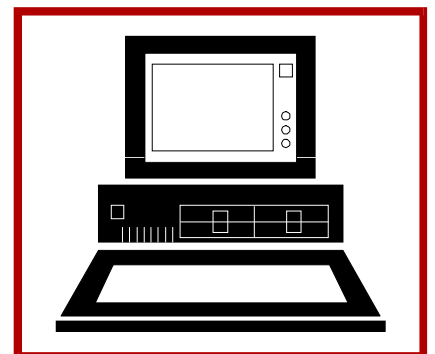
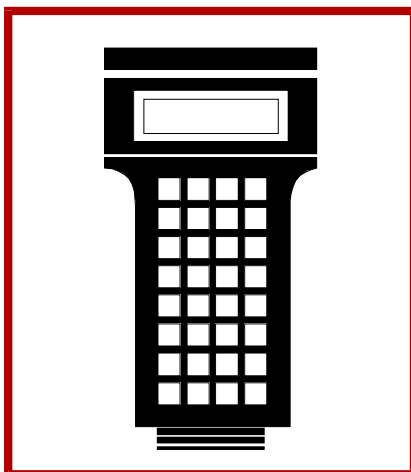
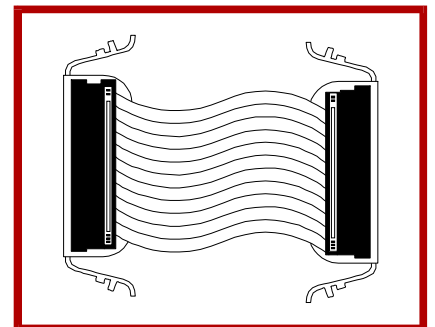
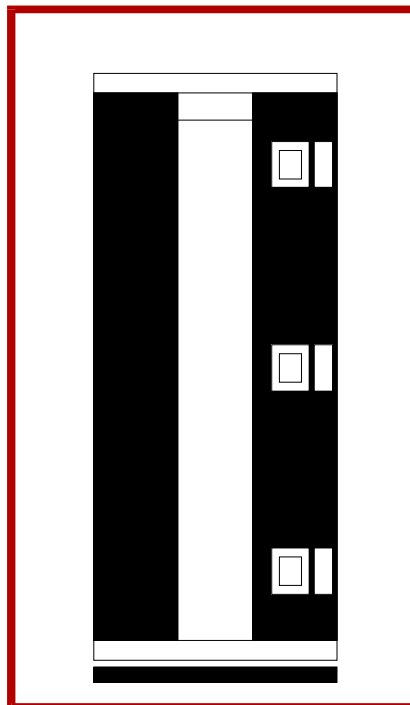
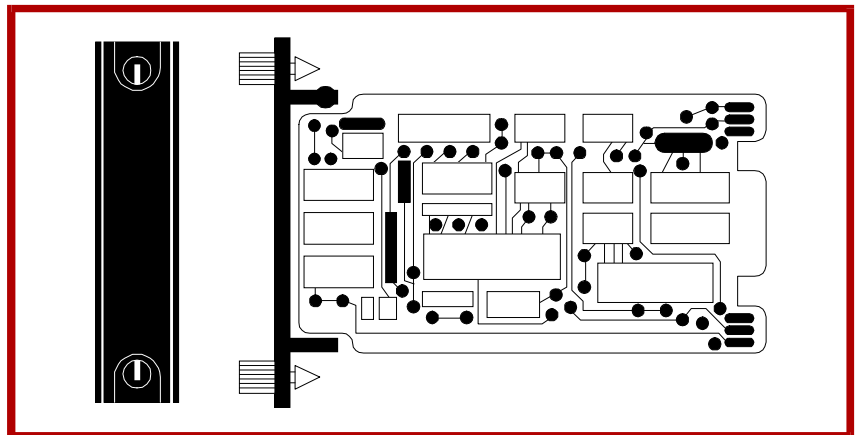


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Bailey®  
**infi 90**

# Instruction

## RTD Analog Input Termination Module (NIA103)



**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.

### RADIO FREQUENCY INTERFERENCE

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

### MANUELS D'OPÉRATION

NE PAS METTRE EN PLACE, RÉPARER OU FAIRE FONCTIONNER L'ÉQUIPEMENT SANS AVOIR LU, COMPRIS ET SUIVI LES INSTRUCTIONS RÉGLEMENTAIRES DE **Elsag Bailey**. TOUTE NÉGLIGENCE À CET ÉGARD POURRAIT ÊTRE UNE CAUSE D'ACCIDENT OU DE DÉFAILLANCE DU MATÉRIEL.

### PERTURBATIONS PAR FRÉQUENCE RADIO

LA PLUPART DES ÉQUIPEMENTS ÉLECTRONIQUES SONT SENSIBLES AUX PERTURBATIONS PAR FRÉQUENCE RADIO. DES PRÉCAUTIONS DEVRONT ÊTRE PRISES LORS DE L'UTILISATION DU MATÉRIEL DE COMMUNICATION PORTATIF. LA PRUDENCE EXIGE QUE LES PRÉCAUTIONS À PRENDRE DANS CE CAS SOIENT SIGNALÉES AUX ENDROITS VOULUS DANS VOTRE USINE.

### 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 MATÉRIELS.

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## Preface

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Termination modules provide an input connection from the plant equipment to the INFI 90<sup>®</sup> process modules. The RTD Analog Input Termination Module (NIAI03) interfaces RTD inputs to the Analog Input Slave Module (IMASM03/04).

This manual explains how to install and use the NIAI03 on the INFI 90 system. It has sections that describe the setup and cabling. The appendix contains information about the IMASM03/04 module.

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<sup>®</sup> Registered trademark of Eltag Bailey Process Automation.

## List of Effective Pages

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Total number of pages in this manual is 21, consisting of the following:

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

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

**NOTE:** On an update page, the changed text or table is indicated by a vertical bar in the outer margin of the page adjacent to 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..

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## Safety Summary

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### **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.

### **SPECIFIC CAUTIONS**

Remove modules from their module mounting unit slots before installing or removing a cable assigned to that slot. Failure to do so could result in damage to the module. (p. 2-3, 4-1)

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. 2-4, 4-1)

It is strongly recommended that all power (cabinet, I/O, etc. be turned off before doing any termination module wiring. Failure to do so could result in equipment damage. Do not apply power until all connections are verified. (p. 2-4, 4-1)

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## Sommaire de Sécurité

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**AVERTISSEMENTS  
D'ORDRE  
GÉNÉRAL****Environnement de l'équipement**

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 prendre les precautions necessaires a eviter tout contact avec des composants sous tension lors de l'entretien.

**ATTENTIONS  
D'ORDRE  
SPÉCIFIQUE**

Retirer le module de son emplacement dans le chassis de montage des modules avant d'installer ou de retirer un câble assigne a cet emplacement. Un manquement à cette procédure pourrait endommager le module. (p. 2-3, 4-1)

Si des circuits d'entree ou de sortie sont alimentes a partir de sources externes, ils presentent un risque de choc electrique meme lorsque l'alimentation du systeme est debranchee du panneau d'entree l'alimentation. Le cas echeant, un avertissement signalant la presence de sources d'alimentation multiples doit etre appose sur la porte de l'armoire. (p. 2-4, 4-1)

LI est fortement recommande que toutes les alimentations (armoire, E/S, etc.) soient coupees avant d'effectuer quelque raccord que ce soit sur une carte de raccordement. Un manquement a ces instructions pourrait causer des dommages a l'equipment. Ne pas rebrancher les alimentations avant d'avoir verifie tous les raccorde-ments. (p. 2-4, 4-1)

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# Table of Contents

	<i>Page</i>
<b>SECTION 1 - INTRODUCTION</b> .....	<b>1-1</b>
OVERVIEW .....	1-1
INTENDED USER .....	1-1
MODULE DESCRIPTION .....	1-1
FEATURES .....	1-1
INSTRUCTION CONTENT .....	1-2
HOW TO USE THIS MANUAL .....	1-3
GLOSSARY OF TERMS AND ABBREVIATIONS .....	1-3
REFERENCE DOCUMENTS .....	1-3
NOMENCLATURE .....	1-4
SPECIFICATIONS .....	1-4
<b>SECTION 2 - INSTALLATION</b> .....	<b>2-1</b>
INTRODUCTION .....	2-1
SPECIAL HANDLING .....	2-1
UNPACKING AND INSPECTION .....	2-2
SETUP/PHYSICAL INSTALLATION .....	2-2
Cable Installation .....	2-2
Termination Module Installation .....	2-3
Terminal Wiring .....	2-4
Power Wiring .....	2-5
<b>SECTION 3 - MAINTENANCE</b> .....	<b>3-1</b>
INTRODUCTION .....	3-1
MAINTENANCE SCHEDULE .....	3-1
<b>SECTION 4 - REPAIR/REPLACEMENT PROCEDURES</b> .....	<b>4-1</b>
INTRODUCTION .....	4-1
REPLACEMENT PROCEDURES .....	4-1
<b>SECTION 5 - SUPPORT SERVICES</b> .....	<b>5-1</b>
INTRODUCTION .....	5-1
REPLACEMENT PARTS AND ORDERING INFORMATION .....	5-1
TRAINING .....	5-1
TECHNICAL DOCUMENTATION .....	5-1
<b>APPENDIX A - RTD SLAVE INPUT MODULE (IMASM03/04)</b> .....	<b>A-1</b>
INTRODUCTION .....	A-1

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## List of Tables

<i>No.</i>	<i>Title</i>	<i>Page</i>
1-1.	Glossary of Terms and Abbreviations .....	1-3
1-2.	Reference Documents .....	1-3
1-3.	Nomenclature .....	1-4
1-4.	Specifications .....	1-4
2-1.	NIAI03 Cable Applications .....	2-2
3-1.	Maintenance Schedule.....	3-1
A-1.	Address Switch Settings (SW1) .....	A-1

## List of Figures

<i>No.</i>	<i>Title</i>	<i>Page</i>
1-1.	Application Example for NIAI03 .....	1-2
2-1.	Cable Connections for NIAI03 .....	2-2
2-2.	Terminal Assignments for NIAI03.....	2-5
A-1.	Address Select Switch (SW1) .....	A-1



---

# SECTION 1 - INTRODUCTION

---

## OVERVIEW

The RTD Analog Input Termination Module (NIAI03) is used by the RTD Analog Slave Module (IMASM03/04). Each NIAI03 can input eight three-wire RTD signals from field equipment. The signals pass through the slave module to the Analog Master Module (IMAMM03). This manual explains the purpose, setup, handling precautions and steps to install the NIAI03 termination module.

---

## INTENDED USER

System engineers and technicians should read this manual before installing and using the termination module (TM). Put the module into operation only after reading and understanding this instruction. Refer to the **Table of Contents** to find the information. Refer to the **HOW TO USE THIS MANUAL** entry in this section to get started.

---

## MODULE DESCRIPTION

The NIAI03 is a single printed circuit board that uses one slot in a Termination Module Mounting Unit (NTMU01/02). The termination module (TM) has one card edge connector that connects to the slave module through a cable. The terminal blocks for field wiring are on the TM. The NIAI03 handles up to eight three-wire RTD inputs for the IMASM03/04. Figure 1-1 shows an application example for the NIAI03.

---

## FEATURES

The design of the NIAI03, as with all INFI 90 devices, allows for flexibility in creating a process management system. Refer to the **NOMENCLATURE** entry of this section for the list of devices that can be used with the TM in an INFI 90 system.

- A standard factory-wired cable connects the TM to the slave module.
- Connect I/O wires on terminals at the front edge of the TM.
- Each TM fits in a standard termination mounting unit.
- Field wire termination for eight three-wire RTD inputs.
- Input channel transient and surge protection.
- RTD input signal routing to the IMASM03/04.

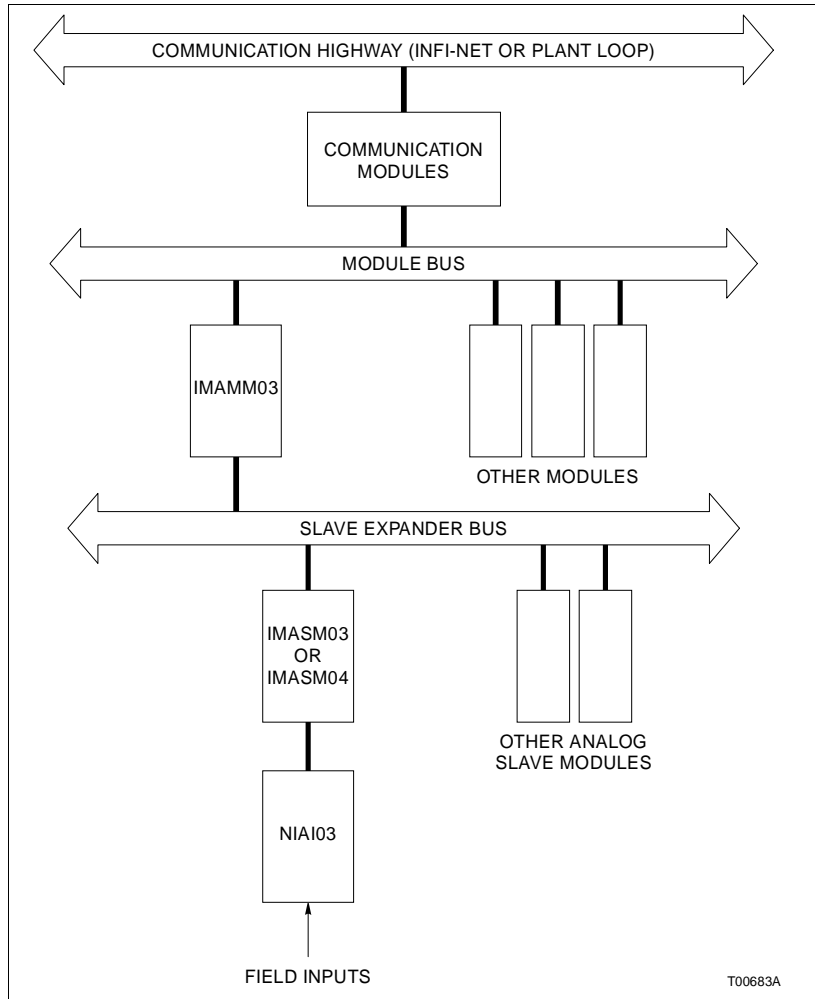


Figure 1-1. Application Example for NIAI03

**INSTRUCTION CONTENT**

This manual has five sections and an appendix.

**Introduction** Provides an overview of the features, description and specifications and a description of the NIAI03.

**Installation** Describes cautions to observe when handling the TM. Shows the cabling, wiring and steps to follow to install and connect the module before applying power.

**Maintenance** Provides a maintenance schedule.

**Repair/Replacement Procedures** Details how to replace a TM.

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

**Appendix A** Shows the board layout and cabling for the Analog Slave Module (IMASM03/04).

---

## HOW TO USE THIS MANUAL

Read this manual before handling the TM. Refer to the sections in this list as needed for more information.

1. Read **Section 2** before connecting the NIAI03.
2. Refer to **Appendix A** for the IMASM03/04 slave module.
3. Refer to **Section 3** for the maintenance schedule.
4. Refer to **Section 4** and **Section 5** when needed.

---

## GLOSSARY OF TERMS AND ABBREVIATIONS

Table 1-1 contains the glossary of terms for this manual.

*Table 1-1. Glossary of Terms and Abbreviations*

Term	Definition
Analog	Continuously variable as opposed to discretely variable.
RTD	Resistance temperature detector. A sensing device that changes resistance with changes in temperature.
Slave Module	One of a series of modules designed to perform high or low level operations as directed by a master module.
TM	Termination Module. Provides input/output connection between plant equipment and the INFI 90/Network 90 <sup>®</sup> modules.
TMU	Termination Mounting Unit. A card cage that provides housing for INFI 90/Network 90 termination modules.

---

## REFERENCE DOCUMENTS

Table 1-2 contains the reference documents for the NIAI03.

*Table 1-2. Reference Documents*

Document Number	Description
I-E96-205	Analog Master Module and Analog Slave Modules (IMAMM03 and IMASM01/ 02/03/ 04)
I-E96-500	Site Planning and Preparation

---

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## NOMENCLATURE

Table 1-3 contains the modules and equipment that can be used with the NIAI03 module:

Table 1-3. Nomenclature

Nomenclature	Description
IMASM03	Analog Input Master Module
NKTM01	Cable, Termination Unit (Ribbon Cable)
NKTU02	Cable, Termination Unit (PVC)
NKTU12	Cable, Termination Unit (non-PVC)
258436A1	Cable retaining kit used when a round cable connects to the TMU.
NTMU01	Termination Mounting Unit (Rear Mount)
NTMU02	Termination Mounting Unit (Front Mount)

## SPECIFICATIONS

Refer to Table 1-4 for the specifications of the NIAI03 termination module.

Table 1-4. Specifications

Property	Characteristic/Value
Power Requirements	+24 VDC at 10 mA.
Mounting	Slides into a single slot in NTMU01/02.
Environmental:	
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	5% to 90% ± 5% up to 55° C (131° F) (noncondensing). 5% to 40% ± 5% up to 70° C (158° F) (noncondensing).
Atmospheric Pressure	Sea level to 3 km (1.86 mi).
Air Quality	Noncorrosive.
Cooling Requirements	No cooling is necessary when used in Bailey Controls cabinets and operated within stated limits.
Surge Protection	Meets IEEE-472-1974 Surge Withstand Capability Test <sup>1</sup> .
Certification	CSA certified for use as process control equipment in an ordinary (non-hazardous) location.

NOTE: 1. Do not use the NKTM01 cable when compliance with IEEE-472-1974 is necessary.

Specifications are subject to change without notice.

---

## SECTION 2 - INSTALLATION

---

### *INTRODUCTION*

This section explains how to install the RTD Analog Input Termination Module (NIAI03). Read, understand, and complete the steps in the order they appear before using the NIAI03 module.

---

### *SPECIAL HANDLING*

Observe these steps when handling electronic circuitry:

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

Use the static grounding wrist strap when installing and removing modules. Static discharge may damage MOS devices on modules in the cabinet. Use grounded equipment and static safe practices when working with modules.

1. **Use Antistatic Bag.** Keep the modules in the antistatic bag until you are ready to install them in the system. Save the bag for future use.
2. **Ground Bags Before Opening. Before opening a bag containing an assembly with CMOS 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 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 cabinet chassis ground.

**UNPACKING AND INSPECTION**

These are steps to follow for general handling:

1. Examine the module to make sure that no damage has occurred in transit.
2. Notify the nearest Bailey Controls sales office of any damage.
3. File a claim for any damage with the shipping company that handled the shipment.
4. Use the original packing material or container to store the module.
5. Store the module in a place with clean air; free of extremes of temperature and humidity.

**SETUP/PHYSICAL INSTALLATION**

This section explains how to configure and install the NIAI03. The required procedures are installing the termination module into the TMU, and connecting the field wiring and communication cables.

**Cable Installation**

The NKTU02/12 and NKTM01 cable connects the NIAI03 to the IMASM03/04 slave module. Figure 2-1 shows the cabling for the NIAI03 to the IMASM03/04. Table 2-1 lists the NIAI03 cable applications.

Figure 2-1. Cable Connections for NIAI03

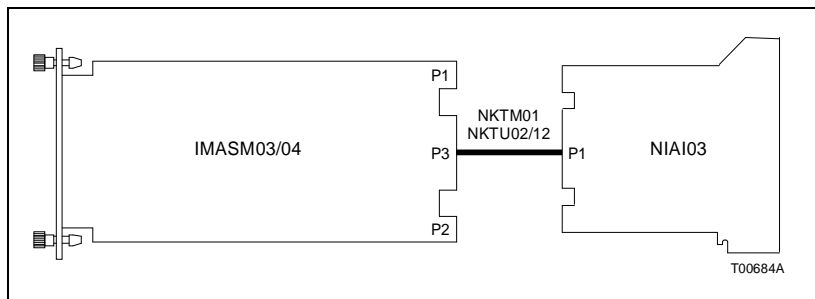


Table 2-1. NIAI03 Cable Applications

Nomenclature/Description	Application	Connector	Maximum Length
NKTU02 (PVC)	Connects TM to IMASM03/04	P1 on TM to MMU backplane	61 m (200 ft)
NKTU12 (non-PVC)			
NKTM01 (ribbon)	Connects TM to IMASM03/04	P1 on TM to MMU backplane	30 m (100 ft)

**CAUTION**

Remove modules from their module mounting unit slots before installing or removing a cable assigned to that slot. Failure to do so could result in damage to the module.

**ATTENTION**

Retirer le module de son emplacement dans le châssis de montage des modules avant d'installer ou de retirer un câble assigné à cet emplacement. Un manquement à cette procédure pourrait endommager le module.

To install the cable follow these steps.

1. If it has already been installed, pull the termination module several inches from the MMU backplane.
2. If round type cables are already installed in the TMU, remove the cable retaining bracket (Bailey part number 258436A1). Use NKTU02/12 or NKTU01 cables. Round cables and ribbon cables can be mixed when installing multiple TMs.
3. Insert the J2 end of the termination module cable into the MMU backplane slot assigned to the slave module. The cable should latch securely in place. Card edge connector P3 of the slave module connects to this end of the cable.
4. If NKTU02 or NKTU12 cables are used, connect the shield wire extending from the J2 end of the cable to the shield bar.
5. Insert the J1 end of the cable into the TMU backplane slot assigned to the NIAI03 module. The cable should latch securely in place. Card edge connector P1 of the NIAI03 module connects to this end of the cable.
6. Replace or add the cable retaining bracket if round type cables (NKTU02/12) are installed in the TMU.

---

**Termination Module Installation**

The NIAI03 inserts into a standard INFI 90 termination mounting unit (TMU) and occupies one slot. To install:

1. Verify slot assignment of the NIAI03 module.
2. Align the NIAI03 module with the guide rails in the TMU and partially insert the module. Leave enough room to connect terminal wiring and cables.

Completely seat the module after cabling and termination wiring is attached.

---

**Terminal Wiring**

Connect the wiring from the RTDs sensing the process to the termination module terminals. Field wiring must be no larger than 14 gauge and no smaller than 22 gauge. For new installations, refer to the **Site Planning and Preparation** manual for information on I/O wiring. Figure 2-2 shows the terminal assignments for each input and a field input termination example.

**CAUTION**

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.

**ATTENTION**

Si des circuits d'entree ou de sortie sont alimentes a partir de sources externes, ils presentent un risque de choc electrique meme lorsque l'alimentation du systeme est debranchee du panneau d'entree l'alimentation. Le cas echeant, un avertissement signalant la presence de sources d'alimentation multiples doit etre appose sur la porte de l'armoire.

**CAUTION**

It is strongly recommended that all power (cabinet, I/O, etc. be turned off before doing any termination module wiring. Failure to do so could result in equipment damage. Do not apply power until all connections are verified.

**ATTENTION**

Il est fortement recommande que toutes les alimentations (armoire, E/S, etc.) soient coupees avant d'effectuer quelque raccord que ce soit sur une carte de raccordement. Un manquement a ces instructions pourrait causer des dommages a l'equipment. Ne pas rebrancher les alimentations avant d'avoir verifie tous les raccordements.

To connect field wiring, follow these steps:

1. Remove the front cover.
2. Ensure the NIAI03 module is pulled out far enough to gain access to the terminal strip.
3. Feed the power and field wiring into the terminal strip area and connect them to the appropriate terminals.
4. Insert the module until it locks securely into place.
5. Replace the front cover.



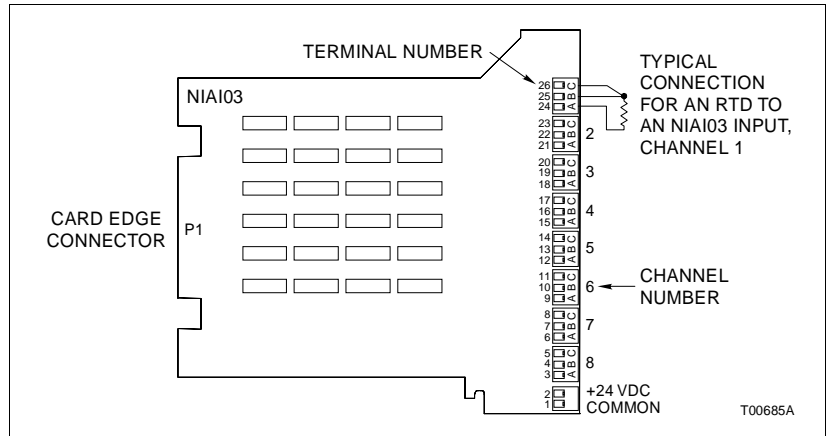


Figure 2-2. Terminal Assignments for NIAI03

**Power Wiring**

There is one terminal block (TB1) that connects to +24 VDC and system common. Figure 2-2 shows their location on the TM. Use 18 AWG wire for power wiring.

To connect power to the termination module in a system using modular power supplies, follow these steps:

1. Remove the front cover.
2. Ensure the NIAI03 module is pulled out far enough to gain access to the terminal strip.
3. Attach an 18 AWG wire from the +24 VDC bus bar on the TMU power bus bar to the TB1 terminal on the TM marked +24 VDC.
4. Attach an 18 AWG wire from the I/O common bus bar on the TMU power bus bar to the TB1 terminal on the TM marked COM.
5. Insert the module until it locks securely into place.
6. Replace the front cover.

The NIAI03 is ready for operation if:

1. The circuit board is mounted in the termination mounting unit.
2. All required cables are connected to the termination module.
3. All required field wires are connected to the termination module.
4. Power is connected and applied to the termination module.

---

## SECTION 3 - MAINTENANCE

---

### **INTRODUCTION**

The Analog Input Termination Module (NIAI03) 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*

<b>Task</b>	<b>Interval</b>
Clean and tighten all power and grounding connections.	Every 6 months or during plant shutdown, whichever occurs first.
Use a static safe vacuum cleaner to remove dust from: Termination Mounting Unit. Termination Modules.	

---

## SECTION 4 - REPAIR/REPLACEMENT PROCEDURES

---

### INTRODUCTION

This section explains the replacement procedures for the Analog Input Termination Module (NIAI03). No special tools are required to replace the module

---

### REPLACEMENT PROCEDURES

If an NIAI03 is faulty, replace it with a new one. **Do not** try to repair the module. Replacing components may affect performance and certification.

**CAUTION**

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.

**ATTENTION**

Si des circuits d'entree ou de sortie sont alimentes a partir de sources externes, ils presentent un risque de choc electrique meme lorsque l'alimentation du systeme est debranchee du panneau d'entree l'alimentation. Le cas echeant, un avertissement signalant la presence de sources d'alimentation multiples doit etre appose sur la porte de l'armoire.

**CAUTION**

It is strongly recommended that all power (cabinet, I/O, etc.) be turned off before doing any termination module wiring. Failure to do so could result in equipment damage. Do not apply power until all connections are verified.

**ATTENTION**

Il est fortement recommande que toutes les alimentations (armoire, E/S, etc.) soient coupees avant d'effectuer quelque raccord que ce soit sur une carte de raccordement. Un manquement a ces instructions pourrait causer des dommages a l'equipment. Ne pas rebrancher les alimentations avant d'avoir verifie tous les raccordements.

**CAUTION**

Remove modules from their module mounting unit slots before installing or removing a cable assigned 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 câble assigne a cet emplacement. Un manquement à cette procédure pourrait endommager le module.

To replace an NIAI03 termination module:

1. Remove the termination module front cover.
2. Pull the termination module several inches from the TMU backplane.
3. Label and remove all field and power wiring from the terminal blocks.
4. Slide the TM out of the cabinet.
5. Slide the new TM into the same slot as the module that was removed.
6. Connect all field and power wiring removed in Step 3.
7. Verify that wiring and cabling to the TM is correct.
8. Fully insert the termination module into the TMU.
9. Replace the termination module front cover.
10. Turn on the cabinet power supply that provides power to the TM.
11. Turn on any external power supplies providing I/O power.

---

## 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.

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### *REPLACEMENT PARTS AND ORDERING INFORMATION*

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

1. Part description, part number and quantity.
2. Model and serial numbers (if applicable).
3. Bailey 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.

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### *TRAINING*

Bailey Controls 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.

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### *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 - RTD SLAVE INPUT MODULE (IMASM03/04)

## INTRODUCTION

The RTD Analog Slave Input Modules (IMASM03/04) use an NIAI03 for termination. Each NIAI03 accepts up to eight three-wire RTD inputs.

The IMASM03 is a three-wire 100 ohm RTD slave module. The IMASM04 is a three-wire 10 ohm copper RTD slave module. This appendix contains figures and tables that show the dipswitch location on the IMASM03/04 and its settings. This information is provided as a quick reference guide for personnel installing the NIAI03. Figure A-1 shows the address select switch (SW1). Table A-1 lists the binary addresses for setting SW1. Refer to the IMAMM03 instruction for more detailed information to install and configure the slave.

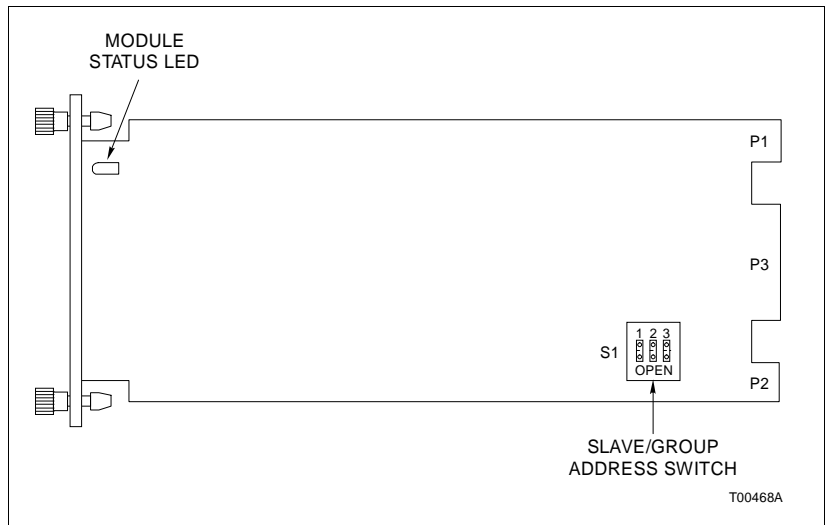


Figure A-1. Address Select Switch (SW1)

Table A-1. Address Switch Settings (SW1)

Addr	MSB 1	2	LSB 3	Addr	MSB 1	2	LSB 3
0	0	0	0	4	1	0	0
1	0	0	1	5	1	0	1
2	0	1	0	6	1	1	0
3	0	1	1	7	1	1	1

OPEN = OFF = 1  
CLOSED = ON = 0

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# Index

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<b>A</b>	
Address select switch (SW1).....	A-1
Address switch settings (SW1).....	A-1
Application example for NIAI03 .....	1-2
<b>C</b>	
Cable connections for NIAI03.....	2-2
<b>G</b>	
Glossary of terms and abbreviations .....	1-3
<b>I</b>	
Installation, NIAI03 .....	2-3
<b>M</b>	
Maintenance schedule .....	3-1
<b>N</b>	
NIAI03 cable applications .....	2-2
Nomenclature .....	1-4

<b>R</b>	
Reference documents .....	1-3
Replacement parts .....	5-1
Replacement procedures .....	4-1
<b>S</b>	
Setup/physical installation.....	2-2
Setup/physical installation	
Cable installation .....	2-2
Power wiring.....	2-5
Terminal module installation .....	2-3
Terminal wiring .....	2-4
Special handling.....	2-1
Specifications .....	1-4
<b>T</b>	
Technical documentation .....	5-1
Terminal assignments for NIAI03.....	2-5
Training .....	5-1
<b>U</b>	
Unpacking and inspection.....	2-2

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