MOORE INDUSTRIES

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DIN-style
Direct Current Alarm

DDA

DDA *DIN-style Direct Current Alarm*

Table of Contents

List of Figures and Tables

DDA

Introduction

Moore Industries' DIN-style Direct Current alarm, the DDA, accepts all standard process current and voltage inputs and provides an alarm response to input that falls outside of an adjustable preset limit. The DDA comes in single- and dual- alarm models. The dual-alarm model allows two separate trip points to be configured per module.

This manual contains the information necessary to calibrate, install, operate, maintain, and troubleshoot the DDA. It includes a brief unit description, a table of performance and operational specifications, and an explanation of Moore Industries' model number based product data tracking system.

The following guidelines are used throughout the manual:

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

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

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

Description

The DDA is a 4-wire, process alarm that is powered by an external 24 Vdc power source. It accepts standard process current or voltage (factory-set) and responds to a user-adjustable trip point by changing the output state when the input exceeds the trip point setting. The output is either a normally-open (NO) or normally-closed (NC) relay contact-closure (standard), or an opto-isolated, open-collector transistor (optional).

The DDA is factory-set for single- or dual-alarm operation. Standard single-alarm units have a double-pole, double-throw (DPDT) relay output (output A). Standard dual-alarm units have two single-pole, double-throw (SPDT) relay outputs (outputs A and B).

The standard DDA has a built-in 1.0 percent dead band. The unit resets when the input signal has crossed over the trip point on its return to the user-selected non-alarm range, and is 1.0 percent of span beyond the trip point.

The unit housing is a plastic, DIN-style case that can be mounted on either a DIN-style top-hat rail (standard) or G-rail (optional). Refer to the Installation Section for housing dimensions.

Specifications

Peformance	**Display Accuracy:** ±0.1% of input span; ±1 count to include repeatability, hysteresis, and adjustment resolution **Repeatability:** Trip point repeats within ±0.1% of input span **Dead Band:** 1% of input span (standard) **Signal Response:** -3dB @ 5Hz typical (low pass) **Alarm Response:** 50 milliseconds standard **Isolation:** 500Vac, input to output to power	**Peformance (continued)**	**RFI/EMI Effect:** With field strengths of 10V/m, at frequencies of 20-500 Mhz, unit will not go into alarm status unless process variable is within ±1.0% of trip point	**Adjustments (continued)**	**Internal Adjustments Type:** Multiturn potentiometers **Zero:** Adjustable to ±10% of span **Span:** With full scale input, output is adjustable to 100%, ±10% of span.
		Ambient Temperature	**Range:** -18°C to 65°C (0°F to 149°F) **Effect:** ±0.018% of span/°C	**Indicators**	**Display:** 3½ digit LCD displays either Input, Trip A setting, or Trip B setting as determined by rotary switch; display indicates from -5.0% to 105% of input span and id linear with respect to the input signal **Trip Point:** Led(s) on front panel indicates alarm status for each trip point ("ON" LED indicates energized relay)
		Adjustments	**Front Panel Adjustments** **Type:** Multiturn potentiometers **Trip Point(s):** Adjust over a range of -5% to 105% of span, typical **Input/Trip Point Viewing:** Two or three-position rotary switch allows selection of viewing the Input, Trip A, or Trip B on the integral LCD	**Weight**	297 grams (10.5 ounces)

DDA

Ordering Information

Unit	Input	Output	Power	Options	Housing
DDA	Current: **0-20 mA** @25Ω **1-5 mA** @100Ω **4-20 mA** @25Ω **10-50 mA** @10Ω Voltage @ 1MΩ **0-1V** **0-5V** **1-5V** **0-10V**	**Alarm Configuration:** (High/Low and Failsafe/Non-Failsafe are jumper-selectable) **SH1** Single, High, Failsafe **SH2** Single, High, Non-Failsafe **SL1** Single, Low, Failsafe **SL2** Single, Low, Non-Failsafe **DH1L1** Dual, High/Low, Failsafe **DH2L2** Dual, High/Low, Non-Failsafe **DH1H1** Dual, High/High, Failsafe **DH2H2** Dual, High/High, Non-Failsafe **DL1L1** Dual, Low/Low, Failsafe **DL2L2** Dual, Low/Low, Non-Failsafe (DPDT relays standard on single alarms, SPDT relays standard on dual alarms; relay contacts rated 5A @ 116Vac or 28Vdc or 2A @ 249Vac; all non-inductive loads, 50/60Hz)	**24DC** Accepts 24Vdc, ±10% (1.5 to 2.5 watts nominal; 3.3 watts max., with TX option)	**-AD** Adjustable Deadband **-AR** Alarm Response time delay **-DA** Deviation Alarm **-DPSTNO** DPST Normally Open relays (dual alarms) **-DPSTNONC** DPST with one Normally Open and one Normally Closed contact per relay (dual alarms) **-EU** Indicator displays in engineering units **-GR** Adaptor for mounting on a DIN (50035-G32) G-rail **-HS** Hermetically Sealed relays **-MR** Manual Reset **-TSO** Transistor Switch Output **-TX** 2-wire Transmitter Excitation	**DIN** Thermoplastic, DIN-style rail (35mm Top Hat Rail) mount housing with removable terminal blocks.

DDA Model Numbers

To order additional or replacement modules for your system, refer to the Ordering Information table and "build" a model number using the information in bold text. Specify the following in order:

Product / Input / Output / Power / Option [Housing]

For example, specify:

DDA / 4-20MA / DH1L2 / 24DC / -AR5 [DIN]

Options

The following options are available with the DDA:

AD Option. *Adjustable Deadband.* Allows you to adjust the deadband to any value between 1 and 20 percent of span. (Not available with MR Option.)

AR Option. *Alarm Response delay.* A factory-set option which causes the output to react to an alarm condition after a specified time delay. The available delays are between 1-30 seconds.

DA Option. *Deviation Alarm.* Accepts input from two sources and then displays a value that is proportional to the *difference* between the two signals. When both input signals are equal to each other, the LCD will display 50.0 percent. This is true regardless of what the actual value of the inputs are, as long as they are of equal value. If either input signal varies, the proportional difference between the two values will be added to or subtracted from the *balanced* indication of 50.0 percent that is displayed on the LCD. (Not available with TX Option.)

DPSTNO Option. *Double-Pole/Single-Throw with Normally Open relays*. Requires dual alarms.

DPSTNC Option. *DPST Normally Closed relays.* Requires dual alarms.

DPSTNONC Option. *DPST with one normally open and one normally closed contact per relay.* Requires dual alarms.

EU Option. *Engineering Units*. Provides user-selectable values for display in the range of 0-200 through 0-1999. (Consult factory for engineering unit values not starting at zero.) This option also allows for changing the position of the decimal point to any one of three locations.

GR Option. *G-Rail.* Adaptor for mounting on a DIN (EN50035) G-rail.

HS Option. *Hermetically sealed* relays rated 3A @ 28Vdc non-inductive or 1A @ 120Vac non-inductive, 50/60Hz.

MR Option. *Manual Reset.* A pair of terminals (labeled "RS" and located on the same terminal strip as the other alarm output contacts) are provided for each output. These must be shorted momentarily to clear an alarm condition. (Non-latching pushbuttons must be supplied by the user. Toggle or latching switches are not recommended because the alarm cannot go into an alarm state if the RS terminals are permanently closed.) (Not available with the AD Option.)

Note:
Units equipped with the MR option must be reset manually after input returns to a non-alarm level.

TSO Option. *Transistor Switch Output.* Provides an open-collector transistor output instead of the standard contact closure relay(s). Can switch 60mA at 60Vdc maximum.

TX Option. *Transmitter Excitation.* Provides 24 Vdc at 25 mA to drive a process loop directly from the DDA. (Not available with the DA Option or with 10-50 mA input units.)

Calibration

Prior to shipment, every DDA is subjected to rigorous testing by our team of skilled technicians. Every product Moore Industries manufactures, sells and services is guaranteed to meet the strict quality standards that have become synonymous with our name.

Before placing your DDA into service, a bench check of basic operation is recommended to ensure that the unit hasn't sustained any damage during transit, and to set zero and span for your application.

Every unit should be:

- Checked to verify that the appropriate DDA model has been ordered for the intended application.
- Connected in a calibration setup and checked for desired output.
- Adjusted for desired zero and span.
- Checked for proper trip point, TSO output or relay function.

Even if a unit has been configured to your specifications by the factory (factory calibration), it is a good idea to perform a simple bench check. The procedures provide a safe means to uncover any unit damage that may have occurred during shipping, and offer a familiarization with DDA operation in the safety of a testing environment, separate from the intended process or application.

These procedures should be carried out in an environment appropriate for general testing of electronic equipment. Use a technician's bench or a similar, lab-type environment.

The DDA has internal and external potentiometer adjustments. All configuration jumpers are inside the unit. Some user-selectable features require a combination of potentiometer adjustments and jumper settings to set them. Use of the jumpers and potentiometers is described later in this section.

Although the front panel LCD and LEDs are very useful for making adjustments, additional test equipment is required to bench check and calibrate the DDA. A list of the calibration equipment required and its hookup are described later in this section.

DDA

Alarm Terminology

Moore Industries suggests that all users take a few moments to become familiar with some of the terms associated with the use of process instrumentation alarms.

Figure 1 illustrates the way the DDA alarm operates. For more in depth information, contact the factory for a copy of Moore Industries' publication *"Alarm Trips: The Ups and Downs"*.

Trip Point is the process input level at which the user wants an alarm relay to change state, typically going into an alarm condition, or *"tripping"*. The DDA alarm trip point is set by adjusting the TRIP potentiometer.

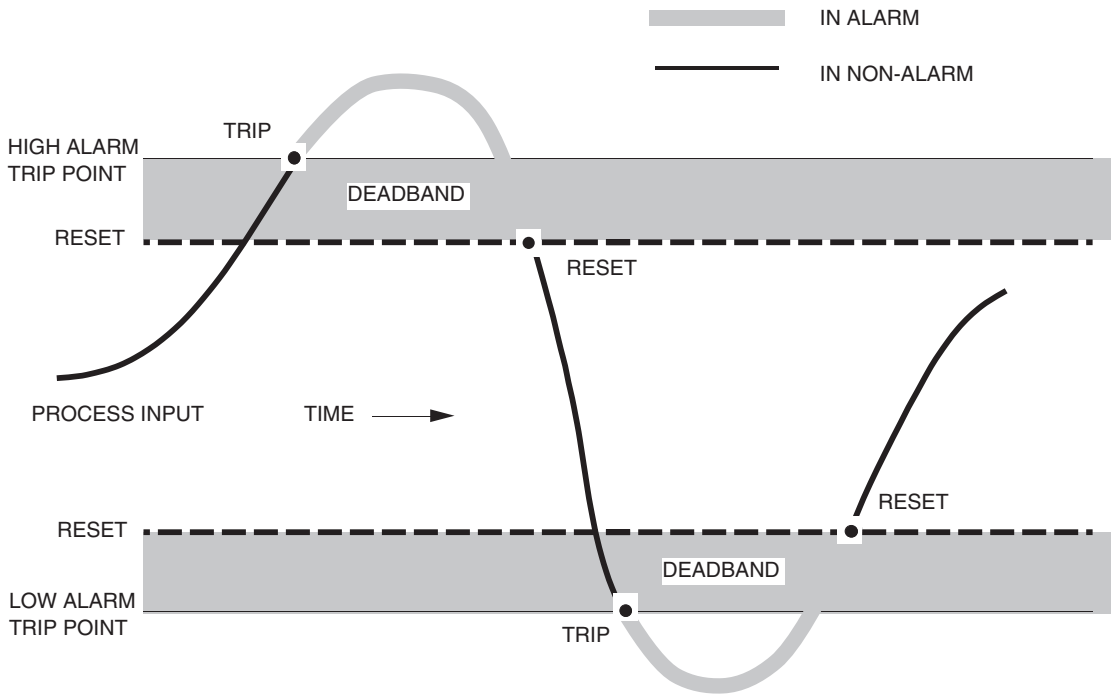
High Alarms trip when the process input goes above the trip point. **Low Alarms** trip when the process input drops below the trip point. The DDA alarm output can be set to function as either a high or low alarm.

Reset Point is the process input level at which the alarm relay changes state, going from alarm to non-alarm. The reset point is not necessarily the same as the trip point, because most applications call for a buffer zone or *"deadband"* around the trip point to allow for minute fluctuations in the process input.

Deadband is the range in which an alarm 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. The standard deadband for the DDA is 1% of the input span unless the unit is equipped with the AD option. AD units have an adjustable deadband of 1-20% of the input span.

The relays of a **Failsafe Alarm** are de-energized when tripped or power is lost, energized when the process input is at a non-alarm level. **Non-failsafe Alarm** relays are energized when tripped, de-energized when the process input is at a non-alarm level. The DDA alarm option can be switched from failsafe to non-failsafe at any time by changing the jumper settings.

Figure 1. *How the DDA Alarm Operates*



DDA Controls

The DDA's controls consist of: the Display Control located on the front panel, the internal jumpers, and the internal and external potentiometer adjustments.

Display Control. The Display Control allows you to select the currently applied input signal or a trip point setting for viewing on the LCD.

When the Display Control is rotated to the position labeled "INPUT", the LCD displays a percent of span. For units equipped with the EU Option, the displayed values depend on the user-selected range that the unit is configured for.

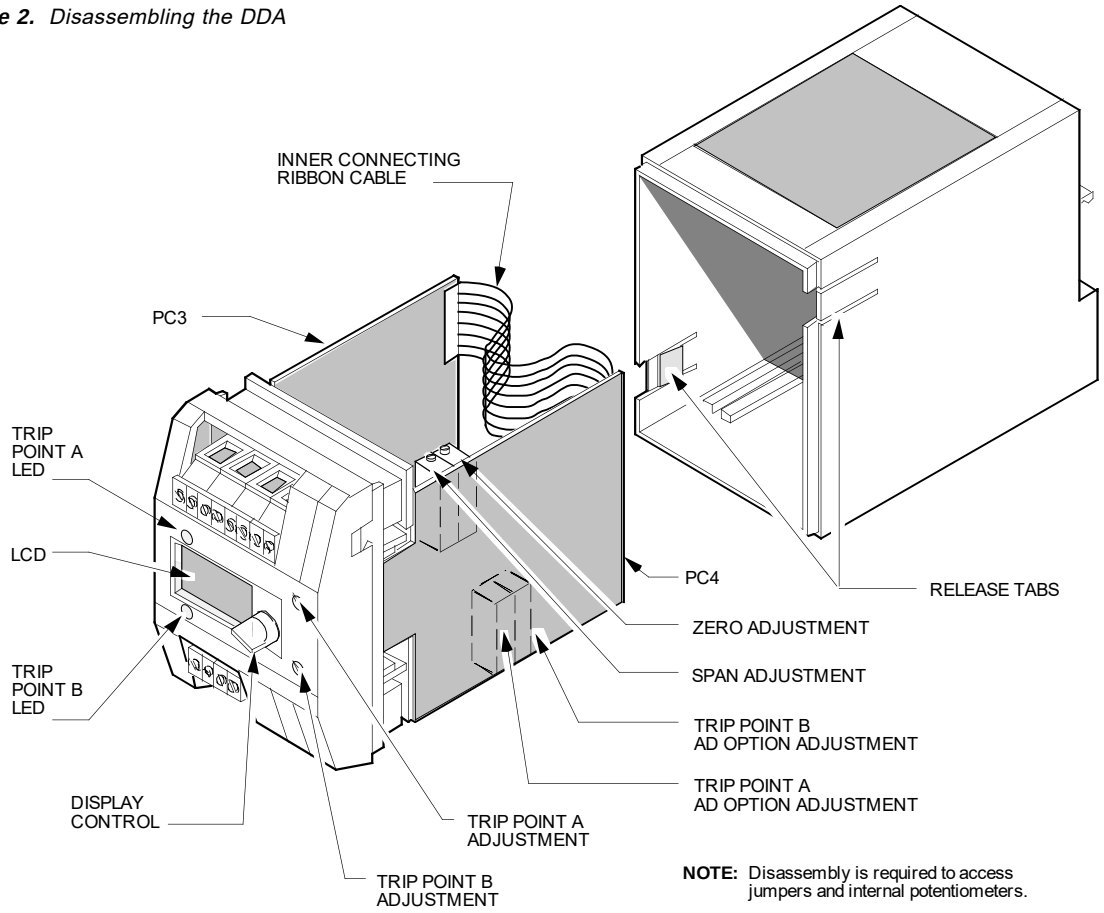
To view the A or B trip point setting, rotate the Display Control to the position labeled "A" or "B", respectively. The trip point setting(s) can be varied at this point by adjusting the corresponding trip point potentiometer.

Single-alarm units have a single trip point setting designated as "A" on the front panel. Rotating the Display Control to position A displays the trip point setting for output A in a percent of span for standard units (a unique value is displayed for DDAs with the EU Option). The A trip point potentiometer is used to adjust the trip point setting to the desired value (see Figure 2).

Dual-alarm units have two trip point settings: A and B. Rotating the Display Control to either trip point displays the corresponding trip point setting on the LCD. A separate potentiometer is provided for each trip point. Single-alarm units have only an "A" trip point potentiometer. Figure 2 shows the location of the trip point potentiometers for dual and single-alarm units. Single-alarm units do not have "B" trip point potentiometers.

Units equipped with the Engineering Units (EU) Option display the input and trip point values in user-specified units-of-measure.

Figure 2. *Disassembling the DDA*



DDA

Jumpers. The DDA is field-configured with removable jumpers for the following functions:

- High- or low-alarm configuration
- Failsafe or non-failsafe operation
- Engineering units range (EU Option)
- Decimal point position on the LCD (EU Option)

All jumpers are located on PC4 (see Figure 2). These are accessed by removing the DIN housing. To remove the housing, pry each of the release tabs outward with a screwdriver. After the first release tab is open, pull the unit forward to keep the tab from reinserting itself. Use the screwdriver to pry out the second tab, then pull the unit from the housing. The jumper and potentiometer locations are shown in Figure 3.

Table 1 (see page 7) lists the jumper settings for failsafe or non-failsafe modes. Table 2 (see page 7) lists the jumper settings for high- or low-alarm operation. Table 3 (see page 7) lists the jumper settings for the EU Option and decimal point position.

Match the jumper designations in Figure 3 with the jumper tables to identify the location of the jumper pins to be shorted.

Caution:

Use static control procedures when changing jumper settings in order to avoid damaging the DDA's internal components.

Potentiometers. The trip point adjustments are the external potentiometers located on the front panel. One trip-point potentiometer is provided for single-alarm units, and two are provided for dual-alarm units. The trip point potentiometers vary the trip point settings within the established display range of the unit. Figure 2 on page 5 shows the location of trip point potentiometers A and B.

The Zero and Span Potentiometers and the Adjustable Dead Band Potentiometers (with AD Option only) are adjusted internally. These potentiometers are located on PC4. The DDA must be disassembled to access them. Figure 3 shows the location of these potentiometers on PC4.

Figure 3. *PC4 Component Locations*

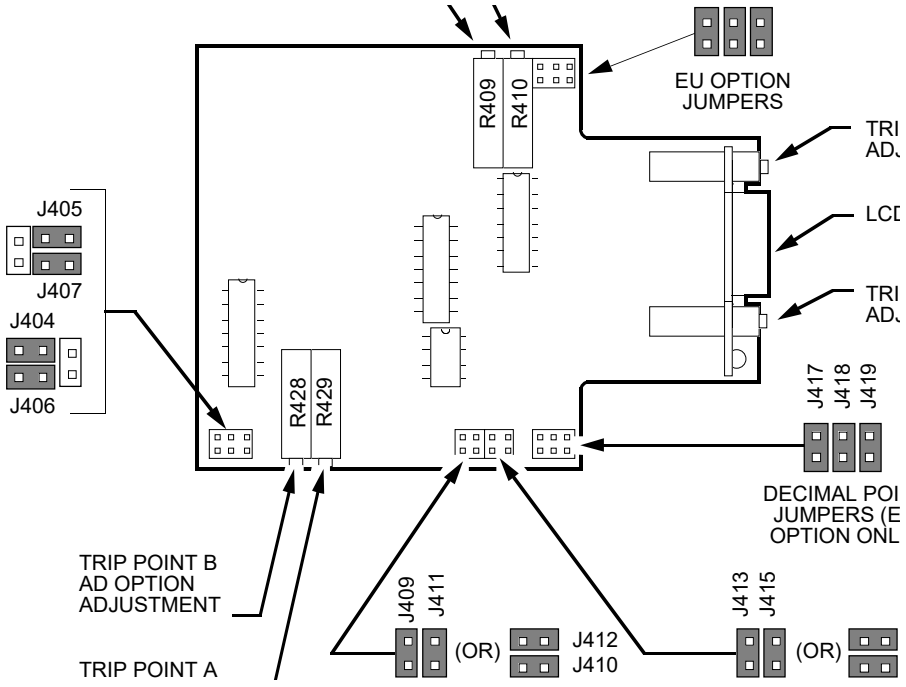


Table 1. *Failsafe/Non-failsafe Jumper Settings*

Channel/Mode	J406	J407
A/Failsafe	Installed	Stored
A/Non-Failsafe	Stored	Installed
	J404	**J405**
B/Failsafe	Installed	Stored
B/Non-Failsafe	Stored	Installed

Table 2. *High/Low Alarm Jumper Settings*

Channel/ Status	Jumpers			
	J409	**J410**	**J411**	**J412**
A/High	Stored	Installed	Stored	Installed
A/Low	Installed	Stored	Installed	Stored
	J413	**J414**	**J415**	**J416**
B/High	Stored	Installed	Stored	Installed
B/Low	Installed	Stored	Installed	Stored

Table 3. *EU Option Display Range Jumper Settings*

Display Ranges	Range Jumpers			Decimal Point Jumpers		
	J401	**J402**	**J403**	**J417**	**J418**	**J418**
0-.200 to 0-.249	Stored	Stored	Installed	Stored	Stored	Installed
0-.250 to 0-.499	Stored	Installed	Stored	Stored	Stored	Installed
0-.500 to 0-.999	Installed	Stored	Stored	Stored	Stored	Installed
0-1.000 to 0-1.999	Stored	Stored	Stored	Stored	Stored	Installed
0-2.00 to 0-2.49	Stored	Stored	Installed	Stored	Installed	Stored
0-2.50 to 0-4.99	Stored	Installed	Stored	Stored	Installed	Stored
0-5.00 to 0-9.99	Installed	Stored	Stored	Stored	Installed	Stored
0-10.00 to 0-19.99	Stored	Stored	Stored	Stored	Installed	Stored
0-20.0 to 0-24.9	Stored	Stored	Installed	Installed	Stored	Stored
0-25.0 to 0-49.0	Stored	Installed	Stored	Installed	Stored	Stored
0-50.0 to 0-99.9	Installed	Stored	Stored	Installed	Stored	Stored
0-100.0 to 0-199.9	Stored	Stored	Stored	Installed	Stored	Stored
0-200 to 0-249	Stored	Stored	Installed	Stored	Stored	Stored
0-250 to 0-499	Stored	Installed	Stored	Stored	Stored	Stored
0-500 to 0-999	Installed	Stored	Stored	Stored	Stored	Stored
0-1000 to 0-1999	Stored	Stored	Stored	Stored	Stored	Stored

Calibration Setup

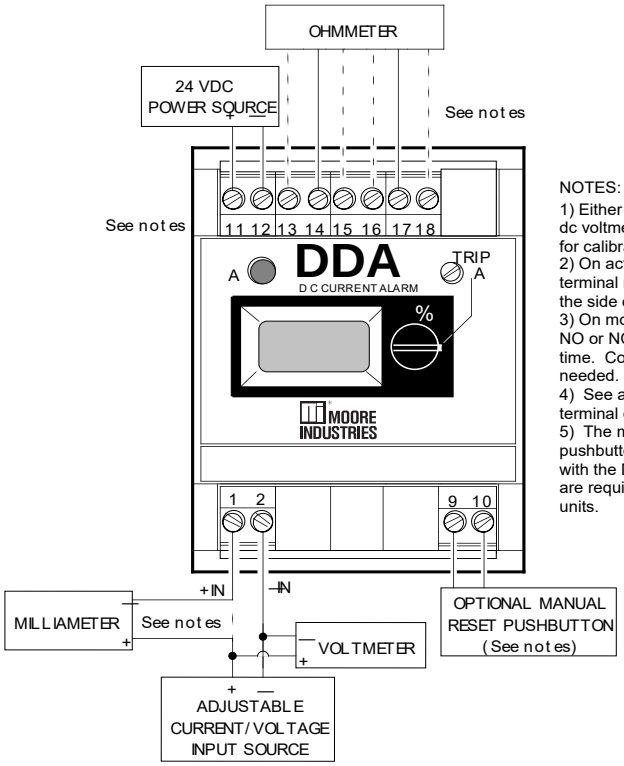
Table 4 lists the equipment required to calibrate the DDA.

Figures 4 and 5 (see pages 8 and 9, respectively) show the calibration hookup required for single- and dual-alarm units with relay outputs. Figures 6 and 7 (see pages 9 and 10, respectively) show the hookup required for single- and dual-alarm units with the TSO Option. Figure 8 on page 10 shows the hookup required to calibrate a unit with the (DA) Option. The tables adjacent to each drawing contain the terminal designations. Use these in conjunction with the calibration drawings to connect the DDA.

Table 4. *Calibration Equipment*

Equipment	Description
Adjustable Current or Voltage Source	Appropriate for the input type and capable of producing the input range necessary for the unit (two sources required for -DA option)
Ohmmeter	Accurate to within 1%
DC Voltmeter (optional)	Voltmeter: accuracy to 0.05% or better
Milliammeter (optional)	Accuracy of 0.05% or better
Power Supply	24Vdc @ 1A
Screwdriver	Slotted-head; head width no greater than 2.54 mm (0.1 in)

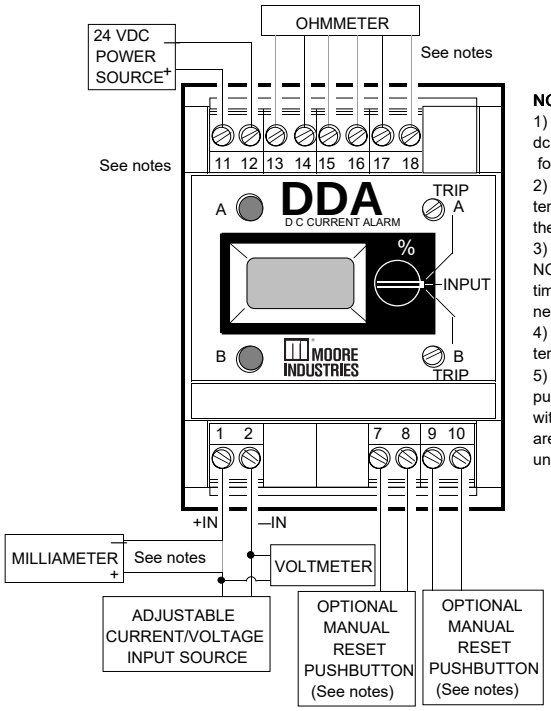
Figure 4. *Calibrating the Single-alarm DDA*



NOTES:
1) Either a milliameter or a dc voltmeter is required for calibraion, but not both.
2) On actual units, the terminal numbers appear on the side of the unit.
3) On most ohmmeters, only NO or NC can be tested at a time. Connect the one that is needed.
4) See adjacent table for terminal designations.
5) The manual reset pushbuttons are not supplied with the DDA, however, they are required for MR equipped units.

Terminal Numbers	Terminal Numbers
1	+IN
2	-IN
9	Manual Reset (Optional)
10	Manual Reset (Optional)
11	+ Power
12	- Power
13	Normally Open, Contact 1
14	Common, Contact 1
15	Normally Closed, Contact 1
16	Normally Open, Contact 2
17	Common, Contact 2
18	Normally Closed, Contact 2

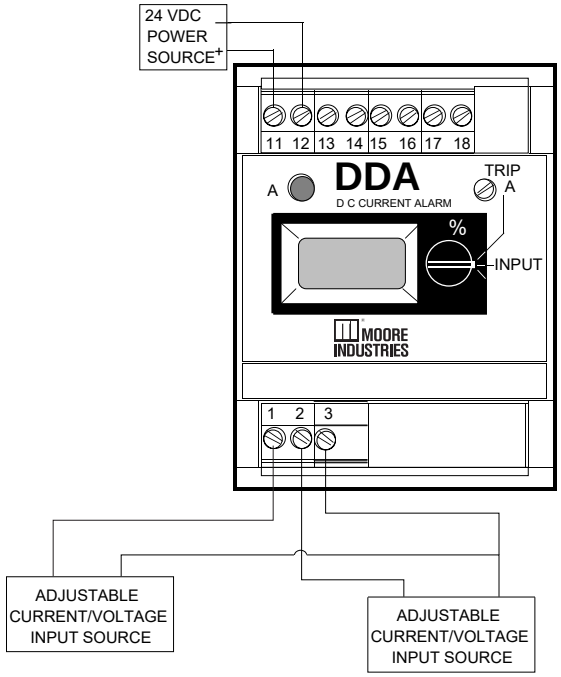
***Figure 5**. Calibrating the Dual-alarm DDA*



NOTES:
1) Either a millammeter or a dc voltmeter is required for calibration, but not both.
2) On actual units, the terminal numbers appear on the side of the unit.
3) On most ohmmeters, only NO or NC can be tested at a time. Connect the one that is needed.
4) See the adjacent table for terminal desegnations.
5) The manual reset pushbuttons are not supplied with the DDA, however they are required for MR equipped units.

Terminal Numbers	Terminal Labels
1	+IN
2	-IN
7	Channel B, Manual Reset, (Optional)
8	Channel B, Manual Reset, (Optional)
9	Channel A, Manual Reset, (Optional)
10	Channel A, Manual Reset, (Optional)
11	+ Power
12	- Power
13	Channel A, Normally Open
14	Channel A, Common
15	Channel A, Normally Closed
16	Channel B, Normally Open
17	Channel B, Common
18	Channel B, Normally Closed

***Figure 6.** Calibrating Single-alarm DDAs with the Transistor Switch Output Option*

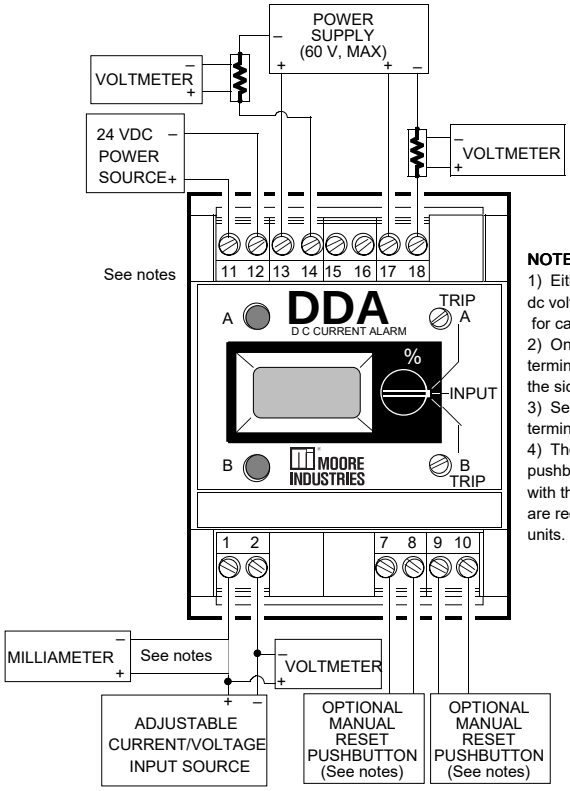


NOTES:
1) On actual units, the terminal numbers apear on the side of the unit.
2) See adjacent table for terminal designations.

Terminal Numbers	Terminal Labels
1	+IN
2	-IN
9	Manual Reset, (Optional)
10	Manual Reset, (Optional)
11	+ Power
12	- Power
13	+ Transistor Switch Output
14	- Transistor Switch Output

DDA

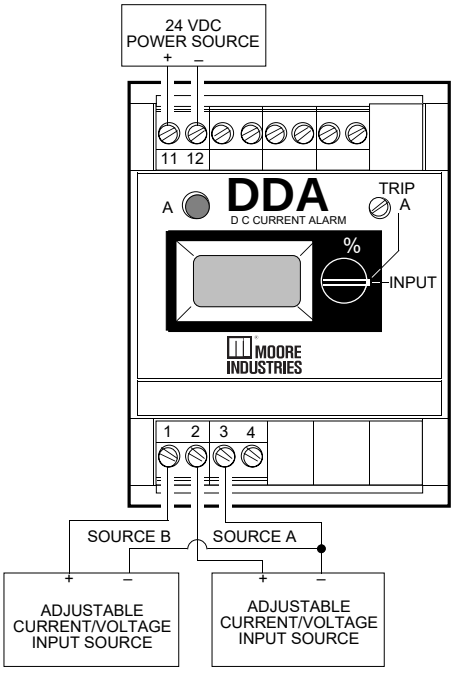
Figure 7. *Calibrating the Dual-alarm DDA with the Transistor Switch Output Option*



NOTES:
1) Either a millammeter or a dc voltmeter is required for calibration, but not both.
2) On actual units, the terminal numbers appear on the side of the unit.
3) See the adjacent table for terminal designations.
4) The manual reset pushbuttons are not supplied with the DDA, however they are required for MR equipped units.

Terminal Numbers	Terminal Labels
1	+IN
2	-IN
7	Channel B, Manual Reset, (Optional)
8	Channel B, Manual Reset, (Optional)
9	Channel A, Manual Reset, (Optional)
10	Channel A, Manual Reset, (Optional)
11	+ Power
12	- Power
13	+ Channel A, Transistor Switch Output
14	- Channel A, Transistor Switch Output
17	+ Channel B, Transistor Switch Output
18	- Channel B, Transistor Switch Output

Figure 8. *Calibrating the DDA with the Deviation Alarm Option*



Notes:
1) On actual units, the terminal numbers appear on the side of the unit.
2) See the adjacent table for terminal designations.

Terminal Numbers	Terminal Labels
1	+IN
2	+ Reference
3	Common
11	+ Power
12	- Power

Calibration Procedures

Note:
Before calibration, partially disassemble the DDA (see Figures 2 and 3 on pages 5 and 6, respectively).

DA equipped DDAs are calibrated differently than standard units (see page 12).

To calibrate the DDA:

1. **Set jumpers J409 through J416 on PC4 for a high- or low-alarm (see Table 2 on page 7 and Figure 3 on page 6).**
2. **Connect the DDA in the correct calibration hookup (see Figures 4-7 on pages 8-10).**
3. **Turn the Display Control to INPUT.**
4. **Apply power to the unit.**
5. **Set the input signal to 0 percent of the input range. The DDA display should read 00.0. If not, adjust the Zero Potentiometer (R409) until 00.0 is displayed.**

Note:
On EU-equipped DDAs, the display may be set to any user-selected value less than 1999 by adjusting the Zero potentiometer (R409) (refer to Table 3 on page 7).

6. **Set the input signal source to 100 percent of the input range. The DDA's display should read 100.0. If not, adjust the Span Potentiometer (R410) until 100.0 is displayed (see Figure 3 on page 6).**

Note:
For units with the EU option, the display may be set to any user-selected value less than 1999 by adjusting the Span potentiometer (R410) (refer to Table 3 on page 7).

7. **Verify the 0 and 100 percent readings by repeating steps 5-6. Then apply 25-, 50-, and 75 percent inputs to verify that the input is linear. If the input is not linear, repeat steps 5-6.**
8. **Turn the Display Control to TRIP A.**
9. **Adjust the TRIP A Potentiometer for a display reading of the desired trip point value, as a percent of span.**
10. **For dual alarm units, turn the Display Control to TRIP B and repeat step 9 using the TRIP B Potentiometer.**
11. **Turn the Display Control to INPUT and set the input source to a value outside the alarm range.**
12. **Observe the DDA output (A or B) with an output monitoring device and increase or decrease the input towards the trip point setting.**
13. **Verify the output trips at selected trip point settings by observing the reaction of the ohmmeter.**
14. **Increase and decrease the input through the trip point setting and verify that the output changes state.**

Note:
Units with the MR Option require manual resetting after the input has exceeded the trip point. Reset the trip point manually after returning to the non-alarm range.

Units with the AR Option will trip after the input has remained beyond the trip point setting for the built-in time delay.

Units with the AD Option will reset at a user-selected setting (see page 12).

15. **Disconnect calibration equipment and re-assemble the DDA.**

DDA

Setting Deadband for AD Equipped Units

The Adjustable Dead Band (AD) Option provides an adjustable 1-20 percent deadband. After calibrating the DDA, deadband is set for AD equipped units by performing the following steps:

1. **Turn the Deadband A Potentiometer (R429) fully counterclockwise (see Figure 3 on page 6).**
2. **Apply power and an input signal equal to the desired trip point setting.**
3. **Slowly turn the TRIP A Potentiometer on the front panel until the unit goes into an alarm state. Then turn the Deadband A Potentiometer fully clockwise.**
4. **Apply an input signal equal to the desired reset point. Slowly turn the Deadband A potentiometer counterclockwise until the alarm resets (output returns to a non-alarm state).**
5. **Increase and decrease input through trip point and deadband to verify reaction of output.**
6. **For dual alarm units, repeat steps 1 through 5 for trip point B using the TRIP B and Deadband B Potentiometers**

Calibrating a Unit with the DA Option

To calibrate units equipped with the DA Option, the DDA must be set up as shown in Figure 8 on page 10. Two input sources are required for this calibration procedure.

To calibrate DA equipped units:

1. **Set input source A to 100 percent of input span and source B to 0 percent of input span.**
2. **Adjust the Zero Potentiometer to a display reading of 00.0.**
3. **Set input source A to 0 percent of input span and source B to 100 percent of input span.**
4. **Adjust the Span Potentiometer for a display reading of 100.0.**
5. **Set the input sources to the same values within the input span range. Verify that the display reading is 50.0.**
6. **Select another value within the input span and set both sources to the new value. Verify that the display reading is 50.0.**
7. **Change the input settings to various values and note that the display changes in proportion to the difference in the two inputs by adding or subtracting the difference from 50.0 percent.**
8. **Disconnect the calibration equipment and reassemble the DDA.**

Installation

Installing the DDA consists of physically mounting the unit and making the appropriate electrical connections.

Mounting the DDA

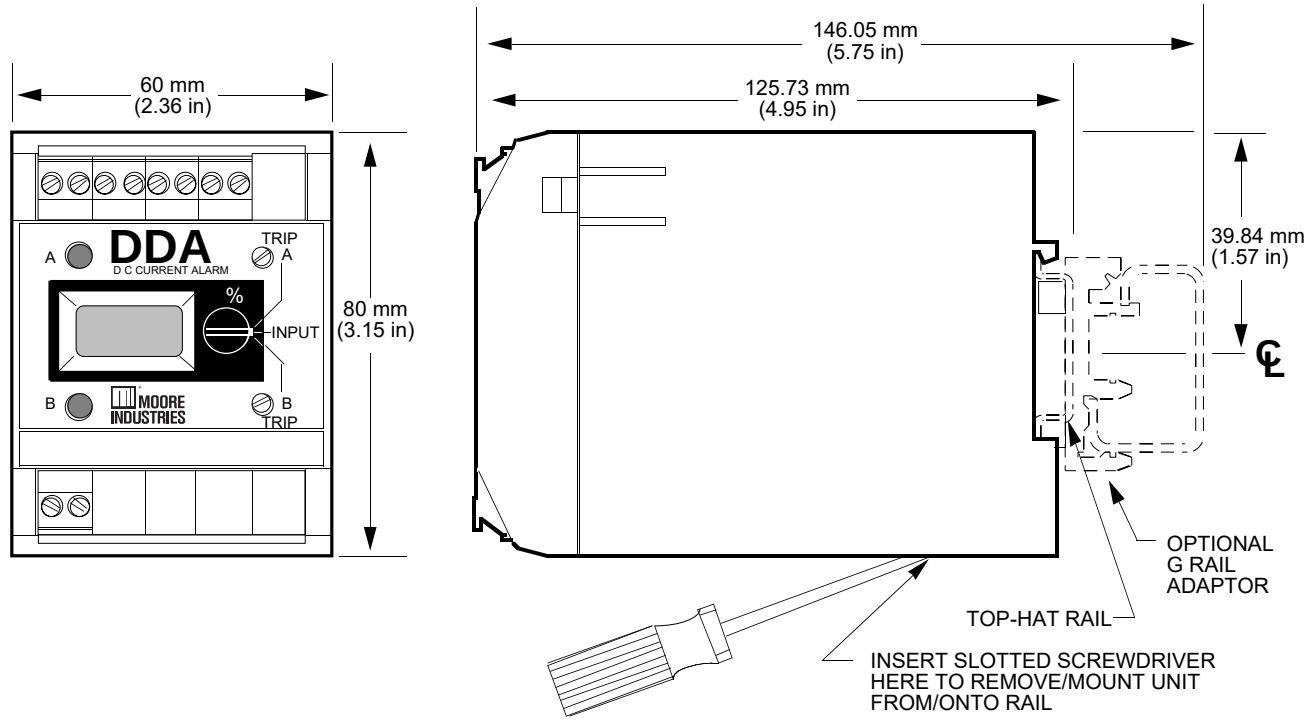
The standard DDA is designed to mount directly on a DIN-style, top-hat rail. With the optional DIN-style G-rail adaptor, the DDA can also be mounted on a DIN-style G-rail.

To mount the DDA on hat rail, place the upper extrusion on the back of the unit over the top edge of the hat rail. Insert the screwdriver over the bottom edge of the sliding retainer clip. Pull the clip down until the unit snaps onto the hat rail.

Figure 9 shows the outline dimensions of the DDA.

Note:
Attention should be given to spacing beneath the unit to ensure adequate room for inserting the screwdriver required to mount and remove the unit (see Figure 9).

Figure 9. *Dimensions of the DDA*



Making the Electrical Connections

All electrical connections are made to removable blocks across the top and bottom of the front panel. Terminals are labeled on the top and bottom surfaces of the unit with the corresponding connection for each terminal.

Figures 10-20 on pages 14-21 illustrate typical installation hookups for the DDA. The tables adjacent to each drawing contain the terminal designations. Use these in conjunction with the drawings to install the DDA.

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.
- 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/or output signal wiring should be 2 inches.
- Static control procedures must be used when the cover or housing is removed from a unit.

CE Conformity

Installation of any Moore Industries products that carry the CE certification (Commission Electrotechnique) ***must*** adhere to the guidelines above in order to meet the requirements set forth in applicable EMC (Electromagnetic Compatibility) directives (EN55011, EN 50082-1, EN50082-2, etc.)

Consult the factory for the most current information on products that have been CE certified.

Operation

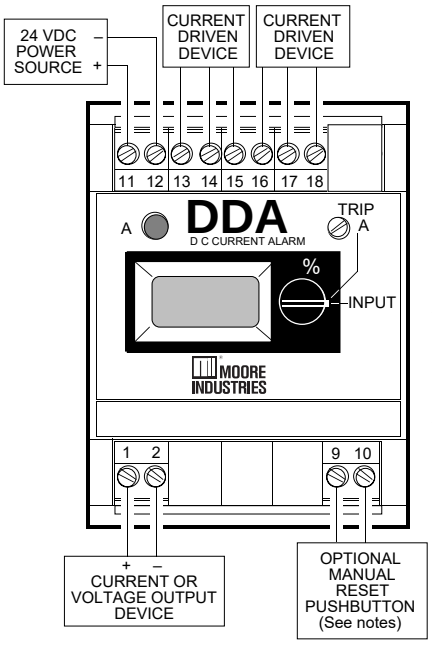
Once properly calibrated, connected, and powered, the DDA will operate reliably for an extended period of time. Unit maintenance is a simple check of terminal connections every six months. A specific maintenance schedule for the DDA should be developed based on the environment in which it is operated.

If a DDA begins to malfunction or to function below rated specifications, complete the following checklist before calling the factory for assistance:

- Verify that all electrical connections are clean and tight.
- Verify that the power source for the unit is supplying power at levels rated safe and appropriate according to product specifications.
- Verify that the process signal has not changed dramatically in an unexpected manner.
- Check the calibration of the instruments used in calibrating the DDA.
- Verify that other devices in the process loop are not the cause of the problem.
- Verify that input to output isolation still exists.
- If the unit is equipped with the MR option, verify that the shorting pushbutton is working properly.

If the difficulties continue, remove the unit from service and recalibrate. The removable terminal blocks on the front panel make it easy to replace the DDA without having to rewire.

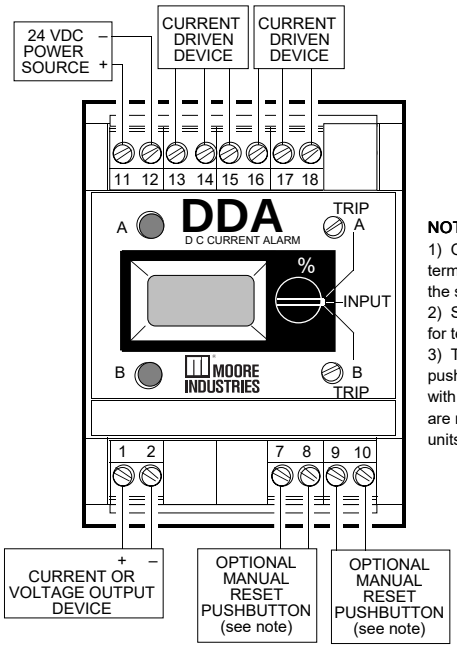
Figure 10. *Installing the Single-alarm DDA*



NOTE:
1) On actual units, the terminal numbers appear on the side of the unit.
2) See the adjacent table for terminal designations.
3) Manual Reset pushbutton is not supplied but is required for —MR equipped units.
4) The manual reset pushbutton is not supplied with the DDA, however it is required for MR equipped units.

Terminal Numbers	Terminal Labels
1	+IN
2	-IN
9	Manual Reset, (Optional)
10	Manual Reset, (Optional)
11	+ Power
12	- Power
13	Normally Open, Contact 1
14	Common, Contact 1
15	Normally Closed, Contact 1
16	Normally Open, Contact 2
17	Common, Contact 2
18	Normally Closed, Contact 2

Figure 11. *Installing the Dual-alarm DDA*

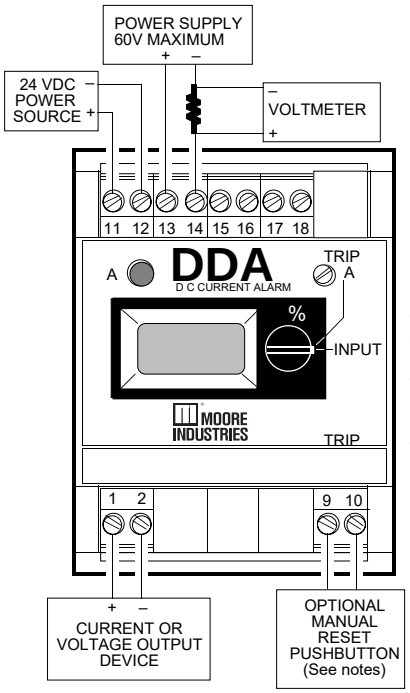


NOTE:
1) On actual units, the terminal numbers appear on the side of the unit.
2) See the adjacent table for terminal designations.
3) The manual reset pushbuttons are not supplied with the DDA, however they are required for MR equipped units.

Terminal Numbers	Terminal Labels
1	+IN
2	-IN
7	Channel B, Manual Reset, (Optional)
8	Channel B, Manual Reset, (Optional)
9	Channel A, Manual Reset, (Optional)
10	Channel A, Manual Reset, (Optional)
11	+ Power
12	- Power
13	Channel A, Normally Open
14	Channel A, Common
15	Channel A, Normally Closed
16	Channel B, Normally Open
17	Channel B, Common
18	Channel B, Normally Closed

DDA

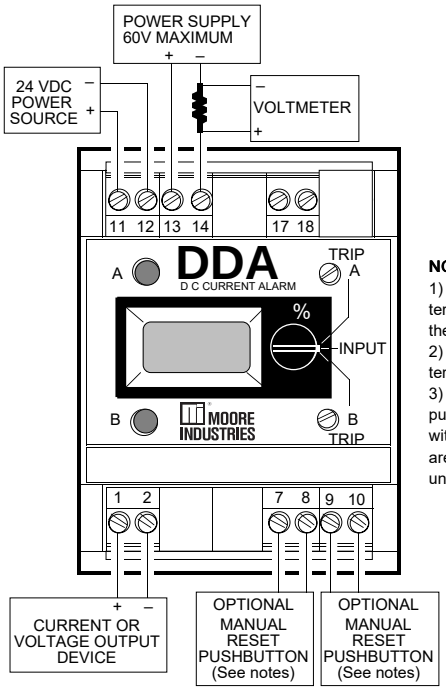
Figure 12. *Installing the Single-alarm DDA with the Transistor Switch Output Option*



NOTE:
1) On actual units, the terminal numbers appear on the side of the unit.
2) See the adjacent table for terminal designations.
3) The manual reset pushbutton is not supplied with the DDA, however it is required for MR equipped units.

Terminal Numbers	Terminal Labels
1	+IN
2	-IN
9	Manual Reset, (Optional)
10	Manual Reset, (Optional)
11	+ Power
12	- Power
13	+ Transistor Switch Output
14	- Transistor Switch Output

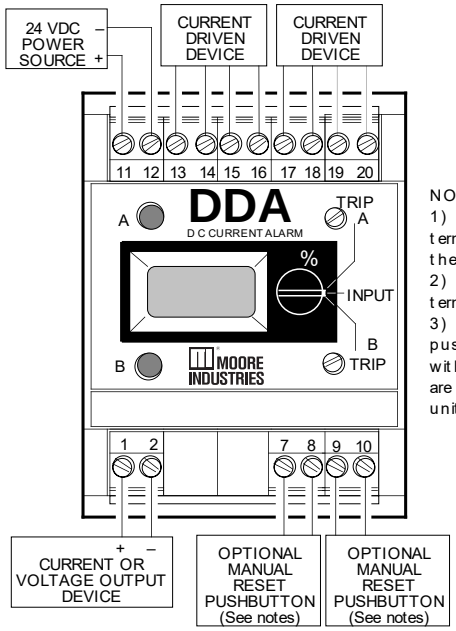
Figure 13. *Installing the Dual-alarm DDA with the Transistor Switch Output Option*



NOTE:
1) On actual units, the terminal numbers appear on the side of the unit.
2) See adjacent table for terminal designations.
3) The manual reset pushbuttons are not supplied with the DDA, however they are required for MR equipped units.

Terminal Numbers	Terminal Labels
1	+IN
2	-IN
7	B Manual Reset, (Optional)
8	B Manual Reset, (Optional)
9	A Manual Reset, (Optional)
10	A Manual Reset, (Optional)
11	+ Power
12	- Power
13	+ A Transistor Switch Output
14	- A Transistor Switch Output
17	+ B Transistor Switch Output
18	- B Transistor Switch Output

Figure 14. *Installing the Dual-alarm DDA with the Double-Pole/Single-Throw, Normally Open Relays Option*

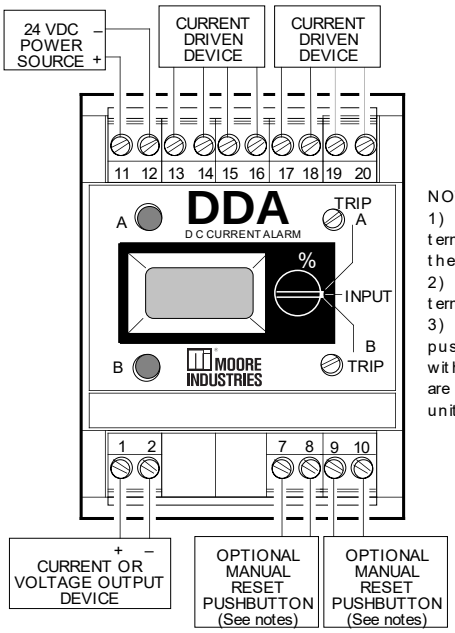


NOTE:
1) On actual units, the terminal numbers appear on the side of the unit.
2) See the adjacent table for terminal designations.
3) The manual reset pushbuttons are not supplied with the DDA, however they are required for MR equipped units.

Terminal Numbers	Terminal Labels
1	+IN
2	-IN
7	B Manual Reset, (Optional)
8	B Manual Reset, (Optional)
9	A Manual Reset, (Optional)
10	A Manual Reset, (Optional)
11	+ Power
12	- Power
13	Channel A, Normally Open, Contact 1
14	Channel A, Common, Contact 1
15	Channel A, Normally Open, Contact 2
16	Channel A, Common, Contact 2
17	Channel B, Normally Open, Contact 1
18	Channel B, Common, Contact 1
19	Channel B, Normally Open, Contact 2
20	Channel B, Common, Contact 2

DDA

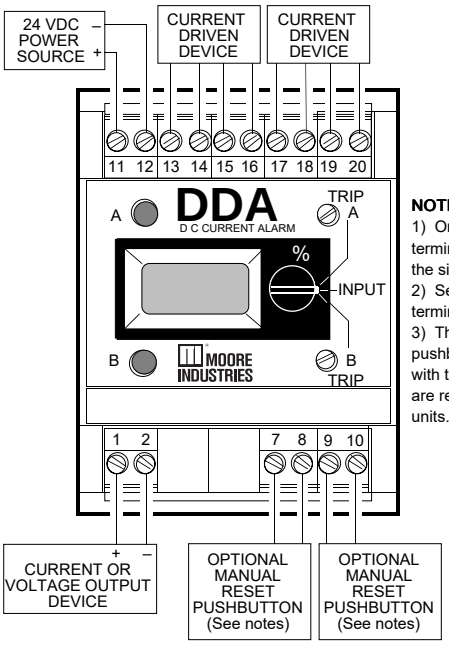
Figure 15. *Installing the Dual-alarm DDA with the Double-Pole/Single-Throw, Normally Closed Relays Option*



NOTE:
1) On actual units, the terminal numbers appear on the side of the unit.
2) See the adjacent table for terminal designations.
3) The manual reset pushbuttons are not supplied with the DDA, however they are required for MR equipped units.

Terminal Numbers	Terminal Labels
1	+IN
2	-IN
7	Channel B Manual Reset, (Optional)
8	Channel B Manual Reset, (Optional)
9	Channel A Manual Reset, (Optional)
10	Channel A Manual Reset, (Optional)
11	+ Power
12	- Power
13	Channel A, Normally Closed, Contact 1
14	Channel A, Common, Contact 1
15	Channel A, Normally Closed, Contact 2
16	Channel A, Common, Contact 2
17	Channel B, Normally Closed, Contact 1
18	Channel B, Common, Contact 1
19	Channel B, Normally Closed, Contact 2
20	Channel B, Common, Contact 2

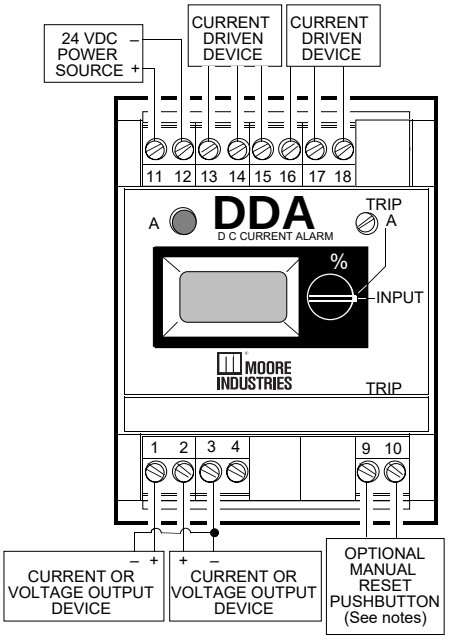
Figure 16. *Installing the Dual-alarm DDA with the Double-Pole/Single-Throw, Normally Open/Normally Closed Relays Option*



NOTE:
1) On actual units, the terminal numbers appear on the side of the unit.
2) See the adjacent table for terminal designations.
3) The manual reset pushbuttons are not supplied with the DDA, however they are required for MR equipped units.

Terminal Numbers	Terminal Labels
1	+IN
2	-IN
7	B Manual Reset, (Optional)
8	B Manual Reset, (Optional)
9	A Manual Reset, (Optional)
10	A Manual Reset, (Optional)
11	+ Power
12	- Power
13	Channel A, Normally Open, Contact 1
14	Channel A, Common, Contact 1
15	Channel A, Normally Closed, Contact 2
16	Channel A, Common, Contact 2
17	Channel B, Normally Open, Contact 1
18	Channel B, Common, Contact 1
19	Channel B, Normally Closed, Contact 2
20	Channel B, Common, Contact 2

Figure 17. *Installing the Single-alarm DDA with the Deviation Alarm Option*

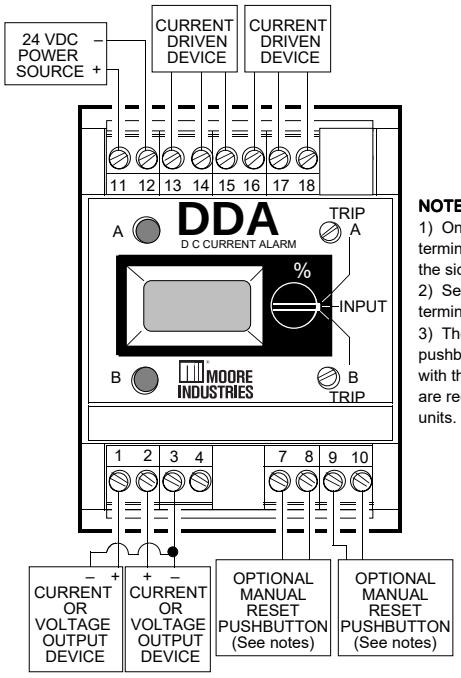


NOTE:
1) On actual units, the terminal numbers appear on the side of the unit.
2) See the adjacent table for terminal designations.
3) The manual reset pushbutton is not supplied with the DDA, however it is required for MR equipped units.

Terminal Numbers	Terminal Labels
1	+IN
2	+ Reference
3	Common
9	Manual Reset, (Optional)
10	Manual Reset, (Optional)
11	+ Power
12	- Power
13	Normally Open, Contact 1
14	Common, Contact 1
15	Normally Closed, Contact 1
16	Normally Open, Contact 2
17	Common, Contact 2
18	Normally Closed, Contact 2

DDA

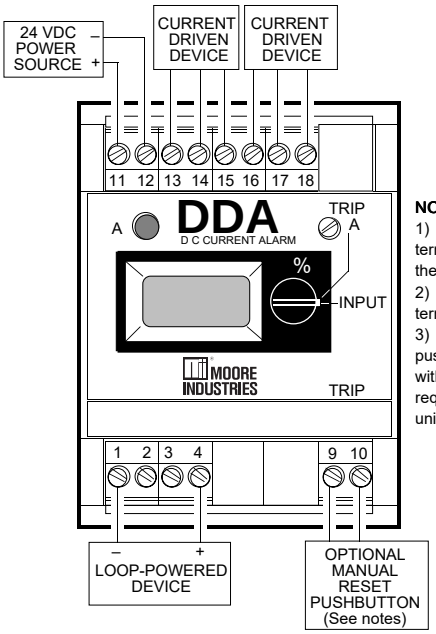
Figure 18. *Installing the Dual-alarm DDA with the Deviation Alarm Option*



NOTE:
1) On actual units, the terminal numbers appear on the side of the unit.
2) See the adjacent table for terminal designations.
3) The manual reset pushbuttons are not supplied with the DDA, however they are required for MR equipped units.

Terminal Numbers	Terminal Labels
1	+IN
2	+ Reference
3	Common
7	Channel B Manual Reset, (Optional)
8	Channel B Manual Reset, (Optional)
9	Channel A Manual Reset, (Optional)
10	Channel A Manual Reset, (Optional)
11	+ Power
12	- Power
13	Channel A, Normally Open
14	Channel A, Common
15	Channel A, Normally Closed
16	Channel B, Normally Open
17	Channel B, Common
18	Channel B, Normally Closed

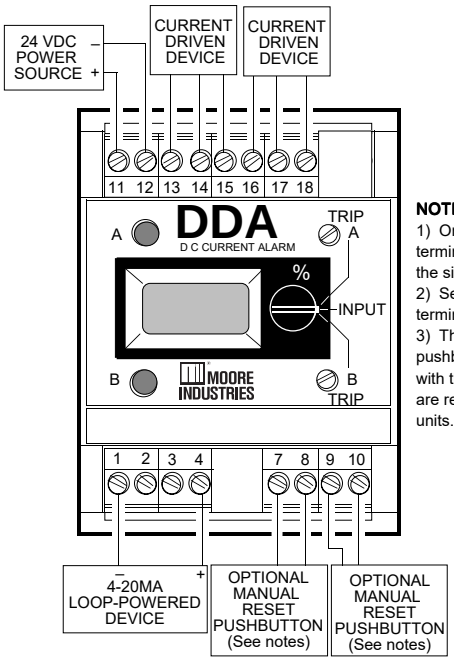
Figure 19. *Installing the Single-alarm DDA with the Transmitter Excitation Option*



NOTE:
1) On actual units, the terminal numbers appear on the side of the unit.
2) See the adjacent table for terminal designations.
3) The manual reset pushbutton is not supplied with the DDA, however it is required for MR equipped units.

Terminal Numbers	Terminal Labels
1	+IN
2	- IN
4	+ Transmitter Excitation
9	Manual Reset, (Optional)
10	Manual Reset, (Optional)
11	+ Power
12	- Power
13	Normally Open, Contact 1
14	Common, Contact 1
15	Normally Closed, Contact 1
16	Normally Open, Contact 2
17	Common, Contact 2
18	Normally Closed, Contact 2

Figure 20. *Installing the Dual-alarm DDA with the Transmitter Excitation Option*



NOTE:
1) On actual units, the terminal numbers appear on the side of the unit.
2) See the adjacent table for terminal designations.
3) The manual reset pushbuttons are not supplied with the DDA, however they are required for MR equipped units.

Terminal Numbers	Terminal Labels
1	+IN
2	-IN
4	+ Transmitter Excitation
7	B Manual Reset, (Optional)
8	B Manual Reset, (Optional)
9	A Manual Reset, (Optional)
10	A Manual Reset, (Optional)
11	+ Power
12	- Power
13	Channel A, Normally Open
14	Channel A, Common
15	Channel A, Normally Closed
16	Channel B, Normally Open
17	Channel B, Common
18	Channel B, Normally Closed

Customer Support

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

If problems involve a particular DDA, there are several pieces of information you can gather ***before*** you call the factory that will help our staff get you answers more efficiently. When you call, please have:

- The model number of the unit in question.
- The serial number of the unit in question.
- The job number (if available).
- The purchase order under which the unit was shipped (if available).

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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