MOORE INDUSTRIES

TCA

Thermocouple Alarm

USER'S MANUAL

April 2016

No. 190-701-00C

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Introduction

Moore Industries' Thermocouple Alarm, the TCA, accepts input from ISA standard thermocouples and provides contact closure output for use by warning or other alarm indicators. The unit's relays are tripped when thermocouple input deviates from a "safe" range, as defined by user-set trip points.

This manual provides a brief description of the TCA, including its physical characteristics and options, and a table of TCA performance and operating specifications. This is followed by a set of procedures for calibrating the unit. Next are instructions for installation, including physical mounting and electrical connections; and finally, information on basic maintenance and troubleshooting.

Notes, cautions, and warnings are included as a means of identifying for the user those practices that may present unnecessary inconvenience (notes), result in damage to the unit (cautions), or can cause injury (warnings).

Description

The TCA accepts input from standard, ISA thermocouples and provides a contact closure signal output based on the state of internal relays. Single-alarm units have one single-pole/double-throw, form C, relays. Dual-alarm TCA's have two. Thermocouple type and range are factory-set, and STD TCA's can be ordered with either AC or DC power.

Operationally, the unit is quite flexible, in that it affords the customer a choice of TCA alarm configurations; high or low, fail-safe or non-fail-safe. Table 1 summarizes the available alarm configuration combinations.

The TCA can also be configured by the factory to meet other operational requirements for a variety of thermocouple applications. Housing, power, and thermocouple input type are all aspects of the TCA that are set at the factory according to customer specification.

High-alarm/Low-alarm. A TCA configured as a high-alarm is tripped when the thermocouple input reaches a customer-set trip point. A low-alarm unit is tripped by a decreasing thermocouple signal that drops below the customer-set trip point.

Fail-safe/Non-fail-safe. A fail-safe TCA is energized when input is within a "safe" range, i.e. is normal or not in an alarm condition. When the input goes into an alarm condition, reaching a trip point or losing power, a fail-safe TCA is de-energized.

Conversely, a non-fail-safe unit is de-energized when input is within the customer-specified "safe" range, and is energized when the input reaches the trip point setting.

Housing options consist of Moore Industries' standard housing (STD), or the plug-in card (PC). The mounting and enclosure options for STD units include several types of multi-hub, explosion-proof enclosures, and hardware for a variety of surface mounting configurations, DIN rail mounting, or use with NEMA boxes. The PC-style TCA is designed for use with Moore Industries' multi-position Rack-mount (RMR) or Surface-mount (SMR) card racks.

Controls and Indicators

Every type and configuration of TCA comes with potentiometers (pots) to control the alarm trip points of each installed relay, and another pot to control the unit's zero setting. Additional pots for controlling unit dead band are available as an option, and precision ten-turn, lockable vernier scales are also available.

Trip point pots afford full zero- to 100-percent adjustability over the unit's specified span. The ZERO pot provides for plus or minus 20-percent of maximum range value adjustment.

Each installed relay is wired to a front panel LED, which lights when the relay is energized. Depending upon the type of relay operation ordered, a lit LED can indicate either a "normal" or an "alarm" thermocouple input condition.

Table 1. TCA Alarm Types

Model Number Designator	This Unit is...	This Unit signals an "Alarm" condition when...	Its LED will be...	Relay(s)
S	Single Alarm	-	-	Only one relay installed
D	Dual Alarm	-	-	Two relays are installed
H1	High Fail-Safe	Input reaches or exceeds Trip Point. (See Note 2).	OFF in alarm ON in normal	DE-energized in alarm Energized in normal
H2	High NON-Fail-Safe	Input reaches or exceeds Trip Point. (See Note 2).	ON in Alarm, OFF in Normal	Energized in Alarm, DE-energized in normal
L1	Low Fail-Safe	Input reaches or drops below Trip Point (See Note 2)	OFF in alarm ON in normal	DE-energized in alarm Energized in normal
L2	Low NON-Fail-Safe	Input reaches or drops below Trip Point (See Note 2)	ON in Alarm, OFF in Normal	Energized in Alarm, DE-energized in normal

NOTES: 1. Older TCA's may use X1 for H1, X2 for H2, X3 for L1, and X4 for L2.
2. The "UPPER" and "LOWER" labeling on the TCA front panel is for reference only. Configurations where the "LOWER" terminals and pots pertain to the unit's High-alarm, for example, are quite possible.
3. Relays in fail-safe alarms are DE-energized in the event of power loss to the unit.

Table 2 lists the performance and operational specifications of Moore Industries' TCA.

Options

There are TCA options to fit the needs of many thermocouple alarm applications, from relay rating to manual reset switches. The following paragraphs briefly describe the most frequently ordered options. Consult your Sales Representative for more information on all of the available options.

AD Option — Adjustable Dead band; Extra multi-turn pots that control the setting of a dead band around trip point settings. See figure 1 for an illustration of TCA dead band. (AD Option not available with some option combinations).

AR Option — Alarm Reset Delay; Factory setting for customer-specified delays of 1, 2, 3, 4, 5, 10, 20, 25, or 30 seconds.

DPDT Option — Double pole/double throw Relays; Contact 5 A @ 28 Vdc or 117 Vac non-inductive. (DPDT Option not available with some option combinations).

EZ Option — Elevated Zero Input; Specifies the value of the input that will represent zero percent of span in the application.

TT Option — Precision Ten-turn, lockable vernier dials; These replace the standard pots, and are set at the factory for zero and full scale based on the customer's application.

DD Option — Downscale Drive on open thermocouple (upscale is standard).

Table 2. TCA Performance and Operational Specifications

Characteristic	Specifications
Input	ISA standard J, K, T, E, R, S, or PII thermocouple. **Span:** 5 mV (See Note 1) 10 mV 25 mV 50 mV (See Note 2) Compatible reference junction compensation resistor included. **Input Resistance:** 800 kΩ, typical.
Output	Factory-configured with one (Single TCA) or two (Dual TCA) single pole/double throw (SPDT), form C, mechanical relays rated at 5 amps @ 117 Vac non-inductive, or 28 Vdc. User selects Normally Open or Normally Closed configuration in order. Refer to table 1 for available configuration combinations. Double Pole/Double Throw (DPDT, form 2C) and 10 amp relays available (See Note 3).
Power	Factory-configured. User selects 117, 220, or 240 Vac, 50/60 Hz, ±10%; or 24 or 45 Vdc, 5 watts, nominal (See Note 4)
Performance	**Repeatability:** Trip point settings repeat within ±0.1% of span. **Dead Band:** 1% of span, standard. Adjustable Dead Band Option available. **Zero Adjustability:** ±25% of rated span. **Response Time:** 50 milliseconds for step change of 1% of span. **Line Voltage Effect:** ±0.005% per 1% line voltage change, ac or dc. **Burn-out Protection:** Upscale on thermocouple, standard. **Isolation:** Input, Output, and Power have no dc path between them (both ac and dc powered units).
Environmental Ratings	**Ambient Temperature Range:** –18 to 65 °C (0 to 150 °F). **Effect of Temperature on Amplifier:** Less than ±0.018% of span per °C (<±0.01% per °F) over the specified range.
NOTES: 1. 5 mV input requires Low Input Span (LSA) option. 2. 50 mV input span not available with ISA type R or S thermocouples. 3. 10 amp relays not available with PC-style housing. 4. Ac power not available with PC-style housing. 5. Refer to Installation Section for unit mounting dimensions.	

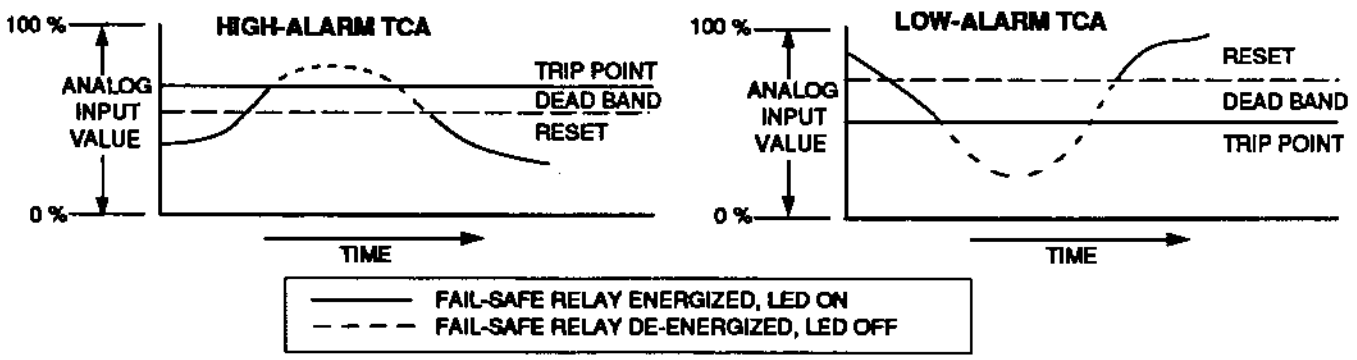


Figure 1. The TCA Dead Band

Model/Serial Number. Moore Industries uses a system of unit model and serial numbers to keep track of factory configuration and options for each TCA shipped or serviced.

The example outlines the significance of each field of information in a typical TCA model number.

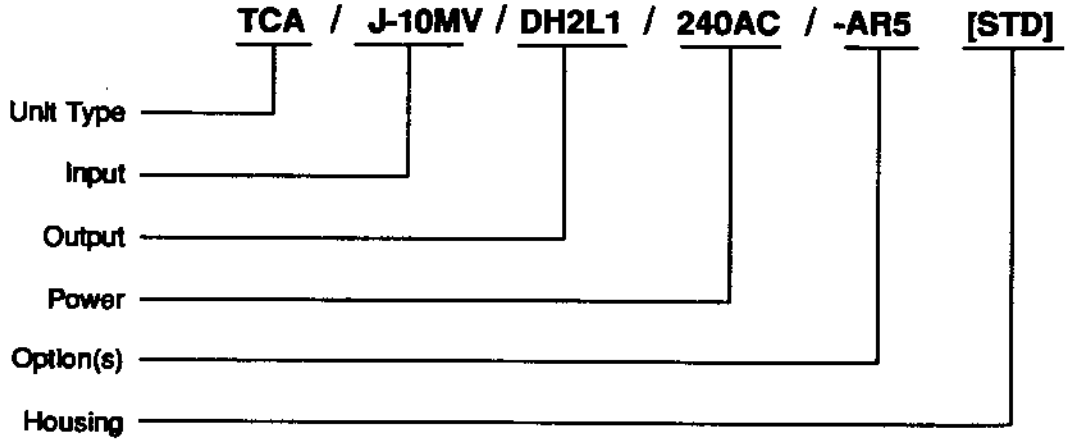
If service information or assistance for a TCA is needed, make a note of the model and serial number before contacting Moore Industries Customer Support. Our highly skilled technicians will be happy to assist you. STD units' serial and model numbers are etched into the L-shaped metal tag on the top of the connection terminal strips. On PC-type TCA's, the numbers are found on an adhesive label affixed to the side of the front panel.

Calibration

Every TCA shipped from the factory is manufactured and tested according to Moore Industries' exacting standards for product quality. A bench check of basic unit operations is recommended, however, in order to identify any damage to the unit that may have occurred during shipping. It also allows the user to effect operational adjustments to trip points, zero, and dead band settings, if available.

It is recommended that the procedures in this section be carried out at a technician's bench or in a similar lab environment. This is the safest means of making adjustments to alarm values; isolated from the intended TCA application.

EXAMPLE



Calibration Setup

The equipment listed in table 3 is needed for calibrating the TCA. It is not supplied with the unit, but should be available in most testing labs.

Be sure to use accurately calibrated test equipment when performing the bench check and calibration of the TCA. The use of inaccurate test equipment may result in unreliable settings for the unit's trip point(s), etc.

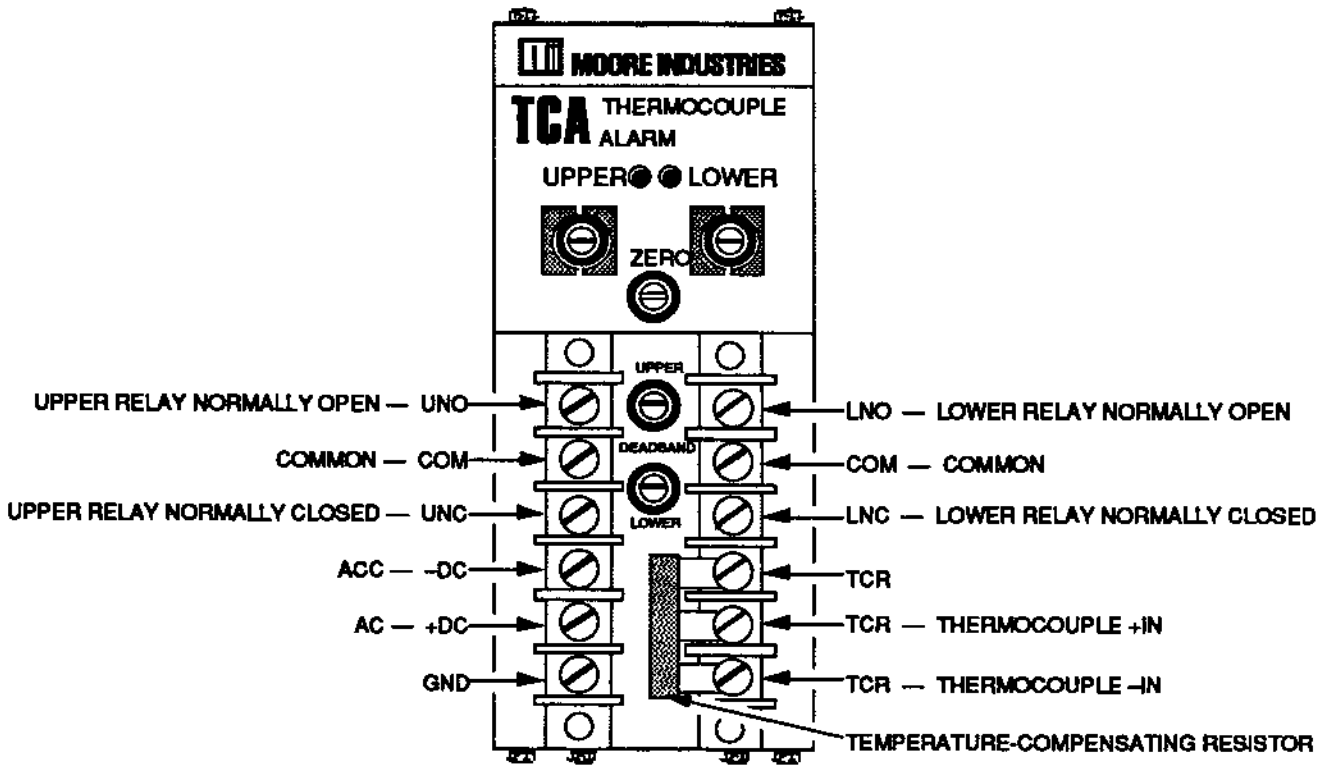
Figure 2 shows the labeling used on the front panel of the STD housed TCA. To access these terminals, use a screw driver to remove the securing screw from the protective plastic cover on the unit front panel.

There are two methods of carrying out the calibration setup connections on the PC-style TCA. Most often the unit is installed in one of Moore Industries' card racks, and the calibration equipment is connected to the appropriate terminal strip illustrated in figure 3.

As an alternative to using the card rack, individual PC TCA's can be checked using Moore Industries' Process Power Supply, the PPS, equipped with its CT Option. The CT-equipped PPS accepts the connection strip of the PC-style TCA in a connector built into its side panel. The PPS front panel provides easy access to a terminal strip similar to the one used by the card racks.

Table 3. TCA Calibration Equipment

Equipment	Specifications
Compensated Thermocouple Simulator	Capable of appropriate type and range for the input specified. Ectron model 1120, or equivalent make and model with accuracy rating of ±0.05%, minimum.
Power Source	AC or dc power input appropriate for the type of TCA being calibrated. Refer to table 2, Specifications, earlier in this manual.
Thermocouple Wiring (optional)	Should be of the same ISA type as the thermocouple that will be used in the application.
Ohmmeter, Milliammeter, or Multimeter	Any device capable of measuring the resistance across contact closure terminals, accuracy should be ±1%, minimum.
Screwdriver	Blade type with head width no greater than 2.54 mm (0.01 in).
Wire Jumpers (required for AR-equipped TCA's ONLY)	Temporary jumper wiring suitable for shorting AR Option diodes so that the alarm delay may be defeated while adjusting the unit's trip point settings.
Extender Card (optional for use with PC-style TCA's ONLY)	Moore Industries' part number 350-513-00.



NOTE: Each unit is factory-configured for ac or dc power as indicated in the model number.

Figure 2. The STD TCA Terminal Labeling

Whether using the card rack or the PPS/CT combination, note that the dc power is applied to the TCA at its pins 8 and 9. DC power connections are effected on the terminal strips of the either the card rack or the PPS.

NOTES

The "UPPER" and "LOWER" labeling used on the TCA is for reference purposes only. The trip point pots allow for adjustments through 100 percent of span, so it is possible for the connections for the "LOWER" labeled alarm to be configured as "high", and the "UPPER" to be configured as a "low".

The LED's DO NOT always indicate an alarm condition; rather, they light to show that their complimentary relay is energized. It is possible for a TCA to be configured such that the LED's are lit when input is in a "normal" or non-alarm state.

Use figure 2, 3, or 4, and refer to the setup depicted in figure 5 to connect the TCA being calibrated to the testing equipment described in table 3.

WARNING

To guard against accidental electric shock, it is recommended that the protective plastic cover be re-installed over the terminal strip of the STD-style TCA before applying power to the calibration setup.

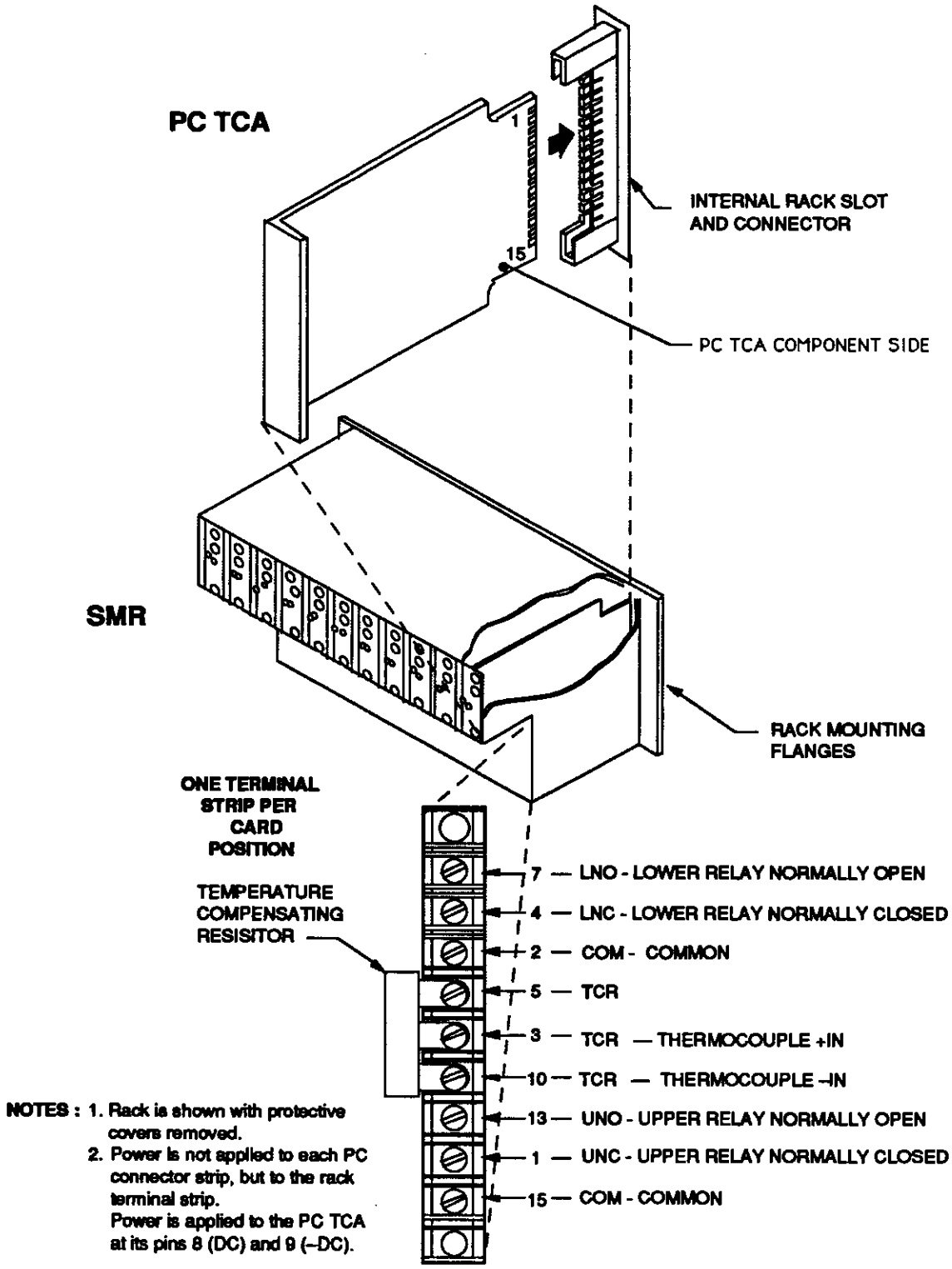


Figure 3. PC TCA Connection Terminals Labeling

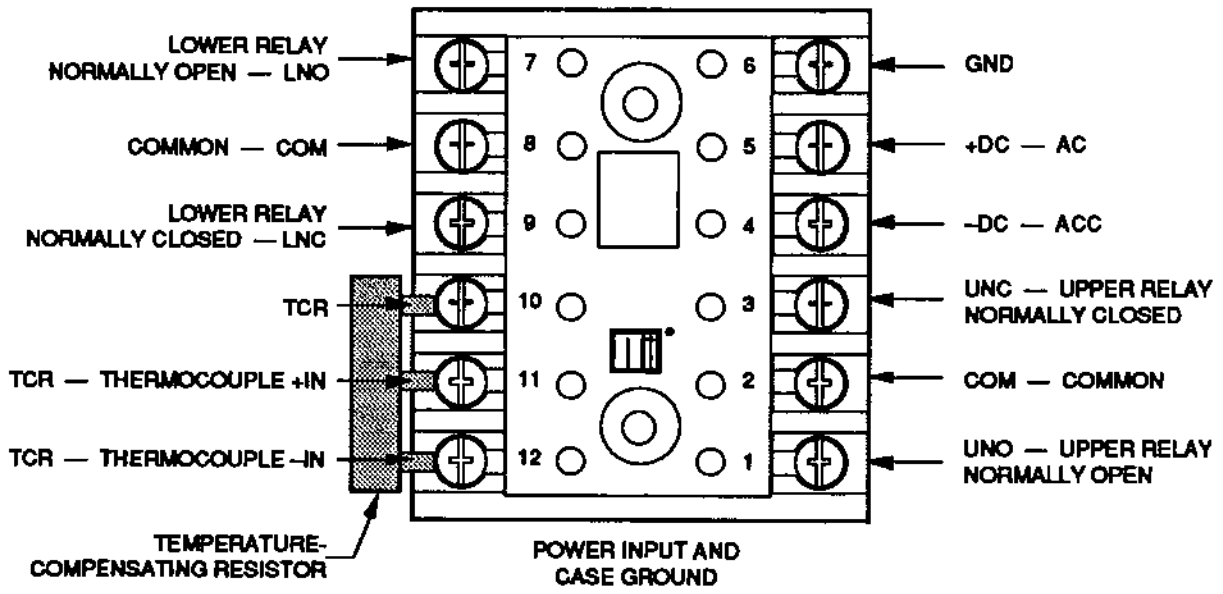


Figure 4. *Terminal Labeling for TCA in Explosion-proof Enclosure*

Calibrating TCA's in Explosion-proof Enclosures

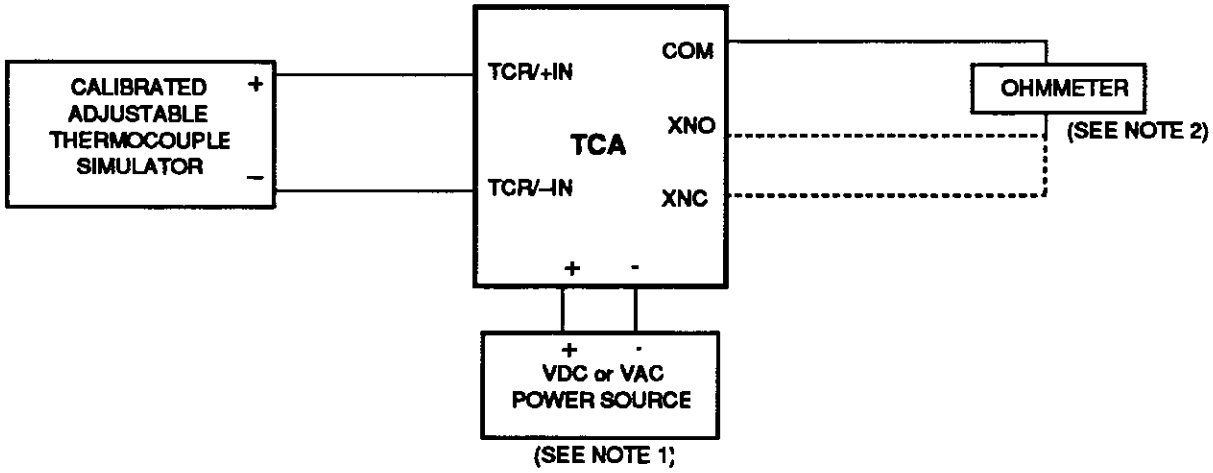
The EX TCA incorporates a modification of the STD housing, where the connection terminals ara permanently mounted inside the base of the explosion-proof enclosure.

To effect the calibration connections, unscrew the top of the enclosure and pull the TCA up and out of the enclosure base, exposing the terminal block. Figure 4 shows the block and its labeling.

Use figure 4 and the setup diagram in figure 5 to connect the test equipment to the terminal block, and then re-connect the TCA by aligning the pins on the bottom of the unit housing with the holes in the terminal block and pressing down until the unit is seated firmly in the enclosure base.

CAUTION

The housing fits into the terminal block in its correct orientation only. Attempting to "force" the unit will bend the pins.



NOTES: 1. Check unit model number for appropriate power source.
2. X = U for upper or L for lower. Connect ohmmeter to XNC for normally closed; to XNO for normally open.

Figure 5. *TCA Calibration Setup*

Calibrating AR-equipped TCA's

Units equipped with the AR Option are factory set for specific alarm delay times ranging from 1 to 30 seconds. The AR setting is set and fully calibrated according to customer requirements before unit shipment.

The delay in an AR-equipped TCA's transition from normal to alarm condition makes the calibration of trip points prohibitively, however, and temporarily disabling the option is therefore recommended during the calibration procedures.

To defeat the AR Option, diodes on printed circuit board #1 must be shorted. There is a diode for each installed relay. TCA's in the STD housing must be partially disassembled to access the AR diode(s). See figure 6.

Access to the AR diode(s) on PC-style TCA's may be difficult if the unit being calibrated is already installed in its rack. If an installed unit must be calibrated in the rack, Moore Industries offers an Extender Card accessory, P/N 350-513-00.

The extender is designed to mate with the connector on the PC-style TCA, and then to mount in the rack so that the unit is clear of the rack front, allowing access to the diode(s).

The location of the AR diodes for STD TCA's is shown in figure 7. Figure 8 shows the diode locations in a PC-style TCA.

NOTE
If calibrating the PC TCA with Moore Industries' PPS/CT, the extender card is not needed.

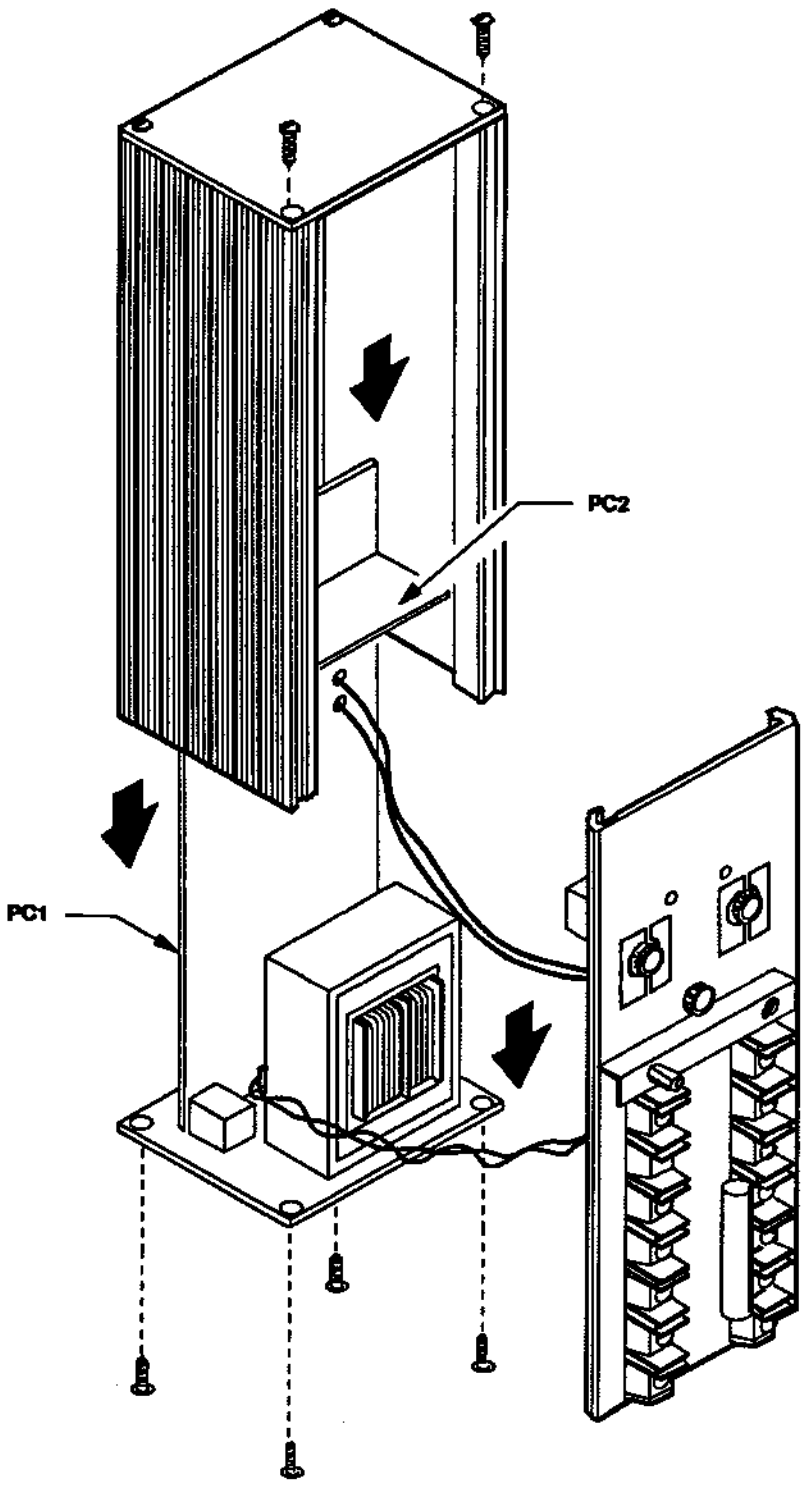


Figure 6. STD TCA Disassembly

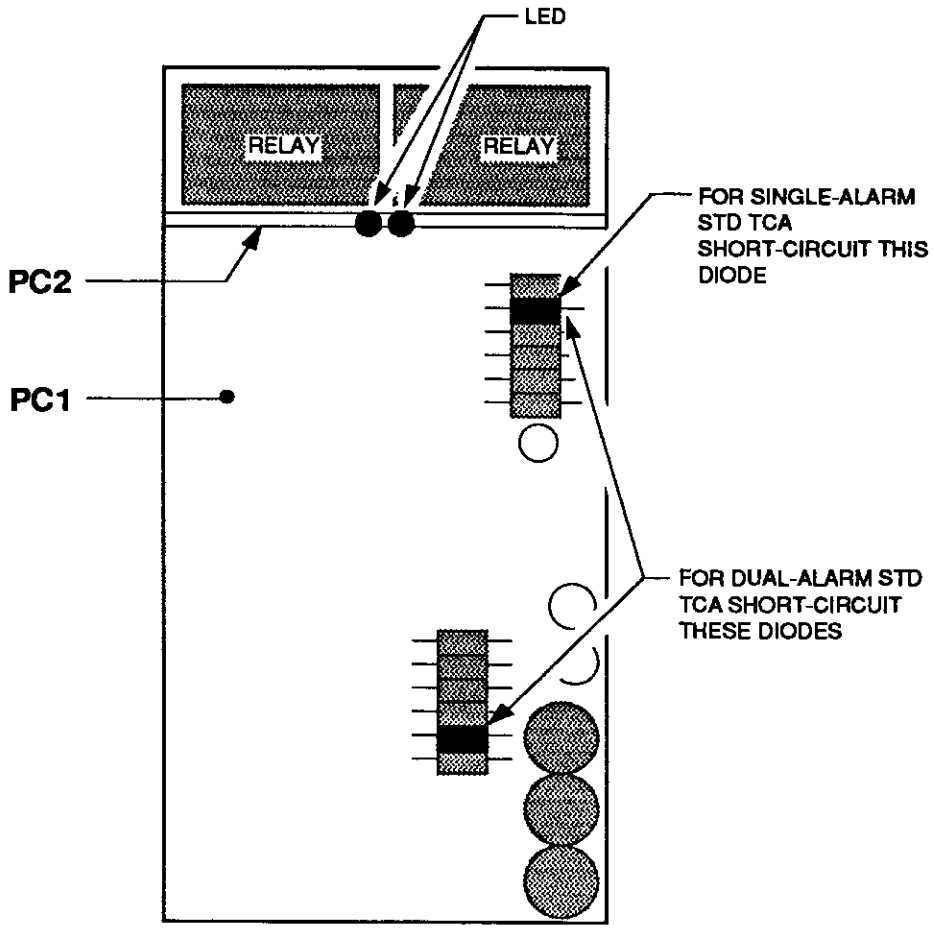


Figure 7. Location of the AR Diodes on the STD TCA

Calibration Procedure

Before beginning this phase of TCA calibration, check the unit's model number to verify that the correct power supply and thermocouple wiring is being used. Make sure that all connections are performed as described in the preceding section.

Using the Calibration Procedures

The Calibration Procedures section is organized according to the parameter of alarm operation being adjusted; zero offset, trip points, or dead band. The procedure for calibrating the TCA dead band, for units equipped with the AD Option, should be conducted after the trip points are set.

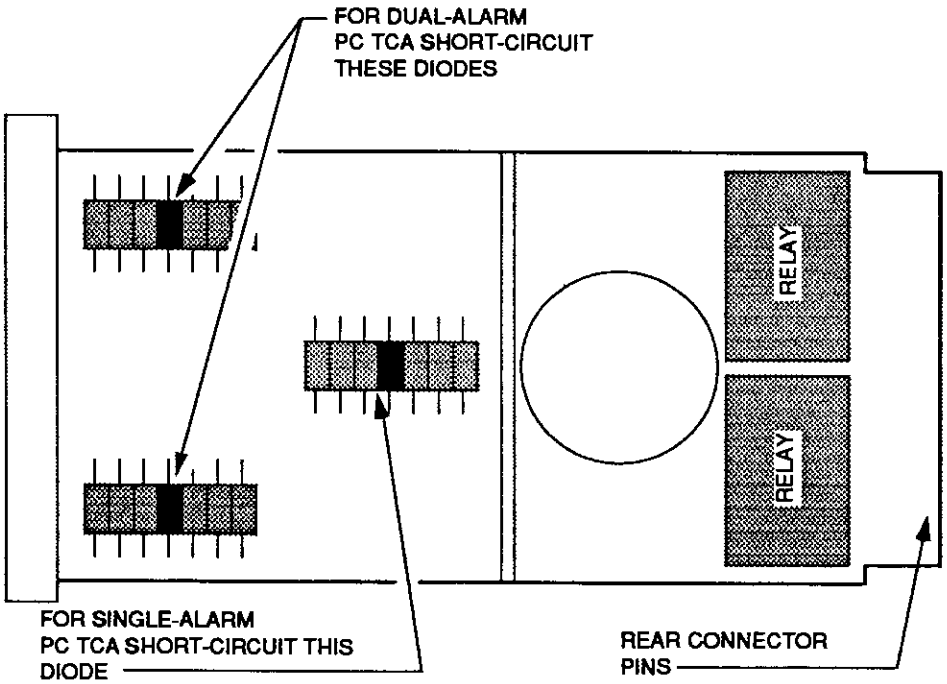


Figure 8. *Location of the AR Diodes on the PC TCA*

If your TCA is equipped with the TT Option, skip to and complete the procedure in the section entitled "TT Option Considerations".

Setting ZERO. Deviations owing to unit environment and thermocouple manufacture can limit the effective range of the TCA. The rated span of each TCA is fully tested at the factory before shipment. The units are adjustable for zero offsets of ±25% of the rated span maximum.

To set the ZERO pot:

1. Complete connections as described in Calibration Setup. Apply appropriate power, and allow approximately five minutes for warm-up/stabilization.
2. Turn all external pots fully counterclockwise.
3. Apply 0% of appropriate thermocouple input span. Refer to unit specifications and model number to verify appropriate thermocouple type and range. If calibrating a single-alarm TCA, skip to step 5.
4. Choose the alarm "side", labeled either "UPPER" or "LOWER", that will be used to set the lower of the two trip points.

NOTE

In dual-alarm TCA's, regardless of how the alarms are configured, high or low, the trip point settings will not, as a rule, be the same. Even, for example, in a high/high configuration, one of the trip points will typically be lower than the other.

5. Turn ZERO pot slowly clockwise, observing appropriate LED and ohmmeter. Set pot (stop turning) at the point where relay (chosen in step 4, for dual-alarm units) changes state. Vary input slightly above and below change-of-state point to achieve as exact a setting as possible.

Setting Low Alarm Trip Points. Not all units are equipped with low alarms, but it is possible for dual units to have two. Perform the following procedure for each installed low alarm.

If the TCA being calibrated has only high alarms, skip to step 14.

1. With all low-alarm pots set fully counterclockwise and ZERO pot set, apply 100% of appropriate thermocouple input span. Refer to unit specifications and model number to verify appropriate thermocouple type and range.

   The low alarm relay will change state.

2. If low alarm is configured as fail-safe, L1 in the unit model number, verify that appropriate LED for low alarm is lit. The LED for a non-fail-safe low alarm, L2 in the model number, will not be lit.

3. Note ohmmeter reading.

   If connected to *X*NO and COM terminals (*X* = U or L), 100% input is a non-alarm condition. There is no contact closure (NO=normally open), and resulting resistance across TCA output terminals is infinite.

   If connected to *X*NC and COM terminals (*X* = U or L), there is contact closure (NC=normally closed), and resulting resistance across TCA output terminals is negligible.

4. Set input to desired trip point. LED/relay state will remain unchanged.

5. Turn appropriate low-alarm adjustment pot (may be labeled either "UPPER" or "LOWER") slowly clockwise, observing LED and ohmmeter.

6. Observe ohmmeter reading, and set pot (stop turning) at the exact point at which relay changes state.

7. If low alarm is configured as fail-safe, L1 in the unit model number, verify that appropriate LED is not lit. The LED for a non-fail-safe low alarm, L2 in the model number, will be lit.

8. Verify desired setting by varying input above and below trip point, observing both LED and ohmmeter to confirm appropriate change of relay state at, or below the trip point setting.

NOTE
Units equipped with any Manual Reset Option have external pushbuttons that must be pressed to reset the relays once the input drops below the trip point.

Setting High Alarm Trip Points. Not all units are equipped with high alarms, but it is possible for dual units to have two. Perform the following procedure for each installed high alarm.

NOTE
Always calibrate ZERO pot before setting trip points.

1. With all high alarm pots set fully counterclockwise and ZERO pot set, apply 0% of appropriate thermocouple input span. Refer to unit specifications and model number to verify appropriate thermocouple type and range.

   If high alarm is configured as fail-safe, H1 in the unit model number, verify that appropriate LED is lit. The LED for a non-fail-safe high alarm, H2 in the model number, will not be lit.

2. Note ohmmeter reading.

   If connected to *X*NO and COM terminals (*X* = U or L), 0% input is a non-alarm condition. There is no contact closure (NO=normally open), and resulting resistance across TCA output terminals is infinite.

   If connected to *X*NC and COM terminals (*X* = U or L), there is contact closure (NC=normally closed), and resulting resistance across TCA output terminals is negligible.

3. Set input to desired trip point. LED/relay state will remain unchanged.
4. Turn appropriate high alarm adjustment pot (may be labeled either "UPPER" or "LOWER") slowly clockwise, observing LED and ohmmeter.
5. Use ohmmeter to set pot (stop turning) at the exact point at which relay changes state.
6. If high alarm is configured as fail-safe, H1 in the unit model number, verify that appropriate LED for high alarm is not lit. The LED for a non-fail-safe high alarm, H2 in the model number, will be lit.
7. Verify desired setting by varying input above and below trip point, observing both LED and ohmmeter to confirm appropriate change of relay state at, or above the trip point setting.

NOTE
Units equipped with any Manual Reset Option have external push buttons that must be pressed to reset the relays once the input drops below the trip point.

Setting Dead Band

See figure 1 for a graphic representation of the TCA dead band. The dead band may be thought of as an "area" around a trip point in which the alarm will not reset.

In a scenario using a high-alarm TCA as an example, the unit will signal an alarm at its trip point, and will continue to signal an alarm as long as the input is above that point. Without an adjustable dead band, the relay will reset when the input drops below the trip point.

When equipped with the AD Option, however, no reset will occur until the input continues to drop to the dead band setting, presumably some percentage of span below the trip point.

To set the dead band potentiometer:

1. Make sure dead band pots are turned fully counterclockwise. Set trip points for installed alarms as described in preceding section.
2. Apply input level at which it is desired that alarm reset. Typically, this will be lower than trip point for high alarms, or higher than trip point for low alarms.
3. Turn dead band pot slowly clockwise, observing LED and ohmmeter.
4. Set pot (stop turning) at the exact point at which relay changes state.
5. Verify desired setting by varying input above and below trip point, observing both LED and ohmmeter to confirm appropriate change of relay state. Unit will "trip" at trip point setting, and will not reset until input returns past dead band setting.

The TCA dead band can be expressed as a percentage of the unit's factory-configured span.

Example:

A single, high-alarm TCA rated for 50 mV input is required to have a 25% dead band around its 35 mV trip point setting. To calculate the input level needed to set the desired dead band, subtract 25% of 50 mV and from 35 mV:

$$\text{Input in mV} = 35 - (0.25 \times 50)$$

The result, 22.5 mV, is the level of input to be applied in step 2. The TCA in this example will signal an alarm condition when the input reaches or exceeds 35 mV, but will not reset until the input drops below 22.5 mV.

Calibrating TT-equipped Units

Lockable, multiturn trip point adjustment pots on the front panel of each TT-equipped TCA are set at the factory so that "0.00" on the dial is equal to 0% of the application's rated input span. "10.00" is equal to 100% of span. The accuracy of these settings is ±0.5% of the rated span.

Calibration of TCA's with this option consists of two procedures. First, the internal, Full-Scale Adjust (FSA) potentiometer(s) must be set (this involves some disassembly of the STD TCA). Then, the unit zero, trip points, and dead band (if so-equipped), must be set.

Figure 9 shows the location of the STD TCA FSA potentiometers. Figure 10 shows the location of the pots on the PC-style unit. Refer to figure 6 when disassembling the unit in STD housing, and refer to figures 9 or 10 while performing the following:

NOTE

The following procedure assumes that the TCA being calibrated has its "UPPER" alarm section configured as a high alarm, and its "LOWER" alarm section configured as a low alarm. If this is not the case for your TCA, interchange references to "UPPER" and "LOWER", as appropriate.

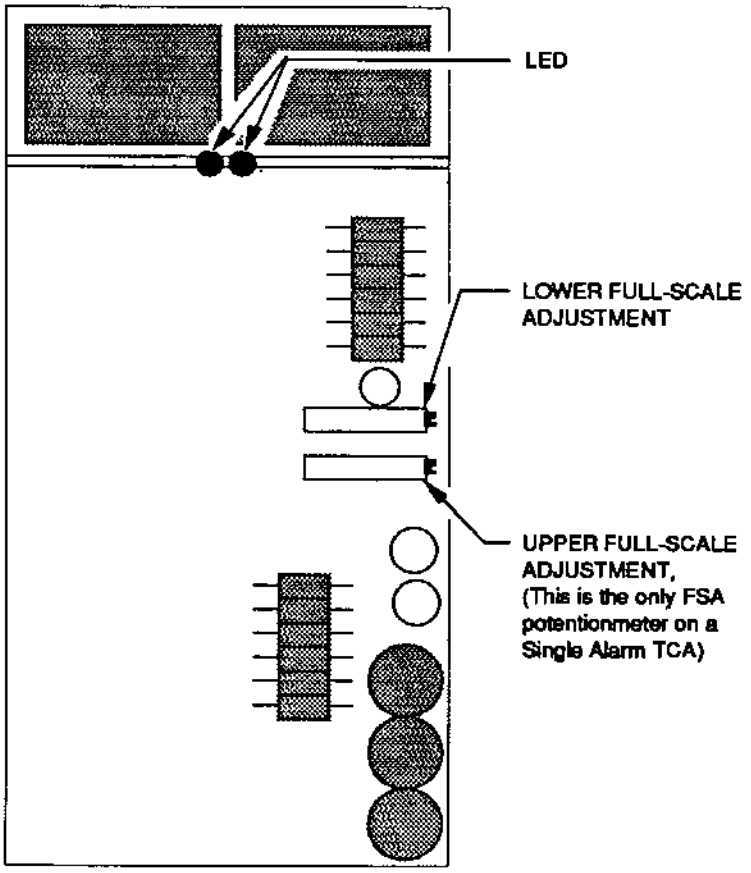


Figure 9. *FSA Potentiometer Locations on the STD TCA*

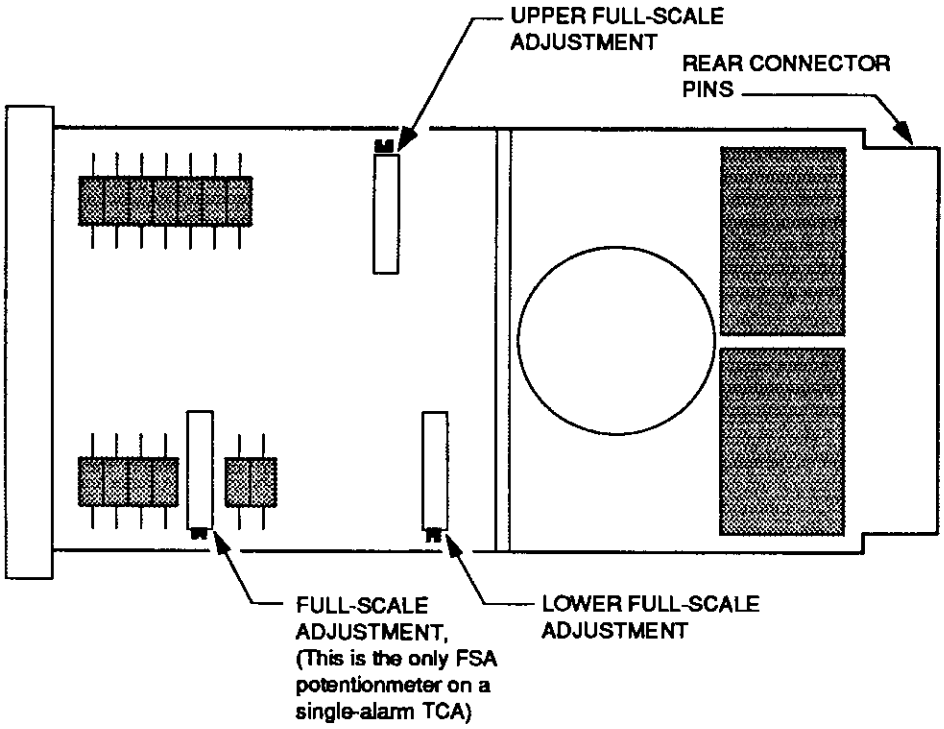


Figure 10. *Location of FSA Pots on PC-style TCA*

1. With the hookup desribed in the Calibration Setup Section complete, disable AR Option as described in section titled "Calibrating AR-equipped TCA's". Connect ohmmeter to "UPPER" alarm terminals first.
2. Verify that all pots are set fully counterclockwise, to 0.00.

NOTE
Steps 3 through 10 apply to high alarms. Skip to step 11 to calibrate the ten-turn dials on low alarms.

3. Apply 0% of appropriate input from application. Refer to unit's model number and specifications listing in table 2.
4. Turn ZERO pot clockwise until both "UPPER" and "LOWER" alarms trip.
5. Apply 100% input to setup.
6. Turn "UPPER" and "LOWER" pots clockwise to 10.0 setting.
7. Turn internal FSA pots fully counterclockwise. High alarms will change state. Disregard low alarm at this time.

8. Turn FSA pot for "UPPER" alarm slowly clockwise, observing ohmmeter and appropriate front panel LED.
9. Set FSA pot (stop turning) at exact point at which high alarm is tripped. If high alarm is configured as fail-safe, H1 in the unit model number, verify that appropriate LED for high alarm is not lit. The LED for a non-fail-safe high alarm, H2 in the model number, will be lit.
10. Disconnect ohmmeter, and reconnect it to "LOWER" alarm section of TCA.
11. With input at 100%, and ohmmeter connected to "LOWER" alarm section of unit, turn appropriate "LOWER" FSA pot fully clockwise. Note that low alarm trips.
12. Turn "LOWER" FSA pot slowly clockwise, observing ohmmeter and appropriate front panel LED.
13. Set FSA pot (stop turning) at exact point at which low alarm is tripped. If low alarm is configured as fail-safe, L1 in the unit model number, verify that appropriate LED for low alarm is not lit. The LED for a non-fail-safe low alarm, L2 in the model number, will be lit.
14. Alternate the input between its rated 0 and 100% level, verifying the setting of the unit's front panel pots (0.00 at 0% input, 10.00 at 100% input). Readjust both FSA pots as necessary.

Installation

Installing the TCA is typically accomplished by physically mounting the unit, then effecting the electrical connections.

Mounting

Figures 11 and 12, respectively, show the outline dimensions of the TCA in the STD and PC housing styles. The drawing of the STD housing includes the dimensions of the U-bracket, typically included with that type of TCA.

Always try to install the TCA in an area relatively free of dust, excessive moisture, or corrosives.

Contact your Moore Industries Sales Representatvie for information on other types of TCA housings, enclosures, and mounting hardware.

Making Electrical Connections

Figure 13 illustrates the installation hookup for the unit. Refer to the label call-outs in figures 2, 3, or 4 of the Calibration Section when making the electrical connections associated with installing the TCA.

When making the electrical connections for units in explosion-proof enclosures, route the wiring through the conduit hubs in the enclosure with enough slack to reach the appropriate terminal.

WARNINGS

Do not apply power to the TCA until all connections are secure. The power input terminals present an electric shock hazard.

Always turn off the power to the unit before servicing.

PC TCA's slide into card slots in Moore Industries' nineteen-inch card racks, the SRM and RMR. Each unit has indicidual contacts on its rear edge that mate with an edge connector at the back of the rack.

Maintenance

Once the TCA is properly calibrated and installed, it will operate reliable for exteneded period of time. No further adjustments should be necessary, unless the unit it moved, or the process input changes.

It is recommended that the unit terminals be checked perodically for signs of oxidation or looseness.

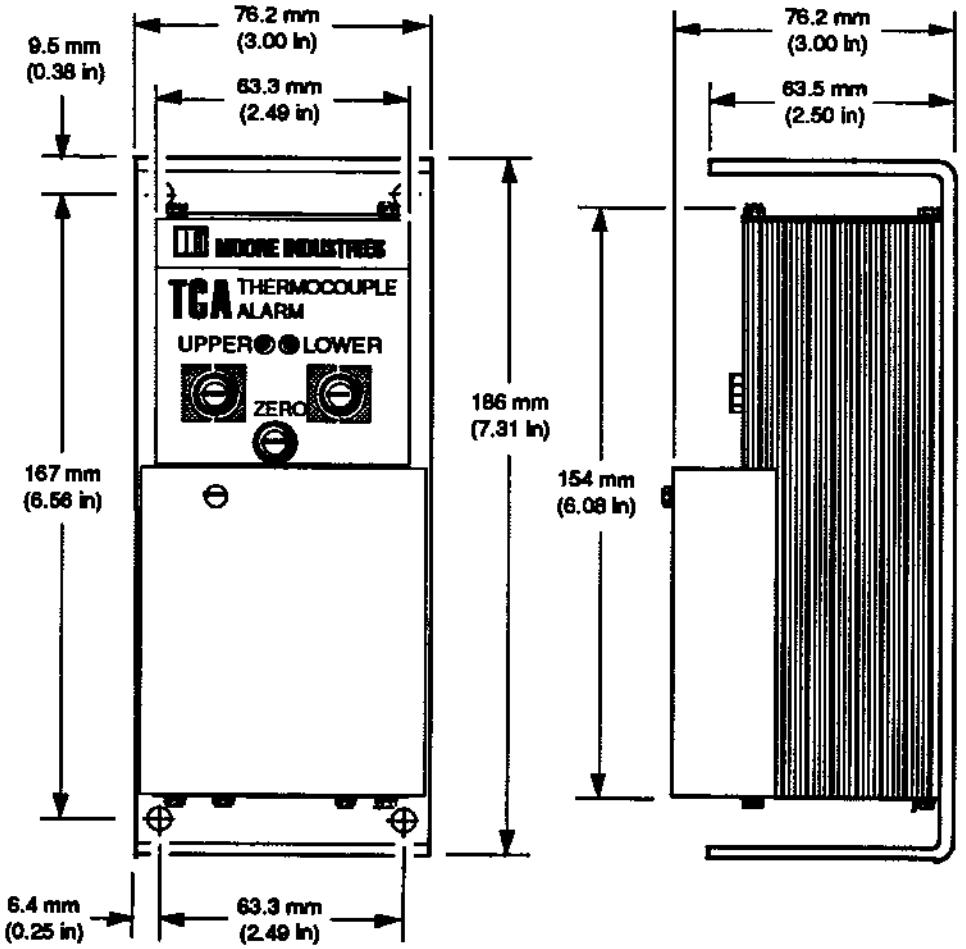


Figure 11. STD TCA Outline Dimensions

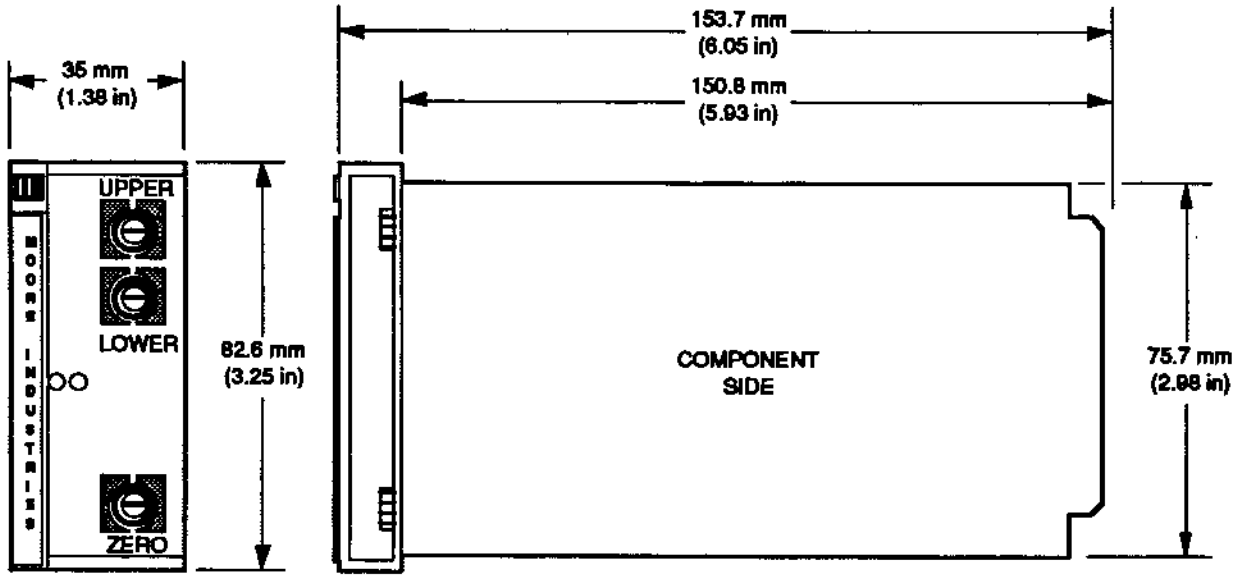
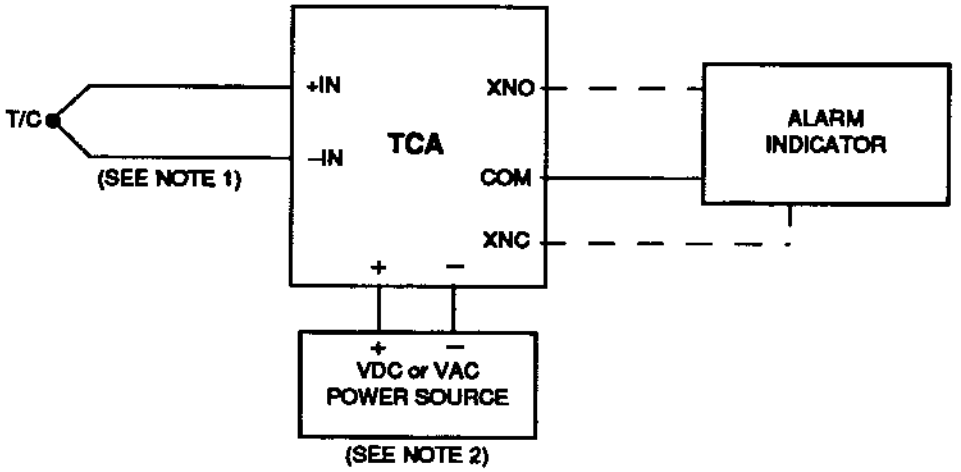


Figure 12. PC TCA Outline Dimensions



NOTES: 1. Connect T/C wire of positive (+) polarity to the +IN terminal of TCA.
2. Check the model number for power source requirements.
3. X=U for upper alarm section, high or low, or L for lower alarm section, high or low.
NO=normally open
NC=normally closed

Figure 13. TCA Installation Hookup Diagram

MOORE INDUSTRIES

June 1990

DCA/MVA/RBA/TCA

USER'S MANUAL SUPPLEMENT

Purpose

This supplement is provided to inform users of Moore Industries' DCA, MVA, RBA and TCA of a recent change in model number designations. The change specifically affects the model number field that shows if the unit is configured for single or dual alarms, high or low alarms, and failsafe or non-failsafe conditions.

This supplement pertains to the above mentioned alarms in Standard (STD) and Plug-in Card (PC) housings.

Table 1 contains examples of new designations. Table 2 is a cross-reference of selected old and new designations. The alphanumeric entries of this configuration designation have the following definitions:

D = Dual (Two alarm functions in same package responding to the same input)
H = High (Goes into alarm when process variable reaches or exceeds the trip point setting)
L= Low (Goes into alarm when process variable reaches or goes below the trip point setting)
S = Single (One alarm function with one process variable in the package)
1 = Fail-safe (Relay de-energizes with alarm)
2 = Non-fail-safe (Relay energizes with alarm)

Table 1. *New Alarm Configuration Designations*

Configuration	Fail-safe	Non-fail-safe
Single, High	SH1	SH2
Single, Low	SL1	SL2
Dual, High/Low	DH1L1	DH2L2
Dual, High/High	DH1H1	DH2H2
Dual, Low/Low	DL1L1	DL2L2

NOTE: Combinations of Fail-safe and Non-fail-safe for Dual alarms are also possible by following the same method of designation. For example, a Dual alarm with a high Fail-safe and a low Non-fail-safe would be DH1L2.

Table 2. *Cross-reference of Selected Old and New Designations*

Old	New
SX1	SH1
SX2	SH2
DX1X3	DH1L1

EXAMPLE

DCA / 4-20MA / **D H 1 L1** / 117AC [STD]

Dual Alarm
High Alarm
Fail-safe
Low Alarm
Fail-safe

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.

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