
Modbus Protocol Guide

TGR Series

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TGR Series

154-0047-0A

Rev.	Release Date	By	Description of Change	ECR
0A		NJS	Initial Release	---

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See Also:

152-0386 TGR Installation Guide



154-0048 TGR BACnet Protocol Guide



Configuration

Congratulations on installing your Senva Modbus TGR Series Toxic Gas monitor. The *Modbus Protocol Guide* assumes the first stage of installation is complete, with the TGR connected to your local RS485 network and powered.

See “TGR Installation Manual” for setup.



The TGR supports the following functions of the Modbus Application Protocol Specification, v1.1b3.:

The TGR supports the following Modbus functions:

- 0x03 *Read Input Register*
- 0x04 *Read Holding Registers*
- 0x06 *Write Single Register*
- 0x10 *Write Multiple Registers*

Protocol

TGR device supports Modbus RTU encoding only (not ASCII).

Scale:

V Varies depending on sensor type.

NO₂ and O₂ have a scale of 10, all other sensors have a scale of 1

*Values must be divided by this scale factor to be read correctly.

Read:

R = Read Only

R/W = Read and Write

Type, Min, Max:

INT8 8-bit integer; -128 to 128, unless otherwise noted

INT16 16-bit integer; -32768 to 32767, unless otherwise noted

Float Number that contains a decimal point

ENUM = UINT16 16-bit unsigned integer that maps to a defined list of values

Readings

Register	Description	Read	Scale	Functionality
1	Sensor1Readings	R	V	Read the current instantaneous readings for sensor 1.
2	Sensor1TWA5Reading	R	V	Read the time weighted average of the past 5 minutes of sensor 1 readings.
3	Sensor1TWA15Reading	R	V	Read the time weighted average of the past 15 minutes of sensor 1 readings.
4	Sensor1TWA60Reading	R	V	Read the time weighted average of the past 60 minutes of sensor 1 readings.
5	Sensor1State	R	1	Reads the state of sensor 1. 0 = Normal; 1 = Trouble; 2 = Warning; 3 = Alarm; 4 = Extended Alarm (Buzzer and alarm relay active if not disabled)
6	Sensor1Status	R	1	Read the status of sensor 1. 1 = Sensor Never Present; 2 = EOL; 4 = Pulse Failure; 8 = Init failure; 16 = No Sensor Present; 32 = Other; 64 = Sensor detected; 128 = Sensor Ready
7	Sensor1CalDaysRemaining	R	1	Read the number of days remaining until sensor 1 needs to be recalibrated.
8	Sensor1LifeDaysRemaining	R	1	Read the number of days remaining on the sensor lifetime.
9	Sensor1GasType	R	1	Read the type of sensor 1.
10	Sensor1SpanMax	R	V	The maximum value that sensor 1 can detect. The sensor cannot detect above this value.
11	Sensor1SpanMin	R	V	The minimum value that sensor 1 can detect. The sensor cannot detect below this value.
12	Sensor1TWA5SP	R	1	Alarm setpoint for the 5-minute time weights average. When in fire safety mode device will alarm if sensor 1 is over this setpoint for 5 minutes.
13	Sensor1TWA15SP	R	1	Alarm setpoint for the 15-minute time weights average. When in fire safety mode device will alarm if sensor 1 is over this setpoint for 15 minutes.
14	Sensor1TWA60SP	R	1	Alarm setpoint for the 60-minute time weights average. When in fire safety mode device will alarm if sensor 1 is over this setpoint for 60 minutes.
15	Sensor1TWAIDLHSP	R	1	Immediate health and danger setpoint, device will immediately alarm when in fire safety mode if sensor 1 ever reads about this setpoint.

Register	Description	Read	Scale	Functionality
16	Sensor2Reading	R	V	Read the current instantaneous readings for sensor 2.
17	Sensor2TWA5Reading	R	V	Read the time weighted average of the past 5 minutes of sensor 2 readings.
18	Sensor2TWA15Reading	R	V	Read the time weighted average of the past 15 minutes of sensor 2 readings.
19	Sensor2TWA60Reading	R	V	Read the time weighted average of the past 60 minutes of sensor 2 readings.
20	Sensor2State	R	1	Reads the state of sensor 2. 0 = Normal; 1 = Trouble; 2 = Warning; 3 = Alarm; 4 = Extended Alarm (Buzzer and alarm relay active if not disabled)
21	Sensor2Status	R	1	Read the status of sensor 2. 1 = Sensor Never Present; 2 = EOL; 4 = Pulse Failure; 8 = Init failure; 16 = No Sensor Present; 32 = Other; 64 = Sensor detected; 128 = Sensor Ready
22	Sensor2CalDaysRemaining	R	1	Read the number of days remaining until sensor 2 needs to be recalibrated.
23	Sensor2LifeDaysRemaining	R	1	Read the number of days remaining on the sensor lifetime.
24	Sensor2GasType	R	1	Read the type of sensor 2.
25	Sensor2SpanMax	R	V	The maximum value that sensor 2 can detect. The sensor cannot detect above this value.
26	Sensor2SpanMin	R	V	The minimum value that sensor 2 can detect. The sensor cannot detect below this value.
27	Sensor2TWA5SP	R	1	Alarm setpoint for the 5-minute time weights average. When in fire safety mode device will alarm if sensor 2 is over this setpoint for 5 minutes.
28	Sensor2TWA15SP	R	1	Alarm setpoint for the 15-minute time weights average. When in fire safety mode device will alarm if sensor 2 is over this setpoint for 15 minutes.
29	Sensor2TWA60SP	R	1	Alarm setpoint for the 60-minute time weights average. When in fire safety mode device will alarm if sensor 2 is over this setpoint for 60 minutes.
30	Sensor2TWAIDLHSP	R	1	Immediate health and danger setpoint, device will immediately alarm when in fire safety mode if sensor 2 ever reads about this setpoint.
31	TroubleRelayState	R	1	Read the state of the Trouble relay.

Register	Description	Read	Scale	Functionality
32	AlarmRelayState	R	1	Read the state of the Alarm relay.
33	SystemStatus	R	1	1 = I2C error; 2 = CRC error; 4 = Write Error; 8 = Using Factory Defaults; 16 = Sensor error; 32 = sensor warning; 64 = nfc error; 128 = assert
34	AirqState	R	1	Gives the state of the overall device, read the individual sensor states to see which sensor is in which state. 0 = Normal; 1 = Trouble; 2 = Warning; 3 = Alarm; 4 = Extended Alarm (Buzzer and alarm relay active if not disabled).
35	FWVersion	R	1	Read the firmware version of the sensor
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Settings

Register	Description	Read	Scale	Functionality
101	Sensor1Warning	R/W	V	Warning relay setpoint for Sensor 1.
102	Sensor1Alarm	R/W	V	Alarm relay setpoint for Sensor 1.
103	Sensor1Hysteresis	R/W	V	Sets how far sensor 1`s gas level must fall below a setpoint before the device will fall below the alarm or warning state.
104	Sensor1CalReset	R/W	1	Can use this point to reset the calibration of sensor 1 back to factory defaults.
105	Sensor2Warning	R/W	V	Warning relay setpoint for Sensor 2.
106	Sensor2Alarm	R/W	V	Alarm relay setpoint for Sensor 2.
107	Sensor2Hysteresis	R/W	V	Sets how far sensor 2`s gas level must fall below a setpoint before the device will fall below the alarm or warning state.
108	Sensor2CalReset	R/W	1	Can use this point to reset the calibration of sensor 2 back to factory defaults.
109	CO2Offset*	R/W	1	If the deice has a CO2 sensor installed this can be used to set an offset.
110	CO2AutoCal*	R/W	1	Enables or disables the CO2 sensor auto calibration feature, for Dual channel sensor this should be disabled.
111	CO2AutoCalBaseline*	R/W	1	Sets the baseline PPM value for the CO2 auto calibration feature.
112	CO2AutoCalPeriod*	R/W	1	Sets the period in days for the CO2 auto calibration feature.
113	TroubleRelayPolarity	R/W	1	Sets the active Polarity of the trouble relay
114	TroubleRelayOnTime	R/W	1	Sets the minimum off time of the trouble relay.

*CO2 Sensor must be installed on the device for points 109-112

Register	Description	Read	Scale	Functionality
115	TroubleRelayOffTime	R/W	1	Sets the maximum off time of the trouble relay.
116	AlarmRelayPolarity	R/W	1	Sets the active Polarity of the alarm relay
117	AlarmRelayOnTime	R/W	1	Sets the minimum off time of the alarm relay.
118	AlarmRelayOffTime	R/W	1	Sets the maximum off time of the alarm relay.
119	FactoryReset	R/W	1	Restore the device to its factory defaults.
120	Protocol	R/W	1	Shows the protocol set for the device communication.
121	MbAddress	R/W	1	Sets the device Modbus address.
122	BaudRate	R/W	1	Sets the baud rate of the device.
123	MbParity	R/W	1	Sets the Modbus Parity of the device.
124	SilenceEnable	R/W	1	Will silence the device alarm.
125	FireControlMode	R/W	1	Used to enable fire control mode.