symphony™

Instruction
Harmony Series

Digital I/O Termination Unit
NTDI02

ABB

Preface

The NTDI02 Digital I/O Termination Unit is a Harmony rack I/O device that is part of the Symphony Enterprise Management and Control System. It provides a signal path between field I/O signals and the following I/O modules.

- Analog output module (IMASO11).
- Digital input module (IMDSI13, IMDSI14, and IMDSI22).
- Pulse input module (IMDSM04).
- Digital output module (IMDSO14 and IMDSO15).
- Frequency counter module (IMFCS01).

The NTDI02 is not a direct replacement for the NTDI01; however, it is a functional replacement for the NTDI01.

This instruction explains the NTDI02 termination unit specifications and operation. It details the procedures necessary to complete setup, installation, maintenance, repair, and replacement of the termination unit.

NOTE: The NTDI02 termination unit is fully compatible with existing INFI 90® OPEN and Symphony™ Enterprise Management Systems.

List of Effective Pages

Total number of pages in this instruction is 46, consisting of the following:

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Safety Summary

Electrostatic Sensitive Device
Devices labeled with this symbol require special handling precautions as described in the installation section.

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 insure that contact with energized parts is avoided when servicing.

SPECIFIC WARNINGS

Verify the main power, field power, and power entry panel circuit breakers/switches are turned off before starting installation, retrofit, upgrade, or wiring procedures. Failure to do so could result in severe or fatal shock. Do not turn the power on until the installation, retrofit, upgrade, or wiring procedures are complete. (p. 2-6)

Never clean electrical parts or components with live power present. Doing so exposes the technician to an electrical shock hazard and may damage the equipment. (p. 3-2)

Wear eye protection whenever working with cleaning solvents. When removing solvents from printed circuit boards using compressed air, injury to the eyes could result from splashing solvent as it is removed from the printed circuit board. (p. 3-2)

There are exposed AC and DC connections inside the cabinet. These exposed electrical connections present a shock hazard that can cause injury or death. (p. 3-4)

If input or output circuits are a shock hazard after disconnecting system power at the power entry panel, then the door of the cabinet containing these externally powered circuits must be marked with a warning stating that multiple power sources exist. (p. 3-4)

SPECIFIC CAUTIONS	Remove a module from its assigned slot before installing or removing a cable assigned to that slot. Failure to do so could result in damage to the module. (p. 2-6, 4-2)
	Do not apply an input voltage to E1 or E2 if any of the sixteen field power inputs exceeds 120Vac. If the AC voltages are out of phase, the total voltage level will exceed the NTDI02 voltage rating which can cause damage to the termination unit. (p. 2-6)

Support Services

ABB will provide assistance in the operation and repair of its products. Requests for sales or application services should be made to your nearest sales or service office. ABB can also provide installation, repair and maintenance contract services.

When ordering parts, use nomenclature or part numbers and part descriptions from equipment manuals. Parts without a description must be ordered from the nearest sales or service office. Recommended spare parts lists, including prices are available through the nearest sales or service office.

ABB has modern training facilities available for training your personnel. On-site training is also available. Contact your nearest ABB sales office for specific information and scheduling.

Additional copies of this instruction, or other instructions, can be obtained from the nearest ABB sales office at a reasonable charge.

Trademarks and Registrations

Registrations and trademarks used in this document include:

® INFI 90	Registered trademark of ABB.
™ Symphony	Trademark of ABB.

Introduction

Section 1

Overview

The NTDI02 Digital I/O Termination Unit is a Harmony rack I/O device that is part of the Symphony Enterprise Management and Control System. It provides a signal path for up to 16 input signals to the following I/O modules. The inputs are used by the controller to monitor and control a process.

- Analog output module (IMASO11).
- Digital input module (IMDSI13, IMDSI14, and IMDSI22).
- Pulse input module (IMDSM04).
- Digital output module (IMDSO14 and IMDSO15).
- Frequency counter module (IMFCS01).

Figure 1-1 shows the Harmony rack I/O architecture. A Harmony area controller and the Harmony rack controllers can use the rack I/O module and termination units for I/O interface.

Intended User

Personnel installing, operating, or maintaining the NTDI02 termination unit should read this instruction before performing any installation, operation, or maintenance procedures. Installation requires an engineer or technician with experience handling electronic circuitry. Those working with the NTDI02 termination unit should have experience working with and know the precautions to take around AC/DC power. A knowledge of the Symphony system and electronic principles is also required.

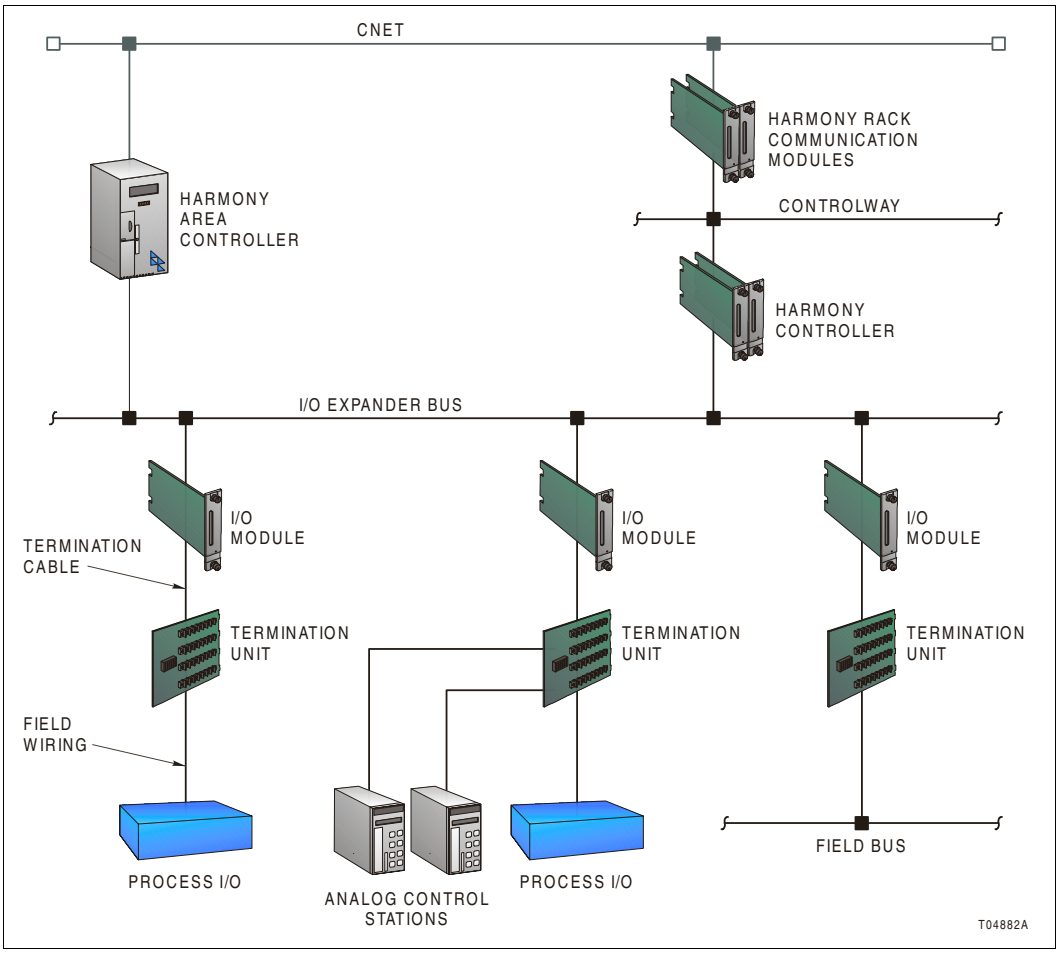

Figure 1-1. Harmony Rack I/O Architecture

Description

The NTDI02 termination unit is a seven-by-seven inch square printed circuit board. The board contains:

- Two fuses.
- 16 programmable dipshunts.
- 16 user configurable jumpers.
- Four terminal strips.
- One cable socket.
- Two power source Faston connectors.
- One system common Faston connector.

Mounting Hardware

Harmony termination units mount in a standard ABB enclosure (P-ME-CAB). An NFTP01 Field Termination Panel is used for termination unit mounting (Fig. 1-2). The panel attaches to the side rails in EIA standard 19-inch enclosures.

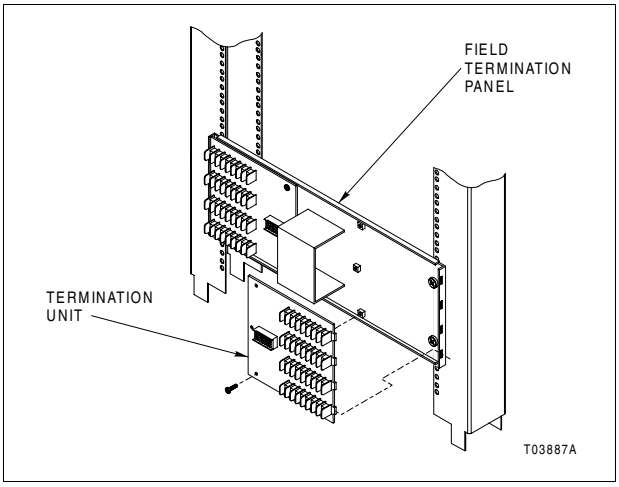

Figure 1-2. Mounting Hardware

Instruction Content

This instruction contains the following sections:

Introduction — Provides an overview of the NTDI02 termination unit.

Installation — Explains the physical installation, wiring and cable requirements, fuse requirements, dipshunt settings, jumpers settings and handling of the termination unit.

Maintenance — Contains a maintenance schedule.

Repair and Replacement — Explains how to replace the termination unit.

Dipshunt and Jumper Settings — Provides detailed diagrams for dipshunt and jumper settings for specific modules.

How to Use this Instruction

Read this instruction in sequence. It is important to become familiar with the entire contents of this instruction before using the termination unit. Refer to a specific section for information as needed.

1. Perform the steps in the installation section.

2. Refer to the maintenance section for scheduled maintenance requirements.

3. Refer to the repair and replacement procedures to replace a termination unit.

Document Conventions

The ? in the nomenclature or in a part number indicates a variable for that position (e.g., IMMFP1?).

Reference Documents

Table 1-1 lists ABB instructions for equipment that is referenced in this instruction.

Table 1-1. Reference Documents

Number	Document
WBPEEUI200502??	Module Mounting Unit (IEMMU11, IEMMU12, IEMMU21, and IEMMU22)
WBPEEUI200505??	Site Planning
WBPEEUI240762??	Digital output module (IMDSO14)
WBPEEUI240763??	Digital output module (IMDSO15)
WBPEEUI240765??	Analog output module (IMASO11)
WBPEEUI240767??	Digital input module (IMDSI13, IMDSI14, and IMDSI22)
WBPEEUI240770??	Frequency counter module (IMFCS01)
WBPEEUI240772??	Pulse input module (IMDSM04)

Related Nomenclature

Table 1-2 lists nomenclature related to the NTDI02 termination unit.

Table 1-2. Related Nomenclature

Nomenclature	Description
IEMMU11, IEMMU12, IEMMU21, IEMMU22	Module mounting unit
IMASO11	Analog output module
IMDSI13, IMDSI14, IMDSI22	Digital input module
IMDSM04	Pulse input module
IMDSO14, IMDSO15	Digital output module
IMFCS01	Frequency counter module
NFTP01	Field termination panel
NKTU01	Termination cable (PVC)
NKTU11	Termination cable (non-PVC)

Specifications

Refer to Table 1-3 for NTDI02 termination unit specifications.

Table 1-3. NTDI02 Termination Unit Specifications

Property	Characteristic/Value
Wire size Maximum Minimum	 12 AWG 22 AWG
Electrical Maximum voltage Maximum current	 250Vac 3A
Measurement Category (IEC 61010-1:2000)	I for circuits > 150 V II for circuits ≤ 150 V
Mounting	Mounts on the field termination panel.

Table 1-3. NTDI02 Termination Unit Specifications *(continued)*

Property	Characteristic/Value
Environmental	
Ambient temperature	0° to 70°C (32° to 158°F)
Relative humidity	5% to 95% up to 55°C (131°F) (noncondensing) 5% to 45% at 70°C (158°F) (noncondensing) Pollution degree: I
Altitude	Sea level to 3 km (1.86 mi)
Air quality	Noncorrosive
Cooling requirements	No cooling is required when used in ABB cabinets and operated within environmental limits.
Certifications	
Canadian Standards Association (CSA)	Certified for use as process control equipment in an ordinary (nonhazardous) location.
Factory Mutual (FM) (pending)	Approval pending for use in Class I; Division 2; Group A, B, C, D; hazardous location.

SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE

Installation

Section 2

Introduction

This section explains NTDI02 termination unit installation. Do ***not*** proceed with operation until the steps are read, understood, and performed in the order in which they appear.

Special Handling

Observe these steps when handling electronic circuitry:

1. ***Use Static Shielding Bag.*** Keep an assembly in its static shielding bag until ready to install it in the system. Save the bag for future use.

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

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

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

5. ***Ground Test Equipment.***

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

7. ***Use a Grounded Wrist Strap.*** Use the ABB field static kit (part number 1948385A1 - consisting of two wrist straps, ground cord assembly, alligator clip, and static dissipative work surface) when working with modules. The kit grounds a technician and the static dissipative work surface to the same ground point to prevent damage to the circuitry by electrostatic discharge. Connect the wrist strap to the appropriate grounding plug on the power supply or to an unpainted portion of the enclosure with the alligator clip. The wrist strap must be effectively connected to the earth grounding electrode system through the AC safety ground.

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

Unpacking and Inspection

1. Examine the hardware immediately to verify it has not been damaged in transit.

2. Notify the nearest ABB 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

Install the fuses and configure the dipshunts ***before*** installing or operating the NTDI02 termination unit. Figure 2-1 shows the layout of the termination unit.

Fuse Installation

There are two fuses on the termination unit. Fuse F1 protects the E1 power supply and fuse F2 protects the E2 power supply. Determine the voltage required and refer to Table 2-1 to select the correct fuse.

Table 2-1. Fuse Ratings

Voltage Required	Part Number	Description
24 VDC or 48 VDC	194776?13001	3 A
125 VDC or 120 VAC	194776?12500	0.25 A

Dipshunt Configuration

There are 16 dipshunts on the termination unit. Dipshunts XU1 through XU16 are for point (I/O) configuration of the 16

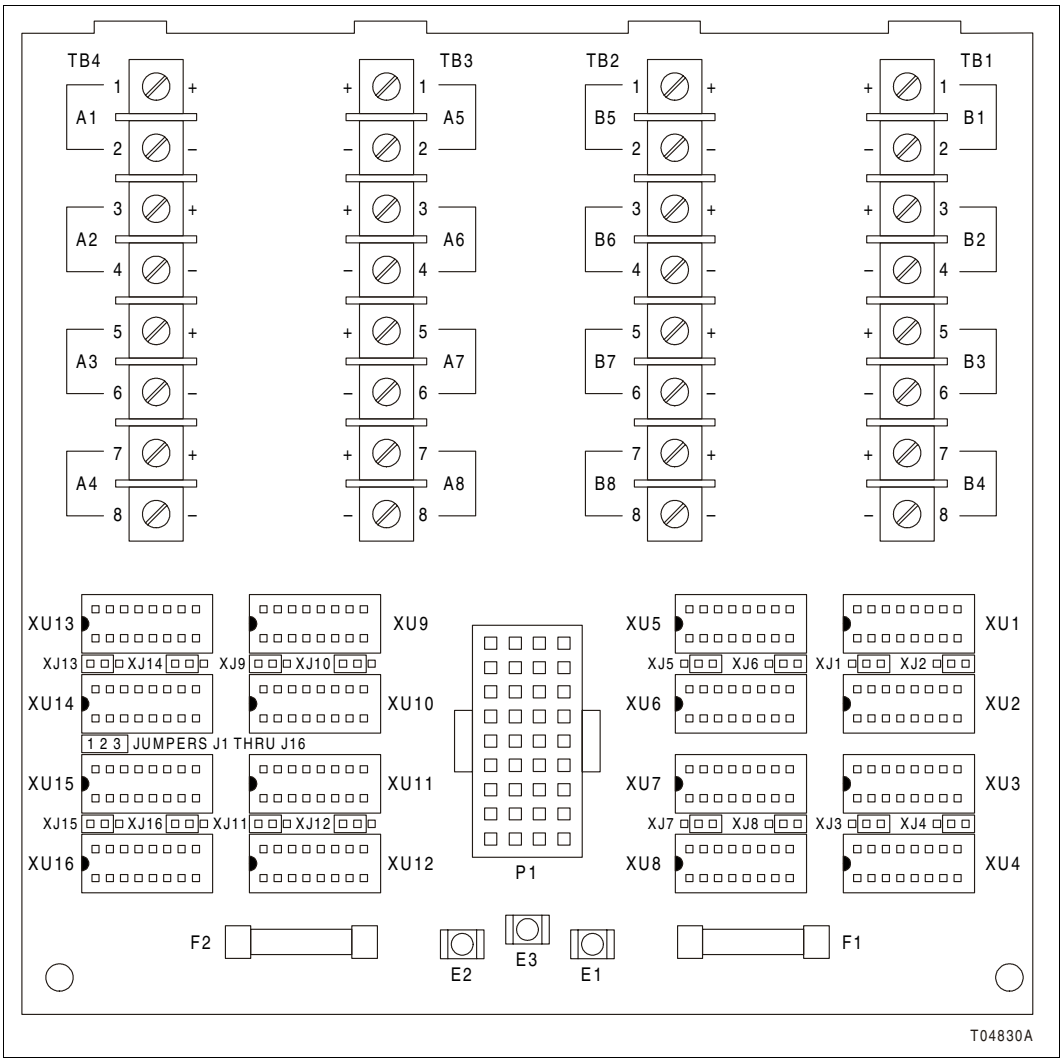

Figure 2-1. Termination Unit Layout

available I/O signals. The actual configuration of these dipshunts depends on the I/O module being used. Refer to Appendix A for the required dipshunt configurations.

NOTE: The connections to TB1 through TB4 are different when using the digital output module IMDSO15. Refer to Figure A-12 and Table A-1 in Appendix A for specific details.

Configure a dipshunt by either cutting straps or leaving straps uncut in certain sequences. Cut the dipshunt straps using a standard shunt cutting tool. Always cut straps completely (e.g. gap should be a minimum of 0.5mm). Install the configured dipshunt into the desired socket on the termination unit. To install a dipshunt, align the end of the dipshunt identified with the silver dot to the end of the socket having an identification mark and push the dipshunt into the socket. Be careful not to bend any pins during insertion.

Connector P1 Signal Paths

Refer to ***TB1 Through TB4 Schematics*** in Appendix B for detailed drawings of TB1 through TB4 and tables defining pin connections P1 to P3.

Figure B-1	TB1
Figure B-2	TB2
Figure B-3	TB3
Figure B-4	TB4

Termination Unit Installation

The termination unit is ready for installation when the fuses are installed, jumpers are set and dipshunts are properly configured. The termination unit mounts on a standard NFTP01 panel as shown in Figure 1-2.

Mounting

To mount the NTDI02 termination unit to the field termination panel:

1. Insert the tabs of the circuit board into the proper slots of the termination panel standoff as shown in Figure 2-2 and slide the circuit board into position.

2. Secure the termination unit circuit board to the field termination panel with two No. 10 x 5/8 thread-forming screws.

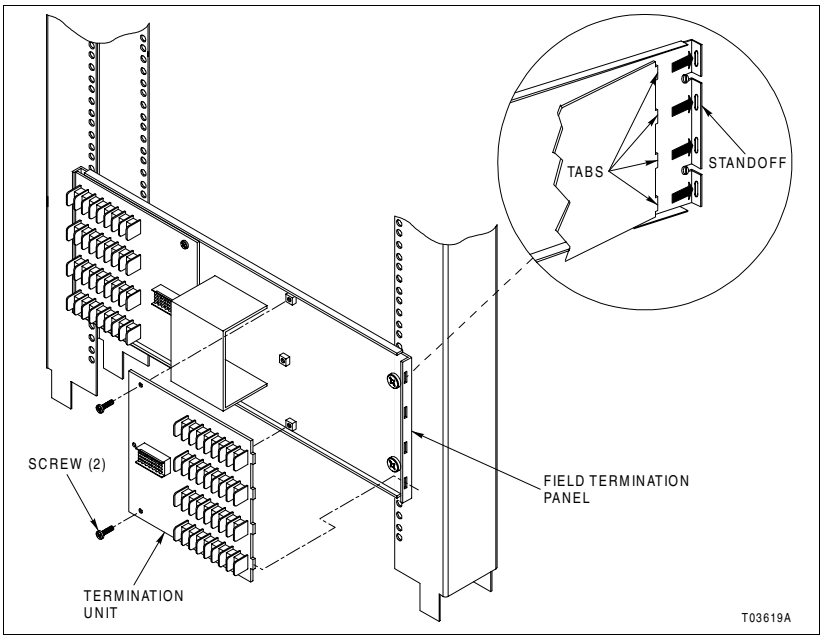

Figure 2-2. Termination Unit Installation

Cable Connection

After mounting the termination unit to the field termination panel, install the NKTU01 or NKTU11 termination cable. Figure 2-3 shows a diagram of cable connections to the I/O module and termination unit.

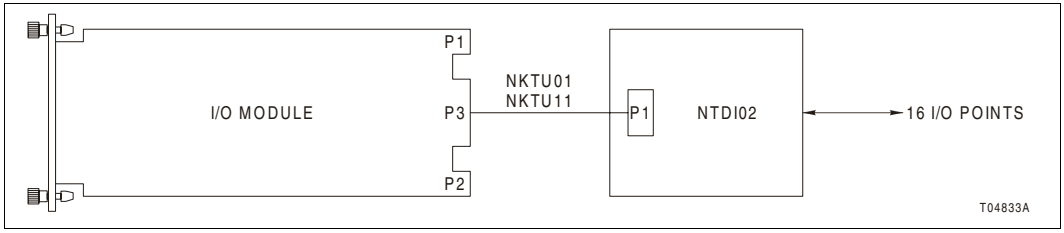

Figure 2-3. Cable Connection

To install the termination unit cable:

CAUTION	**Remove a module from its assigned slot before installing or removing a cable assigned to that slot. Failure to do so could result in damage to the module.**

1. Install the J2 connector of the NKTU01 or NKTU11 termination unit cable in the module mounting unit backplane slot assigned to the I/O module.

2. Insert the J1 connector of the cable into P1 of the termination unit.

Power Wiring

CAUTION	**Do not apply an input voltage to E1 or E2 if any of the sixteen field power inputs exceeds 120Vac. If the AC voltages are out of phase, the total voltage level will exceed the NTDI02 voltage rating which can cause damage to the termination unit.**

There are three terminals that provide power and ground connections. Refer to Figure 2-1 for terminal locations. System power connects to the termination unit through Faston connectors E1 and E2 and can be distributed to the configuration sockets (XU1 - XU16) through fuses (F1 and F2) and jumpers (J1 - J16). Any combination of power can be connected to these connectors depending on the application. However, this requires careful system analysis to ensure circuit board trace amperage capacity is not exceeded. A single trace can handle a continuous three amperes. System ground or neutral connects through Faston connector E3.

WARNING	**Verify the main power, field power, and power entry panel circuit breakers/switches are turned off before starting installation, retrofit, upgrade, or wiring procedures. Failure to do so could result in severe or fatal shock. Do not turn the power on until the installation, retrofit, upgrade, or wiring procedures are complete.**

To connect the power wiring:

1. If required, attach a 12-14 AWG wire from the power distribution source (24 VDC, 48 VDC, 125 VDC, or 120 VAC) to the E1 terminal on the termination unit.

2. If required, attach a 12-14 AWG wire from the power distribution source (24 VDC, 48 VDC, 125 VDC, or 120 VAC) to the E2 terminal of the termination unit.

3. If required, attach a 12-14 AWG wire from the system ground or neutral to the E3 terminal of the termination unit.

NOTE: Do not mix AC and DC power on the E1 and E2 inputs on the termination unit. Do not mix AC and DC commons.

Jumper Settings

1. Position the jumper for each socket used on the termination unit. Use positions 1 and 2 for E2 power and positions 2 and 3 for E1 power.

2. Since socket pairs XU7/XU8 and XU11/XU12 share a common pin on connector P1, it is important to use care when setting these jumpers. These pairs should always have identical jumper settings for power.

Terminal Block Wiring

Refer to Figure 2-1 for terminal block assignments and terminal polarity. Field wiring requirements will depend on the application. Refer to the ***Site Planning*** instruction for specific information on field wiring installation requirements (i.e., spacing, isolation, etc.). Connect the wiring from the input devices to the terminals.

Startup Check List

The termination unit is ready for operation when:

1. The fuses are installed.

2. The dipshunts are configured.

3. Jumpers J1 through J16 are configured.

4. The termination unit is installed on the field termination panel.

5. The cables are connected.

6. Power wiring is connected and applied to the termination unit.

7. Terminal block wiring is connected to the termination unit and field device.

Maintenance

Section 3

Introduction

The reliability of any stand-alone product or control system is affected by the maintenance of the equipment. ABB recommends that all equipment receive preventive maintenance to keep the equipment operating at an optimum level.

This section presents procedures that the customer should be able to perform on site. These preventive maintenance procedures should be used as a guideline to assist in establishing good preventive maintenance practices.

Personnel performing preventive maintenance should meet the following qualifications.

- Personnel should be qualified electrical technicians or engineers that know the proper use of test equipment.
- Personnel should be familiar with the module mounting unit and field termination panel, have experience working with process control systems, and know what precautions to take when working on live AC and/or DC systems.

Preventive Maintenance Schedule

Table 3-1 is the preventive maintenance schedule for the NTDI02 termination unit. The table lists the preventive maintenance tasks in groups according to their specified maintenance interval. Tasks that require further explanation are covered under *Preventive Maintenance Procedures*.

NOTE: The preventive maintenance schedule is for general purposes only. Your application may require special attention.

Equipment and Tools Required

Tools and equipment required for maintenance procedures:

- Antistatic vacuum.
- Screwdriver (medium length).

- Isopropyl alcohol (99.5 percent electronic grade).
- Distilled water.
- Compressed air.
- Foam-tipped swabs.
- Lint-free cloths.
- Nonabrasive eraser.

Table 3-1. Preventive Maintenance Schedule

Task	Frequency
Check cabinet air filters. Clean or replace them as necessary. Check the air filter more frequently in excessively dirty environments.	3 months
Check cabinet and termination unit for dust. Clean using an antistatic vacuum.	
Check all termination unit signal, power and ground connections within the cabinet. Verify that they are secure. Refer to procedure.	
Check termination unit circuit board, giving special attention to power contacts and edge connectors. Clean as necessary. Refer to procedure.	12 months
Complete all tasks in this table.	Shutdown

Preventive Maintenance Procedures

This section covers tasks from Table 3-1 that require specific instructions or further explanation.

Printed Circuit Board Cleaning

WARNING

Never clean electrical parts or components with live power present. Doing so exposes the technician to an electrical shock hazard and may damage the equipment.

Wear eye protection whenever working with cleaning solvents. When removing solvents from printed circuit boards using compressed air, injury to the eyes could result from splashing solvent as it is removed from the printed circuit board.

There are several circuit board cleaning procedures in this section. These procedures cover circuit board cleaning and washing, cleaning edge connectors and circuit board laminate between edge connectors. Use the procedures that meet the needs of each circuit board. Remove all dust, dirt, oil, corrosion or any other contaminant from the circuit board.

Perform all cleaning and handling of the printed circuit boards at static safe work stations. Always observe the steps under ***Special Handling*** in Section 2 when handling printed circuit boards.

General Cleaning and Washing

If the printed circuit board needs minor cleaning, remove dust and residue from the printed circuit board surface using clean, dry, filtered compressed air or an antistatic field service vacuum cleaner.

To wash the printed circuit board:

1. Clean the printed circuit board by spraying or wiping it with isopropyl alcohol (99.5% electronic grade). Use a foam-tipped swab to wipe the circuit board.

2. Remove excess solvent by using compressed air to blow it free of the circuit board.

Edge Connector Cleaning

1. Use a solvent mixture of 80% isopropyl alcohol (99.5% electronic grade) and 20% distilled water.

2. Soak a lint-free cloth with the solvent mixture.

3. Work the cloth back and forth parallel to the edge connector contacts.

4. Repeat with a clean cloth that is soaked with the solvent mixture.

5. Dry the edge connector contact area by wiping with a clean lint-free cloth.

To clean tarnished or deeply stained edge connector contacts:

1. Use a nonabrasive eraser or equivalent to remove tarnish or stains. Fiberglass or nylon burnishing brushes may also be used.

2. Minimize electrostatic discharge by using the 80/20 isopropyl alcohol/water solution during burnishing.

3. Do not use excessive force while burnishing. Use only enough force to shine the contact surface. Inspect the edge connector after cleaning to assure no loss of contact surface.

4. Wipe clean with a lint-free cloth.

Checking Connections

NOTE: Power to the cabinet should be off while performing this preventive maintenance task.

WARNING

There are exposed AC and DC connections inside the cabinet. These exposed electrical connections present a shock hazard that can cause injury or death.

If input or output circuits are a shock hazard after disconnecting system power at the power entry panel, then the door of the cabinet containing these externally powered circuits must be marked with a warning stating that multiple power sources exist.

Check all signal wiring, power and ground connections within the cabinet to verify their integrity. When checking connections, always turn a screw, nut or other fastening device in the direction to tighten only. If the connection is loose, it will be tightened. If the connection is tight, the tightening action will verify that it is secure. There must not be any motion done to loosen the connection.

1. Verify that all power connections within the cabinet are secure.

2. Verify that all wiring connections to the termination unit are secure.

Repair and Replacement

Section 4

Introduction

This section explains the repair and replacement procedures for an NTDI02 termination unit. Table 4-1 is a replacement and spare parts list.

Table 4-1. Parts List

Part Number	Description
1946715?8	Dipshunt
194776?12500	Fuse, 0.25 A
194776?13001	Fuse, 3 A
NFWAB17010	0.19-16 (no.10) x 5/8 in. Phillips-head thread forming screw

Fuse Replacement

If a fuse opens, replace it with a fuse having an equivalent rating. To replace a fuse:

1. Turn off power to the cabinet.
2. Verify that there is no power on E1 or E2.
3. Remove the blown fuse from its holder.
4. Replace the blown fuse with an equivalent fuse.
5. Turn on power to the cabinet.

Termination Unit Replacement

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

Special Handling in Section 2 when replacing a termination unit.

NOTE: Turn off power to the field devices before removing the cables from the termination unit.

CAUTION	**Remove a module from its assigned slot before installing or removing a cable assigned to that slot. Failure to do so could result in damage to the module.**

Follow Steps 1 through 14 to replace the termination unit.

1. Turn off power to the cabinet.

2. Disconnect the power source and ground wiring from the E1, E2, and E3 Faston connectors of the termination unit. Mark the wires according to their terminal assignment as they are removed.

3. If the termination unit is connected to an I/O module, pull the I/O module out of its cable connection on the module mounting unit backplane.

4. If there is a termination cable connected, disconnect it from the P1 connector on the termination unit.

5. Turn off power to the field devices. Disconnect I/O wiring from the terminal blocks. Mark the wires according to their terminal assignment.

6. When all cables and wires are removed from the termination unit, remove the two mounting screws and remove the termination unit from the field termination panel.

7. Verify the proper fuses are installed in fuse holders F1 and F2 of the replacement termination unit.

8. Verify that the dipshunt settings and jumper settings on the replacement termination unit are the same as the dipshunt settings and jumper settings on the faulty termination unit.

NOTE: NTDI01 and NTDI02 may not be interchangeable. The settings may not be the same.

9. Secure the replacement termination unit circuit board to the field termination panel with the two mounting screws.

10. Connect the termination unit cables to their assigned connector on the termination unit.

11. Connect the I/O wiring to the terminal strips.

12. Connect the power source and ground wiring to the E1, E2, and E3 Faston connectors of the termination unit.

13. Push on the faceplate of the I/O module to fully insert it into its module mounting unit slot. The I/O modules should be seated in the termination unit cable at the rear of the module mounting unit when fully inserted.

14. After all cables and wiring have been replaced, return power to the field devices.

15. Return power to the cabinet.

16. Check I/O points for good quality to ensure the new termination unit is functioning properly.

IMASO11

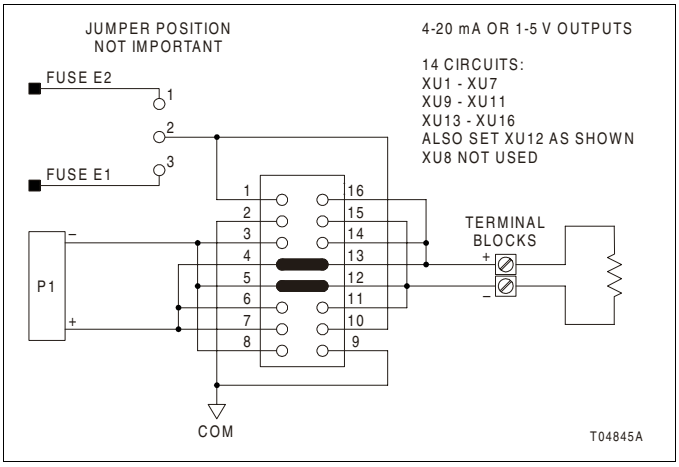

Figure A-1. IMASO11 Analog Output Circuits

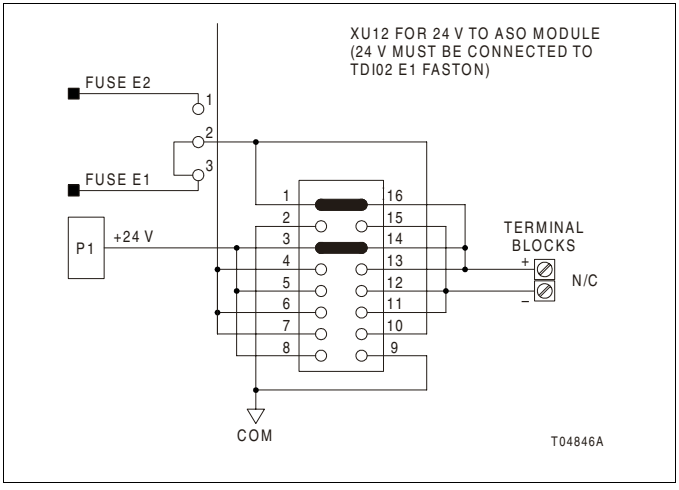

Figure A-2. IMASO11 Internal Powered

IMDSI13, IMDSI14 and IMDSI22

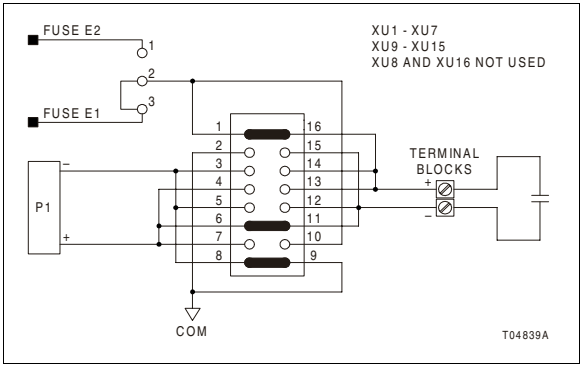

Figure A-3. Settings for IMDSI13, IMDSI14 and IMDSI22 Powered from E1

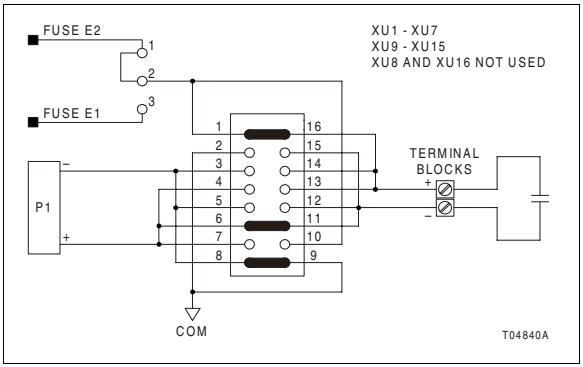

Figure A-4. Settings for IMDSI13, IMDSI14 and IMDSI22 Powered from E2

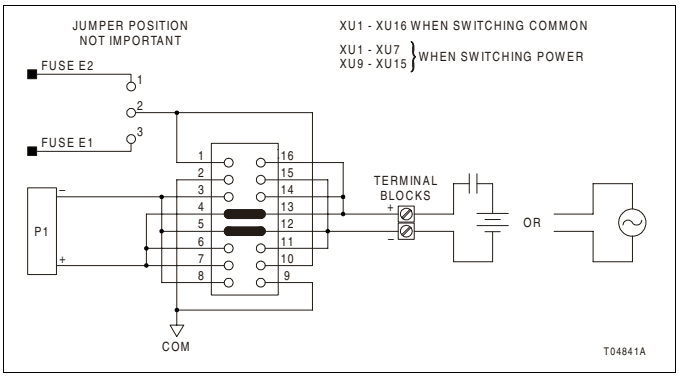

Figure A-5. Settings for IMDSI13, IMDSI14 and IMDSI22 Powered from Field

IMDSM04

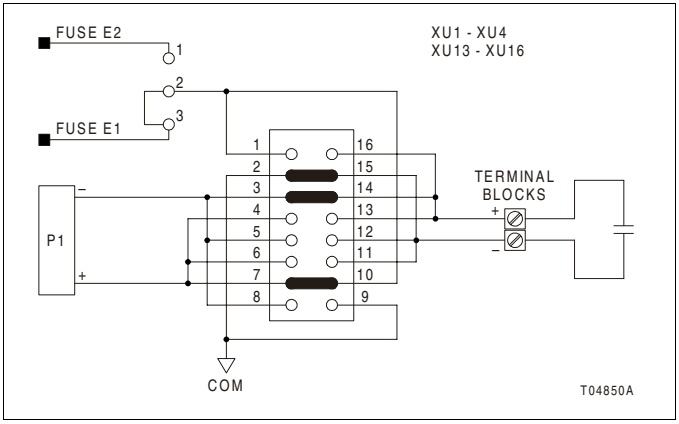

Figure A-6. Settings for IMDSM04 System Powered

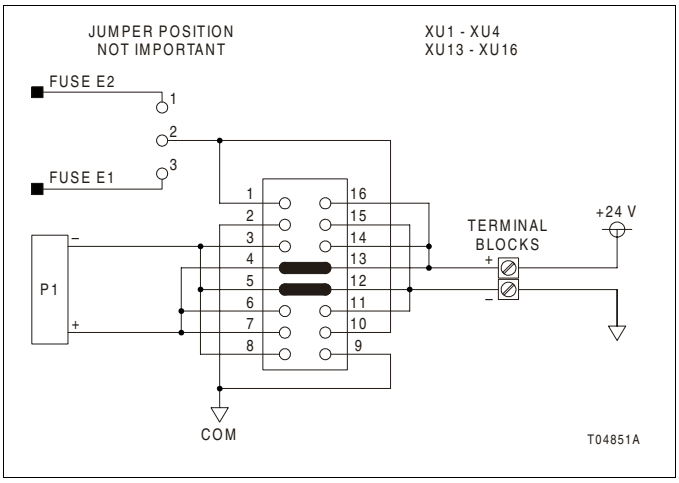

Figure A-7. Settings for IMDSM04 Field Powered

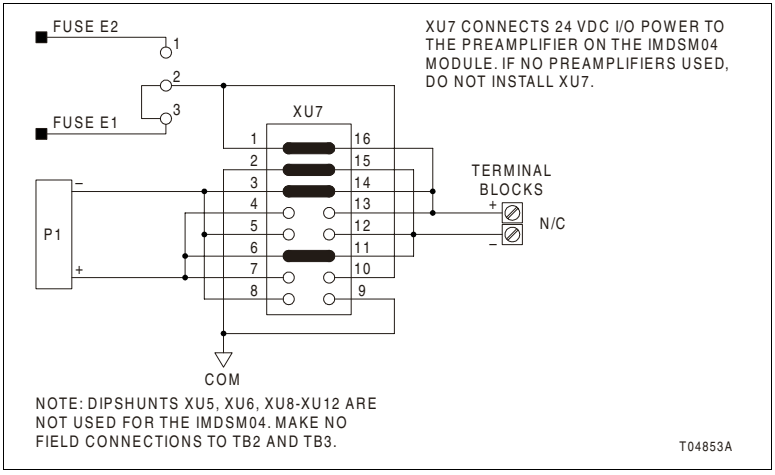

Figure A-8. Settings for IMDSM04 Power for Preamplifiers

IMDSO14

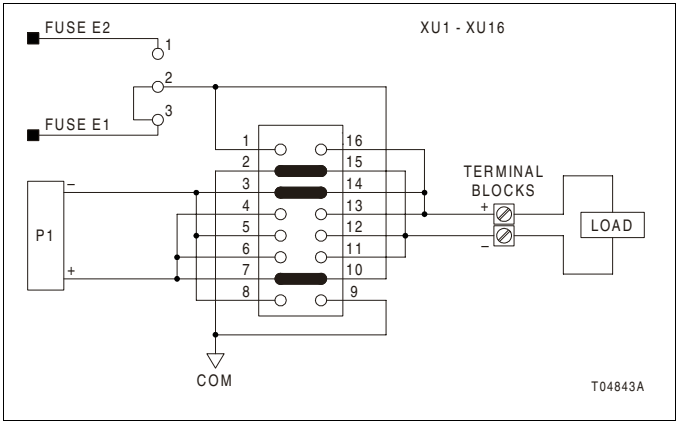

Figure A-9. Settings for IMDSO14 Powered from E1

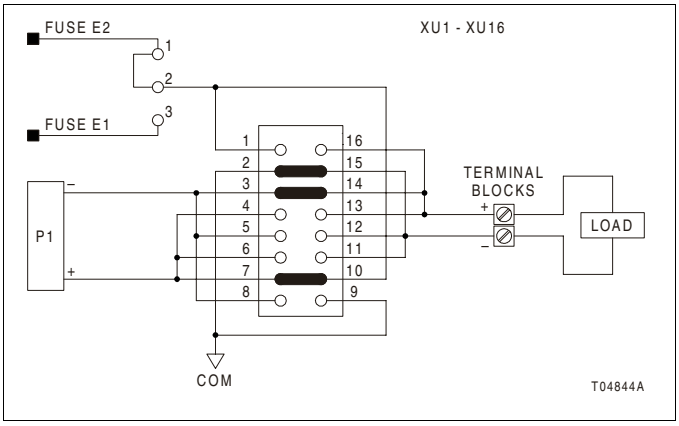

Figure A-10. Settings for IMDSO14 Powered from E2

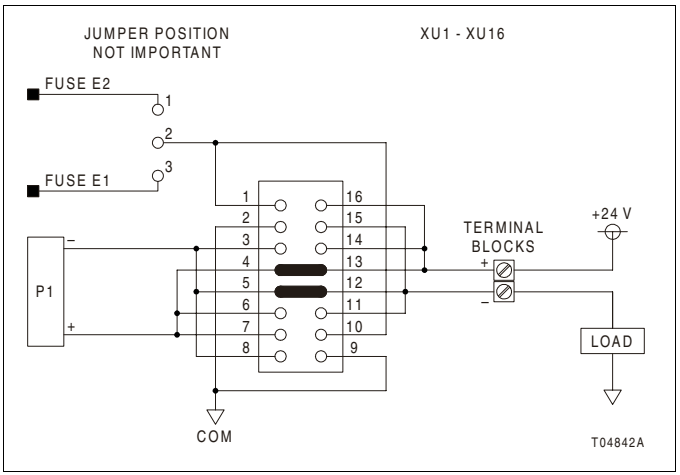

Figure A-11. Settings for IMDSO14 Field Powered

IMDSO15

The digital output module IMDSO15 has specific connections to TB1 through TB4. Refer to Figure A-12 and Table A-1 for details.

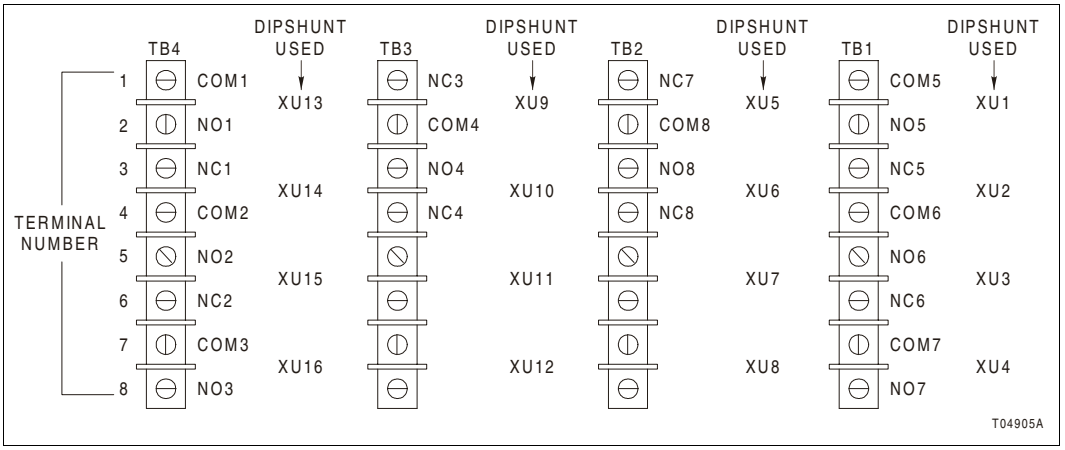

Figure A-12. Custom Relay Contact/Terminal Block Assignment for the IMDSO15

Table A-1. Relay Contact Assignment for IMDSO15

Signal	Terminal No.
COM1	TB4-1
NO1	TB4-2
NC1	TB4-3
COM2	TB4-4
NO2	TB4-5
NC2	TB4-6
COM3	TB4-7
NO3	TB4-8
NC3	TB3-1
COM4	TB3-2
NO4	TB3-3
NC4	TB3-4
COM5	TB1-1
NO5	TB1-2
NC5	TB1-3
COM6	TB1-4
NO6	TB1-5
NC6	TB1-6
COM7	TB1-7
NO7	TB1-8
NC7	TB2-1
COM8	TB2-2
NO8	TB2-3
NC8	TB2-4

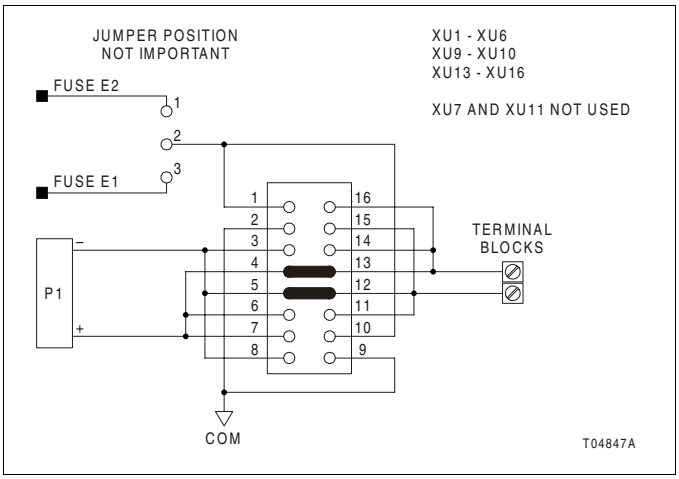

Figure A-13. IMDSO15

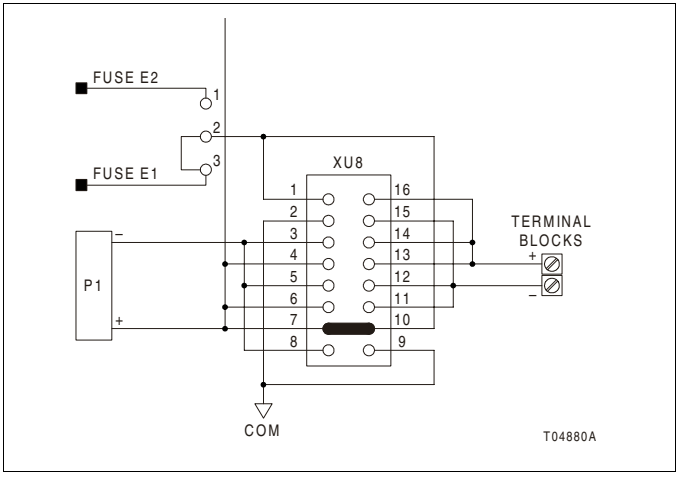

Figure A-14. Settings for IMDSO15 XU8

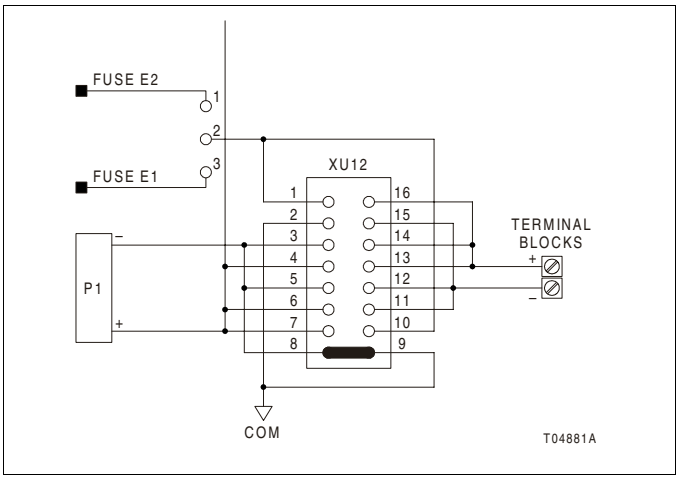

Figure A-15. Settings for IMDSO15 XU12

IMFCS01

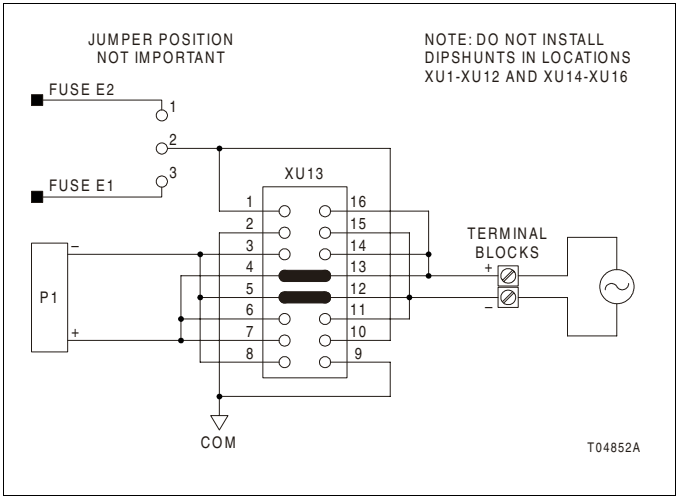

Figure A-16. Settings for IMFCS01

TB1 Through TB4 Schematics

Appendix B

P1 Connections

Table B-1 defines the signal paths for P1.

Table B-1. Connector P1 Signal Paths

Pin	Socket	Jumper	I/O	Pin	Socket	Jumper	I/O
1	XU13	J13	A1	19	XU11/XU12	J11/J12	A7/A8
2	XU13	J13	A1	20	XU11	J11	A7
3	XU14	J14	A2	21	XU8	J8	B8
4	XU14	J14	A2	22	XU12	J12	A8
5	XU15	J15	A3	23	XU1	J1	B1
6	XU15	J15	A3	24	XU1	J1	B1
7	XU16	J16	A4	25	XU2	J2	B2
8	XU16	J16	A4	26	XU2	J2	B2
9	NC			27	XU3	J3	B3
10	NC			28	XU3	J3	B3
11	NC			29	XU4	J4	B4
12	NC			30	XU4	J4	B4
13	XU9	J9	A5	31	XU5	J5	B5
14	E3		COM	32	XU5	J5	B5
15	NC			33	XU6	J6	B6
16	XU9	J9	A5	34	XU6	J6	B6
17	XU10	J10	A6	35	XU7/XU8	J7/J8	B7/B8
18	XU10	J10	A6	36	XU7	J7	B7

P3 Connections

Table B-2 shows the cable pin connections from connector P3 of the I/O module to connector P1 of the termination unit.

Table B-2. Cable Connections for I/O Signals

NKTU01/NKTU11					
P3[1]	P1[2]	P3[1]	P1[2]	P3[1]	P1[2]
1	1	6	17	11	27
A	2	F	18	M	28
2	3	7	19	12	29
B	4	H	20	N	30
3	5	8	21	13	31
C	6	J	22	P	32
4	7	9	23	14	33
D	8	K	24	R	34
5	13	10	25	15	35
E	16	L	26	S	36

NOTES:
1. P3 on I/O module.
2. P1 on termination unit.

TB1 Schematic

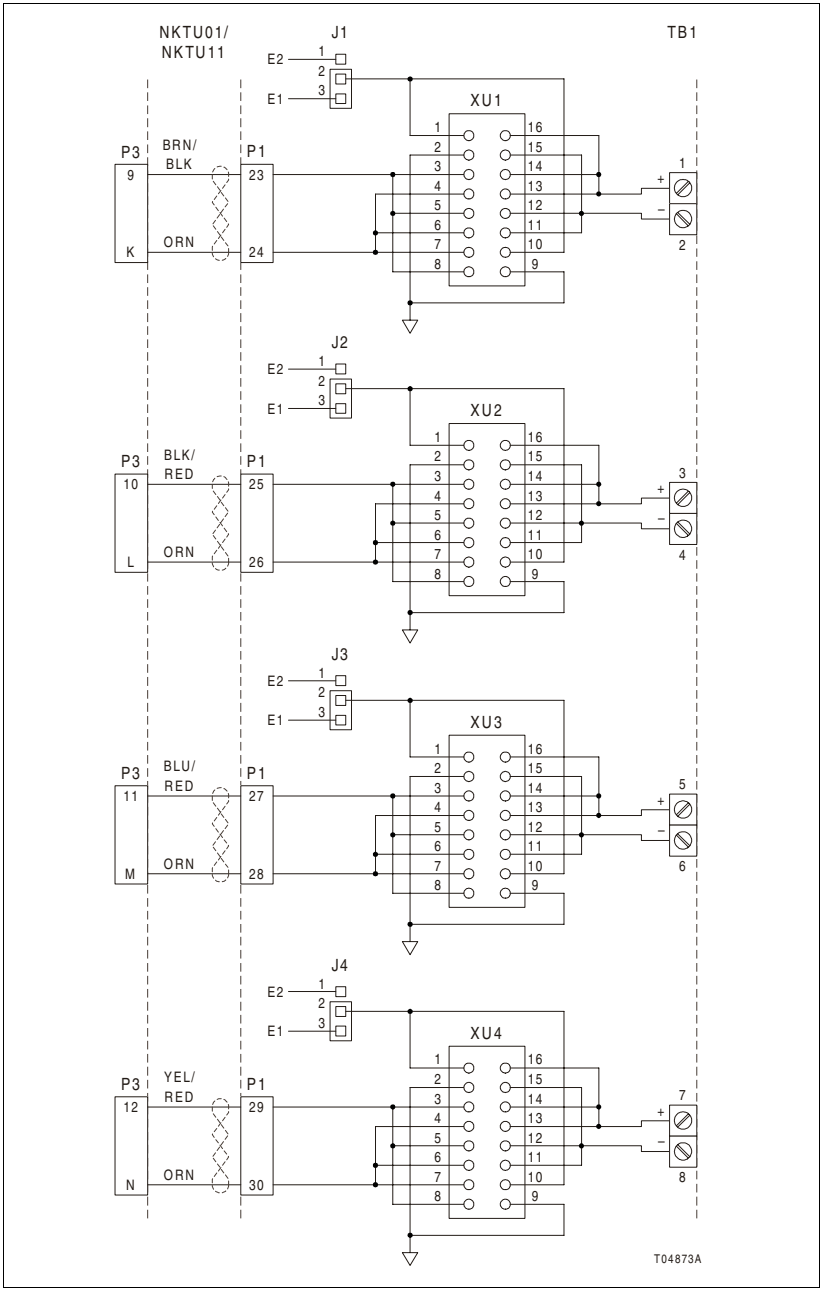

Figure B-1. TB1 Schematic

TB2 Schematic

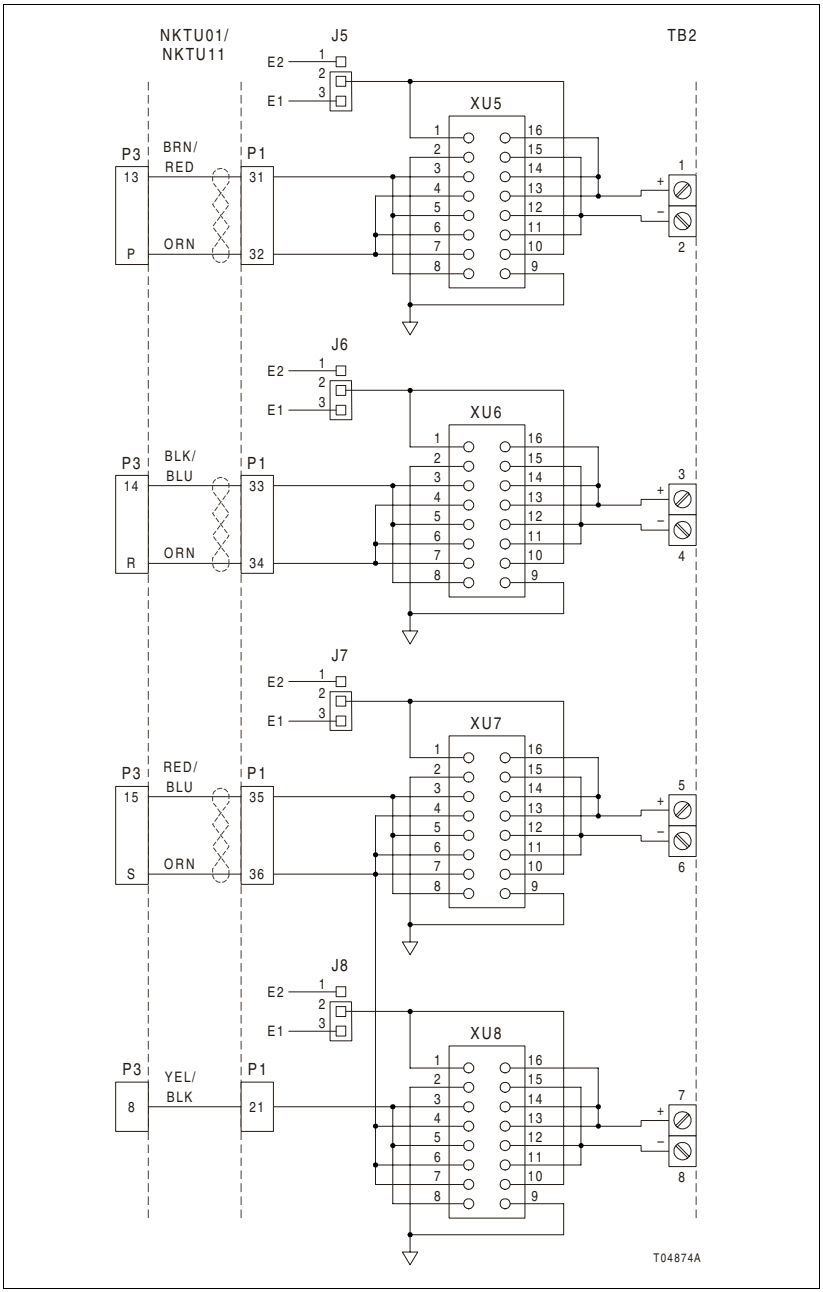

Figure B-2. TB2 Schematic

TB3 Schematic

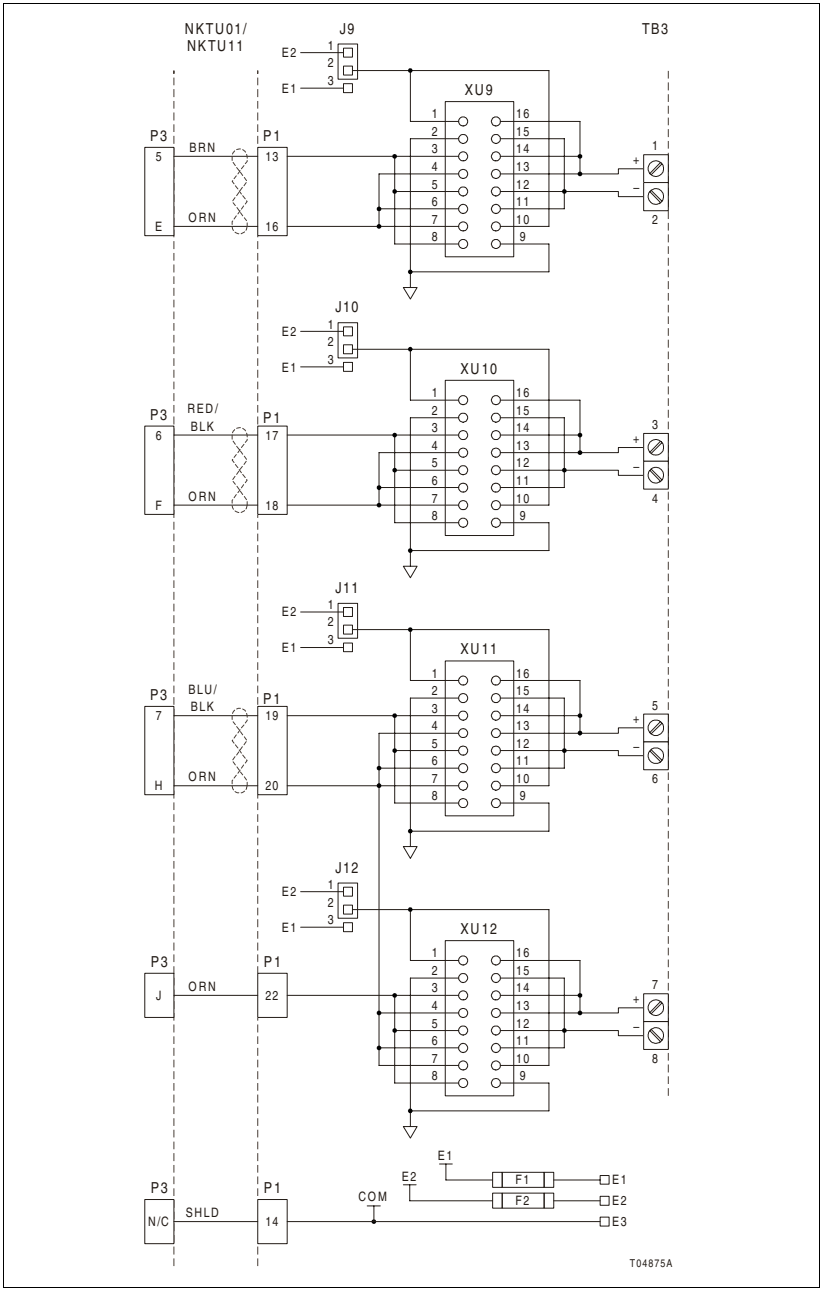

Figure B-3. TB3 Schematic

TB4 Schematic

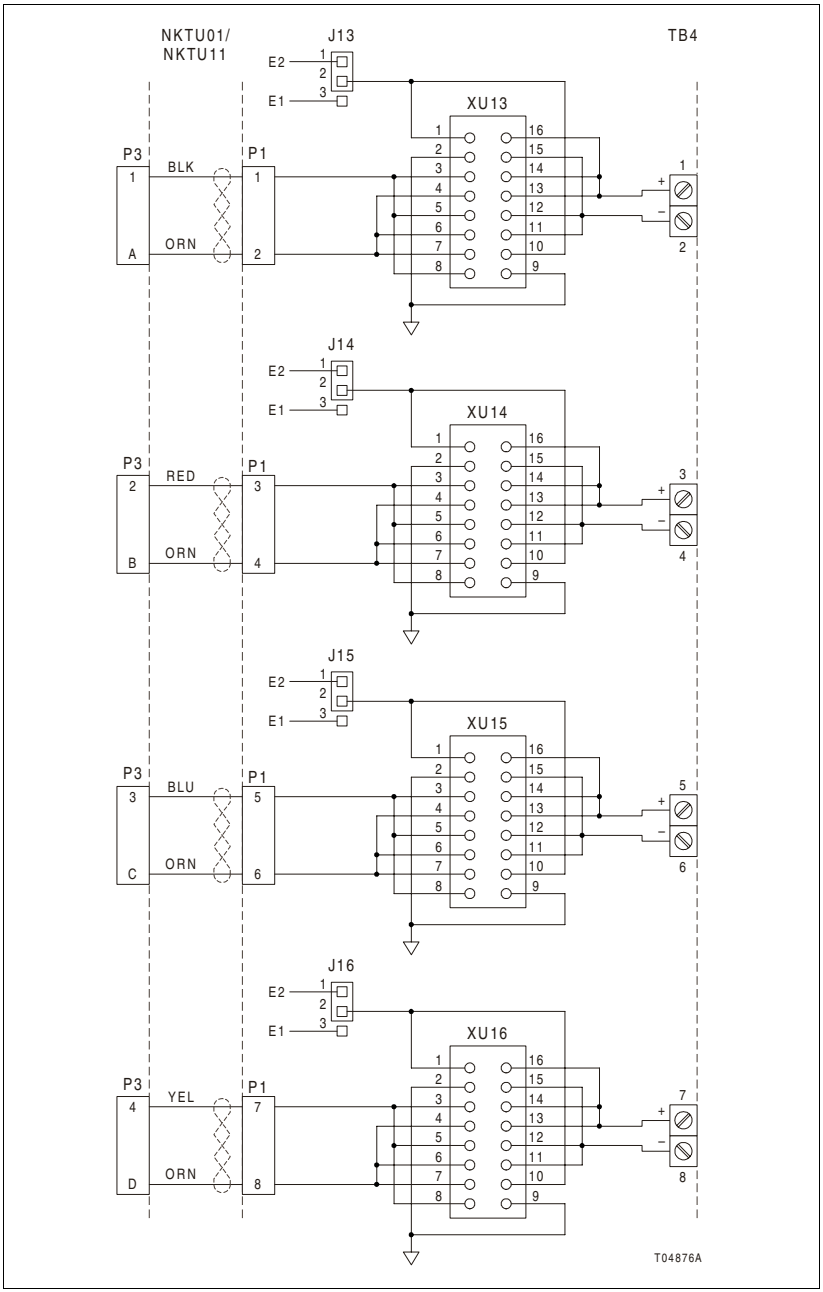

Figure B-4. TB4 Schematic

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