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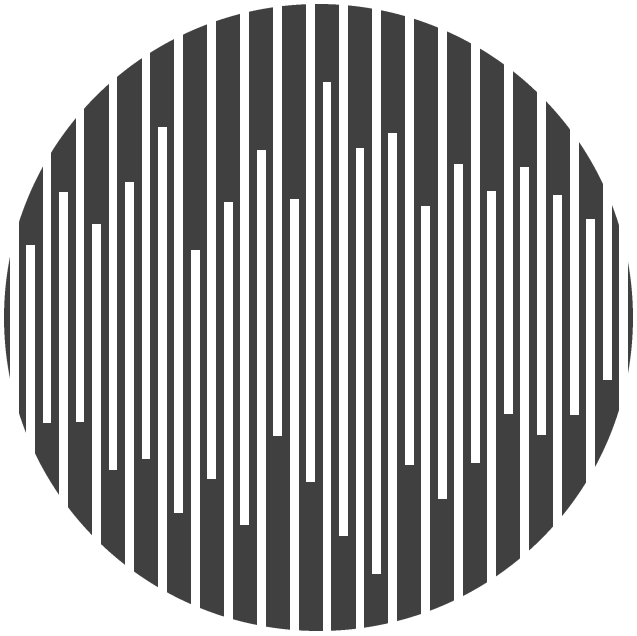
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Modicon
800 Series
Discrete I/O Modules
User Guide

GM–DISC–800 Rev. C

AEG SCHNEIDER AUTOMATION
Modicon • Square D • Telemecanique



MODICON

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Modicon
800 Series Discrete I/O Modules
User Guide

GM–DISC–800 Rev. C

April, 1995

AEG SCHNEIDER AUTOMATION
Modicon • Square D • Telemecanique

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Contents

Chapter 1
800 Series I/O Modules 1

1.1 Overview 2
1.2 System Interface 3
1.3 I/O Map 4
1.3.1 800 Series Configuration 4
1.4 Grounding Guidelines 5
1.5 Installation 6
1.5.1 Field Connection 7
1.6 Quick Start Test 10
1.7 Generic Specifications 11

Chapter 2
B802–008 115 Vac Output 13

2.1 Overview 14
2.1.1 Simplified Schematic 14
2.2 Field Connections 15
2.2.1 Output Connections 15
2.3 Specifications 16

Chapter 3
B803–008 115 Vac Input 17

3.1 Overview 18
3.1.1 Simplified Schematic 18
3.2 Field Connections 19
3.2.1 Output Connections 19
3.3 Specifications 20

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Chapter 4
B804–116 115 Vac Output 21

4.1 Overview 22
4.1.1 Simplified Schematic 22
4.2 Field Connections 23
4.2.1 Output Connections 23
4.3 Specifications 24

Chapter 5
B804–148 48 Vac Output 25

5.1 Overview 26
5.1.1 Simplified Schematic 26
5.2 Field Connections 27
5.2.1 Output Connections 27
5.3 Specifications 28

Chapter 6
B805–016 115 Vac Input 29

6.1 Overview 30
6.1.1 Simplified Schematic 30
6.2 Field Connections 31
6.2.1 Input Connections 31
6.3 Specifications 32

Chapter 7
B806–032 115 Vac Output 33

7.1 Overview 34
7.1.1 Simplified Schematic 34
7.2 Field Connections 35
7.2.1 Output Connections 35
7.3 B806- -032 Fusing Guidelines 36
7.4 Specifications 37

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Chapter 8
B806–124 24 Vac Output 39

8.1 Overview 40
8.1.1 Simplified Schematic 40
8.2 Field Connections 41
8.2.1 Output Connections 41
8.3 Specifications 42

Chapter 9
B807–132 115 Vac Input 43

9.1 Overview 44
9.1.1 Simplified Schematic 44
9.2 Field Connections 45
9.2.1 Input Connections 45
9.2.2 Input Current-to-Frequency Relationship 46
9.3 Specifications 47

Chapter 10
B808–016 230 Vac Output 49

10.1 Overview 50
10.1.1 Simplified Schematic 50
10.2 Field Connections 51
10.2.1 Output Connections 51
10.3 Specifications 52

Chapter 11
B809–016 230 Vac Input 53

11.1 Overview 54
11.1.1 Simplified Schematic 54
11.2 Field Connections 55
11.2.1 Input Connections 55
11.3 Specifications 56

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Chapter 12
B810–008 115 Vac Isolated Output 57

12.1 Overview 58
12.1.1 Simplified Schematic 58
12.2 Field Connections 59
12.2.1 Output Connections 59
12.3 Specifications 60

Chapter 13
B814–108 Relay Output 61

13.1 Overview 62
13.1.1 Simplified Schematic 62
13.2 Configuration 63
13.3 Field Connections 64
13.3.1 Output Connections 64
13.4 Specifications 65

Chapter 14
B817–116 and B817–216 115/230 Vac Isolated Input 67

14.1 Overview 68
14.1.1 Simplified Block Diagram 68
14.2 Field Connections 69
14.2.1 Terminal Numbering and Input Functions 69
14.3 Specifications 71

Chapter 15
B820–008 10 ... 60 Vdc Output (True High) 73

15.1 Overview 74
15.1.1 Simplified Schematic 74
15.2 Field Connections 75
15.2.1 Output Connections 75
15.3 Specifications 76

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Chapter 16
B821–108 10 ... 60 Vdc Input (True High) 77

16.1 Overview 78
16.1.1 Simplified Schematic 78
16.2 Field Connections 79
16.2.1 Input Connections 79
16.3 Specifications 80

Chapter 17
B824–016 24 Vdc Output (True High) 83

17.1 Overview 84
17.1.1 Simplified Schematic 84
17.2 Field Connections 85
17.2.1 Output Connections 85
17.3 Specifications 86

Chapter 18
B825–016 24 Vdc Input (True High) 87

18.1 Overview 88
18.1.1 Simplified Schematic 88
18.2 Field Connections 89
18.2.1 Input Connections 89
18.3 Specifications 90

Chapter 19
B826–032 24 Vdc Output (True High) 91

19.1 Overview 92
19.1.1 Simplified Schematic 92
19.2 Field Connections 94
19.2.1 Output Connections 94
19.3 Specifications 95

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Chapter 20
B827–032 24 Vdc Input (True High) 97

20.1 Overview 98
20.1.1 Simplified Schematic 98
20.2 Field Connections 99
20.2.1 Input Connections 99
20.3 Specifications 100

Chapter 21
B828–016 5 V TTL Output 101

21.1 Overview 102
21.1.1 Simplified Schematic 102
21.2 Field Connections 103
21.2.1 Output Connections 103
21.3 Specifications 104

Chapter 22
B829–116 5 V TTL Input 105

22.1 Overview 106
22.1.1 Simplified Schematic 106
22.2 Field Connections 107
22.2.1 Input Connections 107
22.3 Specifications 108

Chapter 23
B832–016 24 Vdc Output (True Low) 109

23.1 Overview 110
23.1.1 Simplified Schematic 110
23.2 Field Connections 111
23.2.1 Output Connections 111
23.3 Specifications 112

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Chapter 24
B833–016 24 Vdc Input (True Low) 113

24.1 Overview 114
24.1.1 Simplified Schematic 114
24.2 Field Connections 115
24.2.1 Input Connections 115
24.3 Specifications 116

Chapter 25
B836–016 12 ... 250 Vdc Isolated Output 117

25.1 Overview 118
25.1.1 Simple Block Diagram 119
25.2 Field Connections 120
25.2.1 Terminal Numbering and Output Functions 120
25.2.2 Typical User-side Field Connector Circuitry 121
25.3 Specifications 122

Chapter 26
B837–016 24 V ac/dc Input 123

26.1 Overview 124
26.1.1 Simple Block Diagram 124
26.2 Field Connections 126
26.3 Specifications 127

Chapter 27
B838–032 24 Vdc Output (True High) 129

27.1 Overview 130
27.1.1 Simplified Schematic 130
27.2 Field Connections 131
27.2.1 Output Connections 131
27.3 Specifications 132

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Chapter 28
B840–108 Relay Output 133

28.1 Overview 134
28.1.1 Simplified Schematic 134
28.2 Configuration 136
28.3 Field Connections 137
28.3.1 Terminal Numbering and Output Functions 137
28.4 Specifications 138

Chapter 29
B849–016 48 V ac/dc Input 139

29.1 Overview 140
29.1.1 Simple Block Diagram 140
29.2 Field Connections 142
29.2.1 Terminal Numbering and Input Functions 142
29.3 Specifications 143

Chapter 30
B853–016 115 Vac/125 Vdc Input 145

30.1 Overview 146
30.1.1 Simple Block Diagram 146
30.2 Field Connections 148
30.2.1 Terminal Numbering and Input Functions 148
30.3 Specifications 149

Chapter 31
B855–016 Intrinsically Safe 12 Vdc Input 151

31.1 Overview 152
31.2 Installation 153
31.3 Specifications 158

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Chapter 32
B863–032 Monitored 24 Vdc Input 159

32.1 Overview 160
32.1.1 Simplified Schematic 160
32.2 Field Connections 162
32.2.1 Input Connections 162
32.3 Quick Start Test 163
32.3.1 Application Example 164
32.4 Specifications 166

Chapter 33
B863–132 24 Vdc Input 167

33.1 Overview 168
33.1.1 Simplified Schematic 168
33.2 Switch Settings 169
33.3 Field Connections 170
33.4 Configuration 171
33.5 Specifications 172

Chapter 34
B864–001 Register Output 173

34.1 Overview 174
34.1.1 Simplified Block Diagram 175
34.2 Switch Settings 176
34.3 Field Connections 177
34.3.1 Terminal Numbering and Output Functions 177
34.3.2 Pull- -up Resistor Connection 178
34.4 Specifications 180

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Chapter 35
B865–001 Register Input 181

35.1 Overview 182
35.1.1 Simplified Block Diagram 183
35.2 Switch Settings 184
35.3 Field Connections 185
35.3.1 Terminal Numbering and Input Functions 185
35.3.2 Pull- -up Resistor Connection 185
35.3.3 Strobe Type 186
35.4 Specifications 187

Chapter 36
B881–001 Latched 24 Vdc Input 189

36.1 Overview 190
36.1.1 Simplified Block Diagram 190
36.2 Field Connections 192
36.2.1 Terminal Numbering and Input Functions 192
36.3 Specifications 193

Chapter 37
B881–108 Protected 120 Vac Output 195

37.1 Overview 196
37.1.1 Simplified Schematic 198
37.2 Using the Fault Condition Filter 199
37.3 Field Connections 200
37.3.1 Output Connections 200
37.4 Quick Start Test 201
37.4.1 Application Example 202
37.5 Specifications 203

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Chapter 38
B881–508 125 Vdc Output 205

38.1 Overview 206
38.1.1 Simplified Schematic 207
38.2 Fault Conditions 208
38.3 Field Connections 209
38.3.1 Output Connections 209
38.4 Specifications 210

Chapter 39
B882–032 24 Vdc Diagnostic Output 211

39.1 Overview 212
39.1.1 Simplified Schematic 212
39.2 Fault Conditions 213
39.2.1 B882 Mode 213
39.2.2 B818 Mode 213
39.2.3 Fault Definitions 214
39.3 Field Connections 215
39.4 DIP Switch Settings 216
39.5 Quick Start Test 217
39.5.1 Application Example 218
39.6 Specifications 219

Chapter 40
B882–116 24 Vdc Output 221

40.1 Overview 222
40.1.1 Simplified Schematic 222
40.2 Field Connections 223
40.2.1 Output Connections 223
40.3 Configuration 224
40.4 Switch Settings 227
40.5 Specifications 228

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Appendix A
I/O Key Pin Assignments **229**

Index **232**

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Chapter 1
800 Series I/O Modules

- ☐ Overview
- ☐ System Interface
- ☐ I/O Map
- ☐ Grounding Guidelines
- ☐ Installation
- ☐ Quick Start Test
- ☐ Generic Specifications

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1.1 Overview

- ☐ Status indicators
- ☐ Front accessible fuses
- ☐ A module handle permits easy installation and removal
- ☐ Safe, non- -conductive module front permits easy access of test probes
- ☐ Designed for harsh, plant- -floor environments
- ☐ Each point is electrically isolated from logic
- ☐ Removable without disturbing rigid field wiring system
- ☐ Satisfies SWC requirements of IEEE and ANSI guides

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 Modicon controller and the I/O module. This occurs within 300 ms of the signal loss. The module's ACTIVE indicator will also shut OFF.

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.

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.

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1.2 System Interface

When used with a Modicon 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 Modicon 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	Field power is supplied, and OK

☞ **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.

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1.3 I/O Map

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.

1.3.1 800 Series Configuration

The 800 Series I/O Map lets you match the 984 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.

In the Configuration Overview, you must specify the number of I/O drops and I/O modules. These numbers are checked when entries to the I/O Map are made. The Modsoft Runtime files contain descriptions of the different kinds of modules. GCNFTCOP.SYS includes the description of ”B8” modules, with module number, number of inputs, outputs descriptor and identifier. Refer to your Modsoft software.

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1.4 Grounding Guidelines

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

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1.5 Installation

Procedure **How to Install an 800 Series I/O Module**

Installation of your 800 Series module involves: unpacking the module, wiring the field connector, installing key pins in the housing, and mounting the module in the housing.

Step 1 Remove the module from its shipping box and check for damage. If damaged, contact your salesman or distributor for correct replacement procedure.

Step 2 Ensure power to housing is OFF.

Step 3 Designate the housing slot for this module.

Step 4 Locate the required connector assembly. (Modicon Part number AS--8534--000 or AS--8535--000). This assembly consists of one or two 20--pin connectors.

☞ **Note:** Remove the keying tabs on the connector prior to installing the module.

Step 5 Remove the old duct, if a different connector/cabling duct assembly is already present in the designated housing slot.

Step 6 (Optional Step) If there is a module to the immediate left of the slot designated for the module's installation, temporarily remove it.

Step 6 As shown in Figure 1, 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.

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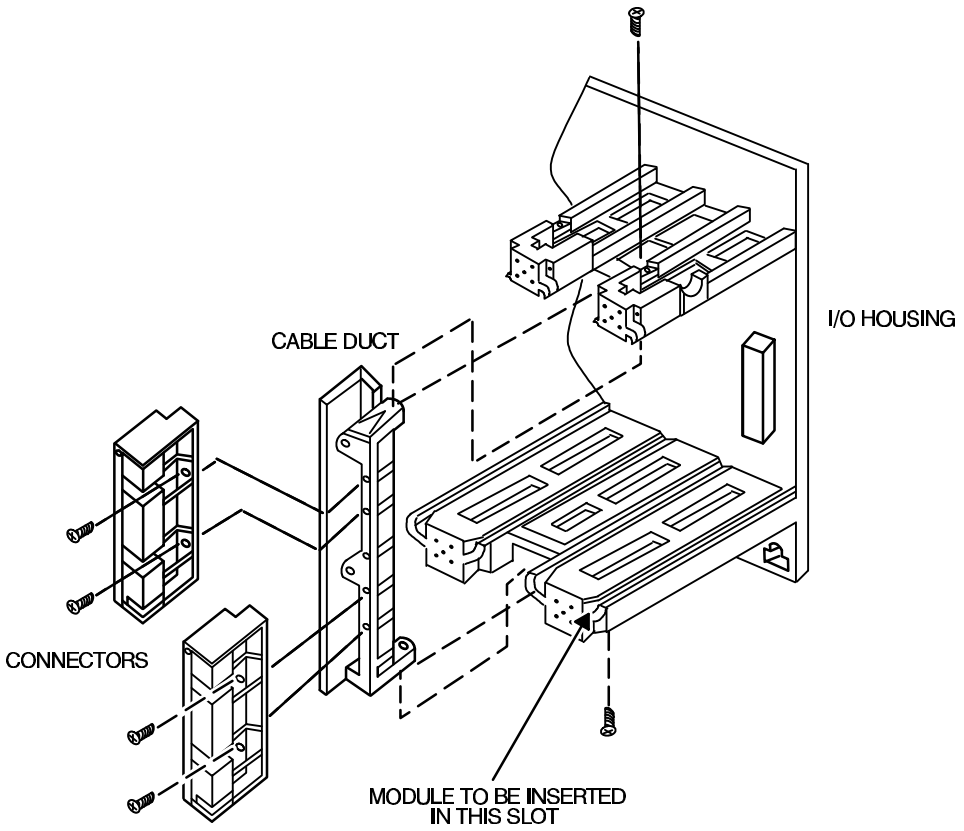


Figure 1 Cabling Duct/Field Connector Assembly

1.5.1 Field Connection

☞ **Note:** When performing this step, refer to the appropriate chapter in this manual of the 800 Series module you are installing for the appropriate connector type.

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

☞ **Note:** Terminals accept either two 141 AWG size wires or one 12 AWG size wire/point.

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Caution: Neat and proper workmanship methods by qualified personnel must be employed when making connections to this module. Take extra precautions if you are using stranded wire. Ensure that loose or projecting strands do not short circuit or ground the other terminals. We recommend that you use solid wire.

Step 8 Re- -install any module temporarily removed.

Note: When performing this step, refer to Appendix A for illustrations of optional key pin patterns for the 800 Series module you are installing. This Appendix contains key pin patterns for all 800 series I/O modules.

Step 9 When using key pins (provided with housing shipment), install them above and below the housing slot selected for this module's installation.

Figure 2 shows this optional mechanical keying system used to match the module type with a particular slot in the housing to ensure proper module replacement.

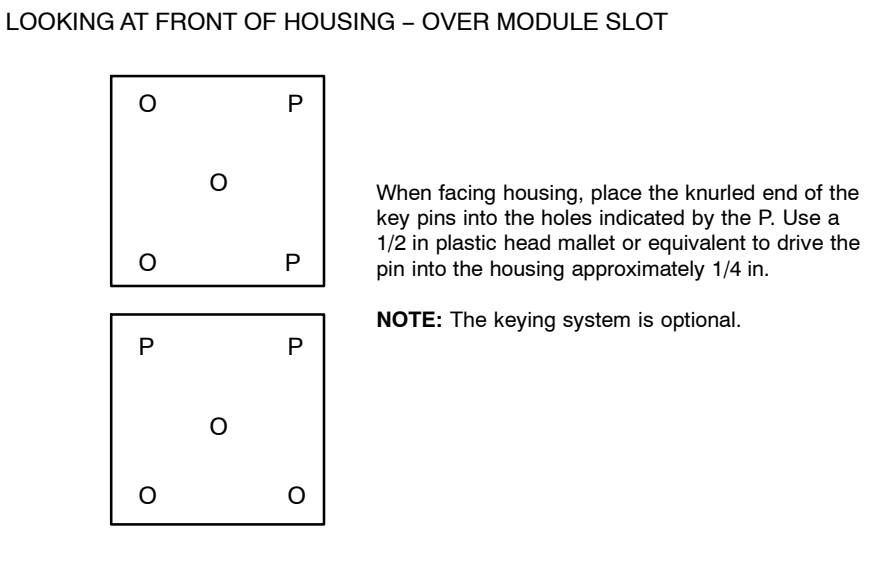


Figure 2 Example of Key Pin Location

Step 10 Insert module into housing, firmly but carefully, seating the edge connector in the backplane.

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☞ **Note:** First time installation of a module may be tight.

Step 11 Secure the module to housing using captive slotted mounting screws at the top and bottom of the module front panel.

Step 12 After confirming all modules are properly installed, apply applicable field power and re- -apply power to the programmable controller.

Step 13 I/O Map the module.

Step 14 Start the controller.

Step 15 Confirm that the module's active light is illuminated.

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1.6 Quick Start Test

Step 1 Determine which channel and slot location are being used for this module.

Step 2 Wire 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.)

Step 3 Stop the PLC.

Step 4 Install the I/O module.

Step 5 I/O Map the module, reference at the desired discrete or register reference.

Step 6 Start the PLC.

Step 7 Confirm that the modules active light is illuminated (may require Step 8 wiring first).

Step 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.

To turn an output ON enter the programming screen (P230 or equivalent) and call up the reference and disable this reference ON.

☞ **Note:** Refer to 984 System Manual for specifics on disabling coils.

See individual chapters for module specific Quick Starts.

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1.7 Generic Specifications

Generic Environmental Specifications

Operating	Temperature	0 ... 60°C (32 ... 140°F)
	Humidity	0 ... 95% (non–condensing) @ 60°C
Operating	Temperature	–40 ... 85°C (32 ... 140°F)
	Humidity	0 ... 95% (non–condensing) @ 60°C
Isolation	Field to System	2000 VAC steady state maximum @ 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
	Non–operating	±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
	Non–operating	0.029 G sq/Hz, 10 ... 50 Hz rolloff @ –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

Generic Mechanical Specifications

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

See individual chapters for module specific Specifications.

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Chapter 2
B802–008 115 Vac Output

- ☐ Overview
- ☐ Field Connections
- ☐ Specifications

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2.1 Overview

The B802- -008 115 Vac (8 point) 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 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.

2.1.1 Simplified Schematic

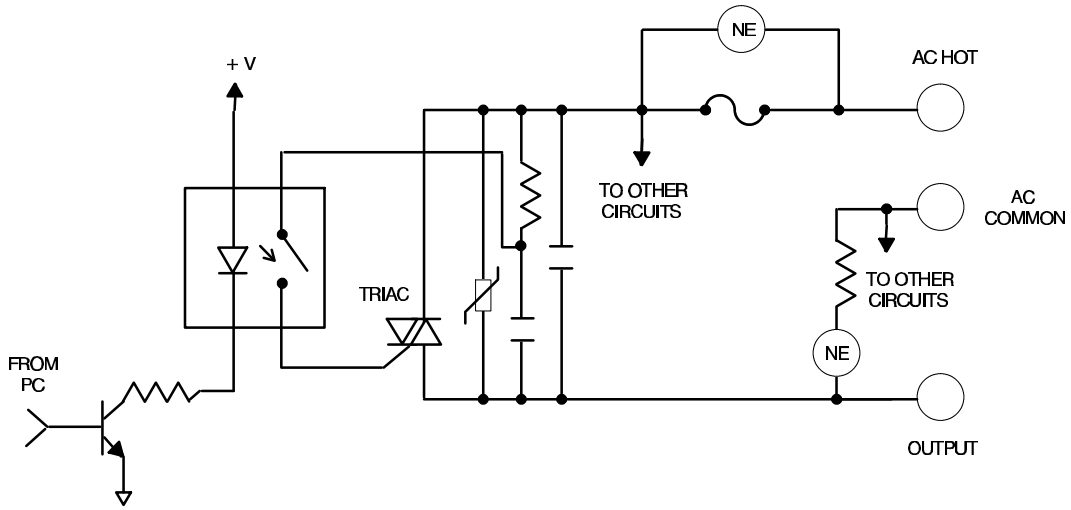


Figure 3 B802–008 Simplified Schematic

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

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2.2 Field 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.

2.2.1 Output Connections

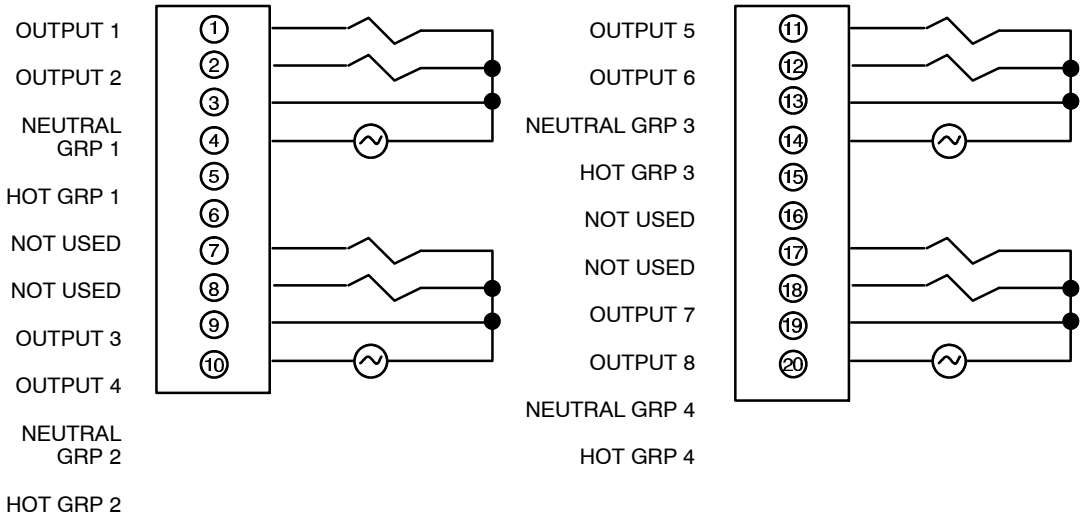


Figure 4 B802–008 Terminal Numbering and Output Connections

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2.3 Specifications

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/μs
	Commutating	5 V/μs
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)

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Chapter 3
B803–008 115 Vac Input

- ☐ Overview
- ☐ Field Connections
- ☐ Specifications

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3.1 Overview

The B803- -008 115 Vac (8 point) 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.

3.1.1 Simplified Schematic

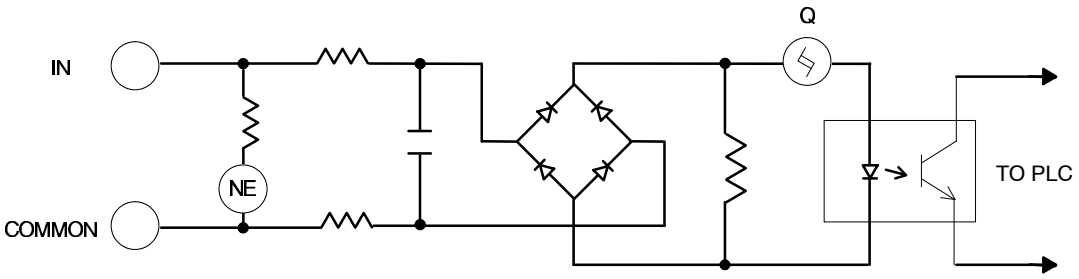


Figure 5 B803–008 Simplified Schematic

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3.2 Field 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.

3.2.1 Output Connections

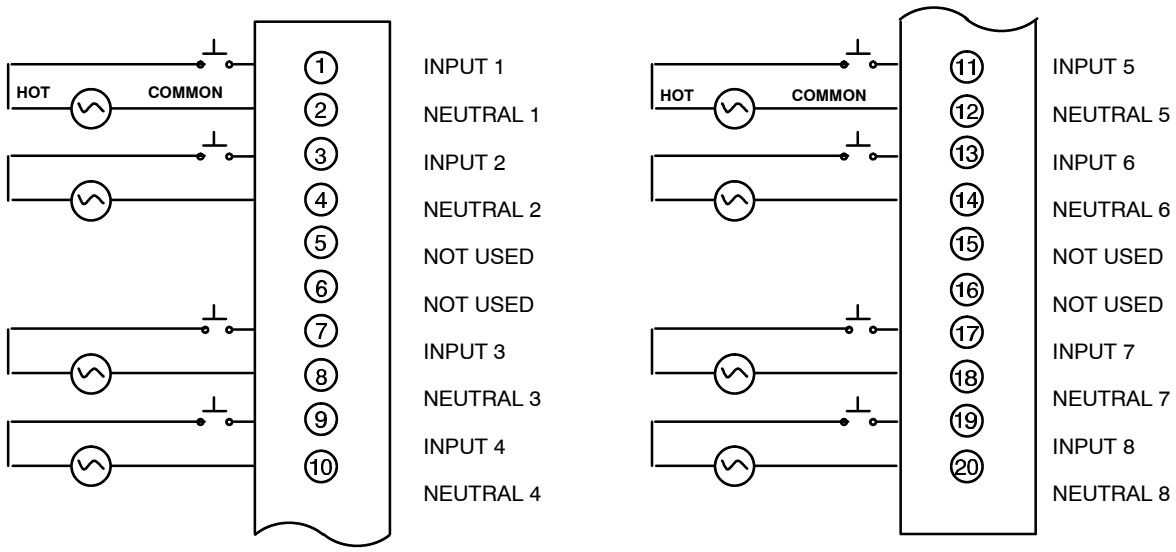


Figure 6 B803–008 Terminal Numbering and Input Connections

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3.3 Specifications

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 < 1kΩ)
OFF Condition	Maximum / Module	0 ... 35 Vac (Source Impedance = 0 Ω) 0 ... 130 Vac (Source Impedance ≥ 40kΩ)
”ON” Condition	Threshold Voltage	60 ± 15VRMS
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

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Chapter 4
B804–116 115 Vac Output

- ☐ Overview
- ☐ Field Connections
- ☐ Specifications

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4.1 Overview

The B804- -116 115 Vac (16 point) Output 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 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.

4.1.1 Simplified Schematic

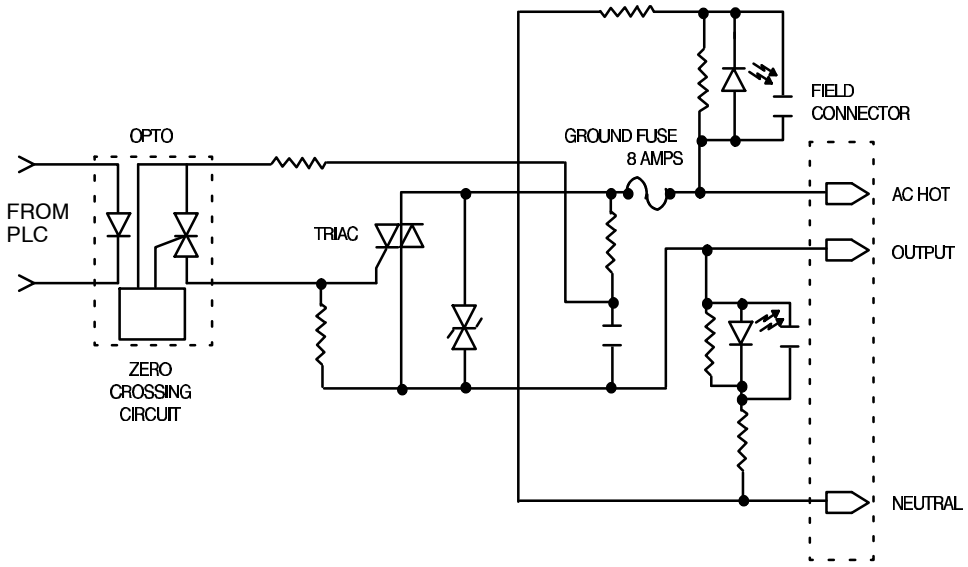


Figure 7 B804–116 Simplified Schematic

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

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4.2 Field 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.

4.2.1 Output Connections

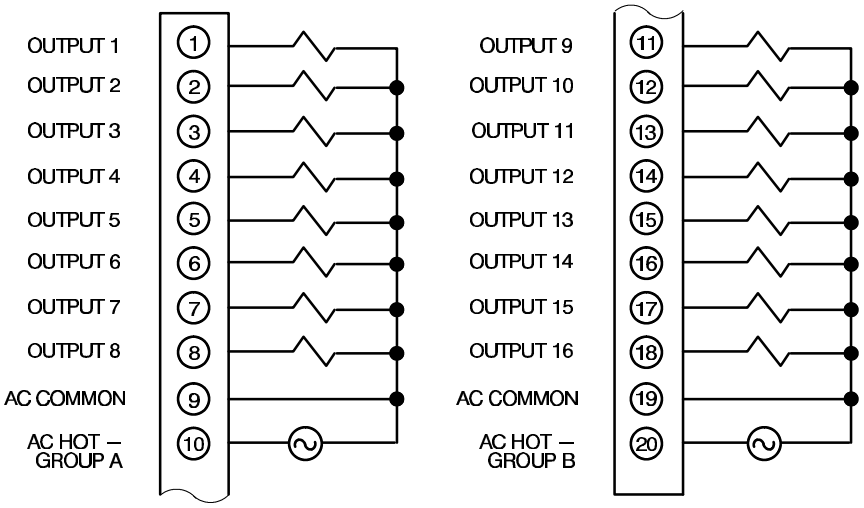


Figure 8 B804–116 Terminal Numbering and Output Connections

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4.3 Specifications

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)
Maximum OFF	Leakage Current	3 mA @ 115 Vac
Voltage Drop		1.5 V @ 2.0 A
Maximum Response Time	OFF → ON	8.3 ms @ 60 Hz
	ON → OFF	8.3 ms @ 60 Hz
dv/dt		100 V/ms
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)

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Chapter 5
B804–148 48 Vac Output

- ☐ Overview
- ☐ Field Connections
- ☐ Specifications

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5.1 Overview

The B804- -148 48 Vac (16 point) 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.

5.1.1 Simplified Schematic

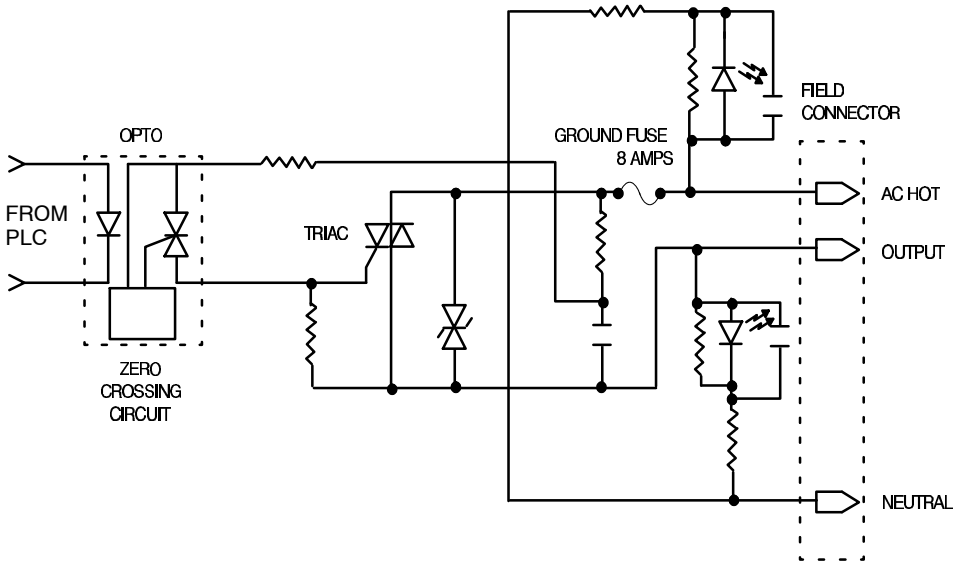


Figure 9 B804–148 Simplified Schematic

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5.2 Field 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.

5.2.1 Output Connections

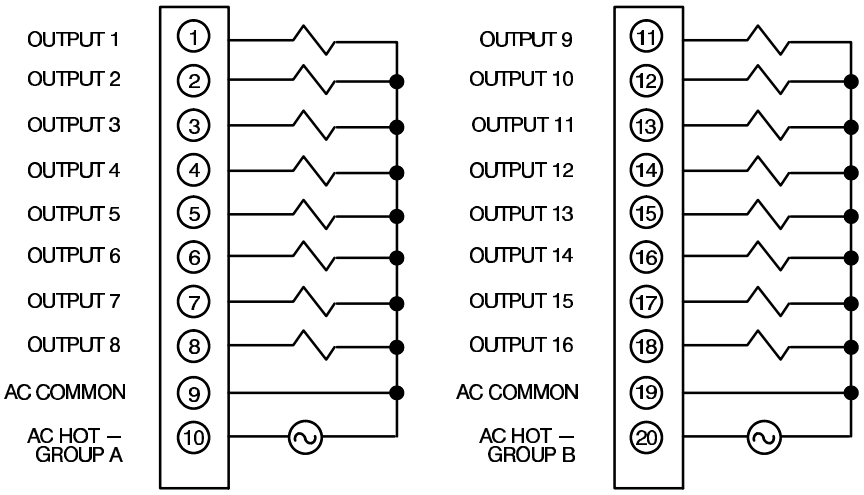


Figure 10 B804–148 Terminal Numbering and Output Connections

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5.3 Specifications

B804–148 Specifications

Description		48 Vac output
Number of Points		16
Operating Range 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
Maximum OFF		3 mA
Leakage Current		3 mA
Voltage Drop		1.5 V @ 2 A
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/ms
	Commutating	5 V/ms
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

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Chapter 6
B805–016 115 Vac Input

- ☐ Overview
- ☐ Field Connections
- ☐ Specifications

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6.1 Overview

The B805- -016 115 Vac (16 point) 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.

6.1.1 Simplified Schematic

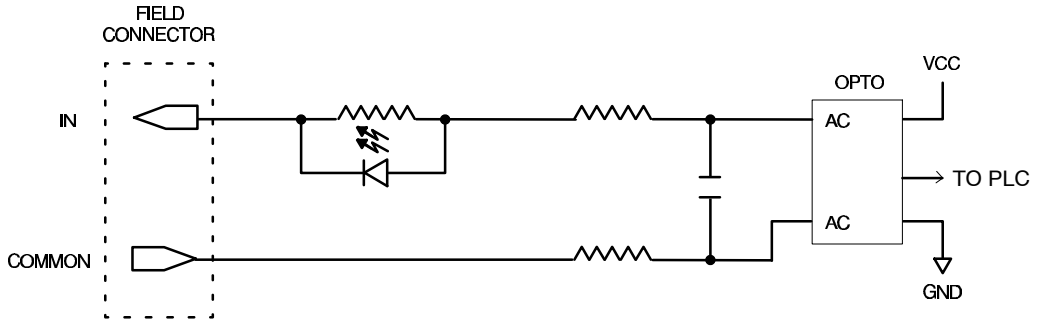


Figure 11 B805–016 Simplified Schematic

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6.2 Field 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.

6.2.1 Input Connections

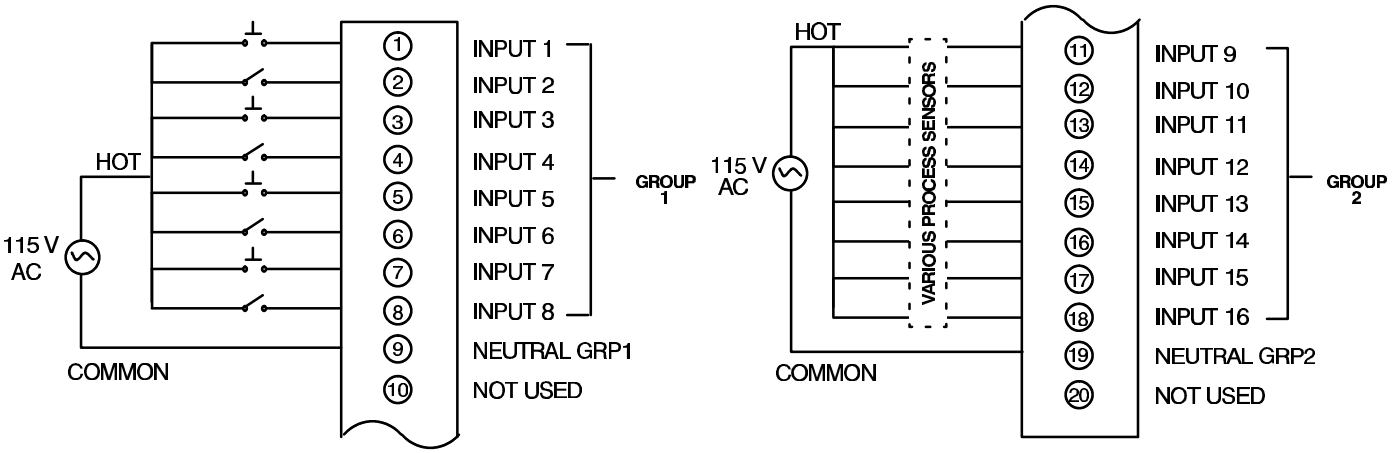


Figure 12 B805–016 Terminal Numbering and Input Connections

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6.3 Specifications

B805–016 Specifications

Description		115 Vac input
Number of Points		16
Operating Range		80 ... 130 Vac / 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 =0 Ω)
OFF Conditions		0 ... 35 Vac (Source Impedance =1 kΩ)
		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 (Typ) @ 60Vac RMS
ON Condition	Threshold Voltage	60 ± 15 V 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

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Chapter 7
B806–032 115 Vac Output

- ☐ Overview
- ☐ Field Connections
- ☐ Fusing Requirements
- ☐ Specifications

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7.1 Overview

The B806- -032 Vac Output Module (B806) 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.

7.1.1 Simplified Schematic

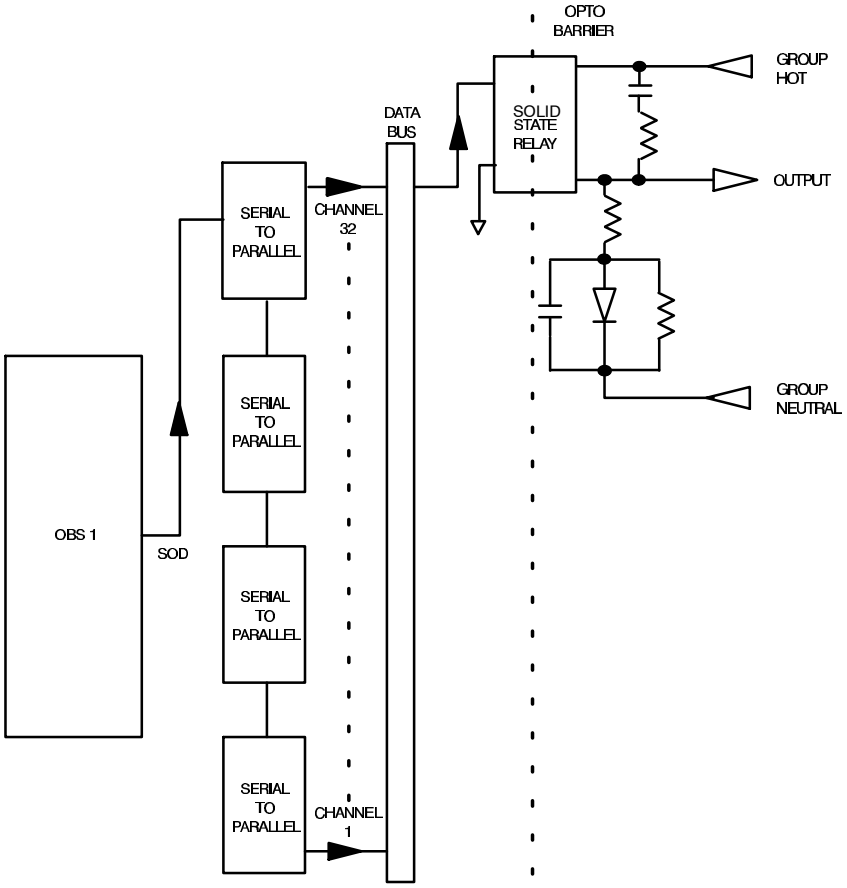


Figure 13 B806–032 Simplified Schematic

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7.2 Field Connections

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

7.2.1 Output Connections

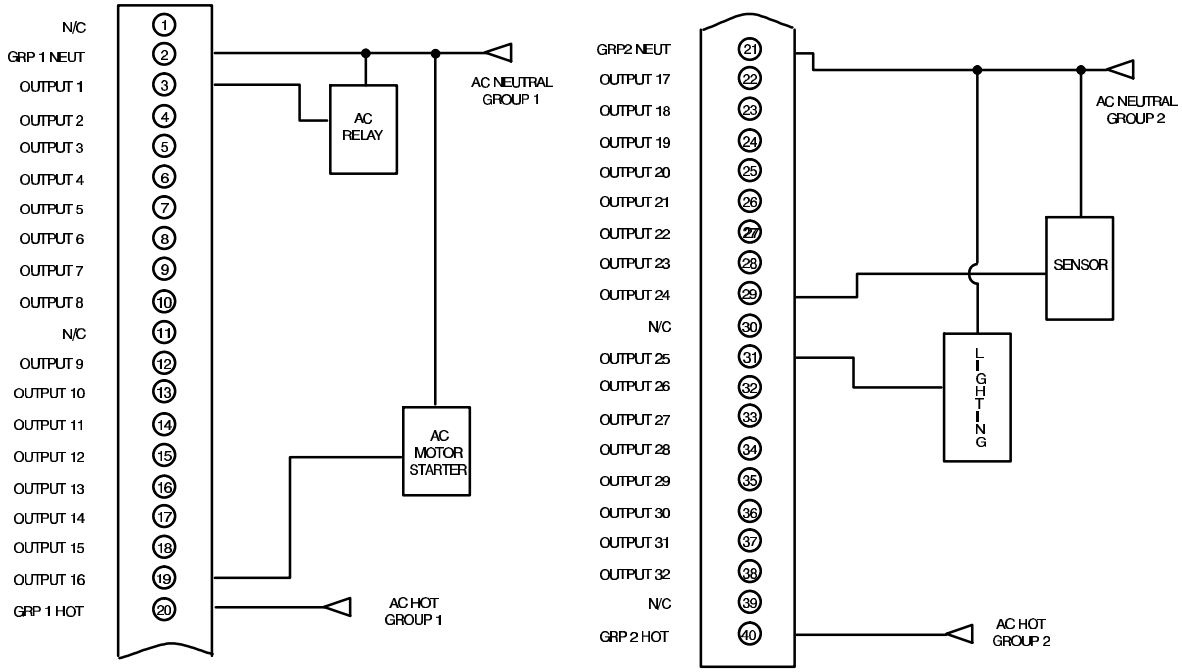


Figure 14 B806–032 Terminal Numbering and Output Connections

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7.3 B806–032 Fusing Guidelines

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

Fuse Rating	Very Fast Acting	2 A
Example Type	*Little Fuse*	3 AB

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

Warning! Failure to fuse these output modules, or to follow the recommended fuse ratings, could cause unpredictable results in module performance and/or damage to this and other equipment. Observe fusing guidelines.

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7.4 Specifications

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/module	16 A
	Maximum/group	8 A
	Minimum Load Current	5 A
Maximum OFF	Leakage Current	2 mA @ 115 Vac
Voltage Drop		1.5 V RMS Maximum
Maximum Response Time	OFF → ON	8.3 ms @ 60 Hz
	ON → OFF	8.3 ms @ 60 Hz
dv/dt		600 V/μs
	Commutating	5 V/μs
Power Required	+5 V	210 mA
	+4.3 V	1 mA
	–5 V	0 mA
Terminal Connector		AS–8535–000

☞ **Note:** The B806 is powered by a standard 120 Vac field power supply.

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Chapter 8
B806–124 24 Vac Output

- ☐ Overview
- ☐ Field Connections
- ☐ Specifications

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8.1 Overview

The B806- -124 Output Module (B806) 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.

8.1.1 Simplified Schematic

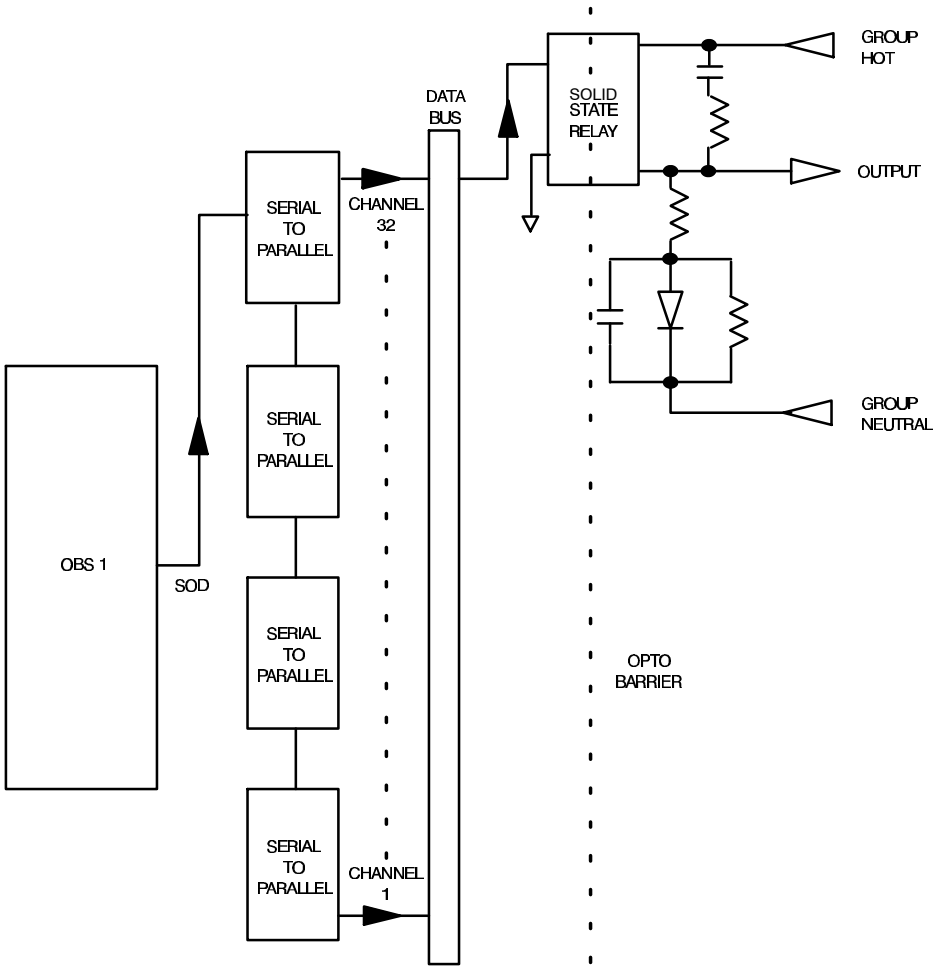


Figure 15 B806–124 Simplified Schematic

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8.2 Field 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.

8.2.1 Output Connections

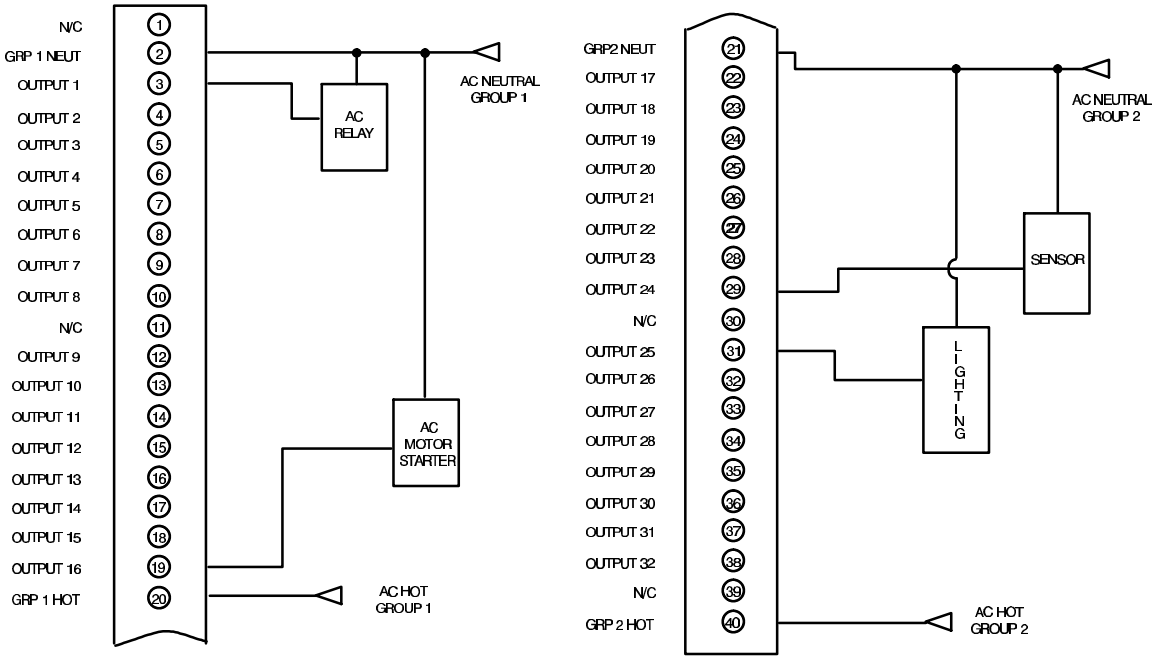


Figure 16 B806–124 Terminal Numbering and Output Connections

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8.3 Specifications

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
Maximum OFF	Leakage Current	2 mA
Voltage Drop		1.5 V (max)
Maximum Response Time	OFF → ON	8.3 ms @ 60 Hz
	ON .→ OFF	8.3 ms @ 60 Hz
dv/dt		600 V/μs
	Commutating	5 V/μs
Power Required	+5 V	210 mA
	+4.3 V	1 mA
	–5 V	0 mA
Terminal Connector		AS–8535–000

☞ **Note:** The B806 is powered by standard 24 Vac field power supply.

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Chapter 9
B807–132 115 Vac Input

- ☐ Overview
- ☐ Field Connections
- ☐ Specifications

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9.1 Overview

The B807- -132 115 Vac (32 point) 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.

9.1.1 Simplified Schematic

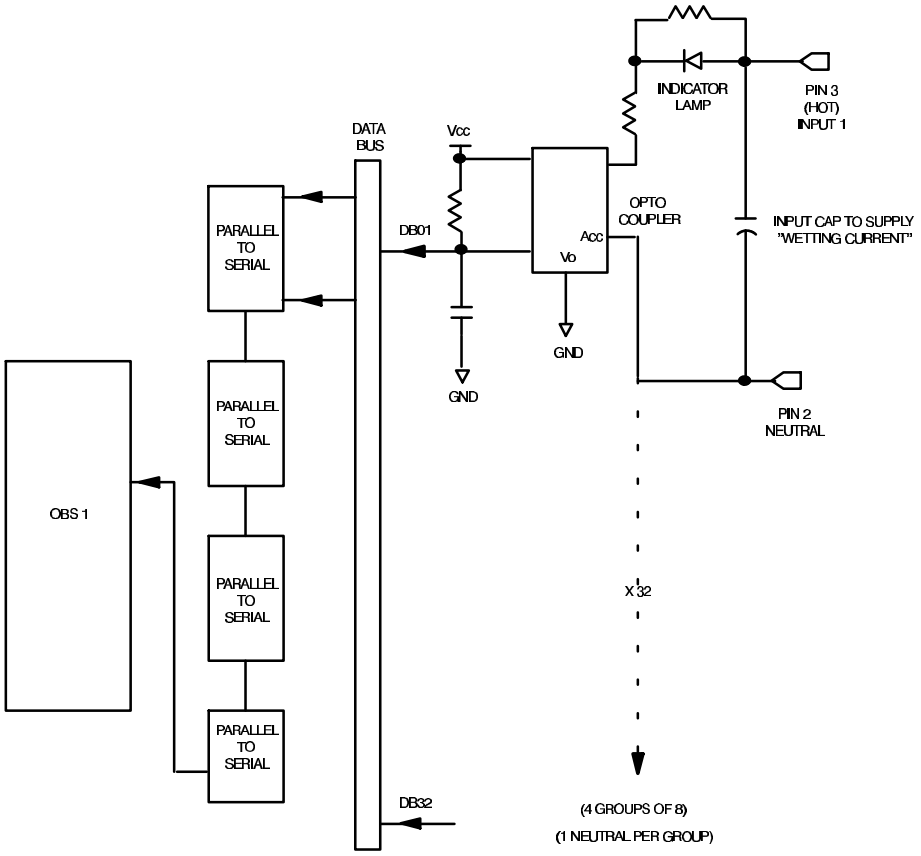


Figure 17 B807–132 Simplified Schematic

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

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9.2 Field 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.

9.2.1 Input Connections

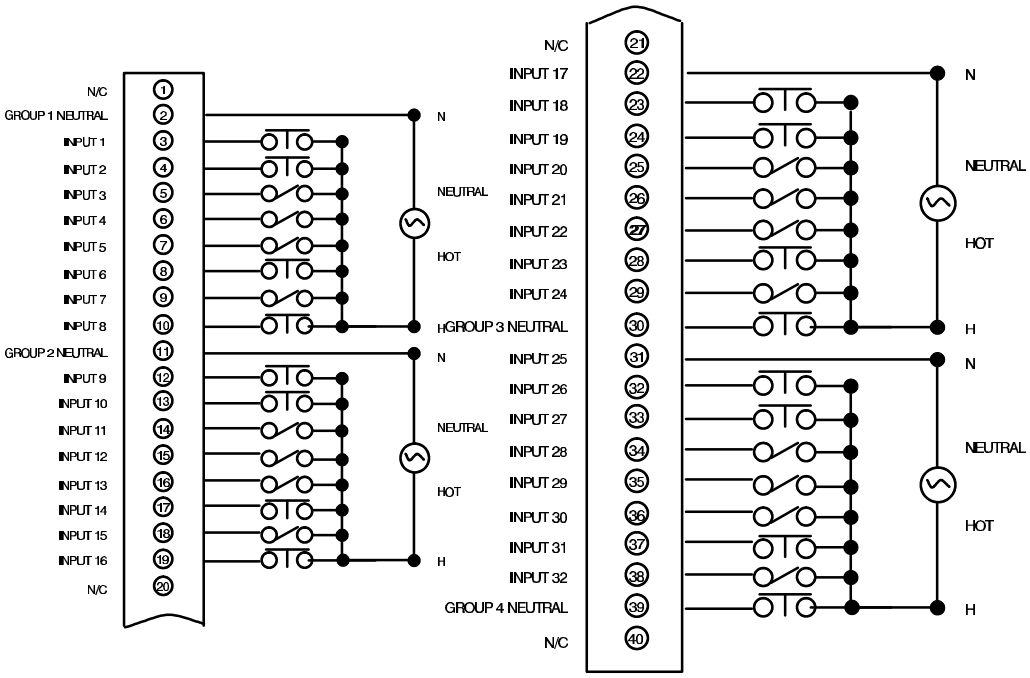


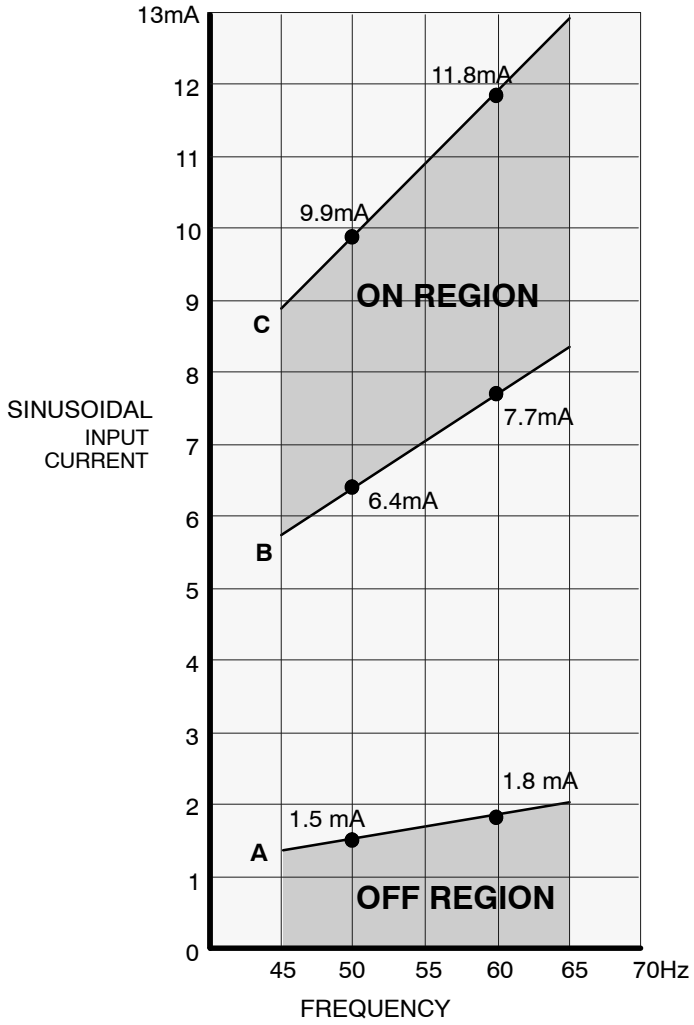
Figure 18 B807–132 Terminal Numbering and Input Connections

☞ **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.

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9.2.2 Input Current-to-Frequency Relationship



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

Figure 19 B807–132 Input Current to Frequency Chart

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9.3 Specifications

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 =0 Ω)
		0 ... 130 Vac (Source Impedance ≥90 kΩ)
ON Current		3.7 mA minimum @ 80 Vac, 50Hz input*
		6.4 mA minimum @ 115 Vac, 60Hz input*
Maximum External to Module Leakage Current		1.8 mA to guarantee an OFF condition @ 60Hz
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
*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 wave form and are specified as RMS voltage and current.

☞ **Note:** Input LED brightness is a function of line voltage applied.

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Chapter 10
B808–016 230 Vac Output

- ☐ Overview
- ☐ Field Connections
- ☐ Specifications

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10.1 Overview

The B808-016 230 Vac (16 point) 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.

10.1.1 Simplified Schematic

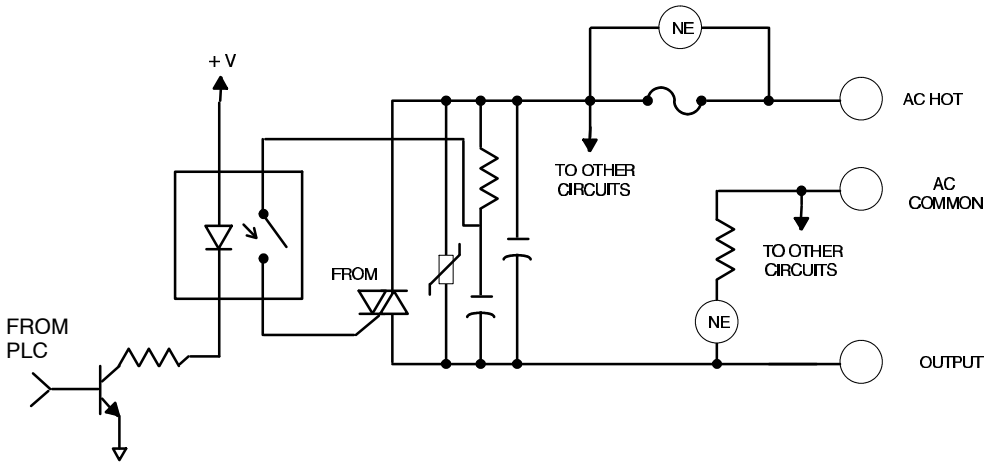


Figure 20 B808–016 Simplified Schematic

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10.2 Field 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.

10.2.1 Output Connections

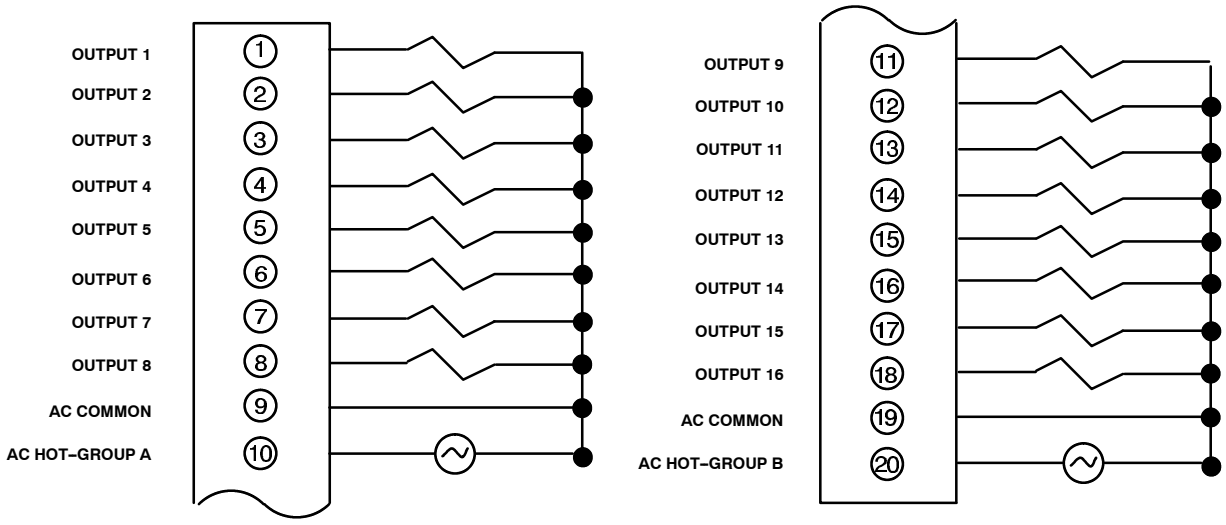


Figure 21 B808–016 Terminal Numbering and Output Connections

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10.3 Specifications

B808–016 Specifications

Description		230 Vac output
Number of Points		16
Operating Voltage		180 ... 260 Vac continuous / 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 @ 2.0A
Maximum OFF	Leakage Current	8 mA @ 230 Vac
Maximum Response Time	OFF → ON	8.3 ms @ 60 Hz
	ON → OFF	8.3 ms @ 60 Hz
Applied dv/dt		100 V/μs
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)

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Chapter 11
B809–016 230 Vac Input

- ☐ Overview
- ☐ Field Connections
- ☐ Specifications

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11.1 Overview

The B809-016 230 Vac (16 point) 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.

11.1.1 Simplified Schematic

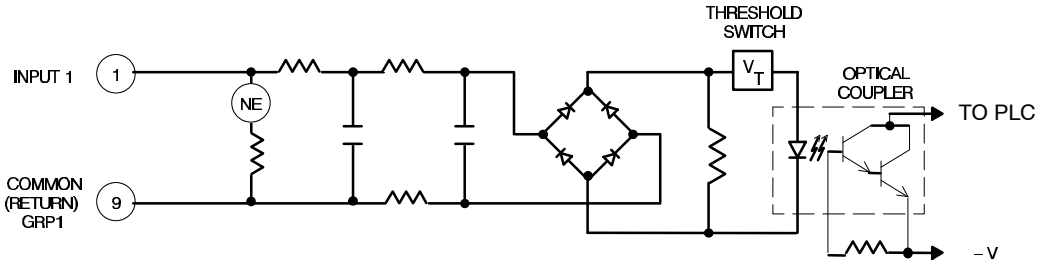


Figure 22 B809–016 Simplified Schematic

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11.2 Field 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.

11.2.1 Input Connections

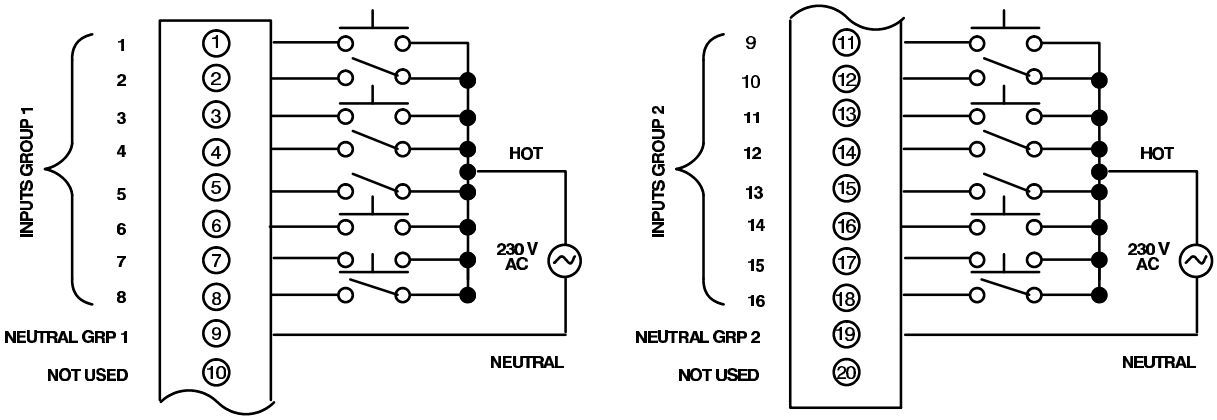


Figure 23 B809–016 Terminal Numbering and Input Connections

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11.3 Specifications

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 =0 Ω))
Peak inrush for 260VRMS (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

☞ **Note:** The B809- -016 input module is electrically compatible with the B808- -016 output module.

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Chapter 12
B810–008 115 Vac Isolated Output

- ☐ Overview
- ☐ Field Connections
- ☐ Specifications

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12.1 Overview

The B810-008 115 Vac (eight-point) 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 B808 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.

12.1.1 Simplified Schematic

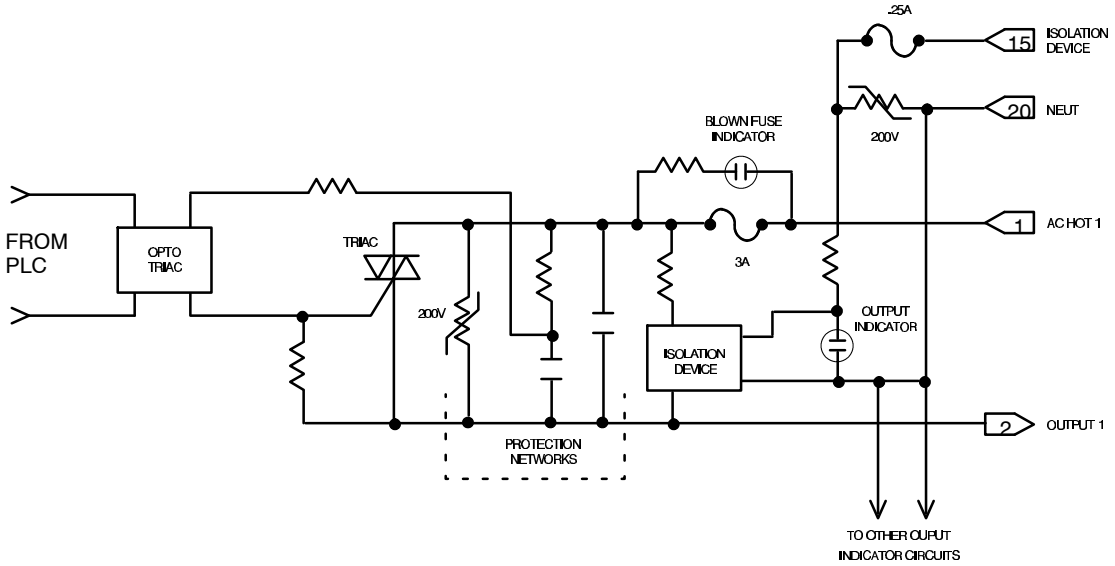


Figure 24 B810–008 Simplified Schematic

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.

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12.2 Field 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.

12.2.1 Output Connections

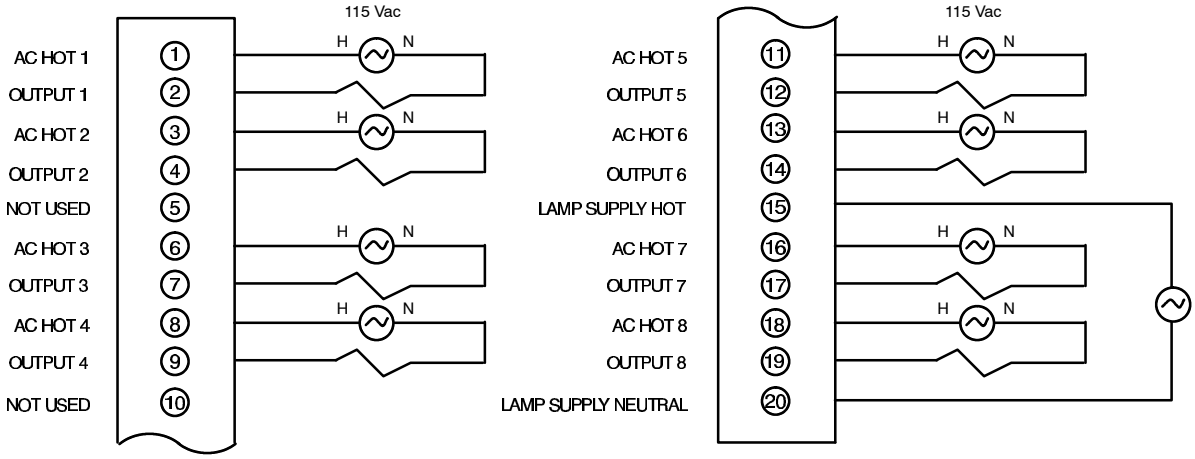


Figure 25 B810–008 Terminal Numbering and Output Connections

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12.3 Specifications

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
	Surge Current	50 A (max) 1 cycle
	Maximum/group	2 A
	Maximum/module	12 A
	Minimum Load Current	50 mA
Maximum OFF	Leakage Current	3 mA @ 115 Vac
ON Voltage Drop		1.3V @ 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/μs
	Commutating	5 V//μs
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)

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Chapter 13
B814–108 Relay Output

- ☐ Overview
- ☐ Configuration
- ☐ Field Connections
- ☐ Specifications

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13.1 Overview

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 Modicon 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 Figure 26).

13.1.1 Simplified Schematic

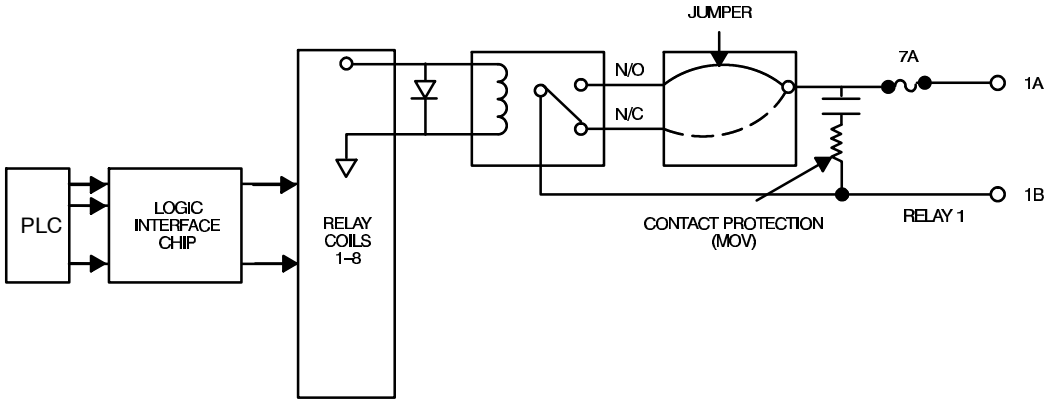


Figure 26 B814–108 Simplified Schematic

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13.2 Configuration

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.

B814–108 User Configuration Wire/Tab Designations

Channel	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

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13.3 Field 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.

13.3.1 Output Connections

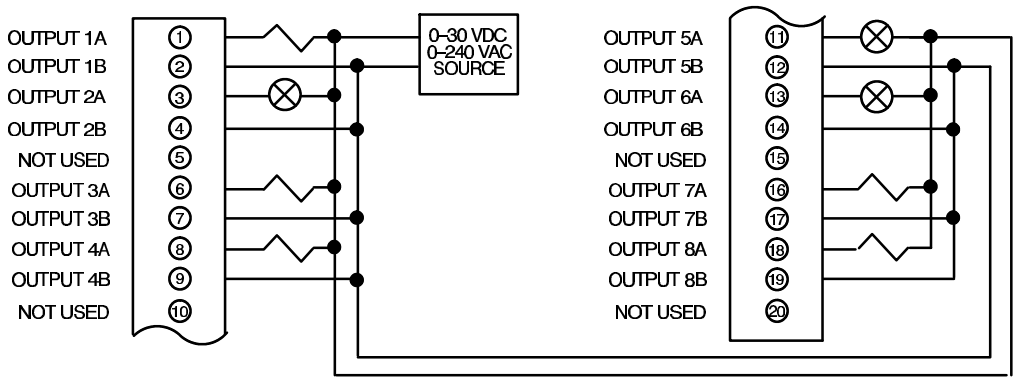


Figure 27 B814–108 Typical Circuit Connections for Power Applications

☞ **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.

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13.4 Specifications

B814–108 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
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
Relay Life Rating		100,000 operations, and 50,000 operations with inductive loads @ 25°C
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
Terminal Connector		AS–8534–000
Fusing		One / output, 7 A

☞ **Note:** For 48 Vdc operation, the maximum load is 1 A.

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Chapter 14
B817–116 and B817–216 115/230 Vac Isolated Input

- ☐ Overview
- ☐ Field Connections
- ☐ Specifications

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14.1 Overview

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 Modicon 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.

14.1.1 Simplified Block Diagram

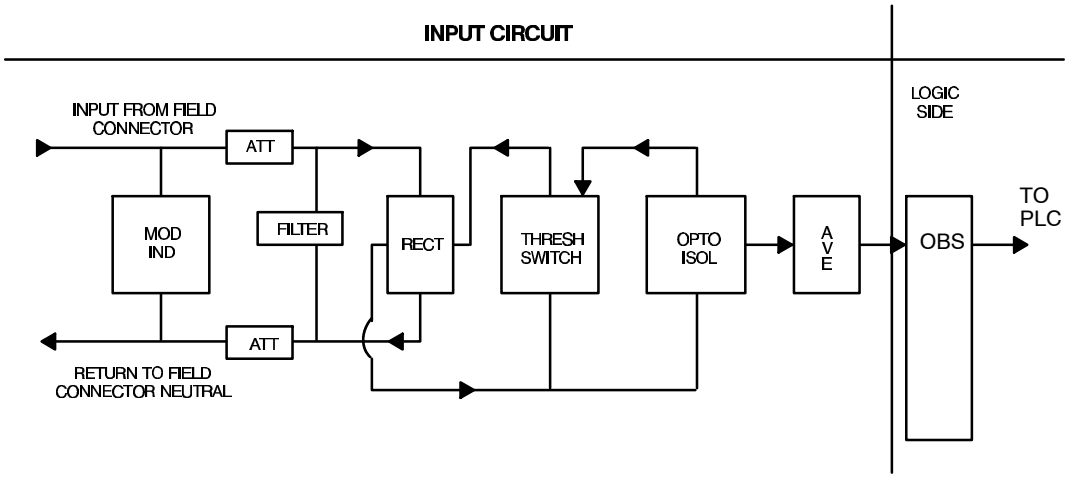


Figure 28 B817–116 and B817–216 Simplified Block Diagram

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.

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14.2 Field 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.

14.2.1 Terminal Numbering and Input Functions

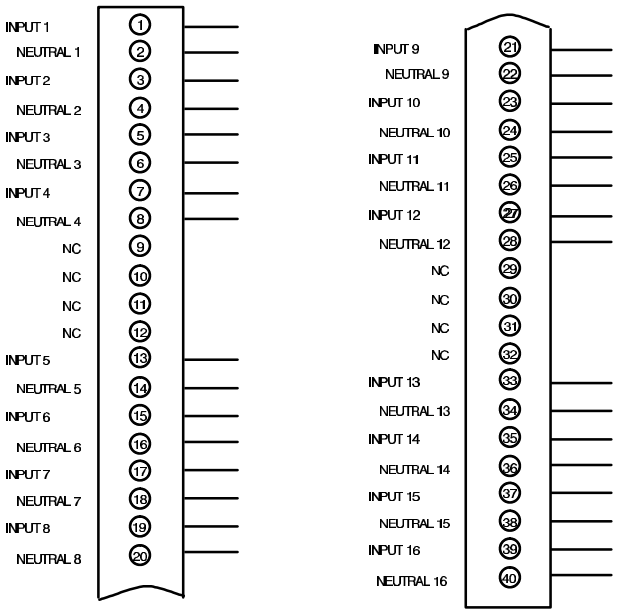


Figure 29 B817–116 and B817–216 Terminal Numbering

Figure 30 and Figure 31 shows typical circuitry connected to the user side of the field connector.

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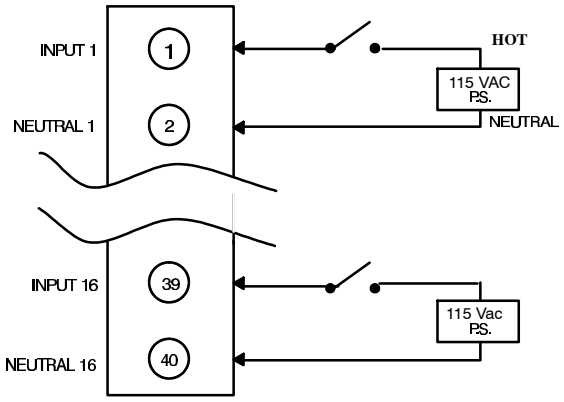


Figure 30 B817–116 Typical Field Circuit Connections

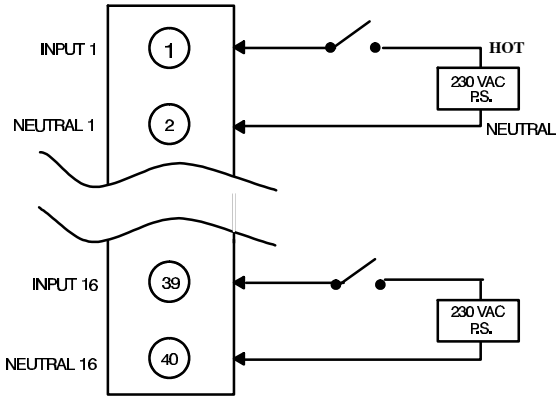


Figure 31 B817–216 Typical Field Circuit Connections

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14.3 Specifications

B817–x16 Specifications

Description		115 Vac isolated input (B817-116)
		230 Vac isolated input (B817-216)
Number of Points		16
Number of Groups		16
Inputs/group		1
Maximum Input Voltage	Continuous	130 Vac / 47 ... 63 Hz (B817–116)
		260 Vac / 47 ... 63 Hz (B817–216)
	Surge	200 Vac for 1 cycle (B817–116)
		400 Vac for 1 cycle (B817–216)
ON Conditions	B817–116	>80 Vac (Source Impedance <1 kΩ)
	B817–216	>160 Vac (Source Impedance <1 kΩ)
OFF Conditions		0 ... 35 Vac (Source Impedance = 0 Ω)
	B817–116	0 ... 130 Vac (Source Impedance >40 kΩ)
		0 ... 90 Vac (Source Impedance = 0 Ω)
	B817–216	0 ... 260 Vac (Source Impedance >80 kΩ)
Wetting Current	B817–116	0 ± 4 mA (typical) @115 Vac
	B817–216	8.2 ± 3 mA (typical) @ 230 Vac
Maximum Response Time (Module)	OFF → ON	6 ms
	ON → OFF	18 ms
Power Required	+5 V	25 mA
	+4.3 V	2 mA
	–5 V	8 mA
Terminal Connector		AS–8535–000

☞ **Note:** Scan time may increase response time when seen in user logic.

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Chapter 15
B820–008 10 ... 60 Vdc Output (True High)

- ☐ Overview
- ☐ Field Connections
- ☐ Specifications

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15.1 Overview

The B820-008 10 ... 60 (eight-point) Output Module (True High) 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 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.

15.1.1 Simplified Schematic

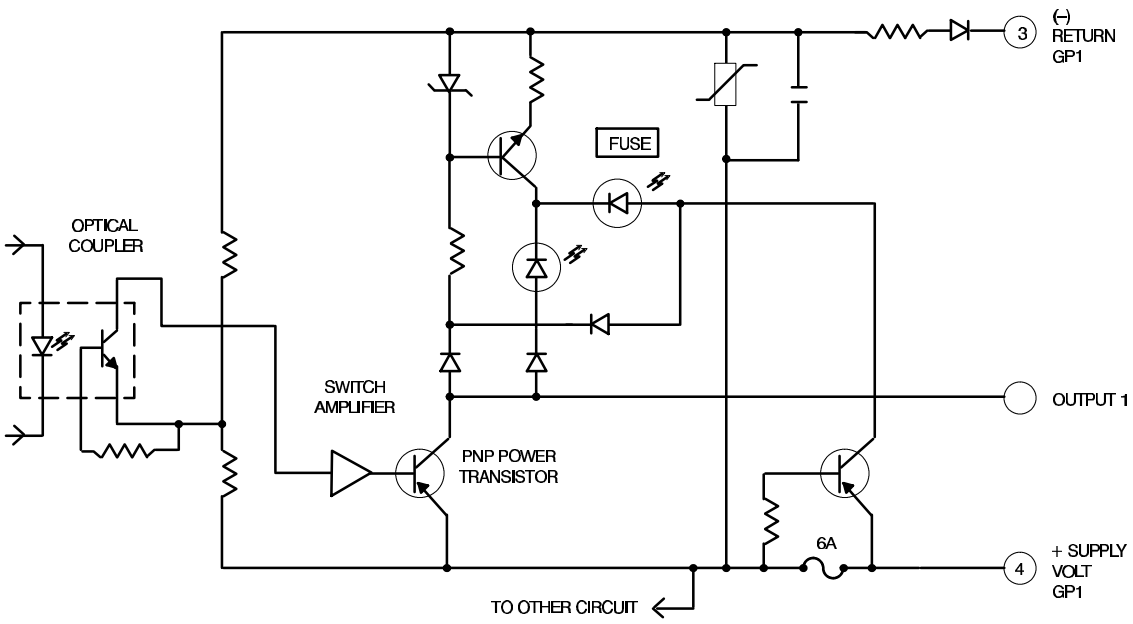


Figure 32 B820–008 Simplified Schematic

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

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15.2 Field 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.

15.2.1 Output Connections

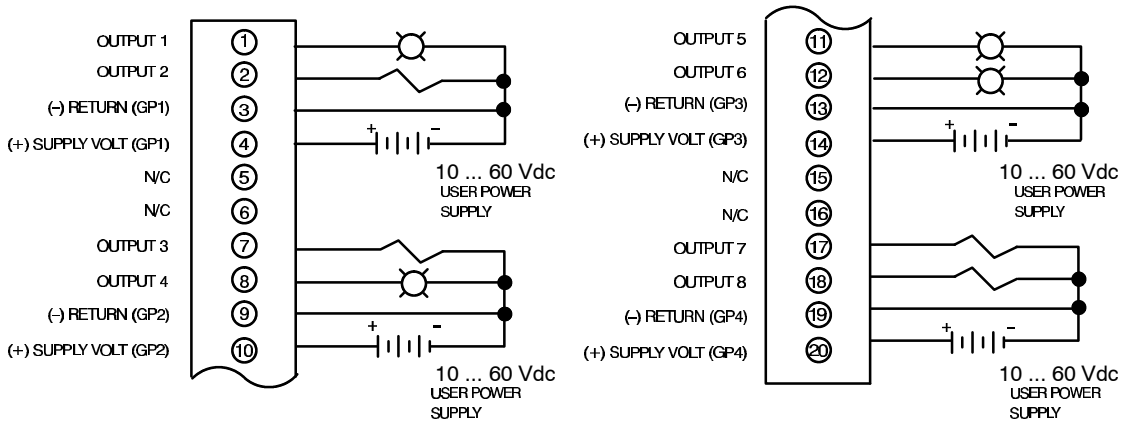


Figure 33 B820–008 Terminal Numbering and Output Connections

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15.3 Specifications

B820–008 Specifications

Description		10 ... 60 Vdc (true high) output
Number of Points		8
Operating Voltage		10 ... 60 Vdc
Number of Groups		4
Outputs / Group		2
ON State Voltage Drop		1.5 Vdc max @ 2A
ON Current	Maximum/point	2 A
	Maximum/group	6 A
	Maximum/module	12.0 A
	Surge Current	10 A/channel max for 10 ms at a repetition rate of 0.05%
Peak Voltage		80 Vdc max for 10 ms at a repetition rate of 0.05%
OFF State	Leakage Current	5 mA (max) @ 60 Vdc
Maximum Response Time	OFF → ON	1 ms (.1 ms typical)
	ON → OFF	1 ms (.1 ms typical)
dv/dt		200 V/μs
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)

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Chapter 16
B821–108 10 ... 60 Vdc Input (True High)

- ☐ Overview
- ☐ Field Connections
- ☐ Specifications

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16.1 Overview

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.

16.1.1 Simplified Schematic

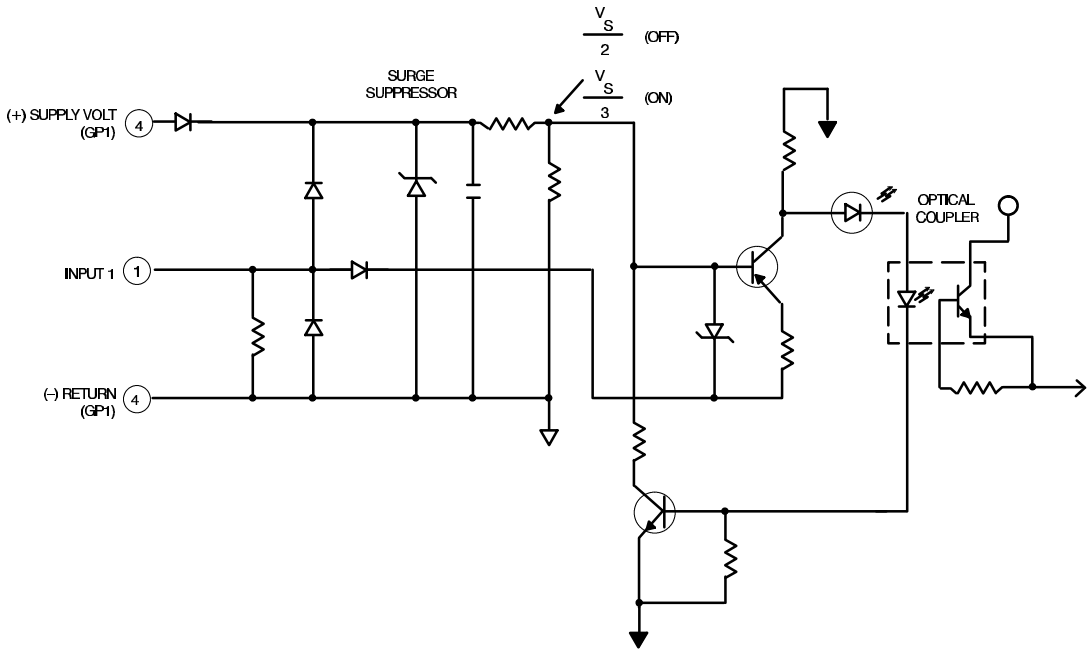


Figure 34 B821–108 Simplified Schematic

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16.2 Field 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.

16.2.1 Input Connections

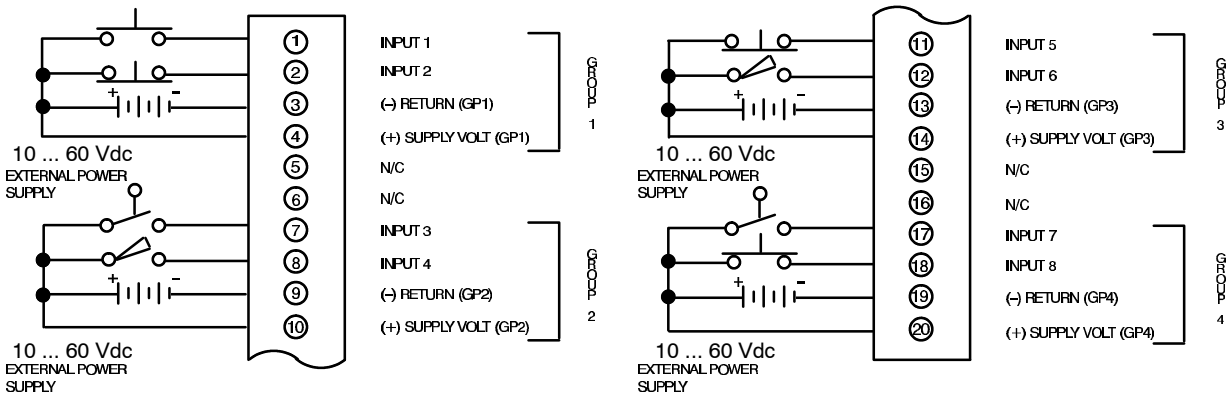


Figure 35 B821–108 Terminal Numbering and Input Connections

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16.3 Specifications

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, take into consideration the values listed for input currents that follow.

Inputs 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 resistance that follow.

Source Resistance	Supply Volt (Vdc)	Input Volt (Vdc)	Max Source Resistance (Ω)
	10	10	200
	60	60	500

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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

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Chapter 17
B824–016 24 Vdc Output (True High)

- ☐ Overview
- ☐ Field Connections
- ☐ Specifications

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17.1 Overview

The Modicon B824-016 24 Vdc True High Output Module consists of sixteen independent outputs divided into two groups of eight. The B824 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.

17.1.1 Simplified Schematic

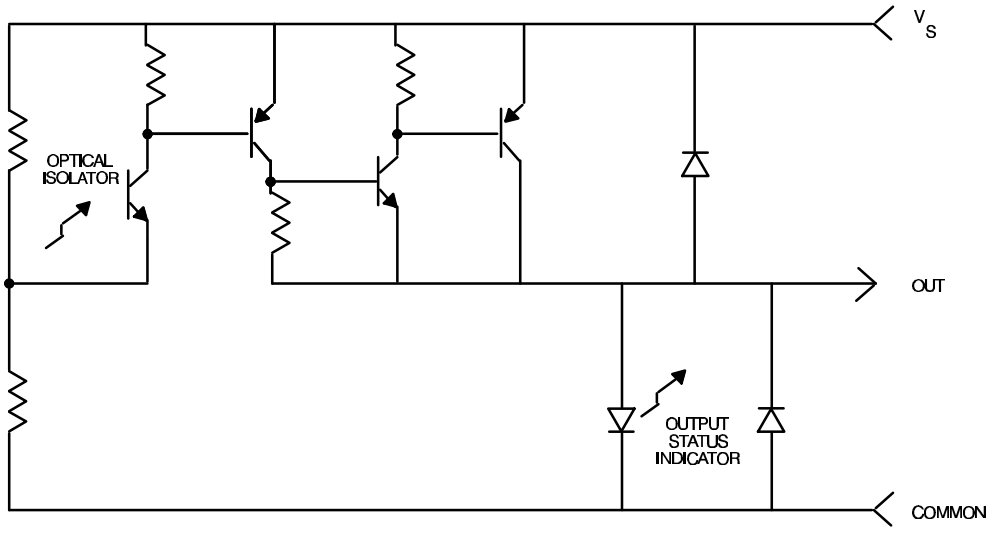


Figure 36 B824–016 Simplified Schematic

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17.2 Field 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.

17.2.1 Output Connections

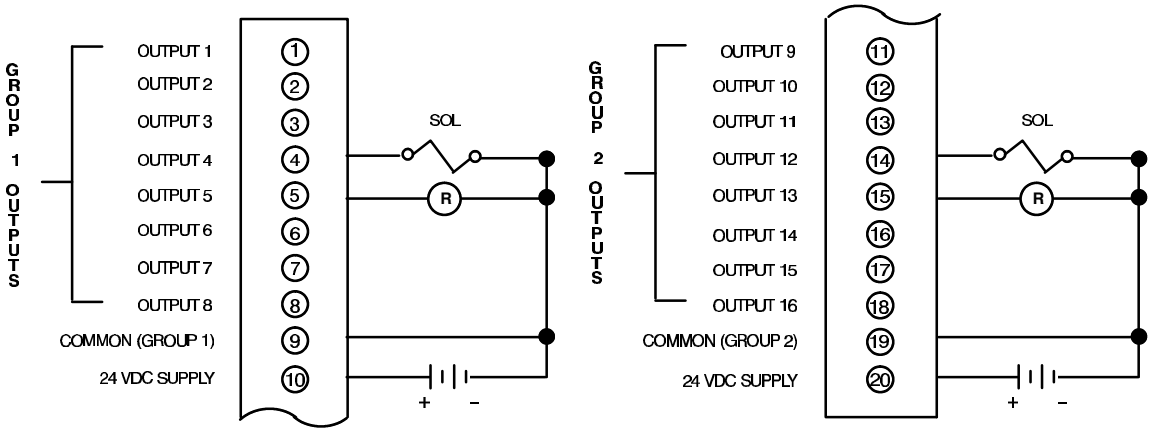


Figure 37 B824–016 Terminal Numbering and Output Connections

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17.3 Specifications

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 Surge	5 A for 10 ms
	Maximum/group	6 A
	Maximum/module	12 A
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		24Vdc $\pm$4 V, 175 mA – Polarity Protected (Excluding field load current)
Terminal Connector		AS–8534–000
Fusing		One / group, 8 A

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Chapter 18
B825–016 24 Vdc Input (True High)

- ☐ Overview
- ☐ Field Connections
- ☐ Specifications

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18.1 Overview

The Modicon B825- -016 24 Vdc True High Input Module consists of a single group of 16 independent inputs. The B825 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.

18.1.1 Simplified Schematic

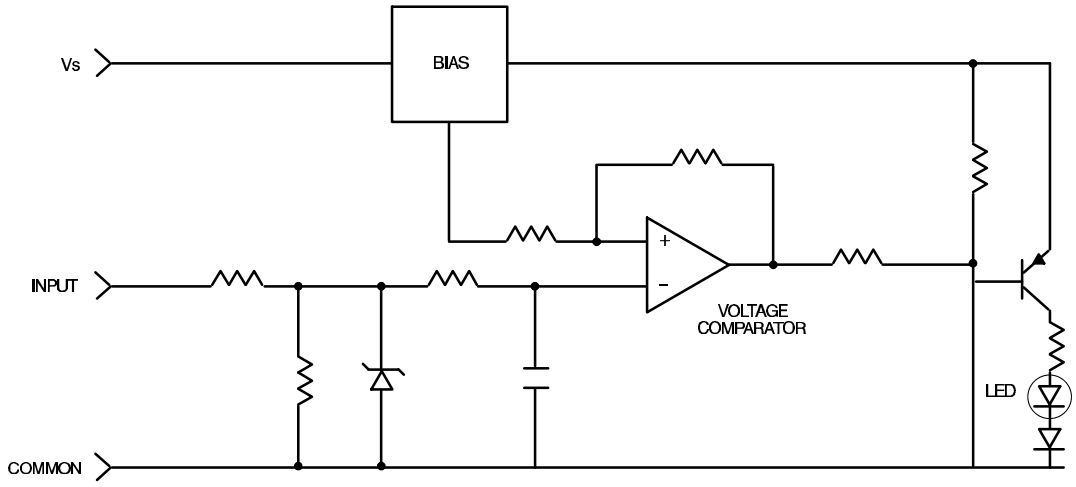


Figure 38 B825–016 Simplified Schematic

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18.2 Field 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.

18.2.1 Input Connections

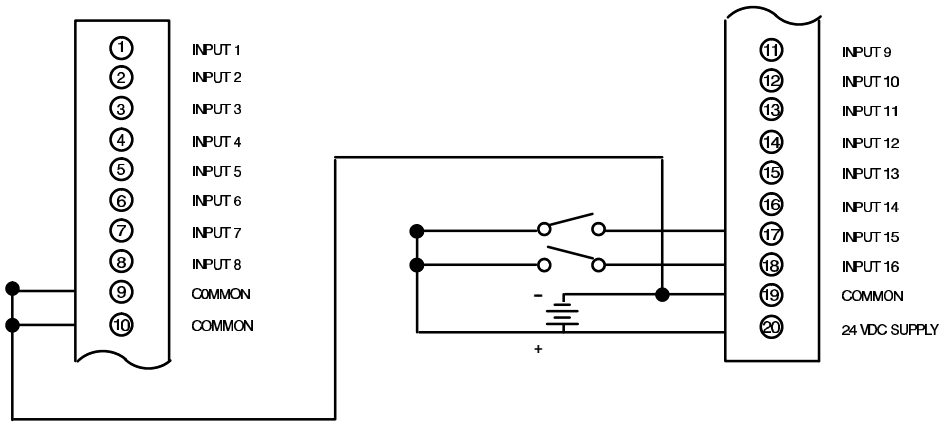


Figure 39 B825–016 Terminal Numbering and Input Connections

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18.3 Specifications

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. 1,000 Ω max resistance to common. Input indicator ON.
OFF Conditions		≤ 5 Vdc or .25 of Vs, whichever is greater. 25,000 Ω 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		24Vdc ±4 V@ 200 mA max (Vs)
Terminal Connector		AS–8534–000

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Chapter 19
B826–032 24 Vdc Output (True High)

- ☐ Overview
- ☐ Field Connections
- ☐ Specifications

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19.1 Overview

The Modicon B826-032 24 Vdc True High Output Module consists of a single group of 32 independent outputs. The B826 converts logic signals used within the PLC into 32 independent 24 Vdc outputs. Outputs are capable of driving relays, pilot lamps, and other loads rated at $^{1}/_{4}$ A. The outputs share an external supply voltage and are protected against overload currents by a single fuse.

19.1.1 Simplified Schematic

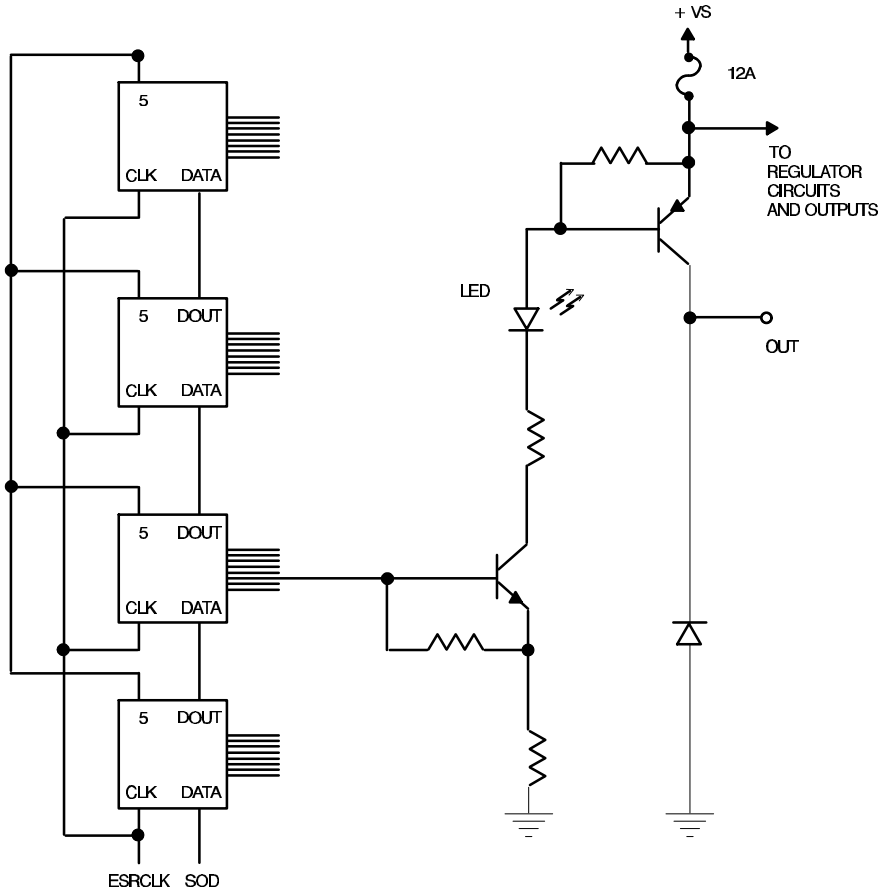


Figure 40 B826–032 Simplified Schematic

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☞ **Note:** Due to its high density and compact design, the module is specifically designed for use in applications such as driving individual pilot lamps, LED displays, or other *noncritical loads*.

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19.2 Field 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.

19.2.1 Output Connections

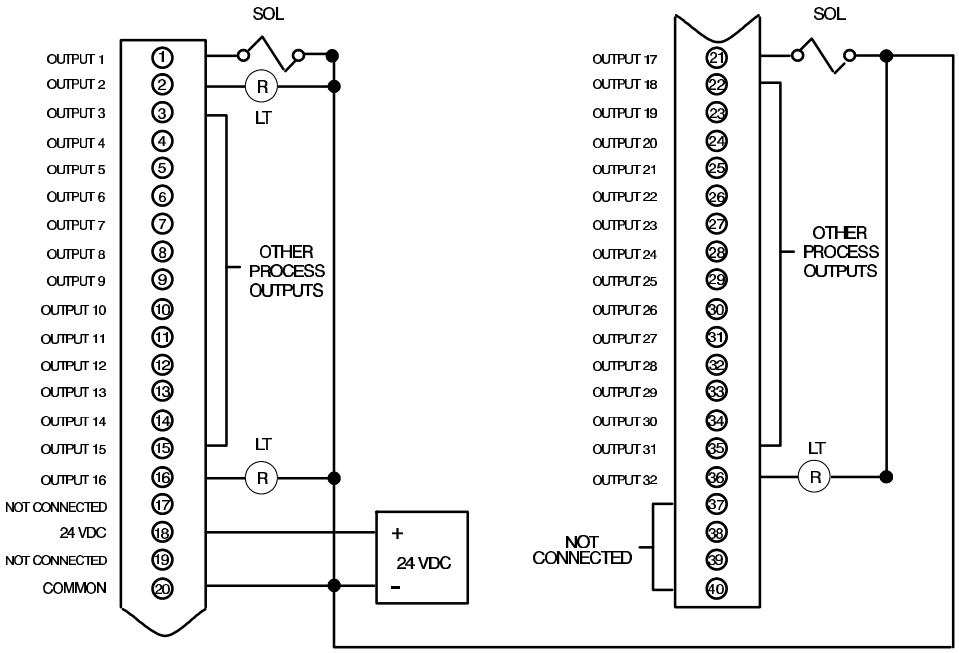


Figure 41 B826–032 Terminal Numbering and Output Connections

☞ **Note:** If any loads are polarity sensitive, their negative (- -) terminal must be connected to the common bus.

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19.3 Specifications

B826–032 Specifications

Description		24 Vdc output
Type of Operation		True high
Number of Points		32
Operating Voltage		20.4 ... 28.8 Vdc
Number of Groups		1
Outputs/group		32
On Current	Maximum/point	0.25 A
	Maximum/module	8 A
	Maximum/group	8 A
Surge Current		2.5A max for .5 mS
Off State Leakage Current		0.1 mA (typical) @ 24 Vdc
		0.75 mA max @ 28.8 Vdc
Maximum Response Time	OFF → ON	1 ms
	ON → OFF	1 ms
Ripple Voltage		± 1.2V max
Peak Voltage		32V max for 10 mS
On State Voltage Drop		0.7 Vdc max
Power Required	+5 V	90 mA
	+4.3 V	1 mA
	–5 V	0 mA
External Power Supply		24 Vdc, 600 mA max (Excluding field load current) 24 Vdc, 540 mA typical
Terminal Connector		AS–8535–000
Fuse		One/group, 12 A

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Chapter 20
B827–032 24 Vdc Input (True High)

- ☐ Overview
- ☐ Field Connections
- ☐ Specifications

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20.1 Overview

The Modicon 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 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.

20.1.1 Simplified Schematic

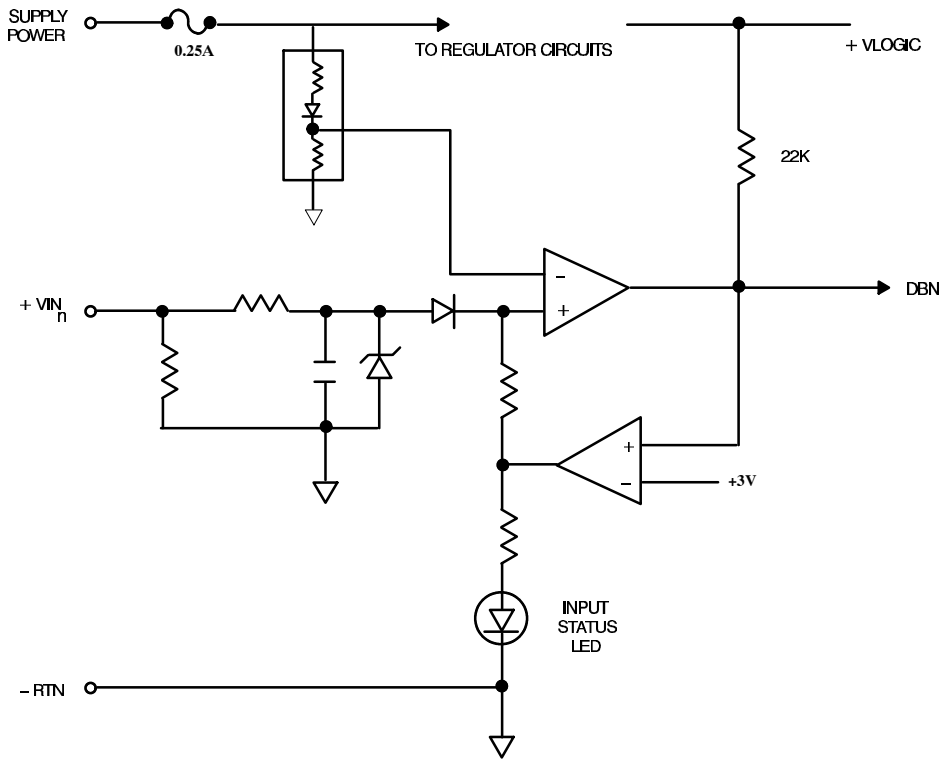


Figure 42 B827–032 Simplified Schematic

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20.2 Field 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.

20.2.1 Input Connections

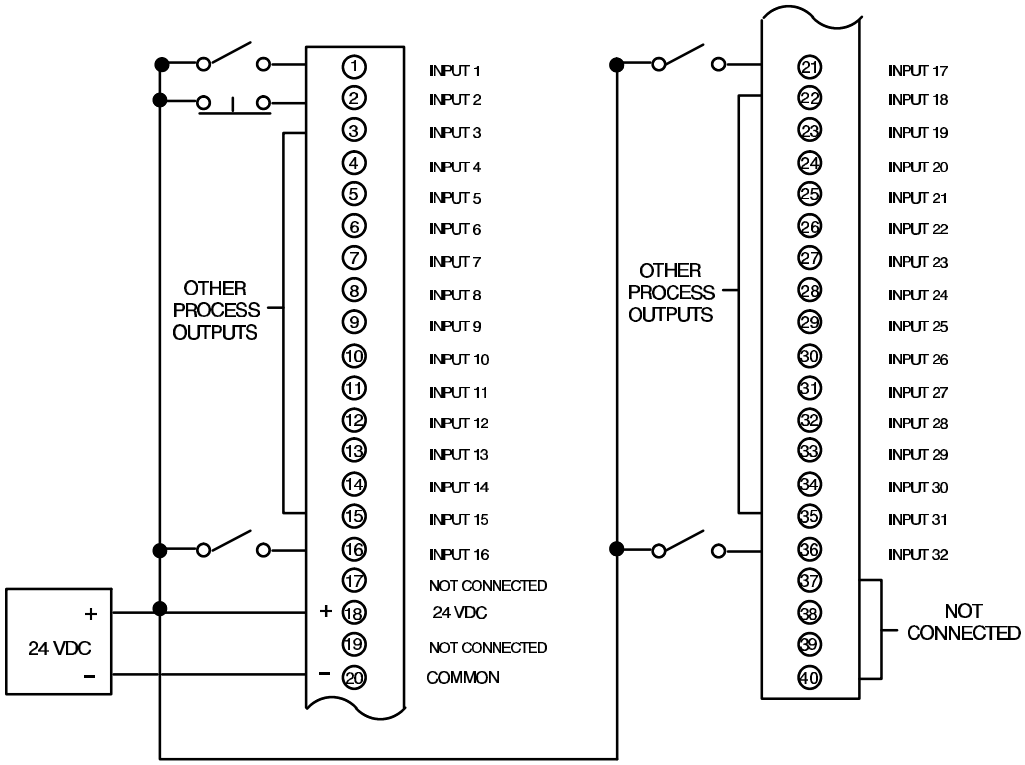


Figure 43 B827–032 Terminal Numbering and Input Connections

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20.3 Specifications

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	60mA max over an 18 ... 30 Vdc range
Terminal Connector		AS–8535–000
Fuse		0.25 A

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Chapter 21
B828–016 5 V TTL Output

- ☐ Overview
- ☐ Field Connections
- ☐ Specifications

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21.1 Overview

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.

21.1.1 Simplified Schematic

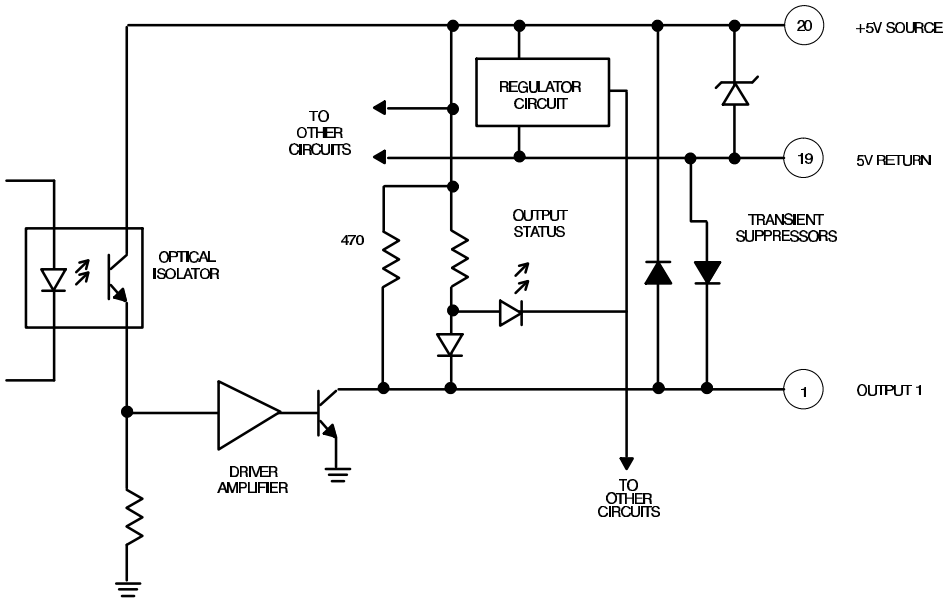


Figure 44 B828–016 Simplified Schematic

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21.2 Field 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.

21.2.1 Output Connections

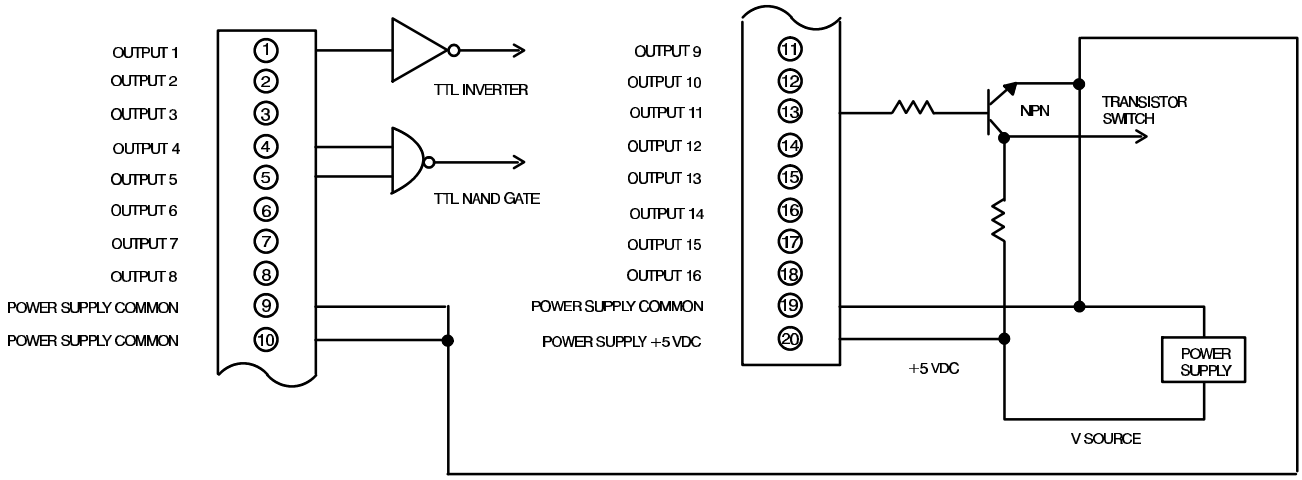


Figure 45 B828–016 Terminal Numbering and Output Connections

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21.3 Specifications

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 @ 1mA 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

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Chapter 22
B829–116 5 V TTL Input

- ☐ Overview
- ☐ Field Connections
- ☐ Specifications

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22.1 Overview

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.

22.1.1 Simplified Schematic

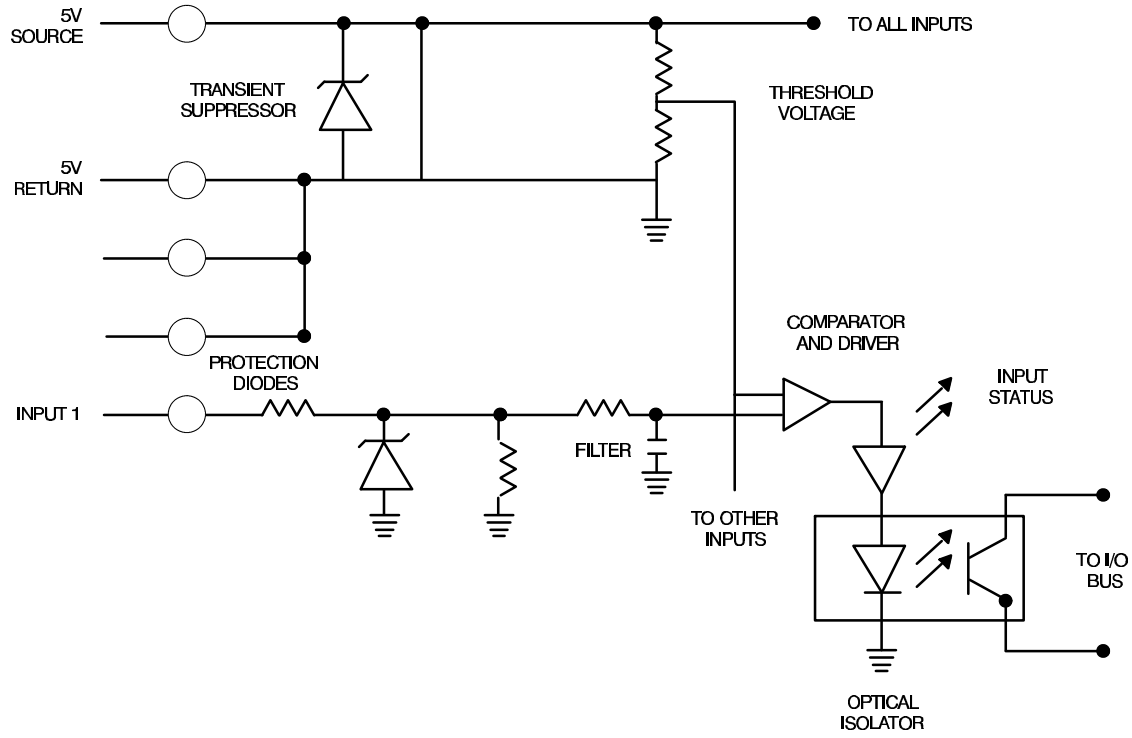


Figure 46 B829–116 Simplified Schematic

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22.2 Field 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.

22.2.1 Input Connections

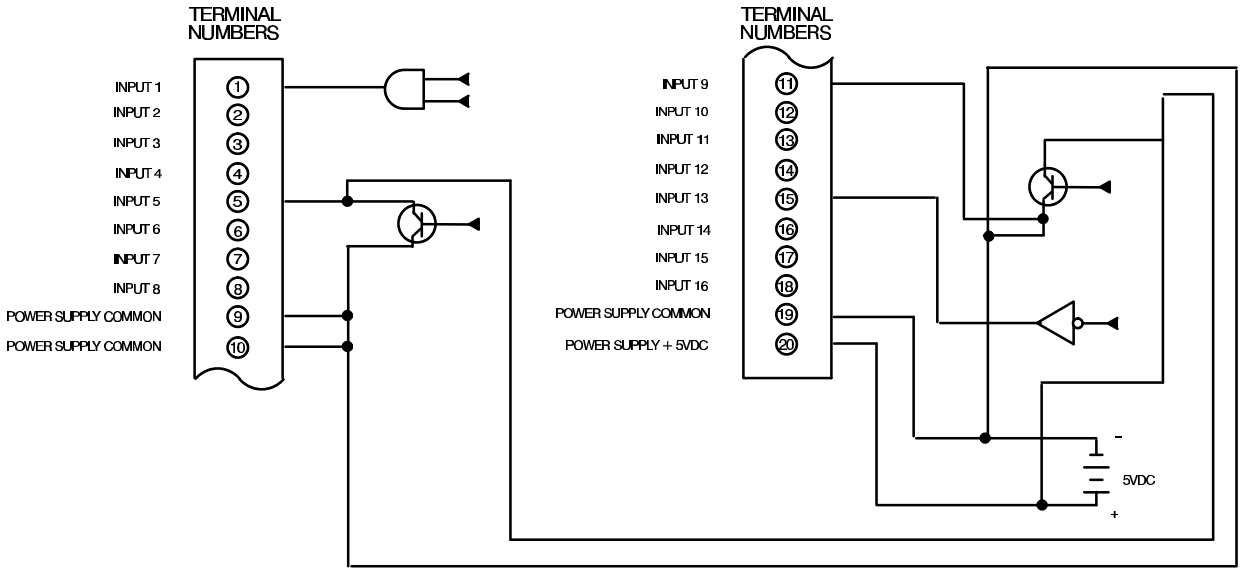


Figure 47 B829–116 Terminal Numbering and Input Connections

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22.3 Specifications

B829–116 Specifications

Description		5 V TTL16-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

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Chapter 23
B832–016 24 Vdc Output (True Low)

- ☐ Overview
- ☐ Field Connections
- ☐ Specifications

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23.1 Overview

The Modicon B832-016 24 Vdc Output Module (True Low) consists of a single group of 16 independent outputs. The B832 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. There are 16 transistor switches, which are used to control loads connected to an external power source.

23.1.1 Simplified Schematic

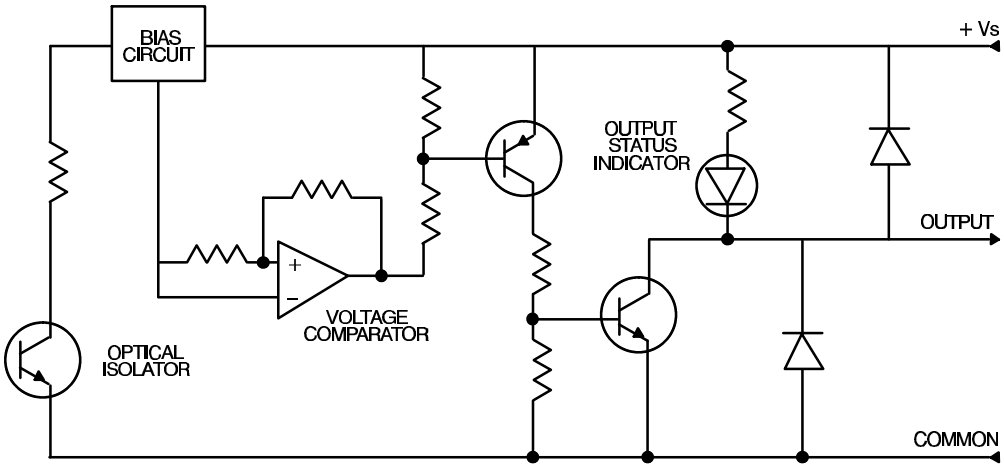


Figure 48 B832–016 Simplified Schematic

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23.2 Field 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.

23.2.1 Output Connections

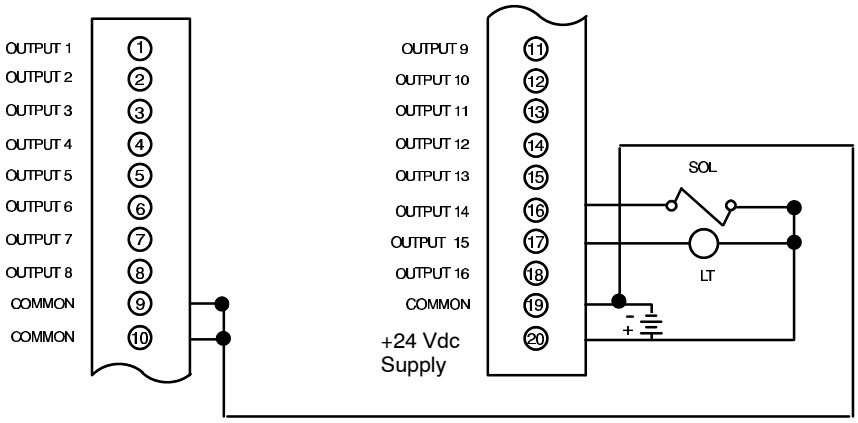


Figure 49 B832–016 Terminal Numbering and Output Connections

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23.3 Specifications

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 maximum (excluding field load current)
Terminal Connector		AS–8534–000
Fusing		1/module, 6 A

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Chapter 24
B833–016 24 Vdc Input (True Low)

- ☐ Overview
- ☐ Field Connections
- ☐ Specifications

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24.1 Overview

The Modicon B833-016 24 Vdc Input Module (True Low) consists of two groups of eight independent inputs. The B833 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.

24.1.1 Simplified Schematic

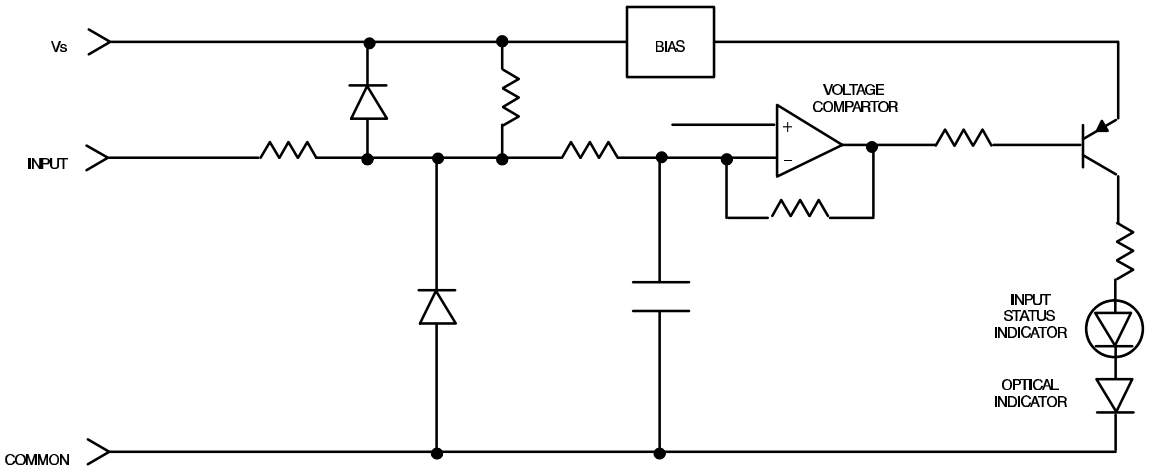


Figure 50 B833–016 Simplified Schematic

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24.2 Field 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.

24.2.1 Input Connections

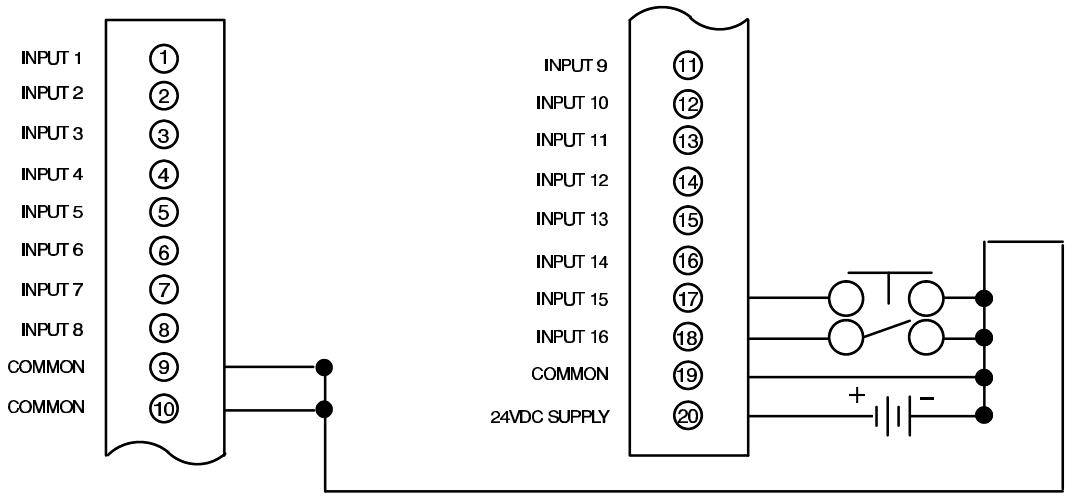


Figure 51 B833–016 Terminal Numbering and Input Connections

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24.3 Specifications

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. 200 Ω max resistance to common. Input indicator ON.
OFF Conditions		≥ 21 Vdc or .75 of Vs, whichever is less. 10,000 Ω min resistance to common. Input indicator OFF.
Maximum Input Voltage		100 V for 3 mS
ON Current		6 mA (typical) @ 24 Vdc
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

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Chapter 25
B836–016 12 ... 250 Vdc Isolated Output

- ☐ Overview
- ☐ Field Connections
- ☐ Specifications

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25.1 Overview

The B836-016 12 ... 250 Vdc Isolated Output Module accepts up to 16 signals from a Modicon PLC and converts them to independent outputs. The module's essential function is to switch one or more field circuits OFF and ON as signalled by the PLC.

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 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 completely floating arrangement, it is equally useful in a true high (sourcing) or true low (sinking) configuration.

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25.1.1 Simple Block Diagram

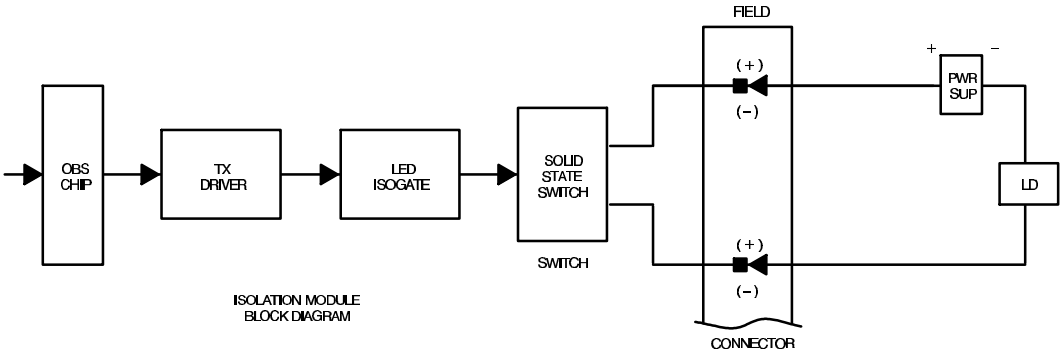


Figure 52 B836–016 Simplified Block Diagram

Caution: Certain large inductive load conditions may require external reverse diodes placed directly across the load for complete circuit protection.

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25.2 Field 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.

25.2.1 Terminal Numbering and Output Functions

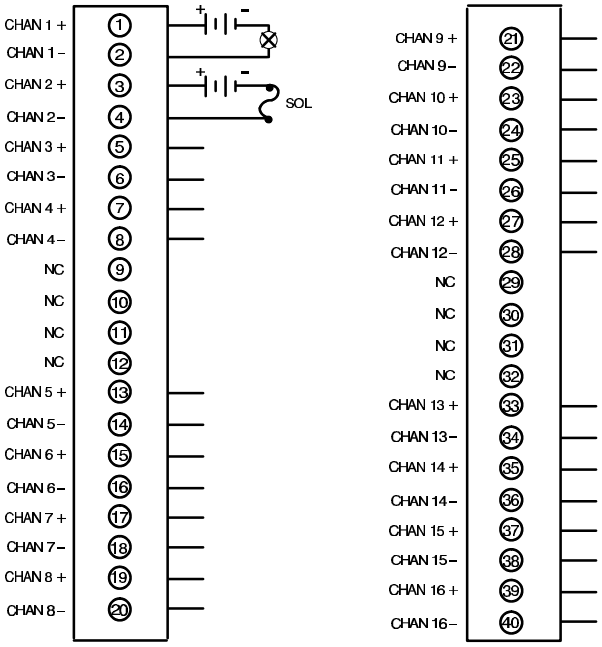


Figure 53 B836–016 Terminal Numbering

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25.2.2 Typical User-side Field Connector Circuitry

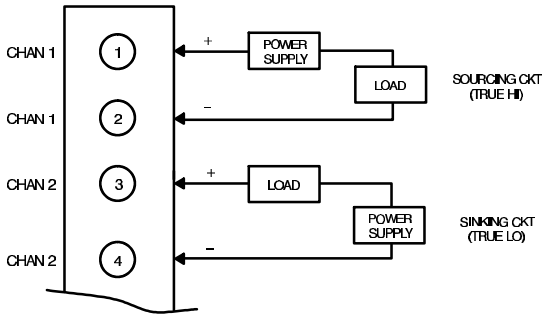


Figure 54 B836–016 Typical Field Circuit Connections

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25.3 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		3.0V 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 does 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

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Chapter 26
B837–016 24 V ac/dc Input

- ☐ Overview
- ☐ Field Connections
- ☐ Specifications

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26.1 Overview

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.

26.1.1 Simple Block Diagram

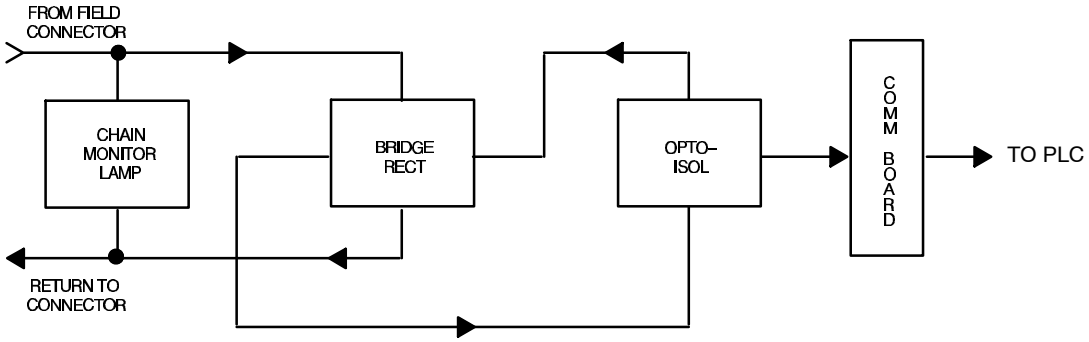


Figure 55 B837–016 Simplified Block Diagram

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.

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Given a nominal 24 V field power supply and 1000 Ω 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.

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26.2 Field 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 input functions are presented below in Figure 56.

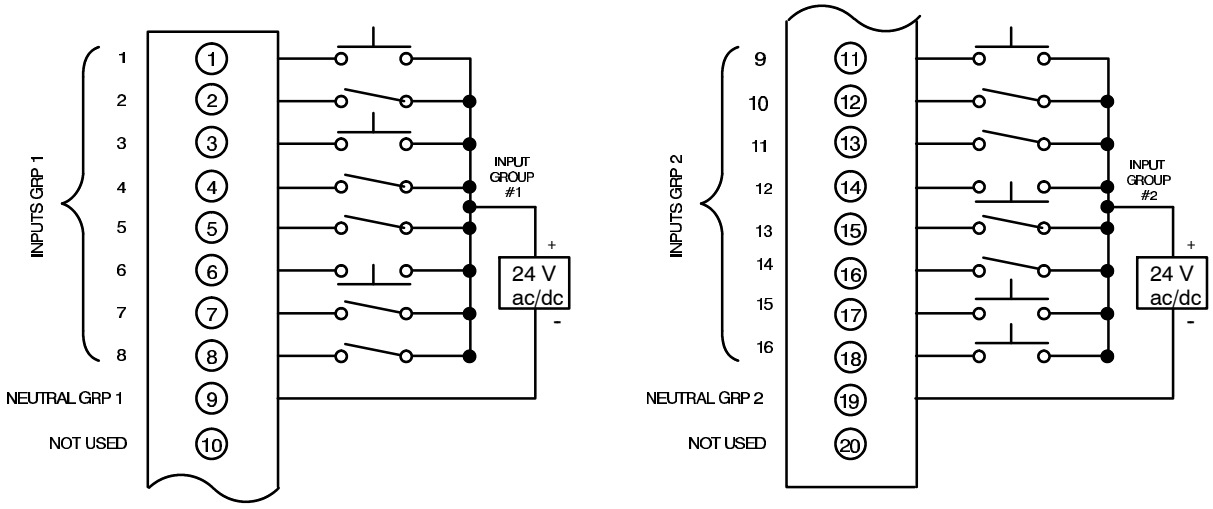


Figure 56 B837–016 Terminal Numbering

☞ **Note:** To use both input groups with a single power supply, jump terminals #9 and #19.

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26.3 Specifications

B837–016 Specifications

Description		24 V ac/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 10 s
		58 V peak 10 ms
ON Conditions		$\geq$ 20.4 Vac or 19.2 Vdc w/Inp Source Impedance of 1 k maximum input current 10 $\pm$ 2 mA
OFF Conditions		< 6 Vac / 10 Vdc
		< 27 Vac w/Inp Source Impedance $\geq$ 15 k
		< 30 Vdc w/Inp Source Impedance $\geq$ 30 k
Input ON Current		10 mA max, 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
External Power Supply		24 Vac/dc, 300 mA
Terminal Connector		AS–8534–000

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Chapter 27
B838–032 24 Vdc Output (True High)

- ☐ Overview
- ☐ Field Connections
- ☐ Specifications

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27.1 Overview

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 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.

27.1.1 Simplified Schematic

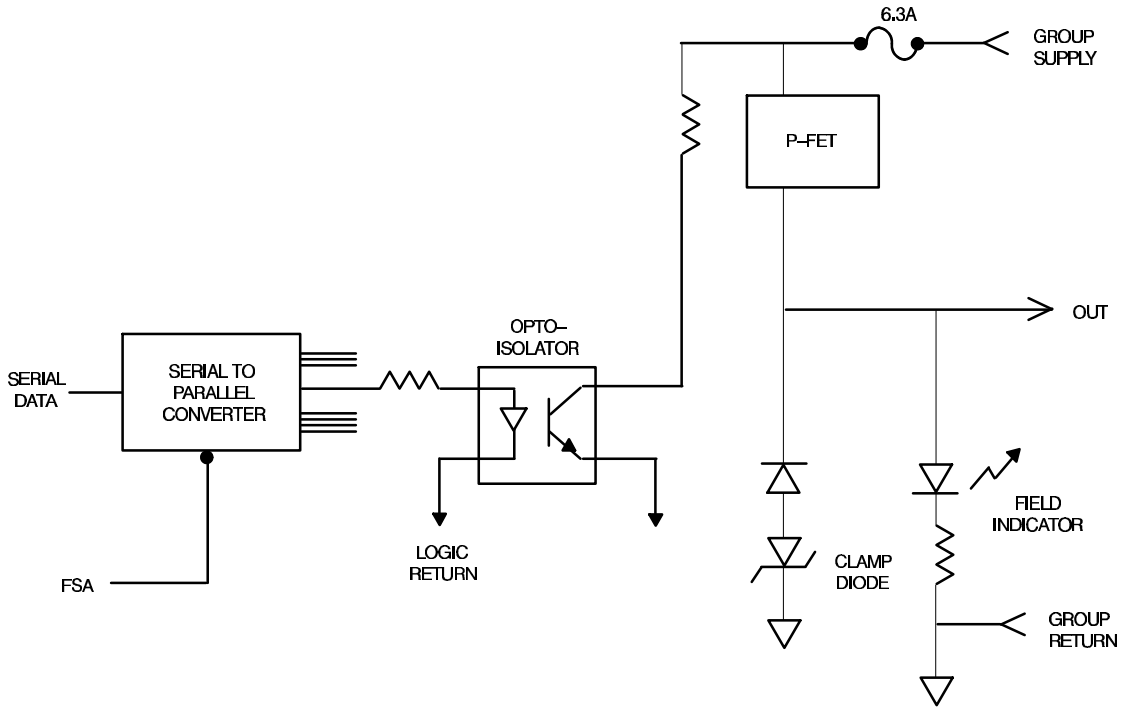


Figure 57 B838–032 Simplified Schematic

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27.2 Field 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.

27.2.1 Output Connections

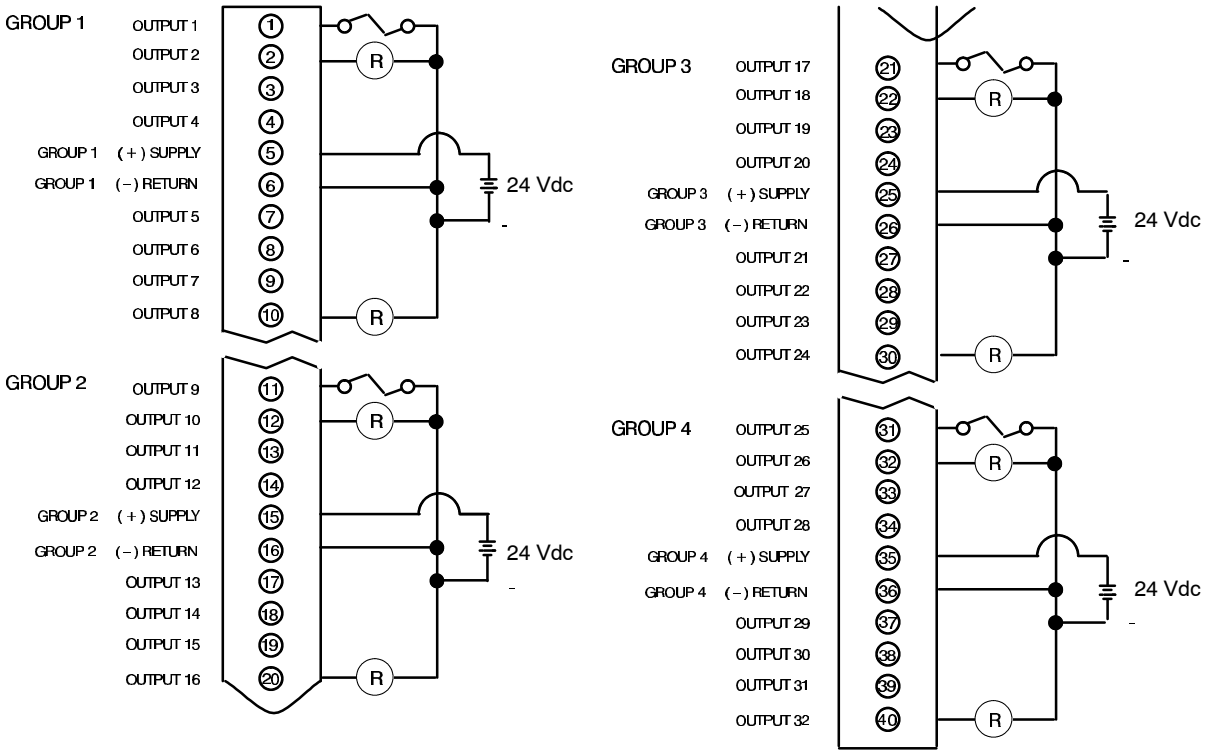


Figure 58 B838–032 Terminal Numbering and Output Connections

☞ **Note:** If any loads are polarity sensitive, their negative (--) terminal must be connected to the group return terminal.

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27.3 Specifications

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 maximum
	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) exists, 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 H
Fast Contactor Turn Off		< 60 ms with 3.0 H 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
	–5 V	0 mA
External Power Supply		24 Vdc ± 4 V, 125 mA (excluding field load current)
Terminal Connector		AS–8535–000

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Chapter 28
B840–108 Relay Output

- ☐ Overview
- ☐ Configuration
- ☐ Field Connections
- ☐ Specifications

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28.1 Overview

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.

28.1.1 Simplified Schematic

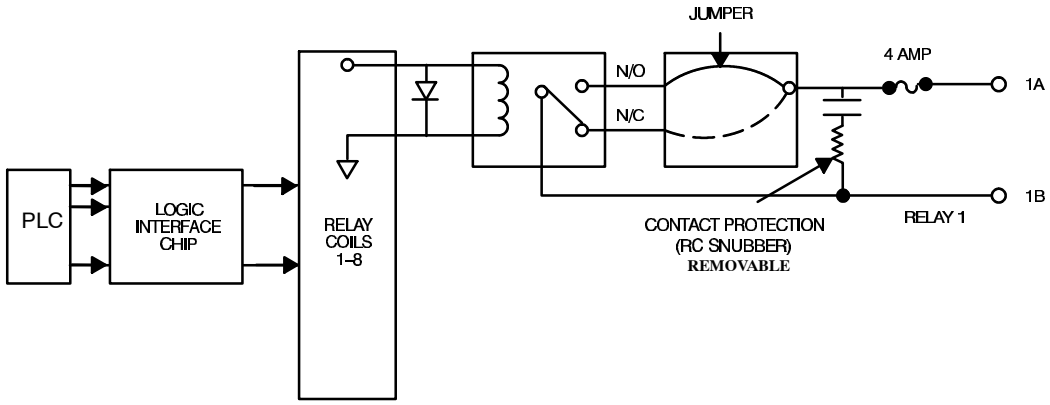


Figure 59 B840–108 Simplified Schematic

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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.

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28.2 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 (see Figure 60).

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

Figure 60 B840–108 User Configuration

The snubber circuits are disconnected by removing the (JP1- -JP8) appropriate jumper. Refer to the label on the side of the module.

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28.3 Field 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.

28.3.1 Terminal Numbering and Output Functions

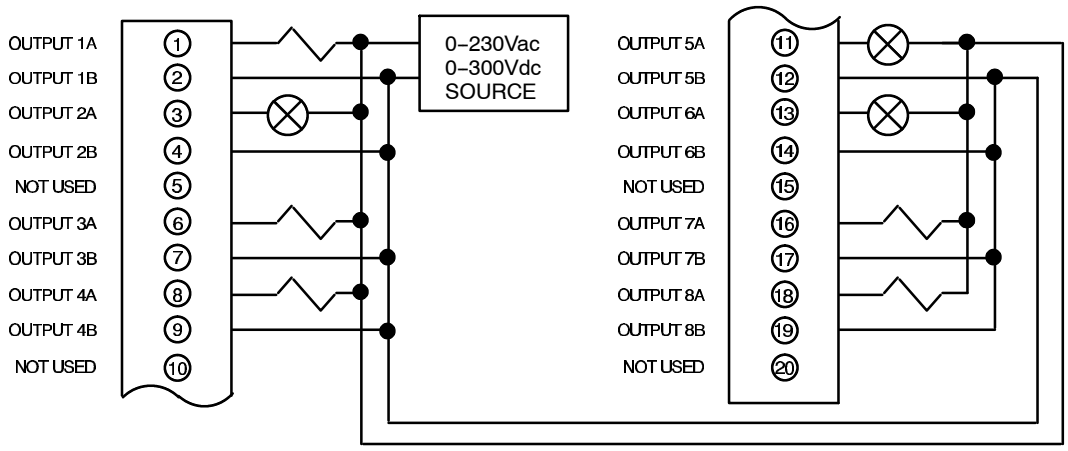


Figure 61 B840–108 Terminal Numbering

☞ **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.

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28.4 Specifications

B840–108 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

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Chapter 29
B849–016 48 V ac/dc Input

- ☐ Overview
- ☐ Field Connections
- ☐ Specifications

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29.1 Overview

The B849-016 48 V ac/dc true high 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.

29.1.1 Simple Block Diagram

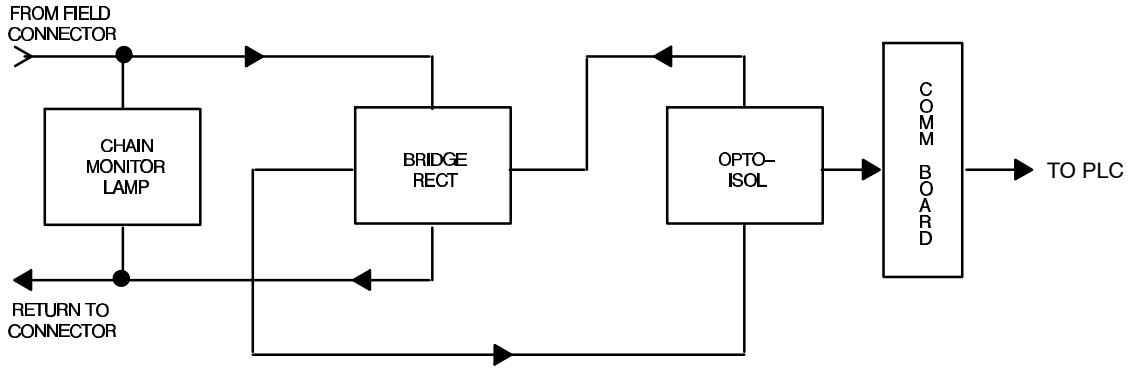


Figure 62 B849–016 Simplified Block Diagram

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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 48 V field power supply and 1000 Ω maximum input source impedance, the module's channel monitor lamps will indicate ON and OFF when input voltages are 41 Vac/39 Vdc for the high level ON; and 15 Vac/20 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 by the controller may be as long as 250 mS. You should not attempt to monitor events with a repetition rate greater than 1 / s without analyzing your system, program, and scan time.

☞ **Note:** It is possible to have the ACTIVE indicator lit with one or more input channels working improperly.

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29.2 Field 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.

29.2.1 Terminal Numbering and Input Functions

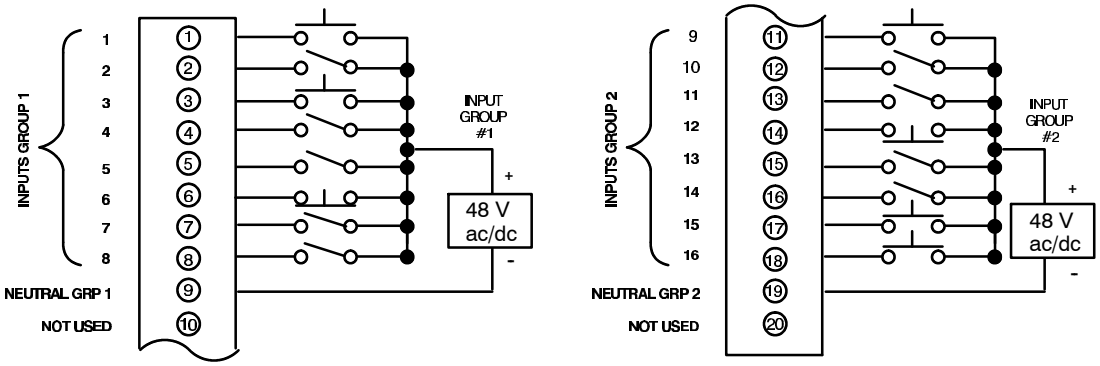


Figure 63 B849–016 Terminal Numbering

☞ **Note:** To use both input groups with a single power supply, jump terminals #9 and #19.

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29.3 Specifications

B849–016 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	$\geq$ 41 Vac or 39 Vdc w/Inp Source Impedance of 1 K maximum input current 7.5 mA $\pm$ 2 mA
OFF Conditions		< 15 Vac / 20 Vdc < 53 Vac w/Inp Source Impedance $\geq$ 25 k < 58 Vdc w/Inp Source Impedance $\geq$ 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

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Chapter 30
B853–016 115 Vac/125 Vdc Input

- ☐ Overview
- ☐ Field Connections
- ☐ Specifications

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30.1 Overview

The B853-016 115 Vac/125 Vdc True High input module senses OFF and ON input signals from its field circuitry, converting them to logic levels used by a Modicon 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 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.

30.1.1 Simple Block Diagram

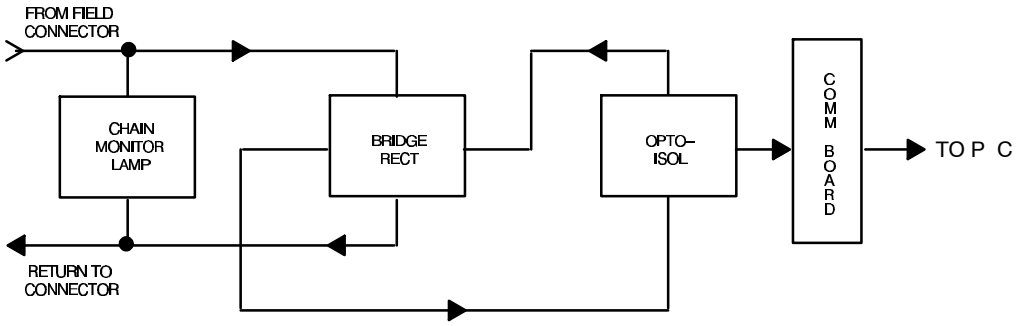


Figure 64 B853–016 Simplified Block Diagram

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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 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.

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30.2 Field 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.

30.2.1 Terminal Numbering and Input Functions

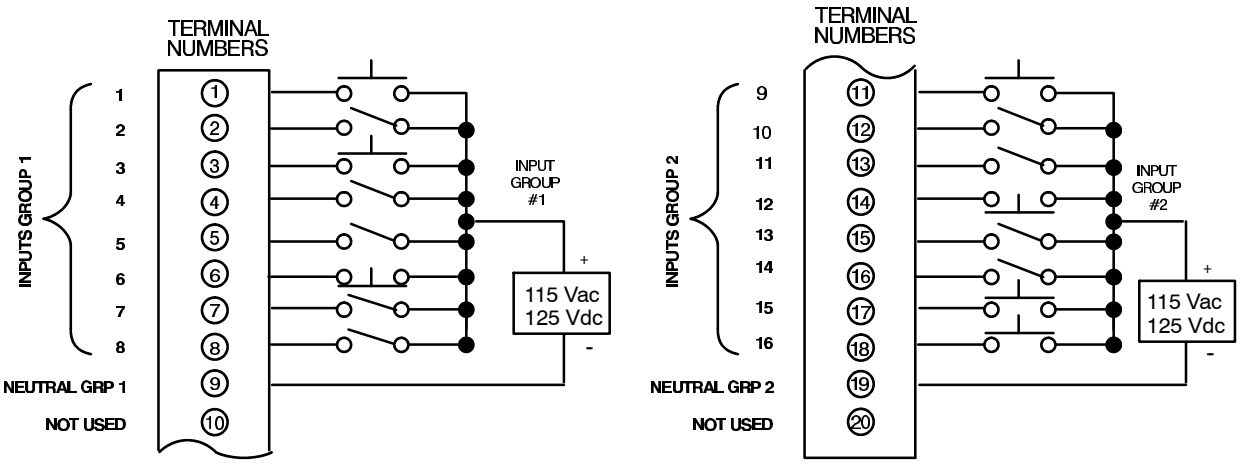


Figure 65 B853–016 Terminal Numbering

☞ **Note:** To use both input groups with a single power supply, jump terminals #9 and #19.

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30.3 Specifications

B853–016 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		$\geq$ 80 Vac or 85 Vdc; w/Inp Source Impedance of 1 k maximum input current 9 mA $\pm$ 2 mA
OFF Conditions		< 35 Vac/40 Vdc; < 130 Vac w/Inp Source Impedance $\geq$ 40 K; < 150 Vdc w/Inp Source Impedance $\geq$ 80 k
ON Current		7 mA (max), 4.5 mA (min)
Maximum Response Time	OFF → ON	6 ms
	OFF → ON	18 ms
Power Required	+5 V	40 mA
	+4.3 V	1 mA
	–5 V	15 mA
Terminal Connector		AS–8534–000

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Chapter 31
B855–016 Intrinsically Safe 12 Vdc Input

- ☐ Overview
- ☐ Installation
- ☐ Specifications

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31.1 Overview

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 module meets Factory Mutual Standard FM 3610 for Intrinsically Safe Connections to Field Side Associated Apparatus.

The B855 module has 16 discrete inputs. The inputs work in the range 11.4 ... 12.6 Vdc, True Low.

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31.2 Installation

Procedure **How to Install a B855**

Installation of your B855 module involves: unpacking the module, wiring the field connector, installing key pins, and mounting the module into the housing.

Step 1 Remove the module from its shipping box and check for damage. If damaged, contact your salesman or distributor for correct procedure.

Step 2 Ensure power to housing is OFF.

Step 3 Designate the housing slot for this module.

Step 4 Locate required connector assembly (Modicon Part number AS--8535--000). This assembly consists of two 20--pin connectors.

Step 5 Referring to Figure 66, 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.

Caution: You must use the MD-8741-000Intrinsically Safe Barrier Strip to meet Factory Mutual's requirements.

Step 6 Referring to Figure 67, 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 sub--assembly 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.

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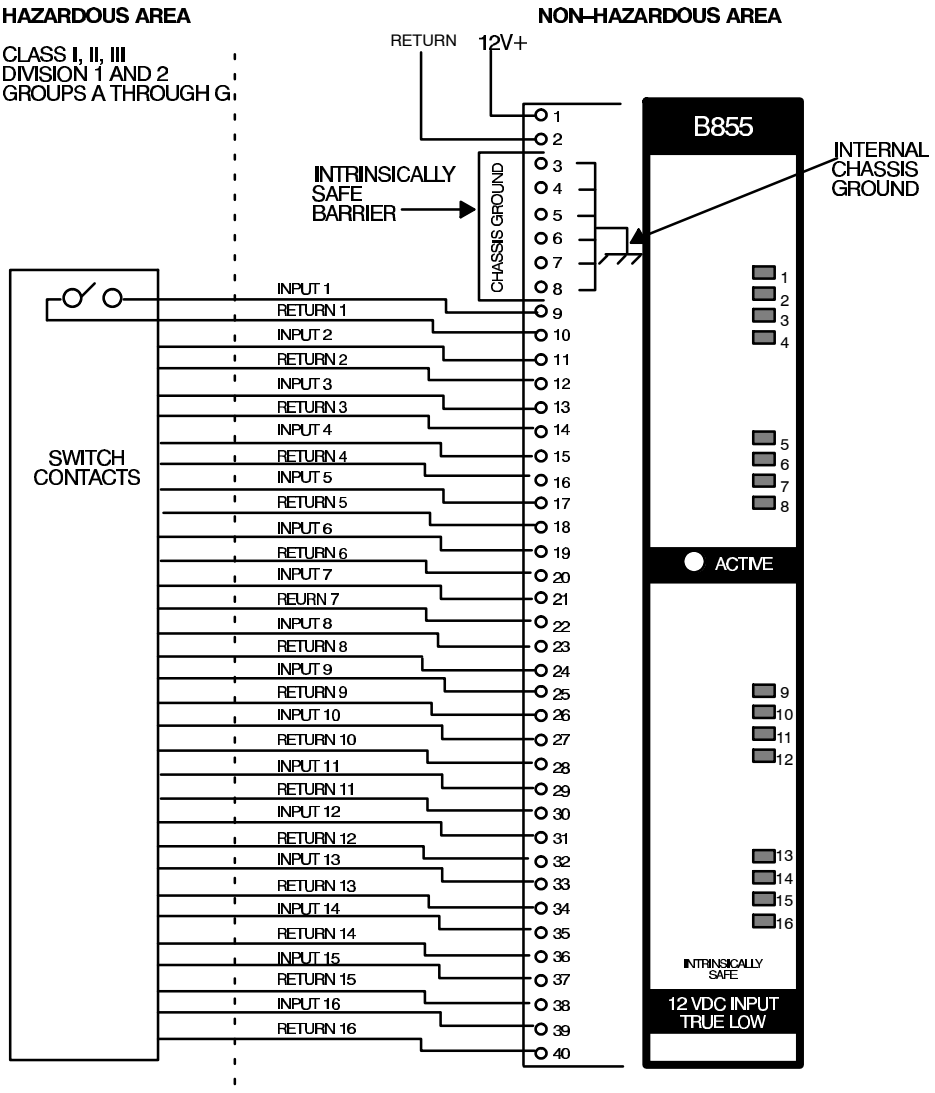


Figure 66 B855–016 Hazardous Area and Safe Area Wiring

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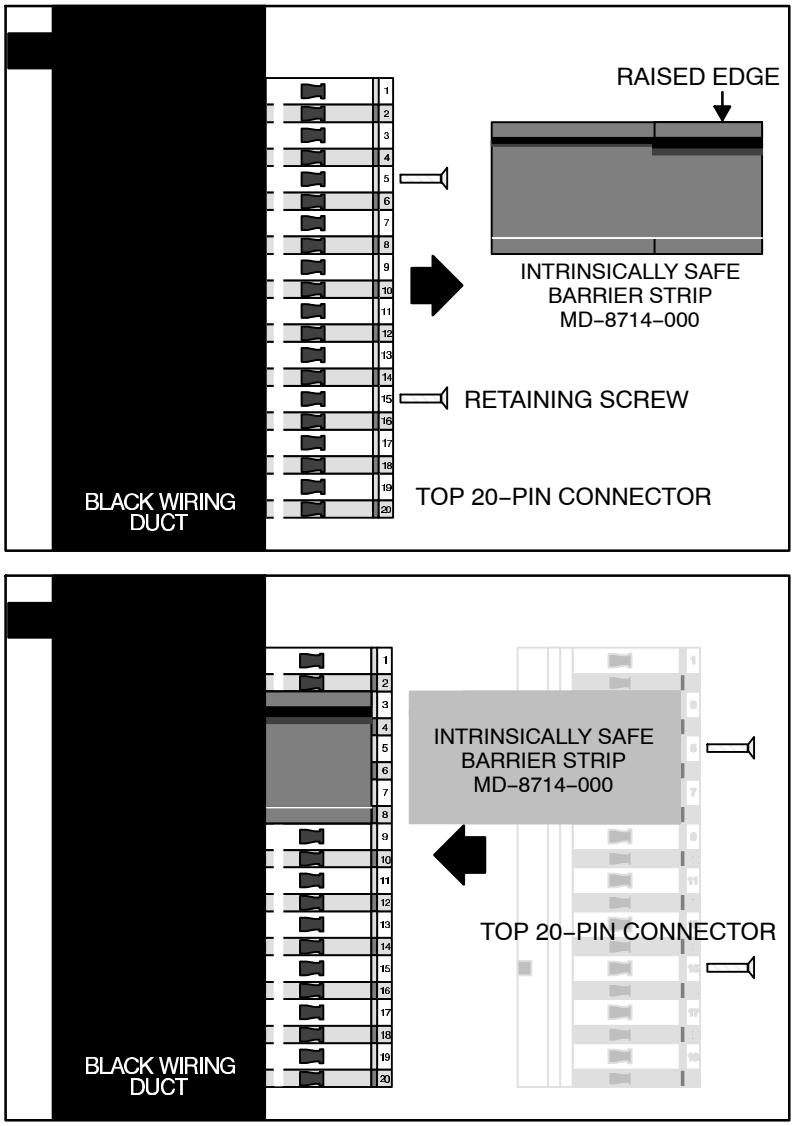


Figure 67 B855–016 Intrinsically Safe Barrier Strip

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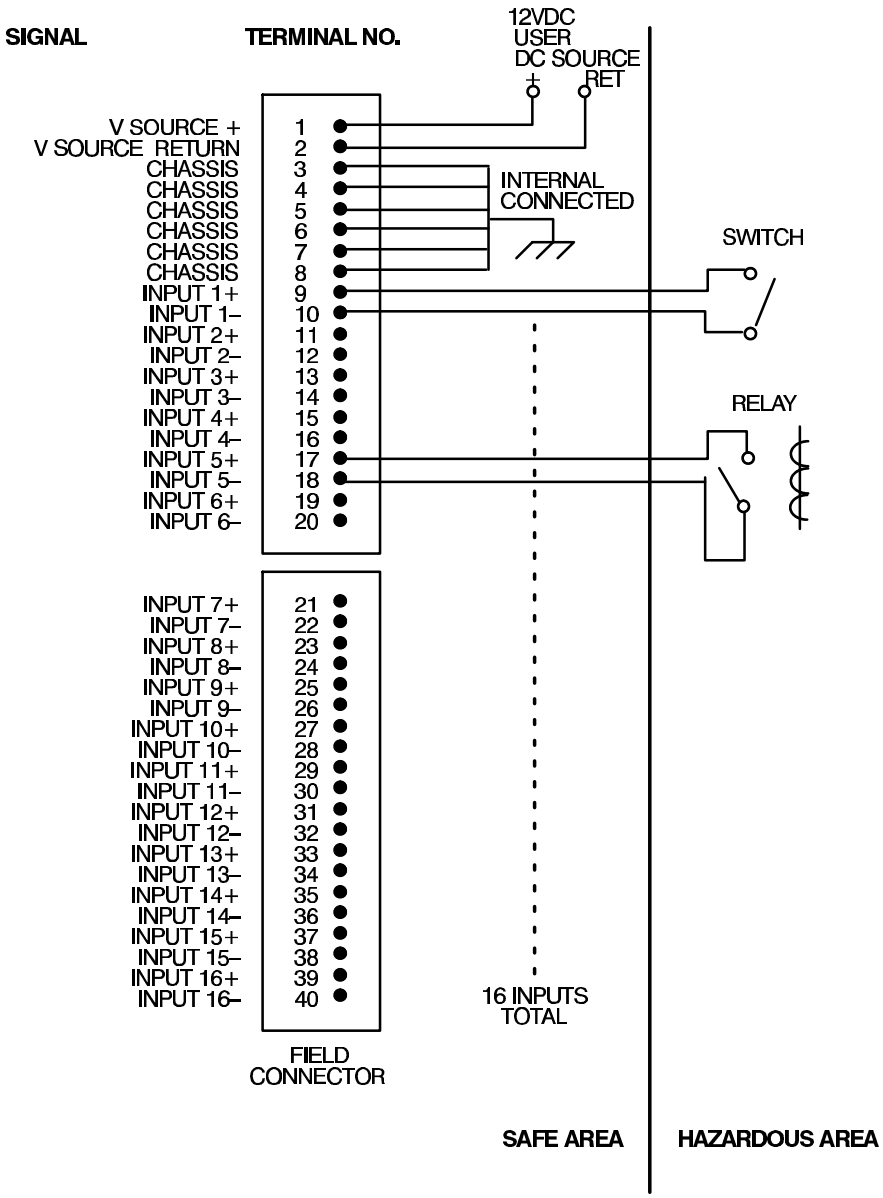


Figure 68 B855–016 Typical Field Circuit Connections

B855–016 Intrinsically Safe 12 Vdc Input

GM–DISC–800

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Step 7 Referring to Figure 68, 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.

Step 8 Insert the module into the housing, firmly but carefully, seating the edge connector in the backplane.

Step 9 Secure module to housing using captive slotted mounting screws at the top and bottom of the module front panel.

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31.3 Specifications

B855–016 Specifications

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	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 μA) 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 power supply recommended is 1.0 A	
Maximum Impedance Limitations	Group	L Inductance	C Capacitance
	A&B	80 mH	1.0 μf
	C	300 mH	3.0 μf
	D	700 mH	8.0 μf
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	

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Chapter 32
B863–032 Monitored 24 Vdc Input

- ☐ Overview
- ☐ Field Connections
- ☐ Quick Start Test
- ☐ Specifications

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32.1 Overview

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 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.

32.1.1 Simplified Schematic

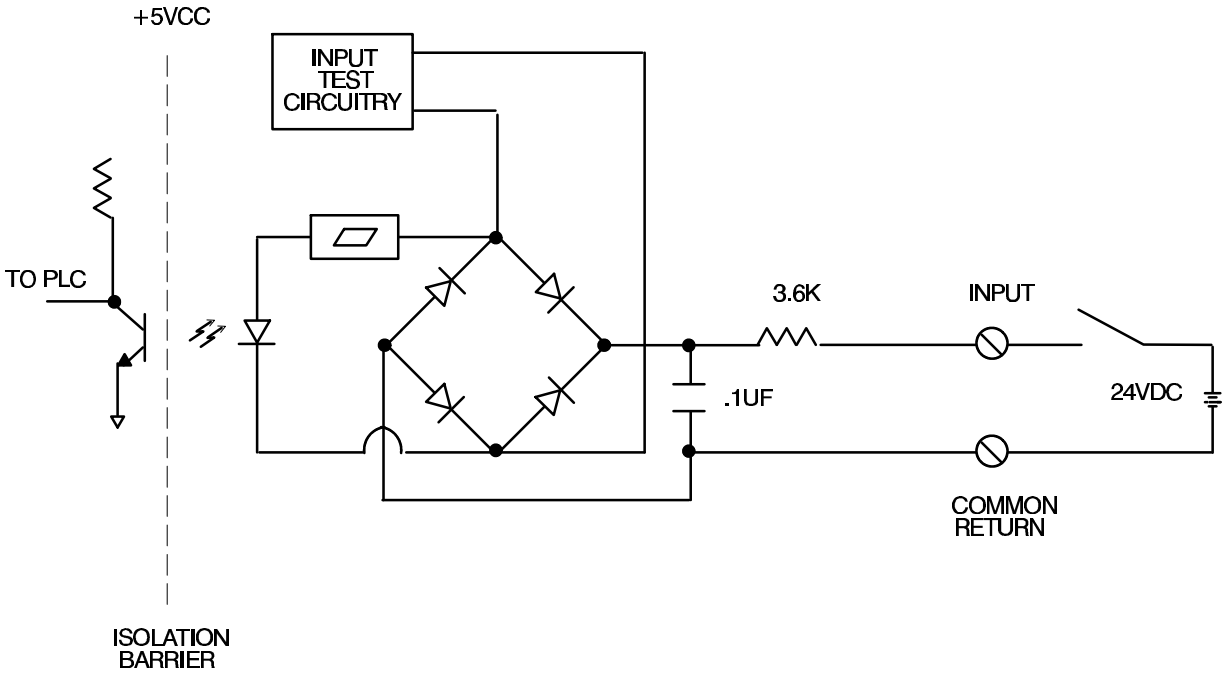


Figure 69 B863–032 Simplified Schematic

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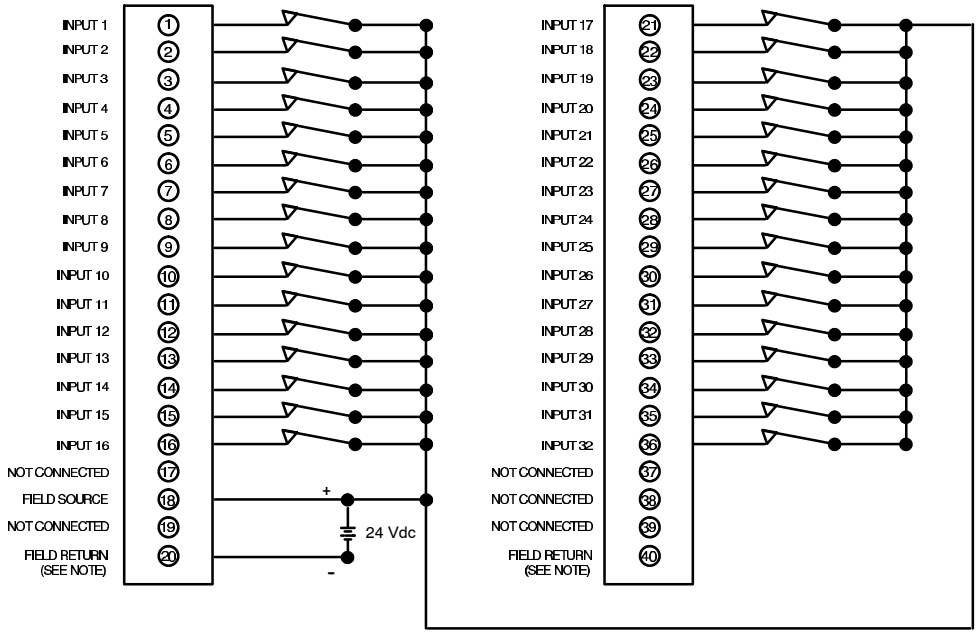
This diagnostic test is performed at a rate of 1/s, and takes less than 1 ms. The inability of an input to detect a low or high state during diagnostics, results in the reporting of a fault to the controller, and the flashing of the ACTIVE LED. Digital filtering is performed on all inputs to reduce the 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.

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32.2 Field 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.

32.2.1 Input Connections



NOTE: PINS 20 AND 40 ARE INTERNALLY CONNECTED TOGETHER

Figure 70 B863–032 Terminal Numbering and Input Connections

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32.3 Quick Start Test

This test configures the module as follows: B863 (4 register binary).

Step 1 Stop the controller.

Step 2 Determine which channel and slot location are being used for this module and insert the module.

☞ **Note:** Remove the keying tabs on the AS--8535--000 high density connector prior to installing module.

Step 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.

Step 4 Turn ON the external 24 Vdc power supply. The Field Power light will come ON.

Step 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.

Step 6 Start the controller.

Step 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.

Step 8 View the B863 I/O mapped registers, 30001 ... 30004 on the reference screen in binary format.

Step 9 Verify that all the points are zero.

☞ **Note:** 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.

Step 10 Turn OFF the external 24 Vdc power supply, and all error flag points change to 1.

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Step 11 Turn ON the external 24 Vdc power supply, and all error flag points change back to 0.

Step 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.

32.3.1 Application Example

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. In Figure 71, registers 30003 and 30004 are compared to registers 40011 and 40012.

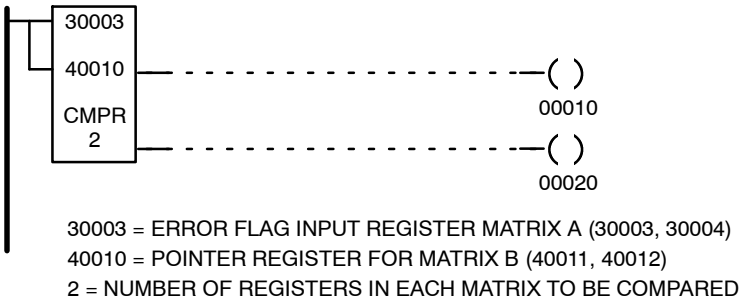


Figure 71 B863–032 Network One

☞ **Note:** 40011 and 40012 must be initialized to zero.

If a miscompare is detected then output 10 goes ON and 40010 will contain the bit with the error as shown in Figure 72. 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.

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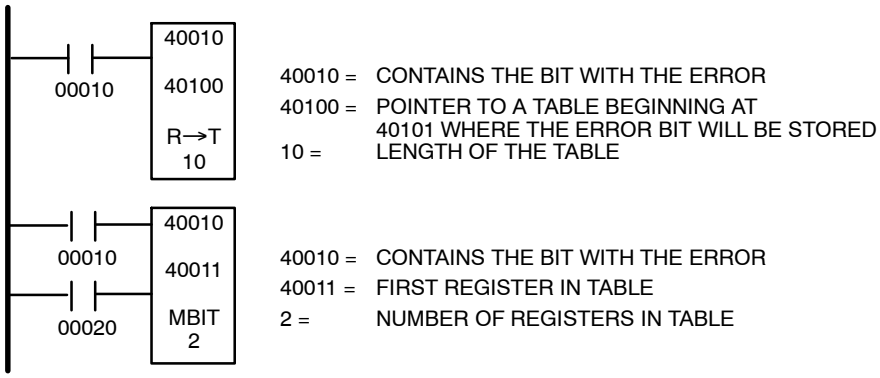


Figure 72 B863–032 Network Two

The following table shows how a failure of input 15 would look in the error table. Figure 73 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.

B863–032 Input 15 Error Table

Register	Data
40100	0001 ← Pointer to Table
40101	0015 ← Fault with Input Bit 15
40102	0000
40103	0000
. . .	. . .
40110	0000

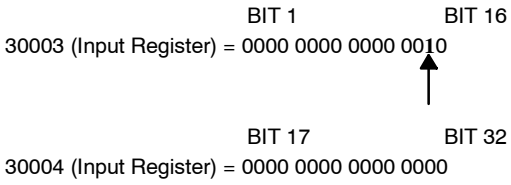


Figure 73 B863–032 Error Location

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32.4 Specifications

B863–032 Specifications

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	250 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

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Chapter 33
B863–132 24 Vdc Input

- ☐ Overview
- ☐ Switch Settings
- ☐ Field Connections
- ☐ Configuration
- ☐ Specifications

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33.1 Overview

The B863- -132 24 Vdc (32-point) 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.

33.1.1 Simplified Schematic

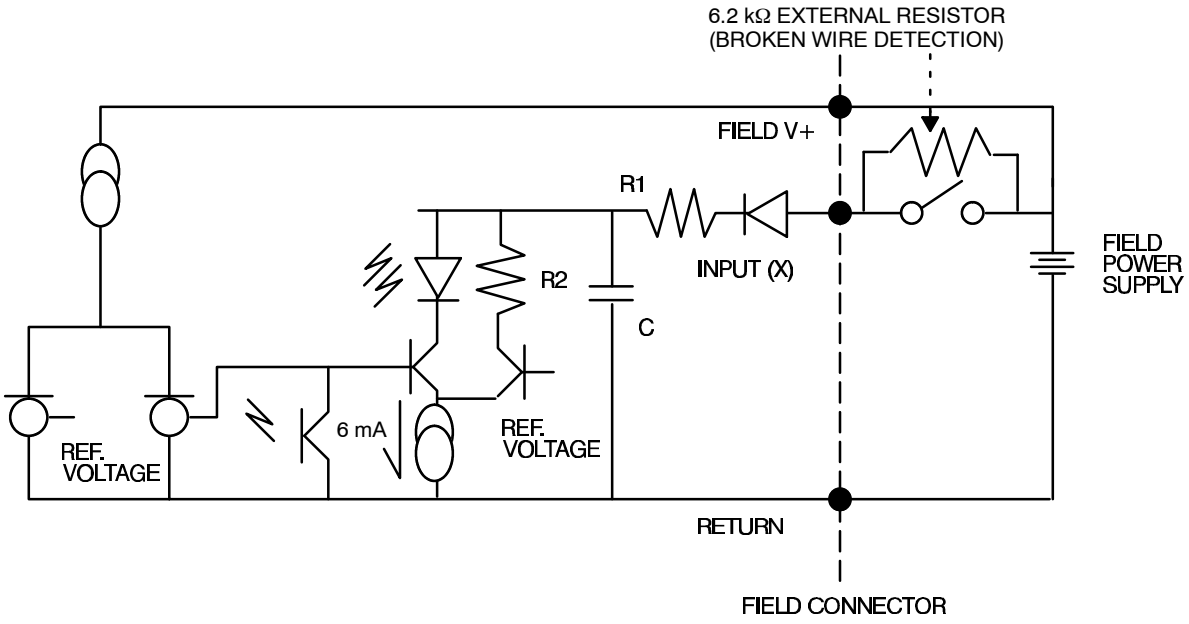


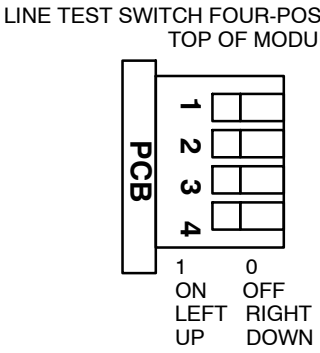
Figure 74 B863–132 Simplified Schematic

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33.2 Switch Settings

A four-position DIP switch (see Figure 75) located on the rear of the module 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.

Caution: Only Binary should be used when operating module in line test mode. Do not use BCD.



SWITCHES	FUNCTIONS
SW1=0	GROUP 1, LINE TEST
=1	GROUP1, NO TEST
SW2=0	GROUP 2, LINE TEST
=1	GROUP2, NO TEST
SW3=0	GROUP 3, LINE TEST
=1	GROUP3, NO TEST
SW4=0	GROUP 4, LINE TEST
=1	GROUP4, NO TEST

Figure 75 Line Test DIP–Switch Settings

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

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33.3 Field 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.

Refer to Figure 76 for input connections.

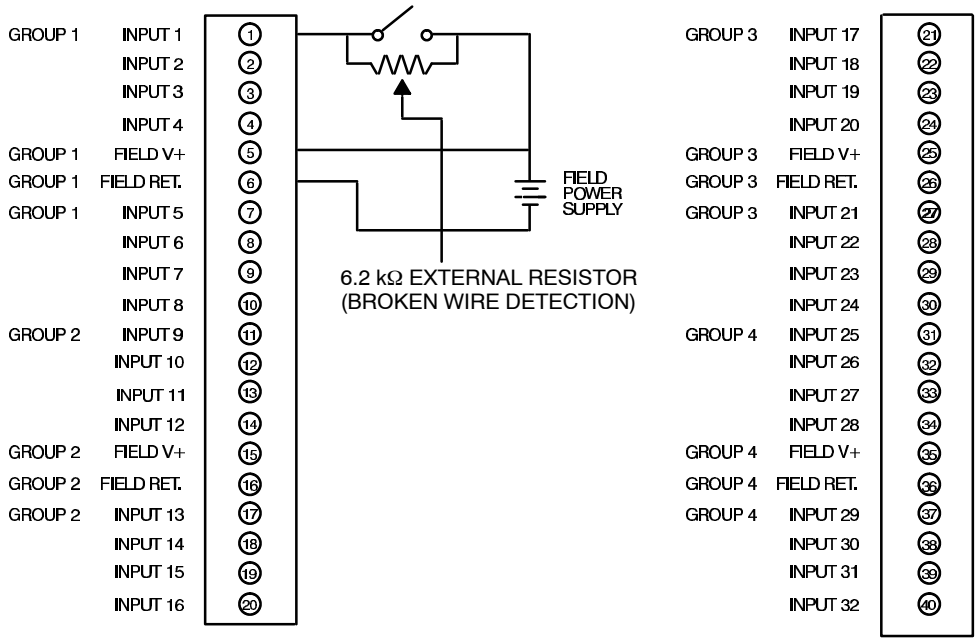


Figure 76 B863–132 Terminal Numbering and Input Connections

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33.4 Configuration

This module appears as a B863 module when configured. This means the module requires four 16-bit words (1*x* registers), see Figure 77. 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.

	MSB	LSB	
1*x* + 0	1 2 3 4 5 6 7 8	9 10 11 12 13 14 15 16	1 ... 16 input data
1*x* + 16	1 2 3 4 5 6 7 8	9 10 11 12 13 14 15 16	17 ... 32 input data
1*x* + 32	1 2 3 4 5 6 7 8	9 10 11 12 13 14 15 16	1 ... 16 fault detection
1*x* + 48	1 2 3 4 5 6 7 8	9 10 11 12 13 14 15 16	17 ... 32 fault detection

Figure 77 B863–132 Data Registers

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33.5 Specifications

B863–132 Specifications

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, ON → OFF	2 ms, contact opening or closing, 100 ms maximum fault detection time
Power Required	+5 V	350 mA
	+4.3 V	10 mA
	–5 V	0 mA (not used)
Terminal Connector		AS–8535–000

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Chapter 34
B864–001 Register Output

- ☐ Overview
- ☐ Switch Settings
- ☐ Field Connections
- ☐ Specifcations

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34.1 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 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 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 data lines 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 is operated in module select mode. In module select mode, all eight data registers are transferred in a single Ourbus cycle.

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34.1.1 Simplified Block Diagram

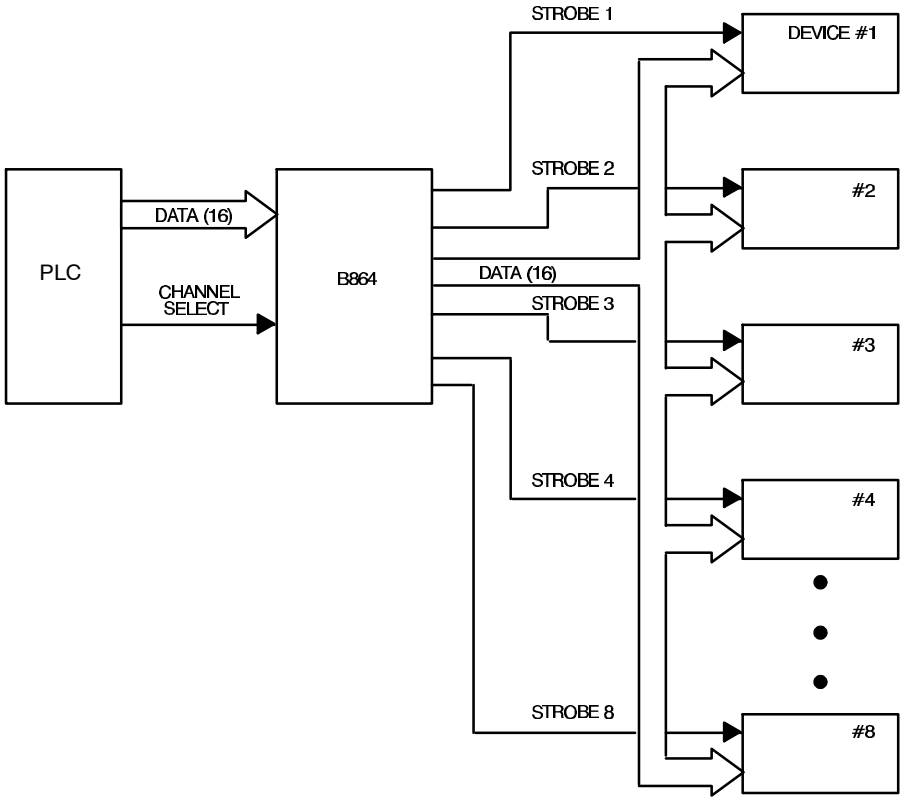


Figure 78 B864–001 Simplified Block Diagram

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34.2 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 you to select 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:

Switch and Traffic Cop Relationship

I/O Map Selection	B864 Switch Setting	Result
Binary	BCD	BCD
Binary	Binary	Binary
BCD	BCD	Erroneous
BCD	Binary	BCD

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34.3 Field 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.

34.3.1 Terminal Numbering and Output Functions

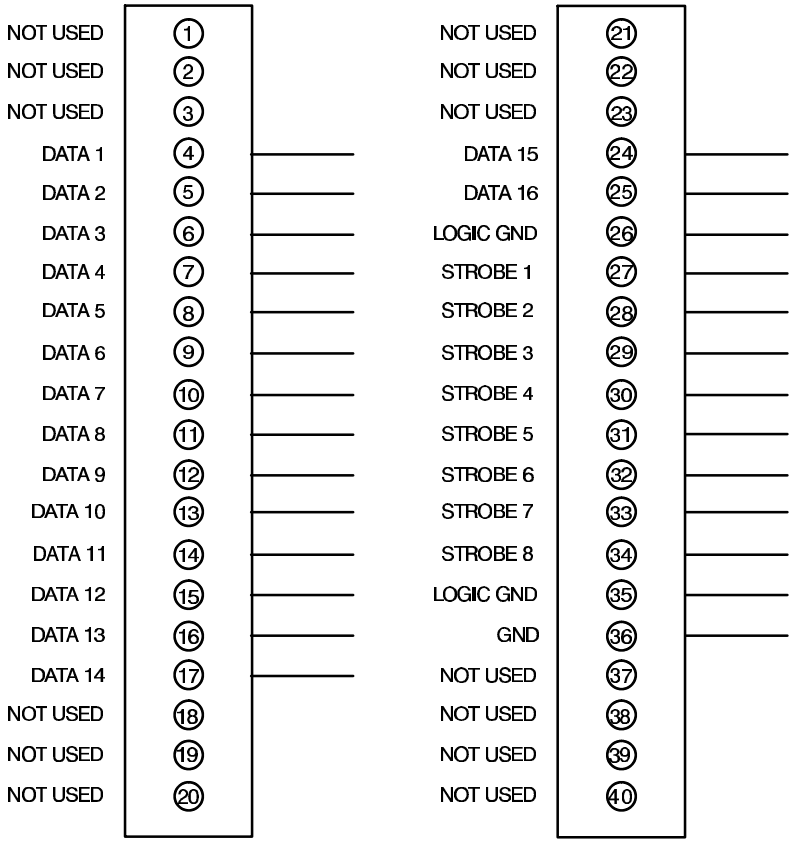


Figure 79 B864–001 Terminal Numbering

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34.3.2 Pull–up Resistor Connection

You must install pull- -up resistors 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, you should adjust the pull- -up resistor values within specification; otherwise, spurious results may be obtained.

Figure 80 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.

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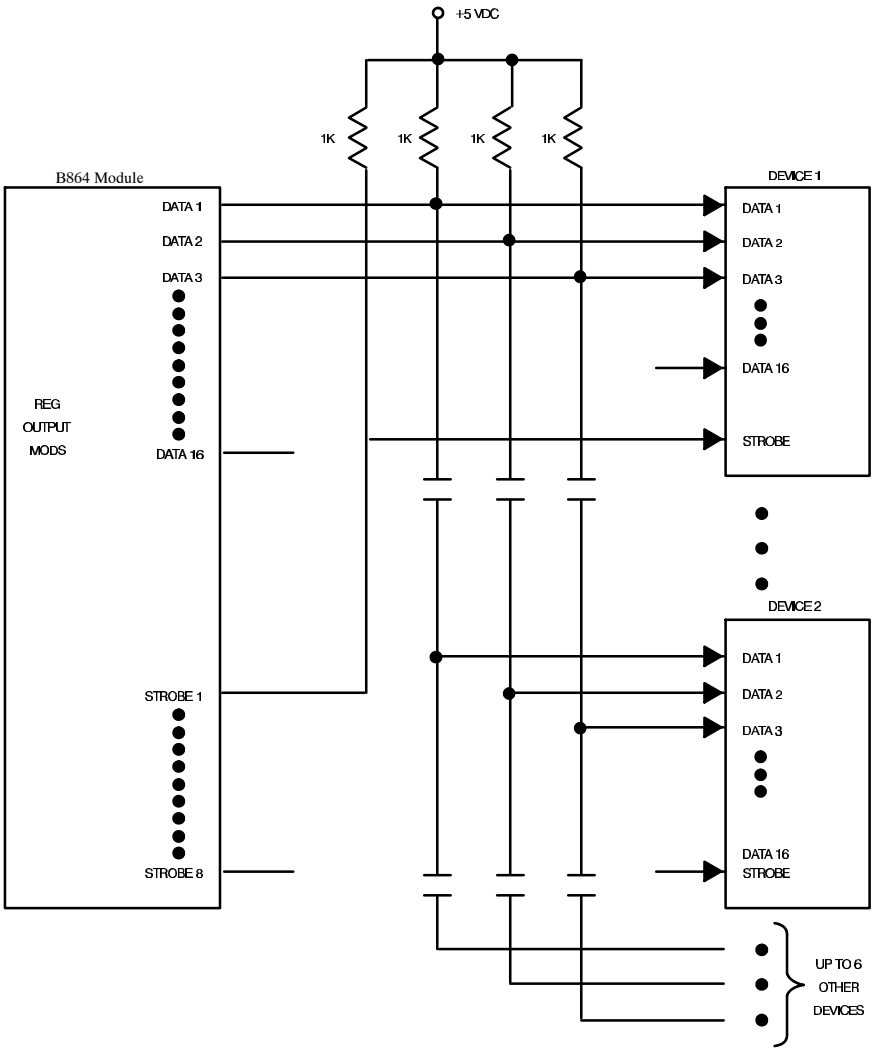


Figure 80 B864–001 Pull–up Resistor Connection

☞ **Note:** Increase pull- -up resistor value by 1 k for each additional device.

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34.4 Specifications

B864–001 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%
Module Throughput		11.3 ms
Power Required	+5 V	100 mA
	+4.3 V	100 mA
	–5 V	0 mA
External 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 @ 1.6 μA High: 1 > 2.4 Vdc @ 40 μA
	CMOS	Low: 0 < 1.6 Vdc @ 0.3 μA High: 1 > 3.3 Vdc @ 0.3 μA
Terminal Connector		AS–8535–000

☞ **Note:** All user field devices must have outputs that feature latched, tri--state, or open collector logic. The user must provide 1 kΩ ±10% pull--up resistors for each strobe line.

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Chapter 35
B865–001 Register Input

- ☐ Overview
- ☐ Switch Settings
- ☐ Field Connections
- ☐ Specifications

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35.1 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 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 range 0000 ... FFFF.

The B865 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- -bit word containing all zeros is routed to the PLC.

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35.1.1 Simplified Block Diagram

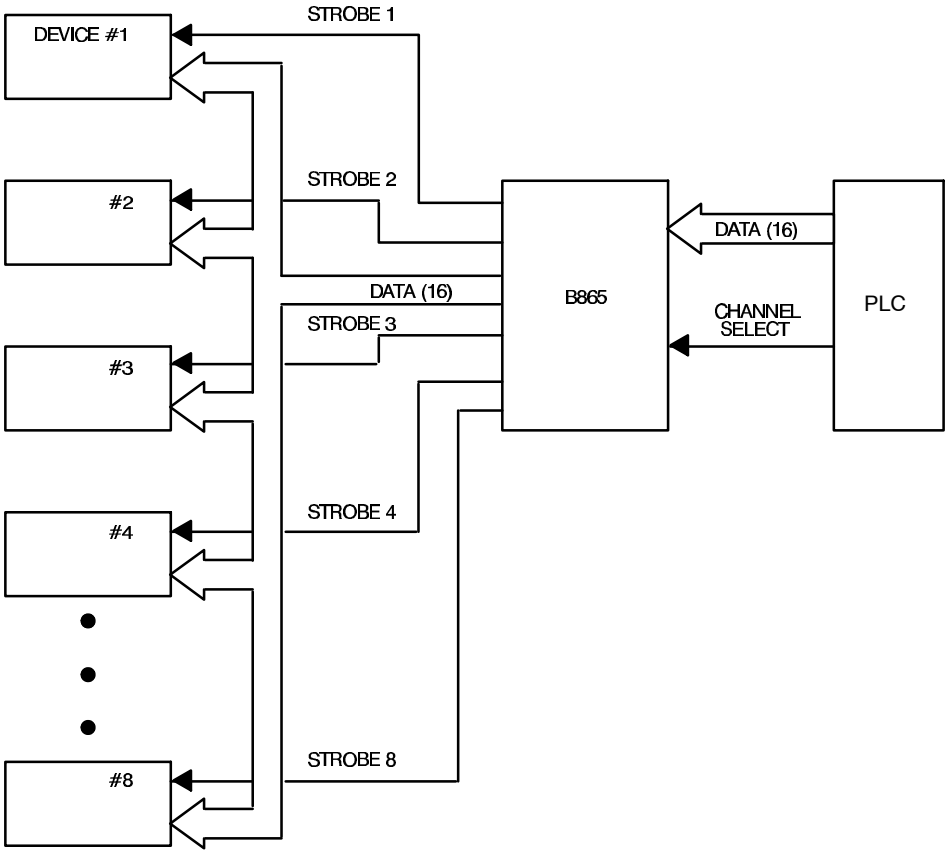


Figure 81 B865–001 Simplified Block Diagram

The B865 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 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 need 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.

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35.2 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 you to select 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 relation between the I/O Map selection, the BCD/binary switch setting, and the results at the output are summarized:

Switch and I/O Map Relationship

I/O Map Selection	B865 Switch Setting	Result
Binary	BCD	BCD
Binary	Binary	Binary
BCD	BCD	Erroneous
BCD	Binary	BCD

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35.3 Field 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.

35.3.1 Terminal Numbering and Input Functions

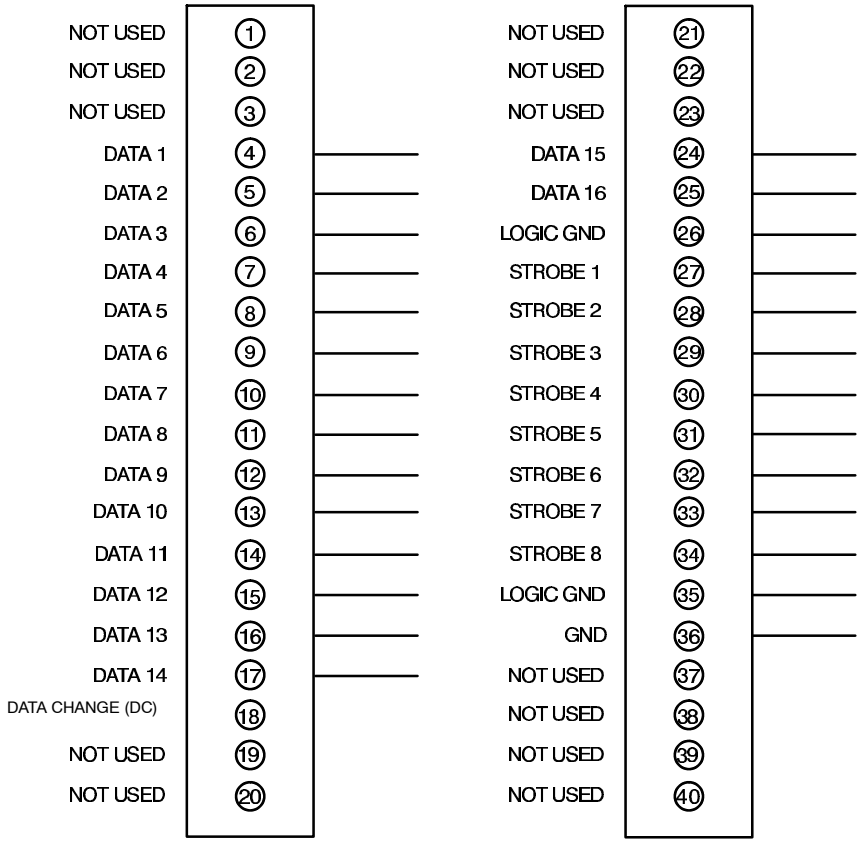


Figure 82 B865–001 Terminal Numbering

35.3.2 Pull–up Resistor Connection

You must provide resistive pull- -ups of 2.2 kΩ $\pm$10% for each strobe line. This is required on ACTIVE devices only. Thumb wheel switches for example,do not require the addition of pull- -up resistors.

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The recommended location for the pull- -up resistors at the device end of the circuit; however, they will work at the module end as well.

Figure 83 shows a typical circuit set- -up.

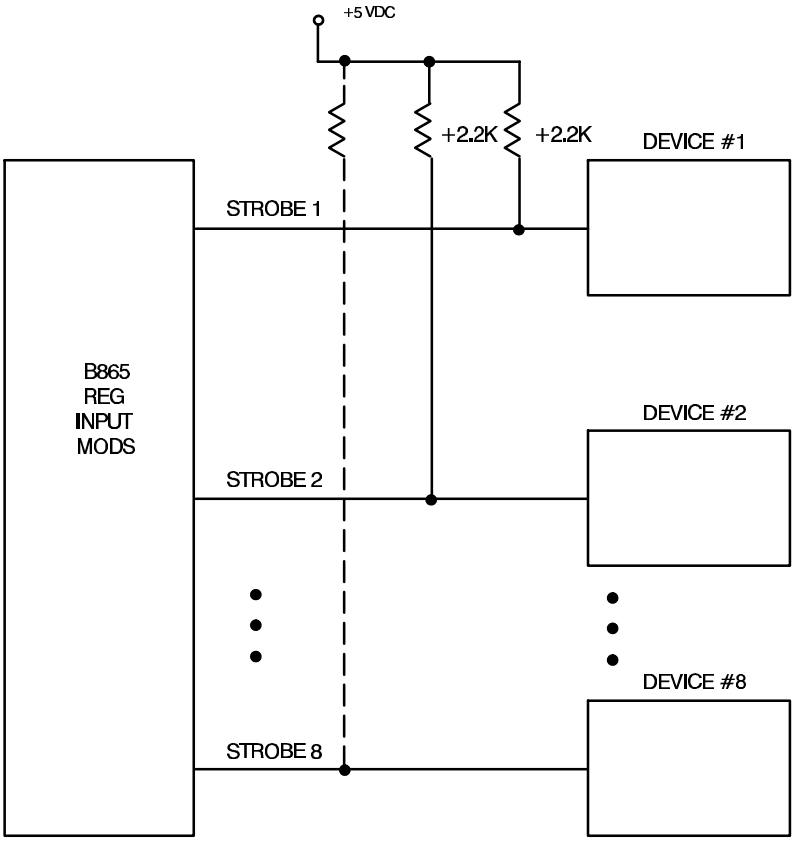


Figure 83 B865–001 Pull–up Resistor Connection

35.3.3 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.

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35.4 Specifications

B865–001 Specifications

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 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
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 Device Requirements	Field Device	Output Level
	TTL	Low: 0 < 0.8 Vdc @ 1.6 μA
		High: 1 > 2.4 Vdc @ 40 μA
	CMOS	Low: 0 < 1.6 Vdc @ 0.3 μA
		High: 1 > 3.3 Vdc @ 0.3 μA
Terminal Connector		AS–8535–000

☞ **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.

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Chapter 36
B881–001 Latched 24 Vdc Input

- ☐ Overview
- ☐ Field Connections
- ☐ Specifications

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36.1 Overview

The B881- -001 True High 24 Vdc 16-channel latched input module senses and converts input signals from its field circuitry to a logic level used by Modicon 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 Modicon, true high dc output module (at proper voltage).

36.1.1 Simplified Block Diagram

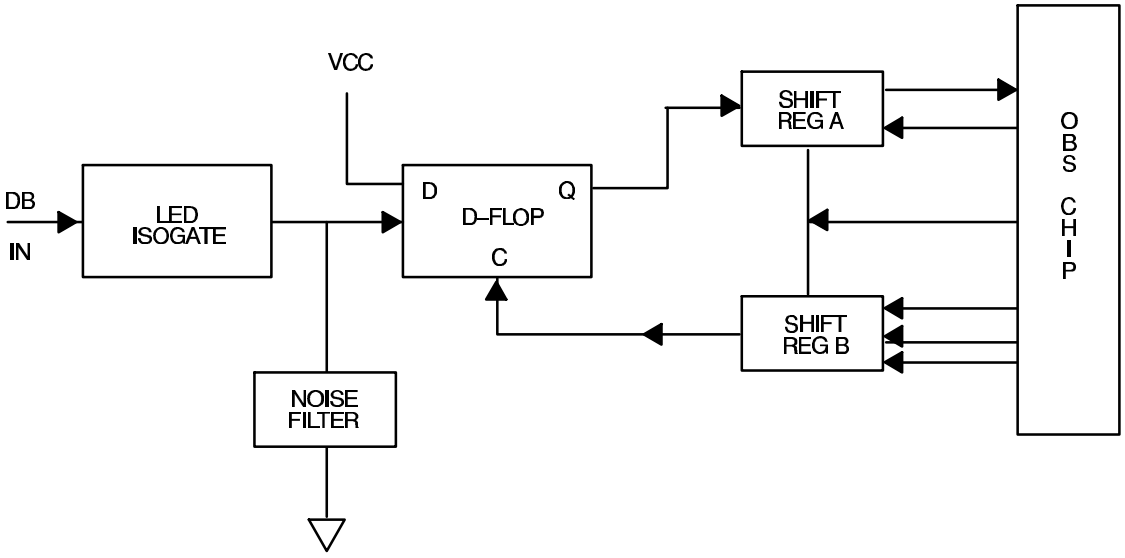


Figure 84 B881–001 Simplified Block Diagram

☞ **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.

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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 μs 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 his actual system and program.

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36.2 Field 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.

36.2.1 Terminal Numbering and Input Functions

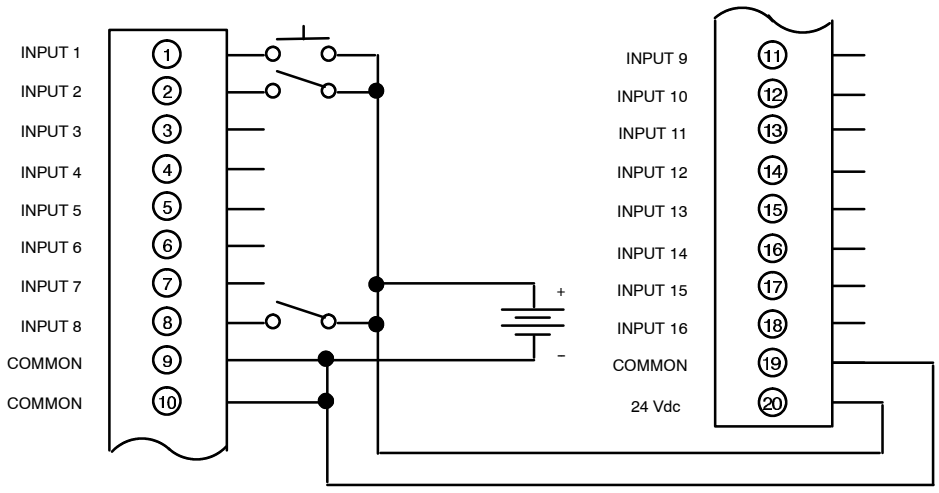


Figure 85 B881–001 Terminal Numbering

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36.3 Specifications

B881–001 Specifications

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
ON Condition		≥ 75% of group supply voltage for .5 ms/ min event pulse width
ON → OFF Condition		≤ 25% of group supply voltage and input reset bit sent back to module
ON → OFF Condition		≤ 25% of group supply voltage
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
Fusing		1/group, .75 A @ 250 Vdc

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Chapter 37
B881–108 Protected 120 Vac Output

- ☐ Overview
- ☐ Using the Fault Condition Filter
- ☐ Field Connections
- ☐ Quick Start Test
- ☐ Specifications

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37.1 Overview

The B881-108 protected ac output module serves eight isolated 120 Vac relays, solenoids, pilot lamps, and other loads up to 2.0 A. The module has eight isolated discrete outputs. Each point can accept its own neutral and hot ac power connections. Therefore the module can switch multi--phase or single phase power. The outputs work over the range 80 ... 130 Vac, true high.

The module detects triac fault conditions and turns the faulted point off for vital applications. The module compares the output to the input circuit reading. When a miscompare occurs and lasts for more than 64 ms or 128 ms, a fault condition is reported to the PLC. All eight output points may be filtered at either 64 ms or 128 ms. You select the filter times to meet your specific application. Filtering can reduce your occurrence of nuisance faults. Some applications include food processing, chemical processing, painting, and foundry casting.



Caution: E--STOP USAGE -- During normal operation, each of the discrete output points switches OFF the load current synchronously with the ac power frequency at the zero crossing of the load current. This synchronous zero crossing switching provides a reliable, low--switching energy/low transient method of controlling a broad range of industrial loads without the need for external load snubbers.

If an application requires that the load or ac voltage to the module be inter--rupted by an external switch (E--stop) at a non--zero load current, a large voltage transient across the load may result. This abnormal transient may be detected and interpreted as a triac ON condition of a protected OFF output point, resulting in nuisance faults.

APPLICATION: ac Power Switched OFF by an Emergency Switch

DESCRIPTION: The *ac hot* and *ac neu* for each point are not isolated and the applied ac voltage source to the module is open--circuited (interrupted external to the module via an E switch), while one or more of the output points are ON, powering an inductive load. The interrupt will cause a large voltage transient across the load, which couples back through the point (an external ac power wiring) to all other ac OUT points wired to the same source. This voltage transient is detected by the monitoring circuit, and is interpreted as a

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fault condition for OFF points. When ac voltage is re--applied, any points that have “faulted” will blow their respective line fuses.

RECOMMENDATION: Eliminate any external ac power interrupt while outputs are in the ON state, or connect a suitable R/C snubber directly across each reactive load to absorb the turn--off energy, and limit the voltage transient across the OFF point to less than 50 V peak during the interrupt.

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37.1.1 Simplified Schematic

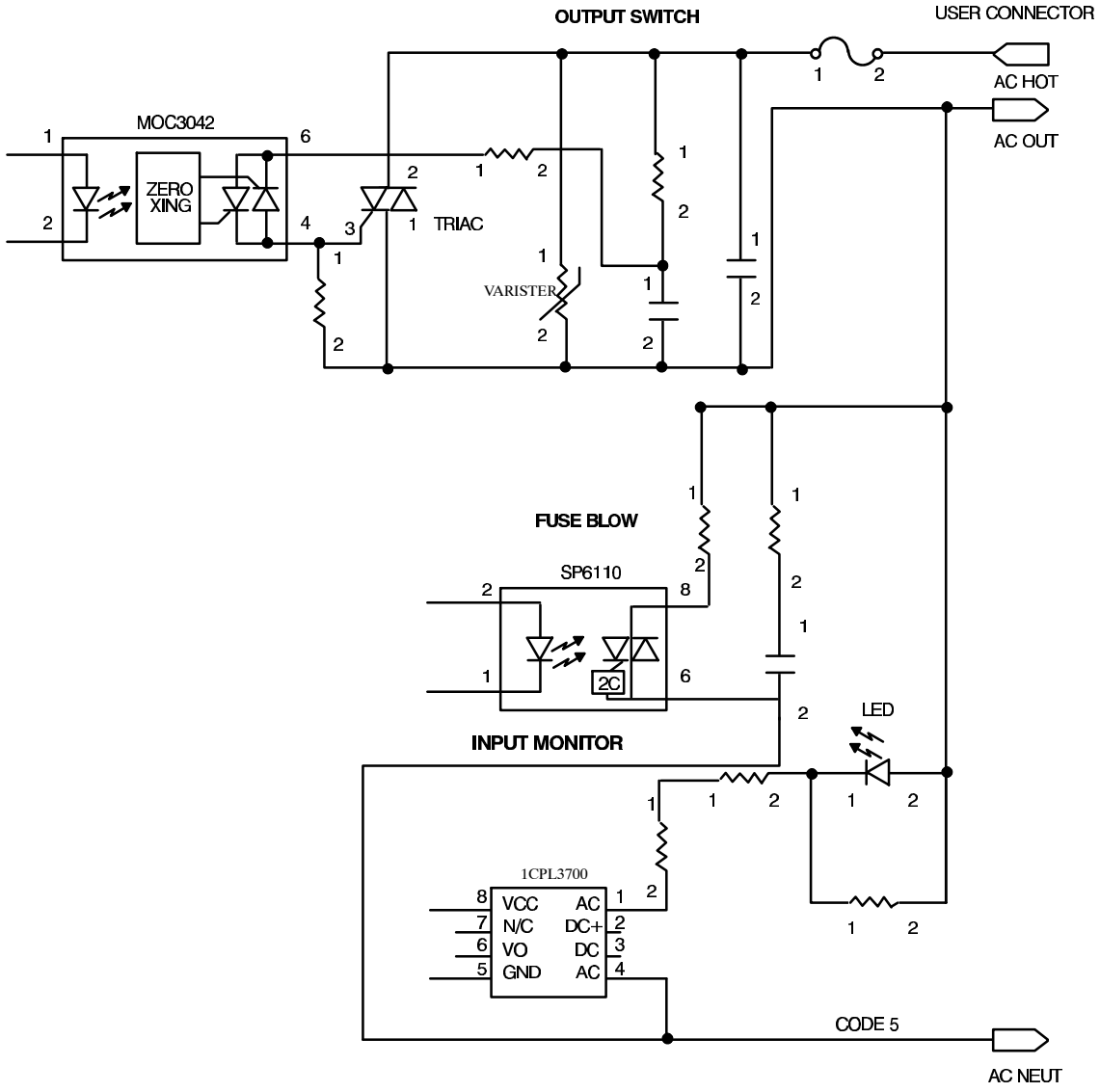


Figure 86 B881–108 Simplified Schematic

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37.2 Using the Fault Condition Filter

You can remove any false or nuisance faults by using a fault condition filter. With the B881--108, you can choose a 64 ms filter, or a 128 ms filter based on your needs. Refer to Figure 87 for fault filter selection DIP switch settings.

The filtered fault is sent to the PLC only when the detected fault exists for more than the selected filter time. Once reported, if output status is on when off is desired, the module turns OFF the faulted point by blowing the point's fuse. For example, if you use a 64 ms filter and point number two is faulted for more than 64 ms, the fault is sent to the PLC and the module turns OFF point number two by blowing its fuse. To replace blown fuses slide the left side of the module towards the rear of the module. If the output is faulted ON it will blow the fuse. If the output is faulted OFF the module reports its condition but does not blow the fuse.

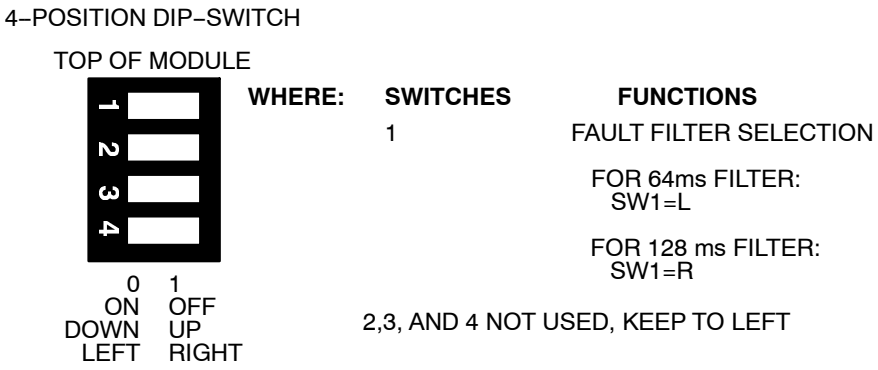


Figure 87 B881–108 DIP–Switch Settings

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37.3 Field 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.

37.3.1 Output Connections

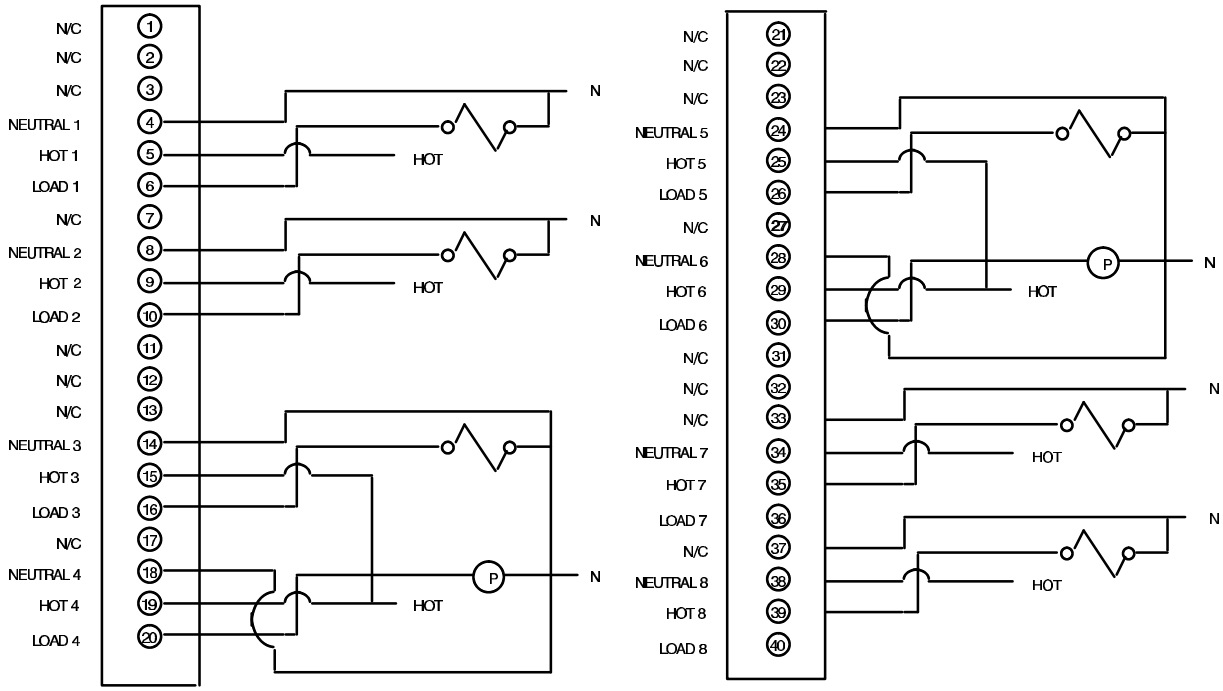


Figure 88 B881–108 Terminal Numbering

You can wire the points individually or as a group, because each output is isolated. Individual points are not isolated when wired as a group.

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37.4 Quick Start Test

This test configures the module as follows: B881 (bi--directional), and a 64 ms filter.

Step 1 Set the four-position DIP switch as follows: (viewing the rear of the module when held vertically):

SW1	Left	Selects a 64 ms Filter
SW2, 3, and 4	Left	Not Used (keep to left)

Step 2 Wire field neutral to terminal 4 (CH1 NEUTRAL) to one side of the field device, wire other side of field device to terminal 6 (CH1 LOAD), then wire your 115 Vac field hot to terminal (CH1 HOT) on a AS--8535--000 high density connector.

☞ **Note:** Remove the keying tabs on the AS--8535--000 high density connector prior to installing module.

Step 3 Stop the PLC.

Step 4 Determine which channel and slot location are being used for this module and insert the module.

Step 5 I/O Map the module as a B881, inputs 10001 ... 10016, outputs 0001 ... 00016.

☞ **Note:** The B881 is a bi--directional module that provides eight discrete outputs, and eight discrete inputs. However, the B881 is identified in the I/O Map as a 16 point bi--directional module, and is allocated 16 discrete inputs and 16 discrete outputs. The B881 uses only the lower order eight input and output points, the higher order of eight inputs and outputs can not be used anywhere.

Step 6 Start the PLC.

Step 7 Confirm that the module's active light is illuminated.

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Active ON steady =	OK
Active Blinking =	An output has an unclear fault detected (output is logically ON, but power is not available at input/output point)
Active OFF =	Failed diagnostics, loss of internal power, or loss of communication with PLC

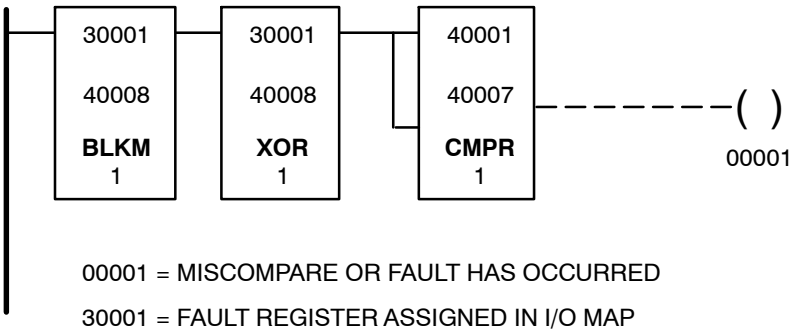
Step 8 Apply 115 Vac to channel 1 hot (CH1), and confirm that the red output light is illuminated after turning channel 1 (CH1) ON.

ON = Power is available at the output, and the module detects power to the input circuit

37.4.1 Application Example

The B881 module, with ability to sense its own output points is an excellent choice for critical operations. The example in Figure 89 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 in Figure 89 moves the contents of fault register 30001 into 40008, where it can be manipulated. The results of the XOR function of the contents of register 40001 and 40008 are written into register 40008. The compare block then compares 40008 with the output state in 40001; if they do not compare, coil 0001 will energize. Coil 0001 can be tied to an indicator light or safety circuity for system protection.



00001 = MISCOMPARE OR FAULT HAS OCCURRED

30001 = FAULT REGISTER ASSIGNED IN I/O MAP

40001 = OUTPUT REGISTER ASSIGNED IN I/O MAP

40007 = POINTER FOR COMPARE BLOCK (POINTS TO 40008)
–THE POINTER CONTAINS THE LOCATION OF THE FIRST ERROR BIT SET IN THE FAULT REGISTER.

40008 = XOR RESULTS OF 30001 AND 40001

Figure 89 B881–108 Application Example

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37.5 Specifications

B881-108 Specifications

Description		115 Vac protected output
Number of Points		8
Operating Voltage		80 ... 130 Vac / 47 ... 63 Hz
		150 Vac for 10 s
		200 Vac for 1 cycle
Number of Groups		8
Outputs/Group		1
ON Current	Maximum/point	2 A continuous
		30 A for 1 cycle
	Maximum/group	2 A
	Maximum/module	16 A
On State Voltage Drop		1.5 Vac maximum @ 2 A
Surge Current		30 A surge current, 1 cycle/output at a rep rate not to exceed 1 surge cycle/min
Load Current		50 mA minimum
Leakage Current		3.0 mA max @ 130 Vac
Load Inductance		1 H maximum with no external diode suppression
Maximum Response Time	OFF → ON	9 ms @ 60 Hz
	ON → OFF	9 ms @ 60 Hz
External Power Supply		
Note: The B881 is powered by a standard 115 Vac field power supply.		
Module Supply Current In		40 mA maximum (all channels ON) of field side current in addition to load current
Power Required	+5 V	285 mA***
	+4.3 V	240 mA
	–5 V	0 mA
Terminal Connector		AS–8535–000
Fuse		3.0 A/point, replaceable
*** When all outputs are ON, +5 V = 285 mA maximum. When all outputs are OFF, +5 V = 210 mA maximum.		

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Chapter 38
B881–508 125 Vdc Output

- ☐ Overview
- ☐ Fault Conditions
- ☐ Field Connections
- ☐ Specifications

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38.1 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 μs provides fast response in critical situations. The B881 conforms to ANSI/IEEE C37.90 1978 duty cycle sequences.

In addition to the normal mode of controlling the outputs, the B881 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 and can be controlled by a B984 High Speed Logic Solver. When a fault occurs during control by the external inputs, that input must be cycled (turned off) to clear the fault flag.

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38.1.1 Simplified Schematic

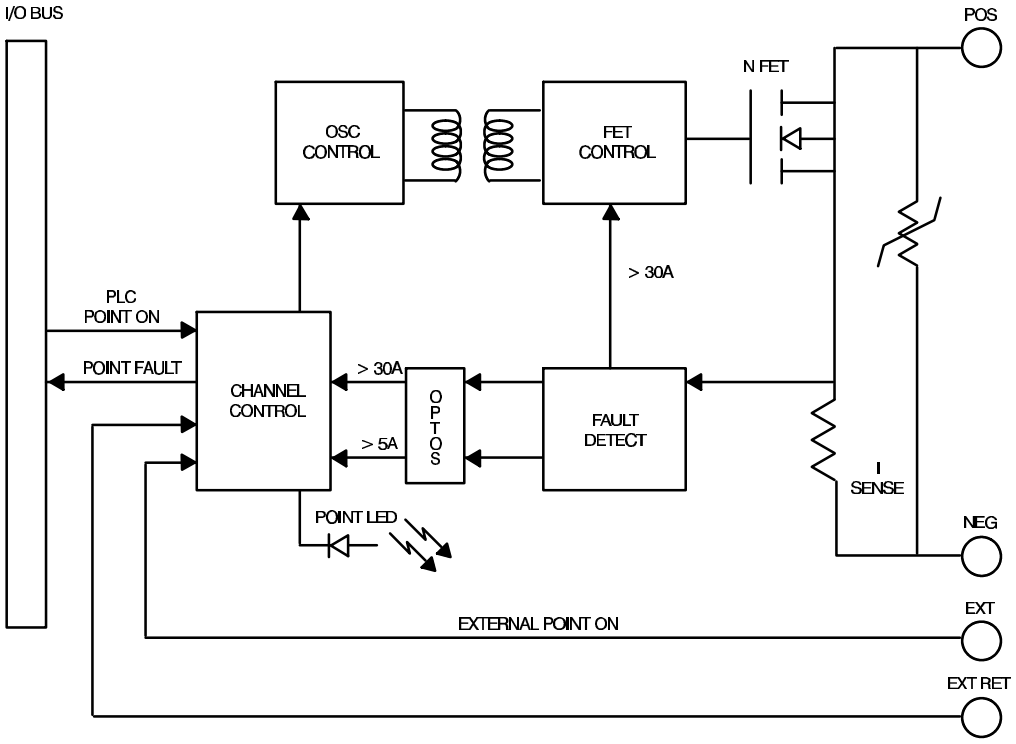


Figure 90 B881–508 Simplified Schematic

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38.2 Fault Conditions

Over current shutdown, as well as, current surges greater than 500 ms are detected by the B881. Each point has a fault bit that you can access using your programming panel software. Each bit indicates either: an over current (greater than 30 A), or a current surge between 5 ... 30 A for a period greater than 500 ms Although the B881 is I/O mapped as a 16 point bi- -directional module, only the lower order eight inputs and outputs are used, the higher order of eight inputs and outputs can not be used anywhere (see Figure 91).

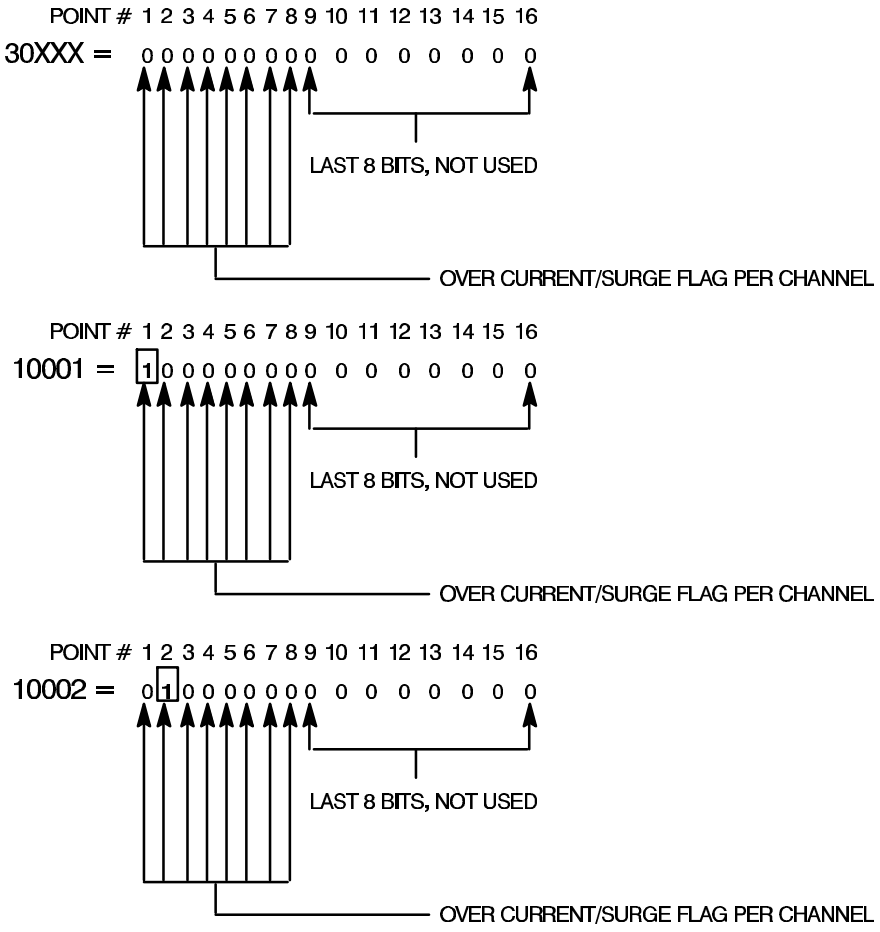


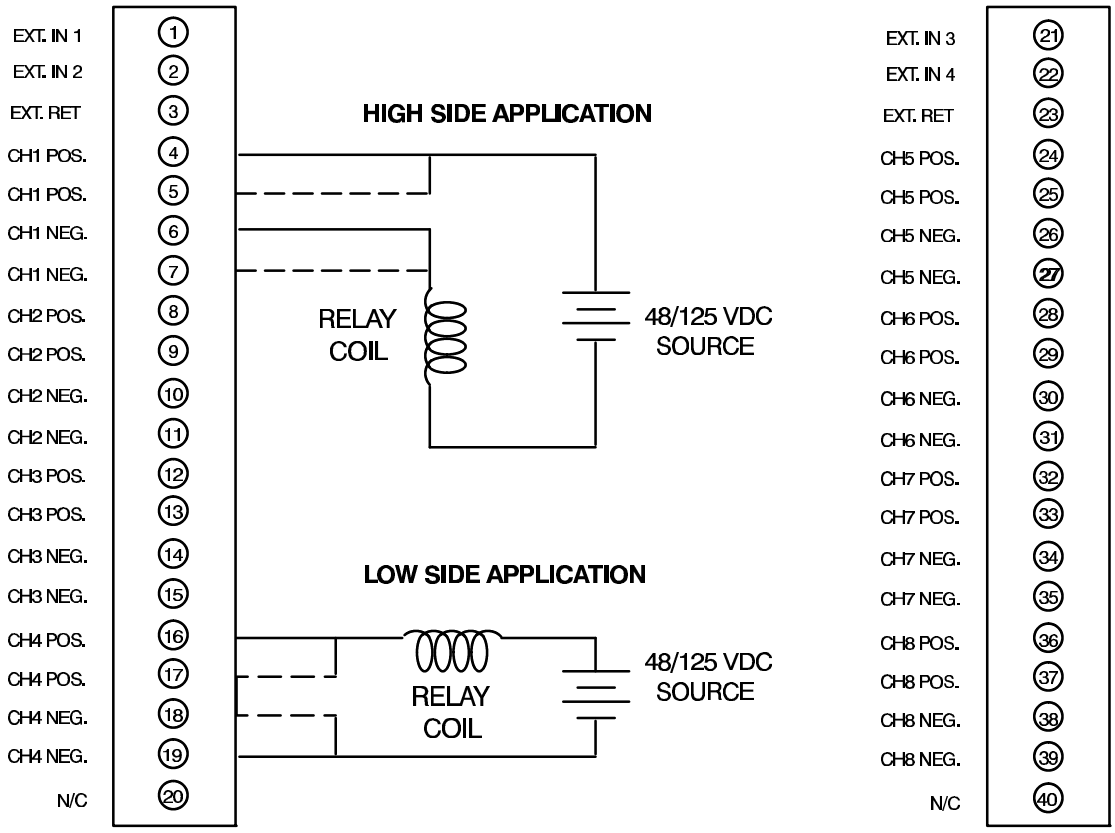
Figure 91 B881–508 Fault Flags

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38.3 Field 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.

38.3.1 Output Connections



NOTE: EACH OUTPUT HAS TWO TERMINALS FOR MULTIPLE WIRE CONNECTIONS.

NOTE: WHEN USING HIGH CURRENT BE SURE TO USE BOTH TERMINALS.

Figure 92 B881–508 Terminal Numbering

Caution: This module does not provide reverse voltage protection. Check for proper voltage polarity of output wiring.

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38.4 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
Surge Current		30.0 A 1 cycle (500 ms)/channel maximum
Minimum Load Current		75 mA
Maximum Response Time	OFF → ON	< 75 μs
	ON → OFF	< 100 μs
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 μS
	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
*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 circuits is required dependant on application.

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Chapter 39
B882–032 24 Vdc Diagnostic Output

- ☐ Overview
- ☐ Fault Conditions
- ☐ Field Connections
- ☐ DIP Switch Settings
- ☐ Quick Start Test
- ☐ Application Example
- ☐ Specifications

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39.1 Overview

The B882- -032 Diagnostic Output Module (B882) serves 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 module also detects field fault conditions and turns the faulted point OFF for vital applications. The B882 Diagnostic dc Output module can detect open load, over current, over voltage, and over temperature conditions.

39.1.1 Simplified Schematic

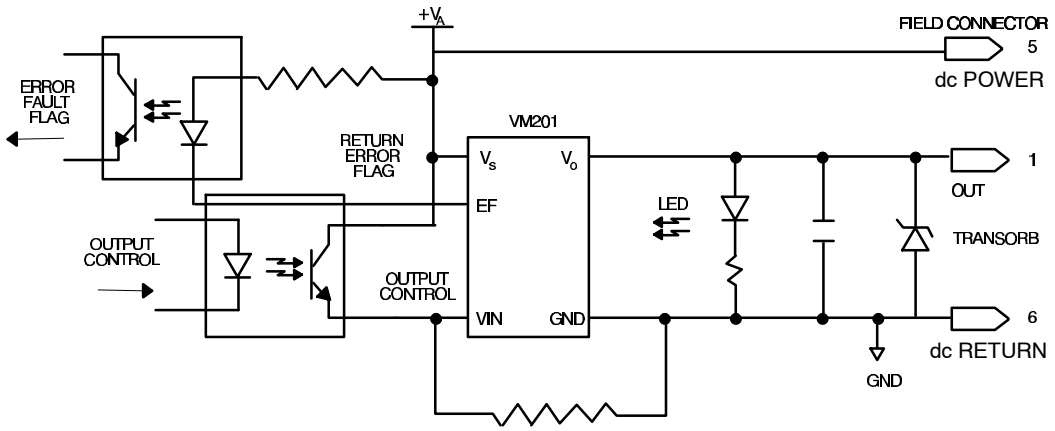


Figure 93 B882–032 Simplified Schematic

You can select the functionality of the Diagnostic dc Output Module. It can be a bi- -directional module (B882) whereby you have 32 discrete outputs and 32 discrete inputs which are fault flags for each respective output. It can also be a uni- -directional module (B818) having 32 discrete outputs without fault flags.

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39.2 Fault Conditions

Open load, over current, over voltage and over temperature fault conditions are detected by the Diagnostic Output Module.

39.2.1 B882 Mode

In the B882 mode when an output fault is detected, the module without controller intervention disarms the faulted output and reports the condition to the controller via discrete input (1*x*), or input register (3*x*) 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 off and back 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 you bring the faulted point low, the fault indicator clears in the 2 ... 5 s.

☞ **Note:** If field power is lost, the module may detect faults. After you re- -apply field power, you must clear all faults.

⚠ **Caution: When a fault is detected, in B882 or B818 mode, the source of the fault should be cleared prior to you restarting the point. Failure to do so may result in damage to the power source, the driven field side device, and eventually the module itself.**

39.2.2 B818 Mode

In the B818 mode when an output fault is detected, 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 turn the point off and back 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 you bring the faulted point low, the fault indicator clears in the 2 ... 5 s.

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Caution: If field power is lost, in the B818 mode, the module may detect faults that are not visible to the controller. After you re--apply field power, you must turn your points OFF then back ON for all ON states.

39.2.3 Fault Definitions

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 you should place a resistor between the output point and the group return. For example, @ 20 Vdc the minimum load is 200 Ω, @ 24 Vdc 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.

Over Voltage If the external voltage supply exceeds the modules rating, the output point turns OFF, and a fault flag may be returned. The point requires cycling, after the external supply returns to the safe operating level. The over voltage trip level has a value of 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.

Caution: Be careful when using the 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.

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39.3 Field 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. Setting the DIP- -switch allows you to select bi- -directional fault reporting or uni- -directional non- -fault reporting functionality prior to installation.

Terminal numbering and their corresponding output functions are presented below in Figure 94.

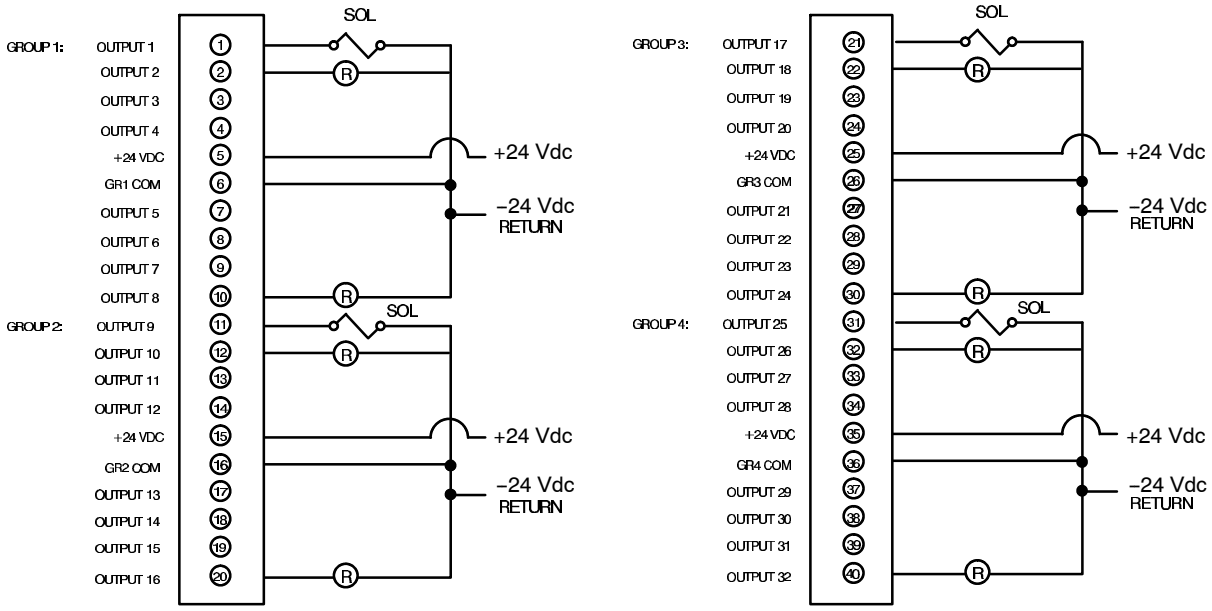


Figure 94 B882–032 Terminal Numbering and Output Connections

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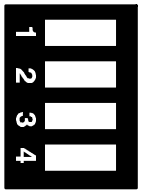
39.4 DIP Switch Settings

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 Figure 95 for switch settings. Also, refer to the label located on the left side of the module itself.

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–DIRCTIONAL SW3 = L (B818)
4	NOT USED, KEEP TO LEFT

Figure 95 B882–032 DIP Switch Settings

☞ **Note:** When you select the bi- -directional module functionality (B882), you have 32 discrete outputs and 32 returned fault flags. When you select the uni- -directional module functionality (B818), you have 32 discrete outputs.

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39.5 Quick Start Test

This test configures the module as follows: **B882** (bi- -directional).

Step 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)

Step 2 Determine which channel and slot location are being used for this module.

Step 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 module.

Step 4 Stop the PLC.

Step 5 I/O Map the module as a B882, registers 30001/30002, 40001/40002 binary.

Step 6 Start the PLC.

Step 7 Write FFFF(hex) into registers 40001 and 40002.

☞ **Note:** Ensure that no field devices are connected to these points.

Step 8 Active light should now be blinking.

Step 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.

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☞ **Note:** Active blinking = One or more outputs have sensed a load fault. Active on steady = Points have the minimum load requirements.

39.5.1 Application Example

The B882 module, with ability to sense its own output points is an excellent choice for critical operations. The example in Figure 96 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 in Figure 96 moves the contents of registers 30001 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 and 40009. This gives you 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, and when a miscompare occurs, coil 00001 turns on which can be tied to an indicator light, or safety circuity for system protection.

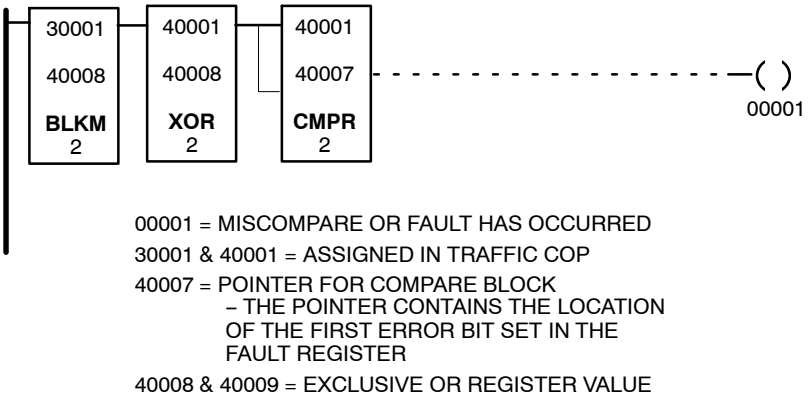


Figure 96 B882–032 Application Example

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39.6 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
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 μf 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**

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Terminal Connector	AS–8535–000

** 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.

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Chapter 40
B882–116 24 Vdc Output

- ☐ Overview
- ☐ Field Connections
- ☐ Configuration
- ☐ Switch Settings
- ☐ Specifications

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40.1 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 µs opposite state pulse once every second.

☞ **Note:** Average currents in output circuits are changed by no more than 0.1% by full test mode.

40.1.1 Simplified Schematic

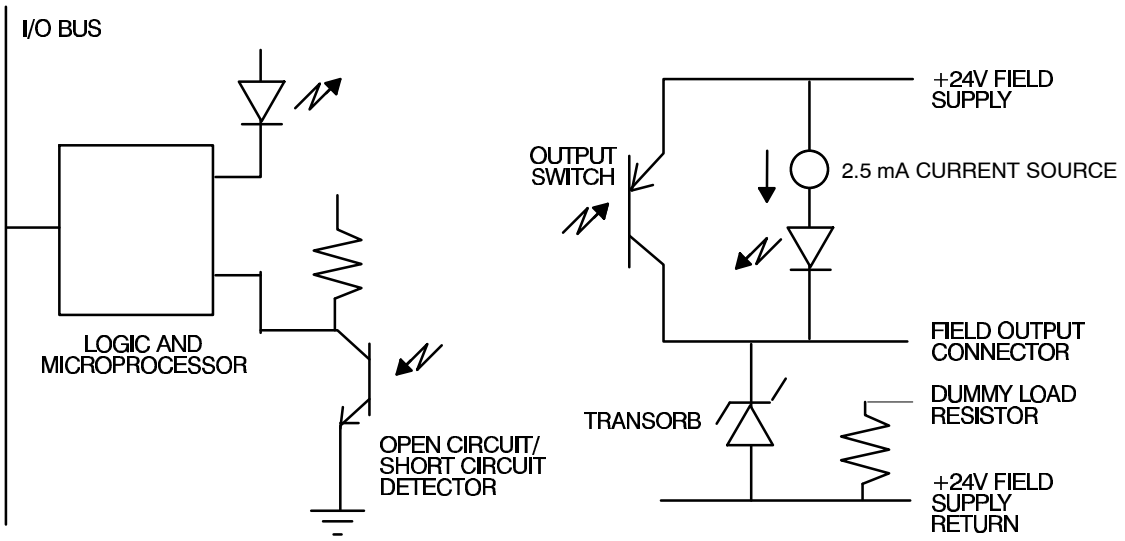


Figure 97 B882–116 Simplified Schematic

This leakage current is actually the 2.5 mA test current source. It cannot be turned OFF.

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40.2 Field 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.

40.2.1 Output Connections

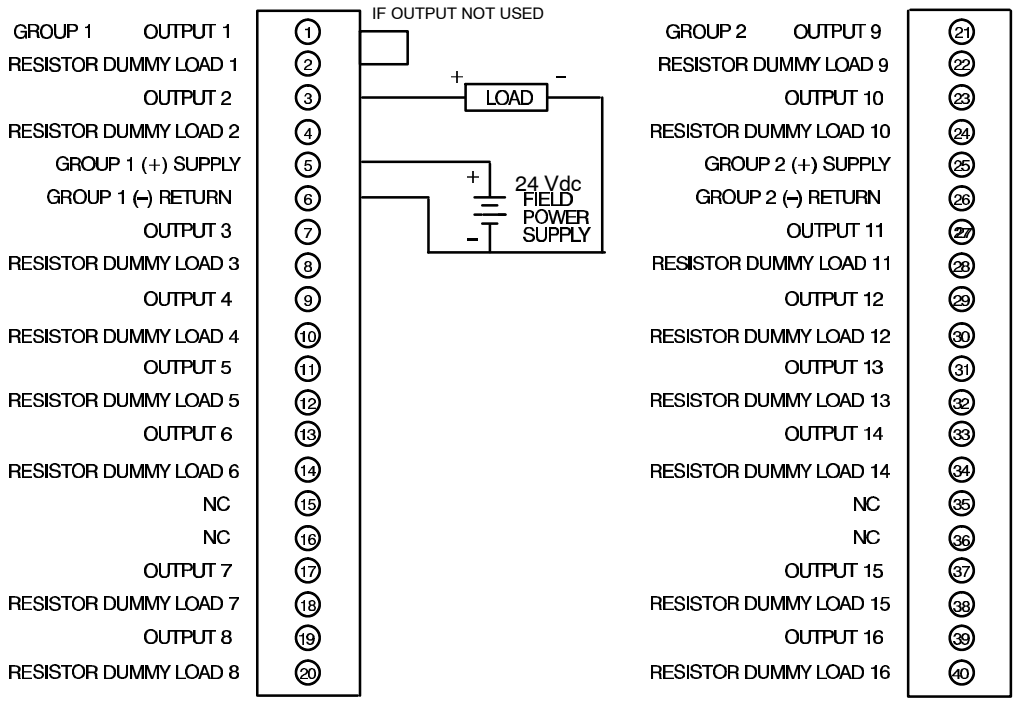


Figure 98 B882–116 Terminal Numbering and Output Connections

☞ **Note:** Dummy load pin is only used to prevent an open circuit fault from being returned from an unused output.

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40.3 Configuration

This module appears as a B882 module when configured—i.e., the module requires either four 16-bit words—two 3*x* input registers and two 4*x* holding registers or 32 discrete 0*x* outputs and 32 discrete 1*x* inputs.

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 3*x* register at position three. If a short fault is detected on output point three, then a one is displayed in register 3*x* + 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 flow chart in Figure 99 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.



Caution: The module will not work correctly with a J810 Remote I/O Processor.

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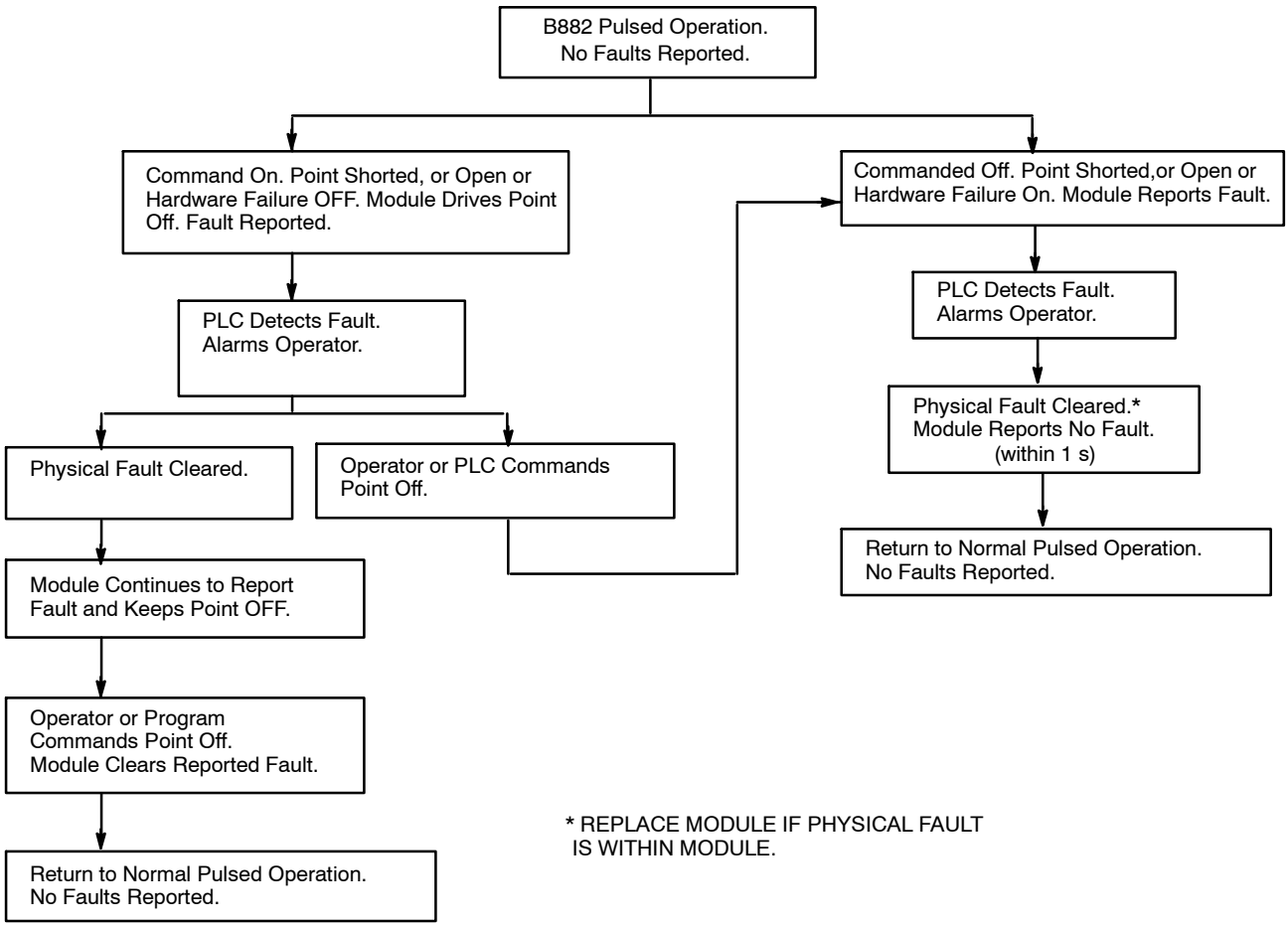


Figure 99 Full Fault Test Mode Only Flow Chart

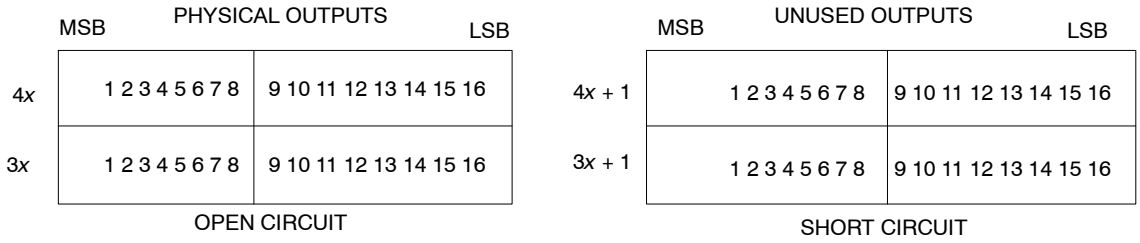


Figure 100 Data Registers

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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, clear 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.

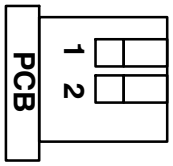
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40.4 Switch Settings

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 relates 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 then no pulse test is performed.

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	GROUP1, NO TEST
SW2=0	GROUP 2, PULSE TEST ENABLED
=1	GROUP2, NO TEST

Figure 101 Pulse Test DIP–Switch Settings

☞ **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.

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40.5 Specifications

B882-116 24 Vdc Output Specifications

Description	24 Vdc output
Number of Points	16
Number of Groups	2
Outputs per Group	8
Working Voltage	19.2 ... 30.0 Vdc

☞ **Note:** 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 recommened. Fuse should be rated for expected load current plus 5 A Slo- -Blow.

⚠ **Caution: When field supply drops from 24 ... 0 V an output current of up to 15 mA may be generated to points that are off. Output fault flags reported when field supply is below 19.2 V may be incorrect.**

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.

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
Minimum Load Current		10 mA
Maximum Load Inductance		0.5 H @ 0.5 A, 4 Hz switching
Maximum Load Capacitance		4 μF @ 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

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Appendix A
I/O Key Pin Assignments

□ Key Pin charts for all 800 Series I/O Modules

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TOP OF HOUSING (CARD BASKET) KEYING (FRONT VIEW)

BOTTOM OF HOUSING (CARD BASKET) KEYING (FRONT VIEW)

	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			

● Indicates keying pin locations.

* Indicates these modules may be obsoleted or superseded, please contact your local distributor for more details.

Figure 102 Key Pin Assignments Chart

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TOP OF HOUSING (CARD BASKET) KEYING (FRONT VIEW)

BOTTOM OF HOUSING (CARD BASKET) KEYING (FRONT VIEW)

	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–B883–211	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

● Indicates keying pin locations.

* Indicates these modules may be obsoleted or superseded, please contact your local distributor for more details.

Figure 103 Key Pin Assignments Chart Cont.

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Index

Numbers

16- -point 115 Vac input modules, 800 Series I/O, B805- -016, 29
16- -point 115 Vac isolated input modules, 800 Series I/O, B817- -116, 67
16- -point 115 Vac output modules, 800 Series I/O, B804- -116, 21
16- -point 115 Vac/125 Vdc input modules, 800 Series I/O, B853- -016, 145
16- -point 230 Vac input modules, 800 Series I/O, B809- -016, 53
16- -point 230 Vac isolated input modules, 800 Series I/O, B817- -216, 67
16- -point 230 Vac output modules, 800 Series I/O, B808- -016, 49
16- -point 24 Vdc output modules, 800 Series I/O, B882- -116, 221
16- -point 48 V ac/dc input modules, 800 Series I/O, B849- -016, 139
16- -point 48 Vac output modules, 800 Series I/O, B804- -148, 25
24 V ac/dc input modules, 800 Series I/O, B837- -016, 123
32- -point 115 Vac input modules, 800 Series I/O, B807- -132, 43
32- -point 115 Vac output modules, 800 Series I/O, B806- -032, 33
32- -point 24 Vac output modules, 800 Series I/O, B806- -124, 39
32- -point input modules (24 Vdc), 800 Series I/O, B863- -132, 167
800 Series I/O
  B802- -008 Eight- -point 115 Vac Output Module, 13
  B803- -008 Eight- -point 115 Vac Input Module, 17
  B804- -116 16- -point 115 Vac Output Module, 21
  B804- -148 16- -point 48 Vac Output Module, 25
  B805- -016 16- -point 115 Vac Input Module, 29
B806- -032 32- -point 115 Vac Output Module, 33
B806- -124 32- -point 24 Vac Output Module, 39
B807- -132 32- -point 115 Vac Input Module, 43
B808- -016 16- -point 230 Vac Output Module, 49
B809- -016 16- -point 230 Vac Input Module, 53
B810- -008 Eight- -point 115 Vac Isolated Output Module, 57
B814- -108 Eight- -relay Output Module, 61
B817- -116 16- -point 115 Vac Isolated Input Module, 67
B817- -216 16- -point 230 Vac Isolated Input Module, 67
B820- -008 10 ... 60 Vdc True High Output Module, 73
B821- -108 10 ... 60 Vdc True High Input Module, 77
B824- -016 24 Vdc True High Output Module, 83
B825- -016 24 Vdc True High Input Module, 87
B826- -032 24 Vdc True High Output Module, 91
B827- -032 24 Vdc True High Input Module, 97
B828- -016 5 V TTL Output Module, 101
B829- -116 5 V TTL Input Module, 105
B832- -016 24 V True Low Output Module, 109
B833- -016 24 V True Low Input Module, 113
B836- -016 12 ... 250 Vdc Isolated Output Module, 117
B837- -016 24 V ac/dc Input Module, 123
B838- -032 True High 24 Vdc Output Module, 129

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B840- -108 Eight- -relay Output Module, 133
B849- -016 16- -point 48 V ac/dc Input Module, 139
B853- -016 16- -point 115 Vac/125 Vdc Input Module, 145
B855- -016 12 Vdc Intrinsically Safe True Low Input Module, 151
B863- -032 Monitored 32- -point 24 Vdc Input Module, 159
B863- -132 32- -point 24 Vdc Input Module, 167
B864- -001 Register Output Module, 173
B865- -001 Register Input Module, 181
B881- -001 Latched 24 Vdc Input Module, 189
B881- -108 Protected 120 Vac Output Module, 195
B881- -508 Eight- -point 125 Vdc Output Module, 205
B882- -032 Diagnostic 32- -point 24 Vdc Output Module, 211
B882- -116 16- -point 24 Vdc Output Module, 221
features, 2
generic specifications, 11
grounding guidelines, 5
I/O map overview, 4
indicator light overview, 3
installation overview, 6
quick start test, 10
system interface, 3

A

application example
B863- -032 Monitored 32- -point 24 Vdc Input Module, 164
B881- -108 Protected 120 Vac Output Module, 202
B882- -032 Diagnostic 32- -point 24 Vdc Output Module, 218

B

B802- -008 Eight- -point 115 Vac Output Module, simplified schematic, 14
B802- -008 Eight- -point 155 Vac Output Module, field connections, 15
B802- -008 Eight- -point Output Module, specifications, 16
B803- -008 Eight- -point 115 Vac Input Module, simplified schematic, 18
B803- -008 Eight- -point 155 Vac Input Module
field connections, 19
specifications, 20
B804- -116 16- -point 115 Vac Output Module
field connections, 23
simplified schematic, 22
specifications, 24
B804- -148 16- -point 48 Vac Output Module
field connections, 27
simplified schematic, 26
specifications, 28
B805- -016 16- -point 115 Vac Input Module
field connections, 31
simplified schematic, 30
specifications, 32
B806- -032 32- -point 115 Vac Output Module
field connections, 35
fusing guidelines, 36
simplified schematic, 34
specifications, 37
B806- -124 32- -point 24 Vac Output Module
field connections, 41
simplified schematic, 40
specifications, 42
B807- -132 32- -point 115 Vac Input Module
field connections, 45
input current- -to- -frequency relationship, 46
simplified schematic, 44
specifications, 47
B808- -016 16- -point 230 Vac Output Module
field connections, 51
simplified schematic, 50
specifications, 52
B809- -016 16- -point 230 Vac Input Module
field connections, 55
simplified schematic, 54
specifications, 56

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B810- -008 Eight- -point 115 Vac Isolated Output Module
field connections, 59
simplified schematic, 58
specifications, 60
B814- -108 Eight- -relay Output Module
configuration, 63
field connections, 64
simplified schematic, 62
specifications, 65
B814- -108, Relay Output, Specifications, 65
B817- -116 16- -point 115 Vac Isolated Input Module
field connections, 69
simplified block diagram, 68
specifications, 71
B817- -216 16- -point 230 Vac Isolated Input Module
field connections, 69
simplified block diagram, 68
specifications, 71
B820- -008 10 ... 60 Vdc True High Output Module
field connections, 75
simplified schematic, 74
specifications, 76
B821- -108 10 ... 60 Vdc True High Input Module
field connections, 79
simplified schematic, 78
specifications, 80
B824- -016 24 Vdc True High Output Module
field connections, 85
simplified schematic, 84
specifications, 86
B825- -016 24 Vdc True High Input Module
field connections, 89
simplified schematic, 88
specifications, 90
B826- -032 24 Vdc True High Output Module
field connections, 94
simplified schematic, 92
specifications, 95
B827- -032 24 Vdc True High Input Module
field connections, 99
simplified schematic, 98
specifications, 100
B828- -016 5 V TTL Output Module
field connections, 103
simplified schematic, 102
specifications, 104
B829- -116 5 V TTL Input Module
field connections, 107
simplified schematic, 106
specifications, 108
B832- -016 24 V True Low Output Module
field connections, 111
simplified schematic, 110
specifications, 112
B833- -016 24 V True Low Input Module
field connections, 115
simplified schematic, 114
specifications, 116
B836- -016 12 ... 250 Vdc Isolated Output Module
field connections, 120
simplified block diagram, 119
specifications, 122
B837- -016 24 V ac/dc Input Module
field connections, 126
simplified block diagram, 124
specifications, 127
B838- -032 True High 24 Vdc Output Module
field connections, 131
simplified schematic, 130
specifications, 132
B840- -108 Eight- -relay Output Module
configuration, 136
field connections, 137
simplified schematic, 134
specifications, 138
B849- -016 16- -point 48 V ac/dc Input Module
field connections, 142
simplified block diagram, 140
specifications, 143
B853- -016 16- -point 115 Vac/125 Vdc Input Module
field connections, 148
simplified block diagram, 146
specifications, 149
B855- -016 12 Vdc Intrinsically Safe True Low Input Module

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

installation, 153
specifications, 158
B863- -032 Monitored 32- -point 24 Vdc Input Module
application example, 164
field connections, 162
quick start test, 163
simplified schematic, 160
specifications, 166
B863- -132 32- -point 24 Vdc Input Module
configuration, 171
field connections, 170
simplified schematic, 168
specifications, 172
switch settings, 169
B864- -001 Register Output Module
field connections, 177
simplified block diagram, 175
specifications, 180
switch settings, 176
B865- -001 Register Input Module
field connections, 185
simplified block diagram, 183
specifications, 187
switch settings, 184
B881- -001 Latched 24 Vdc Input Module
field connections, 192
simplified block diagram, 190
specifications, 193
B881- -108 Protected 120 Vac Output Module
application example, 202
fault condition filter, 199
field connections, 200
quick start test, 201
simplified schematic, 198
specifications, 203
B881- -508 Eight- -point 125 Vdc Output Module
fault conditions, 208
field connections, 209
simplified schematic, 207
specifications, 210
B882- -032 Diagnostic 32- -point 24 Vdc Output Module
application example, 218
fault conditions, 213
field connections, 215
quick start test, 217
simplified schematic, 212
specifications, 219
switch settings, 216
B882- -116 16- -point 24 Vdc Output Module
configuration, 224
field connections, 223
simplified schematic, 222
specifications, 228
switch settings, 227

C

configuration
B814- -108 Eight- -relay Output Module, 63
B840- -108 Eight- -relay Output Module, 136
B863- -132 32- -point 24 Vdc Input Module, 171
B882- -116 16- -point 24 Vdc Output Module, 224

D

diagnostic 24 Vdc output modules, 800 Series I/O, B882- -032, 211

E

eight- -point 115 Vac input modules, 800 Series I/O, B803- -008, 17
eight- -point 115 Vac isolated output modules, 800 Series I/O, B810- -008, 57
eight- -point 115 Vac output modules, 800 Series I/O, B802- -008, 13
eight- -point 125 Vdc output modules, 800 Series I/O, B881- -508, 205
eight- -relay output modules, 800 Series I/O
B814- -108, 61
B840- -108, 133

F

fault condition filter, B881- -108 Protected 120 Vac Output Module, 199
fault conditions

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

B881- -508 Eight- -point 125 Vdc Output Module, 208
B882- -032 Diagnostic 32- -point 24 Vdc Output Module, 213
field connections
B802- -008 Eight- -point 115 Vac Output Module, 15
B803- -008 Eight- -point 115 Vac Input Module, 19
B804- -116 16- -point 115 Vac Output Module, 23
B804- -148 16- -point 48 Vac Output Module, 27
B805- -016 16- -point 115 Vac Input Module, 31
B806- -032 32- -point 115 Vac Output Module, 35
B806- -124 32- -point 24 Vac Output Module, 41
B807- -132 32- -point 115 Vac Input Module, 45
B808- -016 16- -point 230 Vac Output Module, 51
B809- -016 16- -point 230 Vac Input Module, 55
B810- -008 Eight- -point 115 Vac Isolated Output Module, 59
B814- -108 Eight- -relay Output Module, 64
B817- -116 16- -point 115 Vac Isolated Input Module, 69
B817- -216 16- -point 230 Vac Isolated Input Module, 69
B820- -008 10 ... 60 Vdc True High Output Module, 75
B821- -108 10 ... 60 Vdc True High Input Module, 79
B824- -016 24 Vdc True High Output Module, 85
B825- -016 24 Vdc True High Input Module, 89
B826- -032 24 Vdc True High Output Module, 94
B827- -032 24 Vdc True High Input Module, 99
B828- -016 5 V TTL Output Module, 103
B829- -116 5 V TTL Input Module, 107
B832- -016 24 V True Low Output Module, 111
B833- -016 24 V True Low Input Module, 115
B836- -016 12 ... 250 Vdc Isolated Output Module, 120
B837- -016 24 V ac/dc Input Module, 126
B838- -032 True High 24 Vdc Output Module, 131
B840- -108 Eight- -relay Output Module, 137
B849- -016 16- -point 48 V ac/dc Input Module, 142
B853- -016 16- -point 115 Vac/125 Vdc Input Module, 148
B863- -032 Monitored 32- -point 24 Vdc Input Module, 162
B863- -132 32- -point 24 Vdc Input Module, 170
B864- -001 Register Output Module, 177
B865- -001 Register Input Module, 185
B881- -001 Latched 24 Vdc Input Module, 192
B881- -108 Protected 120 Vac Output Module, 200
B881- -508 Eight- -point 125 Vdc Output Module, 209
B882- -032 Diagnostic 32- -point 24 Vdc Output Module, 215
B882- -116 16- -point 24 Vdc Output Module, 223
fusing guidelines, B806- -032 32- -point 115 Vac Output Module, 36

G

grounding guidelines, 800 Series I/O, 5

I

input current- -to- -frequency relationship, B807- -132 32- -point 115 Vac Input Module, 46
installation, B855- -016 12 Vdc Intrinsically Safe True Low Input Module, 153

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intrinsically safe true low input modules (12 Vdc), 800 Series I/O, B855- -016, 151
isolated output modules (12 ... 250 Vdc), 800 Series I/O, B836- -016, 117

L

latched input modules (24 Vdc), 800 Series I/O, B881- -001, 189

M

monitored 32- -point input modules (24 Vdc), 800 Series I/O, B863- -032, 159

P

protected output modules (120 Vac), 800 Series I/O, B881- -108, 195

Q

quick start test
B863- -032 Monitored 32- -point 24 Vdc Input Module, 163
B881- -108 Protected 120 Vac Output Module, 201
B882- -032 Diagnostic 32- -point 24 Vdc Output Module, 217

R

register input modules, 800 Series I/O, B865- -001, 181
register output modules, 800 Series I/O, B864- -001, 173

S

simplified block diagram
B817- -116 16- -point 115 Vac Isolated Input Module, 68
B817- -216 16- -point 230 Vac Isolated Input Module, 68
B836- -016 12 ... 250 Vdc Isolated Output Module, 119
B837- -016 24 V ac/dc Input Module, 124
B849- -016 16- -point 48 V ac/dc Input Module, 140
B853- -016 16- -point 115 Vac/125 Vdc Input Module, 146
B864- -001 Register Output Module, 175
B865- -001 Register Input Module, 183
B881- -001 Latched 24 Vdc Input Module, 190
simplified schematic
B802- -008 Eight- -point 115 Vac Output Module, 14
B803- -008 Eight- -point 115 Vac Input Module, 18
B804- -116 16- -point 115 Vac Output Module, 22
B804- -148 16- -point 48 Vac Output Module, 26
B805- -016 16- -point 115 Vac Input Module, 30
B806- -032 32- -point 115 Vac Output Module, 34
B806- -124 32- -point 24 Vac Output Module, 40
B807- -132 32- -point 115 Vac Input Module, 44
B808- -016 16- -point 230 Vac Output Module, 50
B809- -016 16- -point 230 Vac Input Module, 54
B810- -008 Eight- -point 115 Vac Isolated Output Module, 58
B814- -108 Eight- -relay Output Module, 62
B820- -008 10 ... 60 Vdc True High Output Module, 74
B821- -108 10 ... 60 Vdc True High Input Module, 78
B824- -016 24 Vdc True High Output Module, 84
B825- -016 24 Vdc True High Input Module, 88
B826- -032 24 Vdc True High Output Module, 92
B827- -032 24 Vdc True High Input Module, 98
B828- -016 5 V TTL Output Module, 102
B829- -116 5 V TTL Input Module, 106
B832- -016 24 V True Low Output Module, 110

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B833- -016 24 V True Low Input Module, 114
B838- -032 True High 24 Vdc Output Module, 130
B840- -108 Eight- -relay Output Module, 134
B863- -032 Monitored 32- -point 24 Vdc Input Module, 160
B863- -132 32- -point 24 Vdc Input Module, 168
B881- -108 Protected 120 Vac Output Module, 198
B881- -508 Eight- -point 125 Vdc Output Module, 207
B882- -032 Diagnostic 32- -point 24 Vdc Output Module, 212
B882- -116 16- -point 24 Vdc Output Module, 222
specifications
B802- -008 Eight- -point Output Module, 16
B803- -008 Eight- -point 115 Vac Input Module, 20
B804- -116 16- -point 115 Vac Output Module, 24
B804- -148 16- -point 48 Vac Output Module, 28
B805- -016 16- -point 115 Vac Input Module, 32
B806- -032 32- -point 115 Vac Output Module, 37
B806- -124 32- -point 24 Vac Output Module, 42
B807- -132 32- -point 115 Vac Input Module, 47
B808- -016 16- -point 230 Vac Output Module, 52
B809- -016 16- -point 230 Vac Input Module, 56
B810- -008 Eight- -point 115 Vac Isolated Output Module, 60
B814- -108 Eight- -relay Output Module, 65
B817- -116 16- -point 115 Vac Isolated Input Module, 71
B817- -216 16- -point 230 Vac Isolated Input Module, 71
B820- -008 10 ... 60 Vdc True High Output Module, 76
B821- -108 10 ... 60 Vdc True High Input Module, 80
B824- -016 24 Vdc True High Output Module, 86
B825- -016 24 Vdc True High Input Module, 90
B826- -032 24 Vdc True High Output Module, 95
B827- -032 24 Vdc True High Input Module, 100
B828- -016 5 V TTL Output Module, 104
B829- -116 5 V TTL Input Module, 108
B832- -016 24 V True Low Output Module, 112
B833- -016 24 V True Low Input Module, 116
B836- -016 12 ... 250 Vdc Isolated Output Module, 122
B837- -016 24 V ac/dc Input Module, 127
B838- -032 True High 24 Vdc Output Module, 132
B840- -108 Eight- -relay Output Module, 138
B849- -016 16- -point 48 V ac/dc Input Module, 143
B853- -016 16- -point 115 Vac/125 Vdc Input Module, 149
B855- -016 12 Vdc Intrinsically Safe True Low Input Module, 158
B863- -032 Monitored 32- -point 24 Vdc Input Module, 166
B863- -132 32- -point 24 Vdc Input Module, 172
B864- -001 Register Output Module, 180
B865- -001 Register Input Module, 187
B881- -001 Latched 24 Vdc Input Module, 193
B881- -108 Protected 120 Vac Output Module, 203
B881- -508 Eight- -point 125 Vdc Output Module, 210

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B882- -032 Diagnostic 32- -point 24 Vdc Output Module, 219
B882- -116 16- -point 24 Vdc Output Module, 228
switch settings
B863- -132 32- -point 24 Vdc Input Module, 169
B864- -001 Register Output Module, 176
B865- -001 Register Input Module, 184
B882- -032 Diagnostic 32- -point 24 Vdc Output Module, 216
B882- -116 16- -point 24 Vdc Output Module, 227

T

true high input modules (10 ... 60 Vdc), 800 Series I/O, B821- -108, 77
true high input modules (24 Vdc), 800 Series I/O
B825- -016, 87
B827- -032, 97
true high output modules (10 ... 60 Vdc), 800 Series I/O, B820- -008, 73
true high output modules (24 Vdc), 800 Series I/O
B824- -016, 83
B826- -032, 91
B838- -032, 129
true low input modules (24 V), 800 Series I/O, B833- -016, 113
true low output modules (24 V), 800 Series I/O, B832- -016, 109
TTL input modules (5 V), 800 Series I/O, B829- -116, 105
TTL output modules (5 V), 800 Series I/O, B828- -016, 101

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