Installation Instructions

Original Instructions

Allen-Bradley

Micro870 Programmable Controllers 24V DC Expansion Power Supply

Catalog Number 2085-EP24VDC

Topic	Page
Important User Information	2
Environment and Enclosure	4
North American Hazardous Location Approval	5
Prevent Electrostatic Discharge	6
About the Power Supply	9
Mount the Power Supply	9
System Assembly	12
Wire the Power Supply	13
Specifications	14

Important User Information

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

Reproduction of the contents of this manual, in whole or in part, without written permission of Rockwell Automation, Inc., is prohibited.

Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

	**WARNING:** Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
	**ATTENTION:** Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

Labels may also be on or inside the equipment to provide specific precautions.

	**SHOCK HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.
	**BURN HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.
	**ARC FLASH HAZARD:** Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE).

Environment and Enclosure

ATTENTION: This equipment is intended for use in a Pollution Degree 2 industrial environment, in overvoltage Category II applications (as defined in IEC 60664-1), at altitudes up to 2000 m (6562 ft) without derating.

This equipment is considered Group 1, Class A industrial equipment according to IEC/CISPR 11. Without appropriate precautions, there may be difficulties with electromagnetic compatibility in residential and other environments due to conducted and radiated disturbances.

This equipment is supplied as open-type equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present and appropriately designed to prevent personal injury resulting from accessibility to live parts. The enclosure must have suitable flame-retardant properties to prevent or minimize the spread of flame, complying with a flame spread rating of 5VA, V2, V1, V0 (or equivalent) if nonmetallic. The interior of the enclosure must be accessible only by the use of a tool. Subsequent sections of this publication may contain additional information regarding specific enclosure type ratings that are required to comply with certain product safety certifications.

In addition to this publication, see:

- Industrial Automation Wiring and Grounding Guidelines, Rockwell Automation publication 1770-4.1, for additional installation requirements.
- NEMA Standard 250 and IEC 60529, as applicable, for explanations of the degrees of protection provided by different types of enclosure.

North American Hazardous Location Approval

The following information applies when operating this equipment in hazardous locations.	**Informations sur l'utilisation de cet équipement en environnements dangereux.**
Products marked "CL I, DIV 2, GP A, B, C, D" are suitable for use in Class I Division 2 Groups A, B, C, D, Hazardous Locations and nonhazardous locations only. Each product is supplied with markings on the rating nameplate indicating the hazardous location temperature code. When combining products within a system, the most adverse temperature code (lowest "T" number) may be used to help determine the overall temperature code of the system. Combinations of equipment in your system are subject to investigation by the local Authority Having Jurisdiction at the time of installation.	Les produits marqués "CL I, DIV 2, GP A, B, C, D" ne conviennent qu'à une utilisation en environnements de Classe I Division 2 Groupes A, B, C, D dangereux et non dangereux. Chaque produit est livré avec des marquages sur sa plaque d'identification qui indiquent le code de température pour les environnements dangereux. Lorsque plusieurs produits sont combinés dans un système, le code de température le plus défavorable (code de température le plus faible) peut être utilisé pour déterminer le code de température global du système. Les combinaisons d'équipements dans le système sont sujettes à inspection par les autorités locales qualifiées au moment de l'installation.
WARNING: **Explosion Hazard –** • Do not disconnect equipment unless power has been removed or the area is known to be nonhazardous. • Do not disconnect connections to this equipment unless power has been removed or the area is known to be nonhazardous. Secure any external connections that mate to this equipment by using screws, sliding latches, threaded connectors, or other means provided with this product. • Substitution of components may impair suitability for Class I, Division 2. • If this product contains batteries, they must only be changed in an area known to be nonhazardous.	**AVERTISSEMENT:** **Risque d'Explosion –** • Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher l'équipement. • Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher les connecteurs. Fixer tous les connecteurs externes reliés à cet équipement à l'aide de vis, loquets coulissants, connecteurs filetés ou autres moyens fournis avec ce produit. • La substitution de composants peut rendre cet équipement inadapté à une utilisation en environnement de Classe I, Division 2. • S'assurer que l'environnement est classé non dangereux avant de changer les piles.

Prevent Electrostatic Discharge

ATTENTION: This equipment is sensitive to electrostatic discharge, which can cause internal damage and affect normal operation. Follow these guidelines when you handle this equipment:

- Touch a grounded object to discharge potential static.
- Wear an approved grounding wriststrap.
- Do not touch connectors or pins on component boards.
- Do not touch circuit components inside the equipment.
- Use a static-safe workstation, if available.
- Store the equipment in appropriate static-safe packaging when not in use.

ATTENTION: To comply with the CE Low Voltage Directive (LVD), this equipment must be powered from a source compliant with the following:

Safety Extra Low Voltage (SELV) or Protected Extra Low Voltage (PELV).

ATTENTION: If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

ATTENTION: To comply with UL restrictions, this equipment must be powered from a Class 2 or Limited Voltage Limited Current Source (LVLC).

ATTENTION: Do not connect 120/240V AC power to this supply. Use the 2085-EP24VDC expansion power supply only with 2085 I/O Modules

ATTENTION: Do not remove the protective debris strips until after the controller and all other equipment in the panel near the module are mounted and wired. Remove strips before operating the controller. Failure to remove strips before operating can cause overheating.

ATTENTION: Be careful when stripping wires. Wire fragments that fall into the power supply could cause damage. Once wiring is complete, make sure the power supply is free of all metal fragments.

ATTENTION: Be careful of metal chips when drilling mounting holes for your power supply or other equipment within the enclosure or panel. Drilled fragments that fall into the power supply could cause damage. Do not drill holes above a mounted power supply if the protective debris strips have been removed.

ATTENTION: Do not wire more than 2 conductors on any single terminal.

ATTENTION: This equipment is not resistant to sunlight or other sources of UV radiation.

WARNING: Risk of electrical shock, fire, personal injury or death.

- Do not use the power supply without proper grounding (Protective Earth).
- Turn power off before working on the device.
  Protect against inadvertent re-powering.
- Make sure that the wiring is correct by following all local and national codes.
- Do not modify or repair the unit.
- Do not open the unit as high voltages are present inside.
- Use caution to prevent any foreign objects from entering into the housing.

WARNING: When you insert or remove the module while backplane power is on, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding. Repeated electrical arcing causes excessive wear to contacts on both the module and its mating connector. Worn contacts may create electrical resistance that can affect module operation.

WARNING: When you connect or disconnect the Removable Terminal Block (RTB) with field side power applied, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.

WARNING: This equipment shall be used within its specified ratings defined by Rockwell Automation.

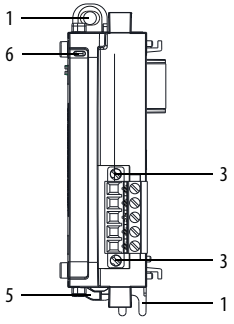
WARNING: Do not disconnect equipment unless power has been removed or the area is known to be nonhazardous.

WARNING: Do not unscrew the RTB hold down screws and remove the RTB while power is on. This could cause an explosion in hazardous location installations. Be sure that power is removed before proceeding.

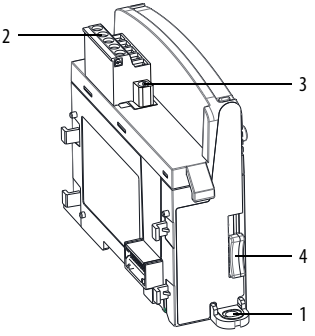
At the end of its life, this equipment should be collected separately from any unsorted municipal waste.

About the Power Supply

The expansion power supply provides bus power (5V, 24V DC) up to the four I/O modules to the right of it. The expansion power supply extends the capabilities of Micro870™ controllers by increasing the number of supported expansion I/O module from four to eight.



Front view



Right top view

24V DC Expansion Power Supply Module Description

	Description		Description
1	Mounting screw hole / mounting foot	4	Module interconnect latch
2	Removable Terminal Block (RTB)	5	DIN rail mounting latch
3	RTB hold down screws	6	Power status LED

Mount the Power Supply

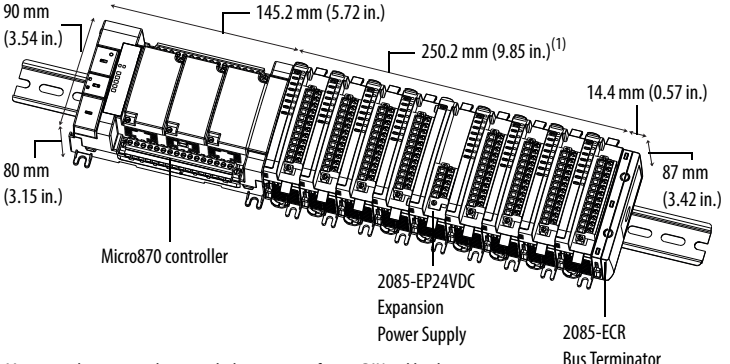
For more information on proper grounding guidelines, see the Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

WARNING: The power supply cannot be mounted next to the controller.

Module Spacing

Maintain spacing from objects such as enclosure walls, wireways and adjacent equipment. Allow 50.8 mm (2in.) of space on all sides for adequate ventilation, as shown.

Mounting Dimensions and DIN Rail Mounting – Horizontal Orientation



Mounting dimensions do not include mounting feet or DIN rail latches.

1) This width measurement applies when only eight single-width expansion I/O modules are used as shown.

DIN Rail Mounting

The module can be mounted using the following DIN rails: 35 x 7.5 mm x 1 mm (EN 50022 – 35 x 7.5).

TIP For environments with greater vibration and shock concerns, use the panel mounting method, instead of DIN rail mounting.

ATTENTION: This product is grounded through the DIN rail to chassis ground. Use zinc plated yellow-chromate steel DIN rail to assure proper grounding. The use of other DIN rail materials (for example, aluminum or plastic) that can corrode, oxidize, or are poor conductors, can result in improper or intermittent grounding. Secure DIN rail to mounting surface approximately every 200 mm (7.8 in.) and use end-anchors appropriately.

Before mounting the module on a DIN rail, use a flat-blade screwdriver in the DIN rail latch and pry it downwards until it is in the unlatched position.

1. Hook the top of the DIN rail mounting area of the module onto the DIN rail, and then press the bottom until the module snaps onto the DIN rail.
2. Push the DIN rail latch back into the latched position.
   Use DIN rail end anchors (Allen-Bradley part number 1492-EAJ35 or 1492-EAHJ35) for vibration or shock environments.

To remove your module from the DIN rail, pry the DIN rail latch downwards until it is in the unlatched position.

Panel Mounting

The preferred mounting method is to use two M4 (#8) per module. Hole spacing tolerance: ±0.4 mm (0.016 in.). For mounting dimensions, refer to Micro830 and Micro850 Programmable Controller User Manual, publication 2080-UM002.

Follow these steps to install your module using mounting screws.

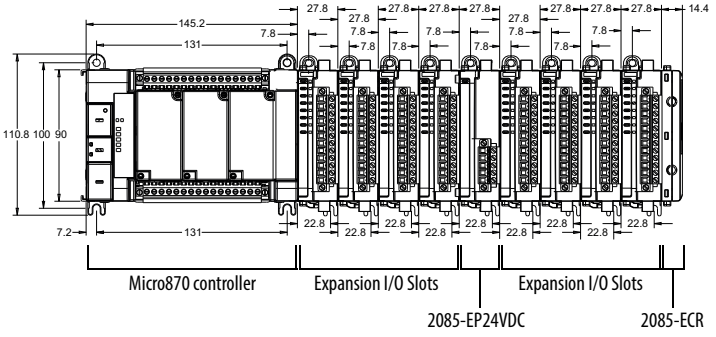
1. Place the module next to the controller against the panel where you are mounting it.
   Make sure the controller and module are spaced properly.
2. Mark drilling holes through the mounting screw holes and mounting feet then remove the module.
3. Drill the holes at the markings, then replace the module and mount it. Leave the protective debris strip in place until you are finished wiring the module and any other devices.

System Assembly

The expansion power supply is attached to I/O modules by means of interconnecting latches and hooks, as well as the bus connector.

Be sure to lock the module interconnect latches and the connector retaining arms, and tighten the RTB hold down screws before applying power to the module.

Example of a Micro870 System with Eight Expansion I/O Modules



Measurements in millimeters

ATTENTION: The expansion power supply only powers up to four expansion I/O modules to the right of the power supply. There can be only one expansion power supply in your system.

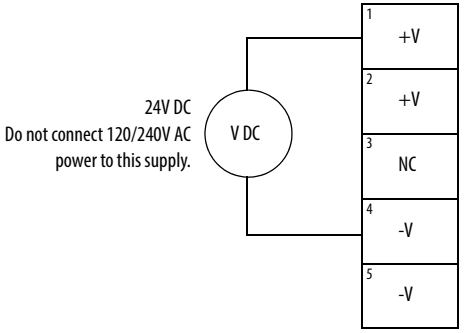
Field Wiring Connections

In solid-state control systems, grounding and wire routing helps limit the effects of noise due to electromagnetic interference (EMI).

ATTENTION: Do not wire more than 2 conductors on any single terminal.

Wire the Power Supply

A single 5-pin Removable Terminal Blocks (RTB) is included with your 2085-EP24VDC module.



Connect	Terminal
+24V DC	1, 2
-24V DC	4, 5
No connection	3
2085-EP24VDC provides expansion bus power to a maximum of four modules to the right.	

ATTENTION: To comply with the CE Low Voltage Directive (LVD), the power supply must be powered from a source compliant with the following:

Safety Extra Low Voltage (SELV) or Protected Extra Low Voltage (PELV).

WARNING: Do not unlatch the connector retaining arms or remove the connector while power is on. This could cause an explosion in hazardous location installations. Be sure that power is removed before proceeding.

ATTENTION: It is recommended to power both the Micro870 controller and 2085-EP24VDC expansion power supply using the same external Class 2 SELV or LVLC 24V DC power supply.

If two separate external power supplies are used and the 2085-EP24VDC's power supply is powered down before the controller's power supply, a misleading recoverable fault may occur indicating loss of power from the 2085-EP24VDC under normal machine power down conditions.

Specifications

General

Attribute	Value
I/O module capacity	4 modules, each module power limited to 4.2 W
Input voltage, nominal	24V DC Ensure that the external 24V power supply has a minimum ride through time of 10 ms at maximum load.
Input voltage rating	21.4...26.4V DC Class 2 or Limited Voltage Limited Current Source (LVLC)
Power consumption, max	24 W
Inrush current, max	6 A for 10 ms
Bus side power rating, max	24V DC (±10%) @ 700 mA 5V DC (±5%) @ 900 mA Maximum bus power limited to 16.8 W
Indicators	1 green – 5V system power
Input overvoltage protection	Reverse polarity protected
Interruption	Output voltage stays within specifications when inputs drops out for 10 ms @ 24V with max load. More than 10 ms interruption can cause the Micro870 controller to fault.
Module location	Between 2085 I/O modules
Limitations	No isolation provided between input power to 2085 bus power

General

Attribute	Value
Dimensions (HxWxD), approx.	110.0 x 36.2 x 87.0 mm (4.3 x 1.4 x 3.4 in)
Weight, approx.	0.09 kg (0.02 lb)
Removable Terminal Block (RTB) screw torque(1)	0.5...0.6 Nm (3.5...4.4 lb-in)
Wire size	0.25... 2.5 mm^2 (22...14 AWG) solid or stranded copper wire rated at 75 °C (167 °F), or greater, 1.2 mm (3/64 in.) insulation max
Wiring category(2)	1 – on power ports
Enclosure type rating	None (open-style)
North American temp code	T4

(1) RTB hold down screws should be tightened by hand. They should not be tightened using a power tool.
(2) Use this Conductor Category information for planning conductor routing. Refer to Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

Environmental

Attribute	Value
Temperature, operating	IEC 60068-2-1 (Test Ad, Operating Cold), IEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock): -20…65 °C (-4…149 °F)
Temperature, surrounding air, max	65 °C (149 °F)
Temperature, storage	IEC 60068-2-1 (Test Ab, Unpackaged Non-operating Cold), IEC 60068-2-2 (Test Bb, Unpackaged Non-operating Dry Heat), IEC 60068-2-14 (Test Na, Unpackaged Non-operating Thermal Shock): -40…85 °C (-40…185 °F)
Relative humidity	IEC 60068-2-30 (Test Db, Unpackaged Damp Heat): 5…95% noncondensing
Vibration	IEC 60068-2-6 (Test Fc, Operating): 2 g @ 10... 500 Hz
Shock, operating	IEC 60068-2-27 (Test Ea, Unpackaged Shock): 25 g

Environmental

Attribute	Value
Shock, nonoperating	IEC 60068-2-27 (Test Ea, Unpackaged Shock): 25 g for DIN rail mounted 35 g for panel mounted
Emissions	IEC 61000-6-4
ESD immunity	IEC 61000-4-2: 6 kV contact discharges 8 kV air discharges
Radiated RF immunity	IEC 61000-4-3: 10V/m with 1 kHz sine-wave 80% AM from 80…2000 MHz 10V/m with 200 Hz 50% Pulse @ 900 MHz 10V/m with 200 Hz 50% Pulse @ 1890 MHz 10V/m with 1 kHz sine-wave 80% AM from 2000…2700 MHz
EFT/B immunity	IEC 61000-4-4: ±2 kV at 5 kHz on power ports
Surge transient immunity	IEC 61000-4-5: ±1 kV line-line(DM) and ±2 kV line-earth(CM) on power ports
Conducted RF immunity	IEC 61000-4-6: 10V rms with 1 kHz sine-wave 80% AM from 150 kHz…80 MHz

Certifications

Certification (when product is marked)(1)	Value
c-UL-us	UL Listed Industrial Control Equipment, certified for US and Canada. See UL File E322657. UL Listed for Class I, Division 2 Group A,B,C,D Hazardous Locations, certified for U.S. and Canada. See UL File E334470.
CE	European Union 2014/30/EU EMC Directive, compliant with: EN 61326-1; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity EN 61000-6-4; Industrial Emissions EN 61131-2; Programmable Controllers (Clause 8, Zone A & B) European Union 2014/35/EU LVD, compliant with: EN 61131-2; Programmable Controllers (Clause 11) European Union 2011/65/EU RoHS, compliant with: EN 50581; Technical Documentation Turkey RoHS EEE Yönetmeligine Uygundur (In Conformity with the EEE Regulation)
RCM	Australian Radiocommunications Act, compliant with: EN 61000-6-4; Industrial Emissions
KC	Korean Registration of Broadcasting and Communications Equipment, compliant with: Article 58-2 of Radio Waves Act, Clause 3
EAC	Russian Customs Union TR CU 20/2011 EMC Technical Regulation Russian Customs Union TR CU 004/2011 LV Technical Regulation

(1) See the Product Certification link at http://www.ab.com for Declaration of Conformity, Certificates, and other certification details.

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
Micro800 Bus Terminator Installation Instructions, publication 2085-IN002	Provides information on how to install the bus terminator module for Micro800 systems.
Micro830, Micro 850, and Micro870 Programmable Controllers User Manual, publication 2080-UM002	A more detailed description of how to install and use your Micro830® LC30, Micro850® LC50, and Micro870 LC70 programmable controller and expansion I/O system.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, http://www.rockwellautomation.com/global/certification/overview.page	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at http://www.rockwellautomation.com/global/literature-library/overview.page. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Notes:

Rockwell Automation Support

Use the following resources to access support information.

Technical Support Center	Knowledgebase Articles, How-to Videos, FAQs, Chat, User Forums, and Product Notification Updates.	https://rockwellautomation.custhelp.com/
Local Technical Support Phone Numbers	Locate the phone number for your country.	http://www.rockwellautomation.com/global/support/get-support-now.page
Direct Dial Codes	Find the Direct Dial Code for your product. Use the code to route your call directly to a technical support engineer.	http://www.rockwellautomation.com/global/support/direct-dial.page
Literature Library	Installation Instructions, Manuals, Brochures, and Technical Data.	http://www.rockwellautomation.com/global/literature-library/overview.page
Product Compatibility and Download Center (PCDC)	Get help determining how products interact, check features and capabilities, and find associated firmware.	http://www.rockwellautomation.com/global/support/pcdc.page

Documentation Feedback

Your comments will help us serve your documentation needs better. If you have any suggestions on how to improve this document, complete the How Are We Doing? form at http://literature.rockwellautomation.com/idc/groups/literature/documents/du/ra-du002_-en-e.pdf.

Rockwell Automation maintains current product environmental information on its website at http://www.rockwellautomation.com/rockwellautomation/about-us/sustainability-ethics/product-environmental-compliance.page.

Rockwell Otomasyon Ticaret A.Ş., Kar Plaza İş Merkezi E Blok Kat:6 34752 İçerenköy, İstanbul, Tel: +90 (216) 5698400

www.rockwellautomation.com

Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444
Europe/Middle East/Africa: Rockwell Automation NV, Pegasus Park, De Kleetlaan 12a, 1831 Diegem, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640
Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

Publication 2085-IN008A-EN-P - March 2018 PN-477616