MOORE INDUSTRIES WORLDWIDE

Demand Moore Reliability

No. 225-720-01D
June 2020

TMZ TPRG: PC-Programmable
MODBUS Temperature Transmitter
TMZ HLPRG: PC-Programmable
MODBUS Signal Converter

TMZ *Transmitter*

User's Manual

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Customer Support

Moore Industries is recognized as the industry leader in delivering top quality to its customers in products and services. We perform a sequence of stringent quality assurance checks on every unit we ship. If any Moore Industries product fails to perform up to rated specifications, call us for help. Our highly skilled staff of trained technicians and engineers pride themselves on their ability to provide timely, accurate, and practical answers to your process instrumentation questions. Our headquarters and other facilities phone numbers are listed below.

There are several pieces of information that can be gathered before you call the factory that will help our staff get the answers you need in the shortest time possible. For fastest service, gather the complete model and serial number(s) of the problem unit(s) and the job number of the original sale.

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Safety Messages

Please read this manual in its entirety. It should answer most of your questions. For personal and system safety, and for optimum product performance, make sure you thoroughly understand the contents before installing, using, or maintaining this product. Should you still have questions please visit our web site at www.miinet.com or contact any of our sales/ support offices nearest you.

Your safety and the safety of others is very important. We have provided many important safety messages in this manual. Please read these messages carefully. These safety messages alert you to potential hazards that could hurt you or others or render damage to units.

All Moore Industries instrumentation should only be used for the purpose and in the manner described in this manual. If you use this product in a manner other than that for which it was intended, unpredictable behavior could ensue with possible hazardous consequences.

Each safety message is associated with a safety alert symbol. These symbols are found throughout the manual. The definition of these symbols is described below:

Pay particular attention wherever you see the following symbols:

Note – Information that is helpful for a procedure, condition or operation of the unit.

Caution – Hazardous procedure or condition that could damage or destroy the unit.

Warning – Hazardous procedure or condition that could injure the operator.

Qualified Personnel

The Moore Industries' product/systems described in this manual may be operated only by personnel qualified for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these Moore Industries' products/systems.

Proper use of Moore Industries products

Moore Industries' products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Moore Industries' . Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

We have reviewed the contents of this publication to ensure consistency with the hardware and/or software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions. Specifications and information are subject to change without notice.

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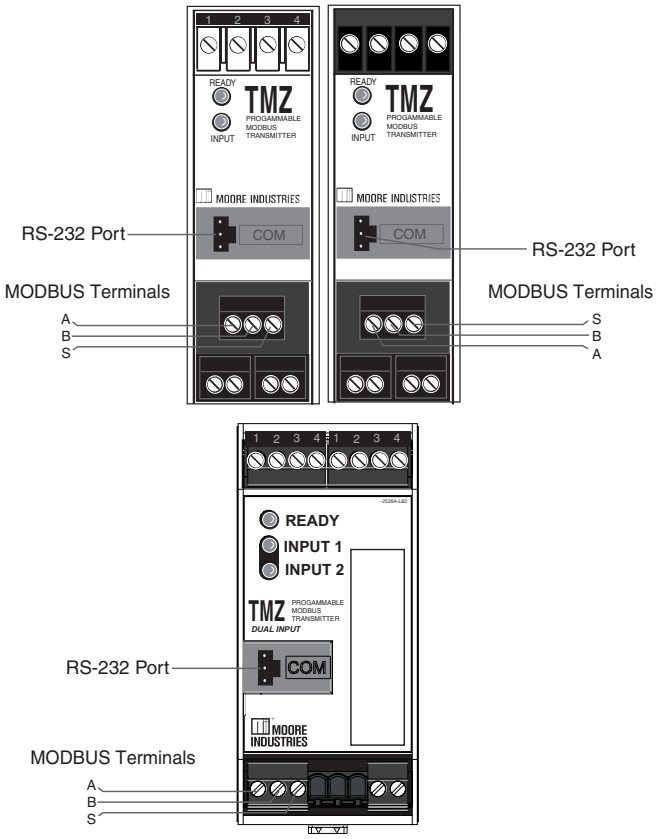
Introduction

This is the users' manual section for the Moore Industries TMZ PC-Programmable MODBUS Temperature Transmitter and Signal Converter. It contains all of the information needed to configure, install, operate and maintain this instrument.

Figure 1. *The Single models HLPRG (top right, TPRG (top left), and the dual input 2PRG model (bottom).*



The TMZ

The TMZ is a PC-Programmable, user-configurable, signal converter. It has a digital output and retains the high accuracy of an Analog to Digital converter without the limitation of low resolution which is associated with analog outputs.

The multi-drop nature of the RS-485 port allows the connection of up to 32 units (without repeaters) on a single drop of cable that consists of two pairs of wires. The TMZ has a READY LED to indicate the health of the unit and an INPUT LED (or 2 Input LEDs for 2PRG) to indicate status.

Model Types

The TMZ includes three model types:

- HLPRG - Single input that accepts current input range from 0-50mA, and voltage input range from 0-10V. See Section 1.
- TPRG - Single input accepts RTD, T/C, Potentiometer, Ohms and mV. See Section 2.
- 2PRG - Dual universal input where each input can be configured using an input selector for HLPRG or TPRG input types. See Section 3..

Inputs

Inputs are dependent on the model type (see above).

TX Power

A transmitter excitation power supply (24V regulated) is provided on the HLPRG unit or input 1 of the 2PRG unit (when configured as HLPRG).

Outputs

The TMZ TPRG, HLPRG, and 2PRG have a standard RS-485 port that supports the MODBUS RTU protocol.

Model and Serial Numbers

Moore Industries uses the model and serial numbers of our instruments to track information on each unit that we sell and service. If a problem occurs with your TMZ, check for a tag affixed to the unit listing these numbers. Supply the Customer Support representative with this information when calling

Section 1 TMZ HLPRG

TMZ HLPRG

PC-Programmable MODBUS
Signal Converter

Figure 1.1. *TMZ HLPRG Dimensions*

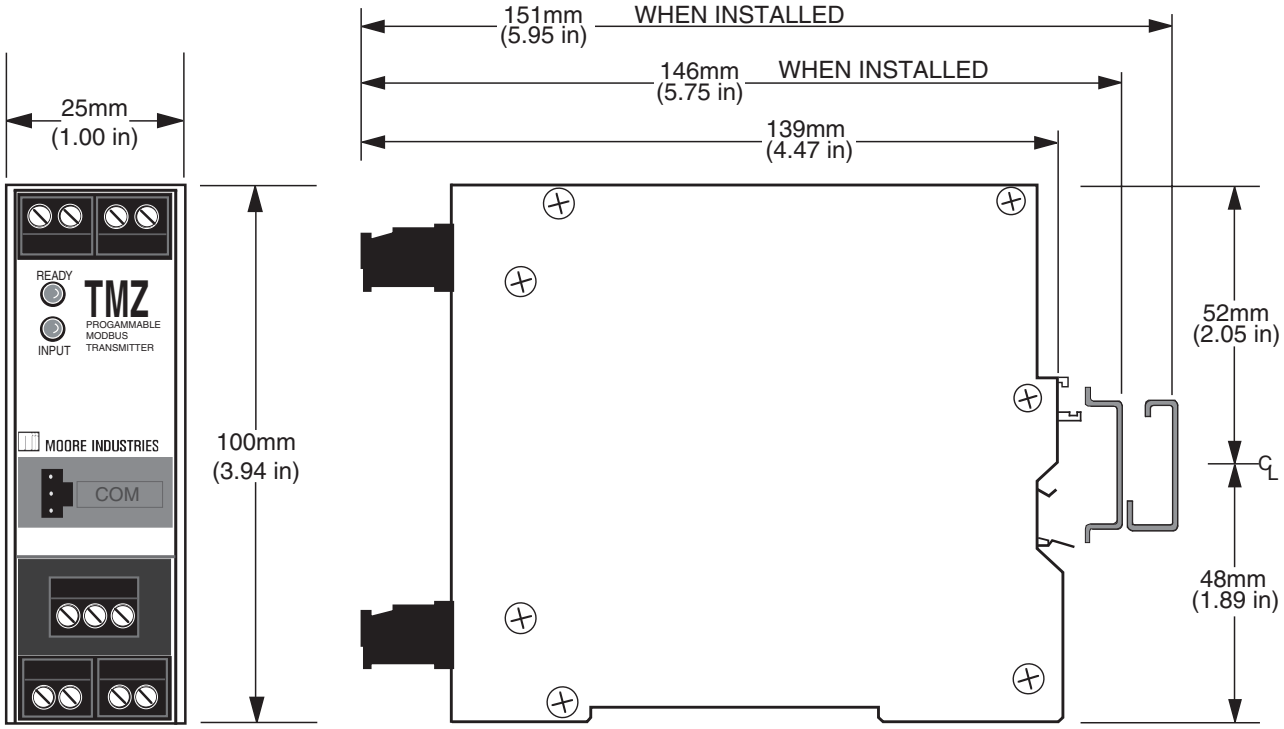
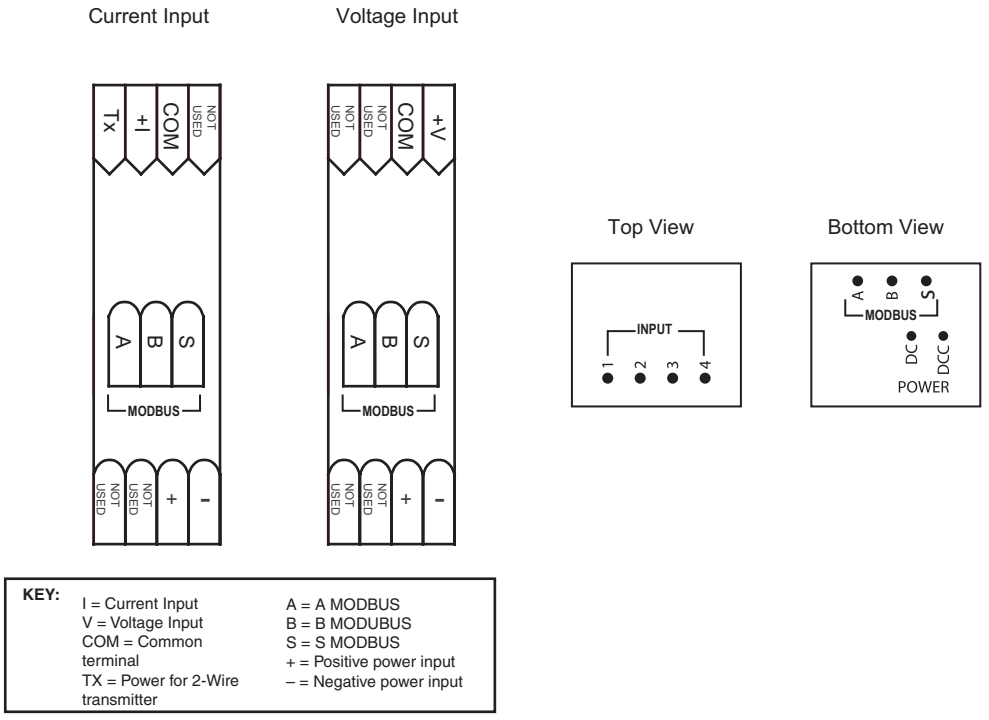


Figure 1.2. *Terminal Designations*

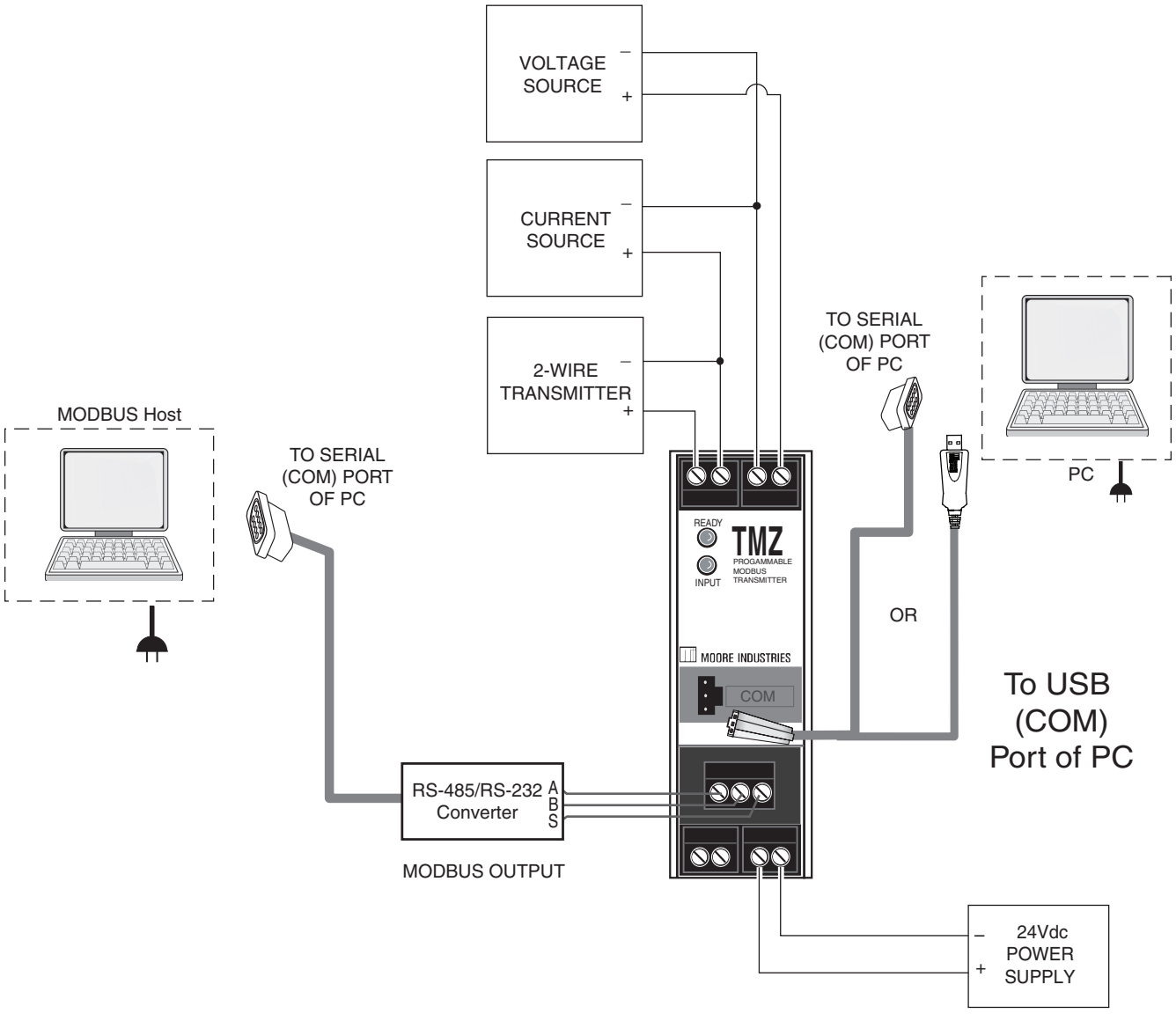


KEY:

I = Current Input	A = A MODBUS
V = Voltage Input	B = B MODUBUS
COM = Common terminal	S = S MODBUS
TX = Power for 2-Wire transmitter	+ = Positive power input
	– = Negative power input

NOTE: *Terminal blocks can accommodate 14-22 AWG solid wiring.*

Figure 1.3. *Hooking-Up the TMZ HLPRG*



Configuring the TMZ HLPRG Model

One of the benefits of the TMZ is that there are no internal or external controls to adjust or settings to change. All operating parameters are set using a PC and Moore Industries' Intelligent PC Configuration Software.

The software settings are downloaded to the transmitter in the form of a Configuration File and stored in the instrument's memory. You can save a backup copy of the file on your PC hard drive or disk. The transmitter communicates with the PC through an RS-232 connection to the PC's USB or RS232 port.

Installing the Configuration Software

Refer to Table 1.1 for the equipment needed.

1. Insert the *Moore Industries Interface Solution PC Configuration Software* CD into the CD drive of the PC. Access the CD and open the "TMZ PC Configuration Software" folder.
2. Double-click the installation program located in the folder. Follow the prompts to correctly install the program.

Once the Configuration Program is installed on the PC, the TMZ can be connected to equipment to simulate input and monitor output. You can then change the transmitter's operating parameters.

The latest version of our Configuration Software for your TMZ unit is also available for download on our website www.miinet.com.

No Transmitter Needed

It is not necessary to connect the instrument to a PC to create configuration files using the software. The Configuration Program can be run without connecting a unit, and ***most*** parameters can be set without the benefit of input from a sensor or TMZ.

This makes it easy to create a set of operating parameters, save them to disk, and download them to one or more transmitters at a later time.

The TMZ ***must*** be connected to the PC in order to: perform sensor trimming; assign a tag, descriptor or message; receive (via download) a configuration file; and save the configuration file from the transmitter's memory.

Connecting the TMZ to the PC

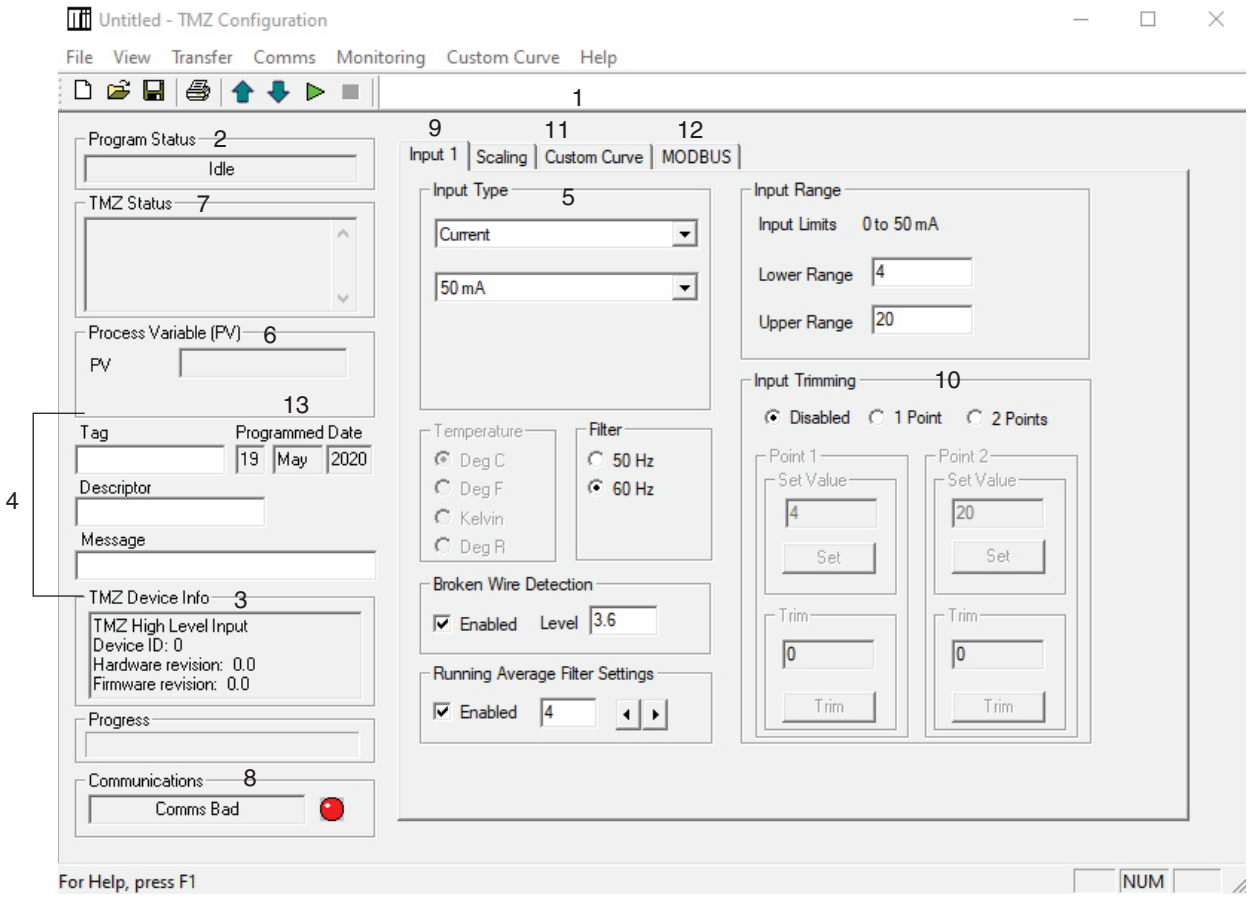
Connect the USB or RS-232 cable to the PC's COM port.

Table 1.1. *Assembling the equipment needed to configure the TMZ HLPRG*

Device	Specifications
Current or Voltage Source	Accurate to 0.05% of span for the intended application
Power Supply	24Vdc, ±10%
Multimeter (optional)	Accurate to ±0.009% of span; e.g., HP Model 3478A
Personal Computer	Microsoft Windows based PC; 16Mb free RAM; 20MB free disk space on hard drive Microsoft Windows 7, 10 1 (one) serial port or one available USB port (with optional USB cable)
Moore Industries PC Configuration Software	Version 1.0 or greater, successfully installed to the hard drive
Communication Cable	USB cable 804-030-26 or RS232 cable 803-053-26

PC Configuration Software Summary

Figure 1.4. *TMZ HLPRG PC Configuration Software Screen*



Once the default configuration has been saved to disk, it is safe to program other parameters. The PC Software is made up of these sections:

1. Tool Bar/Status Bar– Dropdown menus and corresponding icons allow you to perform various functions throughout the PC Configuration Program. *Refer to the Status and Tool Bar Legend* section for a complete description.

2. Program Status– This portion of the program displays the activity (idle, monitoring, downloading, uploading) of the connected unit.

3. TMZ Device Info– Displays your unit configuration HLPRG/TPRG, ID, Hardware revision and firmware revision.

4. Identification Parameters– Use this parameter to place an identifying "Tag" (8 alphanumeric characters max.), "Descriptor" (16 alphanumeric characters max.) or "Message" (32 alphanumeric characters max.). You may also use the *Quick Set* feature to set your *Tag* and download it.

5. Input Type– Select your input type (Current or Voltage) and the respective range of your input.

6. Variables– Displays the value of the Process Variable that is being monitored, as well as the scaled output and custom curve output.

7. Device Status– Notifies of any errors or conditions which are outside of tolerance range.

8. Communications– Indicates current PC connection/communications status.

9. Input– Use this tab to Set Upper Range and Low Range Value, enable Broken Wire, Running Average Filter and to set Input Filter. Refer to the *Input* section for a complete description.

10. Trimming– This parameter allows you to configure and perform input trimming. Refer to the *Trimming* section for a complete description.

11. Scaling & Custom Curve– Use this portion of the screen to set up your custom curve table. Refer to the *Scaling & Custom Curve* section for a complete description.

12. MODBUS– Allows you to configure your MODBUS parameters. Refer to the *MODBUS* section for a complete description.

13. Programmed Date– Displays the date the configuration of the device was last updated.

Status and Tool Bar Legend

Allows such functions as New, Open, Save and Print

Allows you to Upload and Download configurations

Select the PC Port (Comm Port) that you will use

Allows you to Monitor and Stop monitoring processes

Provides functions specific to your Custom Curve table

Controls whether Tool and Status Bars are viewed on the screen

Displays the version of the TMZ Configuration Program

Default/Factory Configurations

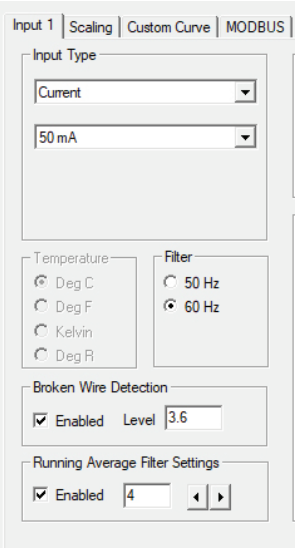
The following are the default factory settings for your unit.

Input: 4-20mA
Filter: 60Hz
Broken Wire: ON Level 3.6mA
Running Average Filter: ENABLED, 4
MODBUS:
  Address: 1
  Baud Rate: 9600
  Parity: None LSW
No. of DP's in integer: 0

Configuration Screens

Input

Figure 1.5. *Input Tab*



Input Range– Allows you to set your "Upper Range Value" (URV) and "Lower Range Value" (LRV) depending upon the input configuration and range chosen in the *Input Type* section.

Note: *The Lower Range Value must be >0 to use broken wire and the level you enter should be less than the Lower Range Value.*

Broken Wire– The TMZ monitors your primary variable. If the monitored value falls equal to or below a set value, then a state of Broken Wire is declared.

Check the "Enabled" box in order to activate Broken Wire notification.

In the "Level" textbox, enter the set value you choose as your limit.

Running Average Filter– This function is for filtering the input signal. The TMZ provides this filter with a user-selected range between 1 and 16. Factory default is 4.

Note: *A higher Running Average Filter setting provides smoother output transitions however, reduces response time. Conversely, a lower setting provides a faster response time, but may seem more unstable.*

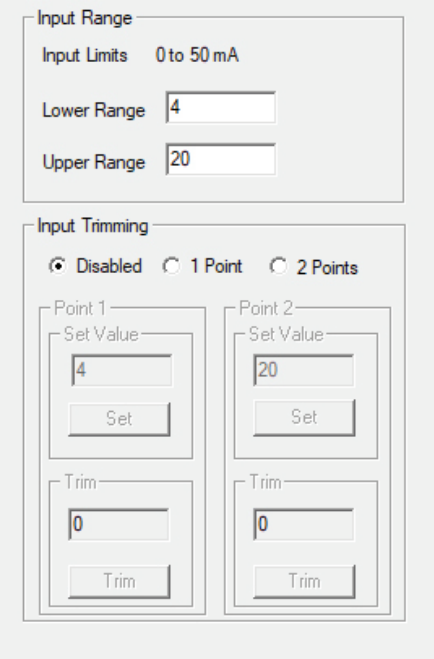
Input Filter– This setting is used to configure the input filter. This filter is designed to reduce the effects of mains-induced noise. The input filter frequency value should be set to the frequency of the local AC supply– either 50Hz or 60Hz.

Note: *Once you have configured all parameters, download to the unit by selecting "Download" in the Transfer dropdown menu located in the Status Bar. You may also download by clicking the button in the Tool Bar.*

You may also use the *Quick Set* feature to configure your *Input* parameters and download the settings.

Trimming

Figure 1. 6. *Trimming*



Sensor Trimming– Sensor Trimming increases the measurement accuracy of your instrument by matching the reading of its actual input to either a calibrated source or the device to which it is connected. This verifies that the input to the transmitter is being interpreted correctly.

You may trim any point between 0% and 100% along the scale. Note that one-point trimming applies an offset to the sensor reading, while two-point trimming applies both an offset and a gain.

Follow the steps below in order to perform sensor trimming.

1. Select either “1 Point” (one-point trimming) or “2 Points” (two-point trimming) by clicking the appropriate button. Each pair consists of “Set” and “Trim” values.

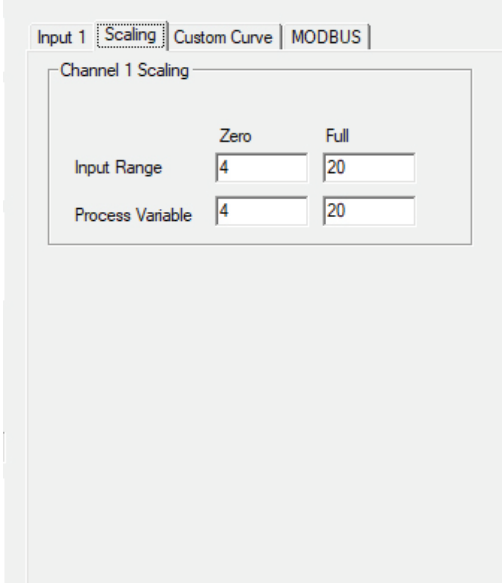
2. Enter the values that need to be trimmed into the “Set Value” field and click “Set”.

3. Apply the targeted signal to the input, wait until it settles and click “Trim” to capture the measured value. If you chose “2 Points”, repeat the step above for the second point.

Note: *Once you have configured all parameters, download to the unit by selecting “Download” in the Transfer dropdown menu located in the Status Bar. You may also download by clicking the button in the Tool Bar.*

Scaling & Custom Curve

Figure 1.7. *Scaling Tab*



Scaling– Scaling allows you to take your PV (Process Variable) reading and manipulate it to a more customized display range (Scaled PV). PV is the unit read after selecting your input type. For example, choosing a Current input would then produce a PV displayed in mA.

Should you require a Scaled PV, follow the instructions below.

1. In the “PV” parameter, enter the actual range of your input type. Place the minimum value in the “LRV” text box and the maximum value in the “URV” box.

2. In the “Scaled PV” parameter, enter the scale or range you require. In the “LRV” text box, enter the value that you wish displayed when your reading is at its minimum. In the “URV” text box, place the value to be displayed when the process variable has reached maximum.

Custom Curve– The Custom Curve feature allows you to set up your own custom curve table. This allows you to tell the transmitter what it should output when it receives a certain input. This feature also allows you the ability to write a table in Microsoft® Excel, save it in a .csv format, and import it into the Configuration Software. This makes it simple to save the custom table for downloading to multiple units or for backup purposes.

To create a custom curve:

1. Click the “Enabled” box .

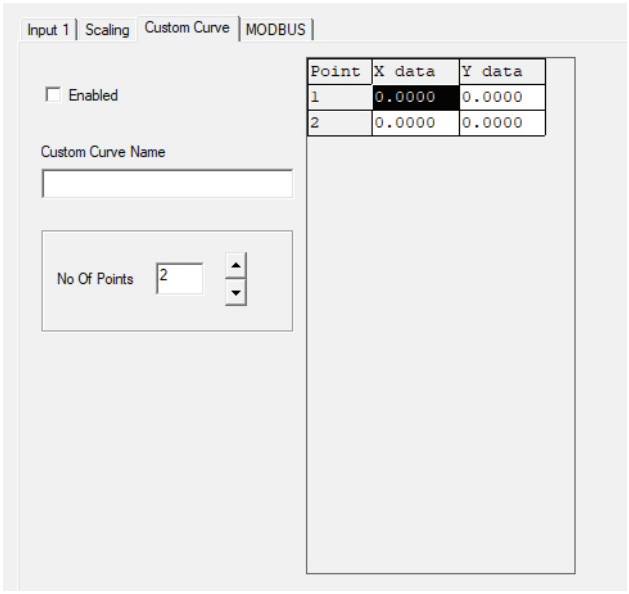
2. Select the number of points for your curve (32 points maximum).

3. Type your individual values in the X and Y columns. Source variables are inserted into the X column while the corresponding data is inserted into the Y column.

4. After all of your data has been entered, you ***must*** use the *Custom Curve* dropdown menu to save your newly created custom (“Save Custom Curve”) and to download it to your TMZ (“Download Custom Curve”).

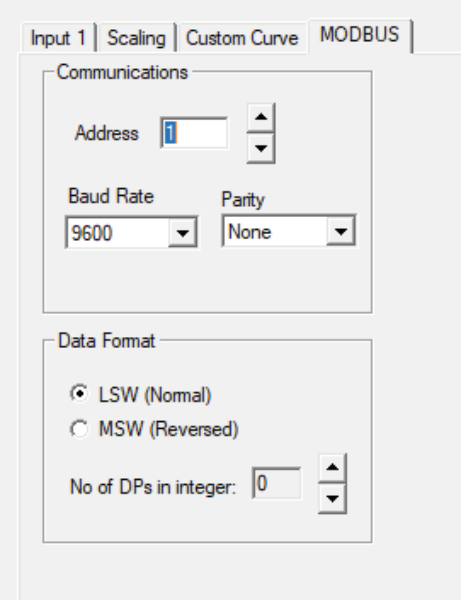
Note: *Once you have configured all parameters, download to the unit by selecting “Download” in the Transfer dropdown menu located in the Status Bar. You may also download by clicking the button in the Tool Bar. However, this does not download your custom table. To do so, you must use the Custom Curve dropdown menu.*

Figure 1.8. *Custom Curve Tab*



MODBUS

Figure 1.9. *MODBUS Tab*



Communications– Used to set MODBUS Address, Baud Rate and Parity parameters.

Address- The number that the TMZ uses to identify itself on the MODBUS network. It is configurable from 1 to 247. By default, the assigned MODBUS address is 01.

Baud Rate- The speed of data transmission. It should be set to match the baud rate of the attached controller. Supported Baud Rates include: 300, 600, 1200, 2400, 4800, 9600, 19.2k and 38.4k. Factory default is 9600.

Parity- A method in serial asynchronous communications of "checking" that characters have been sent correctly. Even, Odd and no Parity (None) are supported. Factory default is None.

Data Format– Allows you to select the word order and number of decimal places you choose.

Selecting LSW (Normal), Least Significant Word, stores the most significant bits in the second register and the least significant bits in the first register (factory default).

MSW (Reversed), Most Significant Word, reverses the above order. The most significant bits will be stored in the first register, with the least significant bits stored in the second register.

No of DPs in integer- This is a calculation that stores a more accurate value in the MODBUS register and offers better resolution. Select your value using the up and down arrows to the right of the display. See below for an example of this process.

PV = 123.456789

"No of DPs in integer" Value	Displayed Integer
1	1234
2	12345
3	123456

Note: *Once you have configured all parameters, download to the unit by selecting "Download" in the Transfer dropdown menu located in the Status Bar. You may also download by clicking the button in the Tool Bar.*

You may also use the *Quick Set* feature to configure your *MODBUS* parameters and download the settings.

Installation HLPRG

Installation consists of physically mounting the unit and completing the electrical connections.

Mounting the TMZ

The TMZ can be mounted on standard DIN mounting rails.

Making the Electrical Connections

Please refer to Figure 1.3 for electrical connections.

When installing any Moore Industries product, always follow all local regulations and standards for grounding, shielding, and safety.

WARNING: Terminals on this unit may be connected to hazardous voltages. Before making ANY connections to this unit, always remove power from the loop or instrument power terminals.

Recommended Ground Wiring Practices

Moore Industries recommends the following ground wiring practices:

- Any Moore Industries product in a metal case or housing should be grounded.
- The protective earth conductor must be connected to a system safety earth ground before making other connections.
- All input signals to, and output signals from, Moore Industries' products should be wired using a shielded, twisted pair wiring technique. Shields should be connected to an earth or safety ground.
- For the best shielding, the shield should be run all the way from the signal source to the receiving device. (see Note below)
- The maximum length of unshielded input and output signal wiring should be 2 inches.

Note: *Some of Moore Industries' instruments can be classified as receivers (IPT², IPX², etc.) and some can be classified as transmitters (TRX, TRY, etc.) while some are both a receiver and a transmitter (SPA², HIM, etc). Hence, your shield ground connections should be appropriate for the type of signal line being shielded. The shield should be grounded at the receiver and not at the signal source.*

CE Conformity

Installation of any Moore Industries' products that carry the CE marking must adhere to the guidelines in the Recommended Ground Wiring Practices section in order to meet the EN 61326 requirements set forth in the applicable EMC directive.

Operation

Once programmed, calibrated, installed, and supplied with the correct power, the TMZ transmitter begins to operate immediately. Depending upon environmental conditions, it can be expected to operate unattended for extended periods of time.

Maintenance

Moore Industries suggests a check for terminal tightness and general unit condition every 6-8 months. Always adhere to any site requirements for programmed maintenance.

Customer Support

Moore Industries is recognized as the industry leader in delivering top quality to its customers in products and services. We perform a battery of stringent quality assurance checks on every unit we ship. If any Moore Industries product fails to perform up to rated specifications, call us for help. Our highly skilled staff of trained technicians and engineers pride themselves on their ability to provide timely, accurate and practical answers to your process instrumentation questions.

If problems involve a particular TMZ HLPRG, there are several pieces of information that can be gathered ***before you call the factory*** that will help our staff get the answers you need ***in the shortest time possible***. For the fastest service, gather the complete model and serial number(s) of the problem unit(s) and the job number of the original sale.

Section 2 TMZ TPRG

Figure 2.1. *TMZ TPRG Dimensions*

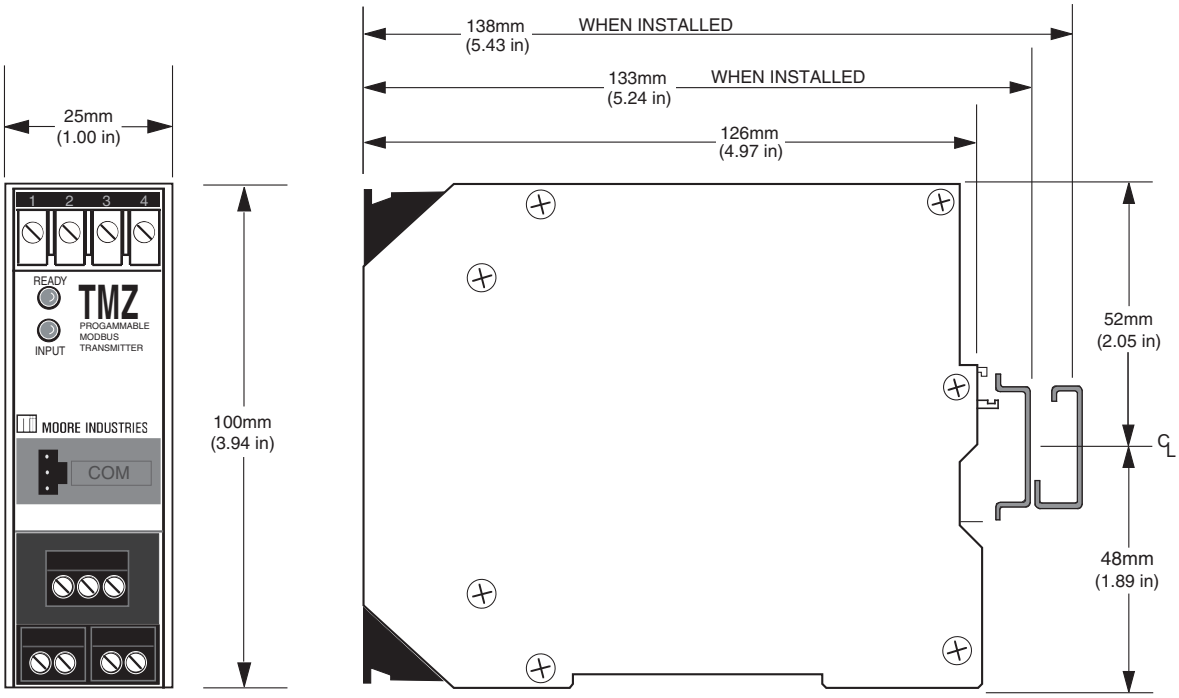


Table 2.1. *Terminal Designations*

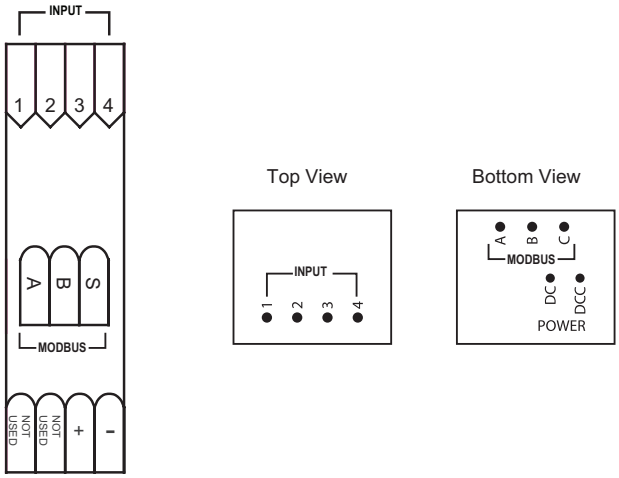


Figure 2.2. *Temperature Sensor Hook-Up Guide*

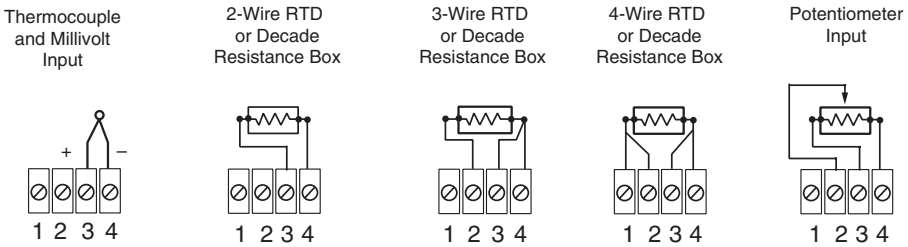
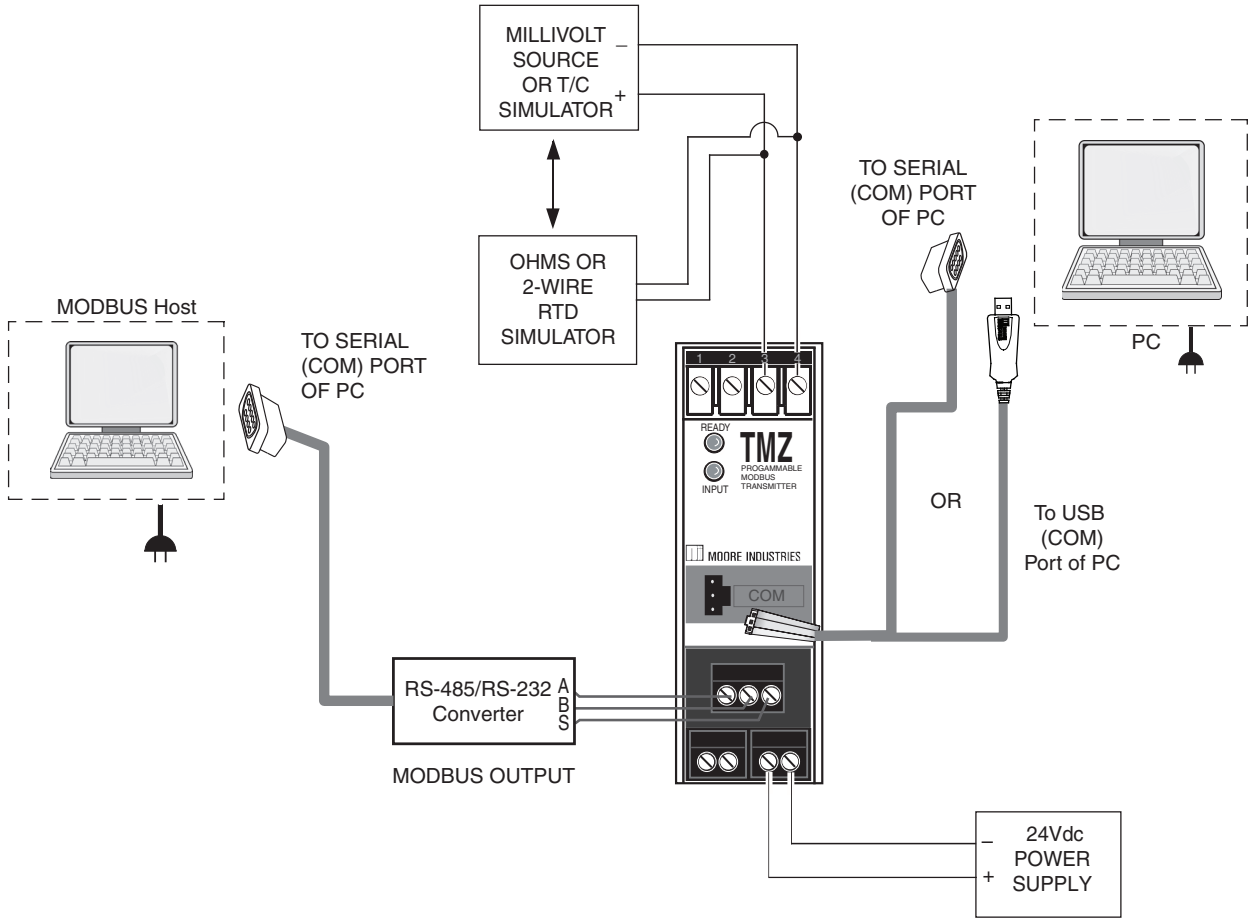
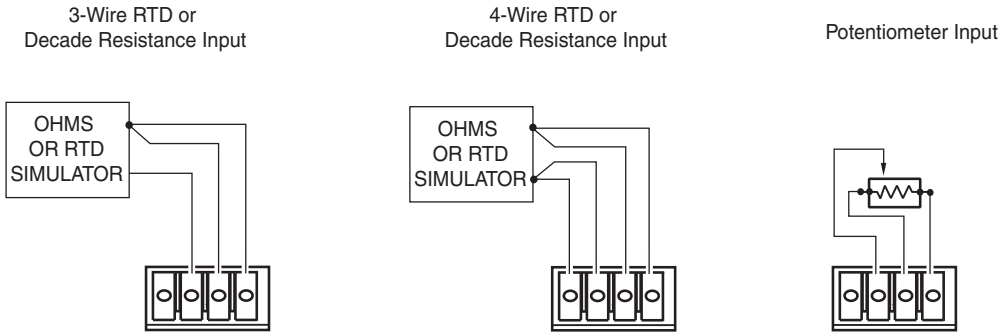


Figure 2.3. *Hooking-Up the TMZ TPRG*



INPUT HOOKUP CONNECTIONS



Configuring the TMZ TPRG Model

One of the benefits of the TMZ is that there are no internal or external controls to adjust or settings to change. All operating parameters are set using a PC and Moore Industries' Intelligent PC Configuration Software.

The software settings are downloaded to the transmitter in the form of a Configuration File and stored in the instrument's memory. You can save a backup copy of the file on your PC hard drive or disk. The transmitter communicates with the PC through an RS-232 connection to the PC's serial port or through the MODBUS output with a fixed baud rate at 9600.

Installing the Configuration Software

See Table 2.2 for information on the necessary equipment.

1. Insert the *Moore Industries Interface Solution PC Configuration Software* CD into the CD drive of the PC. Access the CD and open the "TMZ PC Configuration Software" folder.
2. Double-click the installation program located in the folder. Follow the prompts to correctly install the program.

Once the Configuration Program is installed on the PC, the TMZ can be connected to equipment to simulate input and monitor output. You can then change the transmitter's operating parameters.

The latest version of our Configuration Software for your TMZ unit is also available for download on our website www.miinet.com.

No Transmitter Needed

It is not necessary to connect the transmitter to a PC to create configuration files using the software. The Configuration Program can be run without connecting a transmitter, and ***most*** parameters can be set without the benefit of input from a sensor or TMZ.

This makes it easy to create a set of operating parameters, save them to disk, and download them to one or more transmitters at a later time.

The TMZ ***must*** be connected to the PC in order to: perform sensor trimming; assign a tag, descriptor or message; receive (via download) a configuration file; and save the configuration file from the transmitter's memory.

Connecting the TMZ to the PC

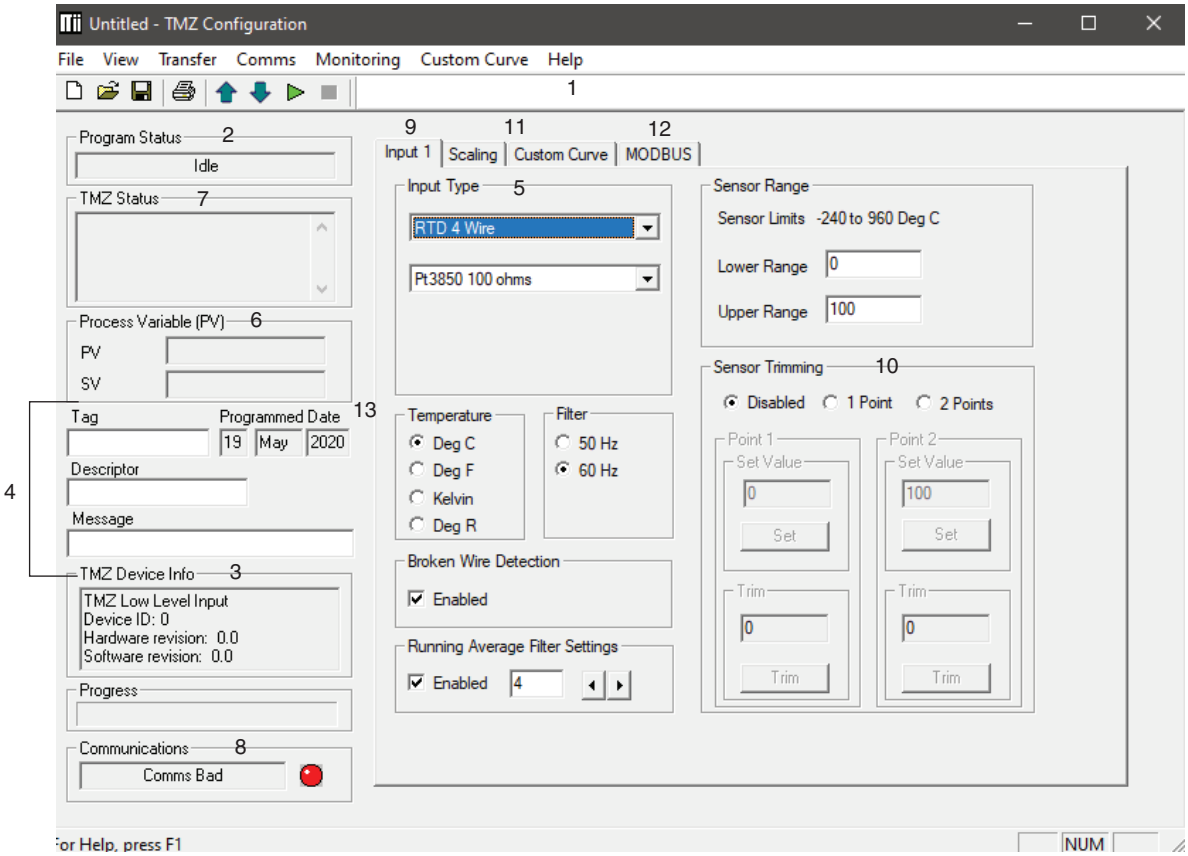
Connect the USB or RS-232 cable to the PC's COM port.

Table 2.2. *Assembling the equipment needed to configure the TMZ TPRG*

Device	Specifications
Variable Input Simulator for Thermocouple, RTD, Millivolt, Potentiometer, or Decade Resistance Box	Variable; Accurate to ±0.05% of unit span
Power Supply	24Vdc, ±10%
Personal Computer	Microsoft Windows based PC; 16Mb free RAM; 20MB free disk space on hard drive Microsoft Windows 7, 10 1 (one) serial port or one available USB port (with optional USB cable)
Moore Industries PC Configuration Software	Version 1.0 or greater, successfully installed to the hard drive
Communication Cable	USB cable 804-030-26 or RS232 cable 803-053-26

PC Configuration Software Summary

Figure 2.4. *TMZ TPRG PC Configuration Software Screen*



Once the default configuration has been saved to disk, it is safe to program other parameters. The PC Software is made up of these sections:

1. Tool Bar/Status Bar– Dropdown menus and corresponding icons allow you to perform various functions throughout the PC Configuration Program. *Refer to the Status and Tool Bar Legend* section for a complete description.

2. Program Status– This portion of the program displays the activity (idle, monitoring, downloading, uploading) of the connected unit.

3. Device ID– Displays your unit configuration HLPRG/TPRG, ID, Hardware revision and firmware revision.

4. Identification Parameters– Use this parameter to place an identifying "Tag" (8 alphanumeric characters max.), "Descriptor" (16 alphanumeric characters max.) or "Message" (32 alphanumeric characters max.). You may also use the *Quick Set* feature to set your *Tag* and download it.

5. Input Type– Select your input type (RTD, T/C, Ohms, mV and Potentiometer) and characteristics.

6. Variables– Displays the value of the Process Variable that is being monitored, the Reference Junction temperature, the scaled output and the Custom Curve output.

7. TMZ Status– Notifies of any errors or conditions which are outside of tolerance range.

8. Communications– Indicates current PC connection/communications status.

9. Input– Use this tab to set your input parameters. Refer to the *Input* section for a complete description.

10. Trimming– This parameter allows you to configure and perform sensor trimming. Refer to the *Trimming* section for a complete description.

11. Scaling & Custom Curve– Use this portion of the screen to set up your custom curve table. Refer to the *Scaling & Custom Curve* section for a complete description.

12. MODBUS– Allows you to configure your MODBUS parameters. Refer to the *MODBUS* section for a complete description.

13. Programmed Date– Displays the date the configuration of the device was last updated.

Default/Factory Configurations

The following are the default factory settings for your unit.

Input:
RTD 4W Pt3850 100Ohms
0 to 100°C
Filter: 60Hz
Broken Wire: ON
Running Average Filter: ENABLED, 4
MODBUS:
Address: 1
Baud Rate: 9600
Parity: None LSW
No. of DP's in integer: 0

Status and Tool Bar Legend

Allows such functions as New, Open, Save and Print

Allows you to Upload and Download configurations

Select the PC Port (Comm Port) that you will use

Allows you to Monitor and Stop monitoring processes

Provides functions specific to your Custom Curve table

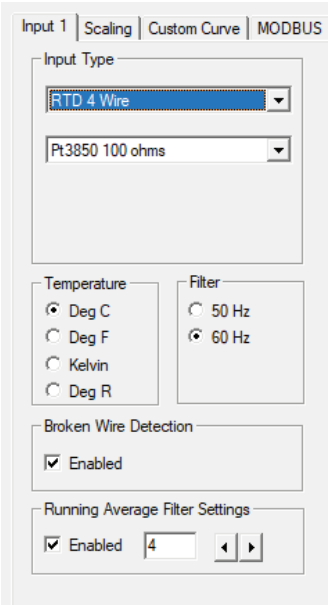
Controls whether Tool and Status Bars are viewed on the screen

Displays the version of the TMZ Configuration Program

Configuration Screens

Input

Figure 2.5. *Input Tab*



Input Range– Allows you to set your "Upper Range Value" (URV) and "Lower Range Value" (LRV) depending upon the input configuration and range chosen in the *Input Type* section.

Note: *The upper and lower range values will, by default, be set to the maximum range determined by input type with the exception of thermocouple and RTD inputs, which have fixed range values user cannot change.*

Temperature Measurements– Select the unit in which you wish your *Input Range* displayed. Choose from Deg C, Deg F, Kelvin or Deg R.

Broken Wire– Allows the TMZ to continuously test the integrity of your sensor wiring by sending out random microamp pulses during operation. If a problem is detected, a message is displayed in the *Device Status* box.

Running Average Filter– This function is for filtering the input signal. The TMZ provides this filter with a user-selected range between 1 and 16. Factory default is 4.

Note: *A higher Running Average Filter setting provides smoother output transitions however, reduces response time. Conversely, a lower setting provides a faster response time, but may seem more unstable.*

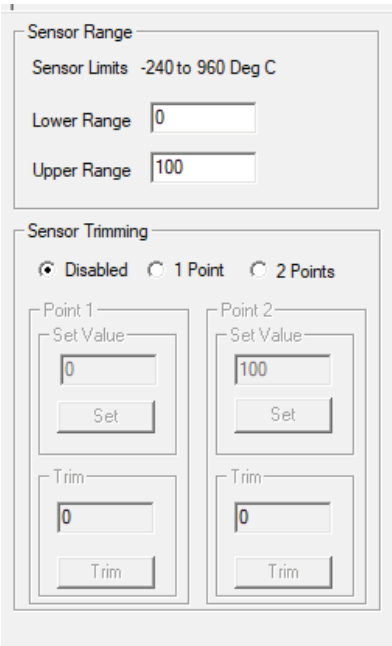
Input Filter– This setting is used to configure the input filter. This filter is designed to reduce the effects of mains-induced noise. The input filter frequency value should be set to the frequency of the local AC supply-either 50Hz or 60Hz.

Note: *Once you have configured all parameters, download to the unit by selecting "Download" in the Transfer dropdown menu located in the Status Bar. You may also download by clicking the button in the Tool Bar.*

You may also use the *Quick Set* feature to configure your *Input* parameters and download the settings.

Trimming

Figure 2.6. *Trimming*



Sensor Trimming– Sensor Trimming increases the measurement accuracy of your instrument by matching the reading of its actual input to either a calibrated source or the device to which it is connected. This verifies that the input from the sensor to the transmitter is being interpreted correctly.

You may trim any point between 0% and 100% along the scale. Note that one-point trimming applies an offset to the sensor reading, while two-point trimming applies both an offset and a gain.

Follow the steps below in order to perform sensor trimming.

1. Select either “1 Point” (one-point trimming) or “2 Points” (two-point trimming) by clicking the appropriate button. Each pair consists of “Set” and “Trim” values.

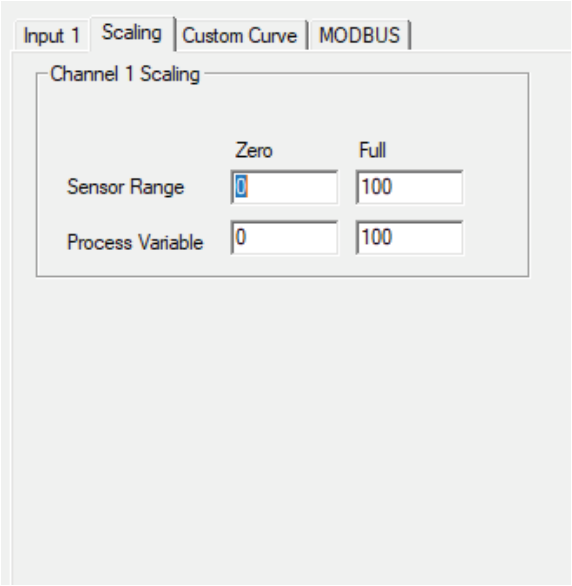
2. Enter the values that need to be trimmed into the “Set Value” field and click “Set”.

3. Apply the targeted signal to the input, wait until it settles and click “Trim” to capture the measured value. If you chose “2 Points”, repeat the step above for the second point.

Note: *Once you have configured all parameters, download to the unit by selecting “Download” in the Transfer dropdown menu located in the Status Bar. You may also download by clicking the button in the Tool Bar.*

Scaling & Custom Curve

Figure 2.7. *Scaling Tab*



Scaling– Scaling allows you to take your PV (Process Variable) reading and manipulate it to a more customized display range (Scaled PV). PV is the unit read after selecting your input type. For example, choosing a mV input would then produce a PV displayed in mV.

Should you require a Scaled PV, follow the instructions below.

1. In the “PV” parameter, enter the actual range of your input type. Place the minimum value in the “LRV” text box and the maximum value in the “URV” box.

2. In the “Scaled PV” parameter, enter the scale, or range you require. In the “LRV” text box, enter the value that you wish displayed when your reading is at its minimum. In the “URV” text box, place the value to be displayed when the process variable has reached maximum.

Custom Curve– The Custom Curve feature allows you to setup your own custom curve table. This allows you to tell the transmitter what it should output when it receives a certain input. This feature also allows you the ability to write a table in Microsoft® Excel, save it in a .csv format, and import it into the Configuration Software. This makes it simple to save the custom table for downloading to multiple units or for backup purposes.

To create a custom curve:

1. Click the “Enabled” box .

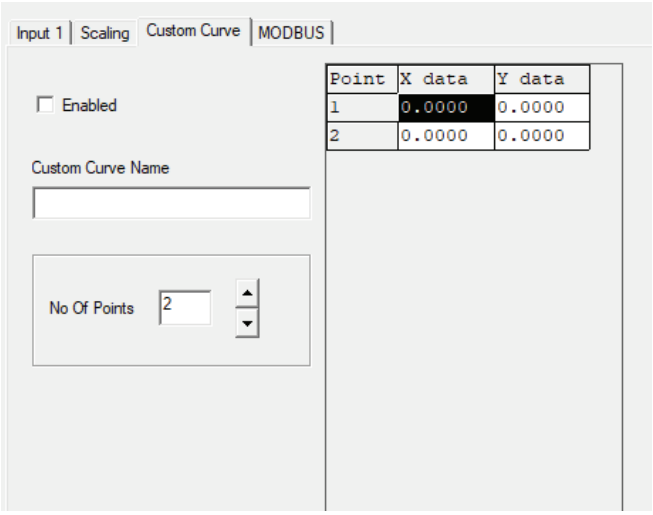
2. Select the number of points for your curve (32 points maximum).

3. Type your individual values in the X and Y columns. Source variables are inserted into the X column while the corresponding data is inserted into the Y column.

4. After all of your data has been entered, you ***must*** use the *Custom Curve* dropdown menu to save your newly created custom (“Save Custom Curve”) and to download it to your TMZ (“Download Custom Curve”).

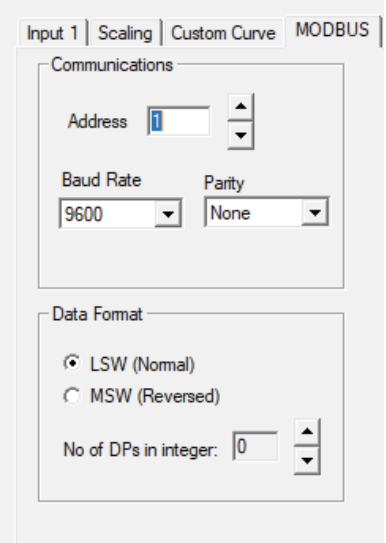
Note: *Once you have configured all parameters, download to the unit by selecting “Download” in the Transfer dropdown menu located in the Status Bar. You may also download by clicking the button in the Tool Bar. However, this does not download your custom table. To do so, you must use the Custom Curve dropdown menu.*

Figure 2.8. *Custom Curve Tab*



MODBUS

Figure 2.9. *MODBUS Tab*



Communications– Used to set MODBUS Address, Baud Rate and Parity parameters.

Address- The number that the TMZ uses to identify itself on the MODBUS network. It is configurable from 1 to 247. By default, the assigned MODBUS address is 01.

Baud Rate- The speed of data transmission. It should be set to match the baud rate of the attached controller. Supported Baud Rates include: 300, 600, 1200, 2400, 4800, 9600, 19.2k and 38.4k. Factory default is 9600.

Parity- A method in serial asynchronous communications of “checking” that characters have been sent correctly. Even, Odd and no Parity (None) are supported. Factory default is None.

Data Format– Allows you to select the word order and number of decimal places you choose.

Selecting LSW (Normal), Least Significant Word, stores the most signifcant bits in the second register and the least significant bits in the first register (factory default).

MSW (Reversed), Most Significant Word, reverses the above order. The most significant bits will be stored in the first register with the least significant bits stored in the second register.

No of DPs in integer- This is a calculation that stores a more accurate value in the MODBUS register and offers better resolution. Select your value using the up and down arrows to the right of the display. See below for an example of this process.

PV = 123.456789

"No of DPs in integer" Value	Displayed Integer
1	1234
2	12345
3	123456

Note: *Once you have configured all parameters, download to the unit by selecting “Download” in the Transfer dropdown menu located in the Status Bar. You may also download by clicking the button in the Tool Bar.*

Installation TPRG

Installation consists of physically mounting the unit and completing the electrical connections.

Mounting the TMZ

The TMZ can be mounted on standard DIN mounting rails.

Making the Electrical Connections

Please refer to Figure 2.3 for electrical connections.

When installing any Moore Industries product, always follow all local regulations and standards for grounding, shielding, and safety.

Warning: *Terminals on this unit may be connected to hazardous voltages. Before making ANY connections to this unit, always remove power from the loop or instrument power terminals.*

Recommended Ground Wiring Practices

Moore Industries recommends the following ground wiring practices:

- Any Moore Industries product in a metal case or housing should be grounded.
- The protective earth conductor must be connected to a system safety earth ground before making other connections.
- All input signals to, and output signals from, Moore Industries' products should be wired using a shielded, twisted pair wiring technique. Shields should be connected to an earth or safety ground.
- For the best shielding, the shield should be run all the way from the signal source to the receiving device. (see Note below)
- The maximum length of unshielded input and output signal wiring should be 2 inches.

Note: *Some of Moore Industries' instruments can be classified as receivers (IPT², IPX², etc.) and some can be classified as transmitters (TRX, TRY, etc.) while some are both a receiver and a transmitter (SPA², HIM, etc). Hence, your shield ground connections should be appropriate for the type of signal line being shielded. The shield should be grounded at the receiver and not at the signal source.*

CE Conformity

Installation of any Moore Industries' products that carry the CE marking must adhere to the guidelines in the Recommended Ground Wiring Practices section in order to meet the EN 61326 requirements set forth in the applicable EMC directive.

Operation

Once programmed, calibrated, installed, and supplied with the correct power, the TMZ transmitter begins to operate immediately. Depending upon environmental conditions, it can be expected to operate unattended for extended periods of time.

Maintenance

Moore Industries suggests a check for terminal tightness and general unit condition every 6-8 months. Always adhere to any site requirements for programmed maintenance.

Customer Support

Moore Industries is recognized as the industry leader in delivering top quality to its customers in products and services. We perform a battery of stringent quality assurance checks on every unit we ship. If any Moore Industries product fails to perform up to rated specifications, call us for help. Our highly skilled staff of trained technicians and engineers pride themselves on their ability to provide timely, accurate and practical answers to your process instrumentation questions.

If problems involve a particular TMZ TPRG, there are several pieces of information that can be gathered ***before you call the factory*** that will help our staff get the answers you need ***in the shortest time possible***. For the fastest service, gather the complete model and serial number(s) of the problem unit(s) and the job number of the original sale.

Section 3 TMZ 2PRG

TMZ 2PRG

Dual Input Model

Figure 3.1. *TMZ Installation Dimensions 2PRG Model*

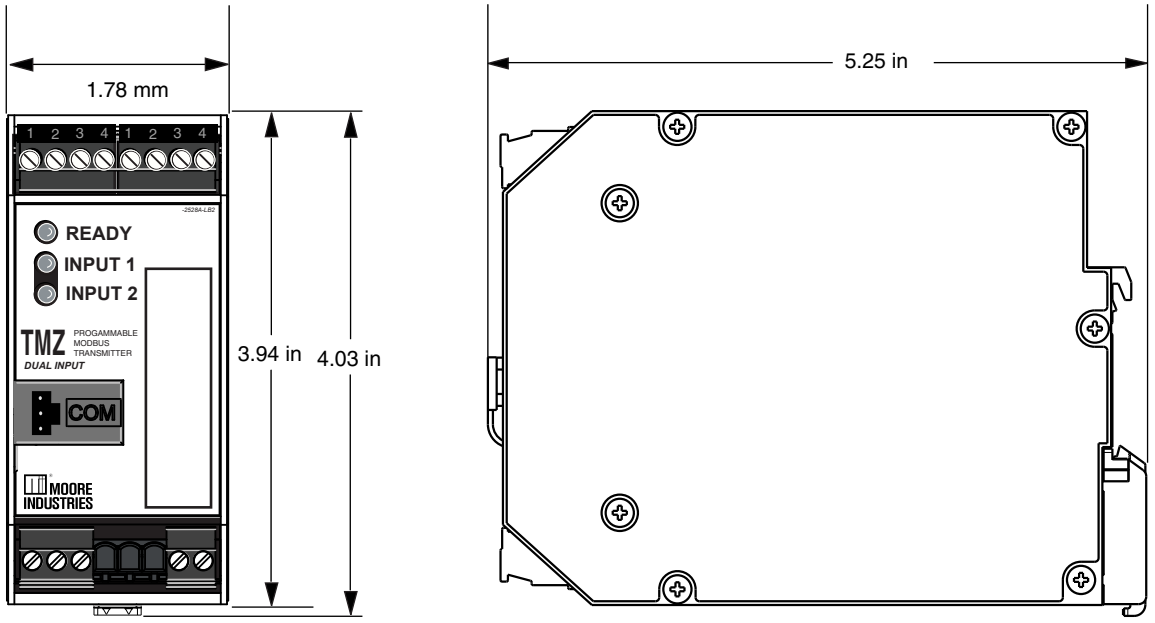


Table 3.1. *Terminal Designations 2PRG Model (Temperature Selection)*

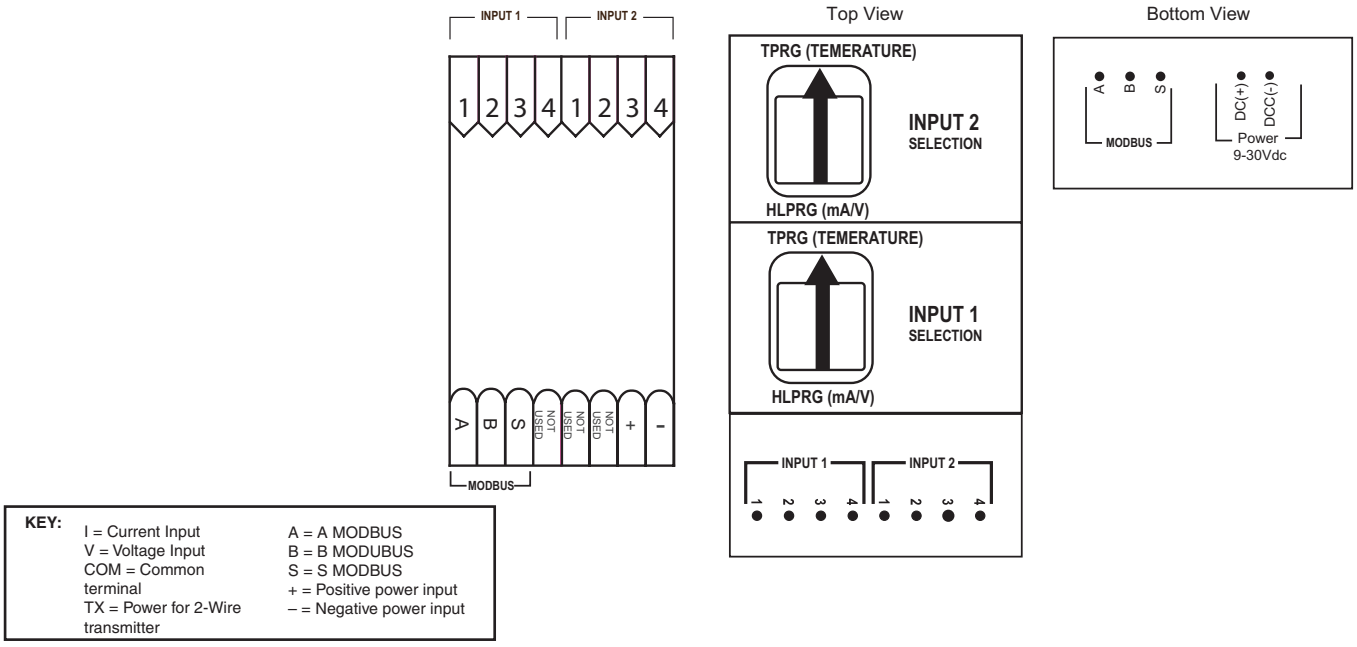


Figure 3.2 *Temperature Sensor Hook-Up Guide Input 1 & 2*

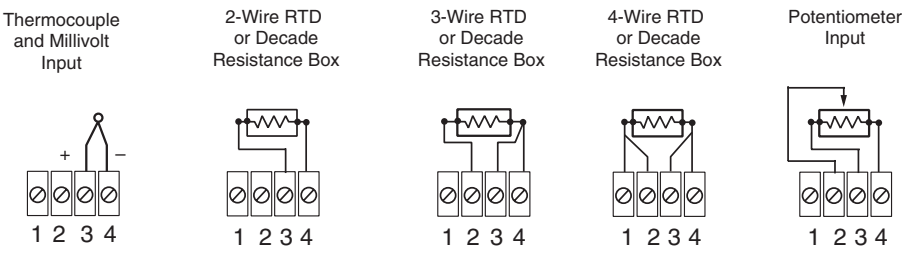
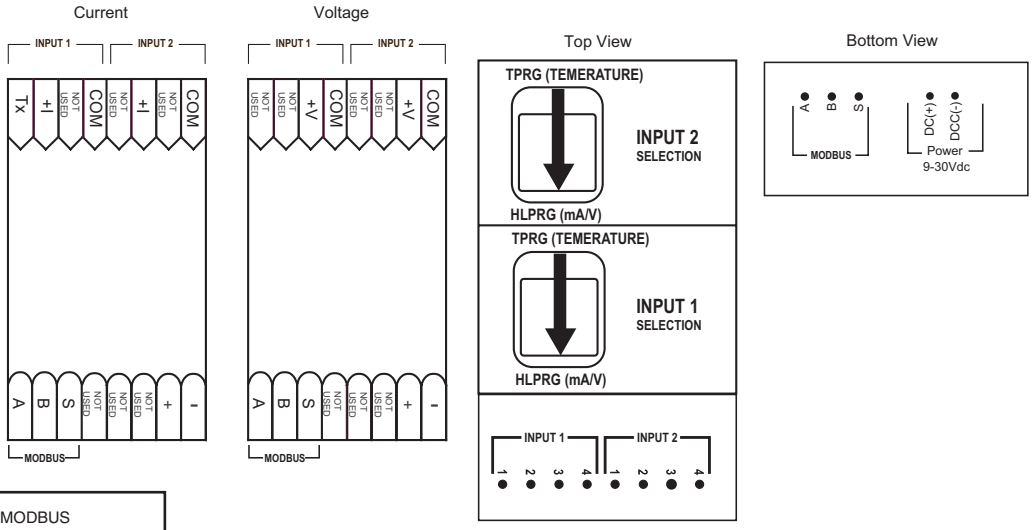
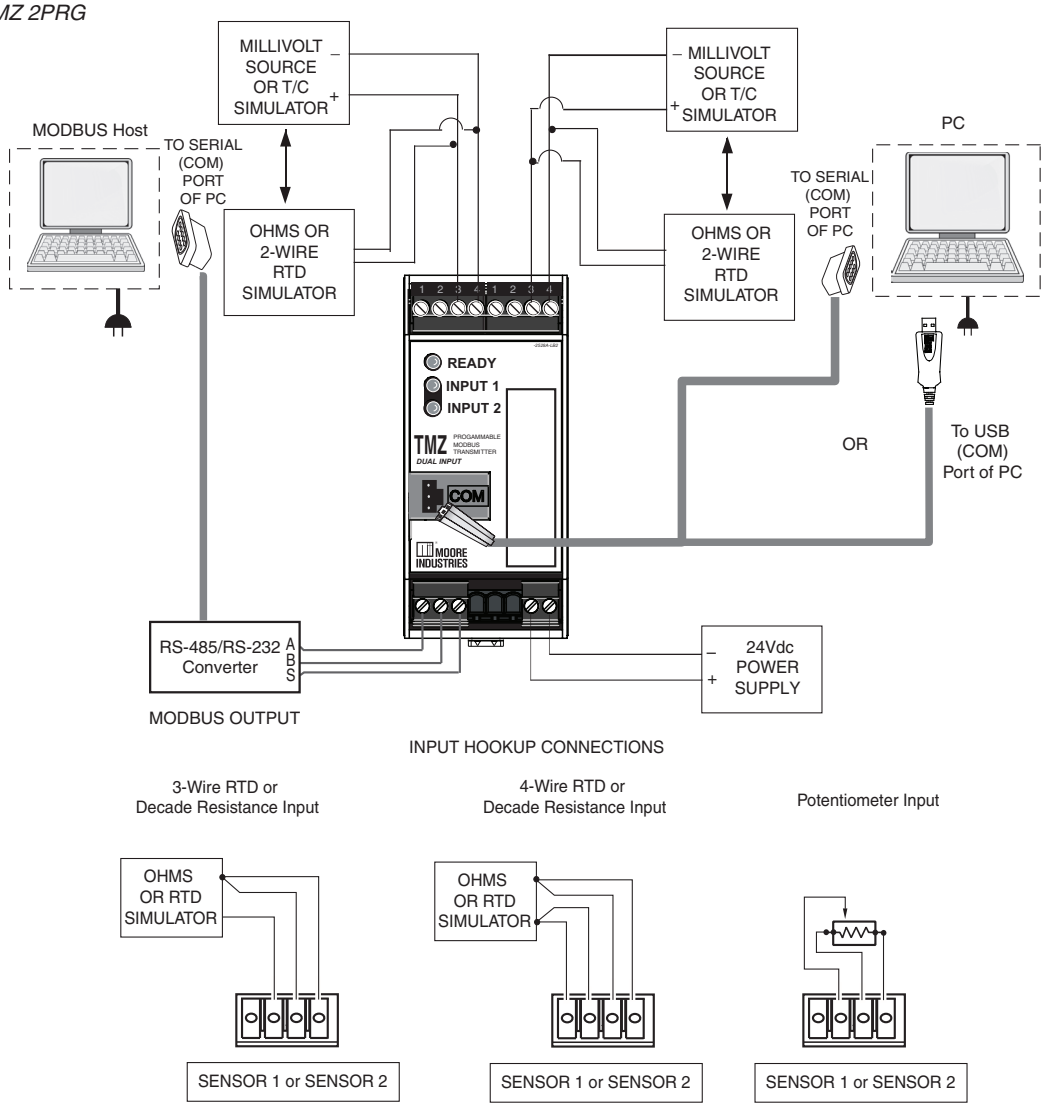


Table 3.2. *Terminal Designations 2PRG Model (mA/V Selection)*



KEY:		
	I = Current Input	A = A MODBUS
	V = Voltage Input	B = B MODUBUS
	COM = Common terminal	S = S MODBUS
	TX = Power for 2-Wire transmitter	+ = Positive power input
		– = Negative power input

Figure 3.3. *Hooking-Up the TMZ 2PRG*



Input Selector for 2PRG

If the input selector needs to be changed from TPRG to HLPRG or vice versa, please follow the instructions below BEFORE hooking up the device.

1. Use acceptable type of pliers as per Figure 3.4.

Note: *Plier tips must have serrated jaw tips to properly grip input selector. See Figure 3.4*

2. Carefully grasp along each side of arrow base with plier tips utilizing recessed area to maximize grip. See Figure 3.5. (next page)

3. While gripping firmly with pliers, gently pull input selector straight up for removal.

4. Release input selector from pliers; installation must be performed by hand.

5. Turn arrow tip towards the desired input (TPRG or HLPRG) and carefully lower input selector back into perimeter of socket opening, keeping input selector parallel and coplanar with case top.

Caution: *This must be done by hand, do not use pliers for installation! Insure socket is aligned with the 18-pin header before gently pressing input selector, flush with top surface of case.*

Figure 3.4. *Acceptable Pliers for Input Selector Removal*

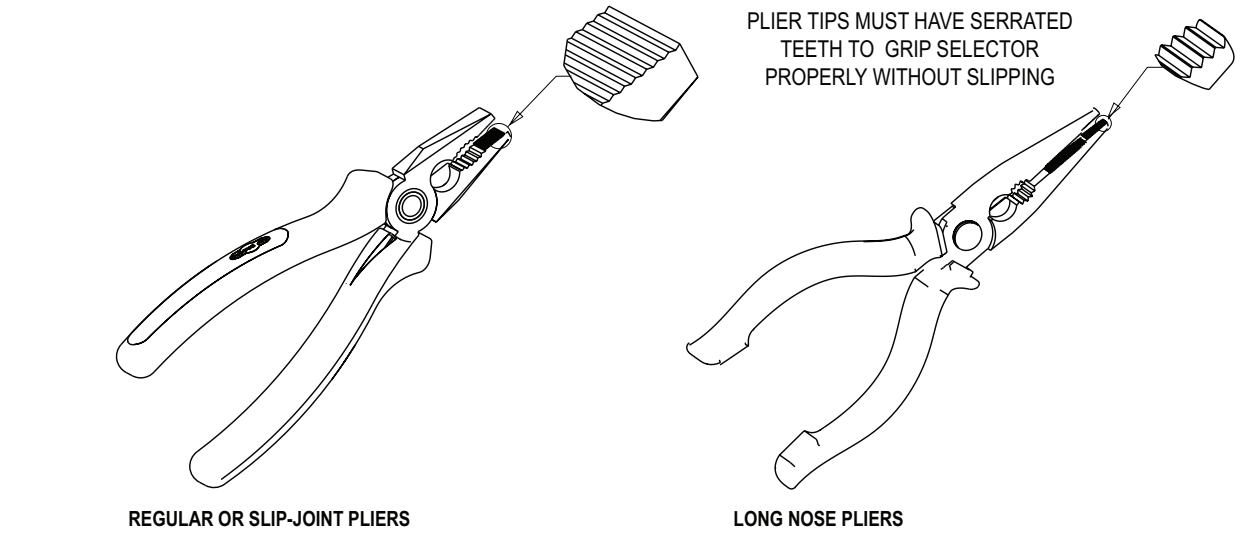
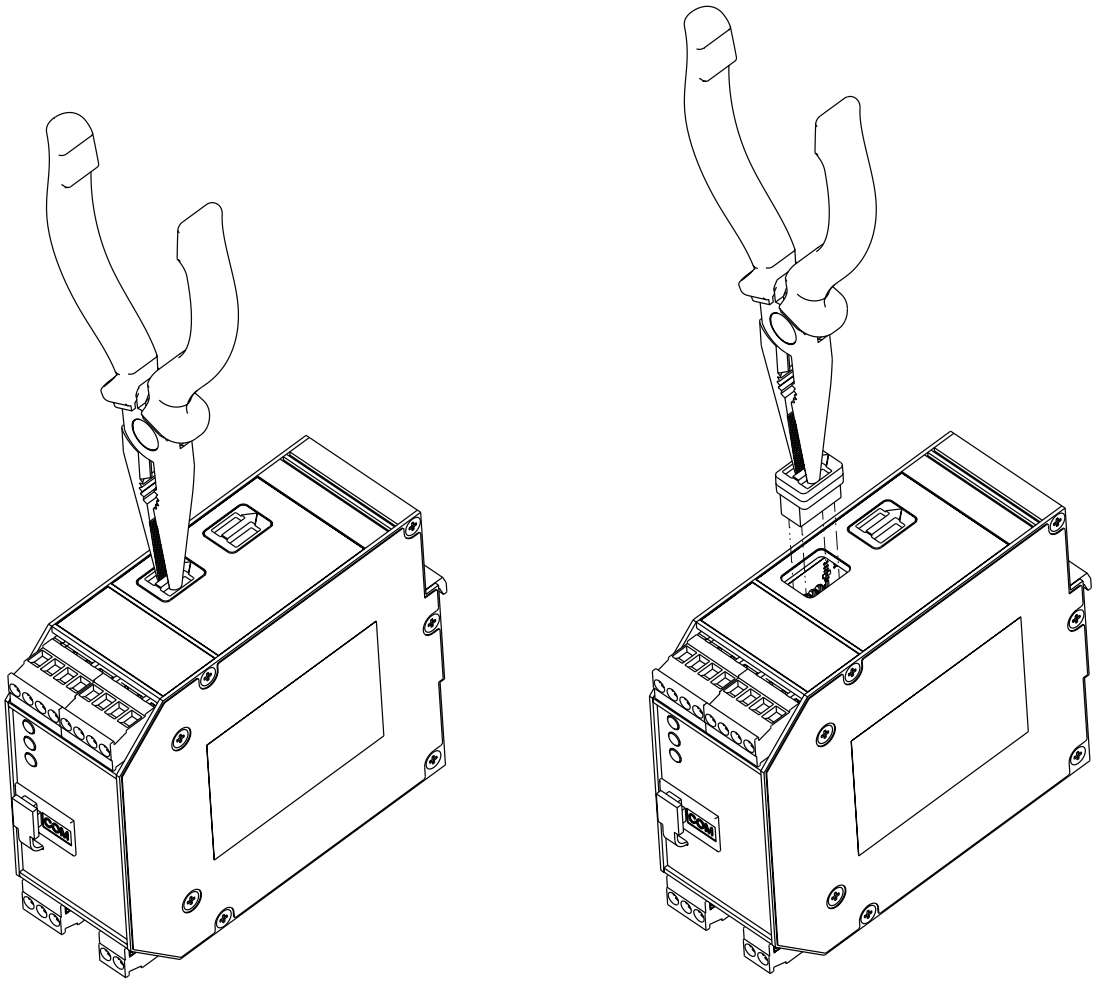


Figure 3.5. *Removing the Input Selectors from the TMZ 2PRG*



Configuring the TMZ 2PRG Model

Once the input selection has been made, all operating parameters are set using a PC and Moore Industries' Intelligent PC Configuration Software. The software settings are downloaded to the transmitter in the form of a Configuration File and stored in the instrument's memory. You can save a backup copy of the file on your PC hard drive or disk. The transmitter communicates with the PC through an
RS-232 connection to the PC's USB or RS232 port.

Installing the Configuration Software

Refer to Table 3.2 for the equipment needed.

1. Insert the *Moore Industries Interface Solution PC Configuration Software* CD into the CD drive of the PC. Access the CD and open the "TMZ PC Configuration Software" folder.
2. Double-click the installation program located in the folder. Follow the prompts to correctly install the program.

Once the Configuration Program is installed on the PC, the TMZ can be connected to equipment to simulate input and monitor output. You can then change the transmitter's operating parameters.

The latest version of our Configuration Software for your TMZ unit is also available for download on our website www.miinet.com.

No Transmitter Needed

It is not necessary to connect the instrument to a PC to create configuration files using the software. The Configuration Program can be run without connecting a unit, and ***most*** parameters can be set without the benefit of input from a sensor or TMZ.

This makes it easy to create a set of operating parameters, save them to disk, and download them to one or more transmitters at a later time.

Note: *If you do not have a transmitter connected then you will need to select the 2PRG with the appropriate input level (HLPRG or TPRG) when starting the configuration program*

The TMZ ***must*** be connected to the PC in order to: perform sensor trimming; assign a tag, descriptor or message; receive (via download) a configuration file; and save the configuration file from the transmitter's memory.

Connecting the TMZ to the PC

Connect the USB or RS-232 cable to the PC's COM port.

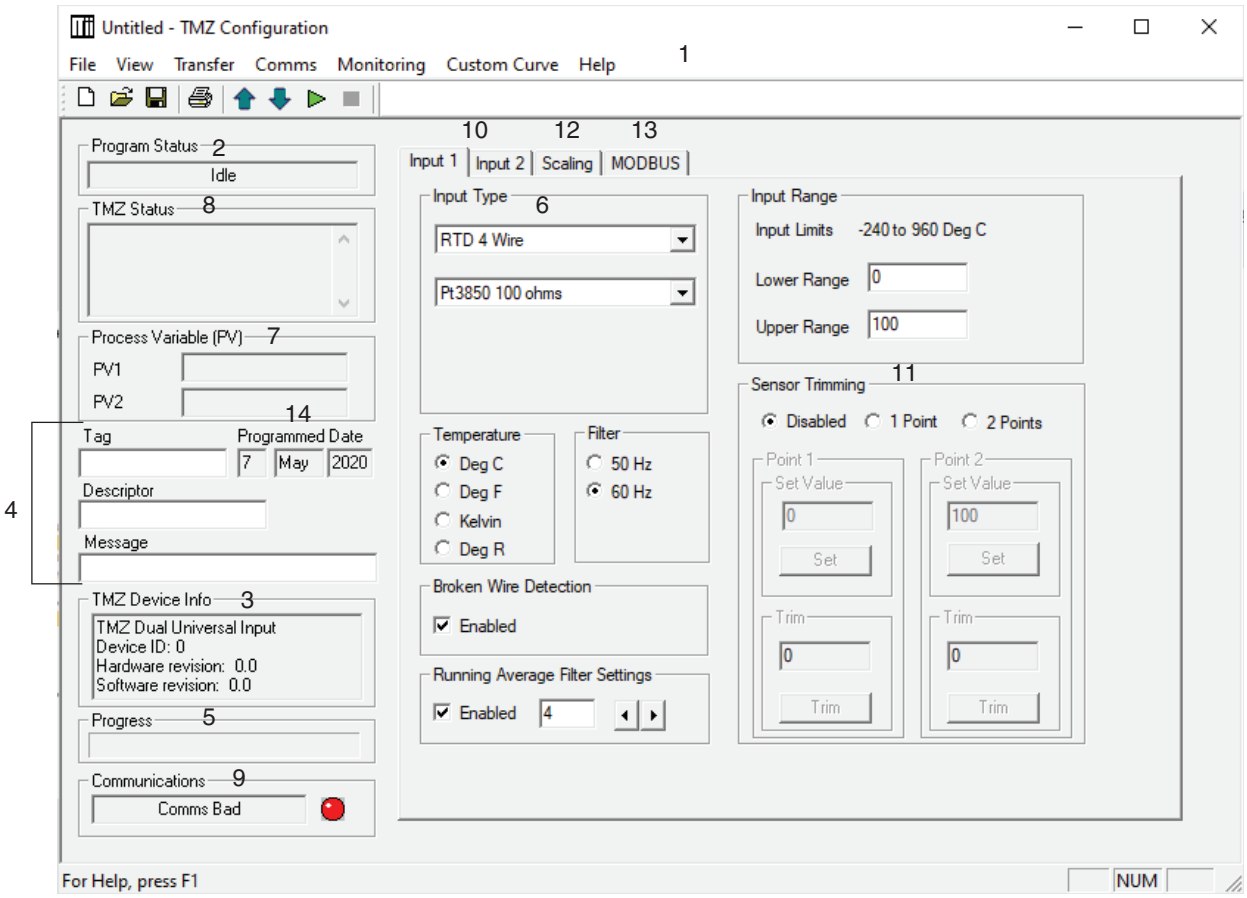
Caution: *Before powering or hooking up the unit, make sure the input selectors are in the correct position for each input (HLPRG or TPRG) - See Table 3.1*

Table 3.3. *Assembling the equipment needed to configure the TMZ 2PRG*

Device	Specifications
Current or Voltage Source Variable Input Simulator for Thermocouple, RTD, Millivolt, Potentiometer, or Decade Resistance Box	Accurate to 0.05% of span for the intended application
Power Supply	24Vdc, ±10% or 117/230Vac (depending on configuration)
Multimeter (optional)	Accurate to ±0.009% of span; e.g., HP Model 3478A
Personal Computer	Microsoft Windows based PC; 16Mb free RAM; 20MB free disk space on hard drive Microsoft Windows 7, 10 1 (one) serial port or one available USB port (with optional USB cable)
Moore Industries PC Configuration Software	Version 1.0 or greater, successfully installed to the hard drive
Communication Cable	USB cable 804-030-26 or RS232 cable 803-053-26

2PRG PC Configuration Software Summary

Figure 3.6. *TMZ 2PRG PC Configuration Software Screen (HLPRG shown)*



Once the default configuration has been saved to disk, it is safe to program other parameters. The PC Software is made up of these sections:

1. Tool Bar/Status Bar– Dropdown menus and corresponding icons allow you to perform various functions throughout the PC Configuration Program. *Refer to the Status and Tool Bar Legend* section for a complete description.

2. Program Status– This portion of the program displays the activity (idle, monitoring, downloading, uploading) of the connected unit.

3. TMZ Device Info– Displays your unit configuration HLPRG/TPRG, ID, Hardware revision and firmware revision.

4. Identification Parameters– Use this parameter to place an identifying "Tag" (8 alphanumeric characters max.), "Descriptor" (16 alphanumeric characters max.) or "Message" (32 alphanumeric characters max.). You may also use the *Quick Set* feature to set your *Tag* and download it.

5. Progress– Displays the upload and downloads parameters for the configuration.

6. Input Type– Select your input type and the respective range of your input.

7. Variables– Displays the value of the Process Variable that is being monitored, as well as the scaled output and custom curve output.

8. Device Status– Notifies of any errors or conditions which are outside of tolerance range.

9. Communications– Indicates current PC connection/communications status.

10. Inputs– Use these tabs to set HLPRG/TPRG input type. Refer to the *Input* section for a complete description.-

11. Sensor Trimming– This parameter allows you to configure and perform input trimming. Refer to the *Trimming* section for a complete description.

12. Scaling – Use this portion of the screen to set up your custom curve table. Refer to the *Scaling & Custom Curve* section for a complete description.

13. MODBUS– Allows you to configure your MODBUS parameters. Refer to the *MODBUS* section for a complete description.

14. Programmed Date– Displays the date the configuration of the device was last updated.

Status and Tool Bar Legend

Allows such functions as New, Open, Save and Print

Allows you to Upload and Download configurations

Select the PC Port (Comm Port) that you will use

Allows you to Monitor and Stop monitoring processes

Provides functions specific to your Custom Curve table

Controls whether Tool and Status Bars are viewed on the screen

Displays the version of the TMZ Configuration Program

Default/Factory Configurations for the TMZ 2PRG

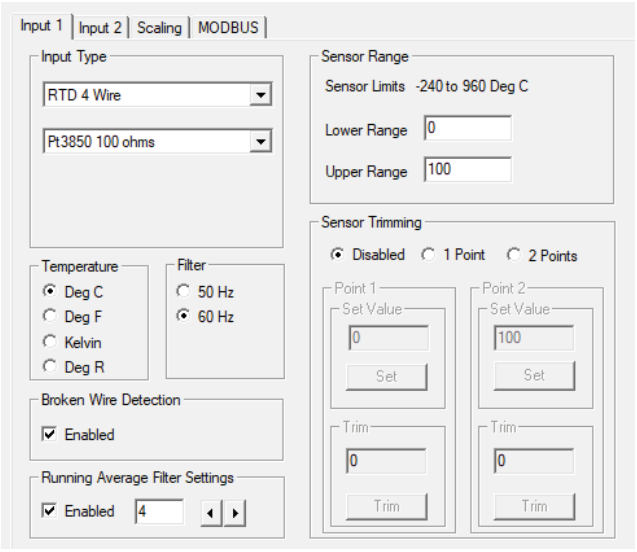
TPRG Input Selected
RTD 4W Pt3850 100 Ohms
0 to 100°C
Filter: 60Hz
Broken Wire: ON
Running Average Filter: ENABLED, 4
MODBUS:
Address: 1
Baud Rate: 9600
Parity: None LSW
No. of DP's in integer: 0

HLPRG Input Selected
Input: 4-20mA
Filter: 60Hz
Broken Wire: ON Level 3.6mA
Running Average Filter: ENABLED, 4
MODBUS:
Address: 1
Baud Rate: 9600
Parity: None LSW
No. of DP's in integer: 0

2PRG Configuration Screens TPRG Input Selected

Input

Figure 3.7. *Input Tab*



Sensor Range– Allows you to set your "Upper Range Value" (URV) and "Lower Range Value" (LRV) depending upon the input configuration and range chosen in the *Input Type* section.

Note: *The upper and lower range values will, by default, be set to the maximum range determined by input type with the exception of thermocouple and RTD inputs, which have fixed range values user cannot change.*

Temperature Measurements– Select the unit in which you wish your *Input Range* displayed. Choose from Deg C, Deg F, Kelvin or Deg R.

Broken Wire– Allows the TMZ to continuously test the integrity of your sensor wiring by sending out random microamp pulses during operation. If a problem is detected, a message is displayed in the *Device Status* box.

Running Average Filter– This function is for filtering the input signal. The TMZ provides this filter with a user-selected range between 1 and 16. Factory default is 4.

Note: *A higher Running Average Filter setting provides smoother output transitions however, reduces response time. Conversely, a lower setting provides a faster response time, but may seem more unstable.*

Input Filter– This setting is used to configure the input filter. This filter is designed to reduce the effects of mains-induced noise. The input filter frequency value should be set to the frequency of the local AC supply-either 50Hz or 60Hz.

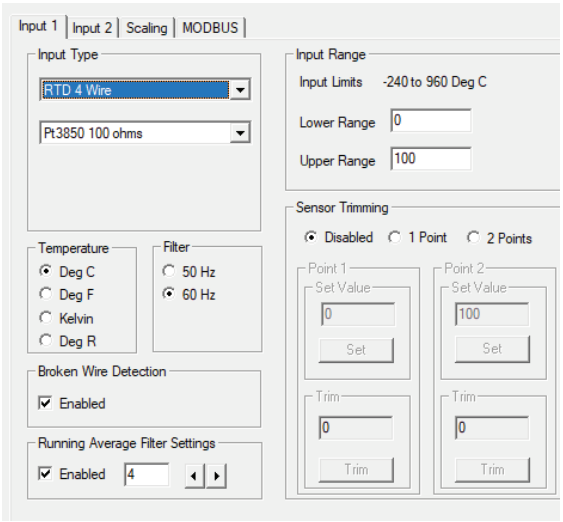
Note: *Once you have configured all parameters, download to the unit by selecting "Download" in the Transfer dropdown menu located in the Status Bar. You may also download by clicking the button in the Tool Bar.*

You may also use the *Quick Set* feature to configure your *Input* parameters and download the settings.

2PRG Configuration Screens HLPRG Input Selected

Input

Figure 3.8. *Input Tab*



Input Range– Allows you to set your "Upper Range Value" (URV) and "Lower Range Value" (LRV) depending upon the input configuration and range chosen in the *Input Type* section.

Note: *The Lower Range Value must be >0 to use broken wire and the level you enter should be less than the Lower Range Value.*

Broken Wire– The TMZ monitors your primary variable. If the monitored value falls equal to or below a set value, then a state of Broken Wire is declared.

Check the "Enabled" box in order to activate Broken Wire notification.

In the "Level" textbox, enter the set value you choose as your limit.

Running Average Filter– This function is for filtering the input signal. The TMZ provides this filter with a user-selected range between 1 and 16. Factory default is 4.

Note: *A higher Running Average Filter setting provides smoother output transitions however, reduces response time. Conversely, a lower setting provides a faster response time, but may seem more unstable.*

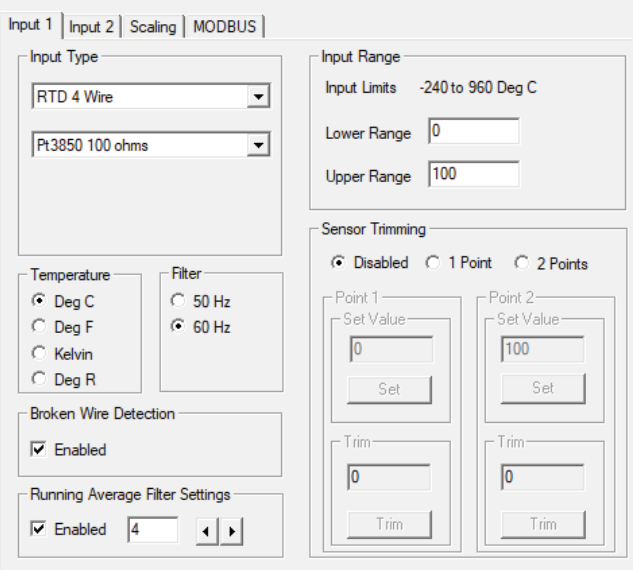
Input Filter– This setting is used to configure the input filter. This filter is designed to reduce the effects of mains-induced noise. The input filter frequency value should be set to the frequency of the local AC supply– either 50Hz or 60Hz.

Note: *Once you have configured all parameters, download to the unit by selecting "Download" in the Transfer dropdown menu located in the Status Bar. You may also download by clicking the* *button in the Tool Bar.*

You may also use the *Quick Set* feature to configure your *Input* parameters and download the settings.

Trimming

Figure 3. 9. *Trimming*



Sensor Trimming– Sensor Trimming increases the measurement accuracy of your instrument by matching the reading of its actual input to either a calibrated source or the device to which it is connected. This verifies that the input to the transmitter is being interpreted correctly.

You may trim any point between 0% and 100% along the scale. Note that one-point trimming applies an offset to the sensor reading, while two-point trimming applies both an offset and a gain.

Follow the steps below in order to perform sensor trimming.

1. Select either “1 Point” (one-point trimming) or “2 Points” (two-point trimming) by clicking the appropriate button. Each pair consists of “Set” and “Trim” values.

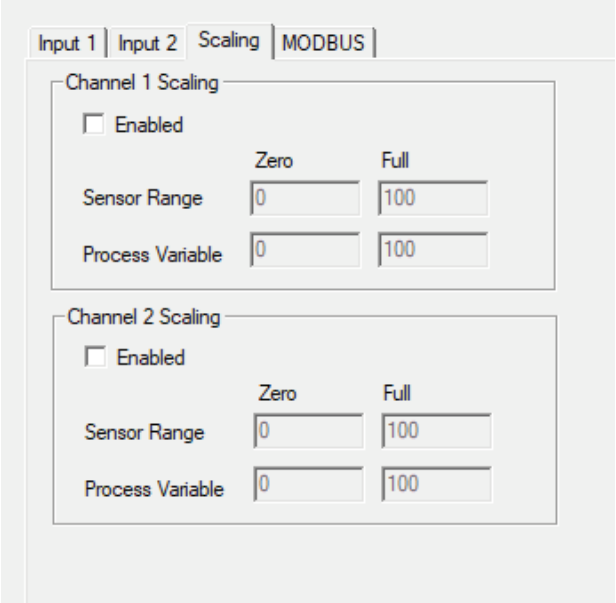
2. Enter the values that need to be trimmed into the “Set Value” field and click “Set”.

3. Apply the targeted signal to the input, wait until it settles and click “Trim” to capture the measured value. If you chose “2 Points”, repeat the step above for the second point.

Note: *Once you have configured all parameters, download to the unit by selecting “Download” in the Transfer dropdown menu located in the Status Bar. You may also download by clicking the button in the Tool Bar.*

Scaling

Figure 3.10. *Scaling Tab*



Scaling– Scaling allows you to take your PV (Process Variable) reading and manipulate it to a more customized display range (Scaled PV). PV is the unit read after selecting your input type. For example, choosing a Current input would then produce a PV displayed in mA.

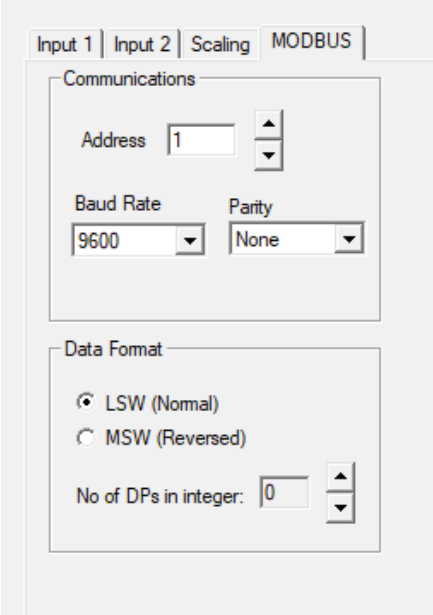
Should you require a Scaled PV, follow the instructions below.

1. In the “PV” parameter, enter the actual range of your input type. Place the minimum value in the “LRV” text box and the maximum value in the “URV” box.

2. In the “Scaled PV” parameter, enter the scale or range you require. In the “LRV” text box, enter the value that you wish displayed when your reading is at its minimum. In the “URV” text box, place the value to be displayed when the process variable has reached maximum.

MODBUS

Figure 3.11. *MODBUS Tab*



Communications– Used to set MODBUS Address, Baud Rate and Parity parameters.

Address- The number that the TMZ uses to identify itself on the MODBUS network. It is configurable from 1 to 247. By default, the assigned MODBUS address is 01.

Baud Rate- The speed of data transmission. It should be set to match the baud rate of the attached controller. Supported Baud Rates include: 300, 600, 1200, 2400, 4800, 9600, 19.2k and 38.4k. Factory default is 9600.

Parity- A method in serial asynchronous communications of "checking" that characters have been sent correctly. Even, Odd and no Parity (None) are supported. Factory default is None.

Data Format– Allows you to select the word order and number of decimal places you choose.

Selecting LSW (Normal), Least Significant Word, stores the most significant bits in the second register and the least significant bits in the first register (factory default).

MSW (Reversed), Most Significant Word, reverses the above order. The most significant bits will be stored in the first register, with the least significant bits stored in the second register.

No of DPs in integer- This is a calculation that stores a more accurate value in the MODBUS register and offers better resolution. Select your value using the up and down arrows to the right of the display. See below for an example of this process.

PV = 123.456789

"No of DPs in integer" Value	Displayed Integer
1	1234
2	12345
3	123456

Note: *Once you have configured all parameters, download to the unit by selecting "Download" in the Transfer dropdown menu located in the Status Bar. You may also download by clicking the* *button in the Tool Bar.*

You may also use the *Quick Set* feature to configure your *MODBUS* parameters and download the settings.

2PRG Installation

Installation consists of physically mounting the unit and completing the electrical connections.

Mounting the TMZ

The 2PRG TMZ can be mounted on standard DIN mounting rails.

Making the Electrical Connections

Please refer to Figure 3.3 for electrical connections.

When installing any Moore Industries product, always follow all local regulations and standards for grounding, shielding, and safety.

Warning: *Terminals on this unit may be connected to hazardous voltages. Before making ANY connections to this unit, always remove power from the loop or instrument power terminals.*

Recommended Ground Wiring Practices

Moore Industries recommends the following ground wiring practices:

- Any Moore Industries product in a metal case or housing should be grounded.
- The protective earth conductor must be connected to a system safety earth ground before making other connections.
- All input signals to, and output signals from, Moore Industries' products should be wired using a shielded, twisted pair wiring technique. Shields should be connected to an earth or safety ground.
- For the best shielding, the shield should be run all the way from the signal source to the receiving device. (see Note below)
- The maximum length of unshielded input and output signal wiring should be 2 inches.

Note: *Some of Moore Industries' instruments can be classified as receivers (IPT², IPX², etc.) and some can be classified as transmitters (TRX, TRY, etc.) while some are both a receiver and a transmitter (SPA², HIM, etc). Hence, your shield ground connections should be appropriate for the type of signal line being shielded. The shield should be grounded at the receiver and not at the signal source.*

CE Conformity

Installation of any Moore Industries' products that carry the CE marking must adhere to the guidelines in the Recommended Ground Wiring Practices section in order to meet the EN 61326 requirements set forth in the applicable EMC directive.

Operation

Once programmed, calibrated, installed, and supplied with the correct power, the TMZ transmitter begins to operate immediately. Depending upon environmental conditions, it can be expected to operate unattended for extended periods of time.

Maintenance

Moore Industries suggests a check for terminal tightness and general unit condition every 6-8 months. Always adhere to any site requirements for programmed maintenance.

Customer Support

Moore Industries is recognized as the industry leader in delivering top quality to its customers in products and services. We perform a battery of stringent quality assurance checks on every unit we ship. If any Moore Industries product fails to perform up to rated specifications, call us for help. Our highly skilled staff of trained technicians and engineers pride themselves on their ability to provide timely, accurate and practical answers to your process instrumentation questions.

If problems involve a particular TMZ TPRG, there are several pieces of information that can be gathered ***before you call the factory*** that will help our staff get the answers you need ***in the shortest time possible***. For the fastest service, gather the complete model and serial number(s) of the problem unit(s) and the job number of the original sale.

Section 4 TMZ Specifications

Specifications 2PRG and HLPRG: mA and V Input Model

Performance

Input Accuracy: Current ±2 microamps; Voltage ±1mV
Overall Accuracy: The overall accuracy of the unit is the input accuracy. It includes the combined effects of linearity, hysteresis, repeatability and adjustment resolution.
Stability: See Table 4.1
Response Time: INPUT UPDATE TIME: 128msec; MODBUS POLLING TIME: Dependent upon how fast and how often a MODBUS master requests data
Isolation: DUAL INPUT AND SINGLE INPUT (WITH -RF) : 500Vrms between case and input; input to MODBUS; power to case and power to MODBUS. 500Vrms between input 1 and input 2 for 2PRG model.
SINGLE INPUT (NON -RF) : 1000Vrms between case and input. 500Vrms between input to MODBUS and power to MODBUS. 1500Vrms between power and input.
Power Supply: 9-30Vdc
Power Consumption: 1W max
Input Impedance: Current, 20 ohms; Voltage, 1.1 Mohms
Input Over-Range Protection: Current, ±100mA; Voltage, ±30Vdc
TX Power Supply: 23.2Vdc ±3%@24mA

Communications

Type: Standard MODBUS RTU protocol interface over RS-485 (parameters as specified in U.S. Standard EIA-RS485)
Address Range: Configurable from 1 to 247. Unit will assume a MODBUS address of 1 by default.
Baud Rates: Interface supports the following: 300, 600, 1200, 2400, 4800, 9600, 19.2k and 38.4k
Character Format: One start bit, 8 data bits and one stop bit
Parity: None, even or odd

Indicators

Indicators LED Type: INPUT LED: Dual color Red/Green LED, Red LED indicates input failure
READY LED: Dual Color Red/Green LED, Green LED indicates unit is operating properly
2PRG model has 2 INPUT LEDs, one for each input

Ambient Conditions

Operating & Storage Range: -40°C to +85°C (-40°F to +185°F)
Relative Humidity: 0-95%, non-condensing
Ambient Temperature Effect: Current, 2 microamps/°C; Voltage, 1mV/°C
RFI/EMI Immunity: Tested per IEC61000-4-3 HLPRG UNIT: 10V/m@20-1000MHz, 1kHz AM 2PRG and HLPRG WITH -RF OPTION: 20V/m@20-1000MHz, 1kHz AM
Noise Rejection: Common mode: 100dB@50/60Hz; Normal Mode: Current Input, 100dB typical@ 50mAp-p@50/60Hz; Voltage Input, 100dB typical@1Vp-p@50/60Hz

Weight

290 g (10.2 oz)
440g (15.6 oz) 2PRG model

Table 4.1. *Long-Term Stability for HLPRG, 2PRG (mA and V) Input Model*

Stability (% of maximum span)	Input Circuit (Years)		
	1	3	5
Current Inputs	0.081	0.14	0.18
Voltage Inputs	0.093	0.16	0.21

Table 4.2. *Long-Term Stability for TPRG, 2PRG (RTD, T/C, mV, Ohms, Pot) Input Model*

Stability (% of maximum span)	Input Circuit (Years)		
	1	3	5
RTD, Ohm, & Pot Inputs	0.09	0.16	0.21
T/C & mV Inputs	0.08	0.14	0.18

Specifications 2PRG and TPRG: RTD, T/C, mV, Ohms and Pot Input Model

Performance

Input Accuracy:
See Table 4.5
Overall Accuracy: The overall accuracy of the unit is the input accuracy. It includes the combined effects of linearity, hysteresis, repeatability and adjustment resolution. It does not include ambient temperature effect. For T/C input, add the RJC error.
Reference Junction Co**mpensation Accuracy (T/C Inputs Only):**
±0.65°C
Stability: See Table 4.2
Response Time: INPUT UPDATE TIME: 128msec; MODBUS POLLING TIME: Dependent upon how fast and how often a MODBUS master requests data
Isolation: DUAL INPUT AND SINGLE INPUT (WITH -RF) : 500Vrms between case and input; input to MODBUS; power to case and power to MODBUS. 500Vrms between input 1 and input 2 for 2PRG model.
SINGLE INPUT (NON -RF) : 1000Vrms between case and input. 500Vrms between input to MODBUS and power to MODBUS. 1500Vrms between power and input.

Power Supply: 9-30Vdc
Power Consumption:
1W maximum
Input Impedance:T/C and mV inputs, 40 Mohms, nominal
Input Over-Range Protection:
±3Vdc = maximum
Excitation Current (RTD and Ohm Inputs Only): 250 microamps, ±10%

Communications

Type: Standard MODBUS RTU protocol interface over RS-485 (parameters as specified in U.S. Standard EIA-RS485)
Address Range: Configurable from 1 to 247. Unit will assume a MODBUS address of 01 by default.
Baud Rates: Interface supports the following: 300, 600, 1200, 2400, 4800, 9600, 19.2k and 38.4k
Character Format: One start bit, 8 data bits and one stop bit
Parity: None, even or odd

Indicators

Indicators LED Type: INPUT LED: Dual color Red/Green LED, Red LED indicates input failure READY LED: Dual Color Red/Green LED, Green LED indicates unit is operating properly 2PRG model has 2 INPUT LEDs, one for each input

Ambient Conditions

Operating & Storage Range:
-40°C to +85°C
(-40°F to +185°F)
Effect of Ambient Temperature on Cold Junction Compensation (T/C Inputs Only): ±0.005°C per °C change of ambient temperature
Relative Humidity:
0-95%, non-condensing
Ambient Temperature Effect:
See Table 4.4
RFI/EMI Immunity Tested per IEC61000-4-3 TPRG UNIT: 10V/m@20-1000MHz, 1kHz AM 2PRG and TPRG WITH -RF OPTION: 20V/m@20-1000MHz, 1kHz AM
Noise Rejection:
Common mode, 100dB@50/60Hz; Normal mode, refer to Table 4.3

Weight

290 g (10.2 oz);
440g (15.6 oz) 2PRG model

Table 4.3. *Normal Mode Rejection Ratio Table*

Sensor Type	Max. p-p Voltage Injection for 70dB at 50/60Hz
T/C E	120mV
T/C J, K, N, C	60mV
T/C T, R, S, B	30mV
100 ohm Pt RTD	120mV
200 ohm Pt RTD	200mV
300, 400, 500, 1000 ohm Pt RTD	400mV
1000 ohm Pt RTD	800mV
120 ohm Ni RTD	200mV
9.03 ohm Cu RTD	30mV
Resistance 4Kohm/mV 1000mV	800mV
Resistance 2Kohm/mV 500mV	400mV
Resistance 1Kohm/mV 250mV	200mV
Resistance 500ohm/mV 125mV	100mV
Resistance 250ohm/mV 62.5mV	50mV
Resistance 125ohm/mV 31.25mV	30mV

Table 4.4. *Ambient Temperature Effect*

Input Type	Accuracy per 1°C (1.8°F) change in Ambient
*RTD	0.0035°C + 0.005% of reading
Ohm	0.002 ohms + 0.005% of reading
Thermocouples	
Input Type	**Accuracy per 1°C (1.8°F) change in Ambient**
J	0.00016°C + 0.005% of reading
K	0.0002°C + 0.005% of reading
E	0.00026°C + 0.005% of reading
T	0.0001°C + 0.005% of reading
R, S	0.00075°C + 0.005% of reading
B	0.0038°C + 0.005% of reading
N	0.0003°C + 0.005% of reading
C	0.00043°C + 0.005% of reading
mV	0.5 microvolts + 0.005% of reading

*Accuracy of Ni672 is 0.002°C

Table 4.5. *Accuracy with RTD, Thermocouple, mV, Ohms, and Pot Inputs Models with TPRG and 2PRG Input*

Input	Type	α	Ohms	Conformance Range	Input Accuracy/Repeatability	Maximum Range
RTD (2-, 3-, 4-Wire)	**Platinum**	0.003850	100	-200 to 850°C -328 to 1562°F	±0.1°C (±0.18°F)	-240 to 960°C -400 to 1760°F
			200			
			300			
			400			
			500			
			1000			
		0.003902	100	-100 to 650°C -148 to 1202°F		-150 to 720°C -238 to 1328°F
			200			
			400			
			500			
			1000			
		0.003916	100	-200 to 510°C -328 to 950°F		-240 to 580°C -400 to 1076°F
	Nickel	0.00672	120	-80 to 320°C -112 to 608°F		-100 to 360°C -148 to 680°F
	Copper	0.00427	9.035	-50 to 250°C -58 to 482°F	±1.5°C (±2.7°F)	-65 to 280°C -85 to 536°F
Ohms	**Direct Resistance**	n/a	0-4000	0-4000 ohms	±0.4 ohms	0-4095 ohms
	Potentiometer		4000 max.	0-100%	±0.1%	0-100%
T/C	**J**	n/a	n/a	-180 to 760°C -292 to 1400°F	±0.25°C (±0.45°F)	-210 to 770°C -346 to 1418°F
	K	n/a	n/a	-150 to 1370°C -238 to 2498°F	±0.30°C (±0.54°F)	-270 to 1390°C -454 to 2534°F
	E	n/a	n/a	-170 to 1000°C -274 to 1832°F	±0.20°C (±0.36°F)	-270 to 1013°C -454 to 1855.4°F
	T	n/a	n/a	-170 to 400°C -274 to 752°F	±0.25°C (±0.45°F)	-270 to 407°C -454 to 764.6°F
	R	n/a	n/a	0 to 1760°C 32 to 3200°F	±0.55°C (±0.99°F)	-50 to 1786°C -58 to 3246.8°F
	S	n/a	n/a	0 to 1760°C 32 to 3200°F	±0.55°C (±0.99°F)	-50 to 1786°C -58 to 3246.8°F
	B	n/a	n/a	400 to 1820°C 752 to 3308°F	±0.75°C (±1.35°F)	200 to 1836°C 392 to 3336.8°F
	N	n/a	n/a	-130 to 1300°C -202 to 2372°F	±0.40°C (±0.72°F)	-270 to 1316°C -454 to 2400.8°F
	C	n/a	n/a	0 to 2300°C 32 to 4172°F	±0.80°C (±1.44°F)	0 to 2338°C 32 to 4240.4°F
mV	**mV**	n/a	n/a	n/a	±30 microvolts	-50 to 1000mV

Section 5 TMZ Ordering Information

Ordering Information

Unit	Input	Output	Power	Options	Housing
TMZ PC-Programmable MODBUS Temperature Transmitter and Signal Converter	Single Input Models: **HLPRG** Single input that programs to accept Current or Voltage Input Current input range: 0-50mA Voltage input range: 0-10Vdc **TPRG** Single input that programs to accept RTD, T/C, Ohms and mV Input (see Table 4.5 for details) Dual Universal Input Model: **2PRG** Dual input where each input can be configured for *HLPRG* or *TPRG* input type (Using input selectors)	**MB** MODBUS RTU (RS-485) communications	**24DC** (9-30Vdc)	**-RF** Enhanced RFI/EMI protection* (see "Specifications" for details) * Only applies to Single Input Models	**DIN** Universal DIN-style housing mounts on 32mm (EN50035) G-type and 35mm (EN50022) Top Hat DIN-rails (HLPRG and TPRG models only) 2PRG model only mounts on 35mm (EN50022) Top Hat DIN-rail **FLB** Externally-mounted flange provides a secure mount and ensures resistance to vibration

When ordering, specify: Unit / Input / Output / Power / Options [Housing]
Model number example: TMZ / TPRG / MB / 24DC / -RF [DIN]

Accessories

Each TMZ order comes with one copy of our Windows Intelligent PC Configuration Software. Use the chart below to order additional parts.

Part Number **750-75E05-01**	**TMZ Intelligent PC Configuration Software** (One copy provided free with each order)
Part Number **803-053-26**	**Non-Isolated Serial Configuration Cable**
Part Number **804-030-26**	**Fuse Protected, Non-Isolated USB Communication Cable**

All product names are the trademarks of their respective companies.

Appendix A: TMZ MODBUS Register Set for HLPRG, TPRG

Table A-1 contains all of the integer registers supported by the TMZ. These registers constitute both the 30000 and 40000 register set.

Table A-1. *MODBUS Register Table*

Register	*Variable*	*Read*	*Description*
0	PV	R	PV (integer)
1	SV	R	SV (integer)
2	PercentOfRange	R	Percent of range (integer)
3	ScaledPV	R	Scaled PV (integer)
4	LinearedPV	R	Linearised PV (integer)
5	ErrorStatus	R	TMZ Error / Status Word
256-257	PV	R	PV (floating point)
258-259	SV	R	SV (floating point)
260-261	PercentOfRange	R	Percent of Range (floating point)
262-263	ScaledPV	R	Scaled PV (floatpoint)
264-265	LinearedPV	R	Linearised PV (floating point)
266	ErrorStatus	R	TMZ Error / Status Word

Table A-2. *Status Word Table*

Status Bit	*Description*
0	Configuration data checksum bad
1	Calibration data checksum bad
2	The configuration data is bad / illegal
3	The calibration data is bad
4	A division by zero error condition
5	RJC is broken
6	Microcontroller watchdog reset has occurred
7	A software watchdog error has occurred
8	Sensor wire 1 is broken (If broken wire is enabled)
9	Sensor wire 2 is broken (If broken wire is enabled)
10	Sensor wire 3 is broken (If broken wire is enabled)
11	Sensor wire 4 is broken (If broken wire is enabled)
12	Input is saturated
13	Hardware error has occurred (one of the ADCs is not working)
14	The calibration process is active
15	TMZ is off line

Appendix B: TMZ MODBUS Register Set for 2PRG

Table B-1 contains all of the MODBUS integer registers supported by the TMZ 2PRG dual input model. These registers constitute both the 30000 and 40000 register set.

Table B-1. *MODBUS Register Table*

Register	Variable	Read/ Write	Description
0	PV1	R	PV1 (integer)
1	PV2	R	PV2 (integer)
2	SV1	R	SV1 (integer)
3	SV2	R	SV2 (integer)
4	PercentOfRange1	R	Percent of range channel 1 (integer)
5	PercentOfRange2	R	Percent of range channel 2 (integer)
6	ErrorStatus	R	TMZ dual input status information
7	Measured PV channel 1	R	Raw measurement from front-end channel 1
8	Measured PV channel 2	R	Raw measurement from front-end channel 2
9	ErrorStatus2	R	TMZ dual input additional status information
256-257	PV1	R	PV1 (float)
258-259	PV2	R	PV2 (float)
260-261	SV1	R	SV1 (float)
262-263	SV2	R	SV2 (float)
264-265	PercentOfRange1	R	Percent of range channel 1 (float)
266-267	PercentOfRange2	R	Percent of range channel 2 (float)
268	ErrorStatus	R	TMZ dual input status information
269	ErrorStatus2	R	TMZ dual input additional status information
270	ErrorStatus3		Factory use only
512	TMZ_OffLine	R	TMZ on line (0) off line (1) mode
513	Model Type	R	Model Type 0 = low level (single input) 1 = high level (single input) 2 = special RTD (single input) 19 = low level dual input 20 = high level dual input
514-531	Reserved	W	Do not use

Appendix C: TMZ MODBUS Register Descriptions for the 2PRG registers 268, 269 and 270

Table C-1 contains descriptions for registers 268, 269 and 270 for the TMZ 2PRG dual input model.

Table C-1. *MODBUS Register Table*

		ErrorStatus 268	**ErrorStatus2 269**	**ErrorStatus3 270**
		Modscan Addr = 269	Modscan Addr = 270	Modscan Addr = 271
Bit 0	0x0001	Config Cksum	S2W1 Broken	S1 HILO Selection
Bit 1	0x0002	Calib Cksum	S2W2 Broken	
Bit 2	0x0004	Bad Config	S2W3 Broken	
Bit 3	0x0008	Bad Calib	S2W4 Broken	
Bit 4	0x0010	DivZero	S2 Sat	
Bit 5	0x0020	RJC Broken	AL1 Active	
Bit 6	0x0040	WD	AL2 Active	
Bit 7	0x0080	SWR WD	Factory Data Error	
Bit 8	0x0100	Sens1 Broken	S1W1 Broken	S1 HILO Seletion
Bit 9	0x0200	Sens2 Broken	S1W2 Broken	
Bit 10	0x0400	RJC2 Broken	S1W3 Broken	
Bit 11	0x0800	SW Error	S1W4 Broken	
Bit 12	0x1000	In Sat	S1 Sat	
Bit 13	0x2000	HW Error		
Bit 14	0x4000	Calib Active	S1 HILO Mismatch	
Bit 15	0x8000	Off Line	S2 HILO Mismatch	

Table C-2 contains the description of 2PRG ErrorStatus3 for register 270.

Table C-2. *MODBUS Register Table*

S1/S2 HILO Selection	Mode
0	Removed
1	TPRG
2	HLPRG
3	INVALID

Warranty Disclaimer

Moore Industries ("The Company") makes no express, implied or statutory warranties (including any warranty of merchantability or of fitness for a particular purpose) with respect to any goods or services sold by the company. The company disclaims all warranties arising from any course of dealing or trade usage, and any buyer of goods or services from the company acknowledges that there are no warranties implied by custom or usage in the trade of the buyer and of the company, and that any prior dealings of the buyer with the company do not imply that the company warrants the goods or services in any way.

Any buyer of goods or services from the company agrees with the company that the sole and exclusive remedies for breach of any warranty concerning the goods or services shall be for the company, at its option, to repair or replace the goods or services or refund the purchase price. The company shall in no event be liable for any consequential or incidental damages even if the company fails in any attempt to remedy defects in the goods or services , but in such case the buyer shall be entitled to no more than a refund of all monies paid to the company by the buyer for purchase of the goods or services.

Any cause of action for breach of any warranty by the company shall be barred unless the company receives from the buyer a written notice of the alleged defect or breach within ten days from the earliest date on which the buyer could reasonably have discovered the alleged defect or breach, and no action for the breach of any warranty shall be commenced by the buyer any later than twelve months from the earliest date on which the buyer could reasonably have discovered the alleged defect or breach.

Return Policy

For a period of thirty-six (36) months from the date of shipment, and under normal conditions of use and service, Moore Industries ("The Company") will at its option replace, repair or refund the purchase price for any of its manufactured products found, upon return to the Company (transportation charges prepaid and otherwise in accordance with the return procedures established by The Company, to be defective in material or workmanship. This policy extends to the original Buyer only and not to Buyer's customers or the users of Buyer's products, unless Buyer is an engineering contractor in which case the policy shall extend to Buyer's immediate customer only. This policy shall not apply if the product has been subject to alteration, misuse, accident, neglect or improper application, installation, or operation. THE COMPANY SHALL IN NO EVENT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.

To return equipment to Moore Industries for repair, follow these four steps:

1. Call Moore Industries and request a Returned Material Authorization (RMA) number.

   Warranty Repair –
   If you are unsure if your unit is still under warranty, we can use the unit's serial number to verify the warranty status for you over the phone. Be sure to include the RMA number on all documentation.

   Non-Warranty Repair –
   If your unit is out of warranty, be prepared to give us a Purchase Order number when you call. In most cases, we will be able to quote you the repair costs at that time. The repair price you are quoted will be a "Not To Exceed" price, which means that the actual repair costs may be less than the quote. Be sure to include the RMA number on all documentation.

2. Provide us with the following documentation:

   a) A note listing the symptoms that indicate the unit needs repair

   b) Complete shipping information for return of the equipment after repair

   c) The name and phone number of the person to contact if questions arise at the factory

3. Use sufficient packing material and carefully pack the equipment in a sturdy shipping container.

4. Ship the equipment to the Moore Industries location nearest you.

The returned equipment will be inspected and tested at the factory. A Moore Industries representative will contact the person designated on your documentation if more information is needed. The repaired equipment, or its replacement, will be returned to you in accordance with the shipping instructions furnished in your documentation.

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Specifications and Information subject to change without notice.