



Installation Instructions

ControlLogix TTL Output Module

Catalog Number 1756-OG16

To:	See page:
Identify the Module Components	6
Note the Power Requirements	7
Understand the Low-True Format	7
Install the Module	8
Key the Module and Removable Terminal Block/Interface Module	9
Wire the Removable Terminal Block	10
Wire the Module	11
Assemble the Removable Terminal Block and the Housing	13
Install the Removable Terminal Block onto the Module	13
Check the Indicators	14
Remove the Removable Terminal Block from the Module	15
Remove the Module	15
See Specifications	16

Obtain a User Manual

This product also has a user manual (pub. no. 1756-UM058). To view it, visit www.ab.com/manuals or www.theautomationbookstore.com.

To purchase a manual, you can:

- contact your distributor or Rockwell Automation representative
- visit www.theautomationbookstore.com and place an order
- call 800.963.9548 (USA/Canada) or 001.320.725.1574 (outside USA/Canada)

2 ControlLogix TTL Output Module

Important User Information



Because of the variety of uses for the products described in this publication, those responsible for the application and use of these products must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards. In no event will Rockwell Automation be responsible or liable for indirect or consequential damage resulting from the use or application of these products.

Any illustrations, charts, sample programs, and layout examples shown in this publication are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Rockwell Automation does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

Allen-Bradley publication SGI-1.1, *Safety Guidelines for the Application, Installation and Maintenance of Solid-State Control* (available from your local Rockwell Automation office), describes some important differences between solid-state equipment and electromechanical devices that should be taken into consideration when applying products such as those described in this publication.

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

Throughout this publication, notes may be used to make you aware of safety considerations. The following annotations and their accompanying statements help you to identify a potential hazard, avoid a potential hazard, and recognize the consequences of a potential hazard:

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.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

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 publication 60664-1), at altitudes up to 2000 meters without derating.

This equipment is considered Group 1, Class A industrial equipment according to IEC/CISPR Publication 11. Without appropriate precautions, there may be potential difficulties ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbance.

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 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.

NOTE: See NEMA Standards publication 250 and IEC publication 60529, as applicable, for explanations of the degrees of protection provided by different types of enclosure. Also, see the appropriate sections in this publication, as well as the Allen-Bradley publication 1770-4.1 ("Industrial Automation Wiring and Grounding Guidelines"), for additional installation requirements pertaining to this equipment.

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.
- If available, use a static-safe workstation.

When not in use, store the equipment in appropriate static-safe packaging.

Removal and Insertion Under Power

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.



North American Hazardous Location Approval

The following information applies when operating this equipment in hazardous locations:

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.

Informations sur l'utilisation de cet équipement en environnements dangereux :

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.

The following information applies when operating this equipment in hazardous locations:	Informations sur l'utilisation de cet équipement en environnements dangereux :
<p>WARNING</p>  <p>EXPLOSION HAZARD</p> <ul style="list-style-type: none"> 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. 	<p>AVERTISSEMENT</p>  <p>RISQUE D'EXPLOSION</p> <ul style="list-style-type: none"> 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.

Allen-Bradley

Identify the Module Components

You received the following components with your order:

- 1756-OG16 module
- Removable Terminal Block (RTB) door label

If you did not receive these components, contact your local distributor Rockwell Automation sales office.

This module mounts in a 1756 chassis and uses a separately-ordered RTB or a Bulletin 1492 Interface Module (IFM)⁽¹⁾ to connect all field-side wiring. This module uses one of the following RTBs:

- 1756-TBNH 20 position NEMA RTB
- 1756-TBSH 20 position Spring Clamp RTB

Use an extended-depth cover (1756-TBE) for applications with heavy gauge wiring or requiring additional routing space. When using an IFM, consult the documentation that came with it to connect wiring.

IMPORTANT

Before you install your module, you should:

- install and ground a 1756 chassis and power supply.
 - order and receive an RTB or IFM, and its components, for your application.
-

⁽¹⁾ The Bulletin 1492 IFM may not be used in any application that requires agency certification of the ControlLogix[®] system. Use of the IFM violates the UL, CSA and FM certifications of this product.

Note the Power Requirements

This module receives power from the 1756 chassis power supply and requires 2 sources of power from the ControlLogix backplane:

- 210mA @ 5.1V dc
- 2.0mA @ 24V dc

Add this current/power value (1.12W) to the requirements of all other modules in the chassis to prevent overloading the power supply.

IMPORTANT

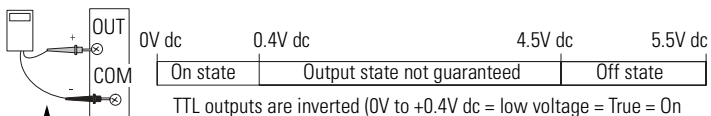
This module requires power from a user-provided +5V dc power supply in addition to requiring power from the ControlLogix backplane. The user-provided power supply is used for the transmission of TTL signals.

Understand the Low-True Format

This module requires both (+) and (-) connections from a 5V dc power supply to function. The module also operates in a low-true format. Outputs may be in the ON or OFF state depending on the voltage applied to the input.

- 0V to 0.4V dc = Output guaranteed to be in ON state
- 0.4 to 4.5V dc = Output state not Guaranteed
- 4.5 to 5.5V dc = Output guaranteed to be in OFF state

The graphic below shows the output state in each voltage range.



(Measure voltage from common terminal to output terminal.)

Allen-Bradley

Install the Module

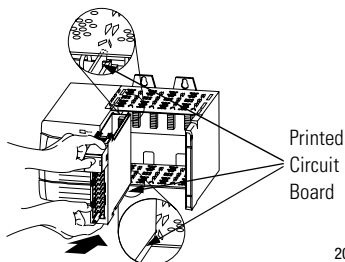
You can install or remove the module while chassis power is applied.

WARNING

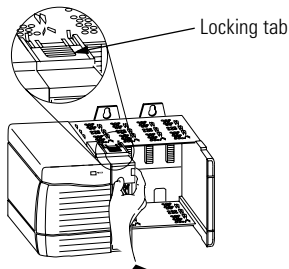
When you insert or remove the module while backplane power is on, an electrical arc can occur. This could cause an explosion in hazardous location installations.

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.

1. Align the circuit board with the top and bottom chassis guides.



2. Slide the module into chassis until module locking tabs click.

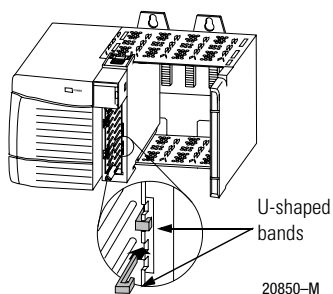


Key the Module and Removable Terminal Block/Interface Module

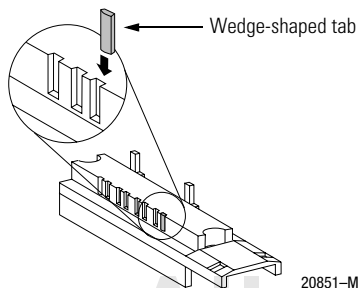
Use the wedge-shaped keying tabs and U-shaped keying bands to prevent connecting the wrong wires to your module.

Key positions on the module that correspond to unkeyed positions on the RTB. For example, if you key the first position on the module, leave the first position on the RTB unkeyed.

1. To key the module, insert the U-shaped band, as shown.



2. Push the band until it snaps in place.
3. To key the RTB or IFM, insert the wedge-shaped tab with rounded edge first, as shown.



4. Push the tab until it stops.

Reposition the tabs to rekey future module applications.

Wire the Removable Terminal Block

Wire the RTB with a 5/16 inch (8mm) maximum flat-bladed screwdriver before installing it onto the module.

ATTENTION

I/O and power cable lengths should be less than 10 meters.



WARNING

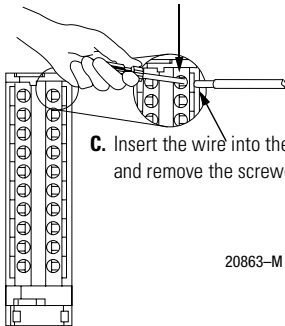
When you connect or disconnect the Removable Terminal Block (RTB) while field side power is on, an electrical arc can occur. This could cause an explosion in hazardous location installations.



Be sure that power is removed or the area is nonhazardous before proceeding.

Spring Clamp RTB

- A.** Strip 7/16 inch (11mm) maximum length of wire.
- B.** Insert the screwdriver into the inner hole of the RTB.

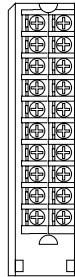


- C.** Insert the wire into the open terminal and remove the screwdriver.

20863-M

NEMA Screw RTB

- A.** Strip 5/16 inch (8mm) maximum length of wire.
- B.** Turn the terminal screw counterclockwise.
- C.** Wrap wire around the terminal.
- D.** Turn the terminal screw clockwise.

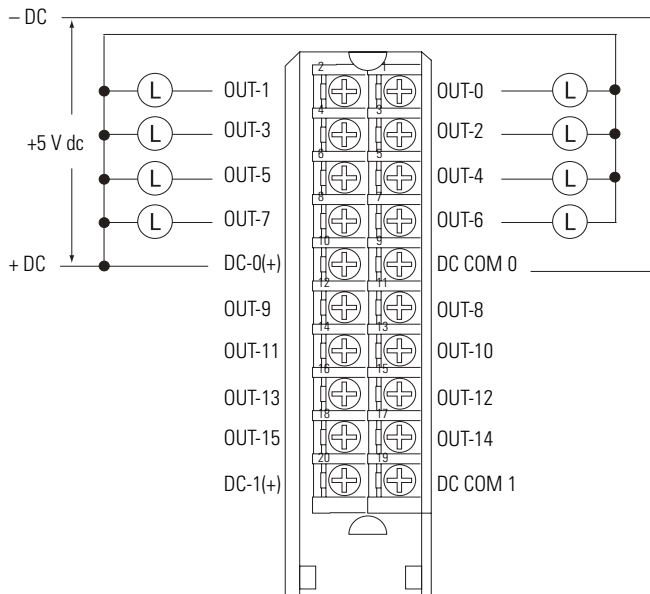


42516

Wire the Module

You can only connect wiring to your module with an RTB or IFM.

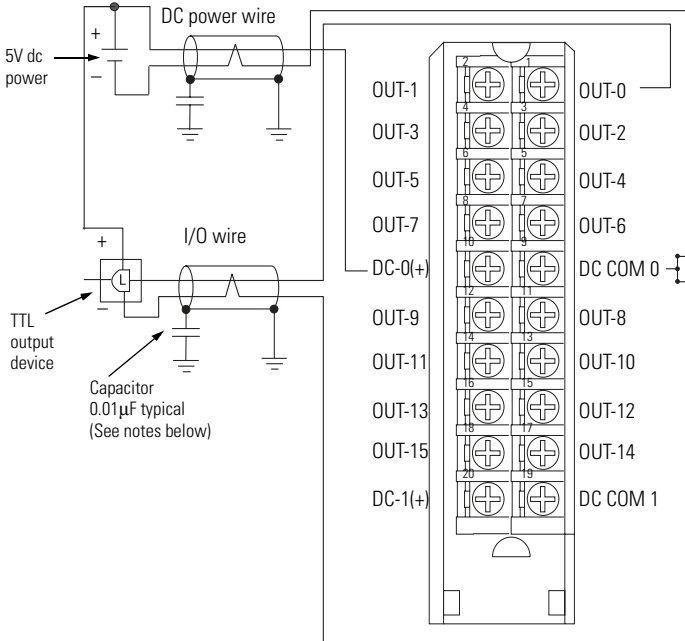
Figure 1 1756-OG16 Wiring Diagram



NOTES:

1. We recommend you use this diagram for applications that do not require CE compliance. For a CE-compliant diagram, see page 12.
2. Do not connect more than two wires to any single terminal.
3. This example shows devices wired to only one of two groups on the module. You can make connections to the second group on terminals 11-20.

Figure 2 1756-0G16 Wiring Diagram for CE-Compliant (and High Noise) Applications



GENERAL NOTES:

1. We recommend you use Belden M 8761 cable where shielded cables are shown.
2. Do not connect more than two wires to any single terminal.
3. This example shows devices wired to only one of two groups on the module. You can make connections to the second group on terminals 11-20.

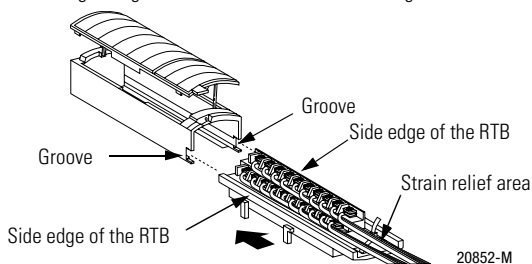
CE REQUIREMENT NOTES:

1. DC power wire and I/O wire should not exceed 10m (30ft) in length.
2. The 0.01 μF capacitors shown must be rated for 2000V dc.

After completing field-side wiring, secure the wires in the strain relief area with a cable-tie.

Assemble the Removable Terminal Block and the Housing

1. Align the grooves at the bottom of the housing with the side edges of the RTB.



2. Slide the RTB into the housing until it snaps into place.

Install the Removable Terminal Block onto the Module

WARNING

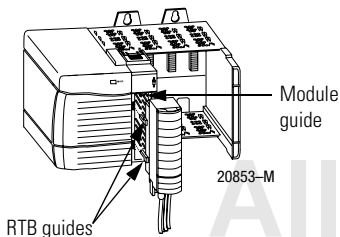


When you connect or disconnect the Removable Terminal Block (RTB) with field side power applied, an electrical arc can occur. This could cause an explosion in hazardous location installations.

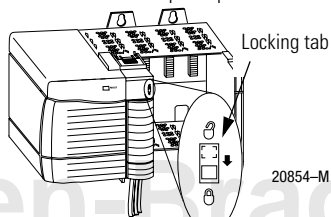
Before proceeding with RTB installation, make certain:

- power is removed or the area is nonhazardous.
- field-side wiring of the RTB has been completed.
- the RTB housing is snapped in place on the RTB.
- the RTB housing is closed.
- the locking tab at the top of the module is unlocked.

1. Align the side and top, bottom guides.



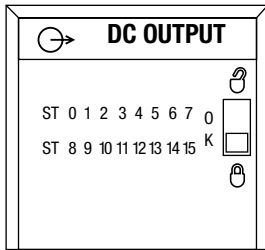
2. Press quickly and evenly to seat the RTB until the latches snap into place.



3. Slide the locking tab down.

Check the Indicators

The indicators show individual I/O status (yellow) for each point and a bi-colored LED for module "OK" (red/green).



During power up, an indicator test is done and the following occurs:

- "OK" indicator turns red for 1 second and then turns to flashing green if it has passed the self-test.
- I/O status indicators turn ON for a maximum of 2 seconds and then turn OFF.

Indicator:	Displaying:	Means:	Take this action:
OK	Steady green light	The outputs are actively being controlled by a system processor.	None
OK	Flashing green light	The module has passed internal diagnostics but is not actively controlled.	Configure the module.
OK	Flashing red light	Previously established communication has timed out.	Check controller and chassis communication.
OK	Steady red light	An unrecoverable error has occurred on the module.	Replace the module.
I/O State	Yellow	The output is active.	None
I/O Fault	Red	A fault has occurred for this point.	Check this point at the controller.

This completes installation of the module. Use the following information to remove the module, if necessary.

Remove the Removable Terminal Block from the Module

If you need to remove the module, you must remove the RTB first.

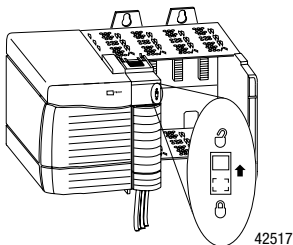
WARNING



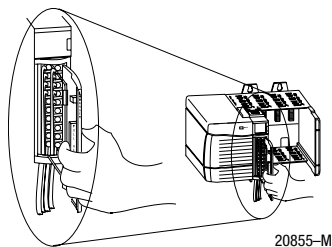
When you insert or remove the module while backplane power is on, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.

Before removing the module, you must remove the RTB.

1. Unlock the locking tab at the top of the module.

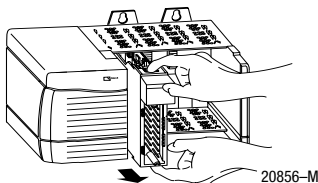


2. Open the RTB door and pull the RTB off the module.

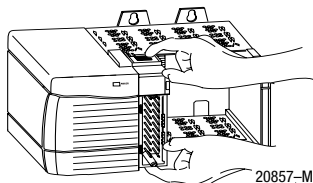


Remove the Module

1. Push in top and bottom locking tabs.



2. Pull module out of the chassis.



Allen-Bradley

1756-OG16 Specifications

Number of Outputs	16 (8 points/common)
Module Location	1756 ControlLogix Chassis
Backplane Current	210mA @ 5.1V dc & 2mA @ 24V dc
Backplane Power	1.12W
Maximum Power Dissipation (Module)	1.5W @ 60°C
Thermal Dissipation	5.2 BTU/hr @ 60°C
Operating Voltage	4.5 to 5.5V dc source 50mV P-P ripple maximum
Voltage Category	5V dc TTL (Low = True) ⁽¹⁾
Low-True Format	The module operates with the following definitions of ON and OFF states: 0V to 0.4V dc = Output guaranteed to be in ON state 0.4 to 4.5V dc = Output state not Guaranteed 4.5 to 5.5V dc = Output guaranteed to be in OFF state For more information, see page 7.
Off-State Leakage Current	0.1mA maximum
Continuous Current	24mA maximum
Load Current Per Point Per Module	0.15mA minimum 24mA maximum 384mA maximum
On-State Voltage Drop	0.4V dc maximum
Output Delay Time (resistive load) OFF to ON (5V to 0V dc transition)	45μs nominal 450μs maximum
ON to OFF (0V to 5V dc transition)	145μs nominal 700μs maximum
Scheduled Outputs	Synchronization within 16.7s maximum, reference to the Coordinated System Time

Configurable Fault4 States per Point	Hold Last State, ON or OFF (OFF is the default)
Configurable Fault States in Program Mode per Point	Hold Last State, ON or OFF (OFF is the default)
Fusing	None
Reverse Polarity Protection	None Damage to circuitry could result
Isolation Group	2 groups of 8
Isolation Voltage Group to group User to system	250V maximum continuous 250V maximum continuous
Field Wiring Arm and Housing	20-position RTB (1756-TBNH or 1756-TBSH) ⁽²⁾
RTB Screw Torque (NEMA clamp)	7 to 9 inch-pounds (0.8 to 1Nm) maximum
Module Keying (Backplane)	Software configurable
RTB Keying	User-defined mechanical keying
Conductors Wire Size	#22 to #14 AWG (0.324 to 2.08 sq. mm) stranded ⁽¹⁾ 3/64 inch (1.2mm) insulation maximum
Category	2 ⁽³⁾
Screwdriver Blade Width for RTB	5/16 inch (8mm) maximum
Environmental Conditions	
Operating Temperature	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): 0 to 60°C (32 to 140°F)
Storage Temperature	IEC 60068-2-1 (Test Ab, Un-packaged Non-operating Cold), IEC 60068-2-2 (Test Bb, Un-packaged Non-operating Dry Heat), IEC 60068-2-14 (Test Na, Un-packaged Non-operating Thermal Shock): -40 to 85°C (-40 to 185°F)

18 ControlLogix TTL Output Module

Relative Humidity	IEC 60068-2-30 (Test Db, Un-packaged Non-operating Damp Heat): 5 to 95% non-condensing
Vibration	IEC60068-2-6 (Test Fc, Operating): 2g @ 10-500Hz
Operating Shock	IEC60068-2-27 (Test Ea, Unpackaged shock): 30g
Non-Operating Shock	IEC60068-2-27 (Test Ea, Unpackaged shock): 50g
Emissions	CISPR 11: Group 1, Class A
ESD Immunity	IEC 61000-4-2: 4kV contact discharges 8kV air discharges
Radiated RF Immunity	IEC 61000-4-3: 10V/m with 1kHz sine-wave 80%AM from 80MHz to 1000MHz
EFT/B Immunity	IEC 61000-4-4: ± 1 kV at 5kHz on power ports ± 1 kV at 5kHz on signal ports

Conducted RF Immunity	IEC 61000-4-6: 10Vrms with 1kHz sine-wave 80%AM from 150kHz to 80MHz
Enclosure Type Rating	None (open-style)
Certifications: (when product is marked)	<p>UL UL Listed Industrial Control Equipment</p> <p>CSA CSA Certified Process Control Equipment</p> <p>CSA CSA Certified Process Control Equipment for Class I, Division 2 Group A,B,C,D Hazardous Locations</p> <p>CE⁽⁴⁾ European Union 89/336/EEC EMC Directive, compliant with: EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity EN 61000-6-4; Industrial Emissions</p> <p>C-Tick⁽⁴⁾ Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Emissions</p>

- (1) TTL outputs are inverted (0 to +0.4V dc = low voltage = True = On.) Use a NOT instruction in your program to convert to traditional True - High logic.
- (2) Maximum wire size will require extended housing - 1756-TBE.
- (3) Use this Conductor Category information for planning conductor routing. Refer to Publication 1770-4.1, 'Industrial Automation Wiring and Grounding Guidelines'.
- (4) See the Product Certification link at www.ab.com for Declarations of Conformity, Certificates, and other certification details.

Allen-Bradley

Rockwell Automation Support

Rockwell Automation provides technical information on the web to assist you in using our products. At <http://support.rockwellautomation.com>, you can find technical manuals, a knowledge base of FAQs, technical and application notes, sample code and links to software service packs, and a MySupport feature that you can customize to make the best use of these tools.

For an additional level of technical phone support for installation, configuration and troubleshooting, we offer TechConnect Support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit <http://support.rockwellautomation.com>.

Installation Assistance

If you experience a problem with a hardware module within the first 24 hours of installation, please review the information that's contained in this manual. You can also contact a special Customer Support number for initial help in getting your module up and running:

United States	1.440.646.3223 Monday – Friday, 8am – 5pm EST
Outside United States	Please contact your local Rockwell Automation representative for any technical support issues.

New Product Satisfaction Return

Rockwell tests all of our products to ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned:

United States	Contact your distributor. You must provide a Customer Support case number (see phone number above to obtain one) to your distributor in order to complete the return process.
Outside United States	Please contact your local Rockwell Automation representative for return procedure.

www.rockwellautomation.com

Corporate Headquarters

Rockwell Automation, 777 East Wisconsin Avenue, Suite 1400, Milwaukee, WI 53202-5302 USA, Tel: (1) 414.212.5200, Fax: (1) 414.212.5201

Headquarters for Allen-Bradley Products, Rockwell Software Products and Global Manufacturing Solutions

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444
Europe: Rockwell Automation SA/NV, Vorstlaan/Boulevard du Souverain 36-BP 3A/B, 1170 Brussels, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640
Asia Pacific: Rockwell Automation, 27/F Citicorp Centre, 18 Whitfield Road, Causeway Bay, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

Headquarters for Dodge and Reliance Electric Products

Americas: Rockwell Automation, 6040 Ponders Court, Greenville, SC 29615-4617 USA, Tel: (1) 864.297.4800, Fax: (1) 864.281.2433
Europe: Rockwell Automation, Brühlstraße 22, D-74834 Elztal-Dallau, Germany, Tel: (49) 6261 9410, Fax: (49) 6261 17741
Asia Pacific: Rockwell Automation, 55 Newton Road, #11-01/02 Revenue House, Singapore 307987, Tel: (65) 351 6723, Fax: (65) 355 1733

Publication 1756-IN585A-EN-P - July 2003

PN 957782-62

Copyright © 2003 Rockwell Automation. All rights reserved. Printed in the U.S.A.