METTLER TOLEDO

A100

Analog Output Module

Technical Manual

17041700A
(10/14).02

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FCC Notice

This device complies with Part 15 of the FCC Rules and the Radio Interference Requirements of the Canadian Department of Communications. Operation is subject to the following conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his or her own expense.

METTLER TOLEDO

Attention: Quality Manager—MTWI

Customer Feedback

Your feedback is important to us! If you have a problem with this product or documentation, or a suggestion on how we can serve you better, please fill out and send this form to us. Or, send your feedback via email to: quality_feedback.mtwt@mt.com. If you are in the United States, you can mail this postpaid form to the address on the reverse side or fax it to (614) 438-4355. If you are outside the United States, please apply the appropriate amount of postage before mailing.

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Phone Number: ( )	Fax Number: ( )	Contact Name:
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Please check the appropriate box to indicate how well this product met your expectations in its intended use.	
	Met and exceeded my needs
	Met all needs
	Met most needs
	Met some needs
	Did not meet my needs

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☐ Retail ☐ Light Industrial ☐ Heavy Industrial ☐ Custom

RESPONSE: Include Root Cause Analysis and Corrective Action Taken.

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PRECAUTIONS

- READ this manual BEFORE operating or servicing this equipment and FOLLOW these instructions carefully.
- SAVE this manual for future reference.

WARNING!

TO AVOID DAMAGE TO THE PCB, REMOVE POWER FROM THE A100 TERMINAL AND WAIT AT LEAST 30 SECONDS BEFORE CONNECTING OR DISCONNECTING ANY WIRES.

CAUTION

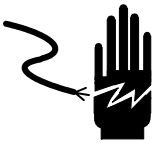
BEFORE CONNECTING/DISCONNECTING ANY INTERNAL ELECTRONIC COMPONENTS OR INTERCONNECTING WIRING BETWEEN ELECTRONIC EQUIPMENT ALWAYS REMOVE POWER AND WAIT AT LEAST THIRTY (30) SECONDS BEFORE ANY CONNECTIONS OR DISCONNECTIONS ARE MADE. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN DAMAGE TO OR DESTRUCTION OF THE EQUIPMENT AND/OR BODILY HARM.

CAUTION

OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.

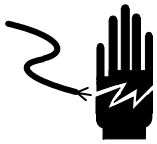
WARNING!

WHEN THIS EQUIPMENT IS INCLUDED AS A COMPONENT PART OF A SYSTEM, THE RESULTING DESIGN MUST BE REVIEWED BY QUALIFIED PERSONNEL WHO ARE FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF ALL COMPONENTS IN THE SYSTEM AND THE POTENTIAL HAZARDS INVOLVED. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.



WARNING

THE A100 IS NOT INTRINSICALLY SAFE. THIS MODULE AND ITS WIRING MUST NOT BE OPERATED IN A HAZARDOUS AREA WITHOUT THE USE OF APPROVED ENCLOSURE(S) AND OR INTRINSIC SAFE BARRIER(S). FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.



WARNING

A CLASS 2, 24 VDC POWER SUPPLY IS REQUIRED TO POWER THE A100 MODULE. THE A100 MODULE IS UL APPROVED FOR USE WITH A CLASS 2 POWER SUPPLY ONLY. DO NOT SUBSTITUTE ANOTHER TYPE OF POWER SUPPLY. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

Precautions(continued)

CAUTION

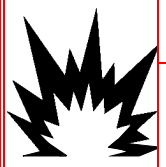
IF THE DC LOAD SUPPLY IS GROUNDED, A FORM OF ISOLATION MUST BE PROVIDED (OPTO ISOLATOR OR EQUAL). FAILURE TO OBSERVE THIS PRECAUTION WILL RESULT IN GROUND LOOPS FROM GROUNDS IN OTHER PARTS OF THE CIRCUITRY AND INACCURATE 4/20 MA DATA OR MODULE DESTRUCTION.

CAUTION

APPROPRIATE SUPPRESSION DEVICES MUST BE USED TO SUPPRESS ALL INDUCTIVE LOADS. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN THE DESTRUCTION OF THE A100 OUTPUT CIRCUIT.

CAUTION

ADDED SAFETY INTERLOCKS, PROPER DISCONNECTS, AND LINE FUSING BY THE CUSTOMER ARE REQUIRED AS THEY ARE IN ANY LOGIC CONTROL SYSTEM.



WARNING

WHEN INSTALLING THE EXPLOSION-PROOF ASSEMBLY, SEALED EXPLOSION-PROOF FITTINGS ARE REQUIRED. THE INSTALLER MUST ENSURE THAT THE FITTINGS ARE SEALED ACCORDING TO NATIONAL AND LOCAL CODE REQUIREMENTS FOR HAZARDOUS LOCATIONS.

WARNING

BEFORE CONNECTING THE A100 TO A PLC OR OTHER SECONDARY CONTROL DEVICE THE UNIT MUST BE FIELD CALIBRATED. FAILURE TO DO SO COULD RESULT IN INCORRECT OPERATION AND/OR PROPERTY DAMAGE.

WARNING

DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING OR CLEANING. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

DECLARATION OF CONFORMITY

Konformitätserklärung
Déclaration de conformité
Declaración de Conformidad
Conformiteitsverklaring
Dichiarazione di conformità

We:

Mettler-Toledo (ChangZhou) Scale & System Ltd.
111 ChangXi Road, ChangZhou,JiangSu, People's Republic of China, 213001

declare under our sole responsibility that the product,
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déclarons sous notre seule responsabilité que le produit,
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verklaren onder onze verantwoordelijkheid, dat het product,
dichiariamo sotto nostra unica responsabilitá, che il prodotto,

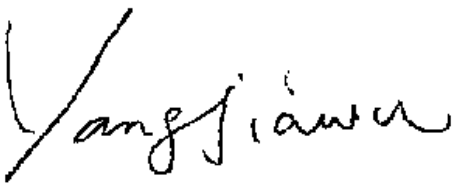
Model/Type: A100

to which this declaration relates is in conformity with the following standard(s) or other normative document(s).
auf das sich diese Erklärung bezieht, mitder/den folgenden Norm(en) oder Richtlinie(n) übereinstimmt.
Auquel se réfère cette déclaration est conforme à la (aux) norme(s) ou au(x) document(s) normatif(s).
Al que se refiere esta declaración es conforme a la(s) norma(s) u otro(s) documento(s) normativo(s).
Waarnaar deze verklaring verwijst, aan de volende norm(en) of richtlijn(en) beantwoordt.
A cui si riferisce questa dichiarazione è conforme alla/e sequente/i norma/e o documento/i normativo/i.

EC Marking	EC Directive	Standards
CE	89/336/EEC Electromagnetic Compatibility (EMC)	EN55022 Class A EN50082-1 EN61000-3 -2 EN61000-3 -3
CE	73/23/EEC Low Voltage Electrical Equipment	EN61010-1

ChangZhou, May 11, 2004, Mettler-Toledo (ChangZhou) Scale & System Ltd.

David Zheng
President



Yang JiaWu
Quality Assurance Manager

Contents

Chapter 1.0

Introduction

This chapter covers

- Model Identification
- Physical Dimensions
- Specifications

Thank you for purchasing a METTLER TOLEDO® A100 Analog Output Module. The A100 Analog Output Module provides an accurate and economical way to convert a METTLER TOLEDO Continuous or Standard Interface Command Set (SICS) level 0 serial digital signal to a 4/20 mA analog process signal, which is then typically sent to a remote analog input such as a PLC.

In addition to the 4/20 mA output signal, discrete setpoint outputs are provided for high- and low-level signaling.

The A100 is self-contained in a plastic housing for installation onto a 35-mm DIN rail. Optionally, the A100 is installed in either a stainless steel harsh enclosure when environmental protection is required, or in a cast aluminum explosion-proof enclosure when used in hazardous areas.

Model Identification

METTLER TOLEDO offers one standard plastic housing model of the A100 Analog Output Module. The A100 is not suitable for mounting in a harsh environment without a protective enclosure. The standard A100 Analog Output Module is shown in Figure 1-1.

Figure 1-1: A100 Analog Output Module

An optional stainless-steel harsh enclosure is available separately and is shown in Figure 1-2. Order this enclosure by MT number 64053670.

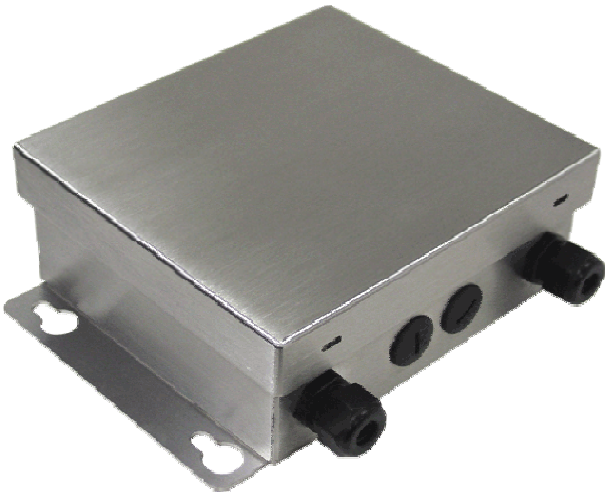


Figure 1-2: Optional Stainless-Steel harsh Enclosure (MT #64053670)

An optional cast-aluminum explosion-proof (flameproof) assembly is available for installation in hazardous areas (Figure 1-3). Order this enclosure by MT number 64053312. **This assembly includes the enclosure and the A100.**

The explosion-proof enclosure is rated by the manufacturer for use in a Class I Group C, D; Class II Group E, F, G; Class III Division 1; or ATEX-approved as EExd IIBH2 IP66 when installed per the manufacturer's recommendations.

Figure 1-3: Optional Cast-Aluminum Explosion-Proof (Flameproof) Enclosure and A100 Assembly (MT #64053312)

Physical Dimensions

The A100 Analog Output Module dimensions (standard and optional enclosures) are shown in Figures 1-4, 1-5, and 1-6.

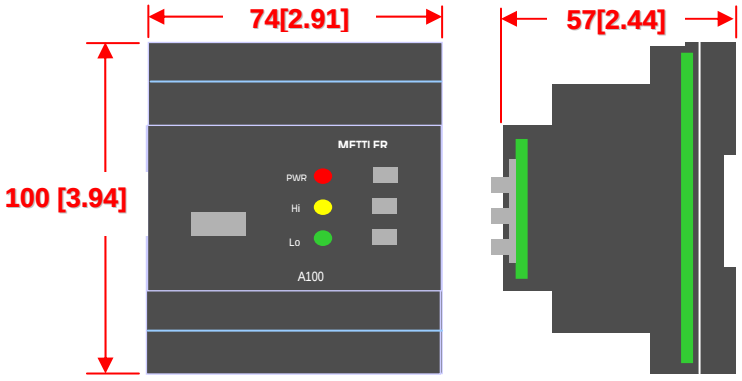


Figure 1-4: A100 Analog Output Module Dimensions

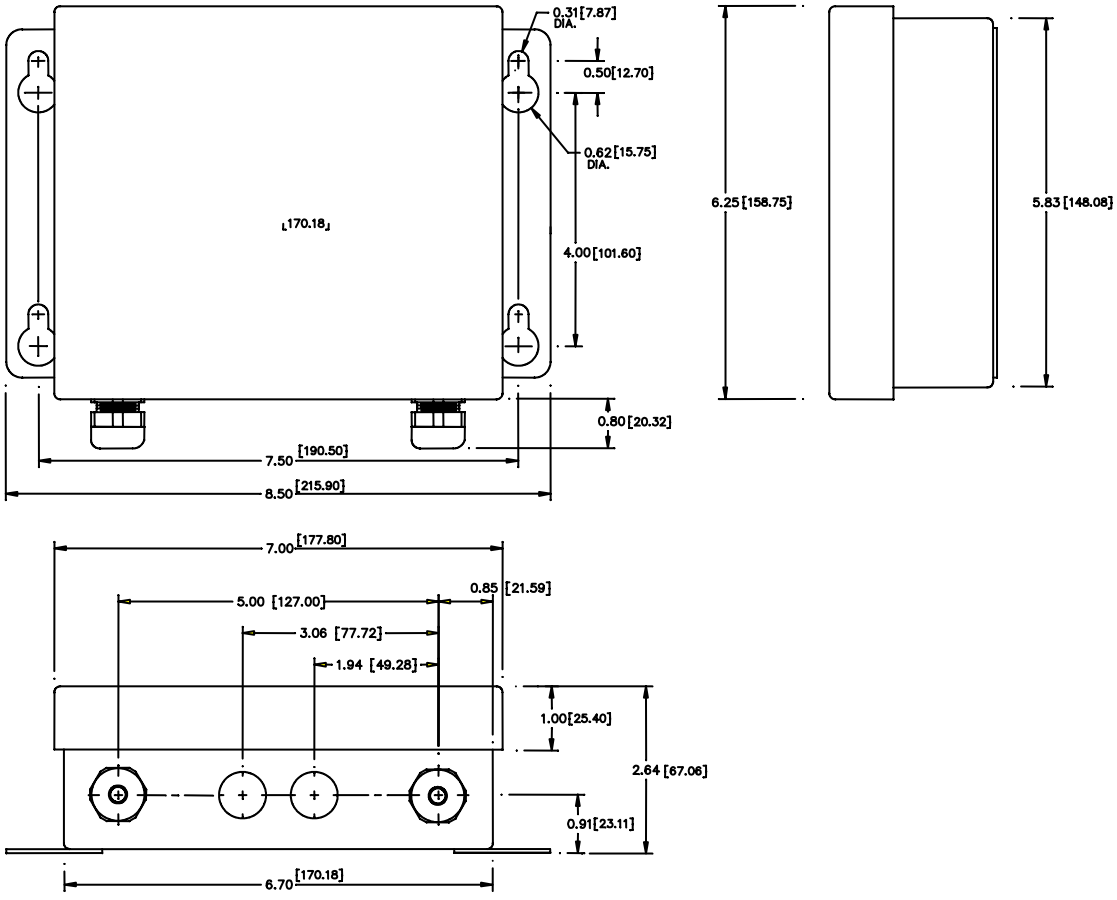


Figure 1-5: Stainless-Steel Harsh Enclosure Dimensions

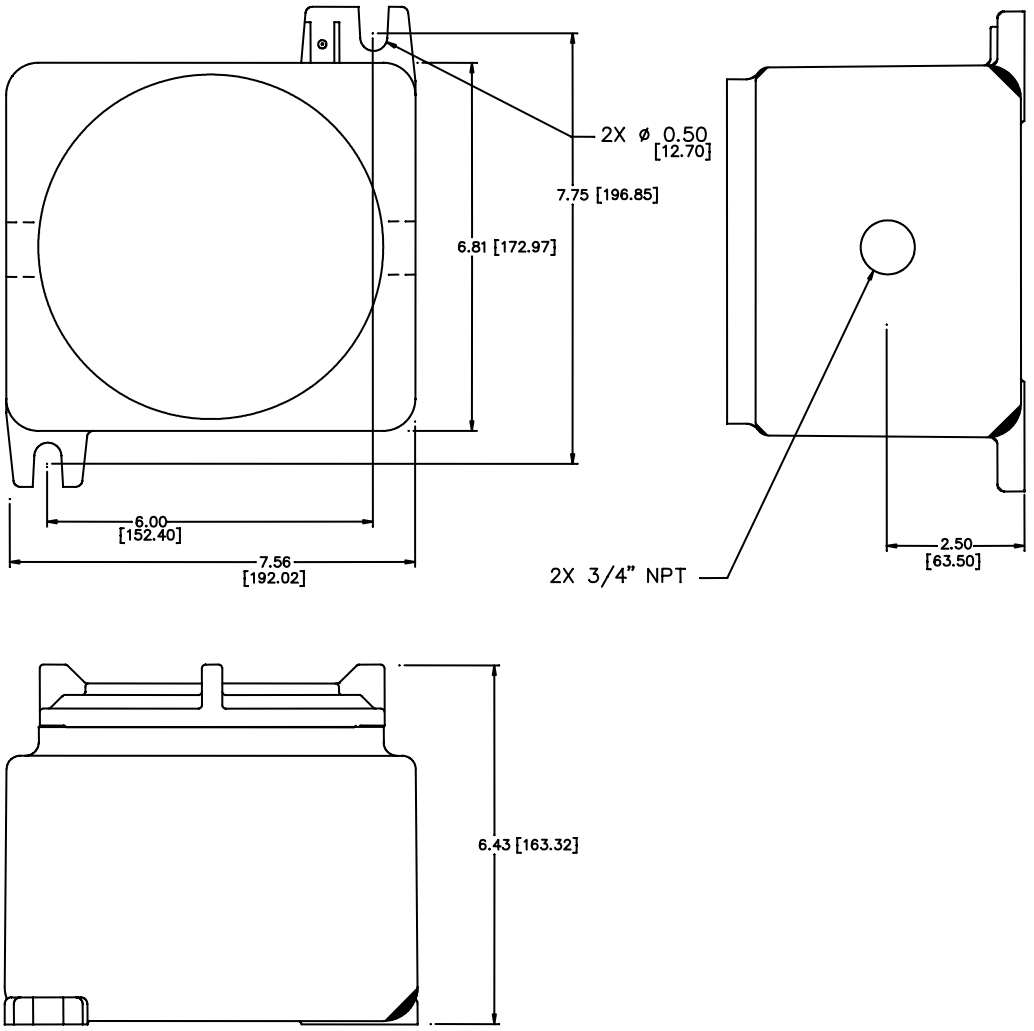


Figure 1-6: Explosion-Proof Assembly Dimensions

Specifications

The A100 Analog Output Module conforms to specifications listed in Table 1-1.

Table 1-1: Specifications

A100 Specifications	
Physical Dimensions (W x D x H)	3.9 x 2.9 x 2.2 inches 100 x 74 x 57 mm
Enclosure Material	Plastic
Mounting	DIN rail (35 mm)
External DC Power Requirements	20 to 28 VDC, 300 mA max, 8 watts from a Class 2 power supply.
Serial Data input (Supported data is automatically enabled at power up)	RS-232, RS-485, 20 mA current loop or fiber optic. (note 1) Protocol: METTLER TOLEDO Continuous or SICS level 0. Supported Baud rates:1.2K, 2.4K, 4.8K, 9.6K Supported Data: 7 or 8 bits with odd, even or no parity, Start bit = STX, Checksum = none or enabled
Discrete Outputs (Setpoints)	One low and one high level output, open collector 5 to 30 VDC 60 mA max sink current Transistor ON when weight < setpoint value (Transistor emitter connected to supply common)
Analog Output	Signal: 4 to 20 mA, (1 mA and 24 mA limits) Load resistance: 0 to 500 ohms max. Output Accuracy / Resolution: 1 part in 4000 min. Temp Stability: 20 PPM/°C (Span), 50 PPM/°C (Zero) Conversion time: 50 ms (20 updates/sec) Isolation: Circuit common connected to supply common
Calibration	DIP switch mode selection enables front panel calibration of setpoint low/high limits. ↺ button: Toggle between modes + button: Increment value - button: Decrement value
LED Indicators	Power: ON with +24 VDC applied Hi : ON when input data < high setpoint Lo : ON when input data < low setpoint
Environmental Conditions	Operating temperature: 14° to 112° F (-10° to +45° C) Storage temperature : -4° to 158° F (-20° to +70° C) Humidity: ≤ 95% RH noncondensing Protection: IP2X DIN rail mounting (module) Cl I Gp C-D, Cl II Gp E-G, Cl III or ATEX-EExd IIBH2 IP66 (mtd. in expl.-proof enclosure)
RFI	RFI susceptibility: ≤ 8µA change at 3V/Meter (26 to 1000 mHZ) RFI emissions: meets FCC class A & EN55022-A.
Agency Approvals	**UL** and **cUL** listed for USA & Canada **Conformité Européene**—This label is your guarantee that our products conform to the latest guidelines.

Note 1: SICS mode is not supported with fiber optic or 20 mA interfaces.

METTLER TOLEDO

For your notes

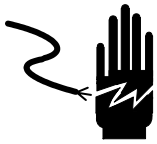
Chapter 2.0

Installation—Nonhazardous Locations

This chapter covers

- Terminal to Module Connections
- Mounting the Module
- Analog Output 4/20 mA Connections
- Power Supply Wiring
- Setpoint Output Connections

This chapter provides detailed instructions for installing the A100 Analog Output Module in nonhazardous locations. Please read this chapter thoroughly before beginning installation.



⚠ WARNING

THE A100 IS NOT INTRINSICALLY SAFE. THIS MODULE AND ITS WIRING MUST NOT BE OPERATED IN A HAZARDOUS AREA WITHOUT THE USE OF APPROVED ENCLOSURE(S) AND OR INTRINSIC SAFE BARRIER(S). FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

Terminal to Module Connections

The A100 module is designed to operate from a METTLER TOLEDO Continuous or Standard Interface Command Set (SICS) level 0 protocol serial ASCII data string (DIP switch 6 must be ON for SICS operation—see Chapter 4.0, *Calibration*). The logic automatically recognizes 2400 to 9600 baud, 7 or 8 bit data with odd or even parity and checksum enabled or disabled. RS-232, RS-485, 20 mA current loop and fiber optic interfaces are supported. (SICS mode not supported for 20 mA current loop or fiber optic connections).

Built-in safety features include:

- Terminal over capacity or under zero (display blank) forces the A100 to synchronously flash slow both HI and LO LEDs. The 4/20 mA output changes to 0 mA (under zero) or 24 ma (over capacity).
- If the A100 goes to 24 mA and the terminal does not blank, the 4/20 mA output stays at 24 mA (+24 mA is an ERROR condition) and the HI and LO LEDs synchronously flash fast. Setpoints turn off.
- Loss of terminal data causes both HI and LO LEDs to alternately flash. The 4/20 mA output goes to zero mA and setpoints turn OFF after three seconds of no data.

The typical wiring connections for each type of serial data allowed are shown in Figure 2-1. Select the one connection that suits the installation.

Important: Ensure that the system is grounded at one place only

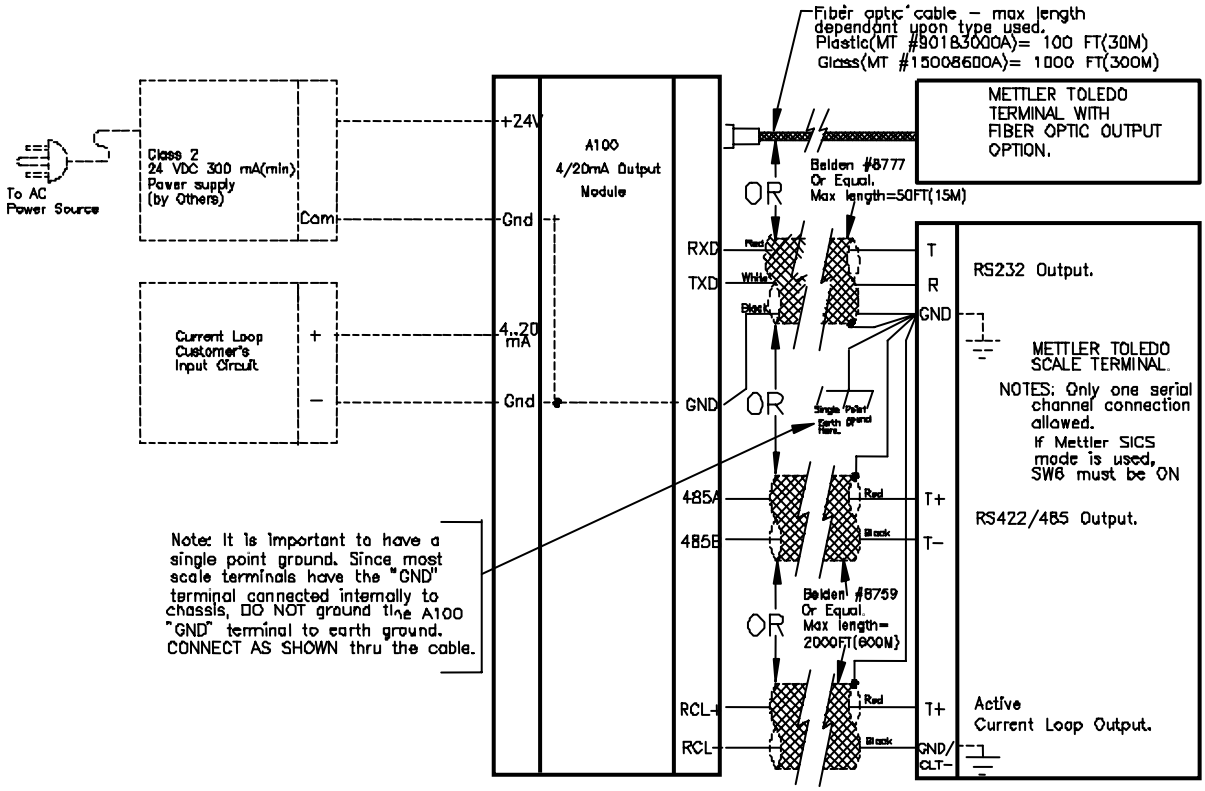


Figure 2-1: Wiring for Serial Connections

Note the grounding arrangement. Since most scale terminals directly connect logic common to chassis, the A100 ground (GND) line should be tied to the scale GND terminal. Do not ground the A100 at any other point.

Mounting the Module

To mount the module, snap it onto the DIN rail located inside the enclosure while retracting the plastic module tab with a screwdriver as shown in Figure 2-2.

Figure 2-2: Retracting the Module Tab

The stainless-steel enclosure has two plastic cord bushings that enable cables to pass into the enclosure. The plugged openings are provided for wiring flexibility, if needed. The installer must provide any additional fittings to meet local codes.

Figure 2-3 shows the module properly mounted on the DIN rail inside the stainless-steel enclosure.

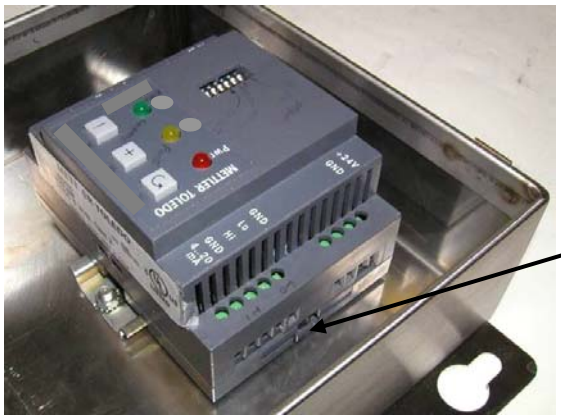


Figure 2-3: Module Mounted on DIN Rail

Analog Output 4/20 mA Connections

The output signal provided by the A100 is a standard 4/20 mA signal commonly used for many industrial process control and PLC applications. Since this signal is analog in nature, it must be well shielded, properly grounded, and protected from higher voltage signals. Do NOT route the signal cable along side power wiring.

Proper grounding is important. The A100 connects the terminal or other PLC device shield, power supply common, and 4/20 mA common lines together. As a result, connect only one of these points to an earth ground.

Many process control instruments are connected by 4/20 mA common to earth internally, which for this system would require it to remain floating without a ground connection. Test for process control equipment ground continuity before wiring is completed. If the process control equipment is not grounded, connect the A100 at the terminal or other PLC device shield terminal to earth ground. If the process control equipment is connected to ground, the A100 wiring must NOT be grounded.

The 4/20 mA current loop external wiring should be a two conductor #20 AWG (0.51 mm^2 minimum) shielded cable. Use Belden #8759 or equal and connect as shown in Figure 2-4.

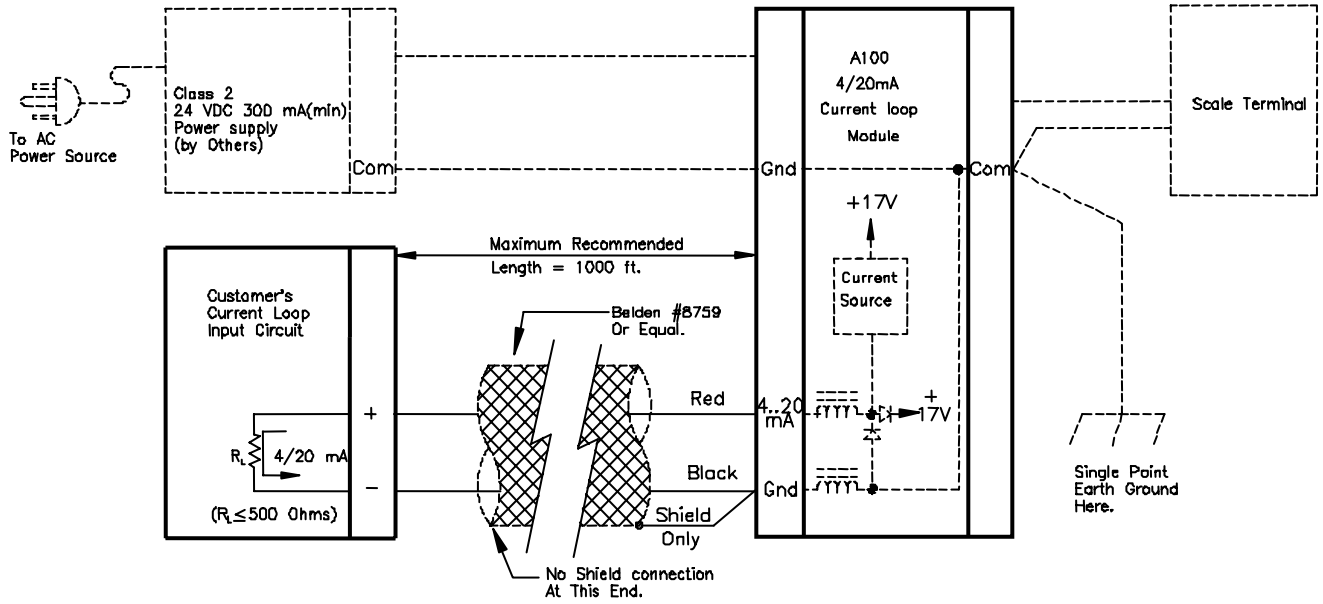
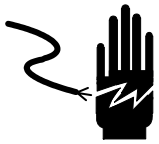


Figure 2-4: Analog Output 4/20 mA Connections

Power Supply Wiring

The A100 is provided with 20–28 VDC power input terminals. The user must provide a Class 2-rated 24 VDC power supply. (A Class 2 power supply is voltage- and current-limited so short-circuit conditions do not become dangerous).



WARNING

A CLASS 2, 24 VDC POWER SUPPLY IS REQUIRED TO POWER THE A100 MODULE. THE A100 MODULE IS UL APPROVED FOR USE WITH A CLASS 2 POWER SUPPLY ONLY. DO NOT SUBSTITUTE ANOTHER TYPE OF POWER SUPPLY. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

Select a power supply with an isolated output. An isolated output is important because the 24 VDC common, terminal or other PLC device shield, setpoint common, and the 4/20 mA common are internally connected together. These common wires must be grounded to earth—but at only ONE point. For best results, ground the terminal or other PLC device shield terminal. Any of the other wires can serve as an alternate single ground connection; however, there must remain **one and only one** connection to earth.

Figure 2-5 shows proper power supply wiring.

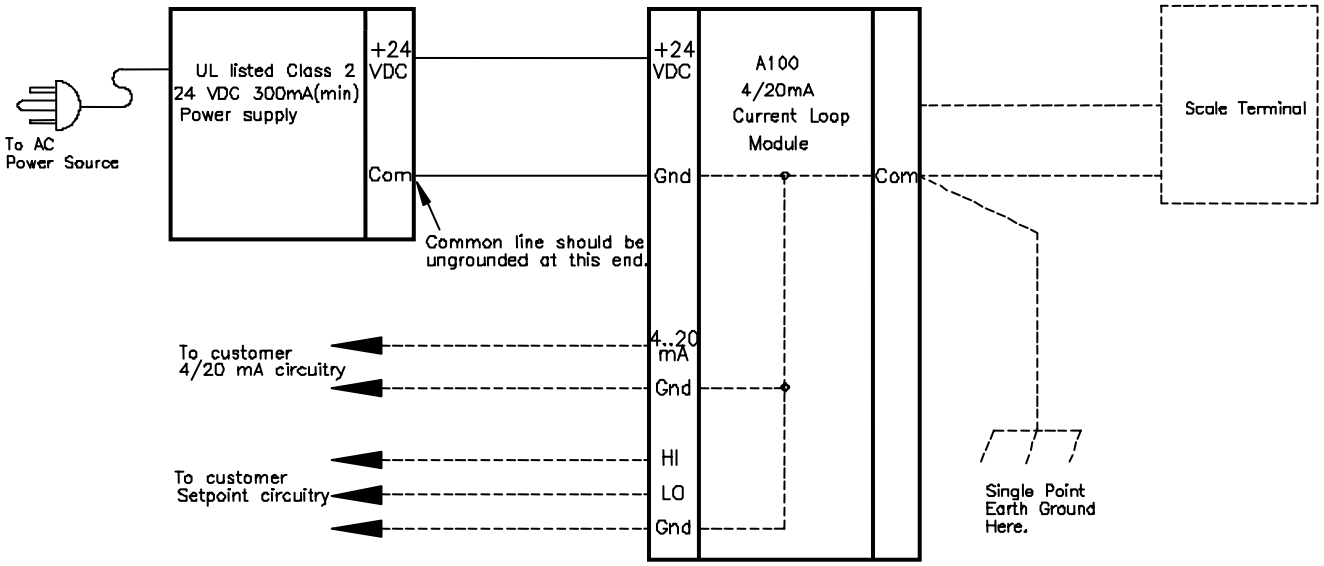


Figure 2-5: Power Supply Wiring

Setpoint Output Connections

The A100 has two open collector transistor outputs. The LO output is turned ON when the terminal or other PLC device signal is below the LO setpoint and turned OFF (open collector state) when it is equal to or above the LO setpoint. The HI output is turned ON when the terminal or other PLC device signal is below the HI setpoint and turned OFF (open collector state) when it is equal to or above the HI setpoint.

Each transistor can sink 60 mA (drive a load rated at 60 mA or less). The load must be connected to an ungrounded voltage of 24 VDC or less.

CAUTION

IF THE DC LOAD SUPPLY IS GROUNDED, A FORM OF ISOLATION MUST BE PROVIDED (OPTO ISOLATOR OR EQUAL). FAILURE TO OBSERVE THIS PRECAUTION WILL RESULT IN GROUND LOOPS FROM GROUNDS IN OTHER PARTS OF THE CIRCUITRY AND INACCURATE 4/20 MA DATA OR MODULE DESTRUCTION.

Suppress all inductive loads with appropriate suppression device(s) directly at the load. The typical illustration in Figure 2-6 shows an R-C type of suppression device across each solenoid. If the load is driven directly from the A100, diodes are commonly employed as suppressors.

CAUTION

APPROPRIATE SUPPRESSION DEVICES MUST BE USED TO SUPPRESS ALL INDUCTIVE LOADS. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN THE DESTRUCTION OF THE A100 OUTPUT CIRCUIT.

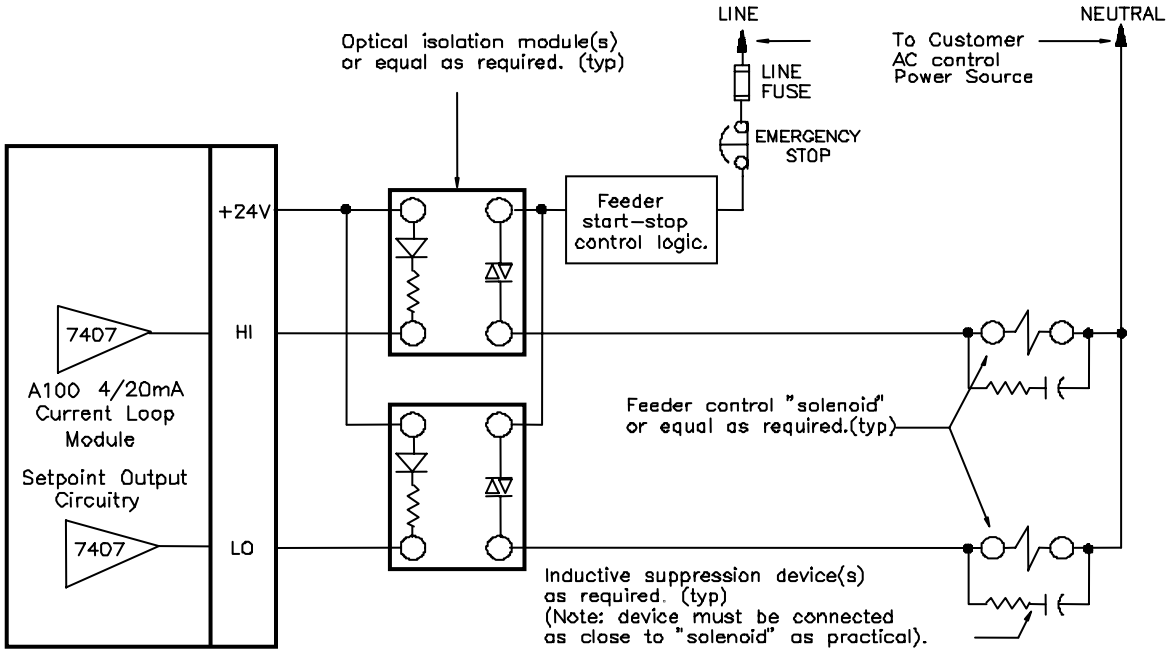


Figure 2-6: Setpoint Output Wiring

CAUTION

ADDED SAFETY INTERLOCKS, PROPER DISCONNECTS, AND LINE FUSING BY THE CUSTOMER ARE REQUIRED AS THEY ARE IN ANY LOGIC CONTROL SYSTEM.

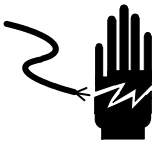
Chapter 3.0

Installation— Hazardous Locations

This chapter covers

- Terminal to Module Connections
- Mounting the Module
- Analog Output 4/20 mA Connections
- Power Supply Wiring
- Setpoint Output Connections

This chapter provides detailed instructions for installing the A100 Analog Output Module in hazardous locations. Please read this chapter thoroughly before beginning installation.



⚠ WARNING

THE A100 IS NOT INTRINSICALLY SAFE. THE LINES MUST NOT BE OPERATED IN A HAZARDOUS AREA WITHOUT AN APPROVED INTRINSIC SAFE BARRIER. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

While installing the A100 Analog Module in hazardous locations is similar to installing it in a nonhazardous location, there are some important differences. They are shown in **bold** in this chapter.

Terminal to Module Connections

The A100 module is designed to operate from a METTLER TOLEDO Continuous or Standard Interface Command Set (SICS) level 0 protocol serial ASCII data string (DIP switch 6 must be ON for SICS operation—see Chapter 4.0, *Calibration*). The logic automatically recognizes 2400 to 9600 baud, 7 or 8 bit data with odd or even parity and checksum enabled or disabled. RS-232, RS-485, 20 mA current loop and fiber optic interfaces are supported. (SICS mode not supported for 20 mA current loop or fiber optic connections).

Built-in safety features include:

- Terminal over capacity or under zero (display blank) forces the A100 to synchronously flash slow both HI and LO LEDs. The 4/20 mA output changes to 0 mA (under zero) or 24 ma (over capacity).
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- Loss of terminal data cause the HI and LO LEDs to alternately flash. The 4/20 mA output goes to zero & setpoints turn OFF after 3 sec. of no data.

The typical wiring connections for each type of serial data allowed are shown in Figure 3-1. Select the one connection that suits the installation.

Important: Ensure that the system is grounded at one place only

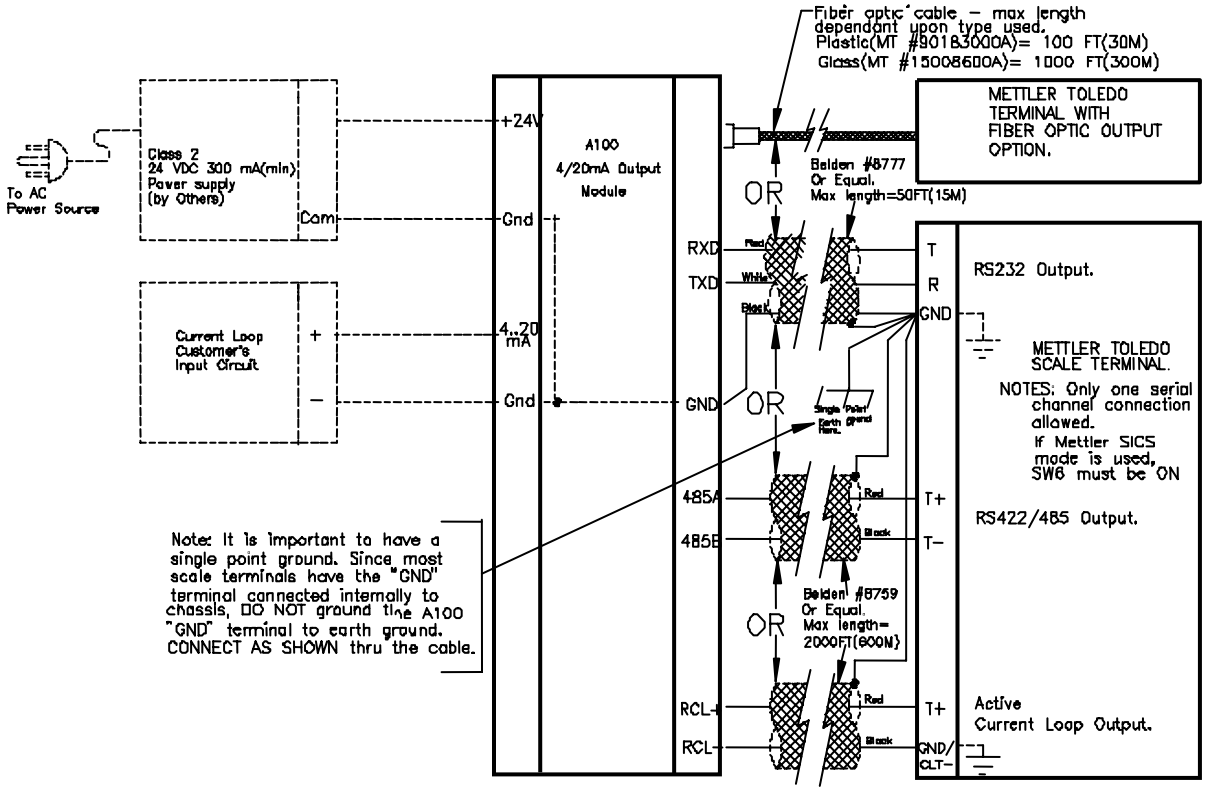


Figure 3-1: Wiring for Serial Connections

Note the grounding arrangement. The system must be grounded at one place only. Since most scale terminals directly connect the logic common to chassis, the A100 ground (GND) line should be tied to the scale GND terminal. Do NOT ground the system at any other point.

Mounting the Module

The explosion-proof enclosure and A100 assembly has only two tapped three-quarter-inch NPT holes. Sealed explosion-proof fittings are required to complete the installation. The installer must provide these fittings and ensure that they are properly installed and sealed according to national and local codes prior to use.

⚠ WARNING

WHEN INSTALLING THE EXPLOSION-PROOF ASSEMBLY, SEALED EXPLOSION-PROOF FITTINGS ARE REQUIRED. THE INSTALLER MUST ENSURE THAT THE FITTINGS ARE SEALED ACCORDING TO NATIONAL AND LOCAL CODE REQUIREMENTS FOR HAZARDOUS LOCATIONS.

To mount the A100 module, snap the module onto the DIN rail while retracting the plastic module tab with a screwdriver as shown in Figure 3-2.

Figure 3-2: Retracting the Module Tab

Figures 3-3 and 3-4 illustrate module installation into the explosion-proof enclosure. Because of space limitations, snap the module onto the DIN rail first and then install into the enclosure as follows:

1. **Install the M6 screws loosely into the predrilled holes in the enclosure as shown in Figure 3-3.**
2. **Place the module and rail onto the screws. Slide the rail slot onto one screw and then center the module between the two screws.**
3. **Position the rail as shown in Figure 3-4 and tighten the screw.**
4. **Center the module and tighten the other screw to complete the installation.**

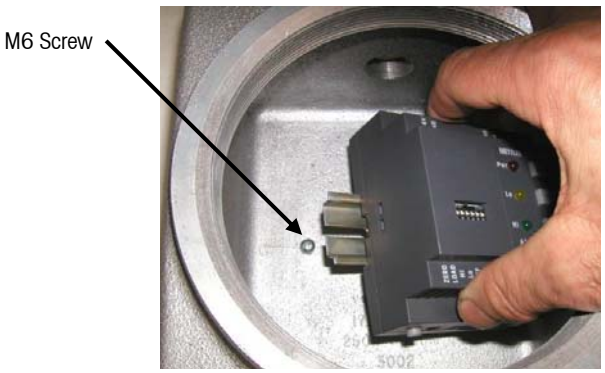


Figure 3-3: Sliding the DIN Rail Slot Onto One Screw

Figure 3-4: Securing the DIN Rail

Analog Output 4/20 mA Connections

The output signal provided by the A100 is a standard 4/20 mA signal commonly used for many industrial process control and PLC applications. Since this signal is analog in nature, it must be well shielded, properly grounded, and protected from higher voltage signals. Do NOT route the signal cable along side power wiring.

Proper grounding is important. The A100 connects the terminal or other PLC device shield, power supply common, and 4/20 mA common lines together. As a result, connect only one of these points to an earth ground.

Many process control instruments are connected by 4/20 mA common to earth internally, which for this system would require it to remain floating without a ground connection. Test for process control equipment ground continuity before wiring is completed. If the process control equipment is not grounded, connect the A100 at the terminal or other PLC device shield terminal to earth ground. If the process control equipment is connected to ground, be sure the A100 wiring is NOT grounded.

The 4/20 mA current loop external wiring should be two conductor #20 AWG (0.51 mm^2 minimum) shielded cable. Use Belden #8759 or equal and connect as shown in Figure 3-5.

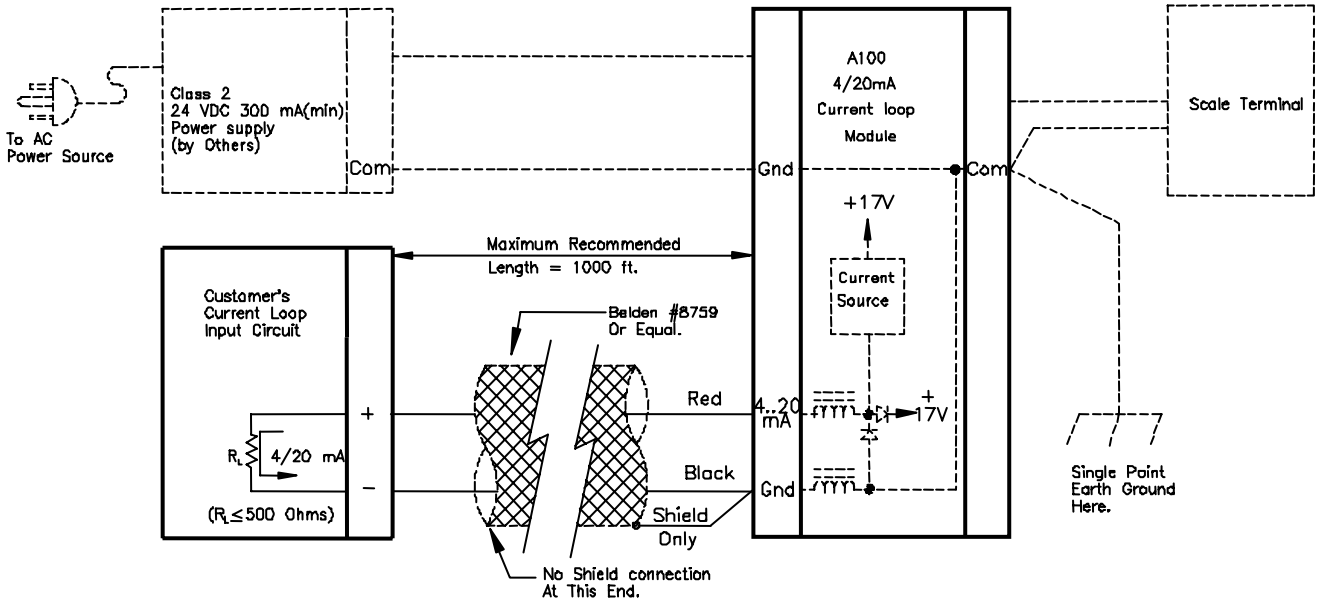
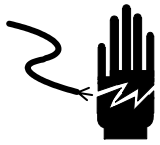


Figure 3-5: Analog Output 4/20 mA Connections

Power Supply Wiring

The A100 is provided with 20–28 VDC power input terminals. The user must provide a Class 2-rated 24 VDC power supply. (A Class 2 power supply is voltage- and current-limited so short-circuit conditions do not become dangerous).



⚠ WARNING

A CLASS 2, 24 VDC POWER SUPPLY IS REQUIRED TO POWER THE A100 MODULE. THE A100 MODULE IS UL APPROVED FOR USE WITH A CLASS 2 POWER SUPPLY ONLY. DO NOT SUBSTITUTE ANOTHER TYPE OF POWER SUPPLY. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

Select a power supply with an isolated output. An isolated output is important because the 24 VDC common, terminal or other PLC device shield, setpoint common, and the 4/20 mA common are internally connected together. These common wires must be grounded to earth—but at only ONE point. For best results, ground the terminal or other PLC device shield terminal. Any of the other wires can serve as an alternate single ground connection; however, there must remain one and only one connection to earth.

Ensure that the power supply is mounted in a safe area or inside its own approved hazardous area enclosure.

Figure 3-6 shows proper power supply wiring.

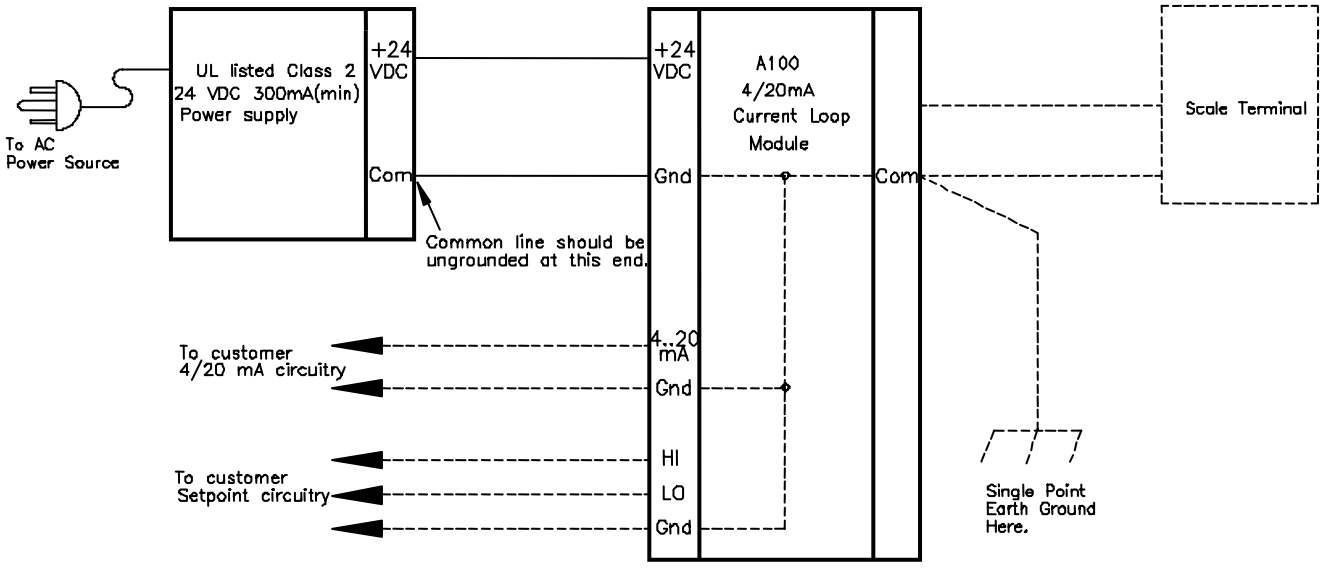


Figure 3-6: Power Supply Wiring

Setpoint Output Connections

The A100 has two open collector transistor outputs. The LO output is turned ON when the terminal or other PLC device signal is below the LO setpoint and turned OFF (open collector state) when it is equal to or above the LO setpoint. The HI output is turned ON when the terminal or other PLC device signal is below the HI setpoint and turned OFF (open collector state) when it is equal to or above the HI setpoint.

Each transistor can sink 60 mA (drive a load rated at 60 mA or less). The load must be connected to an ungrounded voltage of 24 VDC or less.

CAUTION

IF THE DC LOAD SUPPLY IS GROUNDED, A FORM OF ISOLATION MUST BE PROVIDED (OPTO ISOLATOR OR EQUAL). FAILURE TO OBSERVE THIS PRECAUTION WILL RESULT IN GROUND LOOPS FROM GROUNDS IN OTHER PARTS OF THE CIRCUITRY AND INACCURATE 4/20 MA DATA OR MODULE DESTRUCTION.

Suppress all inductive loads with appropriate suppression device(s) directly at the load. The typical illustration in Figure 3-7 shows an R-C type of suppression device across each solenoid. If the load is driven directly from the A100, diodes are commonly employed as suppressors.

CAUTION

APPROPRIATE SUPPRESSION DEVICES MUST BE USED TO SUPPRESS ALL INDUCTIVE LOADS. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN THE DESTRUCTION OF THE A100 OUTPUT CIRCUIT.

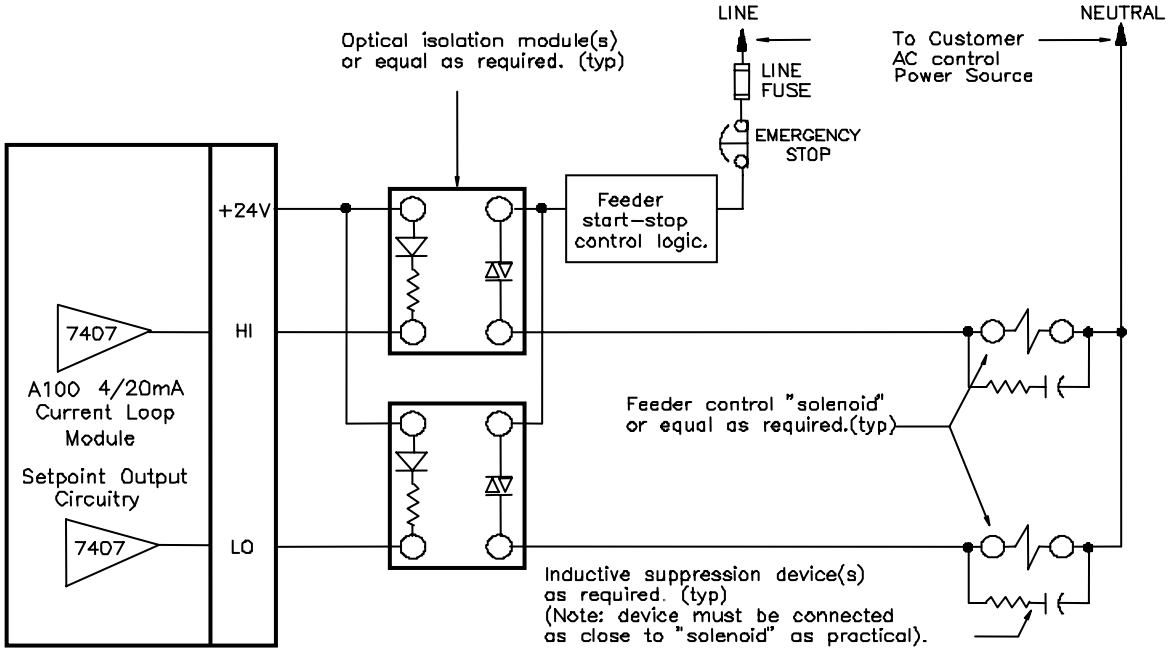


Figure 3-7: Setpoint Output Wiring

CAUTION

ADDED SAFETY INTERLOCKS, PROPER DISCONNECTS, AND LINE FUSING BY THE CUSTOMER ARE REQUIRED AS THEY ARE IN ANY LOGIC CONTROL SYSTEM.

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For your notes

Chapter 4.0

Calibration

This chapter covers
- DIP Switch Functions
- Calibration Procedures

This chapter provides instructions on how to calibrate the A100 Analog Output Module. Please read this chapter thoroughly before beginning calibration.

DIP Switch Functions

Perform calibration procedures using the DIP calibration switches located on the front of the A100 module. Figure 4-1 and Table 4-1 provide information about calibration switch locations, functions, and setup.

WARNING!

BEFORE CONNECTING THE A100 TO A PLC OR OTHER SECONDARY CONTROL DEVICE THE UNIT MUST BE FIELD CALIBRATED. FAILURE TO DO SO COULD RESULT IN INCORRECT OPERATION AND/OR PROPERTY DAMAGE.

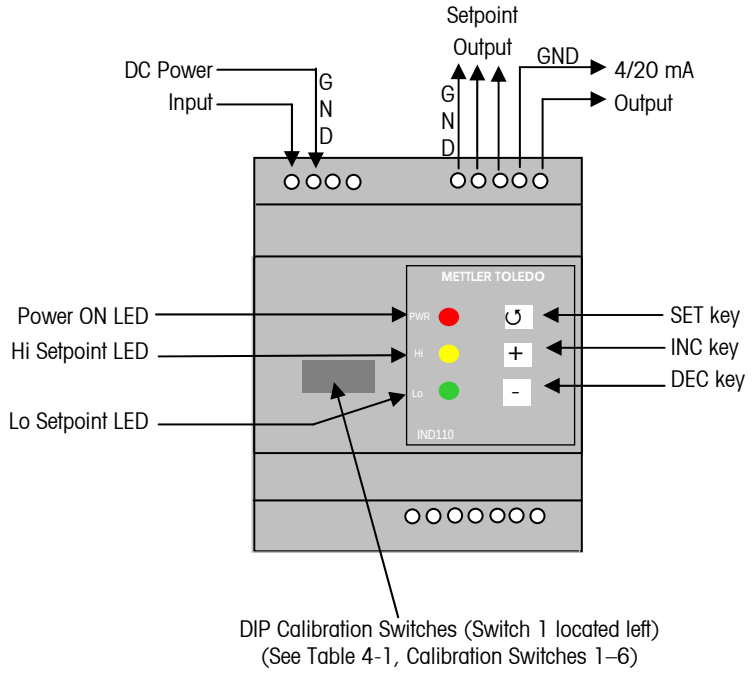


Figure 4-1: Calibration Switch Locations

Table 4-1 shows the calibration and setup functions. Position the DIP calibration switch located on the front panel to ON to select the desired function. After calibration is complete, set switches 1–4 to OFF to store the settings.

Table 4-1: Calibration Switch Functions

Operating Mode	DIP Calibration Switches						LED Status		Conditions	Notes
	1	2	3	4	5	6	LO	HI		
Normal Weighing Conditions	Off	Off	Off	Off	See note 1 below	See note 2 below	On	On	Weight below both setpoints	Operational status Normal conditions. Analog between 4 and 20 mA. Setpoints active
							Off	On	Weight between LO and HI setpoints	
							Off	Off	Weight above HI setpoint	
Error Weighing Conditions	Off	Off	Off	Off	See note 1 below	See note 2 below	Slow Syn. Flash	Slow Syn. Flash	Under capacity (from terminal)	Analog out = 0 mA Both setpoints = off
									Over capacity (from terminal)	Analog out =24 mA Both setpoints = off
							Fast Syn. Flash	Fast Syn. Flash	Over range (Analog>24mA)	Analog out ≥ 24 mA Both setpoints = off
							Alt. flash	Alt. flash	No serial data	Analog out = 0 mA Both setpoints = off
Zero calibration	On	Off	Off	Off	See note 1 below	See note 2 below	Off	Flash	Coarse zero adjust mode	Use ↺ (SET) key to toggle from coarse to fine modes. HI LED flashes for coarse. LO LED flashes for fine. Use + (INC) key to increment or Use – (DEC) key to decrement analog output voltage. Press and hold key for faster speed adjustment.
							Flash	Off	Fine zero adjust mode	
Span calibration	Off	On	Off	Off	See note 1 below	See note 2 below	Off	Flash	Coarse span adjust mode	
							Flash	Off	Fine span adjust mode	
HI setpoint setting	Off	Off	On	Off	See note 1 below	See note 2 below	Off	Flash	Coarse HI set. adjust mode	
							Flash	Off	Fine HI setpoint adjust mode	
LO setpoint setting	Off	Off	Off	On	See note 1 below	See note 2 below	Off	Flash	Coarse LO set. adjust mode	
							Flash	Off	Fine LO setpoint adjust mode	

NOTE 1: Switch 5 ON for NET weight mode and OFF for GROSS weight mode. In NET mode, negative going negative weight data will cause a positive going 4/20 mA output.

NOTE 2: Switch 6 ON for Standard Interface Command Set (SICS) mode. Up to One minute may be required to initially recognize SICS data. SICS not available for 20 mA current loop or fiber optic connections.

Calibration Procedures

Use DIP calibration switches 1–4 and the SET (↺), INC (+), and DEC (–) keys to implement calibration procedures. For normal weighing, DIP switches 1-4 are OFF. For calibration, switches 1–4 are ON as required to calibrate.

Standard Interface Command Set (SICS) mode requires Switch 6 to be ON. One full minute may be required to initially recognize SICS data.

- Sw 1 ON = Weigh mode zero calibration
- Sw 2 ON = Weigh mode span calibration
- Sw 3 ON = LO setpoint cutoff
- Sw 4 ON = HI setpoint cutoff

Set Weigh Mode Zero

To set the weigh mode zero,

1. Unload scale.
2. Turn DIP switch 1 to ON (all other switches OFF). HI LED will flash (coarse setting).
3. With a calibration current meter connected to the output, use INC (+) and DEC (–) keys to adjust output current to the desired **zero load** value (typically 4 mA).
4. If fine adjustment is required, press SET (↺) key until LO LED flashes. Use the INC (+) and DEC (–) keys for fine adjustment.
5. When correct zero value is obtained, put DIP switch1 in OFF position. Zero load current output is stored.

Set Weigh Mode Span

To set the weigh mode span,

1. Load scale with weight corresponding to the desired current output (typically 20 mA).
2. Turn DIP switch 2 to ON (all other switches OFF). HI LED will flash (coarse setting).
3. Use the INC (+) and DEC (–) keys to adjust output current to desired **full load** value (typically 20 mA).
4. If fine adjustment is required, press SET (↺) key until LO LED flashes. Use the INC (+) and DEC (–) keys for fine adjustment.
5. When correct span value is obtained, put DIP switch 2 in OFF position Full load current output is stored.

Calibration can be accomplished with a value less than full load weight. Simply calculate the current output value needed to represent the load applied and adjust

current output for that value. Keep in mind that the lower the value, the lower the setting accuracy obtained. Always try to use the highest calibration weight possible.

IMPORTANT

When calibrating for the high span value (typically 20 mA), the initial current could possibly be above 20 mA. When the output current is approximately 24 mA, it will remain at that level until the span is brought down within range. If the output seems like it is not changing while holding the DEC (–) key, it is because the current is too far above range. Hold the button until it comes within range. Reducing the load until the output is below 20 mA will make it easier to see the span decrease.

Set HI Setpoint Cutoff Value

To set the HI setpoint cutoff value

1. Load scale with a value equal to the desired HI setpoint cutoff point and note the 4/20 mA current output reading.

   Alternatively, calculate the output current at the desired load cutoff point. Note output current value.

2. Turn DIP switch 3 to ON (all other switches OFF). HI LED will flash.
3. Use INC (+) and DEC (–) keys to adjust setting until the 4/20 mA output matches the noted output current value.
4. If fine adjustment is required, press the SET (↺) key until LO LED flashes. Use the INC (+) and DEC (–) keys for fine adjustment.
5. When the correct value is obtained, put DIP switch 3 in OFF position. HI setpoint cutoff value is stored.

Set LO Setpoint Cutoff Value

To set the LO setpoint cutoff value follow the same steps listed under Set HI Setpoint Cutoff Value, except use DIP switch 4 instead of DIP switch 3.

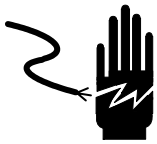
- The HI setpoint must be set for the highest cutoff value. The LO setpoint value must be lower than the HI setpoint value.
- The HI and LO setpoints are not necessary for operation of the A100. Do not program these setpoints if they are not needed.

Chapter 5.0

Service

Ensure that the power has been removed from the A100 Analog Output Module prior to service.

There are no field replaceable parts within the A100 Analog Output Module.



WARNING

DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING OR CLEANING. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

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For your notes

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