Installation Instructions

PLC-5 Relay Cartridge

(Cat. No. 1785-RC)

The 1785-RC Relay Cartridge serves as an interface from the PLC-5 programmable controller to a user supplied external device such as the Allen-Bradley 700P relay. The relay cartridge contains an internal relay contact that is opened or closed based on attempts to edit user programs or force I/O. The user supplies 120VAC which is switched by the internal relay for use by the external device - this may include power from ungrounded floating systems.

What this Document Describes

Controller Compatibility and Firmware Requirement

The relay cartridge is compatible with the PLC-5/40B, -5/60B and -5/80B controllers.

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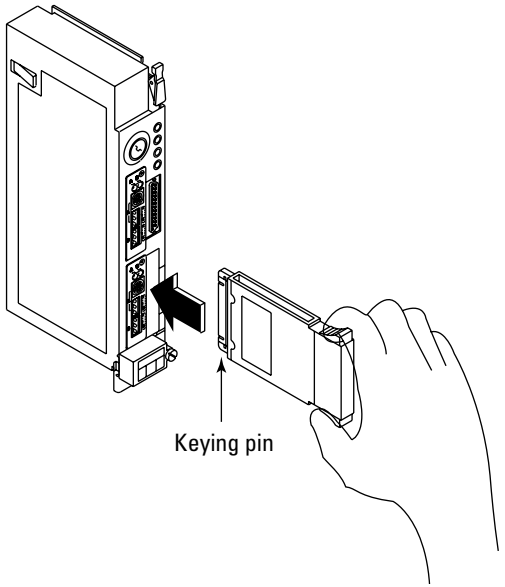
Important: Use of the relay cartridge requires the Series E, revision E firmware release. If your processors are not already at this revision level, contact Rockwell Automation Technical Support to receive this firmware.

Install the Relay Cartridge

1. Turn off power to the I/O chassis and PLC-5 controller.

ATTENTION: Do not insert or remove the relay cartridge while power is applied to the chassis and/or controller. Insertion or removal under power can cause memory loss and processor fault.

2. Insert the relay cartridge firmly but gently into the controller (with the keying pins in the down position) until the cartridge is fully seated in the controller mating connector.



Note: If the relay cartridge is not inserted into the PLC-5 processor, the processor will operate normally, but will not exhibit any of the necessary relay cartridge functions

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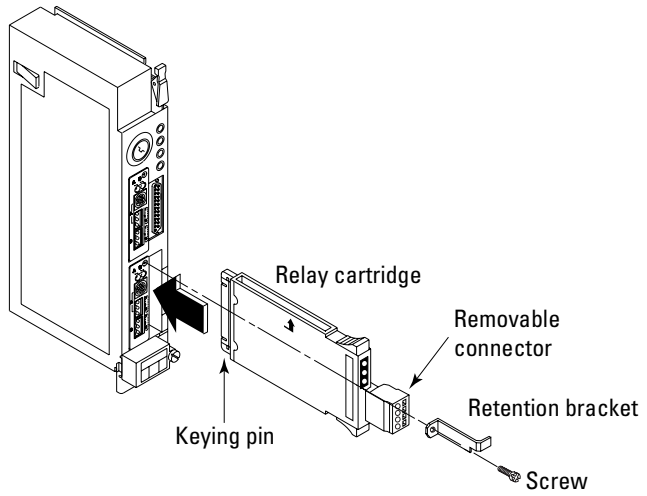

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3. Remove the black screw on the lower Communication Interface Plug on the PLC-5 controller.
4. Hold the cartridge retention bracket over the relay cartridge and position the bracket to align the screw holes of the bracket and the Communication Interface Plug.
5. Replace the screw and tighten securely.

This bracket holds the relay cartridge in place when you detach the connector from the relay cartridge.

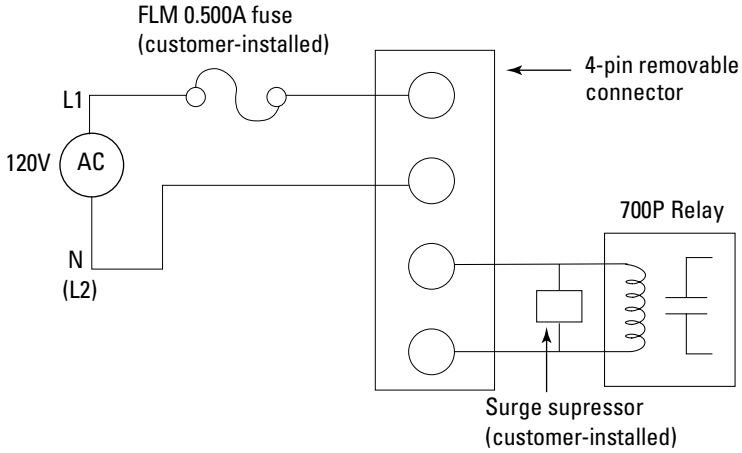
Wire the Relay Cartridge

1. Detach the 4-pin clamp-style removable connector from the relay cartridge and connect wiring as shown below:

Important: The required wire diameter specification for the relay cartridge is 12-22 AWG. The wire must be solid, stranded or fine stranded copper. The maximum length between the connector and power source/relay must be less than 10 meters (unless all circuit components, modules and the power source are located within the same NEMA enclosure).

Important: As shown in the wiring diagram below, you must install both of the following:

- an external FLM, slo-blo 0.5A fuse in series with the L1 line connecting to the 4-pin ARI connector, and
- a surge suppressor (such as Allen-Bradley cat. nos. 700-N5 or -N24) across the external 700P relay coil



2. Reattach the wired connector to the relay cartridge.

Install Firmware and Apply Power

Before you can use the relay cartridge, your processors must be at the Series E, revision E level. If they are not, contact Rockwell Automation Technical Support to receive this firmware.

Apply power to the chassis and PLC-5 controller.

When the controller is in Program or Run mode, all of the status file information is updated. Four status bits (0-3) provide relay cartridge status. These bits are located in status file word S:68:

Bit 0 - this bit indicates if 120Vac external power is applied to the relay cartridge. If power is applied, this bit is set and the External AC Power Status indicator on the relay cartridge is GREEN. If the cartridge is on, and external power is not, the indicator is RED.

Bit 1 - this bit indicates how the controller is driving the internal relay. This bit is set if the controller is driving the relay ON. If this bit is set, the relay coil Status indicator is GREEN. If the bit is reset, the indicator is OFF.

Bit 2 - this bit indicates the state of the internal relay contact. This bit is set or reset, depending on whether the contact is open or closed:

- if 120Vac external power is not present, relay cartridge Internal Relay Contact status indicator is off, and the status bit 2 is not valid
- if 120Vac external power is present, there are four possible relay contact status states:

Expected (driven)	Actual (output)	Relay Contact Status indicator	Status File S:68 bit 2
open	open	green - OK	reset
open	closed	red - failed	set
closed	closed	green - OK	set
closed	open	red - failed	reset

Important: When the relay cartridge internal relay coil switches (from open to closed, or closed to open), you must wait at least 50ms before acting on the internal relay contact status bit 2. The Internal Relay Contact Status indicator may briefly flash RED during this time.

Important: You must qualify relay contact status bit 2 with the relay cartridge 120Vac external power valid bit 0 to assure correct internal relay contact status.

Important: Relay contact status bit 2 is filtered by the controller's firmware. The firmware reads the relay contact status circuit each program scan. Status bit 2 is updated only after two successive reads return the same logic level of status. The update time of status bit 2 will vary depending on program scan time.

Bit 3 - this bit is set whenever the relay cartridge is resident in the PLC-5 controller.

How the Relay Cartridge Works

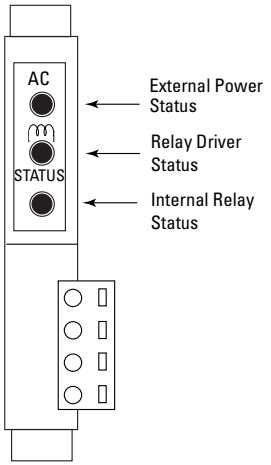
The relay cartridge is designed to open a relay contact whenever the PLC-5 controller detects specific software operation requests, such as:

- a ladder program edit request from RSLogix5, AI5 or 6200 series software - this includes ladder rung inserts, deletes, modifications or modifying processor's name and/or program file names.
- a change to the state of I/O forces - including changing the state of force bits in the force table and enabling or disabling I/O forces.

Important: ALL I/O Force requests will be delayed for one second before the request becomes active.

When the controller is in Run, Remote Run or Remote Test mode, and any of the above requests are detected by the controller, it will open the relay contact for one second.

When the controller is in Program or Remote Program mode, the relay is returned to its normal ON or contact closed state.



Status Indicators

External Power Status	**GREEN**	**valid power**
	RED	power low or not connected
Internal Relay Coil Status	**GREEN**	**relay driven closed**
	OFF	relay driven open
Internal Relay Contact Status	**GREEN**	**contact status OK**
	RED	contact failure
	OFF	contact status not valid - insufficient power

European Union Directive Compliance

If this product has the CE mark, it is approved for installation within the European Union and EEA regions and has been designed and tested to meet the following directives.

EMC Directive

This product is tested to meet Council Directive 89/336/EEC Electromagnetic Compatibility (EMC) and the following standards, in whole or in part, documented in a technical construction file:

- EN 50081-2EMC - Generic Emission Standard, Part 2 - Industrial Environment
- EN 50082-2EMC - Generic Immunity Standard, Part 2 - Industrial Environment

This product is intended for use in an industrial environment.

Low Voltage Directive

This product is tested to meet Council Directive 73/23/EEC Low Voltage, by applying the safety requirements of EN 61131-2 Programmable Controllers, Part 2 - Equipment Requirements and Tests.

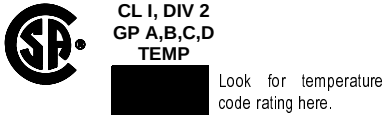
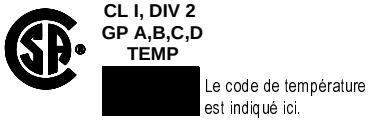
For specific information required by EN 61131-2, see the appropriate sections in this publication, as well as these Allen-Bradley publications:

- *Industrial Automation Wiring and Grounding Guidelines* (publication 1770-4.1)
- *Guidelines for Handling Lithium Batteries* (publication AG-5.4)
- *Automation Systems Catalog*

This equipment is classified as open equipment and must be mounted in an enclosure during operation to provide safety protection.

CSA Hazardous Location Approval

CSA Hazardous Location Approval	Approbation d'utilisation dans des emplacements dangereux par la CSA
CSA certifies products for general use as well as for use in hazardous locations. Actual CSA certification is indicated by the product label as shown below, and not by statements in any user documentation.	La CSA certifie les produits d'utilisation générale aussi bien que ceux qui s'utilisent dans des emplacements dangereux. La certification CSA en vigueur est indiquée par l'étiquette du produit et non par des affirmations dans la documentation à l'usage des utilisateurs.
Example of the CSA certification product label 	Exemple d'étiquette de certification d'un produit par la CSA 
To comply with CSA certification for use in hazardous locations, the following information becomes a part of the product literature for CSA-certified Allen-Bradley industrial control products. • This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D, or non-hazardous locations only. • The products having the appropriate CSA markings (that is, Class I Division 2, Groups A, B, C, D), are certified for use in other equipment where the suitability of combination (that is, application or use) is determined by the CSA or the local inspection office having jurisdiction.	Pour satisfaire à la certification de la CSA dans des endroits dangereux, les informations suivantes font partie intégrante de la documentation des produits industriels de contrôle Allen-Bradley certifiés par la CSA. • Cet équipement convient à l'utilisation dans des emplacements de Classe I, Division 2, Groupes A, B, C, D, ou ne convient qu'à l'utilisation dans des endroits non dangereux. • Les produits portant le marquage approprié de la CSA (c'est à dire, Classe I, Division 2, Groupes A, B, C, D) sont certifiés à l'utilisation pour d'autres équipements où la convenance de combinaison (application ou utilisation) est déterminée par la CSA ou le bureau local d'inspection qualifié.
Important: Due to the modular nature of a PLC control system, the product with the highest temperature rating determines the overall temperature code rating of a PLC control system in a Class I, Division 2 location. The temperature code rating is marked on the product label as shown.	Important: Par suite de la nature modulaire du système de contrôle PLC), le produit ayant le taux le plus élevé de température détermine le taux d'ensemble du code de température du système de contrôle d'un PLC dans un emplacement de Classe I, Division 2. Le taux du code de température est indiqué sur l'étiquette du produit.

CSA Hazardous Location Approval	Approbation d'utilisation dans des emplacements dangereux par la CSA
The following warnings apply to products having CSA certification for use in hazardous locations. 	Les avertissements suivants s'appliquent aux produits ayant la certification CSA pour leur utilisation dans des emplacements dangereux. 
WARNING: Explosion hazard • Substitution of components may impair suitability for Class I, Division 2. • Do not replace components unless power has been switched off or the area is known to be non-hazardous. • Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous. • Do not disconnect connectors unless power has been switched off or the area is known to be non-hazardous. Secure any user-supplied connectors that mate to external circuits on an Allen-Bradley product using screws, sliding latches, threaded connectors, or other means such that any connection can withstand a 15 Newton (3.4 lb.) separating force applied for a minimum of one minute.	AVERTISSEMENT: Risque d'explosion • La substitution de composants peut rendre ce matériel inacceptable pour lesemplacements de Classe I, Division 2. • Couper le courant ou s'assurer quel'emplacement est désigné non dangereux avant de remplacer lescomposants. • Avant de débrancher l'équipement, couper le courant ou s'assurer que l'emplacement est désigné non dangereux. Avant de débrancher les connecteurs, couper le courant ou s'assurer que l'emplacement est reconnu non dangereux. Attacher tous connecteurs fournis par l'utilisateur et reliés aux circuits externes d'un appareil Allen-Bradley à l 'aide de vis, loquets coulissants, connecteurs filetés ou autres moyens permettant aux connexions de résister à une force de séparation de 15 newtons (3,4 lb. - 1,5 kg) appliquée pendant au moins une minute.

Specifications

Backplane Current		0.200A @ +5Vdc
Number of Outputs		1 (N.O. Contact)
Contact Rating		120Vac 50/60Hz @ 0.500A Pilot Duty minimum 100,000 mechanical switching cycles
Wiring		12-22 AWG Category 1[1], use minimum 75° C copper wiring
Weight		70 g 2.0 oz.
Environment	**Operating Temperature**	**0° to 60° C (32° to 140° F)**
	Storage Temperature	**-40° to 85° C (-40° to 185° F)**
	Relative Humidity	**5 to 95% (without condensation)**
Shock Testing	Operating	15 g peak acceleration at 11 ms duration
	Non-operating	**25 g peak acceleration at 11 ms duration**
Vibration Testing		2 g peak acceleration at 10-500 Hz
Agency Certification (when product or packaging is marked)		• CSA certified Process Control Equipment • CSA Class I, Division 2 Groups A, B, C, D • UL listed Industrial Control Equipment • CE marked for all applicable directives • Australian CTick

1 Use this conductor category infomation for planning conductor routing as described in publication 1770-4.1, *Industrial Automation Wiring and Grounding Guidelines*.

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