800 Series I/O Modules using EcoStruxure™ Control Expert

Reference Manual

(Original Document)

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www.schneider-electric.com

All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

Table of Contents

Safety Information

Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER
DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

WARNING
WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

CAUTION
CAUTION indicates a hazardous situation which, if not avoided, **could result** in minor or moderate injury.

NOTICE
NOTICE is used to address practices not related to physical injury.

PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

BEFORE YOU BEGIN

Do not use this product on machinery lacking effective point-of-operation guarding. Lack of effective point-of-operation guarding on a machine can result in serious injury to the operator of that machine.

⚠ WARNING
UNGUARDED EQUIPMENT ● Do not use this software and related automation equipment on equipment which does not have point-of-operation protection. ● Do not reach into machinery during operation. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

This automation equipment and related software is used to control a variety of industrial processes. The type or model of automation equipment suitable for each application will vary depending on factors such as the control function required, degree of protection required, production methods, unusual conditions, government regulations, etc. In some applications, more than one processor may be required, as when backup redundancy is needed.

Only you, the user, machine builder or system integrator can be aware of all the conditions and factors present during setup, operation, and maintenance of the machine and, therefore, can determine the automation equipment and the related safeties and interlocks which can be properly used. When selecting automation and control equipment and related software for a particular application, you should refer to the applicable local and national standards and regulations. The National Safety Council's Accident Prevention Manual (nationally recognized in the United States of America) also provides much useful information.

In some applications, such as packaging machinery, additional operator protection such as point-of-operation guarding must be provided. This is necessary if the operator's hands and other parts of the body are free to enter the pinch points or other hazardous areas and serious injury can occur. Software products alone cannot protect an operator from injury. For this reason the software cannot be substituted for or take the place of point-of-operation protection.

Ensure that appropriate safeties and mechanical/electrical interlocks related to point-of-operation protection have been installed and are operational before placing the equipment into service. All interlocks and safeties related to point-of-operation protection must be coordinated with the related automation equipment and software programming.

NOTE: Coordination of safeties and mechanical/electrical interlocks for point-of-operation protection is outside the scope of the Function Block Library, System User Guide, or other implementation referenced in this documentation.

START-UP AND TEST

Before using electrical control and automation equipment for regular operation after installation, the system should be given a start-up test by qualified personnel to verify correct operation of the equipment. It is important that arrangements for such a check be made and that enough time is allowed to perform complete and satisfactory testing.

⚠ WARNING
EQUIPMENT OPERATION HAZARD ● Verify that all installation and set up procedures have been completed. ● Before operational tests are performed, remove all blocks or other temporary holding means used for shipment from all component devices. ● Remove tools, meters, and debris from equipment. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

Follow all start-up tests recommended in the equipment documentation. Store all equipment documentation for future references.

Software testing must be done in both simulated and real environments.

Verify that the completed system is free from all short circuits and temporary grounds that are not installed according to local regulations (according to the National Electrical Code in the U.S.A, for instance). If high-potential voltage testing is necessary, follow recommendations in equipment documentation to prevent accidental equipment damage.

Before energizing equipment:

- Remove tools, meters, and debris from equipment.
- Close the equipment enclosure door.
- Remove all temporary grounds from incoming power lines.
- Perform all start-up tests recommended by the manufacturer.

OPERATION AND ADJUSTMENTS

The following precautions are from the NEMA Standards Publication ICS 7.1-1995 (English version prevails):

- Regardless of the care exercised in the design and manufacture of equipment or in the selection and ratings of components, there are hazards that can be encountered if such equipment is improperly operated.
- It is sometimes possible to misadjust the equipment and thus produce unsatisfactory or unsafe operation. Always use the manufacturer's instructions as a guide for functional adjustments. Personnel who have access to these adjustments should be familiar with the equipment manufacturer's instructions and the machinery used with the electrical equipment.
- Only those operational adjustments actually required by the operator should be accessible to the operator. Access to other controls should be restricted to prevent unauthorized changes in operating characteristics.

About the Book

At a Glance

Document Scope

This manual is a reference document for the 800 series I/O modules with Control Expert.

The manual provides an overview, keying and wiring information, specifications, and parameter configuring information for four types of modules:

- RIO drop
- analog
- discrete
- special purpose

The manual displays both 984LL and IEC notation, but most module descriptions use 984LL notation. Conversion charts appear in the first chapters.

- Converting Direct Address Notation *(see page 604)*
- Flat Addressing *(see page 606)*

Users should be familiar with automation controls and be qualified to install and operate automation equipment.

Module availability:

- Some modules may no longer be available for sale.
- For the status of particular modules, please contact your local sales office.
- To locate a sales office,
  a. Visit `http://www.schneider-electric.com`
  b. Select your country in the drop-down menu.

Validity Note

This documentation is valid for EcoStruxure™ Control Expert 14.0 or later.

The technical characteristics of the devices described in the present document also appear online. To access the information online:

Step	Action
1	Go to the Schneider Electric home page *www.schneider-electric.com*.
2	In the **Search** box type the reference of a product or the name of a product range. ● Do not include blank spaces in the reference or product range. ● To get information on grouping similar modules, use asterisks (*).
3	If you entered a reference, go to the **Product Datasheets** search results and click on the reference that interests you. If you entered the name of a product range, go to the **Product Ranges** search results and click on the product range that interests you.

Step	Action
4	If more than one reference appears in the **Products** search results, click on the reference that interests you.
5	Depending on the size of your screen, you may need to scroll down to see the data sheet.
6	To save or print a data sheet as a .pdf file, click **Download XXX product datasheet**.

The characteristics that are presented in the present document should be the same as those characteristics that appear online. In line with our policy of constant improvement, we may revise content over time to improve clarity and accuracy. If you see a difference between the document and online information, use the online information as your reference.

Related Documents

title of documentation	Reference number
EcoStruxure™ Control Expert, Program Languages and Structure, Reference Manual	35006144 (English), 35006145 (French), 35006146 (German), 35013361 (Italian), 35006147 (Spanish), 35013362 (Chinese)

You can download these technical publications and other technical information from our website at *www.schneider-electric.com/en/download*.

Product Related Information

⚠ WARNING
UNINTENDED EQUIPMENT OPERATION The application of this product requires expertise in the design and programming of control systems. Only persons with such expertise should be allowed to program, install, alter, and apply this product. Follow all local and national safety codes and standards. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

Part I
800 Series I/O Modules

Overview

This part provides a global overview of the 800 series I/O modules and describes generic features common to all modules.

What Is in This Part?

This part contains the following chapters:

Chapter 1
800 Series I/O Module Overview

800 Series I/O Modules - Technical Data Summary

Introduction

The following tables provide an overview of the technical features for all series 800 I/O.

- RIO interface modules
- analog I/O modules
- discrete I/O modules
- special purpose I/O modules

RIO Interface Modules

Module	Type
J890	Drop Interface
J892	Drop Interface
P890	Direct Interface
P892	Direct Interface

Analog Modules

The following table summarizes the technical data of the 800 series analog I/O modules:

Module	Type	Range	Channels	Remarks
B846-001	In	0-5 V	16	Reed-Relay-Multiplexer for voltage input as front end for B873/875 A/D converter.
		1-5 V		
		+/- 10 V		1 Word (Bin)
B846-002	In	4-20 mA	16	Reed-Relay-Multiplexer for current input (Input impedance 250 Ω) as front end for B873/875 A/D converter.
				1 Word (Bin)
B872-100	Out	4-20 mA	4	User supply required.
B872-200	Out	0-5 VDC	4	Operating range selectable per channel.
		0-10 VDC		No user supply required.
		+/- 5 VDC		
		+/- 10 VDC		

Module	Type	Range	Channels	Remarks
B873-002	In	1-5 VDC	4	4 Words (Bin)
		4-20 mA		
B875-002	In	1-5 VDC	8	8 Words (Bin)
		4-20 mA		
B873-012	In	+/- 10 VDC	4	4 Words Out (Bin)
B875-012	In	+/- 10 VDC	8	8 Words Out (Bin)
B875-102	In	1 - 5 VDC	4 (8)	High Speed
		0 - 5 VDC		
		0 - 10 V		
		+/-5 V		
		+/-10 V		
		4 - 20 mA		
		0 - 20 mA		
		0 - 40 mA		
		+/-20 mA		
		+/-40 mA		
B875-111	In	1 - 5 VDC	8 differential or 16 single	8 words (BIN) As B877 = 16 words (BIN)
		0 - 5 VDC		
		0 - 10 V		
		+/-5 V		
		+/-10 V		
		4 - 20 mA		
		0 - 20 mA		
		+/-20 mA		
B875-114	In	0-2 mA	8 differential	
B875-200	In	4-20 mA	8	A/D converter with pluggable input amplifier modules
		1 - 5 V		
		RTD/TC		
		0 - 10 V		
		0 - 20 mA		

Discrete Modules

The following table summarizes the technical data for the discrete modules:

Module	Type	Range	Channels	Remarks
B802-008	Out	80 - 130 Vac cont.	8	Individually isolated
		47 - 63 Hz		
B803-008	In	80 - 130 Vac cont.	8	Individually isolated
		47 - 63 Hz		
B804-116	Out	80 - 130 Vac cont.	16	Isolated
		47 - 63 Hz		2 groups, 8 points/group
B804-148	Out	40 - 56 Vac	16	Isolated
		47 - 63 Hz		2 groups, 8 points/group
B805-016	In	80 - 130 Vac cont.	16	Isolated
		47 - 63 Hz		2 groups, 8 points/group
B806-032	Out	80 - 130 Vac cont.	32	
		47 - 63 Hz		
B806-124	Out	20 - 28 Vac cont.	32	2 groups, 16 points/group
		47 - 63 Hz		
		32 Vac RMS max. for 10 s		
B807-132	In	80 - 130 Vac cont.	32	4 groups, 8 points/group
		47 - 63 Hz		
B808-016	Out	180 - 260 Vac	16	2 groups, 8 points/group
		47 - 63 Hz		
B809-016	In	160 - 260 Vac	16	2 groups, 8 points/group
		47 - 63 Hz		
B810-008	Out	80 - 130 Vac cont.	8	Isolated
		47 - 63 Hz		
B814-108	Out	0 - 30 Vdc	8	Relay
		0 - 240 Vac		
		47 - 63 Hz		
B817-116	In	115 Vac	16	Isolated
B817-216	In	230 Vac	16	Isolated
B820-008	Out	10 - 60 Vdc	8	True high
B821-108	In	10 - 60 Vdc	8	True high
B824-016	Out	20 - 28 Vdc	16	True high

Module	Type	Range	Channels	Remarks
B825-016	In	20 - 28 Vdc	16	True high
B827-032	In	18 - 30 Vdc	32	True high
B828-016	Out	5 V TTL	16	
B829-116	In	5 V TTL	16	High speed TTL
B832-016	Out	20 - 28 Vdc	16	True low
B833-016	In	20 - 28 Vdc	16	True low
B836-016	Out	12 - 250 Vdc	16	Isolated
B837-016	In	20.4 - 27 Vac	16	Isolated
		47 - 63 Hz		2 groups, 8 points/group
		19.2 - 30 Vdc		
B838-032	Out	20 - 30 Vdc	32	True high
B840-108	Out	0 - 300 Vdc max.	8	Relay
		0 - 230 Vac max.		
		47 - 63 Hz		
B846-001	In	0 - 5 V	16	1 word out (BIN)
		1 - 5 V		
		±10 V		
B846-002	In	4-20 mA	16	1 word out (BIN)
B849-016	In	41 - 53 Vac	16	
		47 - 63 Hz		
		39 - 58 Vdc		
B853-016	In	80 - 130 Vac	16	True high
		47 - 63 Hz		
		85 - 150 Vdc		
B855-016	In	11.4 - 12.6 Vdc	16	Isolated
B863-032	In	18-30 Vdc true high	32	
		24 Vdc nominal		
B863-132	In	0 - 30 Vdc	32	
B864-001	Out		8	8 channel reg. mux
B865-001	In	5 V TTL	8	8 channel reg. mux
B881-001	In	20 - 28 Vdc	16	
B881-508	Out	5 - 140 Vdc max.	8	
B882-032	Out	19.2 - 28 Vdc	32	
B882-116	Out	19.2 - 30 Vdc	16	

Special Purpose Modules

The following table displays a summary of the technical data for the special purpose modules:

Module	Type	Range	Channels	Remarks
B882-239	High Speed Counter	30 kHz		4 inputs
		350 Hz		3 outputs
B883-001	High Speed Counter	50 kHz	2	3 outputs
B883-101	CAM	4	-	-
B883-200	Thermocouple Input	Centigrade	10 In	Open circuit detect
		Far en he it		Self-calibrated
		millivolts		
B883-201	RTD Input	Centigrade	8	European
		Far en he it		American
				Linear
B884-002	PID Loop	N/A	2	Open/closed loop
B885-002	ASCII/BASIC	N/A	2	RS232
				RS422

Chapter 2
800 Series I/O Modules

Purpose

This chapter describes the general features, configuration, and operation of the 800 series I/O modules.

What Is in This Chapter?

This chapter contains the following topics:

800 Series Discrete I/O Modules

Features

Each 800 series discrete I/O module features:

- Status indicators
- Front accessible fuses
- A module handle that permits easy installation and removal
- A non-conductive module front that permits easy access of test probes

In addition, each module:

- Is designed for harsh, plant-floor environments
- Electrically isolates each point from logic
- Can be removed without disturbing rigid field wiring system
- Satisfies SWC requirements of IEEE and ANSI guides

Electrical Isolation

Each I/O point is electrically isolated from the controller by an optical coupler. The I/O signals can withstand the severe voltage transients normally encountered in industrial environments without damage to the I/O module or controller. Moreover, the modules satisfy surge withstand capability (SWC) of both IEEE and ANSI guides.

All I/O points shut off in the event of a communication failure between a controller and the I/O module, and the module's Active LED indicator shuts off. Shut-off occurs within 300 ms of the signal loss.

Ease of Installation

The I/O modules can be inserted into any I/O location in the 800 series I/O structure. The module slides easily into the module housing and does not interfere with any other module's operation.

Shielded Design

The module's protective case shields the logic circuitry from any electrical interference and minimizes the possibility of any noise being coupled from the user side of the circuitry to adjacent modules. A ground is automatically established when the module is inserted into the housing. This low impedance earth ground originates from the housing's backplane.

800 Series Discrete I/O Modules, System Interface

Interface Overview

When used with a PLC in a remote configuration, the appropriate RIO Adapter module or RIO Adapter module with ASCII, must be present in the I/O rack. (See instructions shipped with the adapter modules.)

Indicators

The applicable indicators on the front of the module shows the status as listed below.

Indicator	Color	Meaning When ON or Blinking
Active	Green	The module has passed its power diagnostics without error—it remains on until background diagnostics detect an error condition, loss of internal voltage, or loss of communication with PLC)
Discrete I/O	Red	Power is available at the output of the module for use by field devices
Blown Fuse	Red	A fuse is blown
Over Range	Red	One or more inputs have exceeded the valid input range
Under Range	Red	One or more inputs have dropped below the valid input range
Field Power	Red	Acceptable field power is being supplied.

NOTE: The active indicator does not represent the condition of the I/O points. The indicator may be lit with one or more of the I/O points not working properly.

800 Series Discrete I/O Modules, I/O Map

I/O Map Overview

The I/O map is used to direct the flow of data between the various I/O modules and the logic program. It is the tie between the references used in the logic program and the I/O module connection points.

800 Series Configuration

The 800 series I/O map lets you match the controller I/O addresses with what will be installed or with what actually exists in the field. The I/O map also tells the controller how to use an input signal in user logic, and, where to send an output signal. The format of register data (BCD - binary coded decimal or BIN binary) is specified on this screen. The screen objective is to load the card selections and reference number selections to complete the I/O configuration.

800 Series Discrete I/O Modules, Grounding Guidelines

Grounding Guidelines

Adhere to the following guidelines for grounding the 800 series I/O modules:

- To have proper case ground, the housing must be connected to earth ground.
- When using shielded field circuit wires, do not ground the shield at both ends of the circuit (i.e., the module and the field device).
- Single point grounding should be used where possible.

Priority for shield grounding is as follows:

- Field side device case, if metal.
- Earth ground, as close to the field side device or module as possible.
- From shield to frame.

800 Series I/O Modules, Installation

Installation Overview

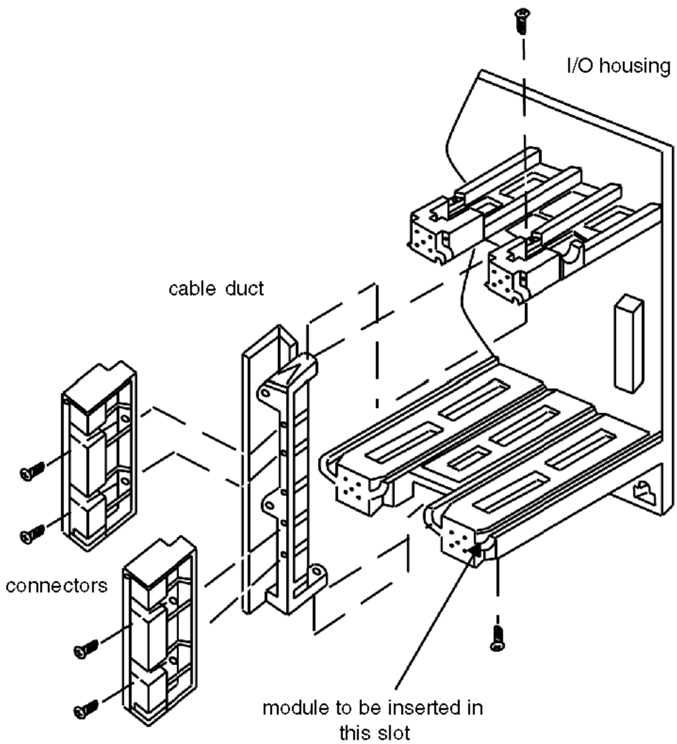
Installation of the 800 series module involves unpacking the module, wiring the field connector, installing key pins in the housing, and mounting the module in its housing.

Installing an 800 Series I/O Module

Use the following procedure to install an 800 series I/O module:

Step	Action
1	Remove module from its shipping box and check for damage. If damaged, contact salesman or distributor for correct replacement procedure.
2	Ensure power to housing is off.
3	Designate housing slot for this module.
4	Locate required connector assembly. (Part number AS-8534-000 or AS-8535-000). This assembly consists of one or two 20-pin connectors.

Remove the keying tabs on the connector prior to installing the module.

Step	Action
5	Remove old duct, if a different connector/cabling duct assembly is already present in designated housing slot. If there is a module to immediate left of slot designated for module's installation, temporarily remove it.
6	As shown below, mount the new field connector/duct assembly to the left of the module's designated housing slot and secure it to the housing top and bottom using the two Phillips-head machine screws provided. 

When performing the following step, use the appropriate connector for the module to be installed, as provided in its specification table.

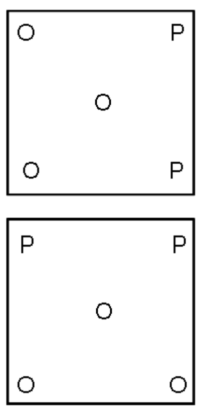
Step	Action
7	Connect field-side wiring to proper pins on field connector.

Terminals accept either two 141 AWG size wires or one 12 AWG size wire/point.

NOTE: Neat and proper workmanship methods by qualified personnel must be employed when making connections to this module. Take extra precautions when using stranded wire. Ensure that loose or projecting strands do not short circuit or ground the other terminals. The use of solid wire is recommended.

Step	Action
8	Reinstall any module temporarily removed.

When performing this step, refer to Appendix A for illustrations of optional key pin patterns for the 800 Series module to be installed. Appendix A contains key pin patterns for all 800 series I/O modules.

Step	Action
9	When using key pins (provided with housing shipment), install them above and below housing slot selected for installation of module. The following illustration shows this optional mechanical keying system used to match the module type with a particular slot in the housing to ensure proper module replacement.  When facing housing place the knurled end of the key pins into the holes indicated by the P. Use a 1/2 in plastic head mallet or equivalent to drive the pin into the housing approximately 1/4 in. **NOTE**: The keying system is optional. looking at front of housing under module slot
10	Insert module into housing, firmly but carefully, seating edge connector in backplane.

First-time installation of a module may be tight.

Step	Action
11	Insert module into housing, firmly but carefully, seating edge connector in backplane.
12	Secure module to housing using captive slotted mounting screws at top and bottom of module front panel.
13	After confirming all modules are properly installed, apply proper field power and reapply power to programmable controller.
14	I/O map module.
15	Start controller.
16	Confirm that active light of module is illuminated.

Quick Start Test—800 Series I/O Modules

Running Quick Start Test

The following table provides the steps for running a quick start test:

Step	Action
1	Determine which channel and slot location are being used for this module.
2	Wire a field device to the appropriate terminals (refer to the individual wiring diagrams/field connector drawings for that particular I/O module) on either the AS-8534-000 low density connector, or AS-8535-000 high density connector, (refer to the Specification section for your particular I/O module to determine which connector is required.)
3	Stop the controller.
4	Install the I/O module.
5	I/O Map the module, at the desired discrete or register reference.
6	Start the controller.
7	Confirm that the modules active light is illuminated. (may require Step 8 wiring first).
8	To turn an Input on apply the required power to the appropriate terminals (refer to the individual wiring diagrams/field connector drawings for your particular I/O module), and confirm that the red I/O light is illuminated after turning I/O point on.

Key Pin Assignments for 800 Series I/O Modules

Charts

The key pin assignments chart is provided below:

	●● / ○ / ○○	●○ / ○ / ●○	○○ / ○ / ●●	○● / ○ / ○●	○● / ○ / ●○
●● / ○ / ○○	AS-B802-008	AS-B803-008	AS-B804-016	AS-B805-016	AS-B806-032
●○ / ○ / ●○	AS-B808-016	AS-B809-016	AS-B820-008	AS-B821-008 AS-B821-108	AS-B822-008*
○○ / ○ / ●●	AS-B824-016	AS-B825-016	AS-B826-032	AS-B827-032	AS-B875-011 AS-B875-012
○● / ○ / ○●	AS-B840-008 AS-B840-108	AS-B841-008*	AS-B850-016*	AS-B842-008	AS-B852-016*
○● / ○ / ●○	AS-B855-016	AS-B810-008	AS-B828-016	AS-B873-011	AS-B833-016
●○ / ○ / ○●	AS-B862-001	AS-B863-001	AS-B864-001	AS-B857-032*	AS-B851-016*
○● / ● / ○○	AS-B865-001	AS-B868-001	AS-B869-001	AS-B872-002	AS-B873-001
●○ / ● / ○○	AS-B875-111	AS-B881-308	AS-B872-100	AS-B872-200*	AS-B875-200
○○ / ● / ●○	AS-B819-232*	AS-B804-148	AS-B882-116		
○○ / ● / ○●		AS-B806-124			

NOTE: ● Indicates keying pin locations.

NOTE: * Indicates these modules may be obsoleted or superseded. Please contact your local distributor for more details.

	● ● ○ ○ ○	● ○ ○ ● ○	○ ○ ○ ● ●	○ ● ○ ○ ●	○ ● ○ ● ○
● ● ○ ○ ○	AS-B807-032	AS-B814-001 AS-B814-108	AS-B814-002	AS-B816-016	AS-B817-116
● ○ ○ ● ○	AS-B823-008*	AS-B846-002	AS-B836-016	AS-B837-016	AS-B849-016
○ ○ ○ ● ●	AS-B829-016 AS-B829-116	AS-B872-011	AS-B883-200	AS-B8883-211	AS-B817-216
○ ● ○ ○ ●	AS-B853-016	AS-B883-001	AS-B886-001	AS-B884-001	AS-B883-201
○ ● ○ ● ○	AS-B832-016	AS-B883-101 AS-B883-111	AS-B886-011	AS-B885-001 AS-B885-002	AS-B838-032
● ○ ○ ○ ●	AS-B846-001	AS-B881-001	AS-B882-239	AS-B984-100	AS-B885-100
○ ● ● ○ ○	AS-B875-001 AS-B875-002	AS-B875-101 AS-B875-102	AS-B880-108	AS-B880-208	AS-B882-032
● ○ ● ○ ○	AS-B863-032	AS-B881-508	AS-B881-408	AS-B863-132	AS-B875-114
○ ○ ● ● ○					
○ ○ ● ○ ●					

NOTE: ● Indicates keying pin locations.

NOTE: * Indicates these modules may be obsoleted or superseded. Please contact your local distributor for more details.

Discrete I/O Module Specifications

Environmental

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Operating	Temperature	0 - 60°C (32 to 140°F)
	Humidity	0 - 95% (noncondensing) at 60°C
Storage	Temperature	-40 - 85°C (32 to 140°F)
	Humidity	0 - 95% (noncondensing) at 60°C
Isolation	Field to System	2000 VAC steady state maximum at 60 Hz for 1 min.
	Between Groups	2500 VDC for 60 s without breakdown. Leakage current shall not exceed 1.5 mA.
Shock	Operating	15 G peak, 11 ms, half sine wave
	Nonoperating	15 G peak, 11 ms, half sine wave
Vibration	Operating	0.005 in D.A.
		Sine from 10 to crossover frequency (57 - 62 Hz)
		1.0 G from crossover frequency to 50 Hz
	Nonoperating	0.029 G sq/Hz, 10 - 50 Hz rolloff at -8dB/octave from 50 - 500 Hz
EMI		MIL-STD 461B
RFI		FCC Class A
Surge Withstand Capability		IEEE 472-1974 and ANSI C37.90A-1974)

Mechanical

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Dimensions (W x H x D)	50.8 x 266.7 x 203.2 mm (2.0 x 10.5 x 8.0 in)
Weight	1.1 kg (2.4 lb)
Space Required	1 I/O slot

Part II
800 Series Analog I/O Modules

At a Glance

This part provides a detailed description of the 800 series analog I/O modules. It includes technical data and wiring information for each module.

What Is in This Part?

This part contains the following chapters:

Chapter 3
B846-001 and B846-002 Input Multiplexers

Purpose

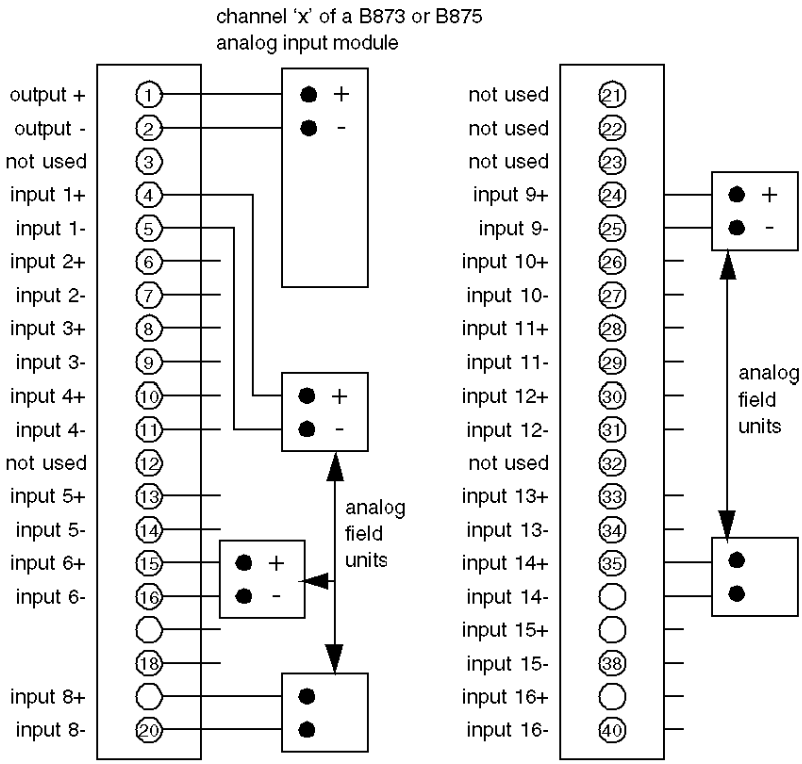
The purpose of this chapter is to describe the features and functionality of the B846-001 and B846-002 input multiplexers.

What Is in This Chapter?

This chapter contains the following topics:

B846-001 and B846-002 Field Connections

User connections are made to a standard screw terminal strip. The rigid wiring system permits module insertion or removal without disturbing the wiring. The connector is an AS-8535-000.



B846-001 and B846-002 Specifications

B846 Multiplexer Specifications

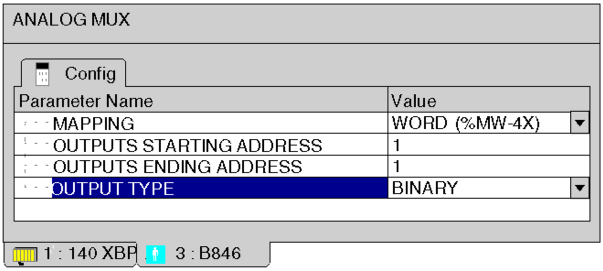
The following table shows the specifications for the B846 input multiplexers.

B846-001		Voltage Input Multiplexer
B846-002		Current Input Multiplexer
Number of Input Points		16, potential isolated from each other
Address Capacity		1 register data out (binary data type)
Ranges	B846-001	0-5 V, 1-5 V, +/- 10 V
	B846-002	4 to 20 mA
Input Impedance	B846-001	Equal to B873 or B875
	B846-002	250 Ω
Relay Response Time		10 ms including diagnostics
Power Required	+5 VDC	65 mA
	+4.3 VDC	1 mA
	-5 VDC	0 mA
Update Time	B846 MUX only	3 ms
	with B875	20 ms
	with B873	20 ms
Note: An over range condition on any B873/B875 channel will add approximately 200 ms per over range channel, to update time of remaining channels.		
Terminal Connector		AS-8535-000
Reference Type		Mapped as 1 register output 4x
Output Type		BIN/BCD

B846-001 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value Options Available
Mapping	WORD (%MW-4X)	-
Outputs Starting Address	1	-
Outputs Ending Address	1	-
Output Type	BINARY	BCD

Mapping parameter references

	984LL, Concept, ProWORX	Control Expert
Reference Type	Mapped as 1 register output 4x	Mapped as 1 word output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 4
B872-100 Analog Output

Purpose

The purpose of this chapter is to describe the features and functionality of the B872-100 analog output module.

What Is in This Chapter?

This chapter contains the following topics:

B872-100 Analog Output

Characteristics

The B872-100 4-channel analog output module converts numerical data ranging from 0000 to 4095 into current ranging from 4 to 20 mA with 12-bit resolution.

The module is designed to control the state of each output channel when the PLC is reset or stopped. The output of the channel can either remain at the last value (hold) or return to zero (RTZ).

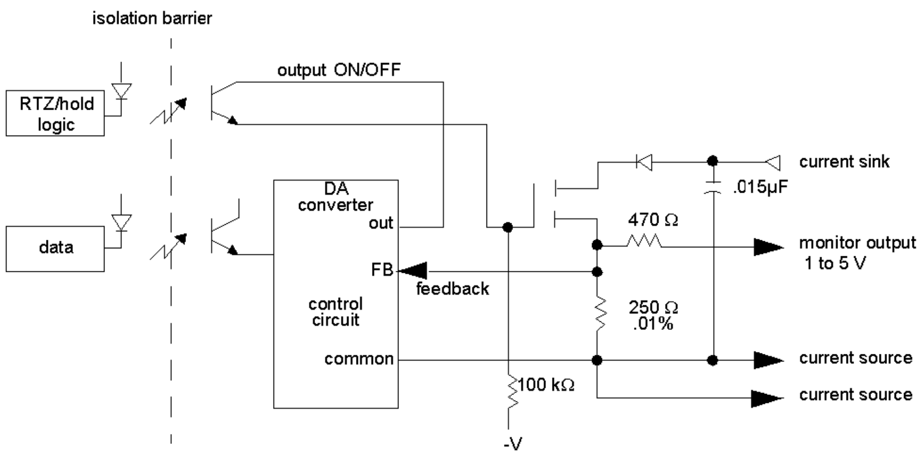
You can select the hold or RTZ option for each of the 4 isolated outputs using a 4-position DIP switch. A switch is associated with each output (switch 1 for output 1, etc.).

- The RTZ function brings the outputs to 0.0 mA as a safety feature
- The hold function maintains the last valid output value after the loss of OURBUS communication

NOTE: Module Output Alert
RTZ disables the output of the module so that output current goes to 0.0 mA, not to zero scale (4 mA). Monitor voltage goes below 1V to indicate an output current loss of less than 4 mA.

The module has four isolated analog outputs, and is capable of updates to all four channels every 1 ms. The 12-bit resolution and the absolute accuracy of +/-0.1% at 25 °C provides precise control of your application.

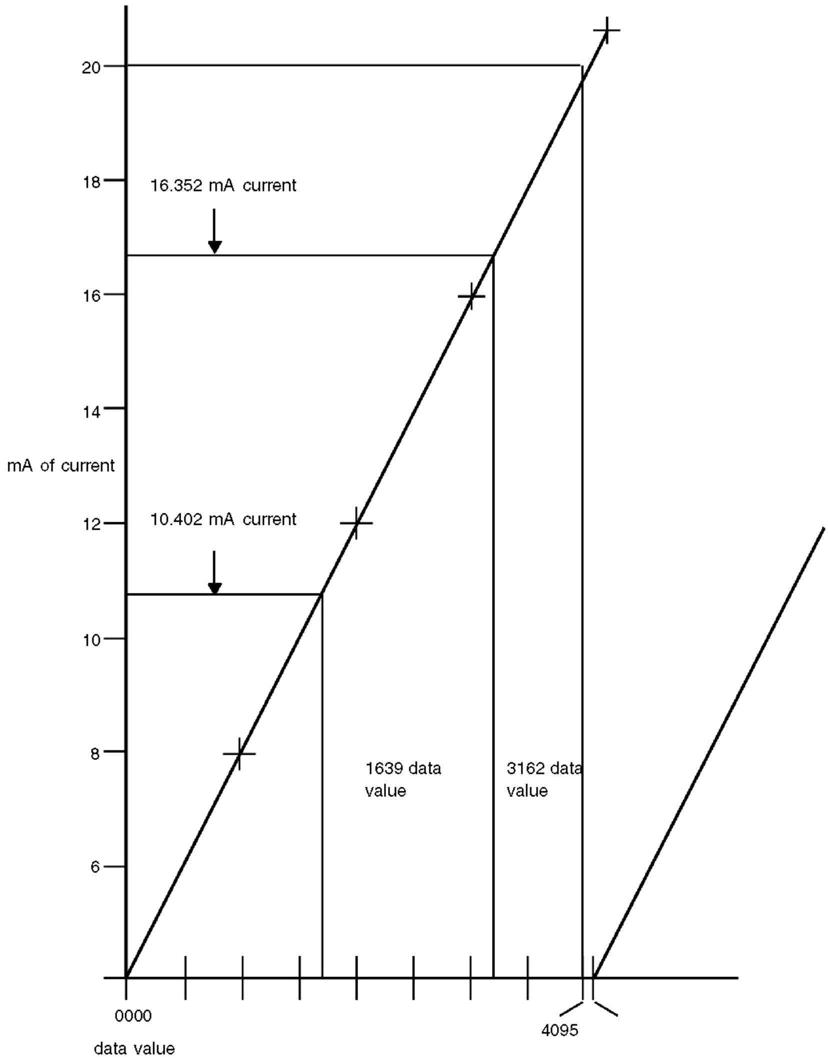
The following figure shows the simplified schematic of the B872-100 module.



B872-100 Data Value to Output Conversion

Data Value to Output Conversion Chart

The B872 accepts data values ranging from 0000 to 4095 and converts them into output currents of 4 to 20 mA. The output current is directly proportional to the data value plus 4 mA. Refer to the figure below for a data value to output conversion chart.



Determining Data value or Output Current

To determine either the data value or the output current, use the following calculations:

To solve for output current:

Current = (Data Value / 256) + 4

For example:

Current = (3162 / 256) + 4

Current = (12.35156) + 4

Current = 16.35156

Current = 16.352

To solve for data value:

Data Value = (Current - 4) x 256

For example:

Data Value = (10.402 - 4) x 256

Data Value = (6.402) x 256

Data Value = 1638.912

Data Value = 1639

NOTE: Data values larger than 4095 will result in currents less than 20 mA. Refer to the in this chapter. The equations above are valid for data values of 0-4095 only. The module can output values in the range of 4096-8191 in a offset scale. If you use this offset range, be sure to subtract 4096 from the calculations provided above. *Trim-Pots Location and Voltmeter Connections, page 60*

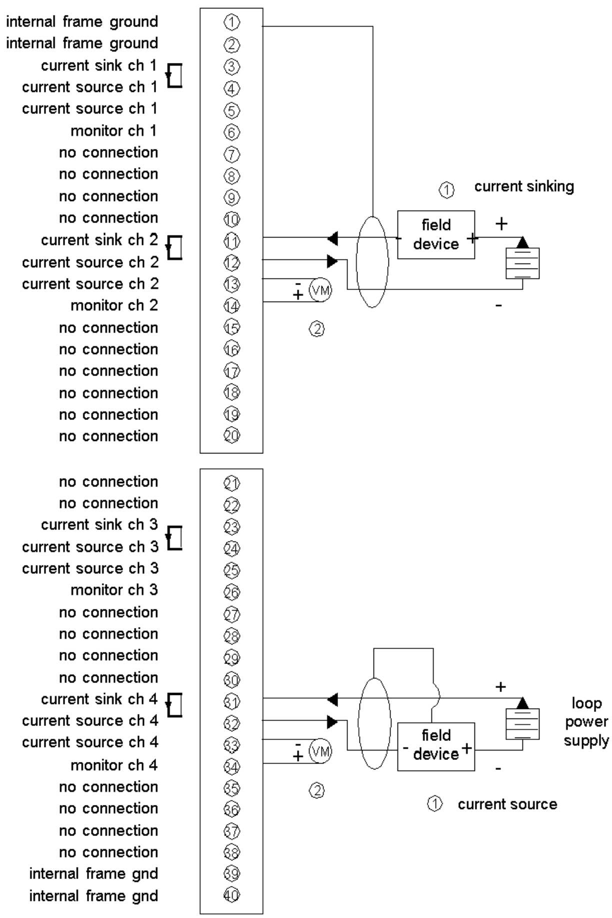
B872-100 Field Connections

User Connections

User connections are made to a standard screw terminal strip, and the rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal Numbering and Functions

Terminal numbering, and their corresponding output functions, are presented in the figure below.



1 Field devices may be located in either sink or source leads as shown

2 VM is an optional voltmeter that reads a voltage proportional to the current

B872-100 - Setting Module DIP-Switch

Switch location and position

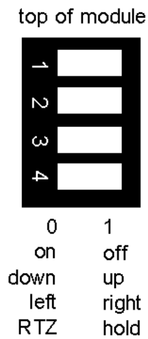
The four position DIP-switch is located on the rear of the module. This switch controls the state of each channel when the system is reset or stopped. The output to the channel can either remain at the last value (Hold) or go to 0.0 mA Return-To-Zero (RTZ).

Set the switch for either hold or RTZ prior to installation of the module. Each of the four switches control the mode of operation for its associated output (i.e., switch 1 for output 1, etc.).

Switch Settings

The following figure presents DIP switch settings for the B872-100 module. Also, refer to the label located on the left side of the module itself.

4- Position DIP- Switches



Switches	Functions
1,2,3,4- Channel	state of output when PLC resets or stops
	For RTZ: SW=L
	For hold: SW=R

Set the switch to the left to select return-to-zero or to the right to select hold (viewing the rear of the module when held vertically). Channels are set independently.

NOTE: The output state after power-up initialization is dependent on the position of DIP-switch. Open circuit in the following table results in current 0 mA.

The following table represents the Relationship Between Power-up and DIP-Switch Settings.

Possible Event During Power-up	Switch=RTZ	Switch=HOLD
At Power-up	Open Circuit	Open Circuit
After Receiving Valid Data	Data	Data
PC Stop (After Run)	Open Circuit	Last Data
Loss of +5 V	Open Circuit	Open Circuit
Loss of +4.3 VIO	Open Circuit	Last Data
Loss of +5 V & +4.3 VIO	Open Circuit	Open Circuit

B872-100 Quick Start Test

Title of Overview Block

This test configures the module as follows: B872 (analog 4 channel output), and output state set to RTZ (return-to-zero).

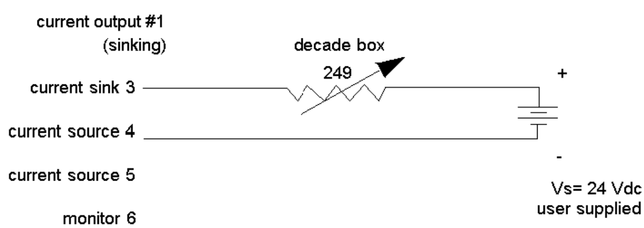
Required Parts

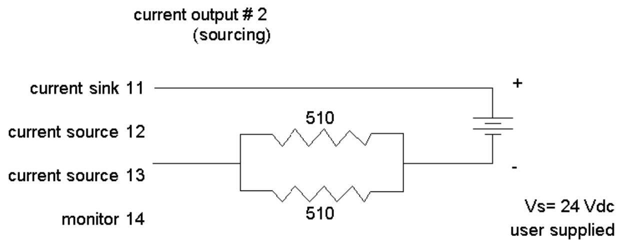
Before starting, make sure you have the following items:

- A loop power supply (24 Vdc, +/-10% at 1-2 A
- A resistance decade box, or two 510 Ω resistors at 1/4 watts 5%
- A AS-8535-000 high density connector

Configuration Switch

The following table gives the procedure for setting the configuration switch:

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Set the 4 position DIP-switch as follows: (viewing the rear of the module when held vertically)
SW1,2,3,&4......Left......RTZ</td></tr>
<tr><td>2</td><td>With a resistance decade box, or two paralleled 510 Ω resistors, wire the output module as shown in the following figure, for current sinking, or the next figure, for current sourcing on a AS-8535-000 high density connector.
Note: The resistance decade box should be set for 249 Ω.
Note: Remove the keying tabs on the AS-8535-000 high density connector prior to installing module.
The following figure shows the wiring for current sinking.

</td></tr>
<tr><td>3</td><td>Determine which channel and slot location are being used for this module.</td></tr>
</table>

Step	Action
4	Stop the controller, and remove AC power. The following figure illustrates Current Output #2 (sourcing) 
5	Insert the module into the rack.
6	Re-apply AC power, attach programmer, and access the I/O Map.
7	Map the module as a B872, registers 40001-40004 binary.
8	Start the controller.
9	Confirm that the module's active light is illuminated. **Note:** Active on steady = OK.
10	Access the programming software. Enter a value of 2048 in any or all of the declared 4xxxx registers in the I/O Map assigned to the module.
11	Using the monitor terminals for each output, measure what should be 3 Vdc. This value is equivalent to 12 mA of current in the loop. Refer to the table below.
12	Continue to provide your output registers with values from Table 2. This assures each output is capable of a span of 4-20 mA. **Note:** When using the two resistors in lieu of a decade box, your voltage monitor readings may vary slightly, because of the value and tolerance of the component.

Current and Monitor Voltage

The following table shows the relationship between current and monitor voltage.

Register Value	Loop Current	Monitor Voltage
4xxxx=0001	4 mA	1.0 V
4xxxx=1024	8 mA	2.0 V
4xxxx=2048	12 mA	3.0 V
4xxxx=3071	16 mA	4.0 V
4xxxx=4095	20 mA-1 LSB	5.0 V-1 LSB

Calibration

Calibration Intervals

The analog output module is calibrated at the factory prior to shipment. To ensure the module's accuracy you should calibrate the trim-pots for each output regularly. Calibration is recommended at 12 month intervals for operation between 25-45 °C and at 6 month intervals between 0-60 °C.

Calibration Tools

The following tools are needed to calibrate an analog output module:

1) A programming panel

2) A precision voltmeter, with an accuracy of +/-0.0001 volts on a 10 volt scale

3) A 1/4 inch Phillips screwdriver

4) A 1/8 inch standard screwdriver

Calibration Procedure (Method 1)

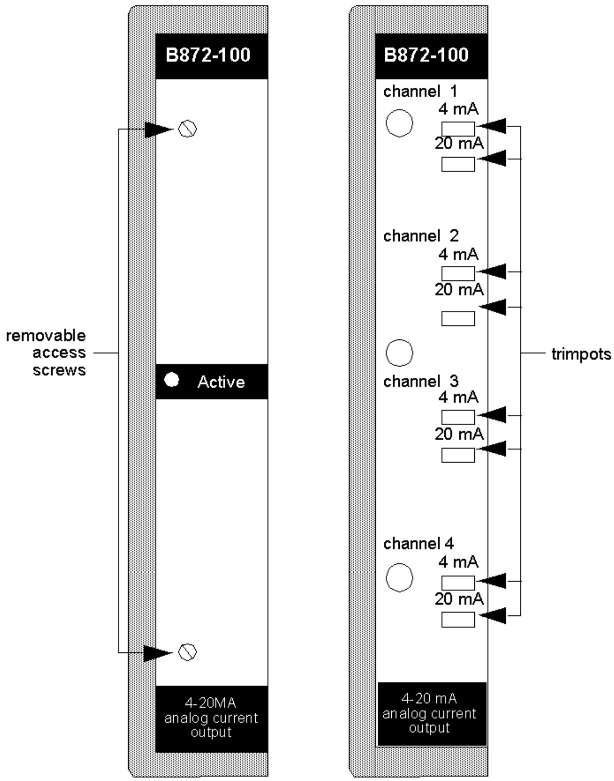
To make the adjustments, a load and loop supply must be connected to the channel being calibrated. There are two ways to make the adjustments. One procedure requires a load and loop supply to be assembled using voltage and resistance (Method 1). Refer to the calibration coltage/resistance procedure and the voltmeter connections diagram. The second procedure uses the existing field side circuit (Method 2). Refer to the calibration procedure, the voltmeter connections diagram, and the voltage/resistance chart. The following table the calibration voltage/resistance procedure (Method 1).

Step	Action
1	Use a close tolerance 250 W resistor (+/-0.01%) and a voltage supply of between 12 and 35 Vdc. The voltage readings will be taken across the resistor. Connect as indicated in the upper part of the voltmeter connections diagram.
2	Remove the two screws and the label located on the front panel of the analog output module. This allows you access to the trim-pots. There are two trim-pots per output. The first two trim-pots are for output number one, the second set is for output two, etc. Refer to the figure below for the location of trim pots.
3	Open the analog output module handle to expose the connectors and terminals.
4	Load the data value of 0000 into the output register for the channel under test.
5	Adjust the top (4 mA calibrate) trim-pot of the set for a voltage of +1.0000, +/-0.002 volts. This calibrates to +/-0.05% of full scale.
6	Manually program a data value of 4095 into the output register for channel one.

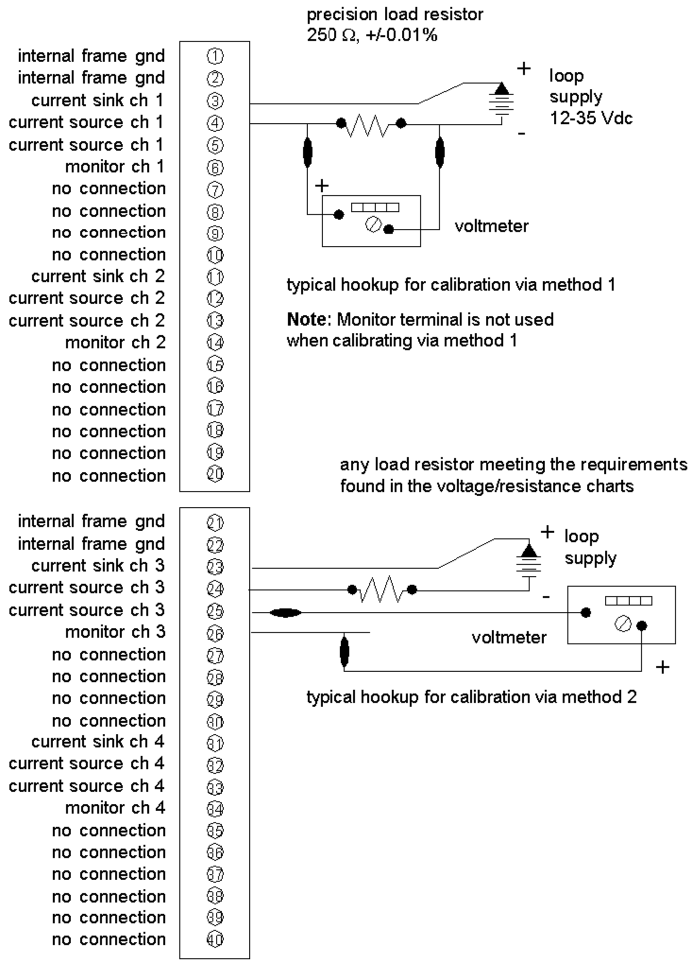
Step	Action
7	Adjust the bottom (20 mA calibrate) trim-pot of the set for a voltage reading of +4.9990, +/-0.002 volts. This calibrates to +/-0.05% of full scale.
8	Return to step 4 and repeat steps 4-8 until module is within tolerance.
9	Move connections to next channel to calibrate, and repeat steps 4 through 8 for each output channel.
10	After the calibration procedure is complete, disconnect the voltmeter, return connections to their original state, close module handle, and replace front label that covers the trim-pots. pot locking paint, and other substances are not required.

Trim-Pots Location and Voltmeter Connections

The following figure shows the location of the Trim-Pots on the B872 Module.



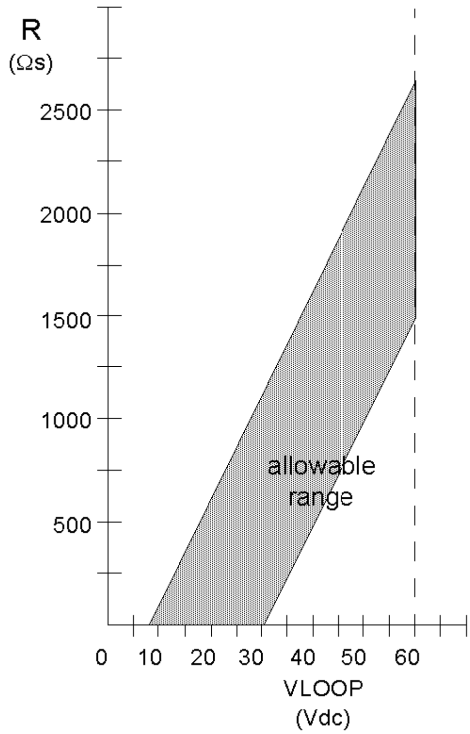
The following figure is the voltmeter connections diagram for the B872-100 module.



Calibration Procedure (Method 2)

The following table gives the calibration procedure (Method 2) for the B872-100 module:

Step	Action
1	Connect loop supply and load resistor (if any) as indicated in the lower part of the voltmeter connections diagram. Verify that resistor and loop supply are within limits as defined by the voltage resistance chart.
2	Connect voltmeter to monitor terminals as indicated in the lower part of the Voltmeter connections diagram.
3	Load the data value of 0000 into the output register for the channel under test.
4	Adjust the top (4 mA calibrate) trim-pot of the set for a voltage of +1.0000, +/-0.002 volts. This calibrates to +/-0.05% of full scale.
5	Manually program a data value of 4095 into the output register for channel one.
6	Adjust the bottom (20 mA calibrate) trim-pot of the set for a voltage reading of +4.9990, +/-0.002 volts. This calibrates to +/-0.05% of full scale.
7	Return to step 3 and repeat steps 3-6 until module is within tolerance.
8	Move connections to next channel to calibrate, and repeat steps 3 through 7 for each output channel.

Step	Action
9	After the calibration procedure is complete, disconnect the voltmeter, return connections to their original state, close module handle, and replace front label that covers the trim-pots. Pot locking paint, and other substances are not required. The following figure is the voltage/resistance chart. 

B872-100 Specifications

B872-100 Specifications

The following table gives the specifications for the B872-100 module.

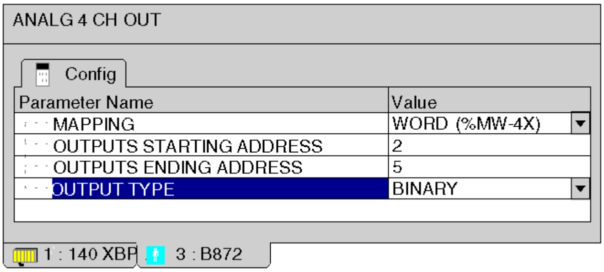
Description	Analog output D/A; 4 - 20 mA
Number of Points	4
Operating Range	4 - 20 mA
Maximum Loop Supply Voltage	60 Vdc
Allowable Resistance Range*	
Minimum and Maximum	Rmin = VLoop** - 30 V 0.02 A Rmax = VLoop** - 7 V 0.02 A
*Resistance is the sum of all components, including wiring, in the field side circuit.	
**VLoop equals the voltage of the loop supply (not to exceed 60 Vdc). If voltage is <30 Vdc, then the minimum loop resistance is 0 Ω. Refer to the *Calibration Procedure (Method 2),* *page 62*	
Voltage Drop @ 20 mA	
Minimum Maximum	7 Vdc 30 Vdc
Response Time to Within +/_0.1% of Full Range	35 mS, all four channels
Valid Data Values	0 thru 4095, or offset 4096-8191
Resolution	1 part in 4096 counts
Monitor Output Voltage	
Range	1 to 5 Vdc
Min Load	1 MΩ
Impedance	470 Ω, typical
Accuracy***	
Output Errors @ 25 °C (77 °F)	
Overall	+/-0.1% @ 25 °C absolute
Nonlinearity	+/-0.024%
Differential Nonlinearity	+/-0.036%
*** All percentages are of full range.	
Output Isolation	
Output to OURBUS	1500 Vac or 2500 Vdc for 1 minute 500 Vac or 500 Vdc continuous operation
Channel to Channel	1500 Vac or 2500 Vdc for 1 minute 500 Vac or 500 Vdc continuous operation

Conversion	
Resolution Update Time	12-bits (1 part in 4096 The module can accept new data every 1 mS for a 4 channel update)
Settling Time	Within +/-0.1%, < 350mS
Linearity	0 to 60 °C, +/- 1 LSB maximum
Differential Nonlinearity	0 to 60 °C, +/- 1.5 LSB maximum
Load Inductance	1 Henry max, with no external diode suppression
Power Required	
+5 V +4.3 V -5 V	475 mA 5 mA 0 mA
Terminal Connector	AS-8535-000
Reference Type	Mapped as 4 registers output 4x
Output Type	BIN/BCD

B872-100 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Value (Default)	Value (Options Available
Mapping	WORD (%MW-4X)	-
Outputs Starting Address	2	-
Outputs Ending Address	5	-
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 4 registers output 4x	Mapped as 4 words output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 5
B872-200 Analog Output

Purpose

The purpose of this chapter is to describe the features and functionality of the B872-200 analog output module.

What Is in This Chapter?

This chapter contains the following topics:

B872-200 Overview

Characteristics

The B872-200 4-channel analog (D/A) output module converts numerical data ranging from 0000 to 4095 into output voltage ranges (12-bit resolution).

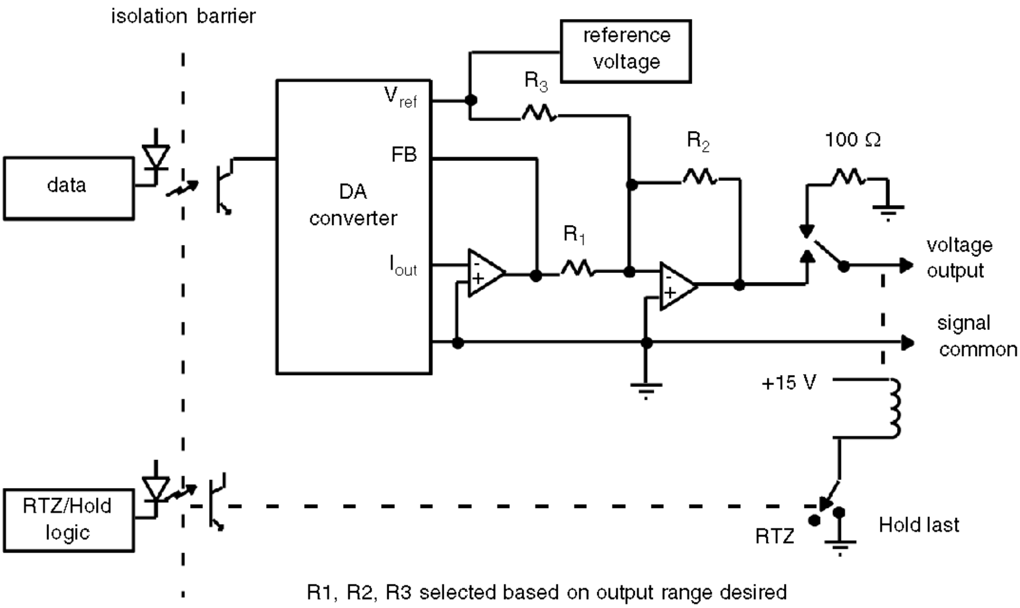
The analog output module allows you to drive a wide array of field devices requiring different voltages based upon your unique application. You can select from four available output voltage ranges. The ranges, which are 0 to 5 V, 0 to 10 V, -5 to 5 V, and -10 to 10 V, are selected by means of four pairs of jumpers, one pair per channel. You can operate multiple ranges simultaneously.

The module is designed to allow you to control the state of each output channel when the programmable controller is reset or stopped. The output of the channel can either remain at the last value (HOLD) or go to 0.0 mV i.e., return-to-zero (RTZ). You can select this option for each of the four isolated outputs using a four-position DIP switch. A switch is associated with each output (switch 1 for output 1, etc.). The HOLD or RTZ function is selected by you to meet your specific application. The RTZ function allows you to bring the outputs to zero as a safety feature. The HOLD function allows you to maintain the last valid output value after the loss of Ourbus communication.

NOTE: Operative Interruption Hazard
RTZ disables the output of the module so that output voltage goes to zero, independent of range selected.

The module has four isolated analog outputs and is capable of updates to all four channels every 1 ms. The 12-bit resolution and the absolute accuracy of +0.1% at 255 C provides precise control of your application. Refer to the figure below for the simplified schematic of the module.

The following figure is the simplified schematic diagram, for the B872-200 Module.

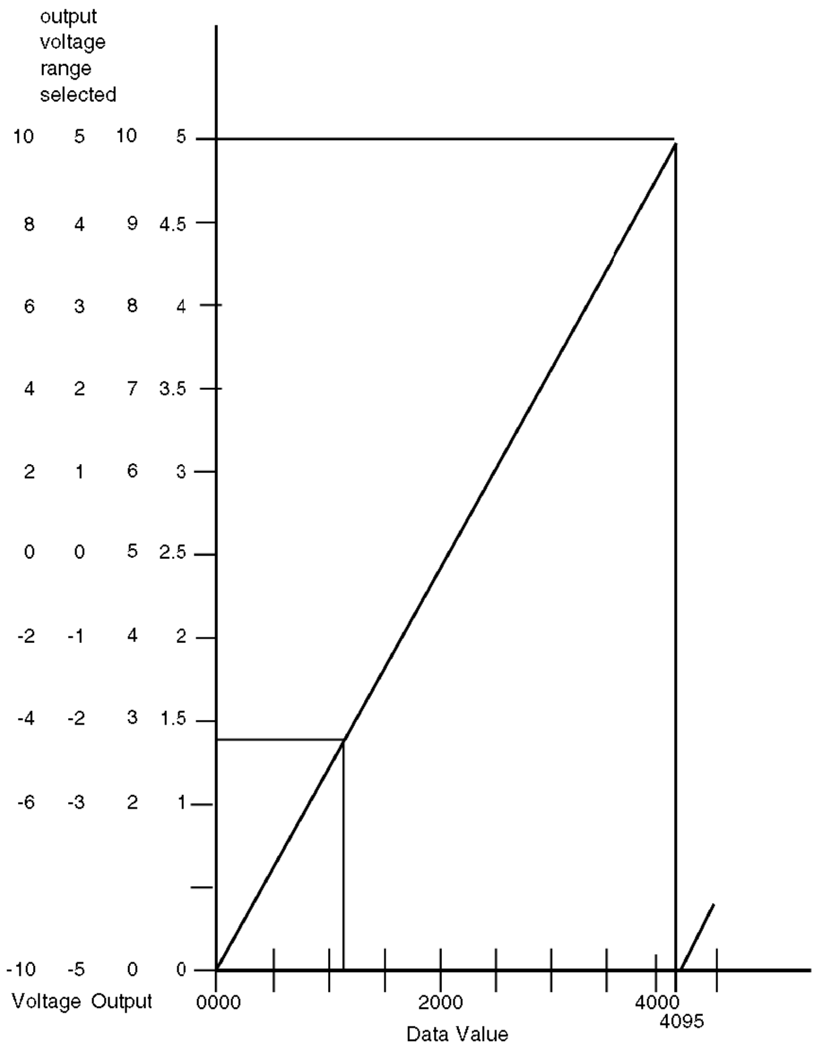


R1, R2, R3 selected based on output range desired

B872-200 Data Value to Output Conversion

Data Value Ranges

The B872 accepts data values ranging from 0000 to 4095 and converts them into output voltages for all four ranges. The output voltage is directly proportional to the data value. The figure below is a data value to output conversion chart for the B872-200 module.



Sample Calculations

Calculations for determining voltage reading or data value for 0 to 5 V or 0 to 10 V ranges:

To solve for voltage reading:

$$\text{voltage output} = \frac{\text{total voltage span x data value}}{4096}$$

where the *total voltage span* is the sum from lowest to highest voltage in the selected range. If the range is -10 to +10 V, the *total voltage span* is 20 V.

For example:

$$\text{Voltage Output} = \frac{5 \text{ x } 1024}{4096}$$

$$\text{Voltage Output} = 1.250 \text{ VDC}$$

To solve for data value:

$$\text{Data Value} = \frac{\text{Output Volts x 4096}}{\text{total voltage span}}$$

For example:

$$\text{Data Value} = \frac{3.1104 \text{ x } 4096}{5}$$

$$\text{Data Value} = 2548$$

Calculations for determining voltage reading or data value for -5 to 5 V or -10 to 10 V Ranges:

To solve for voltage output:

$$\text{Voltage Output} = \frac{\text{total voltage span x Data Value + Offset Voltage}}{4096}$$

where *offset voltage* is the lower number in the selected range. If the range is -10 to +10 V, the *offset voltage* is -10 V.

For example:

$$\text{Voltage Output} = \frac{10 \text{ x } 1024 + (-5)}{4096}$$

$$\text{Voltage Output} = -2.500 \text{ VDC}$$

To solve for data value:

$$\text{Data Value} = \frac{\text{(Voltage Output - Offset Voltage) x 4096}}{\text{total voltage span}}$$

For example:

$$\text{Data Value} = \frac{(1.2183 - (-5)) \times 4096}{10}$$

$$\text{Data Value} = 2547$$

Examples:

-5 to 5 V = 10 V

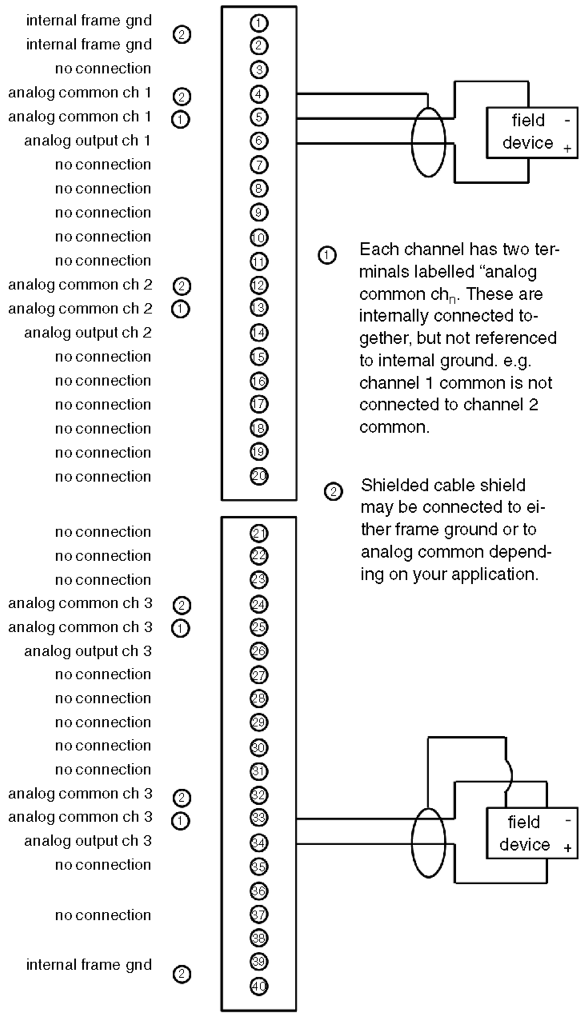
Examples:

-5 to 5 V = -5 V

B872-200 Field Connections

User Connections

User connections are made to a standard screw terminal strip and the rigid wiring system permits module insertion or removal without disturbing the wiring. Terminal numbering and their corresponding output functions are presented in the figure below.



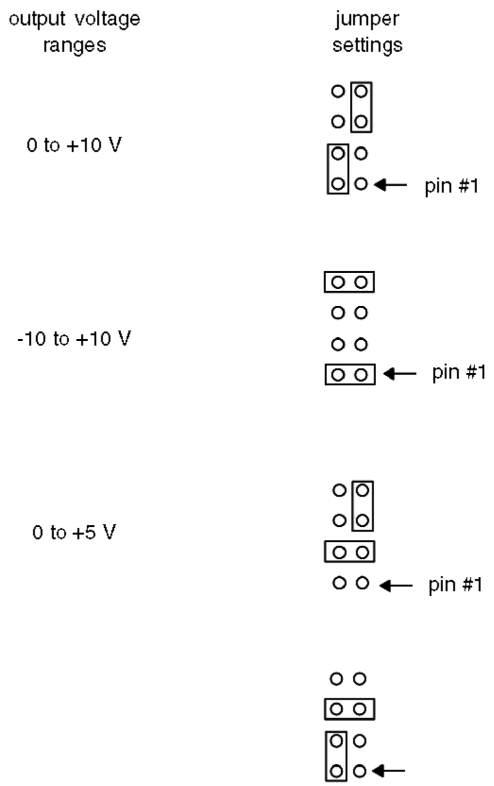
B872-200 - Setting Module Jumpers

Location and Settings

The jumpers are located on the left side of the module (look for four access holes). The holes allow access to the four pairs of jumpers which are used to select an output voltage range for the associated channel.

Set the desired voltage range for 0 V to 5 V, 0 V to 10 V, -5 to 5 V, or -10 V to +10 V prior to installation. Refer to the figure below for the jumper settings. Also refer to the left side of the module itself. The module is shipped set for 0 to 10 V.

The following figure gives the jumper settings for the B872-200 module:



B872-200 - Setting Module DIP-Switch

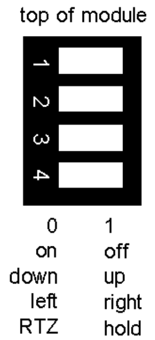
4-Position DIP-Switch

The four position DIP-switch is located on the rear of the module. This switch controls the state of each channel when the system is reset or stopped. The output to the channel can either remain at the last value (Hold) or go to 0.0 mA Return-To-Zero (RTZ).

Set the switch for either hold or RTZ prior to installation of the module. Each of the four switches control the mode of operation for its associated output (i.e., switch 1 for output 1, etc.). Refer to the figure below for switch settings. Also, refer to the label located on the left side of the module itself.

The following figure gives DIP-Switch Settings for the B872-200 module.

4- Position DIP- Switches



Switches	Functions
1,2,3,4- Channel	state of output when PLC resets or stops
	For RTZ: SW=L
	For hold: SW=R

Set the switch to the left to select return-to-zero or to the right to select hold (viewing the rear of the module when held vertically). Channels are set independently.

NOTE: The output state after power-up initialization is dependent on the position of DIP-switch. Open circuit in the following table results in current 0 mA.

The following table shows the relationship between power-up & DIP-switch settings.

Possible Event During Power-up	Switch=RTZ	Switch=HOLD
At Power-up	0 Volts*	0 Volts*
After Receiving Valid Data	Data	Data
PC Stop (After Run)	0 Volts*	Last Data
Loss of +5 V	0 Volts*	0 Volts*
Loss of +4.3 VIO	0 Volts*	Last Data
Loss of +5 V & +4.3 VIO	0 Volts*	0 Volts*
*Active circuits of module are disconnected from the output terminals, the output terminals are connected to an internal 100 Ω resistor.		

B872-200 Quick Start Test

Title of Overview Block

This test configures the module as follows: B872 (analog 4 channel output), and output state set to RTZ (return-to-zero).

Required Parts

Before beginning, make sure you have the following items:

- A digital voltmeter
- An AS-8535-000 high-density connector

Running Quick Start Test

The following table gives the steps for running the quick start test:

Step	Action
1	State of Output Control Switch Place the 4-position DIP-switch (top rear) to the following positions: SW1 = left SW2 = left SW3 = left SW4 = left Refer to *4-Position DIP-Switch, page 75*
2	Output Voltage Range Jumpers The B872 is shipped with each output set (jumpers located below the side access holes) for 0-10 V operation. Therefore, simply verify the jumper settings.
3	Determine slot location for this module. **Note:** Remove keying tabs on the AS-8535-000 high density connector prior to installing module.
4	Stop the controller, and remove AC power.
5	Insert module into rack.
6	Re-apply AC power, attach programmer, and access the I/O Map.
7	Map the module as a B872, registers 40001-40004 binary.
8	Start the controller.
9	Confirm that the module's Active light is illuminated.
10	Access the programming software. Enter a value of 2048 in any or all of the declared 4xxxx registers (40001-40004) in the I/O Map assigned to the module.
11	Place your voltmeter leads on pins 5 and 6 of the field wiring connector to read the corresponding output voltage of 5.000 V. Refer to the table below.
12	Continue to load values from Table 2 into the other registers to assure each output is capable of a span of 0-10 V.

Value and Monitor Voltage

The following table shows the relationship between value and monitor voltage.

Register Value	Monitor Voltage
4xxxx=0001	0000 V
4xxxx=1024	2.500 V
4xxxx=2048	5.000 V
4xxxx=3071	7.500 V
4xxxx=4095	9.999 V

B872-200 Calibration

Principle

The analog output module is calibrated at the factory prior to shipment. To ensure the module's accuracy, you should calibrate the trim-pots for each output regularly. Calibration is recommended at 12 month intervals for operation between 25-45 °C, and at 6 month intervals between 0-60 °C.

Required Tools

The following tools are needed to calibrate an analog output module:

1) A programming panel

2) A precision voltmeter, with an accuracy of +/-0.0001 volts on a 10 volt scale

3) A 1/4 inch Phillips screwdriver

4) A 1/8 inch standard screwdriver

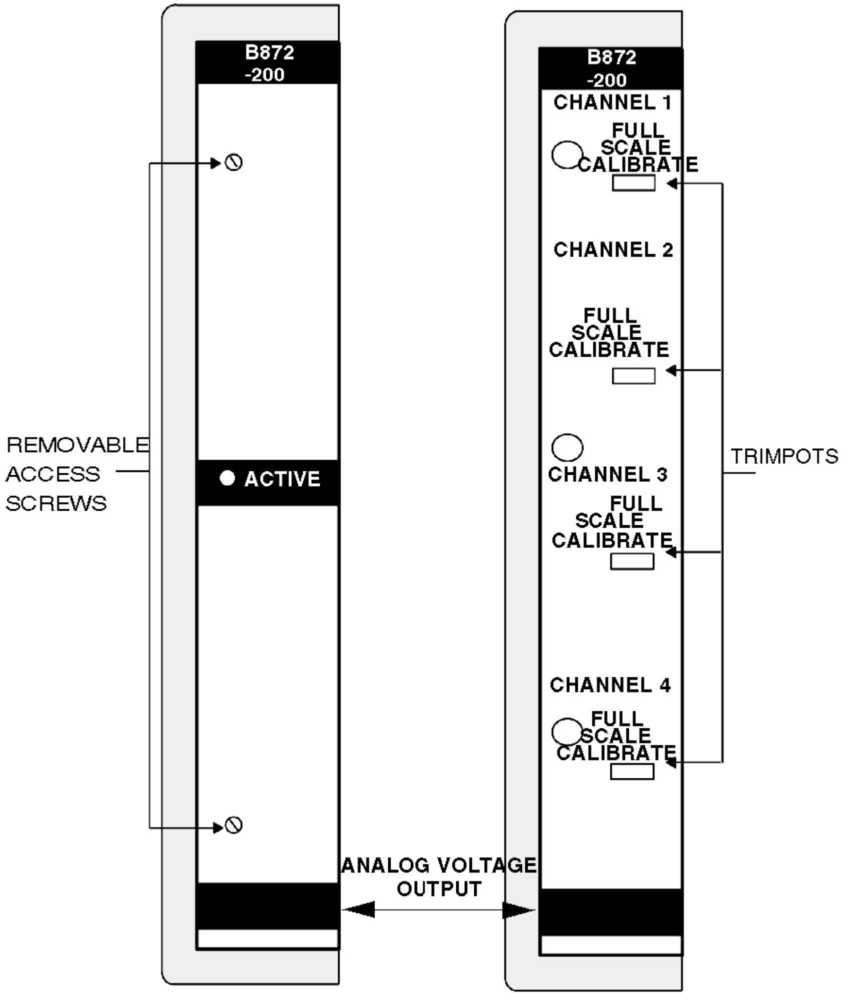
Calibration Procedure

The following table shows the steps to calibrate the B872-200 module:

Step	Action
1	Remove the two screws and the label located on the front panel of the analog output module. This allows you access to the trim-pots. There is one trim-pot per output. The first trim-pot is for output number one, the second set is for output two, etc. The trim-pots adjusts the range's total magnitude (full scale). Refer to the figure below. **Note** The 0.1% tolerance is the maximum FSR accuracy achievable thru calibration for any volt range. Calibrating any range to the 0.1% tolerance throws the other slightly off; i.e., tolerances for the remaining ranges available to that channel cannot be assumed better than +/- 0.25% FSR.
2	Open the analog output module handle to expose the connectors and terminals.
3	Connect the voltmeter minus lead (-) to the channel 1 (Analog Common CH1) and the plus lead (+) to the channel 1 (Analog Output CH1) terminal. Refer to the voltmeter connections diagram below. **Note** Field wiring may remain connected during calibration.
4	With the desired voltage range already selected. Manually program a data value of 4095 into the output register for channel two. Compare channel output voltage with anticipated voltmeter reading given in the table below.
5	Adjust the (full scale calibrate) trim-pot for corresponding channel to get desired voltmeter reading.
6	Repeat steps 3 through 5 for remaining channels.
7	After the calibration procedure is complete, disconnect the voltmeter, return all connections to their original state, close the module handle, and replace the front label that covers the trim-pots. END OF PROCEDURE

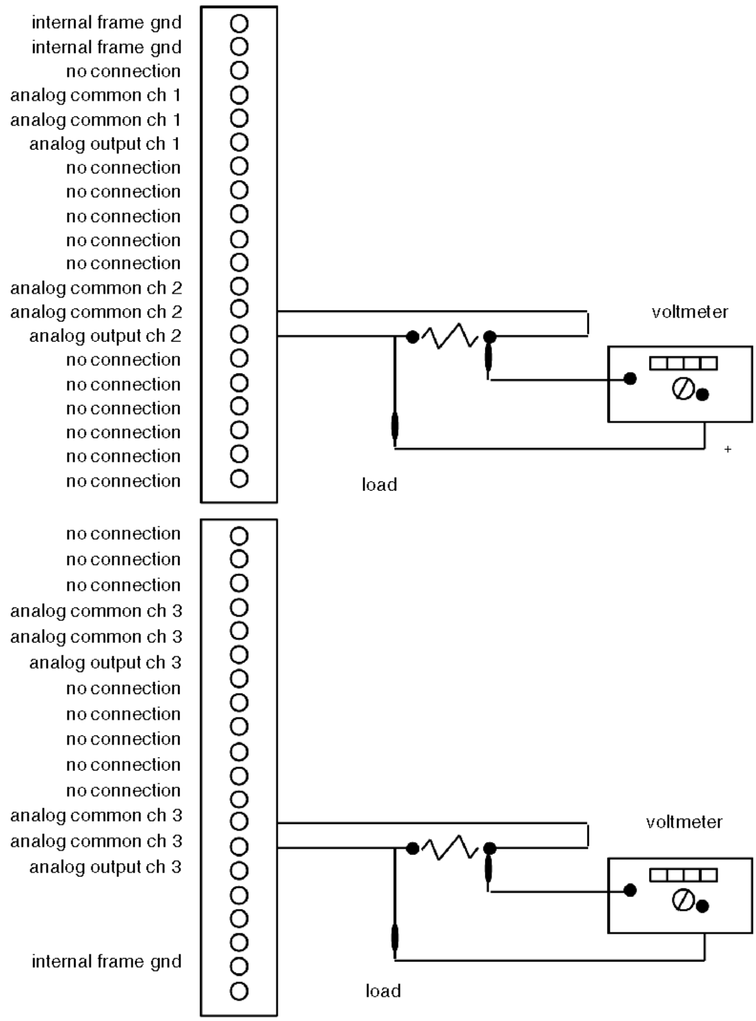
Location of Trim-Pots

The following figure shows the location of the Trim-Pots on the B872-200 Module.



Voltmeter Connections

The following figure is the voltmeter connections diagram for the B872-200 module.



Data Value to Output Channel

The following table gives data value to output channel, for the B872-200 module.

Selected Voltage Range	Data Value	Voltmeter Reading
-5 to 5 V	4095	4.9976
-10 to 10 V	4095	9.99951
0 to 5 V	4095	4.9988
0 to 10 V	4095	9.9976

B872-200 Specifications

B872-200 Specifications

The following table gives the specifications for the B872-200 module:

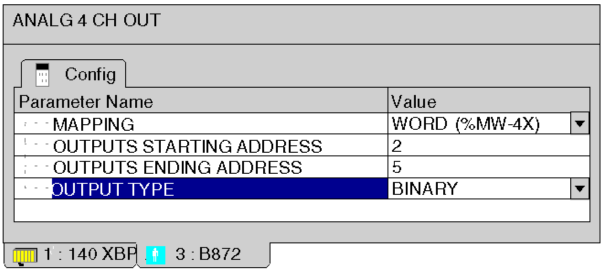
Description	Analog output, D/A
Number of Points	4
Operating Range Voltage	0 - 5 Vdc, 0 - 10 Vdc, -5 to 5 Vdc, -10 to 10 Vdc; selectable per channel
Maximum Output Current	10 mA
Minimum Load	0-5 V= 500 Ω 0-10 V= 1 kΩ -5 to +5 V= 500 Ω -10 to +10 V=1 kΩ
Response Time to Within +/_0.1% of Full Range	35 mS, all four channels
Valid Data Values	0 thru 4095
Resolution	1 part in 4096 counts
Accuracy*** Output Errors @ 25 °C (77 °F) Overall Nonlinearity Differential Nonlinearity *** All percentages are of full range.	 +/-0.1% @ 25 °C absolute +/-0.024% +/-0.036%
Output Isolation Output to OURBUS Channel to Channel	 1500 Vac or 2500 Vdc for 1 minute 500 Vac or 500 Vdc continuous operation 1500 Vac or 2500 Vdc for 1 minute 500 Vac or 500 Vdc continuous operation
Conversion Resolution Update Time Settling Time Linearity Differential Nonlinearity Crosstalk	 12-bits (1 part in 4096) The module can accept new data every 1 mS for a 4 channel update Within +/-0.1%, < 350mS 0 to 60 °C, +/- 1 LSB maximum 0 to 60 °C, +/- 1.5 LSB maximum -92 dB
Load Inductance	1 Henry max, with no external diode suppression
Power Required +5 V +4.3 V -5 V	 750 mA 5 mA 0 mA

Terminal Connector	AS-8535-000
Reference Type	Mapped as 4 registers output 4x
Output Type	BIN/BCD

B872-200 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	WORD (%MW-4X)	-
Outputs Starting Address	2	-
Outputs Ending Address	5	-
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 4 registers output 4x	Mapped as 4 words output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 6
B873-002 and B875-002 Analog Input

Purpose

The purpose of this chapter is to describe the B873-002 and B875-002 analog input modules.

What Is in This Chapter?

This chapter contains the following topics:

B873-002 and B875-002

B873-002 and B875-002 Modules

The B873-002 and B875-002 are analog input modules that can be used with 984 programmable controllers. The only difference between the two modules is that the B873-002 has four input channels and the B875-002 has eight input channels.

The module can be set to produce a data value in the standard range (0000 to 4096) or the elevated range (4095 to 8192). It accepts inputs of 1.0 to 5.0 V or 4 to 20 mA. (Refer to *B873-002 and B875-002 Field Connections,* *page 97*).

Converting Analog Data

The input is converted to a numerical value, ranging from 0001 to 4095 or 4096 to 8191. Values of 0000, 4095, 4096, or 8192 indicate invalid data and a possible problem. (Refer to the *Data Value Reference Chart,* *page 95*). The value is directly proportional to the input signal. For example, an input voltage of 3.0 V causes the module to send a value of 2048 (standard). Or the input could be 12 mA, which would produce a value of 6144 (elevated). (Refer to *Input to Data Value Conversion,* *page 94*).

NOTE: No voltage or current on an input channel produces a data value of 0000 (standard) or 4095 (elevated).

The PLC polls the module and places the values into designated (3x) input registers.

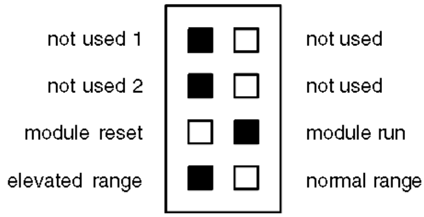
Each time the module is powered up, it:

1 performs diagnostic tests
2 resets the input latches
3 presents a value of 0000 to the controller for each channel; this value is present for approximately 3 s after power up
4 starts converting the inputs according to the schedule found in the *B873-002 and B875-002 Throughput Rate,* *page 96*

B873-002 and B875-002 Switch Settings and Indicators

Switch Settings

There is a DIP switch located at the rear of the module. Switches 1 and 2 are not used. Switch 3 can be set to either module reset or module run. It must set to the module run position for the module to operate. Switch 4 is used to set which data value range the module will produce. Select either normal range or elevated range. Make sure you set Switch 3 and 4 before inserting the module into the housing. Refer to the figure below for a key to setting the DIP switch.



black box indicates switch in down position

Indicators

The Active, Over Range, Under Range indicators are located on the front panel of the module. The Over Range and Under Range indicators are shared by all of the module's input channels. The module's status can be determined by referring to the table below.

The following table gives the Indicator readings for the B873-002 and B875-002 modules:

Indicator	State	Condition
Active	on blinking off	The module is communicating properly and PLC is running The module failed the powerup reference test The module failed the internal diagnostic test/PLC is not in Run mode/communication from PLC to module has failed
Over Range	off on or flickering	All input are within the valid input range One or more inputs have exceeded the valid input range
Under Range	off on or flickering	All input are within the valid input range One or more inputs have dropped below the valid input range

B873-002 and B875-002 Installation

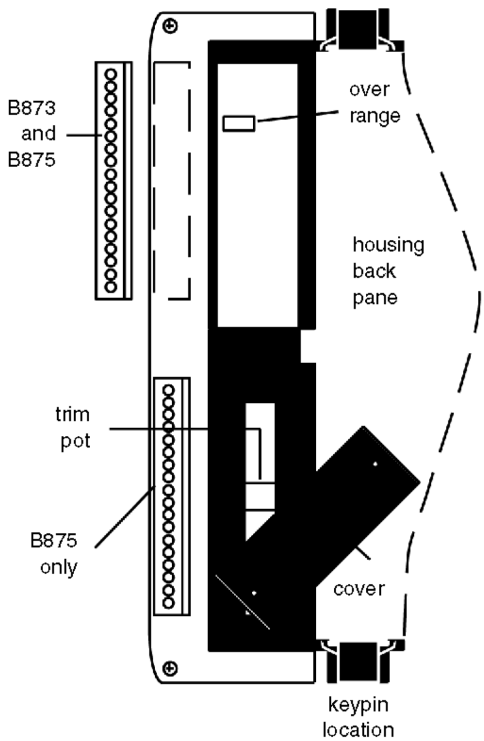
Installing the Module

Remove the module from the box and check for damage. If damage is found, contact your salesman or distributor for correct return procedure.

Set switch three to the module run position, and switch four to the data range selected for input - either standard or eevated - before inserting the module into the housing. (Refer to *Switch Settings,* *page 89*).

Module Characteristics

The following figure shows the 873 / 875 module, at pre-installation.



Included with the module is an analog connector set (Part# AS-8533-001 for B873-002 and Part# AS-8533-002 for B875-002).

The connector set consists of two mounting screws, a wire duct, and either one (B873-002) or two (B875-002) field wiring connectors. Each connector has eighteen recessed slotted screw terminals and can accept various wire gauges, but 16 to 20 gauge is recommended for the field side wiring.

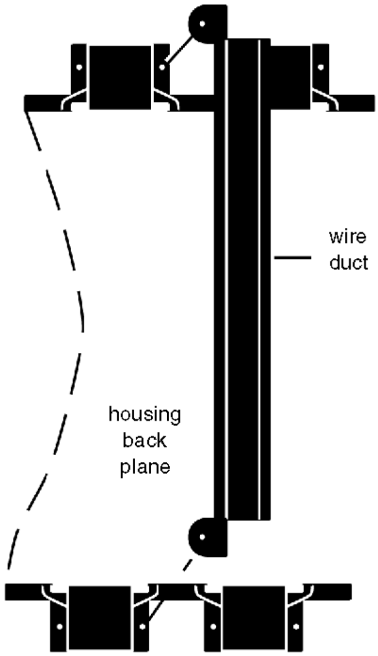
NOTE: The wiring connections can only be made with an 1/8 inch blade screwdriver.

The connector plugs into the module with the field wiring to the left. The removable connector permits module removal and replacement without disturbing the wiring. Refer to the diagram for the terminal numbering for the terminal functions.

The wire duct protects the connections to the analog input module from being damaged or loosened when the module to its immediate left is removed.

Installing the Wire Duct

The following is the wire duct installation diagram, for the B873/B875 module.



Steps to Installation

The following table lists the steps for installing the B873/B875 module:

Step	Action
1	Turn off the power to the housing.
2	Determine which slot will be used for the analog module.* If there is a duct present, and it is different from the one provided in the connector set, then it must be removed.This is accomplished by removing the two screws located on the top and bottom of the housing and then pulling the duct out.
3	If there is a module to the left of this slot, it must be removed until installation of the duct is complete.
4	Insert the wire duct between the two slots with the screw holes to the left. (Refer to the installation diagram.)
5	Using the two 1/4 inch slotted screws provided in the package, secure the wire duct to the housing.
6	Re-install the module(s) and complete the wiring connections. *The wire duct can not be installed for the left-most slot of the housing. Therefore the use of this slot for the analog module is not recommended.

B873-002 and B875-002 Calibration

Required Tools

Calibration is recommended at 12 month intervals for operation at or below 405 C (1045 F) and at 6 month intervals between 405 and 605 C (1045 and 1405 F).

The following tools are needed to calibrate a B873-002 or B875-002 module in a running system:

1.	A programmer
2.	A precision voltmeter
3.	An Analog DC Voltage/Current
4.	A 1/4 inch Phillips screwdriver
5.	A 1/8 inch standard screwdriver
6.	An adhesive for the trim pot adjusting screw (e.g. Locktight Glyptol)

Calibration Adjustments

To achieve full accuracy of the module, allow it to warm up for one hour with a valid input present at the channel to be used for the calibration. Without warm up, the accuracy of the data values will be +/-%2 counts.

Steps to Calibration

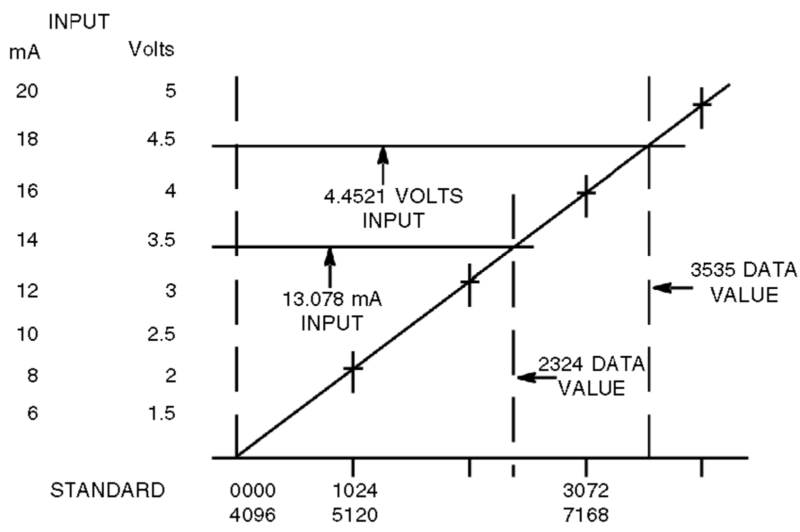
The adjustments can be made using a voltage or current source. Use steps 5a through 10a for voltage or steps 5b through 10b for current.

1.	Remove trim pot access cover, located on the front panel.
2.	Open module handle to expose connector(s) and terminal(s).
3.	Unplug field wiring connector(s).
4.	Set up Programmer to monitor the register for the channel used for calibration.
Method using a voltage source:	
5a.	Connect the positive lead of the voltage source to the channel's input + terminal and the negative lead to the channel's input - terminal.
6a.	Set voltage source to output 1.00048 volts.
7a.	While monitoring the register, adjust the top trim pot until the value toggles between 0000 and 0001 (Standard) or 4095 and 4096 (Elevated).
8a.	Use an adhesive to secure the adjusting screw on the trimmer.
9a.	Set voltage source to output 4.99951 volts.
10a.	While monitoring the register, adjust the bottom trim pot until the value toggles between 4095 and 4096 (Standard) or 8191 and 8192 (Elevated).

Method using a current source:*	
5b.	Connect the positive lead of the current source to the channel's input + terminal and the negative lead to the channel's input - terminal.
6b.	Set current source to output 4.002 mA.
7b.	While monitoring the register, adjust the top trim pot until the value toggles between 0000 and 0001 (Standard) or 4095 and 4096 (Elevated).
8b.	Use an adhesive to secure the adjusting screw on the trimmer.
9b.	Set current source to output 19.998mA.
10b.	While monitoring the register, adjust the bottom trim pot until the value toggles between 4095 and 4096 (Standard) or 8191 and 8192 (Elevated).
11.	Disconnect input source.
12.	Re-connect field wiring.
13.	Close module handle.
14.	Replace trim pot access cover.
* To use this method, a jumper must be connected between the Current Sense terminal and the Input + terminal of the channel to be calibrated.	

Input to Data Value Conversion

The following figure shows the Input to Data Value Conversion chart.



Calculation for determining Data Value (refer to the figure above and the table below):

Voltage:

(Input Voltage - 1) X 1024

Example: (Refer to Graph)

(4.4521V - 1) X 1024

3.4521 X 1024 = 3534.9504 (Add 4096 for Elevated Value)

Data Value = 3535 Standard 7631 Elevated

(Rounded to the nearest whole number)

Current:

(Input Current - 4) X 256

Example: (Refer to Graph)

(13.078mA - 4) X 256

9.078 X 256 = 2323.968 (Add 4096 for Elevated Value)

Data Value = 2324 Standard 6420 Elevated

(Rounded to the nearest whole number)

Data Value Reference Chart

The following is the Data Reference Chart for the B873-200 & B875-200 Modules.

Standard	Elevated	Input Voltage, Current, or Condition
0000	0000	1. First three seconds after power up 2. During failure recovery
0000	4095	Under range
0000	OFF	1.0000V or 4 mA
4095	4096	4.999V or 19.995 mA
4095	8192	Over range

B873-002 and B875-002 Throughput Rate

Update Interval

Update Interval:*

B873- 4 Channels 400 ms

B875- 8 Channels 710 ms

Out of Range 220 ms per channel

All registers are updated every 400 or 710 ms, as long as the inputs on all of the channels are within the valid range. 220 ms is added to the update interval for each channel either under or over range. The input is considered under range when the voltage is at -3 V or below. This keeps unused channels from adding time to the update interval.

NOTE: The over range indicator will be on or flickering, if the input on any channel is between .999 and -2.999 V or below 4 mA; but the 220 ms time will not be added to the update interval.

Update Interval Example

On an eight channel module, 2 channels are under range. All the registers assigned to the module will be updated every 1150 ms, until the inputs on the out of range channels return to the valid range. When they do, the update interval will return to 710 ms.

Update Interval =

(400 or 710) + (out of range channels X 220)

Using the example above:

(710) + (2 X 220) = 1150 ms

If one channel returned to the valid range, the update interval would reduce to 930 ms.

NOTE: As long as the channel is out of range, the register assigned to it will either have data of 0000 (4095 elevated), under range, or 4096 (8192 elevated), over range. (Refer to the data value reference chart)

* The update interval is the amount of time necessary to update the data for all the registers assigned to the module.

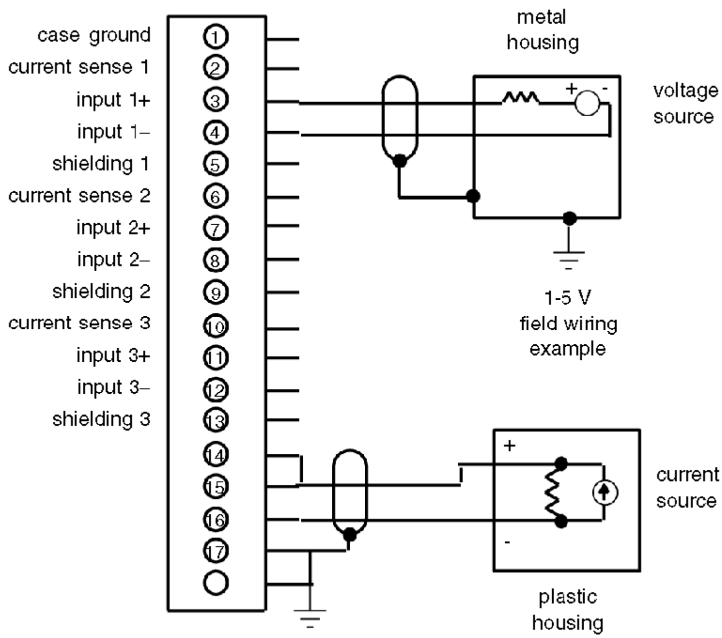
B873-002 and B875-002 Field Connections

User Connections

User connections are made to a standard screw terminal strip; and the rigid wiring system permits module insertion or removal without disturbing the wiring.

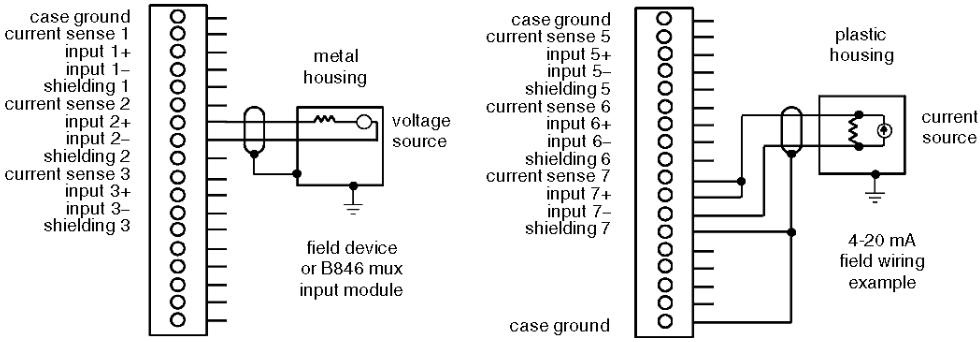
B873-002 Terminal Numbering and Wire Connections

B873-002 terminal numbering and corresponding input functions are presented below.



B875-002 Terminal Numbering and Wire Connections

B875-002 terminal numbering and corresponding output functions are presented below.



NOTE: If a user has a process where the over-range or under-range detection is immaterial, the unused voltage or current terminal, including the shields, on the field connector should be jumpered to case ground.

If over-range or under-range detection is important to your process, and this detection is causing throughput problems with the unused channels (because they float or spike outside the range), then the unused voltage or current channels at the field connector, should be connected in parallel, to a valid Input channel. As long as the valid channel stays within range, the tied channels will also stay within range.

For current, 4 to 20 ma operation, the valid Input is the only Input requiring the 250 Ω resistor to be in the circuit.

Case ground is effective when the H8XX housing is connected to earth ground.

The shield cannot be connected, both ends, to the device and the module. The exception to this is where the device shield is part of the device input circuit, and is not connected internally to device case ground.

NOTE: Any module run-time diagnostic failure will result in a 0000 value being returned to the controller, regardless of selected range.

B873-002 and B875-002 Specifications

Module Specifications

The following table gives specifications for the B873-002 and B875-002 input modules.

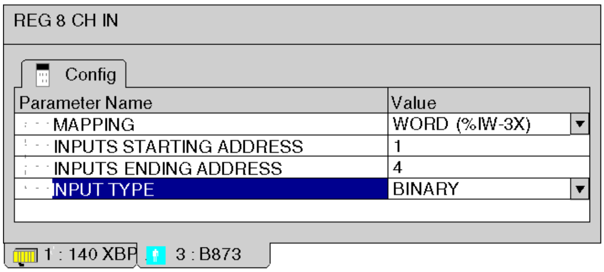
Description	Analog input 4 - 20 mA, 1 - 5 Vdc
Number of Channels	4, (B873-002) 8, (B875-002)
Operating Range Voltage/Current	1 - 5 Vdc / 4 - 20 mA
Impedance Voltage Current	 0.5 MΩ per input 1 MΩ differentially
Resolution	12 bit
Filter	-3 dB @ 18 Hz Rolloff -20 dB per decade
Linearity	+.05% of full scale @ 25 °C (77 °F)
Protection	240 Vac RMS
Common Mode Range Rejection	 0 Vac to 30 Vac RMS > -86 dB @ 60 Hz
Isolation Channel to Channel Input to Case Module	 250 Vac RMS 500 Vac RMS for one minute 1500 Vac RMS for one minute 300 Vac RMS continuous
Accuracy Overall At 25 °C (77 °F) Offset Drift Gain Drift	 7 mV or 19.7 μA +/-0.488 mV or +/-1.95 μA @ 1.2207 mV +/-30 μV or +/-0.12 μA per °C +/-16.7 μV or +/-0.07 μA per °F +/-15 ppm per °C
Repeatability	Over a twenty-four hour period, with a constant voltage and at a constant operating temperature, the input data value will be within +/-2 counts.
Power Required +5 V +4.3 V -5 V	 300 mA 300 mA 0 mA

Data Format 0000 4095 0000 to 4095 4096 to 8191 4096 8192	 Power Up On diagnostic failure or during failure recovery Under range - standard Under range - elevated Valid - standard range Valid - elevated range Over range - standard Over range - elevated
Throughput Rates Update Interval Out of Range Terminal Connector	 4 channels 400 ms 8 channels 710 ms (Including diagnostics) 220 ms for each channel in under or over range condition (Refer to throughput section) AS-8533-001 (B873-002) AS-8533-002 (B875-002)
Reference Type	B873-002 Mapped as 4 registers input 3x B875-002 Mapped as 8 registers input 3x
Input Type	BIN/BCD

B873-002 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	WORD (%IW-3X)	-
Inputs Starting Address	1	-
Inputs Ending Address	4	-
Input Type	BINARY	BCD

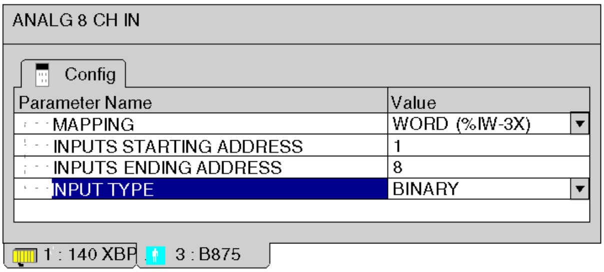
Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 4 registers input 3x	Mapped as 4 words input %IWx
Input Type	BIN/BCD	BIN/BCD

B875-002 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	WORD (%IW-3X)	-
Inputs Starting Address	1	-
Inputs Ending Address	8	-
Input Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 8 registers input 3x	Mapped as 8 words input %IWx
Input Type	BIN/BCD	BIN/BCD

Chapter 7
B873-012 and B875-012 Analog Input

Purpose

This chapter explains features and operation of the B873-012 and B875-012 analog input modules.

What Is in This Chapter?

This chapter contains the following topics:

B873-012 and B875-012 Overview

Module Features

The B873-012 and B875-012 are analog input modules and can be used with 984 Programmable Controllers. The only difference between the two modules is that the B873-012 has four input channels and the B875-012 has eight input channels.

Both modules accept inputs of -10 to +10 volt analog signals. The input is converted to a numerical value, ranging from 0001 to 8191. Values of 0000 or 8192 indicate invalid data. (Refer to the Data Value Reference Chart.) The value is directly proportional to the input signal. For example, an input voltage of -5V causes the module to send a value of 2048. If the input signal goes to 5 V, the module sends a value of 6144. (Refer to Input to Output Data Conversion Chart.)

NOTE: 0.0 V or no voltage on an input channel produces a value of 4096.

The PLC polls the module and places the values into input registers (30XXX) designated by the programmer.

Each time the module is powered up, it performs diagnostic tests, resets the input latches, and, for each channel, presents a value of 0000 to the controller. The value is present for approximately three seconds after power up. The module will then start converting the inputs according to the schedule found in the Throughput Rate Section.

B873-012 and B875-012 Switch Settings and Indicators

Switch Settings

There is a DIP switch located at the rear of the module. Switches 1, 2 and 4 are not used. Switch 3 can be set to either module reset or module run. It must be set to the module run position for the module to operate. Make sure you set switch 3 before inserting the module into the housing. Refer to the figure below for DIP switch settings.

black box indicates switch in down position

Indicators

The Active and Over Range indicators are located on the front panel of the module. The Over Range indicator is shared by all of the module's input channels. The module's status can be determined by referring to the table below.

Indicator	State	Condition
Active	on blinking off	The module is communicating properly and the PLC is running The module failed the powerup reference test The module failed the internal diagnostic test/PLC is not in run mode/communication from PLC to module has failed
Over Range	off on or blinking	All input are within valid input range One or more inputs have exceeded the valid input range

B873-012 and B875-012 Installation

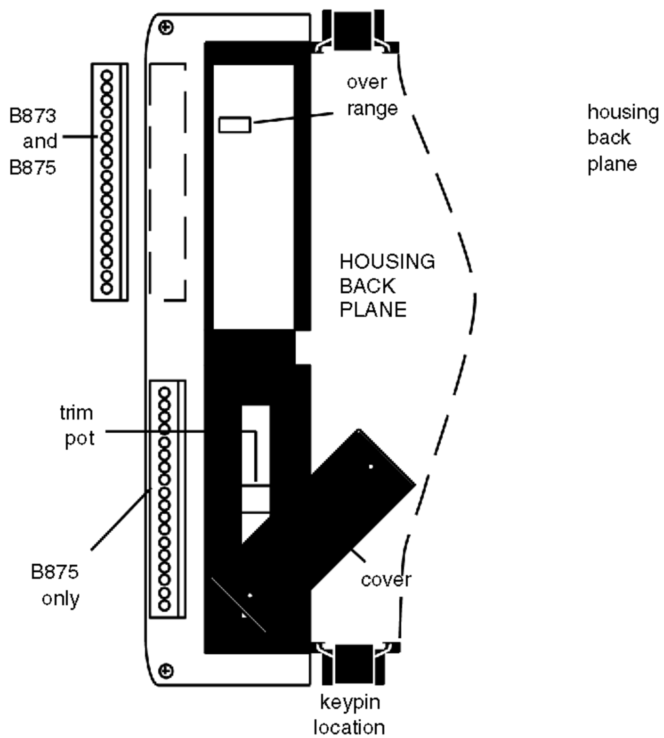
Installing the Module

Remove the module from the box and check for damage. If damage is found, contact your salesman or distributor for correct return procedure.

Set switch three to the module run position and switch four to the data range selected for input - either standard or elevated - before inserting the module into the housing. (Refer to *Switch Settings*, *page 105*.)

Module Characteristics

The following figure shows the B873-012 / B875-012 module at pre-installation.



Included with the module is an analog connector set (Part# AS-8533-001 for B873-012 and Part# AS-8533-002 for B875-012).

The connector set consists of two mounting screws, a wire duct, and either one (B873-012) or two (B875-012) field wiring connectors. Each connector has eighteen recessed slotted screw terminals and can accept various wire gauges, but 16 to 20 gauge is recommended for the field side wiring.

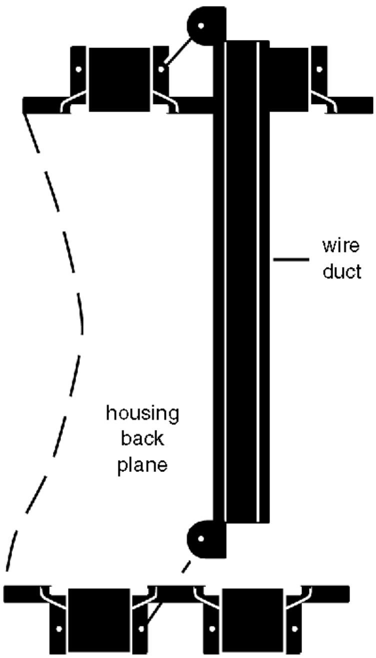
NOTE: The wiring connections can only be made with a 1/8 inch blade screwdriver.

The connector plugs into the module with the field wiring to the left. The removable connector permits module removal and replacement without disturbing the wiring. Refer to diagram for terminal numbering, for terminal functions.

The wire duct protects the connections to the analog input Module from being damaged or loosened when the module to it's immediate left is removed.

Installing the Wire Duct

The following figure is the wire duct installation diagram.



Steps to Installing the Wire Duct

The following step table describes the installation of the wire duct, for the B873-012 and B875-012 modules:

Step	Action
1	Turn off the power to the housing.
2	Determine which slot will be used for the Analog Module.***** If there is a duct present and it is different from the one provided in the connector set, then it must be removed.This is accomplished by removing the two screws located on the top and bottom of the housing and then pulling the duct out.
3	If there is a module to the left of this slot, it must be removed until installation of the duct is complete.
4	Insert the wire duct between the two slots with the screw holes to the left. (Refer to the installation diagram.)
5	Using the two 1/4 inch slotted screws provided in the package, secure the wire duct to the housing.
6	Re-install the module(s) and complete the wiring connections. ***** The duct cannot be installed for the left-most slot of the housing. Therefore the use of this slot for the analog module is not recommended.

B873-012 and B875-012 Calibration

Required Tools

Calibration is recommended at 12 month intervals for operation at or below 405 C (1045 F), and at 6 month intervals between 405 and 605 C (1045 and 1405 F).

The following table indicates the tools required, to calibrate the B873-012 and B875-012 modules:

1.	A programmer
2.	A precision voltmeter
3.	An Analog DC Voltage/Current
4.	A 1/4 inch Phillips screwdriver
5.	A 1/8 inch standard screwdriver
6.	An adhesive for the trim pot adjusting screw (e.g. Locktight Glyptol)

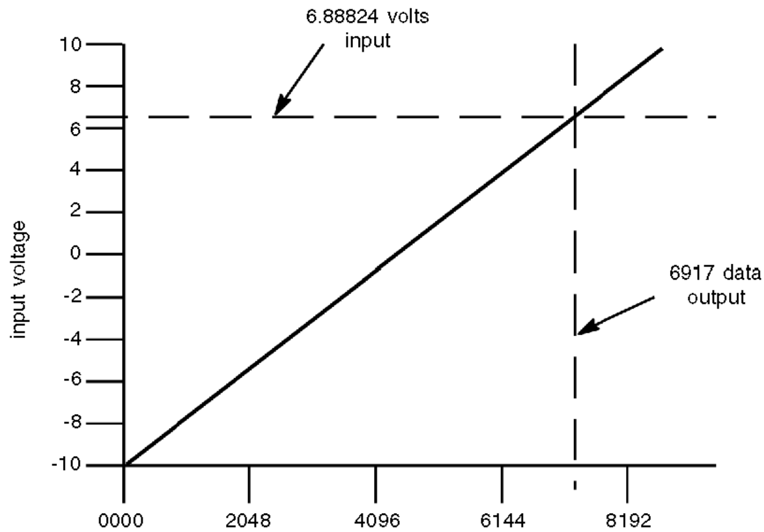
Gain Adjustments Procedure

To achieve full accuracy of the module, allow it to warm up for one hour, with a valid input present at the channel to be used for the calibration. Without warm up, the accuracy of the data values will be +2 counts. The following table gives the steps for adjusting the gain on the B873-012 and B875-012 modules:

Step	Action
1	Remove trim pot access cover, located on the front panel.
2	Open module handle to expose connector(s) and terminal(s).
3	Unplug field wiring connector(s).
4	Set up Programmer to monitor the register for the channel used for calibration.
5	Connect the positive lead of the voltage source to the channel's input + terminal and the negative lead to the channel's input - terminal.
6	Set voltage source to output 9.99877 volts.
7	While monitoring the register, adjust the trimmer until the value toggles between 8191 and 8192 in binary mode.
8	Use an adhesive to secure the adjusting screw on the trimmer.
9	Disconnect input source.
10	Re-connect field wiring.
11	Close module handle.
12	Replace trim pot access cover.

Input Voltage to Output Data Conversion

The following is the input voltage to output data conversion chart.



Determining Data Value from Input Voltage

Calculation for determining data value from input voltage (refer to the figure above and the table below.

(input voltage + 10) X 409.6

Example: (refer to graph)

(6.88824 V + 10) x 409.6

16.88824 x 409.6 = 6917.4231

data value = 6917 (Rounded to the nearest whole number)

Data Value Reference Chart

The following is the data value reference chart for the B873-012 & B875-012 input modules.

Data Value	Input Voltage, Current, or Condition
0000	1. First three seconds after powerup 2. During failure recovery 3. Under range
0001	-9.99756 V
4096	1. 0.00000 V 2. No voltage at input terminal
8191	9.99756 V
8192	Over range

B873-012 and B875-012 Throughput Rate

Update Interval

The following table provides Update Intervals for the B873-012 and B875-012 Modules.

Update Interval:*		
B873-	4 Channels	400 ms
B875-	8 Channels	710 ms
Out of Range		220 ms per channel

All registers are updated every 400 or 710 ms, as long as the inputs on all of the channels are within the valid range. 220 ms is added to the update interval for each channel either under or over range.

Throughput Rate Example

On an eight channel module, 2 channels are under range. All the registers assigned to the module will be updated every 1150 ms, until the inputs on the out of range channels return to the valid range. When they do, the update interval will return to 710 ms.

Update Interval =

(400 or 710) + (Out of Range Channels X 220)

Using the example above:

(710) + (2 X 220) = 1150 ms

If one channel returned to the valid range, the update interval would reduce to 930 ms.

NOTE: As long as the channel is out of range, the register assigned to it will either have data of 0000 (4095 Elevated), under range, or 4096 (8192 Elevated), over range. (Refer to *Data Value Reference Chart*, *page 111*)

* The Update Interval is the amount of time necessary to update the data for all the registers assigned to the module.

NOTE: Any module run-time diagnostic failure will result in a 0000 value being returned to the controller, regardless of selected range.

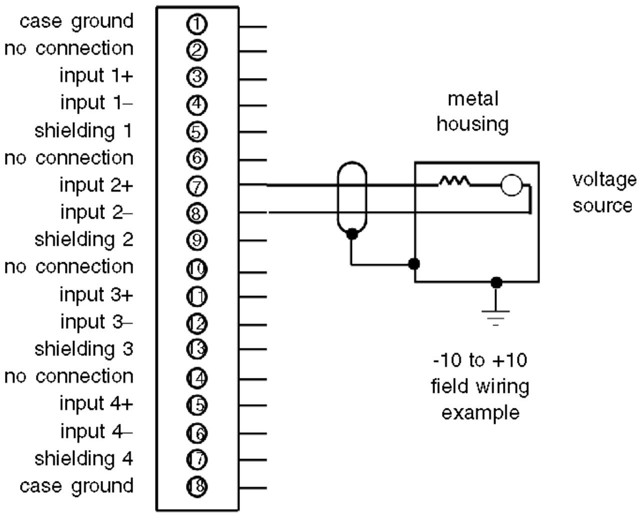
B873-012 and B875-012 Field Connections

User Connections

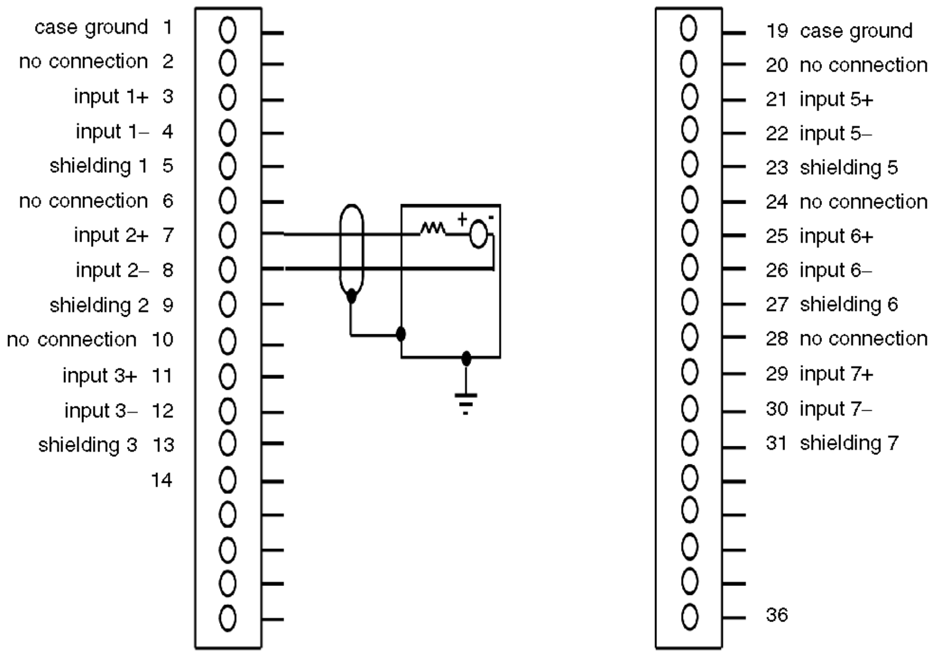
User connections are made to a standard screw terminal strip, and the rigid wiring system permits module insertion or removal without disturbing the wiring.

B873-012 Terminal Numbering and Wire Connections

B873-012 terminal numbering and corresponding input functions are presented in the figure below.



B875-012 terminal numbering and corresponding input functions are presented in the figure below.



B873-012 and B875-012 Specifications

Module Specifications

The following table gives specifications for the B873-012 and B875-012 input modules.

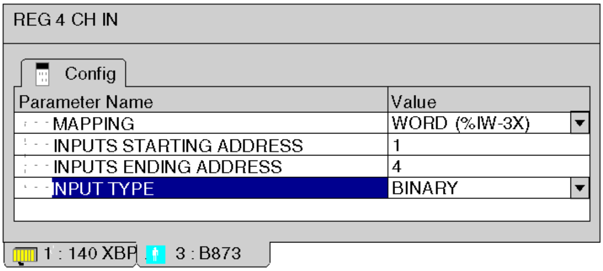
Description	Analog input -10 to +10 VDC
Number of Channels	4, (B873-012) 8, (B875-012)
Operating Range	-10 to +10 VDC
Impedance	0.5 MΩ per input 1 MΩ differentially
Resolution	13 bit
Filter	-3 dB @ 18 Hz Rolloff -20 dB per decade
Linearity	+.05% of full scale @ 25 °C (77 °F)
Protection	240 VAC RMS
Common Mode Range Rejection	 0 VAC to 30 VAC RMS > -86 dB @ 60 Hz
Isolation Channel to Channel Input to Case Module	 250 VAC RMS 500 VAC RMS for one minute 1500 VAC RMS for one minute 300 VAC RMS continuous
Accuracy Overall At 25 °C (77 °F) Offset Drift Gain Drift	 17.1 mV 1.2207 mV 100 μV per °C 55.6 μV per °F +/-15 ppm per °C +/-8.3 ppm per °F
Repeatability	Over a twenty-four hour period, with a constant voltage and at a constant operating temperature, the input data value will be within +/-2 counts.
Power Required +5 V +4.3 V -5 V	 300 mA 300 mA 0 mA

Data Format 0000 0001 to 8191 8192	 Power Up On diagnostic failure or during failure recovery Under range Valid Over range
Throughput Rates Update Interval Out of Range	 4 channels 400 ms 8 channels 710 ms (Including diagnostics) 220 ms for each channel in under or over range condition
Terminal Connector	AS-8533-001 (B873-012) AS-8533-002 (B875-012)
Reference Type	B873-012 Mapped as 4 registers 3x B875-012 Mapped as 8 registers 3x
Input Type	BIN/BCD

B873-012 Parameter Configuration

Parameter and Default Values

Parameter Configuration Window



Module Configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	WORD (%IW-3X)	-
Inputs Starting Address	1	-
Inputs Ending Address	4	-
Input Type	BINARY	BCD

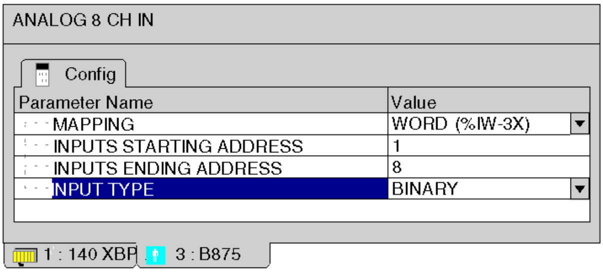
Mapping Parameter References

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 4 registers input 3x	Mapped as 4 words input %IWx
Input Type	BIN/BCD	BIN/BCD

B875-012 Parameter Configuration

Parameter and Default Values

Parameter Configuration Window



Module Configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	WORD (%IW-3X)	-
Inputs Starting Address	1	-
Inputs Ending Address	8	-
Input Type	BINARY	BCD

Mapping Parameter References

	984LL, Concept, ProWORX	Control Expert
Reference Type	Mapped as 8 registers input 3x	Mapped as 8 words input %IWx
Input Type	BIN/BCD	BIN/BCD

Chapter 8
B875–102 High Speed Analog Input

Purpose

This chapter describes the functional and physical characteristics of the B875–102 high speed analog input module.

What Is in This Chapter?

This chapter contains the following topics:

B875–102 High Speed Analog Input, Inputs

Configuration

Module inputs are configurable in two groups by means of DIP switches.

The following table shows input switch group assignments for the four or eight input circuit configurations.

Configuration	Input Group A	Input Group B
Eight Input circuits	1, 2, 3, 4	5, 6, 7, 8
Four input circuits	1, 2	3, 4

Input Ranges

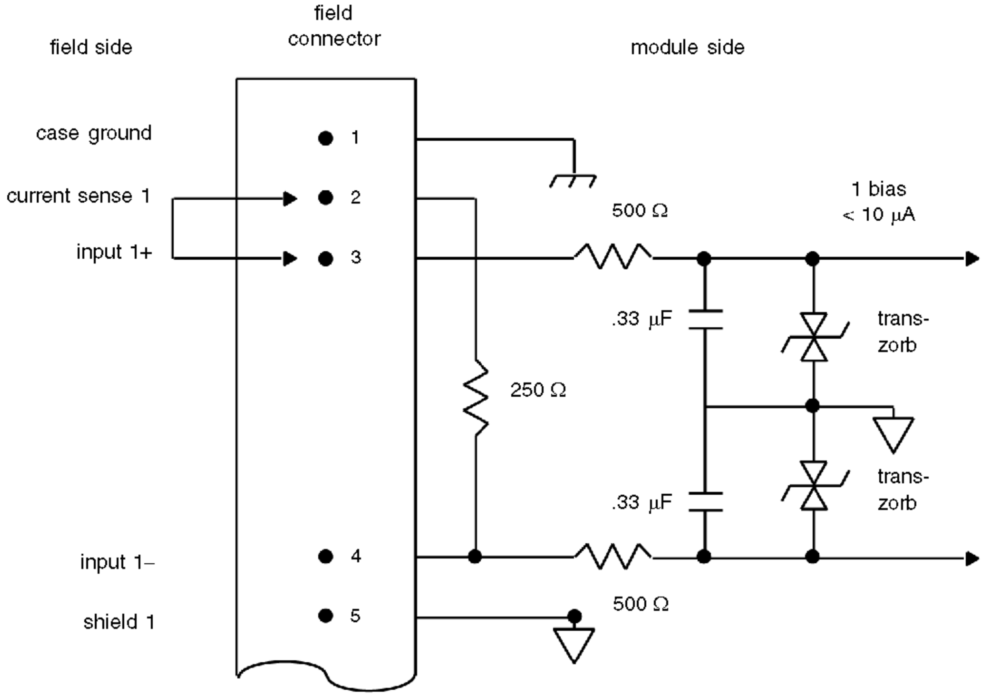
The following table shows the five input ranges acceptable to each input range group. The module will accept an input as much as 2% FSR above its specified range without going into an over-range condition, but nothing below range.

Voltage range (V)	Corresponding Current Range (mA)
0—5	0—20
0—10	0—40
1—5	4—20
-10—+10	-40—+40
-5—+5	-20—+20

For purposes of determining load and protection considerations for the inputting of field circuits, The following figure is a schematic diagram of the input circuit's front end. Note the built-in 250 Ω resistor connected to the current input terminal. When the current sense terminal is externally jumpered to the positive input terminal, current input becomes possible for that input regardless of the voltage range selected.

NOTE: The current sense function has been provided specifically for the 4—20 mA current loop applications (1—5 V input range). However, current mode is operable on all ranges.

B875–102 High Speed Analog Input, Input Circuit Front End.



Notes:

1. Shield is tied to the ground within the module on the field side of the opto-barrier.
2. Circuit shown with current sense input jumpered to +input terminal for current inputs (instead of voltage inputs).

B875–102 High Speed Analog Input, Performance Considerations

Data Update Period

The data update period is the time taken by the module to present fresh data for each channel. With four input circuits, this period is no more than 2.4 ms; for an eight input circuit configuration, this period is no more than 3.0 ms.

Autocalibration

An internal autocalibration process is executed at appropriate times (if necessary) to compensate signal processing for front end drift. The autocalibration function employs feedback mechanisms to adjust the reference voltage to offset gain in the analog to digital converter. Calibration is monitored continuously in the background and adjusted if and when necessary. The following figure shows autocalibration points for all five input ranges. Autocalibration points are indicated by heavy dots on slope line.

The autocalibration process uses the 10 V reference to calibrate the module. The reference voltage is factory preset to exactly 10 volts (zeroed to four places). It should be readjusted in the field once per year.

Input Data Conversion

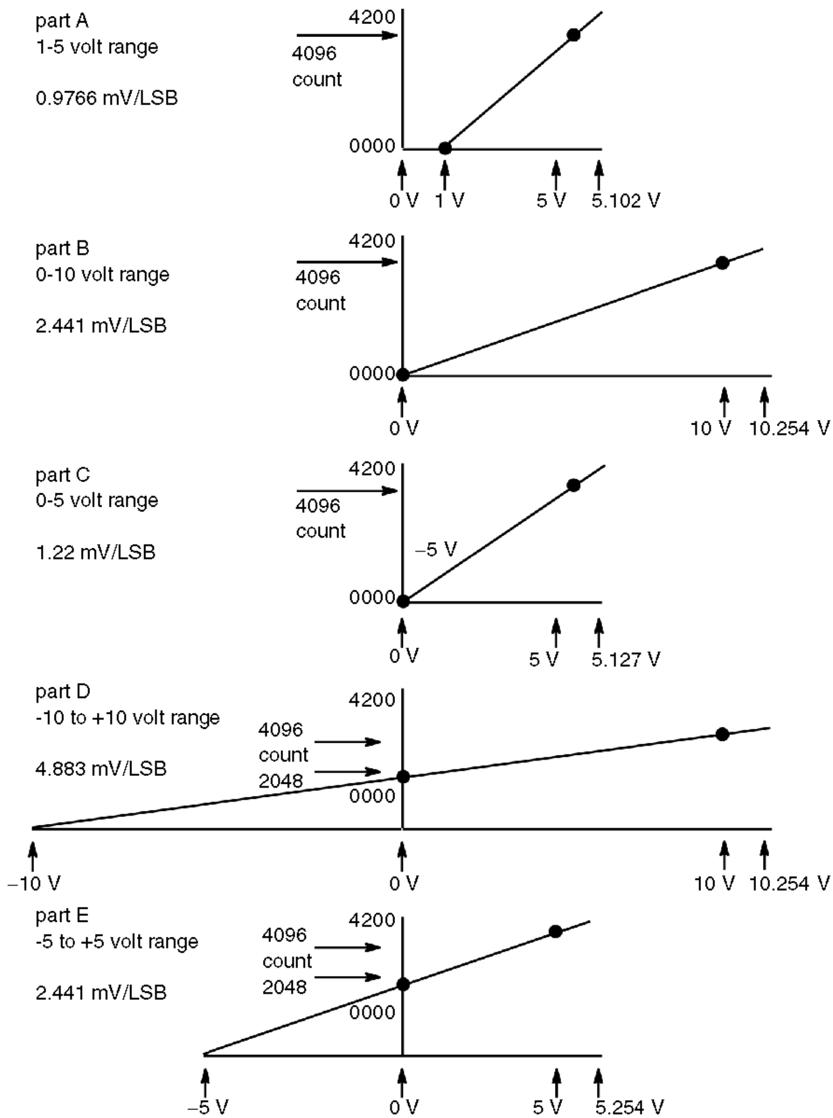
The input module performs an analog-to-digital conversion of an input analog signal with 12 bit resolution (i.e., 1 part in 4096). This implies that the least significant bit of the output code corresponds to slightly more than 0.024% of full scale.

The following illustration is a coarse grain conversion chart for plotting analog input against the equivalent numerical value output to the PC in raw binary format. The example illustrated shows an input voltage of 1.25 V (25% of 5 V FSR) and a numerical count of 1024 (25% of 4200) as projected through the 455 slope line.

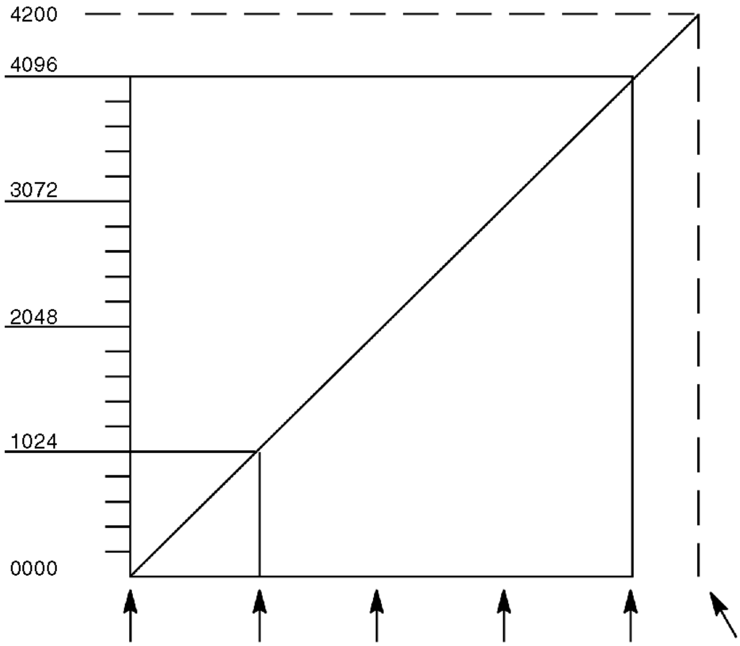
Calculate exact values using the following proportional equation:

Where FSR is full scale range for analog input (including bipolar) and FCR is full count range (4200) in a raw binary format.

B875–102 High Speed Analog Input Autocalibration Points—All Ranges



B875–102 Input Signal vs. Output Data (Raw Binary Format)



V. Range 0 to 5 V	0.0	1.25	2.5	3.75	5.0	5.127
I. Range 0 to 20 mA	0.0	5.0	10.0	15.0	20.0	20.500
V. Range 0 to 10 V	0.0	2.5	5.0V	7.5	10.0	10.254
I. Range 0 to 40 mA	0.0	10.0	20.0	30.0	40.0	41.016
V. Range -5 to +5 V	-5.0	-2.5	0.0	2.5	5.0	5.254
I. Range -20 to 20 mA	-20.0	-10.0	0.0	10.0	20.0	21.016
V. Range -10 to +10 V	-10.0	-5.0	0.0	5.0	10.0	10.508
I. Range -40 to 40 mA	-40.0	-20.0	0.0	20.0	40.0	42.032
V. Range 1 to 5 V	1.0	2.0	3.0	4.0	5.0	5.102
I. Range 4 to 20 mA	4.0	8.0	12.0	16.0	20.0	20.400

Format Conversion

The module is capable of presenting the digitized data to the PC in either raw binary (RB) or converted binary (CB) format. The bit pattern in each case is different. The format is switch selectable and need not be the same for each group of input circuits. A Modicon programmer will display either type of data in one of three different ways: binary, hexadecimal, or decimal form.

Conversion Accuracy

Conversion linearity for this module is 0.05% of full scale–referenced to a straight line drawn through the measured full-scale value and the measured zero point–over the module's operating temperature range.

Raw Binary (RB) Format After digitizing the input signal, the input module presents data in RB format. In decimal representation, data in RB format must be within the 0 to 4200 range. Normally, a 12--bit device would have an upper data limit of 4095. This analog module has the means of allowing the input to be up to 2% over-range at the same resolution (i.e., the count in raw binary may go up to 4200). In RB format, the data range is the same regardless of the voltage range.

Converted Binary (CB) Format CB is obtained by transforming the RB format within the module. When CB data is viewed by the PC or programmer in decimal mode, it looks like a 4-digit voltmeter (DVM) with no sign or decimal point. In CB for-mat, upper and lower data limits are voltage range dependent. Because of the missing sign, CB format is used only for unipolar voltage ranges.

The following figure shows an example of raw binary output. When a 5 V signal is digitized by the module set for 0 to 10 V range, it produces a converted binary code 0800 hex or 2048 decimal.

Raw Binary Word Format

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0

The following figure shows the conditions in converted binary format which produce 1388 hex or 5000 decimal.

Converted Binary Word Format

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	0	0	1	0	0	1	1	1	0	0	0	1	0	0	0

B875–102 High Speed Analog Input, Communications with the PLC

Input Ranges and Output Data Limits

As shown in the following table, data can be in either raw binary or converted binary format. Within the 2% maximum over-range margin allowed, no error code is reported to the PLC.

Input Ranges and Output Data limits

Voltage range	Input Voltage	Raw Binary	Converted Binary
0—5 V	0.000	0000	0000
	5.000	4096	5000
	5.127 (max)	4200	5127
1—5 V	1.000	0000	1000
	5.000	4096	5000
	5.127 (max)	4200	5102
0—10 V	0.000	0000	0000
	9.999	4095	9999
	10.000	4096	N/A
	10.254 (max)	4200	N/A
-5—+5 V	-5.000	0000	Disallowed
	0.0000	2048	N/A
	5.000	4096	N/A
	5.254 (max)	4200	N/A
-10—+10 V	-10.000	0000	Disallowed
	0.000	2048	N/A
	10.000	4096	N/A
	10.508 (max)	4200	N/A

Diagnostic Communications

Diagnostic procedures are executed during the five second initialization period following power--up. Diagnostic routines are also run during wait states concurrent with executing A/D conversions. System diagnostics are: RAM checks, ROM checks, UART checks, as well as checking the legality of configuration switch settings and monitoring the ability to autocalibrate.

If the module fails to pass an internal diagnostic, two retries are made. If either one succeeds, the temporary lack of diagnostic is not reported to the PLC but the module system continues processing uninterrupted. If the module fails the diagnostic three times, the system goes into a power--up reset condition. switch settings and monitor

NOTE: While power-up diagnostics are running, or following detection of a hard failure, data is not available to the PLC.

Good Data. The following illustration shows status flags and data word format for good data to the PLC. When sending good data, status flag bits 14 and 15 are reset to 0.

Good Data Word Output to PLC

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	0	0	RAW BINARY DATA												
0	0	CONVERTED BINARY DATA													

Out-of-range Data. The following figure shows status flags and data word format of out-of-range data output to the PLC. When sending out-of-range data, status bit 14 will be reset to 0, bit 15 will be reset to 1, and the out-of-range indicator will illuminate.

Out-of-range Data Word Output to PLC

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	0	0	RAW BINARY DATA												
1	0	CONVERTED BINARY DATA													

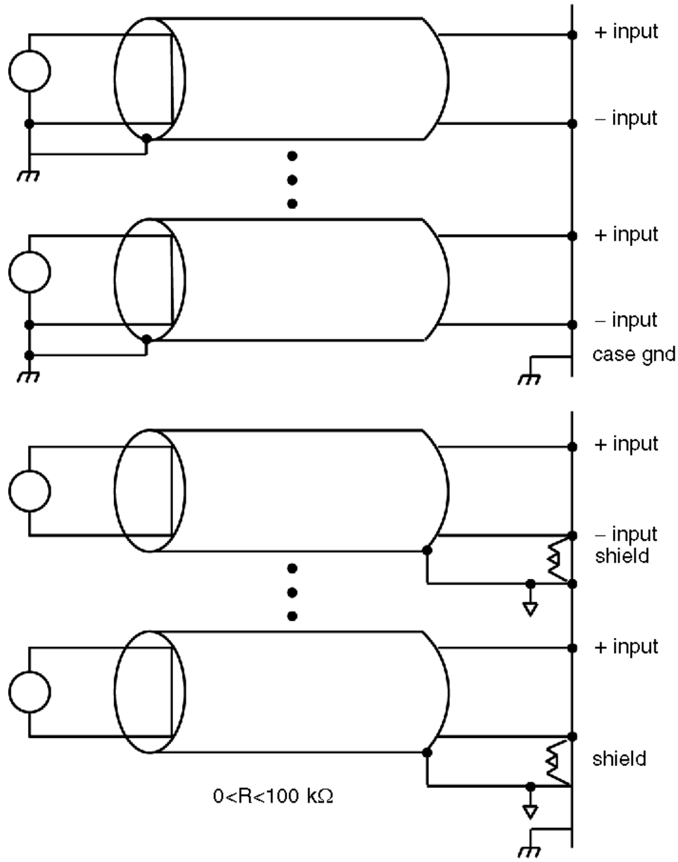
Out--of--Range requires careful examination. Since the module receives instantaneous data from the field but sends averaged data to the PLC, instantaneous data less than 0 or greater than 4200 in RB format is considered out-of-range. Such data will be forced (clamped) to 0000 for under--range and 4200 for over-range values. However, the averaged data will not necessarily be out-of-range if the condition existed for less time than the total averaging period.

In this case, the format indicates at least one of the instantaneous data samples in the average is out of range. Its value for averaging purposes is the clamped value; the average may or may not be out of range. The red out-of-range light will remain on as long as an out-of-range data sample is included in the average.

B875–102 High Speed Analog Input, Typical Circuit and Ground Connections

Field Connections

The following illustration shows typical field circuitry connected to the field connector.



NOTE: Shields 1—8 are tied together internally and also to field side ground within the module. For grounded sources, a jumper to case ground must be externally supplied by the user.

B875–102 High Speed Analog Input, Switch Settings

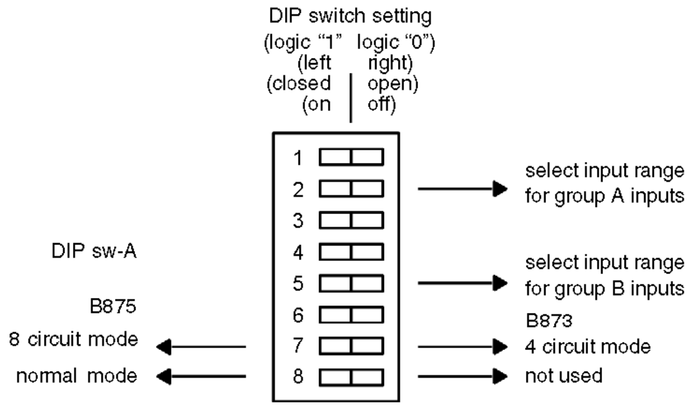
Dip Switch Bank A

The high speed analog input module can be set for any of the five input voltage or current ranges by means of DIP switches. You can also select from seven periods of digital filtering; a feature which allows an instantaneous voltage sample to become part of a moving average. The DIP switches also set the module for 4 or 8 circuit mode and binary or decimal output.

For discussion purposes, we will designate the upper DIP switch bank, A (DIP sw-A) and lower bank, B (DIP sw-B). These switches are accessed through ports at the rear of the module.

The following illustration shows DIP sw-A as seen from the rear of the module. Dip sw-A is used for selecting an input range.

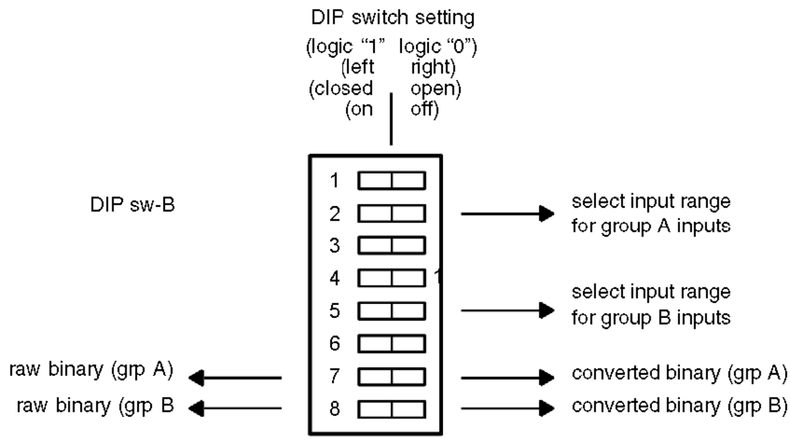
Dip switch bank A normal operation



Dip Switch Bank B

The following illustration shows sw-B. It is used to select input averaging.

DIP switch bank B-normal operation



NOTE: Both sw-A and sw-B follow the same switch setting conventions:
- on, closed, left, and logic "1" all mean the same.
- off, open, right, and "logic 0" all mean the same.
- The switch bank views shown are looking at the back of the module.

Setting Input Range

sw-A settings for all input ranges for both 8 and 4 input configurations, respectively, are shown in the following tables. sw-A has two functions in addition to input range setting

- Switch A7 is on for an 8-circuit configuration and off for a 4-circuit configuration
- Switch A8 must be on for normal operation

Inputs Group A (8 Circuit Mode)

The following table describes the input ranges for group A (inputs 1 - 4):

Input Range	Switch	On	Off
1 - 5 V 4 - 20 mA	A-1	X	
	A-2	X	
	A-3	X	
0 - 10 V	A-1		X
	A-2	X	
	A-3	X	
0 - 5 V	A-1	X	
	A-2		X
	A-3	X	
+/- 10 V	A-1		X
	A-2		X
	A-3	X	
+/- 5 V	A-1	X	
	A-2	X	
	A-3		X

Inputs Group B (8 Circuit Mode)

The following table describes the input ranges for group B (inputs 5 - 8):

Input Range	Switch	On	Off
1 - 5 V 4 - 20 mA	A-4	X	
	A-5	X	
	A-6	X	
0 - 10 V	A-4		X
	A-5	X	
	A-6	X	
0 - 5 V	A-4	X	
	A-5		X
	A-6	X	
+/- 10 V	A-4		X
	A-5		X
	A-6	X	
+/- 5 V	A-4	X	
	A-5	X	
	A-6		X

Inputs Group A (4 Circuit Mode)

The following table describes the input ranges for group A (inputs 1 - 2):

Input Range	Switch	On	Off
1 - 5 V 4 - 20 mA	A-1	X	
	A-2	X	
	A-3	X	
0 - 10 V	A-1		X
	A-2	X	
	A-3	X	
0 - 5 V	A-1	X	
	A-2		X
	A-3	X	
+/- 10 V	A-1		X
	A-2		X
	A-3	X	
+/- 5 V	A-1	X	
	A-2	X	
	A-3		X

Inputs Group B (4 Circuit Mode)

The following table describes the input ranges for group B (inputs 3 - 4):

Input Range	Switch	On	Off
1 - 5 V 4 - 20 mA	A-4	X	
	A-5	X	
	A-6	X	
0 - 10 V	A-4		X
	A-5	X	
	A-6	X	
0 - 5 V	A-4	X	
	A-5		X
	A-6	X	
+/- 10 V	A-4		X
	A-5		X
	A-6	X	
+/- 5 V	A-4	X	
	A-5	X	
	A-6		X

Setting Input Averaging

It is possible to compensate for spurious noise and other forms of amplitude modulation coming through the analog input filter by making the latest input sample part of a moving average–a form of digital filtering. This moving average technique has no affect upon the update interval.

The following tables show sw–B setting for selecting among seven input average sample periods for both 8 and 4 circuit configurations.

sw–B has other functions in addition to average sampling; switch B7 is set to on for binary code output or off for decimal code output for group A (inputs 1-4 in the 8 circuit mode and inputs 1-2 in the 4 circuit mode). Switch B8 does the same for group B.

SW-B Settings Group A (8 Circuit Mode)

The following table describes sw–B Settings for all periods of input averaging (eight circuits) for group A (inputs 1 - 4):

No. of samples averaged	Switch	On	Off
1	B-1	X	
	B-2	X	
	B-3	X	
2	B-1		X
	B-2	X	
	B-3	X	
4	B-1	X	
	B-2		X
	B-3	X	
8	B-1		X
	B-2		X
	B-3	X	
16	B-1	X	
	B-2	X	
	B-3		X
32	B-1		X
	B-2	X	
	B-3		X
64	B-1	X	
	B-2		X
	B-3		X

SW-B Settings Group B (8 Circuit Mode)

The following table describes sw–B Settings for all periods of input averaging (eight circuits) for group B (inputs 5 - 8):

No. of samples averaged	Switch	On	Off
1	B-4	X	
	B-5	X	
	B-6	X	
2	B-4		X
	B-5	X	
	B-6	X	
4	B-4	X	
	B-5		X
	B-6	X	
8	B-4		X
	B-5		X
	B-6	X	
16	B-4	X	
	B-5	X	
	B-6		X
32	B-4		X
	B-5	X	
	B-6		X
64	B-4	X	
	B-5		X
	B-6		X

SW-B Settings Group A (8 Circuit Mode)

The following table describes sw–B Settings for all periods of input averaging (eight circuits) for group A (inputs 1 - 2):

No. of samples averaged	Switch	On	Off
1	B-1	X	
	B-2	X	
	B-3	X	
2	B-1		X
	B-2	X	
	B-3	X	
4	B-1	X	
	B-2		X
	B-3	X	
8	B-1		X
	B-2		X
	B-3	X	
16	B-1	X	
	B-2	X	
	B-3		X
32	B-1		X
	B-2	X	
	B-3		X
64	B-1	X	
	B-2		X
	B-3		X

SW-B Settings Group B (8 Circuit Mode)

The following table describes sw–B Settings for all periods of input averaging (eight circuits) for group B (inputs 3 - 4):

No. of samples averaged	Switch	On	Off
1	B-4	X	
	B-5	X	
	B-6	X	
2	B-4		X
	B-5	X	
	B-6	X	
4	B-4	X	
	B-5		X
	B-6	X	
8	B-4		X
	B-5		X
	B-6	X	
16	B-4	X	
	B-5	X	
	B-6		X
32	B-4		X
	B-5	X	
	B-6		X
64	B-4	X	
	B-5		X
	B-6		X

B875–102 High Speed Analog Input, Indicators

Overview

The following standard front-panel indicators reflect module communication status with the controller and provide an indication of field-side signal status.

Indicator status summary table

Indicator	State	Condition
Active	on	The module is communicating properly with the PLC
	off	The module failed the internal diagnostic test, which determines if valid communication is possible.
Out of Range	off	All inputs are within the valid input range.
	blinking	One or more inputs are outside the valid input range.

The I/O map for an eight-circuit configuration (B875) and four-circuit configuration (B873) looks alike.

B875–102 High Speed Analog Input, Recalibration

Overview

Since the module is shipped factory-calibrated, it is the designer’s intention that the 10 V reference voltage adjustment will be good for one year. It should be recalibrated annually thereafter.

The following tools are needed to adjust the module’s reference voltage:

- A precision digital readout voltmeter with an accuracy of 0.0001 V on a 10 V scale: 6-1/2 digits, to guarantee 4 bit count accuracy.
- A 1/8-inch bit, thin-blade screwdriver.
- A small-bit Phillips-head screwdriver.
- An adhesive (such as Loctite or Glyptol) to secure trim-pot adjustment screws.

NOTE: Field wiring may remain connected during the recalibration procedure, as the module’s working state is not interactive with the reference voltage adjustment. Also, the module does not require warmup to attain temperature.

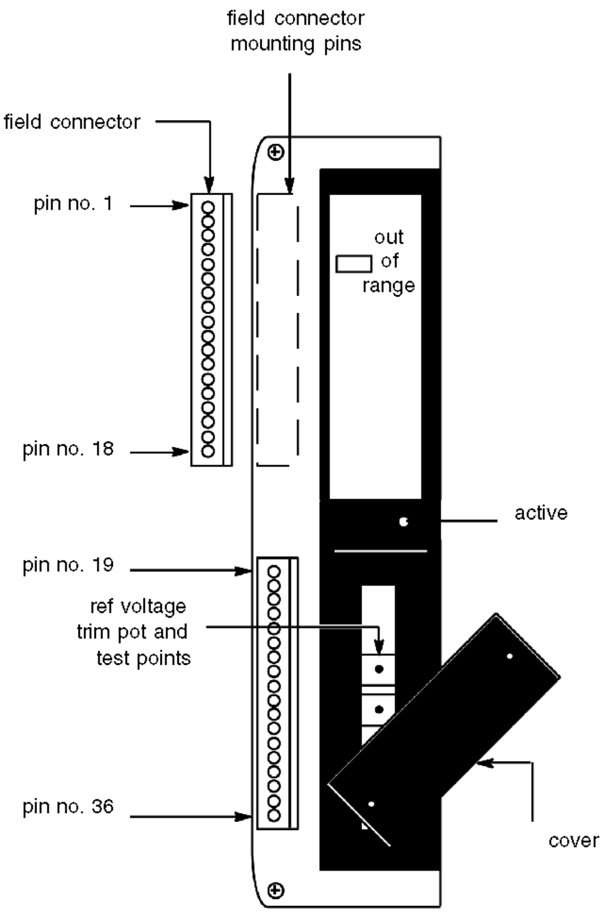
Recalibration Procedure

Use the following table to recalibrate the module.

Step	Action
1	Refer to illustration of reference voltage cover removal, below. Remove reference voltage adjustment cover to gain access to trim pot.
2	Connect DVM as shown in reference voltage adjustment circuit illustration, below.
3	Adjust reference voltage trim pot for exactly 10.0000 V.
4	Secure trim pot with adhesive.
5	Disconnect voltmeter and secure trim pot access cover.
6	Remove power from equipment housing.

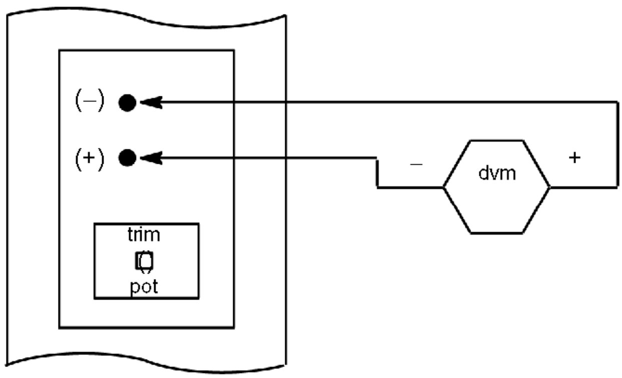
Reference Voltage Cover Removal

Module cover removal



Reference Voltage Adjustment Circuit

Reference voltage adjustment circuit



B875-102 High Speed Analog Input, Installation

Overview

Module installation involves the following: unpacking the module; setting up the configuration switches; installing key pins in the housing; mounting the module in the housing; wiring the connector.

Installation Procedure

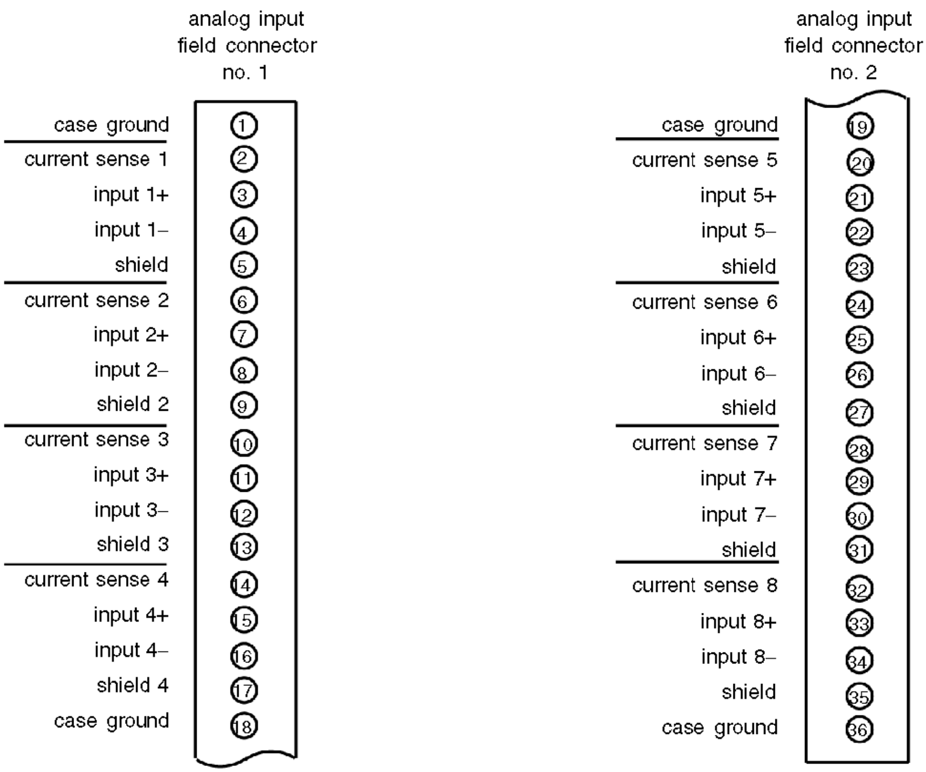
Use the following table to install the module.

Step	Action
1	Remove module from shipping box and check for damage. If damage found, contact distributor (or sales person) for correct return procedure.
2	Ensure that power is removed from housing.
3	Configure switch bank A as follows: ● A-1 through A-6 for desired input voltage ranges appropriate to the intended eight- or four-circuit configuration ● A7 to select eight- or four-circuit input mode. ● A8 to ON for normal operation.
4	Configure switch bank B as follows: ● B-1 through B-6 for desired number of input averaging samples appropriate to eight- or four-circuit configuration designated above. ● B7 to select output code format
5	If using key pins (provided with housing shipment), install them above and below housing slot selected for this module’s installation.
6	Open handle and insert module into housing, firmly seating edge connector in backplane.
7	Secure module using captive mounting screws at top and bottom of module’s front panel.
8	Refer to field connector/input circuit pinout diagram, below. Connect field side wiring to double field connector (located on left side, front edge), laying in cable fan-out as desired. **NOTE**: Use field connector wiring sizes AWG—20 inclusive (solid or stranded).

Step	Action
9	If current sense input circuit(s) is being used, jumper appropriate current sense terminal on field connector to corresponding hot input (+) as shown in field connector/input circuit pinout diagram, below. **NOTE:** Unused inputs should be terminated to reduce electrical noise and other interference due to floating input lines. Jumper unused voltage and current terminals (including shields) to case ground. Case ground will only be effective if H8XX housing is connected to earth ground. Both ends of the shield cannot be connected to the device and module, unless the device shield is part of the device input circuit, and is not connected internally to the device case ground. **NOTE:** If over-range and under-range detection is required, and this detection is causing throughput problems with the unused channels (because they float or spike outside the range) then the unused voltage or current channels at the field connector should be connected in parallel to a valid input channel. As long as the valid channel stays within range, the tied channels will also stay within range. **NOTE:** For currents within the range of 4—20 mA, only the valid input requires the inclusion of the 250 Ω resistor.
10	Refer to field connector mounting drawing, below. Mount two wired field connectors on analog module with pin 1 positioned at top and field wiring to left.
11	Close module handle.
12	Turn on power to housing if desired. **NOTE:** If an open circuit occurs when operating in the voltage mode, the input may take several seconds to decay to zero, due to the front-end RC network. If open-circuit detection is required, the module should be operated in the current mode. The addition of the 250 Ω resistor forces the RC network to discharge rapidly.

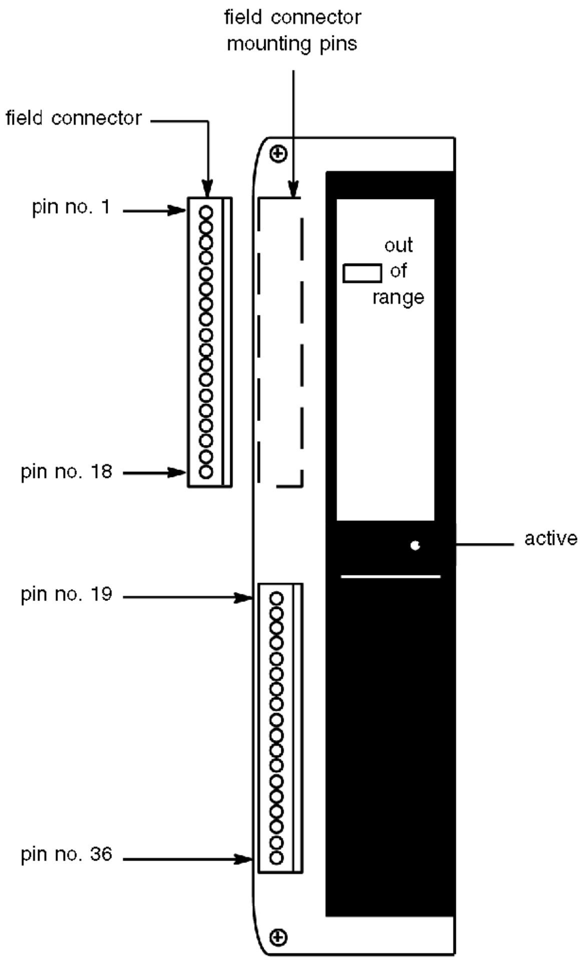
Field Connector/Input Circuit Pinout Diagram

Field connector/input circuit pinout diagram.



Field Connector Mounting Diagram

Field connector mounting diagram



B875–102 High Speed Analog Input, Specifications

Specification Table

The following table provides the specifications for the unit.

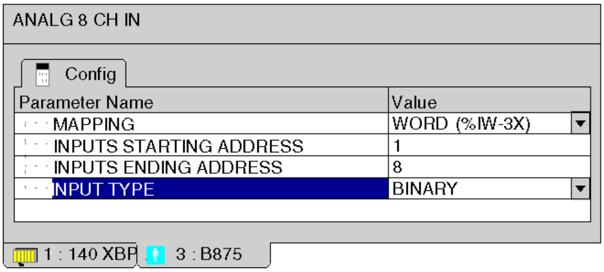
B875-102 Specifications		
Description		Fast A/D voltage or current input
Number of Channels	B873/B875	Four or eight isolated inputs
Operating Range	Voltage	1—5 Vdc
		0—5 Vdc
		0—10 V
		-5—+5 V
		-10—+10 V
	Current	4—20 mA
		0—20 mA
		0—40 mA
		-20—+20 mA
		-40—+40 mA
Impedance	Voltage Mode	>10 MΩ input differentially
		1.5 kΩ with power removed
	Current Mode	250 Ω/input
Resolution		12 bit
Filter		Single Pole dc to 1.0 kHz
Linearity	Error	.05% of full scale over operating temperature range
	Differential	0.0244% of full scale @ 25°C (77°F)
Protection		120 Vac differential input (voltage mode only)
Common Mode	Range	Input voltage plus common mode voltage less than 12 V
	Rejection	>-70 dB, dc to 60 Hz
Isolation	Input to Case	1500 Vac RMS for i minute
	Input to Input	30 Vdc
	Input to OURBUS	1500 Vac RMS for 1 minute
Accuracy	@25°C (77°F)	0.1% of full scale (4 counts)
	Over 0—60°C	0.25% 0f full scale (10 counts)
Terminal Connector		AS–8533–004

B875-102 Specifications		
Repeatability		0.25% of full scale (10 counts) of full scale RMS, constant temperature, no averaging
Autocalibration		High/low range points recalibrated during run time
Power-up Time		5 s maximum
Warm-up Time		5 s concurrent with power-up)
Power Required	+5 V	650 mA max, 300 mA typical
	+4.3 V	975 mA max, 550 mA typical
	-5 V	0 mA
Data Format	0000	Power Up
	8000 Hex	Out of Range
	0001—4200	Valid–All Ranges
	9068 Hex	Over Range
Data Update Period Rate	Four channels	2.4 ms
	Eight channels	3.0 ms (including diagnostics). No additional time penalty for process or data for out-of-range condition.
Reference Type		Mapped as 8 registers input 3x
Input Type		BIN/BCD

B875-102 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module Configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	WORD (%IW-3X)	-
Inputs Starting Address	1	-
Inputs Ending Address	8	-
Input Type	BINARY	BCD

Mapping Parameter References

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 8 registers input 3x	Mapped as 8 words input %IWx
Input Type	BIN/BCD	BIN/BCD

Chapter 9
B875-111 and B877-111 Analog Input

Purpose

This chapter describes the functional and physical characteristics of the B875-111 and B877-111 analog input modules.

What Is in This Chapter?

This chapter contains the following topics:

B875–111 Analog Input, Overview

General Characteristics

The B875–111 analog-to-digital (A/D) input module (B875) converts input voltage and/or input current ranges into binary data. This module can be configured to accept 8 differential or 16 single ended inputs. When selected for 8 differential inputs, the card is called a B875–111. When selected for 16 single ended inputs, the card is called a B877–111. Refer to the simplified schematic below.

The B875 analog input module allows the polling of a wide array of field devices requiring different voltages and different currents based upon a unique application. One can select from five available input voltage ranges on a module-wide basis. The ranges, which are 0 to 5 V, 1 to 5 V, --5 to 5 V, 0 to 10 V, and -10 to 10 V, are selected by means of four DIP switches on the module configuration switch.

One can select from three available input current ranges, which are 0 to 20 mA, 4 to 20 mA, and -20 to +20 mA.

One can select from four available output formats. The formats, which are standard, elevated, full resolution, and decimal, are selected by means of two DIP switches on the module configuration switch.

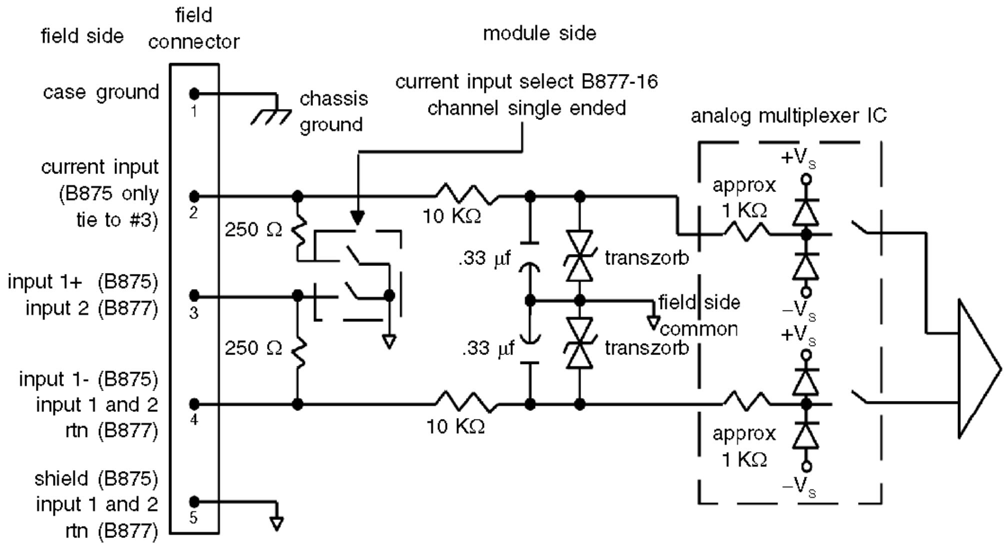
One can select either no averaging, or 8, 16, or 32 sample inputs to be averaged to generate each output by means of two DIP switches on the module configuration switch.

The module has eight/sixteen analog inputs and is capable of updates to all channels every 10—20 msecs. The greater than 12-bit resolution and the absolute accuracy of 0.1% at 0—60° C provides precise control of the application.

Simplified Block Diagram

The following illustration represents the simplified schematic diagram for the B875–111 module.

B875–111 Analog input module, simplified schematic diagram



B875–111 Analog Input, Module Configuration

Overview

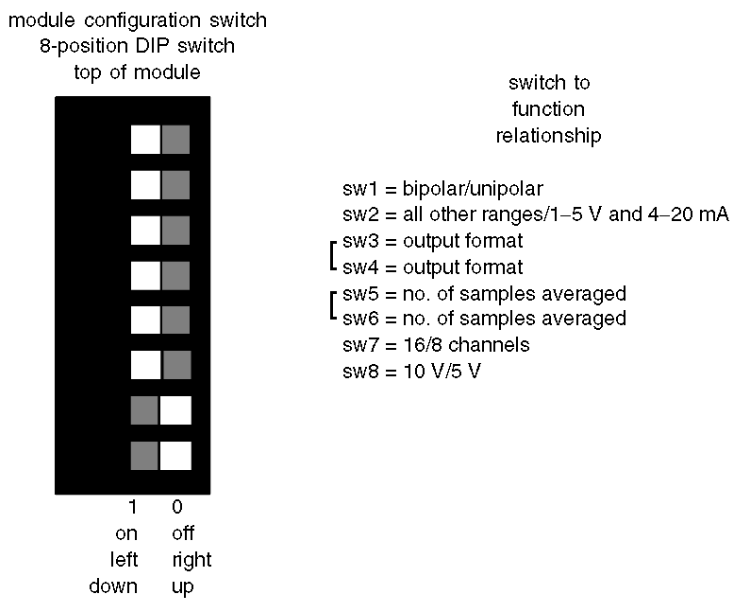
The B875-111 module is shipped from the factory with the 1—5 V range with 0—4095 output format (standard), one sample averaged, and voltage inputs, 8 channel (B875-111)–i.e., all DIP switches to the right. If necessary, reset the module configuration switch and the five-position DIP switch based upon the application requirements prior to installation.

Refer to the illustration of the module configuration switch, below.

Module Configuration Switch with DIP Switches

The following illustration shows the module configuration switch and DIP switch settings for the B875–111 module.

B875–111 analog input module, module configuration switch and DIP switch settings



Use the following table to determine the functions for each switch.

Switches	Functions
SW1	Input Range
	For Bipolar (10 V, 5 V 20 mA):SW1=L
	For Unipolar (0—10 V, 0—5 V, 0—20 mA, 1—5 V, 4—20 mA): SW1=R
SW2	Input Range
	For Offset (1—5 V or 4—20 mA): SW2=R
	For No Offset (All other Ranges): SW2=L
SW3 & SW4	Output Formats (refer to the following table for resolutions)
	For Standard (0000—4095): both SW3 and SW4=R
	For Elevated (4096—8191): SW3=L and SW4=R
	For Full Resolution (Raw Binary): SW3=R and SW4=L
	For Decimal (0001—9999): both SW3 and SW4=L
SW5 & SW6	Samples to Averaged
	For 1 Sample: SW5 and SW6 both R
	For 8 Samples: SW5=L and SW6=R
	For 16 Samples: SW5=R and SW6=L
	For 32 Samples: SW5 and SW6 both L
SW7	Input Types
	For 8 Differential (B875):SW7=R
	For 16 Single Ended (B877): SW7=L
SW8	Input Ranges
	For 10 V (10 V or 0—10 V): SW8=L
	For 5 V (All Others): SW8=R

Output Format Selection

The following table provides the output formats and their resolution relationships:

Output Format	Under Range	Normal Range	Over Range	Resolution	Actual Format
Standard	0000	0000—4095	4096	12 bits	Raw binary, unsigned
Elevated	4095	4096—8191	8192	12 bits	Raw binary, unsigned
Full Resolution	Bit 16=1 Bit 15=1	Bit 16=0 Bit 15=0 1—7499	Bit 16=1 Bit 15=0	Bipolar=1/15000 counts Unipolar=1/7500 counts Offset=1/6000 counts	*Raw binary and two flags
Decimal	Bit 16=1 Bit 15=1	Bit 16=0 Bit 15=0 1—9999	Bit 16=1 Bit 15=0	Bipolar=1/1000 counts Unipolar=1/7500 counts Offset=1/6000 counts	Raw binary and two flags 1—9999 counts 1—9999 counts
*When an under or over range condition exists, the output word contains the applicable flag and the under or out-of-range value.					

Standard output format is raw binary output, 0—4095 counts. Under range is 0000 and over range is 4096.

Elevated output format is raw binary output, 4096—8191 counts. Under range is 4095 and over range is 8192.

Full resolution output format provides the true resolution of the module which depends on the input range.

- Bipolar inputs produce an output of 0001—14,999 counts
- Unipolar inputs produce an output of 0001—7499 counts
- Unipolar and offset inputs produce an output of 0001—5999 counts

In the full resolution format, out-of-range values of 2.4% may be read to the specified accuracy of the module. They can be read in this manner. When an out-of-range condition occurs which is over range the MSB (bit 16) is set to 1. If an under range occurs the second MSB (bit 15) is also set to 1. The remaining 14 bits give the absolute value of the amount over or under range. For example, for a unipolar input of 5.120 volts the output would have bit 16 set to 1. The remaining output bits equaling the raw binary representation of 120 millivolts. Any input above the 0.120 volts in this range willnot be within the specified accuracy of the module.

Decimal output format allows scaled outputs to provide 0001—9999 counts full scale. This format does not indicate the true resolution of the module. For bipolar inputs the output is scaled down and for unipolar inputs the output is scaled up. This format also reports out-of-range values in the same manner as the full resolution mode.

NOTE: For unipolar and unipolar with offset image ranges, the process of scaling the lower resolution output values to the 1—9999 output format creates the possibility of missing codes due to rounding off of numbers in the micro controller.

NOTE: When applying power to the equipment, or after a reset, the module transfers 4000 Hexadecimal during its internal reset, and initialization time until valid data is ready to be transferred. (4000 Hexadecimal corresponds to the second MSB=1, all other bits=0).

Input Selection

First, locate the four access holes on the left side of the module. These holes allow access to three four-position and one five-position DIP switch.

Next, set switch position 5 (SW5) of the five-position DIP switch found in the bottom access hole on the left side of the module, to select the input range. This switch must correspond to switch position 8 (SW8) of the eight-position module configuration DIP switch. SW5 and SW8 settings must be identical.

NOTE: For switch SW5, the input ranges are as follows:
- For 10 V (10 V or 0—10 V) place SW5 to the left.
- For 5 V (all others) place SW5 to the right.

B875–111 Analog Input, Field Connections

Overview

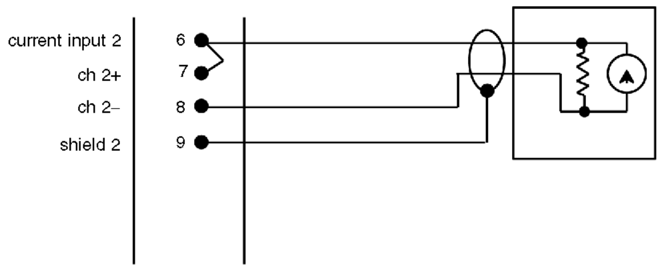
There are two ways to configure the module to accept current inputs. With eight differential current/voltage inputs the module is called the B875-111. With sixteen single-ended current/voltage inputs the module is called the B877-111.

B875-111 field connections

When configuring the B875-111 for eight differential current inputs, note the channels that will receive these inputs. Current inputs are selected by placing a jumper on the field connector between the positive voltage input and the current input terminal for the appropriate channel. For example, if channel 2 is to receive a current input, a jumper must be made between terminal #7 (CH2) and terminal #6 current input CH2), as shown on the following illustration.

The following illustration represents the simplified schematic diagram for the B875–111 module.

B875–111 analog input module, current input dxample drawing



NOTE: DIP switch accessibility
DIP switches accessible through the side cover are not used in differential mode and should be left in the factory-installed voltage input positions.

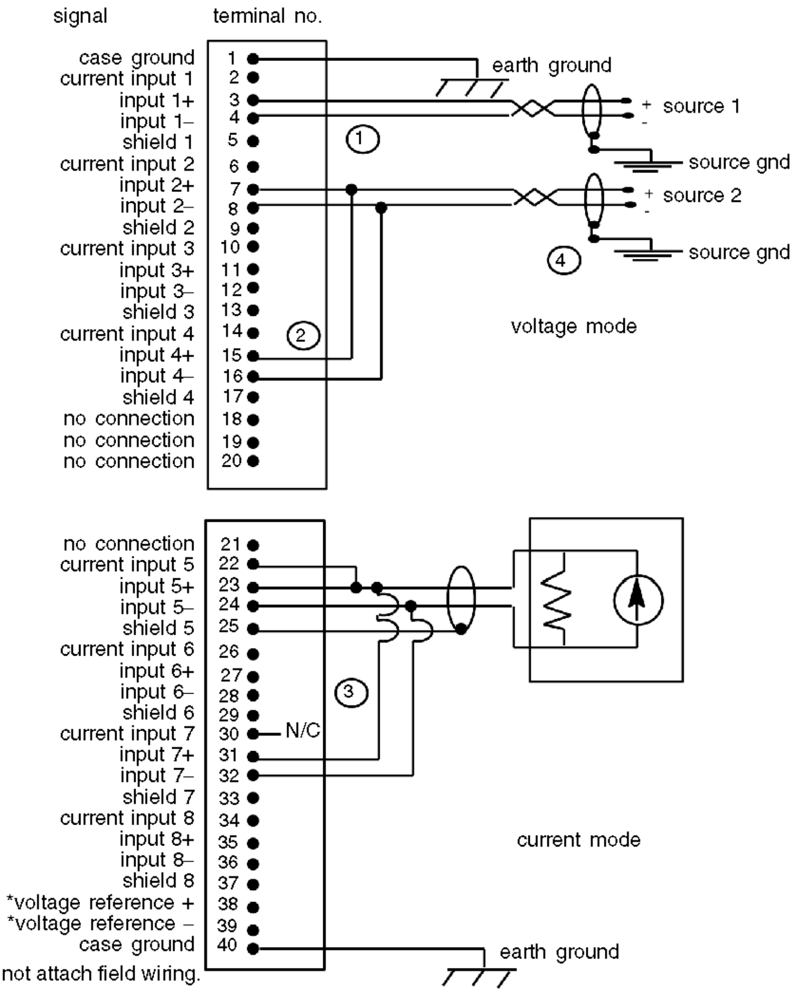
NOTE: Simultaneous current and voltage inputs can exist under the following conditions:

- 1—5 V and 4—20 mA
- 0—5 V and 0—20 mA
- 5 and 20 mA

Connect field-side wiring to proper pins on the field connector. Voltage inputs do not require a jumper on the field connector. Refer to the illustration showing the typical field circuit connections, below.

NOTE: Open-circuit voltage inputs may drift either positive or negatively. If open-circuit detection is required, a current input should be used. When using voltage inputs, an open circuit can be detected if a large-value resistor (2 MΩ or greater) is placed at the field connector across the positive (+) and negative (-) inputs. The resistor clamps the channel to a small offset voltage (<100 mV) if the field connections are broken.

Typical field circuit connections with eight differential inputs



*For reference only. Do not attach field wiring.

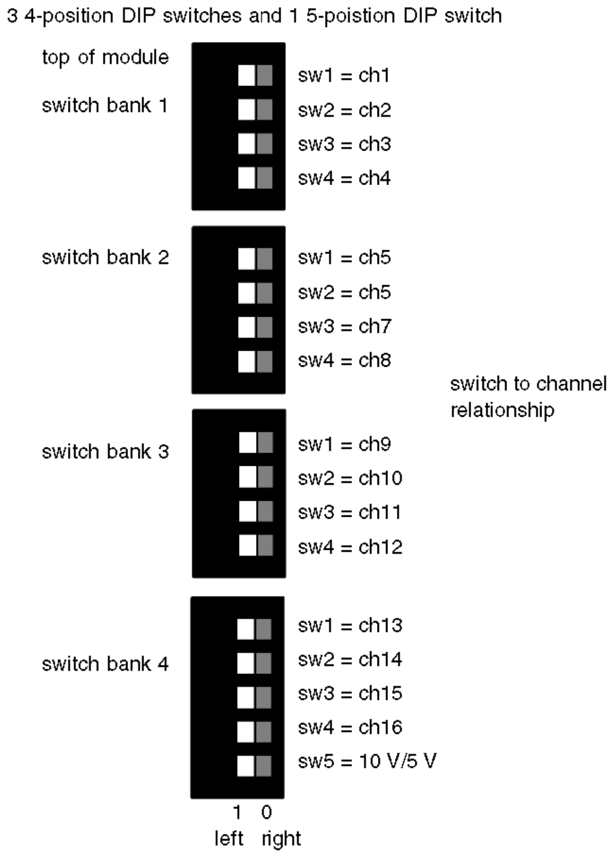
1. Shields 1-8 are common and tied to field side ground.
2. Jumper unused channels in parallel with a valid input to avoid out of range errors.
3. When terminating unused channels in current mode, do not jumper the “current input” pin of the unused channel.
4. When using shielded field circuit wires, ground shield at one end only.

B877-111 Field Connections

Current inputs are selected by setting the DIP switches accessible through the side cover for each channel to receive an input. The DIP switch places a 250 Ω precision resistor between the positive input and analog returns.

The fifth switch (SW5) on switch bank 4, located on the left side selects the voltage range. The position of this switch must be the same as for module configuration switch SW8, located at the rear of the module.Refer to the label located on the left side of the module, and to the illustration showing the current settings for single-ended inputs (B877) below.

Current settings for single-ended inputs, diagram (B877)



Use the following table to determine the functions for each switch.

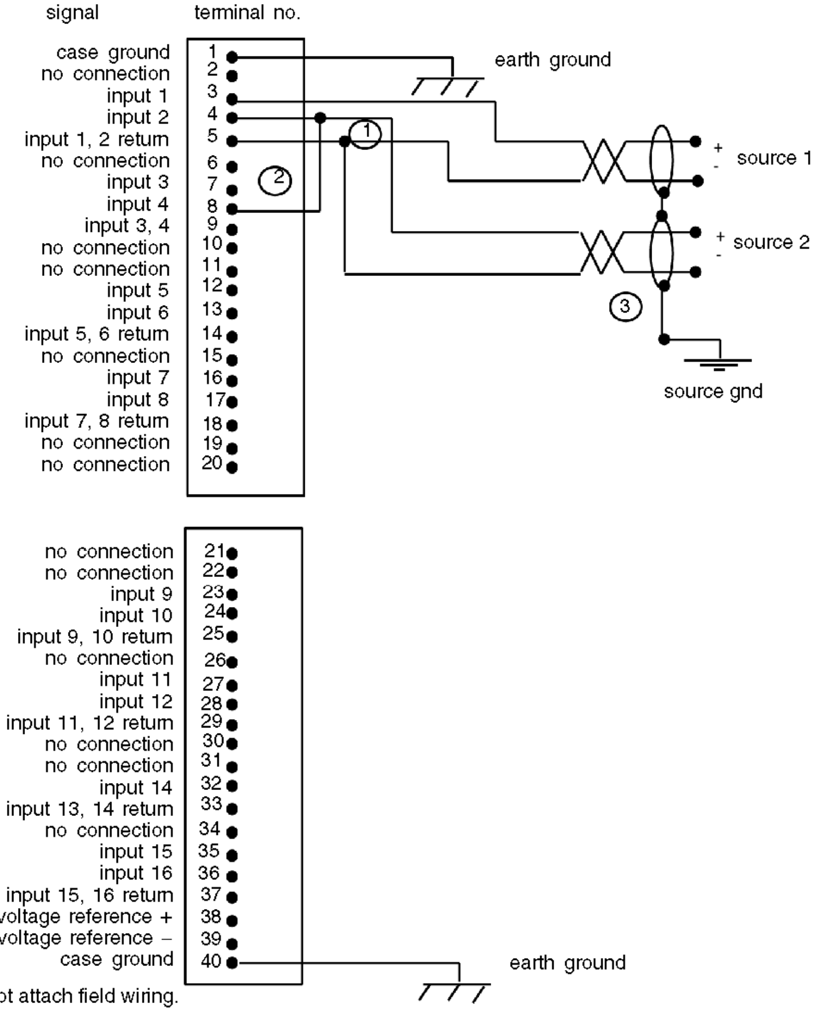
Switches	Functions
Switch Bank 1	Current Inputs
	For Channels 1—4
	SW1—4=Right Side Down
Switch Bank 2	Current Inputs
	For Channels 5—8
	SW1—4=Right Side Down
Switch Bank 3	Current Inputs)
	For Channels 9-12
	Sw1—4=Right Side Down
Switch Bank 4	Current Input
	For Channels 13—16
	SW1—4=Right Side Down
Switch Bank 5	Input Ranges
	For 10 V (V or 0—10 V): SW5=Left Side Down
	For 5 V (All Others): SW5=Right Side Down

NOTE: DIP switch accessibility
DIP switches accessible through the side cover are not used in differential mode and should be left in the factory-installed voltage input positions.

Use the following table to field connect the B77-111 module. Refer to typical field circuit connections, single-ended inputs (B877) diagram, below.

Step	Action
1	Connect field-side wiring to proper pins on field connector when module is configured for sixteen single-ended inputs. **Note:** Open-circuit voltage inputs may drift either positive or negatively. If open-circuit detection is required, a current input should be used. When using voltage inputs, an open circuit can be detected if a large-value resistor (2 MΩ or greater) is placed at the field connector across the positive (+) and negative (-) inputs. The resistor clamps the channel to a small offset voltage (<100 mV) if the field connections are broken.
2	Reinstall any module temporarily removed.
3	When using key pins (provided with housing shipment), install them above and below housing slot selected for this module’s installation.
4	Insert module into housing firmly but carefully, seating edge connector in backplane.
5	Secure module to housing using captive slotted mounting screws at top and bottom of module front panel.

Typical field circuit connections, single-ended inputs (B877) diagram



*For reference only. Do not attach field wiring.

1 All returns are electrically tied together inside the module.

2 Jumper unused channels in parallel with a valid input to avoid out of range errors. You must select a voltage mode for the unused channel.

3 When using shielded field circuit wires, ground shield at one end only.

Module B875–111 Analog Input, Quick Start Test

Overview

The quick-start test configures a B875-111 eight-channel differential module as follows: 0—10 V input range; 0—4096 counts output format; no sample averaging. Use the following table to perform the quick-start test.

Step	Action
1	Set the module configuration switch as follows: (viewing the rear of the module when held vertically) The following table shows switch positions and their selection. **Switch — Position — Selection** **SW1 — Right — Selects Unipolar Inputs** **SW2 — Left — Selects no offset 1—5 V, 4—20 mA** **SW3 & SW4 — Right — Selects 0—4096 output format** **SW5 & SW6 — Right — Selects no averaging** **SW7 — Right — Selects 8 channel (B875)** **SW8 — Left — Selects 10 V inputs**
2	Set voltage/current switches as follows: ● All channels set for voltage inputs 10 Vdc input range ● Place all switches (located below side access holes) to left
3	Jumper input terminal 38 to terminal 3 and terminal 39 to terminal 4 on high-density connector AS–8535-000 **Note:** Terminals 38–39 are a voltage reference only (4.5000 Vdc); they should not be used for any other purpose. **Note:** Remove the keying tabs on high-density connector AS–8535–000 prior to installation.
4	Determine which channel and slot location are being used for this module.
5	Stop controller. Turn power off, insert module and reapply power.
6	I/O map module as B875, registers 30001—30008 binary.
7	Start controller.
8	Observe that module’s active light is illuminated. **Note:** Active on steady=O.K. Active blinking=O.K., but inputs may be out of range
9	Monitor input 30001. It should indicate 1843 decimal. **Note:** 4096 format/10 V range=409.6 counts/V. 409.6X4.5000 Vdc = approximately 1843 decimal

B875–111 Analog Input, Application Example

Setup

Configuration switch pack

The B875–111 can be configured to accept 8 differential or 16 single ended inputs. When selected for 8 differential inputs, the card is called a B875–111. When selected for 16 single ended inputs, the card is called a B877–111.

This selection is made by switch 7 on the configuration switch pack found at the rear of the module. SW7 in the left position is equal to 16 inputs, in the right position it is equal to 8 inputs.

In addition to selecting the number of inputs, you also select voltage range, output format, polarity, offset and number of samples. Refer to the installation instructions and the DIP-switch chart on the left side of the module for details.

For a quick start setup, use the following settings to interface a 0 to +10 V input signal. For the following input parameters:

- 0—10 V input
- 0 to full scale output format
- One sample
- Eight differential inputs

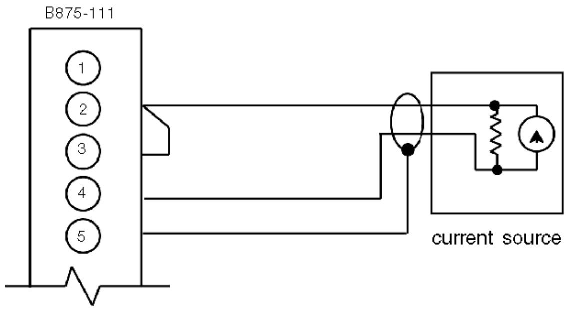
Set the switch settings as follows:

- SW1, SW3, SW5, SW7=right
- SW2, SW4, SW6, SW8=left

Input type selection (voltage or current)

If configured as a B875 (8 differential inputs), current inputs (4—20 mA) are selected by placing a jumper at the field connector between the positive voltage input and the current input terminal for the appropriate channel. Refer to the following illustration.

Field connector jumper diagram



If configured as a B877 (16 single ended current inputs), input type is selected by the switches on the left side of the module. There is one switch for each of the 16 inputs. This switch places a 250 Ω precision resistor between the plus input and analog return. External jumpers are not used and must be removed. The left position is equal to voltage input, and the right position is equal to current input.

The fifth switch on switch bank 4 (left side) selects the voltage range for both B875 and B877 operations. This switch must correspond to switch 8 of the configuration switch bank (at rear of module). The left position of SW5 is equal to 10 volts, and the right position is equal to 5 volts. SW8 must be in the same position as SW5.

For the 0—10 V input signal example, set all the input switches to the left (down or towards the numbers).

I/O Mapping

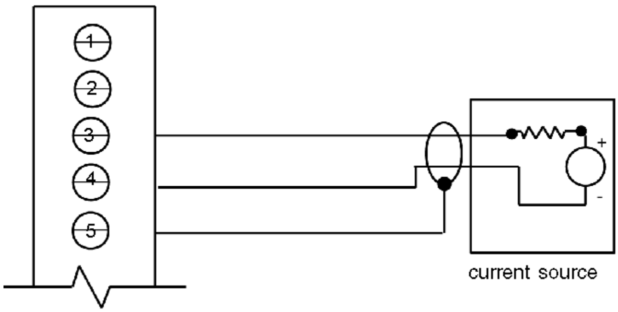
If setup for 8 differential inputs, the module type will be a B875 and requires 8 consecutive 3xxxx binary registers. If setup for 16 single ended inputs, the module type will be a B877 and require 16 consecutive 3xxxx binary registers.

NOTE: Upon power-up the module’ s active indicator flashes rapidly showing that communication with the programmable controller has been established but, that the input data being returned is not valid. (4000 Hexadecimal is sent to the controller during the initialization time). When module initialization is complete, and valid input data is being transferred, the indicator is either steady on, or flashing slowly when any input is out-of-range.

Wire Inputs

The B875–111 and B877–111 require a high-density connector, part number AS–8535–000. Refer to the left side of the module for pinouts. Refer to the following illustration.

0—10 V input example.



Module Checkout

The B875–111 and B877–111 will perform an analog to digital conversion on the inputs. The resolution of the analog to digital conversion is dependent upon the input range and output format selected with the configuration switch bank.

Using a programmer, call up the appropriate registers assigned in the I/O Map. Vary the input signal and check that the register content varies correctly.

Refer to the following table for the quick-start example.

Voltage	Value
@ 0 V	3xxxx=001 (decimal)
@ 5 V	3xxxx=3750
@ 10 V	3xxxx=7500
@ 11 V	3xxxx > 9999 (decimal)* *The active light indicator should be flashing, indicating the input is out of range.

Sample Averaging Input Data

The output data can be processed by a low-pass digital filter in the module to average out and remove any low-frequency noise in the converted input analog data. The digital filter algorithm is:

$$Y_n = Y_{n-1} + \frac{X_n - Y_{n-1}}{2N}$$

where

Xn = Current input data sample

Yn = New output filter data value

Yn-1 = Previous output filter data value.

The digital filter algorithm approximates a classical exponential response characteristic with both the cut-off frequency, F_c, and the time constant, T_c, related to the number of samples to be averaged, N, and the throughput time, T. The "N" is user selected (8,16,32) with DIP-switches. Throughput time,"T", equals 10 ms for the B875–111, and 20ms, for the B877–111.)

$$T_c = 2 \times N \times T \qquad (s)$$

$$F_c = \frac{1}{2 \times \mathrm{Pi} \times T_c} = \frac{.08}{N \times T} \qquad (\mathrm{Hz})$$

where Pi = 3.141

As with any filter, the user must establish what time constant and cut-off frequency is suitable for the specific application. Below is a reference table that approximates the digital filter characteristics for various user settings.

Digital filter approximates (B875-111)

Throughput Time (T)	Number of Samples (N)	Cut-off Frequency (F_c)	Time Constant (T_c)
10 ms	8	1 Hz	160 ms
10 ms	16	0.5 Hz	320 ms
10 ms	32	0.25 Hz	1640 ms

Digital Filter Approximates (B877-111)

Throughput Time (T)	Number of Samples (N)	Cut-off Frequency (F_c)	Time Constant (T_c)
20 ms	8	0.5 Hz	320 ms
20 ms	16	0.25 Hz	640 ms
20 ms	32	0.125 Hz	1280 ms

Approx. step settling-time to 63% of final value = 1 x T_c

Approx. step settling-time to 99% of final value = 4.5 x T_c

Approx. step settling-time to 99.9% of final value = 6.8 x T_c

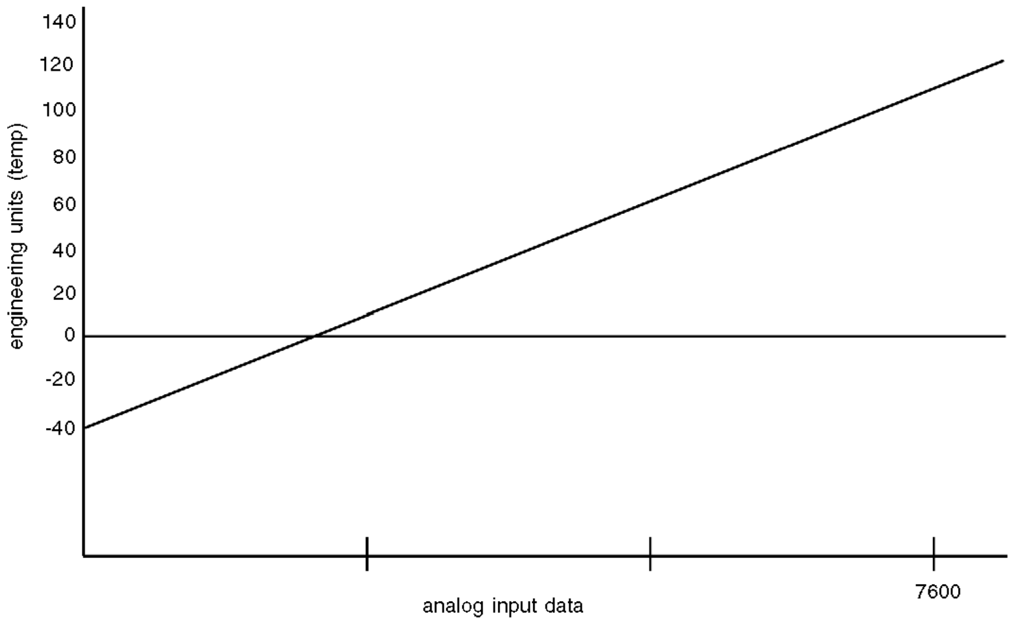
NOTE: As the scan time increases, the average response time may decrease as viewed in ladder logic.

Application

In many applications, analog signals are provided to operators in units (points, gallons per second, degrees C, feet per minute, etc.) via LED displays, CRT monitors or report printouts. An analog input can be scaled to engineering units.

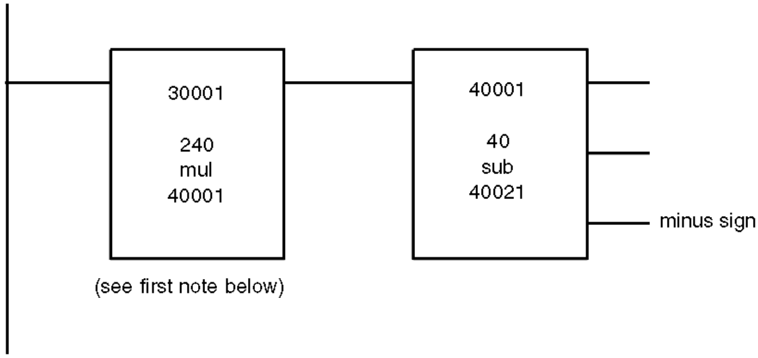
To illustrate the technique, assume that the0—10 V signal in the quick-start example represents a temperature from -40—+140°F. Refer to the following illustration showing the signal to temperature relationship.

Signal to temperature relationship diagram



- What is the engineering unit range? In this example it is 140 - (-40) =180
- Divide this number by 7500 using a calculator. 180/7500 = .024
- Multiply this number by 10,000 to obtain the multiply block constant of 240.
- Multiply the analog input by 240. The high-order result register will contain the range.
- Add or subtract the Y intercept (-40 in this example) to obtain the answer.

Scaled value from analog signal, diagram



NOTE: The logic shown is used to generate the scaled value in register 40020 from the analog signal in 3001. For example: 30001 = 3800; 40020 = 0051°F

NOTE: Only the high-order result of the multiplication is used, and no compensation for round-off is used in this example.

B875–111 Analog Input, Calibration

Calibration Tools

The analog input module is calibrated at the factory prior to shipment. To ensure the module's accuracy, the trim-pot should be calibrated regularly on a yearly interval.

The following tools and materials are needed to calibrate an analog input module:

- A precision digital readout voltmeter with an accuracy of 0.0001 V on a 10 V scale.
- A 1/8-inch bit, thin-blade screwdriver.
- A 1/4-inch Phillips-head screwdriver.
- An adhesive (such as Loctite or Glyptol) to secure trim-pot adjustment screws.

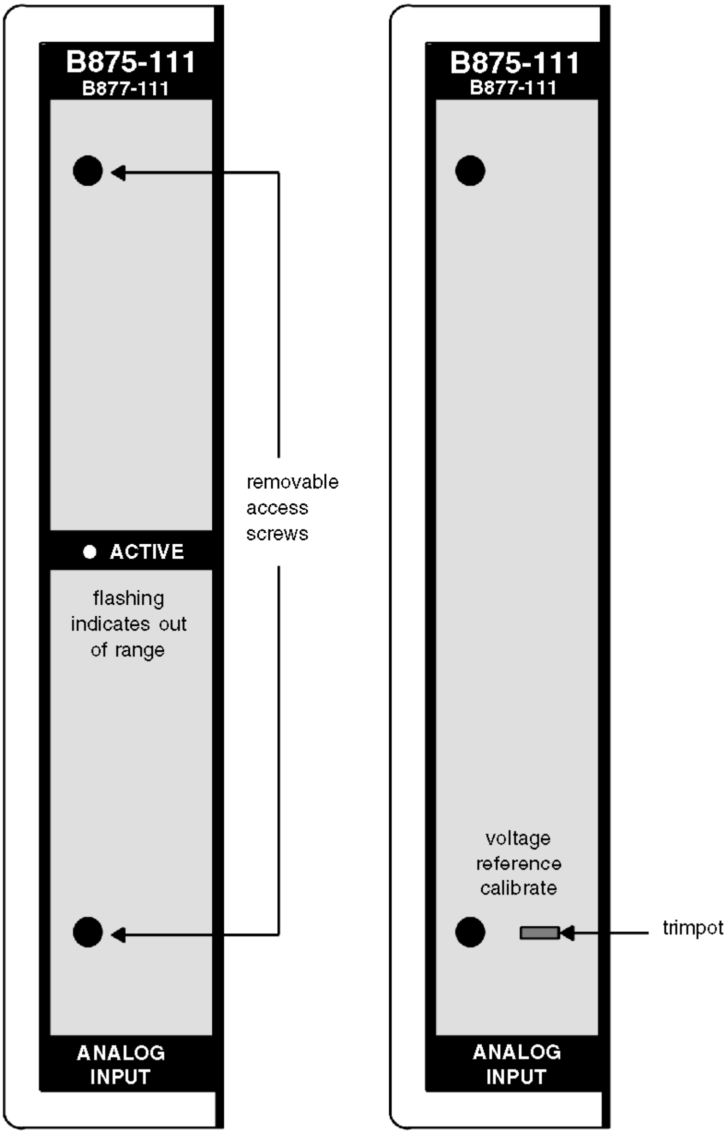
Calibration Procedure

Use the following table to calibrate the module.

Step	Action
1	Remove two screws and label located on front-panel of analog input module to allow access to trim pot. **Note:** The trim pot adjusts the total magnitude of the range (full scale). Refer to trim-pot location diagram, below.
2	Open analog input module handle to expose connectors and terminals.
3	Connect digital voltmeter (DVM) minus lead to voltage reference - (terminal number 38) and plus lead to voltage reference + (terminal number 39). Refer to voltmeter connection diagram, below. **Note:** Field wiring may remain connected during calibration. Five minutes of warm-up is sufficient to attain temperature stability.
4	Adjust reference voltage trim pot for an indication of 4.500 V 0.0001 V.
5	Secure trim pot in place with adhesive.
6	Disconnect voltmeter, return connections to their pre-calibration state, close module handle. Replace front label removed in step 1, above.

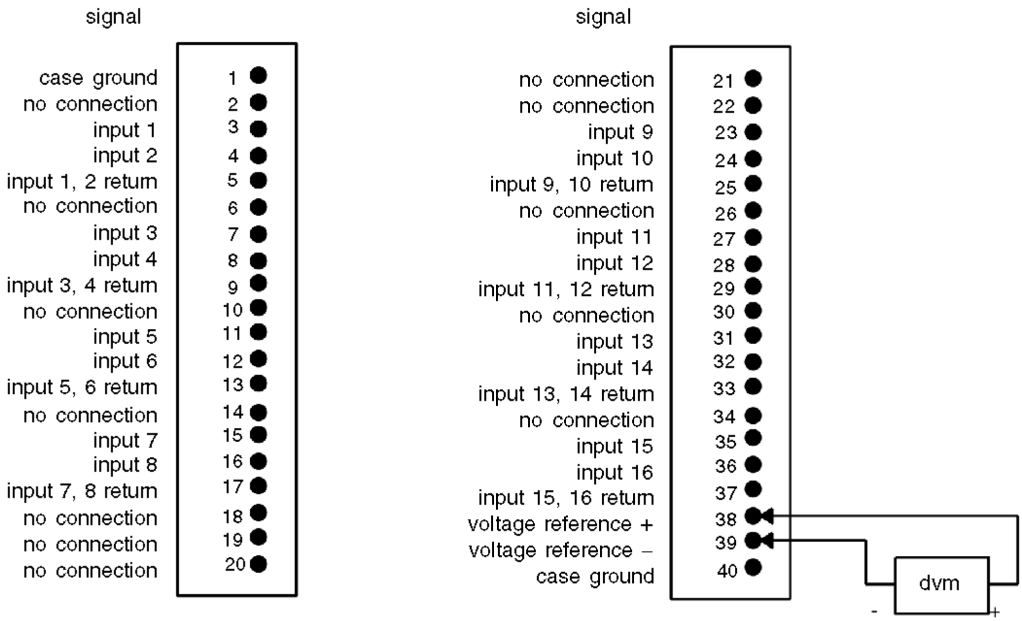
Trim Pot Location Diagram

Trim pot location diagram.



Voltmeter Connection Diagram.

Voltmeter connection diagram.



B875–111 Analog Input, Quick Reference

Overview

To set up the analog input module properly, an eight-position DIP-switch must be set together with SW5 of a five-position DIP switch located on the left side of the module. These switches determines the input range, output format, number of samples to be averaged, and the types of inputs.

DIP-switch configuration parameters, Table

DIP-Switch Configuration Parameters		Eight-Position Switch			Five-Position Switch
Input Range		SW1	SW2	SW8	SW5
	5 V, 20 mA	L	L	R	R
	0—5 V, 0—20 mA	R	L	R	R
	1—V, 4—20 mA	R	R	R	R
	10 V	L	L	L	L
	0—10 V	R	L	L	L
Output Format		SW3	SW4		
	Standard (0—4096)	R	R		
	Elevated (4096—8192)	L	R		
	Variable (0 to full resolution)	R	:		
	Decimal (0—10,000)	L	L		
Samples to be Averaged		SW5	SW6		
	1 or no averaging	R	R		
	8	L	R		
	16	R	L		
	32	L	L		
Types of Inputs		SW7			
	8 Differential	R			
	16 Single-ended	L			

For example, assume that the following values are desired: 5 V input; 0—10,000 counts output; no averaging; differential inputs. Set the switches as follows:

Module Configuration Switch

SW1—4 = L

SW5—8 = 8

Switch Bank 4

SW5 = R

B875–111 Analog Input, Specifications

Specification Table

The following table provides the specifications for the unit.

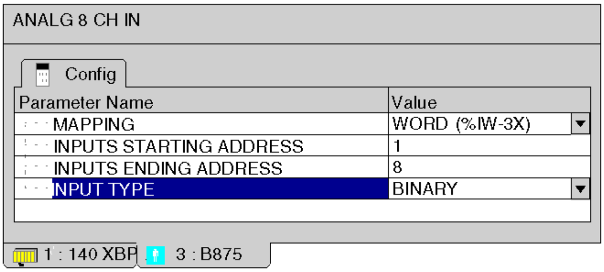
B875-111 Specifications		
Analog Inputs/Module	I/O mapped as B875-111	Eight differential
	I/O mapped as B877-111	16 Single-ended
Input Ranges	Voltage	1—5 Vdc
		0—5 Vdc
		0—10 V
		-5—+5 V
		-10—+10 V
	Current	4—20 mA
		0—20 mA
		-20—+20 mA
Input Analog Filter		Single pole low pass, with -3 dB cut-off frequency at 48 Hz 10%
Input Resistance	Current Mode	250 Ω, 0.05%
	Voltage Mode	Within range > 10 MW, outside range 10,000 Ω
Input Resistance (No power)	Differential Inputs	20kΩ /channel
	Single-ended Inputs	10 kΩ/channel
Input Protection	Normal Mode	120 V RMS differential input
	Common Mode	120 V RMS
Throughput (T)	eight channels	10 ms without input sampling
	16 channels	20 ms without input sampling
Over Current Protection		Up to 30 mA
Common Mode Range		2 V for 10 V, 7 V for 5 V
Rejection		-40 dB typical, dc to 60 Hz
Input Isolation	Input to OURBUS	1500 Vac RMS for 1 minute
	Input to Case	1500 Vac RMS for 1 minute
	Input to Input	25 Vac

B875-111 Specifications		
Accuracy		0.1% absolute accuracy over temperature range
Conversion Resolution	All ranges	>12 bits
	Bipolar	1 part in 15,000
	Unipolar	1 part in 7,500
	Unipolar with offset	1 part in 6,000
Linearity Error		0.05% of full scale over the operating range
Differential	Nonlinearity	0.006% of full scale over the operating range
	Repeatability	0.025% of full scale RMS, constant temperature, no averaging
Output Range		Four selectable output formats
Output Averaging		Options are: N = 8, 16, and 32 samples to be averaged
Output Digital Filter, F_c		Single pole low pass with cut-off frequency dependent upon the number of averaged samples, N and T
Out-of-range Data		2.4% above and below range
Power Required	+5 V	500 mA
	+4.3 V	900 mA
	-5 V	0 mA
Terminal Connector		AS–8535–000
Reference Type		B875-111 Mapped as 8 registers input 3x B877-111 Mapped as 16 registers input 3x
Input Type		BIN/BCD

B875-111 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	WORD (%IW-3X)	-
Inputs Starting Address	1	-
Inputs Ending Address	8	-
Input Type	BINARY	BCD

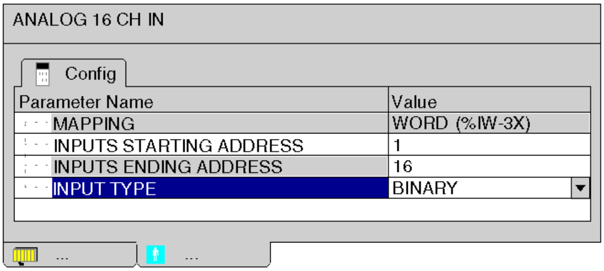
Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 8 registers input 3x	Mapped as 8 words input %IWx
Input Type	BIN/BCD	BIN/BCD

B877-111 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	WORD (%IW-3X)	-
Inputs Starting Address	1	-
Inputs Ending Address	16	-
Input Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 16 registers input 3x	Mapped as 16 words input %IWx
Input Type	BIN/BCD	BIN/BCD

B877–111,Terminal Numbering and Output Connections

Terminal Numbering and Output Connections

The following diagram shows terminal numbering and output connections for the the B877-111 module.

case ground	1	21	no connection
no connection	2	22	no connection
I/P 1+	3	23	I/P 9+
I/P 2+	4	24	I/P 10+
I/P 1, 2–	5	25	I/P 9, 10–
no connection	6	26	no connection
I/P 3+	7	27	I/P 11+
I/P 4+	8	28	I/P 12+
I/P 3, 4–	9	29	I/P 11, 12–
no connection	10	30	no connection
I/P 5+	11	31	I/P 13+
I/P 6+	12	32	I/P 14+
I/P 5, 6–	13	33	I/P 13, 14–
no connection	14	34	no connection
I/P 7+	15	35	I/P 15+
I/P 8+	16	36	I/P 16+
I/P 7, 8–	17	37	I/P 15, 16–
no connection	18	38	V ref +
no connection	19	39	V ref –
no connection	20	40	case ground

Chapter 10
B875–200 Configurable A/D Input

Purpose

This chapter describes the functional and physical characteristics of the B875–200 configurable A/D input module.

What Is in This Chapter?

This chapter contains the following topics:

B875–200 Configurable A/D Input, Overview

General

The B875–200 configurable A/D input module converts a variety of signal sources: thermocouple, RTD, strain gauge/load cell, voltage and current input ranges into binary data. When selected for eight channels, the module is displayed in the I/O map as a B875–200; when selected for four channels, it is displayed in the I/O map as a B873-200.

The module provides the capability to poll a wide array of field devices requiring different signal sources based upon the application selected. Selection may be made from more than 48 available input packs, with any mix per module being acceptable.

NOTE: Third-party input packs
Performance is not guaranteed with third-party 5B type packs. When using third-party packs, contact the manufacturer for support.

An eight-position DIP switch is used to select from one to eight input channels per module. In addition, a two-position jumper is used to select either 0, 2, or 4 samples to be averaged per input. Averaging helps reduce the impact of spurious noise on the input.

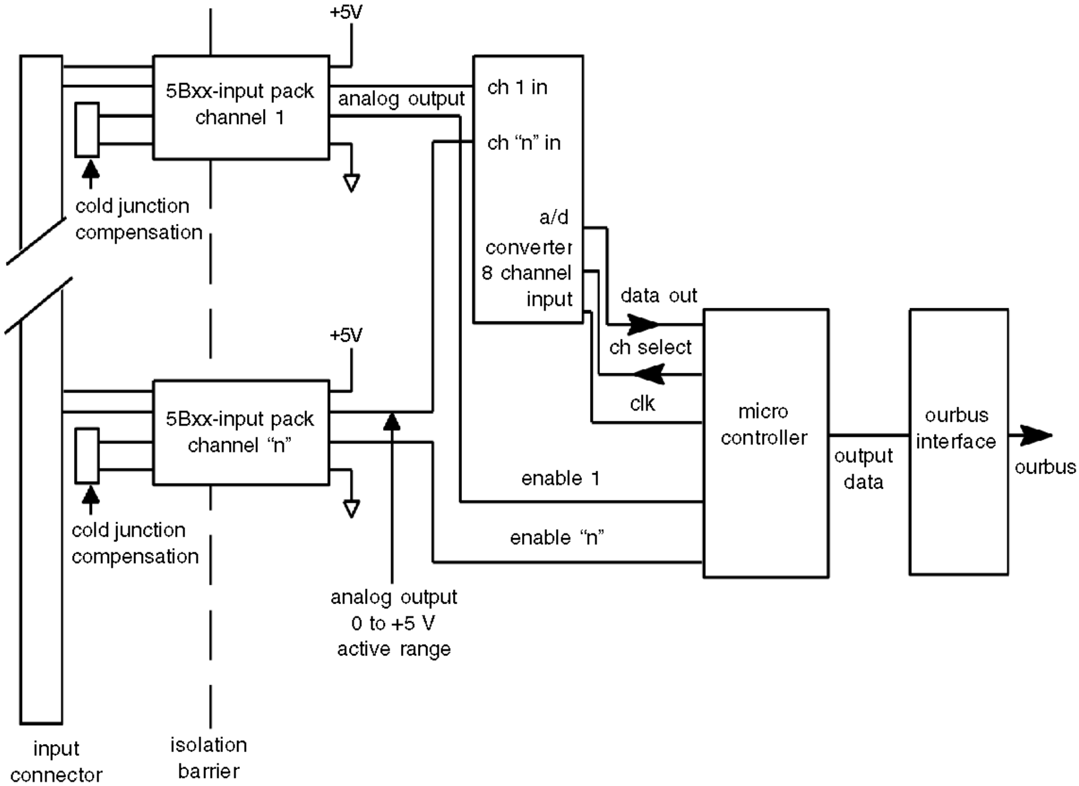
Some application examples include food processing, press operating, chemical processing, painting, and foundry casting.

The module has four/eight analog inputs and is capable of updates to all eight channels every 4 ms. The 12-bit resolution for all ranges, and the absolute accuracy is dependent on the input pack type. This allows for fast and precise control of the application.

NOTE: This module requires two slots.

Simplified Schematic Diagram

Refer to the following simplified schematic diagram for the module.



B875–200 Configurable A/D Input, Input Pack Insertion

Input Pack Insertion Procedure

Use the following procedure to insert the required input pack.

Step	Action
1	Remove channel pull-off tabs that correspond with desired input pack placement.
2	Insert input packs into right side of module corresponding to desired channels. Align input pack so that Phillips-head screw is on top and 14 leads are at bottom.
3	Tighten Phillips-head screw. **Note:** When using either a AS–5B32001A or AS–5B32002A current input pack, a fusible resistor must also be inserted into the board. The proper fusible resistor (part # AS–0418–000) comes with the current input pack. **Note:** Always insert the fusible resistor before inserting the input pack. If the fusible resistor is rectangular, ensure that the side with two leads is next to the input pack. **Note:** Never place the fusible resistor between adjacent channels. This can be detected when the fusible resistor hides the CH on the channel label on the board.
4	Locate write-on label plate (part # AS–157A–000) shipped with module. Ensure that input pack catalog numbers and input register numbers for each input pack installed are clearly identified on label.

B875–200 Configurable A/D Input, Module Configuration

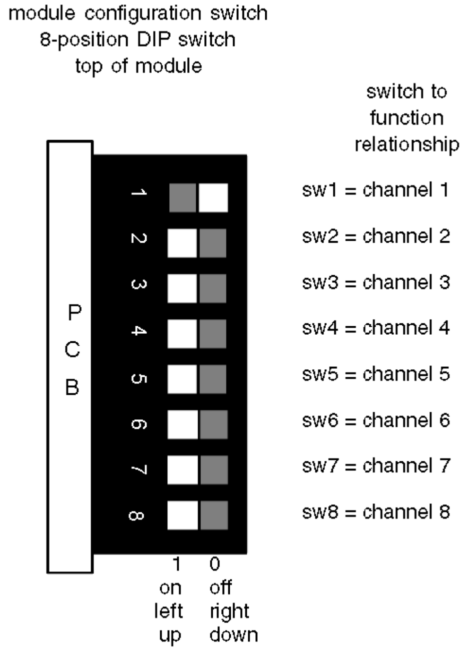
Setting the DIP Switch

Use the following procedure to set the eight-position DIP switch.

Step	Action
1	Locate eight-position DIP switch on rear of module. **Note:** These DIP switches are used to select the desired number of channels, from 1—8.
2	Set DIP switches based upon intended application prior to installation. Refer to module configuration DIP switch settings diagram, below, and to label located on left side of analog input module. **Note:** The analog input module is shipped with channel 1 ON, B873), DIP switch (SW1) set to ON. The module is I/O mapped as a B873 when **only** channels 1—4 are in use. The module is I/O mapped as a B875 when **more than** 4 channels are in use.
3	Ensure all unused DIP switches are kept to the right.

Configuring Settings

Module configuration DIP switch settings, diagram

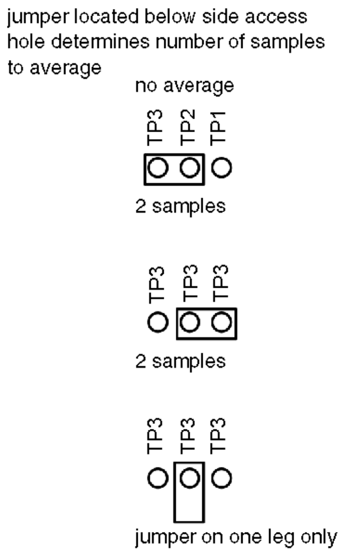


switches	functions
sw1-8	selection of input channels for channels 1-8 (B875) sw1-8 = L for channels 1-4 (B873) sw1-4 = L channels/switches not used. keep to right

NOTE: The B873 mode provides a faster throughput. Ensure that the placement of the input packs correspond with the DIP switch settings.

Sample Averaging Selection

Use the following table to determine the sample averaging selection.

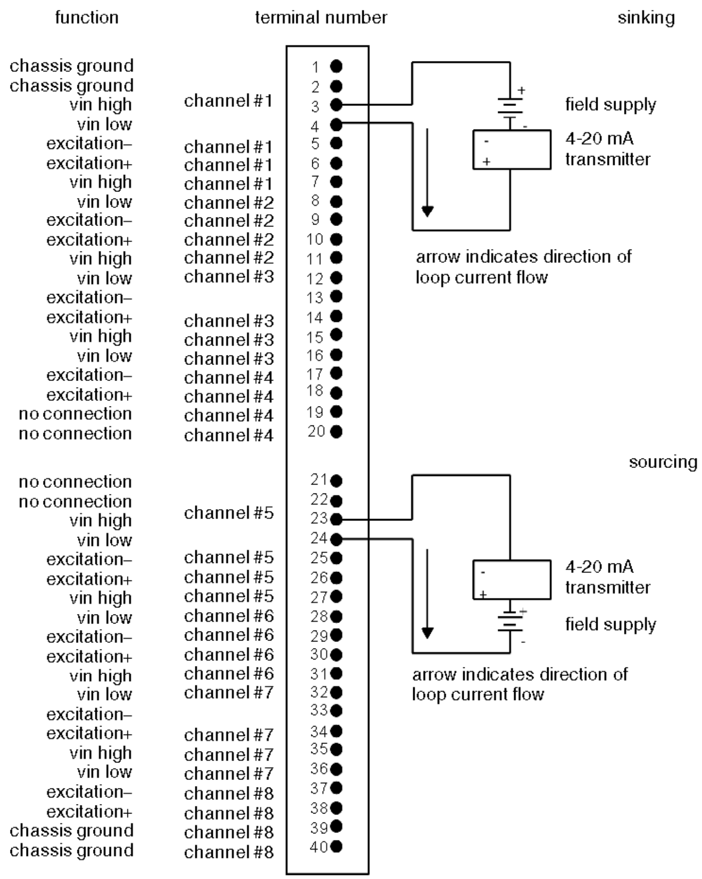
Step	Action
1	Locate access hole on left side of module. **Note:** This hole allows access to three leads and a two-position jumper, that selects the number of samples to be averaged per input channel: 0, 2, 4 samples to be averaged.
2	Select either 0, 2 or 4 samples to be averaged.
3	Set desired averaging prior to installation. Refer to jumper settings diagram, below, and label located on left side of module. **Note:** The module is shipped with the jumper set for four samples. Module configuration DIP switch settings, diagram  **Note:** Sample averaging helps reduce the impact of serious noise on the input.

B875–200 Configurable A/D Input, Field Connections

General

The module may be wired to accept the following types of packs: current input type; voltage input type; RTD input type; linear thermocouple input type; strain gauge/load cell input type. These input types and their connections are discussed below. Refer to the diagram showing the typical field circuit connections for current inputs, below.

Typical field circuit connections for current inputs, diagram



NOTE: A precision 20 Ω fusible resistor must be installed in each current input channel. The fusible resistor is supplied with each 4 - 20 mA or 0 - 20 mA input pack. The B875-200 may be installed in either the sinking or sourcing configuration.

Each channel is floating. Should you need a ground, you may tie one side of field wiring to chassis ground or use shield wiring with shield tied to chassis ground. Refer to note

Low Bandwidth Current Inputs (AS-5B32)

Select the channels to be used for current input packs. Current inputs are selected by inserting the input pack, together with a fusible resistor beside the pack, for the appropriate channel. Refer to the typical field circuit connections for current inputs diagram, above, while connecting the field-side wiring to the proper pins on the field connector.

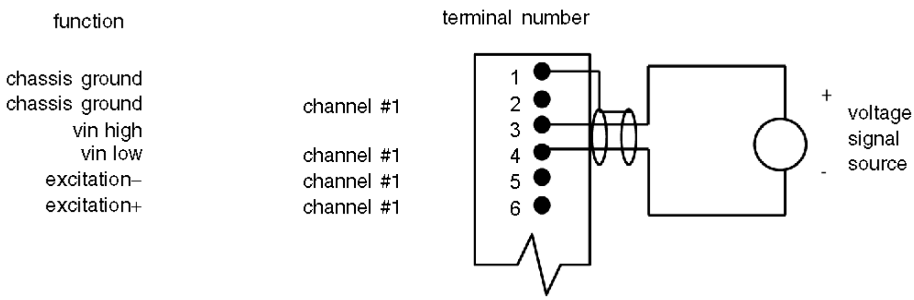
NOTE: All input packs provide 1500 Vac/2500 Vdc isolation from bus to field wiring. Since any floating inputs may be exposed to static charges as high as 15 kV, connect one of the signal input leads to chassis ground either directly or through a resistor in the range of 1kW—10MW. Use the chassis ground at terminals 1, 2, 39 or 40. If the signal source used with an input has a dc signal path to chassis ground, no additional path is required at the B875 end of the field wiring.

NOTE: Channels are set independently. Any of the pack types identified above can be intermixed.

Low and Wide Bandwidths (AS–5B30/31 and AS–5B40/41) Voltage Inputs

Note the channels to receive the voltage inputs. Voltage inputs are selected by inserting the input pack for the appropriate channel. Refer to the following drawing, and connect field-side wiring to the proper pins on the field connector.

Typical field circuit connections for voltage inputs, diagram



NOTE: Voltage wide bandwidth input packs are significantly more sensitive to noise on input lines. Low bandwidth packs are recommended for general purpose input voltage usage.

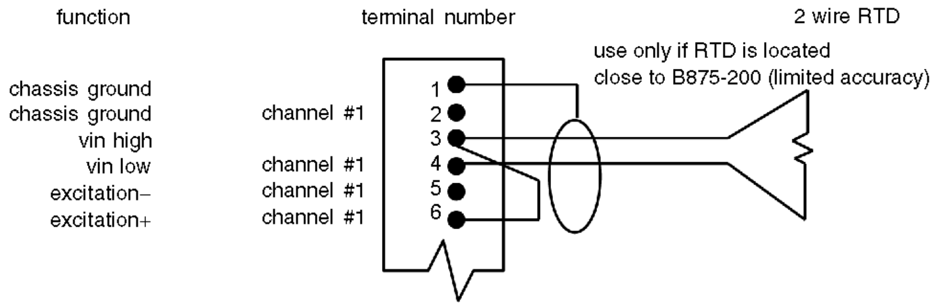
NOTE: The shield-type shown is recommended. One side of the signal source may be connected to chassis ground when using twisted pair wiring.

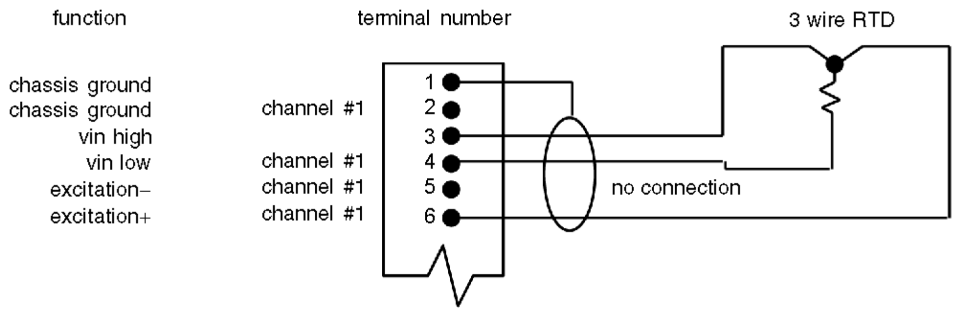
NOTE: Channels are set independently. Any mixture of current, voltage, RTD, linear thermocouple, or strain gauge/load cell may be used as inputs.

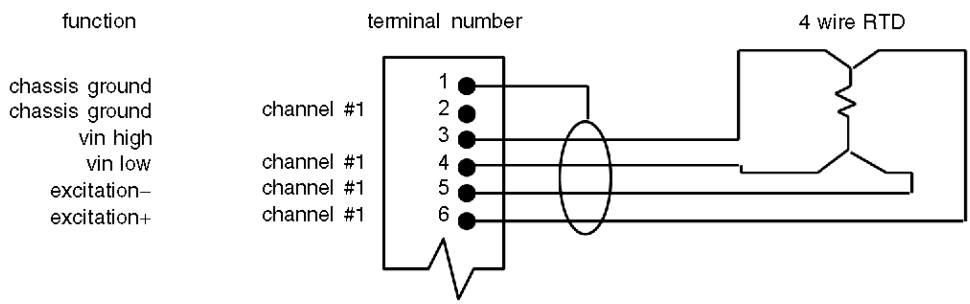
RTD (AS–5B34) Inputs

Note the channels designated to receive RTD inputs. RTD inputs are selected by inserting the input pack for the appropriate channel. Refer to the diagram below and connect the field-side wiring to the proper pins on the field connector.

Typical field circuit connections for RTD inputs, diagram







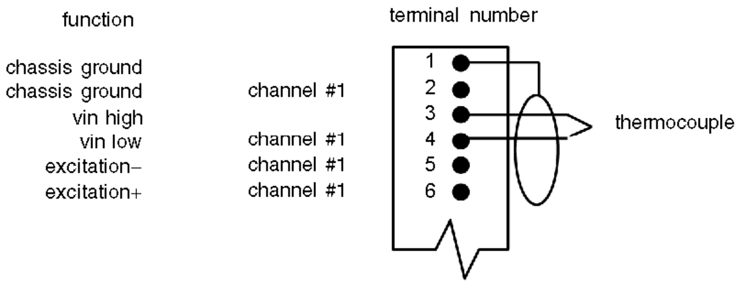
NOTE: The shield-type shown is recommended. One side of the signal source may be connected to chassis ground when using twisted pair wiring.

NOTE: Channels are set independently. Any mixture of current, voltage, RTD, linear thermocouple, or strain gauge/load cell may be used as inputs.

Linear Thermocouple (AS-5B47)

Note the channels designated to receive linear thermocouple inputs. Linear thermocouple inputs are selected by inserting the input pack for the appropriate channel. Refer to the diagram below and connect the field-side wiring to the proper pins on the field connector.

Typical field circuit connections for linear thermocouple inputs, diagram



NOTE: Thermocouple must be of the type designated by the dash number of the AS-5B47 input pack in use. Cold junction compensation is done by a temperature sensor located immediately behind the connector block.

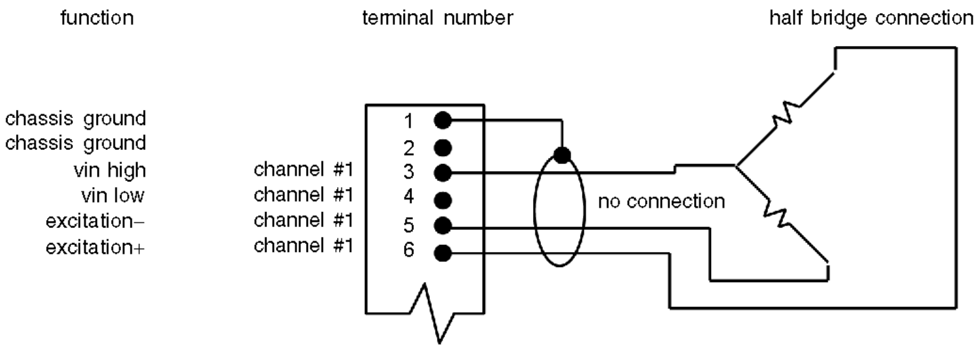
NOTE: The shield-type shown is recommended. One side of the signal source may be connected to chassis ground when using twisted pair wiring.

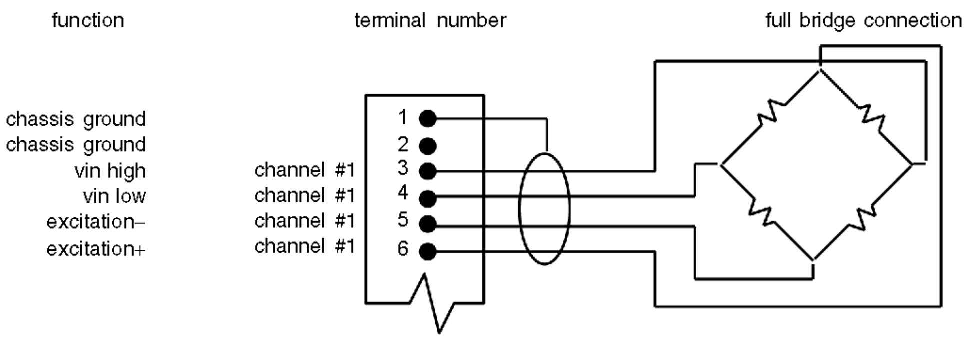
NOTE: Channels are set independently. Any mixture of current, voltage, RTD, linear thermocouple, or strain gauge/load cell may be used as inputs.

Strain Gauge/Load Cell, 0—+5 V Output (AS–5B38)

Note the channels designated to receive strain gauge/load cell inputs. Strain gauge/load cell inputs are selected by inserting the input pack for the appropriate channel. Refer to the diagram below and connect the field-side wiring to the proper pins on the field connector.

Typical field circuit connections for strain gauge/load cell inputs





NOTE: Connection must be such that strain in normal direction of application reuslts in a positive output voltage applied to vin high. Wiring to pins 5 and 6 may be reserved if output negative.

NOTE: The shield-type shown is recommended. One side of the signal source may be connected to chassis ground when using twisted pair wiring.

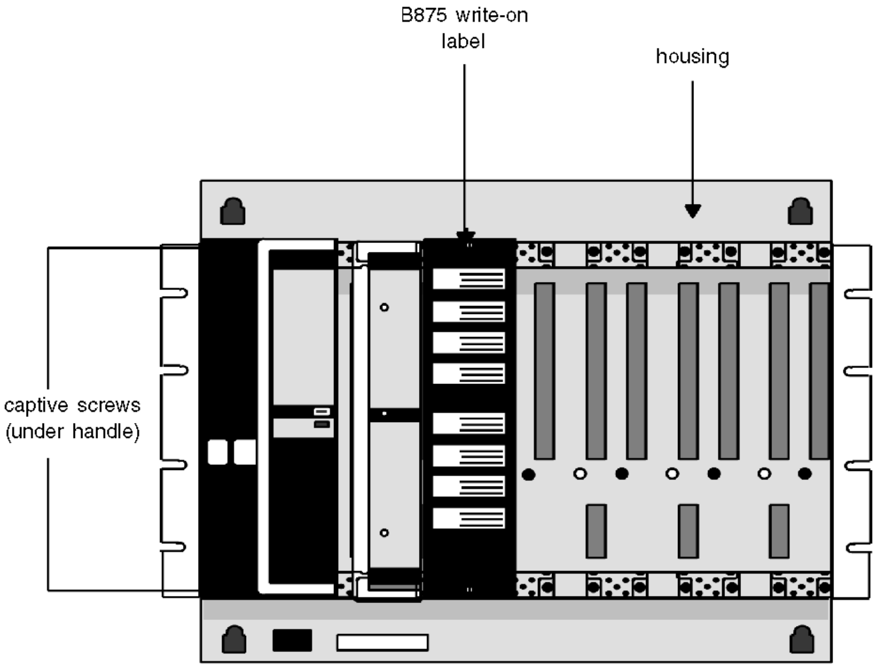
NOTE: Channels are set independently. Any mixture of current, voltage, RTD, linear thermocouple, or strain gauge/load cell may be used as inputs.

Securing the Module

Use the following procedure to secure the module.

Step	Action
1	Reinstall any module temporarily removed
2	When using key pins (provided with housing shipment), install them above and below housing slot selected.
3	Carefully insert module into housing firmly, seating edge connector in backplane.
4	Secure module to housing using captive slotted mounting screws at top and bottom of module’s front panel.
5	Locate write-on label plate (Part No. AS-157A-000). Write input pack catalog numbers and input register numbers for each installed input pack.
6	Insert write-on label plate on right side of installed module. Using two standard screws supplied, tighten them into upper and lower portions of housing slot as shown in following diagram.

Write-on label plate placement, diagram



NOTE: Ensure that all input packs are removed prior to returning module for repair.

Module B875–200 Configurable A/D Input, Quick Start Test

General

Quick start tests for the following modules are described below:

- Isolated Voltage Input (-10 — +10 V)
- Isolated Current Input (4 — 20 mA)
- Isolated Voltage Input (-10 — +10 mV)

NOTE: This module has had nyogel grease applied at the factory to the connector pins to ensure good terminal block connections. Do not remove this grease.

Isolated Voltage Input (-10 — +10 V)

Use the following procedure to configure the module as follows: eight channels (B875 in the I/O map), AS–5B31006A isolated voltage input pack, and four samples to be averaged.

Step	Action
1	Insert eight AS–5B31006A voltage input packs.
2	Set all eight-position DIP switches to left (viewed from rear of module when held vertically). This setting selects eight channels.
3	Set two-position jumper so that pins T1, T2, and T3 (located below access hole on left side of module) are not jumpered. This setting selects four average.
4	Wire + side of field device to input terminal 3 (VIN HIGH).
5	Wire -side of field device to terminal 4 (VIN LOW) on AS–8535-000 high-density connector. **Note:** Remove keying tabs on AS–8535–000 high density connector prior to installing module.
6	Determine which channel and slot locations are to be used.
7	Stop controller, remove power, and insert module in housing.
8	Reapply power
9	I/O map module as a B875, registers 30001—30008 binary.
10	Start controller.
11	Confirm that module's active light is flashing. **Note**: Active ON steady = OK. The active light may also be blinking for one of two reasons: the input to the module is out of range; the selected channel (SW1—SW8) has no input pack installed.
12	Call up appropriate mapped registers of B875 using programming panel.
13	Using measurable voltage source of field device, vary input voltage to B875. Compare these values to those in table below.

The following table shows the signal to output value relationship

Voltage Input (V)	I/O Mapped Registers	Output Value
-9.99	30001 =	0001
-5.00	30001 =	1024
0.00	30001 =	2048
+5.00	30001 =	3072
+9.99	30001 =	4095

Isolated Current Input (-4 — +20 mA)

Use the following procedure to configure the module as follows: eight channels (B875 in the I/O map), AS–5B32001A isolated current input pack, and four samples to be averaged.

Step	Action
1	Insert eight fusible resistors shipped with AS–5B32001A input packs.
2	Insert eight current input packs (AS–5B32001A)
3	Set all eight-position DIP switches to left (viewed from rear of module when held vertically). This setting selects eight channels.
4	Set two-position jumper so that pins T1, T2, and T3 (located below access hole on left side of module) are not jumpered. This setting selects four average.
5	Wire input terminal 3 (VIN HIGH), 4 (VIN LOW) and 1 (CHASSIS GROUND) on AS–8535–000 high density connector as shown in typical field circuit connections for current inputs diagram, above. **Note:** Remove keying tabs on AS–8535–000 high density connector prior to installing module.
6	Determine which channel and slot locations are to be used.
7	Stop controller, remove power, and insert module in housing.
8	Reapply power
9	I/O map module as a B875, registers 30001—30008 binary.
10	Start controller.
11	Confirm that module's active light is flashing. **Note:** Active ON steady = OK. The active light may also be blinking for one of two reasons: the input to the module is out of range; the selected channel (SW1—SW8) has no input pack installed.
12	Call up appropriate mapped registers of B875 using programming panel.
13	Using measurable voltage source of field device, vary input voltage to B875. Compare these values to those in table below.

The following table shows the signal to output value relationship

Current Input (mA)	I/O Mapped Registers	Output Value
4.01	30001 =	0001
8.00	30001 =	1024
12.00	30001 =	2048
16.00	30001 =	3072
19.99	30001 =	4095

Isolated Voltage Input (-10 — +10 mV)

Use the following procedure to configure the module as follows: eight channels (B875 in the I/O map), AS–5B40004A isolated voltage wide bandwidth input pack, and four samples to be averaged.

Step	Action
1	Insert eight voltage input packs (AS–5B40004A)
2	Set all eight-position DIP switches to left (viewed from rear of module when held vertically). This setting selects eight channels.
3	Set two-position jumper so that pins T1, T2, and T3 (located below access hole on left side of module) are not jumpered. This setting selects four average.
4	Wire input terminal 3 (VIN HIGH), 4 (VIN LOW) and 1 (CHASSIS GROUND) on AS–8535–000 high density connector as shown in typical field circuit connections for current inputs diagram, above. **Note:** Remove keying tabs on AS–8535–000 high density connector prior to installing module.
5	Wire remaining inputs (2—8) in similar manner, connecting + to VIN HIGH and - to VIN LOW.
6	Determine which channel and slot locations are to be used.
7	Stop controller, remove power, and insert module in housing.
8	Reapply power
9	I/O map module as a B875, registers 30001—30008 binary.
10	Start controller.
11	Confirm that module’s active light is flashing. **Note:** Active ON steady = OK. The active light may also be blinking for one of two reasons: the input to the module is out of range; the selected channel (SW1—SW8) has no input pack installed.
12	Call up appropriate mapped registers of B875 using programming panel.
13	Using measurable voltage source or field device, vary input voltage to B875. Compare these values to those in table below.

The following table shows the signal to output value relationship

Current Input (mV)	I/O Mapped Registers	Output Value
-9.99	30001 =	0001
-5.00	30001 =	1024
0.00	30001 =	2048
+5.00	30001 =	3072
+9.99	30001 =	4095

B875–200 Configurable A/D Input, Calibration

General

The analog input module is calibrated at the factory prior to shipment. To ensure the module's accuracy, the trim-pot should be calibrated regularly on a yearly interval.

The following tools and materials are needed to calibrate a configurable A/D input module:

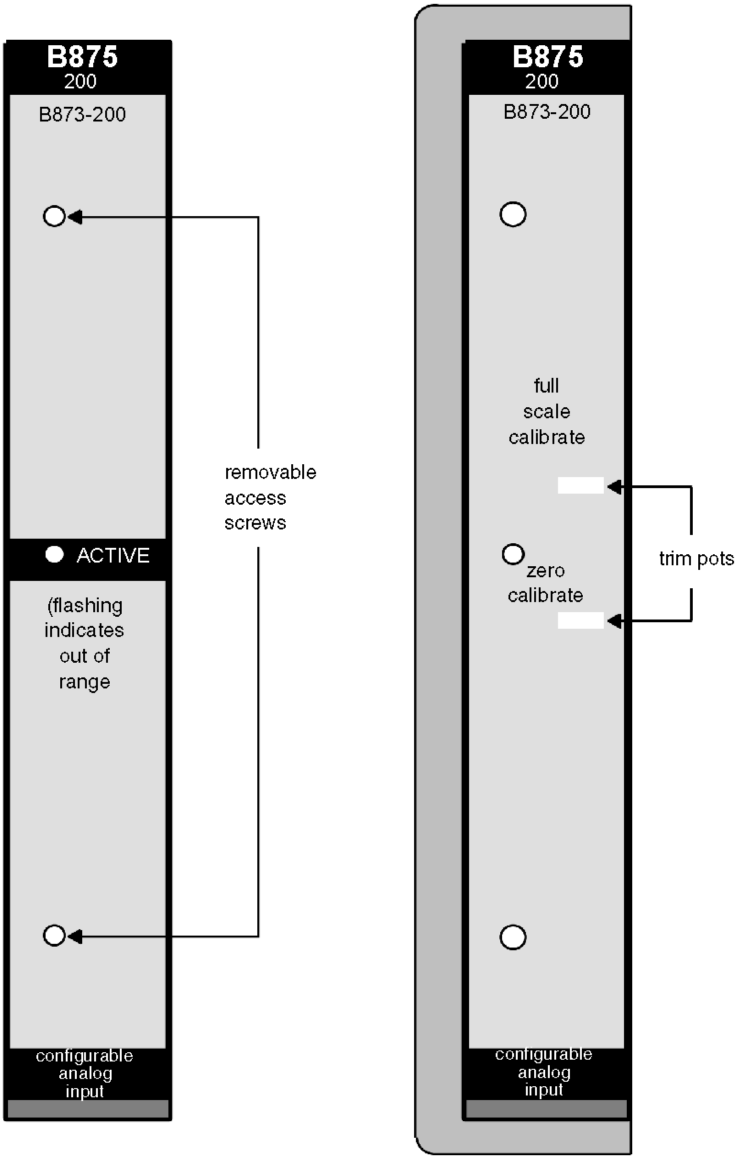
- A precision digital readout voltmeter with an accuracy of 0.0001 V on a 10 V scale.
- A 1/8-inch bit, thin-blade screwdriver.
- A 1/4-inch Phillips-head screwdriver.

NOTE: Calibration is not recommended for analog current, low bandwidth, 4—20 mA (AS–5B32001A) type input packs because of their reduced accuracy

Calibration of a given channel involves calibration of all eight channels of this module. There is no provision to calibrate a particular channel. Therefore, calibration can be performed with any one channel with any type of input pack. Calibration does require the calibration signals to pass through an input pack.

NOTE: If the particular input pack used in calibration is out of calibration, then all B875 modules calibrated with this input pack will be improperly calibrated.

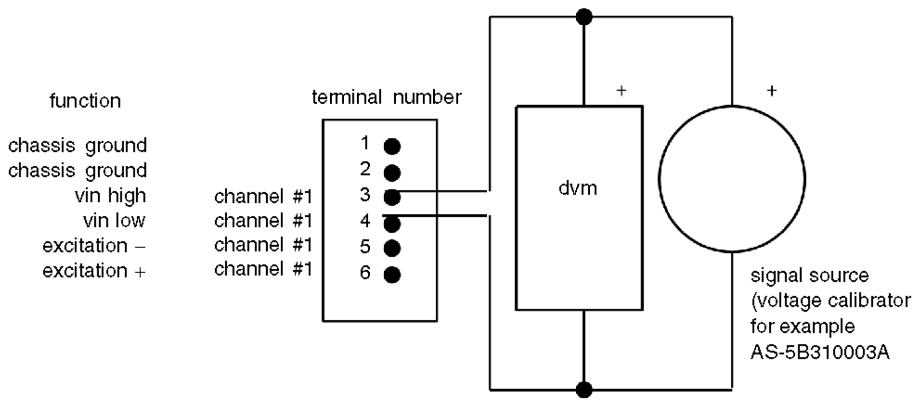
Location of trim pot, diagram



Use the following procedure to calibrate the module. The input pack used in this procedure is used only as an example. A five-minute warm-up time is recommended prior to calibration.

Step	Action
1	To access both trim pots, remove two screws and label located on front panel of module, as shown on location of trim-pot diagram, above. Note: The top trim-pot adjusts the total magnitude of the range (full scale). The bottom trim-pot adjusts the zero offset scale.
2	Open module handle to expose connectors and terminals.
3	Install an input pack in any channel, and connect an appropriate signal source to that channel. Refer to voltmeter connections diagram, below.
4	Apply input signal to selected channel which represents zero signal (zero volts when using analog, V input pack, low bandwidth, 0 to +10 V (AS--5B31003A). On programming panel observe input from B875 for selected channel. Adjust zero cal control (R29) as required to read 0000.
5	Apply input signal that results in output between 80 to 90% of full scale. Use 9.375 V if calibrating with an analog, V input pack, low bandwidth, 0 to +10 V (AS--5B31003A). Resultant reading should be set for 0F00 Hex, or 3840 decimal with full scale calibration control (R57).
6	Repeat previous two steps until readings are correct at both zero and near-full-scale points.
7	After calibration is complete, disconnect voltmeter, return connections to their original state, close module handle, and replace front label that covers trim-pot.

Voltmeter connections diagram



B875–200 Configurable A/D Input, Available Input Packs

General

The module accepts up to eight input packs of any mix. Six categories are available

- Voltage, low bandwidth
- Current, low bandwidth
- RTD
- Strain gauge
- Voltage, wide bandwidth
- Linear thermocouple

Refer to the following tables for the desired input range, output range, and part number required for the intended application.

NOTE: 5B type third party packs
When using third party packs, contact the manufacturer for support.

NOTE: Input packs are issued as revision level A’s, denoted by the last item of the part number, for example, (AS–5B30001A). Changes will be noted by higher revision levels.

NOTE: The usable output range for all AS–5BXX input packs is 0—+5 V when used with this module.

Low Bandwidth (4 kHz) Analog Voltage Input Packs

The following table presents the part numbers and input ranges for the available low bandwidth analog voltage input packs.

Part Number	Input Range
AS–5B30001A	0—10 mV
AS–5B30002A	0—50 mV
AS–5B30003A	0—100 mV
AS–5B30004A	-10—+10 mV
AS–5B30005A	-50—+50 mV
AS–5B30006A	-100—+100 mV
AS–5B31001A	0—1 V
AS–5B31002A	0—5 V
AS–5B31003A	0— +10 V
AS–5B31004A	-1— +1 V
AS–5B31005A	-5— +5 V
AS–5B31006A	-10— +10 V

Low Bandwidth (4 kHz) Analog Current Input Packs

The following table presents the part numbers and input ranges for the available low bandwidth analog current input packs.

Part Number	Input Range
AS–5B32001A	4—20 mA
AS–5B32002A	0—20 mA

NOTE: Each current input pack (4—20 mA) comes with a fusible resistor that must be inserted in addition to the input pack.

Low bandwidth (4k Hz) RTD Input Packs

The following table presents the part numbers, types, and input ranges for the available low bandwidth RTD input packs.

Part Number	Type	Input Range
AS–5B34P01A	100 Ω Pt	-100— +100°C (-148— +212°F)
AS–5B34P02A	100 Ω Pt	0—100°C (32—212°F)
AS–5B34P03A	100 Ω Pt	0—200°C (32—392°F)
AS–5B34P04A	100 Ω Pt	0—600°C (32—1112°F)
AS–5B34C01A	100 Ω Cu @ 0°C	0—120°C (32—248°F)
AS–5B34C02A	100 Ω Cu @ 25°C	0—120°C (32—248°F)
AS–5B34N01A	120 Ω Ni	0—300°C (32—572°F)

Wide Bandwidth (10 kHz) Strain Gauge/Load Cell Input Packs

The following table presents the part numbers and input ranges for the available wide bandwidth strain gauge/load cell input packs.

Part Number	Input Range
AS–5B38002A	3 mV/V, Full Bridge
AS–5B38004A	3 mV/V, Half Bridge
AS–5B38005A	2 mV/V, Full Bridge

NOTE: Isolated strain gauge input to 10 kHz bandwidth, all have 10.0 V excitation for bridges with resistance range of 300W to 10kW.

Wide Bandwidth (10 kHz) Analog Voltage Input Packs

The following table presents the part numbers and input ranges for the available wide bandwidth analog voltage input packs.

Part Number	Input Range
AS–5B40001A	0—10 mV
AS–5B40002A	0—50 mV
AS–5B40003A	0—100 mV
AS–5B40004A	-10— +10 mV
AS–5B40005A	-50— +50 mV
AS–5B40006A	-100— +100 mV
AS–5B41001A	0—1 V
AS–5B41002A	0—5 V
AS–5B41003A	0—10 V
AS–5B41004A	-1— +1 V
AS–5B41005A	-5— +5 V
AS–5B41006A	-10— +10 V

NOTE: Wide bandwidth input packs are only used for high-speed applications. They are more susceptible to external noise levels, and require careful routing and shielding of input signal leads.

Linear Thermocouple Input Packs

The following table presents the part numbers, types, and input ranges for the available linear thermocouple input packs.

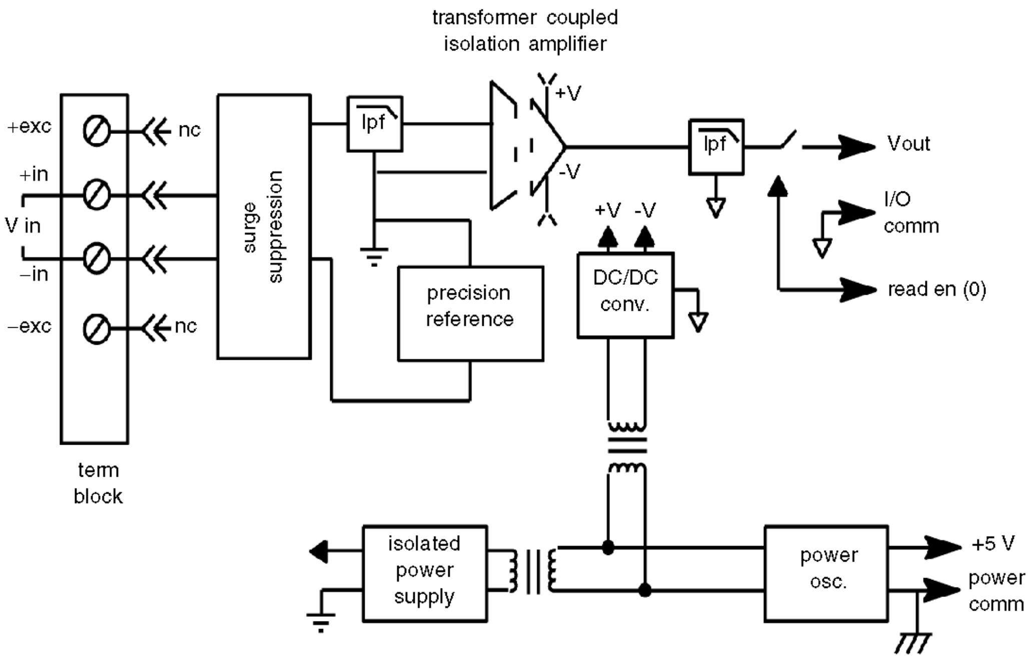
Part Number	Type	Input Range
AS–5B47J01A	J	0—760°C (32—1400°F)
AS–5B47J02A	J	-100— +300°C (-148—572°F)
AS–5B47J03A	J	0—500°C (32—932°F)
AS–5B47K04A	K	0—1000°C (32—1832°F)
AS–5B47K05A	K	0—500°C (32—932°F)
AS–5B47T06A	T	-100— +400°C (-148—752°F)
AS–5B47T07A	T	0—200°C (32—392°F)
AS–5B47E08A	E	0—1000°C (32—1832°F)
AS–5B47R09A	R	500—1750°C (932—3182°F)
AS–5B47S10A	S	500—1750°C (932—3182°F
AS–5B47B11A	B	500—1800°C (932—3272°F)

B875–200 Configurable A/D Input, Input Pack Simplified Schematics

Typical Analog mV (5B30) Simplified Schematic

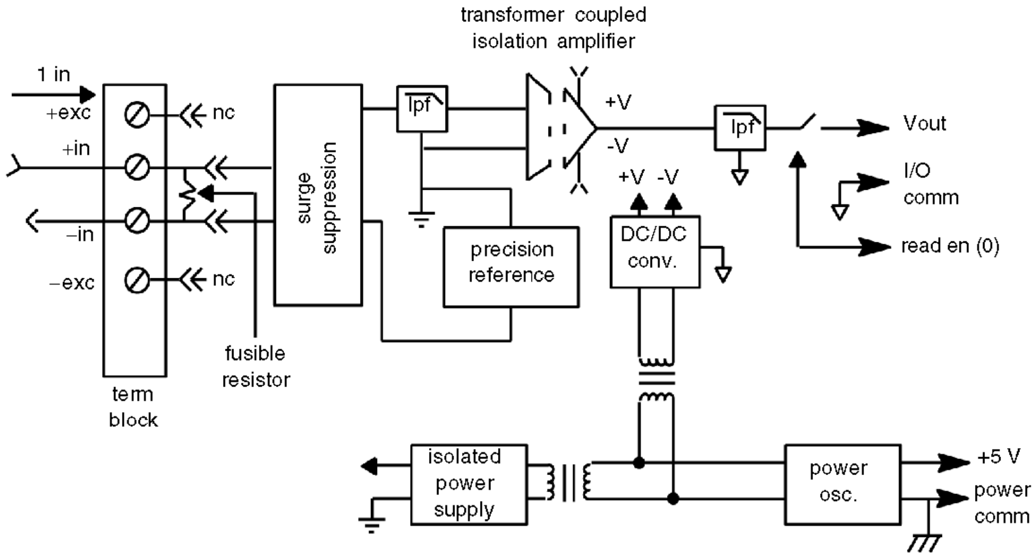
Simplified schematic diagrams for all types of input packs are shown below.

The typical analog mV (5B30) schematic diagram is shown below.



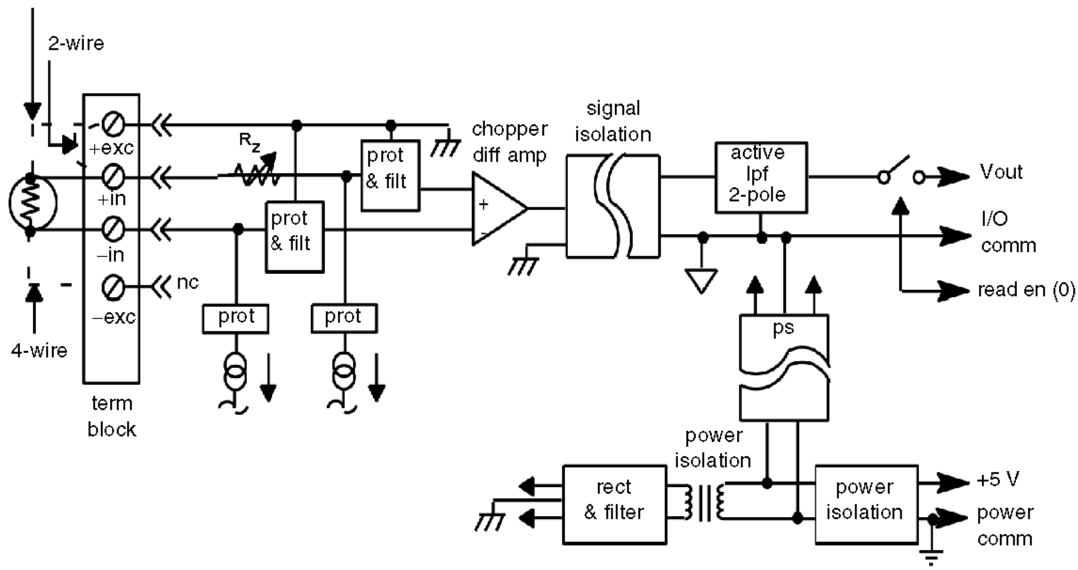
Typical Analog Current (5B32) Simplified Schematic Diagram

The typical analog current (5B32) schematic diagram is shown below.



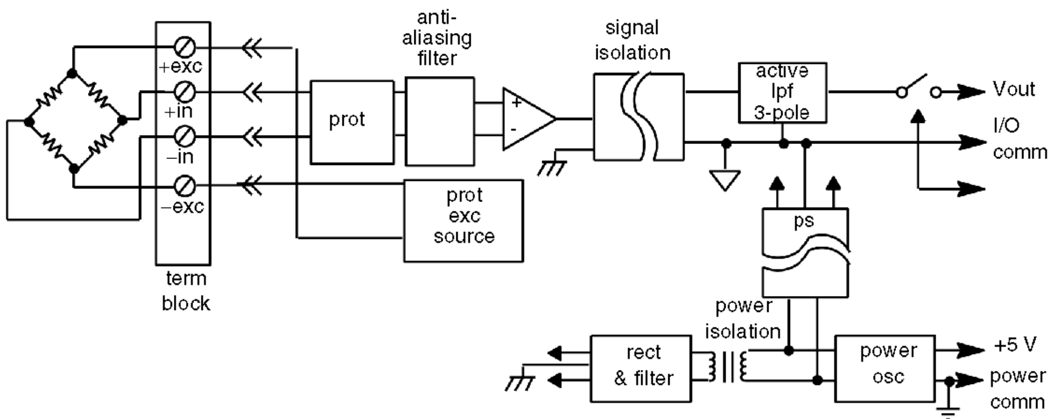
Typical RTD (5B34) Simplified Schematic Diagram

The typical RTD (5B34) schematic diagram is shown below.



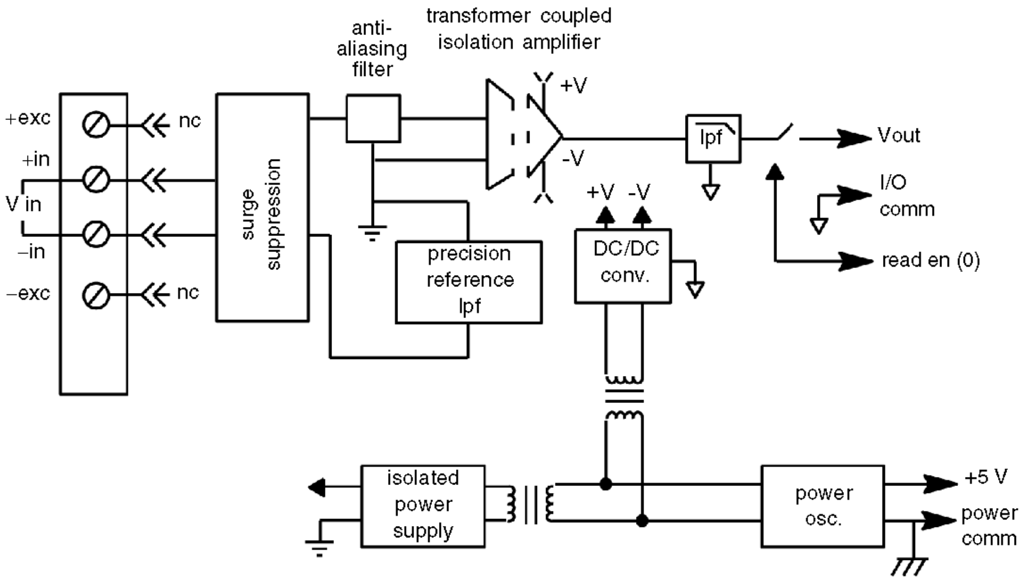
Typical Strain gauge/Load Cell (5B38) Simplified Schematic Diagram

The typical strain gauge/load cell (5B38) schematic diagram is shown below.



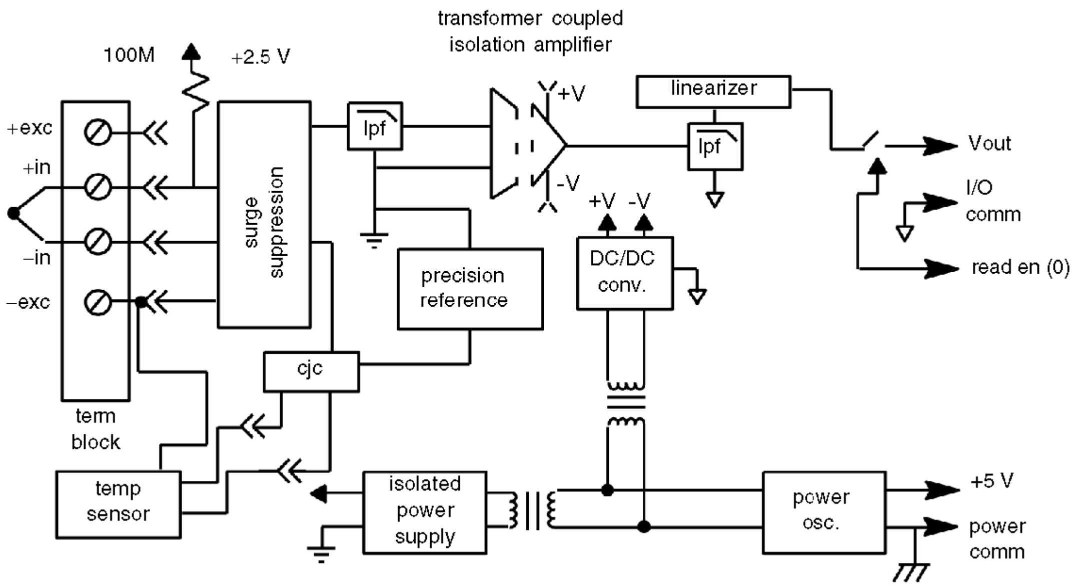
Typical Analog Voltage (5B40 and 5B41) Simplified Schematic Diagram

The typical analog voltage (5B40 and 5B41) schematic diagram is shown below.



Typical Linear Thermocouple (5B47) Simplified Schematic Diagram

The typical linear thermocouple (5B47) schematic diagram is shown below.



B875–200 Configurable A/D Input, Specifications

Specification Table

The following tables provides the specifications for the unit.

B875-200 Specifications		
Analog Channels	B873-200 in I/O Map	Four
	B875-200 in I/O Map	Eight
Voltage Range		Varies with selected input pack
Current Range		
Thermocouple Types		
RTD Types		
Strain Gauge/Load Cell Types		
Input Filter		Three pole or more low pass, with -3dB cut-off frequency of 4 Hz, 10% on low-band units, 10 kHz 10% on wide bandwidth units
Input Resistance	Current Mode	20 Ω
	Voltage Mode	Refer to voltage mode table, below
Input Protection Normal Mode		All input packs can withstand 240 V RMS without damage, however, the fusible resistor used with the current input packs will be destroyed by overcurrent conditions
Note: Input over range or under range on an input pack will not produce reading errors on adjacent channels in excess of 1 count.		
Common Mode		Each input pack can withstand 1500 V RMS
Rejection		In excess of 140 dB for all input packs except AS–5B40 and AS–5B41 which are 80 dB
Input Isolation	Input to OURBUS	1500 Vac RMS or 2500 Vdc for 1 minute
	Input to Case	1500 Vac RMS or 2500 Vdc for 1 minute
	Input to Input	1500 Vac RMS or 2500 Vdc for 1 minute
Conversion Resolution		12 bits all ranges
Out of Range Data		Four counts above and below range
Out of Range Error (flags)		Refer to out-of-range error table, below.
Out of Range Error (Flags) MSB LSB 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Bit 15 14 0 Bits 15 and 14 = Out of range		
Input Averaging		Options are 0, 2, or 4 samples

B875-200 Specifications		
Throughput		1.7 ms typical for 4 channels, 4 ms for eight channels maximum
Power Required	+5 V	550 mA
	+4.3 V	10 mA
	-5 V	0 mA
Terminal Connector		AS–8535–000
Reference Type		Mapped as 8 registers input 3x
Input Type		BIN/BCD

The following table provides the resistance values for the voltage mode for the indicated input pack numbers.

Pack Number	In Range	Power Off and/or Over Range
AS–5B30	5 MΩ	40 kΩ
AS–5B31	650 kΩ	650 kΩ
AS–5B40	200 MΩ	40 kΩ
AS–5B41	650 kΩ	650 kΩ

The following table provides data on out-of-range errors (flags)

Data Flagged	Description
Not Ready	Bit 14 set high (4000 Hex)
Over Range	Bit 15 set high (800x Hex, x=1—4 bits over range)
Under Range	Bits 14 and 15 set high (c00xHex, x=1—4 bits under range)
Normal Data	Bits 14 and 15 are low, normal data range is 0—4095 (0—1FFF Hex)

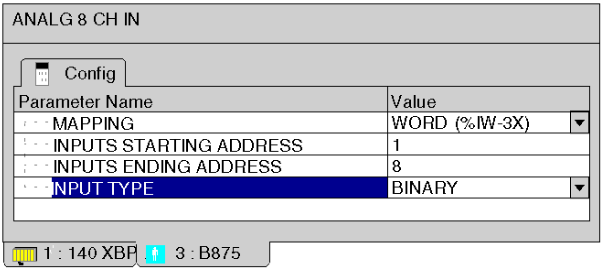
The following table provides data on the accuracy of the input packs.

Input Pack	Calibration Accuracy at 25°C	*Accuracy Over Temp 0—60°C	Nonlinearity	Gain Drift***	Offset Drift***
AS–5B30 AS–5B40 Unipolar	0.15	0.73	0.05	.007%/°C	.008%/°C
Bipolar	0.20	0.78	0.05	.007%/°C	.008%/°C
AS–5B31 AS–5B41 Unipolar	0.15	0.62	0.05	.01%/°C	.002%/°C
Bipolar	0.20	0.67	0.05	.01%/°C	.002%/°C
AS–5B32	0.25	0.70	0.05	.01%/°C	.001%/°C
AS–5B47	0.1 1°C**	0.4 2°C	0.05	.007%/°C	1 V%/°C typ
AS–5B38	0.15	0.80	0.05	.010%/°C	1 V%/°C typ
AS–5B34	0.15	2.0	0.05	.01%/°C	.04%/°C
Unless noted all entries are% of full scale.					
*Accuracy = Calibration + gain drift + offset + non linearity for the range 0—60°C ambient.					
**Calibration accuracy for types J, K, T. For types R & S = 4°C. For type B = 6°C.					
***Both gain and offset drift are from 25°C.					

B875-200 Parameter Configuration

Parameter and Default Values

Parameter Configuration Window



Module Configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	WORD (%IW-3X)	-
Inputs Starting Address	1	-
Inputs Ending Address	8	-
Input Type	BINARY	BCD

Mapping Parameter References

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 8 registers input 3x	Mapped as 8 words input %IWx
Input Type	BIN/BCD	BIN/BCD

Chapter 11
J890 and J892 RIO Interface Modules

Purpose

This chapter explains features and operation of the J890 and J892 RIO interface modules.

What Is in This Chapter?

This chapter contains the following topics:

J890 and J892 Overview

Module Features

A J890 or J892 module may be used to provide the drop interface between a 984 programmable controller and a remote drop of 800 series I/O on an S908 remote I/O (RIO) network. Both interface modules are available in two models - one with a single F connector for RIO cable connection and one with two F connectors. In addition, the J892 contains two half-duplex ports that will support ASCII input/output devices at the remote drop.

Module Table

J89x modules

Part number	RIO cable ports	ASCII ports
AS-J890-101	1	0
AS-J890-102	2	0
AS-J892-101	1	2
AS-J892-102	2	2

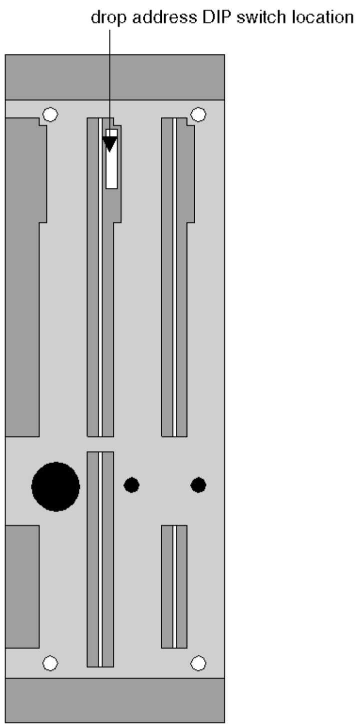
J890 and J892 DIP Switch Settings for the Drop Address

DIP Switch Location

This J890/J892 Interface devices both have a set of DIP switches located on the back of the module. These switches are used to set a unique RIO network address for the remote drop where the interface will reside. The drop address must be set on the Interface module before it is installed in the I/O housing.

Interface Rear View

Rear view of J890 and J892 interface.

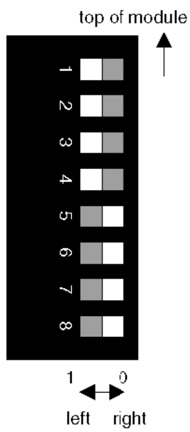


Switch Settings for Drop Address

The drop address DIP switch has eight positions

NOTE: If the controller at the head end of the RIO network supports both a local I/O drop and remote I/O, then drop address # 1 is reserved for the local drop and the first remote drop is addressed as drop # 2. If the controller does not support local I/O, the first remote drop is addressed as drop # 1. For a complete list of 984 controllers and their I/O support capabilities, refer to the Remote I/O System Planning and Installation Guide (890 USE 101 00).

Switch positions for drop addressing.



Switch assignment for drop addressing

Switches	Functions
Positions 1 ... 5	Drop address 1 - 32 set in the 1 direction (to the left)
Positions 6 ... 8	not used set in the 0 direction (to the right)

Mapping Dip Switch Settings for Drop Address

Dip switch settings for the drop address

	Switches				
	1	2	3	4	5
Drop Address					
1	0	0	0	0	0
2	1	0	0	0	0

	Switches				
	1	2	3	4	5
Drop Address					
3	0	1	0	0	0
4	1	1	0	0	0
5	0	0	1	0	0
6	1	0	1	0	0
7	0	1	1	0	0
8	1	1	1	0	0
9	0	0	0	1	0
10	1	0	0	1	0
11	0	1	0	1	0
12	1	1	0	1	0
13	0	0	1	1	0
14	1	0	1	1	0
15	0	1	1	1	0
16	1	1	1	1	0
17	0	0	0	0	1
18	1	0	0	0	1
19	0	1	0	0	1
20	1	1	0	0	1
21	0	0	1	0	1
22	1	0	1	0	1
23	0	1	1	0	1
24	1	1	1	0	1
25	0	0	0	1	1
26	1	0	0	1	1
27	0	1	0	1	1
28	1	1	0	1	1
29	0	0	1	1	1
30	1	0	1	1	1
31	0	1	1	1	1
32	1	1	1	1	1

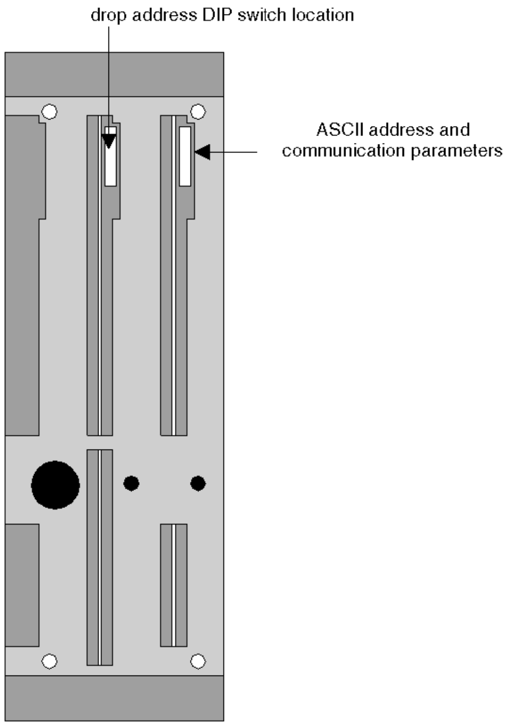
J892 DIP Switch Settings for ASCII Devices

DIP Switch Location

J892 Interface devices have an additional set of DIP switches located at the back of the module for setting ASCI device addresses and ASCII communication parameters. If you want to support ASCII devices at this drop, the ASCII switch setting must be made before the module is installed in the I/O housing.

Interface Rear View

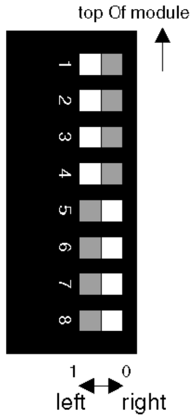
Rear view of J892 interface.



Switch Settings

The drop address DIP switch has eight positions.

Switch positions for ASCII device settings.



Switches 3 ... 6 are used to set ASCII device addresses on the RIO network. The remaining switches are used to specify ASCII communication parameters.

Switch Settings for ASCII Communication

Switch settings for ASCII communication

Switches	ASCII Communication Function
1	RS-232C handshaking for the bottom ASCII port 1 = Data terminal ready/hardware handshake 0 = XON/XOFF
2	RS-232C handshaking for the top ASCII port 1 = Data terminal ready 0 = XON/XOFF
3 ... 6	Port address 1 - 32 Device addressing in pairs
7	Continuous confidence test mode* 1 = Local diagnostic (J892 will not communicate when set to 1 position (left)) 0 = On-line (Normal setting)
8	Not used, always set in the 0 position (right)

Mapping Switch Settings for ASCII Device Addresses

Switch settings for ASCII device addresses

	Switches			
	3	4	5	6
ASCII ports address				
1, 2	0	0	0	0
3, 4	1	0	0	0
5, 6	0	1	0	0
7, 8	1	1	0	0
9, 10	0	0	1	0
11, 12	1	0	1	0
13, 14	0	1	1	0
15, 16	1	1	1	0
17, 18	0	0	0	1
19, 20	1	0	0	1
21, 22	0	1	0	1
23, 24	1	1	0	1
25, 26	0	0	1	1
27, 28	1	0	1	1
29, 30	0	1	1	1
31, 32	1	1	1	1

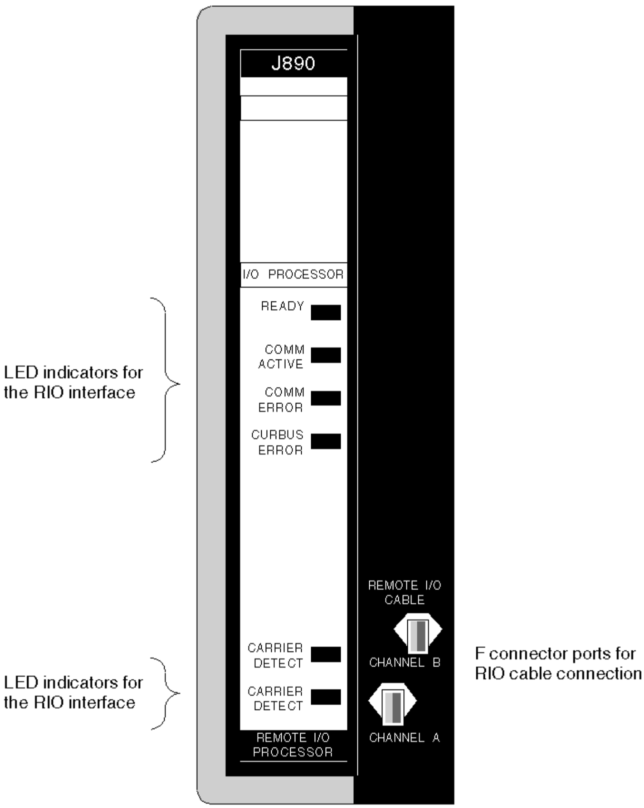
J890 and J892 Indications

Overview

On the face of both the J890 and J892 RIO interface modules are a set of LEDs that indicate the RIO processing status of the module and one or two BNC cable ports used to connect the drop to the RIO network.

J890 Front View

AS-J890 front view

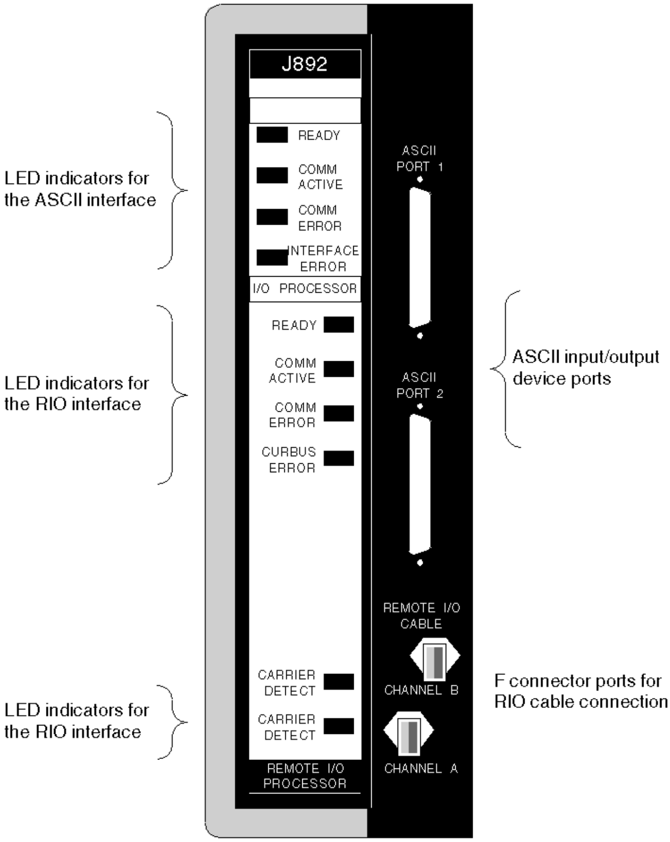


The J892 has additional LEDs that indicate the ASCII device processing status at the drop and a pair of 25-pin, D-shell, female ports for connecting ASCII devices at the drop.

NOTE: The LED indicators on the front panels also provide diagnostic information.Various flash patterns indicate errors detected in the RIO interface and/or in the ASCII interface.

J892 Front View

J892 front view



J890 and J892 LED Status Indications for RIO Interface

J890 and J892 LED status indications for RIO interface.

Name	Color	Indication (when ON)
READY	Green	RIO interface board succesfully passed power-up test
COMM ACTIVE	Green	I/O data being received or sent
COMM ERROR	Red	Communications error between J890 / J892 and 984
OURBUS ERROR	Red	Detected communications error between J890 / J892 and I/O
CARRIER DETECT	Green	Processor sensed carrier signal

NOTE: The COMM ERROR LED for the RIO Interface is ON if only one port on a dual port interface is connected, indicating that no signals are present at the unconnected port. Communications with the 984 are not effected.

J892 LED Status Indications for ASCII Interface

J892 LED status indications for ASCII interface

Name	Color	Indication (when ON)
READY	Green	ASCII board succesfully passed power-up test
COMM ACTIVE	Green	ASCII data being received or sent
COMM ERROR	Red	Detected communications error between J892 and ASCII device
INTERFACE ERROR	Red	Detected ASCII communications error in the J892

NOTE: The COMM ERROR LED for the RIO Interface is ON if only one port on a dual port interface is connected, indicating that no signals are present at the unconnected port. Communications with the 984 are not effected.

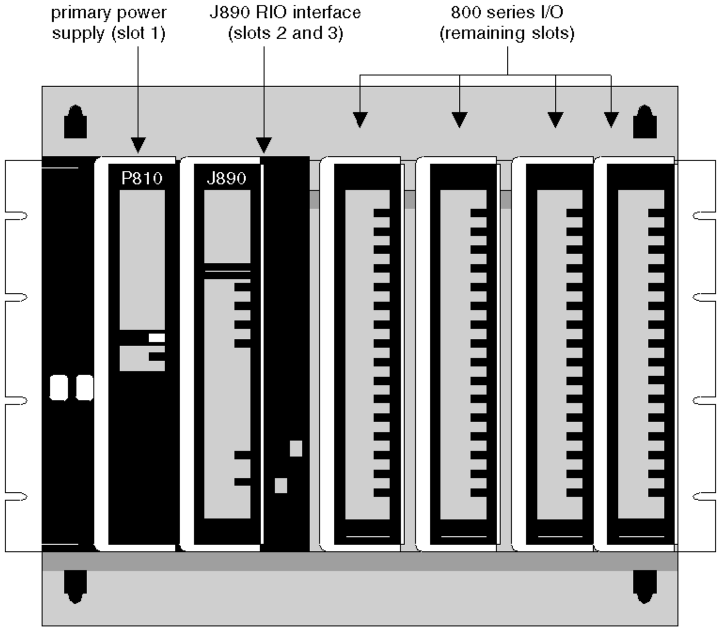
J890 and J892 Installation and Connection

Introduction

After the appropriate switch settings have been made, follow these steps to install the J890/J892 Interface module in a primary (AS-H819-103 or AS-H827-103, AS-H827-107) 800 series I/O housing. The module is 1.5 slots wide.

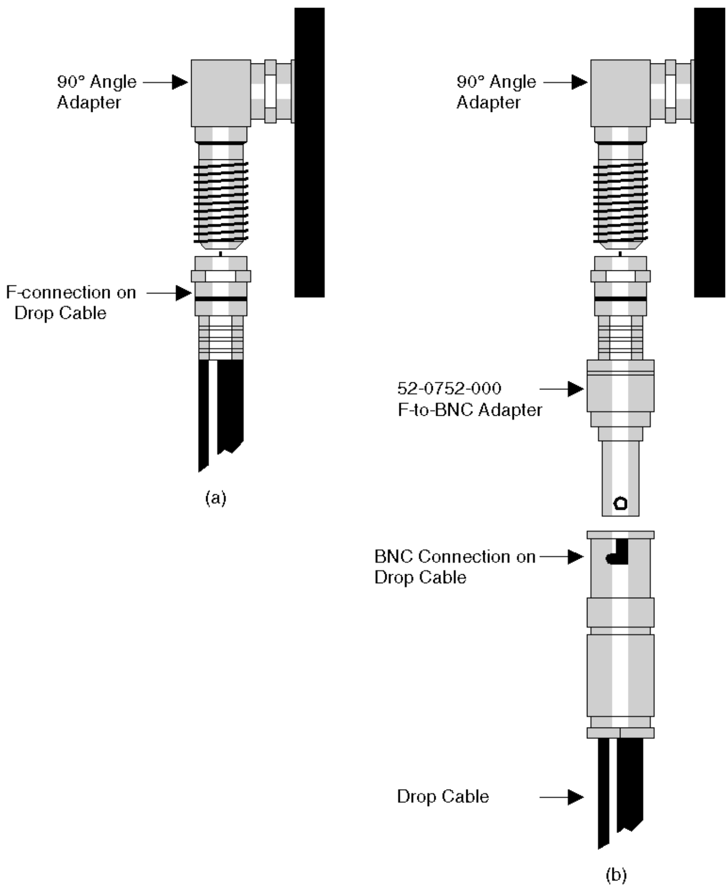
Installing the J890/J892 Module

The following table lists the steps for installing the J890/J892 module:

Step	Action
1	Turn off the power to the I/O housing.
2	If you are installing a J892, make sure that SW7 on the ASCII communications DIP switch pack is set to the 0 position (on-line).
3	Insert the Interface module in slots 2 and 3 of the primary housing (directly to the right of the power supply unit). Press the module firmly to ensure that it is seated properly. Position of a J890 interface module in a primary I/O housing. 
4	Tighten the two captive screws located at the top and bottom of the interface module.

Connecting the J890/J892 to a Drop Cable

The following table lists the steps for connecting the J890/J892 to a drop cable:

Step	Action
1	I/O drop malfunction Do not disconnect the drop cable while the system is running; disconnecting can cause other I/O drops to malfunction.
2	**a:** If the drop cable connection is a F connector nut, install it directly onto an RIO cable port using a 7/16 in open-end wrench-finger tightening is not sufficient (see Figure below (a)) **b:** If the drop cable connection is a BNC connector nut, use a Modicon 52-0752-000 F-to-BNC adapter to make the RIO drop connection (see Figure below (b)) 

Step	Action
3	If you are installing a J892 for ASCII device support, connect the ASCII device cables to the ASCII ports at this time.
4	Apply power to the I/O housing. The I/O drop is ready for checkout; refer to Appendix B for diagnostic messages provided by the LEDs on the J890/J892 front panels. **Note: For a complete discussion of planning and installing an RIO drop, refer to the Remote I/O System Planning Guide (GM-0984-RIO).**

J890 and J892 Connectivity on an S908 RIO Network

User Connections

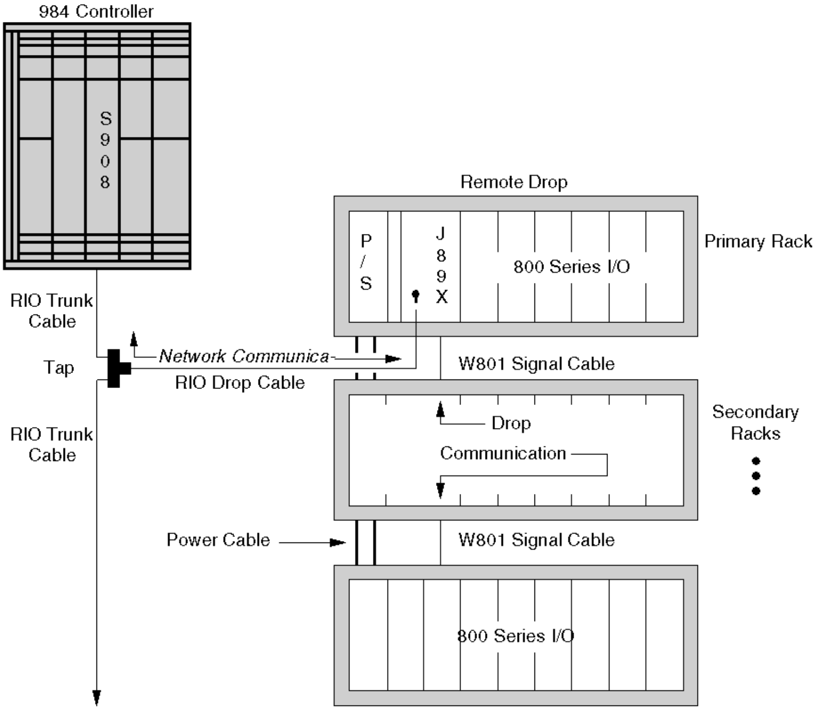
Any 984 programmable controller that supports the S908 RIO network can employ 800_series I/O at any or all of its remote drops, and any remote drop of 800_series I/O can use a J890 or J892 as the drop interface module.

The J890/J892 Interface modules are compatible with all 800 series I/O modules used in a S908 RIO network and may support up to 1024 input and 1024 output bits in a drop (depending on the capability of the head-end controller).

A J890/J892 Interface is a 1.5 slot module designed to be installed in the two slots immediately to the right of the primary power supply in the primary housing of a drop. The Interface sends data to and receives data from the 800 series I/O via the drop's backplane; it communicates with the RIO processing unit in the controller via the RIO cable system.

In addition to managing the I/O data flow within the drop and over the RIO network, a J890/J892 is also used to define the address of the drop on the RIO network. Each module is equipped with a set of DIP switches with which you can set a unique drop address. The J982 also provides a second set of DIP switches for specifying ASCII device addresses. The locations of the switch packs and their addressing scheme are defined in *P890 and P892 Switch Settings for the Drop Address*, *page 238* and *J892 DIP Switch Settings for ASCII Devices*, *page 218*.

J890/J892 drop and network communications



J890 and J892 RIO Interface Error Codes

Introduction

When power is applied to the I/O housing after the J890/J892 interface module has been installed in the drop, the module performs a set of confidence tests on itself. If any faults are detected in the RIO processing portion of the module, the RIO LEDs on the front panel will display a flash pattern of error codes.

Error Codes

J890/J892 I/O processor board test error codes

Failed Diagnostic	READY	COMM ACTIVE	COM ERROR	INTERFACE ERROR
Machine Dead	OFF	OFF	OFF	OFF
PROM Test	OFF	Flashing	OFF	OFF
RAM Test	OFF	OFF	Flashing	OFF
LAN Test	OFF	Flashing	Flashing	OFF
CPU Test	OFF	OFF	OFF	Flashing
OBM Test	OFF	Flashing	OFF	Flashing
Switch Test	OFF	OFF	Flashing	Flashing

The interface error (OBM) test may be caused by an I/O module that has shorted the I/O bus. All of the other diagnostic error codes indicate an internal failure in the remote I/O processing portion of the J890/J892 interface.

J892 ASCII Error Codes

Introduction

Confidence tests can also be run on the J892 module to test the ASCII portion of the device. To establish the ASCII confidence test mode on the J892 board, set SW7 to 1 (to the left) on the eight-position DIP switch. This will run the loop test.

Error Codes

J892 ASCII board test error codes

Failed Diagnostic	READY	COMM ACTIVE	COM ERROR	INTERFACE ERROR
Machine Dead	OFF	OFF	OFF	OFF
PROM Test	Flashing	OFF	OFF	OFF
RAM Test	OFF	Flashing	OFF	OFF
HDLC Digital	Flashing	Flashing	OFF	OFF
HDLC Analog	OFF	OFF	Flashing	OFF
Serial Port Low	Flashing	OFF	Flashing	OFF
Interrupt Low	OFF	Flashing	Flashing	OFF
Serial Port High	Flashing	Flashing	Flashing	OFF
Interrupt High	OFF	OFF	OFF	Flashing
Baud Rate Low	Flashing	OFF	OFF	Flashing
Baud Rate High	OFF	Flashing	OFF	Flashing
Switch Test	Flashing	Flashing	OFF	Flashing
Modem Disconnect	OFF	OFF	Flashing	Flashing
Modem DSR Error	Flashing	OFF	Flashing	Flashing

With the exception of the switch test, these diagnostic error codes indicate an internal failure in the ASCII processing portion of the J892 interface.

J890 and J892 Specifications

Introduction

The following tables give specifications for the J890 and J892 modules.

Costumer Part Numbers

Costumer part numbers

Customer Part Number	Description
AS-J890_101	Contains one F connector RIO cable port, Supports linear and dual RIO cable topologies, No ASCII device support
AS-J890_102	Contains two F connector RIO cable ports, Supports a redundant RIO cable topology, No ASCII device support
AS-J892_101	Contains one F connector RIO cable port, Supports linear and dual RIO cable topologies, Two 25-pin female connectors for ASCII device support
AS-J892_102	Contains two F connector RIO cable ports, Supports a redundant RIO cable topology, Two 25-pin female connectors for ASCII device support

Communications

Communications

Rate	1.544 Mbits/s
Comm Link Time	< 1 ms for 256 I/O points
Drop Hold-Up Time	programmable from 300 ms to 6553.5 s (100 ms increments)

System Power Requirements

System power requirements

J890 Load	1.85 A at + 5 V
J892 Load	4.0 A at + 5 V

Chapter 12
P890 and P892 RIO Processors

Purpose

This chapter explains features and operation of the P890 and P892 RIO processors.

What Is in This Chapter?

This chapter contains the following topics:

P890 and P892 Overview

General Description

The P890/P892 remote I/O processors provide a direct interface between 984 PLC and 800 series I/O. Both modules include an integrated power supply that supplies 3 amps of power to adjacent 800 series I/O modules. In addition, the P892 processor provides two half duplex ASCII ports.

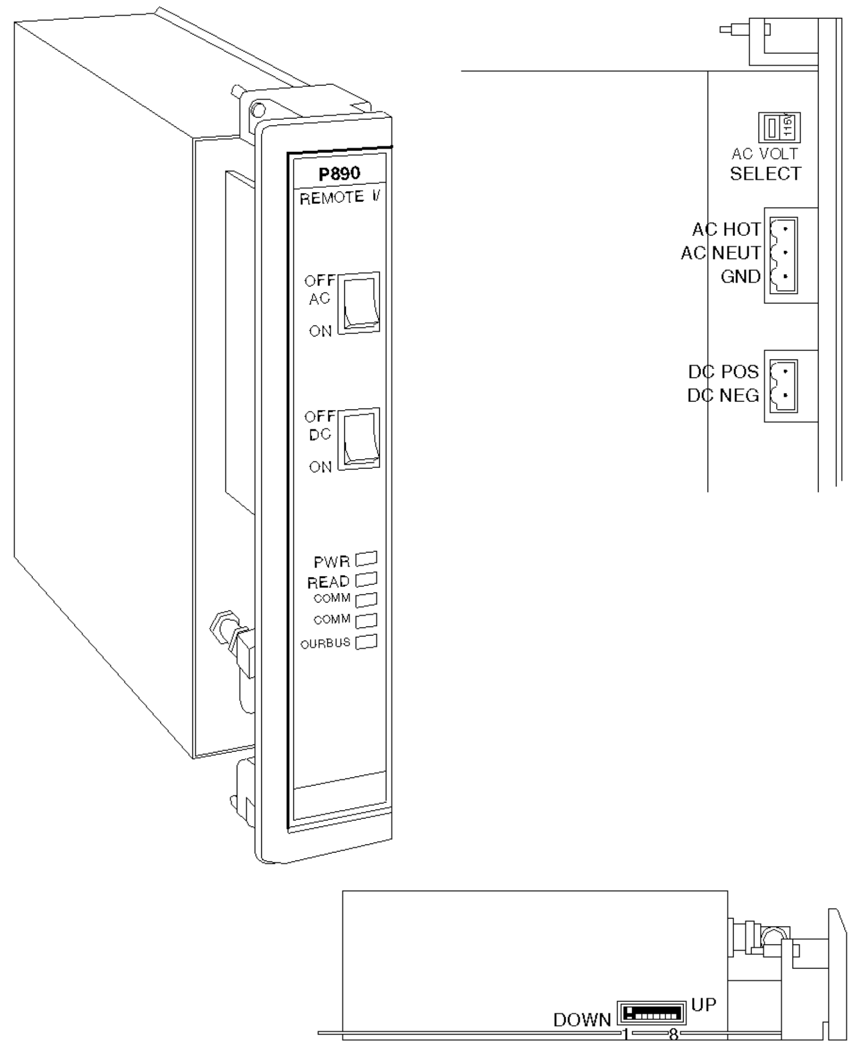
The P890/P892 processor is mounted directly into a primary 19- or 27-inch 800 series I/O housing (H819/H827-209). The connection between the processor and the I/O modules is made through the housing backplane. The remote I/O system coaxial cabling provides the communications path between the P890/P892 processor and the RIO Head.

The P890/P892 processors are compatible with all programmable controllers that support the S908 remote I/O system. The P890/P892 processors are compatible with all 800 Series I/O modules: discrete, analog, register and intelligent. The actual number of remote I/O drops and I/O points per drop supported depends on the controller size.

The P890/P892 processors support a single remote I/O cable configuration. Cable runs from the 984 controller through taps that have drop cables to the P89X remote interfaces.

The P890/P892 processor power supply supports two separate power sources, 115/230 Vac and 24 Vdc. The AC power source is switch selectable between 115 V and 230 V settings. The top ON/OFF switch controls the AC power and the bottom ON/OFF switch controls the 24 Vdc source. Either source can be used to power the P890/P892. The 24 Vdc can be used as a backup power source to the 115/230 Vac. The single slot P890/P892 can provide a maximum of 3 amps to power 800 series I/O modules. For systems needing more power, expander power supplies should be inserted in the next I/O housing.

Front, bottom and side view



P890 and P892 Indicators

Overview

The following table shows P890/P892 processor indicator lights and provides the name, color and indication when on. The I/O processor lights are on both processors. The ASCII error indicator is only on the P892 processor.

Indicator Lights for P890 and P892

Indicator lights for I/O processor P890 and P892.

Name	Color	Indication (when on)
Power OK	Green	All Voltages are OK.
Ready	Amber	I/O processor board successfully passed power-up tests.
Comm Active	Green	I/O comm active between P89X and 984.
Comm Error	Red	A communications error has been detected between the processor and the controller.
Ourbus Error	Red	A communications error has been detected between the processor and the I/O modules.

Indicator Light ASCII (P892 only)

ASCII error indicator light

Name	Color	Indication (when on)
ASCII Error	Red	An ASCII communications error has been detected at the processor.

P890 and P892 Power Available

Overview

Power supplied for I/O use

+5 VIO @ 3 Amp max*

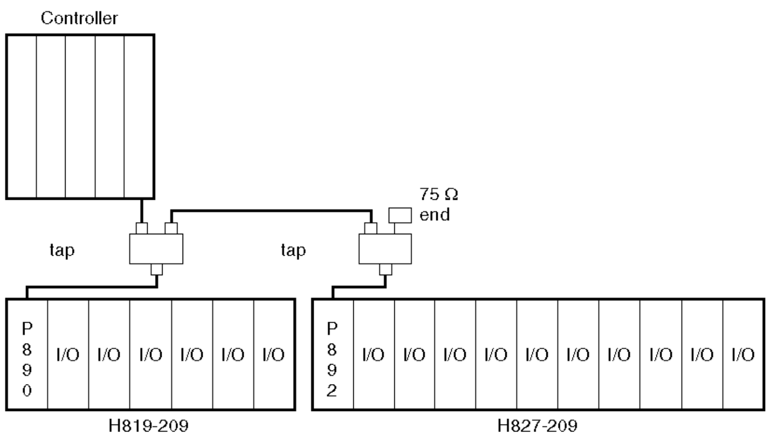
+4.3 V @ 3 Amp max*

-5 V @ .25 Amp

* The +5 VIO and +4.3 V combined total load current should not exceed 3 Amps.

The P890/P892 processors provide a fast drop scan rate, less than 5 milliseconds for 256 I/O points. The communication link time to the RIO head is less than 1 millisecond with up to five immediate retries.

Typical Configuration



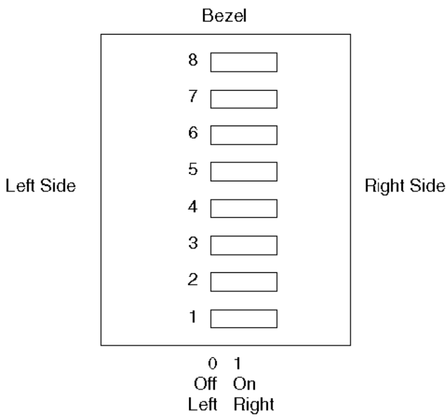
P890 and P892 Switch Settings for the Drop Address

Overview

Before installing the P890 or P892 processor, you must set the switches located on the bottom of the unit. The P890/P892 processor has one set of eight switches used to select drop/port address and ASCII communications handshake method.

P890/P892 Drop Address Switch Settings

View of the switches



Description of the switches

Switches	Functions
For P890 and P892 1-6	 drop/port address 1-32 binary form
For P890 ONLY 7-8	 not used, set to left
For P892 ONLY 7 8	 hand shaking for port 1 hand shaking for port 2 L = Data Terminal Ready/Data Set Ready R = Xon/Xoff

NOTE: You MUST go into the Traffic Cop software and set the ASCII port number to match your switch selection, noting the drop.

NOTE: Drop and port addresses are related. Switch settings for Drop #3 correspond to ASCII ports 5 and 6.

Drop Address Switch Settings

The drop address is set by the setting switches one through six in the switchpack as shown in the table.

Switches							
1	2	3	4	5	6		
						Drop Address	Port Number For P892 ONLY
L	L	L	L	L	L	1	1,2
R	L	L	L	L	L	2	3,4
L	R	L	L	L	L	3	5,6
R	R	L	L	L	L	4	7,8
L	L	R	L	L	L	5	9,10
R	L	R	L	L	L	6	11,12
L	R	R	L	L	L	7	13,14
R	R	R	L	L	L	8	15,16
L	L	L	R	L	L	9	17,18
R	L	L	R	L	L	10	19,20
L	R	L	R	L	L	11	21,22
R	R	L	R	L	L	12	23,24
L	L	R	R	L	L	13	25,26
R	L	R	R	L	L	14	27,28
L	R	R	R	L	L	15	29,30
R	R	R	R	L	L	16	31,32
L	L	L	L	R	L	17	N/A
R	L	L	L	R	L	18	N/A
L	R	L	L	R	L	19	N/A
R	R	L	L	R	L	20	N/A
L	L	R	L	R	L	21	N/A
R	L	R	L	R	L	22	N/A
L	R	R	L	R	L	23	N/A
R	R	R	L	R	L	24	N/A
L	L	L	R	R	L	25	N/A
R	L	L	R	R	L	26	N/A
L	R	L	R	R	L	27	N/A
R	R	L	R	R	L	28	N/A
L	L	R	R	R	L	29	N/A

Switches							
1	2	3	4	5	6		
						Drop Address	Port Number For P892 ONLY
R	L	R	R	R	L	30	N/A
L	R	R	R	R	L	31	N/A
R	R	R	R	R	L	32	N/A

NOTE: Drop addresses 1 to 16 can be used as RIO and ASCII. However, drop addresses 17 to 32 can ONLY be used as RIO.

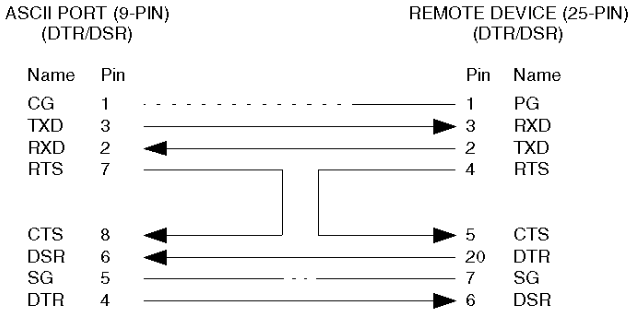
9-Pin ASCII Ports

Correct cable configuration is dependent upon the requirements of the unit attached to the ascii port.

Pin Number	Designation
1	Chassis Ground (CG)
2	Receive (RXD)
3	Transmit (TXD)
4	Data Terminal Ready (DTR)
5	Signal Ground (SG)
6	Data Set Ready (DSR)
7	Request to Send (RTS)
8	Clear to Send (CTS)
9	No Connection (N.C.)

Sample Pin Layout for a 9-Pin ASCII Port

The following graphic depicts one possible pin layout for a cable connecting a P892 ASCII port and another device using hardwired flow control. Actual pin numbers may vary from device to device.



P890 and P892 Installation

Introduction

The following procedure describes how to install a P890 or P892 processor. The processor is installed in an H819/H827-209 800 series I/O Housing in the left-most slot.

NOTE: To ensure proper operation of this module, you must have one of the following revisions (or higher) of Traffic Cop software:
P190 AS-T984-302 Version 2.01 Rev.J
IBM AS-DIBM-902 Version 3.01 Rev.X
If you do not have a tape or diskette with one of the above software levels, call Customer Service and obtain the proper software.

Procedure for Installation

How to Install a P890 or P892 processor

Step	Action
1	Set the address/handshake switch as shown in *P890/P892 Drop Address Switch Settings, page 238*.
2	Ensure that the power supply switches are OFF and power to the housing is OFF. Also, set the 115/230 VAC switch based upon your power requirement. Do not insert the P890 or P892 processor if power is supplied to the unit.
3	Remove the plastic cover to connect the power cables, once they are in place replace the plastic cover.
4	Wire up the power cable for either AC (three pin plug) or DC (two pin plug) depending upon the application.
5	Connect remote I/O cable to the P890 or P892 F-connector.
6	Remove the ASCII port connector covers. Connect the ASCII device cable(s). For the P892 only.
7	Insert the P890/P892 into the H819/H827-209 housing in the left-most slot. Press firmly to ensure that the processor is seated properly in the housing.
8	Tighten the two captive screws located at the top and bottom of the processor.
9	Turn the power supply on. The I/O drop is ready for checkout.

P890 and P892 Specifications

Topology

Topology

Cabling	Single coaxial cable 75 ohm RG-6 type
Connector	F-Type

Communications

Communications

Rate	1.544 MHZ
Drop scan time	< 5 ms for 256 I/O points
Comm link time	< 1 ms for 256 I/O points
Drop hold up time	programmable from 300msec to 6553.6sec (100 msec increments)

Power Supplied to I/O

Power supplied to I/O

+5 VIO	@3 Amp*
+4.3 V	@3 Amp*
-5 V	@.25 Amp

*The +5 VIO and +4.3 V combined can not exceed 3 Amps.

Power Requirements

115/230 VAC +/- 15% @ .75 Amps, 47-63 Hz

24 VDC +/- 15% @ 2 Amps Max.

AC Power Loss Hold up time

8.3 mSec

RFI

Meets applicable FCC requirements for industrial equipment

EMI

Radiated Susceptibility	MS 461B RS03
Conducted Susceptibility	MS 461N CS02

Surge Withstand

IEEE 472_1974, ANSI C37.90a

Static Discharge

15kv to all exterior surfaces, connectors covered or terminated properly, mounted on grounded panel.

Environmental Operating Conditions

Environmental operating conditions

Humidity	0 - 95% non-condensing
Temperature	0 - 60°C
Temperature Storage	- 40 / +80 degrees C
Shock	+/- 10G's, 11ms. 3pulses per axis
Vibration Sine	5 Hz to 50 Hz @ .0005 in D.A. 30min/axis 50 Hz to 500 Hz @ .625G^2 30min/axis
Vibration Random	10 Hz to 50 Hz @ .029G^2 /HZ 60 Hz to 300 Hz @ .029G^2 -8db/octave
Altitude	10,000 ft max

Physical

Physical

Dimensions (W x H x D)	3.53.in x 10.46in. x 8.25in. (8.97cm x 26.59cm x 20.95cm)
Diagnostics	Power-up confidence tests Run time confidence tests

Part III
800 Series Discrete I/O Modules

At a Glance

This part provides a detailed description of the 800 Series discrete I/O modules. It includes technical data and wiring information for each module.

What Is in This Part?

This part contains the following chapters:

Chapter 13
B802–008 115 Vac Output

Purpose

This chapter describes the functional and physical characteristics of the B802–008 115 Vac output module.

What Is in This Chapter?

This chapter contains the following topics:

B802–008 115 Vac Output, Overview

General Characteristics

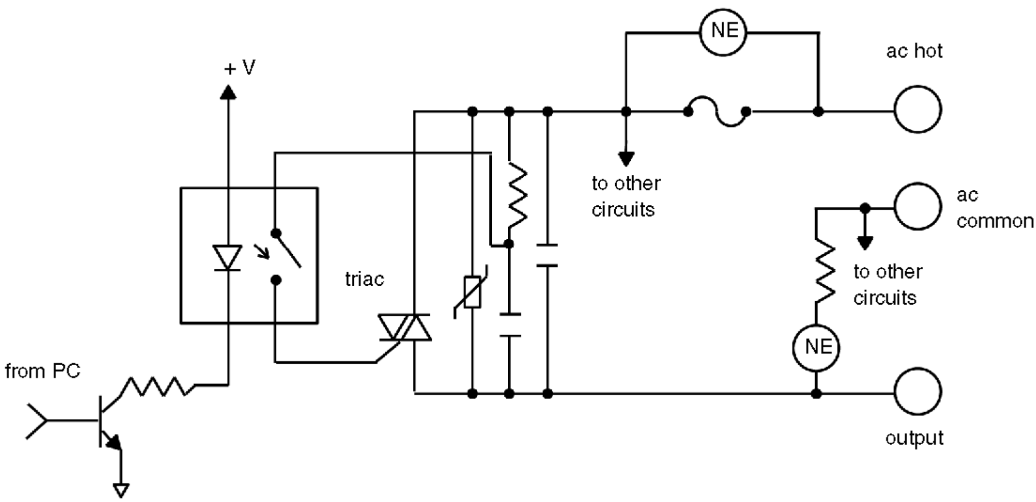
The B802–008 115 Vac output module converts logic signals used within the PLC into eight independent 115 Vac outputs. Each output is capable of driving a relay, pilot lamp, motor starter, solenoid, or any other load up to 2.0 A.

The B802–008 is capable of handling a total continuous current of 12 A. The module uses triac switches to control loads connected to an external power source. These switches are designed to withstand the high surge currents typical of industrial loads.

Simplified Schematic

The module's eight outputs are separated into four groups of two outputs each. An LED indicator lights when an output is on.

Following is a simplified schematic of the B802–008 115 Vac output module.



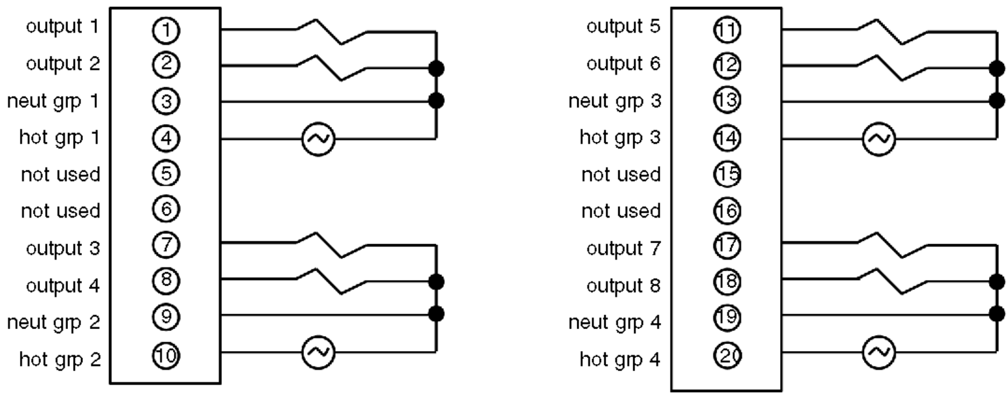
B802–008 115 Vac Output, Field Connections

Overview

User connections are made to a standard screw terminal strip.The rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal Numbering and Output Connections

The following diagram shows terminal numbering and output connections for the the B802–008 module.



B802–008 48 Vac Output, Specifications

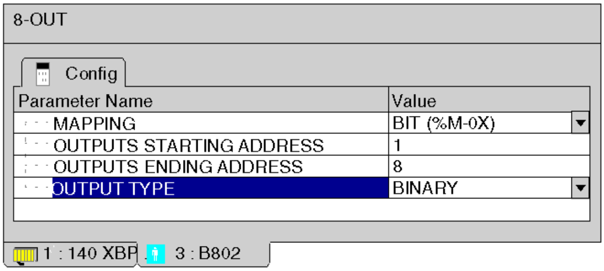
Specification Table

The following table provides the specifications for the unit.

B802-008 Specifications		
Description		115 Vac Output
Number of Points		8
Operating Voltage		80—130 Vac continuous /47—63 Hz
Number of Groups		4
Outputs/group		2
ON Current	Maximum/point	2 A continuous
	Maximum/module	12.0 A
Surge Current		50 A (max)1 cycle/circuit
ON Voltage Drop		1.3 V @ 2.0 A
Maximum OFF	Leakage Current	3 mA @ 115 Vac
	Maximum ON Current	50 mA @ 115 Vac
Maximum Response Time	OFF→ON	8.3 ms @ 60 Hz
	ON→OFF	8.3 ms @ 60 Hz
dv/dt		100 V/s
	Commutating	5 V/s
Power Required	+5 V	76 mA
	+4.3 V	240 mA
	-5 V	0 mA
Terminal Connector		AS-8534-000
Fusing		One/group, Type 3 AG, 6 A (normal blow)
Reference Type		Mapped as 8 bits output 0x or Mapped as 1 register output 4x
Output Type		BIN/BCD

B802–008 Parameter Configuration

Parameter Configuration Window



Module Configuration

Parameter Name	Default Value	(Options Available)
Mapping	Bit (%M-0X)	Word (%MW-4X)
Outputs Starting Address	1	1
Outputs Ending Address	8	1
Output Type	Binary	BCD

Mapping Parameter References

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 8 bits output 0x or Mapped as 1 register output 4x	Mapped as 8 bits output %M or Mapped as 1 word output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 14
B803–008 115 Vac Input

Purpose

This chapter describes the functional and physical characteristics of the B803–008 115 Vac input module.

What Is in This Chapter?

This chapter contains the following topics:

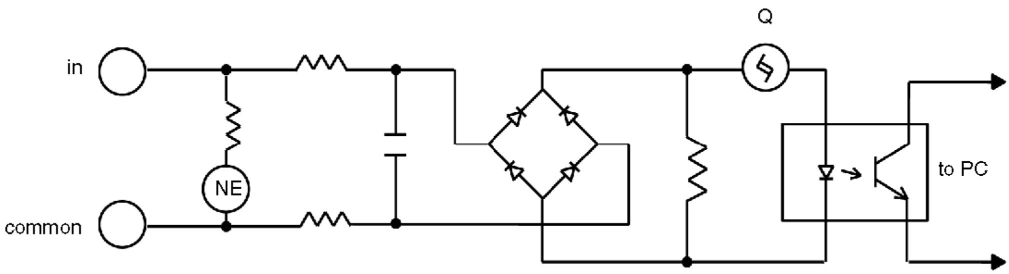
B803–008 115 Vac Input, Overview

General Characteristics

The B803–008 115 Vac input module senses and converts switched input signals into logic voltage levels used by the PLC into 8 independent 115 Vac outputs. The module allows for up to eight independently sensed inputs. These inputs can be received from push buttons, limit and proximity switches, as well as other 115 Vac sources.

Simplified Schematic

Following is a simplified schematic of the B803--008 115 Vac input module.



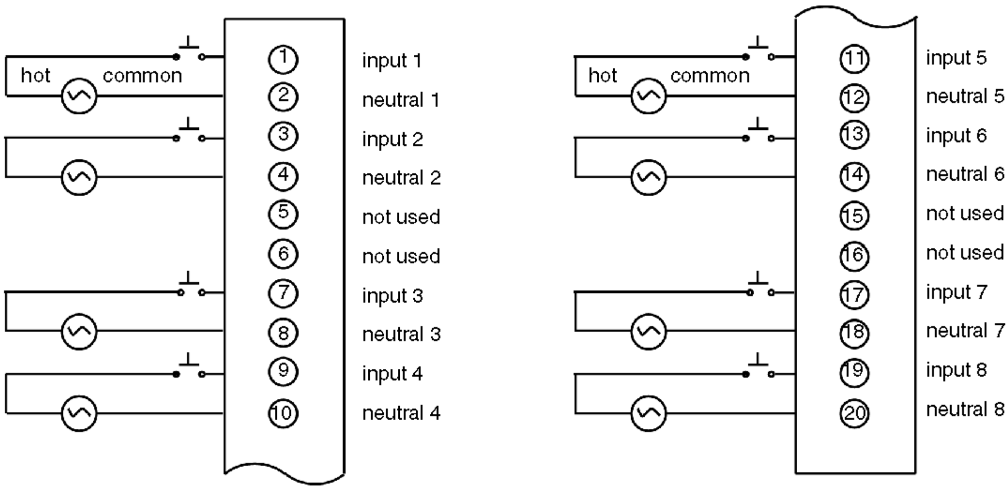
B803–008 115 Vac Input, Field Connections

Overview

User connections are made to a standard screw terminal strip.The rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal Numbering and Input Connections

The following diagram shows terminal numbering and input connections for the B803–008 module.



B803–008 115 Vac Input, Specifications

Specification Table

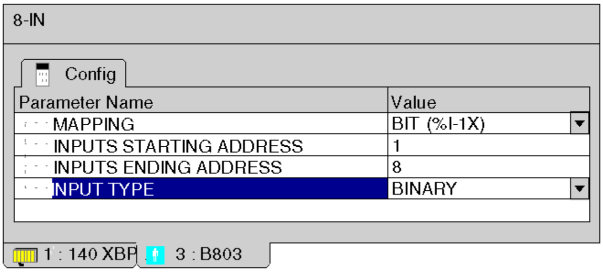
The following table provides the specifications for the unit.

B803-008 Specifications		
Description		115 Vac Isolated Input
Number of Points		8
Operating Range Voltage		80—130 Vac/47—63 Hz
Number of Groups		8
Inputs/group		1
Maximum Input Voltage	Continuous	130 Vac
	Surge	220 Vac for 1 cycle
ON Condition		80—130 Vac (source impedance < 1 kΩ
	Threshold Voltage	60 15 V RMS
OFF Condition	Maximum/Module	0—35 Vac (source impedance)=0Ω 0—130 Vac (source impedance ≥40 kΩ
ON Current		7 mA (typical @ 115 Vac)
Maximum Response Time	OFF→ON	6 ms (4 ms typical)
	ON→OFF	18 ms (12 ms typical)
Power Required	+5 V	27 mA
	+4.3 V	1 mA
	-5 V	2 mA
Terminal Connector		AS-8534-000
Reference Type		Mapped as 8 bits input 1x or Mapped as 1 register input 3x
Input Type		BIN/BCD

B803–008 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%I-1X)	WORD (%IW-3X)
Inputs Starting Address	1	1
Inputs Ending Address	8	1
Input Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 8 bits input 1x or Mapped as 1 register input 3x	Mapped as 8 bits input %Ix or Mapped as 1 word input %IWx
Input Type	BIN/BCD	BIN/BCD

Chapter 15
B804–116 115 Vac Output

Purpose

This chapter describes the functional and physical characteristics of the B804–116 115 Vac output module.

What Is in This Chapter?

This chapter contains the following topics:

B804–116 115 Vac Output, Overview

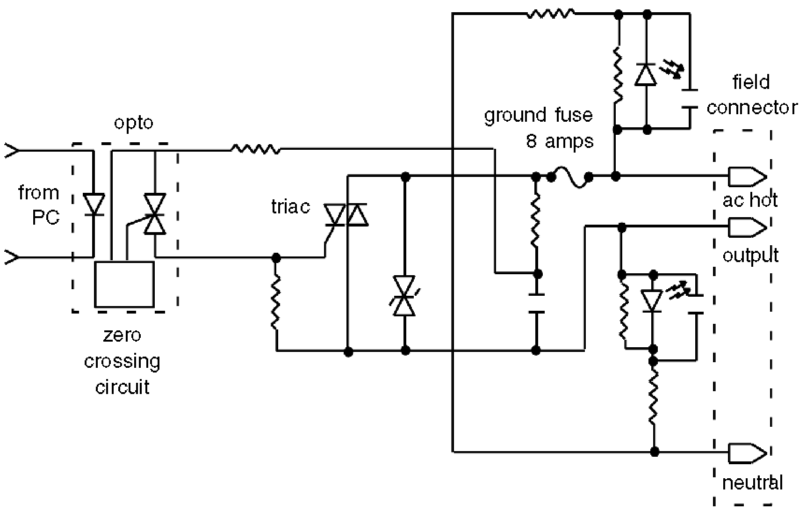
General Characteristics

The B804–116 115 Vacoutput module converts logic signals used in the PLC into 16 independent 115 Vac outputs. Each output is capable of driving a relay, pilot lamp, motor starter, solenoid, or any other load up to 2.0 A.

The B804–116 is capable of handling a total continuous current of 6 A/group of eight points and 12 A/module. The module uses triac switches to control loads connected to an external power source. These switches are designed to withstand the high surge currents typical of industrial loads.

Simplified Schematic

Following is a simplified schematic of the B804–116 115 Vac output module.



The module's 16 outputs are separated into two groups of eight outputs each.

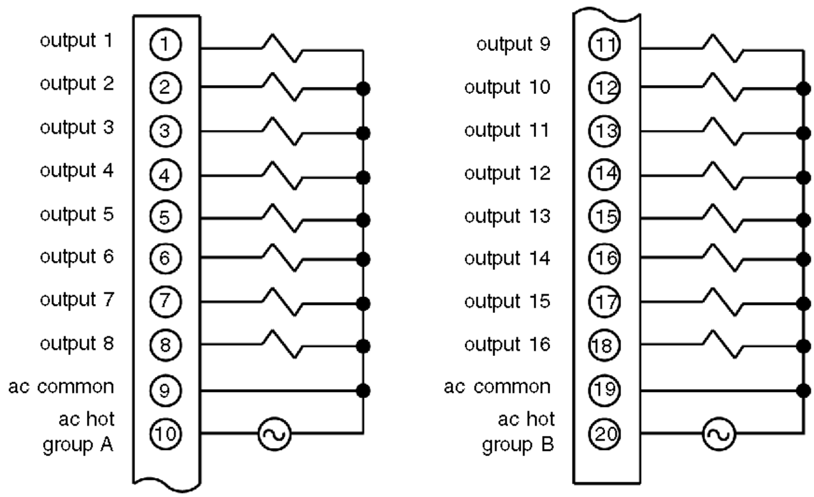
B804–116 115 Vac Output, Field Connections

Overview

User connections are made to a standard screw terminal strip.The rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal Numbering and Output Connections

The following diagram shows terminal numbering and output connections for the the B804-116 module.



B804–116 48 Vac Output, Specifications

Specification Table

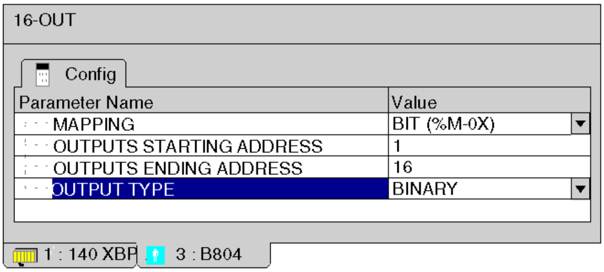
The following table provides the specifications for the unit.

B804-116 Specifications		
Description		115 Vac Output
Number of Points		16
Operating Voltage		80—130 Vac continuous /47—63 Hz
Number of Groups		2
Outputs/group		8
ON Current	Maximum/point	2 A continuous
	Surge Current	50 A 1 cycle
	Maximum/group	6 A
	Maximum/module	12.0 A
	Minimum Load Current	25 mA (B804–116)
	Minimum Load Current	50 mA (B804-016)
Voltage Drop		1.5 V @ 2 A)
Maximum OFF	Leakage Current	3 mA @ 115 Vac
Maximum Response Time	OFF→ON	8.3 ms @ 60 Hz
	ON→OFF	8.3 ms @ 60 Hz
dv/dt		100 V/s
Power Required	+5 V	76 mA
	+4.3 V	480 mA
	-5 V	0 mA
Terminal Connector		AS-8534-000
Fusing		Type 3AB, 8 A (normal blow)
Reference Type		Mapped as 16 bits output 1x or Mapped as 1 register output 4x
Output Type		BIN/BCD

B804–116 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%M-0X)	WORD (%MW-4X)
Outputs Starting Address	1	1
Outputs Ending Address	16	1
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 16 bits output 1x or Mapped as 1 register output 4x	Mapped as 16 bits output %Mx or Mapped as 1 word output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 16
B804–148 48 Vac Output

Purpose

This chapter describes the functional and physical characteristics of the B804–148 48 Vac output module.

What Is in This Chapter?

This chapter contains the following topics:

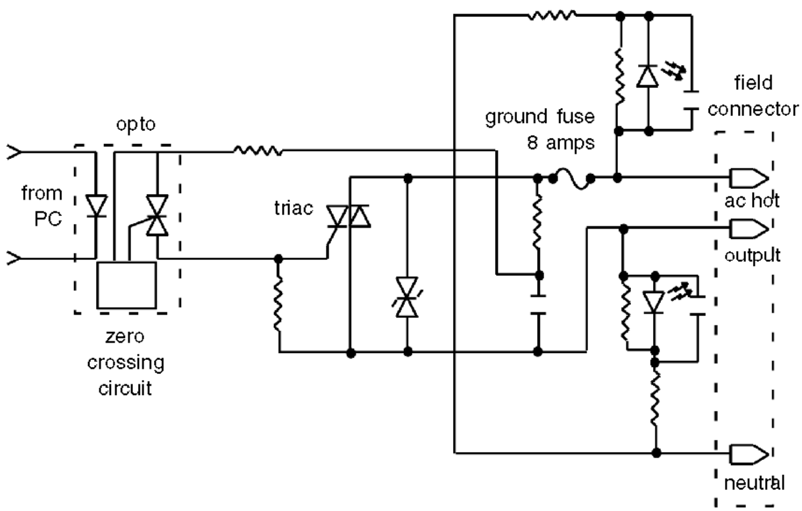
B804–148 48 Vac Output, Overview

General Characteristics

The B804–148 48 Vac output module converts logic signals used within the PLC into 16 independent 48 Vac outputs. Each output is capable of driving a relay, pilot lamp, motor starter, solenoid, or any other load up to 2.0 A. The module has 16 outputs, divided into two groups of eight discrete points.

Simplified Schematic

Following is a simplified schematic of the B804–148 48 Vac output module.



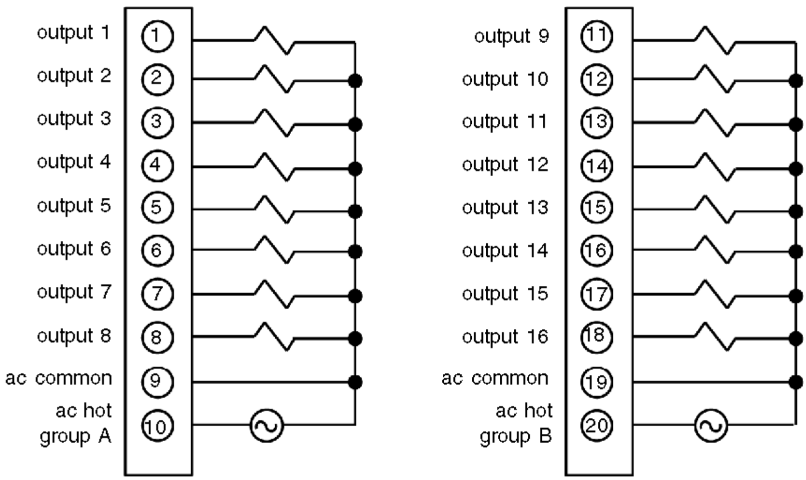
B804–148 48 Vac Output, Field Connections

Overview

User connections are made to a standard screw terminal strip.The rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal Numbering and Output Connections

The following diagram shows terminal numbering and output connections for the the B804–148 module.



B804–148 48 Vac Output, Specifications

Specification Table

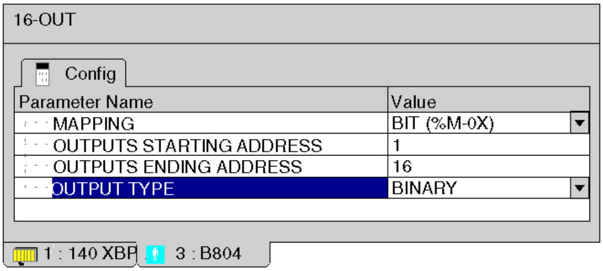
The following table provides the specifications for the unit.

B804-148 Specifications		
Description		48 Vac Output
Number of Points		16
Operating Voltage		40—56 Vac continuous /47—63 Hz
Number of Groups		2
Outputs/group		8
ON Current	Maximum/point	2 A continuous
	Surge Current	50 A 1 cycle
	Maximum/group	6 A
	Maximum/module	12.0 A
Voltage Drop		1.5 V @ 2 A)
Leakage Current		3 mA
Maximum OFF		3 mA
Minimum Load Current		25 mA RMS
Maximum Response Time	OFF→ON	8.3 ms @ 60 Hz
	ON→OFF	8.3 ms @ 60 Hz
dv/dt		100 V/s
	Commutating	5 V/s
Power Required	+5 V	76 mA
	+4.3 V	480 mA
	-5 V	0 mA
Terminal Connector		AS-8534-000
Fusing		One/group, 8 A replaceable
Reference Type		Mapped as 16 bits output 1x or Mapped as 1 register output 4x
Output Type		BIN/BCD

B804–148 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%M-0X)	WORD (%MW-4X)
Outputs Starting Address	1	1
Outputs Ending Address	16	1
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 16 bits output 1x or Mapped as 1 register output 4x	Mapped as 16 bits output %Mx or Mapped as 1 word output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 17
B805–016 115 Vac Input

Purpose

This chapter describes the functional and physical characteristics of the B805–016 115 Vac input module.

What Is in This Chapter?

This chapter contains the following topics:

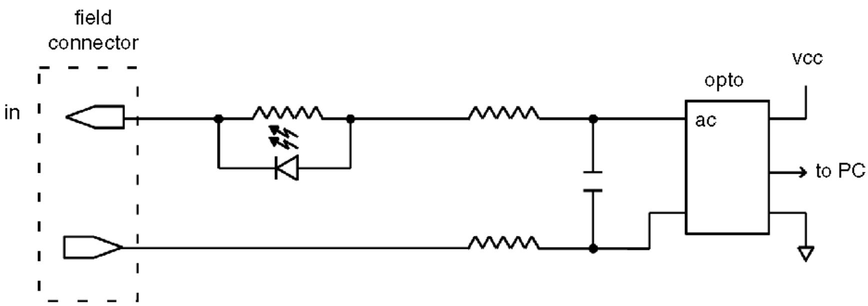
B805–016 115 Vac Input, Overview

General Characteristics

The B805–016 115 Vac input module senses and converts switched input signals into logic voltage levels used by the PLC. The module allows for up to 16 inputs in 2 groups of 8. These inputs can be received from push buttons, limit and proximity switches, as well as other 115 Vac sources.

Simplified Schematic

Following is a simplified schematic of the B805–016 115 Vac input module.



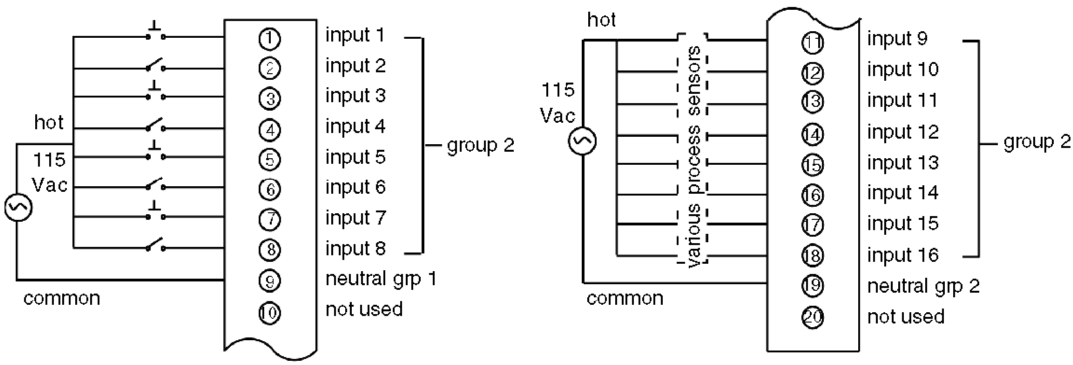
B805–016 115 Vac Input, Field Connections

Overview

User connections are made to a standard screw terminal strip.The rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal Numbering and Input Connections

The following diagram shows terminal numbering and input connections for the B805–016 module.



B805–016 115 Vac Input, Specifications

Specification Table

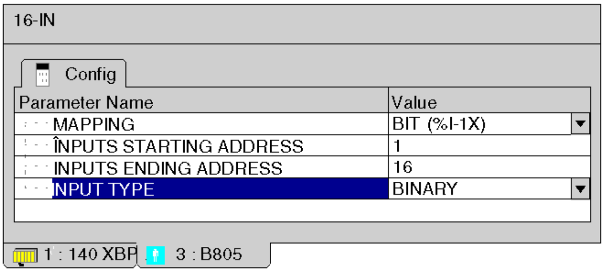
The following table provides the specifications for the unit.

B805–016 Specifications		
Description		115 Vac Input
Number of Points		16
Operating Voltage		80—130 Vac continuous /47—63 Hz
Number of Groups		2
Inputs/group		8
Maximum Input Voltage	Continuous	130 Vac
	Surge	220 Vac for 1 cycle
ON Conditions		80—130 Vac (source impedance)<1 kΩ
	Threshold Voltage	60 15 V RMS
OFF Condition		0—35 Vac (source impedance) = 1kΩ
		0—130 Vac (source impedance)≥40 kΩ
ON Current		6 mA (typical) @ 115 Vac
OFF Current		1.8 mA (max) @ 35 Vac RMS leakage for input sensors
		3.0 mA (typical) @ 60 Vac RMS
Maximum Response Time	OFF→ON	6 ms (4 ms typical)
	ON→OFF	18 ms (11 ms typical)
Power Required	+5 V	40 mA
	+4.3 V	1 mA
	-5 V	14 mA
Terminal Connector		AS-8534-000
Reference Type		Mapped as 16 bits input 1x or Mapped as 1 word input 3x
Input Type		BIN/BCD

B805–016 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%I-1X)	WORD (%IW-3X)
Inputs Starting Address	1	1
Inputs Ending Address	16	1
Input Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 16 bits input 1x or Mapped as 1 word input 3x	Mapped as 16 bits input %Ix or Mapped as 1 word input %IWx
Input Type	BIN/BCD	BIN/BCD

Chapter 18
B806–032 115 Vac Output

Purpose

This chapter describes the functional and physical characteristics of the B806–032 115 Vac output module.

What Is in This Chapter?

This chapter contains the following topics:

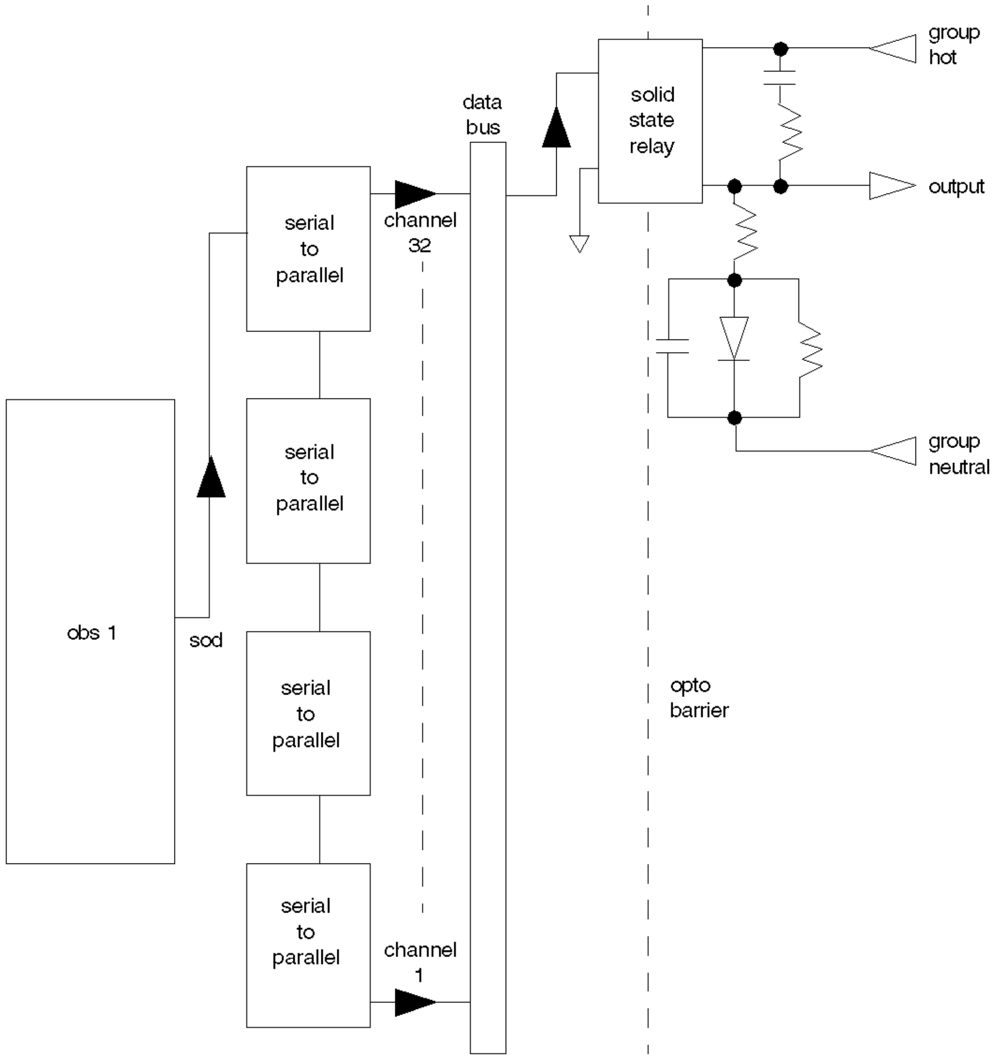
B806–032 115 Vac Output, Overview

General Characteristics

The B806–032 115 Vac output module has 32 outputs. The outputs can serve 120 Vac voltage relays, motor starters, solenoids, pilot lamps, valves, and other loads rated up to 1.0 A. The outputs are divided into two groups of 16 discrete points.

Simplified Schematic

Following is a simplified schematic of the B806–032 115 Vac output module.



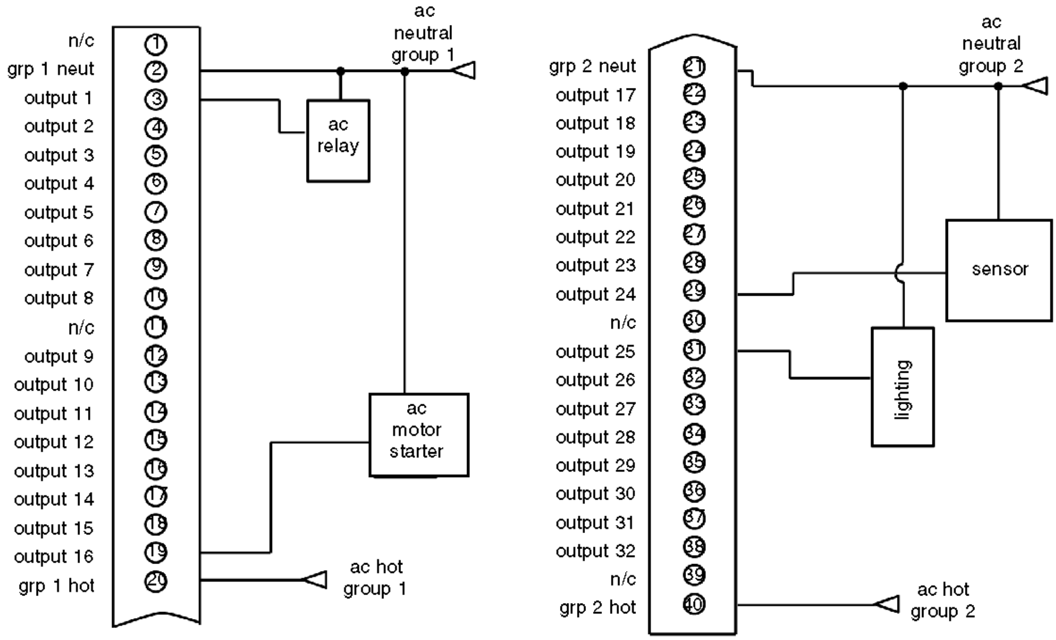
B806–032 115 Vac Output, Field Connections

Overview

User connections are made to a standard screw terminal strip. The rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal Numbering and Output Connections

The following diagram shows terminal numbering and output connections for the the B806–032 module.



B806–032 115 Vac Output, Fusing Guidelines

Fuse Ratings

For reasons of safety and equipment performance, Schneider Electric recommends external fusing on each individual output point according to the following rating:

Fuse Rating	Fuse Value	Example Type
Very Fast Acting	2 A	Littelfuse 3 AB

NOTE: A minimum voltage rating of 250 V is required for fuse operation. Voltage ratings can be found along with current ratings on the fuse end cap.

NOTE: Observe fusing guidelines
Failure either to fuse these output modules or to follow the recommended fuse ratings could cause unpredictable results in module performance.

B806–032 115 Vac Output, Specifications

Specification Table

The following table provides the specifications for the unit.

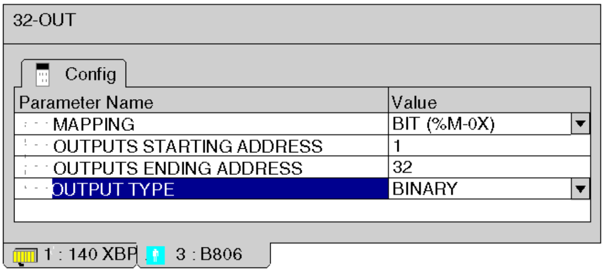
B806–032 Specifications		
Description		115 Vac Output
Number of Points		32
Operating Voltage		80—130 Vac continuous /47—63 Hz
Number of Groups		2
Outputs/group		16
ON Current	Maximum/point	1 A continuous
	Surge Current	15 A 1 cycle
	Maximum/group	8 A
	Maximum/module	16 A
	Minimum Load Current	5 mA
Voltage Drop		1.5 V RMS (maximum)
Maximum OFF	Leakage Current	2 mA @ 115 Vac
Maximum Response Time	OFF→ON	8.3 ms @ 60 Hz
	ON→OFF	8.3 ms @ 60 Hz
dv/dt		600 V/s
	Commutating	5 V/s
Power Required	+5 V	210 mA
	+4.3 V	1 mA
	-5 V	0 mA
Terminal Connector		AS-8535-000
Reference Type		Mapped as 32 bits output 1x or Mapped as 2 registers output 4x
Output Type		BIN/BCD

NOTE: The B806–032 is powered by a standard 24 Vac field power supply.

B806–032 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%M-0X)	WORD (%MW-4X)
Outputs Starting Address	1	1
Outputs Ending Address	32	2
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 32 bits output 1x or Mapped as 2 registers output 4x	Mapped as 32 bits output %Mx or Mapped as 2 words output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 19
B806–124 24 Vac Output

Purpose

This chapter describes the functional and physical characteristics of the B806–124 24 Vac output module.

What Is in This Chapter?

This chapter contains the following topics:

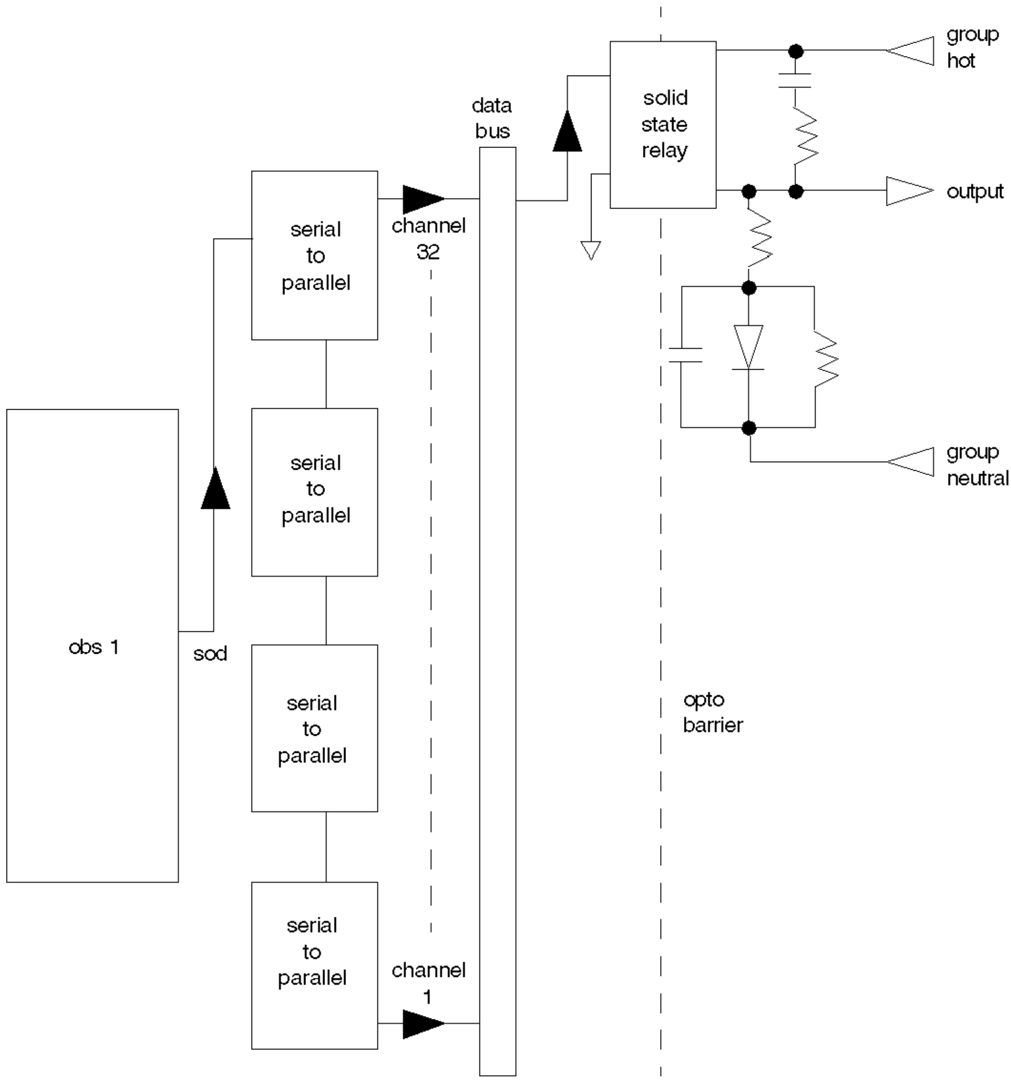
B806–124 24 Vac Output, Overview

General Characteristics

The B806–124 output module has 32 outputs. The outputs can serve 24 Vac voltage relays, motor starters, solenoids, pilot lamps, valves, and other loads rated up to 1.0 A. The outputs are divided into two groups of 16 discrete points.

Simplified Schematic

Following is a simplified schematic of the B806–124 24 Vac output module.



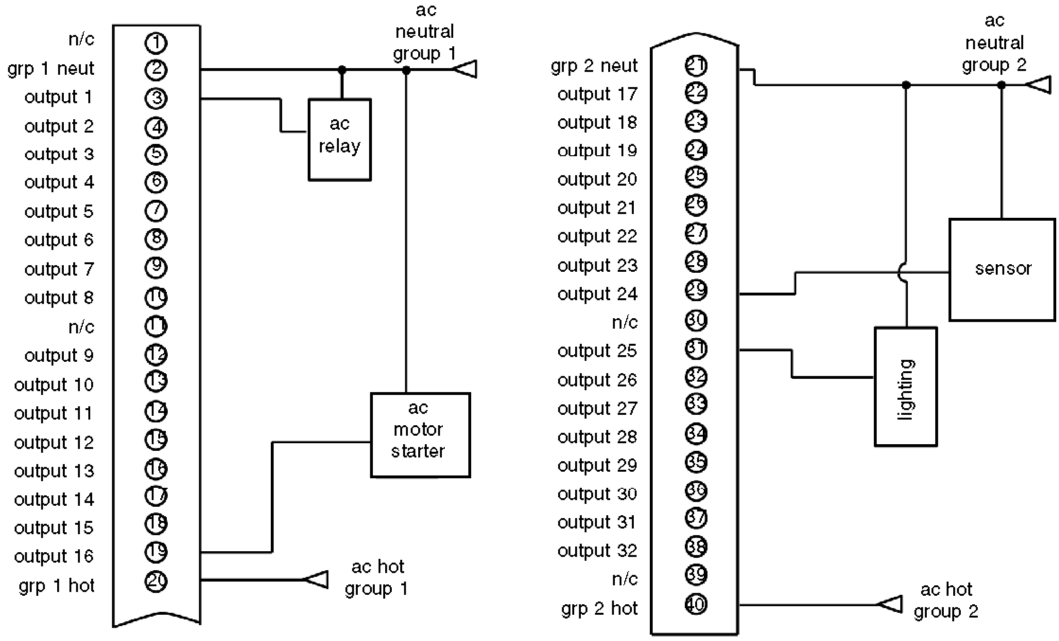
B806–124 24 Vac Output, Field Connections

Overview

User connections are made to a standard screw terminal strip.The rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal Numbering and Output Connections

The following diagram shows terminal numbering and output connections for the the B806–124 module.



B806–124 24 Vac Output, Specifications

Specification Table

The following table provides the specifications for the unit.

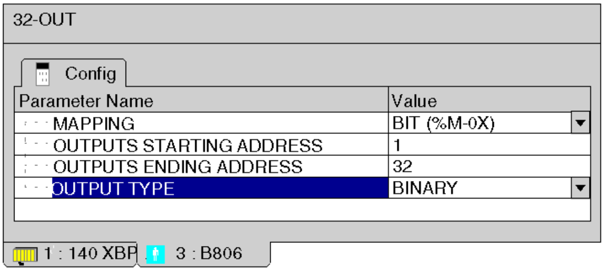
B806–124 Specifications		
Description		24 Vac Output
Number of Points		32
Operating Voltage		20—28 Vac continuous /47—63 Hz
		32 Vac RMS max for 10 s
		42 Vac RMS max for 1 cycle
Number of Groups		2
Outputs/group		16
ON Current	Maximum/point	1 A continuous
	Surge Current	15 A 1 cycle
	Maximum/group	8 A
	Maximum/module	16 A
	Minimum Load Current	5 mA
Voltage Drop		1.5 V (max)
Maximum OFF	Leakage Current	2 mA
Maximum Response Time	OFF→ON	8.3 ms @ 60 Hz
	ON→OFF	8.3 ms @ 60 Hz
dv/dt		600 V/s
	Commutating	5 V/s
Power Required	+5 V	210 mA
	+4.3 V	1 mA
	-5 V	0 mA
Terminal Connector		AS-8535-000
Reference Type		Mapped as 32 bits output 1x or Mapped as 2 registers output 4x
Output Type		BIN/BCD

NOTE: The B806–124 is powered by a standard 24 Vac field power supply.

B806–124 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%M-0X)	WORD (%MW-4X)
Outputs Starting Address	1	1
Outputs Ending Address	32	2
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 32 bits output 1x or Mapped as 2 registers output 4x	Mapped as 32 bits output %Mx or Mapped as 2 words output % MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 20
B807–132 115 Vac Input

Purpose

This chapter describes the functional and physical characteristics of the B807–132 115 Vac input module.

What Is in This Chapter?

This chapter contains the following topics:

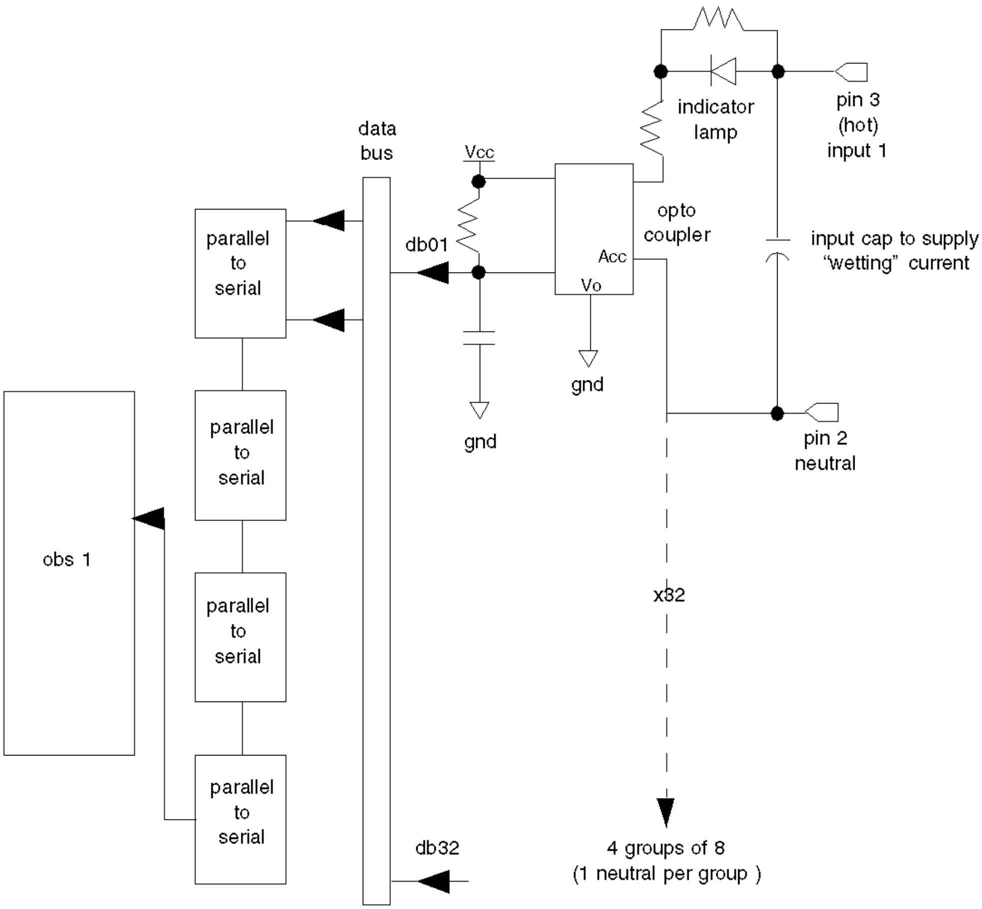
B807–132 115 Vac Input, Overview

General Characteristics

The B807–132 115 Vac input module senses and converts switched input signals into logic voltage levels used by the PLC. These inputs can be received from push buttons, limit and proximity switches, as well as other 115 Vac sources.

Simplified Schematic

Following is a simplified schematic of the B807–132 115 Vac input module.



NOTE: When using Binary and BCD inputs remember that input 1 is the MSB and input 32 is the LSB.

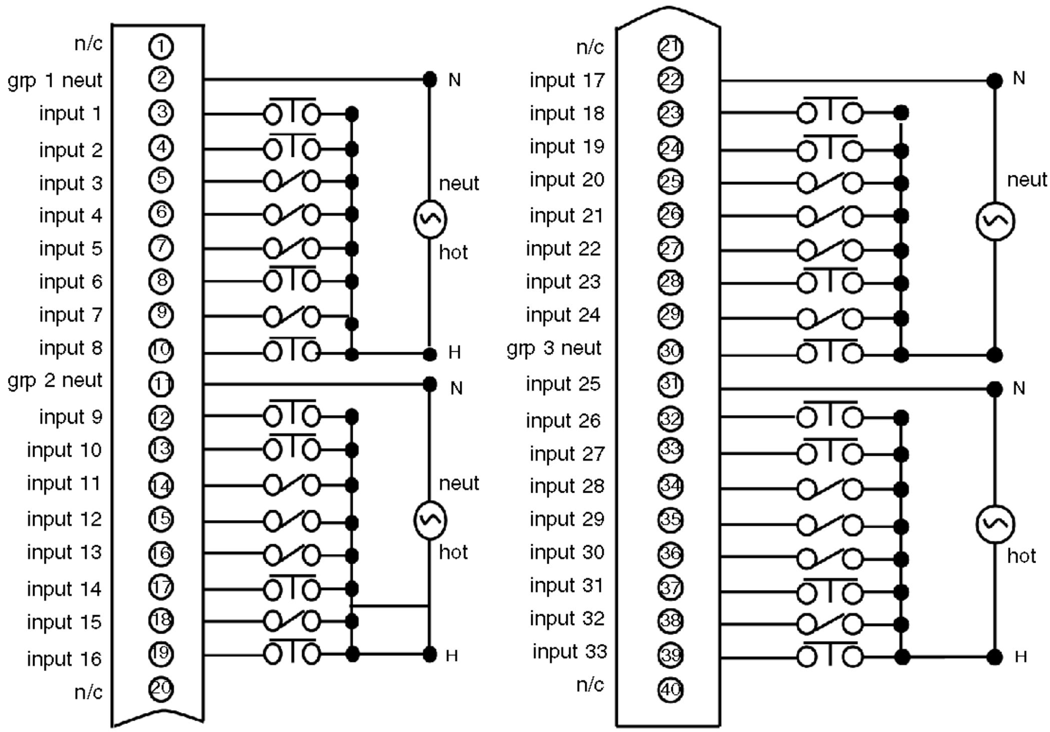
B807–132 115 Vac Input, Field Connections

Overview

User connections are made to a standard screw terminal strip.The rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal Numbering and Input Connections

The following diagram shows terminal numbering and input connections for the B807–132 module.

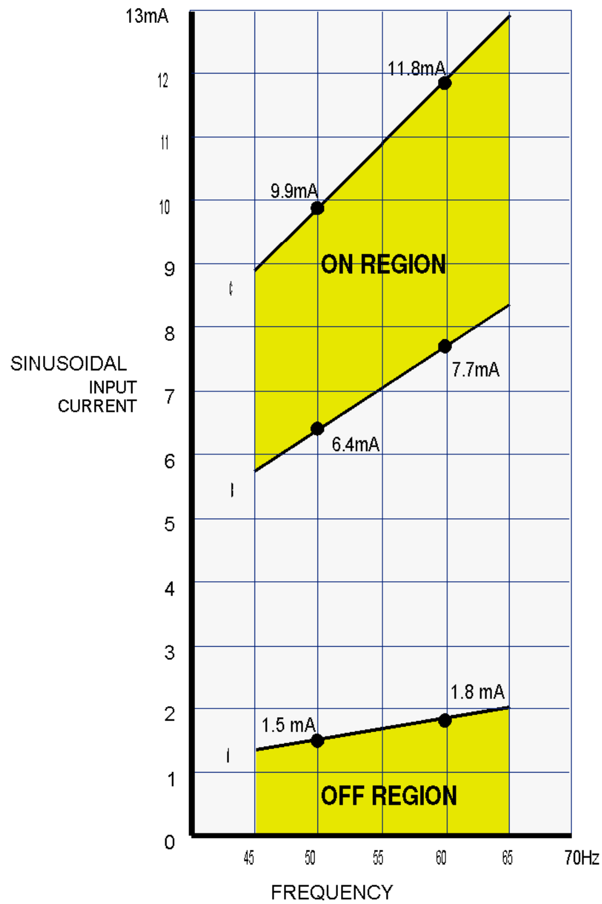


NOTE: Pins 1, 20, 21, and 40 have no internal connections.

NOTE: The module can operate from 47—63 Hz. However, its use with proximity switches is recommended only at 60 Hz nominal line frequency. Leakage current through switching devices connected to the module may cause a false on condition.

Input Current–to–Frequency Relationship

The following illustration is a plot of the input current versus frequency.



A. MAXIMUM ALLOWABLE SINEWAVE LEAKAGE CURRENT (FROM EXTERNAL DEVICE) TO GUARANTEE AN OFF CONDITION (CALCULATED AT 35 Vac) AT B807 TERMINALS

B. MINIMUM REQUIRED INPUT CURRENT TO GUARANTEE AN ON CONDITION NOTE: THE MODULE IS INTENDED TO BE USED WITH VOLTAGE INPUTS; VOLTAGE INPUTS GREATER THAN 80Vac RMS AT MODULE TERMINALS GUARANTEE AN ON CONDITION

C. MAXIMUM MODULE INPUT CURRENT AT 130 Vac

B807–132 115 Vac Input, Specifications

Specification Table

The following table provides the specifications for the unit.

B807–132 Specifications		
Description		115 Vac Input
Number of Points		32
Operating Voltage		80—130 Vac continuous /47—63 Hz
Number of Groups		4
Inputs/group		8
Maximum Input Voltage		150 Vac for 10 s
		200 Vac for 1 cycle
ON Condition		80—130 Vac (source impedance)<1 kΩ
OFF Condition		0—35 Vac (source impedance) = 0Ω
		0—130 Vac (source impedance) ≥90 kΩ
ON Current		3.7 mA minimum @ 80 Vac, 50 Hz input*
		6.4 mA minimum @ 115 Vac, 60 Hz input*
Maximum External to Module Leakage Current		1.8 mA to guarantee an OFF condition @ 60 Hz
Maximum Response Time	OFF→ON	6 ms
	ON→OFF	35 ms
Power Required	+5 V	80 mA
	+4.3 V	2 mA
	-5 V	0 mA
Terminal Connector		AS-8535-000
Reference Type		Mapped as 32 bits input 1x or Mapped as 2 registers input 3x
Input Type		BIN/BCD

*Minimum input on current at stated voltage and frequency with less than 10 Ω source impedance.

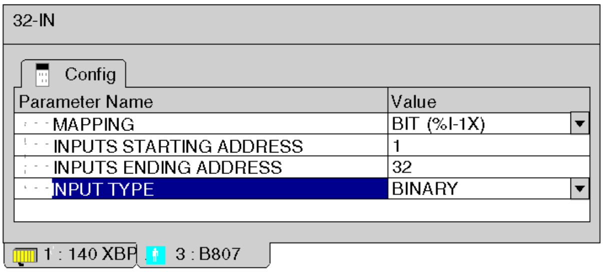
NOTE: All voltage and current specifications assume a sine waveform and are specified as RMS voltage and current.

NOTE: Input LED brightness is a function of line voltage applied.

B807–132 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%I-1X)	WORD (%IW-3X)
Inputs Starting Address	1	1
Inputs Ending Address	32	2
Input Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 32 bits input 1x or Mapped as 2 registers input 3x	Mapped as 32 bits input %Ix or Mapped as 2 words input %IWx
Input Type	BIN/BCD	BIN/BCD

Chapter 21
B808–016 230 Vac Output

Purpose

This chapter describes the functional and physical characteristics of the B808–016 230 Vac output module.

What Is in This Chapter?

This chapter contains the following topics:

B808–016 230 Vac Output, Overview

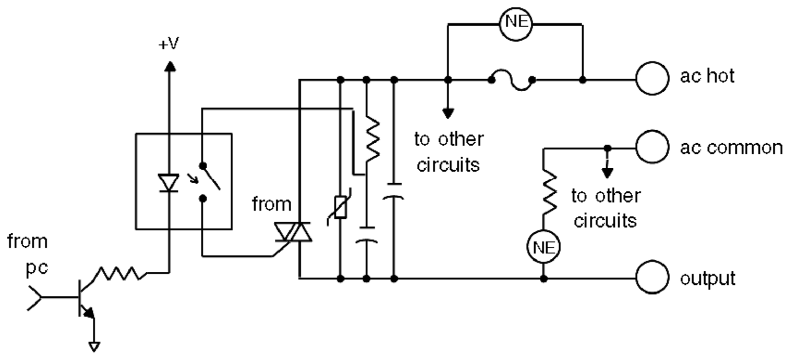
General Characteristics

The B808–016 230 Vac output module converts logic signals used within the PLC into 16 independent 230 Vac outputs. Each output is capable of driving a relay, pilot lamp, motor starter, solenoid, or any other load up to 2.0 A. The B808 is capable of 6 A per group of eight and handling 12 A per module.

The module uses triac switches to control loads connected to an external power source. These switches are designed to withstand the high surge currents typical of industrial loads.

Simplified Schematic

Following is a simplified schematic of the B808–016 230 Vac output module.



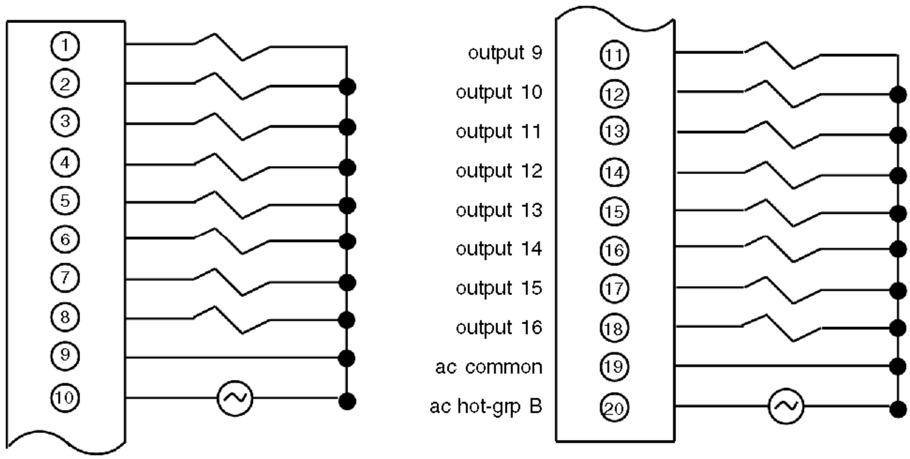
B808–016 230 Vac Output, Field Connections

Overview

User connections are made to a standard screw terminal strip.The rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal Numbering and Output Connections

The following diagram shows terminal numbering and output connections for the the B808–016 module.



B808–016 230 Vac Output, Specifications

Specification Table

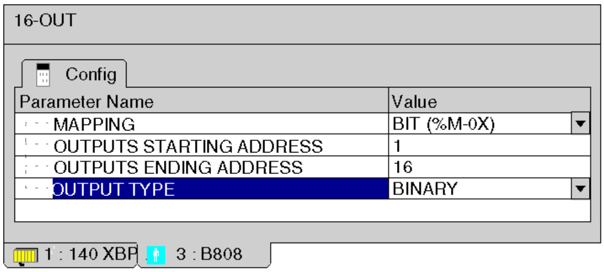
The following table provides the specifications for the unit.

B808–016 Specifications		
Description		230 Vac Output
Number of Points		16
Operating Voltage		180—260 Vac/47—63 Hz
Number of Groups		2
Outputs/group		8
ON Current	Maximum/point	2 A continuous
	Surge Current	50 A (max) 1 cycle
	Maximum/group	6 A
	Maximum/module	12 A
ON Voltage Drop		1.3 V @ 2.0 A
Maximum OFF	Leakage Current	8 mA @ 230 Vac
Maximum Response Time	OFF→ON	8.3 mA @ 60 Hz
	ON→OFF	8.3 ms @ 60 Hz
Applied dv/dt		100 V/s
Power Required	+5 V	76 mA
	+4.3 V	480 mA
	-5 V	0 mA
Terminal Connector		AS-8534-000
Fusing		1/group, Type 3 AB, 8 A (normal blow)
Reference Type		Mapped as 16 bits output 1x or Mapped as 1 register output 4x
Output Type		BIN/BCD

B808–016 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%M-0X)	WORD (%MW-4X)
Outputs Starting Address	1	1
Outputs Ending Address	16	1
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 16 bits output 1x or Mapped as 1 register output 4x	Mapped as 16 bits output %Mx or Mapped as 1 word output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 22
B809–016 230 Vac Input

Purpose

This chapter describes the functional and physical characteristics of the B809–016 230 Vac input module.

What Is in This Chapter?

This chapter contains the following topics:

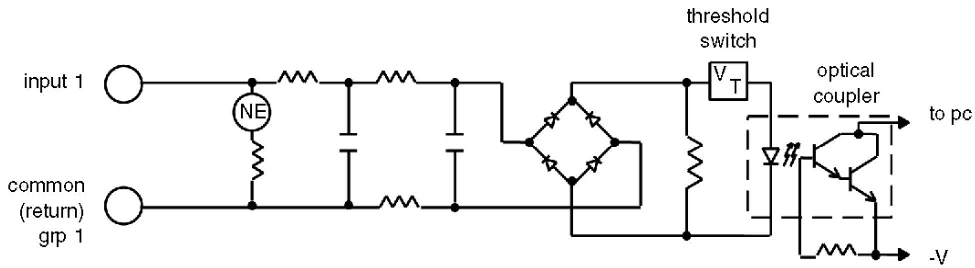
B809–016 230 Vac Input, Overview

General Characteristics

The B809–016 230 Vac input module senses and converts switched input signals into logic voltage levels used by the PLC. The module allows for up to 16 inputs in two groups of eight. These inputs can be received from push buttons, limit and proximity switches, as well as other 230 Vac sources.

Simplified Schematic

Following is a simplified schematic of the B809–016 230 Vac input module.



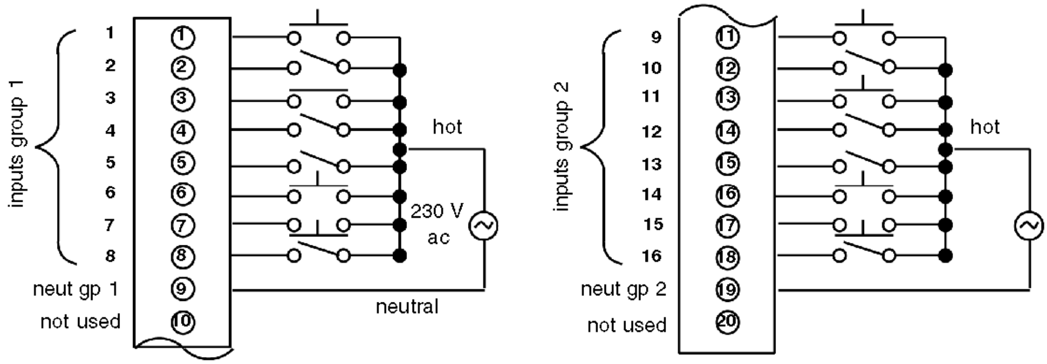
B809–016 230 Vac Input, Field Connections

Overview

User connections are made to a standard screw terminal strip. The rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal Numbering and Input Connections

The following diagram shows terminal numbering and input connections for the B809–016 module.



B809–016 230 Vac Input, Specifications

Specification Table

The following table provides the specifications for the unit.

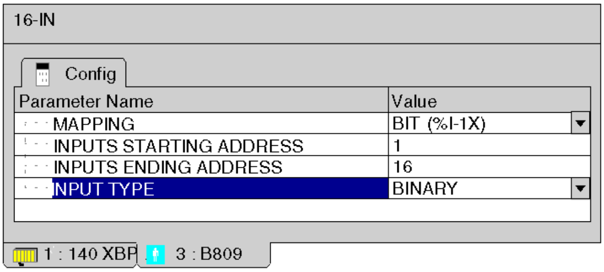
B809–016 Specifications		
Description		230 Vac Input
Number of Points		16
Operating Voltage		160—260 Vac/47—63 Hz
Number of Groups		2
Outputs/group		8
Maximum Input Voltage	Continuous	260 Vac
		300 Vac for 10 s
	Surge	400 Vac for 1 cycle
ON Conditions		160—260 Vac (source impedance)= 1 kΩ
ON Current		8.5 mA (typical) @ 230 Vac
OFF Conditions		0—90 Vac (source impedance)=0Ω
Peak inrush for 260 VRMS (Rs=0) applied @ peak		1.7 A max
Maximum Response Time	OFF→ON	5 ms (3 ms typical)
	ON→OFF	18 ms (12 ms typical
Power Required	+5 V	42 mA
	+4.3 V	1 mA
	-5 V	15 mA
Dimensions	Space Required	1 slot
	Weight	2.38 lbs (1.08 kg)
Terminal Connector		AS-8534-000
Reference Type		Mapped as 16 bits input 1x or Mapped as 1 register input 3x
Input Type		BIN/BCD

NOTE: The B809–016 input module is electrically compatible with the B808-016 output module.

B809–016 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%I-1X)	WORD (%IW-3X)
Inputs Starting Address	1	1
Inputs Ending Address	16	1
Input Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 16 bits input 1x or Mapped as 1 register input 3x	Mapped as 16 bits input %Ix or Mapped as 1 word input %IWx
Input Type	BIN/BCD	BIN/BCD

Chapter 23
B810–008 115 Vac Isolated Output

Purpose

This chapter describes the functional and physical characteristics of the B810–008 115 Vac output module.

What Is in This Chapter?

This chapter contains the following topics:

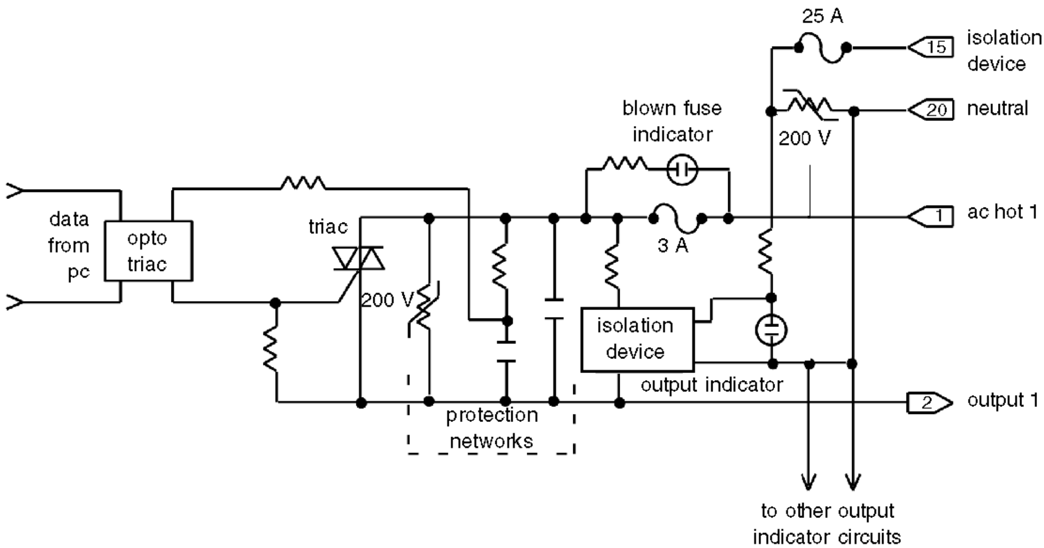
B810–008 115 Vac Output, Overview

General Characteristics

The B810–008 115 Vac output module converts logic signals used within the PLC into eight independent 115 Vac outputs. Each output is capable of driving a relay, pilot lamp, motor starter, solenoid, or any other load up to 2.0 A. The B810–008 is capable of 6 A/group of eight and handling 12 A/module. The module uses eight triac switches to control loads connected to an external power source. These switches are designed to withstand the high surge currents typical of industrial loads.

Simplified Schematic

Following is a simplified schematic of the B810–008 115 Vac output module.



Zero-cross threshold switching is incorporated into each output circuit. Upon controller command, outputs switch on at the first line voltage zero-crossing, and switch off at the first load current zero-crossing.

Output status indicators are provided for each output circuit. These neon indicators will be on when a load is connected and the output is on, or when there is no connected load. These indicators are isolated from the triac output and require a separate lamp supply which is fused at 1/4 A. Blown fuse indicators are also provided for each output circuit. These indicators light (on) when the corresponding fuse has blown.

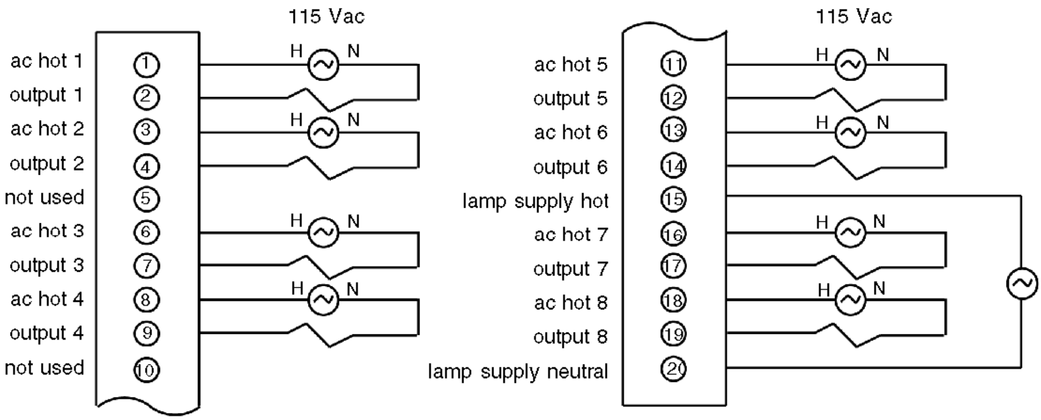
B810–008 115 Vac Output, Field Connections

Overview

User connections are made to a standard screw terminal strip.The rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal Numbering and Output Connections

The following diagram shows terminal numbering and output connections for the B810–008 module.



B810–008 115 Vac Isolated Output, Specifications

Specification Table

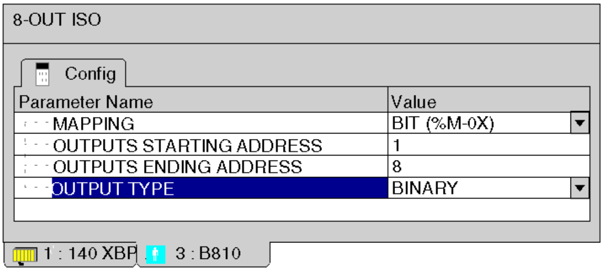
The following table provides the specifications for the unit.

B810–008 Specifications		
Description		115 Vac isolated output
Number of Points		8
Operating Voltage		80—130 Vac continuous/47—63 Hz
Number of Groups		8
Outputs/group		1
On Current	Maximum/point	2 A continuous
	Maximum/module	12 A
	Maximum/group	2 A
	Surge Current	50 A (max) 1 cycle
	Minimum Load Current	50 mA
Maximum OFF	Leakage Current	3 mA @ 115 Vac
ON Voltage Drop		1.3 V @ 2.0A max
Surge Voltage		150 Vac for 10 s
		200 Vac for 1 cycle
Maximum Response Time	OFF→ON	8.3 ms @ 60 Hz
	ON→OFF	8.3 ms @ 60 Hz)
dv/dt		100 V/s
	Commutating	5 V/s
Power Required	+5 V	50 mA
	+4.3 V	240 mA
	-5 V	0 mA
Terminal Connector		AS-8534-000
Fusing		One/group, Type 3 AG, 3 A (normal blow)
Reference Type		Mapped as 8 bits output 0x or Mapped as 1 register output 4x
Output Type		BIN/BCD

B810–008 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%M-0X)	WORD (%MW-4X)
Outputs Starting Address	1	1
Outputs Ending Address	8	1
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 8 bits output 0x or Mapped as 1 register output 4x	Mapped as 8 bits output %Mx or Mapped as 1 word output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 24
B814–108 Relay Output

Purpose

This chapter describes the functional and physical characteristics of the B814–108 relay output module.

What Is in This Chapter?

This chapter contains the following topics:

B814–108 Relay Output, Overview

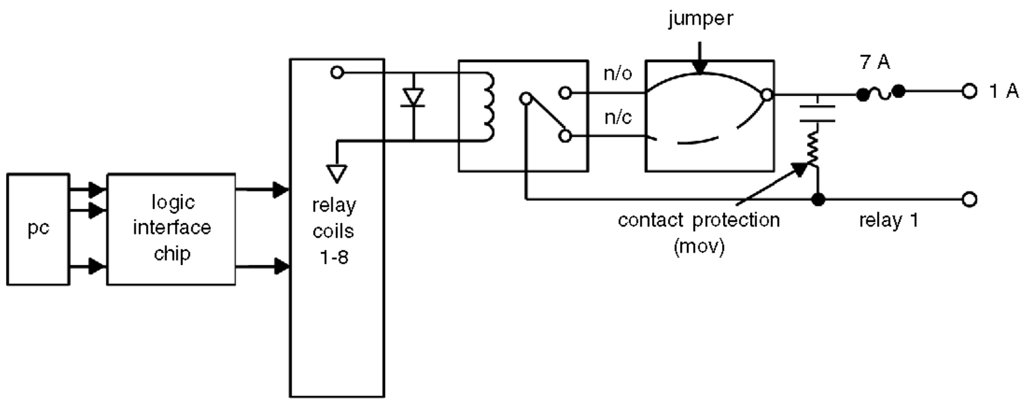
General Characteristics

The B814–108 relay output module converts signals from the PLC to eight independent relay outputs. Each output is capable of driving a relay, pilot lamp, motor starter, solenoid, or any other load up to 5.0 A. Each of the eight outputs is electrically isolated from the I/O bus and from the other seven outputs by the relay coil. The module is designed to withstand the high surge currents typical of industrial loads.

The module is user-configurable as to setting for normally-open or normally-closed operation of the relays as described below, and is compatible with other input modules. Assuming a normally-open configuration, when the relay coil is energized, the relay contacts will conduct current from output A terminal to output B terminal (see the following figure).

Simplified Schematic

Following is a simplified schematic of the B814–108 relay output module.



B814–108 Relay Output, Configuration

Configuration Overview

The B814 is initially shipped with all eight channels jumpered for the normally-open configuration. You may optionally wire any of the channels for normally-closed operation if desired. This is done by transferring a wire jumper from one tab to another on the printed circuit board. Refer to the label on the side of the module.

The following table shows the user configuration wire/tab designations for the unit.

Channel	N.O.	N.C.	Channel	N.O.	N.C.
1	W1-E2	W1-E1	5	W5-E10	W5-E9
2	W2-E4	W2-E3	6	W6-E12	W6-E11
3	W3-E6	W3-E5	7	W7-E14	W7-E13
4	W4-E8	W4-E7	8	W8-E16	W8-E15

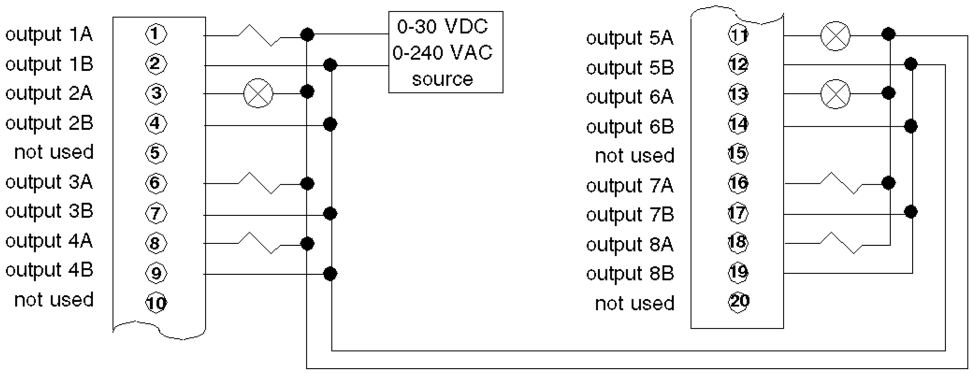
B814–108 Relay Output, Field Connections

Overview

User connections are made to a standard screw terminal strip.The rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal Numbering and Output Connections

The following diagram shows typical circuit connections for power applications of the B814–108 module.



NOTE: Since each output is isolated from the remaining outputs, separate power sources can be used for each load. Each output can be wired for current source or current sink operations.

NOTE: It is possible to have the Active indicator lit with one or more output channels working improperly.

814–108 Relay Output, Specifications

Specification Table

The following table provides the specifications for the unit.

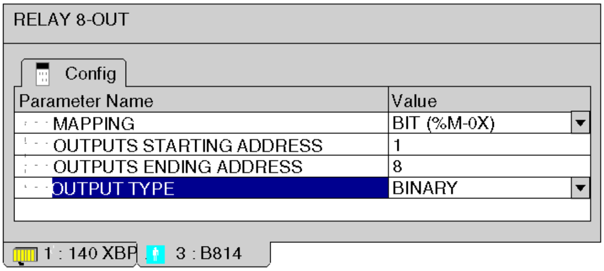
814–108 Specifications		
Description		Relay (NO/NC) output,
Number of Points		8
Operating Voltage		0—30 Vdc 0—240 Vac/47—63 Hz
Number of Groups		8
Outputs/group		1
ON Current	Maximum/point	5 A @ 30 Vdc/120 Vac
		4 A @ 240 Vac
	Maximum/module	40 A @ 30 Vdc/120 Vac
Maximum Load Current	Carrying (unswitched)	3 A max)
	Switching	2.0 max (0.3 A @ 300 Vdc
Switching Capability		960 VA maximum, or 150 W dc maximum
Contact Resistance		< 300 mΩ (including fuse, wire, connectors, and contacts)
OFF State	Leakage Current	.5 mA (typical) @ 240 Vac/60 Hz
Maximum Response Time	OFF→ON	15 ms (6 ms typical)
	ON→OFF	15 ms (6 ms typical)
Power Required	+5 V	107 mA
	+4.3 V	800 mA
	-5 V	0 mA
Relay Life Rating		100,000 operations, and 50,000 operations with inductive loads @ 25°C
Terminal Connector		AS-8534-000
Fusing		1 / output, 7 A
Reference Type		Mapped as 8 bits output 0x or Mapped as 1 register output 4x
Output Type		BIN/BCD

NOTE: For 48 Vdc operation, the maximum load is 1A.

B814–108 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%M-0X)	WORD (%MW-4X)
Outputs Starting Address	1	1
Outputs Ending Address	8	1
Output Type	BINARY	BCD

Mapping parameter references

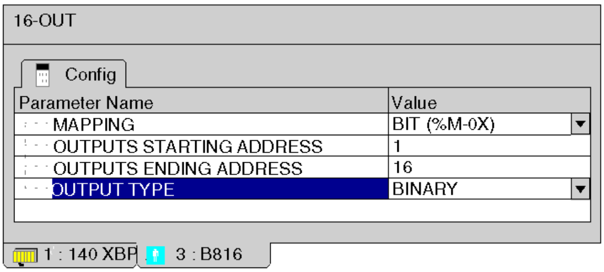
	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 8 bits output 0x or Mapped as 1 register output 4x	Mapped as 8 bits output %Mx or Mapped as 1 word output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 25
B816 Isolated Output

B816 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Name	Default Value	Options
Mapping	BIT (%M-0X)	WORD (%MW-4X)
Outputs Starting Address	1	-
Outputs Ending Address	16	-
Output Type	BINARY	BCD

Chapter 26
B817–116 and B817–216 115/230 Vac Isolated Input

Purpose

This chapter describes the functional and physical characteristics of the B817–116 and B817–216 115/230 Vac isolated input modules.

What Is in This Chapter?

This chapter contains the following topics:

B817–116 (115 Vac) and B817–216 (230 Vac) Isolated Input, Overview

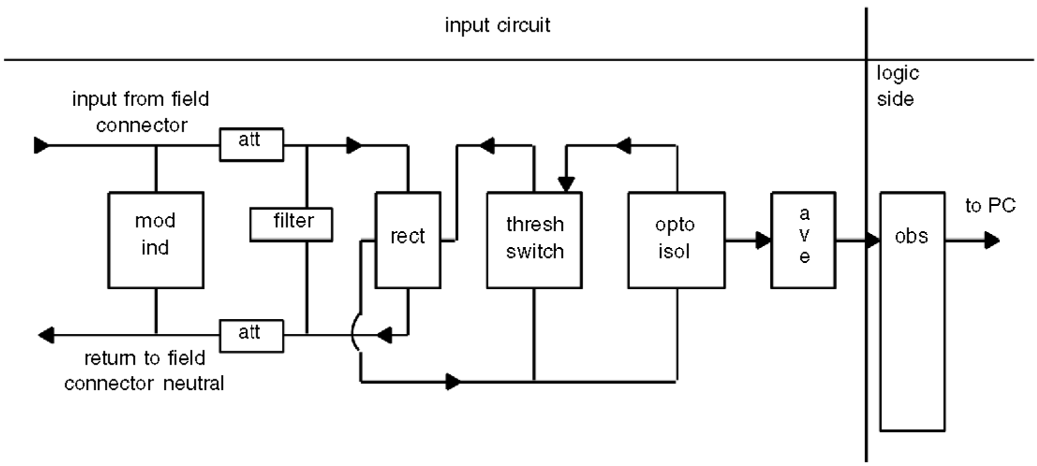
General Characteristics

The B817–116 (115 Vac) and B817–216 (230 Vac) isolated input modules sense off and on input voltages from its field circuitry, converting them to dc logic levels used in the logic program by a PLC.

The module's 16 input circuits are individually isolated from one another. As each input circuit uses a neutral return wire, none has a definite relationship to system ground unless established in the user's field circuitry. The module's logic circuitry is shielded from radiated signals or interference originating in the field, and its field inputs are optically isolated from the system logic.

Simplified Schematic

Following is a simplified schematic of the B817–116 (115 Vac) and B817–216 (230 Vac) isolated input modules.



When the voltage exceeds the threshold circuits voltage requirement, current will flow through the threshold switch and opto-isolator via the precision attenuator and the bridge rectifier. The output pulses coupled through the isolator are averaged so that a steady state dc voltage representation of the inner circuit's on–state condition is sensed by the Ourbus chip (OBS) on the logic side of the module.

The Ourbus output register is set to represent the field on state. As long as the field input status remains true, the module will communicate this status each time it is polled by the PLC.

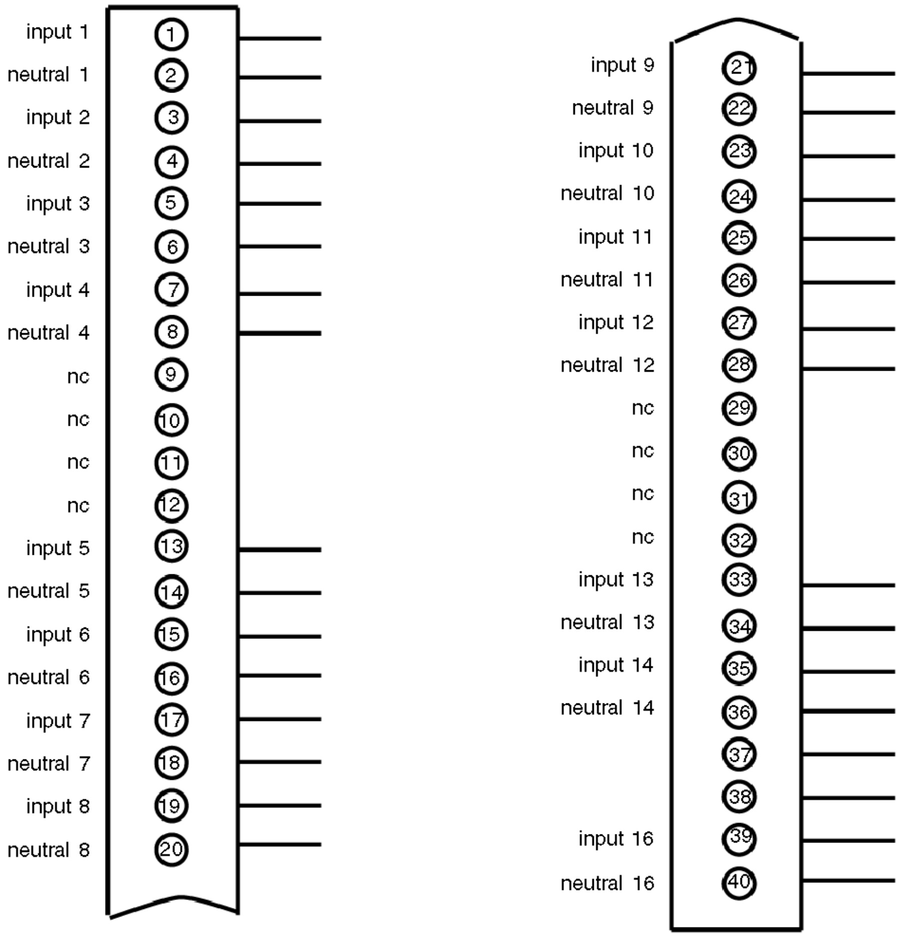
B817–116 (115 Vac) and B817–216 (230 Vac) Isolated Input, Field Connections

Overview

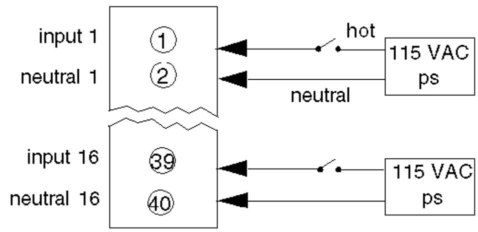
User connections are made to a standard screw terminal strip.The rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal Numbering and Input Connections

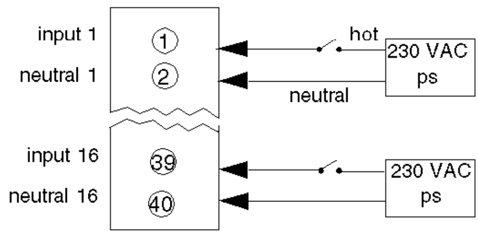
The following diagram shows terminal numbering and input connections for the B817–116 (115 Vac) and B817–216 (230 Vac) isolated input modules.



The following figure shows typical circuitry connected to the user side of the B817–116 field connector.



The following figure shows typical circuitry connected to the user side of the B817–216 field connector.



B817–116 (115 Vac) and B817–216 (230 Vac) Isolated Input, Specifications

Specification Table

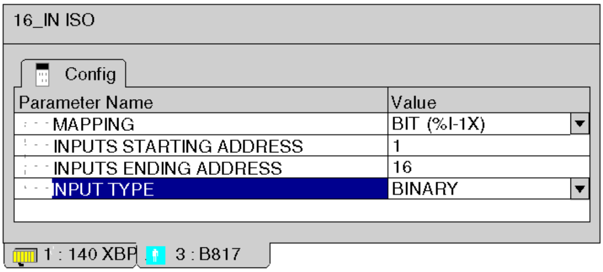
The following table provides the specifications for the unit.

<table>
<tr><th colspan="3">B817–x16 Specifications</th></tr>
<tr><td colspan="2" rowspan="2">Description</td><td>115 Vac isolated input (B817–116)</td></tr>
<tr><td>230 Vac isolated input (B817–216)</td></tr>
<tr><td colspan="2">Number of Points</td><td>16</td></tr>
<tr><td colspan="2">Number of Groups</td><td>16</td></tr>
<tr><td colspan="2">Inputs/group</td><td>1</td></tr>
<tr><td rowspan="4">Maximum Input Voltage</td><td rowspan="2">Continuous</td><td>130 Vac/47—63 Hz (B817–116)</td></tr>
<tr><td>260 Vac/47—63 Hz (B817–216)</td></tr>
<tr><td rowspan="2">Surge</td><td>200 Vac for 1 cycle (B817–116)</td></tr>
<tr><td>400 Vac for 1 cycle (B817–216)</td></tr>
<tr><td>ON Conditions</td><td>B817–116</td><td>>80 Vac (source impedance,<1 kΩ</td></tr>
<tr><td></td><td>B817–216</td><td>>160 Vac (source impedance, <1 kΩ</td></tr>
<tr><td rowspan="4">OFF Conditions</td><td></td><td>0—35 Vac (source impedance)=0Ω</td></tr>
<tr><td>B817–116</td><td>0—130 Vac (source impedance)>40kΩ</td></tr>
<tr><td></td><td>0—90 Vac (source impedance)=0Ω</td></tr>
<tr><td>B817–216</td><td>0—260 Vac (source impedance)>80 kΩ</td></tr>
<tr><td rowspan="2">Wetting Current</td><td>B817–116</td><td>0 4 mA (typical) @ 115 Vac</td></tr>
<tr><td>B817–216</td><td>8.2 3 mA (typical) @ 230 Vac</td></tr>
<tr><td rowspan="2">Maximum Response Time</td><td>OFF→ON</td><td>6 ms</td></tr>
<tr><td>ON→OFF</td><td>18 ms</td></tr>
<tr><td rowspan="3">Power Required</td><td>+5 V</td><td>25 mA</td></tr>
<tr><td>+4.3 V</td><td>2 mA</td></tr>
<tr><td>-5 V</td><td>8 mA</td></tr>
<tr><td colspan="2">Terminal Connector</td><td>AS-8535-000</td></tr>
<tr><td colspan="2">Reference Type</td><td>Mapped as 16 bits input
1x
or
Mapped as 1 register input
3x</td></tr>
<tr><td colspan="2">Input Type</td><td>BIN/BCD</td></tr>
</table>

B817–116 and B817–216 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%I-1X)	WORD (%IW-3X)
Inputs Starting Address	1	1
Inputs Ending Address	16	1
Input Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 16 bits input 1x or Mapped as 1 register input 3x	Mapped as 16 bits input %Ix or Mapped as 1 word input %IWx
Input Type	BIN/BCD	BIN/BCD

Chapter 27
B818 24 Vac Output

Purpose

This chapter describes the functional and physical characteristics of the B818 24 Vac output module.

What Is in This Chapter?

This chapter contains the following topics:

B818 24 Vdc (True High) Output, Specifications

Specification Table

The following table provides the specifications for the unit.

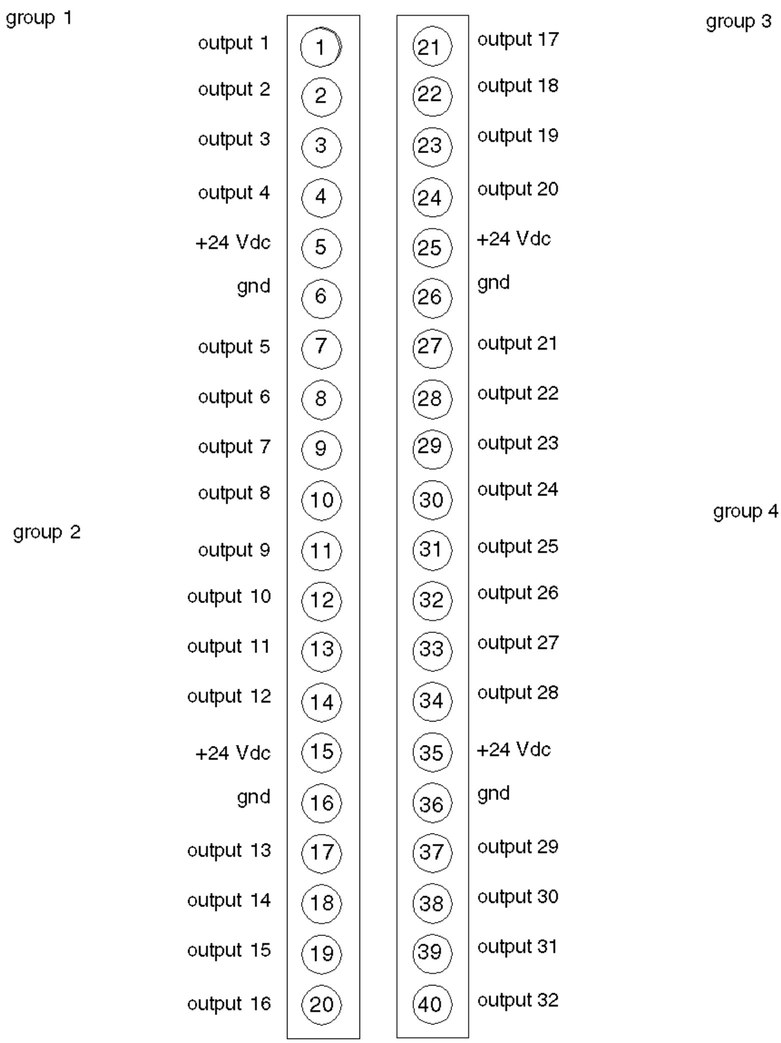
B818 Specifications		
Description		24 Vdc output
Type of Operation		True high
Number of Points		32
Operating Voltage		20—28 Vdc
Number of Groups		4
Outputs/group		8
On Current	Maximum/point	1 A continuous
	Maximum/module	24 A
	Maximum/group	6 A
	ON→OFF	1 ms)
Power Required	+5 V	300 mA
	+4.3 V	10 mA
	-5 V	0 mA

B818 24 Vdc Output, Field Connections

Terminal Numbering and Output Functions

User connections are made to a standard screw terminal strip. The rigid wiring system permits module insertion or removal without disturbing the wiring.

The following illustration shows how to field connect the unit.



B818—Setting Module DIP Switch

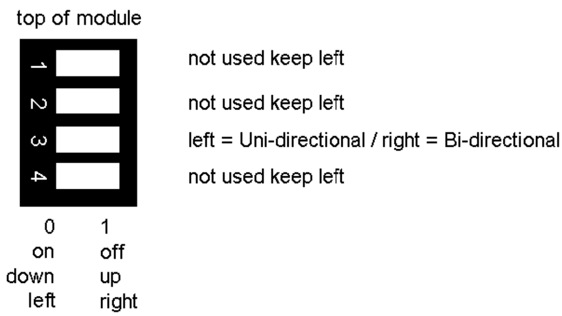
Switch location and position

The four position DIP-switch is located on the rear of the module. This switch controls the mode of the module as Bi-directional or Uni-directional.

Switch Settings

The following figure presents DIP switch settings for the B872-100 module. Also, refer to the label located on the left side of the module itself.

4- position DIP switches

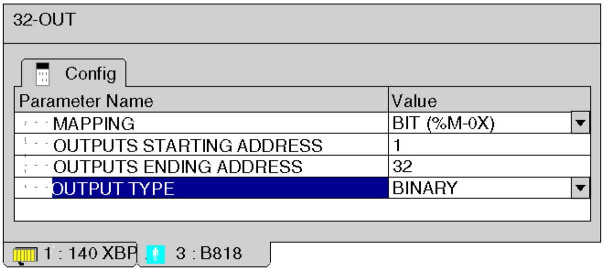


NOTE: Two types of switches may be in use. Toggle up/down or throw left/right

B818 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Name	Default Value	Options
Mapping	BIT (%M-0X)	WORD (%MW-4X)
Outputs Starting Address	1	-
Outputs Ending Address	32	-
Output Type	BINARY	BCD

Chapter 28
B819–232 230 Vac Input

Purpose

This chapter describes the functional and physical characteristics of the B819-232 230 Vac input module.

What Is in This Chapter?

This chapter contains the following topics:

B819-232, 230 Vac Input, Keying and Wiring

Overview

User connections are made to a standard screw terminal strip.The rigid wiring system permits module insertion or removal without disturbing the wiring.

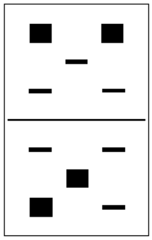
Terminal Numbering and Output Connections

The following diagram shows terminal numbering and output connections for the the B819-232 module.

not used	1	2	I/P 1
I/P 2	3	4	I/P 3
I/P 4	5	6	I/P 5
I/P 6	7	8	I/P 7
I/P 8	9	10	group A neutral
not used	11	12	I/P 9
I/P 10	13	14	I/P 11
I/P 12	15	16	I/P 13
I/P 14	17	18	I/P 15
I/P 16	19	20	group B neutral
not used	21	22	I/P 17
I/P 18	23	24	I/P 19
I/P 20	25	26	I/P 21
I/P 22	27	28	I/P 23
I/P 24	29	30	group C neutral
not used	31	32	I/P 25
I/P 26	33	34	I/P 27
I/P 28	35	36	I/P 29
I/P 30	37	38	I/P 31
I/P 32	39	40	group D neutral

Mechanical Keying

The following figure shows the keying for the the B819-232 module.



B819-232, 32 Point Input, Specifications

Specification Table

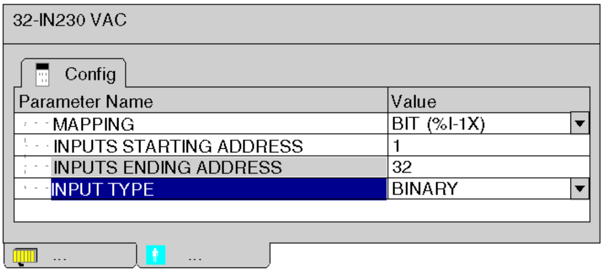
The following table provides the specifications for the unit.

B819-232 Specifications		
Description		230 Vac 32 point input module
Number of Points		32
Operating Voltage		170-250 Vac
Number of Groups		4
Inputs per group		8
Power Required	+5 V	25 mA
	+4.3 V	1 mA
	-5 V	0 mA
Visual indicator	1 neon light per input	"on" when input is on
	1 "active" indicator	"on" when good communication with PC
Maximum input voltage	Continous	250 Vac
	Surge	400 Vac (1cycle), 300 Vac (10 sec. max.)
Transient		5/50 ns 1kV peak
On Level		≥ 170 Vac cont.
Off Level		< 90 Vac with 0 Ω < 250 Vac with 70 kΩ
Reference Type		Mapped as 32 bits input 1x or Mapped as 2 registers input 3x
Input Type		BIN/BCD

B819-232 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%I-1X)	WORD (%IW-3X)
Outputs Starting Address	1	1
Outputs Ending Address	32	2
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 32 bits input 1x or Mapped as 2 registers input 3x	Mapped as 32 bits input %Ix or Mapped as 2 words input %IW
Input Type	BIN/BCD	BIN/BCD

Chapter 29
B820–008 10—60 Vdc Output

Purpose

This chapter describes the functional and physical characteristics of the B820–008 10—60 Vdc output module.

What Is in This Chapter?

This chapter contains the following topics:

B820–008 10—60 Vdc Output, Overview

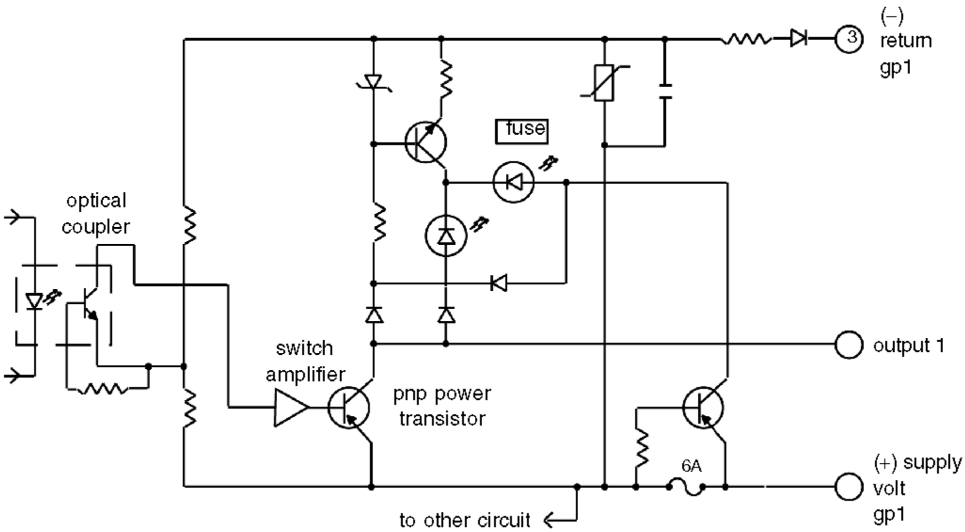
General Characteristics

The B820–008 10—60 output module converts logic signals used within the PLC into eight independent 10—60 Vdc outputs. Each output is capable of driving a relay, pilot lamp, motor starter, solenoid, or any other load up to 2.0 A.

The B820–008 is capable of handling a total continuous current of 12 A. The module uses transistor switches to control loads connected to an external power source. These switches are designed to withstand the high surge currents typical of industrial loads.

Simplified Schematic

Following is a simplified schematic of the B820–008 10—60 Vdc output module.



The module’s eight outputs are separated into four groups of two outputs each.

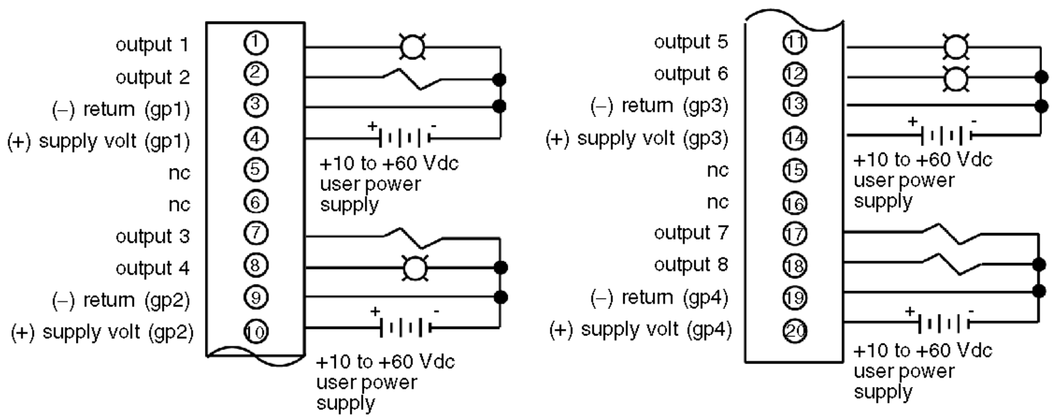
B820–008 10—60 Vdc Output, Field Connections

Overview

User connections are made to a standard screw terminal strip.The rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal Numbering and Output Connections

The following diagram shows terminal numbering and output connections for the B820–008 module.



B820–008 10—60 Vdc Output, Specifications

Specification Table

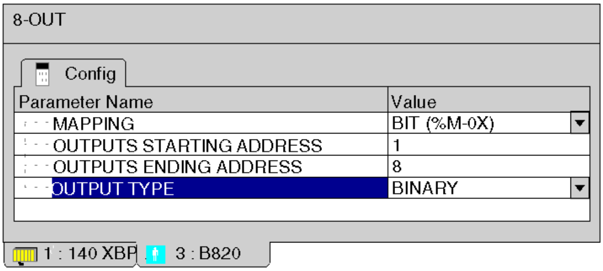
The following table provides the specifications for the unit.

B820–008 Specifications		
Description		10—60 Vdc output
Type of Operation		True high
Number of Points		8
Operating Voltage		10—60 Vdc
Number of Groups		4
Outputs/group		2
On Current	Maximum/point	2 A
	Maximum/module	12 A
	Maximum/group	6 A
	Surge Current	10 A/channel max for 10 ms at a repetition rate of 0.05%
ON State	Voltage Drop	1.5 Vdc max @ 2 A
OFF State	Leakage Current	5 mA (max) @ 60 Vdc
Peak Voltage		80 Vdc max for 10 ms at a repetition rate of 0.05%
Maximum Response Time	OFF→ON	1 ms (.1 ms typical)
	ON→OFF	1 ms (.1 ms typical))
dv/dt		200 V/s
Power Required	+5 V	90 mA
	+4.3 V	80 mA
	-5 V	0 mA
External Power Supply		10—60 Vdc, 500 mA max./group (excluding field load current))
Terminal Connector		AS-8534-000
Fusing		One/group, 3 AG, 6 A (normal blow)
Reference Type		Mapped as 8 bits output 0x or Mapped as 1 register output 4x
Output Type		BIN/BCD

B820–008 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%M-0X)	WORD (%MW-4X)
Outputs Starting Address	1	1
Outputs Ending Address	8	1
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 8 bits output 0x or Mapped as 1 register output 4x	Mapped as 8 bits output %Mx or Mapped as 1 word output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 30
B821–108 10—60 Vdc Input (True High)

Purpose

This chapter describes the functional and physical characteristics of the B821–108 10—60 Vdc input module (True High).

What Is in This Chapter?

This chapter contains the following topics:

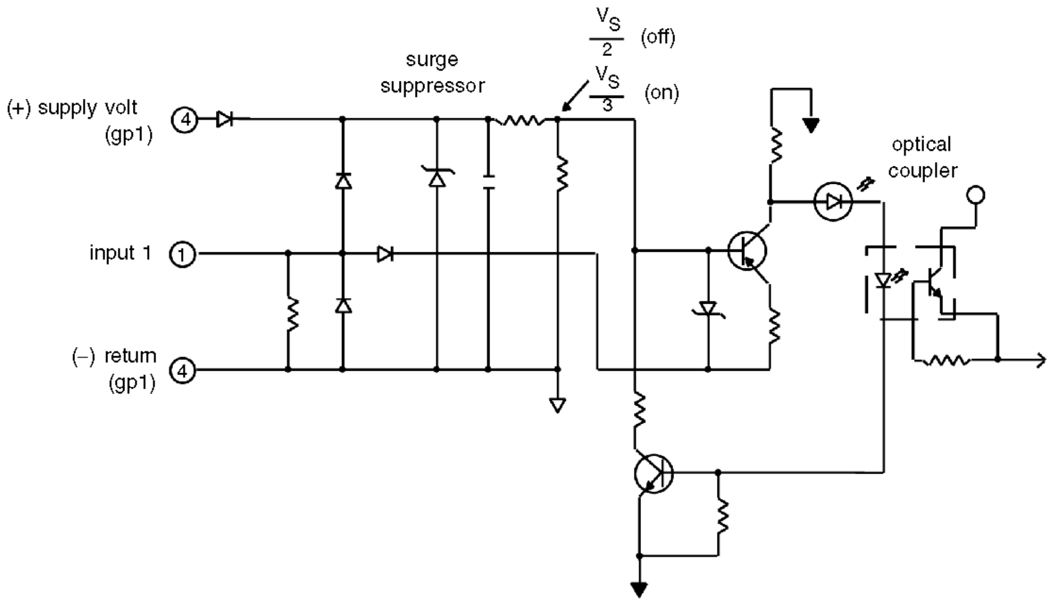
B821–108 10—60 Vdc Input (True High), Overview

General Characteristics

The B821–108 10—60 Vdc input module (True High) senses and converts switched input signals into logic voltage levels used by the PLC. The module allows for up to eight inputs in four groups of two. Each group shares a common reference voltage supply input. These inputs can be received from push buttons, limit and proximity switches, as well as other 10—60 Vdc sources.

Simplified Schematic

Following is a simplified schematic of the B821–108 10—60 Vdc input module (True High).



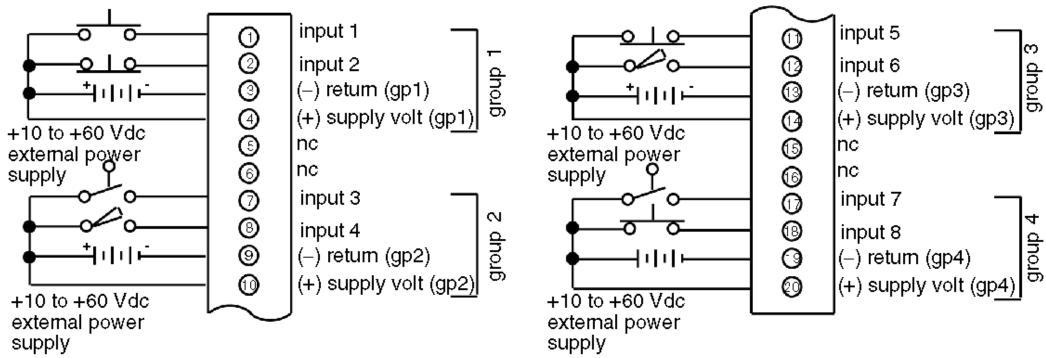
B821–108 10—60 Vdc Input (True High), Field Connections

Overview

User connections are made to a standard screw terminal strip.The rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal Numbering and Input Connections

The following diagram shows terminal numbering and input connections for the B821–108 module.



B821–108 10–60 Vdc Input (True High), Specifications

Specification Table

The following table provides the specifications for the unit.

B821–108 Specifications		
Description		10—60 Vdc input module
Type of Operation		True high
Number of Points		8
Operating Voltage		10—60 Vdc
Number of Groups		4
Inputs/group		2
On Level	Input Voltage	If the applied input voltage is ≥70% of the external power supply, the input to the controller is guaranteed to be in an ON logic state. However, to achieve satisfactory margin, the input voltage should be 75% of the supply voltage. Once the input to the controller is in the ON state, it remains ON as long as the input voltage is ≥60% of the power voltage.

NOTE: When designing or selecting a drive circuit for the B821–108 module, take into consideration the values listed for input currents that follow.

Specification Table, Continued

The specification table for the unit is continued below.

Input Current	Supply Volt (Vdc)	Input Volt (Vdc)	Max Input Current (mA)
	10	10	10
	24	24	15
	48	48	25
	60	60	32
OFF Level	Input Voltage	If the applied input voltage is ≤40% of the supply voltage, the input to the controller is guaranteed to be in an OFF logic state. However, to achieve satisfactory margin, the input voltage should be ≤25% of the supply voltage.	

NOTE: When designing or selecting a drive circuit for the B821, take into consideration the values listed for source resistances that follow.

Specification Table, Continued

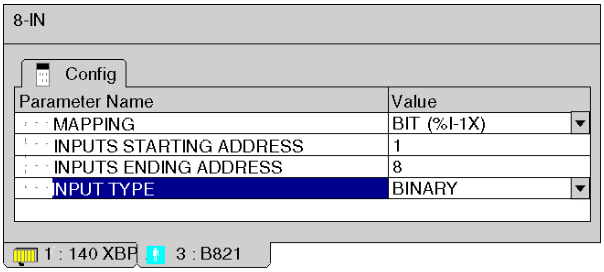
The specification table for the unit is continued below.

Source Resistance	Supply Volt (Vdc)	Input Volt (Vdc)	Max Source Resistance Ω)
	10	10	200
	60	60	500
Maximum Input Voltage	Continuous	10—60 Vdc	
Maximum Response Time	OFF→ON	2.5 ms min, 11 ms max	
	ON→OFF	2.5 ms min, 11 ms max	
Power Required	+5 V	27 mA	
	+4.3 V	1 mA	
	-5 V	10 mA	
External Supply		10—60 Vdc (excluding input current)	
External Supply Current/Group		2 mA (max) @ 10 Vdc	
		5 mA (max) @ 24 Vdc	
		10 mA (max) @ 48 Vdc	
		12 mA (max) @ 60 Vdc	
Terminal Connector		AS-8534-000	
Reference Type		Mapped as 8 bits input 1x or Mapped as 1 register input 3x	
Input Type		BIN/BCD	

B821–108 Parameter Configuration

Parameter and Default Values

Parameter configuration Window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%I-1X)	WORD (%IW-3X)
Inputs Starting Address	1	1
Inputs Ending Address	8	1
Input Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 8 bits input 1x or Mapped as 1 register input 3x	Mapped as 8 bits input %Ix or Mapped as 1 word input %IWx
Input Type	BIN/BCD	BCD/BIN

Chapter 31
B824–016 24 Vdc Output (True High)

Purpose

This chapter describes the functional and physical characteristics of the B824–016 24 Vdc (True High) output module.

What Is in This Chapter?

This chapter contains the following topics:

B824–016 24 Vdc Output (True High), Overview

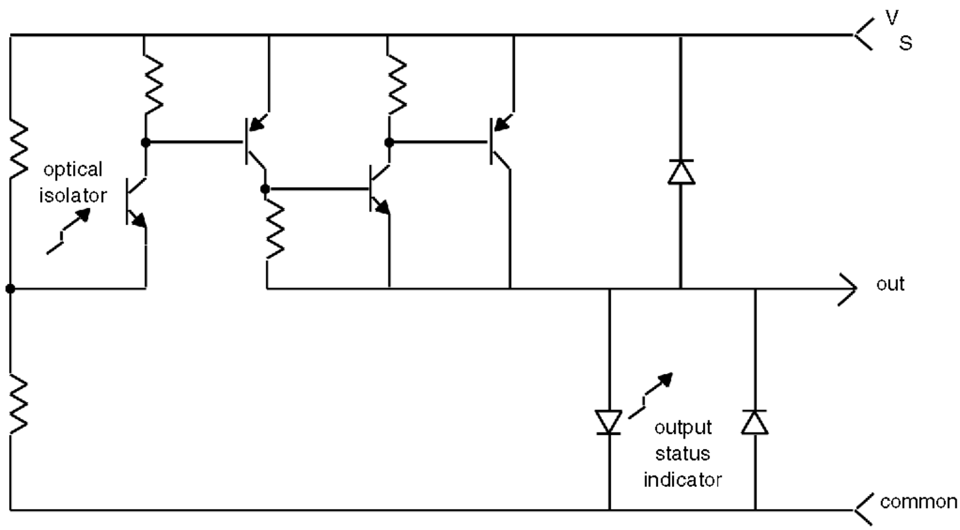
General Characteristics

The B824–016 24 Vdc (True High) output module consists of sixteen independent outputs divided into two groups of eight. The B824–016 converts signals used within the PLC into 16 independent outputs. Outputs are capable of driving motor starters, relays, and a variety of other loads.

There are 16 transistor switches which are used to control loads connected to external power source. The module's 16 outputs are in two groups, eight outputs per group. Each group is fused to protect the outputs from overload currents and polarity reversal.

Simplified Schematic

Following is a simplified schematic of the B824–016 24 Vdc (True High) output module.



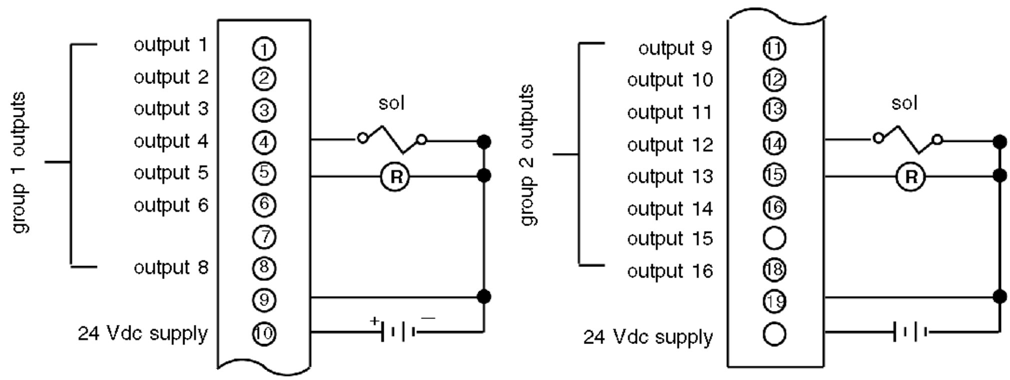
B824–016 24 Vdc Output (True High), Field Connections

Overview

User connections are made to a standard screw terminal strip.The rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal Numbering and Output Connections

The following diagram shows terminal numbering and output connections for the B824–016 module.



B824–016 24 Vdc Output (True High), Specifications

Specification Table

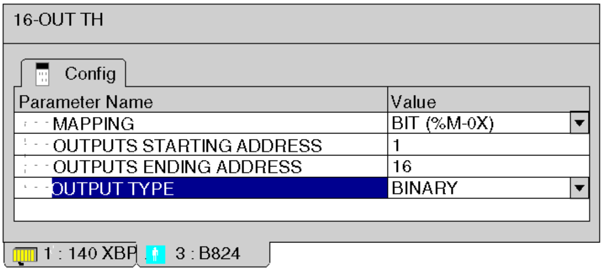
The following table provides the specifications for the unit.

B824–016 Specifications		
Description		24 Vdc output
Type of Operation		True high
Number of Points		16
Operating Voltage		20—28 Vdc
Number of Groups		2
Outputs/group		8
On Current	Maximum/point	2 A continuous
	Maximum/module	12 A
	Maximum/group	6 A
	Maximum Surge	5 A for 10 ms
ON State	Voltage Drop	1.8 Vdc @ 2 A
OFF State	Leakage Current	1 mA (max) @ 24 Vdc
Maximum Response Time	OFF→ON	1 ms
	ON→OFF	1 ms)
Power Required	+5 V	32 mA
	+4.3 V	260 mA
	-5 V	0 mA
External Power Supply		24 Vdc 4 V, 175 mA -polarity protected (excluding field load current)
Terminal Connector		AS-8534-000
Fuse		One/group, 8 A
Reference Type		Mapped as 16 bits output 0x or Mapped as 1 register output 4x
Output Type		BIN/BCD

B824–016 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%M-0X)	WORD (%MW-4X)
Outputs Starting Address	1	1
Outputs Ending Address	16	1
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 16 bits output 0x or Mapped as 1 register output 4x	Mapped as 16 bits output %Mx or Mapped as 1 word output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 32
B825–016 24 Vdc Input (True High)

Purpose

This chapter describes the functional and physical characteristics of the B825–016 24 Vdc (True High) input module.

What Is in This Chapter?

This chapter contains the following topics:

B825–016 24 Vdc Input (True High), Overview

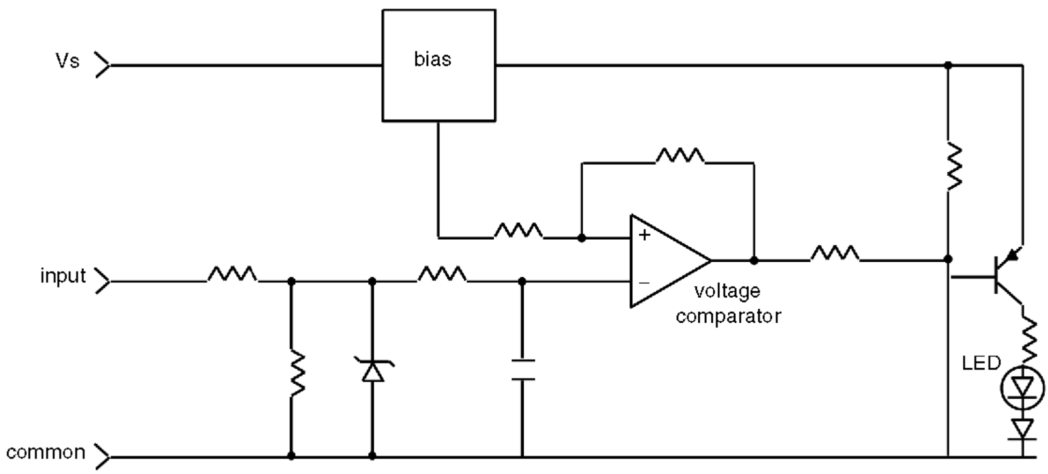
General Characteristics

The B825–016 24 Vdc (True High) input module consists of a single group of 16 independent inputs. The B825–016 senses and converts switched input signals into logic voltage levels used by the PLC.

The module provides 16 inputs that share an external power supply. Inputs can be received from push buttons, limit and proximity switches, and other 24 Vdc sources. Input voltages are sensed by comparing the incoming voltage against a fixed threshold. The threshold is a function of the user–supplied field voltage.

Simplified Schematic

Following is a simplified schematic of the B825–016 24 Vdc (True High) input module.



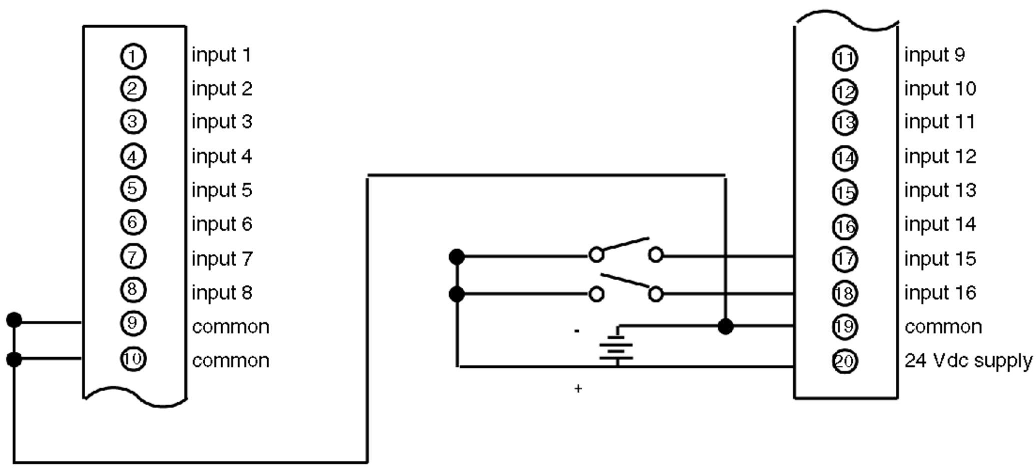
B825–016 24 Vdc Input (True High), Field Connections

Overview

User connections are made to a standard screw terminal strip.The rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal Numbering and Input Connections

The following diagram shows terminal numbering and input connections for the B825–016 module.



B825–016 24 Vdc Input (True High), Specifications

Specification Table

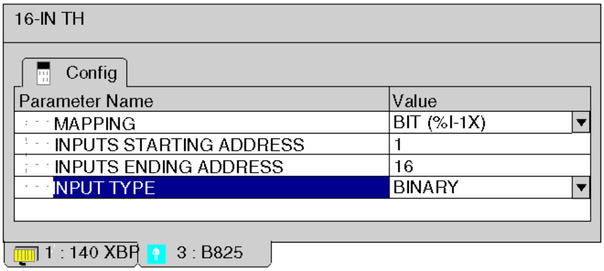
The following table provides the specifications for the unit.

B825-016 Specifications		
Description		24 Vdc input
Type of Operation		True high
Number of Points		16
Operating Voltage		20—28 Vdc
Number of Groups		1
Inputs/group		16
Maximum Input Voltage	Continuous	30 Vdc
	Surge	500 Vdc for 3 ms
ON Conditions		≥ 21 Vdc or.75 of Vs, whichever is less. 1000Ω max resistance to common. Input indicator ON.
OFF Conditions		≤ 5 Vdc or.25 of Vs, whichever is greater. 25,000Ω resistance to common. Input indicator OFF.
ON Current		6 mA (typical) @ 24 Vdc
Maximum Response Time	OFF→ON	11 ms (2.5 ms typical)
	ON→OFF	11 ms (2.5 ms typical)
Power Required	+5 V	27 mA
	+4.3 V	1.2 mA
	-5 V	15 mA
External Power Supply		24 Vdc 4 V @ 200 mA max (Vs)
Terminal Connector		AS-8534-000
Reference Type		Mapped as 16 bits input 1x or Mapped as 1 register input 3x
Input Type		BIN/BCD

B825–016 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%I-1X)	WORD (%IW-3X)
Inputs Starting Address	1	1
Inputs Ending Address	16	1
Input Type	BINARY	BCD

Mapping parameter references

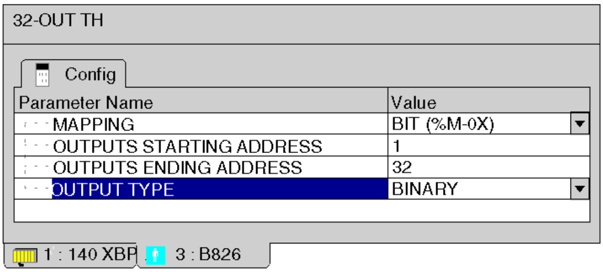
	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 16 bits input 1x or Mapped as 1 register input 3x	Mapped as 16 bits input %Ix or Mapped as 1 word input %IWx
Input Type	BIN/BCD	BIN/BCD

Chapter 33
B826–032 24 Vdc Output (True High)

B826–032 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%M-0X)	WORD (%MW-4X)
Outputs Starting Address	1	1
Outputs Ending Address	32	2
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 32 bits output 0x or Mapped as 2 registers output 4x	Mapped as 32 bits output %Mx or Mapped as 2 words output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 34
B827–032 24 Vdc Input (True High)

Purpose

This chapter describes the functional and physical characteristics of the B827–032 24 Vdc (True High) input module.

What Is in This Chapter?

This chapter contains the following topics:

B827–032 24 Vdc Input (True High), Overview

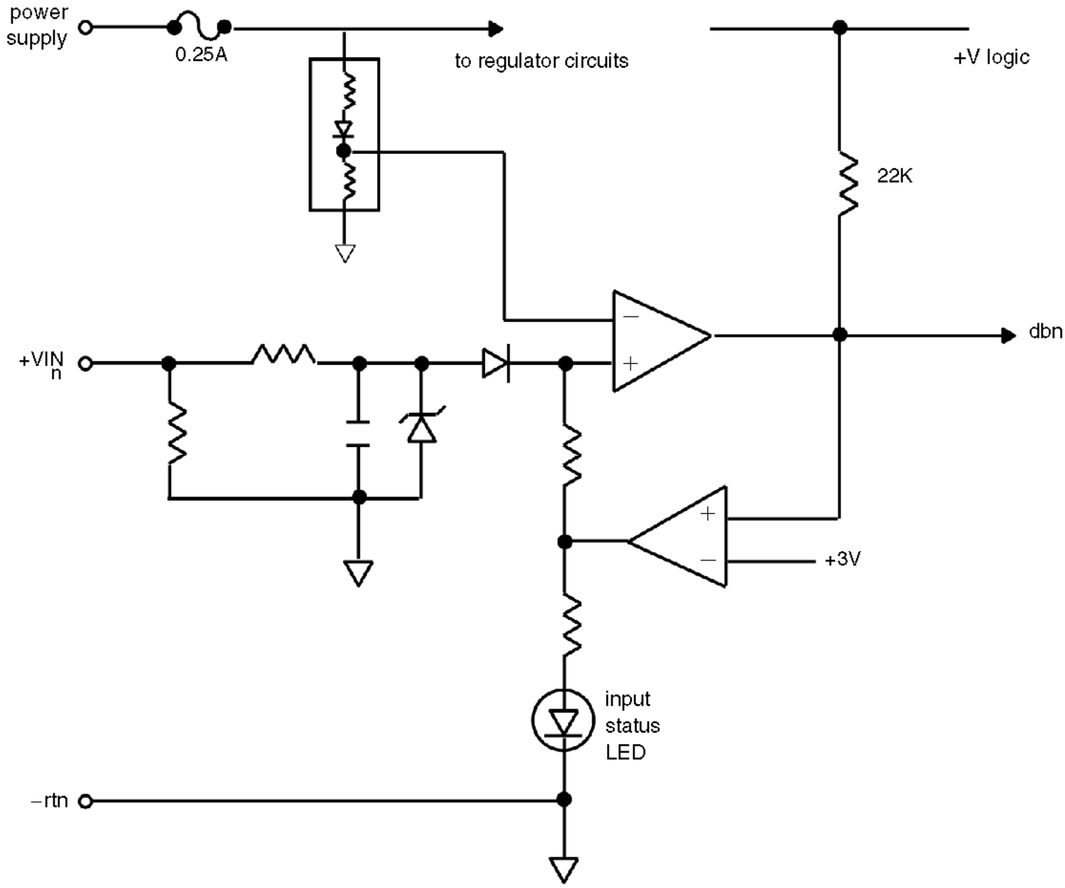
General Characteristics

The B827–032 24 Vdc true high input module consists of a single group of 32 independent inputs. The B827 senses and converts switched input signals into logic voltage levels used by the PLC. Inputs can be received from push buttons, limit and proximity switches, and other 24 Vdc sources.

The B827–032 provides 32 inputs that share an external supply voltage. Input voltages are sensed by comparing the incoming voltage against a fixed threshold. The threshold is a function of the user-supplied field voltage.

Simplified Schematic

Following is a simplified schematic of the B827–032 24 Vdc (True High) input module.



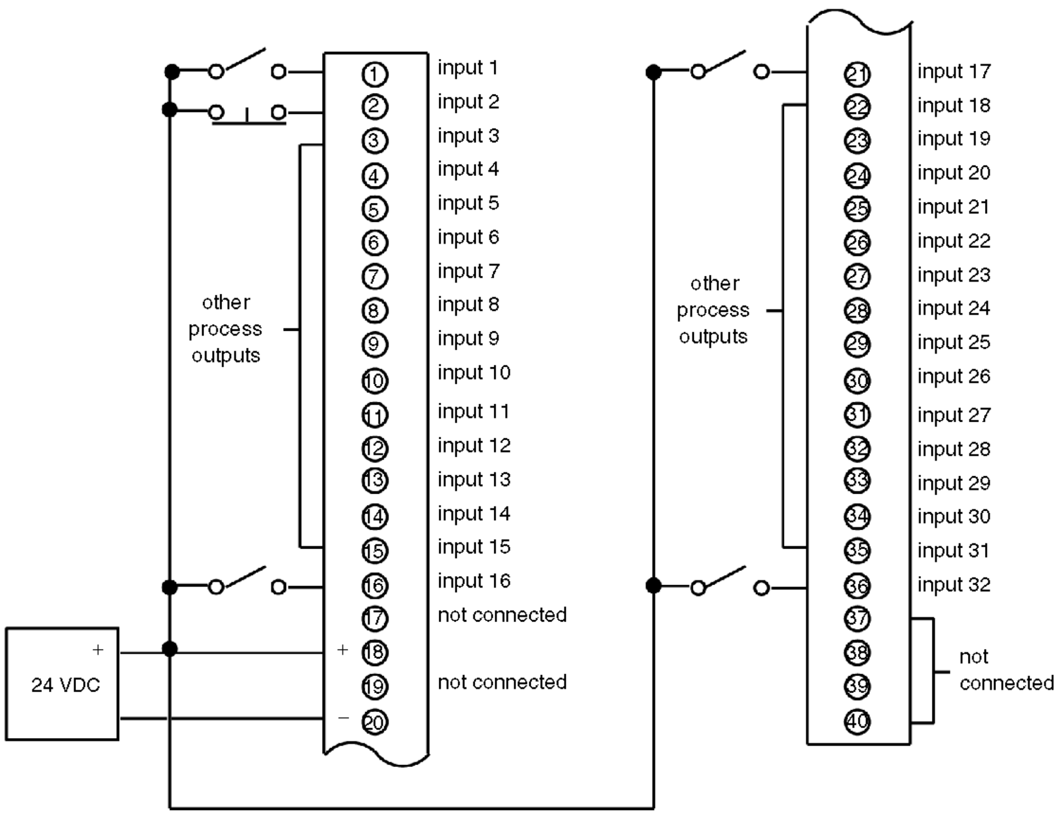
B827–032 24 Vdc Input (True High), Field Connections

Overview

User connections are made to a standard screw terminal strip.The rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal Numbering and Input Connections

The following diagram shows terminal numbering and input connections for the B827–032 module.



B827–032 24 Vdc Input (True High), Specifications

Specification Table

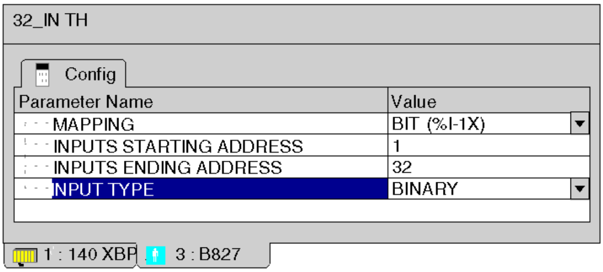
The following table provides the specifications for the unit.

B827–032 Specifications		
Description		24 Vdc high density input
Type of Operation		True high
Number of Points		32
Operating Voltage		18—30 Vdc
Number of Groups		1
Outputs/group		32
ON Level Input Voltage		≥22.5 Vdc or.75 of Vs, whichever is less
OFF Level Input Voltage		≤4.5 Vdc or.25 of Vs, whichever is greater
Input Resistance	On State	8—11 kΩ
	Off State	6—8 kΩ
Maximum Response Time	OFF→ON	0.4 ms
	ON→OFF	1 ms)
Power Required	+5 V	30 mA
	+4.3 V	1 mA
	-5 V	0 mA
External Power Supply	Supply Voltage	18—30 Vdc continuous 40 Vdc peak for 10 ms surge
	Supply Current	60 mA max over an 18—30 Vdc range
Terminal Connector		AS-8535-000
Fuse		0.25 A
Reference Type		Mapped as 32 bits input 1x or Mapped as 2 registers input 3x
Input Type		BIN/BCD

B827–032 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%I-1X)	WORD (%IW-3X)
Inputs Starting Address	1	1
Inputs Ending Address	32	2
Input Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 32 bits input 1x or Mapped as 2 registers input 3x	Mapped as 32 bits input %Ix or Mapped as 2 words input %IWx
Input Type	BIN/BCD	BIN/BCD

Chapter 35
B828–016 5 V TTL Output

Purpose

This chapter describes the functional and physical characteristics of the B828–016 5 V TTL output module.

What Is in This Chapter?

This chapter contains the following topics:

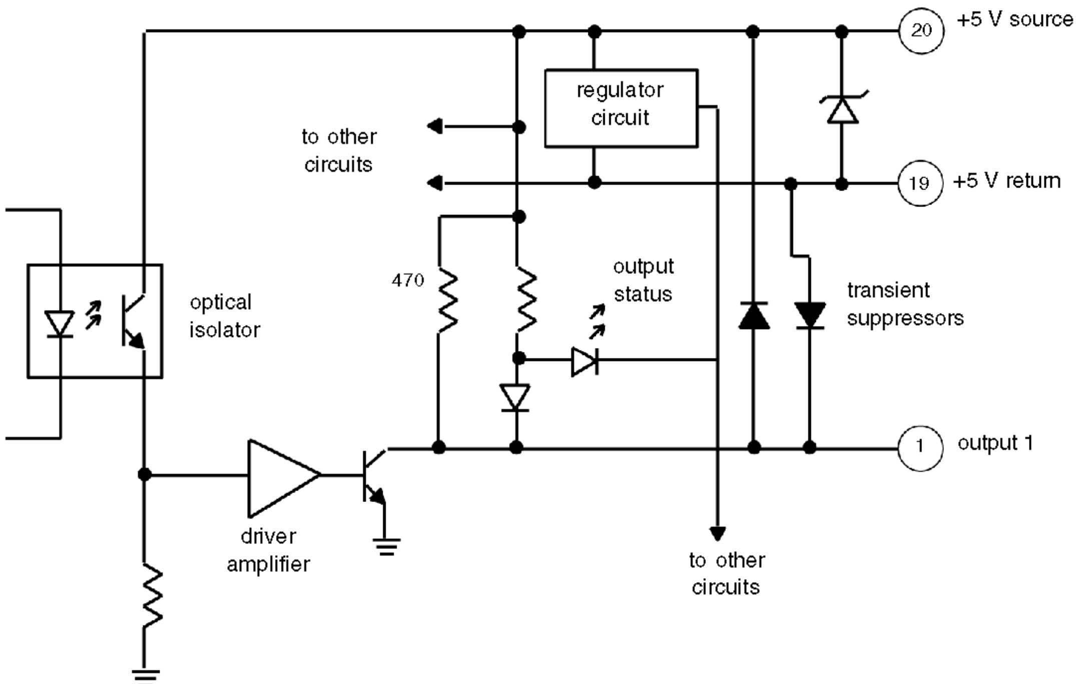
B828–016 5 V TTL Output, Overview

General Characteristics

The B828–016 5 V TTL output module converts logic signals used within the controller into sixteen independent 5 V TTL outputs. These outputs are compatible with TTL and DTL logic as well as other loads such as LED displays. The module uses sixteen transistor switches which are capable of sinking load currents up to 75 mA supplied from an external 5 Vdc power source.

Simplified Schematic

Following is a simplified schematic of the B828–016 5 V TTL output module.



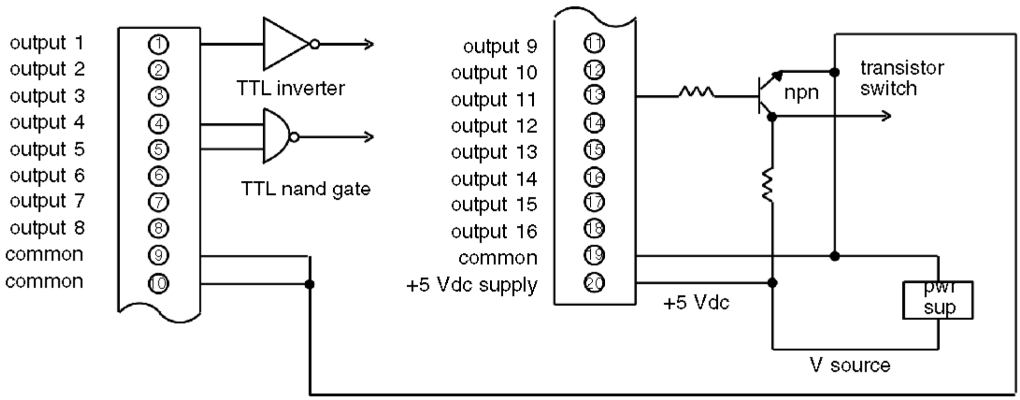
B828–016 5 V TTL Output, Field Connections

Overview

User connections are made to a standard screw terminal strip.The rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal Numbering and Output Connections

The following diagram shows terminal numbering and output connections for the B828–016 5 V TTL output module.



B828–016 5 V TTL Output, Specifications

Specification Table

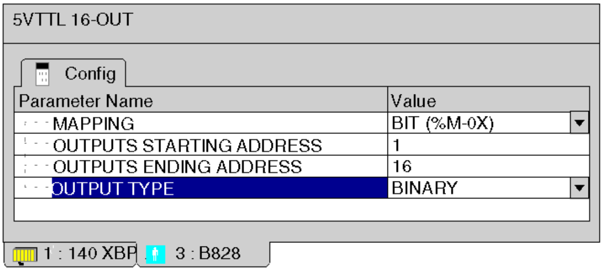
The following table provides the specifications for the unit.

B828–016 Specifications		
Description		5 V TTL output
Number of Points		16
Operating Voltage		5 V TTL
Number of Groups		1
Outputs/group		16
ON Level		4.0 Vdc min @ 1 mA source, 5 Vdc supply @ 4.75 Vdc
OFF Level		0.4 Vdc max @ 75 mA rated current: sinking 75 mA max., continuous, 100 mA peak (10 ms, 20% duty cycle)
Maximum Response Time	OFF→ON	1 ms
	ON→OFF	1 ms)
Power Required	+5 V	32 mA
	+4.3 V	220 mA
	-5 V	0 mA
External Power Supply		5.0 0.25 Vdc, 600 mA max outputs ON
Terminal Connector		AS-8534-000
Fusing		One/group, 1.5 A
Reference Type		Mapped as 16 bits output 0x or Mapped as 1 register output 4x
Output Type		BIN/BCD

B828–016 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Value (Default)	Value (Options Available
Mapping	BIT (%M-0X)	WORD (%MW-4X)
Outputs Starting Address	1	1
Outputs Ending Address	16	1
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 16 bits output 0x or Mapped as 1 register output 4x	Mapped as 16 bits output %Mx or Mapped as 1 word output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 36
B829–116 Fast Response 5 V TTL Input

Purpose

This chapter describes the functional and physical characteristics of the B829–116 fast response 5 V TTL input module.

What Is in This Chapter?

This chapter contains the following topics:

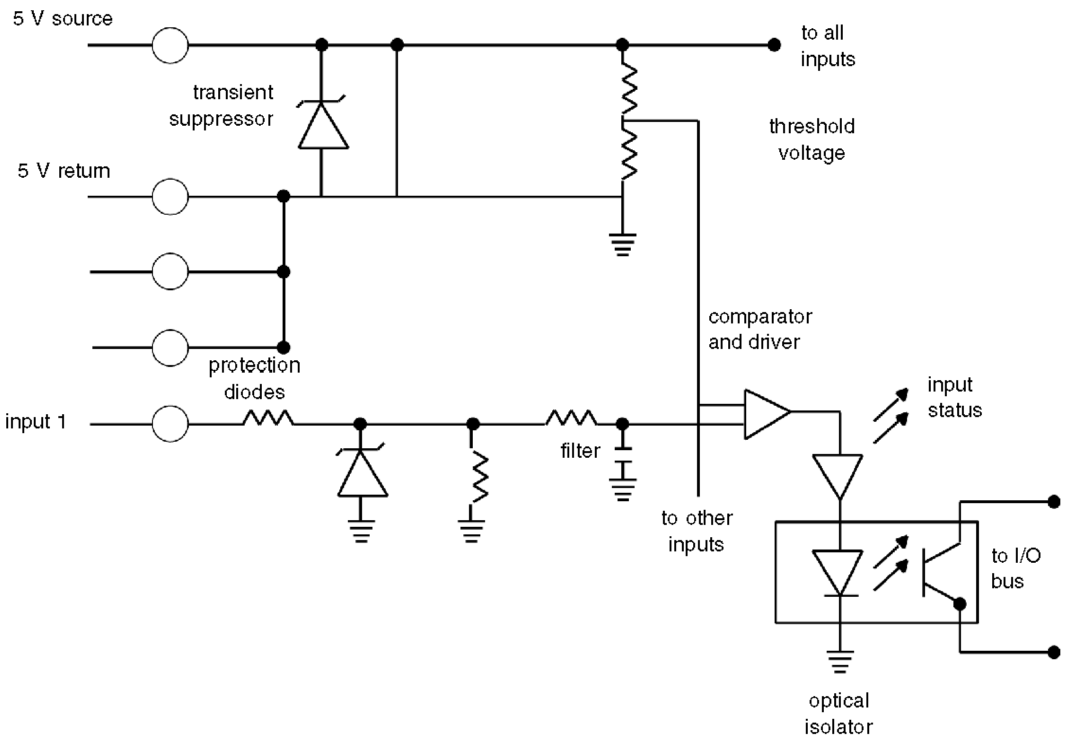
B829–116 Fast Response 5 V TTL Input, Overview

General Characteristics

The B829–116 fast response 5 V TTL input module converts signals from 16 independent 5 V logic-compatible inputs into signals used by the PLC. Each input is capable of conditioning signals from TTL devices or DTL devices for use by the PLC

Simplified Schematic

Following is a simplified schematic of the B829–116 fast response 5 V TTL input module.



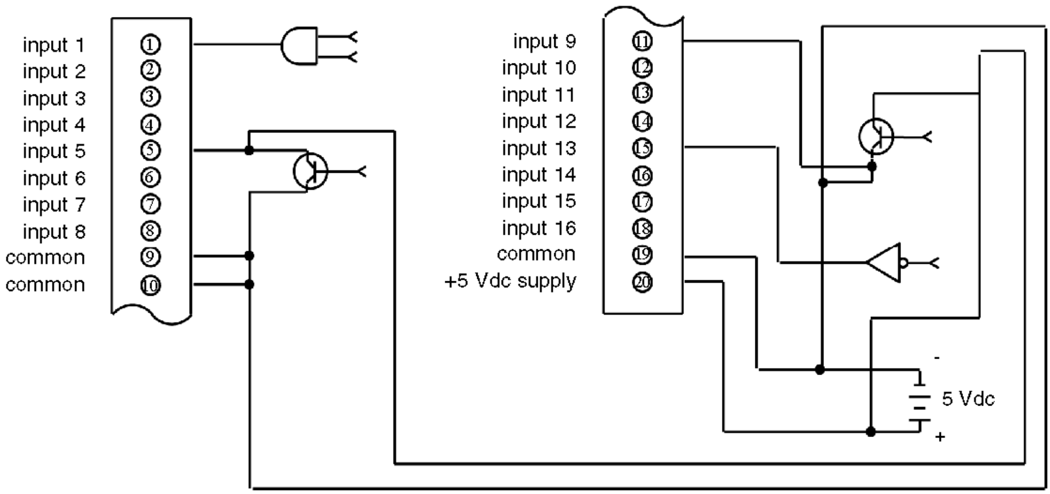
B829–116 Fast Response 5 V TTL Input, Field Connections

Overview

User connections are made to a standard screw terminal strip. The rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal Numbering and Input Connections

The following diagram shows terminal numbering and input connections for the B829–116 fast response 5 V TTL input module



B829–116 Fast Response 5 V TTL Input, Specifications

Specification Table

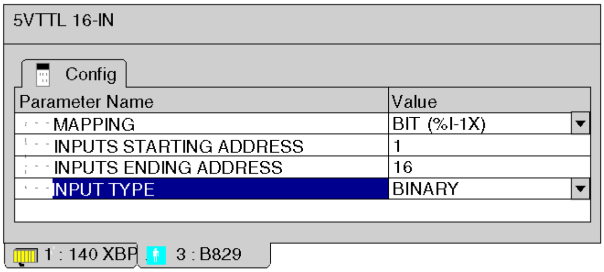
The following table provides the specifications for the unit.

B829–116 Specifications		
Description		5 V TTL 16-point
Number of Points		16
Operating Voltage		5 V
Number of Groups		1
Outputs/group		16
Input Ratings	ON Level	VIH=2.0 Vdc (minimum)
		IIL=0.1 mA (max) @ VIH=5.5 Vdc
		V (source)=5.0 Vdc
		V (max input)=8.0 V
		I (max positive clamp)=25 mA
	OFF Level	VIL=0.8 Vdc (maximum)
		IIL=1.1 mA (maximum) @ V
		(source)=5.25 Vdc and VIL=0.0 V
		V (max negative input)= -2 Vdc
		1 (max negative clamp)=15 mA
Transient Voltage		100 V for 10 ms
Maximum Response Time	OFF→ON	1 ms
	ON→OFF	1 ms)
Power Required	+5 V	21 mA
	+4.3 V	1 mA
	-5 V	0 mA
External Power Supply		5.0 0.25 Vdc, 325 mA all inputs ON
Terminal Connector		AS-8534-000
Reference Type		Mapped as 16 bits input 1x or Mapped as 1 register input 3x
Input Type		BIN/BCD

B829–116 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value ()	Value (Options Available)
Mapping	BIT (%I-1X)	WORD (%IW-3X)
Inputs Starting Address	1	1
Inputs Ending Address	16	1
Input Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 16 bits input 1x or Mapped as 1 register input 3x	Mapped as 16 bits input %Ix or Mapped as 1 Word input %IWx
Input Type	BIN/BCD	BIN/BCD

Chapter 37
B832–016 24 Vdc Output (True Low)

Purpose

This chapter describes the functional and physical characteristics of the B832–016 24 Vdc (True Low) output module.

What Is in This Chapter?

This chapter contains the following topics:

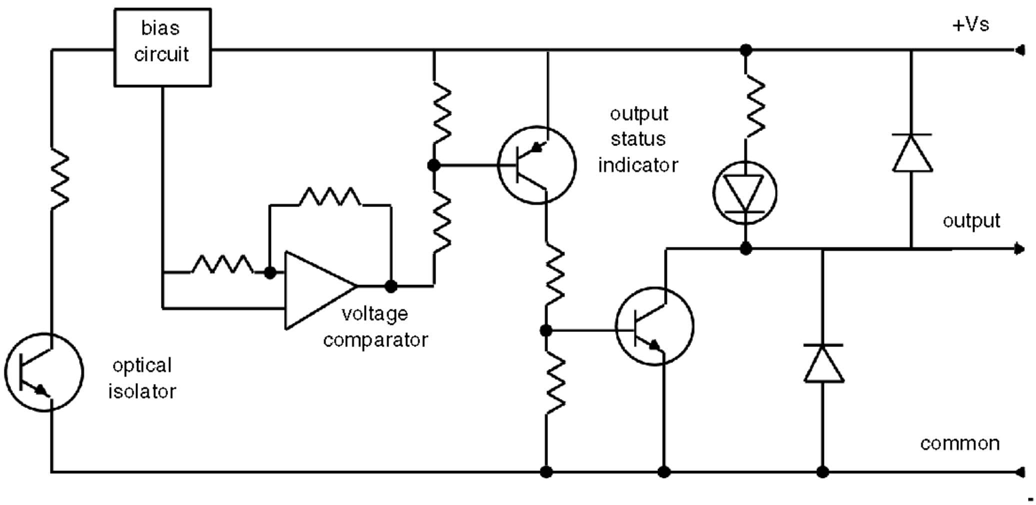
B832–016 24 Vdc Output (True Low), Overview

General Characteristics

The Modicon B832–016 24 Vdc (True Low) output module consists of a single group of 16 independent outputs. The B832–016 converts signals used within the PLC into 16 independent 24 Vdc outputs. These outputs are capable of driving indicators, relays, and a variety of other loads. Sixteen transistor switches are used to control loads connected to an external power source.

Simplified Schematic

Following is a simplified schematic of the B832–016 24 Vdc (True Low) output module.



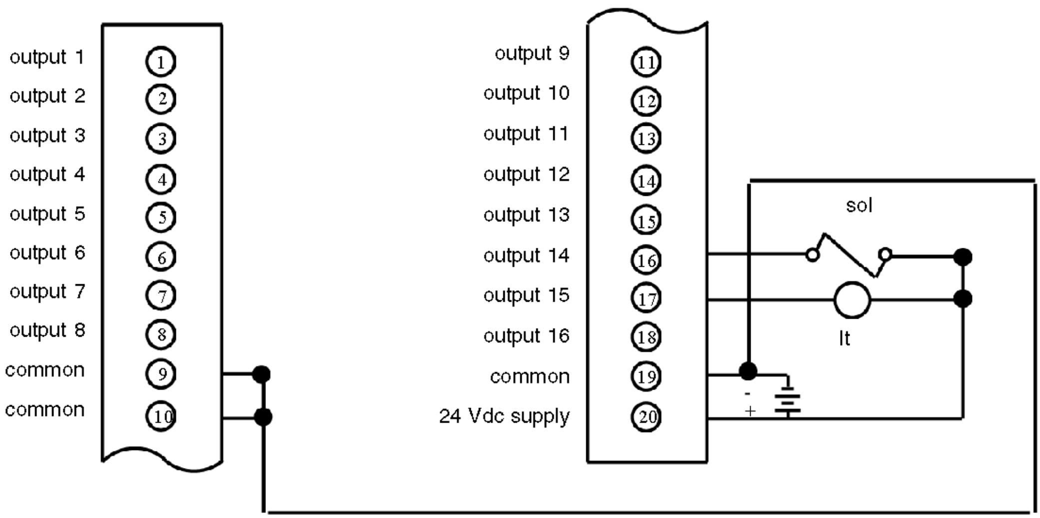
B832–016 24 Vdc Output (True Low), Field Connections

Overview

User connections are made to a standard screw terminal strip. The rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal Numbering and Output Connections

The following diagram shows terminal numbering and output connections for the B832–016 24 Vdc (True Low) output module



B832–016 24 Vdc Output (True Low), Specifications

Specification Table

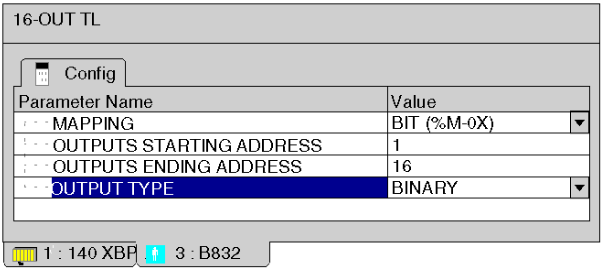
The following table provides the specifications for the unit.

B832–016 Specifications		
Description		24 Vdc output
Type of Operation		True low
Number of Points		16
Operating Voltage		20—28 Vdc
Peak Voltage		33 Vdc for 1 s
Number of Groups		2
Outputs/group		8
On Current	Maximum/point	250 mA
	Surge Current	1 A for 10 ms
	Maximum/group	2 A
	Maximum/module	4 A
Off Current		0.5 mA maximum
On Voltage Drop		0.5 Vdc maximum/output @ 250 mA
Maximum Response Time	OFF→ON	1 ms
	ON→OFF	1 ms)
Power Required	+5 V	32 mA
	+4.3 V	235 mA
	-5 V	0 mA
External Power Supply		24 Vdc, 4 V, 600 mA (excluding field load current)
Terminal Connector		AS-8534-000
Fusing		1/module, 6 A
Reference Type		Mapped as 16 bits output 0x or Mapped as 1 register output 4x
Output Type		BIN/BCD

B832–016 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%M-0X)	WORD (%MW-4X)
Outputs Starting Address	1	1
Outputs Ending Address	16	1
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 16 bits output 0x or Mapped as 1 register output 4x	Mapped as 16 bits output %Mx or Mapped as 1 word output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 38
B833–016 24 Vdc Input (True Low)

Purpose

This chapter describes the functional and physical characteristics of the B833–016 24 Vdc (True Low) input module.

What Is in This Chapter?

This chapter contains the following topics:

B833–016 24 Vdc Input (True Low), Overview

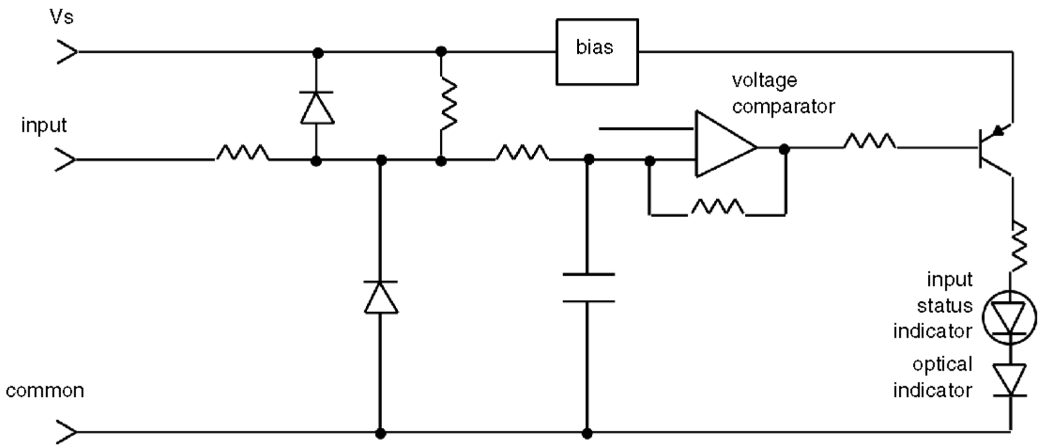
General Characteristics

The B833–016 24 Vdc (True Low) input module consists of two groups of eight independent inputs. The B833–016 senses and converts switched input signals into logic voltage levels used by the PLC.

Inputs can be received from push buttons, limit and proximity switches, and other 24 Vdc sources. The module provides 16 inputs that share an external power supply. Input voltages are sensed by comparing the incoming voltage against a fixed threshold.

Simplified Schematic

Following is a simplified schematic of the B833-016 24 Vdc (True Low) input module.



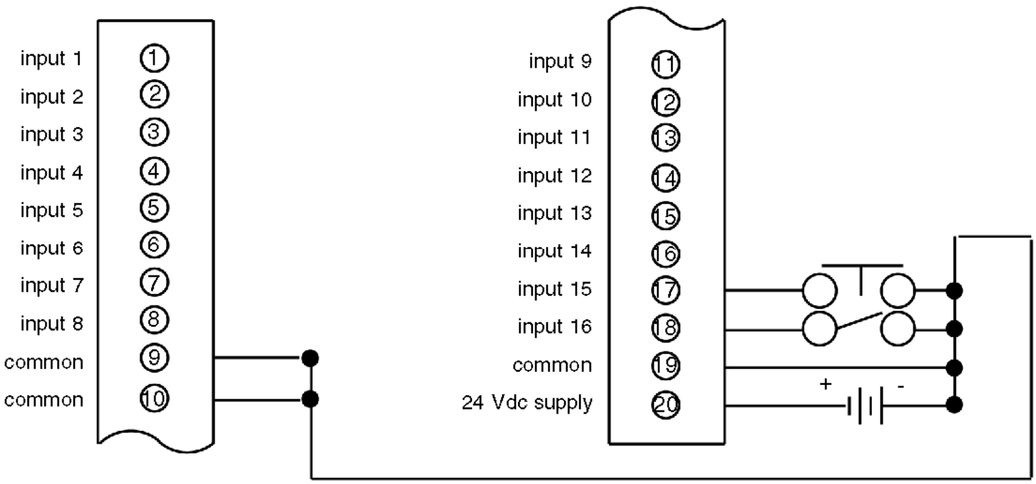
B833–016 24 Vdc Input (True Low), Field Connections

Overview

User connections are made to a standard screw terminal strip. The rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal Numbering and Input Connections

The following diagram shows terminal numbering and input connections for the B833–016 24 Vdc (True Low) input module.



B833–016 24 Vdc Input (True Low), Specifications

Specification Table

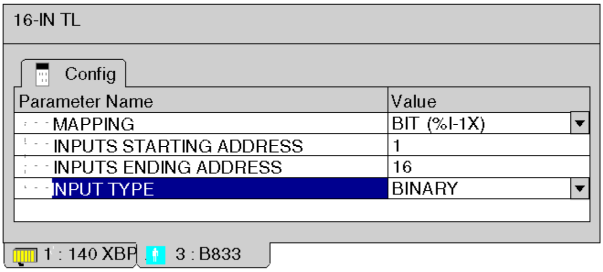
The following table provides the specifications for the unit.

B833–016 Specifications		
Description		24 Vdc true low input
Type of Operation		True low
Number of Points		16
Operating Voltage		20—28 Vdc
Number of Groups		2
Outputs/group		8
Maximum Input Voltage		100 Vdc for 3 ms
ON Conditions		≤2.6 Vdc or .13 of Vs, whichever is greater. 200Ω max resistance to common. Input indicator ON.
OFF Conditions		≥21 Vdc or .75 of Vs, whichever is less. 10,000Ω min resistance to common. Input indicator OFF.
Maximum Response Time	OFF→ON	11 ms
	ON→OFF	11 ms)
Power Required	+5 V	27 mA
	+4.3 V	2 mA
	-5 V	0 mA
External Power Supply		24 Vdc, 4 V, 300 mA (excluding field load current)
Terminal Connector		AS-8534-000
Reference Type		Mapped as 16 bits input 1x or Mapped as 1 register input 3x
Input Type		BIN/BCD

B833–016 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%I-1X)	WORD (%IW-3X)
Inputs Starting Address	1	1
Inputs Ending Address	16	1
Input Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 16 bits input 1x or Mapped as 1 register input 3x	Mapped as 16 bits input %Ix or Mapped as 1 word input %IWx
Input Type	BIN/BCD	BIN/BCD

Chapter 39
B836–016 12—250 Vdc Isolated Output

Purpose

This chapter describes the function al and physical characteristics of the B836–016 12—250 Vdc isolated output module.

What Is in This Chapter?

This chapter contains the following topics:

B836–016 12—250 Vdc Isolated Output, Overview

General Characteristics

The B836–016 12—250 Vdc isolated output module accepts up to 16 signals from a 984 PLC and converts them to independent outputs. The module’s essential function is to switch one or more field circuits off

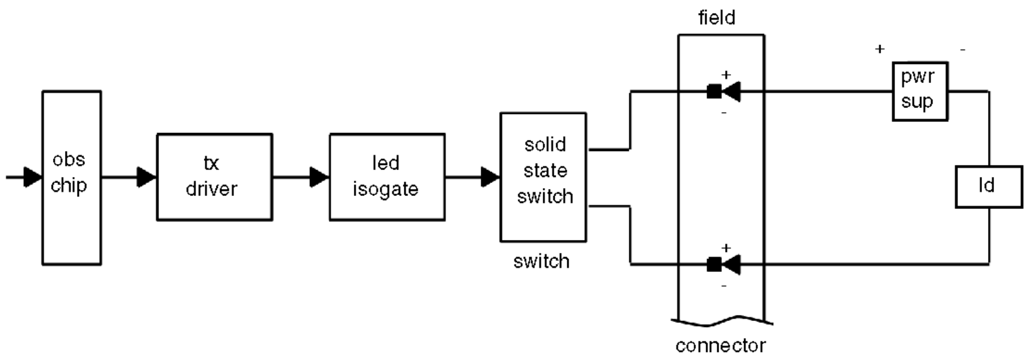
At any given time, one or more output channel’s signals may be in a true high configuration while one or more of the remaining output channel’s signals are in a true low configuration. The output signals are capable or driving displays, relays, lamps, or any load connected to a 12—250 Vdc user supplied voltage source. Finally, the module is fused against overload currents and protected from accidental polarity reversal.

Since all of the16 circuits are the same, describing one circuit’s function describes the module’s function.

Data commands from the controller are shipped via OURBUS to the OBS communications chip in the B836–016 module via Modicon’s standard data interface. The OBS chip directs the signal to the addressed channel which in turn feeds the transistor driver, couples through the ISOGATE and turns the field effect transistor (FET) switch on. Since the circuit is a completely floating arrangement, it is equally useful in a true high (sourcing) or true low (sinking) configuration.

Simplified Schematic Diagram

Following is a simplified block diagram of the B836–016 12—250 Vdc isolated output module.



NOTE: Certain large inductive load conditions may require external reverse diodes placed directly across the load for complete circuit protection.

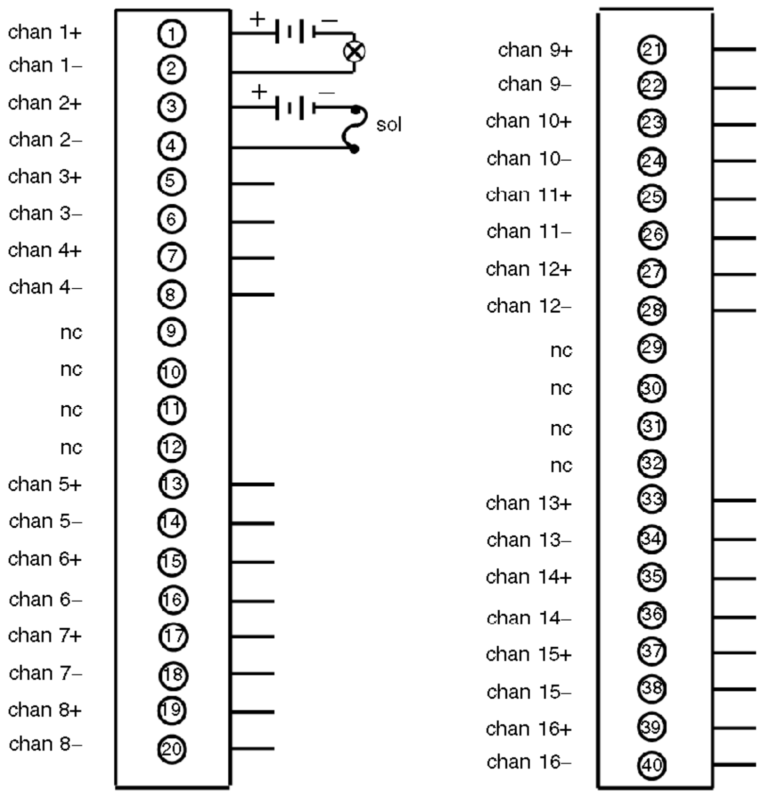
B836–016 12—250 Vdc Isolated Output, Field Connections

Overview

User connections are made to a standard screw terminal strip. The rigid wiring system permits module insertion or removal without disturbing the wiring.

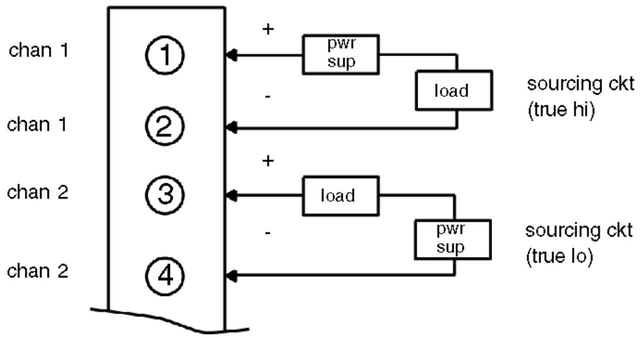
Terminal Numbering and Output Connections

The following figure shows the terminal numbering and output connections required.



Typical User-Side Field Connector Circuitry

The following figure shows an example of typical user-side field connector circuitry.



B836–016 12—250 Vdc Isolated Output, Specifications

Specifications

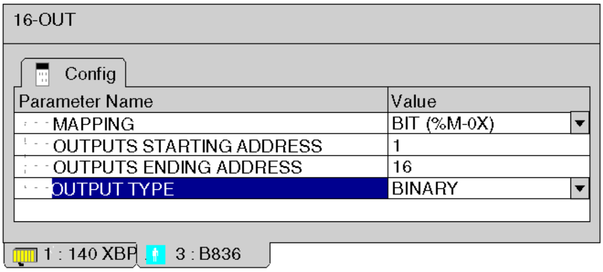
B836–016 Specifications

Description		12—250 Vdc isolated output
Number of Points		16
Operating Voltage		12—250 Vdc
Number of Groups		16
Outputs/group		1
Maximum Load Current		0.75 A (typical) @ 250 Vdc
		1 A (typical) @125 Vdc
		1.5 A (typical) @ 48 Vdc
Surge Current		5.0 A max (for 10 ms @ 1 s repetition rate)
Maximum OFF Leakage Current		1 mA
Maximum Load Current		5 mA
ON State Voltage Drop		3. V max @ 1.50 A
Maximum Output Current		8.0 A dc total switched current (all channels cumulative)
Minimum Output Current		15.0 mA dc (lower current des not guarantee indicator operation)
Maximum Response Time	OFF→ON	1 ms
	ON →OFF	5 ms
Power Required	+5 V	50 mA
	+4.3 V	603 mA
	-5 V	0 mA
Terminal Connector		AS-8535-000
Fusing		1/group, 4 A
Reference Type		Mapped as 16 bits output 0x or Mapped as 1 register output 4x
Output Type		BIN/BCD

B836–016 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%M-0X)	WORD (%MW-4X)
Outputs Starting Address	1	1
Outputs Ending Address	16	1
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 16 bits output 0x or Mapped as 1 register output 4x	Mapped as 16 bits output %Mx or Mapped as 1 word output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 40
B837–016 24 Vac/Vdc Input (True High)

Purpose

This chapter describes the function al and physical characteristics of the B837–016 24 Vac/Vdc (True High) input module.

What Is in This Chapter?

This chapter contains the following topics:

B837–016 24 Vac/Vdc Input (True High), Overview

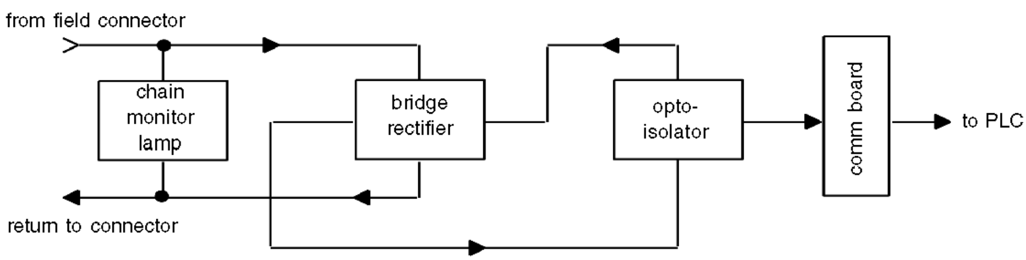
General Characteristics

The B837–016 24 Vac/Vdc (True High) input module senses off and on input signals from its field circuitry and converts them to logic levels used by a Modicon PLC. The module’s 16 inputs are separated into two groups of eight channels, each group being totally isolated from the other.

Although both groups use common return wires, none has a definite relationship to system ground unless established in the user’s field circuitry. Since both groups nominally employ independent power return sources, both ac and dc powered field circuits may input to the module at the same time.

Simplified Schematic Diagram

Following is a simplified block diagram of the B837–016 24 Vac/Vdc (True High) input module.



When the user’s ac/dc powered field circuit goes on - as the result of a limit switch for example - it presents the field power voltage at the modules appropriate input channel. When the input voltage meets or exceeds the module’s guaranteed on threshold, the resulting voltage turns the channel monitor lamp on, current flows through the bridge rectifier and subsequently the opto-isolator (OPTO-ISOL) circuit.

Given a nominal 24 V field power supply and 1000Ω maximum input source impedance, the module’s channel monitor lamps will indicate on and off when voltages are 20.4 Vac/19.2 Vdc for the high level on; and 6 Vac/10 Vdc for the low level off respectively. The optical energy goes to the communications board (COMM BOARD) where the Ourbus output register is set to represent the field circuit’s on state. As long as the field input status remains true, the module will communicate this status each time it is polled by the controller.

NOTE: Reversal of external signal polarity will not cause channel circuit damage as circuit design is indifferent to accidental polarity reversal.

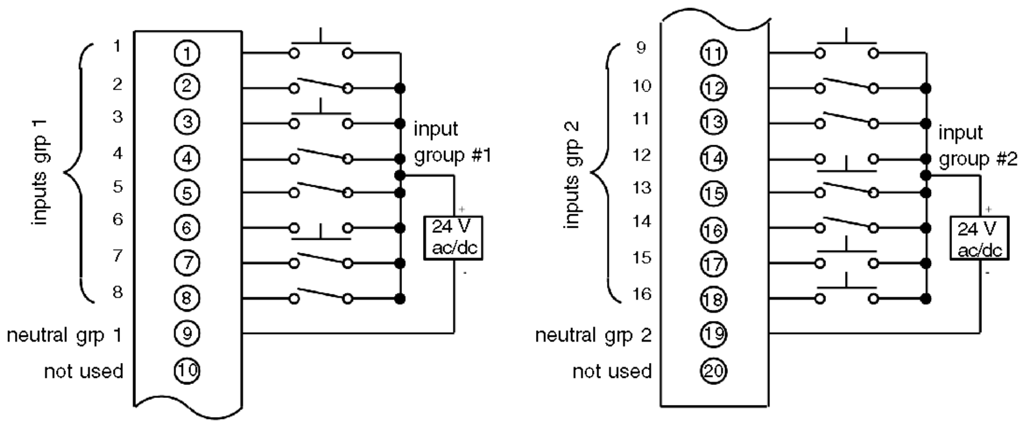
B837–016 24 Vac/Vdc Input (True High), Field Connections

Overview

User connections are made to a standard screw terminal strip. The rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal Numbering and Input Connections

The following diagram shows terminal numbering and input connections for the B837–016 24 Vac/Vdc True High input module.



NOTE: To use both input groups with a single power supply, jump terminals #9 and #19.

B837–016 24 Vac/Vdc Input (True High), Specifications

Specification Table

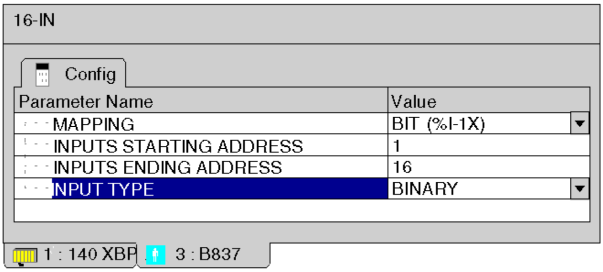
The following table provides the specifications for the unit.

B837–016 Specifications		
Description		24 Vac/dc input
Number of Points		16
Operating Voltage		20.4—27 Vac/47—63 Hz; 19.2—30 Vdc
Number of Groups		2
Outputs/group		8
Maximum Input Voltage	Continuous	27 Vac/30 Vdc)
	Inrush	32 Vac/36 Vdc for 10s; 58 V peak 10 ms
ON Conditions		≥ 20.4 Vac or 19.2 Vdc with input source impedance of 1 k maximum input current 10 2 mA
OFF Conditions		< 6 Vac/10 Vdc < 27 Vac with input source impedance ≥15 k < 30 Vdc with input source Impedance ≥30 k
Input ON Current		10 mA (max), 5 mA (minimum)
Maximum Response Time	OFF→ON	6 ms
	ON→OFF	18 ms
Power Required	+5 V	40 mA
	+4.3 V	1 mA
	-5 V	15 mA
External Power Supply		24 Vac/dc, 300 mA
Terminal Connector		AS-8534-000
Reference Type		Mapped as 16 bits input 1x or Mapped as 1 register 3x
Input Type		BIN/BCD

B837–016 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%I-1X)	WORD (%IW-3X)
Inputs Starting Address	1	1
Inputs Ending Address	16	1
Input Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 16 bits input 1x or Mapped as 1 register 3x	Mapped as 16 bits input %Ix or Mapped as 1 word input %IWx
Input Type	BIN/BCD	BIN/BCD

Chapter 41
B838–032 24 Vdc Output (True High)

Purpose

This chapter describes the functional and physical characteristics of the B838–032 24 Vdc (True High) output module.

What Is in This Chapter?

This chapter contains the following topics:

B838–032 24 Vdc Output (True High), Overview

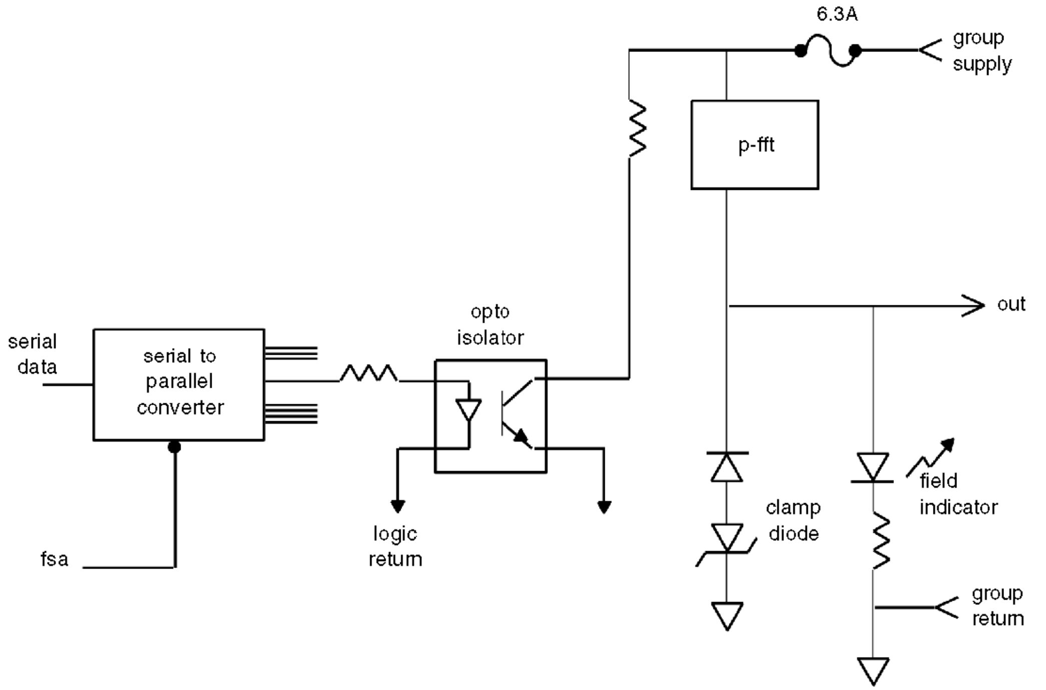
General Characteristics

The B838–032 24 Vdc (True High) output module consists of a four groups of eight outputs for a total of 32 outputs. The B838–032 converts logic signals used within the PLC into 32 24 Vdc outputs.

Outputs are capable of driving relays, pilot lamps, and other loads rated at 1/4 A. Each group of eight share an external supply voltage and is fused at 6.3 A. The outputs are designed to withstand the extreme voltage transients often encountered in an industrial environment.

Simplified Schematic Diagram

Following is a simplified schematic of the B838–032 24 Vdc (True High) output module.



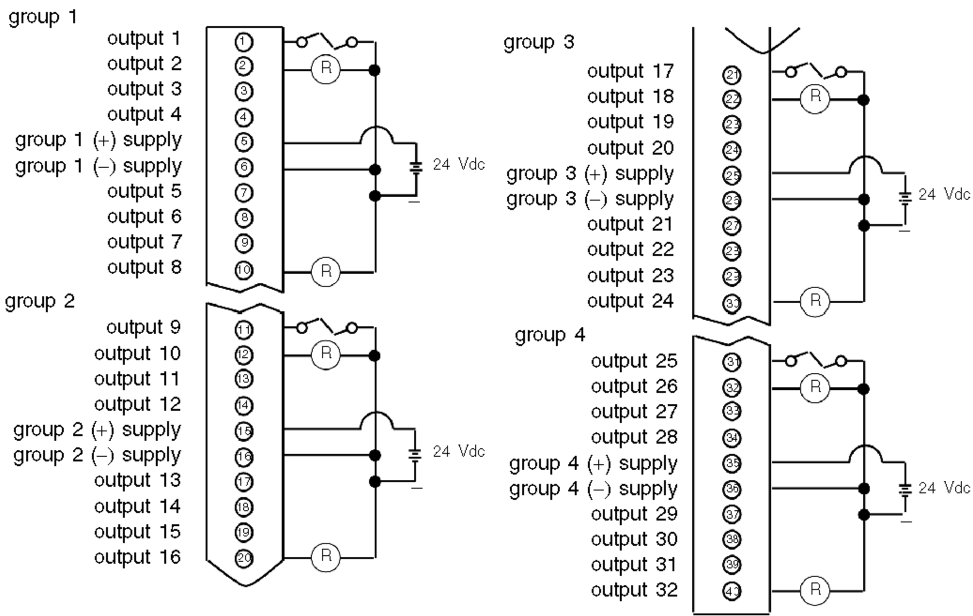
B838–032 24 Vdc Output (True High), Field Connections

Overview

User connections are made to a standard screw terminal strip. The rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal Numbering and Output Connections

The following diagram shows terminal numbering and output connections for the B838–032 24 Vdc (True High) output module



B838–032 24 Vdc Output (True High), Specifications

Specification Table

The following table provides the specifications for the unit.

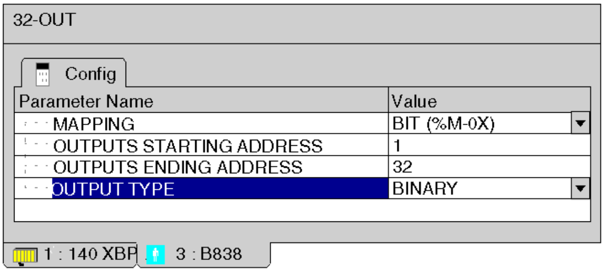
B838–032 Specifications		
Description		24 Vdc output
Type of Operation		True High
Number of Points		32
Operating Voltage		20—30 Vdc
Number of Groups		4
Outputs/group		8
Load Voltage	Ripple Voltage	4.0 peak to peak @ 10 kHz or less
	Peak Voltage	33 V max
	ON State Voltage Drop	1.0 Vdc @ 1/2 A @ full power
Load Current	Continuous Current	0.50 A max / output, 16 A/module maxi-mum
	Surge Current	The surge current of the B838 is 2.5 A for 0.5 ms, and should not be exceeded. If a short circuit (momentary or sustained) ex-ists, the FET on the output may fail prior to the group fuse blowing. Modicon recommends one of the following options to protect the outputs:1) Add external fuses to each output (1 - 1.5 A fast blow),2) Add external current limiting resistors to protect the output FET
Lamp Loads		Up to 5 W
Inductive Load Clamp Voltage		-20 V nominal
Inductive Clamp Current		1/2 A peak, 0.6 Hz up to 3.0 Hz
Fast Contactor Turn Off		<60 ms with a 3.0 Hz load
Off State Leakage Current		1 mA max @ 30 Vdc
Maximum Response Time (Resistive Load)	OFF→ON	1 ms
	ON→OFF	1 ms
Power Required	+5 V	160 mA
	+4.3 V	1 mA
Power Required (Cont.)	-5 V	0 mA
External Power Supply		24 Vdc 4 V, 125 mA (excluding field load current
Terminal Connector		AS-8535-000

B838–032 Specifications	
Reference Type	Mapped as 32 bits output 0x or Mapped as 2 registers output 4x
Output Type	BIN/BCD

B838–032 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%M-0X)	WORD (%MW-4X)
Outputs Starting Address	1	1
Outputs Ending Address	32	2
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 32 bits output 0x or Mapped as 2 registers output 4x	Mapped as 32 bits output %Mx or Mapped as 2 words output % MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 42
B840–108 Relay Output

Purpose

This chapter describes the functional and physical characteristics of the B840–108 relay output module.

What Is in This Chapter?

This chapter contains the following topics:

B840–108 Relay Output, Overview

General Characteristics

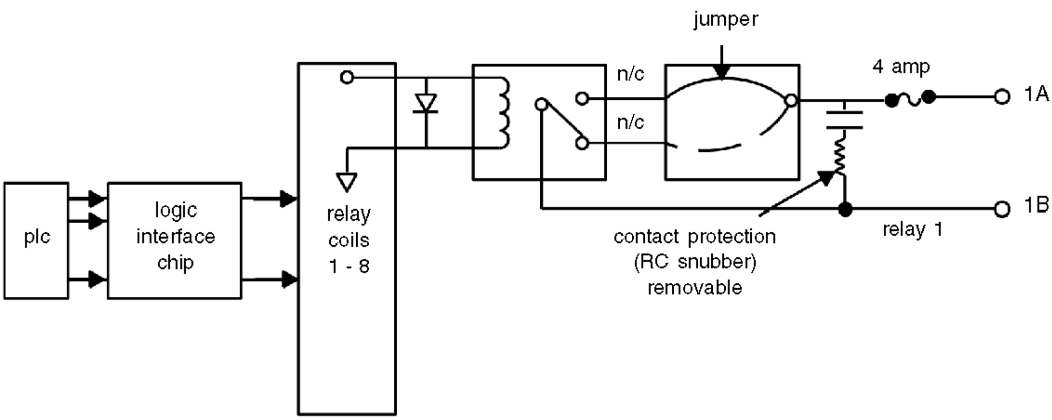
The B840–108 relay output module converts signals from the 800 series Ourbus to eight independent relay outputs. Each output is capable of driving relays, pilot lamps, or other loads up to 2 A.

The module utilizes eight high–reliability mercury–wetted relays to control the loads. Each of the eight outputs is electrically isolated from the I/O bus and from the other seven outputs by the relay coil. These outputs are capable of switching 100 VA maximum instantaneous power associated with ac or dc loads. Such devices may range from relays and pilot lamps to multiplexed low level analog signals.

Each output has an RC snubber to protect the mercury wetted contacts from arcing caused by rapid rate of rise of applied voltage from inductive loads upon instantaneous opening of the contacts. The output signals can withstand severe voltage transients that may be encountered in industrial environments—i.e., the voltage transients will not propagate through the relay to the Ourbus, thus protecting all other controller system components from damage. All output circuits are also fused to protect against overload currents.

Simplified Schematic Diagram

Following is a simplified schematic diagram of the B840–108 relay output module.



The module is user–configurable as to setting up for normally–open or normally–closed operation of the relays as described below. You can also optionally configure the RC snubber circuit to remove it when minimal leakage current applications such as data multiplexing are being used.

The logic interface chip samples the eight logic level signals simultaneously from the PLC on each scan and holds these samples to drive the appropriate reed relay coil. Assuming a normally–open jumpered configuration, when the relay coil is energized, the reed relay contacts conduct current from the output A terminal to the output B terminal.

Configuration

The B840–108 relay module is initially shipped with all 8 channels jumpered for the normally-open configuration with all snubber circuits connected. You may wire any of the channels for either normally-open or normally-closed operation by transferring a wire jumper from one tab to another on the printed circuit board to change from normally-open to normally-closed

The following illustration shows the user wiring configuration for the B840–108 relay module

CHAN	RELAY	
	N.O.	N.C.
1	W1-E2	W1-E1
2	W2-E4	W2-E3
3	W3-E6	W3-E5
4	W4-E8	W4-E7
5	W5-E10	W5-E9
6	W6-E12	W6-E11
7	W7-E14	W7-E13
8	W8-E16	W8-E15

CHAN	SNUBBER	
	IN	OUT
1	JP1	JP1
2	JP2	JP2
3	JP3	JP3
4	JP4	JP4
5	JP5	JP5
6	JP6	JP6
7	JP7	JP7
8	JP8	JP8

The snubber circuits are disconnected by removing the (JP1-JP8) appropriate jumper. Refer to the label on the side of the module.

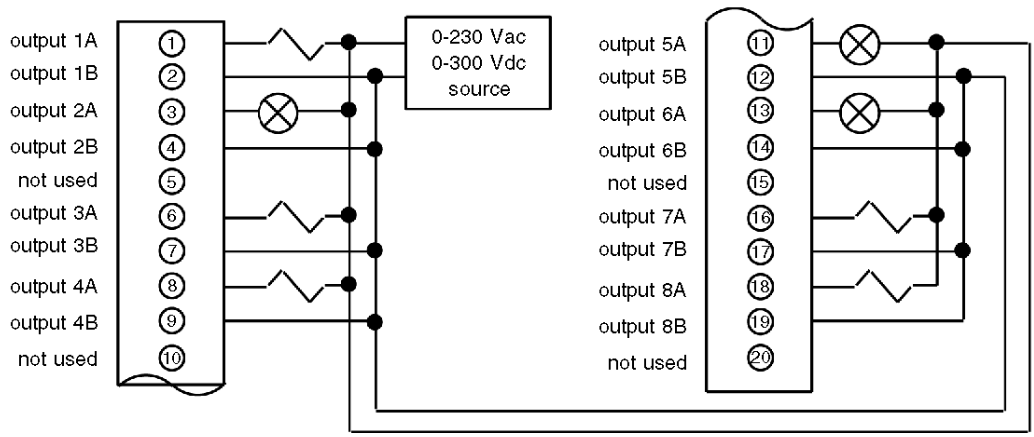
B840–108 Relay Output, Field Connections

Overview

User connections are made to a standard screw terminal strip. The rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal Numbering and Output Connections

The following diagram shows terminal numbering and output connections for the B840–108 relay output module.



NOTE: Since each output is isolated from the remaining outputs, separate power sources can be used for each load. Each output can be wired for current source or current sink operation.

NOTE: It is possible to have the active indicator lit when one or more output channels are working improperly

840–108 Relay Output, Specifications

Specification Table

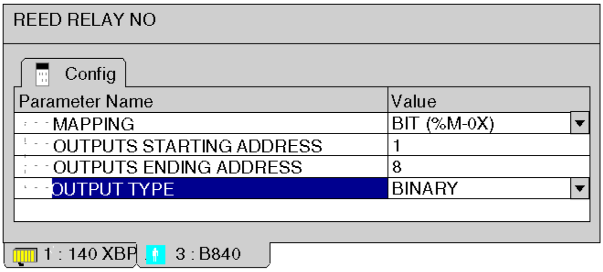
The following table provides the specifications for the unit.

840–108 Specifications		
Description		Reed Relay (NO/NC) output, isolated circuits, sink or source current
Number of Points		8
Operating Voltage		0—300 Vdc max 0—230 Vac max./47—63 Hz
Number of Groups		8
Outputs/group		1
Maximum Load Current	Carrying (unswitched)	(3 A max)
	Switching	2.0 max (0.3 A @ 300 Vdc)
Switching Capability		100 VA max
Contact Resistance		< 150 mΩ (including fuse, pc clad, wire, connectors, and contacts)
Open Circuit Impedance (Snubber Circuits Connected		20 KΩ + 5 KΩ capacitive reactance @ 60 Hz
Maximum Response Time	OFF→ON	6 ms (2 ms typical)
	ON→OFF	6 ms (2 ms typical)
Power Required	+5 V	67 mA
	+4.3 V	400 mA
	-5 V	0 mA
Relay Life Rating		1 billion operations @rated load @ 25°C
Terminal Connector		AS-8534-000
Fusing		1 / group, 4 A
Reference Type		Mapped as 8 bits output 0x or Mapped as 1 register output 4x
Output Type		BIN/BCD

B840–108 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%M-0X)	WORD (%MW-4X)
Outputs Starting Address	1	1
Outputs Ending Address	8	1
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 8 bits output 0x or Mapped as 1 register output 4x	Mapped as 8 bits output %Mx or Mapped as 1 word output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 43
B842–008 Reed Relay Output

Purpose

This chapter describes the functional and physical characteristics of the B842–008 reed relay output module.

What Is in This Chapter?

This chapter contains the following topics:

B842–008 Reed Relay Output, Overview

General Characteristics

The B842–008 reed relay output module, normaly closed, converts the signals used on the 800 series OURBUS to 8 independent mercury wetted reed relay outputs capable of driving relays, pilot lamps, or other loads up to 2.0 amperes, or low level circuits such as analog multiplexing.

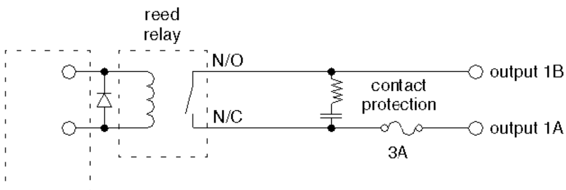
The module uses eight high reliability mercury wetted reed relays to control loads. Each output is electrically isolated from the I/O Bus and from the other seven outputs by the coil of the relay and will withstand the severe voltage transients normally encountered in industrial environments without damage or adverse effect on the controller.

Self-contained resistor and capacitor snubber networks suppress transient voltages when inductive loads are driven and provides contact protection. The eight outputs are also fused to protect their circuitry against overload currents.

The B842–008 reed relay output mdule is compatible with input modules.

Simplified Schematic

Following is a simplified schematic of the B842–008 reed relay output module.



B842–008 Reed Relay Output, Field Connections

Overview

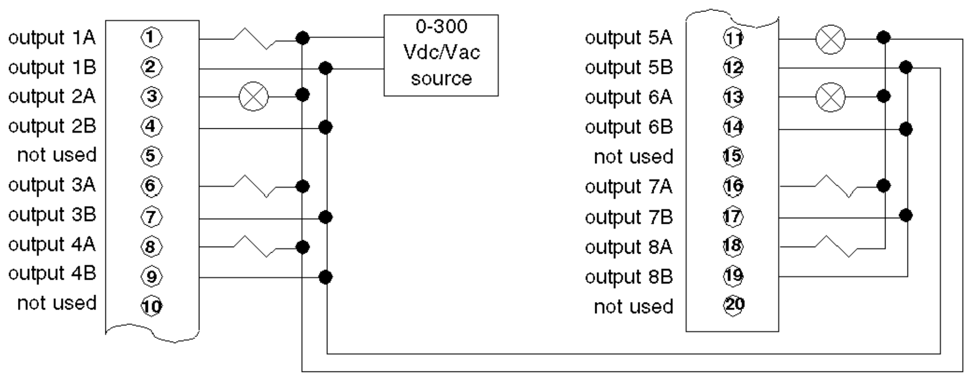
This module performs in a rigid wiring system where the user connections are made to terminal strips attached to the front of the card basket. The I/O modules slide in slots of the card basket and make contact with the terminal strips via the mating connector.

User connections are made to standard screw-type terminals capable of securing up to two AWG 14 solid or straded wires per terminal. Terminals are numbered from one at the top to 20 at the bottom as shown in the figure.

The data bus connections are made via the standard OURBUS interface connector to a shielded backplane at the rear of the card basket. The module may be placed in any location in the I/O struction without interfering with any other module´s operation. When the module is inserted into the card basket, it picks up a low impedance earth shield ground by connecting the module´s shield to the backplane´s earth shield ground.

Terminal Numbering and Output Connections

The following figure shows typical circuit connections for power applications of the B842–008 module.



NOTE: Since each output is isolated from the remaining outputs, separate power sources can be used for each load. Each output can be wired for current source or current sink operations.

NOTE: It is possible to have the active indicator lit with one or more output channels working improperly.

842–008 Reed Relay Output, Specifications

Specification Table

The following table provides the specifications for the unit.

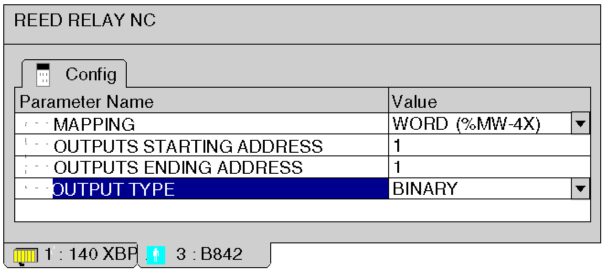
842–008 Specifications		
Description		Reed Relay Output (NC)
Number of Points		8
Operating Voltage		300 V, max. Vdc or Peak ac
Number of Groups		8
Outputs / group		1
Maximum Load Current	Carrying	3 A max. continuous after closure
	Switching	2 max.
Switching Capability		100 VA max. instantaneous power
Contact Resistance		< 100 mΩ
OFF State	Leakage Current	5 mA @ 120 Vac
Maximum Response Time		6 ms max. (2 ms typical)
Power Required	+5 V	5.06 +/- 0.32 Vdc, 67 mA max.
	-5 V	-5.06 +/- 0.26 Vdc, 0 mA
	V I/O	4.25 +/- 0.33 Vdc, 400 mA max.
Terminal Connector		AS-8534-000
Fusing		1 / output, 3 A
Protection		The B842-008 output module has a resistor-capacitor snubber network to protect contacts from transients due to switching inductive loads.
Open Circuit Impedance		25 k capacitive reactance at 6 Hz
Isolation Voltage		Between outputs and I/O Bus, between outputs and case, and outputs to outputs. 1500 Vac steady state max. (at 60 Hz) for 60 sec. 2500 Vdc for 60 sec.
Reference Type		Mapped as 8 bits output 0x or Mapped as 1 register output 4x
Output Type		BIN/BCD

NOTE: The module must be mounted in an upright position

B842–008 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	WORD (%MW-4X)	BIT (%M-0X)
Outputs Starting Address	1	1
Outputs Ending Address	1	8
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 8 bits output 0x or Mapped as 1 register output 4x	Mapped as 8 bits output %Mx or Mapped as 1 word output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 44
B849–016 48 Vac/Vdc Input (True High)

Purpose

This chapter describes the functional and physical characteristics of the B849–016 48 V ac/dc (True High) input module.

What Is in This Chapter?

This chapter contains the following topics:

B849–106 48 Vac/Vdc Input (True High), Overview

General Characteristics

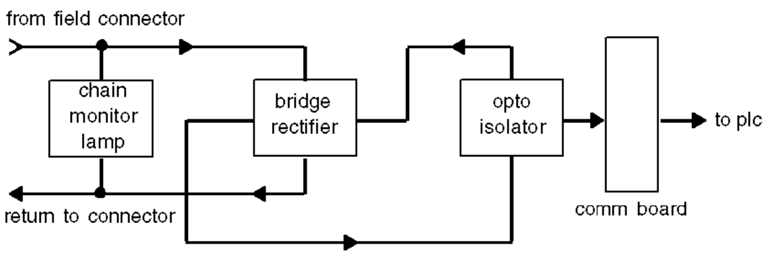
The B849–016 48 V ac/dc input module senses off and on input signals from its field circuitry, converting them to logic levels used by a PLC. The module's 16 input circuits are divided into two groups of eight channels, each group totally isolated from the other.

Although both groups use common return wires, none has a definite relationship to system ground unless established in the user's field circuitry. Since both groups nominally employ independent power return sources, both ac and dc powered field circuits may input to the module at the same time.

NOTE: Reversal of external signal polarity will not cause channel circuit damage as circuit design is indifferent to accidental polarity reversal.

Simplified Block Diagram

Following is a simplified block diagram of the B849–016 48 V ac/dc input module.



When the user's ac/dc powered field circuit goes on — as the result of a limit for example — it presents the field power voltage at the modules appropriate input channel. When the input voltage meets or exceeds the module's guaranteed on threshold, the resulting voltage turns the channel monitor lamp on, current flows through the bridge rectifier and subsequently the opto-isolator (OPTO-ISOL) circuit.

Given a nominal 115 Vac/125 Vdc field power supply and a kΩ maximum input source impedance, the module's channel monitor lamps will indicate on and off when input voltages are 80 Vac/85 Vdc for the high level on; and 35 Vac/40 Vdc for the low level off respectively.

The optical energy goes to the communications board (COMM BOARD) where the OURBUS output register is set to represent the field circuit's on state. As long as the field input status remains true, the module will communicate this status each time it is polled by the controller. Total scan time may be as long as 250 ms. The user should not attempt to monitor events with a repetition rate greater than 1/s without analyzing his actual system, program, and scan time.

NOTE: It is possible to have the active indicator lit with one or more input channels working improperly.

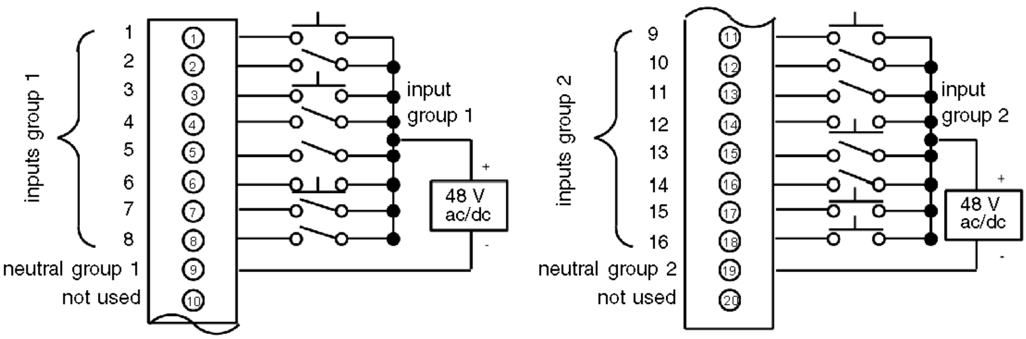
B849–016 48 Vac/Vdc Input (True High), Field Connections

Overview

User connections are made to a standard screw terminal strip. The rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal Numbering and Input Connections

The following diagram shows terminal numbering and input connections for the B849–016 48 V ac/dc input module.



NOTE: To use both input groups with a single power supply, jump terminals #9 and #19.

849–016 48 Vac/Vdc Input (True High), Specifications

Specification Table

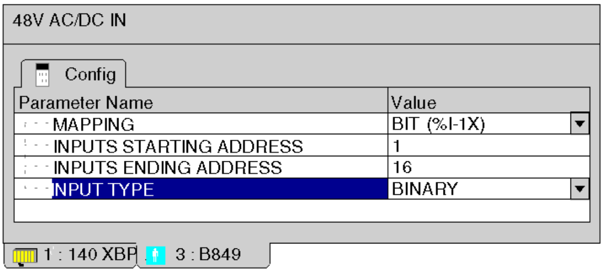
The following table provides the specifications for the unit.

849–016 Specifications		
Description		48 Vac/dc input
Number of Points		16
Operating Voltage		41—53 Vac / 47—63 Hz 39—58 Vdc
Number of Groups		2
Inputs/group		8
Maximum Input Voltage	Continuous	53 Vac / 58 Vdc 63 Vac / 70 Vdc (for 10 s maximum) 110 Vpk (for 10 ms max)
ON Conditions	ON Conditions	≥ 41 Vac or 39 Vdc w/Input Source Impedance of 1 K maximum input current 7.5 mA 2 mA
OFF Conditions		< 15 Vac / 20 Vdc < 53 Vac w/Input Source Impedance ≥25 k < 58 Vdc w/Input Source Impedance ≥50 k
ON Current		8 mA (max), 4.5 mA (minimum)
Maximum Response Time	OFF→ON	6 ms
	ON→OFF	18 ms
Power Required	+5 V	40 mA
	+4.3 V	1 mA
	-5 V	15 mA
External Power Supply		48 Vac/dc, 300 mA
Terminal Connector		AS-8534-000
Reference Type		Mapped as 16 bits input 1x or Mapped as 1 register input 3x
Input Type		BIN/BCD

B849–016 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%I-1X)	WORD (%IW-3X)
Inputs Starting Address	1	1
Inputs Ending Address	16	1
Input Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 16 bits input 1x or Mapped as 1 register input 3x	Mapped as 16 bits input %Ix or Mapped as 1 word input %IWx
Input Type	BIN/BCD	BIN/BCD

Chapter 45
B853–016 115 Vac/125 Vdc Input (True High)

Purpose

This chapter describes the functional and physical characteristics of input module 853–016 115 Vac/125 Vdc.

What Is in This Chapter?

This chapter contains the following topics:

B853–016 115 Vac/125 Vdc Input (True High), Overview

General Characteristics

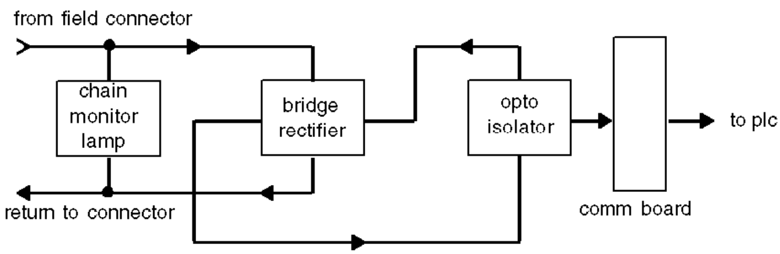
True High input module B853–016 115-Vac/125-Vdc senses off and on input signals from its field circuitry, converting them to logic levels used by a PLC. The module's 16 input circuits are divided into two groups of eight channels, each group being totally isolated from the other.

Although both groups use common return wires, none has a definite relationship to system ground unless established in the user's field circuitry. Since both groups nominally employ independent power return sources, both ac and dc powered field circuits may directed to the module at the same time.

NOTE: Reversal of external signal polarity will not cause channel circuit damage as the circuit design is indifferent to accidental polarity reversal.

Simplified Block Diagram

Following is a simplified schematic of the True High input module B853–016 115-Vac/125-Vdc



When the user's ac/dc powered field circuit goes on—as the result of a limit switch, for example—it presents the field power voltage at the module's appropriate input channel. When the input voltage meets or exceeds the module's on threshold, the resulting voltage turns the channel monitor lamp on, current flows through the bridge rectifier and subsequently the opto-isolator (OPTO-ISOL) circuit.

Given a nominal 115 Vac/125 Vdc field power supply and a kΩ maximum input source impedance, the module's channel monitor lamps will indicate on and off when input voltages are 80 Vac/85 Vdc for the high level on; and 35 Vac/40 Vdc for the low level off respectively.

The optical energy goes to the communications board (COMM BOARD) where the OURBUS output register is set to represent the field circuit's on state. As long as the field input status remains true, the module will communicate this status each time it is polled by the controller. Total scan time may be as long as 250 ms. The user should not attempt to monitor events with a repetition rate greater than 1/s without analyzing his actual system, program, and scan time.

NOTE: It is possible to have the active indicator lit with one or more input channels working improperly.

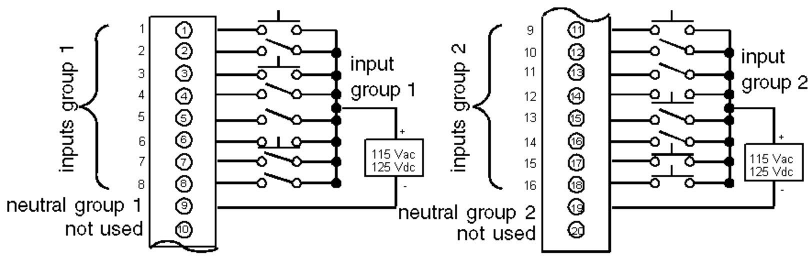
B853–016 115 Vac/125 Vdc Input (True High), Field Connections

Overview

User connections are made to a standard screw terminal strip. The rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal Numbering and Input Connections

The following diagram shows terminal numbering and input connections for the B853–016 115 Vac/125 Vdc (True High) input module.



NOTE: To use both input groups with a single power supply, jump terminals #9 and #19.

B853–016 115 Vac/125 Vdc Input (True High), Specifications

Specification Table

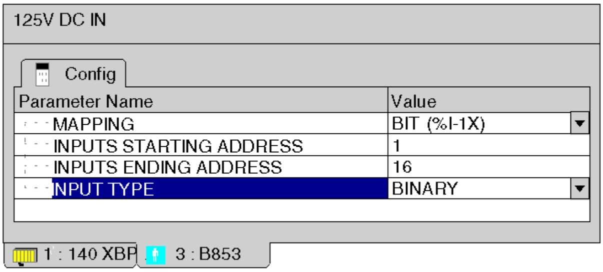
The following table provides the specifications for the unit.

853-016 Specifications		
Description		115 Vac/125 Vdc input
Number of Points		16
Operating Voltage		80—130 Vac/47— 63 Hz; 85—150 Vdc
Number of Groups		2
Inputs/group		8
Maximum Input Voltage	Continuous	130 Vac/150 Vdc
	Surge	150 Vac/180 Vdc for 10 s; 280 V peak for 10 ms
ON Conditions		≥ 80 Vac or 85 Vdc; w/Input Source Impedance of 1 K maximum input current 9 mA 2 mA
OFF Conditions		< 35 Vac/40 Vdc; < 130 Vac w/Input Source Impedance ≥ 40 K; < 150 Vdc w/Input Source Impedance ≥ 80 K
ON Current		7 mA (max), 4.5 mA (min)
Maximum Response Time	OFF→ON	6 ms
	ON→OFF	18 ms
Power Required	+5 V	40 mA
	+4.3 V	1 mA
	-5 V	15 mA
Terminal Connector		AS-8534-000
Reference Type		Mapped as 16 bits input 1x or Mapped as 1 register input 3x
Input Type		BIN/BCD

B853–016 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%I-1X)	WORD (%IW-3X)
Inputs Starting Address	1	1
Inputs Ending Address	16	1
Input Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 16 bits input 1x or Mapped as 1 register input 3x	Mapped as 16 bits input %Ix or Mapped as 1 word input %IWx
Input Type	BIN/BCD	BIN/BCD

Chapter 46
B855–016 Intrinsically Safe Input

Purpose

This chapter describes the functional and physical characteristics of the B855–016 intrinsically safe input module.

What Is in This Chapter?

This chapter contains the following topics:

B855–016 Intrinsically Safe Input, Overview

General Characteristics

The B855–016 intrinsically safe (fully isolated) input module accepts 16 switch closures or low impedance discrete inputs less than 100 Ω and operates in any 800 series I/O slot.

The B855 module monitors hazardous area contact closures. The B855 can operate in either continuously or intermittently hazardous environments containing acetylene, hydrogen, ethylene or methane gases; metal, coal or grain dust, and fibers. The B855–016 module meets factory mutual standard FM 3610 for intrinsically safe connections to field side associated apparatus.

The B855–016 module has 16 discrete inputs. The inputs work in the range 11.4-12.6 Vdc, True Low.

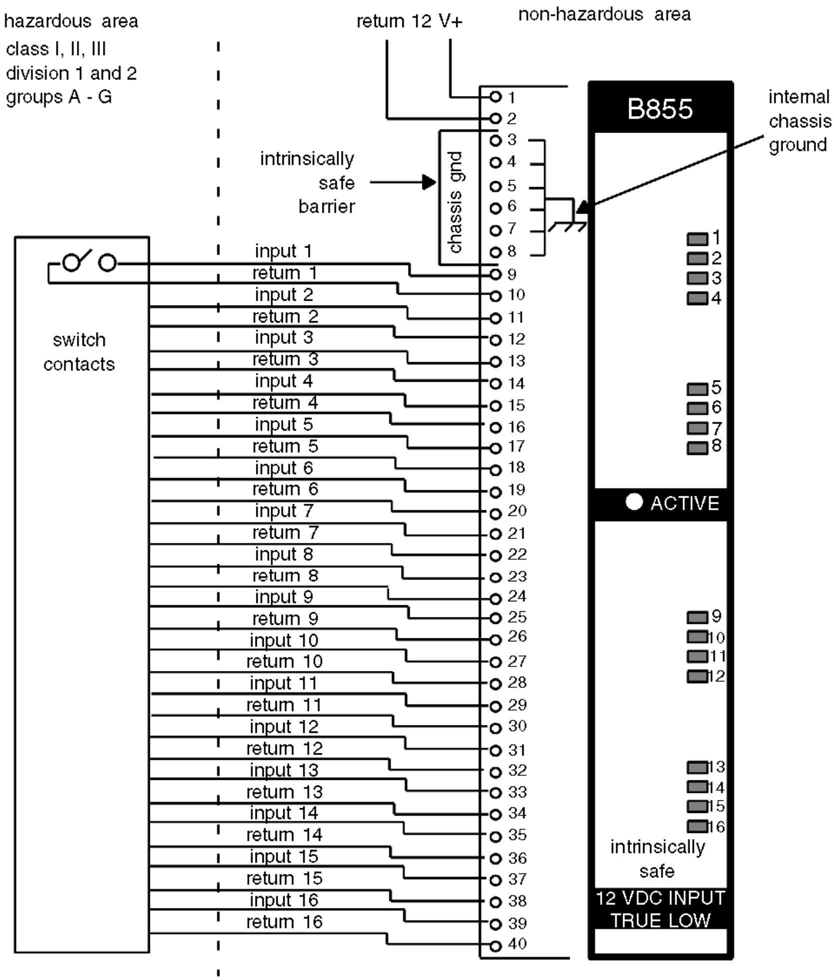
B855–016 Intrinsically Safe Input, Installation

Installation Procedure

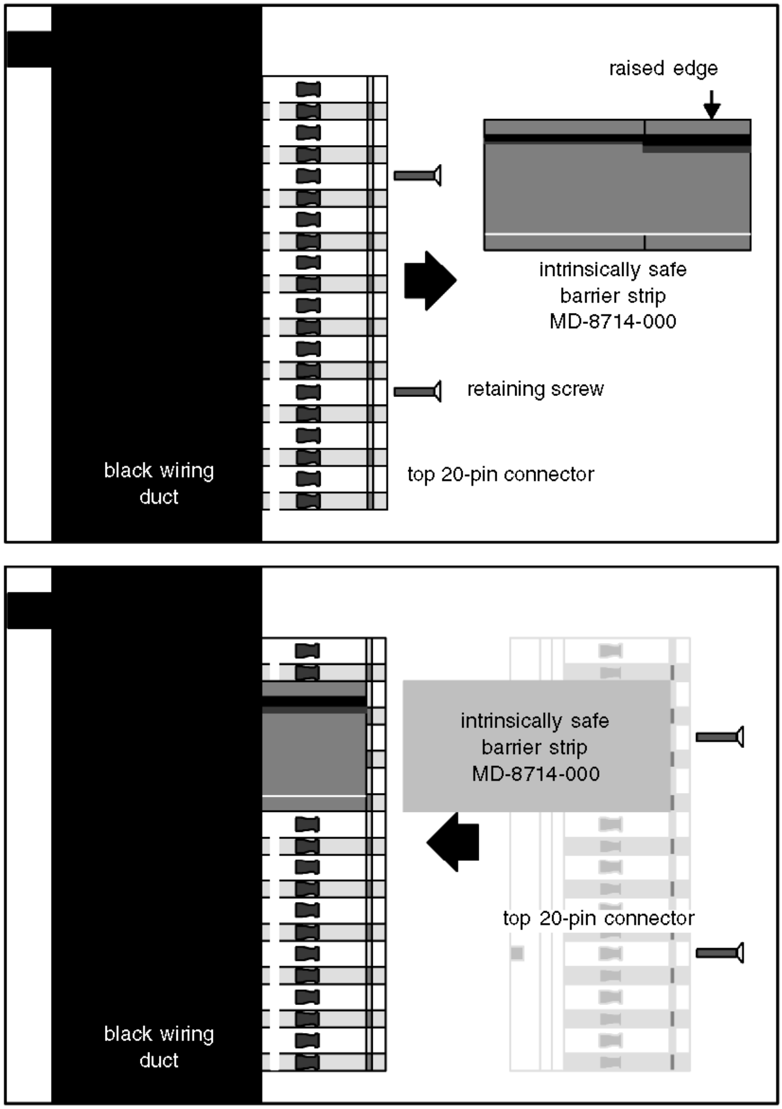
Installation of the B855–016 module involves unpacking the module, wiring the field connector, installing key pins, and mounting the module into the housing.

Step	Procedure
1	Remove the module from its shipping box and check for damage. If damaged, contact your vendor for instructions.
2	Ensure power to housing is off.
3	Designate the housing slot for this module.
4	Locate required connector assembly (Part number AS-8535-000). This assembly consists of two 20-pin connectors.
5	Referring to the hazardous area and safe area wiring diagram below, connect field side wiring to proper pins on the field connector. You must wire the hazardous area connections, pins 9-40, separately from the safe area connections. Wire the dc source to the safe area connections, pins 1 and 2. Refer to Caution, below.
6	Refer to the intrinsically safe barrier strip diagram below. Remove the two Phillips head screws from the top 20-pin connector of the AS-8535-000. Take the intrinsically safe barrier strip out of the white bag attached to the handle of the module. Place the intrinsically safe barrier strip on the left side of the top 20-pin connector between pins 3, and 8. Make sure the raised edge of the intrinsically safe barrier strip is facing away from the black wiring duct. Insert this subassembly inside the black wire duct while aligning the two screw holes. Insert the two Phillips head screws and tighten them down. Note: You must use key pins (shipped with this module) to meet factory mutual’s requirements.
7	Referring to typical field circuit connections illustration, below, connect field side wiring to proper pins on the field connector. Note: The external 12 Vdc (5%) power supply for the module should be a minimum of 1.0 A
8	Insert the module into the housing, firmly but carefully, seating the edge connector in the backplane.
9	Secure module to housing using captive slotted mounting screws at the top and bottom of the module front panel.
10	Note: To meet factory mutual’s requirements, Schneider Electric recommends the MD-8741-000 intrinsically safe barrier strip.

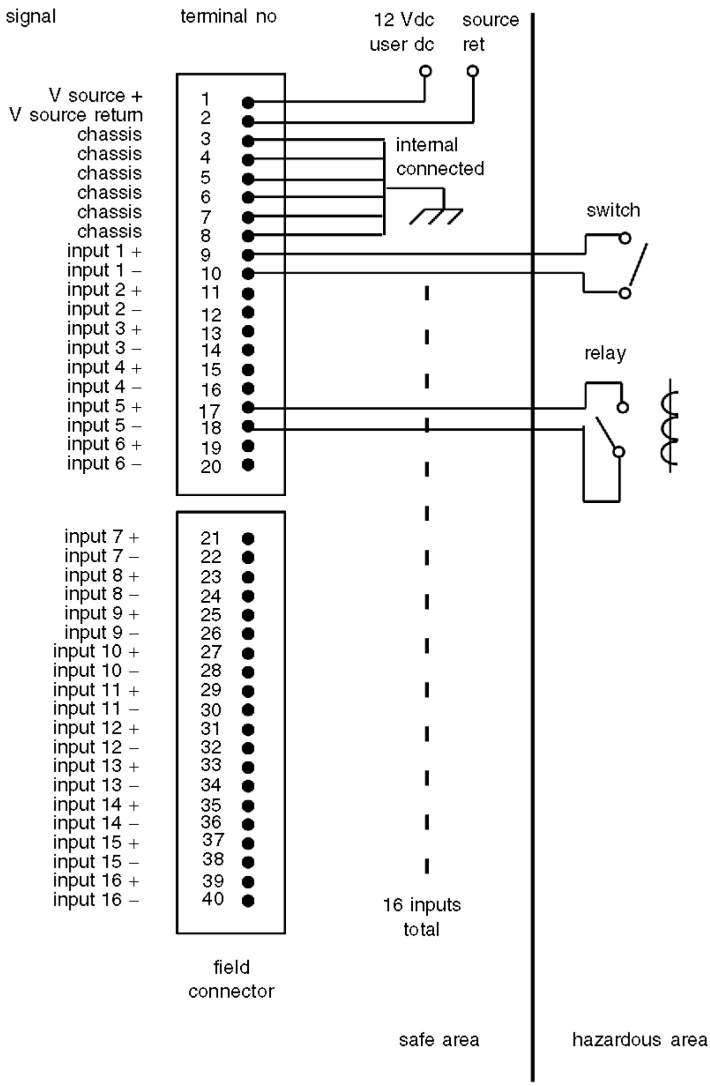
The following illustration shows the B855–016 hazardous area and safe area wiring.



The following illustration shows the B855–016 intrinsically safe barrier strip.



The following illustration shows the typical field circuit connections.



B855–016 Intrinsically Safe Input, Specifications

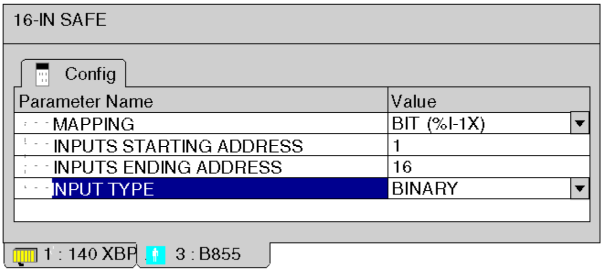
B855-016, Specification Table			
Description		12 Vdc intrinsically safe input (true low)	
Number of Points		16 isolated	
Operating Voltage		11-4-12.6 Vdc	
Number of Groups		1	
Inputs/group		16	
Maximum Input Voltage	Continuous	Continuous 12 Vdc 5%	
	Surge	500 Vdc for 3 ms	
ON State Conditions		100 Ω or less total impedance (3.9 mA @ 12 Vdc)	
OFF State Conditions		An open circuit, no less than 100,000 Ω (75 mA) approx. 8.95 V present on + lead	
Maximum Response Time	OFF → ON	1 ms	
	ON → OFF	5 ms	
Power Required	+5 V	80 mA	
	+4.3 V	1.5 mA	
	-5 V	0 mA	
Leakage Current		< 1.5 mA	
Wattage Rating on the Module		1.8 W	
Maximum Input Voltage @ Source Inputs		Not to exceed 500 Vdc for 3 ms to user source terminals	
Module Supply Voltage In		11.4 - 12.6 Vdc, 0.5 A max. load working 80 mA inrush current Minimum recommended power supply: 1.0 A	
Maximum Impedance Limitations	Group	L Inductance	C Capacitance
	A & B	80 mH	1.0 mf
	C	300 mH	3.0 mf
	D	700 mH	8.0 mf
Note: These are Factory Mutual requirements. Please consult with your vendors regarding field devices, wiring, and barriers to ensure compliance.			
Terminal Connector		AS-8535-000	
Factory Mutual FM 3610		Requires use of key pins and MD-8741-000 barrier strip included with the module	

B855-016, Specification Table	
Reference Type	Mapped as 16 bits input 1x or Mapped as 1 register input 3x
Input Type	BIN/BCD

B855–016 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value ()	Value (Options Available)
Mapping	BIT (%I-1X)	WORD (%IW-3X)
Inputs Starting Address	1	1
Inputs Ending Address	16	1
Input Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 16 bits input 1x or Mapped as 1 register input 3x	Mapped as 16 bits input %Ix or Mapped as 1 word input %IWx
Input Type	BIN/BCD	BIN/BCD

Chapter 47
B862–001 Register Output

Purpose

This chapter describes the functional and physical characteristics of the B862–001 register output module.

What Is in This Chapter?

This chapter contains the following topics:

B862–001 Register Output, Overview

Overview

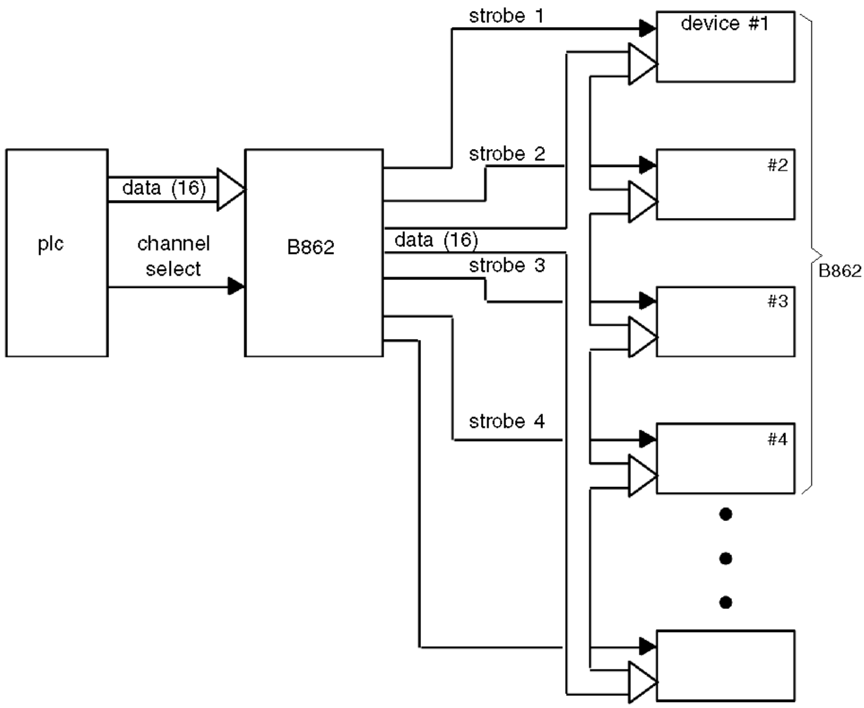
The B862–001 register output module provides a 5 V TTL or CMOS-compatible interface between a PLC and peripheral field devices. The B862–001 register output module operates in either BCD or binary mode.

The desired mode is operator selectable, with the 16-bit output either having BCD values in the range 0000 to 9999 or binary output in the range 0000 (HEX) to FFFF (HEX).

The B862-001 is a 4-channel register output module with four 16-bit registers. A channel is defined as a 16-bit data path. The channels can be configured as 4 BCD or 4 binary registers via an appropriate switch setting.

The module is organized in a group strobe arrangement with the 16 datalines associated at a given moment with one of the 4 strobe lines. Each strobe line addresses one of the devices on the data bus and enables it to transmit data to a given peripheral device to the exclusion of the other devices. The data lines are routed to all devices. The B862-001is operated in module-select mode. In module- select mode, all 4 data registers are transferred in a single OURBUS cycle.

The following is a simplified block diagram of the unit.



B862–001 Register Output, Switch Settings

Switch Settings

Two toggle switches are located at the top left of the module and are used to determine the type of communication with external devices. Both switches are user selectable.

1. Bin/BCD Switch

This toggle switch determines whether the output data is to be interpreted by the target devices as a BCD or a binary value.

2. Strobes Active Hi/Lo Switch

This toggle switch allows selection of either true-hi or true-lo for strobing output data.

NOTE: The relation between the I/O map selection, the BCD/binary switch setting, and the results at the output are summarized in the following table:

Table

The following table identifies the relationship between the switch and I/O map facility.

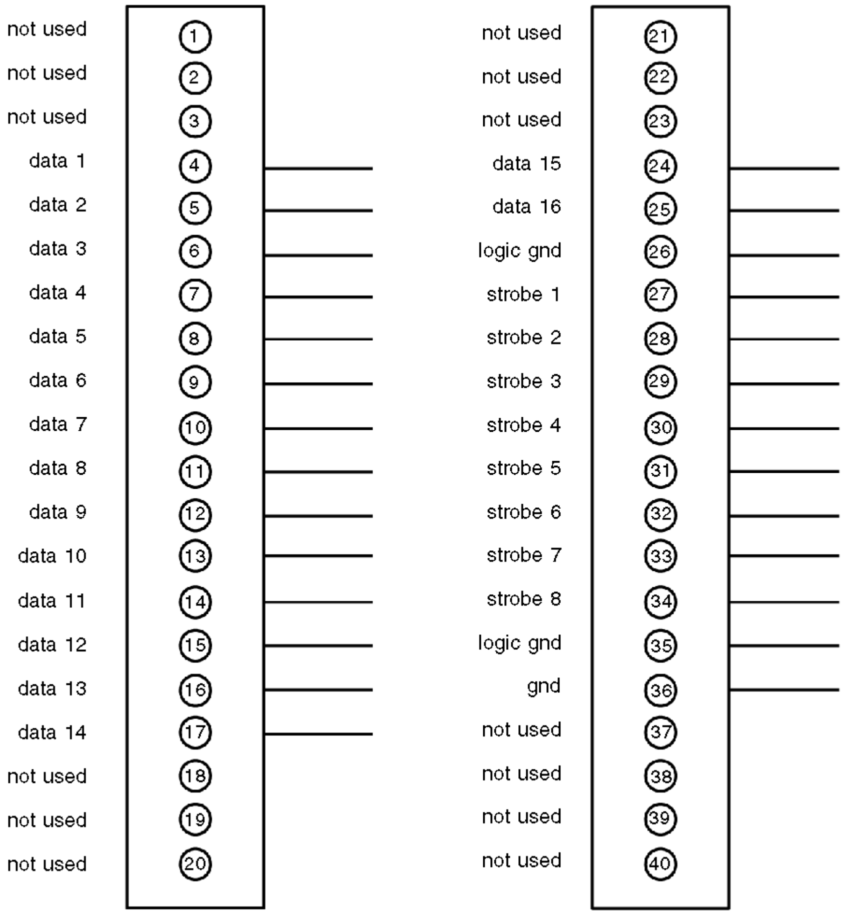
I/O Map Selection	B862 Switch Setting	Result
Binary	BCD	BCD
Binary	Binary	Binary
BCD	BCD	Erroneous
BCD	Binary	BCD

B862–001 Register Output, Field Connections

Terminal Numbering and Output Functions

User connections are made to a standard screw terminal strip. The rigid wiring system permits module insertion or removal without disturbing the wiring.

The following illustration shows how to field connect the unit.

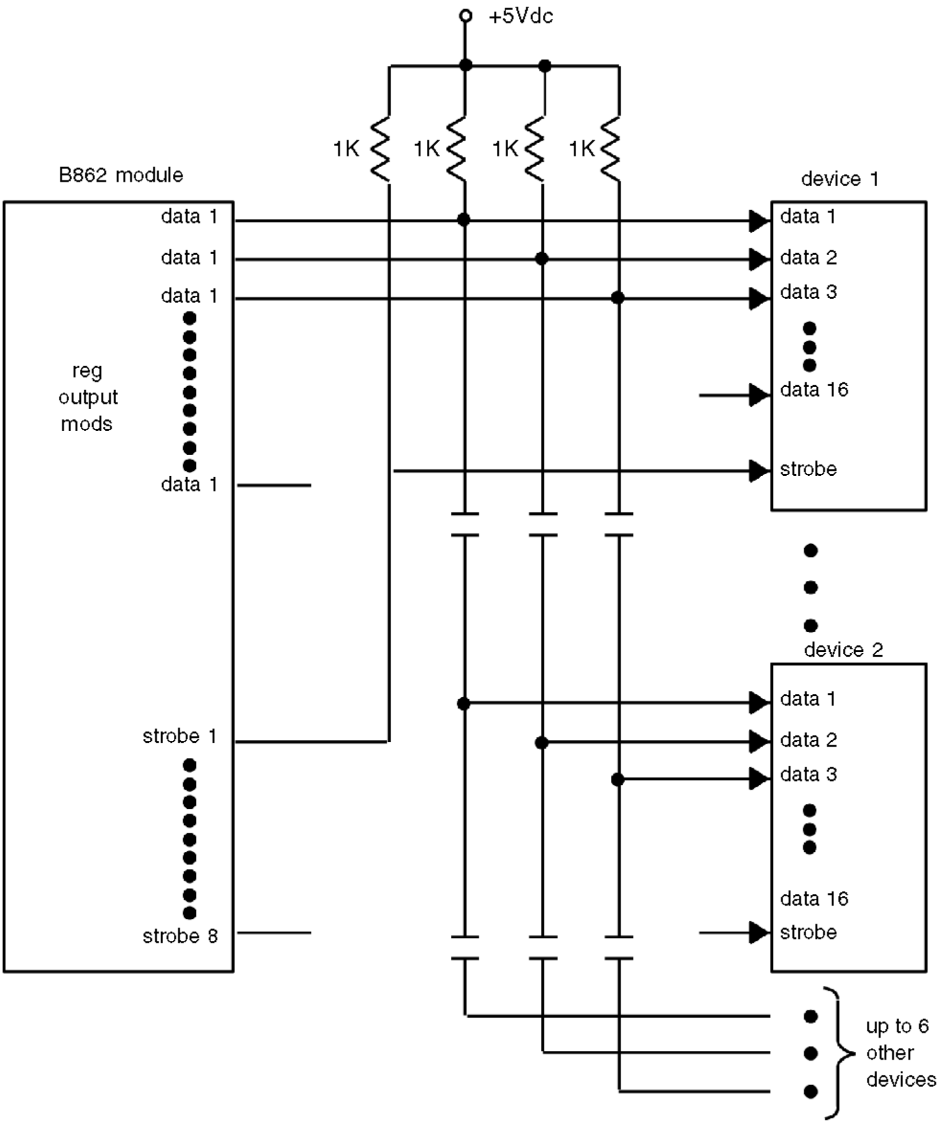


Pull-up Resistor Connection

Pull-up resistors must be installed at the active device end to use the B862 output module. The value of the pull-up resistor depends upon the number of devices that are attached to the data bus, as explained below. Each output meets 0.4 V maximum at 16 mA for a logic low and 3.3 V minimum at 16 mA for a logic high. If the current limit has been exceeded, the pull-up resistor values should be adjusted within specification; otherwise, spurious results may be obtained.

The following illustration indicates how the resistors are connected at the device end. For a single device consisting of 16 data lines, 16 1 k resistors are required, or, one 1 k resistor per data line. As additional devices are added to the data bus, the value of the pull-up resistor must be increased by 1 k. In other words, if two devices are used, the pull-up resistor must be 2 k, three devices require a 3 k pull-up, and so on, with the maximum number of 8 devices requiring 8 k of pull-up for each data line.

Pull-up resistor connection



NOTE: Increase pull-up resistor value by 1 k for each additional device.

B862–001 Register Output, Specifications

Specification Table

The following table provides the specifications for the unit.

B862-001 Specifications		
Description		TTL register output
Number of Points		4 channels, 16 data lines
Operating Voltage		5 V TTL
Number of Groups		N/A
Outputs/group		N/A
Guaranteed Min. Levels		High State > 3.5 Vdc
		Low State < 0.4 Vdc while sinking 16 mA
Strobe Output Power		Two TTL loads @ 5 Vdc
Strobe Width Timing		200 µs ±10%
Response Time		11.3 ms between an OURBUS write and field update
Power Required	+5 Vdc I/O	100 mA max.
	+4.3 Vdc I/O	100 mA max.
External Power Supply		+5 Vdc is required for pull-up resistor Vcc
Field Device Requirements	TTL output level	Low: < 0.8 Vdc @ 1.6 mA High: > 2.4 Vdc @ 40 µA
	CMOS output level	Low: < 1.6 Vdc @ 0.3 µA
		High: > 3.3 Vdc @ 0.3 µA
Terminal Connector		AS-8535-000
Reference Type		Mapped as 64 bits output 0x or Mapped as 4 registers output 4x
Output Type		BIN/BCD

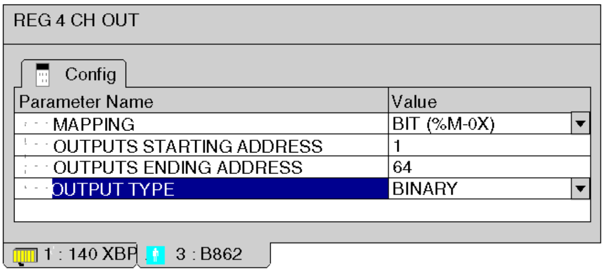
NOTE: All user field devices must have outputs that feature latched, tristate, or open collector logic.

NOTE: The user must provide 1.0 kΩ ± 10% pull-up resistors for each strobe line.

B862–001 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%M-0X)	WORD (%MW-4X)
Outputs Starting Address	1	1
Outputs Ending Address	64	4
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 64 bits output 0x or Mapped as 4 registers output 4x	Mapped as 64 bits output %Mx or Mapped as 4 words output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 48
B863–032 Monitored 24 Vdc Input

Purpose

This chapter describes the functional and physical characteristics of the B863–032 monitored 24 Vdc input module.

What Is in This Chapter?

This chapter contains the following topics:

B863–032 Monitored 24 Vdc Input, Overview

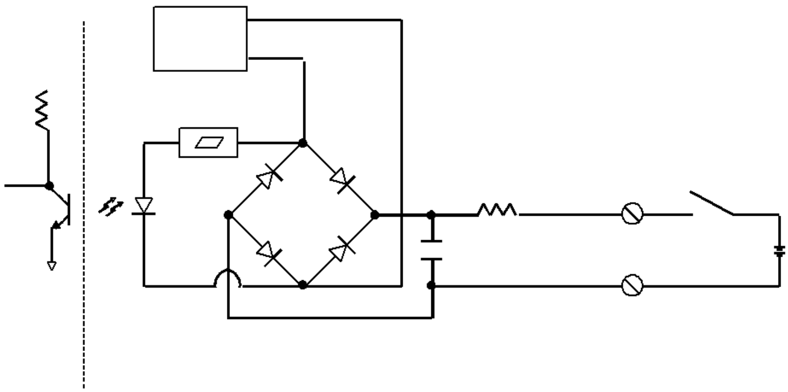
General Characteristics

The B863–032 monitored dc input module (B863) is a 32 point, 24 Vdc, true high, 800 Series, module capable of determining the state of switches, relays, solenoids, lamps, proximity switches, and other 24 Vdc powered devices. In addition, the B863–032 monitors itself to insure its ability to detect high or low states at its inputs.

This feature is designed to provide an extra margin of reliability in safety shutdown systems. This is accomplished with a module resident diagnostic test. The diagnostics verify the module's functionality by momentarily forcing all inputs to a low state followed by a high state. This forcing function is transparent to the input source.

Simplified Schematic

Following is a simplified schematic of the B863–032 monitored 24 Vdc input module.



This diagnostic test is performed at a rate of 1/s, and takes less than 1 ms. The inability of an input to detect a low or high state during diagnostics, results in the reporting of a fault to the controller, and the flashing of the active LED. Digital filtering is performed on all inputs to reduce the occurrence of nuisance faults. Communication between the module and the controller consists of four words. Two words contain the state of each input, and the other two words contain the fault status of each input. Within the state words, a high, or one indicates a on condition. Within the fault status words, a high, or one indicates a fault at the respective input.

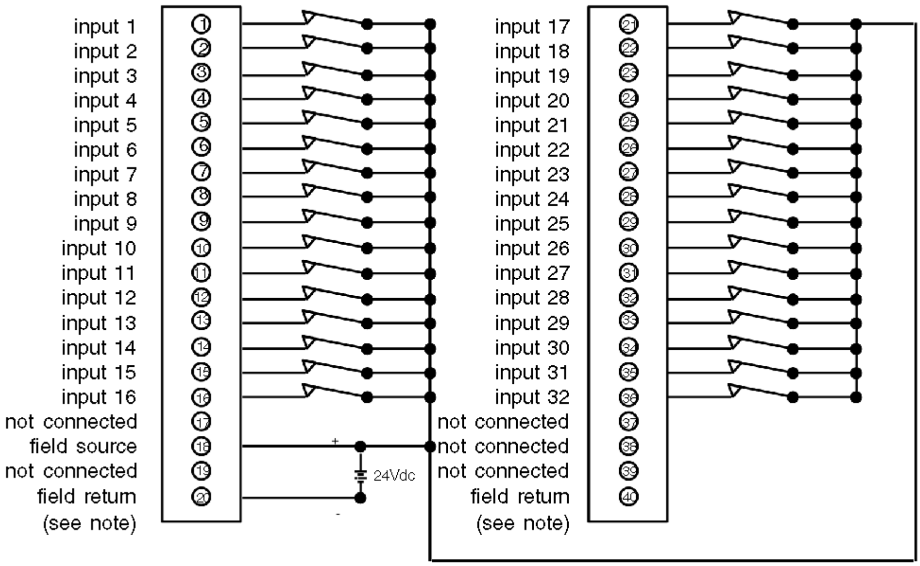
B863–032 Monitored 24 Vdc Input, Field Connections

Overview

User connections are made to a standard screw terminal strip. The rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal Numbering and Input Connections

The following diagram shows terminal numbering and input connections for the B863–032 monitored 24 Vdc input module.



Note: Pins 20 and 40 are internally connected together

B863–032 Monitored 24 Vdc Input, Quick Start Test

Quick Start Test Procedure

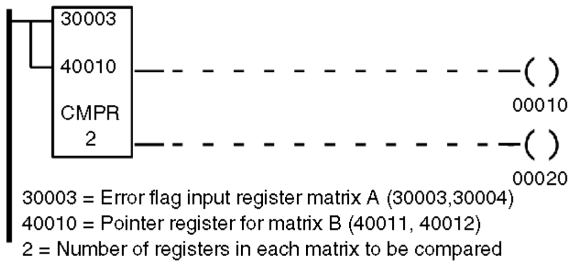
This test configures the module as follows: B863 (4 register binary).

Step	Action
1	Stop the controller.
2	Determine which channel and slot location are being used for this module and insert the module.
3	Wire +24 Vdc external power supply to terminal 18, and connect common to terminal 20 on a AS-8535-000 high density connector. Do not connect any other field wiring to the connector. **NOTE:** Remove the keying tabs on the AS-8535-000 high density connector prior to installing module.
4	Turn ON the external 24 Vdc power supply. The Field Power light will come ON.
5	I/O Map the module as a B863, four register inputs 30001 ... 30004 binary. Recall that the first two registers are used for real inputs, and the last two registers are error flags.
6	Start the controller.
7	Confirm that the module's active light is illuminated. Note: Active on steady = OK. Active blinking = Check the 24 Vdc external power supply voltage and wiring.
8	View the B863 I/O mapped registers, 30001 ... 30004 on the reference screen in binary format.
9	Verify that all the points are zero. The first two registers, 30001 and 30002 are real inputs. Open inputs to the module reads 0. The second two registers, 30003 and 30004 are error flags. A value of 1 in any of these error flag points indicates a faulty input.
10	Turn OFF the external 24 Vdc power supply, and all error flag points change to 1.
11	Turn ON the external 24 Vdc power supply, and all error flag points change back to 0.
12	To test an input, connect a wire from the +24 Vdc point on the connector terminal 18, and touch the other end of the wire to terminal 1. Bit 1 in 30001 goes from 0 to 1. The error flag for input 1 is found at bit 1 in register 30003. When the input is functional this reads 0.

Application Example 1

The B863 module not only reads 24 Vdc inputs, but it allows you to monitor the health of the input circuits through the use of the input error flags. In the following example, networks allow you to monitor the error flag inputs for maintenance and troubleshooting. If the B863 module is I/O mapped as 30001-30004, then registers 30001 and 30002 are the real world inputs, and 30003 and 30004 become the error flag Inputs.

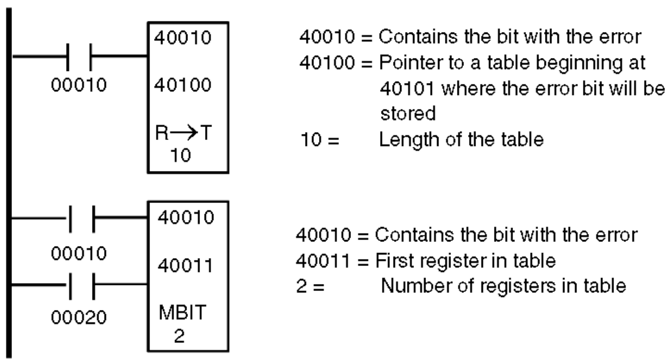
Comparison of registers 30003 and 30004 to registers 40011 and 40012.



NOTE: 40011 and 40012 must be initialized to zero.

Application Example 2

If a miscompare is detected then output 10 goes ON and 40010 will contain the bit with the error as shown in the following illustration. These error bits are stored in an error table through the R-T function block. The MBIT function block sets the same bit in matrix B so the input at fault is not placed into the error table on every scan.



The following table shows how a failure of input 15 would look in the error table.

B863-032 Input 15 Error Table	
Register	**Data**
40100	0001 ¨ Pointer to Table
40101	0015 ¨ Fault with Input Bit 15
40102	0000
40103 .. . 40110	0000 .. . 0000

The following figure shows matrix A input registers (30003 and 30004) and how a failure of input 15 or bit 15 looks. When the error is corrected, the error table and pointer should be cleared to 0.

```
                          BIT 1                    BIT16
30003 (Input Register) = 0000 0000 0000 0010

                          BIT 17                   BIT32
30004 (Input Register) = 0000 0000 0000 0000
```

B863–032 Monitored 24 Vdc Input, Specifications

Specifications

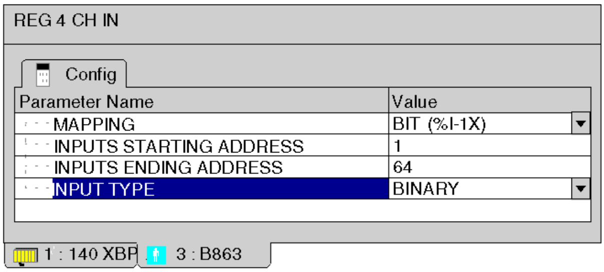
B863–032, specification table

Description		24 Vdc high density monitored input
Type of Operation		True high
Number of Points		32
Operating Range Voltage		18-30 Vdc true high, 24 Vdc nominal
Number of Groups		2
Inputs/group		16
On State Conditions		18 Vdc minimum @ the input,
		30 Vdc maximum @ the input,
		Typical on state current: 4 mA
Off State Conditions		6 Vdc maximum @ the input,
		Typical OFF state current: 1 mA
Maximum Response Time	OFF→ON	10 ms
	ON →OFF	10 ms
Power Required	+5 V	0 mA
	+4.3 V	0 mA
	-5 V	0 mA
External Power Supply	Operating Current	20 mA of field power plus point input channel
	Operating Voltage	18-30 Vdc true high, 24 Vdc nominal
Terminal Connector		AS-8535-000
Reference Type		Mapped as 64 bits input 1x or Mapped as 4 registers input 3x
Input Type		BIN/BCD

B863–032 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%I-1X)	WORD (%IW-3X)
Inputs Starting Address	1	1
Inputs Ending Address	64	4
Input Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 64 bits input 1x or Mapped as 4 registers input 3x	Mapped as 64 bits input %Ix or Mapped as 4 words input %IWx
Input Type	BIN/BCD	BIN/BCD

Chapter 49
B863–132 24 Vdc Input

Title of overview block

This chapter describes the functional and physical characteristics of the B863–132 24 Vdc input module.

What Is in This Chapter?

This chapter contains the following topics:

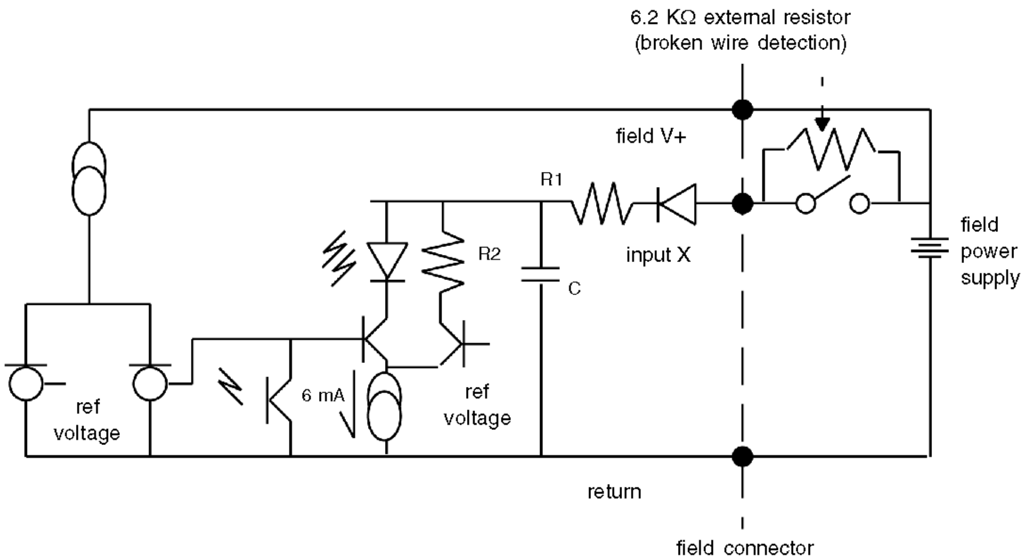
B863–132 24 Vdc Input, Overview

General Characteristics

The B863–132 24 Vdc input module senses and converts switched input signals into logic voltage levels used by the PLC. This module senses and reports broken wire faults. The module is designed for safety applications whereby it monitors essential field wiring. This module satisfies applications where connectivity diagnostics are important to the process. A logic side LED indicates the logic state that is written into the state table.

Simplified Schematic

Following is a simplified schematic of the B863–132 24 Vdc input module.



B863–132 24 Vdc Input, Switch Settings

Switch Settings

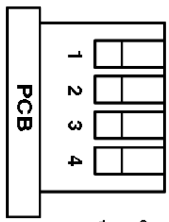
A four–position DIP switch located on the rear of the module (see diagram below) is used to select broken wire testing. Each individual switch relates to one of the four groups of eight input points.

For example, DIP-Switch position #1 when set to off senses for broken wire faults for group 1 and so on; when set to on no fault is reported.

Only Binary should be used when operating module in line test mode. Do not use BCD.

The line test dip-switch settings are shown below.

line test switch four position DIP switch
to of module



1	0
on	off
left	right
up	down

switches	functions
sw1 = 0	group 1, line test
= 1	group 1, no test
sw2 = 0	group 2, line test
= 1	group 2, no test
sw3 = 0	group 3, line test
= 1	group 3, no test
sw4 = 0	group 4, line test
= 1	group 4, no test

NOTE: When using binary and BCD inputs remember that input 1 is the MSB and input 32 is the LSB.

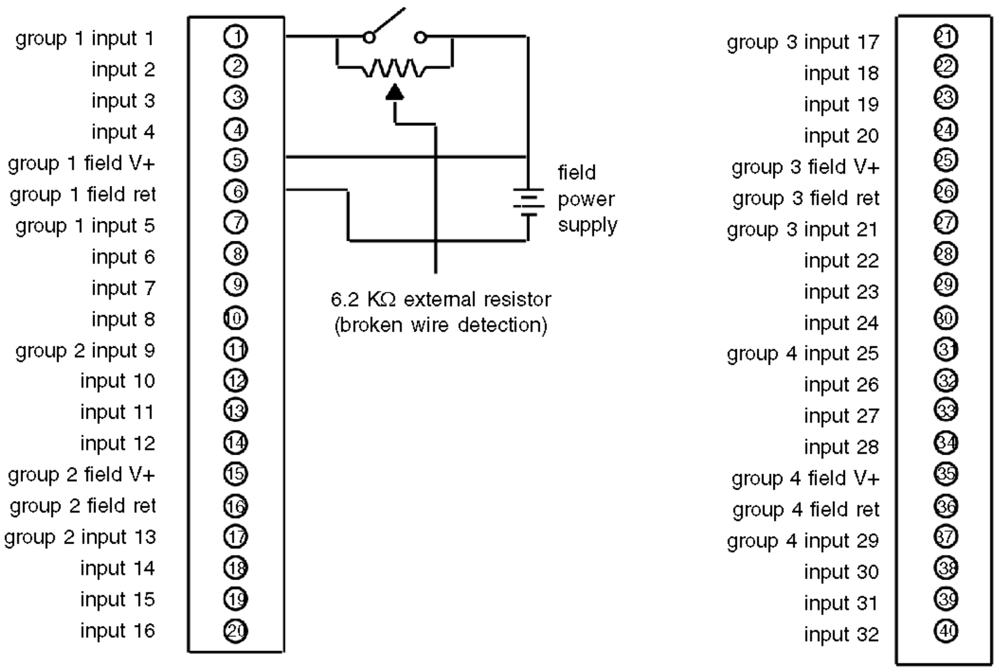
B863–132 24 Vdc Input, Field Connections

Overview

User connections are made to a standard screw terminal strip. The rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal Numbering and Input Connections

The following diagram shows terminal numbering and input connections for the B863–132 24 Vdc input module.



B863–132 24 Vdc Input, Configuration

Configuration Guidelines

This module appears as a B863 module when configured. This means the module requires four 16–bit words (1**x** registers), as shown in the data registers diagram below. The first two words contains the state of the input points. The second two words contain the condition of the field wiring. If a broken wire is detected on input point, then a one is displayed in input register (1**x**+32) at its position. When the fault is fixed, a zero appears in the bit. A one indicates a detected fault, whereas, a zero indicates normal operation of that input point.

B863–132 24 Vdc Input, Specifications

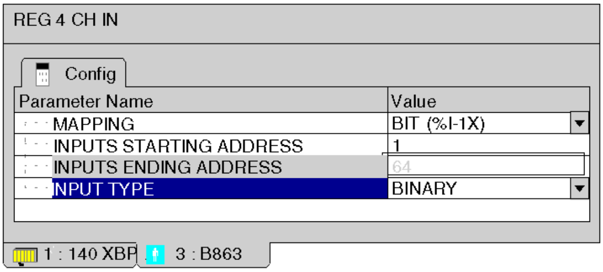
The following table provides the specifications for the unit.

Description		24 Vdc input
Number of Points		32
Number of Groups		4
Inputs/group		8
Working Voltage		0-30 Vdc
Reference Voltage		19.2-30 Vdc
Reference Current		9-15 mA/group
Threshold Voltage		11-15 Vdc
External Resistor		(Broken wire detect) 6.2 kΩ +10%, 1 external resistor/input point, resistor across contactor for nominally operated 24 Vdc system
Input Current	Low State	1.8- 3 mA
	High State	5.75-7.1 mA
Transition Time	ON	V in = 20 Vdc: 200 ms minimum
		V in = 30 Vdc: 25 ms minimum
	OFF	V in = 20 Vdc: 100 ms maximum
		V in = 30 Vdc: 250 ms maximum
Maximum Response Time	OFF→ ON	2 ms, contact opening or closing, 100 ms maximum fault detection time
	ON →OFF	
Power Required	+5 V	350 mA
	+4.3 V	10 mA
	-5 V	0 mA (not used)
Terminal Connector		AS-8535-000
Reference Type		Mapped as 64 bits input 1x or Mapped as 4 registers input 3x
Input Type		BIN/BCD

B863–132 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%I-1X)	WORD (%IW-3X)
Inputs Starting Address	1	1
Inputs Ending Address	64	4
Input Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 64 bits input 1x or Mapped as 4 registers input 3x	Mapped as 64 bits input %Ix or Mapped as 4 words input %IWx
Input Type	BIN/BCD	BIN/BCD

Chapter 50
B864–001 Register Output

Purpose

This chapter describes the functional and physical characteristics of the B864–001 register output module.

What Is in This Chapter?

This chapter contains the following topics:

B864–001 Register Output, Overview

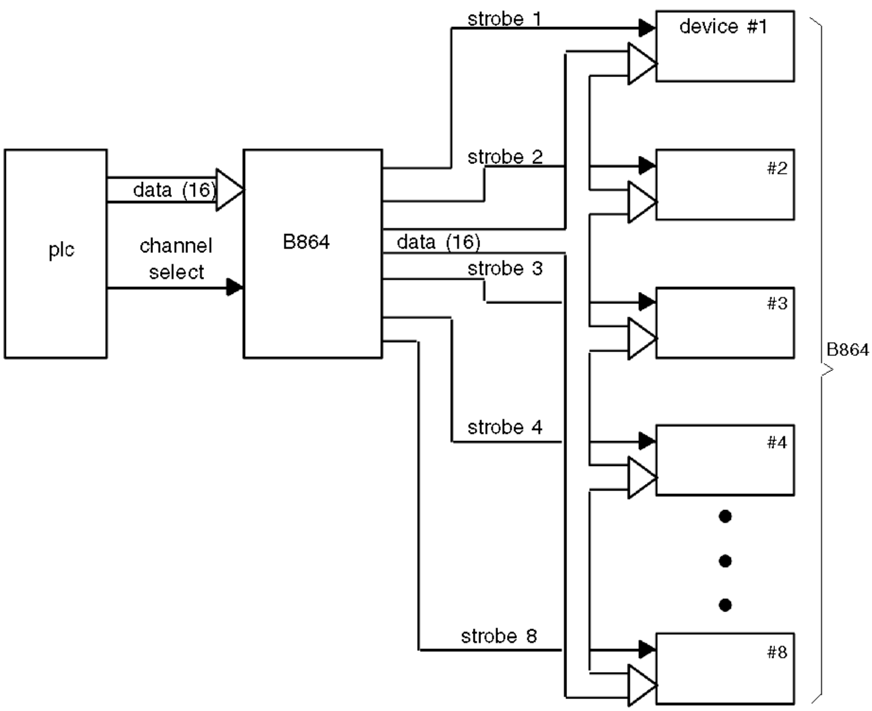
Overview

The B864–001 register output module provides a 5 V TTL or CMOS-compatible interface between a PLC and peripheral field devices.The B864–001 register output module operates in either BCD or binary mode. The desired mode is operator selectable, with the 16-bit output either having BCD values in the range 0000- 9999 or binary output in the range 0000- FFFF hex.

The B864-001 is an eight-channel register output module with eight 16-bit registers. A channel is defined as a 16-bit data path. The channels can be configured as eight BCD or eight binary registers via the appropriate switch setting.

The module is organized in a group strobe arrangement with the 16 datalines associated at a given moment with one of the eight strobe lines. Each strobe line addresses one of the devices on the data bus and enables it to transmit data to a given peripheral device to the exclusion of the other devices. The data lines are routed to all devices. The B864-001is operated in module-select mode. In module- select mode, all eight data registers are transferred in a single ourbus cycle.

The following is a simplified block diagram of the unit.



B864–001 Register Output, Switch Settings

Switch Settings

Two toggle switches are located at the top of the module and are used to determine the type of communication with external devices. Both switches are user selectable.

1. Bin/BCD Switch

This toggle switch determines whether the output data is to be interpreted by the target devices as a BCD or a binary value.

2. Strobes Active Hi/Lo Switch

This toggle switch allows selection of either true-hi or true-lo for strobing output data.

NOTE: The relation between the I/O map selection, the BCD/binary switch setting, and the results at the output are summarized in the following table:

Table

The following table identifies the relationship between the switch and I/O map facility.

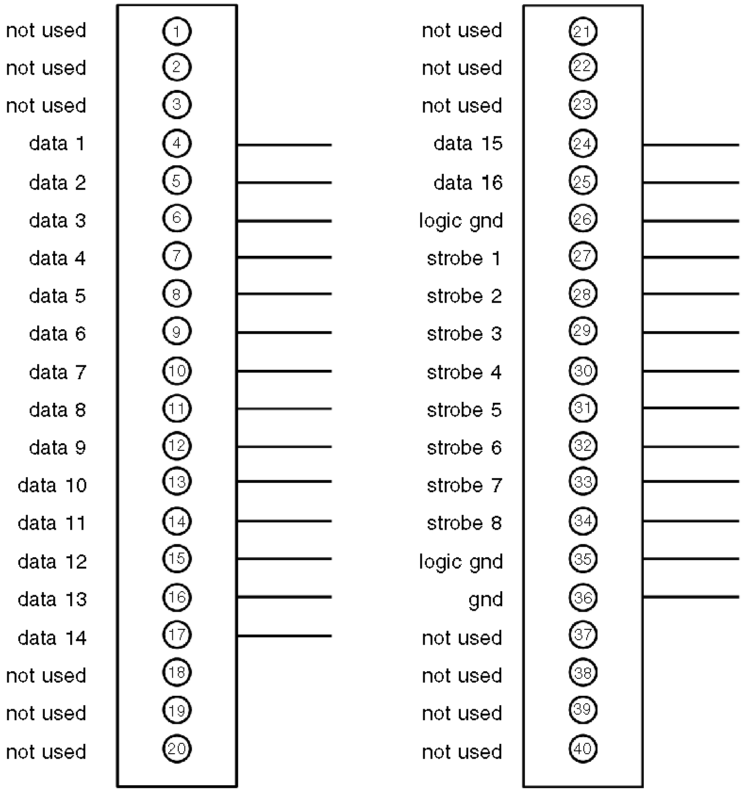
I/O Map Selection	B864 Switch Setting	Result
Binary	BCD	BCD
Binary	Binary	Binary
BCD	BCD	Erroneous
BCD	Binary	BCD

B864–001 Register Output, Field Connections

Terminal Numbering and Output Functions

User connections are made to a standard screw terminal strip. The rigid wiring system permits module insertion or removal without disturbing the wiring.

The following illustration shows how to field connect the unit.

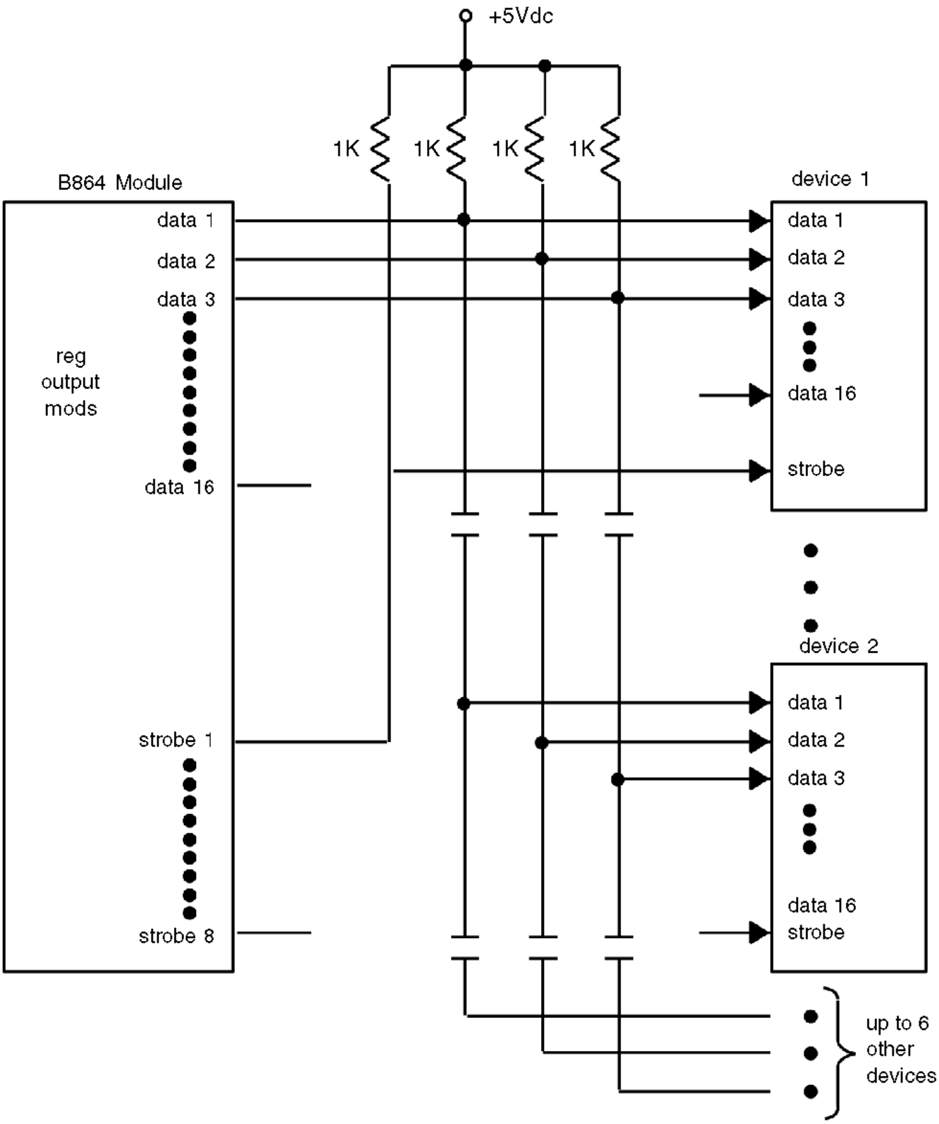


Pull-up Resistor Connection

Pull-up resistors must be installed at the active device end to use the B864 output module. The value of the pull-up resistor depends upon the number of devices that are attached to the data bus, as explained below. Each output meets 0.4 V maximum at 16 mA for a logic low and 3.3 V minimum at 16 mA for a logic high. If the current limit has been exceeded, the pull-up resistor values should be adjusted within specification; otherwise, spurious results may be obtained.

The following illustration indicates how the resistors are connected at the device end. For a single device consisting of 16 data lines, 16 1 K resistors are required, or, one 1 K resistor/data line. As additional devices are added to the data bus, the value of the pull-up resistor must be increased by 1 K. In other words, if two devices are used, the pull-up resistor must be 2 K, three devices require a 3 K pull-up, and so on, with the maximum number of 8 devices requiring 8 k of pull-up for each data line.

Pull-up resistor connection



NOTE: Increase pull-up resistor value by 1 K for each additional device.

B864–001 Register Output, Specifications

Specification Table

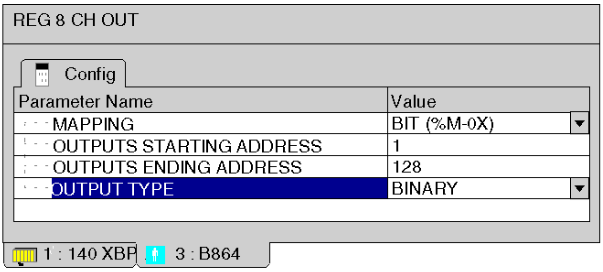
The following table provides the specifications for the unit.

Module B864-001, Specification Table		
Description		TTL register output
Number of Points		8 channels, 16 data lines
Operating Voltage		5 V TTL
Number of Groups		N/A
Outputs/group		N/A
Guaranteed Min. Levels		High State>3.5 Vdc
		Low State<0.4 Vdc while sinking 16 mA
Strobe Output Power		Two TTL loads @ 5 Vdc
Strobe Width Timing		200 s 10%
Module Throughput		11.3 ms
Power Required	+5 V	100 mA
	+4.3 V	100 mA
	-5 V	0 mA
External Power Supply		A +5 Vdc external power supply is required for pull-up resistor VCC
Field Device Requirements		Output Level
	TTL	Low: 0<0.8 Vdc @ 1.8 A High: 1>2.4 Vdc @ 40 A
	CMOS	Low: 0<1.6 Vdc @ 0.3 A
		High: 1>3.3 Vdc @ 0.3 A
Terminal Connector		AS-8535-000
Reference Type		Mapped as 128 bits output 0x or Mapped as 8 registers output 4x
Output Type		BIN/BCD

B864–001 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%M-0X)	WORD (%MW-4X)
Outputs Starting Address	1	1
Outputs Ending Address	128	8
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 128 bits output 0x or Mapped as 8 registers output 4x	Mapped as 128 bits output %Mx or Mapped as 8 words output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 51
B865–001 Register Input

Purpose

This chapter describes the functional and physical characteristics of the B865–001 register input module.

What Is in This Chapter?

This chapter contains the following topics:

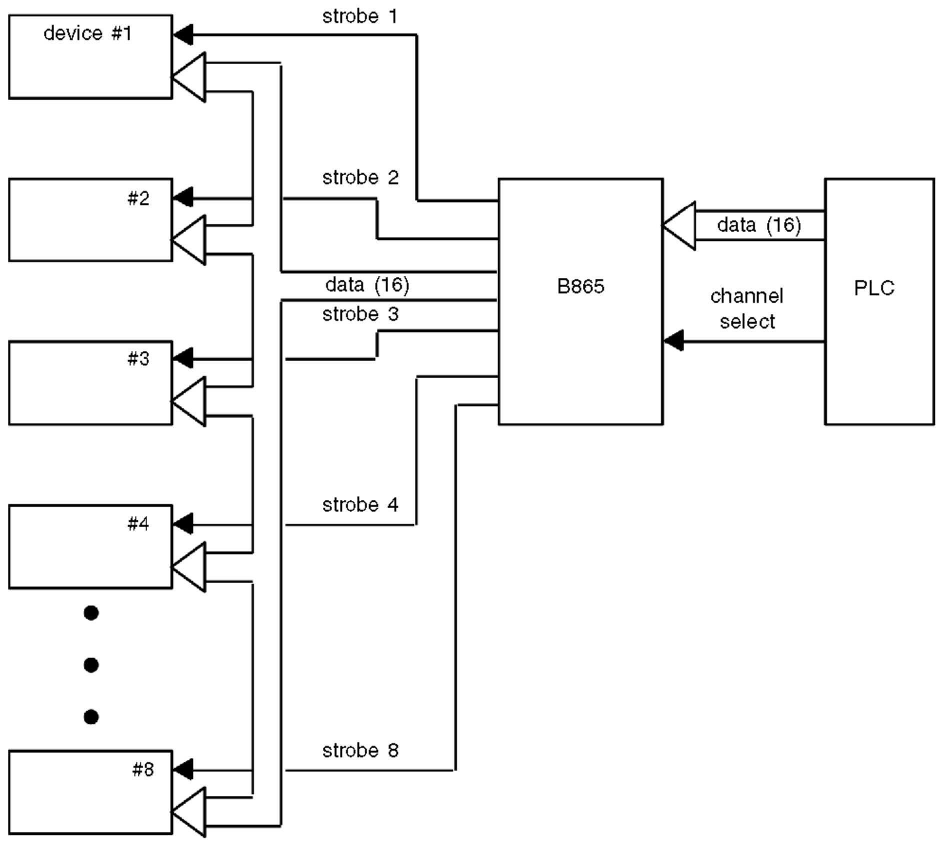
B865–001 Register Input, Overview

The B865–001 register input module provides a 5 V TTL or CMOS-compatible interface between peripheral field devices and a PLC.The B865-001 is an eight-channel register module with eight 16-bit registers. A channel is defined as a 16-bit data path.

The module can operate in either BCD or binary mode. The desired mode is user-selectable, with the parallel 16-bit input having BCD values in the range 0000- 9999 and the binary input in the range0000-FFFF.

The B865–001 operates in module-select mode, which updates the controller with eight input registers of new data samples on one scan period. The module-select feature ensures data integrity by sampling and comparing data from the user device twice during each channel's active strobe period. If the samples are equal, the data is accepted for further processing. If the samples are not equal, the old data is sent to the controller. If a channel has three consecutive no-compares, a 16-bitword containing all zeros is routed to the PLC.

The following diagram shows the schematic diagram for the B865–001 register input module.



The B865–001 operates with a 16-bit data path. Data is routed from a device by means of a strobe line associated with each device. The datalines are common to all devices while the strobe performs the addressing function.

The DC (data changing) signal from the field device is used for slowly changing data such as thumb wheel switches, and prevents erroneous information from being transferred to the PLC. This input needs only be used for slowly changing data that may cause the capture of erroneous information. The DC input connection is made on terminal 18 of the module’s field side wiring strip.

B865–001 Register Input, Switch Settings

Switch Settings

Two toggle switches are located at the top of the module and are used to determine the type of communication with external devices. Both switches are user selectable.

1. Data Polarity Switch

This toggle switch allows selection of true-hi or true-lo input data.

2. Bin/BCD Switch

This toggle switch determines whether the input data is to be interpreted by the controller as a BCD or a binary value.

NOTE: The switch and I/O map relationship is summarized in the following table.

Table

The following table identifies the relationship between the switch and I/O map facility.

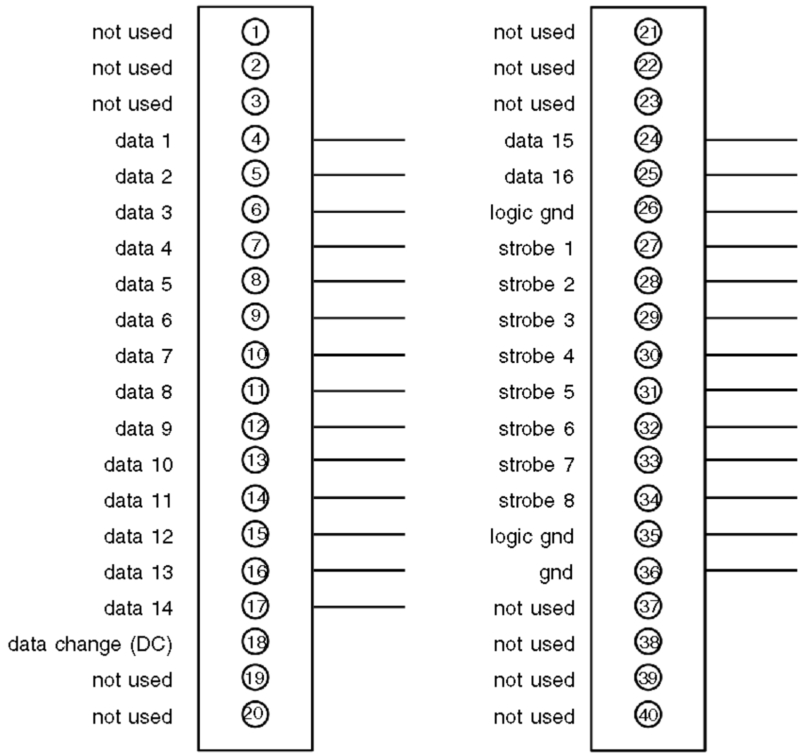
I/O Map Selection	B865 Switch Setting	Result
Binary	BCD	BCD
Binary	Binary	Binary
BCD	BCD	Erroneous
BCD	Binary	BCD

B865–001 Register Output, Field Connections

Terminal Numbering and Input Functions

User connections are made to a standard screw terminal strip The rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal numbering and input functions are shown on the following illustration.

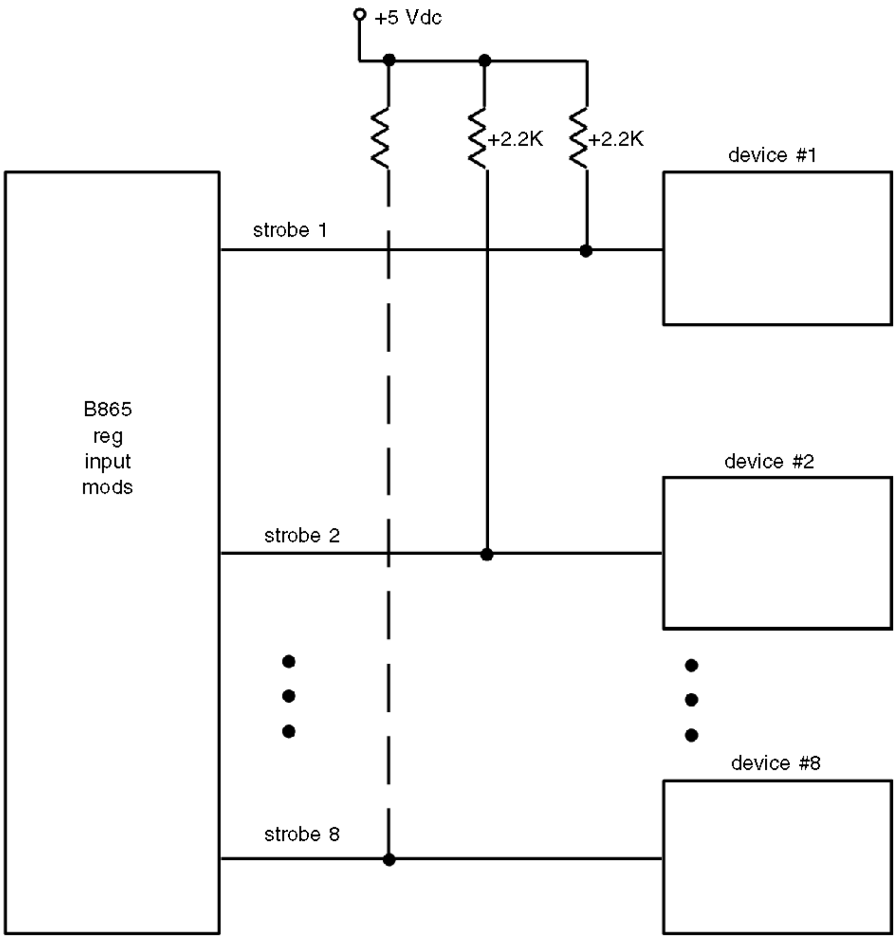


Pull-up Resistor Connection

Resistive pull-ups of 2.2 kΩ 10% for each strobe line must be provided.This is required on active devices only. Thumb wheel switches, for example, do not require the addition of pull-up resistors.

The recommended location for the pull-up resistors is at the device end of the circuit. However, they will work at the module end as well.

The following illustration shows a typical circuit setup.



Strobe Type

Strobe lines for the B865 module are true-low. The opposite is the case in other Modicon I/O modules. Therefore, when multiple thumb wheel inputs require diode isolation, the polarity of the diodes may have to be reversed.

B865–001 Register Input, Specifications

Module B865–001, specification table

Description		TTL register input
Number of Points		8 channels, 16 data lines
Operating Voltage		5 V TTL
Number of Groups		NA
Outputs/group		NA
Guaranteed Min. Levels		High State>3.5 Vdc
		Low State<0.4 Vdc while sinking 16 mA
Strobe Output Power		2 TTL loads @ 5 Vdc
Strobe Width Timing		2 mS 10%
Data Set-up Time		Within 180 s after the strobe has gone active (LO), data must have sta-bilized on the field side inputs
Minimum Data Hold Time		100 s must be provided by user
Maximum Response Time	OFF→ON	20 ms
	ON →OFF	20 ms
Power Required	+5 V	400 mA
	+4.3 V	600 mA
	-5 V	0 mA
External Supply		A +5 Vdc external power supply is required for pull-up resistor VCC
Field Devices Requirements	Field Device	Output Level
	TTL	Low: 0 < 0.8 Vdc @ 1.6 A
		High: 1 > 2.4 Vdc @ 40 A
	CMOS	Low: 0 < 1.6 Vdc @ 0.3 A
		High: 1 > 3.3 Vdc @ 0.3 A
Terminal Connector		AS-8535-000

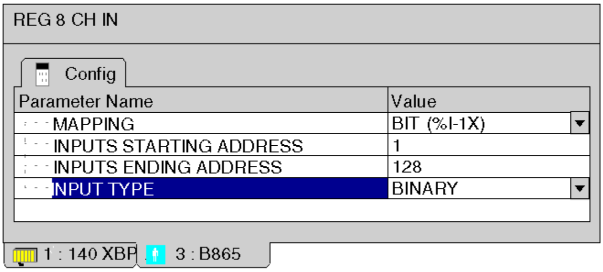
Reference Type	Mapped as 128 bits input 1x or Mapped as 8 registers input 3x
Input Type	BIN/BCD

NOTE: All user field devices must have outputs that feature latched, tri-state, or open collector, or wired or passive logic. The user must provide 2.2 kΩ 10% pull-up resistors for each strobe line.

B865–001 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%M-0X)	WORD (%IW-3X)
Inputs Starting Address	1	1
Inputs Ending Address	128	8
Input Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 128 bits input 1x or Mapped as 8 registers input 3x	Mapped as 128 bits input %Ix or Mapped as 8 words input %IWx
Input Type	BIN/BCD	BIN/BCD

Chapter 52
B868–001 Register Output

Purpose

This chapter describes the functional and physical characteristics of the B868–001 register output module.

What Is in This Chapter?

This chapter contains the following topics:

B868–001 Register Output, Overview

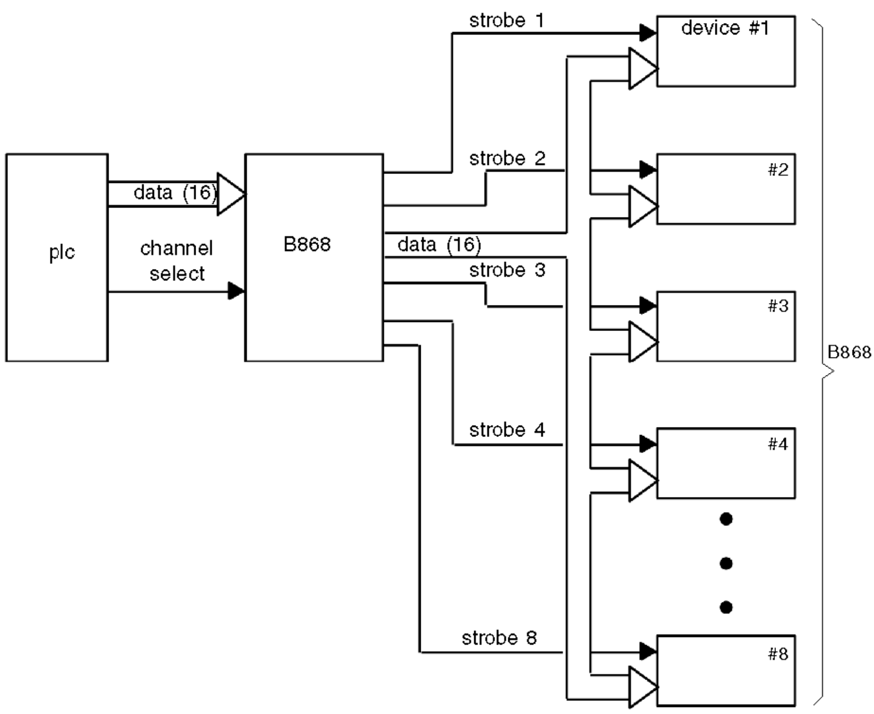
Overview

The B868–001 register output module provides a 5 V TTL or CMOS-compatible interface between a PLC and peripheral field devices. The B868–001 register output module operates in either BCD or binary mode.

The desired mode is operator selectable, with the 16-bit output either having BCD values in the range 0000 to 9999 or binary output in the range 0000 (HEX) to FFFF (HEX).

The B868-001 is a 8-channel register output module with four 16-bit registers and is operated in channel select mode. In the channel select mode, only one channel (16-bit register width) is transferred during each cycle. This is accomplished by employing a simple form of handshaking with the PC. A channel select word is sent by the PC to the B868 module, directing it to send a specific channel to the addressed field device. The B868 then echos back to the controller the channel address of the last valid transmission. Channel select requires 1 input and 2 consecutive output registers. The input register contains the channel number echo, while the output registers contain the channel address and the data.

The following is a simplified block diagram of the unit.



B868–001 Register Output, Switch Settings

Switch Settings

Two toggle switches are located at the top left of the module and are used to determine the type of communication with external devices. Both switches are user selectable.

1. Bin/BCD Switch

This toggle switch determines whether the output data is to be interpreted by the target devices as a BCD or a binary value.

2. Strobes Active Hi/Lo Switch

This toggle switch allows selection of either true-hi or true-lo for strobing output data.

NOTE: The relation between the I/O map selection, the BCD/binary switch setting, and the results at the output are summarized in the following table:

Table

The following table identifies the relationship between the switch and I/O map facility.

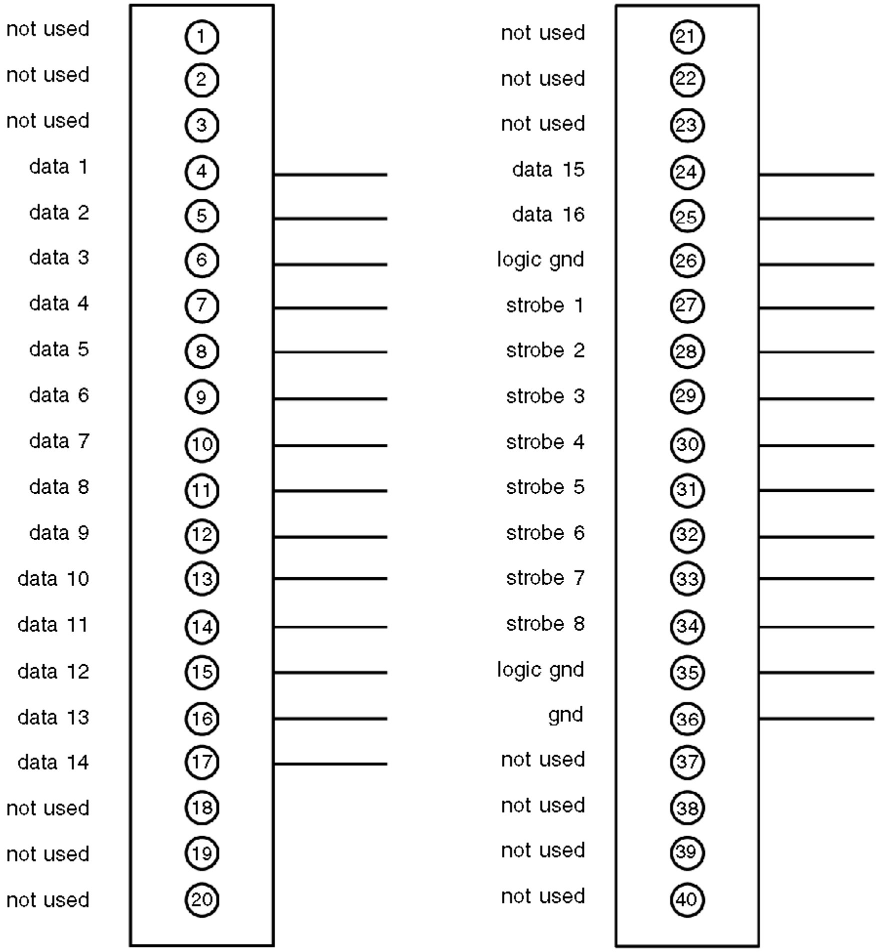
I/O Map Selection	B868 Switch Setting	Result
Binary	BCD	BCD
Binary	Binary	Binary
BCD	BCD	Erroneous
BCD	Binary	BCD

B868–001 Register Output, Field Connections

Terminal Numbering and Output Functions

User connections are made to a standard screw terminal strip. The rigid wiring system permits module insertion or removal without disturbing the wiring.

The following illustration shows how to field connect the unit.

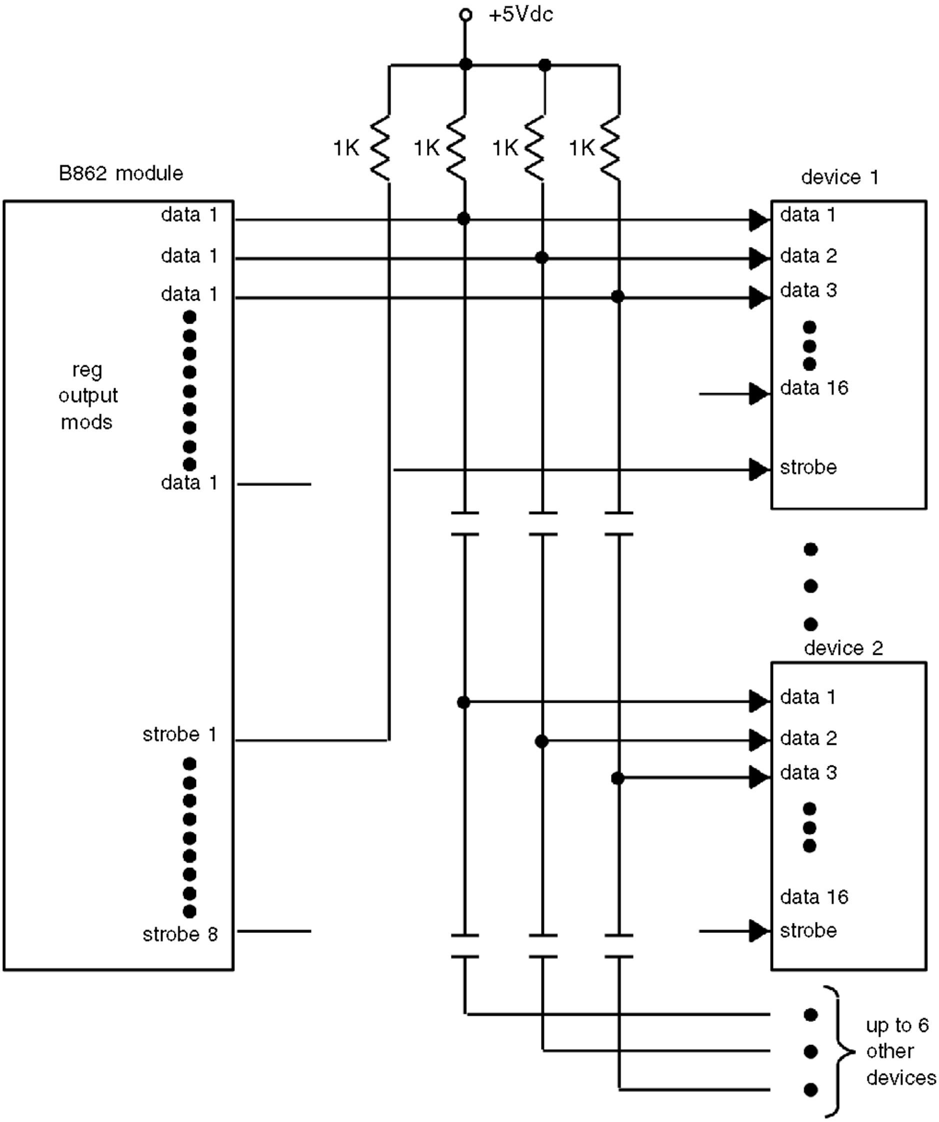


Pull-up Resistor Connection

Pull-up resistors must be installed at the active device end to use the B868 output module. The value of the pull-up resistor depends upon the number of devices that are attached to the data bus, as explained below. Each output meets 0.4 V maximum at 16 mA for a logic low and 3.3 V minimum at 16 mA for a logic high. If the current limit has been exceeded, the pull-up resistor values should be adjusted within specification; otherwise, spurious results may be obtained.

The following illustration indicates how the resistors are connected at the device end. For a single device consisting of 16 data lines, 16 1 k resistors are required, or, one 1 k resistor per data line. As additional devices are added to the data bus, the value of the pull-up resistor must be increased by 1 k. In other words, if two devices are used, the pull-up resistor must be 2 k, three devices require a 3 k pull-up, and so on, with the maximum number of 8 devices requiring 8 k of pull-up for each data line.

Pull-up Resistor Connection



NOTE: Increase pull-up resistor value by 1 k for each additional device.

B868–001 Register Output, Specifications

Specification Table

The following table provides the specifications for the unit.

B868-001 Specifications		
Description		TTL register output
Number of Points		8 channels, 16 data lines
Operating Voltage		5 V TTL
Number of Groups		N/A
Outputs/group		N/A
Guaranteed Min. Levels		High State > 3.5 Vdc
		Low State < 0.4 Vdc while sinking 16 mA
Strobe Output Power		Two TTL loads @ 5 Vdc
Strobe Width Timing		200 μs ±10%
Response Time		11.3 ms between an OURBUS write and field update
Power Required	+5 Vdc I/O	100 mA max.
	+4.3 Vdc I/O	100 mA max.
External Power Supply		+5 Vdc is required for pull-up resistor Vcc
Field Device Requirements	TTL output level	Low: < 0.8 Vdc @ 1.6 mA High: > 2.4 Vdc @ 40 μA
	CMOS output level	Low: < 1.6 Vdc @ 0.3 μA
		High: > 3.3 Vdc @ 0.3 μA
Terminal Connector		AS-8535-000
Reference Type Inputs		Mapped as 16 bits input 1x or Mapped as 1 register input 3x
Reference Type Outputs		Mapped as 32 bits output 0x or Mapped as 2 registers output 4x
Output Type		BIN/BCD

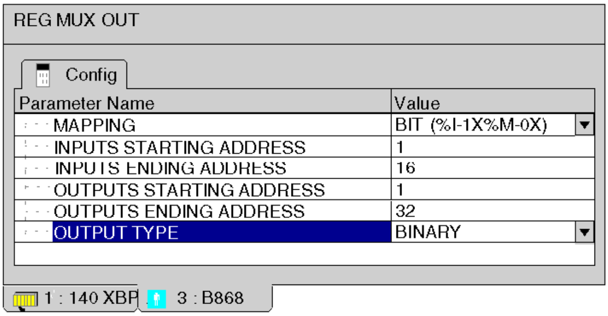
NOTE: All user field devices must have outputs that feature latched, tristate, or open collector logic.

NOTE: The user must provide 1.0 kΩ ± 10% pull-up resistors for each strobe line.

B868–001 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%I-1X%M-0X)	WORD (%IW-3X%MW-4X)
Inputs Starting Address	1	1
Inputs Ending Address	16	1
Outputs Starting Address	1	1
Outputs Ending Address	32	2
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type Inputs	Mapped as 16 bits input 1x or Mapped as 1 register input 3x	Mapped as 16 bits input %Ix or Mapped as 1 word input %IWx
Reference Type Outputs	Mapped as 32 bits output 0x or Mapped as 2 registers output 4x	Mapped as 32 bits output %Mx or Mapped as 2 words output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 53
B869–002 Register Input

Purpose

This chapter describes the functional and physical characteristics of the B869–002 register input module.

What Is in This Chapter?

This chapter contains the following topics:

B869–002 Register Input, Overview

Overview

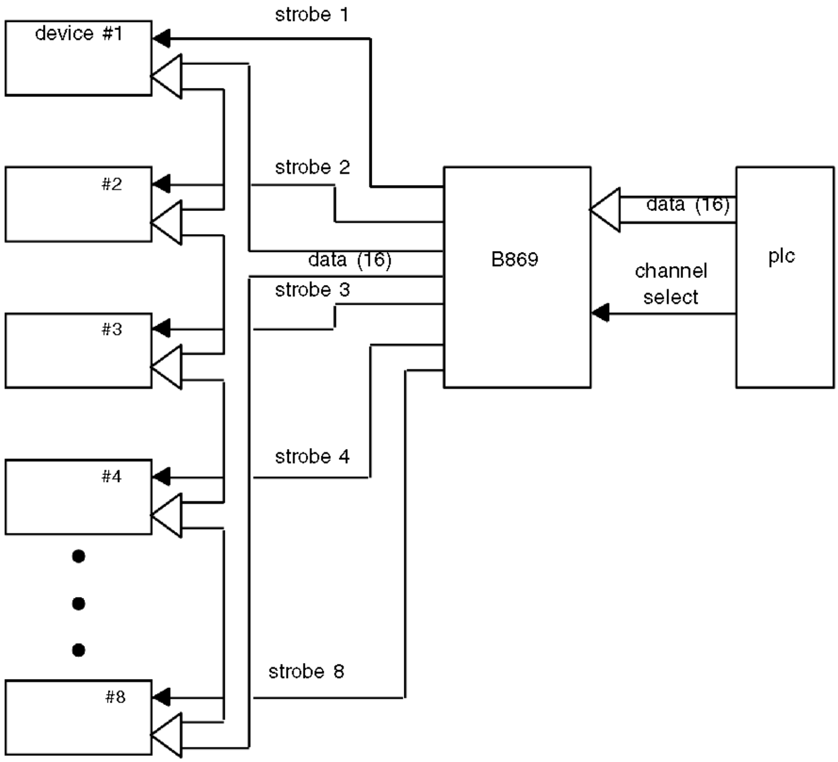
The B869–002 register input module provides a 5 V TTL or CMOS-compatible interface between peripheral field devices and a PLC. The B869-002 is capable of inputting numeric 4-digit BCD data, or 16-bit binary data from field devices to the controller.

The module can operate in either BCD or binary mode. The desired mode is user-selectable, with the parallel 16-bit input having BCD values in the range 0000 to 9999 and the binary input in the range 0000 (HEX) to FFFF (HEX).

The B869-002 is an 8 channel device that operates in a channel select mode. In the channel select mode, only one channel (16-bit register width) is transferred during each cycle. This is accomplished by employing a simple form of handshaking with the PC. A channel select word is sent by the PC to the module, requesting data from a specific channel. The module then responds by sending the requested data, together with a channel select echo. Channel select mode requires 1 output and 2 consecutive input registers. The output register (Channel Select Reg) contains the address of the selected channel, while the 2 input registers contain the channel number echo and the data, respectively.

Schematic Diagram

The following figure shows the schematic diagram for the B869–002 register input module.



The B869–002 operates with a 16-bit data path. Data is routed in from a device by means of a strobe line associated with each device. The data lines are common to all devices while the strobe performs the addressing function. The channel select function permits the PC to transfer a single channel of 16 bits from a selected field device to the PC during one OURBUS cycle.

The DC (data changing) signal from the field device is used for slowly changing data such as thumb wheel switches and prevents erroneous information from being transferred to the PLC.

To avoid loading the bus when a device is not being addressed, any active device interfaced to the input module must have latched, tri-state, or open collector outputs.

B869–002 Register Input, Switch Settings

Switch Settings

Two toggle switches are located at the top of the module and are used to determine the type of communication with external devices. Both switches are user selectable.

1. Data Polarity Switch

This toggle switch allows selection of true-hi or true-lo input data.

2. Bin/BCD Switch

This toggle switch determines whether the input data is to be interpreted by the controller as a BCD or a binary value.

NOTE: The switch and I/O map relationship is summarized in the following table.

Table

The following table identifies the relationship between the switch and I/O map facility.

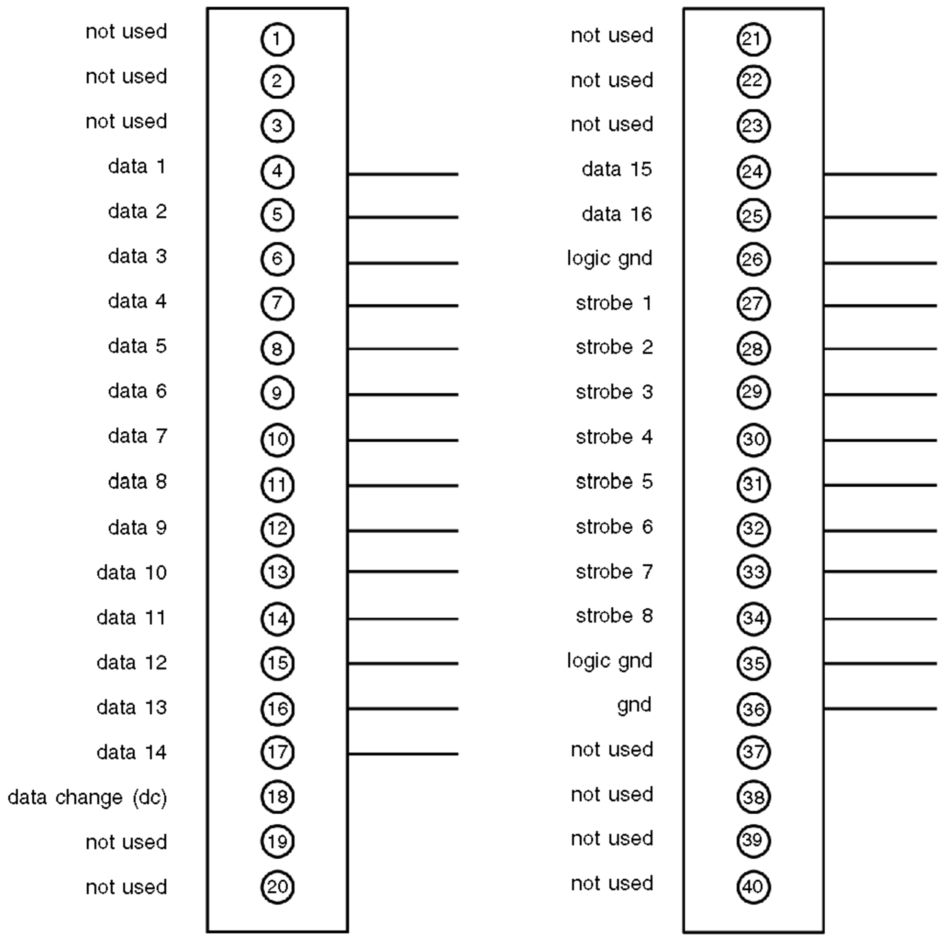
I/O Map Selection	B869 Switch Setting	Result
Binary	BCD	BCD
Binary	Binary	Binary
BCD	BCD	Erroneous
BCD	Binary	BCD

B869–002 Register Output, Field Connections

Terminal Numbering and Input Functions

User connections are made to a standard screw terminal strip. The rigid wiring system permits module insertion or removal without disturbing the wiring.

Terminal numbering and input functions are shown on the following illustration.

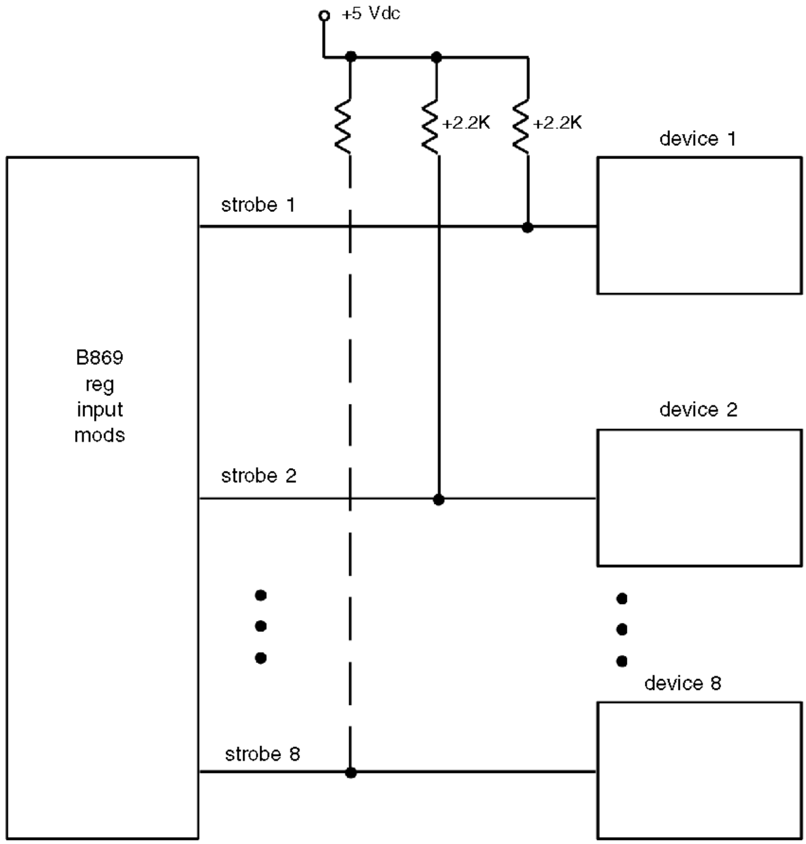


Pull-up Resistor Connection

Resistive pull-ups of 2.2 kΩ ± 10% for each strobe line must be provided.This is required on active devices only. Thumb wheel switches, for example, do not require the addition of pull-up resistors.

The recommended location for the pull-up resistors is at the device end of the circuit. However, they will work at the module end as well.

The following illustration shows a typical circuit setup.



Strobe Type

Strobe lines for the B869 module are true-low. The opposite is the case in other I/O modules. Therefore, when multiple thumb wheel inputs require diode isolation, the polarity of the diodes may have to be reversed.

B869–002 Register Output, Specifications

Specification Table

The following table provides the specifications for the unit.

B869-002 Specifications		
Description		TTL register output
Number of Points		8 channels, 16 data lines
Operating Voltage		5 V TTL
Number of Groups		N/A
Outputs/group		N/A
Guaranteed Min. Levels		High State > 3.5 Vdc
		Low State < 0.4 Vdc while sinking 16 mA
Strobe Output Power		Two TTL loads @ 5 Vdc
Strobe Width Timing		2 ms ± 10%
Data Set-up Time		Within 180 μs after the strobe has gone active (LO), data must have stabilized on the field side inputs
Minimum Data Hold Time		100 μs must be provided by the user
Response Time		20 ms between a field data change and an I/O Comm (OURBUS) update
Power Required	+5 Vdc I/O	400 mA max.
	+4.3 Vdc I/O	600 mA max.
External Power Supply		+5 Vdc may be required for pull-up Vcc
Field Device Requirements	TTL output level	Low: < 0.8 Vdc @ 1.6 mA High: > 2.4 Vdc @ 40 μA
	CMOS output level	Low: < 1.6 Vdc @ 0.3 μA
		High: > 3.3 Vdc @ 0.3 μA
Terminal Connector		AS-8535-000
Reference Type Inputs		Mapped as 32 bits input 1x or Mapped as 2 registers input 3x

B869-002 Specifications	
Reference Type Outputs	Mapped as 16 bits output 0x or Mapped as 1 register output 4x
Output Type	BIN/BCD

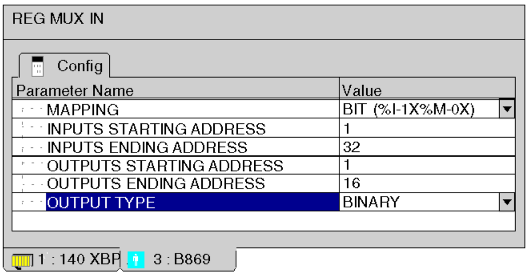
NOTE: All user field devices must have outputs that feature latched, tristate, open collector or wired or passive logic.

NOTE: The user must provide 2.2 kΩ ± 10% pull-up resistors for each strobe line.

B869–002 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value ()	Value (Options Available)
Mapping	BIT (%I-1X%M-0X)	WORD (%IW-3X%MW-4X)
Inputs Starting Address	1	1
Inputs Ending Address	32	2
Outputs Starting Address	1	1
Outputs Ending Address	16	1
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type Inputs	Mapped as 32 bits input 1x or Mapped as 2 registers input 3x	Mapped as 32 bits input %Ix or Mapped as 2 words input %IWx
Reference Type Outputs	Mapped as 16 bits output 0x or Mapped as 1 register output 4x	Mapped as 16 bits output %Mx or Mapped as 1 word output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 54
B881–001 Latched 24 Vdc Input

Purpose

This chapter describes the functional and physical characteristics of the B881–001 latched 24 Vdc input module.

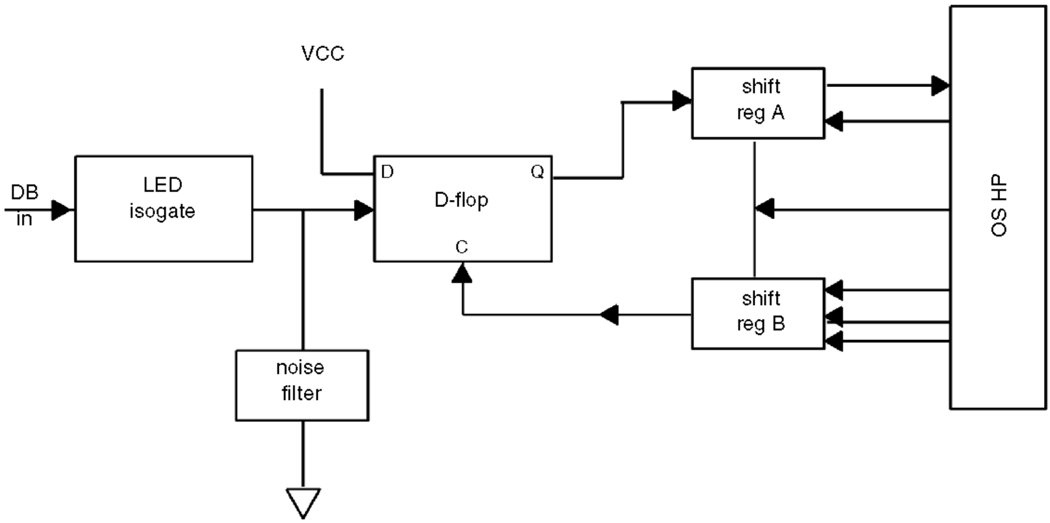
What Is in This Chapter?

This chapter contains the following topics:

B881–001 Latched 24 Vdc Input, Overview

The B881–001 Latched 24 Vdc input module senses and converts input signals from its field circuitry to a logic level used by PLC. The incoming signal causes the module to latch at the occurrence of the on state and may be considered a latching event. The 24 Vdc, true high latched input module is capable of direct connection to any PLC, true high dc output module (at proper voltage).

The following illustration shows the B881–001 Latched 24 Vdc input module simplified block diagram



The latching mechanism exists solely to lockout subsequent incoming signals for the time it takes to communicate to the controller that a latching event occurred, receive an acknowledgement, and reset the latch. The latched input module does not affect the users field circuit, drive the controller or communicate information to it other than the fact that a latching event took place.

Signals on the 16-channel inputs are compared to a reference voltage nominally set to 75% of the group supply voltage. An input signal of 500 s minimum pulse width and equal to or exceeding the reference voltage threshold will cause a latched on state for any given channel.An input signal voltage less than 25% of the group supply voltage will result in a system off state.

When the module senses and latches on the leading edge of the true-high, incoming field signal or data bit (DB), it clocks the D-type flip-flop on the low-to-high transition, in effect, capturing the latching event.

The module’s on state is communicated to the controller through shift register (A) and OBS chip via a handshake mechanism. The logic is then returned to the module from the CPU as an inverted signal through shift register (B) where it resets the flip- flop (latch condition) for that channel only. The reset latch is then available for another, low-to-high, event transition. To ensure that the controller has received a latched event, the module actually operates in a user programmed, echoed- data handshake mode. The handshake mechanism requires four to six scans before a new event can be recognized. Total scan time is software-limited to 200 ms maximum and hardware limited to 250 ms maximum.Thus, you should not attempt to record events with a repetition rate greater than one per second unless willing to analyze this actual system and program.

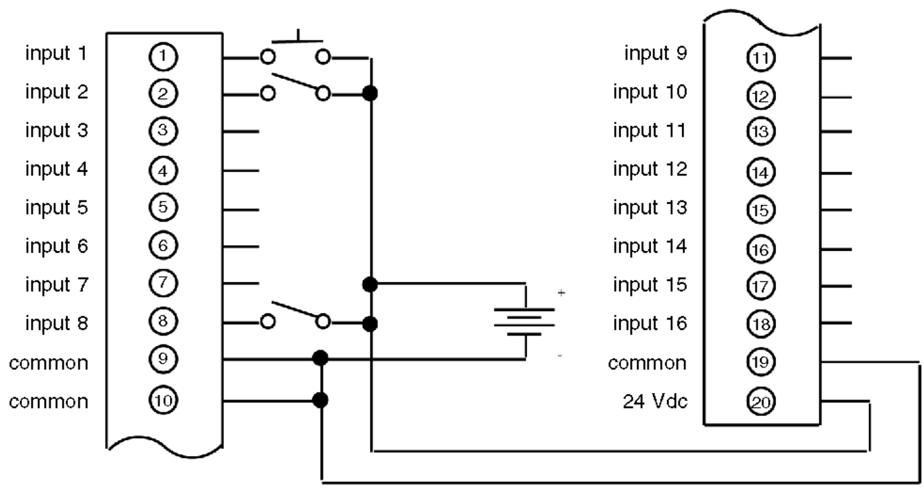
NOTE: Reversal of external load polarity will not cause circuit failure as the module is fused to protect its circuitry against overload currents and accidental polarity reversal.

B881–001 Latched 24 Vdc Input, Field Connections

Terminal Numbering and Input Functions

User connections are made to a standard screw terminal strip. The rigid wiring system permits module insertion or removal without disturbing the wiring.

The following illustration shows the field connections for the unit.



B881–001 Latched 24 Vdc Input, Specifications

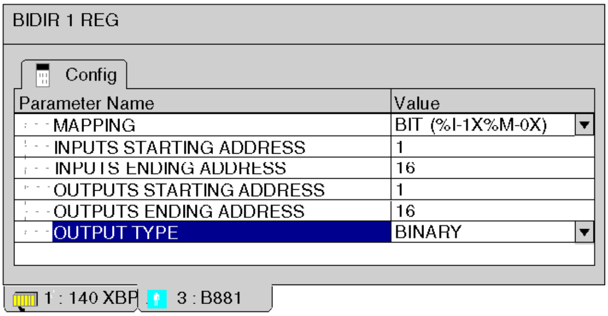
Module B881–001, specification table

Description		24 Vdc (LATCH) input
Type of Operation		True High
Number of Points		16
Operating Range Voltage		20-28 Vdc
Number of Groups		1
Inputs/group		16
OFF → ON		≤25% of group supply voltage and input reset bit sent back to module
ON → OFF		≤25% of group supply voltage
ON Condition		≥75% of group supply voltage for .5 ms/min event pulse width
Maximum Input Voltage	Continuous	30 Vdc
	Inrush	40 Vdc for 10 ms
	ON current	6 mA @ 24 Vdc (typical)
Minimum Pulse Width		0.5 ms
Repetition Rate		1/s
Power Required	+5 V	30 mA
	+4.3 V	1.1 mA
	-5 V	0 mA
External Power Supply		24 Vdc (4 Vdc), 310 mA
Terminal Connector		AS-8534-000
Fuse		1/group, .75 A @ 250 Vdc
Reference Type Inputs		Mapped as 16 bits input 1x or Mapped as 1 register input 3x
Reference Type Outputs		Mapped as 16 bits output 0x or Mapped as 1 register output 4x
Output Type		BIN/BCD

B881–001 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%I-1X%M-0X)	WORD (%IW-3X%MW-4X)
Inputs Starting Address	1	1
Inputs Ending Address	16	1
Outputs Starting Address	1	1
Outputs Ending Address	16	1
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type Inputs	Mapped as 16 bits input 1x or Mapped as 1 register input 3x	Mapped as 16 bits input %Ix or Mapped as 1 word input %IWx
Reference Type Outputs	Mapped as 16 bits output 0x or Mapped as 1 register output 4x	Mapped as 16 bits output %Mx or Mapped as 1 word output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 55
B881–508 125 Vdc Output

Purpose

This chapter describes the functional and physical characteristics of the B881–508 125 Vdc output module.

What Is in This Chapter?

This chapter contains the following topics:

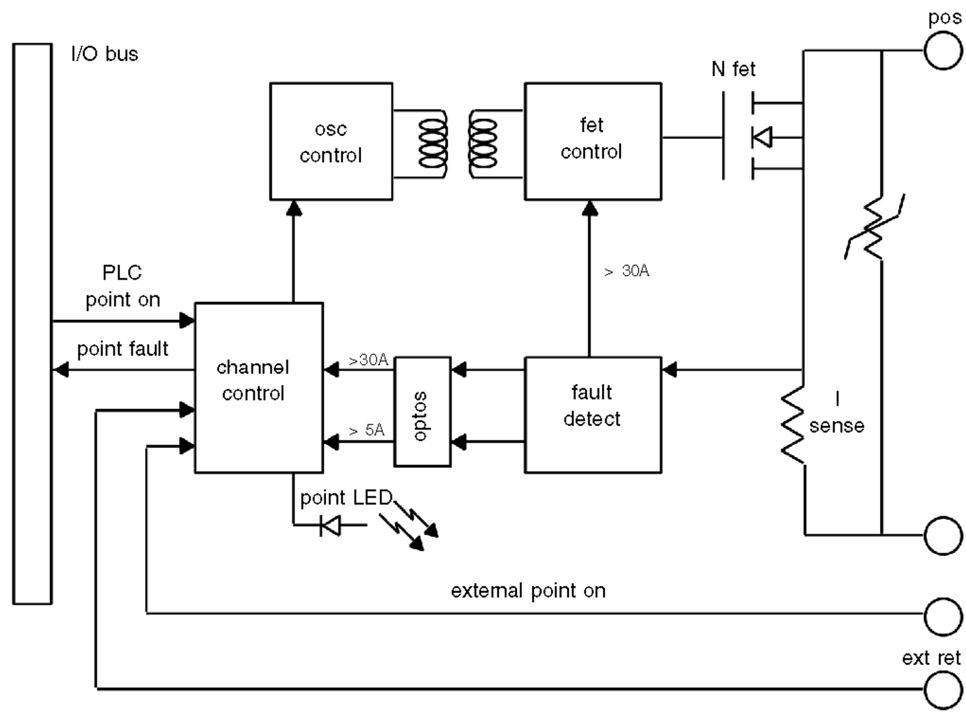
B881–508 125 Vdc Output, Overview

The B881–508 125 Vdc output module has eight isolated outputs. The outputs can serve 125 Vdc voltage relays, pilot lamps, motor starters, solenoids, valves, and any other load rated up to 140 Vdc (the outputs work in the range 5—140 Vdc).

Also, the B881 allows current surges within certain time limits. Internal fault flags report currents greater than 30 A, and currents between 5—30 A for a period greater than 500 ms. This shut down mode can only be cleared by resetting the point. Point control within ms provides fast response in critical situations. The B881–508 conforms to ANSI/IEEEC37.90 1978 duty cycle sequences.

In addition to the normal mode of controlling the outputs, the B881–508 allows the first four points to be independently controlled by external inputs through the field side connector. These external inputs are 24 Vdc active high. When a fault occurs during control by the external inputs, that input must be cycled (turned off) to clear the fault flag.

The following illustration is the B881–508 simplified schematic diagram

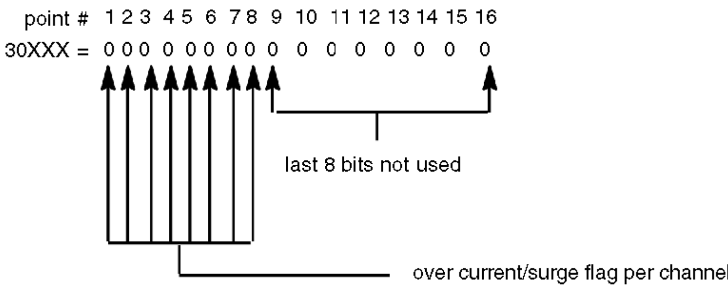


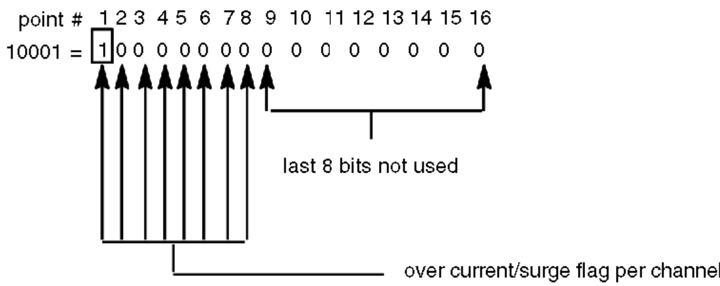
B881–508 125 Vdc Output, Fault Conditions

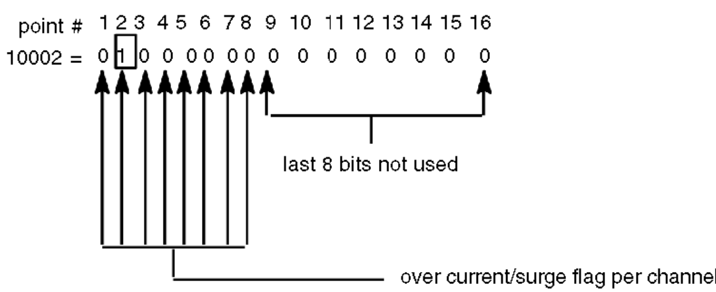
Overview

Over-current shutdown, as well as current surges greater than 500 ms are detected by the B881–508. Each point has a fault bit that can be accessed using the programming panel software. Each bit indicates either an over-current (greater than 30 A), or a current surge between 5 -3 A for a period greater than 500 ms. Although the B881-508 is I/O mapped as a 16-point bi-directional module, only the lower order eight inputs and outputs are used; the higher order eight inputs and outputs can not be used. Refer to the illustration below.

The following illustration shows the B881–508 fault flags





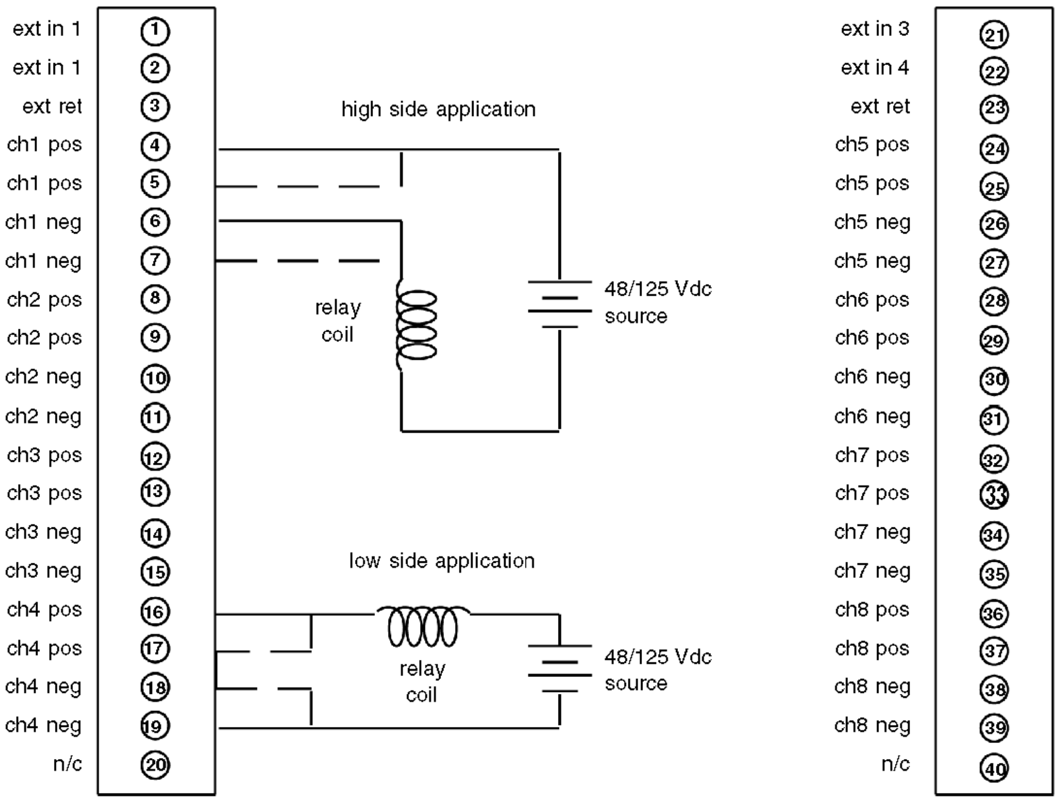


B881–508 125 Vdc Output, Field Connections

Overview

User connections are made to a standard screw terminal strip.The rigid wiring system permits module insertion or removal without disturbing the wiring.

The following illustration shows the B881–508 terminal numbering



NOTE: Reverse voltage protection
This module does not provide reverse voltage protection. Check for proper voltage polarity of the output wiring.

B881–508 125 Vdc Output, Specifications

B881–508, specifications

Description		125 Vdc true high output
Number of Points		8
Operating Voltage		5-140 Vdc maximum
Number of Groups		8
Outputs/group		1
Maximum Load Current		5.0 A continuous/channel maximum @ 25°C derated by 0.03 A/°C-4.0 A continuous per channel maximum @ 60°C 29.0 A/ module maximum
Pulsed ON Cycle		500 ms maximum for 5-30 A load
Inductance and Maximum Current/Channel		I^2L < 25 W*
		I^2LF < 0.5 W**
Wattage		< 24 W, 2.5 W/point maximum
Minimum Load Current		75 mA
Surge Current		30.0 A 1 cycle (500 ms)/channel maximum
Minimum Load Current		75 mA
Maximum Response Time	OFF → ON	<75 S
	ON → OFF	<100 S
Maximum OFF State Leakage Current		<3 mA
ON State Voltage Drop Across Module		< 0.75 Vdc @ 4 A Load Current
External Inputs	Response Time	75 S
	Working Voltage Range	19.2-28 Vdc
	Maximum Input Range	30 Vdc
	Mode of Operation	True High
Power Required	+5 V	300 mA
	+4.3 V	0 mA
	-5 V	0 mA
External Power Supply		5-140 Vdc field power supply
Terminal Connector		AS-8535--000

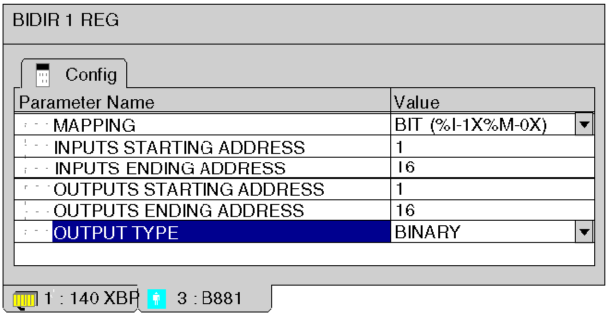
Reference Type Input	Mapped as 16 bits input 1x or Mapped as 1 register input 3x
Reference Type Outputs	Mapped as 16 bits output 0x or Mapped as 1 register output 4x
Output Type	BIN/BCD
*Typical values of relay inductance and currents that can be switched safely at 1 s rates using this formula.	
**For repetitive pulses, use this formula.	

NOTE: Proper fusing of external circuitry is required, depending on the application.

B881–508 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%I-1X%M-0X)	WORD (%IW-3X%MW-4X)
Inputs Starting Address	1	1
Inputs Ending Address	16	1
Outputs Starting Address	1	1
Outputs Ending Address	16	1
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type Input	Mapped as 16 bits input 1x or Mapped as 1 register input 3x	Mapped as 16 bits input %Ix or Mapped as 1 word input %IWx
Reference Type Outputs	Mapped as 16 bits output 0x or Mapped as 1 register output 4x	Mapped as 16 bits output %Mx or Mapped as 1 word output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 56

B882–032 24 Vdc Diagnostic Output and B818 20-28 Vac Discrete Output

Purpose

This chapter describes the functional and physical characteristics of the B882–032 24 Vdc diagnostic output module and the B818 20-28 Vac discrete output module.

What Is in This Chapter?

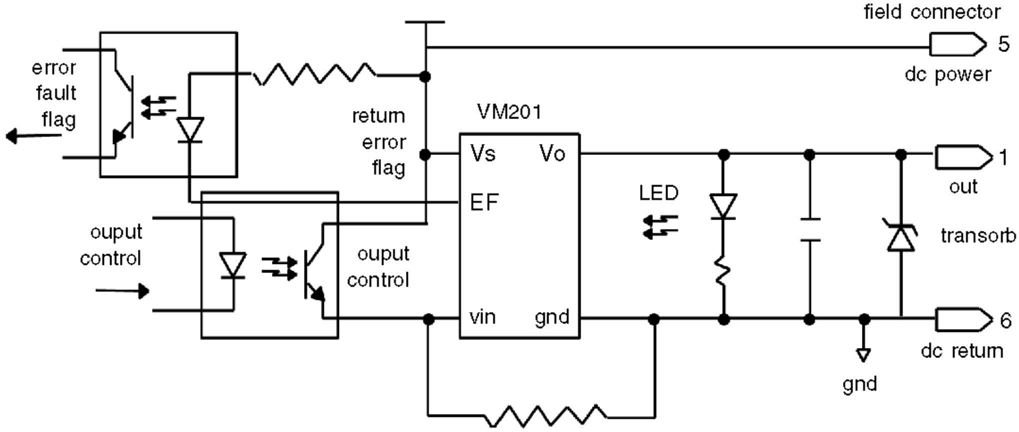
This chapter contains the following topics:

B882–032 24 Vdc Diagnostic Output, Overview

The B882–032 diagnostic output module provides 32 points that make up four groups of eight outputs. Each group of eight outputs shares an external power supply voltage. The outputs work over the range of 20.0—28.0 Vdc, true high. It is capable of driving 24 Vdc relays, solenoids, pilot lamps, and other loads rated up to 1.0 A.

The B882–032 module also detects field fault conditions and turns the faulted point off for vital applications. The B882–032 diagnostic dc output module can detect open-load, over-current, over-voltage, and over-temperature conditions.

The following illustration is the B882–032 simplified block diagram



The functionality of the diagnostic dc output module can be selected according to the following criteria. It can be a bi-directional module (B882) with 32 discrete outputs and 32 discrete inputs which represent fault flags for each respective output. It can also be a uni-directional module (B818) having 32 discrete outputs without fault flags.

B882–032 24 Vdc Diagnostic Output, Fault Conditions

B882 Mode

Open-load, over-current, over-voltage and over-temperature fault conditions are detected by the diagnostic output module.

When an output fault is detected In the B882 mode, the module without controller intervention disarms the faulted output and reports the condition to the controller via discrete input (1x), or input register (3x) points. The point remains disarmed until the user's logic rearms the point by turning the point back on. To turn the point back on the user's logic must turn the point first off and then on.

NOTE: If the controller attempts to turn a faulted point back on, there must be a 2 -5 s delay from the time of a fault to the time of cycling the faulted point on. When this delay is not given, the module ignores the change. When the fault point is brought low, the fault indicator clears in the 2-5 s range.

NOTE: If field power is lost, the module may detect faults. After field power is reapplied, all faults must be cleared

NOTE: Clearing faults prior to restarting
When a fault is detected in either the B882 or B818 mode, the source of the fault should be cleared prior to restarting the point. Failing to clear the source of a fault may result in damage to the

- power source
- driven field-side device
- module

B818 Mode

When an output fault is detected In the B818 mode, the module without controller intervention disarms the faulted output. Faults are not reported to the controller. To turn the point back on, the user's logic must first turn the point off and then on.

NOTE: If the controller attempts to turn a faulted point back on, there must be a 2 - 5 s delay from the time of a fault to the time of cycling the faulted point on. When this delay is not given, the module ignores the change. When the faulted point is brought low, the fault indicator clears in the 2 -5 s range.

NOTE: Loss of power.
If field power is lost in the B818 mode, the module may detect faults that are not visible to the controller.

- After field power is reapplied, the points must be turned off and then on for all on states.

Fault Definitions

Term	Definition
Open Load	When the load current is less than, or equal to 100 mA, the output is turned OFF and the fault flag is set. To prevent the fault flag from being set, a resistor should be placed between the output point and the group return. For example, @ 20 Vdc the minimum load is 200 Ω, @ 24Vdc the minimum load is 240 Ω, and @ 28 Vdc the minimum load is 280 Ω. When the output is already on and the load exceeds the open load trip level for one to one and a half ms, the output is turned OFF, and the fault flag is set.
Over Current	When the load current exceeds the over current trip level following the switching of a point from OFF to ON, the output is turned OFF, and the fault flag is set. When the output is already on and the current exceeds the over current trip level for one to one and a half ms, the output is turned OFF, and the fault flag is set.

NOTE: The over current trip level has a value of 3.5 A or greater. Over current greater than 12 A may cause point failure

Term	Definition
Over Voltage	If the external voltage supply exceeds the module’s rating, the output point turns OFF, and a fault flag may be returned. The point requires cycling after the external supply returns to a safe operating level. The over-voltage trip level has a value greater than 31 Vdc. There is no time delay.
Over Temperature	When the junction temperature of the output transistor reaches 140°C or greater, the output is turned OFF, and the fault flag is set.

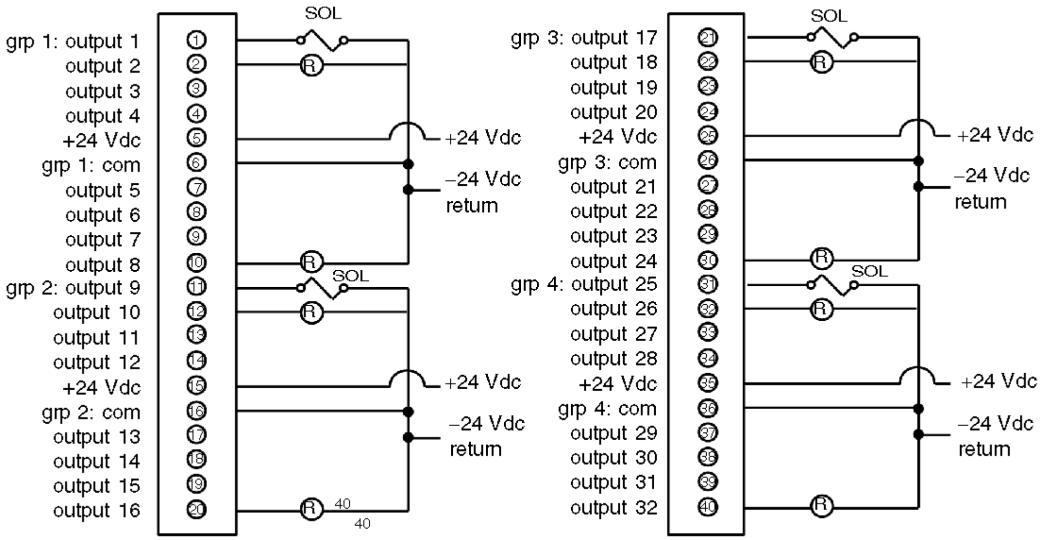
NOTE: the following about unused outputs in a B882
- Unused outputs should not be turned on since their field points are not wired.
- Turning them on will cause an open load fault and the active light will blink.
- The minimum load required is 100 mA.

B882–032 24 Vdc Diagnostic Output, Field Connections

Terminal Number and Output Functions

User connections are made to a standard screw terminal strip. The rigid wiring system permits module insertion or removal without disturbing the wiring. Setting the DIP switch allows selection of bi-directional fault reporting or uni-directional non-fault reporting functionality prior to installation.

The following illustration shows the B882–032 terminal numbering and output connections



B818, 20-28 Vac Output, Keying and Wiring

Overview

User connections are made to a standard screw terminal strip.The rigid wiring system permits module insertion or removal without disturbing the wiring.

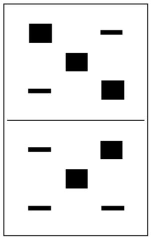
Terminal Numbering and Output Connections

The following figure shows terminal numbering and output connections for the the B818 module.

grp 1 -> output 1	1	21	output 17 <- grp 3
output 2	2	22	output 18
output 3	3	23	output 19
output 4	4	24	output 20
+24 Vdc	5	25	+24 Vdc
gnd	6	26	gnd
output 5	7	27	output 21
output 6	8	28	output 22
output 7	9	29	output 23
output 8	10	30	output 24
grp 2 -> output 9	11	31	output 25 <- grp 4
output 10	12	32	output 26
output 11	13	33	output 27
output 12	14	34	output 28
+24 Vdc	15	35	+24 Vdc
gnd	16	36	gnd
output 13	17	37	output 29
output 14	18	38	output 30
output 15	19	39	output 31
output 16	20	40	output 32

Mechanical Keying

The following figure shows the keying for the the B818 module.



B882–032 24 Vdc Diagnostic Output, Dip Switch Settings

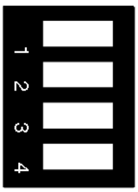
The four-position dip switch is located on the rear of the module. This switch controls the functionality of the module (bi-directional or uni-directional).

Set switch SW3 for either (B882) bi-directional fault reporting, or (B818) uni- directional non-fault reporting. Refer to the following illustration for switch settings. Also refer to the label located on the left side of the module itself.

The following illustration shows the B882–032 dip switch settings

4 position DIP switch

top of module



0	1
on	off
down	up
left	right
switches	functions
1 and 2	not used, keep to left
3	module functionality
	for bi-directional sw3 = R (B882)
	for uni-directional sw3 = L (B818)
4	Not used, keep left

NOTE: Selecting the bi-directional module functionality(B882) allows 32 discrete outputs and 32 returned fault flags. Selecting the uni-directional module functionality (B818) allows 32 discrete outputs.

Module B882–032 24Vdc Diagnostic Output, Quick Start Test

Quick Start Test Table

This test configures the module as follows: B882 (bi-directional).

The quick-start test is presented in the following table.

Step	Procedure
1	Set the 4 position dip-switch as follows: (viewing the rear of the module when held vertically): SW1 and SW2 Left Not Used (keep to left SW3 Right Selects B882 (bi-directional) SW4 Left Not Used (keep to left)
2	Determine which channel and slot location is being used for this module.
3	Wire terminals 5,15, 25, 35 to a +24 Vdc supply, and wire terminals 6,16, 26, 36 to a -24 Vdc Supply on a AS -8535 -000 high density connector.

NOTE: Remove the keying tabs on the AS-8535-000 high density connector prior to installing the module.

Quick-start test table, continued.

Step	Procedure
4	Stop the PLC.
5	I/O map the module as a B882, registers 30001/30002, 40001/40002 binary.
6	Start the PLC.
7	Write FFFF (hex) into registers 40001 and 40002.

NOTE: Ensure that no field devices are connected to these points.

Quick-start test, continued.

Step	Procedure
8	Active light should now be blinking.
9	Look at registers 30001 and 30002 in binary format, all bits should be set to a one indicating a returned fault. The fault is present as a result of the open-load condition of the outputs. The module is correctly monitoring its output points and is being read properly by the controller.

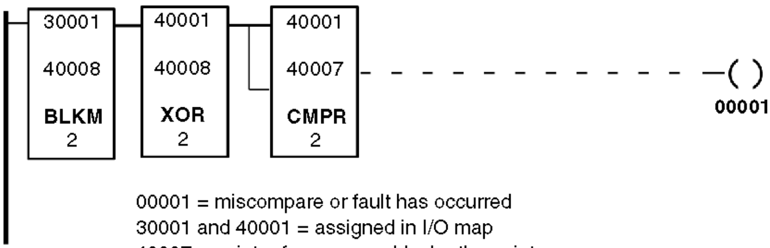
NOTE: Active blinking = One or more outputs have sensed a load fault. Active on steady = Points have the minimum load requirements.

Application Example

The B882 module, with ability to sense its own output points is an excellent choice for critical operations. The example shown below shows ladder logic that allows for detection of point errors. This could ultimately be used to control a system if a critical failure occurred.

The block move shown below moves the contents of registers30001 and 30002 into 40008 and 40009 where they can be worked. The XOR Block Exclusively OR's the contents of 40001 and 40002 with 40008 and 40009, then places the results of this XOR in 40008 and40009. This gives a value that can be used in the compare block that compares the contents of 40001 and 40002 to the values in 40008 and 40009. When a miscompare occurs, coil 00001 turns on, which can be tied to an indicator light, or safety circuity for system protection.

The following illustration provides an example of the application diagram



00001 = miscompare or fault has occurred
30001 and 40001 = assigned in I/O map
40007 = pointer for compare block - the pointer contains the location of the first error bit set in the fault register
40008 and 40009 = exclusive or register value

B882–032 24 Vdc Diagnostic Output, Specifications

B882-032 specifications

Description		24 Vdc diagnostic output
Type of Operation		True high
Number of Points		32
Operating Voltage		19.2-28 Vdc
Number of Groups		4
Outputs/group		8
ON State Voltage Drop		0.5 Vdc maximum @ 1 A
OFF State Leakage		1.0 mA maximum @ 28.0 Vdc
Minimum Load		100 mA
Maximum Continuous Current	per output	1.0 A
	per group	6.0 A
	per module	24.0 A
Surge Current	peak	7.5 A for 0.5 ms
	maximum	10 pulses/s with 1.0 A dc
Load Inductance		1 H maximum with no external diode suppression
Load Capacitance		1000 f maximum
Flags B882 Only	Open Load	100 mA or less
	Over Current	3.5 A or greater
	Over Voltage	31 Vdc or greater
	Over Temperature	140°C or greater
Maximum Response Time	OFF → ON	1 ms with a resistive load
	ON → OFF	1 ms with a resistive load
Power Required	+5 V	300 mA*
	+4.3 V	10 mA
	-5 V	0 mA
* When all outputs are ON, +5 V = 300mA. When all outputs are OFF, +5 V = 200 mA.		
External Power Supply		With nominal voltage of 24 Vdc required to power the field side of the B882**
Terminal Connector		AS-8535-000

Reference Type Inputs	Mapped as 32 bits input 1x or Mapped as 2 registers input 3x
Reference Type Outputs	Mapped as 32 bits output 0x or Mapped as 2 registers output 4x
Output Type	BIN/BCD
** The external power supply must provide power to the field side loads and the field side electronics. The amperage sizing requirements of this supply have three components: 160 mA/group maximum (all channels ON), plus steady state load current of all outputs capable of being ON simultaneously, plus the inrush current of all outputs capable of being switched simultaneously.	

B818, 20-28 Vac Output, Specifications

Specification Table

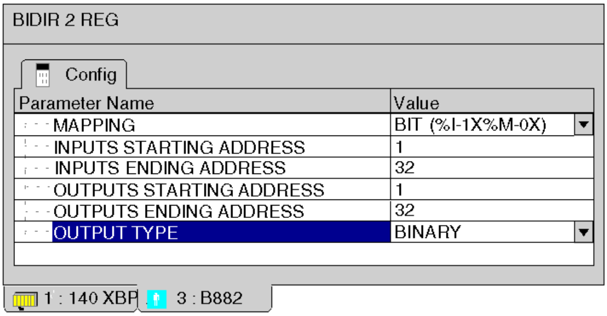
The following table provides the specifications for the unit.

B818 Specifications		
Description		32 point discrete output module
Number of Points		32
Operating Voltage		20-28 Vac cont.
Number of Groups		4
Outputs/group		8
ON Current	Maximum/point	1 A
	Maximum/group	6 A
	Maximum/module	24 A
Power required	+ 5 V	300 mA
	+ 4.3 V	10 mA
	- 5 V	0 mA
Reference Type		Mapped as 32 bits output 0x or Mapped as 2 registers output 4x
Output Type		BIN/BCD

B882–032 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%I-1X%M-0X)	WORD (%IW-3X%MW-4X)
Inputs Starting Address	1	1
Inputs Ending Address	32	2
Outputs Starting Address	1	1
Outputs Ending Address	32	2
Output Type	BINARY	BCD

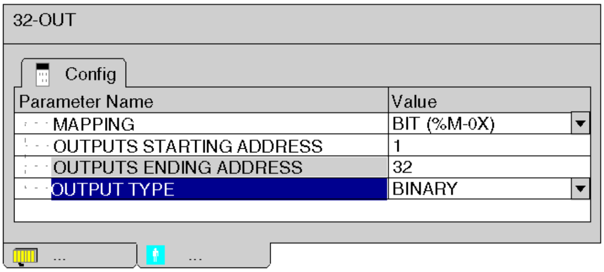
Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type Inputs	Mapped as 32 bits input 1x or Mapped as 2 registers input 3x	Mapped as 32 bits input %Ix or Mapped as 2 words input %IWx
Reference Type Outputs	Mapped as 32 bits output 0x or Mapped as 2 registers output 4x	Mapped as 32 bits output %Mx or Mapped as 2 words output %MWx
Output Type	BIN/BCD	BIN/BCD

B818 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%M-0X)	WORD (%MW-4X)
Outputs Starting Address	1	1
Outputs Ending Address	32	2
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type	Mapped as 32 bits output 0x or Mapped as 2 registers output 4x	Mapped as 32 bits output %Mx or Mapped as 2 words output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 57
B882–116 24 Vdc Output

Purpose

This chapter describes the functional and physical characteristics of the B882–116 24 Vdc output module.

What Is in This Chapter?

This chapter contains the following topics:

B882–116 24 Vdc Output, Overview

Overview

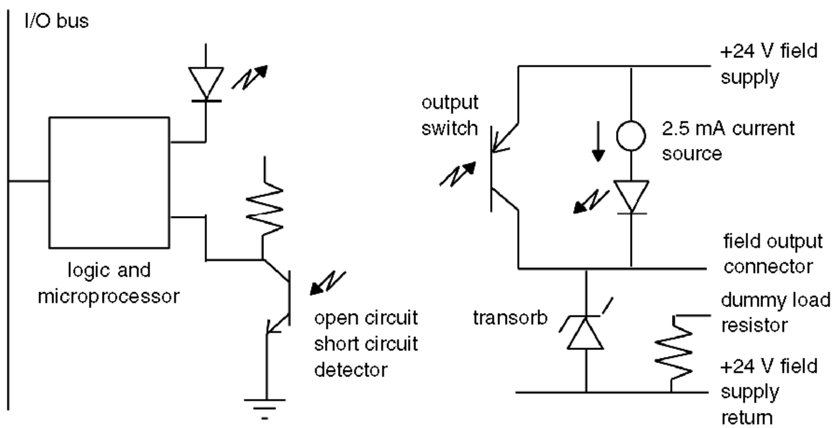
The B882–116 24 Vdc (16-point) output module monitors field points for both open and short circuit fault conditions. The module is designed for safety applications whereby it monitors essential field wiring.

Two test modes are available: pulse test mode, and no pulse test mode. In no pulse test mode, the module detects open circuits only when the output point is off, and short circuits only when the point is on. Leakage current in the off state is less than 3 mA. Trip current to detect a short circuit is greater than 1 A. In pulse test mode, the module pulses the output to the opposite of the command state to determine the complete status of the output load. Pulse timing is: 500 s opposite state pulse once every second.

NOTE: Average currents in output circuits are changed by no more than 0.1% by full test mode.

Schematic diagram

The following illustration is the B882–116 simplified schematic diagram



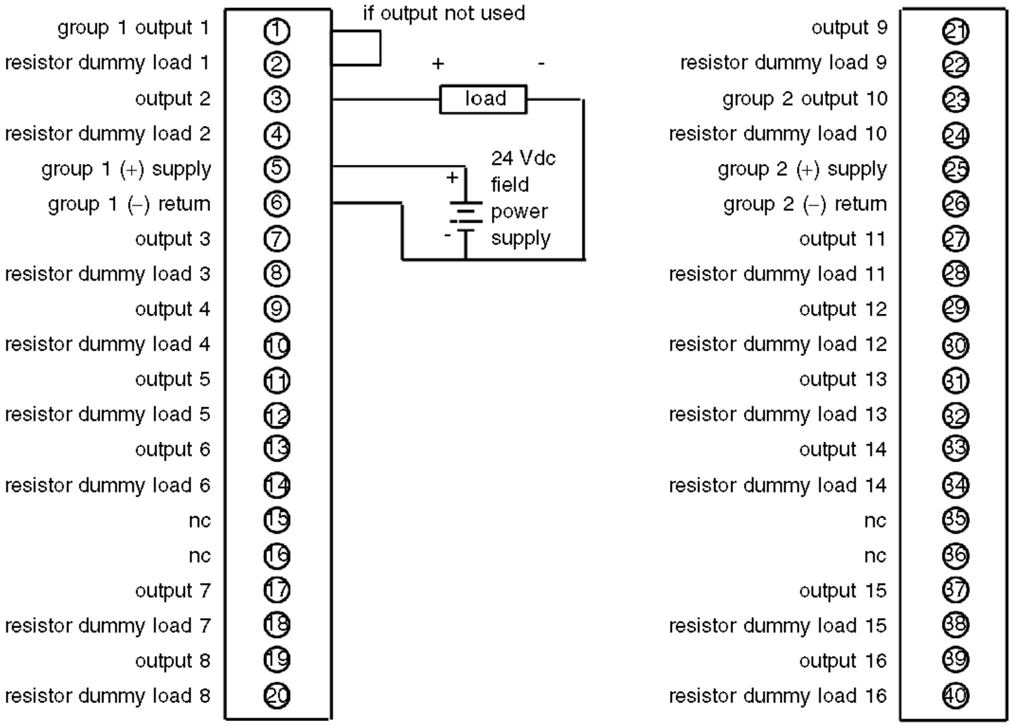
This leakage current is actually the 2.5 mA test current source. It cannot be turned off.

B882–116 24 Vdc Output, Field Connections

Overview

User connections are made to a standard screw terminal strip. The rigid wiring system permits module insertion or removal without disturbing the wiring.

The following illustration shows the B882–116 terminal numbering and output connections



NOTE: The dummy load pin is only used to prevent an open circuit fault from being returned from an unused output.

B882–116 24 Vdc Output, Configuration

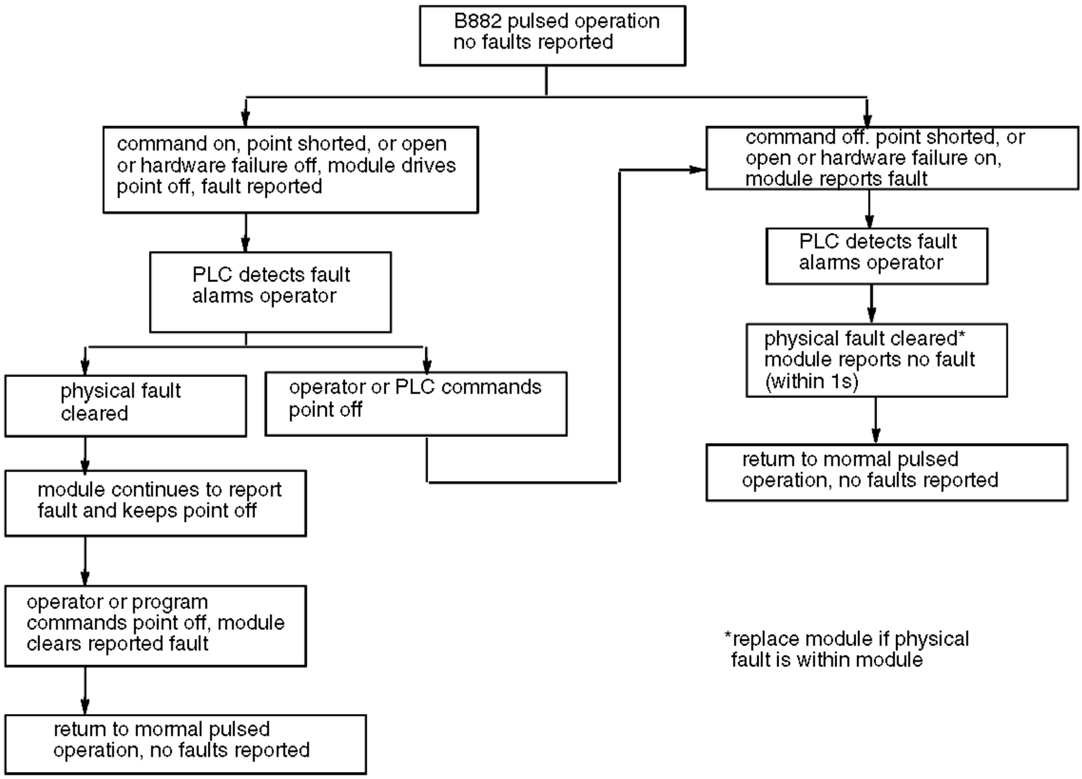
This module appears as a B882 module when configured—i.e., the module requires either four 16-bit words—two 3x input registers and two 4x holding registers or 32 discrete 0x outputs and 32 discrete 1xinputs.

The first holding register contains the command state programmed by the user. The input registers contains the faults detected. If an open circuit fault is detected on output point three, then a one is displayed in the 3x register at position three. If a short fault is detected on output point three, then a one is displayed in register 3x + 1 at position three. A one indicates a detected fault, whereas a zero indicates normal operation of that output point.

The module uses only three of the four configured 16-bit words. A point that is shorted disables the output current flow. Once a fault is detected the operation follows the following flow chart if the module is in the pulse test mode of operation. If not in pulse test mode, then reported faults are cleared when a command changes it to the opposite state. In either case the detection of a short will force the point off.

NOTE: The module will not work correctly with a J810 remote I/O processor.

The B882–116 full fault test mode only flow chart is shown in the illustration below.



Data Registers

	MSB PHYSICAL OUTPUTS	LSB		MSB UNUSED OUTPUTS	LSB
40XXX	1 2 3 4 5 6 7 8	9 10 11 12 13 14 15 16	40XXX + 1	1 2 3 4 5 6 7 8	9 10 11 12 13 14 15 16
30XXX	1 2 3 4 5 6 7 8	9 10 11 12 13 14 15 16	30XXX + 1	1 2 3 4 5 6 7 8	9 10 11 12 13 14 15 16
	OPEN CIRCUIT			SHORT CIRCUIT	

The B882–116 module mode behavior table is shown below.

Module Mode Behavior	Partial Test Mode	Full (PULSE) Test Mode
Use with high speed field devices	Yes	Not recommended
Finds opens when OFF	Yes	Yes
Finds opens when ON	No	Yes
Reaction to OPEN fault*	No Change	Point OFF
To clear open fault, close physical fault, then	See Note 1	Write 0
Finds shorts when OFF	No	Yes
Finds shorts when ON	Yes	Yes
Reaction to short fault*	Point OFF	Point OFF
To clear short fault, clear physical fault, then	See Note 2	Write 0
*In all cases faults are reported to the PLC via register entries for corresponding point and type of fault(s). In addition, the fault lamp for the corresponding group will blink until fault indication is cleared. Any points with detected short faults will be turned off independent of the command state from the PLC.		
Note 1: In partial test mode an open fault indication will be cleared by writing a 1 to the output point independent of the actual status of the output wiring.		
Note 2: In partial test mode a short fault indication will be cleared by writing a 0 to the output point independent of the actual status of the output wiring.		

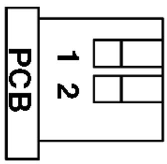
B882–116 24 Vdc Output, Switch Settings

A two-position dip switch located on the rear of the module is used to select one of two test modes on a group basis. No pulse test mode detects open circuits only when the output is off, and shorts circuits only when the point is on.

Pulse test mode pulses the output to the opposite of the command state to determine the status of the output load. Each individual switch relate s to each group of eight output points. For example, DIP switch position #1 when set to on enables pulse test fault sensing for group 1(points 1-8). When a fault is detected the corresponding fault LED flashes independent of the test mode. When the switch is in the off position, no pulse test is performed.

The pulse dip-switch settings for the B882–116 module is shown below.

pulse test switch
2 position DIP switch
top of module



1	0
on	off
left	right
up	down

switches	functions
sw1 = 0	group 1, pulse test enabled
= 1	group 1, no test
sw2 = 0	group 2, pulse test enabled
= 1	group 2, no test

NOTE: When using binary and BCD format, remember that output 16 is the LSB of word one and word two is ignored by the module.

B882–116 24 Vdc Output, Specifications

B882–116 specification table

Description	24 Vdc output
Number of Points	16
Number of Groups	2
Outputs per Group	8
Working Voltage	19.2-30.0 Vdc

NOTE: The 24 V field supply must be rated to supply output load current +.5 A for the module, +5 A surge rating. This 5 A surge rating is required to correctly detect short circuits. Group input power fusing is recommended. The fuse should be rated for expected load current plus 5 A slo-blow.

NOTE: Low-voltage
When field supply drops from 24 to 0 V, an output current of up to 15 mA may be generated to points that are OFF. When field supply is below 19.2 V, reported output fault flags may be incorrect.

Module B882–116 specification table, continued

ON State Voltage Drop	0.5 Vdc maximum @ 0.5 A
OFF State Leakage Current	3.0 mA maximum at 30.0 Vdc
	Maximum allowable load resistance 6 kΩ

NOTE: 3 mA x 6 kΩ = 18 V—i.e. leakage current produces enough voltage on a 6 kΩ load resistor to simulate a valid input signal.

Module B882–116 specification table, continued

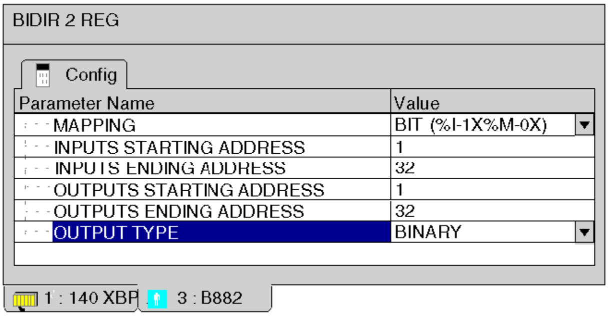
Inrush Current		1.0 A peak for 0.1 ms at 4 pulses/s while carrying 0.5 A dc
Continuous Current	Maximum	0.5 A
	Maximum/group	4.0 A
	Maximum/module	8.0 A
Maximum Load Current		10 mA
Maximum Load Inductance		0.5 H @ 0.5 A, 4 Hz switching
Maximum Load Capacitance		4 F @ 4 Hz maximum switching frequency
Power Required	+5 V	350 mA maximum all outputs ON
	+4.3 V	10 mA
	-5 V	0 mA (not used)
Terminal Connector		AS-8535-000

Reference Type Inputs	Mapped as 32 bits input 1x or Mapped as 2 registers input 3x
Reference Type Outputs	Mapped as 32 bits output 0x or Mapped as 2 registers output 3x
Output Type	BIN/BCD

B882–116 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	BIT (%I-1X%M-0X)	WORD (%IW-3X%MW-4X)
Inputs Starting Address	1	1
Inputs Ending Address	32	2
Outputs Starting Address	1	1
Outputs Ending Address	32	2
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type Inputs	Mapped as 32 bits input 1x or Mapped as 2 registers input 3x	Mapped as 32 bits input %Ix or Mapped as 2 words input %IWx
Reference Type Outputs	Mapped as 32 bits output 0x or Mapped as 2 registers output 3x	Mapped as 32 bits output %Mx or Mapped as 2 words output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 58
B883–001 High Speed Counter

Purpose

This chapter describes the functional and physical characteristics of the B883-001 high speed counter module.

What Is in This Chapter?

This chapter contains the following topics:

B883–001 High Speed Counter, Overview

Overview

The B883-001 high speed counter module consists of two separate and independent counters and associated logic, and controls up to three outputs. After being configured, the module can operate independently of the PC and react to external events faster than the PC scan time. The module counters have the following characteristic:

Counter #1 has bi-directional (up/down) count capability and has two inputs, two set points, a programmable maximum count, and two outputs. Counter 1 will also accept input from a quadrature type device such as an encoder.

Counter #2 is an up counter and has one input, a programmable maximum count, and one output.

Both counters accept pulsed inputs of 0 to 5, 0 to 12, or 0 to 24 Vdc at frequencies up to 50 KHz. the B883 options are selected by commands from the PC and by terminal wiring.

Counter #1 has three modes of operation. Counter #2 can accept input either from an external source or from one of two internal clocks. Both counters can be configured to operate in a wide variety of applications (refer to the section on programming the B883)

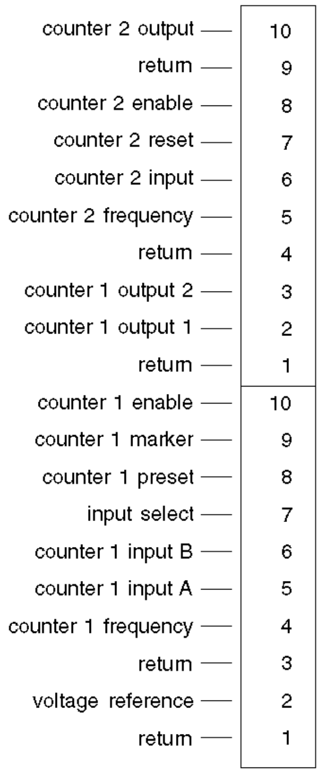
B883–001 High Speed Counter, Keying and Wiring

Overview

User connections are made to a standard screw terminal strip.The rigid wiring system permits module insertion or removal without disturbing the wiring.

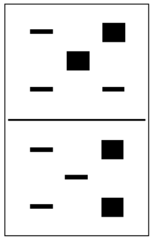
Terminal Numbering and Output Connections

The following diagram shows terminal numbering and output connections for the the B883-001 module.



Mechanical Keying

The following figure shows the keying for the the B883-001 module.



B883–001 High Speed Counter, Specifications

Specification Table

The following table provides the specifications for the unit.

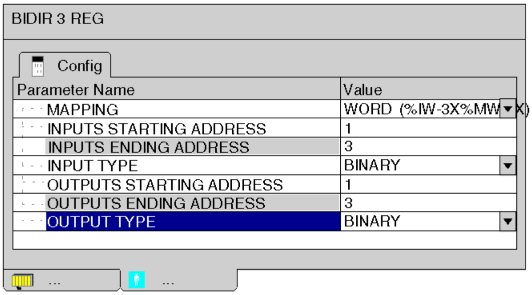
B883-001 Specifications		
Number of Counters		2
Number of Auxiliary Inputs		6
Number of Outputs		3
Operating voltage		5-24 Vdc
Overvoltage		Up to 30 Vdc
Power Required	+5 V	677 mA
	+4.3 V	0 mA
	-5 V	0 mA
Voltage Range	5 Vdc	2.4 to 5.5 Vdc
	12 Vdc	6 to 16 Vdc
	24 Vdc	12 to 32 Vdc
Transition	0 to 1	1 to 0
5 Vdc	2.4 Vdc	1.6 Vdc
12 Vdc	5.6 Vdc	4.0 Vdc
24 Vdc	11.2 Vdc	8.0 Vdc
Max Count Frequency		50 kHz
Ramp Time		7 V per sec
Topology: 2 counters/module	Counter 1	bidirectional up/down
	Counter 2	unidirectional up
Visual indicators	1 LED/output	"on" when output is on
	1 "field power" indicator	"on" when field power is present
	1 "active" indicator	"on" when good communication with PC
	1 "PWR" indicator	"on" when backplane power applied
Reference Type Inputs		Mapped as 48 bits input 1x or Mapped as 3 registers input 3x

B883-001 Specifications	
Reference Type Outputs	Mapped as 48 bits output 0x or Mapped as 3 registers output 4x
Output Type	BIN/BCD

B883–001 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	WORD (%IW-3X%MW-4X)	BIT (%I-1X%M-0X)
Inputs Starting Address	1	1
Inputs Ending Address	3	48
Input Type	BINARY	-
Outputs Starting Address	1	1
Outputs Ending Address	3	48
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type Inputs	Mapped as 48 bits input 1x or Mapped as 3 registers input 3x	Mapped as 48 bits input %Ix or Mapped as 3 words input %IWx
Reference Type Outputs	Mapped as 48 bits output 0x or Mapped as 3 registers output 4x	Mapped as 48 bits output %Mx or Mapped as 3 words output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 59
B883–101 and B883–111 CAM

Purpose

This chapter describes the functional and physical characteristics of the B883-101 and B883-111CAM modules.

What Is in This Chapter?

This chapter contains the following topics:

B883-101 and B883-111 CAM, Overview

Overview

The B883-111 CAM module with velocity compensation and the B883-101 CAM module are 800 series input/output (I/O) modules with added microprocessor control capabilities. These modules are used to automate the operation of metal shaping power presses for any mass production industry such as motor vehicle manufacture and assembly. Both models of the CAM module are physically indistinguishable and will be discussed as a single unit.

The CAM module receives a twelve-bit (plus control) parallel position code from an encoder. The module then transmits an eight-bit parallel control code to its discrete outputs based upon the received position data.

Operating instructions in command form are loaded into the module from a programmable controller by way of the I/O system. After the commands are loaded, position codes received by the module are processed and outputted by the CAM module at a 4.000 Hertz rate. This speed is in excess of the PC’s scan rate. A total of 16 output intervals may be defined and distributed at random among eight outputs.

CAM module inputs will be accepted in binary, binary coded decimal (BCD) or Gray code.

If your application requires velocity compensation, choose the B883-111 module. The B883-111 module compensates for changes in velocity.

B883–101 and B883–111 CAM, Keying and Wiring

Overview

User connections are made to a standard screw terminal strip.The rigid wiring system permits module insertion or removal without disturbing the wiring.

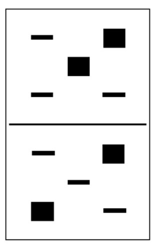
Terminal Numbering and Output Connections

The following diagram shows terminal numbering and output connections for the the B883-101and B883-111 modules.

Power Common	1	11	Field Power
O/P 1	2	12	NC
O/P 2	3	13	NC
O/P 3	4	14	NC
O/P 4	5	15	NC
NC	6	16	O/P 5
NC	7	17	O/P 6
NC	8	18	O/P 7
NC	9	19	O/P 8
Field Power	10	20	Power Common

Mechanical Keying

The following figure shows the keying for the the B883-101 and B883-111 modules.



B883–101 and B883–111 CAM, Specifications

Specification Table

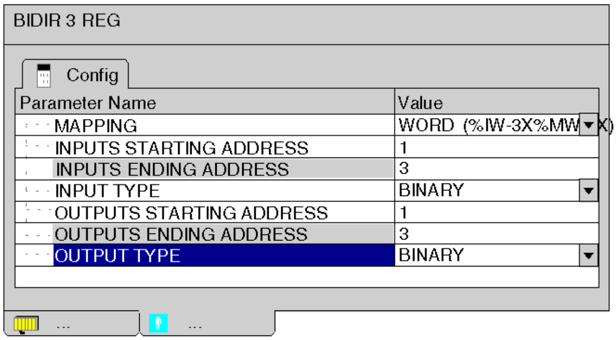
The following table provides the specifications for the unit.

B883-101 & B883-111 Specifications		
Number of Inputs		12
Number of Outputs		8
Supply Voltage		Max. 7 Vdc
Operating Voltage		20.4 - 28.8 Vdc 25 mA - 1.9 A
Maximum velocity		4000 counts/sec
Topology		8 positive true saturated switches per module (12 Bit TTL/CMOS input)
Power required	+ 5 V	1000 mA
	+ 4.3 V	0 mA
	- 5 V	0 mA
Visual indicators	1 active indicator	"on" when good communication with PC
	1 run indicator	"on" when in run mode
Reference Type Inputs		Mapped as 48 bits input 1x or Mapped as 3 registers input 3x
Reference Type Outputs		Mapped as 48 bits output 0x or Mapped as 3 registers output 4x
Output Type		BIN/BCD

B883–101 and B883–111 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	WORD (%IW-3X%MW-4X)	BIT (%I-1X%M-0X)
Inputs Starting Address	1	1
Inputs Ending Address	3	48
Input Type	BINARY	-
Outputs Starting Address	1	1
Outputs Ending Address	3	48
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type Inputs	Mapped as 48 bits input 1x or Mapped as 3 registers input 3x	Mapped as 48 bits input %Ix or Mapped as 3 words input %IWx
Reference Type Outputs	Mapped as 48 bits output 0x or Mapped as 3 registers output 4x	Mapped as 48 bits output %Mx or Mapped as 3 words output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 60
B883–200 Thermocouple Input Module

Purpose

This chapter describes the functional and physical characteristics of the B883-200 thermocouple input module.

What Is in This Chapter?

This chapter contains the following topics:

B883–200 Thermocouple Input, Overview

Overview

The B883-200 thermocouple input module is a smart I/O module that multiplexes up to ten thermocouples into three consecutive input registers of the control system.

Each B883-200 module provides reference junction temperature compensation, open circuit detection, and linearization for ten thermocouples. Also built-in are self-calibration, internal diagnostics, and 800-series bus diagnostics.

Any mix of type B, E, J, K, R, S, T or N thermocouple operations or simple −20 to +80 mV input operations may be set by the user under program control.

For the thermocouple inputs, the PLC can access individual temperature readings in degrees Centigrade, Fahrenheit or in compensated millivolts. Each time the PLC scans the B883-200 module, it receives the specified temperature or millivolt reading along with open-circuit and module health data. The thermocouple wire is terminated on a special isothermal connector assembly on the housing. Each B883-200 module uses three consecutive input registers and three output registers.

B883–200 Thermocouple Input, Keying and Wiring

Overview

User connections are made to a standard screw terminal strip.The rigid wiring system permits module insertion or removal without disturbing the wiring.

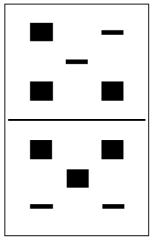
Terminal Numbering and Output Connections

The following diagram shows terminal numbering and output connections for the the B883-200 module.

nc	1	2	nc
therm 1+	3	4	therm 1–
1	5	6	therm 2+
therm 2–	7	8	2
therm 3+	9	10	therm 3–
3	11	12	therm 4+
therm 4–	13	14	4
nc	15	16	therm 5+
therm 5–	17	18	5
gnd	19	20	nc
cjc 2+	21	22	cjc 2–
therm 6+	23	24	therm 6–
6	25	26	therm 7+
therm 7–	27	28	7
therm 8+	29	30	therm 8–
8	31	32	therm 9+
therm 9–	33	34	9
nc	35	36	therm 10+
therm 10–	37	38	10
nc	39	40	nc

Mechanical Keying

The following figure shows the keying for the the B883-200 module.



B883–200 Thermocouple Input, Specifications

Specification Table

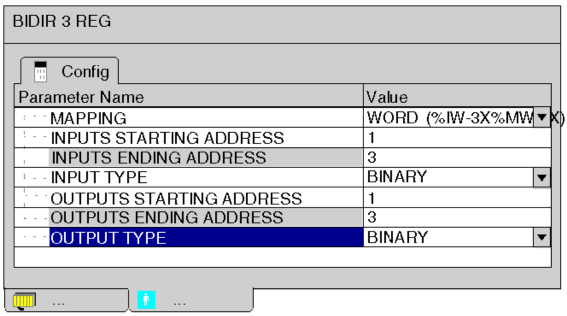
The following table provides the specifications for the unit.

B883-200 Specifications		
Description		Thermocouple input Type B,E,J,K,R,S,T,N or linear mV
Inputs per Modules		10
Max. Common Mode Voltage		200 Vdc/Vac (peak)
Resolution Under Program Control		1°C, 1°F, 10 mV 0.1°C, 0.1°F, 1 mV
Update Time		100 ms per selected channel 1 sec. max. all channels
Power-up Time		13 sec. max.
Warm-up Time		2 Min. max.
Interface to PC		3 output registers (4xxxx) 3 input registers (3xxxx) Junction CJC=cold
Power required	+ 5 V	400 mA
	+ 4.3 V	5 mA
	- 5 V	0 mA
Visual indicators compensation	1 "active" indicator	"on" when good comunication wirth PC
Reference Type Inputs		Mapped as 48 bits input 1x or Mapped as 3 registers input 3x
Reference Type Outputs		Mapped as 48 bits output 0x or Mapped as 3 registers output 4x
Output Type		BIN/BCD

B883–200 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	WORD (%IW-3X%MW-4X)	BIT (%I-1X%M-0X)
Inputs Starting Address	1	1
Inputs Ending Address	3	48
Input Type	BINARY	-
Outputs Starting Address	1	1
Outputs Ending Address	3	48
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type Inputs	Mapped as 48 bits input 1x or Mapped as 3 registers input 3x	Mapped as 48 bits input %Ix or Mapped as 3 words input %IWx
Reference Type Outputs	Mapped as 48 bits output 0x or Mapped as 3 registers output 4x	Mapped as 48 bits output %Mx or Mapped as 3 words output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 61
B883–201 RTD Input

Purpose

This chapter describes the functional and physical characteristics of the B883-201 RTD input module.

What Is in This Chapter?

This chapter contains the following topics:

B883–201 RTD Input, Overview

Overview

The B883-201 resistance temperature detector (RTD) module is a smart I/O module that multiplexes up to eight two- or three-wire RTDs into three consecutive input registers of a control system.

Each B883-201 module provides linearization for any mix of 8 RTDs. Also built-in are self-calibration, internal diagnostics, and 800-series bus diagnostics.

American standard platinum, European standard platinum per DIN, or linear resistance input can be selected by the user under program control.

When an RTD is selected, the PLC can access each individual temperature reading in Centigrade, Fahrenheit or in compensated millivolts. Each time the PLC scans the B883-201 module, it receives the specified temperature or millivolt reading along with open-circuit and module health data.

Each B883-201 uses three consecutive input registers and three output registers. These registers are assigned to the same slot within the channel.

B883–201 RTD Input, Keying and Wiring

Overview

User connections are made to a standard screw terminal strip.The rigid wiring system permits module insertion or removal without disturbing the wiring.

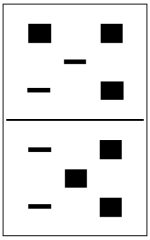
Terminal Numbering and Output Connections

The following diagram shows terminal numbering and output connections for the the B883-201 module.

nc	1	2	nc
nc	3	4	nc
nc	5	6	nc
nc	7	8	ex 1 hi
sense 1 hi	9	10	ex 1 lo
shield 1	11	12	ex 2 hi
sense 2 hi	13	14	ex 2 lo
shield 2	15	16	ex 3 hi
sense 3 hi	17	18	ex 3 lo
shield 3	19	20	ex 4 hi
sense 4 hi	21	22	ex 4 lo
shield 4	23	24	ex 5 hi
sense 5 hi	25	26	ex 5 lo
shield 5	27	28	ex 6 hi
sense 6 hi	29	30	ex 6 lo
shield 6	31	32	ex 7 hi
sense 7 hi	33	34	ex 7 lo
shield 7	35	36	ex 8 hi
sense 8 hi	37	38	ex 8 lo
shield 8	39	40	gnd

Mechanical Keying

The following figure shows the keying for the the B883-201 module.



B883–201 RTD Input, Specifications

Specification Table

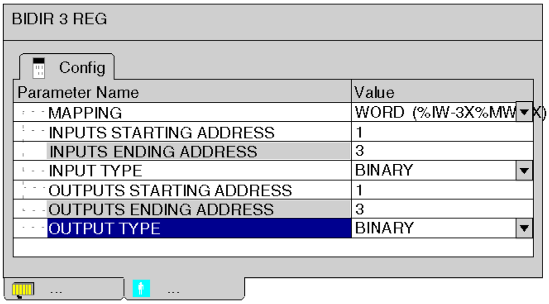
The following table provides the specifications for the unit.

B883-201Specifications		
Description		RTD input American or European 100 ΩPlatinum
Inputs per Module		8
Max. Common Mode Voltage		7 Vdc/Vac (peak)
Resolution Under Program Control		1°C, 1°F, 10Ω 0.1°C, 0.1°F, 1Ω
Update Time		125 ms per selected channel 1 sec. max. all channels
Power-up Time		13 sec. max.
Warm-up Time		2 min. max.
Interface to PC		3 output registers (4xxxx) 3 input registers (3xxxx)
Power required	+ 5 V	640 mA
	+ 4.3 V	5 mA
	- 5 V	0 mA
Visual indicators	1 active indicator	"on" when good comunication with PC For 2 wire RTD short and excitation
Reference Type Inputs		Mapped as 48 bits input 1x or Mapped as 3 registers input 3x
Reference Type Outputs		Mapped as 48 bits output 0x or Mapped as 3 registers output 4x
Output Type		BIN/BCD

B883–201 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	WORD (%IW-3X%MW-4X)	BIT (%I-1X%M-0X)
Inputs Starting Address	1	1
Inputs Ending Address	3	48
Input Type	BINARY	-
Outputs Starting Address	1	1
Outputs Ending Address	3	48
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type Inputs	Mapped as 48 bits input 1x or Mapped as 3 registers input 3x	Mapped as 48 bits input %Ix or Mapped as 3 words input %IWx
Reference Type Outputs	Mapped as 48 bits output 0x or Mapped as 3 registers output 4x	Mapped as 48 bits output %Mx or Mapped as 3 words output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 62
B884–002 PID

Purpose

This chapter describes the functional and physical characteristics of the B884-002 PID module.

What Is in This Chapter?

This chapter contains the following topics:

B884–002 PID, Overview

Overview

The B884-002 PID module provides two completely independent and separate Proportional Integral Derivative (PID) loops. You can configure the PID loops for control strategies including open loop, closed loop, PID, PID on error squared and cascade control.

You configure the PID module using a configuration program (Part #SW-BDD-3DA) on an IBM or compatible personal computer. You can download the data either through the PLC or directly to the modules, where it is stored in a non-volatile EEPROM memory.

To ensure the highest accuracy and reliability, the module has fully floating, isolated and protected inputs and outputs. The module has seven independently configured analog inputs (4 voltage/current, 2 thermocouple, 1 frequency), two analog outputs, two discrete inputs and two discrete outputs. Each loop is assigned two voltage and one thermocouple inputs.

There is no need for any analog adjustments such as trimpots for zero, offset, or span, which results in superior accuracy, stability and reliability.

B884–002 PID Control, Keying and Wiring

Overview

User connections are made to a standard screw terminal strip.The rigid wiring system permits module insertion or removal without disturbing the wiring.

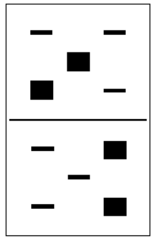
Terminal Numbering and Output Connections

The following diagram shows terminal numbering and output connections for the the B884-002 module.

RS422 TXD–	1	2	RS422 TXD+
RS422 RXD–	3	4	RS422 RXD+
RS232 Rx	5	6	RS232 Tx
RS232 RTS	7	8	RS232 CTS
RS422 En L	9	10	Signal GND
A Out 1+	11	12	A Out 1 Com
A Out 2+	13	14	A Out 2 Com
NC	15	16	Disc In 1
Disc In 2	17	18	Disc Out 1
Disc Out 2	19	20	24 VDC Com
24 VDC +	21	22	24 VDC Com
Power In +	23	24	Power In Com
TC Bypass	25	26	NC (CJC)
NC (CJC)	27	28	THERM 1+
THERM 1–	29	30	THERM 2+
THERM 2–	31	32	A V/I 1+
A V/I 1–	33	34	A V/I 2+
A V/I 2–	35	36	A V/I 3+
A V/I 3–	37	38	A V/I 4+
A V/I 4–	39	40	NC

Mechanical Keying

The following figure shows the keying for the the B884-002 module.



B884–002 PID Control, Specifications

Specification Table

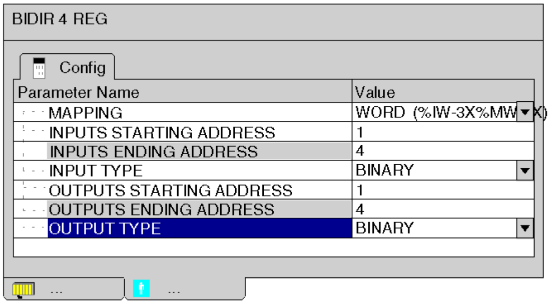
The following table provides the specifications for the unit.

B884-002 Specifications		
Description		PID Control Module
External power supply requirements		24 Vdc +/- 20% at 0.3 A
Algorithms		P, PI, PD, PID
Topology		4 analog inputs 2 thermocouple inputs 1 pulse input 2 discrete inputs 2 analog outputs 2 discrete outputs
Interface to PC		4 output registers (4xxxx) 4 input registers (3xxxx) A=analog)
Power required	+ 5 V	25 - 50 mA
	+ 4.3 V	2 mA
	- 5 V	0 mA
Visual indicators	1 "active" indicator	"on" when good communication with PC
Reference Type Inputs		Mapped as 64 bits input 1x or Mapped as 4 registers input 3x
Reference Type Outputs		Mapped as 64 bits output 0x or Mapped as 4 registers output 4x
Output Type		BIN/BCD

B884–002 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	WORD (%IW-3X%MW-4X)	BIT (%I-1X%M-0X)
Inputs Starting Address	1	1
Inputs Ending Address	4	64
Input Type	BINARY	-
Outputs Starting Address	1	1
Outputs Ending Address	4	64
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type Inputs	Mapped as 64 bits input 1x or Mapped as 4 registers input 3x	Mapped as 64 bits input %Ix or Mapped as 4 words input %IWx
Reference Type Outputs	Mapped as 64 bits output 0x or Mapped as 4 registers output 4x	Mapped as 64 bits output %Mx or Mapped as 4 words output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 63
B885–002 ASCII / BASIC

Purpose

This chapter describes the functional and physical characteristics of the B885-002 ASCII / BASIC module.

What Is in This Chapter?

This chapter contains the following topics:

B885–002 ASCII / BASIC, Overview

Overview

The B885-002 ASCII / BASIC module runs user-written BASIC programs independently of the controller's memory logic and scan. It also performs READ and WRITE commands to and from serial devices connected to either of the module's two RS 232/422 ports (jumper selectable). In addition, its real-time clock/calendar allows the module to run a BASIC program or flag and return a value to the PLC at a user specified date and time.

The module provides report generation, interactive operator interface, high level math, peripheral communication and data storage.

Using a dumb terminal or an IBM personal computer with Emulator Software (Part # SW-E885-1DA), you program the module's 53K of user memory. If you need more memory, you may provide an additional 32K of user EPROM. You can designate part of the memory as retentive variable memory to store formulas or other process parameters.

B885–002 ASCII / BASIC, Keying and Wiring

Overview

User connections are made to a standard screw terminal strip.The rigid wiring system permits module insertion or removal without disturbing the wiring.

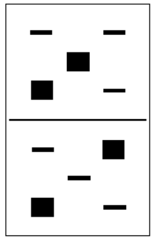
Terminal Numbering and Output Connections

The following diagram shows terminal numbering and output connections for the the B885-002 module.

1	N/A	Protective GND
2	OUT	RS232 Send
3	IN	RS232 Receive
4	OUT	RS232 RTS
5	IN	RS232 CTS
6	IN	RS232 DSR
7	N/A	RS232 & RS422
8	CD*	Common
12	OUT	RS422 RTS high
13	OUT	RS422 RTS low
14	OUT	RS422 SD high
15	OUT	RS422 SD low
16	IN	RS422 CTS low
17	IN	RS422 CTS high
18	OUT	+5 V
19	IN	Select Input RS 422
20	OUT	RS232 DTR
21	IN	RS422 RD high
25	IN	RS422 RD low

Mechanical Keying

The following figure shows the keying for the the B885-002 module.



B885–002 ASCII / BASIC, Specifications

Specification Table

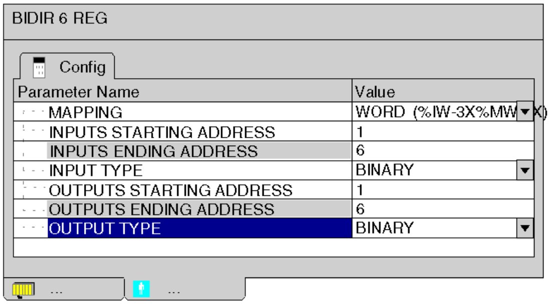
The following table provides the specifications for the unit.

B885-002 Specifications		
Description		ASCII/Basic 64 k RAM, 2 RS232/422 Ports
Interface to PC		6 input registers (3xxxx) 6 output registers (4xxxx)
Carrier detect (CD)		For RS232 leave pins 18 and 19 unconnected For RS422 connect pins 18 and 19
Power Required	RS 422 mode	RS 232 mode
+ 5 Vdc	500 mA	400 mA
+ 4.3 Vdc	1760 mA	1000 mA
- 5 Vdc	0 mA	0 mA
Visual indicators	1 "active" indicator	"on" when good communication with PC
	2 "port" indicators	"on" when active communications
	1 "battery ok" indicator	"on" when battery is ok
	1 "run" indicator	
	1 "power ok" indicator	
Reference Type Inputs		Mapped as 96 bits input 1x or Mapped as 6 registers input 3x
Reference Type Outputs		Mapped as 96 bits output 0x or Mapped as 6 registers output 4x
Output Type		BIN/BCD

B885–002 Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	WORD (%IW-3X%MW-4X)	BIT (%I-1X%M-0X)
Inputs Starting Address	1	1
Inputs Ending Address	6	96
Input Type	BINARY	-
Outputs Starting Address	1	1
Outputs Ending Address	6	96
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type Inputs	Mapped as 96 bits input 1x or Mapped as 6 registers input 3x	Mapped as 96 bits input %Ix or Mapped as 6 words input %IWx
Reference Type Outputs	Mapped as 96 bits output 0x or Mapped as 6 registers output 4x	Mapped as 96 bits output %Mx or Mapped as 6 words output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 64
Module B885-1xx Motion Modules

Purpose

This chapter describes the functional and physical characteristics of the B885-1xx motion modules.

What Is in This Chapter?

This chapter contains the following topics:

Module B885-1xx, Motion Modules, overview

Overview

B885-1xx motion modules are high performance, single axis servo motion controllers contained in a single-width 800-Series I/O module. They are designed to plug directly into the I/O rack of the 984 PLC, although they are capable of standalone operation.

The modules use Schneider Automation's patented Direct Numerical Processing (DNP) technology. Advanced digital brushless motion control eliminates potentiometer adjustments and analog velocity loops for optimal control.

The B885-100 / B885-101 module uses a resolver to provide feedback for the position, velocity, and commutation of the motor. Essentially, a rotary brushless transformer that provides absolute position information to the motion module, the resolver gives the module a high degree of noise immunity.

The B885-110 / B885-111 module additionally has two quadrature encoder interfaces for extra position and velocity feedback.

Control communication interface to the B885-1xx modules can be either through the 800 I/O system backplane or the Modbus/RS-232 serial port. The module is designed to work directly with the Cyberline 1000 series brushless servo amplifiers as well as those of third-party vendors.

The PLC communicates with the motion modules through six input and six output registers with the control instructions providing a powerful, smooth and fast link between the two. Adjustable command buffering and direct register to function bits provide added communication speed for high response functions.

Motion programs, developed using MMDS, are either stored directly in the flash memory of the motion module or as registers in the PLC. The Motion Development Software (MMDS) is an on-line/ off-line, menu driven package (Part # SW-MMDS-1DB) for the IBM-AT or compatible computers. It enables the user to set up, program, operate and diagnose operation of the motion module. The program and file manipulation features are a versatile system for application management. The MMDS communicates via a computer serial port to the Modbus port on the motion module.

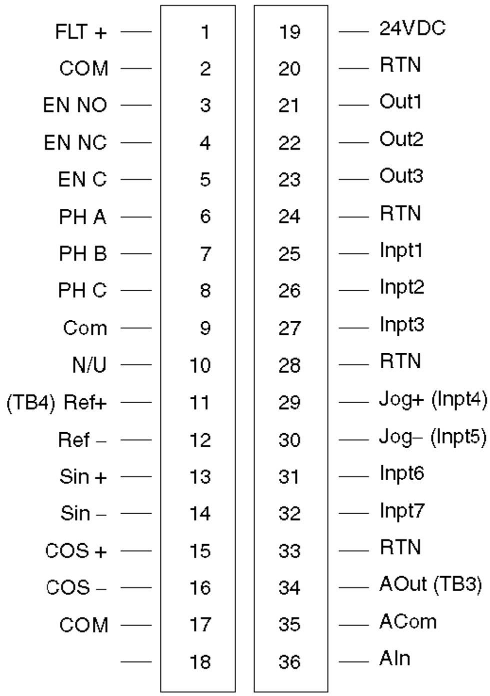
Module B885-1xx, Motion Modules, Keying and Wiring

Overview

User connections are made to a standard screw terminal strip.The rigid wiring system permits module insertion or removal without disturbing the wiring.

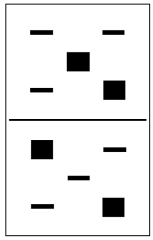
Terminal Numbering and Output Connections

The following diagram shows terminal numbering and output connections for the B885-1xx module.



Mechanical Keying

The following figure shows the keying for the B885-1xx module.



Module B885-1xx, Motion Modules, Specifications

Specification Table

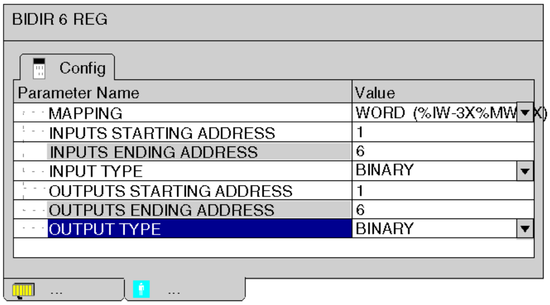
The following table provides the specifications for the unit.

B885-1••Specifications		
Voltage Range		24 Vdc
Topology		6 Inputs 6 Outputs
Resolver Feedback		Resolution 10-65535
Digital inputs		7, +drv fault input
Digital outputs		3, +drv enable COM
Analog output		+/- 10 V, 5 mA, 12 bit resolution
Analog input		+/- 10 V, 10 bit resol.
Power required	+ 5 V	25 mA
	+ 4.3 V	0 mA
	- 5 V	0 mA
System accuracy	Typical	+/- 6 arcminutes
	Worst case	+/- 10 arcminutes
Reference Type Inputs		Mapped as 96 bits output 1x or Mapped as 6 registers input 3x
Reference Type Outputs		Mapped as 96 bits output 0x or Mapped as 6 registers output 4x
Output Type		BIN/BCD

Module B885-1xx Parameter Configuration

Parameter and Default Values

Parameter configuration window



Module configuration

Parameter Name	Default Value	Value (Options Available)
Mapping	WORD (%IW-3X%MW-4X)	BIT (%I-1X%M-0X)
Inputs Starting Address	1	1
Inputs Ending Address	6	96
Input Type	BINARY	-
Outputs Starting Address	1	1
Outputs Ending Address	6	96
Output Type	BINARY	BCD

Mapping parameter references

	Modsoft, Concept, ProWORX	Control Expert
Reference Type Inputs	Mapped as 96 bits input 1x or Mapped as 6 registers input 3x	Mapped as 96 bits input %Ix or Mapped as 6 words input %IWx
Reference Type Outputs	Mapped as 96 bits output 0x or Mapped as 6 registers output 4x	Mapped as 96 bits output %Mx or Mapped as 6 words output %MWx
Output Type	BIN/BCD	BIN/BCD

Chapter 65
Modules 3240 4 Axis and 3220 8 Axis Servo Motion Control Module

Purpose

This chapter describes the functional and physical characteristics of the 3240 4 axis and 3220 8 axis servo motion control module.

What Is in This Chapter?

This chapter contains the following topics:

Module 3240 4 Axis Servo Motion Control Module, Specification

Specification Table

The 3240 motion control module is used for program applications which require control of two to four axes of motion.

The following table provides the specification for the unit.

3240 Motion Control Module Specifications	
Positioning accuracy Typical Worst Case	 +/- 5 arc minutes +/- 9 arc minutes
Position repeatability	+/- 3 arc minutes
Absolute positioning range	> +/- 130,000 revolutions
Position resolution range	10 to 16,384 per revolution
Speed resolution range	> 1,000,000 to 1; software dependent
Inputs	"T" type brushless resolver for position, velocity, commutation control Home, CW limit, CCW limit, drive fault 10-27 Vdc; 2.7K nominal Impedance
Outputs	3 phase bipolar commutated current command compatible with Cyberline drives, or Bipolar current command for DC or hydraulic drives.
Enable Output	24 Vdc max., 0.5 A
No. Axes supported	4
Power Reqirements	115 Vdc +/- 10% (230 Vac +/- 10% optional) 60 Hz (50 Hz optional)
I/O points/serial ports	4 serial ports, up to 30 discrete I/O

Module 3220 8 Axis Servo Motion Control Module, Specification

Specification Table

The 3220 motion control module is used for program applications which require control of one to eight axes of motion. It has advanced motion diagnostics.

The following table provides the specification for the unit.

3220 Motion Control Module Specifications	
Positioning accuracy Typical Worst Case	 +/- 4 arc minutes +/- 8 arc minutes
Position repeatability	+/- 2 arc minutes
Absolute positioning range	> +/- 130,000 revolutions
Position resolution range	10 to 16,384 per revolution
Speed resolution range	> 1,000,000 to 1; software dependent
No. Axes supported	8
Profiling	500 point
Servo characteristics	set in software
Servo Feedback	"R" type brushless resolver for position, velocity, commutation control
Servo Inputs	Home, CW limit, CCW limit, drive fault 11-15 Vdc; 1K nominal Impedance
Servo Outputs	3 phase bipolar commutated current command compatible with Cyberline drives, or Bipolar current command for DC or hydraulic drives
Enable Output	Drive enable output, 24 Vdc max., open collector, 250 mA max.
Power Reqirements	115 Vdc +/- 10% (220 Vac +/- 10% optional) 60 Hz (50 Hz optional)
I/O points/serial ports	48 inputs / 48 outputs with 2 serial ports or 32 inputs / 32 outputs with 4 serial ports

Chapter 66
Modules 410 Single Axis Motion Control Module

Module 410 Single Axis Motion Control Module, Specification

General Characteristics

The 410 combines logic, I/O control, motion control, and drive in a single unit. It provides a complete set of control functions, math, conditionals and subroutines for programs up to 500 steps.

There are 5 models:

Model	Cont. O/P	Peak O/P	Cont. O/P	Peak O/P
410-0	5A AC	7A AC	5A DC	10A DC
410-1	10A AC	14A AC	10A DC	20A DC
410-2	20A AC	28A AC	20A DC	40A DC
410-3	30A AC	42A AC	30A DC	60A DC
410-4	60A AC	84A AC	60A DC	120A DC

Specification Table

The following table provides the specification for the unit.

410 Motion Control, Specifications	
Positioning accuracy normalized	
Typical	+/- 8 arc minutes
Worst Case	+/- 12 arc minutes
Position repeatability	+/- 4 arc minutes
Absolute positioning range	> +/- 130,000 revolutions
Position resolution range	10 to 16,384 per revolution
Speed resolution range	> 1,000,000 to 1
Servo characteristics	set in software
Feedback	"T" type brushless resolver for position, velocity, commutation
Digital input types	+/- End-of-travel and home limits, inhibit input, 4 user inputs 10-27 Vdc, 6.6k nominal impedance
Digital output types	Fault output, 4 user defined outputs 27 Vdc, open collector, 100 mA per channel

410 Motion Control, Specifications	
Analog Inputs (+/-10 Vdc) Channels Resolution	 2 user defined (channel 1, velocity loop input) 11-bit
Analog Outputs (+/-10 Vdc) Channels Resolution	 2 user defined (defaults to tachometer and current command monitor) 8-bit

Part IV
800 Series I/O Modules Configuration

At a Glance

This part provides a detailed description of how to configure Control Expert to include the 800 series modules in a system.

What Is in This Part?

This part contains the following chapters:

Chapter 67
800 Series I/O Modules Configuration

Configuring 800 Series I/O Modules with Control Expert

Introduction

To configure a series 800 I/O module under Control Expert, configure a RIO drop, which contains I/O modules. The following description gives you step by step instructions to implement and configure series 800 I/O modules with Control Expert system.

Adding a RIO Bus

To add an RIO Bus

Step	Action	Comment
1	From the Project Browser "Configuration" tree, open the local rack	The graphical representation of the local rack opens.
2	Double-click an empty slot in the rack where you want to place your RIO head.	The "New Device" dialog window opens.
3	Open the "Communication" tree and double-click on the 140 CRP 93X 00 module.	The RIO head module is added to the local rack. In the Project Browser "Configuration" tree the "RIO bus" is automatically added.

Adding a 800 I/O Drop

To add an 800 I/O Drop

Step	Action	Comment
1	From the Project Browser "Configuration" tree, double-click the "RIO bus"	The graphical representation of the RIO bus opens.
2	Double-click an empty node of the RIO bus	The "New Device" dialog window opens.
3	In the "New Device" dialog window, select both the appropriate rack from the "800 IO Drop" tree and a "Drop-end communicator" module.	A new 800 I/O rack containing a communication module is added to your RIO bus.
4	Click OK.	

Adding a 800 I/O Module

To add a new I/O module to your RIO Drop

Step	Action	Comment
1	From the "RIO Bus" configuration window, double-click an empty slot in the rack where you want to place your I/O module.	The "New Device" dialog window opens.
2	From the "New Device" window, open the list of analog or discrete modules and double-click on the appropriate module.	The I/O module is added to the rack.

Configuring a Module

To configure an I/O module,

1. Double click on the module.

When the configuration window opens, enter the following parameters:

Parameter Name	Description
MAPPING	Define whether access is either 1. Bits (%I-1x, %M-0x) 2. Words (%IW-3x, %MW-4x)
INPUTS STARTING ADDRESS	In the address type, as defined by the MAPPING parameter, enter the starting address of the input data.
INPUTS ENDING ADDRESS	Parameter automatically calculated by the system.
OUTPUTS STARTING ADDRESS	In the address type, as defined by the MAPPING parameter, enter the starting address of the output data.
OUTPUTS ENDING ADDRESS	Parameter automatically calculated by the system.
OUTPUT TYPE	Define whether data value is interpreted either as 1. BINARY 2. BCD

Converting Direct Address Notation

Use the following table to convert 984LL notation to IEC notation.

Outputs and Inputs	984LL Notation Register Addresses	IEC Notation		
		System Bits and Words	Memory Addresses	I/O Addresses
output	0x	System Bit	%Mx	%Qx
input	1x	System Bit	%Ix	%Ix
input	3x	System Word	%IWx	%IWx
output	4x	System Word	%MWx	%QWx

Chapter 68
800 Series I/O Modules with Control Expert Addressing Modes

Purpose

To allow an easy transition from the register addressing (3x, 4x) of 984LL to the IEC addressing modes used in Control Expert, this chapter describes

- Flat Addressing
- Topological Addressing

NOTE: Topological addresses overlapping (%IWr.m.c) is not supported by Quantum application, use flat addressing (%IWx) when memory overlapping control is needed.

What Is in This Chapter?

This chapter contains the following topics:

Flat Addressing—800 Series I/O Modules

Introduction

800 series I/O modules follow a system of flat address mapping in Control Expert. To work properly. each module requires a determinate number of bits and/or words. The IEC addressing system is equivalent to the 984LL register addressing. Use the following assignments:

- 0x is now `%Mx`
- 1x is now `%Ix`
- 3x is now `%IWx`
- 4x is now `%MWx`

The following table shows the relationship between 984LL notation and IEC notation.

Outputs and Inputs	984LL Notation Register Addresses	IEC Notation		
		System Bits and Words	Memory Addresses	I/O Addresses
output	0x	System Bit	%Mx	%Qx
input	1x	System Bit	%Ix	%Ix
input	3x	System Word	%IWx	%IWx
output	4x	System Word	%MWx	%QWx

To access the I/O data of a module,

Step	Action
1	Enter the address range in the configuration screen.

Examples

The following examples show the relationship between 984LL register addressing and IEC addressing:

000001 is now `%M1`

100101 is now `%I101`

301024 is now `%IW1024`

400010 is now `%MW10`

Topological Addressing—800 Series I/O Modules with Control Expert

Accessing I/O Data Values

Use topological addressing to access I/O data items. Identify the topological location of the module within an 800 series I/O module with Control Expert using the following notation:

`%<Exchangetype><Objecttype>[\b.e\]r.m.c[.rank]`

where:

- **b** = bus
- **e** = equipment (drop)
- **r** = rack
- **m** = module slot
- **c** = channel

NOTE: When addressing,
1. The [\b.e\] defaults to \1.1\ in a local rack and does not need to be specified.
2. The rank is an index used to identify different properties of an object with the same data type (value, warning level, error level).
3. The rank numbering is zero-based, and if the rank is zero, omit the entry.

For detailed information on I/O variables, please refer to the *EcoStruxure™ Control Expert, Program Languages and Structure, Reference Manual*.

Reading Values: An Example

To read	Action
input value (rank = 0) from channel 7 of an analog module located in slot 6 of a local rack:	Enter `%IW1.6.7[.0]`
input value (rank = 0) from channel 7 of an analog module located in slot 6 of drop 3 of RIO bus 2:	Enter `%IW\2.3\1.6.7[.0]`
'out of range' value (rank = 1) from channel 7 of an analog module located in slot 6 of a local rack:	Enter `%I1.6.7.1[.0]`

Addressing Example—800 Series I/O Modules with Control Expert

Analog Module

The following example compares the 2 possible addressing modes. An 8-channel analog input module B875-200 with the following configuration data is used:

- mounted in slot 5 of the RIO rack #3 located at drop 4 on bus 2
- starting input address is 201 (input word %IW201)
- end input address is 208 (input word %IW208)

To access the I/O data from the module you can use the following syntax:

Module data	Flat addressing	Topological addressing	Concept addressing
Channel 3	%IW203	%IW\2.4\3.5.3	300203

For comparison, the register addressing as used with concept is added in the last column.

Discrete Module

The following example compares the 2 possible addressing modes. An 32-channel discrete output module B838-032 with the following configuration data is used:

- mounted in slot 4 of the RIO rack #3 located at drop 4 on bus 2
- starting output address is 101 (output word %MW101)
- end output address is 102 (output word %MW102)

To access the I/O data from the module you can use the following syntax:

Module data	Flat addressing	Topological addressing	Concept addressing
Output 5	%MW101.11	%QW\2.4\3.4.1.1.11	300101
Output17	%MW102.15	%QW\2.4\3.4.1.2.15	300102

For comparison, the register addressing as used with concept is added in the last column. As concept does not support direct addressing of a bit in a word, the bit extraction has to be performed in the user program.

The same configuration as before but data mapped into bits:

- mounted in slot 4 of the RIO rack #3 located at drop 4 on bus 2
- starting output address is 1 (output %M1)
- end output address is 32 (output %M32)

To access the I/O data from the module you can use the following syntax:

Module data	Flat addressing	Topological addressing	Concept addressing
Output 5	%M5	%Q\2.4\3.4.5	000005
Output17	%M17	%Q\2.4\3.4.17	000017

For comparison, the register addressing as used with Concept is added in the last column.

Appendices

Overview

The materials in this appendix describe:

- the replacement of existing 800 remote I/O adapters with Schneider Electric ASP890300 remote I/O processor
- procedures for the reflash of executive software in the Schneider Electric ASP890300 remote I/O processor
- installation requirements for 800 series I/O modules bearing the CE mark

What Is in This Appendix?

The appendix contains the following chapters:

Appendix A
ASP890300 Universal Hardware Upgrade Guide

Purpose

The purpose of this chapter is to assist users in the physical replacement of existing 800 I/O Remote Adapters with the Schneider Electric ASP890300 Remote I/O Processor.

Existing Remote I/O system installations may utilize obsolete taps (MA-0185-000, Revision B or lower). The minimum revision taps that should be used are Revision C or higher. Any revision MA-0185-100 tap may be used. Refer to Section 3.6 of the *Remote I/O Cable System Planning and Installtion Guide* (890 USE 101 00) for more information.

What Is in This Chapter?

This chapter contains the following topics:

Replacement of AS-P89X-000 Adapters

Overview

The ASP890300 is backplane compatible with AS-P890-000 and AS-P892-000 installations. The AC power and ASCII port connections are different.

AC Power Connector Rewiring

Rewiring is required to accommodate a 5 terminal connector that includes a 115/230 VAC jumper selection option as opposed to the switch selectable option in the original units. Rewiring requires a small slotted screwdriver.

⚠ DANGER

ELECTRIC SHOCK

Connect the module grounding terminal to the protective ground, using a green/yellow wire.

Failure to follow these instructions will result in death or serious injury.

ASCII Port Connector

Pin 1 on the P892 is chassis ground. Pin 1 on the ASP890300 ASCII port connector is not used. The connector shell is chassis ground.

Replacement of AS-J89X-X0X Adapters

Overview

The ASP890300 is **not physically compatible** if installations use the following adapter models.

AS-J890-001	AS-J892-001
AS-J890-002	AS-J892-002
AS-J890-101	AS-J892-101
AS-J890-102	AS-J892-102

In these installations, you will need to:

- replace the primary backplanes (housings)
- perform power calculations to determine if additional supplies are needed (see *I/O Module Current Requirements, page 624*)
- consider backplane interconnection cables
- review ASCII port and coaxial cable connection

Primary Backplane Replacement

ASP890300 modules are compatible with:

- AS-H810-208 (10", ASP890300 plus three I/O modules)*
- AS-H810-209 (10", ASP890300 plus three I/O modules)*
- AS-H819-209 (19", ASP890300 plus six I/O modules)
- AS-H827-209 (27", ASP890300 plus ten I/O modules)

*Repair/service exchange only.

Power Considerations

If the primary backplane power requirements exceed the ASP890300 capabilities, enough I/O modules must be removed from the primary backplane to bring the current load within specified limits. In this case, an additional backplane and power supply will need to be added in the configuration unless the extra modules can be added to an existing powered backplane. For further reference, see *Power Supply Capacities in Remote Drop Secondary Applications, page 623* and *I/O Module Current Requirements, page 624*.

Secondary backplanes AS-H819-100 and AS-H827-100 support 7 and 11 I/O modules, respectively. Subtract two modules if power supplies need to be added.

Backplane Interconnection Cables

See *Backplane Interconnection Diagrams, page 620* for appropriate configurations.

ASCII Port Pinout Comparison

The following table shows how the ASCII port pinouts are used on the J892 and ASP890300.

Terminal	J892 (25 pin)	ASP890300 (9 pin)
1	Shield	Not Used
2	TXD	RXD
3	RXD	TXD
4	RTS	DTR
5	CTS	SGND
6	DSR	DSR
7	Ground	RTS
8	Not Used	CTS
20	DTR	N/A

- The ASP890300 connector shell is chassis ground.

Coaxial Cable Interconnection/Terminations

AS-J89X-00X Remote I/O Adapters - These have BNC type connectors which are not compatible with the F style connections on ASP890300 modules. Installers may use BNC Jack to Male "F" Connector Adapters, part number 52-0724-000. The external 75Ω terminator added in series with the coax drop cable must be removed as the ASP890300 is terminated internally.

AS-J890-10X Remote I/O Adapters are compatible in this respect. They have "F" type coaxial cable connectors and are terminated internally.

Replacement of AS-J81X-000 Adapters

Overview

NOTE: You are reminded the ASP890300 is not compatible with J200 or S901 RIO heads that communicate with J810/J812 modules. Use of the ASP890300 requires the use of an S908 or CRP type RI/O head.

The ASP890300 is not physically compatible if installations use the following adapter models:

AS-J810-000	AS-J812-000

In these installations, you will need to:
- replace the primary backplanes (housings)
- perform power calculations to determine if additional supplies are needed (see *I/O Module Current Requirements, page 624*)
- consider backplane interconnection cables
- review ASCII Port and coaxial cable connections

Primary Backplane Replacement

ASP890300 modules are compatible with:
- AS-H810-208 (10", ASP890300 plus three I/O modules)*
- AS-H810-209 (10", ASP890300 plus three I/O modules)*
- AS-H819-209 (19", ASP890300 plus six I/O modules)
- AS-H827-209 (27", ASP890300 plus ten I/O modules)

*Repair/service exchange only.

Power Considerations

If the primary backplane power requirements exceed the ASP890300 capabilities, enough I/O modules must be removed from the primary backplane to bring the current load within specified limits. In this case, an additional backplane and power supply will need to be added in the configuration unless the extra modules can be added to an existing powered backplane. For further reference, see *Power Supply Capacities in Remote Drop Secondary Applications, page 623* and *I/O Module Current Requirements, page 624*.

Secondary backplanes AS-H819-100 and AS-H827-100 support 7 and 11 I/O modules, respectively. Subtract two modules if power supplies need to be added.

Backplane Interconnection Cables

See *Backplane Interconnection Diagrams, page 620* for appropriate configurations.

ASCII Port Pinout Comparison

The following table shows how the ASCII port pinouts are used on the J812 and ASP890300.

Terminal	J812 (25 pin)	ASP890300 (9 pin)
1	GND	Not Used
2	TXD	RXD
3	RXD	TXD
4	RTS	DTR
5	CTS	SGND
6	DSR	DSR
7	SGND	RTS
8	Not Used	CTS
20	DTR	N/A

- The ASP890300 connector shell is chassis ground.

Coaxial Cable Interconnection/Terminations

These have BNC type connectors which are not compatible with the F style connections on ASP890300 modules. Unless otherwise accommodated, installers may use BNC Jack to Male "F" Connector Adapters, part number 52-0724-000.

Replacement of Slot Mount PLCs

Compatibility

The ASP890300 is backplane compatible with Slot Mount PLC installations. These include:

- PC-0984-380/1/5; PC-E984-381/5
- PC-0984-480/5; PC-E984-480/5
- PC-0984-680/5; PC-E984-685
- PC-0984-780/5; PC-E984-785

AC Power Connector Rewiring

Rewiring is required to accommodate one 2 terminal and one 3 terminal connector, which include a 115/230VAC jumper selection option as opposed to the switch selectable option in the original units. Rewiring requires a small slotted screwdriver.

⚠ DANGER

ELECTRIC SHOCK

Connect the module grounding terminal to the protective ground, using a green/yellow wire.

Failure to follow these instructions will result in death or serious injury.

Power Considerations

If replacing high end slot mount PLCs: Both +5VDC I/O power and the Combined load in PC-0984-680/5s and PC-0984-780/5s are rated 1A higher than the ASP890300. If the Primary backplane power requirements exceed the ASP890300 capabilities, enough I/O modules must be removed from the primary backplane to bring the current load within specified limits. In this case, an additional backplane and power supply will need to be added in the configuration unless the extra modules can be added to an existing powered backplane. See *I/O Module Current Requirements, page 624* and *Power Supply Capacities in Remote Drop Secondary Applications, page 623*.

Secondary backplanes AS-H819-100 and AS-H827-100 support 7 and 11 I/O modules, respectively. Subtract two modules if power supplies need to be added.

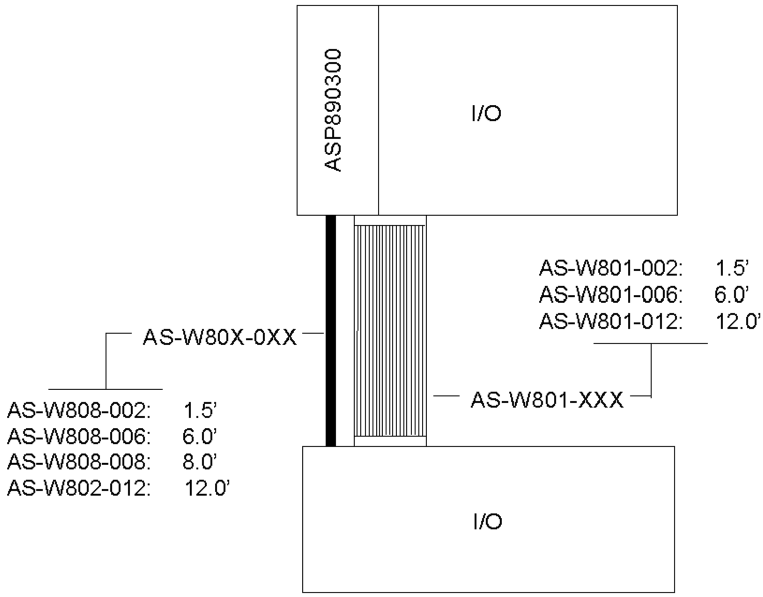
Backplane Interconnection Cables

For more information, see *Backplane Interconnection Diagrams, page 620*

Backplane Interconnection Diagrams

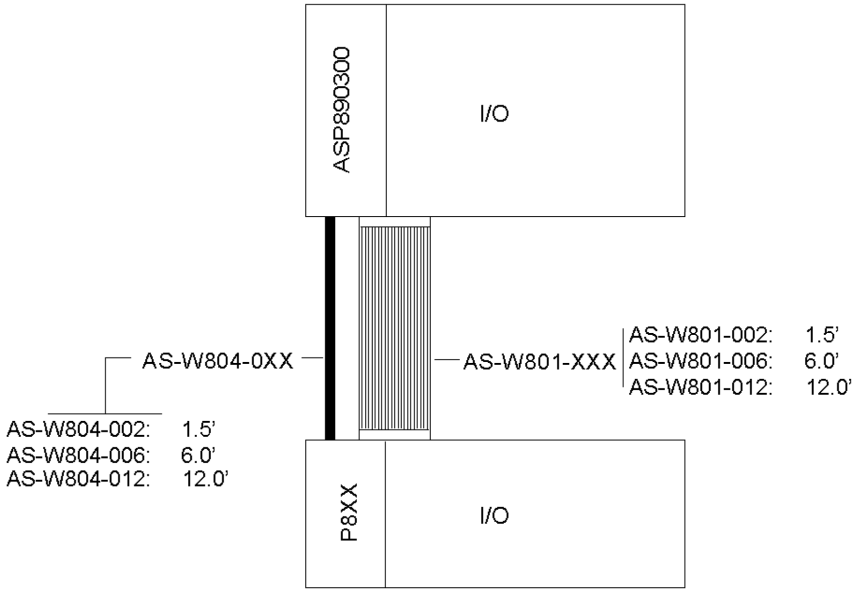
ASP890300 with No Secondary Power Supply

The following illustration shows ASP890300 configurations with no secondary power supply.



ASP890300 with a Secondary Power Supply Installed

The following illustration shows ASP890300 configurations with a secondary power supply.



ASP89X Capacity Information

Capacity

	Current Capacity (A)				
Type	+5.0 V	+4.3 V	-5.0 V	Max Combined +5 V and +4.3 V Load	Input
AS-P89X-000	3.0	3.0	0.25	3.0	115/230 VAC, 0.75A @115 VAC, or 24 VDC, 2 A
ASP890300	7.0	6.0	0.5	7.0	115 VAC, 1.1A, 50/60Hz 230 VAC, 0.65 A, 50/60Hz 24 VDC, 4 A

Power Supply Capacities in Remote Drop Secondary Applications

Power Supply Capacities

	Current Capacity (A)				
Type	+5.0 V	+4.3 V	-5.0 V	Max Combined +5 V and +4.3 V Load	Input
AS-P800-003	2.5	10.0	0.5	12.5	115/230 VAC, 1.5 A @115 VAC
AS-P801-001	5.0	10.0	0.5	15.0	115/230 VAC, 1.7 A @115 VAC
AS-P802-001	2.5	10.0	0.5	12.5	24 VDC, 8 A
AS-P810-001	5.0	5.0	0.3	10.0	115/230 VAC, 1.6 A @115 VAC
AS-P830-000	5.0	6.0	0.5	6.0	115/230V AC, 0.5 A @115 VAC, or 24 VDC, 2 A
AS-P840-000	5.0	10.0	0.5	15.0*	115/230 VAC, 1.1 A @115 VAC

*55° C max; 12 A max @ 60° C

I/O Module Current Requirements

Requirements

Module	Current (mA) @		
	+5.0V	+4.3V	-5.0V
AS-B802-008	76	240	0
AS-B803-008	27	1	2
AS-B804-116	76	480	0
AS-B804-116	76	480	0
AS-B804-148	76	480	0
AS-B805-016	40	1	14
AS-B806-032	210	1	0
AS-B806-124	210	1	0
AS-B807-132	80	2	0
AS-B808-016	76	480	0
AS-B809-016	42	1	15
AS-B810-008	50	240	0
AS-B814-001	120	220	0
AS-B814-002	120	220	0
AS-B814-108	107	800	0
AS-B817-116	25	2	8
AS-B817-216	25	2	8
AS-B820-008	90	80	0
AS-B821-008	20	0	0
AS-B821-108	27	1	10
AS-B824-016	32	260	0
AS-B825-016	27	1	15
AS-B826-032	90	1	0
AS-B827-032	30	1	0
AS-B828-016	32	220	0
AS-B829-016	120	0	0
AS-B829-116	21	1	0
AS-B832-016	32	235	0
AS-B833-016	27	2	0
AS-B836-016	50	603	0

Module	Current (mA) @		
	+5.0V	+4.3V	-5.0V
AS-B837-016	40	1	15
AS-B838-032	160	1	0
AS-B840-008	120	220	0
AS-B840-108	67	400	0
AS-B842-008	120	220	0
AS-B846-001	65	1	0
AS-B846-002	65	1	0
AS-B849-016	40	1	15
AS-B853-016	40	1	15
AS-B855-016	80	1	0
AS-B862-001	180	220	0
AS-B863-001	180	220	0
AS-B863-032	250	0	0
AS-B863-132	350	10	0
AS-B864-001	100	100	0
AS-B865-001	400	600	0
AS-B868-001	180	220	0
AS-B869-001	180	220	0
AS-B872-002	540	220	0
AS-B872-011	240	880	0
AS-B872-100	475	5	0
AS-B872-200	750	5	0
AS-B873-001	400	440	0
AS-B873-002	300	300	0
AS-B873-011	300	440	0
AS-B873-012	300	300	0
AS-B875-001	300	440	0
AS-B875-002	300	300	0
AS-B875-011	300	440	0
AS-B875-012	300	300	0
AS-B875-102	650	975	0
AS-B875-111	500	900	0
AS-B875-200	550	10	0

Module	Current (mA) @		
	+5.0V	+4.3V	-5.0V
AS-B881-001	30	1	0
AS-B881-108	285	240	0
AS-B881-508	300	0	0
AS-B882-032	300	10	0
AS-B882-116	350	10	0
AS-B882-239	188	0	0
AS-B883-001	667	0	0
AS-B883-101	1000	0	0
AS-B883-111	1000	0	0
AS-B883-200	400	5	0
AS-B883-201	640	5	0
AS-B884-002	50	2	0
AS-B885-001	500	1760	0
AS-B885-002	500	1760	0
AS-B885-100	25	0	0
AS-B885-101	25	0	0
AS-B885-110	25	0	0
AS-B885-111	25	0	0
AS-B984-100	0	0	0
AS-B984-101	0	0	0

Appendix B
ASP890300 Executive Software Reflash

Purpose

The purpose of this chapter is to provide guidelines for reflash of executive software used in the processor. Executive software can be obtained on the Schneider web site at

www.schneiderautomation.com

by selecting the appropriate Firmware location.

The ASP890300 executive software is resident in flash RAM and may be updated as required. Reflash requires a PC with an available serial port and loaded with Schneider panel software. Concept contains utilities that may be used. Versions of ProWORX and Modsoft that support 800 series I/O contain reflash utilities.

What Is in This Chapter?

This chapter contains the following topics:

Interconnection

Cables

Cables that may be used to connect the panel PC serial port to the ASP890300 ASCII port 1 are:

- AS-W952-012 Programming Cable, 12’
- 990NAA26320 Programming Cable, 12’
- 990NAA26350 Programming Cable, 50’

Communication Parameters

RTU and ASCII Mode

Communication parameters for RTU and ASCII modes are shown here:

RTU Mode	9600 baud, 8 data bits, Even parity, 1 stop bit
ASCII Mode	9600 baud, 7 data bits, Even parity, 1 stop bit

Procedure

ASP890300 Executive Reflash Procedure

Use the following procedure to reflash the ASP890300 executive software.

Step	Action
1	At a time when system operation can be interrupted, turn off power to the ASP890300 and other supplies in the affected drop. Ensure the ASP890300 front panel power switches are in the OFF position.
2	Remove module from the backplane. Note the position of the MODE SELECT switch. The switch should be returned to that position when the reflash sequence has been completed. Set the MODE SELECT switch to position 7 (RTU mode) or 8 (ASCII mode)
3	Connect a communication cable from the panel software PC serial port to the ASP890300 ASCII Port 1 ONLY. Port 2 is not supported.
4	The module may be reinserted into the system backplane and powered. It may also be flashed on the bench, e.g. plugged into a spare non-system backplane and powered on. After power is turned on, the Comm Active LED (third from the top) will blink 9 times, then pause, blink 9 times and pause, etc. This indicates the module is in kernel mode and ready to be flashed.
5	In panel software, display the exec download menu.
6	Use the **Direct MB Device** selection. The address used should be that selected by the ASP890300 address rotary switches. If connected to a Modbus network, insure there are no address conflicts. Set the communication parameters to those listed above per the mode selection, either RTU or ASCII, and perform the normal executive software loading procedure.
7	After the transfer is complete, the panel software will indicate a timeout error, and there will be no further communication to the P890. Look at the ASP890300 LEDs for confirmation that the flash sequence has succeeded. When an exec download has successfully completed, the front panel LEDs will repeatedly blink in the same sequence from top to bottom as that following a power up. If the operation fails, the Comm Active LED will continue to flash as noted in Step 4. **NOTE:** Some versions of the built-in exec loader in ProWORX may lock up at the end of the transfer.
8	Power down the ASP890300.
9	Unplug the programming cable from the ASCII Port. Remove the module from its backplane. Set the MODE SELECT switch back to the correct position (noted in Step 2).
10	Insert the ASP890300 into the rack. Turn on power to it and other supplies as required. The ASP890300 should operate normally.

Appendix C
CE Requirements for ASP890300/800 Series I/O Systems

Purpose

This chapter covers the installation requirements necessary to maintain compliance with the European Directive for EMC 89/336/EEC for certain 800 Series I/O system components. The majority of 800 Series I/O components are approved per these requirements; however, examine your particular product/shipping carton for the CE mark to ensure approval.

What Is in This Chapter?

This chapter contains the following topics:

Requirements—800 Series I/O Modules with Control Expert

Requirements List

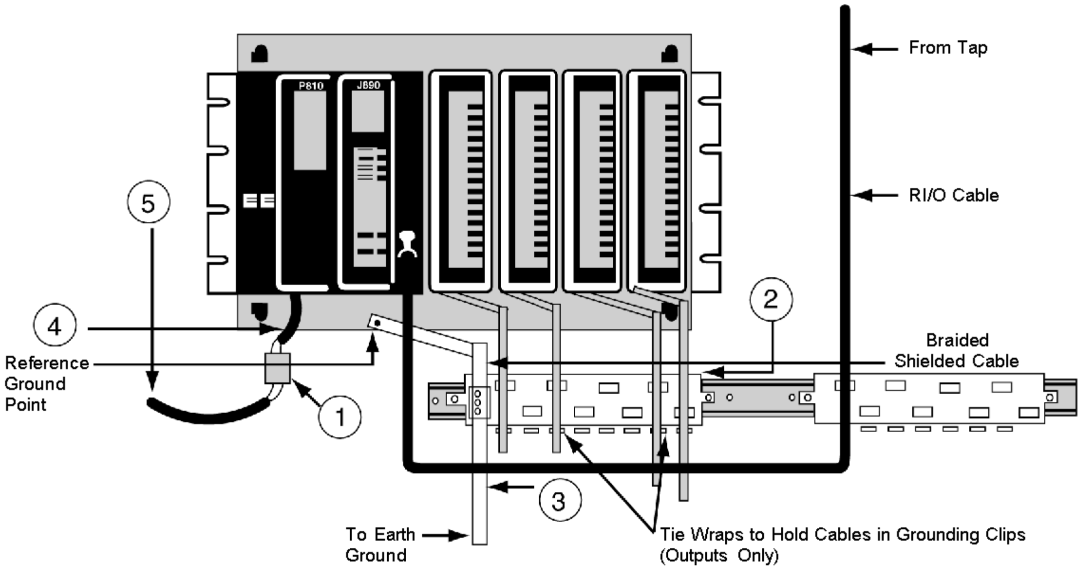
The following requirements should be followed for installations complying with the CE marking.

Requirement for	Description
Power supply and I/O lines	All wiring for power supply and I/O lines must be in grounded steel conduits (EMT) or must use braided shielded cable. If shielded cable is used, the braid must have 80% or more shield coverage, and the outside diameter of the braid (without jacket) must be in the range of 0.189 ... 0.237 in (4.8 ... 6.0 mm).
Cable shields	All cable shields must be grounded, using clips on the Grounding Bar (part number CER001). Shield is not terminated at module field connector.
Grounding	Install braided earth ground to both ● grounding clip (or clips as required) ● backplane ground reference
Line filters	Use a 110/220 Vac Line Filter (Schaffner part number FN670-30/6). Install as shown in the AC power input figure.

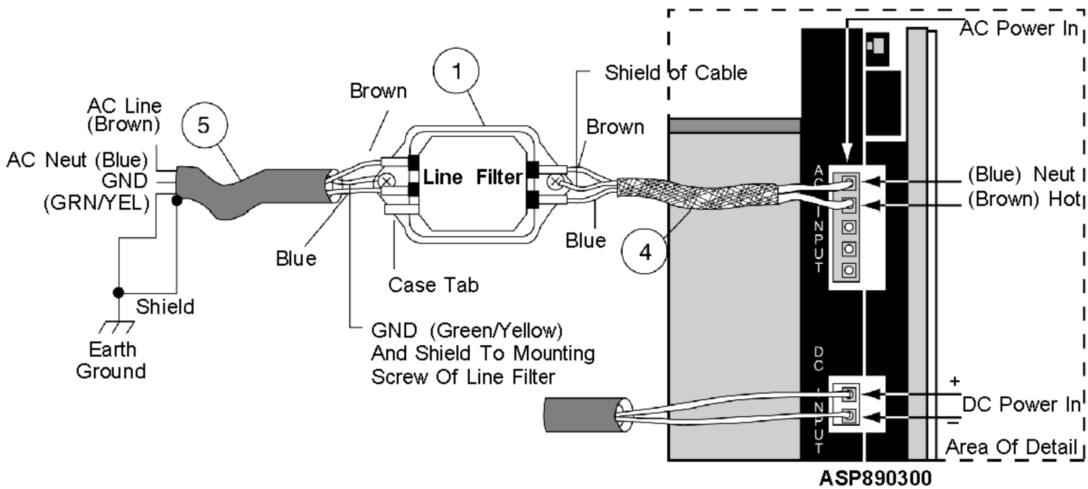
CE Installation—800 Series I/O Modules with Control Expert

Remote Drop Example

The following graphics show the correct CE installation for a remote drop.



Typical CE Installation for a Remote Drop



Installation Parts List—800 Series I/O Modules with Control Expert

Manufacturers Part Numbers/Instructions

Callout	Vendor	Part Number	Description	Instructions
1	Schaffner	FN670-3/06	Line Filter (Fast on terminals) **Dimensions:** Length: 3.4 in (85 mm) Width: 2.2 in (55 mm) Height: 1.6 in (40 mm) **Mounting Holes:** 0.2 in (5.3 mm) dia. 3 in (75 mm) centerline mounted **Fast on Terminals:** 0.25 in (6.4 mm)	Install next to the 984 CPU.
2	Schneider	CER001 or equivalent	Grounding Bar	All cable shields must be grounded. **NOTE:** Not required if using steel conduit.
3			Flat Ground Braided Cable	
4	Oflex	35005 3 conductor 100cy Series	Shielded Cable maximum length: 30 in (760 mm)	The shield is terminated at the EMI Line Filter and open at CPU end. The third conductor is not used.
5	Oflex	35005 3 conductor 100cy Series	Shielded Cable	Terminate the shield at panel ground, at EMI Filter.

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