User's Guide
TG Series

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Rev.	Release Date	By	Description of Change	ECR
0A	4/14/2016	CKB	Initial Release	---
0B	3/7/2017	CKB	Updated for RS485 version.	

Contents

References:

    152-0270   TG Series Analog Installation Instructions

    152-0271   TG Series RS485 Installation Instructions

    152-0272   TG Series Hose Barb Installation Instructions

    152-0273   TG Sensor Replacement Instructions

    154-0032   BACnet Protocol Guide

    154-0033   Modbus Protocol Guide

General Overview

The TG product contains 3 menu systems:

- **_User Menu_** – Configure system functions setpoints, such as relay setpoints and analog output scaling.
- **_Setup Menu_** – Add/Remove sensors, and view sensor information.
- **_Testing Menu_** – Test functionality of system interfaces, such as relays and analog output signals.

Each menu is composed of a hierarchy of primitive elements: _Categories_, _Items, Numerical Values,_ and _Option Values_. _Categories_ give you access to _Items_, which may contain either _Numerical Values_ when the setting is numerical, or _Option Values_ when the setting is multiple choice. A list of available _Categories_ is shown at the top of each menu in this document. See _Figure 1_ below for an example.
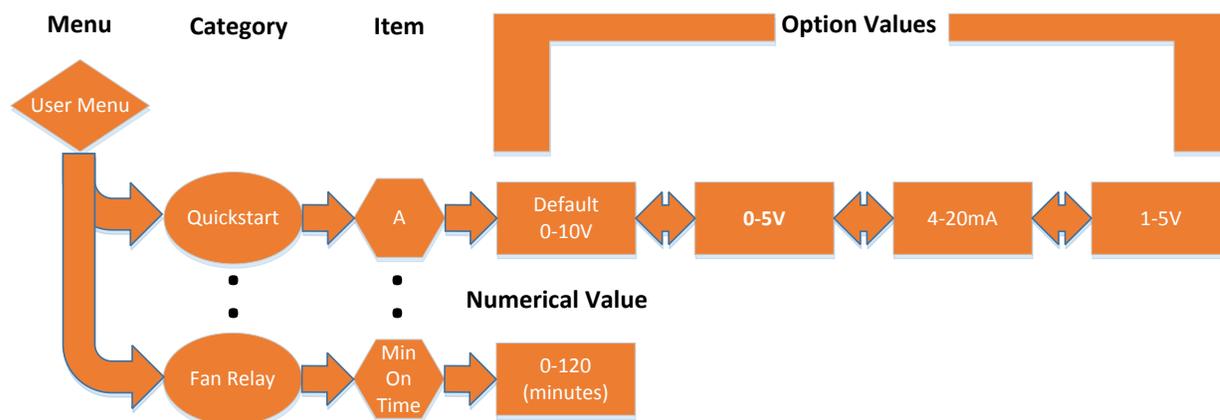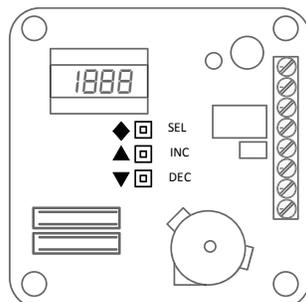

Figure 1: _The "Quickstart" category contains an Item 'A', which has a set of multiple choice option values. The "Fan Relay" category has an Item 'Min On Time' (ΠΕΛ) which can be set to any Numerical Value between 0-120 in minutes._

Buttons

- ◆ – "Select" button.
- ▲ – "Inc" button (Increment).
- ▼ – "Dec" button (Decrement).

Navigation and Selection

- Pressing ▲ or ▼ while viewing a Category/Item advances to the next or previous Category/Item.
- Pressing ▲ or ▼ while viewing a Numerical Value increments or decrements the value.
- Pressing ▲ or ▼ while viewing an Option Value scrolls through the available options.
- Pressing ◆ while viewing a Category allows you to view the items it contains.
- Pressing ◆ while viewing an Item allows you to view and modify the Values/Options for that Item.
- Pressing ◆ while viewing a Value/Option applies your selection and returns you to the Item view.
- Hold ▲, ▼, and ◆ for 1 second while the alarm buzzer is active to suppress the alarm.
- Each Menu contains an ESC Item, which will exit the current menu.
- Each Category contains an ESC Item, which will return you to the previous Menu screen.

*Unless otherwise specified, all changes to Numerical Values/Option Values occur at the time ▲ or ▼ is pressed.

User Menu

Access the User Menu by pressing the ◆ button for one second. The User Menu organizes settings into several categories. Many of these settings can also be modified over BACnet or Modbus. The object/instance number is noted in each modifiable value. See the relevant protocol guide for more information.

<u>Categories</u>

- **Quickstart (9StArt)**
  Allows the user to select from a list of pre-defined configurations for quick and easy startup.

- **Analog Output Channel 1 (Out_1)**
  Contains all of the settings which control the output signal on channel 1. (*Analog Version only*)

- **Analog Output Channel 2 (Out_2)**
  Contains all of the settings which control the output signal on channel 2. (*Analog Version only*)

- **RS485 (rS485)**
  Manually set the RS485 communication settings. (*RS485 Version only*)

- **CO Setpoints (CO_SEtt InGS)**
  Contains all of the user configurable setpoints, which control the system response to the CO Gas Sensor. (*CO Sensor only*)

- **NO₂ Setpoints (nO2_SEtt InGS)**
  Contains all of the user configurable setpoints, which control the system response to the NO2 Gas Sensor. (*NO₂ Sensor only*)

- **Temperature Setpoints (ºFC_SEtt InGS)**
  Contains all of the user configurable setpoints, as well as unit selection, which control the system response to the thermistor.

- **Fan Relay (FAn_rELAY)**
  Configure the timing of the fan relay (warning relay).

- **Alarm Relay (ALr_rELAY)**
  Configure the timing of the alarm relay. (*Analog Version only*)

- **Buzzer (bUZZEr)**
  Configure the timing of the alarm buzzer.

- **Display (dISPLAY)**
  Customize the performance of the display.

9StArt

A   Applies the following setpoints to their respective sensors:

CO Warning = 25, CO Alarm = 100, NO2 Warning = 1, NO2 Alarm = 3 (in PPM), Buzzer Delay = 30 (minutes).

10U	0-10V Output Range **(Default)**
1_5	1-5V Output Range (Analog Version Only)
420	4-20mA Output Range (Analog Version Only)
0_5	0-5V Output Range (Analog Version Only)

B   Applies the following setpoints to their respective sensors:

CO Warning = 15, CO Alarm = 50, NO2 Warning = 0.7, NO2 Alarm = 2 (in PPM), Buzzer Delay = 30 (minutes).

10U	0-10V Output Range
1_5	1-5V Output Range (Analog Version Only)
420	4-20mA Output Range (Analog Version Only)
0_5	0-5V Output Range (Analog Version Only)

C   Applies the following setpoints to their respective sensors:

CO Warning = 35, CO Alarm = 100, NO2 Warning = 1, NO2 Alarm = 5 (in PPM) , Buzzer Delay = 30 (minutes).

10U	0-10V Output Range
1_5	1-5V Output Range (Analog Version Only)
420	4-20mA Output Range (Analog Version Only)
0_5	0-5V Output Range (Analog Version Only)

tSt   Applies the following setpoints to their respective sensors:

CO Warning = 5, CO Alarm = 10, NO2 Warning = 0.5, NO2 Alarm = 1 (in PPM) , Buzzer Delay = 2 (minutes).

10U	0-10V Output Range
1_5	1-5V Output Range (Analog Version Only)
420	4-20mA Output Range (Analog Version Only)
0_5	0-5V Output Range (Analog Version Only)

ESC   Returns to the User Menu screen.

Out_1 / Out_2

U_C   Selects the output mode of the analog output signals. Changing this setting on either Out_1 or Out_2 sets the output mode on both analog output channels.

UOL	Voltage Out (Default)
CUr	Current Out

SEП   Selects the sensor to be output on output channel 1 (*Out_1*) or output channel 2 (*Out_2*). By default, if a single sensor is present it will be configured on output channel 1. If two sensors are present, CO will default to output channel 1, while the NO2 sensor will default to output channel 2.

      ПOП   No sensor selected.
      CO   CO Gas.
      ПO2   NO2 Gas.
      ºFC   Temperature.

U.H1   Sets the voltage corresponding to the maximum sensor reading, 0-10 Volts.

      Default: *10* Volts

U.LO   Sets the voltage corresponding to the minimum sensor reading, 0-10 Volts.

      Default: *0* Volts

C.H1   Sets the current corresponding to the maximum sensor reading, 4-20 Milliamps.

      Default: *20* Milliamps

C.LO   Sets the current corresponding to the minimum sensor reading, 4-20 Milliamps.

      Default: *4* Milliamps

ESC   Returns to the User Menu screen.

RS485

Adr   Sets the RS485 address. The full address range 0-254 is supported. When at address 255, this is considered "AUTO ADDRESSING" mode (see *TG BACnet/Modbus Protocol Guides*), and will show up as "*??*" on the LCD display if an automatic address has not been detected and configured. Once an address has been selected in auto mode, the address will show up in this field along with an "O/R" symbol in the bottom center of the LCD to indicate this address was automatically selected by the TG.

RS485 Version Only: AV123 (BACnet), R123 (Modbus).

Default: *??* (Auto Mode)

id.1   Sets the Ones digit of the device id. The max device id is 4,194,302

If the combination of id.1 and id.2 exceed 194,302, then the max value that may be set it the id.3 field is 3.

Example: To set the device id to 1,234,567 each id field should be as follows $\underset{id.3}{1} \ \underset{id.2}{234} \ \underset{id.1}{567}$

Default: Varies

id.2   Sets the Thousands digit of the device id. See *id.1*.

Default: 665

id.3   Sets the Millions digit of the device id. See *id.1*.

Default: 0

br   Sets the RS485 baud rate.

RS485 Version Only: AV124 (BACnet), R124 (Modbus).

Aut	Auto Baud Rate (Default)
9.6	9600 Baud
19.2	19,200 Baud
28.8	28,800 Baud
38.4	38,400 Baud
57.6	57,600 Baud
76.8	76,800 Baud
115	115,200 Baud
230	230,400 Baud
460	460,800 Baud

Pro   Sets the RS485 protocol.

RS485 Version Only: MSV122 (BACnet), R122 (Modbus).

Aut	Auto Protocol (Default)
bAC	BACnet
ASC	Modbus ASCII
rtU	Modbus RTU

PAr   Sets the RS485 parity.
RS485 Version Only: MSV126 (BACnet), R126 (Modbus).

   Aut   Auto Parity (Default)
   non   No Parity
   Odd   Odd Parity
   EUn   Even Parity

d.b   Sets the RS485 data bits.
RS485 Version Only: R127 (Modbus accessible only).

   Aut   Auto Data Bits (Default)
   7   7 Data Bits
   8   8 Data Bits

S.b   Sets the RS485 stop bits.
RS485 Version Only: R128 (Modbus accessible only).

   Aut   Auto Stop Bits (Default)
   1   Stop Bit
   15   1.5 Stop Bits
   2   2 Stop Bits

ESC   Returns to the User Menu screen.

CO_SEttings

SP.H   Sets the alarm setpoint level in PPM. Accepts any value between 0-1000 in whole PPM.
RS485 Version Only: AV152 (BACnet), R152 (Modbus).
Default: 100 PPM

SP.L   Sets the warning setpoint level in PPM. Accepts any value between 0-1000 in whole PPM.
RS485 Version Only: AV150 (BACnet), R150 (Modbus).
Default: 25 PPM

HYS   Sets the setpoint hysteresis, in PPM. The setpoint hysteresis defines how far below the Warning/Alarm setpoint the sensor value must drop before changing state from Alarm to Warning or Warning to Normal.
RS485 Version Only: AV154 (BACnet), R154 (Modbus).
Default: 0 PPM

ΓG.H   Sets the value in PPM which corresponds to the maximum analog output signal range. Accepts any value between 0-1000 in whole PPM. (Analog Version Only)

Default: *200* PPM

ΓG.L   Sets the value in PPM which corresponds to the minimum analog output signal range. Accepts any value between 0-1000 in whole PPM. (Analog Version Only)

Default: *0* PPM

ESC   Returns to the User Menu screen.

NO2_SEttINGS

SP.H   Sets the alarm setpoint level in PPM. Accepts any value between 0-20 in whole PPM.
RS485 Version Only: AV162 (BACnet), R162 (Modbus).

Default: *3* PPM

SP.L   Sets the warning setpoint level in PPM. Accepts any value between 0-20 in whole PPM.
RS485 Version Only: AV160 (BACnet), R160 (Modbus).

Default: *1* PPM

HYS   Sets the setpoint hysteresis, in PPM. The setpoint hysteresis defines how far below the Warning/Alarm setpoint the sensor value must drop before changing state from Alarm to Warning or Warning to Normal.
RS485 Version Only: AV164 (BACnet), R164 (Modbus).

Default: *0* PPM

ΓG.H   Sets the value in PPM which corresponds to the maximum analog output signal range. Accepts any value between 0-20 in whole PPM. (*Analog Version Only*)

Default: *10* PPM

ΓG.L   Sets the value in PPM which corresponds to the minimum analog output signal range. Accepts any value between 0-20 in whole PPM. (*Analog Version Only*)

Default: *0* PPM

ESC   Returns to the User Menu screen.

°FC_SETTINGS

FC Selects the temperature display units.
RS485 Version Only: MSV133 (BACnet), R133 (Modbus).

    °C   Degrees Celsius
    °F   Degrees Fahrenheit (Default)

MG.H Sets the value which corresponds to the maximum analog output signal range. Accepts any value between -20°C (-4°F) and 85°C (185°F) in whole degrees. (Analog Version Only)

Default: *140* °F

MG.L Sets the value which corresponds to the minimum analog output signal range. Accepts any value between -20°C (-4°F) and 85°C (185°F) in whole degrees. (Analog Version Only)

Default: *14* °F

ESC Returns to the User Menu screen.

FAN_RELAY

Mt.L Sets the minimum time, in minutes, which the relay must be active before it can turn off. Accepts any value between 0-120 in whole minutes.
RS485 Version Only: BO210 minimum on time (BACnet), R214 (Modbus).

Default: *1* Minute

Ft.L Sets the minimum time, in minutes, which the relay must be inactive before it can turn on. Accepts any value between 0-120 in whole minutes.
RS485 Version Only: BO210 minimum off time (BACnet), R216 (Modbus).

Default: *1* Minute

Ft.H Sets the maximum time, in minutes, which the relay can be inactive. Accepts any value between 0-1440 in whole minutes. If set to '0' the maximum off time will be infinite.
RS485 Version Only: AV212 (BACnet), R212 (Modbus).

Default: *0* Minutes

ESC Returns to the User Menu screen.

ALr_rELAY

Nt.L   Sets the minimum time, in minutes, which the relay must be active before it can turn off. Accepts any value between 0-120 in whole minutes.

Default: *1* Minute

Ft.L   Sets the minimum time, in minutes, which the relay must be inactive before it can turn on. Accepts any value between 0-120 in whole minutes.

Default: *1* Minute

Ft.H   Sets the maximum time, in minutes, which the relay can be inactive. Accepts any value between 0-1440 in whole minutes. If set to '0' the maximum off time will be infinite.

Default: *0* Minutes

ESC   Returns to the User Menu screen.

bUZZEr

Nt.L   Sets the minimum time, in minutes, which the buzzer must be active before it can turn off. Accepts any value between 0-120 in whole minutes.

RS485 Version Only: BO230 minimum on time (BACnet), R234 (Modbus).

Default: *0* Minutes

Ft.L   Sets the minimum time, in minutes, which the buzzer must be inactive before it can turn on. Accepts any value between 0-120 in whole minutes.

RS485 Version Only: BO230 minimum off time (BACnet), R236 (Modbus).

Default: *0* Minutes

dEL   Sets the time delay, in minutes, before the buzzer activates once its activation setpoint has been reached. Accepts any value between 0-60 in whole minutes.

RS485 Version Only: AV232 (BACnet), R232 (Modbus).

Default: *30* Minutes

ESC   Returns to the User Menu screen.

dISPLAY

SrC   Sets the sensor values to be displayed in Idle mode. After all user selected sources have been displayed, if any pertinent conditions exist in the system they will be shown in the form of a condition code. (See Idle Condition Codes section)

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

cnt	CO, NO2, and Temperature. (CO and NO2 sensors must be installed)
c	CO. (CO sensor must be installed)
n	NO2. (NO2 sensor must be installed)
t	Temperature.
cn	CO, NO2. (CO and NO2 sensors must be installed)
c t	CO, Temperature. (CO sensor must be installed)
nt	NO2, Temperature. (NO2 sensor must be installed)
OFF	Blank display.

COn   Sets the contrast of the display. The higher the value of the contrast, the darker the lettering on the screen will be. Accepts any integer value from 50-100.

Default: 75

ItMU   Sets the amount of time, in seconds, that a value in the Idle menu is displayed before automatically moving to the next value. Accepts any integer value from 1-10 seconds.

Default: 10 Seconds

ESC   Returns to the User Menu screen.

Setup Menu

Access this menu by pressing the ◆ and ▲ buttons simultaneously for one second. The settings menu is organized into several categories.

Categories

- **CO (CO):** Allows the user to view information about the CO sensor (nA/PPM, and sensor lifetime left in days), as well as add/remove the sensor and set a 0 PPM point.

- **NO2 (NO2):** Allows the user to view information about the NO2 sensor (nA/PPM, and sensor lifetime left in days), as well as add/remove the sensor and set a 0 PPM point.

- **Reset (rSt):** Resets the device configuration to its factory default settings.

CO

Add
Adds a CO sensor to the TG. If a CO sensor is already installed its nA and EOL values will be overwritten with default values after being added. (See *Sensor Replacement Instructions*)

nA
Sets the nanoamp per PPM setting for the CO sensor. This value must be set manually after adding a sensor. If the new value is 4 or more digits long round it to 3 digits. Example: 23.45 will become 23.5. (See *Sensor Replacement Instructions*)

EOL
View the number of days remaining in the CO sensor's lifespan. This value can be used to verify whether a sensor needs to be replaced in the near future.

ZEr
Sets the present sensor reading as the sensor's zero point. This should only be used in an environment where the user is sure there is zero CO gas present.

CLZ
Clears the present zero setting of the device for the CO sensor.

rUE
Removes the installed CO sensor from the TG. This item is only visible if a CO sensor is presently installed. Confirmation is required to remove a sensor. (See *Sensor Replacement Instructions*)

ESC
Exits back to the main Setup Menu screen.

NO2

Add   Adds a NO2 sensor to the TG. If a NO2 sensor is already installed its *NA* and *EOL* values will be overwritten with default values after being added. (See *Sensor Replacement Instructions*)

NA   Sets the nanoamp per PPM setting for the NO2 sensor. This value must be set manually after adding a sensor. If the new value is 4 or more digits long round it to 3 digits. Example: 23.45 will become 23.5. (See *Sensor Replacement Instructions*)

EOL   View the number of days remaining in the NO2 sensor's lifespan. This value can be used to verify whether a sensor needs to be replaced in the near future.

ZEr   Sets the present sensor reading as the sensor's zero point. This should only be used in an environment where the user is sure there is zero NO2 gas present.

CL2   Clears the present zero setting of the device for the NO2 sensor.

rUE   Removes the installed NO2 sensor from the TG. This item is only visible if a NO2 sensor is presently installed. Confirmation is required to remove a sensor. (See *Sensor Replacement Instructions*)

ESC   Exits back to the main Setup Menu screen.

Testing Menu

Access this menu by pressing the ◆ and ▼ buttons simultaneously for one second.

ItMU   Allows the user to set the testing interval. This interval will be acknowledged by all tests activated by the user until either the interval runs out or OFF is manually selected. Accepts any value between 0-300 in whole seconds.

     Default: **10** Seconds

Out   Allows the user to force the output signal to its highest value (ie. 20mA in Current mode, or 10 Volts in voltage mode).

     On   Begin output testing
     OFF   Turn off output testing

FAN   Allows the user to turn on the Fan relay for the length of the testing interval.

     On   Begin Fan relay testing.
     OFF   Turn off Fan relay testing.

ALM   Allows the user to turn on the Alarm relay for the length of the testing interval.

     On   Begin Alarm relay testing.
     OFF   Turn off Alarm relay testing.

bUZ   Allows the user to turn on the Piezo Buzzer for the length of the testing interval.

     On   Begin Buzzer testing.
     OFF   Turn off Buzzer testing.

Idle Condition Codes

NNt   Set while there is no RS485 traffic detected. If the device is connected to an active RS485 network and this condition is set, check the RS485 connections on the TG device to ensure they are properly connected. If no traffic is expected to be on the line then this condition can be ignored.

NbN   Set while RS485 is detecting the network baud rate.

NPN   Set while RS485 is detecting the network protocol.

NAd   Set while RS485 is establishing a device address.

LSU   Set while the supply voltage is below the minimum operating threshold stated in the datasheet and install guide.

EtP   Set when the calculated temperature is below/above the minimum/maximum operating range of the TG device.