Digital Link Accessories
Hardware Manual

Version 1.0

Catalog No. M.3000.0343

Part No. M.3000.0834

**IND. CONT. EQ.
89X2**

Keep all product manuals as a product component during the life span of the product.
Pass all product manuals to future users/owners of the product.

KOLLMORGEN

Because Motion Matters™

Record of Revisions

Edition	Valid for	Description
08/2010	PiCPro V18.0	Slice I/O Release

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Should information not covered in this document be required, contact the Customer Service Department, Kollmorgen, 672 South Military Road, P.O. Box 1960, Fond du Lac, WI 54936-1960. Kollmorgen can be reached by telephone at (920) 921-7100 or (800) 558-4808 in the United States or by e-mail at glmotion.support@kollmorgen.com.

Table of Contents

1   Introduction to Digital Link Accessories

1.1   Overview

This manual covers all products that reside on the Digital Link communication network, but that are neither Controls nor Drives.

1.2   Contents of This Manual

This manual includes the following major topics:

- Information to safely operate and maintain the equipment in a safe manner.
- User responsibilities for product acceptance and storage.
- Power and environmental information for general power, control cabinet, grounding, heat control and handling.
- Procedures for mounting, wiring, and connecting the Accessories to the control system.
- Recommended system wiring guidelines for signal separation, differential devices, and to ensure ElectroMagnetic Compatibility.
- The location of connectors on the Accessory and descriptions of their functionality.
- Physical, electrical, environmental and functional specifications/dimensions.
- Description of the minimal maintenance necessary.
- A troubleshooting chart of potential problems and possible solutions.
- Part numbers and descriptions for the drive and related equipment.

1.3   Software and Manuals

1.3.1   Required Software and Manuals

PiCPro (one of the following)

- Professional Edition
- MMC Limited Edition
- Monitor Edition (Diagnostics Only)

1.3.2   Suggested Manuals

- MMC smart Drive and Digital MMC Control Hardware Manual
- Standalone MMC Hardware Manual
- Function/Function Block Reference Guide
- Motion Application Specific Function Block Manual
- Ethernet Application Specific Function Block Manual
- General Purpose Application Specific Function Block Manual

1.4   Kollmorgen Support Contact

Contact your local Kollmorgen representative for:

- Sales and order support
- Product technical training
- Warranty support
- Support service agreements

Kollmorgen Technical Support can be reached:

- In the United States, telephone (800) 558-4808
- Outside the United States, telephone (920) 921-7100
- E-mail address: glmotion.support@kollmorgen.com
- Web site: www.glcontrols.com

2   Safety Precautions

READ AND UNDERSTAND THIS SECTION IN ITS ENTIRETY BEFORE UNDERTAKING INSTALLATION OR ADJUSTMENT OF THE MMC SMART DRIVE AND ANY ASSOCIATED SYSTEMS OR EQUIPMENT

The instructions contained in this section will help users to operate and maintain the equipment in a safe manner.

PLEASE REMEMBER THAT SAFETY IS EVERYONE'S RESPONSIBILITY

2.1   System Safety

The basic rules of safety set forth in this section are intended as a guide for the safe operation of equipment. This general safety information, along with explicit service, maintenance and operational materials, make up the complete instruction set. All personnel who operate, service or are involved with this equipment in any way should become totally familiar with this information prior to operating.

2.1.1   User Responsibility

It is the responsibility of the user to ensure that the procedures set forth here are followed and, should any major deviation or change in use from the original specifications be required, appropriate procedures should be established for the continued safe operation of the system. It is strongly recommended that you contact your OEM to ensure that the system can be safely converted for its new use and continue to operate in a safe manner.

2.1.2   Safety Instructions

- Do not operate your equipment with safety devices bypassed or covers removed.
- Only qualified personnel should operate the equipment.
- Never perform service or maintenance while automatic control sequences are in operation.
- To avoid shock or serious injury, only qualified personnel should perform mainte- nance on the system.

<table>
<tr><td colspan="2" align="center">**ATTENTION**</td></tr>
<tr><td>⚠</td><td>Do not touch the main power supply fuses or any components internal to the power modules while the main power supply switch is ON. Note that when the main power switch is OFF, the incoming supply cable may be live.</td></tr>
</table>

- **GROUNDING (Protective Earth)**

The equipment must be grounded (connected to the protective earth connection) according to OEM recommendations and to the latest local regulations for electrical safety. The grounding (protective earth) conductor must not be interrupted inside or outside the equipment enclosures. The wire used for equipment grounding (connection to protective earth) should be green with a yellow stripe.

2.2   Safety Signs

The purpose of a system of safety signs is to draw attention to objects and situations which could affect personal or plant safety. It should be noted that the use of safety signs does not replace the need for appropriate accident prevention measures. Always read and follow the instructions based upon the level of hazard or potential danger.

2.3   Warning Labels

Hazard warning
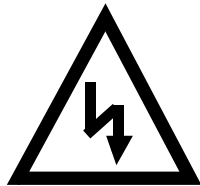
Danger Electric
Shock Risk

When you see this safety sign on a system, it gives a warning of a hazard or possibility of a hazard existing. The type of warning is given by the pictorial representation on the sign plus text if used.

To ignore such a caution could lead to severe injury or death arising from an unsafe practice.

Danger, Warning, or Caution warning

Symbol plus DANGER, WARNING or CAUTION:
These notices provide information intended to prevent potential
personal injury and equipment damage.

Hot Surface warning

Symbol plus HOT SURFACE:
These notices provide information intended to prevent potential
personal injury.

2.4   Safety First

Kollmorgen equipment is designed and manufactured with consideration and care to
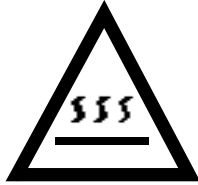generally accepted safety standards. However, the proper and safe performance of
the equipment depends upon the use of sound and prudent operating, maintenance
and servicing procedures by trained personnel under adequate supervision.

For your protection, and the protection of others, learn and always follow these safety
rules. Observe warnings on machines and act accordingly. Form safe working habits
by reading the rules and abiding by them. Keep these safety rules handy and review
them from time to time to refresh your understanding of them.

2.5   Safety Inspection

2.5.1   Before Starting System

- Ensure that all guards and safety devices are installed and operative and all doors
  which carry warning labels are closed and locked.

- Ensure that all personnel are clear of those areas indicated as potentially hazard-
  ous.

- Remove (from the operating zone) any materials, tools or other objects that could
  cause injury to personnel or damage the system.

- Make sure that the control system is in an operational condition.

- Make certain that all indicating lights, horns, pressure gauges or other safety
  devices or indicators are in working order.

2.6   After Shutdown

Make certain all controlled equipment in the plant is safe and the associated electrical,
pneumatic or hydraulic power is turned off. It is permissible for the control equipment
contained in enclosures to remain energized provided this does not conflict with the
safety instructions found in this section.

2.7 Operating Safely

- Do not operate the control system until you read and understand the operating instructions and become thoroughly familiar with the system and the controls.

- Never operate the control system while a safety device or guard is removed or disconnected

- Where access to the control system is permitted for manual operation, only those doors which provide that access should be unlocked. They should be locked immediately after the particular operation is completed.

- Never remove warnings that are displayed on the equipment. Torn or worn labels should be replaced.

- Do not start the control system until all personnel in the area have been warned.

- Never sit or stand on anything that might cause you to fall onto the control equipment or its peripheral equipment.

- Horseplay around the control system and its associated equipment is dangerous and should be prohibited.

ATTENTION
⚠   Know the emergency stop procedures for the system.
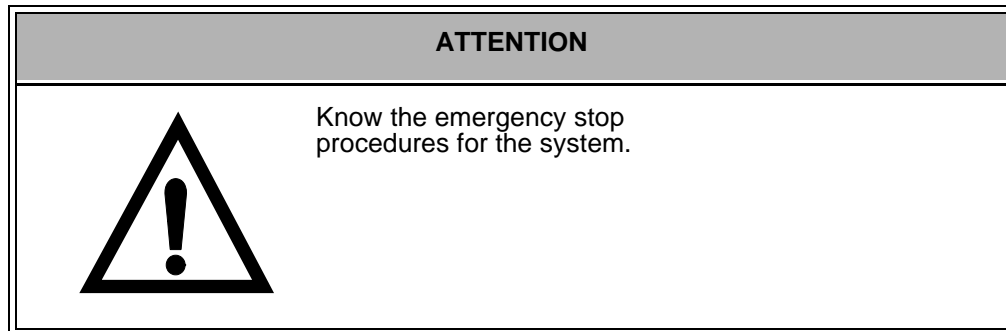
- Never operate the equipment outside specification limits.

- Keep alert and observe indicator lights, system messages and warnings that are displayed on the system.

- Do not operate faulty or damaged equipment. Make certain proper service and maintenance procedures have been performed.

2.8 Electrical Service & Maintenance Safety

- **ALL ELECTRICAL OR ELECTRONIC MAINTENANCE AND SERVICE SHOULD BE PERFORMED BY TRAINED AND AUTHORIZED PERSONNEL ONLY.**

- It should be assumed at all times that the POWER is ON and all conditions treated as live. This practice assures a cautious approach which may prevent accident or injury.

- To remove power:
  LOCK THE SUPPLY CIRCUIT DISCONNECTING MEANS IN THE OPEN POSITION.
  APPLY LOCKOUT/TAGOUT DEVICES IN ACCORDANCE WITH A DOCUMENTED AND ESTABLISHED POLICY.

- Make sure the circuit is safe by using the proper test equipment. Check test equipment regularly.

- There may be circumstances where troubleshooting on live equipment is required. Under such conditions, special precautions must be taken:

    - Make sure your tools and body are clear of the areas of equipment which may be live.

    - Extra safety measures should be taken in damp areas.

    - Be alert and avoid any outside distractions.

    - Make certain another qualified person is in attendance.

- Before applying power to any equipment, make certain that all personnel are clear of associated equipment.

- Control panel doors should be unlocked only when checking out electrical equipment or wiring. On completion, close and lock panel doors.

- All covers on junction panels should be fastened closed before leaving any job.

- Never operate any controls while others are performing maintenance on the system.

- Do not bypass a safety device.

- Always use the proper tool for the job.

- Replace the main supply fuses only when electrical power is OFF (locked out).

2.9   Safe Cleaning Practices

- Do not use toxic or flammable solvents to clean control system hardware.

- Turn off electrical power (lock out) before cleaning control system assemblies.

- Keep electrical panel covers closed and power off when cleaning an enclosure.

- Always clean up spills around the equipment immediately after they occur.

- Never attempt to clean a control system while it is operating.

- Never use water to clean control equipment unless you are certain that the equipment has been certified as sealed against water ingress. Water is a very good conductor of electricity and the single largest cause of death by electrocution.

3 Slice I/O

3.1 Introduction

This section contains information on Kollmorgen's Slice I/O System of I/O modules. The Slice I/O System allows the user to integrate a variety of Slice I/O modules with any MMC Digital Control via the Digital Link communication interface. Information on Kollmorgen's line of Digital Controls can be found in the Standalone MMC Hardware Manual, and the MMC Smart Drive and Digital Control Hardware Manual.

3.2 Features

The Slice I/O System provides the following features:

- DIN rail mounting

- Removal Terminal Blocks, which allow the user to replace a Module without unwiring/rewiring the Module

- Individual Module replacement. Any Module can be replaced without the need to remove any other Module

- The Slice I/O Coupler, which:

    - Provides the interface between the Digital Link communications network and the Slice I/O Modules

    - Provides 16 fast inputs (24Vdc), and 16 fast outputs (24Vdc)

- Slice I/O Modules, that provide I/O between the Digital Control and the machine. Slice I/O Modules include the following:

    - Digital Input Modules (5Vdc, 12Vdc, 24Vdc, 48Vdc, 110Vac, and 220Vac)

    - Digital Output Modules (5Vdc, 24Vdc, 120Vdc, and Relay Out)

    - Analog Input Modules (0-20ma, 4-20ma, 0-10Vdc, +/-10Vdc)

    - Analog Output Modules (0-20ma, 0-1,000ma, 0-5Vdc, 0-10Vdc, +/-10Vdc)

    - Power Supply and Distribution Modules

3.3 Overview

Kollmorgen's Slice I/O System offers a low cost, highly modular solution to system I/O requirements. One Slice I/O Coupler can provide up to 144 input points, and 144 output points, depending on the type of Slice I/O Module installed. Furthermore, a Control System containing a Digital Control can contain from 2 to 64 Slice I/O Couplers, depending on the Control type and other Digital Link devices (typically Kollmorgen Smart Drives) that are installed within the system.

Once properly installed, Slice I/O Input Modules provide machine data to the Application Program, and Slice I/O Output Modules provide machine control from the Application Program. The Application Program is developed using Kollmorgen's PiCPro integrated Application Development Environment.

3.4 Slice I/O Coupler Major Components

The Slice I/O Coupler contains the Digital Link "IN" and "OUT" ports, Digital Link node address switches, 16 fast DC Inputs, 16 fast DC Outputs, and an interface for adding Slice I/O Modules to the Coupler. The major components of the Slice I/O Coupler are shown in .

Figure 3-1: Slice I/O Coupler

Digital Link Status

Slice I/O Bus Status

Digital Link "IN"

Digital Link "OUT"
System Power (24V Com)

System Power (+24Vdc)

DL Node Address "10s"

Chassis Ground
DL Node Address "1s"

Field Power (24V Com)

Filed Power (+24Vdc)

Slice I/O Modules
can be added here

Power Input Connector

16 Fast DC Inputs

16 Fast DC Outputs
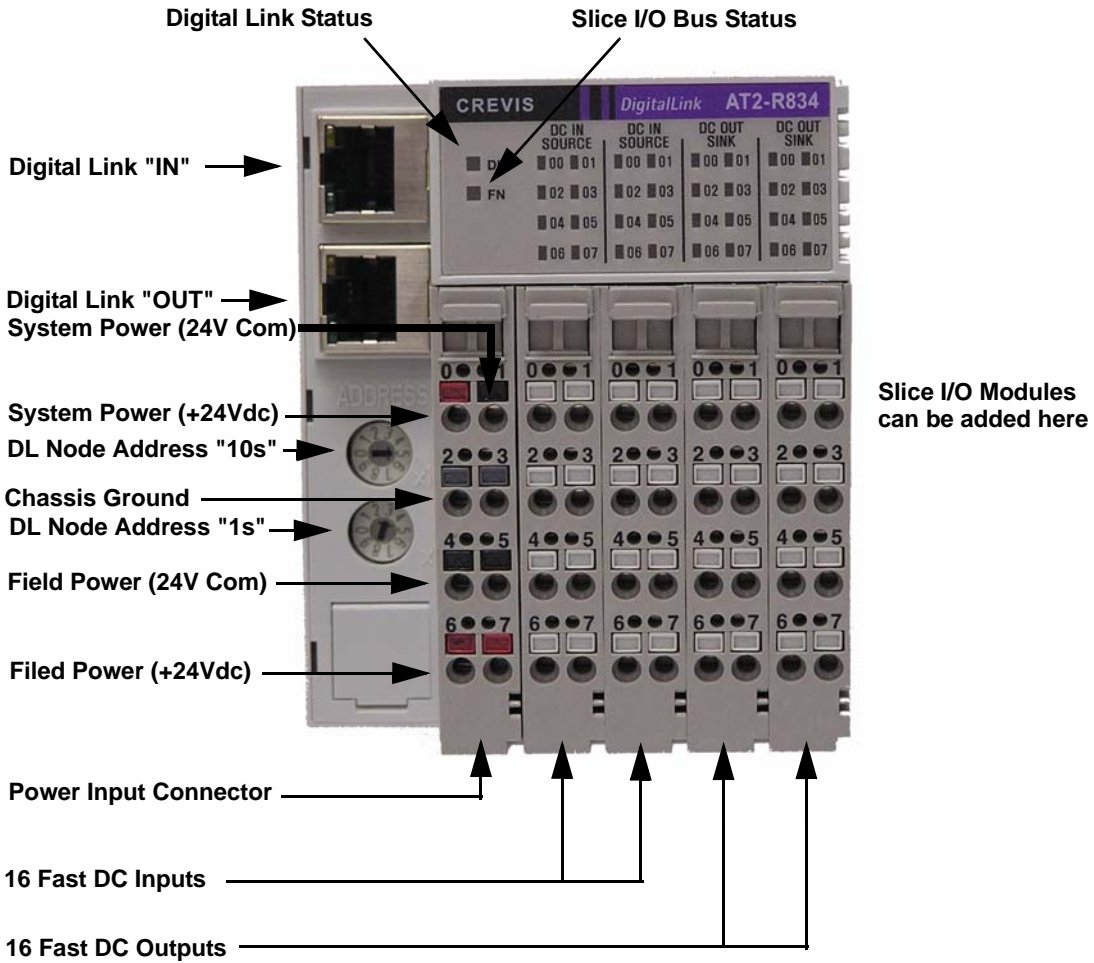
3.5   Power Supply Requirements

Power to the Slice I/O Coupler is provided by the user via the Input Power Connector, located on the far left of the Coupler as shown in .

The Slice I/O System contains two separate and distinct Power Systems. These Power Systems provide the System Power and the Field Power to the Coupler and Slice I/O modules. Each Power System is described below.

3.5.1   System Power

24Vdc (nominal) is provided by the user, and the Slice I/O Coupler converts this to 5Vdc to provide System Power. This 5Vdc supplies the power for the components within the Coupler and the attached Slice I/O modules.

The Coupler can provide a maximum of 1A of 5Vdc power to the attached Slice I/O modules. If the System Power of the attached Slice I/O modules exceeds 1A, an Expansion Power Supply Module (P/N ST-7111) must be installed to provide addition System Power. Refer to the ST-7111 Data Sheet for additional information.

To determine the system System Power requirements, refer to the Data Sheets for all connected Slice I/O Modules for each Module's System Power current usage. The current usage is listed under "Power Dissipation" in the "General Specifications" section in the Data Sheets.

3.5.2   Field Power

24Vdc (nominal) is provided by the user to the Slice I/O Coupler, and the Coupler uses this to power the 16 Fast Inputs and 16 Fast Outputs provided by the Coupler. This 24Vdc is also passed through the Coupler to supply Field Power to any connected 24Vdc Slice I/O Modules.

The Coupler can provide a maximum of 10A of 24Vdc power to power the 16 Inputs and 16 Outputs provided by the Coupler plus the Field Power requirements of the attached Slice I/O modules. If the Field Power required exceeds 10A, an Expansion Field Power Distributor Module (P/N ST-7241) must be installed to provide addition Field Power. Refer to the ST-7241 Data Sheet for additional information.

To determine the system Field Power requirements, refer to the Data Sheets for all connected Slice I/O Modules for each Module's Field Power current usage. The current usage is listed under "Field Power - Power Dissipation" in the "General Specifications" section in the Data Sheets. Then, add the current requirements of any loads connected to the Slice I/O outputs.

3.5.3   Non-24Vdc Field Power

Many Slice I/O modules require Field Power other than 24Vdc, such as 5Vdc, 48Vdc, 110Vac, or 220Vac. When switching between Field Power voltages, it is absolutely

necessary to install an Expansion Field Power Distributor (P/N ST-7241) between the Modules. Refer to the ST-7241 Data Sheet for additional information.

WARNING

Failure to read and understand this section can result in damage to the entire Slice I/O System. This damage will not be covered under Kollmorgen's warranty policy.

3.6   Module Installation

The Slice I/O Coupler and Slice I/O Modules are mounted to a DIN Rail that is typically mounted to the user's control panel.

### 3.6.1   DIN Rail Installation

Mount the required length of DIN rail to the panel within the control cabinet. Make sure that the DIN rail makes good electrical connection to the panel, and that the panel is connected to Single Point Ground. When selecting the DIN rail, Kollmorgen has found that the galvanized product exhibits superior performance, especially in the area of noise emission and suppression.

3.6.2   Slice I/O Coupler Installation

Mount the Slice I/O Coupler on the left of the DIN rail as follows:

- Make certain that the release lever found at the bottom of the Coupler is in the release position. Do this by inserting a flat-bladed screw driver into the Release Tab, and pushing the handle of the screw driver towards the top of the Coupler (using the bottom of the Coupler as a pivot point) until the Release Tab locks in the Release (out) position. Please note that twisting the screwdriver blade while it is in the Release Tab will not move the Release Tab into the Release position.

- Position the Coupler over the DIN rail, making sure that the back of the Coupler is tight against the panel that the DIN rail is mounted to.

- Press the Coupler Release Lever up towards the Coupler, until it snaps into the "lock" (in) position.

- Make sure that the plastic End Cover that is included with the Coupler is installed on the right side of the Coupler to protect the Slice I/O contact pins.

Slice I/O Coupler dimensions are shown in .

Figure 3-2: Slice I/O Coupler Dimensions
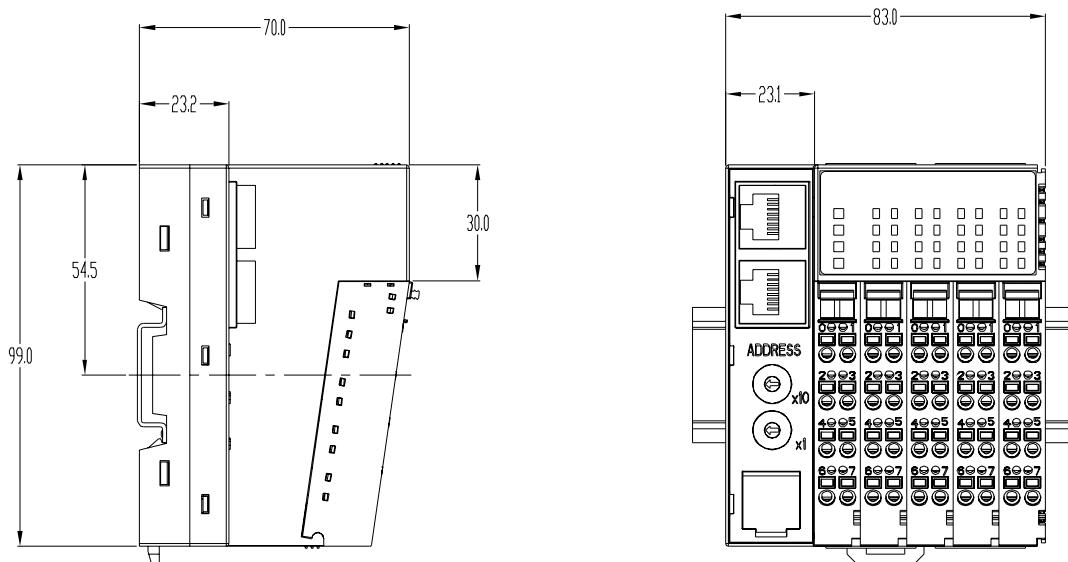
3.6.3   Slice I/O Module Installation

Mount a Slice I/O Module to the right of the Coupler or another Slice I/O Module as follows:

- Remove the End Cover from the right side of the Slice I/O system that the additional Slice I/O Module(s) is being installed on.

- Make certain that the blue release lever found at the bottom of the Module is in the non-release position by rotating the lever towards the bottom of the Module until it is flush with the bottom of the Module.

- Align the plastic guides located at the top and bottom of the Module with the associated slots in the previously mounted Module, and slide the Module down towards the DIN rail

- Press the Module firmly onto the DIN rail until it snaps into place

- Re-install the plastic End Cover that was removed in step one on the right side of the installed Module(s) to protect the Slice I/O contact pins.

3.7   Module Removal

This section describes the steps required to remove the Slice I/O Coupler and a Slice I/O Module from the DIN rail.

3.7.1   Slice I/O Coupler Removal

Perform the following steps to remove a Slice I/O Coupler from the DIN rail:

- If there is a Slice I/O Module attached to the right side of the Coupler, remove it as described in Section 3.7.2 below.

- Locate the Coupler Release Tab located underneath the Coupler

- Insert a flat-bladed screw driver into the Release Tab, and push the handle of the screw driver towards the top of the Coupler (using the bottom of the Coupler as a pivot point) until the Release Tab locks in the Release (out) position. Please note that twisting the screwdriver blade while it is in the Release Tab will not move the Release Tab into the Release position.

- Rock the bottom of the Coupler out of the DIN rail. With the bottom still rocked forward, lift the Coupler straight up and off of the DIN rail.

3.7.2   Slice I/O Module Removal

Perform the following steps to remove a Slice I/O Module from the DIN rail:

- Locate the blue Release Tab at the bottom of the Module.

- Using a flat-bladed screwdriver, rotate the Release Tab down and away from the Module until it stays in the Release position, which is at a right angle to the bottom of the Module.

- Slide the Module away form the DIN rail until it is completely separated from the surrounding Module(s).

3.8   Removable Terminal Block Operation

Connection between Slice I/O Modules and user equipment is made via Removable Terminal Blocks located on each Module. Removable Terminal Blocks allow the replacement of a Module without the need for unwiring/rewiring.

Terminal block Removal:

- Pull the Terminal Block Release Tab, located at the top of the Terminal Block, until the Terminal Block rocks forward and out of the Module.

Terminal Block Insertion:

- Before inserting the Terminal Block into the Module, push the Terminal Block Release Tab, located at the top of the Terminal Block, all the way in to the "lock" position.

- Hook the bottom of the Terminal Block into the Module

- Rock the top of Terminal Block forward until it snaps into the Module

Terminal Block Wiring:

- Use wire up to 14AWG

- Strip .25in (6.35mm) of insulation from the end of the wire

- Using a small flat-bladed screwdriver, depress the Wire Release Tab above the desired terminal

- Insert the previously-strip wire into the terminal hole

- Release the Wire Release Tab

3.9   Slice I/O Coupler Details

This section describes the Slice I/O Coupler, including the LED Indicators, Connectors, and Operation.

3.9.1 LED Indicators

There are 32 LEDs located on the Coupler that indicate the status of the 32 I/O points that are integrated within the Coupler. These LEDs are described in section 3.9.5 on page 24 and section 3.9.6 on page 25.

There two additional LEDs located on the front of the Coupler, as follows:

- The Digital Link Status LED, labeled "DL" on the front of the Coupler as seen in Figure 3-1 on page 14, indicates the status of the communication between the Coupler and the Digital Control. This LED can be in one of three states:

  - Off - the Digital Control running the user's application has not yet initialized the Coupler, or power is not being applied to the Coupler

  - Green - the Coupler is initialized and the user's application is controlling the Coupler. This condition occurs when the Coupler is properly connected to the Digital Control, and the user's application is running (scanning). When the "DL" LED is green, the user's application control's the outputs on the Coupler and all attached Slice I/O Modules.

  - Red - the Coupler is initialized and the user's application is not controlling the Coupler. This condition can occur if the Coupler is disconnected from the Digital Control, or the user's application is stopped (not scanning). When the "DL" LED is red, all outputs on the Coupler and attached Slice I/O Modules are forced off.

- The Slice I/O Communication Link Status LED, labeled "FN" on the front of the Coupler as seen in Figure 3-1 on page 14, indicates the status of the communication between the Coupler and the attached Slice I/O Modules. This LED can be in one of the following three states:

  - Off - The Slice I/O system is not being accessed. All outputs are forced off.

  - Green - The slice I/O system is being properly accessed by the application. Outputs are being controlled by the application, and Inputs are being read by the application.

  - Red - There has been a communication problem between the Slice I/O Coupler and the attached Slice I/O Modules. The outputs on the Coupler continue to be controlled by the user's application, however, the outputs on all attached Slice I/O modules are forced off.

3.9.2 Node Address Rotary Switches)

Two rotary switches are used to set the Digital Link Node address of the Slice I/O Coupler. These are labeled "x10" and "x1" on the front of the Coupler, as seen in Figure 3-1 on page 14. Rotate the switches to the desired address.

Addresses can be set to any number from 1 through 64. The top switch represents values of base ten. The bottom switch represents values of base 1.

As an example, rotating the switch to a setting of 2 on the top switch equals the value of 20 (2 x 10). Rotating the switch on the bottom switch to a setting of 5 equals the value of 5. The actual address setting is 25 (20 + 5).

Address

 x10

 x1
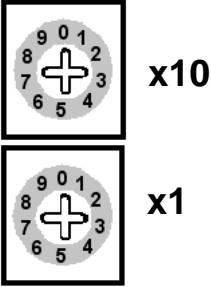
3.9.3   Digital Link Ports

The two 8-pin RJ-45 Digital Link Port connectors, labeled "IN" and "OUT" on the front of the Coupler, (see Figure 3-1 on page 14 for location) provide communications between the Coupler and other Digital Link devices. Each connector is described below:

- Digital Link "IN" Port

Connect the Coupler's Digital Link "IN" port to another Digital Link device's "OUT" port (or the "Digital Link" port if connecting to a Digital Control) using a "straight-through" shielded cable.

In addition, there are two LEDs built into the "IN" port connector, as described below:

- The upper LED will turn yellow to indicate that the Coupler has failed its on-board diagnostics
- The lower LED will turn green to indicate that there is a Digital Link device successfully connected to the "IN" port

- Digital Link "OUT" Port

Connect the Coupler's Digital Link "OUT" port to another Digital Link device's "IN" port using a "straight-through" shielded cable.
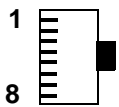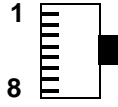
In addition, there is an LED built into the lower portion of the "OUT" port connector, which will turn green that there is a Digital Link device successfully connected to the "OUT" port.

- Pin descriptions for are provided in Table 3-1
- Pin assignments are provided in Table 3-2
- The available Digital Link Port to Digital Drive cables are described in Table 3-3

Table 3-1: Digital Link Port Pin Description			
Digital Link Connector (IN/OUT) Signals		**Pin**	
Function	**Notes**	**"In" Connector**	**"Out" Connector**
Receive Data +	Receives data from connected device.	1	3
Receive Data -	Receives data from connected device.	2	6
Transmit Data +	Transmits data to connected device.	3	1
Transmit Data -	Transmits data to connected device.	6	2
Protective Ground	Provides a path for the ground signal to an external single point ground.	Connector Shell	Connector Shell

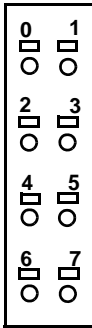| Table 3-2: Digital Link Port Pin Assignments			
Pin	**Label**	**In/Out**	**Connector Pinout**
IN Connector			
1	Receive +	In	
2	Receive -	In	
3	Transmit +	Out	
4	Not Used	N/A	
5	Not Used	N/A	
6	Transmit -	Out	
7	Not Used	N/A	
8	Not Used	N/A	
Connector Shield	Provides a path for the ground signal to an external single point ground.	In	
OUT Connector			
1	Transmit +	Out	
2	Transmit -	Out	
3	Receive +	In	
4	Not Used	N/A	
5	Not Used	N/A	
6	Receive -	In	
7	Not Used	N/A	
8	Not Used	N/A	
Connector Shield	Provides a path for the ground signal to an external single point ground.	In	

RJ-45 Connectors

"DIAG" LED

"IN" LINK LED

IN

1 8 IN

"OUT" LINK LED

OUT

1 8 OUT

Table 3-3: Digital Link Port "IN" to "OUT" Cables				
Part Numbers: .3 M (1.0 ft): M.1302.8285 .6 M (2.0 ft): M.1302.8286 1 M (3.3 ft): M.1302.8287 2 M (6.6 ft): M.1302.8288 3 M (9.8 ft): M.1302.8289 5 M (16.4 ft): M.1302.8300 10 M (32.8 ft): M.1302.8301 15 M (49.2 ft): M.1302.8302 30 M (98.4 ft): M.1302.8303 Cable type: 28 AWG, shielded, twisted pair, 8 conductor.				
8-Pin RJ-45 Plug (to Digital Link Port "OUT", face view) 1 8		8-Pin RJ-45 Plug (to Digital Drive "IN", face view) 1 8		
Pin	**Signal**	**Pin**	**Signal**	**Notes**
1	Transmit Data +	1	Receive Data +	Twisted
2	Transmit Data -	2	Receive Data -	Pair
3	Receive Data +	3	Transmit Data +	Twisted
6	Receive Data -	6	Transmit Data -	Pair
4	None	4	None	Twisted
5	None	5	None	Pair
7	None	7	None	Twisted
8	None	8	None	Pair
Shell	Drain	Shell	Drain	

3.9.4   Power Input Connector

The 8-terminal Power Input Connector is used to bring User-provided System Power and Filed Power to the Slice I/O Coupler and attached Slice I/O Modules. This Removable Terminal Block is located at the left of the Coupler, as seen in Figure 3-1 on page 14.

- Pin descriptions are provided in Table 3-4

- Pin assignments are provided in Table 3-5

Table 3-4: Power Input Connector Pin Descriptions		
Signal Type	Notes	Pins
SYS24V, SYS24COM	24 VDC input that provides System Power.	0,1
FLD24V, FLD24COM	24 VDC input that provides Field Power.	4,5,6,7
GND	Protective Ground. Must be connected to Protective Earth Ground (SPG)	2,3

Table 3-5: Power Input Connector Pin Assignment			
Pin	Signal	In/Out	Connector Pinout
0	System Power 24Vdc	In	8-pin cage-clamp connector (face view)
1	System Power 24Vdc Common	In	
2	Chassis Ground	In	
3	Chassis Ground	In	
4	Field Power 24Vdc Common	In	
5	Field Power 24Vdc Common	In	
6	Field Power 24Vdc	In	
7	Field Power 24Vdc	In	

3.9.5 DC Input Connectors

Two connectors provide user access to the 16 fast DC Inputs provided on the Slice I/O Coupler. The two connectors are identical, and provide access to eight DC Inputs each. These Removable Terminal Blocks are located between the Power Input Connector and the DC Output Connectors, as seen in .

Note that since the tho DC Input connectors are identical, only one is described below.
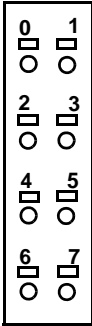
The inputs provided are Sourcing-type. This means that when presented with a "low" signal state (Field Power 24Vdc Common), the input is Active. In addition, each input also has a corresponding Status LED associated with it, located above the Removable Terminal Block

For example, if a simple switch is being monitored by one of these inputs, connect one end of the switch to Field Power 24Vdc Common, and the other end of the switch to the desired input on the Removable Terminal Block. When the switch is open, the

associated Status LED will be off, and the corresponding input bit, as read by the application program, will be low. When the switch is closed, the associated Status LED will be on, and the corresponding input bit, as read by the application program, will be high.

- Pin descriptions are provided in Table 3-6
- Pin assignments are provided in Table 3-7

Table 3-6: DC Input Connector Pin Descriptions		
Signal Type	Notes	Pins
DCIN0 - DCIN7	Sourcing-type 24Vdc (nominal) inputs.	0 - 7

Table 3-7: DC Input Connector Assignment			
Pin	Signal	In/Out	Connector Pinout
0	DC Input 0	In	8-pin cage-clamp connector (face view)
1	DC Input 1	In	
2	DC Input 2	In	
3	DC Input 3	In	
4	DC Input 4	In	
5	DC Input 5	In	
6	DC Input 6	In	
7	DC Input 7	In	

3.9.6   DC Output Connectors

Two connectors provide user access to the 16 fast DC Outputs provided on the Slice I/O Coupler. The two connectors are identical, and provide access to eight DC Outputs each. These Removable Terminal Blocks on the right side of the Coupler, as seen in Figure 3-1 on page 14.
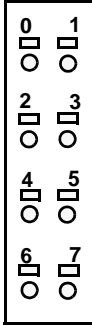
Note that since the tho DC Output connectors are identical, only one is described below.

The Outputs provided are Sinking-type. This means that when Active (written high by the application program), the Output is driven by Field Power 24Vdc Common. In addition, each Output also has a corresponding Status LED associated with it, located above the Removable Terminal Block

For example, if a simple light is being controlled by one of these outputs, connect one end of the light to Field Power 24Vdc, and the other end of the light to the desired output on the Removable Terminal Block. When the light is controlled off by the application program (written low), the associated Status LED will be off, and the light will be off. When the light is controlled on by the application program (written high), the associated Status LED will be on, and the light will be on.

- Pin descriptions are provided in Table 3-8
- Pin assignments are provided in Table 3-9

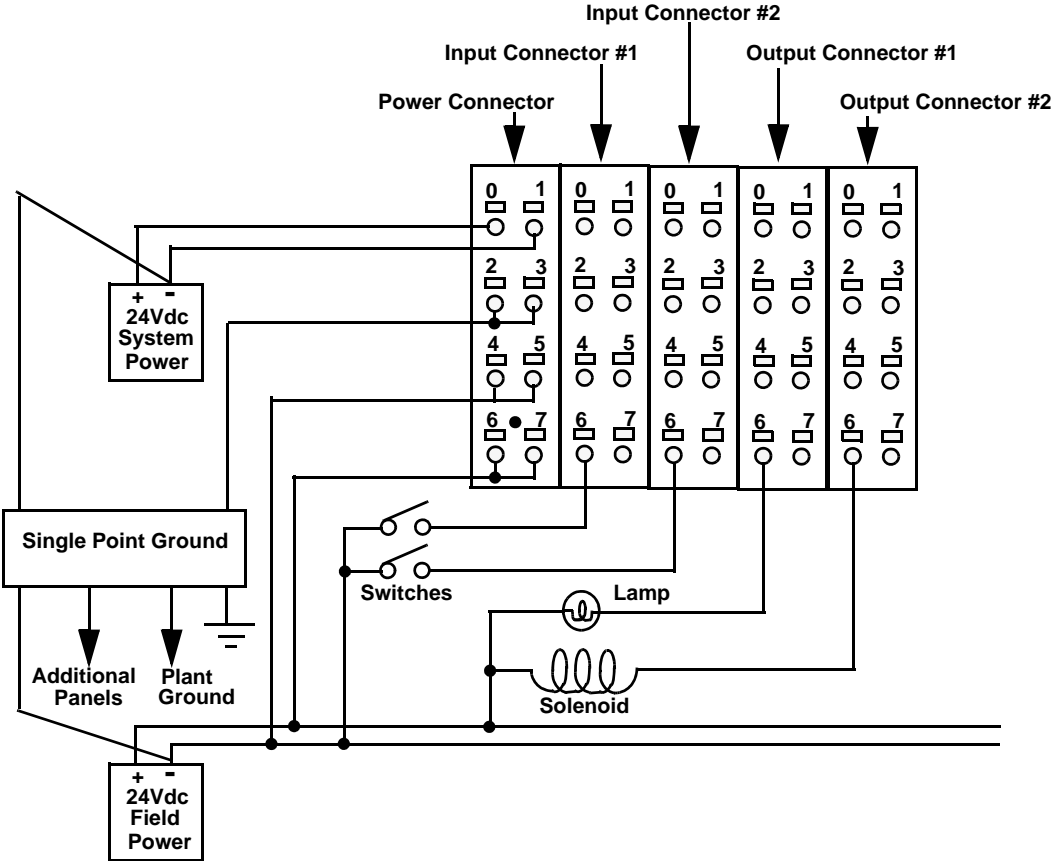| Table 3-8: DC Output Connector Pin Descriptions		
Signal Type	Notes	Pins
DCOUT0 - DCOUT7	Sinking-type 24Vdc (nominal) outputs.	0 - 7

Table 3-9: DC Output Connector Assignment			
Pin	Signal	In/Out	Connector Pinout
0	DC Output 0	In	8-pin cage-clamp connector (face view)
1	DC Output 1	In	
2	DC Output 2	In	
3	DC Output 3	In	
4	DC Output 4	In	
5	DC Output 5	In	
6	DC Output 6	In	
7	DC Output 7	In	

3.9.7 Slice I/O Coupler Wiring Example

Refer to Figure 3-3 on page 27 for an example of typical Slice I/O Wiring.

Figure 3-3: Slice I/O Coupler Wiring Example

Input Connector #2

Input Connector #1

Output Connector #1

Power Connector

Output Connector #2

+ -
24Vdc
System
Power

Single Point Ground

Additional
Panels

Plant
Ground

Switches

Lamp

Solenoid

+ -
24Vdc
Field
Power

3.10 Slice I/O Modules

A wide variety of add-on Slice I/O Modules may be attached to the Slice I/O Coupler, including:

- DC and AC Input Modules
- DC, AC, and Relay Output Modules
- Analog Input Modules
- Analog Output Modules
- Power Supply and Power Distribution Modules

All Slice I/O Modules that will work with the Slice I/O Coupler are listed starting on .

3.10.1 Slice I/O Limitations and Precautions

When adding Slice I/O Modules, the following limitations and precautions must be observed:

- Each Slice I/O Module consumes a defined number of Input bytes and/or Output bytes (8 bits per byte). The Slice I/O Coupler supports a maximum of 16 Input bytes, and 16 Output bytes. The number of Input bytes and/or Output bytes that a particular module consumes is defined in the Module's data sheet.
- There are limitations to the amount of System Power that can be provided by the Slice I/O Coupler. Refer to for details.
- There are limitations to the amount of Field Power that can be provided through the Slice I/O Coupler. Refer to for details.
- Many Slice I/O modules require Field Power other than 24Vdc, such as 5Vdc, 48Vdc, or 110Vac. When switching between Field Power voltages, it is absolutely necessary to install an Expansion Field Power Distributor (P/N ST-7241) between the Modules. Refer to the ST-7241 Data Sheet for additional information.

WARNING
Failure to read and understand this section can result in damage to the entire Slice I/O System. This damage will not be covered under Kollmorgen's warranty policy.

3.10.2 Slice I/O Modules

All available Slice I/O Modules are listed in sections as follows:

- Digital Input Modules are listed in .
- Digital Output Modules are listed in .
- Analog Input Modules are listed in .
- Analog Output Input Modules are listed in .
- Power Modules are listed in .
- Accessory Parts are listed in .

Data sheets for each individual Module can be found at:

http://www.crevis.co.kr/eng/htm/2_f_s_is.htm

Table 3-10: Digital Input Slice I/O Modules	
Part Number	Description
ST-1114	4 Point, Sink, 5Vdc
ST-1124	4 Point, Source, 5VDC
ST-1214	4 Point, Sink, 12V/24VDC
ST-1224	4 Point, Source, 12V/24VDC
ST-1218	8 Point, Sink, 12V/24VDC
ST-1228	8 Point, Source, 12V/24VDC
ST-121F	16 Point, Sink, 12V/24VDC (Does not have Removable Terminal Block)
ST-122F	16 Point, Source, 12V/24VDC (Does not have Removable Terminal Block)
ST-1314	4 Points, Sink, 48VDC
ST-1324	4 Points, Source, 48VDC
ST-1804	4 Points, 110VAC
ST-1904	4 Points, 220VAC

Table 3-11: Digital Output Slice I/O Modules	
Part Number	Description
ST-2114	4 Points, TTL Inverting, 5VDC/20mA
ST-2124	4 Points, TTL Non-Inverting, 5VDC/20mA
ST-2314	4 Points, Sink, 24VDC/0.5A
ST-2324	4 Points, Source, 24VDC/0.5A
ST-2414	4 Points, Sink, 24VDC/0.5A (with Diagnostic feedback)
ST-2424	4 Points, Source, 24VDC/0.5A (with Diagnostic feedback)
ST-2614	4 Points, Sink, 24VDC/2A

Table 3-11: Digital Output Slice I/O Modules (Continued)	
ST-2624	4 Points, Source, 24VDC/2A
ST-2514	4 Points, Sink, 24VDC/2A (with Diagnostic feedback)
ST-2524	4 Points, Source, 24VDC/2A (with Diagnostic feedback)
ST-2318	8 Points, Sink, 24VDC/0.5A
ST-2328	8 Points, Source, 24VDC/0.5A
ST-221F	16 Points, Sink, 20P Connector, 24VDC/0.5A (Does not have Removable Terminal Block)
ST-222F	16 Points, Source, 20P Connector, 24VDC/0.5A (Does not have Removable Terminal Block)
ST-2742	2 Points, Relay, 230VAC/2A, 24VDC/ 2A
ST-2744	4 Points, Relay, 230VAC/2A, 24VDC/ 2A
ST-2748	8 Points, Relay, 230VAC/2A, 24VDC/ 2A
ST-2852	2 Points, Triac, 120VAC/2A, 24VDC/2A

Table 3-12: Analog Input Slice I/O Modules	
Part Number	Description
ST-3114	4 Channels, 0~20mA, 12Bit
ST-3134	4 Channels, 0~20mA, 14Bit
ST-3118	8 Channels, 0~20mA, 12Bit
ST-3214	4 Channels, 4~20mA, 12Bit
ST-3234	4 Channels, 4~20mA, 14Bit
ST-3218	8 Channels, 4~20mA, 12Bit
ST-3624	4 Channels, 0~5VDC, 12Bit
ST-3644	4 Channels, 0~5VDC, 14Bit
ST-3424	4 Channels, 0~10VDC, 12Bit
ST-3444	4 Channels, 0~10VDC, 14Bit

Table 3-12: Analog Input Slice I/O Modules (Continued)	
ST-3428	8 Channels, 0~10V, 12Bit
ST-3524	4 Channels, -10~+10VDC, 12Bit
ST-3544	4 Channels, -10~+10VDC, 14Bit

Table 3-13: Analog Output	
Part Number	Description
ST-4112	2 Channels, 0~20mA, 12Bit
ST-4114	4 Channels, 0~20mA, 12Bit
ST-4212	2 Channels, 4~20mA, 12Bit
ST-4214	4 Channels, 4~20mA, 12Bit
ST-4911	1 Channels, 0~1A, 12Bit
ST-4622	2 Channels, 0~5V, 12Bit
ST-4422	2 Channels, 0~10V, 1
ST-4424	4 Channels, 0~10V, 12Bit
ST-4522	2 Channels, -10~+10VDC, 12Bit

Table 3-14: Power Modules	
Part Number	Description
ST-7111	Expansion Power Supply (Input 24VDC/Output 1.0A/5VDC)
ST-7241	Expansion Field Power Distributor
ST-7008	Potential Distributor, for Shield
ST-7108	Potential Distributor, for 0VDC
ST-7118	Potential Distributor, for 24VDC
ST-7188	Potential Distributor, for 24VDC and 0VDC

Table 3-15: Accessory Parts	
Part Number	Description
ST-END	End Cover
ST-NUM-0-9	Numbering, 0~9, White
ST-NUM-BLANK	Numbering, Blank
ST-RTB	Removable Terminal Block

3.11 Slice I/O Coupler Specifications

Part number	AT2-R834
Digital Link Ports	IEEE 802.3/802.3u-100Base-TX Cable type: Shielded, Straight Pinned, CAT5 or better (CAT5e, CAT6, etc.) Maximum cable length: 30 M (98.4 ft)
System Power Input	24Vdc (nominal), 20 VDC to 30 VDC, .5A Maximum
System Power Output	5Vdc (nominal), 1A Maximum (to connected Modules)
Field Power Input	24Vdc (nominal), 11Vdc to 28.8Vdc, 10A Maximum (dependent on current used for connected I/O)
Operating temperature range	5°C to 55°C (41°F to 131°F)
Storage temperature range	-40°C to 85°C (-40°F to 185°F)
Humidity	5 to 90%, non-condensing
CE Marked (Pending)	Conforms to Directives 73/23/EEC, 89/336/EEC, 92/31/EEC, 93/68/EEC by conforming to the following standards: EN 50081-2:1993EMC Generic Industrial Emissions EN 50082-2:1995EMC Generic Industrial Immunity EN 61131-2:1994/A11:1996 Low voltage directive requirements for programmable controllers Operates with emissions below EN55011/ CISPR 11 Class A limits Immune to: • Electrostatic discharge (4K V contact mode, 8K V air discharge) per EN61000-4-2 • RF electromagnetic fields per EN61000-4-3, ENV 50141, and ENV50204 • Electrical fast transients per EN61000-4-4 • Magnetic fields per EN61000-4-8 Refer to the EMC Guidelines for more information.
UL and C/UL Listed	UL File E235505
Physical size	3.27" wide x 3.90" high x 2.76" deep 83 mm x 99 mm x 70 mm
Vibration	10-57 Hz (.012in peak-to-peak) 57 - 500 Hz (acceleration = 2 g)
Shock	10g

DC Inputs	
Number of Inputs	16
Configuration	Sourcing only
Input voltage	Nominal 24 VDC, maximum 28.8 VDC
Input current	4.5 mA at 24 VDC, typical
Guaranteed on voltage	11 VDC
Guaranteed off voltage	5 VDC
Turn on/off time	500 us
General DC Outputs	
Number of outputs	16
Configuration	Sinking only
Input voltage	Nominal 24 VDC, 28.8 VDC maximum
Protection of logic circuits	Optical isolation between the logic and field side
Maximum current	.5 A per output
Voltage range	24 VDC nominal, 11 to 28.8 VDC
Switch characteristics	Solid-state switches
Time delay on for resistive loads	300 µsec max
Time delay off for resistive loads	300 µsec max
Leakage current in off state	50 uA max
Switch voltage, maximum ON	.3 VDC max
Over-current protection	Yes
Short circuit protection	Yes
Scan loss response	Outputs turn off

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