# BACnet Protocol Guide
# TG

***Senva Sensors***
***9290 SW Nimbus Ave***
***Beaverton, OR 97008***

## 154-0032-0A

| Rev. | Release Date | By | Description of Change | ECR |
|---|---|---|---|---|
| 0A | 3/13/2017 | CKB | Initial Release | --- |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

| | | |
|---|---|---|
| **Access Legend** | Readable | R |
| | Writable | W |
| | Writable with 0 only (statistics reset, see Analog Inputs) | W0 |
| | Saved in non-volatile configuration memory | NV |

**See Also:**

| | |
|---|---|
| 152-0271 | TG BACnet Installation Instructions |
| 152-0273 | TG Sensor Replacement Instructions |
| 154-0031 | TG Series User's Guide |
| 154-0033 | TG Modbus Protocol Guide |

# Protocol Implementation Conformance Statement

| | |
|---|---|
| **Date** | 3/13/2017 |
| **Vendor Name** | Senva Sensors |
| **Product Name** | TG |
| **Product Model Number** | TGX-BXX (See catalog for model numbering) |
| **Firmware Revision** | 1.1.0 |
| **Application Software Version** | March 13 2017, 15:55:01 |
| **BACnet Protocol Revision** | 14 |
| **Product Description** | Toxic gas detector for CO, $NO_2$, or both. |
| **BACnet Standardized Device Profile** | BACnet Application Specific Controller (B-ASC) |
| **List of BACnet Interoperability Building Blocks Supported** | DS-RP-B, DS-RPM-B, DS-WP-B, DS-WPM-B, DM-DDB-B, DM-DOB-B, DM-DCC-B, DM-TS-B, DM-RD-B |
| **Segmentation Capability** | No Support |
| **Standard Object Types Supported** | See following. Optional implementations are **marked**. |
| **Data Link Layer Options** | MS/TP Master, MS/TP Slave (9600 – 115200) |
| **Device Address Binding** | No Support |
| **Networking Options** | No Support |
| **Character Sets Supported** | ISO 10646 (UTF-8) |
| **Communications Gateway** | No Support |
| **Network Security Options** | Non-Secure Device |

# Configuration

Congratulations on installing your new Senva BACnet TG series toxic gas sensor! The *BACnet Protocol Guide* assumes the first stage of installation is complete, with the TG connected to your local RS485 network and powered. A green status LED indicates the TG is powered and ready. If not, please refer to the separate *Installation Instructions* before continuing.

The factory configuration defaults to AUTO for the easiest installation:

- Automatic *Baud Rate* detection (see BV114, AV124): 9600 – 115200 baud
- Automatic *Protocol* detection (see BV112, MSV122): BACnet
- Automatic *MAC Address* selection (see BV113, AV123): 0 – 127

The *RS485 Status* LED and the LCD indicate the progress of the automatic configuration process with a combination of color, blinking, and idle condition codes. Refer to the *User's Guide* for details.

To begin the automatic configuration procedure, simply connect the RS485 terminals to an active MS/TP network. (An active network consists of at least one other MS/TP master, typically a gateway or controller.) When an un-configured TG is installed on such a network, it observes all MS/TP traffic to learn the relevant network parameters. During the observation phase, the TG will not interfere with existing network traffic in any way.

The TG selects the automatic MAC address from a pool of unused addresses detected on the local MS/TP network. The TG adds candidate addresses to the pool after observing two successive Poll-For-Master requests to the candidate time out with no reply. To reduce collisions with other devices that may also be executing the automatic configuration procedure, the final address is randomly selected from the pool. However, the random component is strongly biased towards lower addresses (to keep the efficiency of the token ring high).

A TG typically needs to observe the network for 15 to 30 seconds before selecting a MAC address. If many TGs simultaneously execute the automatic configuration procedure, this may take somewhat longer. After selecting a MAC address, the TG performs two tests to confirm that the address is really unused:

- The first test confirms that two devices have not simultaneously selected the same MAC address.
- The second test confirms that there is no MS/TP slave device occupying the selected MAC address (since a slave device would not naturally respond to the Poll-For-Master requests).

If either test fails, the TG abandons the selected address and returns to passive observation. If the TG does not detect any unused addresses on the network, it remains in the observation state indefinitely. There are a number of conditions where this may occur:

- There is no MS/TP master device on the network generating Poll-For-Master requests.
- All MAC addresses from 0 – 127 are already assigned to other devices.
- The *Max Master* property has been set smaller than 127, and all MAC addresses from 0 – *Max Master* are already assigned to other devices.

After auto configuration completes, the *RS485 Status* LED turns green. Assuming no conflicts, a BACnet controller can then discover the TG to query or configure the various objects. To differentiate between multiple discovered TGs, check the last three digits of the unique serial number printed on the label. The TG sets the default *Device ID* by adding "665000" to the last three digits of the serial number. For an example, see Figure 1.

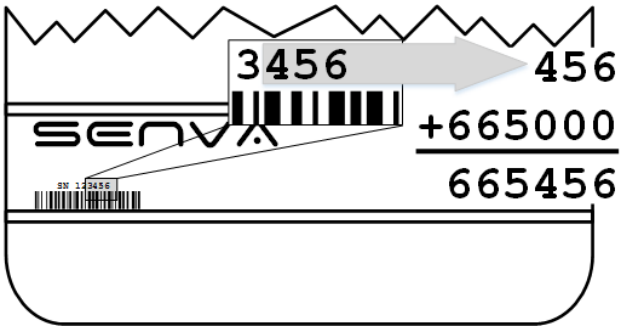


***Figure 1: Default Device ID***

The TG stores any discovered automatic configuration result in non-volatile memory and reloads them whenever the TG resets (e.g. after power loss). All automatic configuration parameters can be manually set at any time via the on-board LCD Menu (see *User's Guide*).

**WARNING:** Before moving a TG with an automatically selected *MAC Address*, ensure there will not be conflicts on the new network! If necessary, reset the automatic configuration by setting the *MAC Address* to 255 or assign a new address manually.

For permanent installations, the protocol configuration parameters (see AV123, AV124, MSV126) may be set to lock the baud rate, serial format, and protocol. However, this will prevent the TG from adapting to future changes in the network environment.

# Device

| | | |
|---|---|---|
| • Object Identifier | **W** | Default: 665XXX (see Configuration) |
| • Object Name | **W** | 30 characters maximum |
| • Object Type | R | |
| • System Status | R | |
| • Vendor Name | R | |
| • Vendor Identifier | R | |
| • Model Name | R | |
| • Firmware Revision | R | |
| • Application Software Version | R | |
| • **Location** | **W** | 30 characters maximum |
| • **Description** | **W** | 30 characters maximum |
| • Protocol Version | R | |
| • Protocol Revision | R | |
| • Protocol Services Supported | R | |
| • Protocol Object Types Supported | R | |
| • Object List | R | |
| • Max APDU Length Accepted | R | |
| • Segmentation Supported | R | |
| • APDU Timeout | R | |
| • Number of APDU Retries | R | |
| • **Max Master** | **W** | 1 – 127; see AV123 |
| • **Max Info Frames** | **W** | 0 – 255; see AV123 |
| • Device Address Binding | R | |
| • Database Revision | R | |
| • **Serial Number** | **R** | Matches the serial number printed on the label |
| • **Last Restart Reason** | **R** | |
| • **Time of Device Restart** | **R** | |
| • **Local Date** | **R** | Volatile; must be set via Time-Synchronization |
| • **Local Time** | **R** | Volatile; must be set via Time-Synchronization |
| • Property List | R | |

- **Device Features** — **R** — Proprietary property ID 6650

  This read-only property, of type *Bit String*, enumerates the major hardware features associated with the device. Each '1' in the value represents a feature available in the specific device.

  1. *RS485 (always present)*
  2. *Fan Relay*
  3. *Alarm Relay*
  4. *Alarm Buzzer*
  5. *$NO_2$ Sensor*
  6. *CO Sensor*
  7. *Thermistor*
  8. *LCD Display*

# Analog Inputs

| | | |
|---|---|---|
| • Object Identifier | R | |
| • Object Name | R | |
| • Object Type | R | |
| • Present Value | **W** | Only writable when *Out Of Service* is TRUE |
| • Status Flags | R | |
| • Event State | R | Always NORMAL |
| • **Reliability** | **W** | Only writable when *Out Of Service* is TRUE |
| • Out of Service | **W** | |
| • Units of Measure | R | |
| • **Update Interval** | **R** | |
| • **Minimum Present Value** | **R** | |
| • **Maximum Present Value** | **R** | |
| • **Resolution** | **R** | |
| • Property List | R | |

For statistical purposes, analog input values are organized into groups. By convention, the primary object leading each group provides the most accurate, up-to-date reading possible. Secondary objects within a group provide statistical measurements updated over time that may support some simple logging with low overhead for setup and bandwidth. Secondary values:

- **Smoothed:** Returns the value after applying a first-order exponential filter (see AV134).
- **Minimum:** Returns the single lowest valid reading taken since last reset.
- **Maximum:** Returns the single highest valid reading taken since last reset.
- **Average:** Returns the average of all valid readings taken since last reset.

Each analog input group shares common *Out Of Service* and *Reliability* properties. Setting *Out Of Service* to *True* also disables all statistical measurements, so that any group value may be arbitrarily set. Statistics will be reset after setting *Out Of Service* to *False* again.

Once recorded, there are a few methods to reset statistics records (*Minimum*, *Maximum*, *Average*):

- Manually for a single object, by writing 0 to the *Present Value* (**W0** in the Access Legend).
- Manually for an individual group, by setting *Out Of Service* to *True* and then *False* again.
- Manually for all objects, by writing the *Statistics Reset* key (see AV192).
- Automatically for single values, by configuring *Auto Reset Statistics* (see BV195).

## AI310 Temperature R/W0

Returns the approximate internal air temperature of the installed device. The default units are °F (see MSV133). The TG uses this temperature to compensate gas sensor measurements.

**WARNING:** The internal air temperature may vary from outside air due to self-heating of the device.

If the temperature is beyond the product's specifications, the LCD will indicate the corresponding *Temperature Limit* warning condition (see *User's Guide, Idle Condition Codes*).

The default smoothed value response time is 30 seconds (see AV134).

**AI312 Smoothed ● AI314 Minimum ● AI316 Maximum ● AI318 Average**

## AI320 CO Gas Concentration R/W0

Returns the measured CO (carbon monoxide) gas concentration, in parts per million.

The default smoothed value response time is 90 seconds (see AV136).

**AI322 Smoothed ● AI324 Minimum ● AI326 Maximum ● AI328 Average**

## AI330 $NO_2$ Gas Concentration R/W0

Returns the measured $NO_2$ (nitrogen dioxide) gas concentration, in parts per million.

The default smoothed value response time is 90 seconds (see AV136).

**AI332 Smoothed ● AI334 Minimum ● AI336 Maximum ● AI338 Average**

## AI380 Power Supply Voltage R/W0

Returns the approximate working voltage provided to the power supply input. The voltage reported is an internal voltage after rectification and input protection (typically 1.0 – 2.0 V less than the external supply).

If the supply voltage drops below 10.0 V, the device anticipates power loss and saves the current configuration to non-volatile memory. However, if the power loss is incomplete, the device may continue to operate at the reduced supply voltage. In this state, configuration changes may be lost if the device has insufficient reserve power if full power loss occurs. The LCD will indicate the corresponding *Low Supply Voltage* warning condition (see the *User's Guide, Idle Condition Codes*).

**AI382 Smoothed ● AI384 Minimum ● AI386 Maximum ● AI388 Average**

# Analog Values

| | | |
|---|---|---|
| • Object Identifier | R | |
| • Object Name | R | |
| • Object Type | R | |
| • Present Value | **W** | Writable unless indicated otherwise. |
| • Status Flags | R | |
| • Event State | R | |
| • Reliability | R | |
| • Out of Service | R | |
| • Units of Measure | R | |
| • **Minimum Present Value** | **R** | |
| • **Maximum Present Value** | **R** | |
| • **Resolution** | **R** | |
| • Property List | R | |

### AV103 Reset Count R/NV

Returns a lifetime count of firmware resets for any reason. The device maintains this count in a protected section of non-volatile memory unaffected by *Configuration Reset* (see AV190).

### AV104 Up Time R

Returns the time since the last device reset, in seconds. To determine the cause, read the *Last Restart Reason* property of the *Device* object.

### AV123 MAC Address R/W/NV

Sets the MS/TP address, 0 – 254 (MS/TP reserves address 255 for broadcast).

When *Auto Address* is *Active* (see BV113), returns the auto-selected address (see Configuration). Otherwise, returns the user-configured address.

Setting any address also sets *Auto Address* to *Inactive*. When setting a new address, the device acknowledges using the original address. Therefore, a client must temporarily remember the original address and only switch at the beginning of the next new transaction.

When *Max Info Frames* (see Device) is not equal to 0 and the *MAC Address* is smaller than or equal to the *Max Master* (see Device), the device operates in MS/TP master mode. Otherwise, the device operates in MS/TP slave mode (no token passing or polling, no initiation of *I-Am* or *I-Have* services).

**NOTE:** Because *Max Master* must be 127 or less, addresses 128 – 254 are always MS/TP slaves.

Default: Varies

## AV124 RS485 Baud Rate R/W/NV

Sets the communication baud rate, 1200 – 460800.

When *Auto Baud Rate* is *Active* (see BV114), returns the auto-detected baud rate (see Configuration). Otherwise, returns the user-configured baud rate.

Almost by definition, successfully reading baud rate implies a correct value, with no further action required. However, when transitioning an MS/TP network to a new baud rate, it may be useful to remotely configure the new baud rate before transitioning the gateway/controller. Setting any user-configured baud rate also sets *Auto Baud Rate* to *Inactive*.

**WARNING:** The device provides no facility to revert the baud rate remotely. Once changed, the device will lose communication until the gateway/controller baud rate matches the new configuration.

Default: *Varies*

## AV134 Smoothed Temperature Response Time R/W/NV

Sets the step response time for smoothed temperature (see AI312), in seconds.

Across all groups, the various *Smoothed* values track the instantaneous measurement after the application of a first-order exponential function. This low pass filter attenuates fast changes, such as a spike in gas concentration caused by a passing vehicle. *Smoothed* values may provide a stable baseline measurement but will always lag the instantaneous measurement (see Figure 2A).

Formally, response time sets the time required for a *Smoothed* value to complete 90% of the transition after an ideal step between two stable values (see Figure 2B).

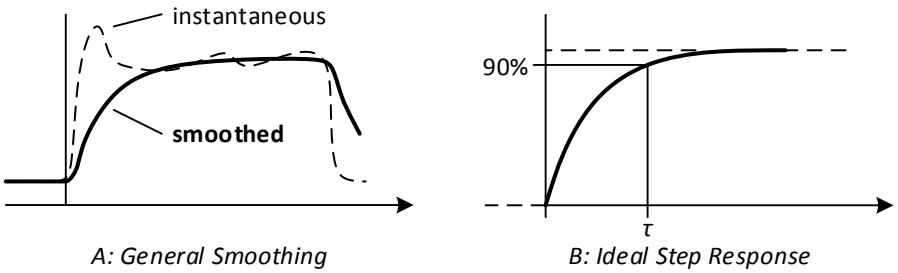


***Figure 2: Smoothed Response Time***

During periods of invalid measurement, *Smoothed* values return 0 (undefined). The resumption of valid measurements momentarily suppresses the smoothing function while the value stabilizes.

Default: 30 seconds

## AV136 Smoothed Gas Response Time R/W/NV

Sets the averaging time interval of the gas sensor measurements (see AI320, AI330), in seconds.

Averaging is implemented as a first order exponential filter. The response time is defined at 90% per time interval.

Default: 90 seconds

### AV150 CO Warning Setpoint R/W/NV

Sets the CO gas concentration required to enter the *Warning* state, in parts per million. (See MSV170 for state descriptions)

This object is only present in models with the *CO Sensor* feature.

Default: 25 PPM

### AV152 CO Alarm Setpoint R/W/NV

Sets the CO gas concentration required to enter the *Alarm* state, in parts per million. (See MSV170 for state descriptions)

This object is only present in models with the *CO Sensor* feature.

Default: 100 PPM

### AV154 CO Hysteresis R/W/NV

Sets how many PPM the CO gas level must fall below a setpoint before the system state transitions back from *Alarm* to *Warning*, or from *Warning* to *Alarm*, in parts per million.

This object is only present in models with the CO Sensor feature.

Default: 0 PPM

### AV156 CO Sensor Calibration R/W/NV

Sets the gas sensitivity calibration of the presently installed CO Sensor, in nanoamperes per PPM.

This object is only present in models with the *CO Sensor* feature.

**IMPORTANT:** This value must be updated when a sensor is installed or replaced. (See *Sensor Replacement Instructions*)

Default: *Varies*

### AV158 CO Sensor Life R/NV

Returns the remaining life of the installed CO sensor, in days. Typical sensor life is at least 5 years, therefore the starting value for sensor life is 1825 days.

This object is only present in models with the *CO Sensor* feature.

### AV160 $NO_2$ Warning Setpoint R/W/NV

Sets the $NO_2$ gas concentration required to enter a *Warning* state, in parts per million. (See MSV170 for state descriptions)

This object is only present in models with the *NO2 Sensor* feature.

Default: 1.0 PPM

### AV162 $NO_2$ Alarm Setpoint R/W/NV

Sets the $NO_2$ gas concentration at which the TG will enter an *Alarm* state, in parts per million. (See MSV170 for state descriptions)

This object is only present in models with the *NO2 Sensor* feature.

Default: 3.0 PPM

## AV164 $NO_2$ Hysteresis R/W/NV

Sets how many PPM the $NO_2$ gas level must fall below a setpoint before the system state transitions from *Alarm* to *Warning*, or from *Warning* to *Alarm*, in parts per million.

This object is only present in models with the $NO_2$ Sensor feature.

Default: 0.0 PPM

## AV166 $NO_2$ Sensor Calibration R/W/NV

Sets the Nanoamp per PPM of the presently installed $NO_2$ Sensor, in units of nanoamperes per PPM.

This object is only present in models with the *NO2 Sensor* feature.

**IMPORTANT:** This value must be updated when a sensor is installed or replaced. (See *Sensor Replacement Instructions*)

Default: *Varies*

## AV168 $NO_2$ Sensor Life R

Returns the remaining life of the installed $NO_2$ sensor, in days. Typical sensor life is at least 5 years, therefore the starting value for sensor life is 1825 days.

This object is only present in models with the *NO2 Sensor* feature.

## AV190 System Configuration Reset W

Always returns 0. Write 9699690 reset the TG to factory defaults.

**WARNING:** The entire non-volatile configuration will be permanently lost; previous configurations cannot be recovered. This includes the current RS485 serial format and *Slave Address*. However, the sensor calibration and lifetime counter will not be reset. (See AV156, AV158, AV166, and AV168.

After a configuration reset, the TG itself will reset and re-learn the current baud rate, serial format, and protocol (see Configuration).

## AV192 Statistics Reset W

Always reads 0. Write 4765089 to reset analog statistics

## AV212 Fan Maximum Off Time R/W/NV

The maximum time the relay may be off before automatically activating the relay, in seconds (See BO210). When written to "0", the *Maximum Off Time* is ignored.

The relay will remain active for the relay's *Minimum On Time* (See Figure 3). If the relay's *Minimum Off Time* is greater than the *Maximum Off Time* the relay will remain off for the entire *Minimum Off Time* prior to being forced on by the *Maximum Off Time* (See BO210).

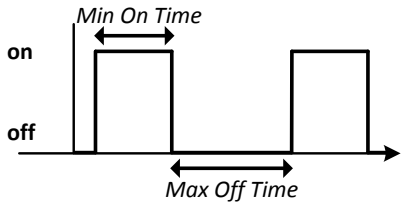


***Figure 3: Max Off Time Diagram***

Default: 0 seconds

## AV232 Buzzer Delay R/W/NV

The time the audible buzzer alarm (See BO230) waits before activating after the system has entered the *Alarm* state, in seconds. Once activated the buzzer will remain active until the gas concentration has fallen below the alarm setpoint (See AV152, AV162), or the buzzer is suppressed (See *User's Guide*) by holding down all 3 buttons on the device for 1 second.

Default: 1800 seconds (30 minutes)

# Binary Outputs

| | | |
|---|---|---|
| • Object Identifier | R | |
| • Object Name | R | |
| • Object Type | R | |
| • Present Value | W | |
| • Status Flags | R | |
| • Event State | R | |
| • **Reliability** | **W** | |
| • Out of Service | **W** | |
| • Polarity | R | Always NORMAL |
| • **Inactive Text** | **R** | |
| • **Active Text** | **R** | |
| • **Change of State Time** | **R** | Only valid if the system time is valid |
| • **Change of State Count** | **W** | Write '0' to reset |
| • **Time of State Count Reset** | **R** | Only valid if the system time is valid |
| • **Elapsed Active Time** | **W** | Write '0' to reset |
| • **Time of Active Time Reset** | **R** | Only valid if the system time is valid |
| • **Minimum Off Time** | **W** | 0 – 65536 seconds |
| • **Minimum On Time** | **W** | 0 – 65536 seconds |
| • Priority Array | R | |
| • Relinquish Default | **W** | |
| • **Current Command Priority** | **R** | |
| • Property List | R | |

The device reserves priority 16 in the standard BACnet binary output priority array for the current state of the binary output, as driven by the system state. Priority 6 is also reserved, as per the BACnet standard. All other priorities are available to the user to force an override on the relay.

Commands to priorities 1-5 take immediate effect, superseding the *Minimum On/Off Times*. Commands to priorities 7-15 respect the *Minimum On/Off Times* of the binary output.

### BO210 Fan Relay R/W

Sets the state of the fan relay. The fan relay will activate automatically when the system state is greater than or equal to the *Warning* state (See MSV170), unless the state of the relay is being overridden by the user.

### BO230 Alarm Buzzer R/W

Sets the state of the alarm buzzer. The alarm buzzer will activate automatically when the system state is equal to the *Extended Alarm* state, and deactivate when the system state falls below the *Alarm* state (See MSV170). The *Status Flags* property will return *Overridden* when the buzzer has been locally suppressed (See *User's Guide*).

# Binary Values

- Object Identifier R
- Object Name R
- Object Type R
- Present Value W
- Status Flags R
- Event State R
- Out of Service R
- **Inactive Text** **R**
- **Active Text** **R**
- Property List R

### BV111 Identify Device R/W

Sets the device interface into an easily identifiable state. When set to *Active*, all of the status LEDs light up (see *Installation Instructions*), and the LCD screen will blink the current MAC address. The device will remain in identify mode until the value is reset to *Inactive* or any button is held for 1 second.

This feature may be useful if several devices are connected on a single network and the association between discovered device IDs and physical devices is uncertain.

Default: *Normal LEDs*

### BV112 Auto Protocol R/W/NV

Sets the state of automatic protocol detection. When *Active*, the RS485 receiver initially allows frames of any supported protocol. On establishing confidence in a particular protocol (about 10 consecutive frames of the same type), this becomes the preferred *RS485 Protocol* (see MSV122).

Generally, having a preferred protocol disallows other protocols. This reduces uncertainty in the unlikely event that a particular frame or sequence could be interpreted as more than one protocol. However, should the protocol really change (e.g. by moving the device to a different network), the device will eventually lose confidence in the preferred protocol. After temporarily allowing all protocols, automatic protocol detection will establish a new preference. To avoid the delays associated with changing protocol, set the *RS485 Protocol* to some option that permanently allows multiple protocols (See MSV122, options 5-8).

When changing this value, the device keeps the current *RS485 Protocol* to avoid communication loss. Setting *Inactive* disables further automatic protocol changes and only allows the protocol(s) specifically set in *RS485 Protocol*.

Default: *Active*

### BV113 Auto MAC Address R/W/NV

Sets the state of the automatic address selection. When *Active*, the *MAC Address* (see AV123) has been automatically selected from a pool of unused MS/TP master addresses (see Configuration). When changing this value, the device keeps the actual *MAC Address* to avoid communication loss.

Default: *Active*

## BV114 Auto Baud Rate R/W/NV

Sets the state of automatic baud rate detection. When *Active*, the device may automatically change the *Baud Rate* (see AV124) in response to RS485 communication errors. When changing this value, the device presents the actual *Baud Rate* to avoid communication loss.

**IMPORTANT:** If *Active*, the device will not create an MS/TP token on an idle line. Typically, an MS/TP master (see AV123) with the smallest *MAC Address* creates a token after about 500 milliseconds to build an orderly token ring. However, allowing the device to create a token on an idle line could obstruct a controller attempting to force a switch to a new baud rate.

In all other cases, the device follows standard BACnet token passing rules. To force standard behavior on an idle line, set *Auto Baud Rate* to *Inactive*.

Default: *Active*

## BV116 Auto Parity R/W/NV

Sets the state of automatic parity detection. When *Active*, the device may automatically change the *Parity* (see MSV126) in response to RS485 communication errors. When changing this value, the device keeps the current *Parity* to avoid communication loss.

Default: *Active*

## BV195 Auto Reset Statistics R/W/NV

Sets the reset mode for statistical measurements (*Minimum*, *Maximum*, *Average*). When *Active*, reading an individual statistical measurement also resets it, as if it had been followed by a write of 0 (see Analog Inputs).

Auto reset mode may be useful in some low-overhead remote logging installations.

**WARNING:** When using *Auto Reset Statistics* as part of a periodic process, ensure there are no extra reads generated between logging intervals. Otherwise, the resulting records may reflect only a portion of the intended interval.

Default: *Inactive*

# Multi State Values

- Object Identifier R
- Object Name R
- Object Type R
- Present Value **W**
- Status Flags R
- Event State R
- Out of Service R
- Number of States R
- **State Text** **R**
- Property List R

Unless otherwise specified, changes to RS485 parameters are effective after the response (i.e. a client must maintain the original parameters for the remainder of the current transaction).

## MSV122 RS485 Protocol R/W/NV

Sets or returns the current RS485 protocol(s):

1. Auto Protocol
2. BACnet
3. Modbus RTU
4. Modbus ASCII
5. BACnet and Modbus RTU
6. BACnet and Modbus ASCII
7. Modbus RTU and ASCII
8. Any Protocol

If *Auto Protocol* (BV112) is *Active*, returns the preferred automatic protocol (typically *BACnet*). Otherwise, returns the user-configured protocol option.

Setting any value other than *Auto* also sets *Auto Protocol* to *Inactive*. Setting *Auto* copies any previously set protocol option to the automatic protocol detector, and sets *Auto Protocol* to *Active*. Setting an option with multiple protocols (5 – 8) reduces the *Auto Protocol* re-detection delay.

Default: *Auto*

## MSV126 RS485 Parity R/W/NV

Sets the communication parity:

1. *Auto*
2. *No Parity*
3. *Odd Parity*
4. *Even Parity*

If *Auto Parity* is *Active* (see BV116), returns the auto-detected parity (typically *No Parity* for BACnet). Otherwise, returns the user-configured parity option.

Setting any value other than *Auto* sets *Auto Parity* to *Inactive*. Setting *Auto* sets *Auto Parity* to *Active*, but keeps the current parity option to avoid loss of communication.

Default: *Auto*

## MSV133 Temperature Units R/W/NV

Sets the preferred units for temperature values:

1. *Degrees Fahrenheit* (°F)
2. *Degrees Celsius* (°C)

Verify the setting by reading the *Units of Measure* of the temperature object (AI310). Saved statistical values automatically convert when the selected unit changes.

Default: *Degrees Fahrenheit*

## MSV170 System State R

Gets the current system state:

1. *Normal*
2. *Warning*
3. *Alarm*
4. *Extended Alarm*

The device determines the current "System State" of the device by using the user defined setpoints. For more information on 'Smoothed PPM' see AI322 and AI332. For more information on setpoints see AV150, AV152, AV154, AV160, AV162, and AV164. See (Figure 4)

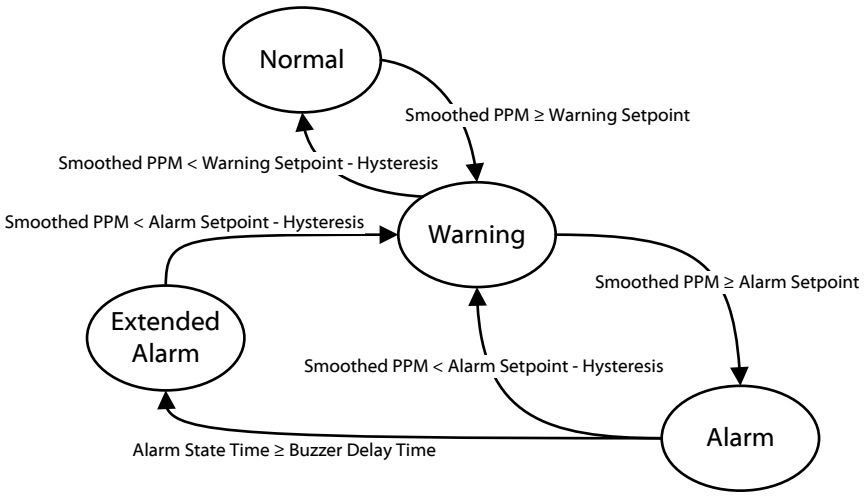


***Figure 4: System State Diagram.***

# Files

| | | |
|---|---|---|
| • Object Identifier | R | |
| • Object Name | R | |
| • Object Type | R | |
| • File Type | R | |
| • File Size | R | |
| • Modification Date | R | |
| • Archive | W | |
| • Read Only | R | Always *True* |
| • File Access Method | R | Always *Stream Access* |
| • Property List | R | |

### FILE25000 User Configuration R

Returns a copy of the non-volatile device configuration (read only). Technical support may request a copy of the file contents to diagnose installation problems.