PC-Only Programmable Transmitter

Introduction

Models TX787 and TX788 are microprocessor-based 2-wire transmitters that feature high accuracy and high long-term stability. Setting the new standard in ease of setup, these transmitters feature **PC-Only™** configuration technology. The unique Communications Adapter provides a fully isolated serial interface *and power source,* allowing the transmitter to be configured with a "**PC-Only**" - no external power supply, calibrator or meter is required!

Quick Start

Before beginning the process of setting up the transmitter, it is important to understand the difference between ***calibration*** and ***configuration***. The transmitter's precision references (4 and 20 milliamps out; resistance, voltage and current as appropriate; and a thermal reference) are ***calibrated*** at the factory and may be adjusted later if necessary. ***Configuration*** is the process of defining the sensor type and range in engineering units. ***Configuration*** is performed by connecting the transmitter to a PC and running the configuration software. Because the Communications Adapter provides power to the transmitter's microprocessor, it is not necessary to provide any external power to the transmitter in order to configure it.

1. Install the Configuration and Calibration software
Run "setup.exe" on the distribution diskette and follow the on-screen instructions.
Note: the software contained on the distribution diskette runs under Windows 95 and Windows NT.
If you are running Windows v3.1, contact Omega Engineering.

2. Connect the Communications Adapter to the computer and transmitter.

3. Identify the serial port to which the Adapter is connected.
Select "Options" from the menu bar, then click "Communications" and select the correct COMM port from the pull-down menu. Note that if you change the serial port you must exit the software and restart it with the correct setting.

4. Configure the transmitter.

What you will need:

Calibration
- PC
- Communications Adapter
- Transmitter
- Multimeter
- 24VDC power supply

Configuration
- PC
- Communications Adapter
- Transmitter

User's Guide

An OMEGA Technologies Company

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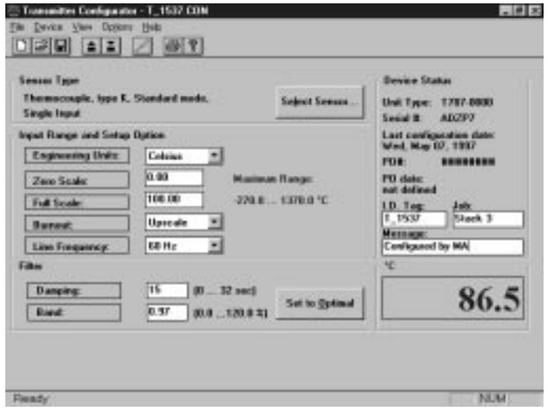


Calibration

To calibrate the transmitter, connect a 24VDC power supply, a 250Ω load and multi-meter (in milliamp mode) in series to the transmitter's output.

1. Upload

2. Click on the Calibration Icon

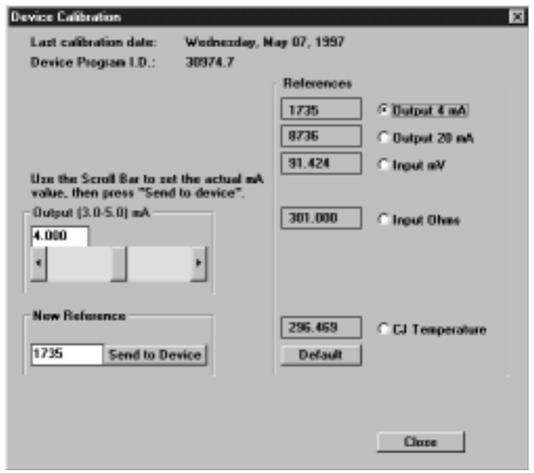
3. Output Calibration: Select "**Output 4mA**", enter the mA reading from the meter into the dialog box and click "Send to Device." Repeat for 20mA calibration.

4A. Input Calibration Models XXXXX-X000 (e.g. TX787-0000): Provide a precision 100.00mV source to the transmitter, select "**Input mV**" on the Device Calibration screen, wait for the on-screen display to settle, then click "Send to Device." Repeat the procedure, substituting a 300.00Ω input (4-wire connection) and selecting "**Input Ohms.**"

4B. Input Calibration Models XXXXX-X001 (e.g. TX787-0001): Provide a precision 300.00mV source to the transmitter, select "**Input mV**" on the Device Calibration screen, wait for the on-screen display to settle, then click "Send to Device." Repeat procedure, substituting a 15.00 Volt input and selecting "**Input Volts**", and substituting a 50mA input, selecting "**Input mA.**" Note that the input terminals are different for each of the signal levels.

5. To calibrate the cold junction compensation reference, select **"Temperature,"** enter the nominal ambient temperature in the dialog box, set the input simulation type to match the input simulator (i.e., type J thermocouple), verify that the simulator is set to the proper value, then click "Send to Device."

6. Click "Close." A message in the lower left corner of the screen will indicate the progress of the download and finally that the download has been successfully completed.



Configuration

Configuration may be performed with a transmitter on-line or off-line. When a transmitter is on-line, the upload and download icons will be distinctly black. If no transmitter is on-line, those icons will be grey.

1. Upload Current configuration from the transmitter

2. Configure

• If the current "Sensor Type" does not match the application, click on the "Sensor Selection" box then select the appropriate "tab" at the top of the "Input Sensor Selection" screen.

• Make one selection from the "Input Connection" and "Type" boxes (if offered) for the selected sensor type. Leave the "Mode" as "Standard" or the "Transfer Function" as "Linear" for now. Click the "OK" button to return to the Configuration Screen.

• Select the Engineering Units (from the pull down menu), enter the "Zero Scale" and "Full Scale" values and the "Burnout" mode (transmitter to go above full scale or below zero scale upon input failure).

• Click the "**Set to Optimal**" button to optimize the transmitter's filtering.

3. Download New configuration to the transmitter.

Additional Configuration Options and Features

The TX787 and T788 is capable of performing many functions in addition to the simple example outlined in the Quick Start exercise.

Dynamic Input Filtering

Filtering is provided to optimize the stability and response time of the transmitter output signal. The filter is set by specifying a Filter Band and a Damping Time Constant. To simplify the definition of the filter values, click on the "Set to Optimal" button on the configuration screen.

Filter Band

The Filter Band allows the transmitter to be configured to react quickly to significant changes in input while smoothing out small changes. This band defines the range above and below the current input reading *within which the Damping Time Constant will be applied.* It is defined as a percent of the configured span of the transmitter. For example, a 0.5% Filter Band on a transmitter configured for an input range of 200 to 700 deg F would mean that the Damping Time Constant will be applied to input changes of less than 2.5 deg but that changes of more than 2.5 deg would be immediately reflected in the output. In general, the larger the full scale range, the smaller the Filter Band should be. Conversely, a larger Filter Band is generally appropriate for smaller input ranges. Clicking the "Set to Optimal" button triggers the calculation of an appropriate setting based on the currently defined input range.

Damping

Damping defines the length of time, in seconds, that the input will be averaged over to determine the output value *when the input change is less than the Filter Band.* Changes in the input that are greater than the Filter Band bypass the Damping filter and are immediately reflected in the output. The default value of 15 seconds, when used with the optimal Filter Band yields a very stable output while maintaining a fast response to significant changes in the input.

Input/Output Trimming

Because of slight variations between sensing elements or other loop characteristics, it is sometimes beneficial to "trim" the transmitter so that its output corrects for these effects. If the measurement error is known, the transmitter may be trimmed "off-line." "ON-line" trimming allows the characteristics of an individual sensor to measure and match to the transmitter to which it will be connected in the field. Trimming allows the basic calibration of the transmitter to be left intact.

Dynamic Sensor Simulation

This option allows a loop to be tested dynamically verifying control logic as well as wiring. The transmitter's current loop output can be controlled via four parameters: simulate an input value in raw units (ohm, mV, etc.); simulate an input value in engineering units (e.g. 450 DEG); set an ouput in percent; or set an ouput in mA. After an initial simulation is selected, the ouput may be incremented or decremented in 1% or 10% steps.

Other Transfer Functions

The transfer function is the "formula" that the transmitter uses to determine the appropriate output signal for a given input signal. A "Linear" function means that output is changed in a straight line fashion as the input changes within the configured input zero and full scale range: 0% of range input yields 4 mA output, 25% of range input yields 8 mA, etc. A "Standard" function means that the transmitter will apply a standard linearization curve for temperature inputs.

RTD Sensor Matching

The accuracy of RTD temperature sensing can be increased significantly when the temperature transmitter is "matched" to the individual sensor using a method called Callender Van Dusen linearization. Doing so requires entering the sensor's Alpha, Beta (measured for temperatures above zero and for temperatures below zero), Sigma, and Ro values into the transmitters' configuration. These values can be requested from the manufacturer when the sensor is purchased or may be measured by a testing lab.

Square Root

Select this function if the transmitter's output is to vary with the square root of the input.

Custom Polynomial

The transmitter can use up to a 10th order polynomial equation ($y = A_0 + A_1x + A_2x^2 + \ldots + A_{10}x^{10}$) as the transfer function by inputting the coefficients into the transmitter's configuration.

Custom Table

The transmitter can use a User Defined table by specifying a .tbl file. The data in the file should be two columns, tab delimited. Up to 140 data pairs may be listed. The input values in column one must be equally spaced.

Defining The Transmitter's User Fields

Each unit may be assigned an I.D. Tag name of up to eight characters, Job Number up to eight characters, and a "Message" of up to sixteen characters; stored in the transmitter's memory. Click on the desired field, enter the text, and click the download icon.

Saving The Configuration Information To A File

The transmitter's configuration information may be saved to a file by clicking the diskette icon on the tool bar and specifying a file name and location.

Printing the Configuration Information

Clicking the printer icon on the tool bar will initiate the printing of a preconfigured summary of the transmitter's configuration and calibration information. The report includes the current time and date, the date of the last calibration, and date of the last configuration. Printing this report before and after calibrating a unit provides "as found" and "as left" documentation. If a printer has been defined (in Windows) that prints to a file, this comprehensive report can be saved on disk for future reference.

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **37 months** from date of purchase. OMEGA Warranty adds an additional one (1) month grace period to the normal **three (3) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit should malfunction, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of being damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by it will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUEST/ INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.
The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. P.O. number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. P.O. number to cover the COST of the repair,
2. Model and serial number of product, and
3. Repair instructions and/or specific problems relative to the product.

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