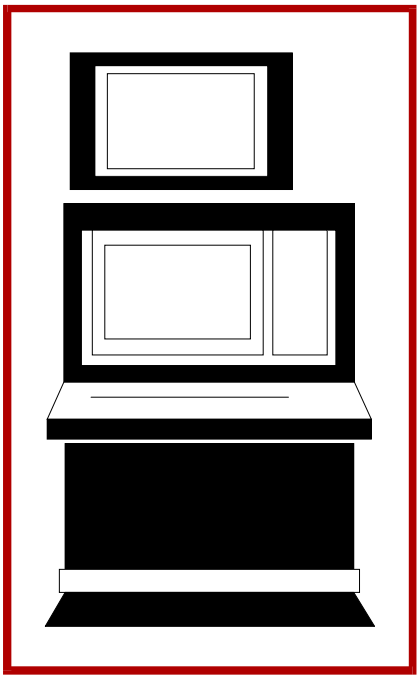
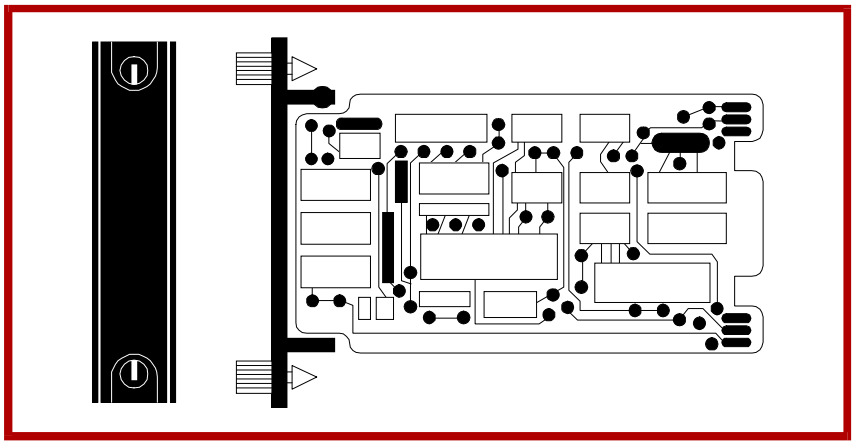
Bailey® infi 90®

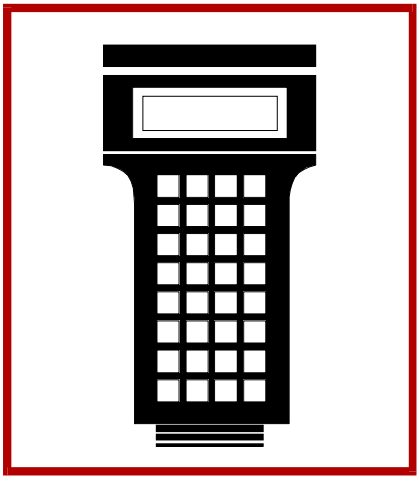
E96-307

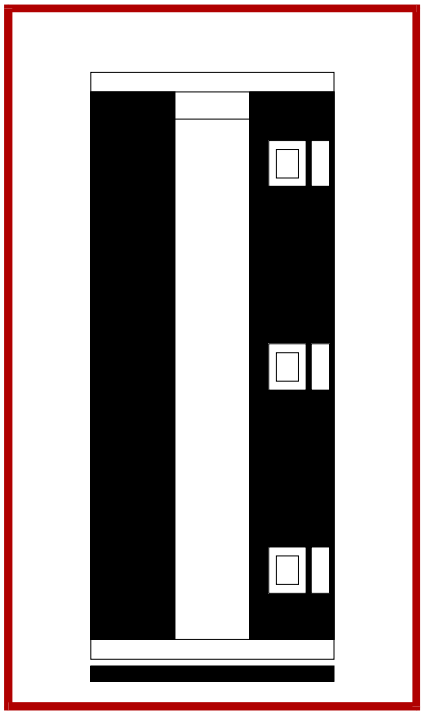
Instruction

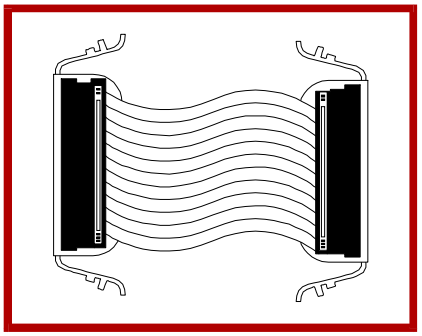
Digital Slave Input Module
(IMDSI02)

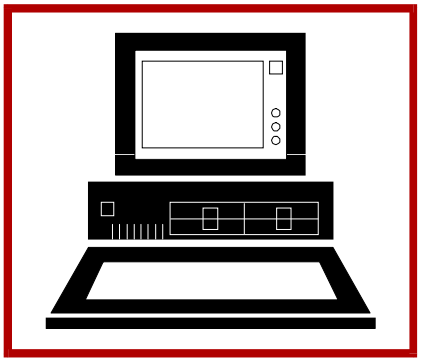












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WARNING notices as used in this instruction apply to hazards or unsafe practices that could result in personal injury or death.

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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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.

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PERTURBATIONS DU PROCÉDÉ

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Preface

The Digital Slave Input module (IMDSI02) is an interface used to bring sixteen separate process field signals into the Infi 90 Process Management System. These digital inputs are used by master modules to monitor and control a process.

This instruction explains the slave module features, specifications and operation. It details the procedures you must follow to set up and install an IMDSI02 module, and explains status indicators that help in system test and diagnosis.

The system engineer or technician using the IMDSI02 should read and understand this instruction before installing and operating the slave module. In addition, a complete understanding of the Infi 90 system is beneficial to the user.

List of Effective Pages

Total number of pages in this instruction is 34, consisting of the following:

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

Safety Summary

GENERAL WARNINGS	**Equipment Environment** All components, whether in transportation, operation or storage must be in a noncorrosive environment. **Electrical Shock Hazard During Maintenance** Disconnect power or take precautions to ensure that contact with energized parts is avoided when servicing. **Special Handling** This module uses Electrostatic Sensitive Devices (ESD).

SPECIFIC WARNING	Disconnect power before installing dipshunts for slave modules on the MMU back plane (slave expander bus). Failure to do so could result in severe or fatal shock. (p. 3-5, 5-1)

Sommaire de Sécurité

AVERTISSEMENT D'ORDRE GENERAL	**Environment de l'equipement** Nes pas soumettre les composantes a une atmosphere corrosive lors du transport, de l'entreposage ou de l'utilisation. **Risques de chocs electriques lor de l'entretien** S'assurer de debrancher l'alimentation ou de prende les precautions necessaires a eviter tout contact avec des composants sours tension lors de l'entretien. **Precautions de Manutention** Ce module contient des composantes sensibles aux decharges electro-statiques.

ADVERTISSEMENT D'ORDRE SPECIFIQUE	Couper l'alimentation avant d'installer les dipshunts sur la plaque arriere du chassis de montage de modules (MMU). Toute negligence a cet egard constitue un risque de choc pouvant entrainer des blessures graves, voire moretiles. (p. 3-5, 5-1)

Table of Contents

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List of Figures

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SECTION 1 - INTRODUCTION

OVERVIEW

The Digital Slave Input module (IMDSI02) brings sixteen separate digital signals into the Infi 90 system for processing and monitoring. It interfaces process field inputs with the Infi 90 Process Management System. A contact closure, switch or solenoid is an example of a device that supplies a digital signal. Master modules provide the control functions; slave modules provide the I/O.

This manual explains the purpose, operation and maintenance of the Digital Slave Input (DSI) module. It addresses handling precautions and installation procedures. Figure 1-1 illustrates the Infi 90 communication levels and the position of the DSI module within these levels.

INTENDED USER

System engineers and technicians should read this manual before installing and operating the DSI module. A module ***SHOULD NOT*** be put into operation until this instruction is read and understood. You can refer to the Table of Contents to find specific information after the module is operating.

MODULE DESCRIPTION

The DSI 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.

The slave module has three card edge connectors for external signals and power (P1, P2 and P3). P1 connects to common (ground) and +5 VDC power (refer to Table 5-1). P2 connects the module to the slave expander bus to communicate with a master module (refer to Table 5-2). The digital signals are input through connector P3 using a cable connected to a Termination Unit (TU) or Termination Module (TM) (refer to Table 5-3). The terminal blocks (physical connection points) for field wiring are on the TU/TM.

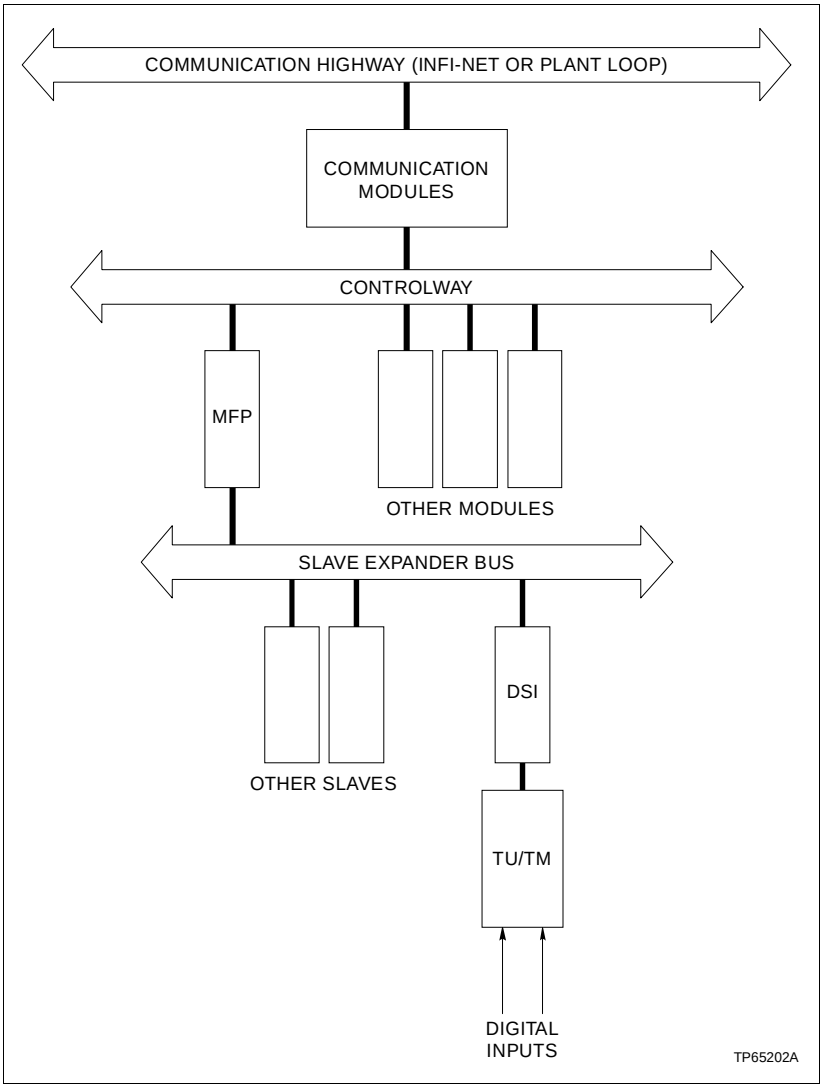


Figure 1-1. Infi 90 Communication Levels

FEATURES

The modular design of the DSI module, as with all Infi 90 modules, allows for flexibility when you are creating a process management strategy. It brings sixteen separate digital signals (24 VDC, 125 VDC and 120 VAC) into the system.

Individual voltage and response time jumpers on the module configure each of the inputs. Selectable response times (fast or slow) for DC inputs allow the Infi 90 system to compensate for process field device debounce time.

The front panel LED status indicators provide a visual indication of the input states to aid in system test and diagnosis. A DSI module can be removed or installed without powering the system down.

INSTRUCTION CONTENT

This manual consists of eight sections. ***Introduction*** is an overview of the DSI module: Features, description and specifications. ***Desciption and Operation*** explains the module operation and input circuitry. ***Installation*** describes precautions to observe when handling DSI modules and setup procedures required before module operation. It also discusses switch and jumper settings, and installation procedures. ***Operating Procedures*** explains the front panel indicators and startup of the slave module. ***Troubleshooting*** describes the error indications and corrective actions to take. ***Maintenance*** has a maintenance schedule for the slave module. ***Repair/Replacement Procedures*** details the procedures to replace a module. ***Support Services*** provides replacement part ordering information. It explains other areas of support that Bailey Controls provides.

HOW TO USE THIS MANUAL

Read this manual through in sequence. It is important to become familiar with the entire contents of this manual before using the DSI. The manual is organized in sections to enable you to find specific information quickly.

1. Read and do the steps in Section 3.

2. Read Section 4 before powering up the module.

3. Refer to Section 5 if a problem occurs.

4. Refer to Section 6 for scheduled maintenance requirements.

5. Use Section 8 when ordering replacement parts.

REFERENCE DOCUMENTS

Document Number	Document
I-E96-201	Multi-Function Processor (IMMFP01)
I-E96-202	Multi-Function Processor (IMMFP02)
I-E96-209	Logic Master Module (IMLMM02)
I-E93-911	Termination Unit Manual
I-E96-110	Operator Interface Station
I-E93-916	Engineering Work Station
I-E92-501-2	Configuration and Tuning Terminal
I-E93-900-20	Function Code Application Manual

NOMENCLATURE

The following modules and equipment can be used with a DSI module:

Nomenclature	Hardware
IMMFP01/02	Multi-Function Processor Module
IMLMM02	Logic Master Module
NIDI01	Termination Module, Digital Inputs
NTDI01	Termination Unit, Digital Inputs
NKTM01	Cable, Termination Module
NKTU01	Cable, Termination Unit
NKTU02	Cable, Termination Module

GLOSSARY OF TERMS AND ABBREVIATIONS

Term	Definition
Configuration	A control strategy with function blocks.
Controlway	A redundant peer-to-peer communication path for point data transfer between intelligent modules within a process control unit.
Digital	A discrete input signal having only two states: on or off.
Dipshunt	Dual in-line package with shorting bars.
Dipswitch	A dual in-line package that contains single pole switches.
EWS	Engineering Work Station; an integrated hardware and software personal computer system for configuring and monitoring Infi 90 modules and systems.
Function Code	An algorithm that defines specific functions. These functions link together to form the control strategy.
LED	Light Emitting Diode; the module front panel indicator that shows status and error messages.
LSB	Least Significant Bit; the bit of a binary number that carries the least numerical weight.
Master Module	One of a series of controller modules designed to direct field processes through a slave module. The multi-function processor is an example.

GLOSSARY (continued)

Term	Definition
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 modules.
MSB	Most Significant Bit; the bit of a binary number that carries the most numerical weight.
OIS	Operator Interface Station; integrated operator console with data acquisition and reporting capabilities. It provides a window into the process for flexible control and monitoring.
PCU	Process Control Unit; rack type industrial cabinet that contains master, slave and communication modules, and their communication paths.
Slave Expander Bus	Parallel address/data bus between the master module and the slave.
TM	Termination Module; provides input/output connection between plant equipment and the Infi 90 process modules. The termination module slides into a slot in the termination mounting unit.
TU	Termination Unit; provides input/output connection between plant equipment and the Infi 90 process modules. The termination unit is a flat circuit board for panel mounting.

SPECIFICATIONS

LOGIC POWER	
Voltage	+5 VDC (± 5%)
Current Consumption	55 mA @ +5 VDC (typical) 79 mA (maximum)
DIGITAL INPUTS	
Voltages	24 VDC (±10%) 125 VDC (±10%) 120 VAC (±10%)
Current (typical)	4.5 mA @ 24 VDC 5.0 mA @ 125 VDC 7.0 mA @ 120 VAC rms @ 60 Hz
Turn-On Voltage (minimum)	24 VDC 21.4 VDC 125 VDC 95.0 VDC 120 VAC 85.0 VAC

GLOSSARY (continued)

SPECIFICATIONS (continued)

DIGITAL INPUTS (continued)		
Turn-off Voltage (maximum)	24 VDC 125 VDC 120 VAC	12 VDC 60 VDC 42 VAC
Maximum Input Current at Minimum Turn-on	24 VDC 125 VDC 120 VAC	3 mA @ 21.4 VDC 3 mA @ 95.0 VDC 5 mA @ 85.0 VAC 60 Hz
Off Leakage Current (maximum)	24 VDC 125 VDC 120 VAC	10 uA (@ Vin ≤ 12 VDC) 10 uA (@ Vin ≤ 60 VDC) 1.6 mA (@ Vin ≤ 42 VAC 60 Hz)
DC Response Time	DC 'Fast' - 1.5 ms DC 'Slow' - 17 ms	
ISOLATION		
300 volts rms between input and logic circuitry and input to input. CSA approved for 300 volts isolation.		
COMMUNICATION INTERFACE		
Passive contact input interface read by the Multi-Function Processor or Logic Master Module via slave expander bus.		
MOUNTING		
Occupies one slot in a standard Infi 90 Module Mounting Unit.		
ENVIRONMENTAL		
Ambient Temperature	0^{o} to 70^{o}C (32^{o} to 158^{o}F)	
Relative Humidity	0 to 95% up to 55^{o}C (131^{o}F) (non-condensing) 0 to 45% at 70^{o}C (158^{o}F) (non-condensing)	
Atmospheric Pressure	Sea level to 3 km (1.86 miles)	
Air Quality	Non-corrosive	
CERTIFICATION		
CSA certified for use as process control equipment in an ordinary (non-hazardous) location.		

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

SECTION 2 - DESCRIPTION AND OPERATION

INTRODUCTION

This section explains the inputs and input circuitry, control logic, logic power and connections for the Digital Slave Input (DSI) module. The DSI is a digital input interface to a Multi-Function Processor (MFP), Multi-Function Controller (MFC), or Logic Master Module (LMM). These master modules provide the control functions. A master module communicates with its slave modules on a 12-line slave expander bus as shown in Figure 1-1. Each slave on the slave expander bus has a unique address set by its slave address dipswitch (S1) (see Figure 2-1).

INPUTS

Digital field inputs are voltages of 24 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 has two possible propagation (speed) choices for DC inputs to allow for contact debounce time: a slow setting (17 millisecond response time) and a fast setting (1.5 millisecond response time). Jumpers on the DSI select the voltage level and response time for each input. Section 3 explains 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, 125 VDC or 120 VAC) set by the jumpers. They are not isolated from each other, but are isolated from the module circuits.

Input Circuits

Figure 2-1 shows the DSI in block diagram form to illustrate signal flow through the module. The input isolation block consists of current limiters and optocouplers to isolate the sixteen field inputs from the module circuitry. The input circuits provide 300 volts isolation between input and logic circuits, and other input channels, by using PCB trace separation to CSA standards.

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 slave expander bus interface allows the master module to read these bytes.

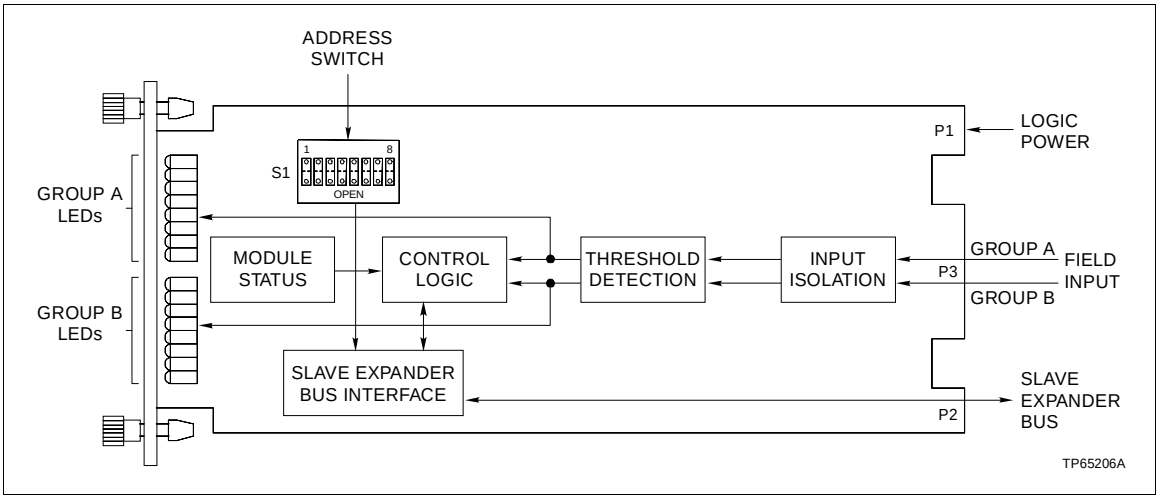


Figure 2-1. Digital Slave Input Module Block Diagram

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. Jumpers on the DSI 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 slave expander bus interface transmits a logic 1 to the master module on the slave 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.

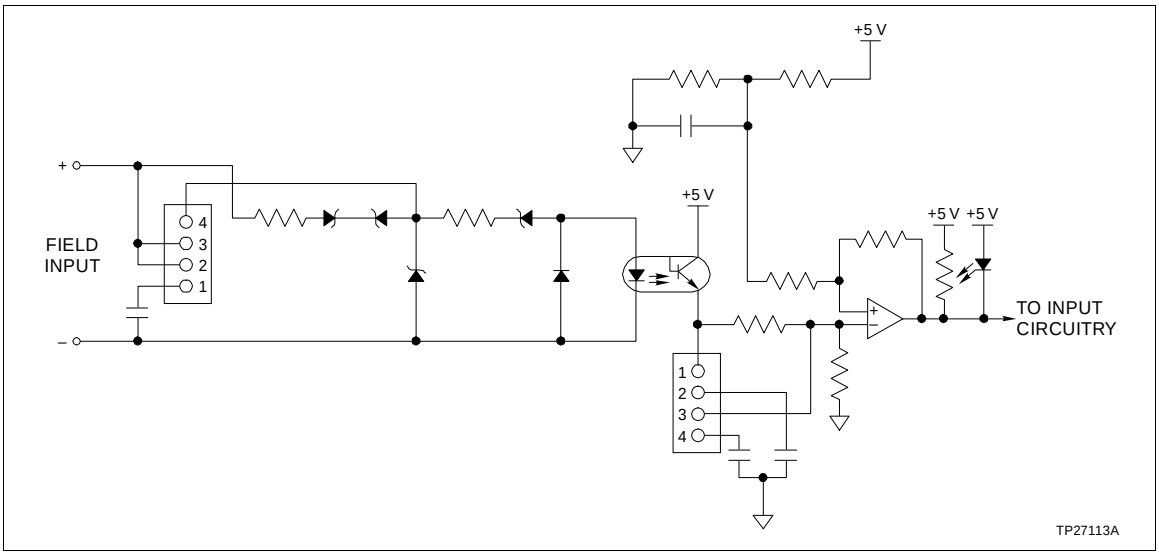


Figure 2-2. IMDSI02 Digital Input Circuit

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 module.

CONTROL LOGIC

Function Code (FC) 84 in the master module configuration accesses the DSI on the slave expander bus. It also allows the master 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 slave expander bus interface (see Figure 2-1). The slave address in FC 84 must be the same as the address set on the slave 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 slave expander bus communication and master module configuration are correct. The master 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) shown in Figure 2-1.

SLAVE EXPANDER BUS

The Infi 90 slave expander bus is a high speed synchronous parallel bus. It provides a communication path between master modules and slave modules. The master module provides the control functions and the DSI module provides input to the master module. The P2 card edge connector of the DSI and master module connect to the bus.

The slave expander bus is twelve 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 master and slave modules. Cable assemblies can extend the bus to six MMUs.

A master module and its slaves form an individual subsystem within a Process Control Unit (PCU). The slave expander bus between master/slave subsystems must be separated. Leaving a dipshunt socket empty or not connecting the MMUs with cables separates them.

UNIVERSAL SLAVE EXPANDER BUS INTERFACE

The DSI uses a custom gate array to perform the slave 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 what you must do before you put the Digital Slave Input module (IMDSI02) into operation. ***DO NOT PROCEED*** with operation until you read, understand and do the steps in the order in which they appear.

NOTE: Refer to Product Instruction I-E93-911 for termination device wiring instructions.

SPECIAL HANDLING

NOTE: Always use Bailey's Field Static Kit (P/N 1948385A2 - consists of wrist strap, ground cord assembly, alligator clip) when working with modules. The kit is designed to connect a technician and the static dissipative work surface to the same ground point to prevent damage to the modules by electrostatic discharge.

The Digital Slave Input (DSI) module uses electrostatic sensitive devices. Follow Steps 1 through 4 when handling:

1. Keep the module in its special anti-static bag until you are ready to install it in the system. Save the bag for future use.

2. Ground the anti-static bag before opening.

3. Verify that all devices connected to the module are properly grounded before using them.

4. Avoid touching the circuitry when handling the module.

UNPACKING AND INSPECTION

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

2. Notify the nearest Bailey Controls Sales Office of any such damage.

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

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

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

SETUP/PHYSICAL INSTALLATION

Prior to installation, you must set the address of the DSI and install jumpers to configure the digital inputs. You must configure the Termination Unit (TU) or Termination Module (TM) to accept the field device signals.

Slave Address Selection Switch (S1)

The DSI can have one of 64 addresses (address 0 to 63) on the slave expander bus. This address uniquely identifies the slave to the master module and must be the same as the address set in the master module configuration (Function Code 84 specification 1).

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 (see Figure 3-2). Table 3-1 is a binary address conversion table for setting S1.

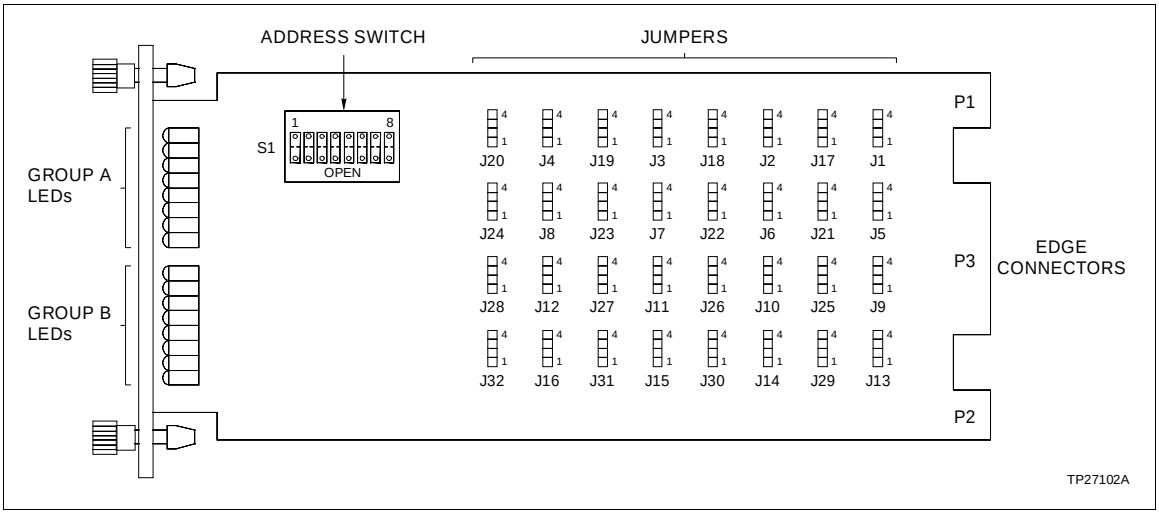


Figure 3-1. Digital Slave Input Module

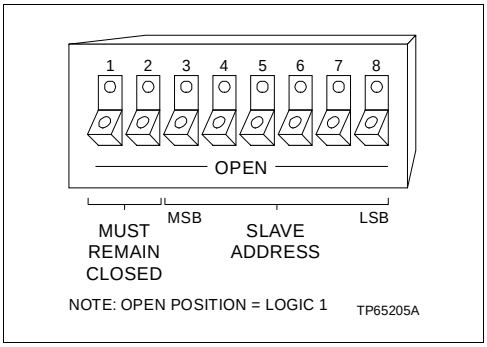


Figure 3-2. Address Select Switch (S1)

Table 3-1. Address Switch Settings (S1)

Addr	MSB					LSB	Addr	MSB					LSB
	3	4	5	6	7	8		3	4	5	6	7	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

Digital Input Jumper Settings

Jumpers J-1 through J-16 set the input voltage levels and jumpers J-17 through J-32 set the DC voltage response time (speed). The DC inputs have two propagation (speed) choices to allow for debounce time: a slow setting (17 millisecond response time) or fast setting (1.5 millisecond response time). There are four terminals at each jumper location. Refer to Tables 3-2 and 3-3 to determine the jumper settings for your application; place a jumper across the pins shown in the table. Figure 3-1 shows the location of the jumpers on the IMDSI02.

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, 125 VDC or 120 VAC) set by the jumpers.

A special application of the DSI is with the sequence of events Function Code (FC 99). You may need to remove jumpers J17 to J32 (DC inputs only) for this application. Removing the jumpers disables **ALL** DSI hardware noise filtering. It may be necessary to take special precautions to eliminate input signal noise.

Table 3-2. Digital Input Voltage and Response Time Jumpers

Group A			Group B		
Input	Voltage Jumper (J)	Speed Jumper (J)	Input	Voltage Jumper (J)	Speed Jumper (J)
1	1	17	1	9	25
2	2	18	2	10	26
3	3	19	3	11	27
4	4	20	4	12	28
5	5	21	5	13	29
6	6	22	6	14	30
7	7	23	7	15	31
8	8	24	8	16	32

Table 3-3. Jumper Settings

Voltage	J1 - J16	J17 - J32
120 VAC	1-2	1-2
125 VDC Slow	2-3	2-3
125 VDC Fast	2-3	3-4
24 VDC Slow	3-4	2-3
24 VDC Fast	3-4	3-4

Termination Unit/Module Configuration

A TU/TM connects the field device wiring to the Infi 90 system. The terminal blocks (connection points) are located on the TU/TM.

You must configure the TU/TM to accept the digital field inputs sent to the DSI module. Refer to the appendices to determine the configuration for your application.

Physical Installation

NOTE: Section 3 provides instructions pertaining to the physical installation of the slave only. For complete cable and TU/TM information, refer to Termination Unit Manual I-E93-911.

The DSI module inserts into a standard Infi 90 Module Mounting Unit (MMU) and occupies one slot. To install:

1. Verify the slot assignment of the module.

WARNING	**Disconnect power before installing dipshunts for slave modules on the MMU backplane (slave expander bus). Failure to do so could result in severe or fatal shock.**
AVERTISSEMENT	**Couper l'alimentation avant d'installer les dipshunts sur la plaque arriere du chassis de montage de modules (MMU). Toute negligence a cet egard constitue un risque de choc pouvant entrainer des blessures graves, voire moretiles.**

2. Verify that a dipshunt is in the slave expander bus socket on the MMU backplane between the slave and master module.

3. Connect the hooded end of the termination cable from the TU/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 slave module. The latches should snap securely into place.

4. Align the module with the plastic 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.

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. (To remove the module, turn the module retaining screws to the unlatched position and gently slide out).

WIRING CONNECTIONS AND CABLING

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

Wiring

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

> **NOTE:** You must install a dipshunt on the back plane of the MMU to connect the slave expander bus between the slave module and master module. Locate the modules so the bus can connect the modules or they will not communicate.

Cable Connections

The IMDSI02 uses either a NTDI01 or NIDI01 for termination. See Figure 3-3 to determine the cables to use with the TU/TM you are using.

FUSING

The DSI does not have any on board fusing requirements.

PRE-OPERATING ADJUSTMENTS

You do not have to make any adjustments to the DSI prior to operating.

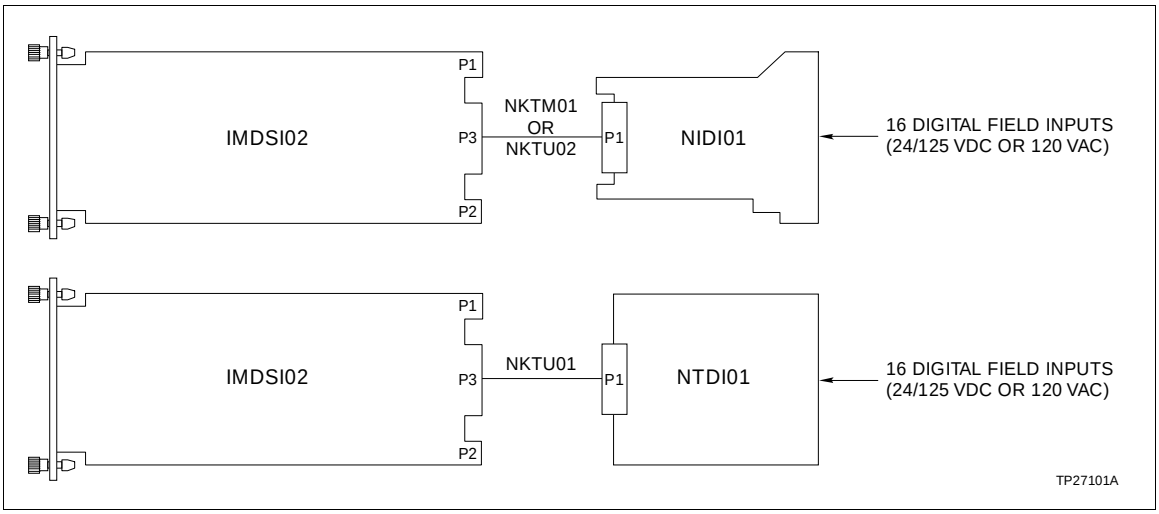


Figure 3-3. IMDSI02 Cable Connections and Termination

SECTION 4 - OPERATING PROCEDURES

INTRODUCTION

This section explains the front panel indicators and start-up procedures for the Digital Slave Input module (IMDSI02).

INDICATORS

The Digital Slave Input (DSI) module has point (input) status LED indicators on the front panel to aid in system test and diagnosis. There are sixteen 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 master module controls the startup of the DSI module; it is fully automatic. Function Code (FC) 84 in the master module configuration enables the DSI. Specification 1 (FC 84) is the slave module address. It must be the same as the address set on the address dipswitch (S1).

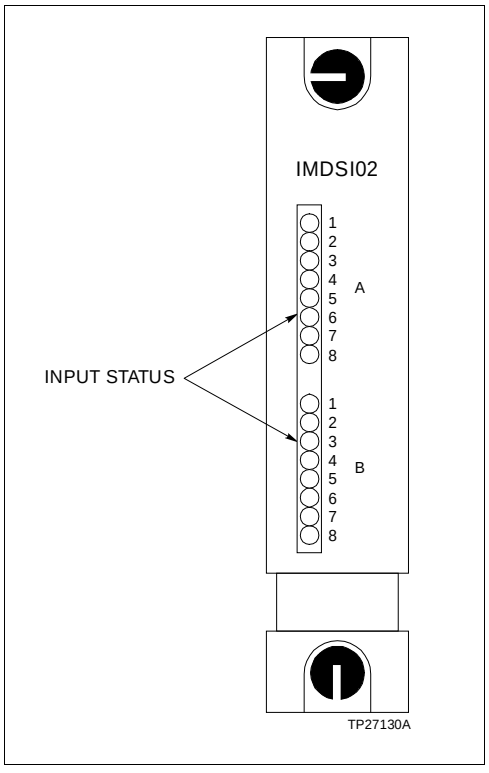


Figure 4-1. IMDSI02 Front Panel

SECTION 5 - TROUBLESHOOTING

INTRODUCTION

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

ERROR INDICATIONS AND CORRECTIVE ACTION

You can obtain the status of the DSI by checking the master module for good quality on its input blocks. Use any Infi 90 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 master module for bad quality on its input blocks.

MASTER MODULE ERRORS

The address set on address switch (S1) and in the master module configuration must be the same. The master module generates a MISSING SLAVE MODULE error if they do not match. Verify that the address set on S1 is the same as the address in Function Code (FC) 84 specification 1. If not:

1. Remove the module and change the setting of S1 to correspond with the module configuration (refer to Section 3 for the procedures to set an address and to install a slave module)

OR

2. Modify the address in the module configuration (FC 84 specification 1) to correspond with the address set on S1. Use an Infi 90 operator interface to modify the configuration (for procedures on how to modify a function code specification, refer to the Product Instruction for the operator interface you are using).

WARNING	**Disconnect power before installing dipshunts for slave modules on the MMU backplane (slave expander bus). Failure to do so could result in severe or fatal shock.**
AVERTISSEMENT	**Couper l'alimentation avant d'installer les dipshunts sur la plaque arriere du chassis de montage de modules (MMU). Toute negligence a cet egard constitue un risque de choc pouvant entrainer des blessures graves, voire moretiles.**

The master module generates a MISSING SLAVE MODULE error if the slave expander bus is not connected between the slave module and the master module. Verify the bus connection on the MMU back plane.

> **NOTE:** If FC 84 specification 3 is set to 0, the master module will trip when the DSI module fails. Changing specification 3 to a 1 will allow the master module to continue to operate when a slave fails.

If you determine the slave module is faulty, replace it with a new one. Refer to Section 7 for procedures to replace a DSI module.

MODULE PIN CONNECTIONS

The slave 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
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

[1] Shared Pins (Inputs 7 and 8)

SECTION 6 - MAINTENANCE

INTRODUCTION

The Digital Slave Input (DSI) module requires limited maintenance. This section contains a maintenance schedule.

MAINTENANCE SCHEDULE

Perform the tasks in Table 6-1 at the specified intervals.

Table 6-1. Maintenance Schedule

Task	Interval
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: Modules Module Mounting Unit Fan Assembly Power Entry Panel	Every 6 months or during plant shutdown, whichever occurs first

SECTION 7 - REPAIR/REPLACEMENT PROCEDURES

INTRODUCTION

This section explains the replacement procedures for a Digital Slave 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. Ensure they are set the same as the original module.

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

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

Bailey Controls is ready to help in the use, application and repair of its products. Contact your 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 Bailey 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.

When you order standard parts from Bailey Controls, use part numbers and descriptions from the Recommended Spare Parts Lists. You must order parts without commercial descriptions from the nearest Bailey Controls sales office.

TRAINING

Bailey Controls has a modern training facility that provides service and repair instruction. This facility is available for in-plant training of your personnel. Contact a Bailey Controls sales office for specific information and scheduling.

TECHNICAL DOCUMENTATION

You can obtain additional copies of this manual from the nearest Bailey sales office at a reasonable charge.

APPENDIX A - TERMINATION UNIT (NTDI01) CONFIGURATION

INTRODUCTION

The IMDSI02 uses a NTDI01 for termination. Dipshunts on the Termination Unit (NTDI01) configure the digital inputs. The Digital Slave Input (DSI) module accepts inputs of 24 VDC, 125 VDC and 120 VAC.

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.

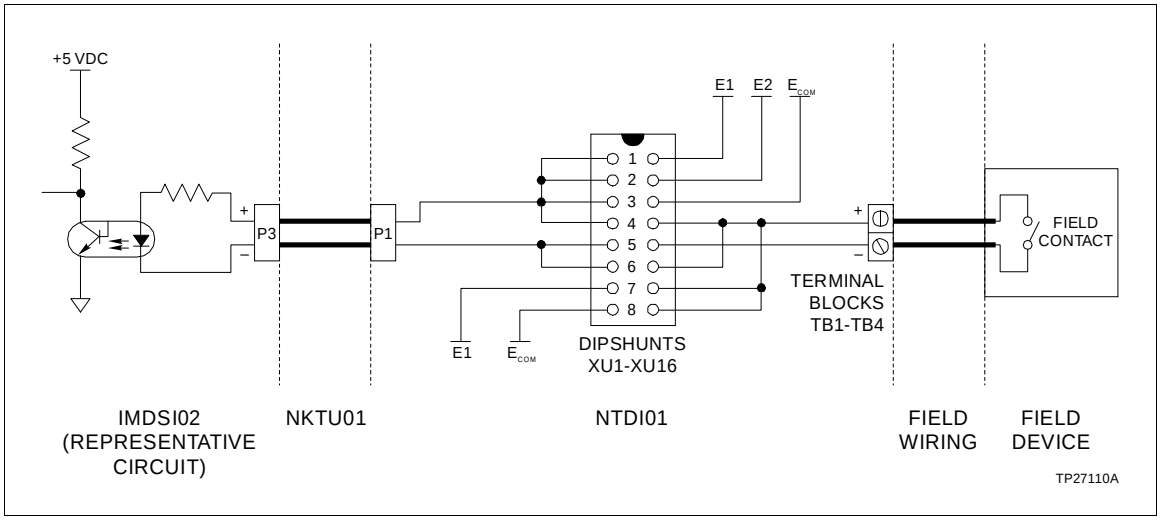
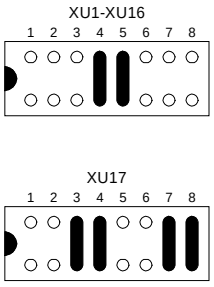
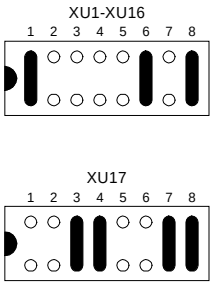
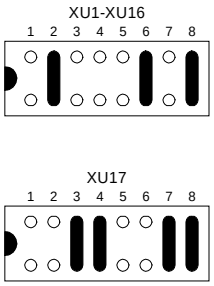


Figure A-1. NTDI01 Dipshunt

Table A-1. NTDI01 Dipshunt Configuration

Application/Signal Type	Dipshunt Configuration
Field powered contact	
System powered from E1, 24 VDC, 125 VDC, 120 VAC	
System powered from E2, 24 VDC, 125 VDC, 120 VAC	

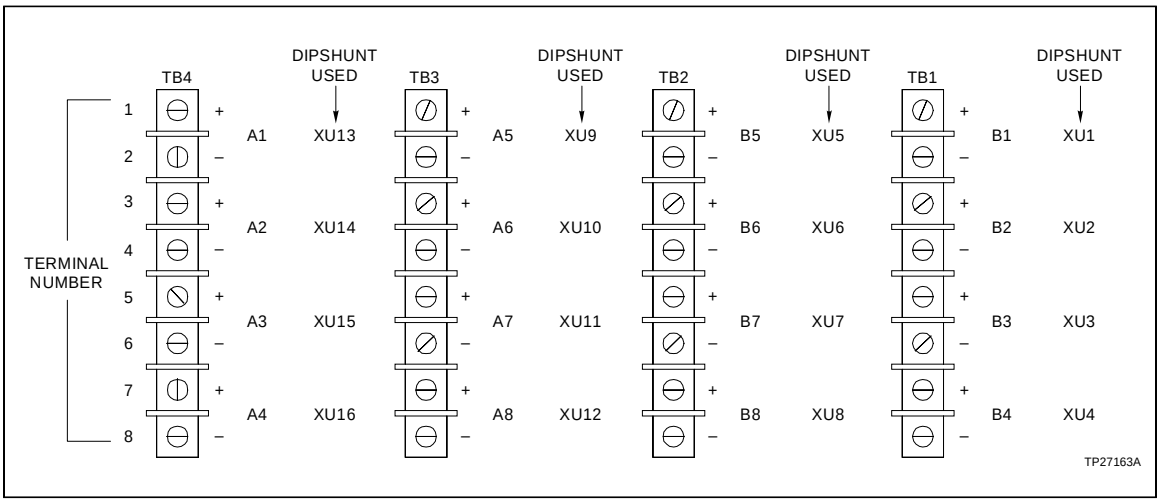


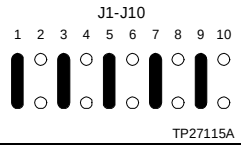
Figure A-2. NTDI01 Terminal Assignments

APPENDIX B - TERMINATION MODULE (NIDI01) CONFIGURATION

INTRODUCTION

The IMDSI02 uses a NIDI01 for termination. Jumpers on the Termination Module (NIDI01) configure the digital inputs. The Digital Slave Input (DSI) module accepts inputs of 24 VDC, 125 VDC and 120 VAC. 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, 125 VDC, 120 VAC	

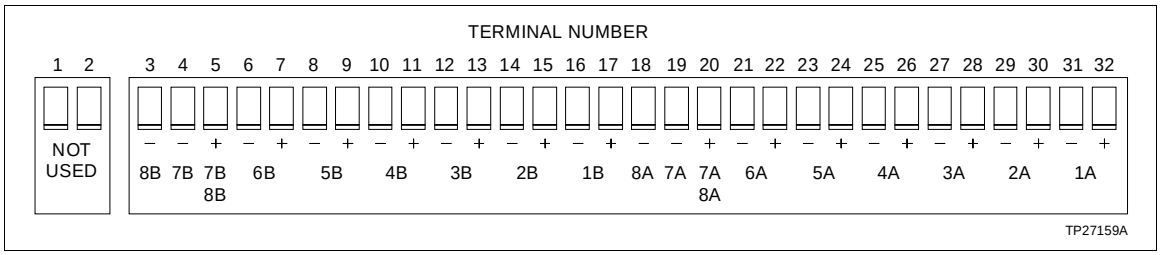


Figure B-1. NIDI01 Terminal Assignments

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