MOORE INDUSTRIES WORLDWIDE

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Programmable PROFIBUS
Temperature Transmitter

TPZ

TPZ

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TPZ

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Introduction

This is the user's manual for Moore Industries' TPZ Programmable PROFIBUS Temperature Transmitter. It contains all of the information needed to configure, install, operate and maintain the TPZ.

About this Manual

Pay particular attention wherever you see a "***Note***", "***Caution***" or "***WARNING***".

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.

The TPZ

The TPZ is a 2-wire (loop-powered), user-configurable, PROFIBUS-based temperature transmitter. It allows you to network multiple transmitters on one link that utilitzes the PROFIBUS protocol. The TPZ configures to accept a direct input from sensors and a wide array of transmitters and instruments. It then converts the input to a two-way, all digital communication protocol that is ready for direct interface with an AMS, DCS and other computer-based SCADA systems.

The TPZ's size, accuracy and compatibility make it the ideal solution when measurements must be made in remote or otherwise difficult-to-access locations.

> ***Note:***
> *This document describes configuration of the TPZ using both a Device Description and Moore Industries' Intelligent PC Configuration Software. All configurable parameters may be set using either method. Please refer to the appropriate section for your configuration method.*

Model and Serial Numbers

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

Specifications

Performance

Input Accuracy: Refer to Table 4

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 Compensation: ±0.45°C (±0.81°F)

Stability: Refer to Table 1

Isolation: 500Vrms between input, output and case continuous, and will withstand a 500Vrms dielectric strength test for one minute (with no breakdown)

Step Response Time: 500msec, maximum, from the time an input is applied until the time the corresponding floating point processed variable is available to be read by other PROFIBUS devices

Over-voltage Protection: Input, ±5Vdc peak, maximum

Digital Input Filter: 50/60 Hz (user-selectable)

Power Supply Requirement: 9-32Vdc, 12.07mA maximum under normal operation; 18mA maximum under fault conditions

Performance (Continued)

Power Supply Effect: ±0.002% of span per 1V change

Load Effect: N/A

T/C Input Impedance: 40Mohms, nominal

Excitation Current: RTD and Ohms, 250 microamps, ±10%

RTD Lead Wire Resistance Maximum: RTD resistance + 2X lead wire resistance <4000 ohms; Recommended lead wire resistance for three wire connections: <35 ohms/wire; 10 ohm copper sensor <5 ohms

Sensor Lead Resistance Effect: 1.0 ohm in reading/ohm of lead resistance for 2-wire sensors; 1.0 ohm in reading/ohm of lead of unbalanced resistance for 3-wire sensors; no effect on 4-wire sensors

Resolution: Input, 20-bit

Supply Range: 9-32V

Display

Type: Top Row, 10mm (0.4 in) high black digits on a reflective background; Bottom Row, 6mm (0.225 in) high digits on a reflective background; Two-digit PROFIBUS address indicator

Display (Continued)

Format: Two rows of five alphanumeric characters

Decimal Points: Automatically adjusted decimal point with a user selectable maximum up to four places

Range: -99999 to 99999

Minimum Display Span: 1.00

Ambient Temperature

Operating and Storage Range: -40°C to +85°C (-40°F to +185°F)

Relative Humidity: 0-95%, non-condensing

Ambient Temperature Effect: Refer to Table 2

Effect on Reference Junction Compensation: ±0.005°C of input span/°C change of ambient temperature

RFI/EMI Immunity: 20V/m@80-1000MHz, 1kHz AM when tested according to IEC 1000-4-3-1995 with 0.5% of span or less

Startup Time: Performance falls within specification 8 seconds after power is applied

Noise Rejection: Common mode, 100dB@50/60Hz; Normal Mode: Refer to Table 3

Weight 235g (8.3 oz)

Specifications and information subject to change without notice.

Table 1. *Long-Term Stability Table*

Stability (% of maximum span)	Input to PROFIBUS		
	1 yr	3 yrs	5 yrs
T/C, mV	0.008	0.014	0.019
RTD, Ohm, Potentiometer	0.047	0.081	0.104

Table 2. *Ambient Temperature Effects Table*

Sensor Type	Digital Accuracy per 1°C (1.8°F) change in Ambient
RTD	0.003°C
T/C	0.003°C + 0.005% of reading
Millivolt	0.005mV + 0.005% of reading
Ohm	0.002 ohms + 0.005% of reading

Table 3. *Normal Mode Rejection Ratio Table*

Sensor Type		Max. p-p Voltage Injection for 70dB at 50/60Hz
T/C: J, K, N, C, E		150mV
T/C: T, R, S, B		80mV
Pt RTD: 100, 200, 300 ohms		250mV
Pt RTD: 400, 500, 1000 ohms		1V
Ni: 120 ohms		500mV
Cu: 9.03 ohms		100mV
Resistance	mV	
1-4kohms	250-1000	1V
0.25-1kohms	62.5-250	250mV
0.125-0.25kohms	31.25-62.5	100mV

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Table 4. *Input and Accuracy Table*

Input	Type	α	Ohms	Conformance Range	Minimum Span	Input Accuracy	Maximum Range	Sensor-to-Transmitter Matching
RTD	Platinum	0.003850	100	-200 to 850°C -328 to 1562°F	10°C (18°F)	±0.1°C (±0.18°F)	-240 to 960°C -400 to 1760°F	Up to ±0.014°C (±0.025°F) system accuracy*.
			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		±0.85°C (±1.53°F)	-65 to 280°C -85 to 536°F	
Ohms	Direct Resistance	n/a	0-4000 ohms	0-4000 ohms	10 ohms	±0.4 ohms	0-4000 ohms	
	Potentiometer		4000 ohms	0-100%	10%	±0.1%	0-100%	
T/C	J	n/a	n/a	-180 to 760°C -292 to 1400°F	35°C 63°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	40°C 72°F	±0.3°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	35°C 63°F	±0.2°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	35°C 63°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	50°C 90°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	50°C 90°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	75°C 135°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	45°C 81°F	±0.4°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	100°C 180°F	±0.8°C (±1.44°F)	0 to 2338°C 32 to 4240.4°F	
Millivolts	DC	n/a	n/a	-50 to 1000mV	4mV	15 microvolts	-50 to 1000mV	

*High-accuracy measurements are achieved by using a 4-wire, 1000 ohm platinum RTD with a span of 100°F (50°F minimum) calibrated in our sensor-matching calibration bath.
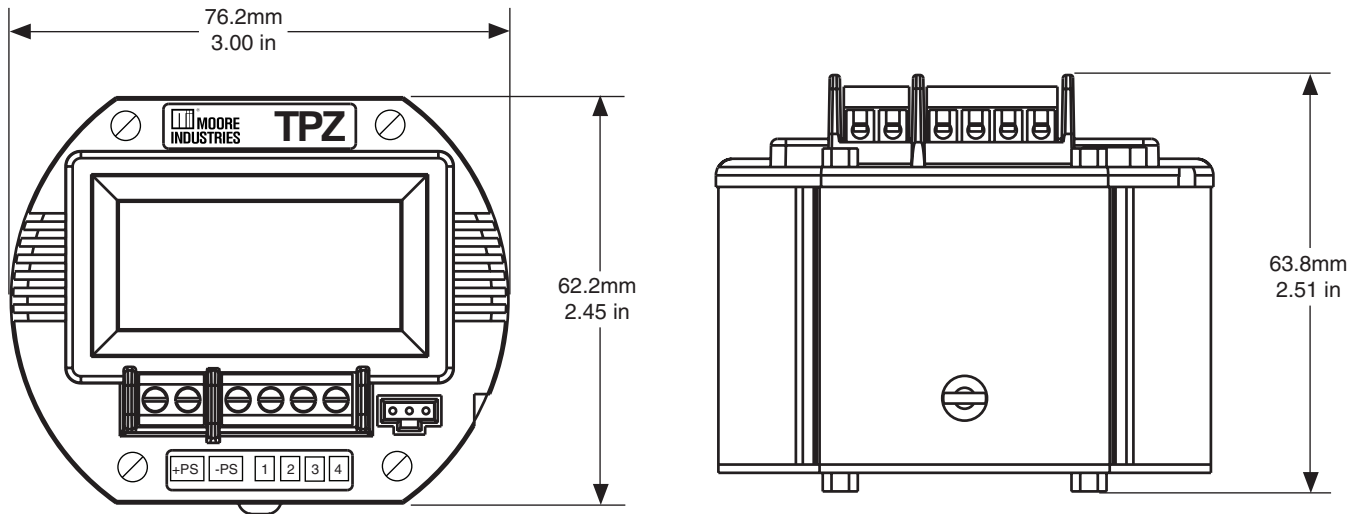
Figure 1. *TPZ Hockey-Puck Housing (HP) Dimensions*

76.2mm
3.00 in

62.2mm
2.45 in

63.8mm
2.51 in

+PS -PS 1 2 3 4

Figure 2. *BH Housing Dimensions*

SIDE VIEW

102mm
(4.02 in)

119mm
(4.69 in)

GND

1/2 NPT

57mm
(2.24 in)

22mm
(0.87 in)

76mm
(2.99 in)

TOP VIEW

64mm
(2.52 in)

10mm
(0.38 in)

102mm
(4.02 in)

68mm
(2.68 in)

84mm
(3.31 in)

25mm
(1.00 in)

68mm
(2.68 in)

124mm
(4.88 in)
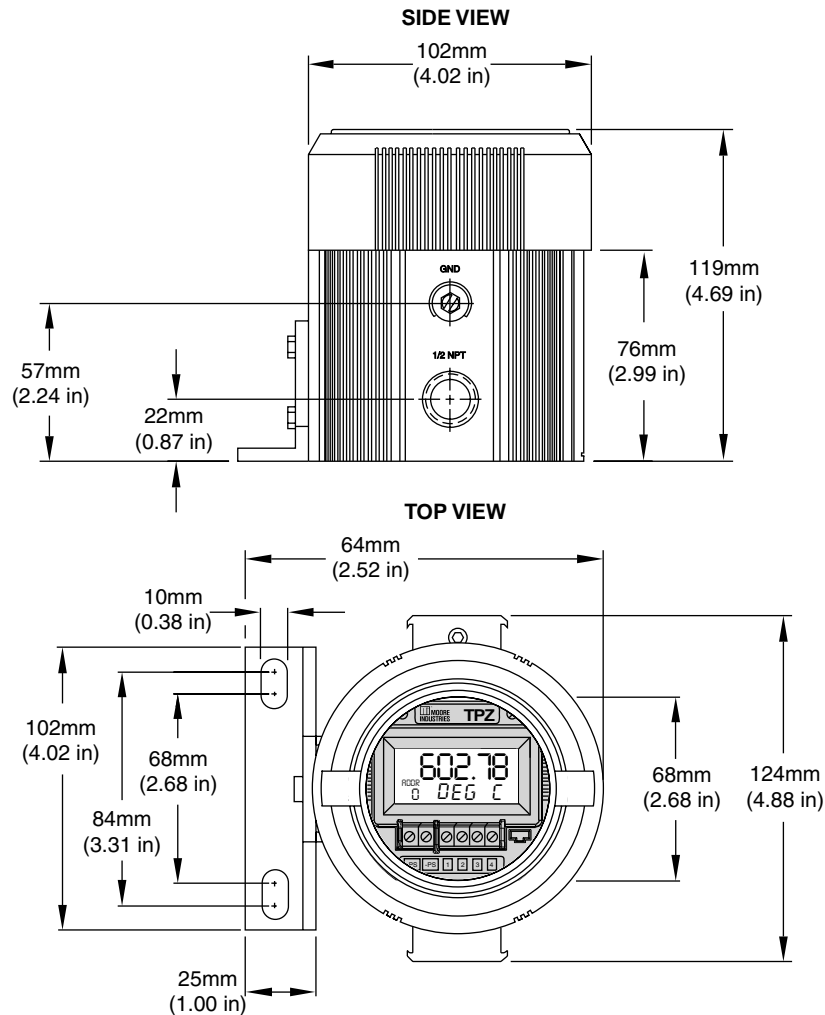
Figure 3. *D-Box Housing Dimensions*

Table 5. *Necessary Equipment Table*

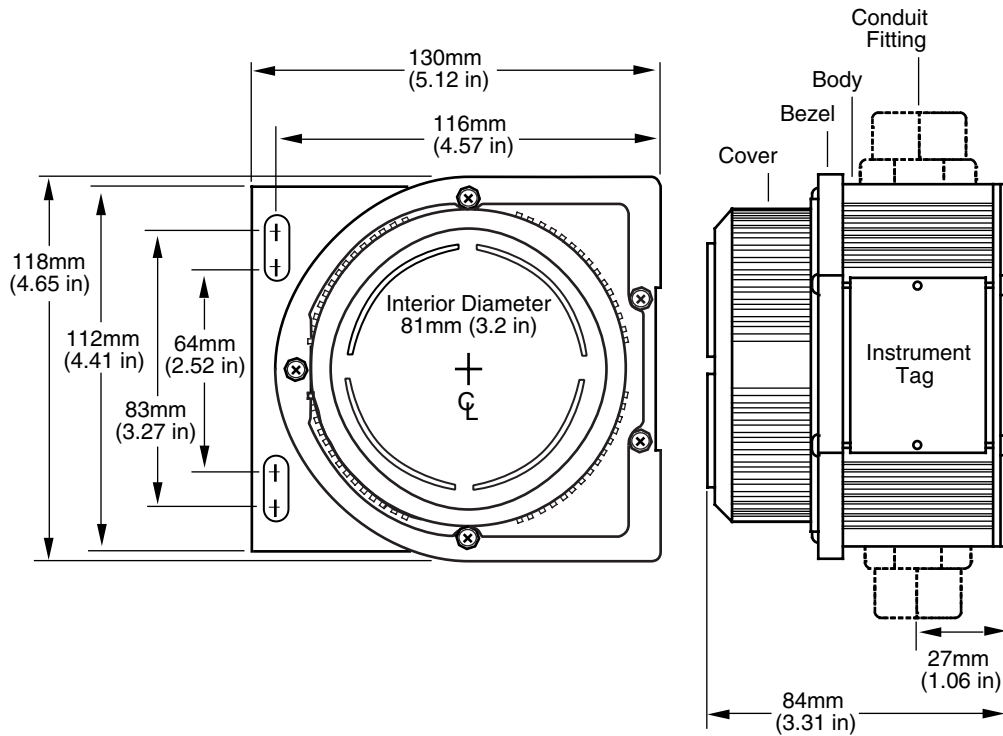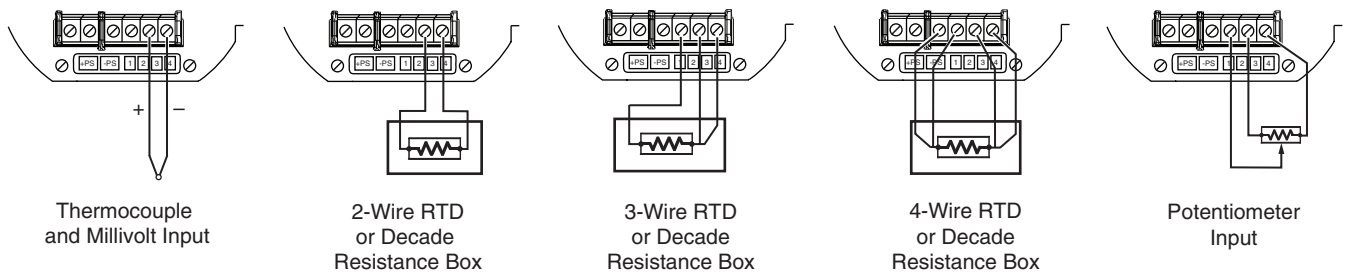| Device	Specifications
Variable Input Simulator for Thermocouple, RTD, Millivolt, Potentiometer or Decade Resistance Box	Variable; Accurate to ±0.05% of unit span
PROFIBUS Bus Power	9-32Vdc
Personal Computer	Pentium-based PC, or equivalent with: CD Drive, 4Mb free RAM (8Mb recommended); 20Mb free disk space on hard drive (More RAM & hard disk space is required for Windows 98, NT, 2000,XP or Vista), Operating System: Microsoft Windows® 98, NT, 2000, XP or Vista, 1 (one) serial port
Siemens SIMATIC PDM (If using Device Description for configuration)	Version 5.1 or higher (may be purchased from Siemens.com or your local Siemens representative)
Moore Industries PC Configuration Software (If using Moore Industries' software for configuration**)**	Version 1.0 or higher, successfully installed onto the hard drive
Communication Cable	Part Number: 803-040-26

Figure 4. *Incorporating the TPZ Into Your PROFIBUS System*

OR

DCS

PC

DP to PA
Coupler
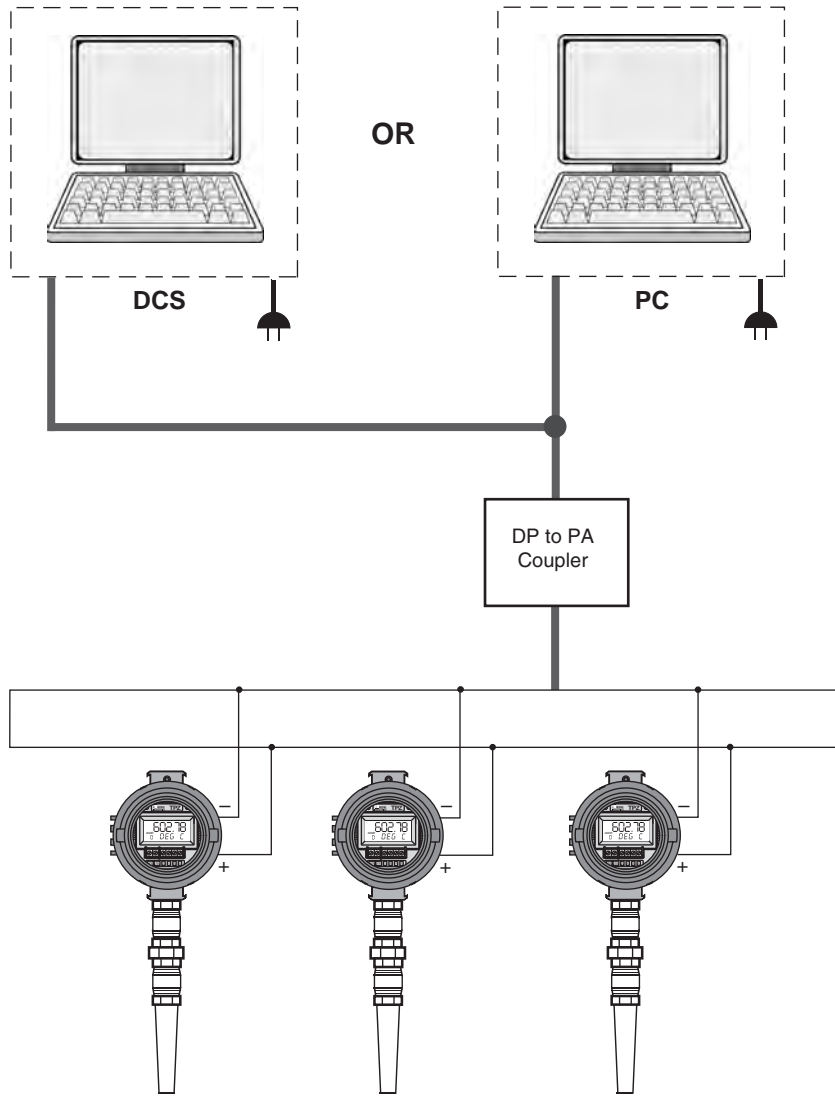
Note:
When connecting your RTD to the TPZ,
ensure that you are placing the same
color wires at terminals 1 and 2
(either red or white). If configuring the
TPZ for 3- or 4-Wire RTD, connect the other
pair of wires to terminals 3 and 4.

Input Hook-Up Connections

Thermocouple
and Millivolt Input

2-Wire RTD
or Decade
Resistance Box

3-Wire RTD
or Decade
Resistance Box

4-Wire RTD
or Decade
Resistance Box

Potentiometer
Input

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TPZ Configuration: Device Description

Note:
The following configuration and usage instructions are based on a TPZ operating in conjunction with Siemens SIMATIC PDM.

Once you have installed the TPZ in parallel within your PROFIBUS system and have installed the DD, you are ready to configure your device. All configurable parameters can be set using Siemens SIMATIC PDM.

The following section describes device installation into your system.

1. To include the TPZ into an existing project, skip to Step 6.

2. To create a new object, open *Simatic Manager*. Access the *File* dropdown menu and select *New*. In the *New* properties box, enter a name for the project to be created. Select *OK.*

3. Open the *View* dropdown menu and select *Process Device Network View*.

4. To include your PC into the network if it was not created automatically by the software, right-click on the *Networks* icon within the *Process Device Network View* page and select *Insert new object* then select *PC.*

5. Next, to include a DP interface, right-click on the *Networks* icon within the *Process Device Network View* page and select *Insert new object* then select *PROFIBUS DP net*.

6. You will need to insert a new PROFIBUS PA device into the PROFIBUS DP network. Right-click on the *PROFIBUS DP net* icon within the *Process Device Network View* page and select *Insert new object*; select *PROFIBUS PA device.* You will need to enter a device name, device address (valid addresses range from 0-125; Moore Industries' default address is 126) and select the number of like devices that should be created.

7. Right-click the *PROFIBUS PA* device icon in the right-hand pane of your view then select *Properties*. On the device tab click *New Selection.* Scroll down the list to *Sensors*, and expand the list. Scroll down to *Temperature* and expand the associated list. Select *Moore Industries*, then *TPZ.*

8. Double-click the *PROFIBUS PA* device icon and choose whether to sign in as a *Maintenance engineer* or *Specialist.* You are now ready to configure the TPZ.

Configuration Sections

The following sections describe the configuration parameters of your TPZ. They are broken down into subsections as viewed on the associated configuration sections.

Identification

Figure 5. *Identification Configuration Section*

Parameter	Value	Unit	Status
Moore TPZ Temperature Meter			
» **Identification**			
» » **Operation Unit**			
TAG	TPZ		Loaded
Descriptor	...		Loaded
Message	...		Loaded
» » **Device**			
Manufacturer	Moore Industries		Loaded
Product designation	TPZ/TPRG/10-30V		Loaded
Serial Number	0		Loaded
Software Revision	1-02-05		Loaded
Hardware Revision	1-03		Loaded
Installation Date			Loaded
Profile Revision	0x301		Loaded
PROFIBUS Ident Number	Profile specific		Loaded
» » » **Static Revision No.**			
Physical Block	5		Loaded
Transducer Block	5		Loaded
Function Block	10		Loaded
» » **Manufacturer Specific Parameter**			
Input Filter	60 Hz		Loaded
Filter Size	8		Loaded
LCD Address	hexadecimal		Loaded
LC-Display Selector	OUT		Loaded
CUSTOM EGU			
PV Precision	3 digits		Loaded
Total hours calibration	0	h	Loaded

Operation Unit
This section allows for identifying descriptors that you may assign to your device. These include a *TAG, Descriptor and Message.*

Device
The *Device* portion of the screen is primarily a read-only display of the following parameters: *Manufacturer, Product designation, Serial Number, Software Revision, Hardware Revision and Profile Revision.*

The following parameters are user-configurable:

Installation Date– The date on which the specific device was installed.

PROFIBUS Ident Number– Per EN50170, each PROFIBUS-DP device must have an indentifying number provided by the PROFIBUS User Orgnaization (PNO). Using the dropdown menu, you may select which version of this identification number–*Profile Spe-*

cific (use standard GSD file PA139700.GSD) or *Manufacturer Specific* (use Moore Industries' GSD file MTP2069B.GSD)–that you choose to use.

Static Revision No.
Relating to the PROFIBUS-specific Physical, Transducer and Function Blocks, these values indicate the revision level of the static data associated with the block. The *Static Revision No.* is changed by the device each time data is written to a static parameter (i.e. configuration change).

Manufacturer Specific Parameter
The *Manufacturer Specific Parameter* section allows you to configure the *Input Filter, Filter Size, LCD Address, LC-Display, CUSTOM EGU and PV Precision* parameters. Below is a description of each parameter.

Input Filter– This is used to configure the input filter which helps reduce mains-induced noise. The value selected should match the frequency of the local AC supply (50Hz or 60Hz).

Filter Size– This function is utilized to filter the input signal. The TPZ provides this filter with a user-selected range between 1 and 16. Default is 8.

> *Note:*
> *A higher filter setting provides smoother output transitions; however, reduces response time. Conversely, a lower setting provides a faster response time, but may reduce noise rejection.*

LCD Address– This determines how the slave address is displayed. You may select between hexadecimal and decimal. In decimal, you may only view addresses up to 99.

LC-Display Selector– Allows you to select the numerical value shown on your TPZ's display. Select between PV (Process Variable), OUT (Output), PV + Custom EGU and OUT + Custom EGU.

CUSTOM EGU– Use this parameter to enter the custom label you wish viewed if selecting *Custom EGU* in the *LC-Display Selector* section.

PV Precision– This parameter allows you to select the precision of the value shown on the TPZ's display. Allowed values are 0, 1, 2, 3 digits or Auto.

Total hours calibration– Allows you to review the number of hours that have passed since the device was last calibrated.

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Input

Figure 6. *Input Configuration Section*

Parameter	Value	Unit	Status
» **Input**			
Input Sensor Type	Pt3850 100 Ohm		Loaded
Unit	°C		Loaded
Bias of channel 1	0.000	°C	Loaded
Connection Type	2 wires		Loaded
Line Compensation 1	0.000	ohm	Loaded
Broken Wire Detection	Disabled		Loaded
SENSOR TRIM MODE	Sensor Trim disabled(factory default)		Loaded
» » **Characterization**			
» » **Output Limit Indicator**			
sensor value min 1	0		Loaded
sensor value max 1	0		Loaded
» » **Measuring Limits**			
Lower Value Min	-240	°C	Loaded
Upper Value Max	960	°C	Loaded
Input Lower Range	-240	°C	Loaded
Input Upper Range	960	°C	Loaded
» » **Process Value Scale**			
Lower Value	-240	°C	Loaded
Upper Value	960	°C	Loaded

The following section describes configuration of the TPZ's input parameters.

Input Sensor Type– Select your input sensor type and wiring connections from the assosciated dropdown menu.

Unit– Choose the temperature unit to be displayed–K, °C, °F or °R.

Bias of channel– This value is algebraically added to your PV reading, before any trimming or custom curve functions have been performed.

Connection Type– Via a dropdown menu, select a 2-, 3- or 4-wire connection to the sensor.

Line Compensation– This only applies to two wire resistance and two wire RTD measurements. Enter a value to compensate for line resistance when using a two wire input. This value is only displayed in ohms.

Broken Wire Detection– During operation, the TPZ sends random microamp pulses through the input wiring to check for broken wiring or a burned out sensor.

Enabling *Broken Wire Detection* allows for this feature. Factory default for thermocouples is *Disabled*; RTD default is *Enabled.*

SENSOR TRIM MODE– This feature will show the status of sensor trim.

To perform sensor trimming, follow the steps below.

1. To set trim mode, select the *Device* dropdown menu, *Sensor Trim*, then *Select Trim Mode.* Choose from: *No action, Sensor Trim disabled (factory default), Select 1-point Trim Method* or *Select 2-point Trim Method;* click *OK.*

2. If *1-point* or *2-point Trim Method* are selected, you must perform an upload to PC Program to open the new sensor trimming options.

3. To enter a new trim point, select *Set Trim Point* from the *Sensor Trim* submenu, select *Lower* (or *Upper) Trim Point,* then enter a new value in the *Input* dialog box.

Note:
Setting a new trim point will reset trimming, and require all active trim points to be re-applied.

4. To apply a new value to a trim point, select *Apply new Trim Value* from the *Sensor Trim* submenu, and select *Lower* (or *Upper) Trim Point.* When prompted, ensure that the sensor trimming input is set to the lower (or upper) trim point. Click *OK* in order to apply trim values.

    Sensor trim is reset whenever the trim mode, or a trim point are changed. After any change that leaves trimming enabled, new trim values will have to be applied to all active trim points in order for trimming to occur.

Figure 7. *Custom Curve Configuration Section*

» Input			
Input Sensor Type	Custom Table (mV,Ohm)		Changed
Unit	Ohm		
Input Range and Mode	4000 Ohm		
Bias of channel 1	0.000	Ohm	
Connection Type	2 wires		Changed
Line Compensation 1	0.000	ohm	
Broken Wire Detection	Enabled		
» » Sensor Trim			
Sensor Trim Mode	Sensor Trim disabled(factory default)		
» » Characterization			
Min Number of Coordinat	2		
Max Number of Coordinat	128		
Number of Coordinates	2		
» » » Custom Curve			
Set Number of Coordinate	10		Changed
x[0]	0	Ohm	
y[0]	5		
x[1]	10	Ohm	
y[1]	15		
x[2]	20	Ohm	
y[2]	25		
x[3]	30	Ohm	
y[3]	35		
x[4]	40	Ohm	
y[4]	45		
x[5]	50	Ohm	
y[5]	55		
x[6]	60	Ohm	
y[6]	65		
x[7]	70	Ohm	
y[7]	75		
x[8]	80	Ohm	
y[8]	85		
x[9]	90	Ohm	
y[9]	95		

Characterization– If Custom Curve is enabled, *Characterization* becomes available. Here, you may set X and Y parameters which can also be viewed in graph format when *Characterization* is accessed from the *View* dropdown menu.

Custom Curve
This section will allow you to enter the X,Y coordinates of the custom table to be used for linearization. The Custom Curve feature lets you set up your own custom curve table. This allows you to tell the transmitter what it should output when it receives a certain input.

Custom Curve can only be used with ohm and millivolt input types.

To create a custom curve:

1. Select *Custom Table* from the *Input Sensor Type* submenu found in the *Input* menu. Next, select the required *Input* parameters.

2. In the *Number of Coordinates* box, located in the *Characterization* section, select the number of points (128 points maximum) that you will use.

3. Once in the *Custom Curve* section, type your individual values in the *x data* and *y data* rows. Source variables are inserted into the *x* row, while the corresponding data is inserted into the *y* row.

Output Limit Indicator
Use this parameter to reset *sensor value min* and *max*.

sensor value min– Saves the lowest measurement since the last configuration.

sensor value max– Saves the highest measurement since the last configuration.

Measuring Limits
Set values specific to your sensor's upper and lower ranges from this section of the configuration screen.

Lower Value Min / Upper Value Max– Read-only fields that display the absolute minimum and maximum usable measurement values (respectively) of the sensor.

Input Lower Range– Enter the value that you want to use as the lower end of your input sensor. If the PV drops below the selected value, this will result in an underflow fault status.

Input Upper Range– Enter the value that you want to use as the upper end of your input sensor. If the PV rises above the selected value, this will result in an overflow fault status.

Process Value Scale
This section allows you to scale the *Lower Value* (0%) and *Upper Value* (100%) ranges of the process value to a desired span.

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Output

Figure 8. *Output Configuration Section*

Parameter	Value	Unit	Status
» Output			
» » Output Scale			
Lower Value	-240	°C	Loaded
Upper Value	960	°C	Loaded
» » Output Signal			
Unit	°C		Loaded
Decimal Point	3		Loaded
Damping	0	s	Loaded
Fail Safe Mode	Last Out Value		Loaded
Fail Safe Default Value	0	°C	Loaded
» » Output Limits			
Lower Limit Alarm	-240	°C	Loaded
Lower Limit Warning	-200	°C	Loaded
Upper Limit Warning	850	°C	Loaded
Upper Limit Alarm	960	°C	Loaded
Limit Hysteresis	5.000	°C	Loaded

Use this section to configure your sensor's output parameters.

Output Scale

Use these parameters to scale the *Lower Value* (0%) and *Upper Value* (100%) of the output signal range to a desired span.

Output Signal

This section allows for configuration of the following parameters:

Unit– Use this dropdown menu to select the Engineering Unit (EGU) in which you wish the *Output Scale*, *Output Limits* and *Fail Safe Value* parameters displayed.

Decimal Point– Select the desired resolution of your output display by adjusting the number of digits to the right of the decimal point. Choose from 0, 1, 2, 3 digits and Auto.

Damping– Output damping allows you to introduce a delay into the response time of your device in order to keep short-lived spikes from appearing on the output.

The value entered in the *Damping* text box is the time constant for the rise time resulting in a value equal to 63% of the output. This rise in output results from a step change appearing on the input.

Damping values are time constants, thus always displayed in seconds. Allowed damping values are between 0 and 30sec (in steps of 1sec). The factory default setting is zero.

Fail Safe Mode– The setting in this section determines how the TPZ will react in response to a failure. Settings include:

Fail Safe Value which is a user-selected value entered in the *Fail Safe Default Value* field. The Status displayed is *Uncertain.*

Last Out Value (default setting) which, upon a failure, will display the last valid output before the failure's occurrence. The Status displayed is *Uncertain.*

Wrong Value which displays the wrong calculated value at the output and indicates Status as *Bad.*

Fail Safe Default Value– Set this parameter if you have selected *Fail Safe Value,* above. This would be the value displayed once a failure was detected.

Output Limits

This section allows you to set alarm parameters.

Lower Limit Alarm– Allows you to enter the lower alarm limit.

Lower Limit Warning– Allows you to enter the lower warning limit.

Upper Limit Warning– Allows you to enter the upper warning limit.

Upper Limit Alarm– Allows you to enter the upper alarm limit.

Limit Hysteresis– Allows you to enter a dead band value to clear alarms and warnings.

Human Interface

Figure 9. *Human Interface Read-Only Section*

Parameter	Value	Unit	Status
» Human Interface			
» » Simulation			
Simulation	Disabled		Loaded
Simulation Value	300		Loaded
Quality	Good		Loaded
Status	OK		Loaded

The *Human Interface* section is a read-only screen that displays information regarding *Simulation* activity.

Simulation

These fields display parameters set in the *Simulation* section. The *Simulation* feature is accessed via the *Device* dropdown menu located on the upper-left portion of the configuration screens.

Use this feature to simulate a desired *Measured Value* and *Output* (Analog Input Block) value.

Using the *Measured Value* tab allows you to display a desired value on the TPZ's LCD and also select the quality of the signal being sent.

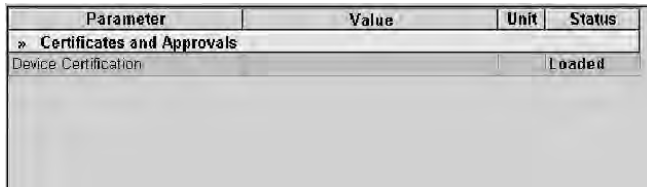**Measured Value Simulation–** Follow the steps below to utilize *Measured Value Simulation.*

1. Select *Enabled* from the *Simulation* dropdown menu.

2. Enter the desired value into the *Simulation Value* text box.

3. Next, choose both the desired *Quality* and *Status* of the signal sent by selecting from the associated dropdown menus.

4. Click *Transfer.* The value will be displayed on the TPZ. The AI block will calculate the output value and quality based on the simulated value.

5. To exit, select *Disabled* in the *Simulation* dropdown box and then click *Transfer.*

AI Output Simulation– The *Output* tab allows the simulation of the Analog Input (AI) Block output value. To use this feature, follow the instructions below.

1. Select *Manual* in the *Target Mode* dropdown box; click *Transfer.*

2. Enter the desired value into the *Simulation Value* text box.

3. Next, choose both the desired *Quality* and *Status* of the signal sent by selecting from the associated dropdown menus.

4. Click *Transfer.* The value will be displayed on the TPZ. The output value and quality will be sent on the bus.

5. To exit *Output* simulation, select *Auto* in the *Target Mode* dropdown box and then click *Transfer.*

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Certificates and Approvals

Figure 10. *Certificates and Approvals Read-Only Section*

This section will display any certifications and/or approvals that have been issued to the device.

Additional Status Windows

View Dropdown Menu
The *View* dropdown menu offers several specialized screens to accompany TPZ operation. Opening the menu displays the following:

Display– Comprised of two tabs–*Output* and *Measured Value*–these windows allow you to view the associated values and ranges. These windows also display several messages regarding the operations of the device.

Yt diagram– This graph allows you to monitor your variables in a temperature vs. time depiction. You may adjust the time and temperature ranges within the view by double-clicking anywhere within the graph view.

Characterization– This graph allows you to view trending of Custom Curve variables. By double-clicking anywhere within the graph, you are able to adjust the X and Y points and ranges as well as modifying trending views.

Alarm States– Utilizing this feature allows access to several alarm parameters. Based on settings made in the *Output Limits* section of the *Output* configuration screen, you are able to view messages and status regarding *Upper Limit Warning, Lower Limit Warning, Upper Limit Alarm* and *Lower Limit Alarm*. There is also an *Alarm Summary* window which displays messages regarding all alarm parameters. Use the *Messages* button for detailed Alarm status.

Device Status– The *General* tab displays information as configured and shown in the *Identification* configuration screen. The *Physical Block, Transducer Block* and *Function Block* tabs display information about the respective PROFIBUS-specific parameters.

Device Dropdown Menu
Among other features within the *Device* dropdown menu is an important safety capability known as *Write Locking*. This is outlined below.

Write Locking– Allows you to select the *Write Lock* between On and Off. Setting *Write Lock* to On prevents you from downloading any information to the TPZ. You may only monitor the present activity and configuration.

TPZ Configuration:
PC Configuration Software

One of the benefits of the TPZ is that there are no internal or external controls to adjust or settings to change. All configurable parameters can be set using a PC and Moore Industries' Intelligent PC Configuration software.

In using the software program, settings are downloaded to the instrument 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 external media. The TPZ communicates with the PC through an RS-232 connection to the PC's serial port.

Installing the Configuration Software

Refer to Table 3 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 *TPZ 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 onto your PC, the TPZ can be connected to equipment to simulate input and monitor processes. You can then change the operating parameters of the transmitter.

No Transmitter Needed
It is not necessary to connect the TPZ 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 benefit of input from a sensor or TPZ.

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

Connecting the TPZ to the PC

Connect the RS-232 end of the cable to the PC's COM port.

See Table 3 for information on the necessary equipment.

The TPZ *must* be connected to the PC in order to: trim input, assign a tag, set write locking, perform Simulation, receive (via download) a configuration file and save the configuration file (via upload) from the TPZ's memory.

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PC Configuration Software Summary

Figure 11. TPZ PC Configuration Software Main Screen

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

1. Menu Bar/Tool Bar– Dropdown menus and corresponding icons allow you to perform various functions throughout the PC Configuration Program.

2. Program Status– This portion of the program displays the activity of the software. It will display such messages as: Idle, Monitoring, Uploading and Downloading.

3. TPZ Status– Indicates if there are problems or faults with the instrument.

4. Process Variable (OUT/RJC/PV)– Displays the present Process Variable readings.

The *OUT* box displays the output from the Analog Input Block.

The *RJC* section displays the ambient temperature.

The value read in the *PV* box represents the Transducer block output.

5. Write Lock/Address– Allows you to toggle the *Write Lock* between Yes and No. Setting *Write Lock* to Yes prevents you from downloading any information to the TPZ. You may only monitor the present activity and configuration.

Use the *Address* box to enter the unit's address (valid addresses range from 0-125; Moore Industries' default address is 126).

6. Identification Parameters– Use this parameter to place an identifying *Tag* (32 alphanumeric characters, maximum), *Descriptor* (32 alphanumeric characters, maximum) or *Message* (32 alphanumeric characters, maximum) to the Physical Block.

7. TPZ Device Info– This read-only display indicates instrument configuration and device identification.

8. Communications– Notifies user of current PC connection/communications status.

9. Input/Scaling/Trimming/Display/Alarms/Simulation/Custom Curve Tabs–These tabs change the right side of the screen and allow you to set the appropriate part of the TPZ's configuration. See corresponding sections of this manual for additional information regarding these tabs.

Configuration Screens

Note:
Unless otherwise noted, ensure that the PC Configuration Program is idle before making any selections or configuration changes to the program. Also, when attempting to download or upload, monitoring must be stopped. To do this, click Stop in the Monitoring dropdown menu, or click the Stop Monitoring icon on the Tool Bar.

Input

Figure 12. *Input Tab*
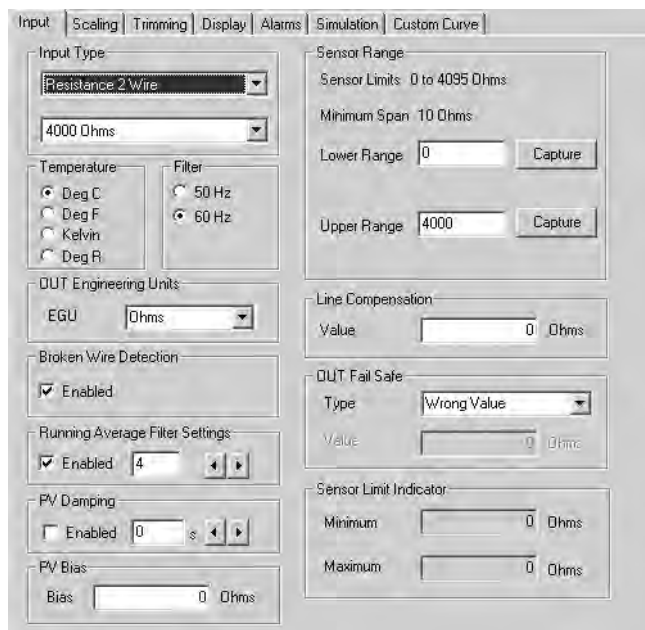
Input Type– Select your input type and the respective range of your input.

Temperature– Use this section to select the temperature unit you wish to view.

If mV, Resistance or Potentiometer are the selected *Input Type* then *Temperature* selection is disabled.

Filter– This setting is used to configure the input filter. The 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.

OUT Engineering Units– This setting allows you to select how the output is displayed.

Broken Wire Detection– During operation, the TPZ sends random microamp pulses through input wiring to check for broken wiring or a burned out sensor.

To utilize *Broken Wire Detection*, check the *Enabled* box. If a failure is detected, a message will appear in the *TPZ Status* box.

Running Average Filter Settings– This function is for filtering the input signal. The TPZ 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.

PV Damping–PV Damping allows you to introduce a delay into the response of your unit in order to stop short-lived spikes from initiating faults and generating fault messages.

The configured damping period will determine the time response that the analog output will take to achieve a 66% change in output in response to a stepped input.

To enable PV Damping, select the *Enabled* button. Use the arrows to select a value between 1sec and 30sec.

PV Bias– This value is algebraically added to your PV reading, before any trimming or custom curve have been performed.

Sensor Range– Allows you to set your upper and lower range values within the range chosen in the *Input Type* section.

The desired Lower and Upper Range settings can be entered via your PC keyboard or captured. To capture an input, follow the steps below.

1. Apply the desired Lower Range input and press the corresponding *Capture* button.

2. Next, apply the desired Upper Range input and press the corresponding *Capture* button.

Line Compensation– This only applies to two wire resistance and two wire RTD measurements. Enter a value to compensate for line resistance when using a two wire input. This value is only displayed in ohms.

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OUT Fail Safe– In the case of an output failure, you have the ability to set a mode you choose to alert of the failure.

Fail Safe Value allows you to enter a preset value into the *Value* text box.

Last Value Out will display the last value present before the failure.

Wrong Value sends the output to an incorrect reading due to the failure.

Sensor Limit Indicator– Displays the minimum and maximum values read by the sensor until a change in input type.

<div align="center">

Note:
Once you have configured all parameters, download to the unit by selecting Download in the Transfer dropdown menu located in the Menu Bar. Or, click the ⬇ button in the Tool Bar.

</div>

Scaling

Figure 13. Scaling Tab

OUT Scaling– This allows you to customize the output display of the Analog Input Block.

To perform *OUT Scaling* follow the steps below:

1. The *Sensor Range* boxes will display the range selected in the *Input Type* section of the *Input* screen.

2. In the *Scaled to* text boxes, enter the values you wish displayed when your input is at its Zero and Full ranges.

Once downloaded, your unit will display the scaled values on its LCD.

PV Scaling– This allows you to customize the output display of the Transducer Block.

To perform *PV Scaling*, follow the steps described for *OUT Scaling* (above).

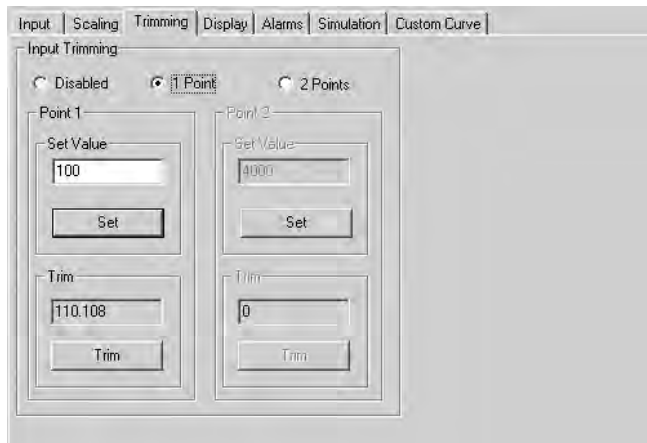<div align="center">

Note:
In the Display tab you can select to use a Custom Label for either the Analog Input Block Out Value (OUT) or Transducer Block Primary Variable (PV).

Note:
Once you have configured all parameters, download to the unit by selecting Download in the Transfer dropdown menu located in the Menu Bar. Or, click the ⬇ button in the Tool Bar.

</div>

Trimming

Figure 14. *Trimming Tab*

Input Trimming– 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 1 Point trimming applies an offset to the sensor reading, while 2 Point trimming applies both an offset and a gain.

Follow the steps below in order to trim the sensor for the desired variables.

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

2. Enter the values that require trimming into the *Set Value* field; 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.

Click *Disabled* if not using the trimming function.

Display

Figure 15. *Display Tab*
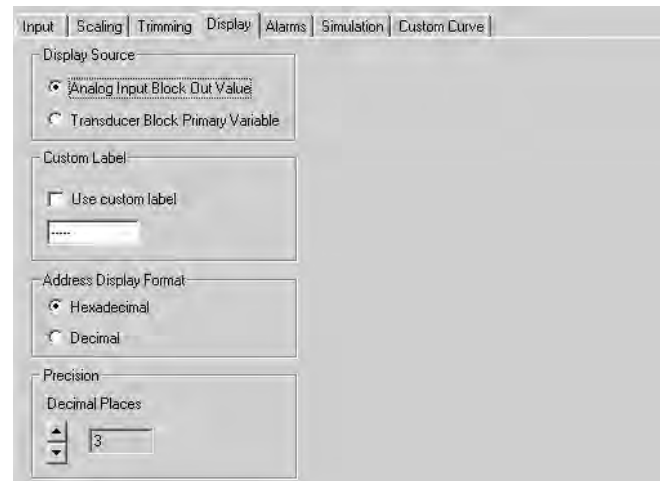
Display Source– Allows you to select which value is is displayed on the TPZ's LCD.

Analog Input Block Out Value– By selecting this feature, the *OUT* value (as viewed in the *Process Variables* section of the PC Configuration program) is displayed.

Transducer Block Primary Variable– Choosing this parameter displays the *PV* value (as viewed in the *Process Variables* section of the PC Configuration program).

Custom Label– The *Custom Label* is used to display any label you choose to attach to your reading. Clicking the *Use custom label* box causes the instrument to always display the custom label as Engineering Units (EGU).

1. Check the *Use custom label* box.

2. Enter the label you wish viewed into the text box. This value is limited to five characters.

Address Display Format– Allows you to select how your slave addresses are displayed. However, *Decimal* may only be used for addresses 0-99. *Hexadecimal* must be used for addresses 100-126.

Precision– Select the number of decimal places (up to three) shown on the TPZ's display.

Note:
Once you have configured all parameters, download to the unit by selecting Download in the Transfer dropdown menu located in the Menu Bar. Or, click the button in the Tool Bar.

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Alarms

Critical– Allows you to set the values which will cause your transmitter to go into an alarm state. Use this parameter to set your lower and upper alarm values.

In the *Lower Limit Alarm* and *Upper Limit Alarm* boxes, enter the desired values you wish to use as your alarm values.

Advisory– This section allows you to set warning alarm values. These values will notify you that your process is approaching an alarm state.

In the *Lower Limit Warning* and *Upper Limit Warning* boxes, enter the desired values you wish to use as warning values.

Hysteresis– This is the range in which an relay remains in an alarm condition even after the monitored process variable input has returned to a safe level, at or below/above the trip point setting.

Alarm Summary–Displays alarm levels for the four alarm parameters previously configured.

Note:
Once you have configured all parameters, download to the unit by selecting Download in the Transfer dropdown menu located in the Menu Bar. Or, click the ⬇ button in the Tool Bar.

Simulation

Simulation allows the transducer block input (PV) to be disconnected so that you may set the input value and status for test purposes.

You can only simulate one output at a time–either *PV Simulation or OUT Simulation*.

PV Simulation– Allows you to simulate Transducer Block output.

1. Select *Enabled (*selecting *Disabled* allows you to enable *OUT Simulation).*

2. Enter the desired test signal into the *Value* text box.

3. Next, choose both the desired *Quality* and *Status* of the signal sent by selecting from the associated dropdown menus.

4. Click the *Transfer* button at the bottom of the screen. The output value and quality will be calculated based on the simulated value and will be displayed on the TPZ and in the *PV* box of the *Process Variables* section.

5. To exit, select the *Disabled* button; click *Transfer.*

OUT Simulation– Allows simulation of the Analog Input Block output value. To use this feature, follow the instructions below.

For *Manual* Simulation:

1. Select *Manual* in the *Mode* section.

2. Enter the desired simulation value into the *Value* text box; click *Transfer.* Next, choose both the desired *Quality* and *Status* of the signal sent by selecting from the associated dropdown menus.

   The output value and quality will be sent on the bus. The value will be displayed on the TPZ and in the *OUT* box of the *Process Variables* section.

3. To exit *OUT* simulation, select *Auto* in the *Mode* box and then click *Transfer.*

For *Out of Service* simulation:

1. Select *Out of Service* in the *Mode* section; click *Transfer.*

2. Enter a value into the *Value* text box to be displayed if the unit goes Out of Service (OOS); click *Transfer.*

   The output value and quality will be sent on the bus.

3. To exit *Out of Service* simulation select *Auto* in the *Mode* box, then click *Transfer.*

While the TPZ is in *Simulation* mode, you can toggle, and change, simulation configurations. The transmitter will continue monitoring and update the unit to the changed simulation values once you click *Transfer*.
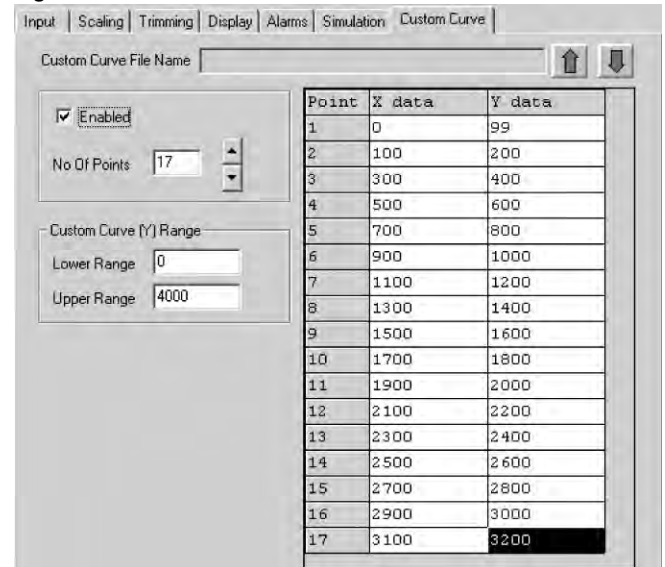
Refer to the *Additional Status Information* field in the *View* dropdown menu to view simulation details.

Custom Curve

Figure 18. *Custom Curve Tab*

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 (128 points maximum) and enter it into the *No Of Points* text box.

3. In the *Custom Curve (Y) Range* text boxes, enter the values you wish displayed when your input is at its lower and upper ranges.

4. 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.

5. After all of your data has been entered, you may use the *Custom Curve* dropdown menu in the Menu Bar to save your newly created custom table (*Save Custom Curve*) and to download it to your TPZ (*Download Custom Curve*) or simply click the up and down arrows found in the upper-right section of the *Custom Curve* screen.

Note:

Once you have configured all parameters, download to the unit by selecting Download in the Transfer dropdown menu located in the Menu Bar. Or, click the ⬇ button in the Tool Bar.

Cyclic Data

The cyclic data telegram adheres to the structure shown in Table 6. The status byte is implemented according to the PROFIBUS PA profile for process control devices.

Table 6. *Cyclic Data*

Byte	Data	Access	Data Format
0-4	AI function block 1 (temperature)	r	Measured value (32-bit floating decimal point (IEEE-754)) index 0
			Quality byte index 4

Table 7. *TPZ Quality Bytes*

Quality (Binary)								Meaning of Quality	Usage
Q		**QS**				**L**		**Meaning of Quality**	**Usage**
1	0	0	0	0	0	-	-	Good(non-cascade): OK	No error, Status ok
1	0	0	0	0	1	-	-	Good(nc): maintenance required	Does not apply to TPZ
1	0	0	0	1	0	-	-	Good(nc): update event	Does not apply to TPZ
1	0	0	0	1	1	-	-	Good(nc): active advisory alarm	Indicates high/low warning limit exceeded
1	0	0	1	0	0	-	-	Good(nc): active critical alarm	Indicates high/low alarm limit exceeed
1	0	0	1	0	1	-	-	Good(nc): unacknowledge update event	Does not apply to TPZ
1	0	0	1	1	0	-	-	Good(nc): unacknowledge advisory event	Does not apply to TPZ
1	0	1	0	0	0	-	-	Good(nc): unacknowledge critical event	Does not apply to TPZ
1	0	1	0	0	1	-	-	Good(nc): initiate fail safe	Does not apply to TPZ
0	1	0	0	0	0	-	-	Uncertain: non specific	Does not apply to TPZ
0	1	0	0	0	1	-	-	Uncertain: last usable value (LUV)	If failure occurs and "Fail Saf Mode" is set for "Last Out Value"
0	1	0	0	1	0	-	-	Uncertain: substitute value	If failure occurs and "Fail Saf Mode" is set for "Fail Safe Value"
0	1	0	0	1	1	-	-	Uncertain: initial value	At AI initialisation
0	1	0	1	0	0	-	-	Uncertain: sensor conversion not accurate	Input Saturation, or RJC out of range when broken wire detection on
0	1	0	1	0	1	-	-	Uncertain: engineering unit violation	PV exceeds sensor range limits
0	1	0	1	1	0	-	-	Uncertain: sub normal	Does not apply to TPZ
0	1	0	1	1	1	-	-	Uncertain: configuration error	EEPROM not programmable
0	1	1	0	0	0	-	-	Uncertain: sensor calibration	In calibration mode
0	1	1	0	0	1	-	-	Uncertain: simulated value	When in simulation mode (i.e. AI block actual mode is manual)
0	0	0	0	0	0	-	-	Bad: non specific	Custom linearization table not available
0	0	0	0	0	1	-	-	Bad: configuration error	Transducer configuration error
0	0	0	0	1	0	-	-	Bad: not connected	Does not apply to TPZ
0	0	0	0	1	1	-	-	Bad: sensor failure	Broken Wire (TB only), RTD/TC linearization error (out of table range)
0	0	0	1	0	0	-	-	Bad: device failure	RJC broken
0	0	0	1	0	1	-	-	Bad: no communication (LUV)	Does not apply to TPZ
0	0	0	1	1	0	-	-	Bad: no communication (no LUV)	Does not apply to TPZ
0	0	0	1	1	1	-	-	Bad: out of service	If block is in Out Of Service mode
1	1	0	0	0	0	-	-	Good (cascade): OK	Does not apply to TPZ
1	1	0	0	0	1	-	-	Good (c): initialization acknowledged	
1	1	0	0	1	0	-	-	Good (c): initialization request	
1	1	0	0	1	1	-	-	Good (c): not invited	
1	1	0	1	0	1	-	-	Good (c): do not select	
1	1	0	1	1	0	-	-	Good (c): local override	
1	1	1	0	0	0	-	-	Good (c): initiate fail safe	

Table 8. *Description of TPZ Limit Bits*

Quality (Binary)								Meaning of Limit Bits
Q		**QS**				**L**		**Meaning of Limit Bits**
-	-	-	-	-	-	0	0	OK
-	-	-	-	-	-	0	1	Low limited (under range)
-	-	-	-	-	-	1	0	High limited (over range)
-	-	-	-	-	-	1	1	Constant

Notes:
Q represents Quality
QS represents Quality Substatus
L represents Limits

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Installation

Installation consists of physically mounting the device in parallel within your existing PROFIBUS system and completing the electrical connections.

Mounting the TPZ

The TPZ HP (hockey-puck housing) can be mounted with rails, flanges or in one of our larger housings, such as a D-BOX or BH.

Making the Electrical Connections

In PROFIBUS systems, the PROFIBUS Master provides power to the connected devices. Refer to Figure 4 for a connection diagram of the TPZ into your system.

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 any other connections.

• All input signals to, and output signals from, Moore Industries' products should be wired using a shielded, twisted pair technique. Shields are to be connected to an earth or safety ground at the unit itself.

• The maximum length of unshielded input and output signal wiring should be 2 inches.

CE Conformity

Installation of any Moore Industries' products that carry CE certification (Commission Electrotechnique) **must** adhere to the guidelines in *Recommended Ground Wiring Practices* in order to meet the requirements set forth in applicable EMC (Electromagnetic Compatibility) directives 89/336/EEC, EN 61326. Consult the factory for the most current information on products that have been CE certified.

Operation

Once configured, installed, and supplied with the correct power, the TPZ Programmable PROFIBUS Temperature 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 quick check for terminal tightness and general unit condition every 6-8 months. Always adhere to any site requirements for programmed maintenance.

Customer Support

If service assistance is ever required for an device in your application, refer to the back cover of this manual for the telephone numbers to Moore Industries' customer service department.

If possible, make a note of the model number of the unit before calling. For fastest assistance, have the following information available: serial number, the job number and purchase order number under which it was shipped.

Intrinsically-Safe Applications

This page contains information for the TPZ instrument when used within an intrinsically-safe system.

The diagrams on the following page must be used for units that are to operate in areas requiring intrinsically-safe instrumentation.

Refer to the *Special Conditions* outlined below before proceeding with installation.

Special Conditions of Use

The following instructions must be adhered to when the TPZ is used in hazardous 'Classified' locations and potentially explosive atmospheres.

I. Intrinsically Safe (Ex ia) Applications (Zones 0 and 1)

1.   The Model TPZ Temperature Transmitter shall be installed in a final enclosure rated for a minimum of IP20.

2.   For Zone 0 installations, the final enclosure shall not contain more than 10% in total of aluminum, magnesium, titanium and zirconium, or 7.5% in total of magnesium, titanium and zirconium.

3.   For Zone 1 installations, the final enclosure shall not contain 7.5% in total of magnesium.

4.   Wiring must be rated for 85°C.

II. Type N (Ex n) Applications (Zone 2)

1.   As Category 3 equipment, the Model TPZ Temperature Transmitter shall be installed in an enclosure which maintains an ingress protection of IP54 and meets the enclosure requirements of EN60079-0 and EN60079-15.

2.   The Model TPZ Temperature Transmitter shall contain external transient protection to prevent the supply voltage from exceeding 46.2V including tolerance.

3.   Wiring must be rated for 85°C.

Safety Concerns

For your safety, read the following information carefully before proceeding with installation.

WARNING: EXPLOSION HAZARD – FOR DIVISION 2 HAZARDOUS LOCATIONS. DO NOT DISCONNECT EQUIPMENT WHEN A FLAMMABLE ATMOSPHERE IS PRESENT.

WARNING: SUBSTITUTION OF COMPONENTS IS NOT ALLOWED AS IT MAY IMPAIR THE INTRINSIC SAFETY (ZONES 0 & 1, DIVISION 1) OF THE UNIT AND/OR THE NON-INCENDIVE/ TYPE N (DIVISION 2, ZONE 2) CIRCUIT. DO NOT OPEN THE UNIT WHEN EITHER ENERGIZED OR WHEN AN EXPLOSIVE GAS/DUST ATMOSPHERE IS PRESENT. DISCONNECT POWER BEFORE SERVICING. READ AND UNDERSTAND THE MANUFACTURER'S INSTALLATION AND OPERATING PROCEDURES, AND ADHERE TO ALL APPLICABLE ELECTRICAL CODES, SAFETY INSTRUCTIONS AND REGULATIONS.

AVERTISSEMENT – RISQUE D'EXPLOSION. NE PAS DEBRANCHER TANT QUE LE CIRCUIT EST SOUS TENSION, A MOINS QU'IL NE S' AGISSE D'UN EMPLACEMENT NON DANGEREUX.

WARNING: END-USER MUST MARK EITHER CHECKER BOX ON THE INSTRUMENT ID LABEL WITH THE INTENDED APPLICATION – INTRINSICALLY SAFE OR TYPE N / NON-INCENDIVE.
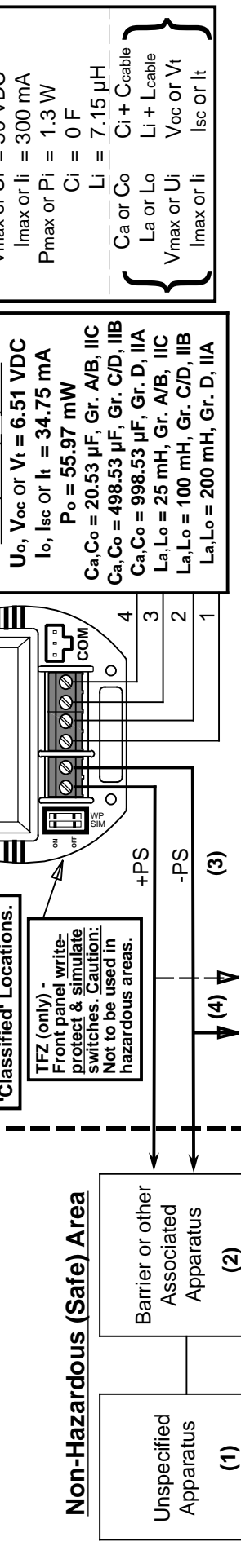
MOORE INDUSTRIES

DO NOT SCALE DRAWING

TOLERANCES (UNLESS NOTED)
DECIMALS = ±inch/mm
.X = ±.1 / 2.54
.XX = ±.03 / 0.76
.XXX = ±.010/0.25
HOLES=±.003-.002/+.08-.05
ANGLES: = ± 30'

		DRAWN	Gus H. Elias	07/07
CHECKED	S.W.	07/07
ENGINEER	Gus H. Elias	07/07
SCALE	NONE

CATEGORY: CONTROL DRAWING

DRAWING NUMBER: 100-100-72 (Page 1 of 3)

REVISION: B

REVISED BY — DATE 02/08 — BY G.E. — APPROVAL **CB**

ECO 15044

TITLE:
Field Installation Diagram:
TFZ [HP] & TPZ [HP]
Intrinsically Safe System
For Hazardous 'Classified' Locations

CERTIFIED PRODUCT

This is a controlled 'Related' or 'Schedule' drawing. No modifications are permitted without the notification and final approval of the Certification Engineer (related dwgs.) or the Certifying Agency (schedule dwgs.).

Non-Hazardous (Safe) Area

Unspecified Apparatus **(1)**

Barrier or other Associated Apparatus **(2)**

Ground Path Resistance Must Not Exceed 1

I.S. Entity Parameters
(Power/Loop, +PS & -PS):

V_{max} or U_i = 30 VDC
I_{max} or I_i = 300 mA
P_{max} or P_i = 1.3 W
C_i = 0 F
L_i = 7.15 μH

C_a or C_o	$C_i + C_{cable}$
L_a or L_o	$L_i + L_{cable}$
V_{max} or U_i	V_{oc} or V_t
I_{max} or I_i	I_{sc} or I_t

Input device must be 'Agency' approved per application area (CSA, DEMKO, FM, ISSeP, KEMA, LCIE, UL, SAA, SIRA, TUV, etc....).

Sensor Type - mV, POT, RTD, T/C:
U_o, V_{oc} Or V_t = 6.51 VDC
I_o, I_{sc} Or I_t = 34.75 mA
P_o = 55.97 mW
C_a,C_o = 20.53 μF, Gr. A/B, IIC
C_a,C_o = 498.53 μF, Gr. C/D, IIB
C_a,C_o = 998.53 μF, Gr. D, IIA
L_a,L_o = 25 mH, Gr. A/B, IIC
L_a,L_o = 100 mH, Gr. C/D, IIB
L_a,L_o = 200 mH, Gr. D, IIA

* **TFZ [HP] or TPZ [HP]: PC-Programmable Foundation Fieldbus & PROFIBUS Temperature & Signal Transmitters with Display.**

Caution: The 3-Pin 'COM' Port Must Not Be Used In Hazardous 'Classified' Locations.

TFZ (only) - Front panel write-protect & simulate switches. **Caution:** Not to be used in hazardous areas.

MOORE INDUSTRIES T*Z — COM — 4 3 2 1 — WP SIM — ON OFF

+PS

-PS

(3)

(4)

Hazardous 'Classified' Locations/Areas
US (NEC 500/505) / Canada (C22.2-1010.1)
Intrinsically Safe & Non-Incendive
Class I, Zone 0, AEx ia IIC, (T4 / T5 / T6)*
Class I; Divisions 1 & 2; Groups A-D

ATEX: Ex II 1G Ex ia IIC, Ex II 3G Ex nA nL IIC (TFZ),
Ex II 3G Ex nA IIC (TPZ); (T4 / T5 / T6)*.
IECEx: Ex ia IIC Ga, Ex nA nL IIC (TFZ), Ex nA IIC (TPZ), (Tcode*)

*Temperature Codes: T4@85°C, T5@70°C, T6@55°C
Operating Temperature Range: -40°C Tamb. +85°C

IECEx ⟨Ex⟩ FM c US APPROVED CE 0518

For areas classified with "Dust-Hazard" (Class II, Class III, Division 1, Groups E, F & G; Class III), the TFZ/TPZ devices must be mounted in approved protective enclosures that are rated and suitable for use in the designated areas. Use +85°C rated electrical wire. Enclosure cover must be closed tightly.
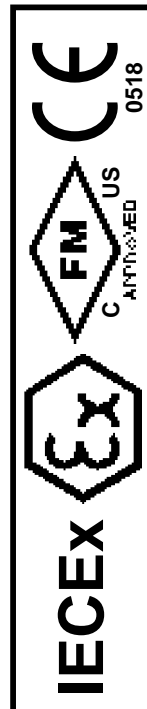
Notes:

(1) Apparatus which is unspecified except that it **must not** be supplied from, or contain under normal or abnormal conditions a source of potential with respect to earth in excess of 250 VRMS or 250 VDC which is considered to be the Safe Area's maximum voltage.

(2) The Barrier or other Associated Apparatus **must** be approved by the **"specific"** (CSA/EECS/FM/LCIE/SAA/SIRA/TUV, etc..) certifying agency for I.S. connections in: "Class I-III, Division 1, Groups A-G" locations. There is no output voltage **(Voc, Vt or Vo)**; just digital communication. A Shunt Zener Barrier is NOT required for Non-Incendive (or Class I, Division 2 or Type N) installations.

(3) The combined Capacitance and Inductance of the inter-connecting cables and the PC-Programmable Transmitter **must not** exceed the values indicated on the Associated Apparatus.

(4) +PS/-PS terminal leads may be connected to multiple agency-approved devices.

5- For US applications, installation **must** be in accordance to **'ANSI-12.06.01'** (Installation of I.S. Systems for Hazardous 'Classified' Locations) and the National Electric Code **'ANSI/NFPA 70'**. Also, a dust-tight conduit seal **must** be used when installed in Class II and Class III environments. For applications in Canada, adhere to the 'Canadian Electric Code C22.1' most current publication on I.S. installation guidelines. For CENELEC/ATEX and IECEx applications, adhere to 'EN 60079-14:1997 or any equivalent IEC-based, most current and pertaining publication on I.S. installation guidelines.

6- **Warning:** Substitution of components is **NOT** allowed as it may impair the Intrinsic Safety of the unit and/or the Non-Incendive circuit. DO NOT open the unit when either energized or if an explosive gas/dust atmosphere is present. Disconnect power before servicing. Also read, understand and adhere to the manufacturer's installation and operating procedures.

7- The maximum power parameters of the COM port (to be used only in safe/non-hazardous areas) are: V_{max} = 3.0 VDC, I_{max} = 300 μA, P_{max} = 240 μW.

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DO NOT SCALE DRAWING

TOLERANCES (UNLESS NOTED)		DRAWN	Gus H. Elias	07/07
DECIMALS = ±inch/mm		CHECKED	S.W.	07/07
X = ±.1 /2.54		ENGINEER	Gus H. Elias	07/07
.XX = ±.03 /0.76		SCALE		
.XXX = ±.010/0.25			NONE	
HOLES:=+.003-.002/+.08-.05				
ANGLES: = ± 30'				

CATEGORY CONTROL DRAWING

TITLE Field Installation Diagram:
TFZ [HP] & TPZ [HP]
-- FISCO --
For Hazardous 'Classified' Locations

DRAWING NUMBER 100-100-72 (Page 2 of 3)

REVISED BY		DATE	BY
ECO 15044		02/08	G.E.

REVISION B
APPROVAL CB

NOTICE RE PROPRIETARY INFORMATION: This drawing and the inform-
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This is a controlled 'Related' or 'Schedule'
drawing. No modifications are permitted
without the notification and final approval
of the Certification Engineer (related dwgs.)
or the Certifying Agency (schedule dwgs.).

I.S. Ground

(Caution: The 3-Pin
'COM' Port Must Not
Be Used In Hazardous
'Classified' Locations.)

TFZ (only) -
Front panel write-
protect & simulate
switches. **Caution:**
Not to be used in
hazardous areas.
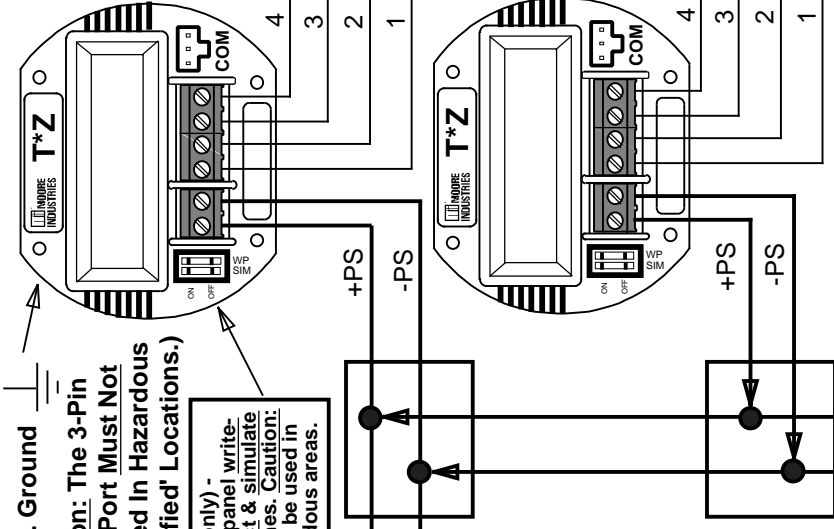
Non-Hazardous (Safe) Area

**Barrier or other
Agency-Approved
Associated
Apparatus
suitable for
FISCO**

Ground Path
Resistance Must Not
Exceed 1

**Refer to
Page 3 of 3
for notes on
FISCO.**

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* TFZ or TPZ: PC-Programmable
Foundation Fieldbus & PROFIBUS
Temperature & Signal Transmitters with Display.

IECEx ⟨Ex⟩

FM C APPROVED US

C€ 0518

**Sensor Type - mV,
POT, RTD, , T/C:**

Uo, Voc Or Vt = 6.51 VDC
Io, Isc Or It = 34.75 mA
Po = 55.97 mW

Ca,Co = 20.53 µF, Gr. A/B, IIC
Ca,Co = 498.53 µF, Gr. C/D, IIB
Ca,Co = 998.53 µF, Gr. D, IIA
La,Lo = 25 mH, Gr. A/B, IIC
La,Lo = 100 mH, Gr. C/D, IIB
La,Lo = 200 mH, Gr. D, IIA

**Same Sensor Type
parameters as
indicated above**

**Agency-Approved
Intrinsically Safe
Apparatus suitable
for FISCO**

**Agency-Approved
Termination with:**
R = 90....100
C = 0......2.2 µF

**FISCO Parameters
(+PS & -PS):**
Vmax or Ui = 24 VDC
Imax or Ii = 380 mA
Pmax or Pi = 5.32 W
Ci = 0 F
Li = 7.15 µH

**Model TFZ & TPZ Temperature
Transmitters are suitable for a
FISCO system in accordance
with IEC 60079-27.**

T*Z
MOORE INDUSTRIES
COM
WP SIM
ON OFF
4 3 2 1
+PS -PS

T*Z
MOORE INDUSTRIES
COM
WP SIM
ON OFF
4 3 2 1
+PS -PS

	DO NOT SCALE DRAWING			DRAWING NUMBER 100-100-72 (Page 3 of 3)		REVISION **B**
	TOLERANCES (UNLESS NOTED)	DRAWN Gus H. Elias	07/07	CATEGORY CONTROL DRAWING		APPROVAL
MOORE INDUSTRIES	DECIMALS = ±inch/mm .X = ±.1 /2.54 .XX = ±.03 /0.76 .XXX = ±.010/0.25 HOLES:=+.003-.002/+.08-.05 ANGLES: = ± 30'	CHECKED S.W.	07/07	TITLE **Field Installation Diagram: TFZ [HP] & TPZ [HP] -- FISCO Notes --** For Hazardous 'Classified' Locations	DATE 07/07	BY G.E. ***CB***
		ENGINEER Gus H. Elias	07/07	REVISED BY **ECO 15044**		
		SCALE NONE		NOTICE RE PROPRIETARY INFORMATION: This drawing and the information contained herein are the proprietary property of Moore Industries International, Inc. (MII) and should not be reproduced or disclosed to any third party without the written consent of an authorized officer of MII.		

The FISCO Concept allows the interconnection of Intrinsically Safe apparatus to associated apparatus not specifically examined in such combination (refer to Page 2 of 3). The criterion for such interconnection is that the voltage (Vmax or Ui), the current (Imax or Ii), and the power (Pi), which Intrinsically Safe apparatus can receive and remain Intrinsically Safe, considering faults, must be equal or greater than the voltage (Uo, Voc, Vt), the current (Io, Isc, It) and the power (Po) which can be provided by the associated apparatus (supply unit). In addition, the maximum unprotected residual capacitance (Ci) and inductance (Li) of each apparatus (other than the terminators) connected to the Fieldbus must be less than or equal to 5nF and 10µH, respectively.

In each I.S. Fieldbus segment only one active source, normally the associated apparatus, is allowed to provide the necessary power for the Fieldbus system. The allowed voltage (Uo, Voc, Vt) of the associated apparatus used to supply the bus must be limited to the range of 14Vdc to 24Vdc. All other equipment connected to the bus cable has to be passive, meaning that the apparatus is not allowed to provide energy to the system, except to a leakage current of 50 µA for each connected device. Separately-powered equipment needs a galvanic isolation to insure that the Intrinsically Safe Fieldbus circuit remains passive.

- The cable used to interconnect the devices needs to comply with the following parameters:

1- Loop Resistance R' = 15 - 150 µ/km
2- Inductance per unit length L' = 0.4 - 1 mH/km
3- Capacitance per unit length C' = 80 - 200 nF/km
4- C' = C' Line/Line + 0.5 C' Line/Screen (if both Lines are floating)

or,

5- C' = C' Line/Line + C' Line/Screen (if the Screen is connected to one line)
6- Length of Spur Cable = 30 meters (maximum)
7- Length of Trunk Cable = 1 km
8- Length of Splice = 1 meter (maximum)

- Terminators: At each end of the Trunk cable an Agency-Approved (FM, CSA, UL, ATEX, ANZEx, etc...) line terminator with the following parameters is considered suitable: R = 90 - 100   &   C = 0 - 2.2 µ F

Installation Notes for FISCO & Entity Concepts:

a) No revisions can be made to this certified drawing prior to notifying FM Approvals (the certifying agency).
b) Associated apparatus manufacturer's installation guidelines must be followed when installing and commissioning this equipment (TFZ & TPZ).
c) The FISCO Associated Apparatus must be Agency-Approved (FM, CSA, UL, ATEX, ANZEx, etc...).
d) Control equipment connected to FISCO barrier must not use or generate more than 250 Vrms or Vdc.
e) Resistance between FISCO Intrinsically Safe Ground and Earth Ground must be less than 1.0 .
f) Installation should be in accordance with ANSI/ISA-RP12.06.01 "Installation of Intrinsically Safe Systems for Hazardous 'Classified' Locations" and the National Electric Code (ANSI/NFPA 70), and/or applicable CEC and IEC reguations and requirements for installing and commissioning such devices.
g) The FISCO Concept allows interconnection of Fieldbus Intrinsically Safe apparatus with FISCO associated apparatus when the following is true:

    (Vmax or Ui)   (Voc, Vt or Uo)   (Imax or Ii)   (Isc, It or Io)   (Pmax or Pi)   (Po)
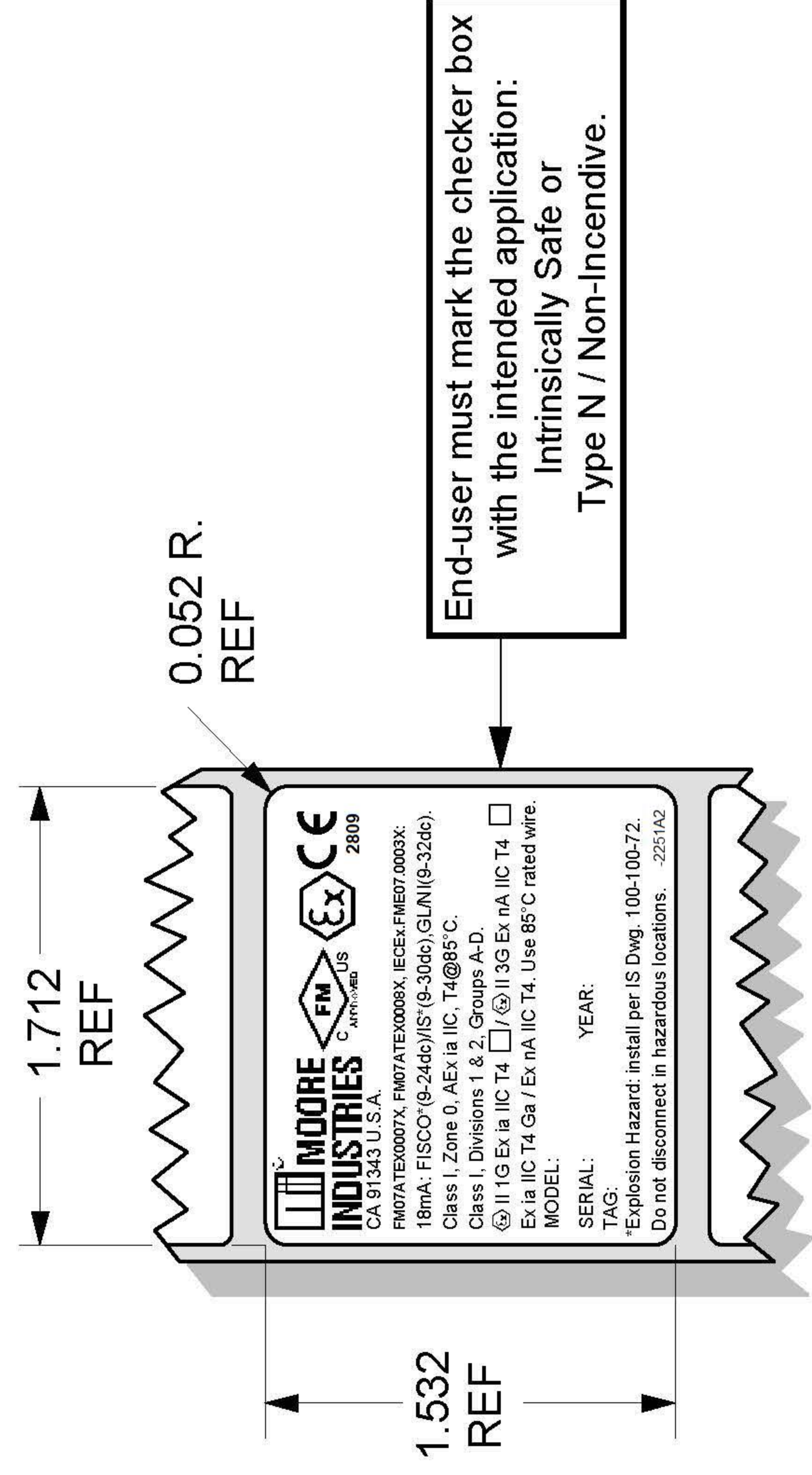
Installation Notes for Non-Incendive & Type N Concepts:

For Non-Incendive (Class I, Division 2, Groups A, B, C & D), and for Class II/III, Divisions 1 & 2, Group E, F & G, and for Type N hazardous applications, install per the NEC/CEC/IEC using threaded metal conduit. Intrinsic Safety barrier is not required. The maximum supply voltage is 32 Vdc. A dust-tight seal must be used at the conduit entry when the device is used in Class II & III locations.
WARNING: Explosion Hazard -- Do not disconnect equipment unless power has been switched off or the area is known to be Non-Hazardous. Substitution of components is not allowed as it may affect the circuit design integrity and possibly impair suitability for hazardous locations.

	DRAWING NUMBER			REVISION
	200-251-2251			A2
				APPROVAL
				WT

CATEGORY	COMPUTERIZED LABEL		REVISED BY			
TITLE	REAR ID LABEL		ECO 18628	DATE 3/19	BY	KD

TPZ: PC-Prog, Profibus PA Temp. X-mitter
FISCO (9-24Vdc), Intrinsically Safe (9-30Vdc),
Gen. Loc./Non-Incentive/Type N (9-32Vdc).
--- ATEX, cFMus, IECEx ---

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DO NOT SCALE DRAWING

TOLERANCES (UNLESS NOTED)	DRAWN	Gus H. Elias	07/07
DECIMALS = ±inch/mm	CHECKED	S.W.	07/07
.X = ±.1 /2.54	ENGINEER	Gus H. Elias	07/07
.XX = ±.03 /0.76			
.XXX = ±.010/0.25	SCALE	1/1	
HOLES:=+.003-.002/+.08-.05			
ANGLES: = ± 30'			

CERTIFIED PRODUCT

This is a controlled 'Related' or 'Schedule' drawing. No modifications are permitted without the notification and approval of the Certification Engineer (related dwgs.) or the Certifying Agency (schedule dwgs.).

0.052 R. REF

1.712 REF

1.532 REF

End-user must mark the checker box with the intended application: Intrinsically Safe or Type N / Non-Incendive.

MOORE INDUSTRIES
CA 91343 U.S.A.
FM07ATEX0007X, FM0TATEX0008X, IECEx.FMI07.0003X:
18mA: FISCO*(9-24dc)/IS*(9-30dc),GLiN(9-32dc):
Class I, Zone 0, AEx ia IIC, T4@85°C.
Class I, Divisions 1 & 2, Groups A-D.
Ⓔ II 1G Ex ia IIC T4 ☐ / Ⓔ II 3G Ex nA IIC T4
Ex ia IIC T4 Ga / Ex nA IIC T4. Use 85°C rated wire.
MODEL:
SERIAL: YEAR:
TAG:
*Explosion Hazard: install per IS Dwg. 100-100-72.
Do not disconnect in hazardous locations.   -2251A2

FM APPROVED
CE
2809

NOTES:

1. TO PRINT THIS LABEL: JOB SPECIFIC MODEL, SERIAL, YEAR AND TAG NUMBERS WILL BE DOWNLOADED FROM THE MENTOR DATA FILE AND PRINTED ALONG WITH THE FIXED TEXT AND GRAPHICS (SUPPLIED BY THE LEGI 93 DATA FILE) TO CREATE THE FINISHED LABEL.

2. THE FIXED TEXT AND GRAPHIC FIELDS FOR THIS LABEL ARE STORED UNDER NO. 200-251-2251 IN THE LEGI 93 LABEL MACHINE COMPUTER HARD DISK.

3. MATERIAL: .002 SILVER, IDENTIPLATE (MII P/N 200-301-00) DIE CUT AS SHOWN ABOVE. REFER TO LABEL SPEC. DRAWING 200-301-00.

4. ALL MATERIAL MUST BE ROHS COMPLIANT.

RETURN PROCEDURES

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.