

ControlNet Modular Repeater Short-distance Fiber Module

Catalog Number 1786-RPFS

Topic	Page
Important User Information	2
Environment and Enclosure	3
North American Hazardous Location Approval	4
European Hazardous Location Approval	5
Module Components	6
Mount the Module	6
Connect the Fiber Module	10
Troubleshoot the Module	11
Specifications	12
Additional Resources	16

About the Module

Use the 1786-RPFS module when you need a short-distance fiber link between two ControlNet products. Maximum distance is 300 m (984 ft). The fiber link provides ground isolation between nodes and is less susceptible to noisy environments than copper media.

IMPORTANT The supported distance depends on the quality of the fiber, number of splices, and connectors. The total light loss through the fiber link must be less than 4.2 dB.

Important User Information

Solid-state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (Publication [SGI-1.1](#) available from your local Rockwell Automation sales office or online at <http://www.rockwellautomation.com/literature/>) describes some important differences between solid-state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid-state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.





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 consequences.
	SHOCK HAZARD: Labels may be on or inside the equipment, for example, drive or motor, to alert people that dangerous voltage may be present.
	BURN HAZARD: Labels may be on or inside the equipment, for example, drive or motor, to alert people that surfaces may reach dangerous temperatures.
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 m (6562 ft) without derating.

This equipment is considered Group 1, Class A industrial equipment according to IEC/CISPR Publication 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 non-metallic. 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.



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

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.
<p>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.</p>	<p>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.</p>
<div style="display: flex; align-items: center;">  <div> <p>WARNING: 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. </div> </div>	<div style="display: flex; align-items: center;">  <div> <p>AVERTISSEMENT: 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. </div> </div>

European Hazardous Location Approval

European Zone 2 Certification (The following applies when the product bears the Ex Marking.)

This equipment is intended for use in potentially explosive atmospheres as defined by European Union Directive 94/9/EC and has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of Category 3 equipment intended for use in potentially explosive atmospheres, given in Annex II to this Directive. Compliance with the Essential Health and Safety Requirements has been assured by compliance with EN 60079-15 and EN 60079-0.



WARNING: You must follow these guidelines:

- This equipment must be installed in an enclosure providing at least IP54 protection when applied in Zone 2 environments.
 - This equipment shall be used within its specified ratings defined by Rockwell Automation.
 - Do not disconnect equipment unless power has been removed or the area is known to be nonhazardous.
-

Prevent Electrostatic Discharge

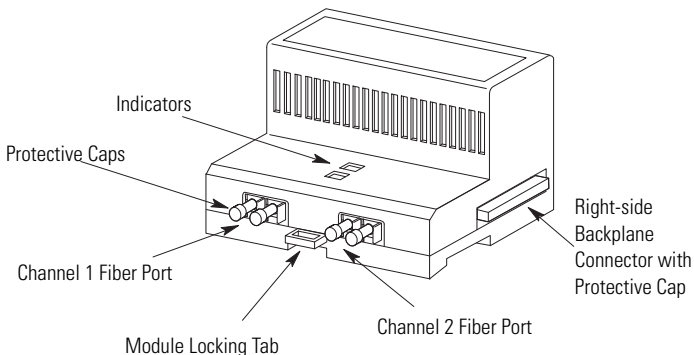


ATTENTION: This equipment is sensitive to electrostatic discharge, which can cause internal damage and affect normal operation. Follow these guidelines when you handle this equipment:

- 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.
-

Module Components

The illustration shows the components that comprise the 1786-RPFS module.



Both sides of the module contain a backplane connector.

30073

Mount the Module

Mount the module on a 35 x 7.5 mm (1.38 x 0.30 in.) DIN rail, Allen-Bradley part number 199-DR1, 46277, EN 50022.

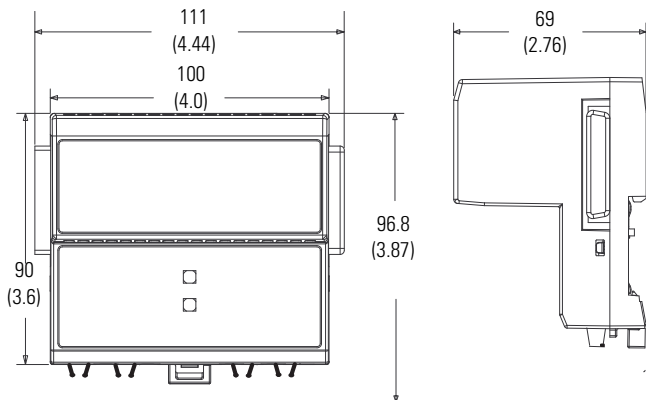


ATTENTION: This product is grounded through the DIN rail to chassis ground. Use zinc plated yellow-chromate steel DIN rail to assure proper grounding. The use of other DIN rail materials (for example, aluminum or plastic) that can corrode, oxidize, or are poor conductors, can result in improper or intermittent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

TIP

Horizontal mounting is preferred. Vertical mounting is allowed. We recommend that the 1786-RPA/B repeater adapter module be mounted at the top if vertical mounting is chosen.

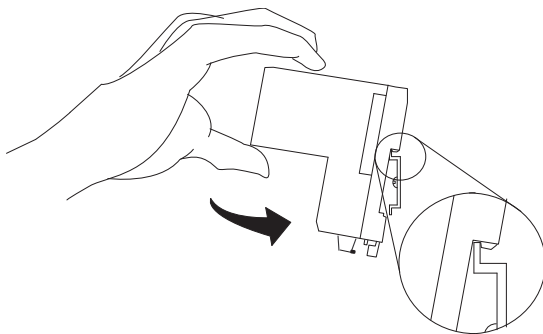
Mounting Dimensions



All dimensions are in mm (in.).

30082

1. Position the module at a 30° angle.



30075

2. Hook the lip on the back of the module to the top of the DIN rail and press the bottom of the module until the locking tab snaps securely in place.

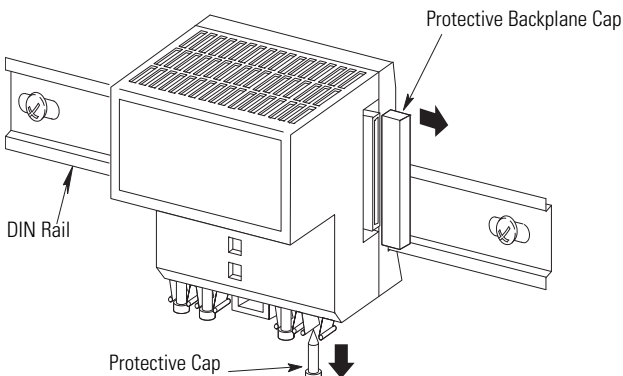
TIP Use a screwdriver to move the locking tab downward, if the module is not secured.

8 ControlNet Modular Repeater Short-distance Fiber Module



WARNING: If 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.



Both sides of the module contain a backplane connector.

30078

If	Then
You will connect another module	Remove the protective backplane cap.
You will not use the backplane connector	Keep the protective cap on to protect the connector from dust.

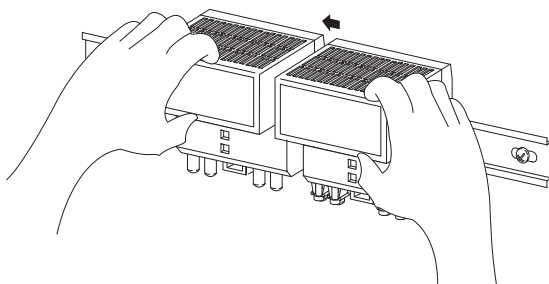
3. If necessary, remove the protective caps from the transmit and receive fiber channels.



ATTENTION: Do not discard the end cap. Use this end cap to cover the exposed interconnections on the last module on the DIN rail. Failure to do so could result in equipment damage.

If	Then
You will use a channel	Remove the protective cap from the channel.
You will not use a channel	Keep the protective cap on to protect the channel from dust.
You place the module in storage	Keep the protective cap on to protect the channel from dust.

4. If applicable, slide the module to the left to mate with the repeater adapter or another repeater module.



30077

IMPORTANT Make certain that you secure the adapter and repeater modules with DIN-rail anchors. If you do not, loss of communication or module damage may result.

Consult with your local distributor for attenuation specifications before you purchase your fiber media components.

You can attach a maximum of four modules to the repeater adapter, or, the number of modules whose total power consumption does not exceed 1.6 A @ 5V DC, whichever occurs first.

IMPORTANT If you exceed the module or power limit, you may damage the repeater adapter and modules.

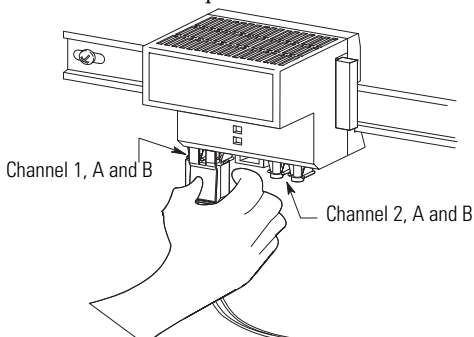
Connect the Fiber Module

This module requires a pre-terminated zipcord wiring kit. The kits are offered in a variety of lengths. Consult with your local distributor for attenuation specifications before you purchase your fiber media components.

The zipcord uses a duplex cable that contains two separate fibers, one for transmit and one for receive. If you are wiring only one channel, you can use either channel 1 or channel 2.

1. Hold down the latch and insert the channel 1 zipcord connector into the A and B connectors until the pins and latch lock into place.

Make certain you insert the blue pin, receive, of the zipcord connector in A and the black pin, transmit, into B.



2. Hold down the latch and insert the other end of the duplex cable into another module by using either channel 1 or channel 2 of the other module.

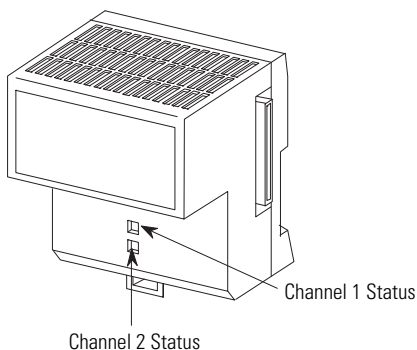
IMPORTANT The duplex cable is manufactured with the fiber reversed on opposite ends. This automatically connects channel A of one unit to channel B of the other. Do not connect more than one duplex fiber or two simplex fibers between the same modular repeaters, even if they are from different modules on the same repeater.



ATTENTION: Under certain conditions, viewing the optical port may expose the eye to hazard. When viewed under some conditions, the optical port may expose the eye beyond the maximum permissible exposure recommendations

Troubleshoot the Module

Use the channel 1 or 2 status indicators to check module status and troubleshoot the module.



30081

Indicator	Probable Cause
Off	Repeater not connected to the power supply.
Green	Channel is operating normally.
Flashing Green	No activity on the channel.



ATTENTION: Class 1 laser product. Laser radiation is present when the system is open and interlocks bypassed. Only trained and qualified personnel should be allowed to install, replace, or service this equipment.

Specifications

Technical Specifications - 1786-RPFS

Attribute	Value
All supply voltages or voltage ranges	Backplane: 5V DC, 300 mA
Dissipation	2 W
Communication rate	5 Mbps
Mounting orientation	Any mounting orientation
Minimum enclosure size (HxWxD), approx	304.8 x 196.8 x 101.6 mm (12 x 7.75 x 4 in.)
Fiber type	200/230 micron HCS (hard-clad silica)
Power level	
TX power, min	(-17 dBm) @ 0...70 °C (32...158 °F) into 200 micron HCS fiber
RX responsivity, min	-21.3 dBm @ 0...70 °C (32...158 °F)
Fiber temp range	200 micron HCS: -20...85 °C (-4...185 °F)
Bend radius	38 mm (1.5 in.), during installation 10 mm (0.4 in.) during operation
Tension, max	490 N (110 lb), during installation 310 N (70 lb), during operation
Connection	2 dB (mated pair) when added between transmitter and receiver
Optical power budget	4.2 dB ⁽¹⁾
Fiber termination type ST	Versa V-System
Fiber operation wavelength	650 nm (red)
Transmitter output	<5 mW/nm

Technical Specifications - 1786-RPFS

Attribute	Value
Enclosure type rating	None (open-style)
North American temp code	T5
IEC temp code	T4

- (1) This includes all loss associated with the fiber link, including splices, fiber attenuation, bulkhead connectors, and the ST terminations.

Environmental Specifications - 1786-RPFS

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)	0...60 °C (32...140 °F)
Temperature, surrounding air, max	60 °C (140 °F)
Temperature, nonoperating IEC 60068-2-1 (Test Ab, Unpackaged Nonoperating Cold), IEC 60068-2-2 (Test Bb, Unpackaged Nonoperating Dry Heat), IEC 60068-2-14 (Test Na, Unpackaged Nonoperating Thermal Shock)	-40...85 °C (-40...185 °F)
Relative humidity IEC 60068-2-30 (Test Db, Unpackaged Damp Heat)	5...95% noncondensing
Vibration IEC60068-2-6 (Test Fc, Operating)	5 g @ 10...500 Hz

14 ControlNet Modular Repeater Short-distance Fiber Module

Environmental Specifications - 1786-RPFS

Attribute	Value
Shock, operating IEC60068-2-27 (Test Ea, Unpackaged Shock)	30 g
Shock, nonoperating IEC60068-2-27 (Test Ea, Unpackaged Shock)	50 g
Emissions CISPR 11	Group 1, Class A
ESD immunity IEC 61000-4-2	4 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 100% AM at 900 and 1890 MHz 3V/m with 1 kHz sine-wave 80% AM from 2000...2700 MHz

Certifications⁽¹⁾ - 1786-RPFS

Certification ⁽²⁾	Value
UL	UL Listed Industrial Control Equipment. See UL File E65584.
CSA	CSA Certified Process Control Equipment. See CSA File LR54689C. CSA Certified Process Control Equipment for Class I, Division 2 Group A, B, C, D Hazardous Locations. See CSA File LR69960C.
FM	FM Approved Equipment for use in Class I Division 2 Group A,B,C,D Hazardous Locations

Certifications⁽¹⁾ - 1786-RPFS

Certification⁽²⁾	Value
CE	European Union 2004/108/EC EMC Directive, compliant with: <ul style="list-style-type: none">• 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)
C-Tick	Australian Radiocommunications Act, compliant with: <ul style="list-style-type: none">• AS/NZS CISPR 11; Industrial Emissions
Ex	European Union 94/9/EC ATEX Directive, compliant with: <ul style="list-style-type: none">• EN 60079-15; Potentially Explosive Atmospheres, Protection 'n'• EN 60079-0; General Requirements• II 3 G Ex nA IIC T4X

(1) When product is marked.

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

Additional Resources

These documents contain additional information concerning related Rockwell Automation products.

Resource	Description
ControlNet Coax Taps Installation Instructions, publication 1786-IN007	Document contains procedures and specifications for the installation of ControlNet coaxial taps.
ControlNet Coax Media Planning and Installation Guide, publication CNET-IN002	Document describes the components and topologies for creating a ControlNet coax media system.
ControlNet Fiber Media Planning and Installation Guide, publication CNET-IN001	Document describes the components and topologies for creating a ControlNet fiber media system.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-IN041	More information on proper wiring and grounding techniques.

You can view or download publications at <http://www.rockwellautomation.com/literature/>. To order paper copies of technical documentation, contact your local Rockwell Automation distributor or sales representative.

Documentation Feedback

Your comments will help us serve your documentation needs better. If you have any suggestions on how to improve this document, complete this form, publication [BA-DU002](#), available at <http://www.rockwellautomation.com/literature/>

Allen-Bradley, Rockwell Software, Rockwell Automation, and TechConnect are trademarks of Rockwell Automation, Inc. Trademarks not belonging to Rockwell Automation are property of their respective companies.

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 Kleerlaan 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 1786-IN012B-EN-P - November 2010

PN-83809

Supersedes Publication 1786-5.12 - February 1998

Copyright © 2010 Rockwell Automation, Inc. All rights reserved. Printed in the U.S.A.