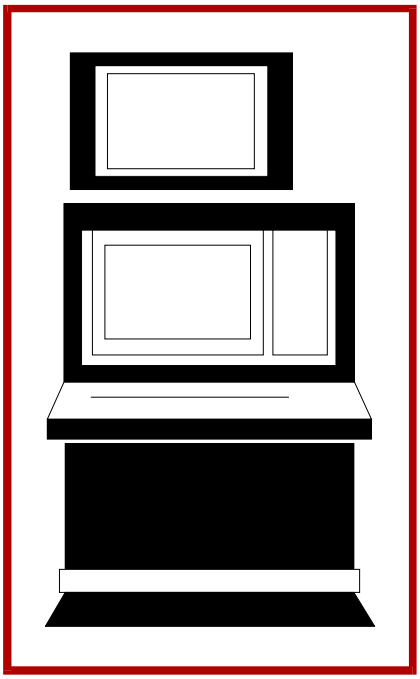
Bailey® infi 90®

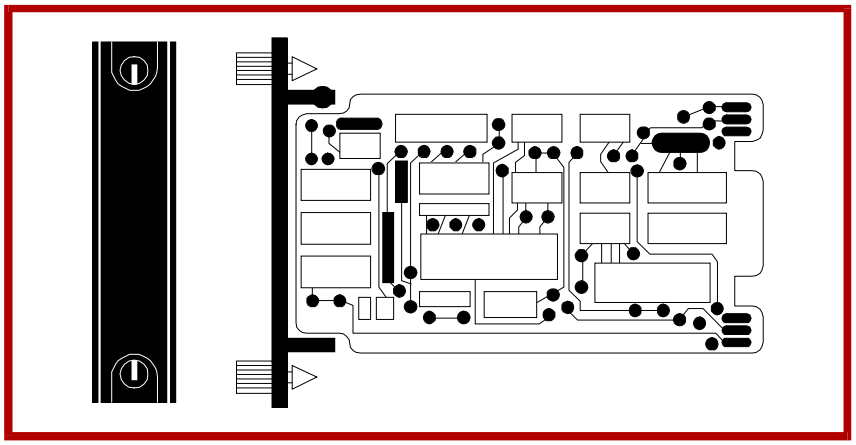
IMDSI1□

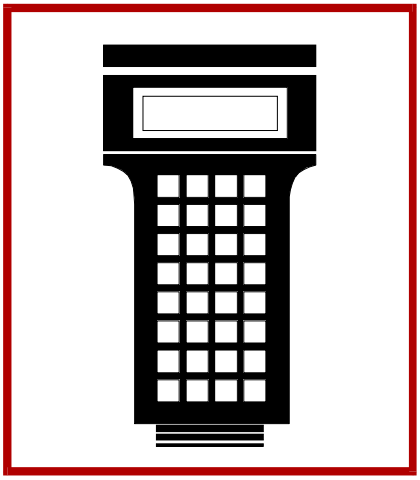
Instruction

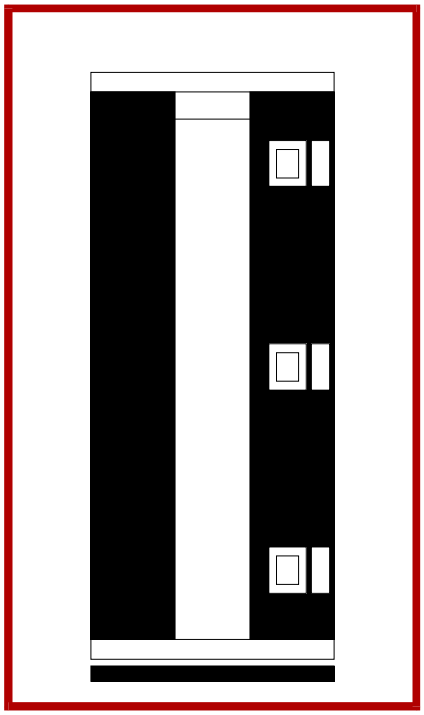
Digital Input Modules

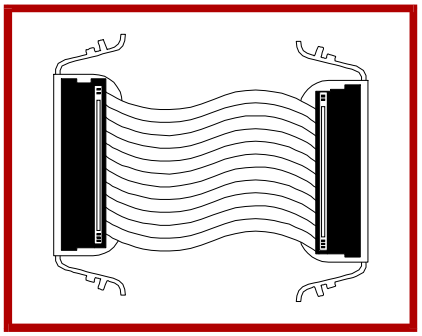
IMDSI12, IMDSI13, IMDSI14, IMDSI15

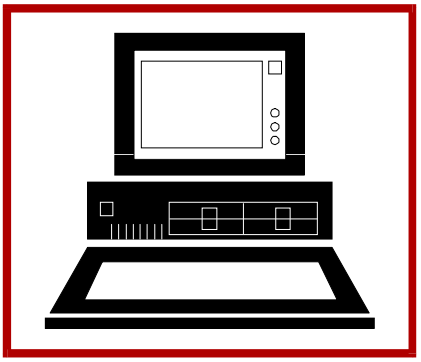












Bailey Process Control and Automation Solutions from Elsag Bailey Group

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

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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.

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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 MATÉREILS.

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Preface

The IMDSI1□ Digital Input Module is an interface used to bring 16 separate process field signals into the INFI 90® OPEN Strategic Process Management System. These digital inputs are used by control modules to monitor and control a process.

This instruction explains the digital input module specifications and operation for the IMDSI12, IMDSI13, IMDSI14 and IMDSI15 modules. It details the procedures necessary to complete setup, installation, maintenance, troubleshooting and replacement of the module.

The IMDSI12 is the functional equivalent of the existing IMDSI02 module except that the IMDSI12 only offers a 17 millisecond debounce filter time. Any of the IMDSI1□ modules may be used as a direct replacement for the IMDSI02 module, with the correct jumper settings. For example, an IMDSI13 module may be substituted for an IMDSI02 module that has all its jumpers set for 24 VDC with a 17 millisecond debounce filter.

The system engineer or technician using the IMDSI1□ digital input module should read and understand this instruction before operating the module.

List of Effective Pages

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

Page No.	Change Date
Preface	Original
List of Effective Pages	Original
iii through vii	Original
1-1 through 1-8	Original
2-1 through 2-4	Original
3-1 through 3-8	Original
4-1	Original
5-1 through 5-3	Original
6-1 through 6-4	Original
7-1	Original
8-1	Original
A-1 through A-3	Original
B-1	Original
C-1 through C-3	Original
Index-1 through Index-2	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.

Table of Contents

Table of Contents (continued)

List of Figures

List of Tables

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 insure that contact with energized parts is avoided when servicing.
SPECIFIC WARNINGS	Disconnect power before installing dipshunts on the MMU backplane. Failure to do so will result in contact with cabinet areas that could cause severe or fatal shock. (p. 3-6, 5-1) Never clean electrical parts or components with live power present. Doing so exposes you to an electrical shock hazard. (p. 6-2) 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. 6-2) 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. 6-4) 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. 6-4)

Trademarks and Registrations

Registrations and trademarks used in this document include:

® INFI 90	Registered trademark of Elsag Bailey Process Automation
® INFI-NET	Registered trademark of Elsag Bailey Process Automation

SECTION 1 - INTRODUCTION

OVERVIEW

The IMDSI1□ Digital Input modules provide 16 separate digital signals into the INFI 90® OPEN system for processing and monitoring. It interfaces process field inputs with the INFI 90 OPEN Strategic Process Management System. A contact closure or switch is an example of a device that supplies a digital signal. Control modules provide the control functions; I/O modules provide the inputs and outputs. Four variations of the IMDSI1□ modules are presented in this instruction:

- IMDSI12 - 24 VDC, 48 VDC, 125 VDC or 120 VAC inputs.
- IMDSI13 - 24 VDC inputs.
- IMDSI14 - 48 VDC inputs.
- IMDSI15 - 125 VDC or 120 VAC inputs.

The IMDSI12 is the functional equivalent of the existing IMDSI02 module with the restriction that the IMDSI02 offers selectable debounce filter times of 1.5 milliseconds (fast) and 17 milliseconds (slow) and the IMDSI12 module offers only the 17 milliseconds (slow) debounce filter time. The slow debounce filter is used in the majority of digital input applications.

Any of the IMDSI1□ modules may be substituted in place of an IMDSI02 where appropriate jumper settings are used. For example, an IMDSI13 module may be substituted for an IMDSI02 module that has all its jumpers set for 24 VDC with a slow debounce filter.

Figure 1-1 shows the INFI 90 OPEN communication levels and the position of the digital input modules within these levels.

INTENDED USER

This instruction is written for engineers, technicians and system designers as a source of technical information on the IMDSI1□ digital input modules. This instruction should be used by those planning to purchase, install, operate, troubleshoot, maintain or replace these modules. Those working with the digital input modules should have experience working with and know the precautions to take around AC/DC power. A knowledge of the INFI 90 OPEN system and electronic principles is also required.

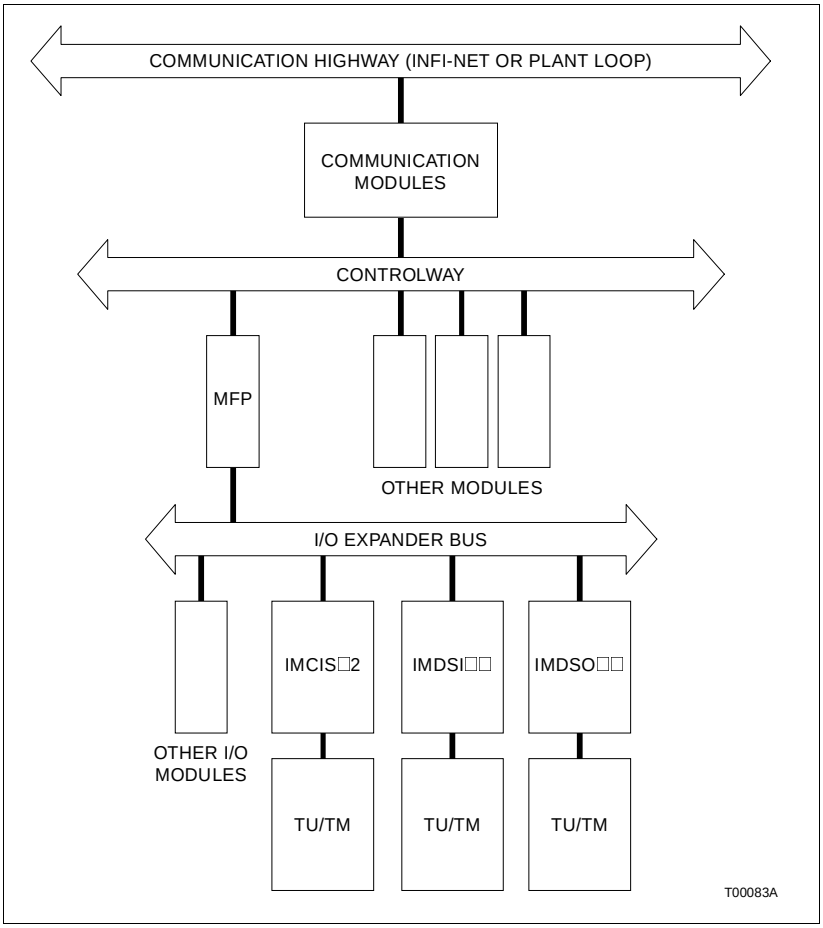


Figure 1-1. INFI 90 OPEN Communication Levels

MODULE DESCRIPTION

The digital input module consists of a single printed circuit board that occupies one slot in a module mounting unit (MMU). It monitors two separate groups of eight digital inputs. Twelve inputs are isolated from each other; the remaining two pairs share common positive input lines.

Two captive screws on the module faceplate secure it to the MMU. Sixteen front panel LED status indicators (group A and group B) display the input status and provide aid in system test and diagnosis.

The digital input module has three card edge connectors for external signals and power (P1, P2 and P3). P1 connects to common (ground) and +5 VDC power. P2 connects the module to the I/O expander bus to communicate with a control module. P3 inputs the digital signals using a cable connected to a termination unit (TU) or termination module (TM). The terminal blocks (physical connection points) for field wiring are on the TU/ TM.

INSTRUCTION CONTENT

This instruction is divided into eight sections and three appendices. Read this instruction before installing or operating the IMDSI1□ digital input module. A summary of section content follows:

Introduction — Contains a brief description, general usage information and technical specifications.

Description and Operation — Uses block diagrams and schematics to explain module operation and input circuitry.

Installation — Covers the preliminary steps to install the module and prepare for operation. It covers dipswitch and jumper settings, mounting, wiring connections, cabling and preoperational checks.

Operating Procedures — Provides information on front panel indicators and start-up procedures.

Troubleshooting — Explains the meaning of error indications and contains troubleshooting procedures.

Maintenance — Contains scheduled maintenance tasks and procedures.

Repair and Replacement Procedures — Contains procedures that explain how to replace the module.

Support Services — Explains the services and training that Elsag Bailey makes available to their customers.

Appendices — Appendix A provides configuration information for the NTDI01 termination unit. Appendix B provides configuration information for the NIDI01 termination module. Appendix C provides a quick reference to switch and jumper location and settings.

HOW TO USE THIS MANUAL

Read this instruction before handling the IMDSI1□ digital input module. Refer to a specific section for information as needed.

1. Read the operating procedures section before installing the module.

2. Do the steps in the installation section.

3. Refer to the troubleshooting section to resolve problems if they occur.

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

5. Refer to the repair and replacement procedures to replace a module.

6. Use the support services section for information on ordering spare modules and warranty information.

DOCUMENT CONVENTIONS

The □ in a nomenclature item indicates variables for that position, i.e., IMDSI1□.

GLOSSARY OF TERMS AND ABBREVIATIONS

Table 1-1 contains those terms and abbreviations that are unique to Elsag Bailey or have a definition that is different from standard industry usage.

Table 1-1. Glossary of Terms and Abbreviations

Term	Definition
EWS	Engineering work station.
Function Code (FC)	An algorithm which manipulates specific functions. These functions are linked together to form the control strategy.
I/O Expander Bus	Parallel communication bus between the control and I/O modules.
MFP	Multi-function processor module. A multiple loop controller with data acquisition and information processing capabilities.
MMU	Module mounting unit. A card cage that provides electrical and communication support for INFI 90 OPEN/Network 90 modules.
OIS	Operator interface station. Integrated operator console with data acquisition and reporting capabilities. It provides a digital access into the process for flexible control and monitoring.
TM	Termination module. Provides input/output direct connection between plant equipment and the INFI 90 OPEN/Network 90 modules.
TU	Termination unit. Provides input/output direct connection between plant equipment and the INFI 90 OPEN/Network 90 modules.

REFERENCE DOCUMENTS

Table 1-2 lists Elsag Bailey instructions for equipment that is referenced in this instruction.

Table 1-2. Reference Documents

Number	Document
I-E92-501-2	Configuration and Tuning Terminal (CTT)
I-E96-192-1	Operation, Operator Interface Station (40 Series) IIOIS42
I-E96-200	Function Code Application Manual
I-E96-201	Multi-Function Processor (IMMFP01)
I-E96-202	Multi-Function Processor (IMMFP02)
I-E96-203	Multi-Function Processor (IMMFP03/IMMFP03B)
I-E96-209	Logic Master Module (IMLMM02)
I-E96-211	IMMFC03 Multi-Function Controller
I-E96-212	IMMFC04 Multi-Function Controller
I-E96-213	IMMFC05 Multi-Function Controller
I-E96-424	Termination Unit (NTDI01)
I-E96-410	Termination Module (NIDI01)
WBPEEUI200501A0	Module Mounting Unit (IEMMU11/12/21/22)
WBPEEUI220756A0	Operation, Operator Interface Station (40 Series) IIOIS43

NOMENCLATURE

Table 1-3 contains the digital input module nomenclature used in this instruction.

Table 1-3. Nomenclature

Nomenclature	Description
IMDSI12	Digital input module (24 VDC, 48 VDC, 125 VDC or 120 VAC input)
IMDSI13	Digital input module (24 VDC input)
IMDSI14	Digital input module (48 VDC input)
IMDSI15	Digital input module (125 VDC or 120 VAC input)

RELATED HARDWARE

Table 1-4 contains related hardware associated with the IMDSI1□ digital input module.

Table 1-4. Related Hardware

Nomenclature	Description
IEMMU11/12/21/22	Module mounting unit
NIDI01	Termination module, digital input
NKTM01/02	Cable, termination module (PVC)
NKTU01	Cable, termination unit (PVC)
NKTU02	Cable, termination module (PVC)

Table 1-4. Related Hardware (continued)

Nomenclature	Description
NKTU11	Cable, termination unit (non PVC)
NKTU12	Cable, termination module (non PVC)
NTDI01	Termination unit, digital input

SPECIFICATIONS

Table 1-5 contains the specifications for the IMDSI1□ digital input module.

Table 1-5. Specifications

<table>
<tr><th>Property</th><th>Characteristic/Value</th></tr>
<tr><td>Power consumption</td><td>95 mA at 5 VDC (typical), 115 mA maximum</td></tr>
<tr><td>Overvoltage category on inputs</td><td>II, per IEC 1010-1</td></tr>
<tr><td>Digital inputs</td><td>16 channels
<table>
<tr><th colspan="4">IMDSI12</th></tr>
<tr><th>IMDSI13</th><th>IMDSI14</th><th colspan="2">IMDSI15</th></tr>
<tr><td>24 VDC</td><td>48 VDC</td><td>125 VDC</td><td>120 VAC</td></tr>
<tr><td>5.5 mA</td><td>4.7 mA</td><td>4.5 mA</td><td>4.8 mA</td></tr>
<tr><td>16.8 VDC</td><td>20.1 VDC</td><td>69.3 VDC</td><td>54 VAC</td></tr>
<tr><td>13 VDC</td><td>29 VDC</td><td>58 VDC</td><td>48 VAC</td></tr>
<tr><td>4 mA at 14.7 VDC</td><td>4 mA at 32 VDC</td><td>4 mA at 68.4 VDC</td><td>3 mA at 53.8 VAC</td></tr>
<tr><td>7 µA (at V_{in} ≤12 VDC)</td><td>10 µA (at V_{in} ≤12 VDC)</td><td>10 µA (at V_{in} ≤60 VDC)</td><td>10 µA (at V_{in} ≤60 VAC)</td></tr>
<tr><td colspan="4">17 ms (fixed)</td></tr>
</table>
Voltage (±10%)
Current
Turn-on voltage (min)
Tun-off voltage (max)
Maximum input current at minimum turn-on
Off-leakage current (max)
DC response time (debounce filter)</td></tr>
<tr><td>Communication interface</td><td>Passive contact input interface read by the MFP or logic master module (LMM) via the I/O expander bus</td></tr>
<tr><td>Mounting</td><td>Occupies one slot in a standard INFI 90 OPEN module mounting unit (IEMMU)</td></tr>
<tr><td>Environmental</td><td></td></tr>
<tr><td>Ambient temperature (per IEC 68-2-1, 2,14)</td><td>Temperature rating within the cabinet or enclosure applies. INFI 90 OPEN internal cabinet rating: 0° to 70° C (32° to 158° F)</td></tr>
<tr><td>Relative humidity (per IEC 68-2-3)</td><td>5% to 95% up to 55° C (131° F), noncondensing
5% to 45% at 70° C (158° F), noncondensing
Pollution degree: 1 (no condensation)</td></tr>
<tr><td>Atmospheric pressure</td><td>Sea level to 3 Km (1.86 miles)</td></tr>
<tr><td>Air quality (per ISA S71.04, Class LA, LB, LC - level 1)</td><td>Noncorrosive</td></tr>
</table>

Table 1-5. Specifications

<table>
<tr><th>Property</th><th>Characteristic/Value</th></tr>
<tr><td>Isolation
(IEC 1010-1, IEC 255, IEC 60)

Channel to channel and channel to logic</td><td>
<table>
<tr><th>Test</th><th>Common Mode</th><th>Normal Mode</th></tr>
<tr><td colspan="3">IMDSI12/15</td></tr>
<tr><td>Insulation resistance (100/500 VDC)</td><td>100 MΩ</td><td>N/A</td></tr>
<tr><td>Dielectric VAC (45 - 65 Hz) or VDC</td><td>1.4 kV rms/1min. or 1.95 kV DC/1min.</td><td>N/A</td></tr>
<tr><td>Impulse voltage (1.2/50 µS)</td><td>±2.55 kVp</td><td>±1 kVp</td></tr>
<tr><td colspan="3">IMDSI13/14</td></tr>
<tr><td>Insulation resistance (100/500 VDC)</td><td>100 MΩ</td><td>N/A</td></tr>
<tr><td>Dielectric VAC (45 - 65 Hz) or VDC</td><td>1 kV rms/1min. or 1.5 kV DC/1min.</td><td>N/A</td></tr>
<tr><td>Impulse voltage (1.2/50 µS)</td><td>±2 kVp</td><td>±1 kVp</td></tr>
</table>
</td></tr>
<tr><td>Electromagnetic compatibility

Conducted transients</td><td>
<table>
<tr><th>Test</th><th>Common Mode</th><th>Normal Mode</th></tr>
<tr><td>Voltage/current surge (1.2/50 µS to 8/20 µS) (IEC 1000-4-5, EN 61000-4-5)</td><td>±2 kVp</td><td>±1 kVp</td></tr>
<tr><td>Fast transient bursts (IEC 1000-4-4, EN 61000-4-4)</td><td>±2 kVp</td><td>N/A</td></tr>
<tr><td>Damped oscillatory wave, 0.1 MHz and 1 MHz (IEC 1000-4-12, EN 61000-4-12)</td><td>±2 kVp</td><td>±1 kVp</td></tr>
<tr><td>Ring wave (IEC 1000-4-12, EN 61000-4-12)</td><td>±2 kVp</td><td>±1 kVp</td></tr>
</table>

Electrostatic discharge (IEC 1000-4-2, EN 61000-4-2)
Contact: ±6 kV
Air: ±8 kV

Magnetic and electromagnetic fields

Power frequency magnetic field (IEC 1000-4-8, EN 61000-4-8)
Continuous: 30 A/m (rms)
Short duration: 300 A/m (rms)

Pulse magnetic field (IEC 1000-4-9, EN 61000-4-9)
Peak value: 300 A/m

Damped oscillatory magnetic field, 0.1 MHz and 1 MHz (IEC 1000-4-10, EN 61000-4-10)
Peak value: 30 A/m

Radiated radio-frequency electromagnetic field, 80 MHz to 1GHz (ENV 50140)
Unmodulated rms: 10 V/m
Amplitude modulated: 80% AM (1 kHz)

Radiated radio-frequency field, 900 ±5 MHz (ENV 50204)
Unmodulated rms: 10 V/m
Pulse modulated: Duty cycle 50%
Rep. cycle 200 Hz
</td></tr>
</table>

Table 1-5. Specifications

Property	Characteristic/Value
Magnetic and electromagnetic fields *(continued)*	
Radio-frequency common mode, amplitude modulated, 0.15 MHz to 80 MHz (ENV 50141)	Unmodulated rms: 10 V/m Amplitude modulated: 80% AM (1 kHz) Source impedance: 150 Ω
Emission test RF radiated fields, 30 MHz to 1000 MHz (ENV 55011)	Class A
CE Mark Declaration	This product, when installed in an INFI 90 OPEN cabinet, complies with the following directives/standards requested for CE marking:
EMC 89/336/EEC	EN50081-2 Generic Emission Standard - Part 2: Industrial Environment EN50082-2 Generic Immunity Standard - Part 2: Industrial Environment
Low Voltage Directive 73/23/EEC	EN 61010 Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use - Part 1: General Requirements
Certifications	
CSA (Canadian Standards Association)	Certified for use as process control equipment in an ordinary (non-hazardous) location per CSA C22.2 No. 1010.1-92
FM (Factory Mutual) (pending)	Approval for the following categories. Nonincendive for: Class I, Division 2, Groups A,B,C,D Class II, Division 2, Groups F,G

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

SECTION 2 - DESCRIPTION

INTRODUCTION

This section explains the inputs and input circuitry, control logic, logic power and connections for the IMDSI1□ Digital Input modules. The DSI is a digital input interface to a multi-function processor (MFP), multi-function controller (MFC), or logic master module (LMM). These control modules provide the control functions. A control module communicates with its I/O modules on a I/O expander bus as shown in Figure 1-1. Each I/O module on the I/O expander bus has a unique address set by address dipswitch S1 (Fig. 2-1).

INPUTS

Digital field inputs are voltages of 24 VDC, 48 VDC, 125 VDC or 120 VAC rms. These voltages indicate an energized (ON) field device; a 0 volt input indicates a de-energized (OFF) field device. The DSI have a fixed input debounce filter for DC inputs to allow for contact debounce time (17 millisecond response time).

The IMDSI13 (+24 VDC) module and the IMDSI14 (+48 VDC) module have a fixed configuration and do not require any jumper selections. The IMDSI15 (+125 VDC/120 VAC) module has jumpers to select DC or AC mode. The IMDSI12 (+24, +48, +125 VDC or 120 VAC) module has jumpers to select the DC or AC mode and jumpers to select the working voltage. Refer to the Installation section for an explanation of the jumper connections.

> **NOTE:** Due to the number of pins on the P3 connector, twelve inputs are separate while the remaining two pairs share input terminals. The positive (+) side of point 7 and 8 are tied together in each group (refer to Table 5-3). These points must use the same contact voltage (24 VDC, 48 VDC, 125 VDC or 120 VAC) set by the jumpers on the IMDSI12 module, or according to the relevant IMDSI1□ module working voltage.

Input Circuits

Figure 2-1 is a block diagram illustrating signal flow through the module. The input isolation block consists of current limiters and optocouplers to isolate the 16 field inputs from the module circuitry. The input circuits provide 1500 VDC isolation between input and logic circuitry and other input channels. Refer to Table 1-5.

Digital input high impedance provides additional (passive) protection from high energy transients of field digital inputs.

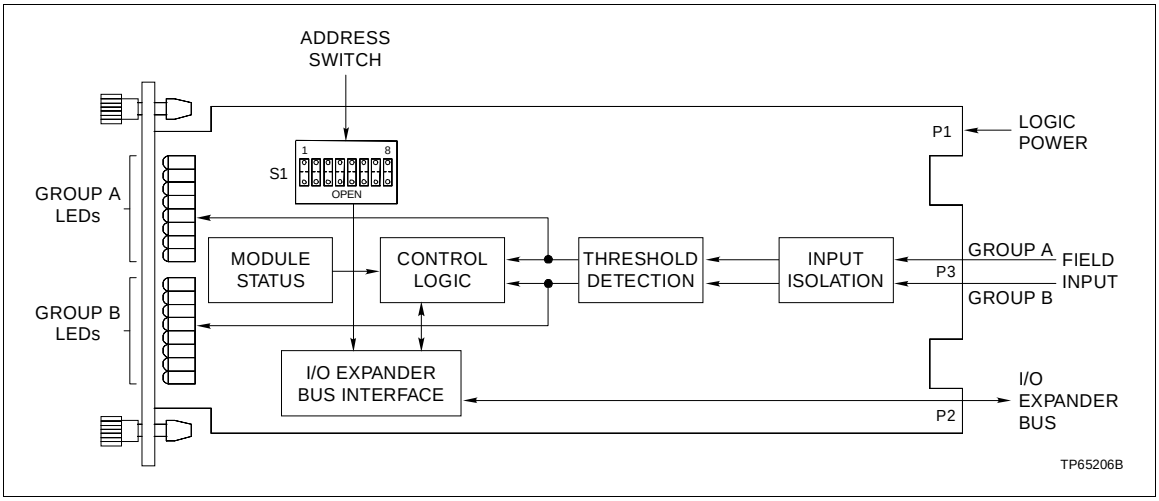


Figure 2-1. Digital Input Module Block Diagram

Input signal path and low isolation capacitance allow protection against fast transient-burst disturbance.

The threshold detection block circuits test the input voltage to determine if it is at the proper voltage level to indicate an ON or OFF state. The output of this comparator is sent to a read buffer in the control logic block. If an input is energized, it also causes a corresponding input status LED on the front panel to light.

The control logic block consists of buffers that hold the input and status byte values. The I/O expander bus interface allows the control module to read these bytes.

Input Circuit Description

When an input signal is present at the proper voltage level, a zener diode conducts (turns on) to cause current flow through an optocoupler. Configurable jumpers (on IMDSI12) or fixed resistors (on IMDSI13, IMDSI14 or IMDSI15) select the turn-on threshold and input voltage.

The optocoupler output causes a comparator output to go low. This lights a corresponding status LED on the module front panel to indicate an energized input; the I/O expander bus interface transmits a logic 1 to the control module on the I/O expander bus. When no input signal is present, no current flows through the optocoupler. The front panel LED does not light and the DSI transmits a logic 0 on the bus. Figure 2-2 shows the digital input circuit.

NOTE: The components inside the dashed boxes in Figure 2-2 are mounted only on the module versions stated in the note.

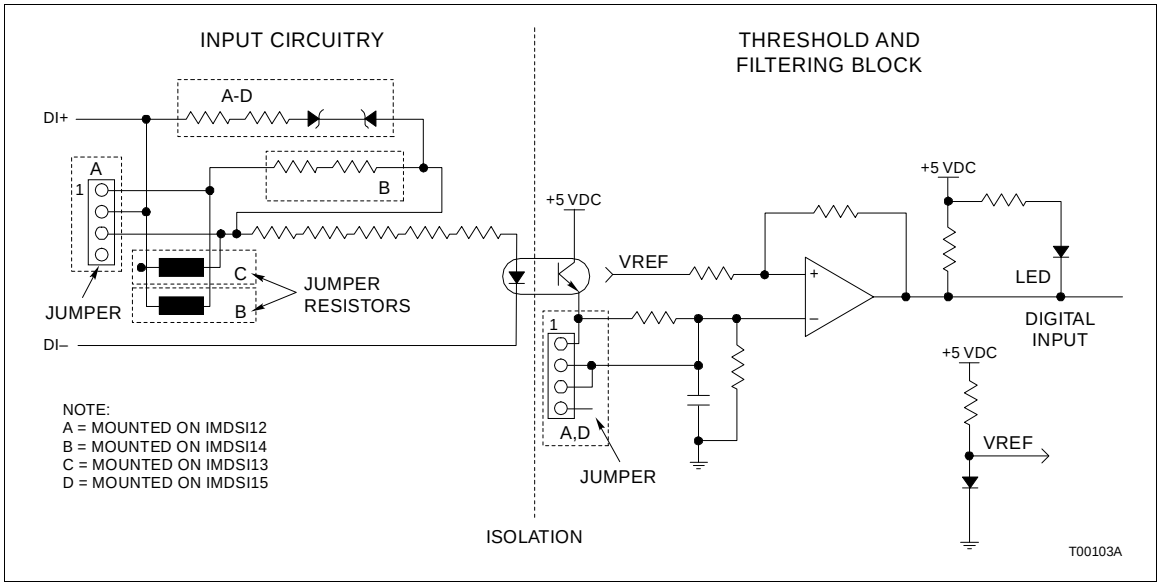


Figure 2-2. Digital Input Module Circuitry

Input Circuit Connections

The contact input signals connect to the 30-pin card edge connector (P3), shown in Figure 2-1, using a termination cable from a termination unit or termination module.

CONTROL LOGIC

Function Code (FC) 84 in the control module configuration accesses the DSI on the I/O expander bus. It also allows the control module to automatically read point (input) data or status data from the DSI. This data is output by the buffer circuits (control logic) to the I/O expander bus interface (Fig. 2-1). The I/O address in FC 84 must be the same as the address set on address dipswitch (S1).

Point Data Byte

Point data is two 8-bit bytes. Each byte corresponds to group A or group B inputs. Each bit of data represents one input. The bit value reflects the state of that input, either open (logic 0) or closed (logic 1).

Status Byte

The status byte ensures module integrity. It makes sure I/O expander bus communication and control module configuration are correct. The control module reads the status byte and compares it to an expected value. If a mismatch occurs, it flags the error and marks the point as bad quality.

LOGIC POWER

Logic power (+5 VDC) drives the DSI circuits. It connects through the top 12-pin card edge connector (P1) show in Figure 2-1.

I/O EXPANDER BUS

The INFI 90 OPEN I/O expander bus is a high speed synchronous parallel bus. It provides a communication path between control modules and I/O modules. The control module provides the control functions and the DSI module provides input to the control module. The P2 card edge connector of the DSI and control module connect to the bus.

The I/O expander bus is parallel signal lines located on the module mounting unit (MMU) back plane. A 12-position dipshunt placed in a connection socket on the MMU back plane connects the bus between the control and I/O modules. Cable assemblies can extend the bus to six MMUs.

A control module and its I/O modules form an individual subsystem within a process control unit (PCU). The I/O expander bus between control and I/O module subsystems must be separated. Leaving a dipshunt socket empty or not connecting the MMUs with cables separates them.

UNIVERSAL I/O EXPANDER BUS INTERFACE

The DSI uses a custom gate array to perform the I/O expander bus interface function. All the control logic and communication protocol are built into an integrated circuit (IC). This IC provides the following functions:

- Address comparison and detection.
- Function code latching and decoding.
- Read strobe generation.
- Data line filtering of bus signals.
- On-board bus drivers.

SECTION 3 - INSTALLATION

INTRODUCTION

This section explains the procedures required to put the IMDSI1□ digital input module into operation. It includes instructions on setting the address selection switch, digital input jumper settings, termination configuration and physical installation. Information is also provided on wiring connections and cabling, fusing and preoperating adjustments. ***DO NOT PROCEED*** with operation until you read, understand and complete the steps in the order in which they appear.

SPECIAL HANDLING

NOTE: Always use the Elsag Bailey field static kit (part number 1948385□1, consisting of two wrist straps, ground cord assembly, alligator clip, and static dissipating work surface when working with static sensitive devices. The kit is designed to connect the technician and the static dissipating work surface to the same ground point to prevent damage to the static sensitive devices by electrostatic discharge.

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

1. ***Use Static Shielding Bag.*** Keep the module in its static shielding bag until you are 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 Static Sensitive Devices.*** 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 cards if necessary.

7. ***Use a Grounded Wrist Strap.*** Connect the wrist strap to the appropriate grounding plug.

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 to verify it has not been damaged in transit.

2. Notify the nearest Elsag Bailey 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

Before installation, set the module S1 address switch and install jumpers to configure the digital inputs. Configure the termination unit (TU) or termination module (TM) to accept the field device signals.

Address Selection Switch (S1)

The DSI can have one of 64 addresses (address 0 to 63) on the I/O expander bus. This address uniquely identifies the I/O module to the control module and must be the same as the address set in the control module configuration (Function Code 84 specification S1).

The address is set by an eight position address dipswitch (S1), shown in Figure 3-1. The six right switch positions (3 through 8) of S1 set the six bit DSI address. Positions 1 and 2 are not used and must remain in the closed position (Fig. 3-2). Table 3-1 is a binary address conversion table for setting S1.

Digital Input Jumper Settings

The IMDSI13 and IMDSI14 modules have fixed configurations, thus no jumper settings are required. The IMDSI12 (24/48/125 VDC or 120 VAC) module requires jumper settings for both the working voltage and the DC or AC mode selections. The IMDSI15 (125 VDC/120 VAC) module requires jumper settings for the DC or AC mode selection.

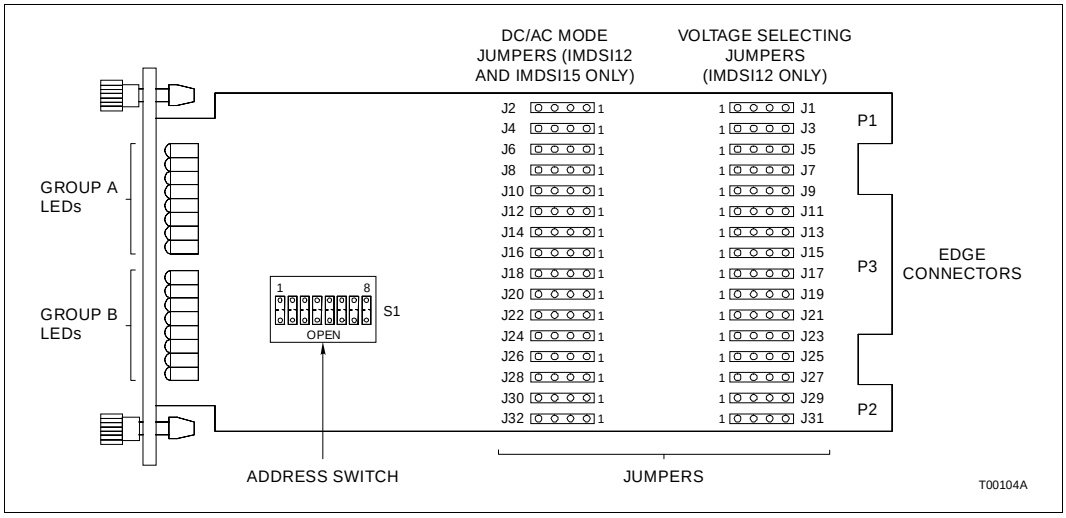


Figure 3-1. S1 Address Select Switch Location

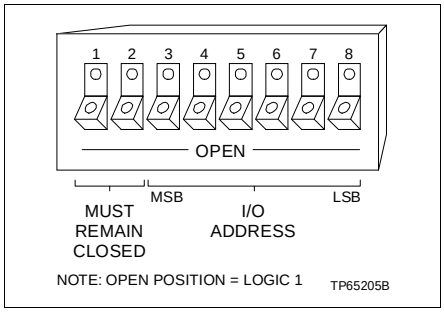


Figure 3-2. Address Select Switch S1 Settings

Table 3-1. S1 Address Switch Settings

ADDR	MSB 3	4	5	6	7	LSB 8	ADDR	MSB 3	4	5	6	7	LSB 8
0	0	0	0	0	0	0	14	0	0	1	1	1	0
1	0	0	0	0	0	1	15	0	0	1	1	1	1
2	0	0	0	0	1	0	16	0	1	0	0	0	0
3	0	0	0	0	1	1	17	0	1	0	0	0	1
4	0	0	0	1	0	0	18	0	1	0	0	1	0
5	0	0	0	1	0	1	19	0	1	0	0	1	1
6	0	0	0	1	1	0	20	0	1	0	1	0	0
7	0	0	0	1	1	1	21	0	1	0	1	0	1
8	0	0	1	0	0	0	22	0	1	0	1	1	0
9	0	0	1	0	0	1	23	0	1	0	1	1	1
10	0	0	1	0	1	0	24	0	1	1	0	0	0
11	0	0	1	0	1	1	25	0	1	1	0	0	1
12	0	0	1	1	0	0	26	0	1	1	0	1	0
13	0	0	1	1	0	1	27	0	1	1	0	1	1

Table 3-1. S1 Address Switch Settings (continued)

ADDR	MSB 3	4	5	6	7	LSB 8	ADDR	MSB 3	4	5	6	7	LSB 8
28	0	1	1	1	0	0	46	1	0	1	1	1	0
29	0	1	1	1	0	1	47	1	0	1	1	1	1
30	0	1	1	1	1	0	48	1	1	0	0	0	0
31	0	1	1	1	1	1	49	1	1	0	0	0	1
32	1	0	0	0	0	0	50	1	1	0	0	1	0
33	1	0	0	0	0	1	51	1	1	0	0	1	1
34	1	0	0	0	1	0	52	1	1	0	1	0	0
35	1	0	0	0	1	1	53	1	1	0	1	0	1
36	1	0	0	1	0	0	54	1	1	0	1	1	0
37	1	0	0	1	0	1	55	1	1	0	1	1	1
38	1	0	0	1	1	0	56	1	1	1	0	0	0
39	1	0	0	1	1	1	57	1	1	1	0	0	1
40	1	0	1	0	0	0	58	1	1	1	0	1	0
41	1	0	1	0	0	1	59	1	1	1	0	1	1
42	1	0	1	0	1	0	60	1	1	1	1	0	0
43	1	0	1	0	1	1	61	1	1	1	1	0	1
44	1	0	1	1	0	0	62	1	1	1	1	1	0
45	1	0	1	1	0	1	63	1	1	1	1	1	1

1 = OPEN; 0 = CLOSED

IMDSI12 module

To set the jumpers for the IMDSI12 module, refer to following procedures.

1. Refer to Table 3-2 and start with input A1, jumper J1. Move to the right and locate the desired working voltage. Note the jumper/pin position. Position the J1 jumper strap in that position.

2. Refer to Table 3-3 and start with input A1, jumper J2. Move to the right and locate the correct digital input mode (AC or DC) and note the jumper/pin position. Position the J2 jumper strap in that position.

3. Repeat steps 1 and 2 until the jumpers are set for group A and group B inputs.

IMDSI15 module

To set the jumpers for the IMDSI15 module, refer to following procedures.

1. Refer to Table 3-3 and start with input A1, jumper J2. Move to the right and locate the correct digital input mode (AC or DC) and note the jumper/pin position. Position the J2 jumper strap in that position.

2. Repeat step 1 until the jumpers are set for group A and group B inputs.

Table 3-2. Working Voltage Settings (IMDSI12 only)

Input	Jumper	+24 VDC	+48 VDC	125 VDC/ 120 VAC
A1	J1	2-3	1-2	3-4
A2	J3	2-3	1-2	3-4
A3	J5	2-3	1-2	3-4
A4	J7	2-3	1-2	3-4
A5	J9	2-3	1-2	3-4
A6	J11	2-3	1-2	3-4
A7	J13	2-3	1-2	3-4
A8	J15	2-3	1-2	2-3
B1	J17	2-3	1-2	3-4
B2	J19	2-3	1-2	3-4
B3	J21	2-3	1-2	3-4
B4	J23	2-3	1-2	3-4
B5	J25	2-3	1-2	3-4
B6	J27	2-3	1-2	3-4
B7	J29	2-3	1-2	3-4
B8	J31	2-3	1-2	3-4

Table 3-3. DC/AC Mode Settings (IMDSI12 and IMDSI15)

Input	Jumper	AC Mode	DC Mode
A1	J2	1-2	3-4
A2	J4	1-2	3-4
A3	J6	1-2	3-4
A4	J8	1-2	3-4
A5	J10	1-2	3-4
A6	J12	1-2	3-4
A7	J14	1-2	3-4
A8	J16	1-2	3-4
B1	J18	1-2	3-4
B2	J20	1-2	3-4
B3	J22	1-2	3-4
B4	J24	1-2	3-4
B5	J26	1-2	3-4
B6	J28	1-2	3-4
B7	J30	1-2	3-4
B8	J32	1-2	3-4

NOTE: Due to the number of pins on the P3 connector, 12 inputs are separate while the remaining two pairs share input terminals. The positive (+) side of point 7 and 8 are tied together in each group (refer to Table 5-3). For IMDSI12 module, these points must use the same contact voltage (24 VDC, 48 VDC, 125 VDC or 120 VAC) set by the jumpers.

Termination Configuration

A termination unit (TU) or termination module (TM) connects the field device wiring to the INFI 90 OPEN system. The terminal blocks (connection points) are located on the TU or TM.

Configuration of the TU or TM is required to accept the digital field inputs sent to the DSI module. Refer to the appendices for additional information.

Physical Installation

NOTE: This installation section provides instructions pertaining to the physical installation of the digital input module only. For complete cable and termination information, refer to the applicable instruction manual (Table 1-2).

The DSI module inserts into a standard INFI 90 OPEN module mounting unit (MMU) and occupies one slot. To install:

1. Verify the slot assignment of the module.

WARNING	**Disconnect power before installing dipshunts on the MMU backplane. Failure to do so will result in contact with cabinet areas that could cause severe or fatal shock.**

2. Verify that a dipshunt is in the I/O expander bus socket on the MMU backplane between the I/O module and control module.

3. For TU or TM devices, connect the hooded end of the termination cable from the TU or TM to the MMU backplane. To do this, insert the connector into the backplane slot in the same slot as the one assigned to the digital input module. The latches should snap securely into place.

4. Align the digital input module with the guide rails in the MMU; gently slide the module in until the front panel is flush with the top and bottom of the MMU frame and the module is seated in the cable to the termination device.

5. Push and turn the two captive retaining screws on the module faceplate one half turn to the latched position. It is latched when the slots on the screws are vertical and the open ends face the center of the module.

WIRING CONNECTIONS AND CABLING

The DSI has three card edge connectors to supply logic power, establish I/O expander bus communication and provide digital inputs (P1, P2, P3 respectively).

Wiring

Installing the module in the MMU connects the digital input module to the logic power (+5 VDC), necessary to drive the circuitry, at P1. It also connects P2 to the I/O expander bus for communication with the control module. P1 and P2 connections require no additional wiring or cabling.

> **NOTE:** You must install a dipshunt on the backplane of the MMU to connect the I/O expander bus between the digital input module and control module. Locate the modules so the bus can connect the modules or they will not communicate.

Cable Connections

The IMDSI1□ digital input module can use either a NTDI01 termination unit or an NIDI01 termination module for termination. Refer to Figure 3-3 to determine the cables to use with the TU or TM.

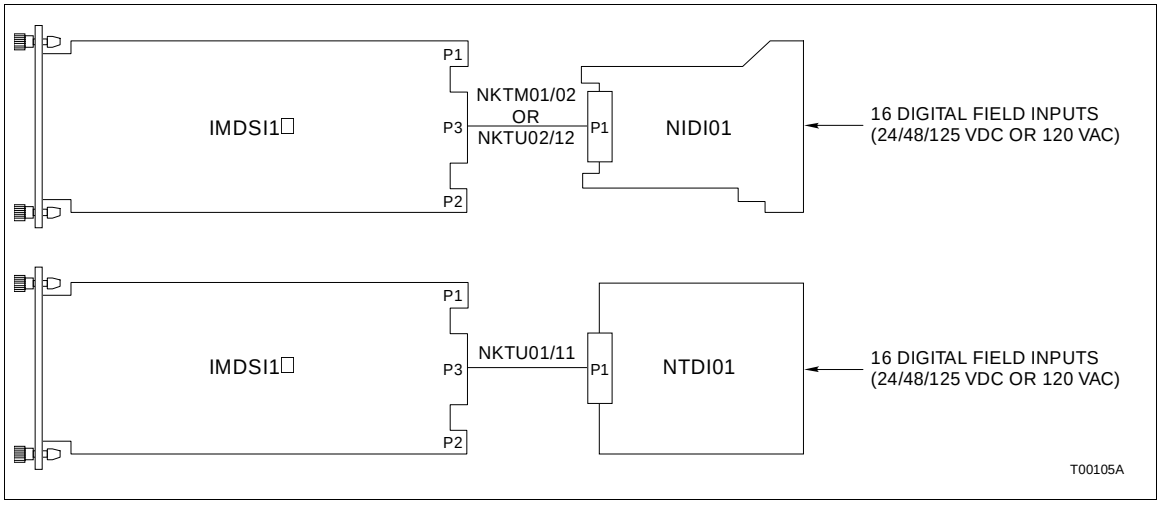


Figure 3-3. Cable Connections and Termination

FUSING

The IMDSI1□ digital input module does not have any on board fusing requirements.

PREOPERATING ADJUSTMENTS

The IMDSI1□ digital input module does not require any adjustments prior to operation.

SECTION 4 - OPERATING PROCEDURES

INTRODUCTION

This section explains the front panel indicators and start-up procedures for the IMDSI1□ digital input module.

INDICATORS

The DSI module has point (input) status LED indicators on the front panel to aid in system test and diagnosis. There are 16 LEDs divided into two groups of eight (group A and group B). The location of the LEDs is shown in Figure 4-1. Each indicator represents a digital input. A red LED indicates an energized input. A blank LED indicates a non-energized input.

START-UP PROCEDURES

The control module controls the start-up of the DSI module; it is fully automatic. Function Code (FC) 84 in the control module configuration enables the DSI. Specification S1 of FC 84 is the I/O module address. It must be the same as the address set on the address dipswitch (S1).

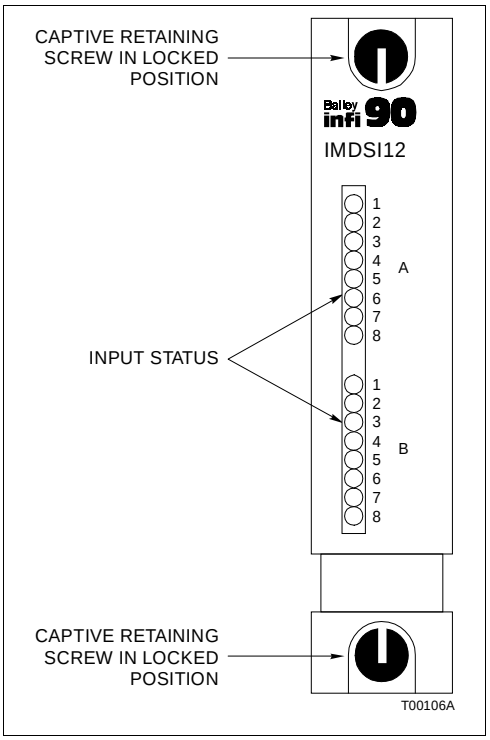


Figure 4-1. Front Panel View

SECTION 5 - TROUBLESHOOTING

INTRODUCTION

This section explains the error indications and corrective actions for the IMDSI1□ Digital Input (DSI) module.

ERROR INDICATIONS AND CORRECTIVE ACTION

You can obtain the status of the DSI by checking the control module for good quality on its input blocks. Use any INFI 90 OPEN operator interface (e.g., Operator Interface Station, Engineering Work Station, Configuration and Tuning Terminal) to do this.

> **NOTE:** If you look at the DSI front panel input status LED indicators and there are no LEDs lit, this may indicate a faulty DSI (an input must be energized to light an LED). Check the control module for bad quality on its input blocks.

CONTROL MODULE ERRORS

The address set on address switch S1 and in the control module configuration must be the same. The control module generates a MISSING SLAVE MODULE error if they do not match. Verify that the address set on switch S1 is the same as the address in Function Code (FC) 84 specification S1. If not:

1. Remove the module and change the setting of S1 to correspond with the module configuration. Refer to the ***INSTALLATION*** in Section 3 for the procedures to set an address and to install a digital input module.

- or -

2. Modify the address in the module configuration (FC 84 specification S1) to correspond with the address set on S1. Use an INFI 90 OPEN operator interface to modify the configuration. For procedures on how to modify a function code specification, refer to the instruction manual for the operator interface being used (Table 1-2).

WARNING	**Disconnect power before installing dipshunts on the MMU backplane. Failure to do so will result in contact with cabinet areas that could cause severe or fatal shock.**

The control module generates a MISSING SLAVE MODULE error if the I/O expander bus is not connected between the

digital input module and the control module. Verify the bus connection on the MMU back plane.

> **NOTE:** If FC 84 specification S3 is set to 0, the control module will trip when the DSI module fails. Changing specification S3 to a 1 will allow the control module to continue to operate when a digital input module fails.

If you determine the digital input module is faulty, replace it with a new one. Refer to the ***REPAIR/REPLACEMENT PROCEDURES*** in Section 7 for procedures to replace a DSI module.

MODULE PIN CONNECTIONS

The digital input module has three connection points for external signals and power (P1, P2 and P3). Tables 5-1, 5-2 and 5-3 show the pin connections.

Table 5-1. P1 Power Pin Connections

Pin (P1)	Connection
1	+5 VDC
2	+5 VDC
3	NC
4	NC
5	COMMON
6	COMMON
7	NC
8	NC
9	NC
10	NC
11	NC
12	NC

NC = Not connected

Table 5-2. P2 Expander Bus Connections

Pin (P2)	Signal
1	Data 1
2	Data 0
3	Data 3
4	Data 2
5	Data 5
6	Data 4
7	Data 7
8	Data 6

Table 5-2. P2 Expander Bus Connections (continued)

Pin (P2)	Signal
9	Clock
10	Sync
11	NC
12	NC

NC = Not connected

Table 5-3. P3 Input Signal Pin Connections

Group A			Group B		
Digital Input	Pin (+)	Pin (-)	Digital Input	Pin (+)	Pin (-)
1	A	1	1	K	9
2	B	2	2	L	10
3	C	3	3	M	11
4	D	4	4	N	12
5	E	5	5	P	13
6	F	6	6	R	14
7	H[1]	7	7	S[1]	15
8	H	J	8	S	8

NOTE:
1. Shared pin (inputs 7 and 8)

SECTION 6 - MAINTENANCE

INTRODUCTION

The reliability of any stand-alone product or control system is affected by the maintenance of the equipment. Elsag Bailey recommends that all equipment users practice a preventive maintenance program that will 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.

- Maintenance personnel should be qualified electrical technicians or engineers that know the proper use of test equipment.
- Maintenance personnel should be familiar with the module mounting unit, 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 6-1 is the preventive maintenance schedule for the digital input module. The table lists the preventive maintenance tasks in groups according to their specified maintenance interval. Instructions for 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

The tools and equipment required for maintenance procedures are:

- Antistatic vacuum.
- Screwdriver (medium length).
- Isopryl alcohol (99.5 percent electronic grade).
- Distilled water.
- Compressed air.
- Foam tipped swabs.
- Lint free cloths.

Table 6-1. Preventive Maintenance Schedule

Task	Frequency
Check cabinet, module mounting unit backplane assembly, digital input module and termination device for dust. Clean as necessary using an antistatic vacuum. If circuit board cleaning is necessary, refer to procedure.	Every six months or during plant shutdown, whichever occurs first.
Check all signal, power and ground connections that are associated with the digital input module. Verify that they are secure. Refer to procedure.	

PREVENTIVE MAINTENANCE PROCEDURES

This section covers tasks from Table 6-1 that require specific instructions or further explanation.

- Cleaning printed circuit boards and edge connectors.
- Checking signal, power and ground connections.

Printed Circuit Board Cleaning

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.

Do all cleaning and handling of the printed circuit boards at static safe work stations. Always observe the steps under ***SPECIAL HANDLING*** in Section 3 when handling printed circuit boards.

WARNING

Never clean electrical parts or components with live power present. Doing so exposes you to an electrical shock hazard.

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.

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 an Eberhard Faber (400A) pink pearl 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 field wiring connections to the termination unit or termination module are secure.

SECTION 7 - REPAIR/REPLACEMENT PROCEDURES

INTRODUCTION

This section explains the replacement procedures for a IMDSI1□ Digital Input (DSI) module. There are no special tools required to replace a DSI module.

MODULE REPAIR/REPLACEMENT

If you determine the DSI is faulty, replace it with a new one. ***DO NOT*** try to repair the module; replacing components may affect the module performance. You can remove the module while system power is supplied. To replace a module:

1. Push and turn the two front panel captive retaining screws one half turn to unlatch the module. It is unlatched when the slots on the screws are vertical and the open end of the slots face away from the module.

2. Gently slide the module out of the MMU.

3. Configure the replacement module switch and jumper settings. Refer to ***Address Selection Switch (S1)*** and ***Digital Input Jumper Settings*** in Section 3. Make certain these adjustments are set the same as the original module.

4. In the same slot assignment as the original module, align the replacement module with the guide rails in the MMU; gently slide it in until the front panel is flush with the top and bottom of the MMU frame and and the module is fully seated in the cable to the termination device.

5. Push and turn the two captive retaining screws on the module faceplate one half turn to the latched position. It is latched when the slots on the screws are vertical and the open ends face the center of the module.

6. Return to normal operation.

SECTION 8 - SUPPORT SERVICES

INTRODUCTION

Elsag Bailey Process Automation is ready to help in the use 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 at your facility, order replacement parts from a Elsag Bailey Process Automation sales office. Provide the following information.

1. Part description, part number and quantity.

2. Model and serial number (if applicable).

3. Elsag Bailey Process Automation instruction number and page number of part reference.

TRAINING

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

TECHNICAL DOCUMENTATION

Additional copies of this instruction, or other Elsag Bailey Process Automation instruction, can be obtained from the nearest Elsag Bailey sales office at a reasonable charge.

APPENDIX A - TERMINATION UNIT (NTDI01) CONFIGURATION

INTRODUCTION

The IMDSI1□ module can use a NTDI01 for termination. Dipshunts on the NTDI01 Termination Unit configure the digital inputs. The digital input module accepts inputs of 24 VDC, 48 VDC, 125 VDC and 120 VAC, depending on the module selected. Refer to Table 1-3 for the variations available.

Figure A-1 shows the NTDI01 dipshunt without strapping, and the digital signal path from the field device (contact) to the DSI module for a termination unit application. Refer to Table A-1 to determine the dipshunt strapping to configure your application. Figure A-2 shows the terminal assignments for the digital input signals. Refer to this figure when connecting field wiring to the NTDI01.

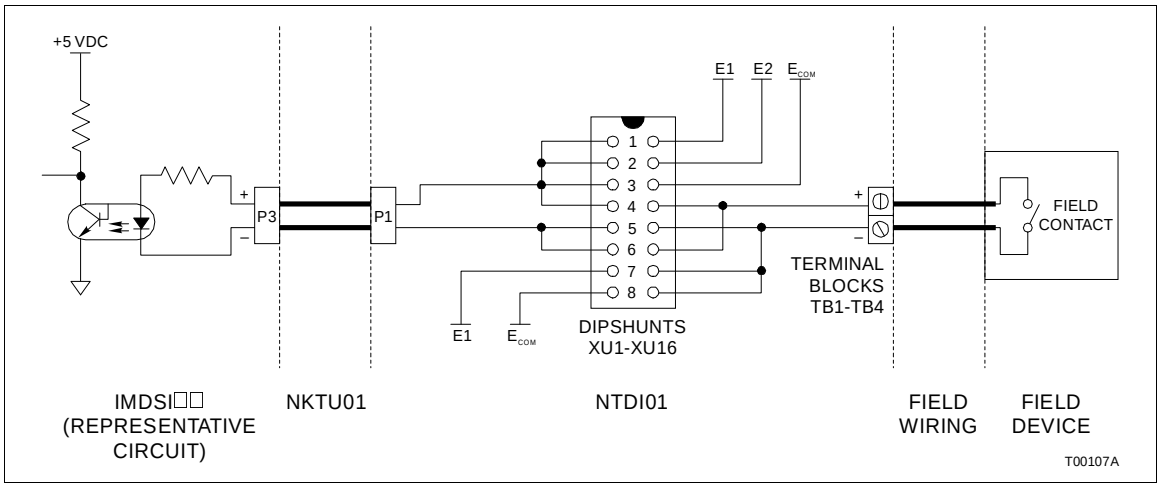
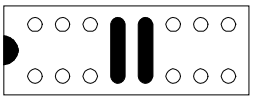
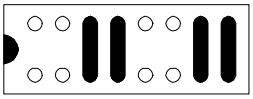
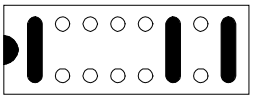
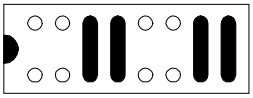
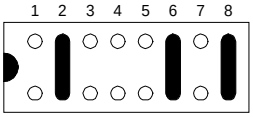
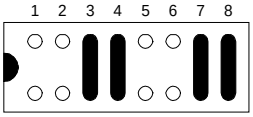


Figure A-1. NTDI01 Termination Unit Dipshunt

Table A-1. NTDI01 Dipshunt Configuration

Application/Signal Type	Dipshunt Configuration
Field powered contact	XU1-XU16 1 2 3 4 5 6 7 8  XU17 1 2 3 4 5 6 7 8 
System powered from E1, 24 VDC, 48 VDC, 125 VDC, 120 VAC	XU1-XU16 1 2 3 4 5 6 7 8  XU17 1 2 3 4 5 6 7 8 
System powered from E2, 24 VDC, 48 VDC, 125 VDC, 120 VAC	XU1-XU16 1 2 3 4 5 6 7 8  XU17 1 2 3 4 5 6 7 8  TP27114A

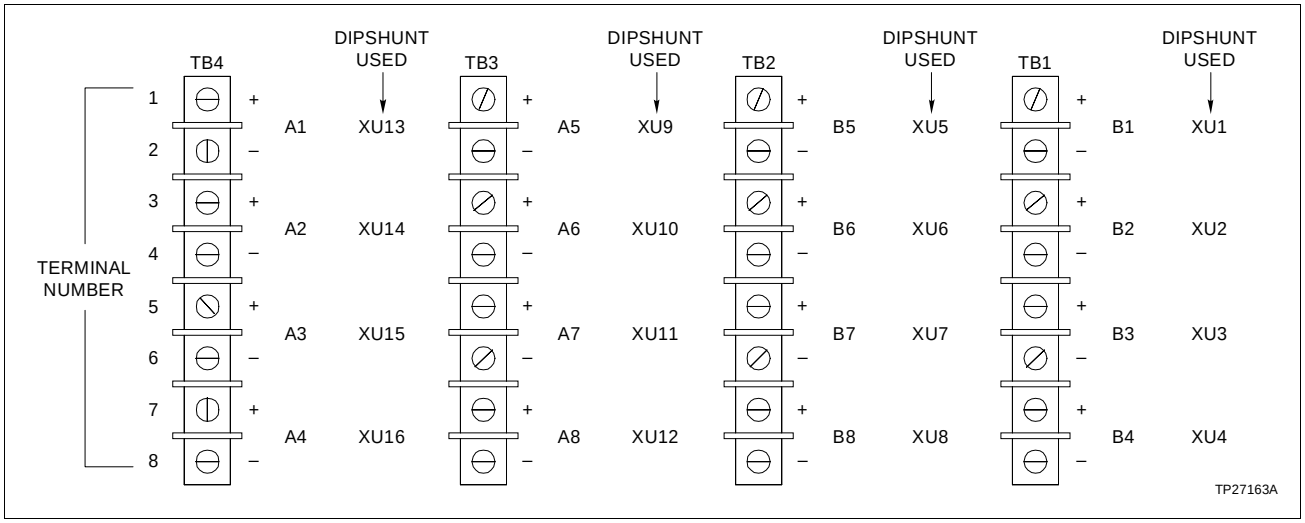


Figure A-2. NTDI01 Termination Unit Terminal Assignments

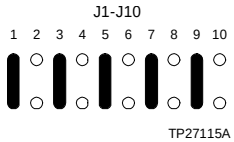
APPENDIX B - TERMINATION MODULE (NIDI01) CONFIGURATION

INTRODUCTION

The IMDSI1□ digital input module can use a NIDI01 for termination. Jumpers on the NIDI01 Termination Module configure the digital inputs. The digital input module accepts inputs of 24 VDC, 48 VDC, 125 VDC and 120 VAC, depending on the module selected. Refer to Table 1-3 for the variations available.

Refer to Table B-1 to determine the jumper settings to configure your application. Figure B-1 shows the terminal assignments for the digital input signals. Refer to this figure when connecting field wiring to the NIDI01.

Table B-1. NIDI01 Jumper Configuration

Application/Signal Type	Jumper Configuration
24 VDC, 48 VDC, 125 VDC, 120 VAC	

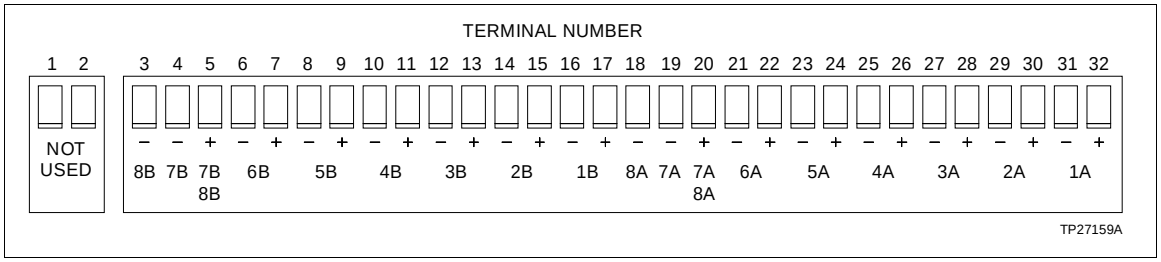


Figure B-1. NIDI01 Terminal Assignments

APPENDIX C - QUICK REFERENCE INFORMATION

INTRODUCTION

This section provides a source for reference information. It contains the jumper and switch locations for the IMDSI1□ digital input module. Refer to ***INSTALLATION*** in Section 3 for a complete description of jumper and switch settings.

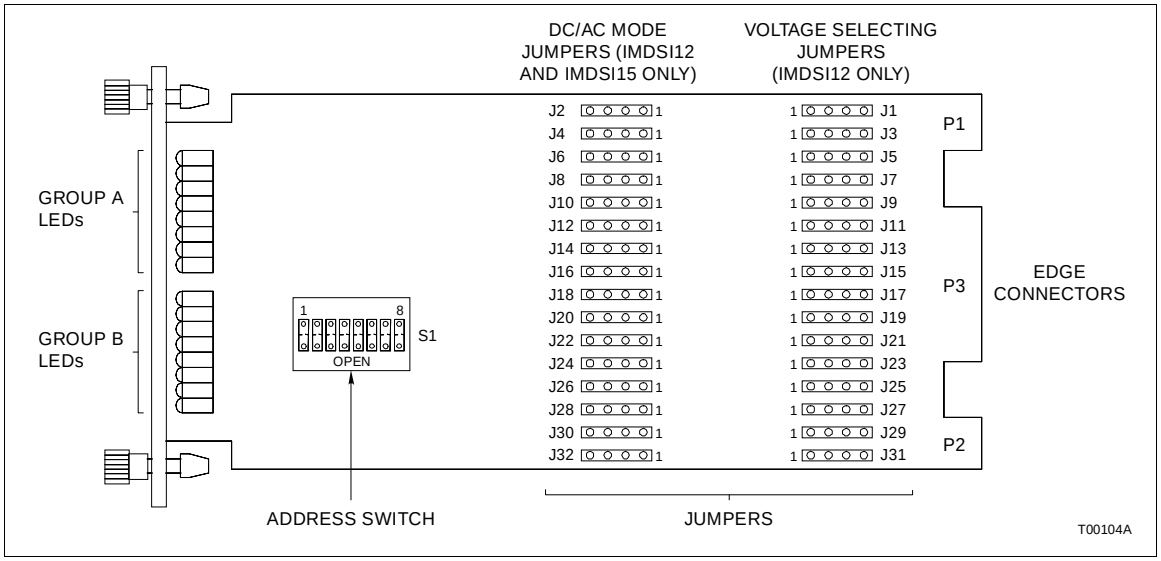


Figure C-1. S1 Address Select Switch Location and Jumper Locations

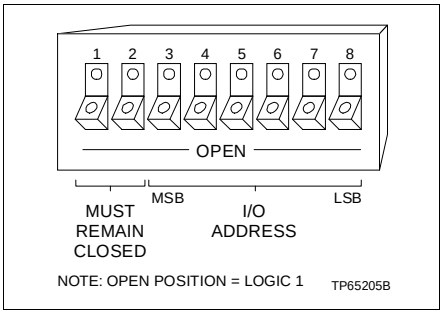


Figure C-2. Address Select Switch S1 Settings

Table C-1. S1 Address Switch Settings

ADDR	MSB 3	4	5	6	7	LSB 8	ADDR	MSB 3	4	5	6	7	LSB 8
0	0	0	0	0	0	0	32	1	0	0	0	0	0
1	0	0	0	0	0	1	33	1	0	0	0	0	1
2	0	0	0	0	1	0	34	1	0	0	0	1	0
3	0	0	0	0	1	1	35	1	0	0	0	1	1
4	0	0	0	1	0	0	36	1	0	0	1	0	0
5	0	0	0	1	0	1	37	1	0	0	1	0	1
6	0	0	0	1	1	0	38	1	0	0	1	1	0
7	0	0	0	1	1	1	39	1	0	0	1	1	1
8	0	0	1	0	0	0	40	1	0	1	0	0	0
9	0	0	1	0	0	1	41	1	0	1	0	0	1
10	0	0	1	0	1	0	42	1	0	1	0	1	0
11	0	0	1	0	1	1	43	1	0	1	0	1	1
12	0	0	1	1	0	0	44	1	0	1	1	0	0
13	0	0	1	1	0	1	45	1	0	1	1	0	1
14	0	0	1	1	1	0	46	1	0	1	1	1	0
15	0	0	1	1	1	1	47	1	0	1	1	1	1
16	0	1	0	0	0	0	48	1	1	0	0	0	0
17	0	1	0	0	0	1	49	1	1	0	0	0	1
18	0	1	0	0	1	0	50	1	1	0	0	1	0
19	0	1	0	0	1	1	51	1	1	0	0	1	1
20	0	1	0	1	0	0	52	1	1	0	1	0	0
21	0	1	0	1	0	1	53	1	1	0	1	0	1
22	0	1	0	1	1	0	54	1	1	0	1	1	0
23	0	1	0	1	1	1	55	1	1	0	1	1	1
24	0	1	1	0	0	0	56	1	1	1	0	0	0
25	0	1	1	0	0	1	57	1	1	1	0	0	1
26	0	1	1	0	1	0	58	1	1	1	0	1	0
27	0	1	1	0	1	1	59	1	1	1	0	1	1
28	0	1	1	1	0	0	60	1	1	1	1	0	0
29	0	1	1	1	0	1	61	1	1	1	1	0	1
30	0	1	1	1	1	0	62	1	1	1	1	1	0
31	0	1	1	1	1	1	63	1	1	1	1	1	1

1 = OPEN; 0 = CLOSED

Table C-2. Working Voltage Settings (IMDSI12 only)

Input	Jumper	+24 VDC	+48 VDC	125 VDC/ 120 VAC
A1	J1	2-3	1-2	3-4
A2	J3	2-3	1-2	3-4
A3	J5	2-3	1-2	3-4
A4	J7	2-3	1-2	3-4
A5	J9	2-3	1-2	3-4
A6	J11	2-3	1-2	3-4
A7	J13	2-3	1-2	3-4
A8	J15	2-3	1-2	2-3
B1	J17	2-3	1-2	3-4
B2	J19	2-3	1-2	3-4
B3	J21	2-3	1-2	3-4
B4	J23	2-3	1-2	3-4
B5	J25	2-3	1-2	3-4
B6	J27	2-3	1-2	3-4
B7	J29	2-3	1-2	3-4
B8	J31	2-3	1-2	3-4

Table C-3. DC/AC Mode Settings (IMDSI12 and IMDSI15)

Input	Jumper	AC Mode	DC Mode
A1	J2	1-2	3-4
A2	J4	1-2	3-4
A3	J6	1-2	3-4
A4	J8	1-2	3-4
A5	J10	1-2	3-4
A6	J12	1-2	3-4
A7	J14	1-2	3-4
A8	J16	1-2	3-4
B1	J18	1-2	3-4
B2	J20	1-2	3-4
B3	J22	1-2	3-4
B4	J24	1-2	3-4
B5	J26	1-2	3-4
B6	J28	1-2	3-4
B7	J30	1-2	3-4
B8	J32	1-2	3-4

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