger points (e.g. Set to 12 degrees and 28 degrees) could be used to monitor and report when temperatures go outside an acceptable range due to equipment failure.
- 2) Two trigger points could be used as Mid 1 and Mid 2 Triggers, the other two as High and Low Triggers.

NOTE: Ensure the jumpers on the Analogue Module have been set correctly for use with the 994089 Serial Temperature Sensor and the sensor is connected before power up of the Analogue Module. (Refer to the Analogue Module Installation Instructions for details).

The status of the Inputs vary as follows:-

Input Status	Temp Range
Tamper	< 0.5°
Seal	0.5° to Trigger Value
Alarm	Trigger Value to 31°
Tamper	> 31.5°

The tamper state should only ever be used to indicate a fault condition.

In this manner, each Analogue Module can accommodate 1 Serial Temperature Sensor using all 4 Mode “3” Inputs. (Inputs must be grouped as Inputs 1,2,3&4.)

Mode “4” and Mode “5”

These modes are specifically designed for the 994089 Serial Temperature Sensor. Modes 4 & 5 can operate with one to four Temperature Sensors connected to an Analogue Module. One Temperature Sensor can be connected to each individual analogue Input.

Each Input, however, offers the ability to programme two Trigger Values. The first Trigger Value is the Mean value of the desired range. The second Trigger Value is the Dead band. The deadband value determines the scope of the range. (ie. Maximum desired value to Minimum desired value).

This configuration allows the Installer to programme a HIGH Trigger Value and a LOW Trigger Value for each Input, enabling up to 4 Serial Temperature Sensors to be connected to an Analogue Module.

e.g. If a mean temperature of 22 degrees and a deadband of 4 degrees is programmed, then the Zone will go into alarm at 24 degrees +/-0.5 and will Seal at 20 degrees +/- 0.5. The Zone will be in the Tamper state when the temperature is within the deadband.

NOTE: Ensure the jumpers on the Analogue Module have been set correctly for use with the 994089 Serial Temperature Sensor and the sensor is connected before power up of the Analogue Module. (Refer to the Analogue Module Installation Instructions for details).

The status of the Inputs vary as follows:-

	Mode 4	Mode 5
Calibration String	4214FA000000	5205FA6E0000
Input Status	Temperature Range	Temperature Range
Seal	0° to (T1 - T2/2)	-55° to (T1 - T2/2)
Tamper	(T1 - T2/2) to (T1 + T2/2)	(T1 - T2/2) to (T1 + T2/2)
Alarm	(T1 + T2/2) to 31.5°	(T1 + T2/2) to 70°

T1 = Trigger1 Value

T2 = Trigger2 Value

A tamper signal will not be returned in these modes for cases where the temperature sensor exhibits full deflection.

i.e. In Mode 4 at the 0° Celsius and 31° Celsius ends of it's range.

In Mode 5 at the -55° Celsius and 70° Celsius ends of it's range.

Each Analogue Module can accommodate up to 4 Serial Temperature Sensors, each using a single Mode “4” or Mode “5” Input with two Trigger Values.

**Analog Module to
alter: Q01**

This screen allows an Analogue Module to be selected for programming. A module may be selected by either using the UP and DOWN Arrow Keys or entering the module number directly using the DIGIT Keys.

**Q01 Present -000
but not secure**

Pressing the ON Key to change modes will tell the installer whether the module is currently in the network. If the module is not in the network, it will display the word "Absent" following the Analogue Module number. If the module is present, the Analogue Module number is followed by the words "Present-nnn but not secure" or "Present-nnn and secure", depending upon the LAN security status. The number (nnn) denotes the number of times the module has failed to acknowledge a message from the Control Module since the last LAN Init. or LAN Secure operation. (See "Configuring the Model 3000/Access 4000 LAN" for further details.)

Press the OK Key to proceed to the next screen.

**Q01 Poll
Time: 060 sec**

This screen allows the Installer to specify the maximum time this module can be out of communication with the Control Module. Only modules in unprotected Areas should be programmed with short times. Modules in protected Areas can have times set up to 255 seconds maximum. If too many modules are programmed for short times, LAN communications may slow down.

**Q01 LAN
Priority: 0**

Pressing the ON Key allows the LAN Priority to be programmed between 0 and 3 for this module. LAN Priority can be used to give certain modules priority over other modules when sending information to the Control Module. Priority 0 is the highest priority and priority 3 is the lowest. For example, if a module was programmed for priority 0 and another module was programmed for priority 1 and both modules were sending information at *exactly the same time*, the module with priority 0 would send its message first.

The most common programming in small systems is to leave all priorities at 0. In larger systems with many Terminals, Zone Expanders, Readers and Analogue Modules, the Analogue Modules may be set to Priority 3, Zone Expanders to Priority 2, Readers to Priority 1 and Terminals to Priority 0. This would give Terminals the fastest response, while Readers would still have a faster response than Expanders during heavy LAN traffic. Analogue Modules to be used for basic air-conditioning purposes would only require a low priority of 3 but this may be reviewed if the Analogue Module was to be used to monitor more important applications.

**Q01 Auto Update
Time: 060 min**

This screen allows the Installer to set the time in minutes between each Analogue Module update. This is the time that each programmed input will log its current value to review.

**Q001 1234....
Opts -> nnnnnnnn**

This screen allows the Installer to specify which analogue Inputs, if any, are to log their values to review each time the Auto Update timer above expires. eg. A "Y" under "1" means that analogue Input number 1 will have its value recorded to review each time the Auto Update timer, as set in the previous screen, expires. This allows the system to act as a recorder, logging periodic analogue Input values which can be reported or printed etc. via a Comms Task.

**Q01:Z01 Trigger1
Value: $\pm$?**

This screen will be displayed next. Programming of Trigger Values is explained later in this chapter. However, in the interest of efficiency, it is recommended that the Calibration String be programmed first.

**Q01:Z01 Calib:
000000000000**

Easy Tip:

The easiest and most efficient manner in which to programme the Analogue Module is to skip all the Trigger Value screens for the moment by repeatedly pressing the OK Key until the Calibration String programming screen is displayed.

Explanation:

The first digit of the Calibration String sets the Mode of the Analogue Module. This determines the number of Trigger points and the manner in which they will be used. If the Calibration String is altered after the Trigger Value is programmed, the Trigger Value may not reflect the value previously set.

**Q01:Z01 Calib:
000000000000**

These screens allow each input to be scaled and calibrated via a special calibration string entered in HEX format. This screen is altered by the Installer according to technical notes which should accompany each transducer being connected to an analogue Input.

Use the DIGIT Keys to enter the specific Calibration String for your device. Press the OK Key to proceed to the next screen.

A Calibration String must be entered for each programmed Input.

A separate screen is displayed for each of the four analogue inputs.

**Analog Module to
alter: Q01**

When all Calibration Strings have been entered, the screen will return to the very first Analogue Module programming screen. Move through the Analogue Module programming structure again using the OK Key until the first Trigger Value screen is displayed.

**Q01:Z01 Trigger1
Value: $\pm$ 0000**

The pre-programmed Calibration String will determine the appearance of these screens and the format in which the value is to be entered.

Use the "9" Key to toggle between the "+" and "-" sign and enter the value via the DIGIT Keys. No decimal point is entered. The position of the decimal point is assumed as per the display format configuration setting contained within the calibration string (ie. + 0255 will be interpreted as either 255, 25.5, 2.55 or 0.255 depending upon the calibration string).

For example; A Serial Temperature Sensor input operating in Mode 1 will only accept Trigger1 Value. Furthermore, as per the sensor instructions, the Trigger Value is to be entered in Degrees Celsius and two decimal places are assumed.

The Trigger Value screens for those inputs with valid Calibration Strings will now have changed. The value displayed reflects the full scale value in units of measure appropriate to the type of sensor. The virtual position of the decimal point will be as set by the Input's Calibration String.

In the case of the 994089 Serial Temperature Sensor, 0000 will be displayed. Desired values are entered in ° Celsius, the valid range being from 0° to 31.5°.

Enter Trigger Values for those of the four analogue Inputs that are to be used. Make note of the mode in which the sensors will be operating as this will affect the number of usable Trigger Values on each Input and the sensor to which each Input refers.

Q01:Z01 Trigger2
Value: ± 0000

This screen allows the Installer to specify the second Trigger Value for this Input. This Trigger Value applies only to Sensors used in Mode 4 or Mode 5. **In any other mode, any value entered in this field will be ignored.** The status of the Zone will change as per the Mode description.

Use the "9" Key to toggle between the "+" and "-" sign and enter the value via the DIGIT Keys. No decimal point is entered. The position of the decimal point is assumed as per the display format configuration setting contained within the calibration string (ie. + 0255 will be interpreted as either 255, 25.5, 2.55 or 0.255 depending upon the calibration string).

Similar screens are used to programme Trigger Values for the remaining 3 analogue Inputs, if required. Programme their values in the same manner as above.

Putting it all together

When all analogue Inputs have been programmed, the Installer can set about programming the Calculated Auxiliaries, Function Zones, Inputs or Areas. These features provide the output or automation which is to occur as a result of the changes of state of the analogue Inputs.

A LAN Initialize [MENU 7,8,2] or LAN Secure [MENU 7,8,1] must be done once all changes have been made. Refer to the relevant sections of this manual for further information.

Testing

Zone testing works as for other modules, with the screen showing the seal/alarm/tamper status according to the pre-programmed Trigger Values and the Mode being used.

Analogue Input values may be read via MENU 1, 3. This procedure also has the same effect as performing a LAN Init or the specific Analogue Module.

Viewing Analogue Values

MENU 1,3 allows the selected analogue Input to be viewed in scaled units. The Arrow Keys allow other Inputs to be viewed if desired. Whenever a module is selected for viewing, that module will automatically report the latest analogue value every two seconds to the Control Module so that the most up to date value may be viewed. If a module cannot report its latest value for any reason, the display will show "?????". One reason may be that the module is absent.

This screen will automatically time-out after 2 minutes.

Reporting Formats

Analogue Module Inputs do not currently report on Contact ID or Securitel format.

