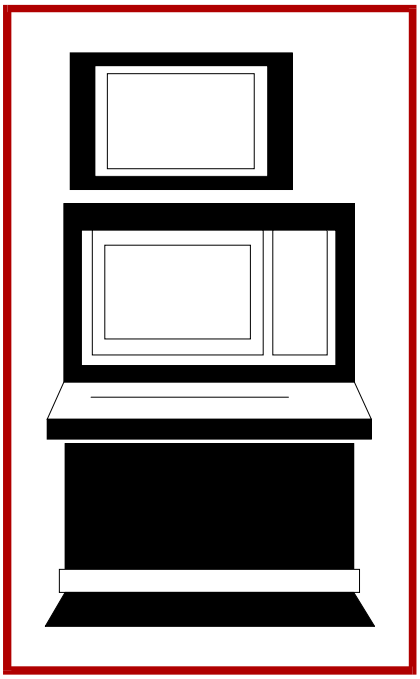
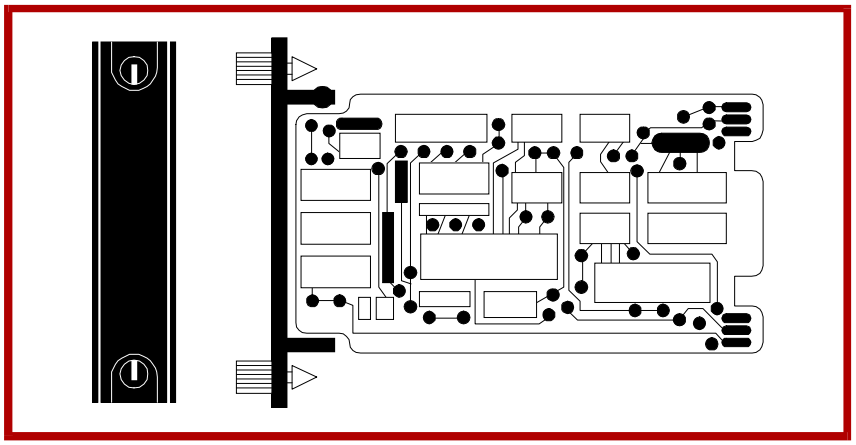
Bailey® infi 90®

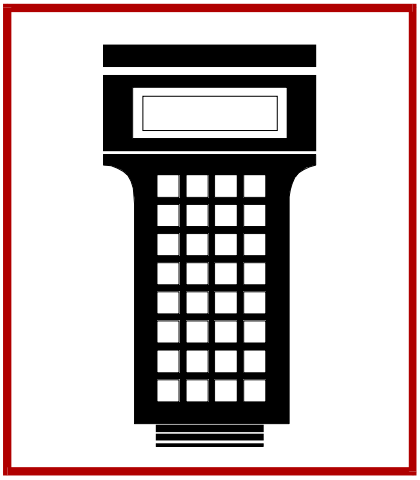
E96-407

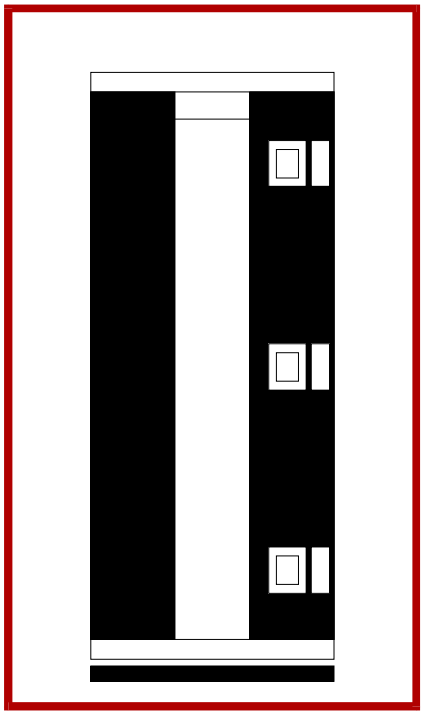
Instruction

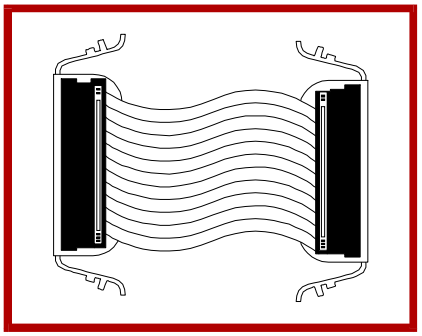
Analog Output Termination Unit
(NTAO01)

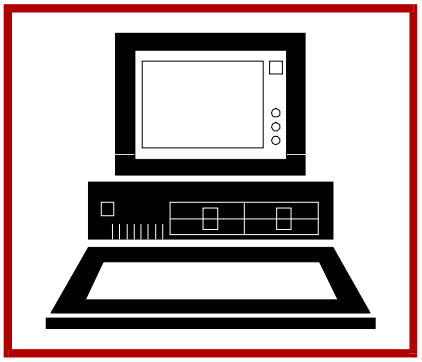












Bailey Process Control and Automation Solutions from Elsag Bailey Group

WARNING notices as used in this instruction apply to hazards or unsafe practices that could result in personal injury or death.

CAUTION notices apply to hazards or unsafe practices that could result in property damage.

NOTES highlight procedures and contain information that assists the operator in understanding the information contained in this instruction.

WARNING

INSTRUCTION MANUALS

DO NOT INSTALL, MAINTAIN, OR OPERATE THIS EQUIPMENT WITHOUT READING, UNDERSTANDING, AND FOLLOWING THE PROPER **Elsag Bailey** INSTRUCTIONS AND MANUALS; OTHERWISE, INJURY OR DAMAGE MAY RESULT.

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MOST ELECTRONIC EQUIPMENT IS INFLUENCED BY RADIO FREQUENCY INTERFERENCE (RFI). CAUTION SHOULD BE EXERCISED WITH REGARD TO THE USE OF PORTABLE COMMUNICATIONS EQUIPMENT IN THE AREA AROUND SUCH EQUIPMENT. PRUDENT PRACTICE DICTATES THAT SIGNS SHOULD BE POSTED IN THE VICINITY OF THE EQUIPMENT CAUTIONING AGAINST THE USE OF PORTABLE COMMUNICATIONS EQUIPMENT.

POSSIBLE PROCESS UPSETS

MAINTENANCE MUST BE PERFORMED ONLY BY QUALIFIED PERSONNEL AND ONLY AFTER SECURING EQUIPMENT CONTROLLED BY THIS PRODUCT. ADJUSTING OR REMOVING THIS PRODUCT WHILE IT IS IN THE SYSTEM MAY UPSET THE PROCESS BEING CONTROLLED. SOME PROCESS UPSETS MAY CAUSE INJURY OR DAMAGE.

AVERTISSEMENT

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PERTURBATIONS DU PROCÉDÉ

L'ENTRETIEN DOIT ÊTRE ASSURÉ PAR UNE PERSONNE QUALIFIÉE EN CONSIDÉRANT L'ASPECT SÉCURITAIRE DES ÉQUIPEMENTS CONTRÔLÉS PAR CE PRODUIT. L'AJUSTEMENT ET/OU L'EXTRACTION DE CE PRODUIT PEUT OCCASIONNER DES À-COUPS AU PROCÉDÉ CONTRÔLE LORSQU'IL EST INSÉRÉ DANS UNE SYSTÈME ACTIF. CES À-COUPS PEUVENT ÉGALEMENT OCCASIONNER DES BLESSURES OU DES DOMMAGES MATÉREILS.

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Preface

Termination units provide a connection from the plant equipment to the INFI 90® process modules. The NTAO01 Analog Output Termination Unit provides an interface between the IMAOM01 Analog Output Module and eight analog outputs. This product instruction explains how to install and use the NTAO01 Analog Output Termination Unit.

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List of Effective Pages

Total number of pages in this manual is 25, consisting of the following:

Page No.	Change Date
Preface	Original
List of Effective Pages	Original
iii through vi	Original
1-1 through 1-4	Original
2-1 through 2-7	Original
3-1	Original
4-1 through 4-3	Original
5-1	Original
A-1 through A-2	Original
Index-1	Original

When an update is received, insert the latest changed pages and dispose of the superseded pages.

NOTE: On an updated page, the changed text or table is indicated by a vertical bar in the outer margin of the page at the changed area. A changed figure is indicated by a vertical bar in the outer margin next to the figure caption. The date the update was prepared will appear beside the page number.

Safety Summary

GENERAL WARNINGS	**Equipment Environment** All components, whether in transportation, operation or storage, must be in a noncorrosive environment. **Electrical Shock Hazard During Maintenance** Disconnect power or take precautions to ensure that contact with energized parts is avoided when servicing. **Special Handling** This module uses electrostatic sensitive devices.
SPECIFIC CAUTIONS	It is strongly recommended that all power (cabinet, I/O, etc.) be turned off before doing any termination unit wiring. Failure to do so could result in equipment damage. Do not apply power until all connections are verified. (p. 2-6, 4-1) Remove modules from their assigned module mounting unit slots before installing or removing a cable connected to that slot. Failure to do so could result in damage to the module. (p. 4-2)

Sommaire de Sécurité

AVERTISSEMENTS D'ORDRE GÉNÉRAL	**Environment de l'equipement** Nes pas soumettre les composantes a une atmosphere corrosive lors du transport, de l'entreposage ou de l'utilisation. **Risques de chocs electriques lor de l'entretien** S'assurer de debrancher l'alimentation ou de prende les precautions necessaires a eviter tout contact avec des composants sours tension lors de l'entretien. **Precautions de Manutention** Ce module contient des composantes sensibles aux decharges electro-statiques.
ATTENTIONS D'ORDRE SPÉCIFIQUE	II est fortement recommand, que toutes les alimentations (armoire, E/S, etc.) soient coupées avant d'effectuer quelque raccord que ce soit sur un carte de raccordement. Un manquement à ces instructions pourrait causer des dommage à l'équipement. Ne pas rebrancher les alimentations avant d'avoir vérifié tous les raccordements. (p. 2-6, 4-1) Retirer le module de son emplacement dans le chassis de montage des modules avant d'installer ou de retirer un cable assigne a cet emplacement. Un manquement a cette procedure pourrait endommager le module. (p. 4-2)

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SECTION 1 - INTRODUCTION

OVERVIEW

The NTAO01 Analog Output Termination Unit (TAO) is used in conjunction with the IMAOM01 Analog Output Module (AOM). The termination unit provides eight channels for analog signals from the module to field devices such as recorders, indicators, or any four to 20 milliamp, one to five VDC or zero to ten VDC device. A field device may be system powered from the termination unit. Figure 1-1 shows an example TAO application.

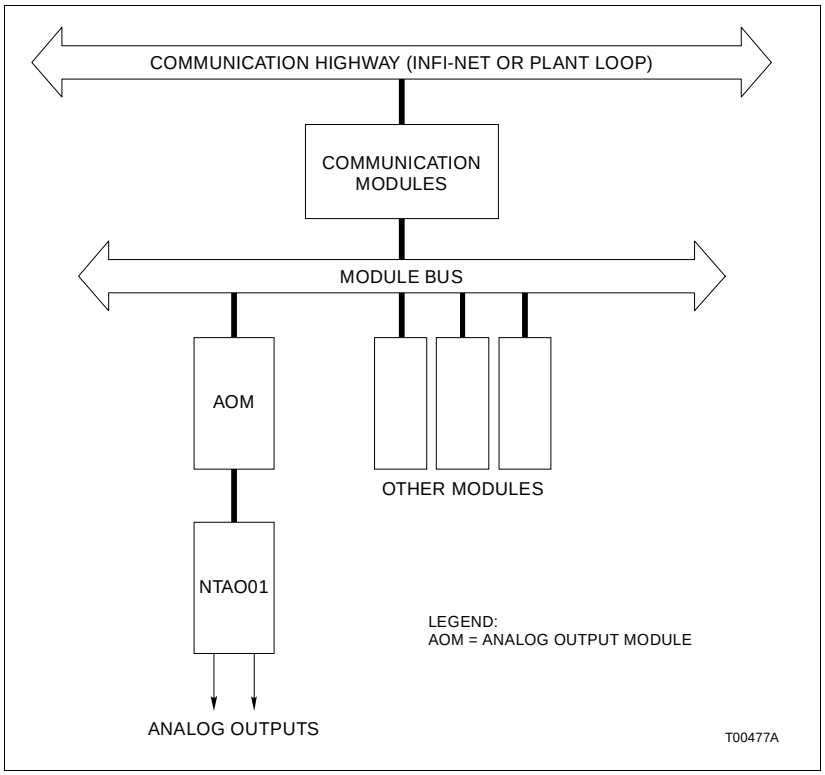

Figure 1-1. Example NTAO01 Termination Unit Application

INTENDED USER

System engineers and technicians should read this manual before installing and placing the termination unit into operation. ***Do not*** put the termination unit into operation until this instruction is read and understood.

MODULE DESCRIPTION

The NTAO01 termination unit is a single printed circuit board that attaches to an NFTP01 Field Termination Panel inside the INFI 90 cabinet. The NTAO01 termination unit has one socket connector, P1. It carries the outputs from the analog output module to the field device through an NKTU01 and NKTU11 Termination Unit Cable. Field devices connect to the TAO terminal block. The TAO dipshunts select the output signal type (voltage or current). The output signal type on the termination unit (selected by the dipshunt cut) must match the analog output module's output signal type.

INSTRUCTION CONTENT

This manual consists of five sections and an appendix.

Introduction Contains an overview of the features, specifications and a description of the TAO termination unit.

Installation Describes precautions to observe when handling modules and setup procedures required before unit operation. This section discusses dipshunt settings and installation procedures.

Maintenance Provides a maintenance schedule.

Repair/Replacement Procedures Details how to replace TAO termination unit.

Support Services Describes the support services (spare parts, training, documentation, etc.) available from Bailey Controls Company.

Appendix A Contains data to connect the termination unit to the analog output module. Appendix A shows the switch settings and cabling requirements for the analog output module.

HOW TO USE THIS MANUAL

Read this manual through in sequence. Read Section 2 thoroughly. Do the steps in order. Complete all steps in Section 2 before using the TAO termination unit. Refer to the table of contents or index to find specific information after the unit is operating.

REFERENCE DOCUMENTS

Table 1-1 lists the documents referenced in this instruction.

Table 1-1. Reference Documents

Number	Document Title
I-E96-206	IMAOM01 Analog Output Module

GLOSSARY OF TERMS AND ABBREVIATIONS

Table 1-2 lists definitions of the terms and abbreviations used in this instruction.

Table 1-2. Glossary of Terms and Abbreviations

Term	Definition
Analog	Continuously variable as opposed to discretely variable.
Configuration	The act of setting up equipment to accomplish specific functions or a list of parameters associated with such a setup.
Dipshunt	Dual in-line package with shorting straps.
Dipswitch	A dual in-line package that contains switches.
FTP	Field termination panel. A panel inside the INFI 90 cabinet on which to mount termination units.
INFI-NET	Advanced data communication highway.
Module Bus	Peer to peer communication link used to transfer information between intelligent modules within a process control unit.
Plant Loop	Network 90® data communication highway.
Termination Unit	Provides input/output connection between plant equipment and the INFI 90/ Network 90 modules.

NOMENCLATURE

Table 1-3 is a list of related hardware.

Table 1-3. Nomenclature

Nomenclature	Hardware
IMAOM01	Analog Output Module
NKTU01	Termination Unit Cable (PVC)
NKTU11	Termination Module Cable (non-PVC)

SPECIFICATIONS

Refer to Table 1-4 for the specifications of the NTAO01 termination unit.

Table 1-4. Specifications

Property	Characteristic/Value
Surge Protection	Meets IEEE-472-1974 surge withstand capability test.
Wire Size Minimum Maximum	 22 gauge 12 gauge
Mounting	Occupies one slot in a standard field termination panel.

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Table 1-4. Specifications

Property	Characteristic/Value
Electromagnetic/Radio Frequency Interference	No values available at this time. Keep cabinet doors closed. Do not use communication equipment closer than 2 meters from the cabinet.
Ambient Temperature	0° to 70°C (32° to 158°F)
Relative Humidity	0% to 95% up to 55°C (131°F) noncondensing 0% to 45% up to 70°C (158°F) noncondensing
Atmospheric Pressure	Sea level to 3 km (1.86 mi.)
Air Quality	Bailey Controls equipment should be operated and stored in a noncorrosive environment.
Cooling Requirements	No cooling is necessary when used in Bailey Controls cabinets and operated within stated environmental limits.
Certification	CSA certified for use as process control equipment in an ordinary (nonhazardous) location.

SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

SECTION 2 - INSTALLATION

INTRODUCTION

This section explains how to configure and install the NTAO01 Analog Output Termination Unit. Read, understand, and complete the steps in the order they appear before using the termination unit.

SPECIAL HANDLING

Observe these steps when handling electronic circuitry:

> **NOTE:** Always use Bailey's Field Static Kit (part number 1948385A1 - consisting of two wrist straps, ground cord assembly, alligator clip, and static dissipative work surface) when working with the modules. The kit grounds a technician and the static dissipative work surface to the same ground point to prevent damage to the modules by electrostatic discharge.

1. ***Use Static Shielding Bag.*** Keep the modules in the static shielding bag until you are ready to install them in the system. Save the bag for future use.

2. ***Ground Bag Before Opening.*** Before opening a bag containing an assembly with CMOS devices, touch it to the equipment housing or a ground to equalize charges.

3. ***Avoid Touching Circuitry.*** Handle assemblies by the edges; avoid touching the circuitry.

4. ***Avoid Partial Connection of CMOS Device.*** Verify that all devices connected to the modules are properly grounded before using them.

5. Ground Test Equipment.

6. ***Use an Antistatic Field Service Vacuum.*** Remove dust from the module if necessary.

7. ***Use a Grounded Wrist Strap.*** Connect the wrist strap to the appropriate grounding plug on the power entry panel. The grounding plug on the power entry panel is connected to the earth grounding electrode system through the AC safety ground.

8. ***Do Not Use Lead Pencils to Set Dipswitches.*** To avoid contamination of switch contacts that can result in unnecessary circuit board malfunction, do not use a lead pencil to set a dipswitch.

UNPACKING AND INSPECTION

1. Examine the hardware immediately for shipping damage.

2. Notify the nearest Bailey Controls sales office of any such damage.

3. File a claim for any damage with the transportation company that handled the shipment.

4. Use the original packing material and container to store the hardware.

5. Store the hardware in an environment of good air quality, free from temperature and moisture extremes.

SETUP/PHYSICAL INSTALLATION

This section explains how to configure and install the TAO termination unit. The required procedures are fuse installation, dipshunt configuration, installing the termination unit, cable connection and termination wiring.

Fuse Installation

Two fuses are installed with every TAO termination unit. Verify that the fuses are installed in fuse clips F1 and F2 (see Figure 2-1 for fuse clip locations). Fuse F1 is a 0.5 amp/250 volt fuse (Bailey Controls part number 194776A15000) used for 24 VDC I/O power for the AOM module. Fuse F2 is a 3.0 amp/250 volt fuse (Bailey Controls part number 1948776A13001) used for 24 VDC I/O power for external devices.

Dipshunt Configuration

The dipshunts select the analog output type (voltage or current) for the field device connected to the termination unit. Each channel is independent. The TAO termination unit has precut, installed dipshunts. The dipshunts are in the voltage position (position one of the dipshunt matched with position V on the PC board). To select current, remove the dipshunts, rotate the dipshunt 180 degrees and insert the dipshunt (position one of the dipshunt matched with position I on the PC board).

If needed, configure dipshunts by either cutting straps or leaving straps uncut in certain sequences. Cut the dipshunt straps using a standard shunt cutting tool (Amp Inc. part number 435862-1). Always cut straps completely and ensure they do not touch adjacent straps. Install the configured dipshunt into the desired socket (XU1 through XU8) on the TAO circuit board. Be careful not to bend any pins during insertions. Table 2-1 shows how to cut dipshunts one through eight (analog outputs one through eight respectively). Refer to Appendix A to

find the dipswitch and jumper settings for the analog output module. Figures 2-2 and 2-3 show typical output circuits.

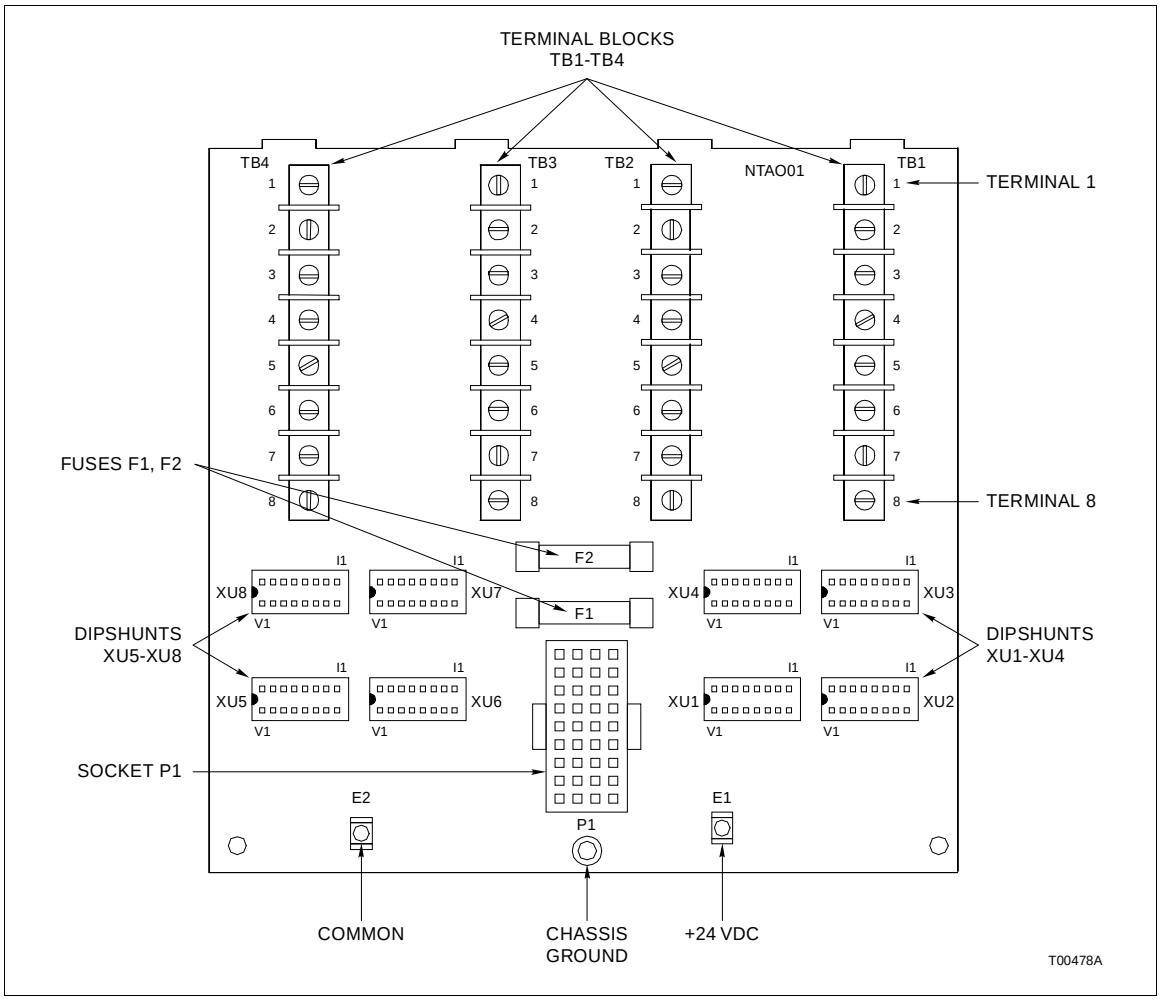
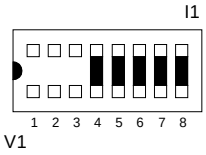
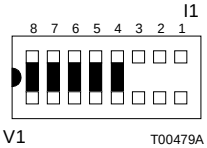


Figure 2-1. NTAO01 Termination Unit Layout

Table 2-1. NTAO01 Termination Unit Dipshunt Configuration

Analog Output	
Application/ Signal Type	**Dipshunt Configuration XU1 - XU8**
Voltage 0 to 10 VDC 1 to 5 VDC	
Current 4 to 20 mA	

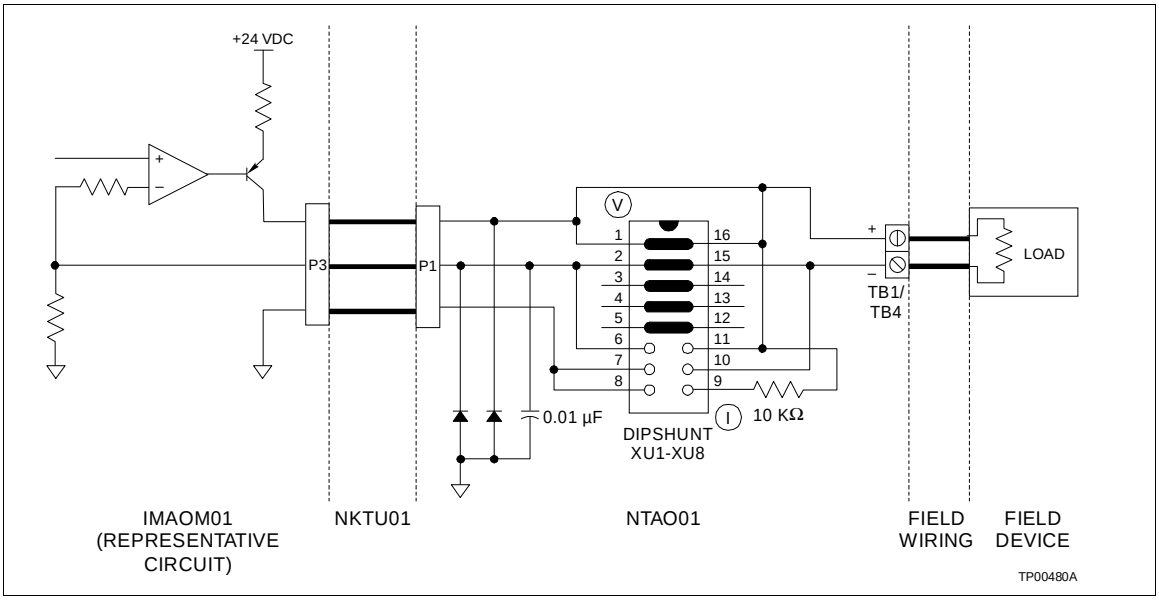


Figure 2-2. NTAO01 Termination Unit Typical Current Output Circuit

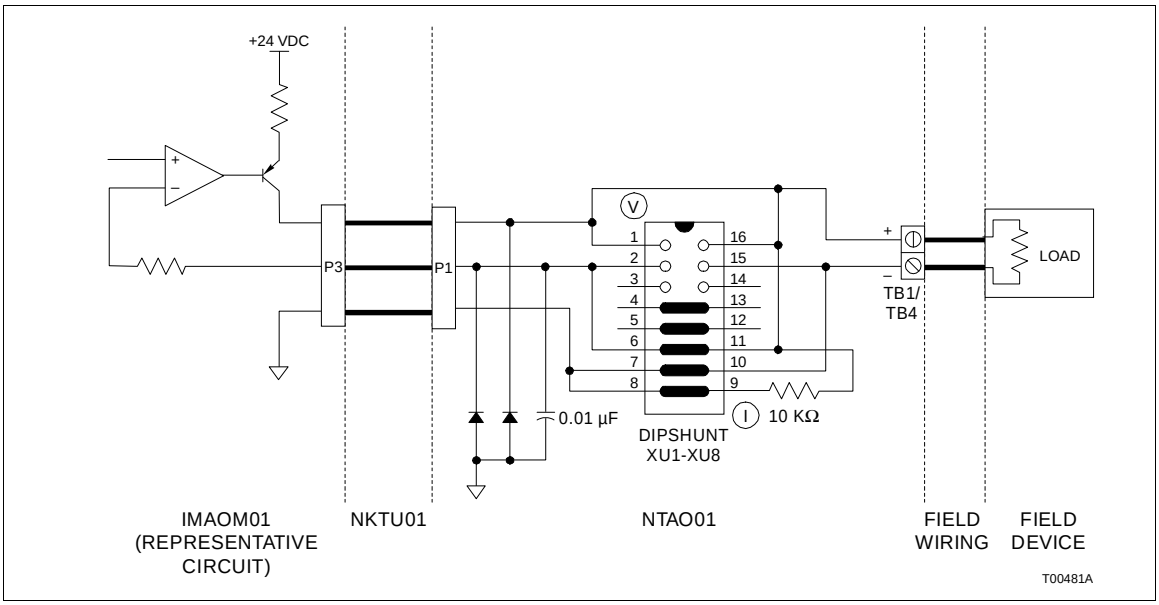


Figure 2-3. NTAO01 Termination Unit Typical Voltage Output Circuit

Installing the Termination Unit

The TAO termination unit mounts on a standard field termination panel. To install:

1. Insert the tabs of the circuit board into the proper slots of the field termination panel standoff (see Figure 2-4) and slide the circuit board into position.

2. Secure the termination unit circuit board to the field termination panel with two number ten self tapping screws.

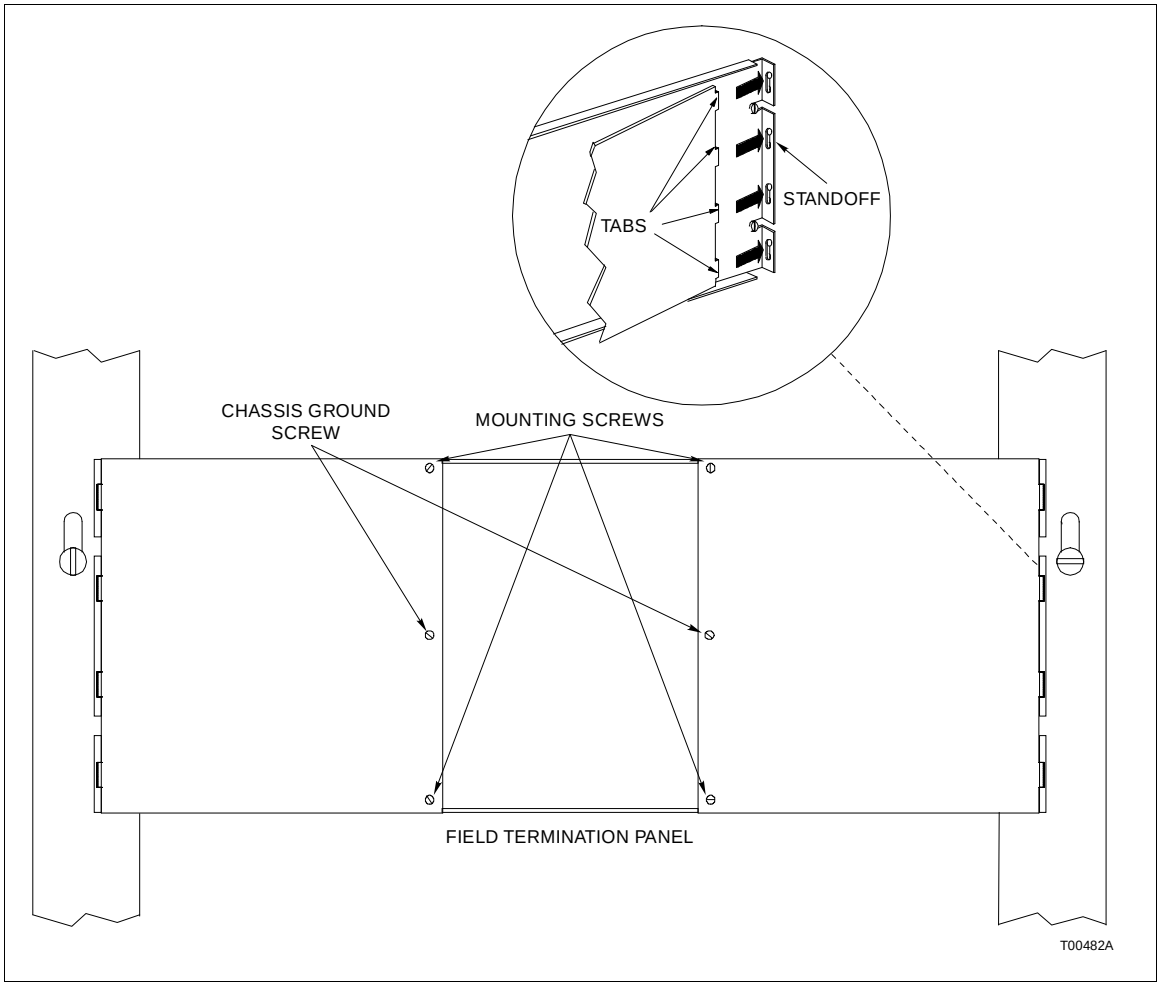


Figure 2-4. Termination Unit Mounting Diagram

3. Install a number ten self tapping screw and external star lock washer for the chassis common connection (E3).

Cabling Connections

The TAO termination unit supports the analog output module (AOM). Figure 2-5 shows the cable connection between the TAO termination unit and the AOM module. The cable is either the NKTU01 or NKTU11 Termination Unit Cable (KTU).

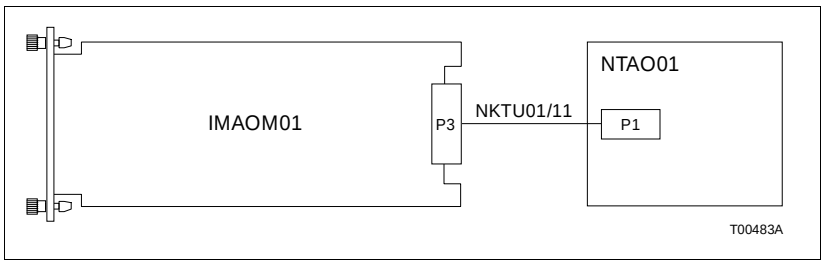


Figure 2-5. Cable Connections

Cable Installation

The KTU cable connects the TAO termination unit to the AOM module. The KTU cable is a round, shielded cable of 61 meters (200 feet) maximum length. Figure 2-3 shows the cable connections. To install the cable:

1. Properly mount the termination unit on the field termination panel ***before*** installing the cable.

2. If the module is installed, pull it several inches from the module mounting unit backplane ***before*** installing the cable.

3. Insert the hooded end of the cable into the module mounting unit backplane slot assigned to the analog output module. The cable should latch securely in place. Card edge connector P3 of the analog output module connects to this end of the cable.

4. Insert the male 36 pin connector end of the cable into the P1 connector of the termination unit. The cable should latch securely in place.

Power Wiring

CAUTION	**It is strongly recommended that all power (cabinet, I/O, etc.) be turned off before doing any termination unit wiring. Failure to do so could result in equipment damage. Do not apply power until all connections are verified.**
ATTENTION	**Il est fortement recommand, que toutes les alimentations (armoire, E/S, etc.) soient coupées avant d'effectuer quelque raccord que ce soit sur un carte de raccordement. Un manquement à ces instructions pourrait causer des dommage à l'équipement. Ne pas rebrancher les alimentations avant d'avoir vérifié tous les raccordements.**

There is one terminal (E1) that connects to +24 VDC and one terminal (E2) that connects to system common. Figure 2-1 shows their locations on the TAO circuit board.

To connect power to the termination unit in a system using modular power supplies:

1. Attach a 14 AWG wire from a +24 VDC source within the cabinet to the E1 terminal on the termination unit.

2. Attach a 14 AWG wire from the DC common bus bar at the bottom of the cabinet to the E2 terminal of the termination unit.

Terminal Wiring

Refer to Figure 2-6 for terminal block assignments and wiring polarity. Field wiring should be 12 to 22 AWG wire.

NOTE: In Figure 2-6, dipshunt XU1 is AO1, XU2 is AO2, etc.

The NTAO01 termination unit is ready for operation if:

1. Proper polarity of all signals is maintained.
2. The fuses are installed.
3. The dipshunts are installed.
4. The cable is installed and verified.
5. All field wiring is complete.
6. Power is connected and applied to the termination unit.

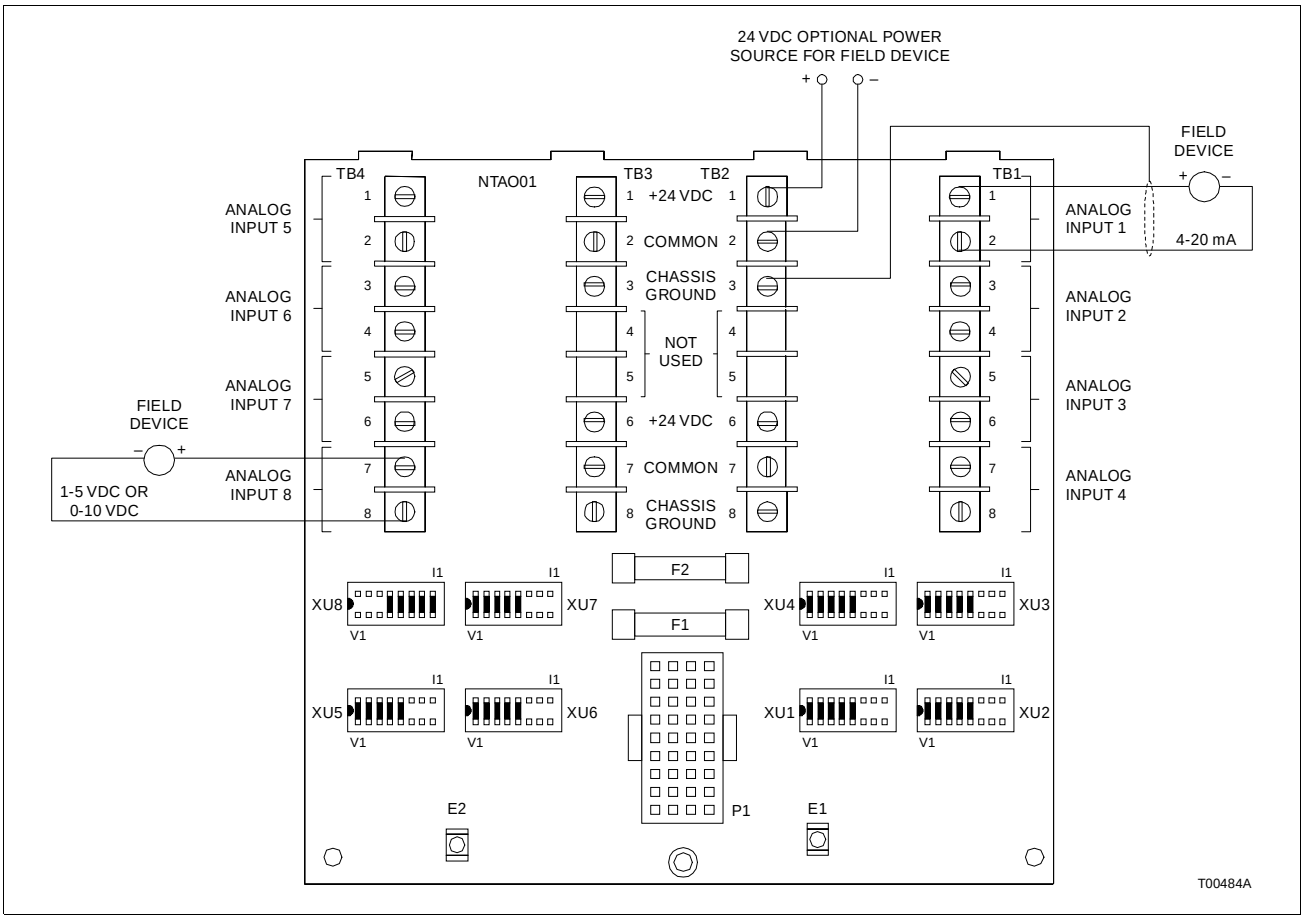


Figure 2-6. NTAO01 Terminal Assignments and Application Examples

SECTION 3 - MAINTENANCE

INTRODUCTION

The NTAO01 Analog Output Termination Unit requires limited maintenance. This section contains a maintenance schedule.

MAINTENANCE SCHEDULE

Execute the tasks in Table 3-1 at the specified intervals.

Table 3-1. Maintenance Schedule

Task	Interval
Clean and tighten all power and field wiring connections	Every 6 months or during plant shut-down, whichever occurs first.
Use a static safe vacuum cleaner to remove dust from: Termination Units Field Termination Panel	

SECTION 4 - REPAIR/REPLACEMENT PROCEDURES

INTRODUCTION

This section explains the replacement procedures for the analog output termination unit (TAO). Repair procedures are limited to fuse and termination unit replacement. If the termination unit fails, remove and replace it with a known good unit.

FUSE REPLACEMENT

If a fuse (F1 or F2) opens, replace it with a fuse having an equivalent rating. Table 4-1 describes the fuses and lists the Bailey part numbers. To replace a fuse:

1. Turn off power to the cabinet.
2. Remove the blown fuse from its holder.
3. Replace the blown fuse.
4. Turn on power to the cabinet.

Table 4-1. Recommended Spare Parts List

Description	Part Number
Fuse (F1) 0.5A/250V	194776A15000
Fuse (F2) 3.0A/250V	194776A13001

TERMINATION UNIT REPLACEMENT PROCEDURES

CAUTION	**It is strongly recommended that all power (cabinet, I/O, etc.) be turned off before doing any termination unit wiring. Failure to do so could result in equipment damage. Do not apply power until all connections are verified.**
ATTENTION	**Il est fortement recommand, que toutes les alimentations (armoire, E/S, etc.) soient coupées avant d'effectuer quelque raccord que ce soit sur un carte de raccordement. Un manquement à ces instructions pourrait causer des dommage à l'équipement. Ne pas rebrancher les alimentations avant d'avoir vérifié tous les raccordements.**

If a TAO termination unit is faulty, replace it with a new one. ***Do not*** try to repair the unit; replacing components may affect the performance and certification of the unit.

CAUTION	**Remove modules from their assigned module mounting unit slots before installing or removing a cable connected to that slot. Failure to do so could result in damage to the module.**
ATTENTION	**Retirer le module de son emplacement dans le chassis de montage des modules avant d'installer ou de retirer un cable assigne a cet emplacement. Un manquement a cette procedure pourrait endommager le module.**

When replacing a termination unit, verify that:

1. The proper fuses have been installed on the replacement termination unit.

2. All dipshunts are configured on the replacement termination unit the same as on the failed unit.

3. The module terminated by the faulty termination unit should be disconnected from the termination unit cable before the NKTU01 cable is disconnected from the termination unit. Pull the module out of its module mounting unit slot so that its edge connector is not in contact with the termination cable connected to the module mounting unit backplane.

> **NOTE:** Turn off power to the cabinet before removing the +24 VDC and grounding connection to the termination unit.

To replace the termination unit:

1. Label and remove all field wiring from the terminal blocks (TB1 through TB4).

2. Label and disconnect the cable connected to the termination unit at P1.

3. Label and disconnect system +24 VDC I/O power and system common from the E1 and E2 terminals.

4. Remove the 2 screws securing the termination unit to the field termination panel and the chassis ground screw and slide out the termination unit.

5. Insert the tabs of the circuit board into the proper slots of the field termination panel standoff and slide the new circuit board into position.

6. Secure the termination unit circuit board to the field termination panel with 2 screws.

7. Install the chassis ground screw with external star lock washer.

8. Connect all wiring.

9. Connect the cable to the P1 connector.

10. Verify all connections to the TAO termination unit.

11. Energize the cabinet power supply that provides power to the termination unit.

SECTION 5 - SUPPORT SERVICES

INTRODUCTION

Bailey Controls Company is ready to help in the use, application and repair of its products. Contact the nearest sales office to make requests for sales, applications, installation, repair, overhaul and maintenance contract services.

REPLACEMENT PARTS AND ORDERING INFORMATION

When making repairs, order replacement parts from a Bailey sales office. Provide this information:

1. Part description, part number and quantity.

2. Model and serial numbers (if applicable).

3. Bailey Controls instruction manual number, page number and reference figure that identifies the part.

Order parts without commercial descriptions from the nearest Bailey Controls Company sales office.

TRAINING

Bailey Controls Company has a modern training facility available for training your personnel. On-site training is also available. Contact a Bailey Controls sales office for specific information and scheduling.

TECHNICAL DOCUMENTATION

Additional copies of this manual, or other Bailey Controls Company manuals, can be obtained from the nearest Bailey Controls Company sales office at a reasonable charge.

APPENDIX A - IMAOM01 ANALOG OUTPUT MODULE

INTRODUCTION

The IMAOM01 Analog Output Module produces eight analog output signals in response to messages received over the module bus from other modules in the system. For more information, reference the IMAOM01 Analog Output Module product instruction.

Figure A-1 shows the dipswitch and jumper locations on the module. Determine the address for the module and set S2 dipswitches to the corresponding address positions shown in Table A-1.

Jumper E3 selects either individual one to five VDC or four to 20 milliamps, or zero to ten VDC for all eight outputs. When jumper E3 is configured for zero to ten VDC, all outputs must be configured for voltage outputs. Table A-2 shows how to set the E3 jumper on the module.

When jumper E3 is set for one to five VDC, jumpers E6 (AO8) through E13 (AO1) set analog outputs one through eight for either four to 20 milliamps or one to five VDC. Table A-3 shows the settings for jumpers E6 through E13.

NOTE: Do not move jumpers E1 and E2. They are factory installed.

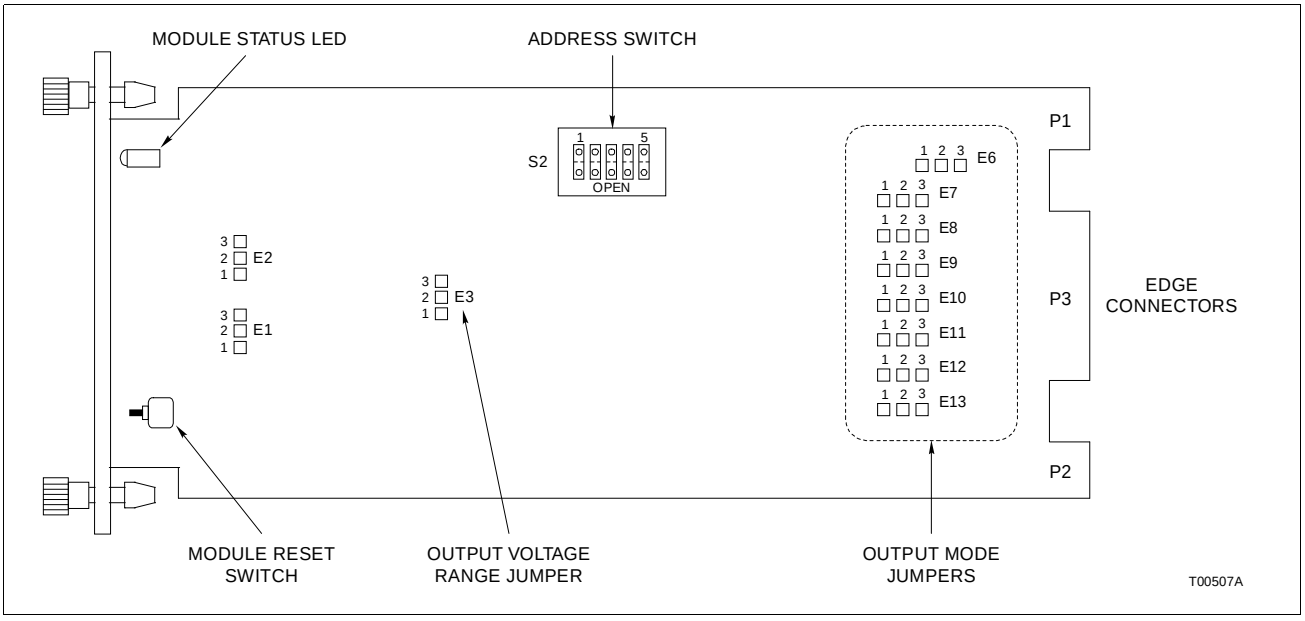


Figure A-1. Analog Output Module Layout

Table A-1. Example AOM Module Address Switch Settings (S2)

Address Example	Dipswitch Position (Binary Value)				
	1 (16)	2 (8)	3 (4)	4 (2)	5 (1)
7	0	0	1	1	1
15	0	1	1	1	1
31	1	1	1	1	1

NOTE: 0 = CLOSED or ON, 1 = OPEN or OFF.

Table A-2. Settings for Jumper E3

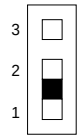
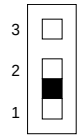
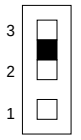
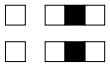
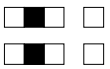
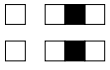
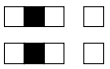
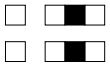
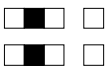
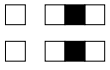
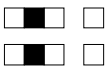
Signal	Jumper
4 to 20 mA	
1 to 5 VDC	
0 to 10 VDC	 T00485A

Table A-3. Settings for Jumpers E6 through E13

Jumper (Analog Output)	Voltage Output 1 to 5 VDC 0 to 10 VDC	Current Output 4 to 20 mA
	1 2 3	1 2 3
E6 (AO8) E7 (AO7)		
E8 (AO6) E9 (AO5)		
E10 (AO4) E11 (AO3)		
E12 (AO2) E13 (AO1)		 T00486A

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