EOTec 2C20 Installation Guide

ControlNet Electrical Interface Module

For the EOTec 2000 Series

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Limited Warranty

Weed Instrument Co., Inc. (“Seller”) warrants that the Products will operate substantially in conformance with Seller’s published specifications, when subjected to normal, proper and intended usage by properly trained personnel, for a period of two (2) years from the date of shipment to Buyer (the “Warranty Period”). Seller agrees during the Warranty Period, provided it is promptly notified in writing upon the discovery of any defect and further provided that all cost of returning the defective Products to Seller are pre-paid by Buyer, to repair or replace, at Seller’s option, defective Products so as to cause the same to operate in substantial conformance with said specifications. Replacement parts may be new or refurbished, at the election of Seller. All replaced parts shall become the property of Seller. Shipment to Buyer of repaired or replacement Products shall be made in accordance with the provisions of Section 5 of the Seller’s Terms & Conditions of Sale. Lamps, fuses, bulbs and other expendable items are expressly excluded from the warranty. Seller’s sole liability with respect to equipment, materials, parts or software furnished to Seller by third party suppliers shall be limited to the assignment by Seller to Buyer or any such third party supplier’s warranty; to the extent the same is assignable. In no event shall Seller have any obligation to make repairs, replacements or corrections required, in whole or in part, as the result of (i) normal wear and tear, (ii) accident, disaster or event of force majeure, (iii) misuse, fault or negligence of or by Buyer, (iv) use of the Products in a manner of which they were not designed, (v) causes external to the Products such as, but not limited to, power failure or electrical power surges, (vi) improper storage of the Products, or (vii) use of the Products in combination with equipment or software not supplied by Seller. If Seller determines that Products for which Buyer has requested warranty services are not covered by the warranty hereunder, Buyer shall pay or reimburse Seller for all costs of investigating and responding to such request at Seller’s then prevailing time and materials rates. If Seller provides repair services or replacement parts that are not covered by the warranty, Buyer shall pay Seller therefore at Seller’s then prevailing time and materials rates. ANY INSTALLATION, MAINTENANCE, REPAIR, SERVICE, RELOCATION OR ALTERATION TO OR OF, OR OTHER TAMPERING WITH, THE PRODUCTS PERFORMED BY ANY PERSON OR ENTITY OTHER THAN SELLER WITHOUT SELLER’S PRIOR WRITTEN APPROVAL, OR ANY USE OF REPLACEMENT PARTS NOT SUPPLIED OR APPROVED BY SELLER, SHALL IMMEDIATELY VOID AND CANCEL ALL WARRANTIES WITH RESPECT TO THE AFFECTED PRODUCTS. EXCEPT AS EXPRESSLY PROVIDED IN THIS WARRANTY, SELLER DISCLAIMS ALL WARRANTIES, WHETHER EXPRESS OR IMPLIED, ORAL OR WRITTEN, WITH RESPECT TO THE PRODUCTS, INCLUDING WITHOUT LIMITATION ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. SELLER DOES NOT WARRANT THAT THE PRODUCTS ARE ERROR-FREE OR WILL ACCOMPLISH ANY PARTICULAR RESULT.

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Installation and Hazardous Area Warnings

These products should not be used to replace proper safety interlocking. No software-based device (or any other solid-state device) should ever be designed to be responsible for the maintenance of consequential equipment or personnel safety. In particular, Weed Instrument disclaims any responsibility for damages, either direct or consequential, that result from the use of this equipment in any application.

All power, input and output (I/O) wiring must be in accordance with Class I, Division 2 wiring methods and in accordance with the authority having jurisdiction.

WARNING (EXPLOSION HAZARD)	SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS 1, DIVISION 2.
WARNING (EXPLOSION HAZARD)	WHEN IN HAZARDOUS LOCATIONS, DISCONNECT POWER BEFORE REPLACING OR WIRING UNITS.
WARNING (EXPLOSION HAZARD)	DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NONHAZARDOUS.

Standards and Safety

The EOTec 2C20 ControlNet Electrical Interface Module from Weed Instrument has been designed to meet the following standards.

EMC immunity – IEC61326-1:1998 Equipment for Measurement, Control and Laboratory Use

UL/cUL Listed and FM Approved for:
Class I, Division 2, Groups A, B, C, D
T4 (-40°C To +85°C)

When used in Hazardous Locations:

Class I, Division 2, Groups A, B, C & D, T4.

Substitution of components may impair suitability for Class I, Division 2. Power, input and output (I/O) wiring must be in accordance with Class I, Division 2 wiring methods and in accordance with the authority having jurisdiction. Do not connect/disconnect equipment unless area is known to be non-hazardous and power is switched off. Certified components for use in a suitable enclosure. The maximum ambient temperature is 85°C.

Install the units in accordance with local and national electrical codes.

Lightning Danger: Do not work on equipment during periods of lightning activity.

Refer to the Technical Specifications section, at the end of this manual, for complete specifications on agency approvals.

Table of Contents

Introduction

Thank you for purchasing the EOTec 2C20 ControlNet Electrical Interface Module from Weed Instrument Company. This manual describes how to install and wire the module. By using a 2C20 ControlNet Interface Module and the various Optical Interface Modules, you can easily implement point-to-point, daisy-chain and star network topologies. The mating Optical Interface Modules are available in a variety of multimode and single-mode versions and can be mixed and matched in a module stack to obtain the best possible configuration for the fiber types and distances involved.

The 2C20 ControlNet Electrical Interface Module is compatible with the wire portion of the ControlNet Protocol Specification and all ControlNet requirements must be adhered to unless expressly addressed in this or other Weed Instrument documentation or literature.

The Fiber Optic portion of the ControlNet Specification is somewhat limited in scope and Weed Instrument Fiber Optic Products have a more varied set of specifications based on field requirements and proven applications. The fiber portion of this series is not designed to be compatible with the fiber portion of the ControlNet Specification and, therefore, interconnection ***by fiber*** to any other manufacturer's products is neither expressed nor implied.

EOTec 2C20 ControlNet Electrical Interface Module

The modular system of the EOTec 2000 Series provides a truly flexible means of establishing nearly every conceivable network topology. The modules are very easy to set up and in many applications, the default settings can be utilized without the need for reconfiguration. Once you finish verifying the configuration jumpers, installing the modules on the DIN rail, simply connect your interface cables and fibers, apply power, and they will immediately begin to operate.

Refer to the *EOTec 2000 ControlNet User Manual* for detailed information about the features, capabilities and operation of the units, including information on settings that need to be made in the PLC control software.

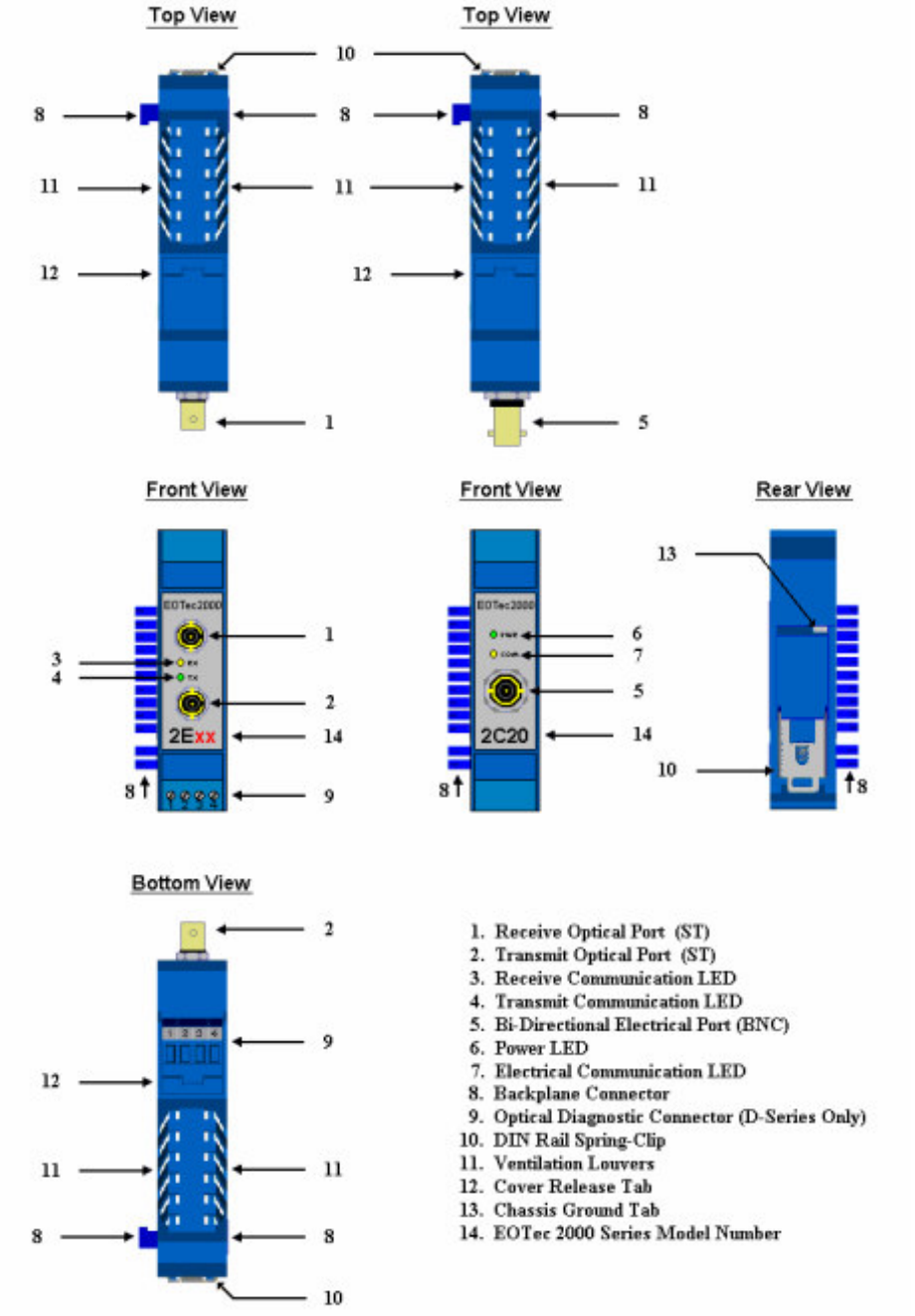
Contents of the shipping container

The 2C20 is packaged in a box that should contain the following items:

- An EOTec 2C20 ControlNet Electrical Interface Module
- The *EOTec 2C20 Installation Guide* (this document)
- The EOTec 2CTR Bus Termination Connector (plug into the right-hand side of the module stack)

Module Layout

The 2C20 has a Green LED that illuminates whenever power is applied (PWR) and a Green LED to indicate activity from its ControlNet port (COM). This COM LED may be flashing or appear to be on continuously dependant upon the amount of activity received at the ControlNet port.



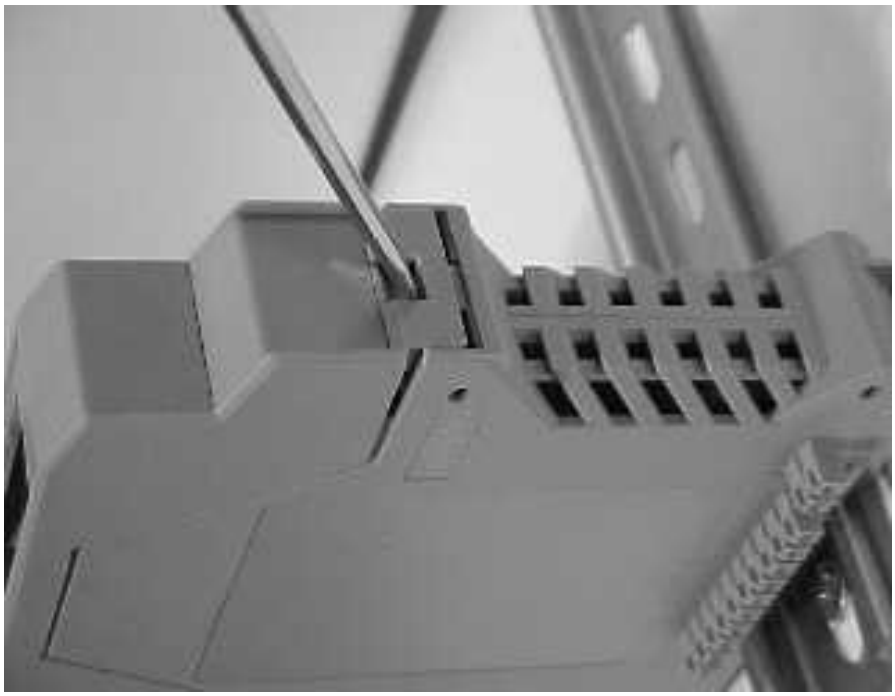
1. Receive Optical Port (ST)
2. Transmit Optical Port (ST)
3. Receive Communication LED
4. Transmit Communication LED
5. Bi-Directional Electrical Port (BNC)
6. Power LED
7. Electrical Communication LED
8. Backplane Connector
9. Optical Diagnostic Connector (D-Series Only)
10. DIN Rail Spring-Clip
11. Ventilation Louvers
12. Cover Release Tab
13. Chassis Ground Tab
14. EOTec 2000 Series Model Number

Setup/Configuration

Some network topologies and module configurations require the changing of a jumper or two inside the module's case. This is easily accomplished with a small screwdriver.

Opening the Housing

To open the case simply press in on the two release tabs on the top and bottom of the front cover with a small screwdriver to "unlock" the front cover. Pull gently on the front panel and the electronics assembly will slide out of the housing.



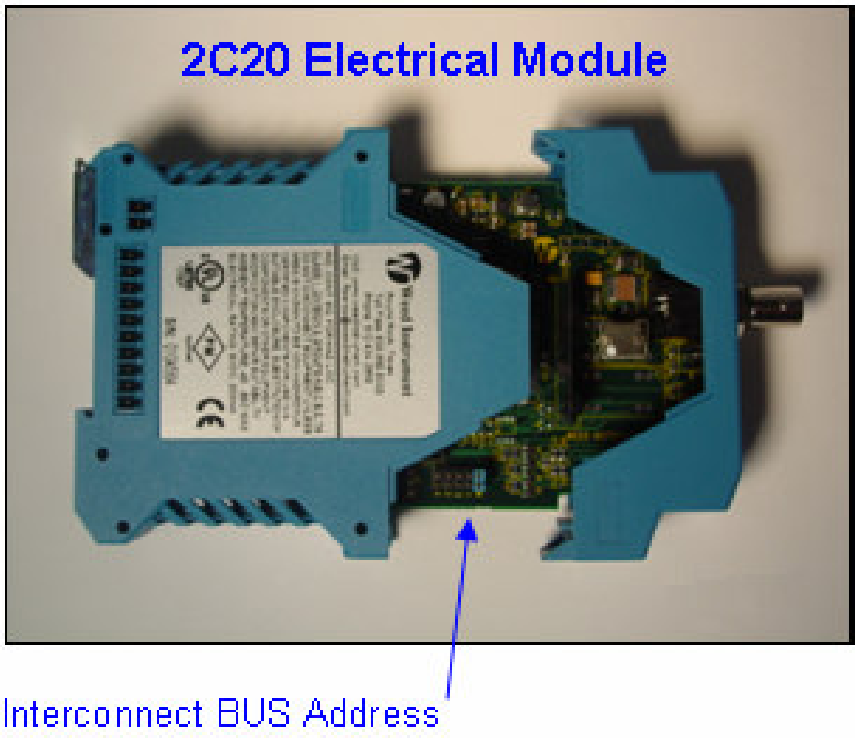
Closing the Housing

After verifying the jumper configurations, line up the circuit board with the slots on the left side of the housing such that the assembly will mate with the edge-card connector in the bottom and slide the electronics assembly back into the housing. Ensure the front cover lines up with the housing flaps and that both the top and bottom release tabs "click" into place when the front cover is fully seated.

Address Jumper

Almost all EOTec 2000 Series Modules have a 5-position jumper labeled “M1234” that is referred to as the module’s “Address” jumper. This jumper is used to assign the bus interconnection pins that this particular module will use to communicate with the other modules in the module stack. It also is used to assign the Master (M) module of the module stack. The Master module will control all routing of data through the module stack. Any module in the stack can be set as the Master module.

The factory default setting of the address jumper for Electrical Interface Modules is the Master (M) position. The factory default setting for the Optical Interface Modules is address 1. For a single point-to-point topology, these settings do not need to be changed. However, any other topology will require changing the Address jumper to accommodate the module stack’s configuration and network topology.



The Address jumper rules are simple. Each module stack must have one module set to “M”. Each module in the stack must have a different Address setting with no Address settings being repeated in the module stack. The modules at opposite ends of a specific fiber link DO NOT have to have the same address settings.

The following table lists the typical Address jumper settings for the topologies listed.

Topology	Module	Address Jumper Setting
Point-to-Point and end of Daisy-Chain	**Electrical Interface Module** **Optical Interface Module**	M 1
Middle locations of Daisy-Chains	**Electrical Interface Module** **Optical Interface Module** **Optical Interface Module**	M 1 2
Optical Star (add up to 4 Optical Modules as needed)	**Electrical Interface Module** **Optical Interface Module** **Optical Interface Module** **Optical Interface Module** **Optical Interface Module**	M 1 2 3 4
Electrical Repeater (Electrical Star)	**Electrical Interface Module** **Electrical Interface Module** **Electrical Interface Module** **Electrical Interface Module** **Electrical Interface Module**	M 1 2 3 4

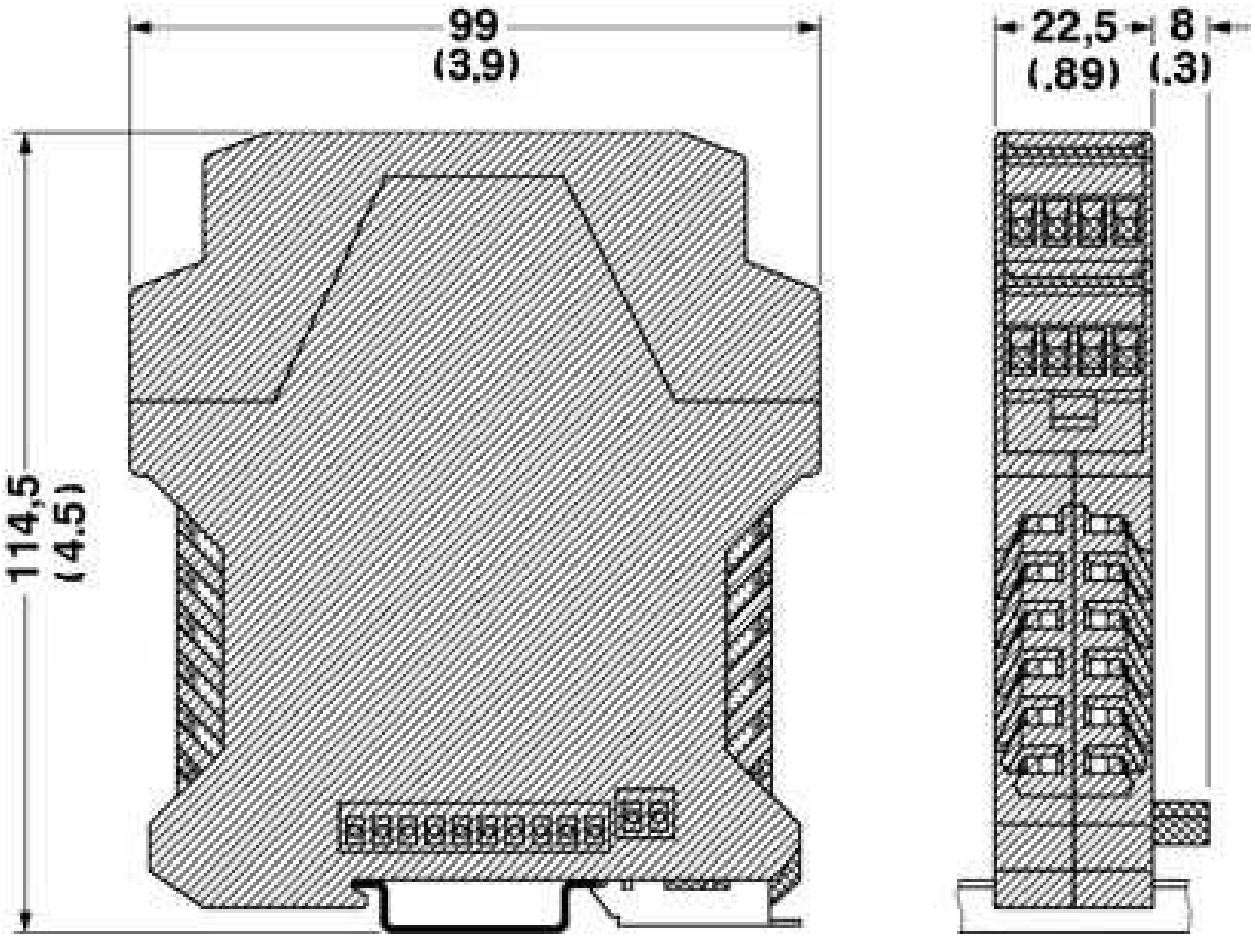
The 2CTR and 2A09

The 2CTR Bus Terminator must be plugged into the module interconnection bus on the right-hand side of the module stack to provide the necessary termination for the bus. The 2CTR will not interfere with the use of the 2A09 End Clamp on that side of the module stack. If you require additional Bus Terminators please order Model Number 2CTR.

The 2A09 End Clamps are used to secure the module stack and prevent the modules from inadvertently sliding apart on the DIN rail. The center screw secures the 2A09 to the DIN rail and two cage-clamp connections are available on the top and bottom which provide excellent points to attach Protective Earth Ground to the DIN rail when necessary. Two 2A09 End Clamps are provided with each Power Supply Module of the EOTec 2000 series. If additional End Clamps are required please order Model Number 2A09.

Dimensions

The following diagram shows the module's dimensions. This package outline is the same for almost all EOTec 2000 series modules.

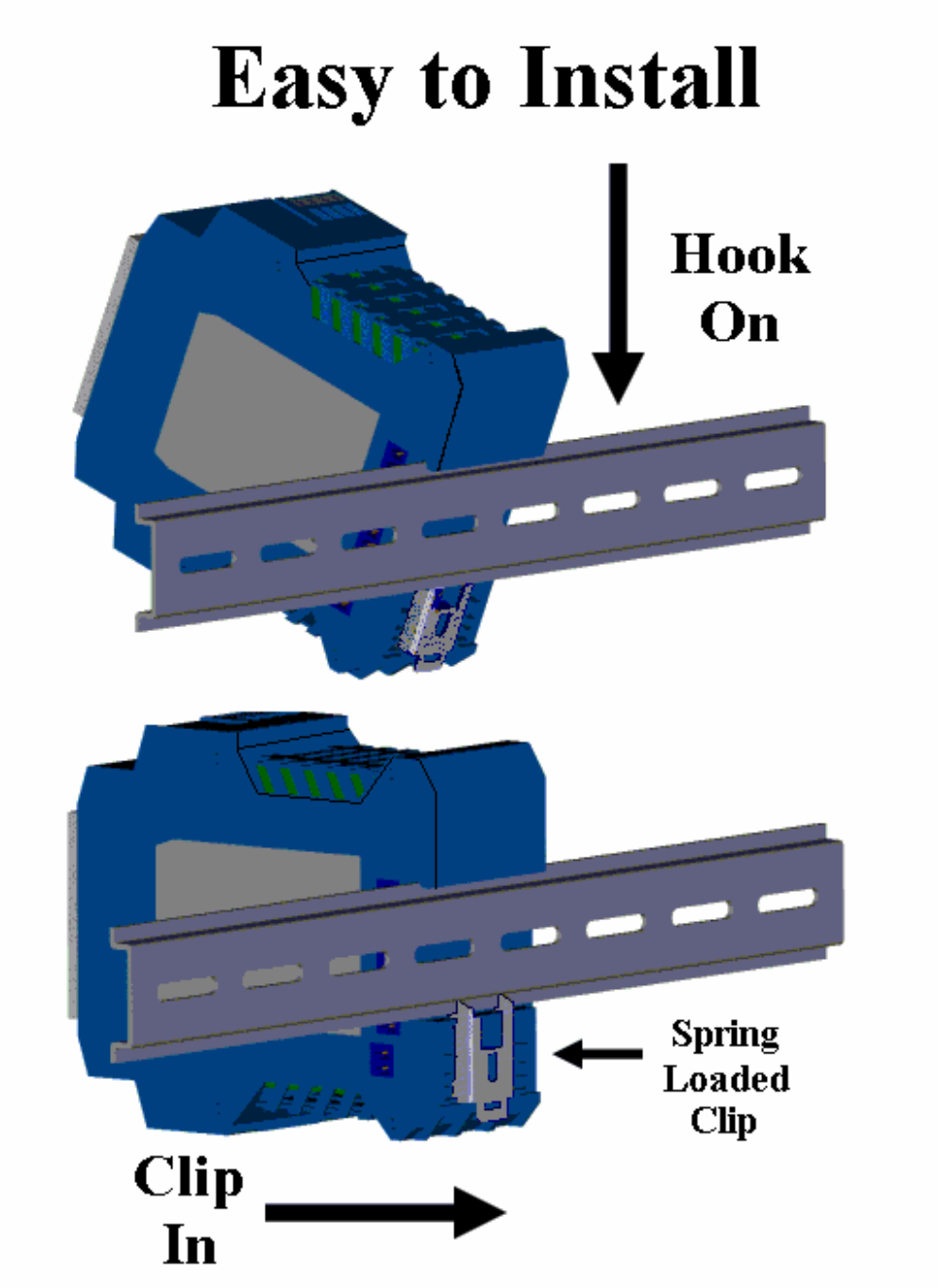


mm

(inches)

Installation

Fasten the module onto a standard DIN rail, as shown below. Hook the module on top of the rail and push down to clip it in on the bottom. Make sure to leave enough room to route any cabling. Modules are then slid together to interconnect them to form the module stack.



To remove the module from the DIN rail, slide the module apart from the rest of the module stack such that the interconnection bus has clearance on both sides. Open the spring-loaded clip as shown below by inserting a screwdriver into the bottom slot on the clip and pushing up on the screwdriver's handle (pivoting down at the tip) to disengage the clip from the DIN rail.

Connections Summary

These connections apply to the EOTec 2C20 ControlNet Electrical Interface Module as mated with other modules to make up the module stack.

Connections Summary	
ControlNet Ports	1, ControlNet BNC style connector located on the front of the 2C20 module, this connection is made to a ControlNet tap
Module Bus Interconnections – Bus Power	2-pin, male/female interconnection on each side of the module near the DIN rail attachment, these connections are mated to adjacent modules of the module stack
Module Bus Interconnections – Bus Data	10-pin, male/female interconnection on each side of the module near the DIN rail attachment, these connections are mated to adjacent modules of the module stack. The 2CTR is plugged into the bus interconnection on the right-hand side of the module stack.
Fiber Connections	Via mated 2Exx Optical Interface Module(s), 1 transmit and 1 receive ST* style female fiber connectors, multimode and single-mode module versions available
Source Power Connections The mated power supply module(s) supplies all the modules of the module stack with 9VDC for their internal operation	Via mated 2Axx Power Supply Module(s), connection is via a pluggable, cage-clamp terminal block on the top-front of the power supply module, 90-260VAC/120-260VDC, 15 to 30VDC inputs available, optional alarm relay outputs are located on the bottom-front of the module

Power Wiring Guidelines

Weed EOTec 2000 Series modules are powered by 9VDC as supplied by an EOTec 2000 Power Supply Module in the module stack and passed to each module via the interconnection bus. The 2C20 module only has connections for receiving power from the interconnection bus and must be connected to a Power Supply Module. Multiple Power Supply Modules can be added to the module stack if power redundancy is required.

The source power to the EOTec 2000 Power Supply Module is applied to its top-front connector. The optional alarm relay output connections are made at the bottom-front of the module. Choices of EOTec 2000 Power Supply Modules are listed in the table below.

Model	Input Power Requirements
2A06	90 to 260VAC, 47-440Hz at 400mA 120 to 260VDC at 400mA
2A08	15 to 30VDC at 400mA
2A16 w/alarm relay output	90 to 260VAC, 47-440Hz at 400mA 120 to 260VDC at 400mA
2A18 w/alarm relay output	15 to 30VDC at 400mA

ControlNet Wiring Guidelines

The 2C20 module is connected to the ControlNet network anywhere on the trunk cable via a ControlNet tap with 1m drop cable connected to the BNC connector located on the front of the 2C20 module. The maximum drive capability of the 2C20 is based on the number of nodes and the length of the coax cable connected. The 2C20 can drive 48 nodes on 250m of cable, 1 node on 1000m of cable.

The maximum allowable coax segment length =

1000m – [16.3m [number of taps - 2]]

All ControlNet wiring requirements apply.

Fiber Connection Guidelines

A variety of EOTec 2000 Series Optical Interface Modules are available for use with the 2C20 module. Choose from 850nm or 1300nm, Multimode and Single-mode and a selection of Optical Dynamic Ranges (fiber power/loss budget). The 2Dxx series of Optical Interface Modules have an additional 4-20mA diagnostic output that is proportional to the optical power received at its optical RX port. This output, located on the bottom-front of the module can be used to chart the degradation of the fiber over time or indicate a fiber break.

The Optical Interface Modules of the EOTec 2000 series, each has a pair of fiber ports, one transmit (TX) and one receive (RX), located on the front of the module. When making your fiber optic connections, always ensure that the transmit (TX) port at one end of the fiber connects to the receive (RX) port at the other end of the fiber.

The following table lists the EOTec 2000 Optical Interface Modules that can be utilized with the 2C20.

Model, Model w/diag.	Wavelength	Fiber Type	Fiber Connect	Max Optical Dynamic Range, Fiber Size	Typical Max Distance
2E07, 2D07	850nm	Multimode	ST	12dB, 62.5/125µm	2mi/3.4km
2E09, 2D09	1300nm	Multimode	ST	12dB, 62.5/125µm	5mi/8km
2E10, 2D10	850nm	Multimode	ST	17dB, 62.5/125µm	3mi/4.8km
2E19, 2D19	1300nm	Multimode	ST	17dB,62.5/125µm	7mi/11.3km
2E36, 2D36	1300nm	Single-mode	ST	10dB, 9/125µm	12mi/20km
2E46, 2D46	1300nm	Single-mode	ST	16db, 9/125µm	20mi/32km

Technical Specifications

General Specifications	
Maximum nodes	99 nodes supported
Maximum taps per segment	48 (using coax cable length of 250m maximum)
Maximum coax cable length	1000m (when connected to only 2 taps)
Trunk connection	Anywhere on the trunk via ControlNet Tap with 1m drop cable required
Coax cable connection	BNC
Data rate	5M baud
Propagation delay	1µs maximum per link pair
Coax propagation delay	4.17µs/km 1.27µs/1000ft
Fiber propagation delay	5.01µs/km 1.53µs/1000ft
Power indicator	Green LED illuminates with power applied
Com indicator	Green LED flashes with data from the coax cable input
Mounting	35mm DIN Rail
Power input	9VDC via Interconnection Bus
Input power, maximum	1.8 W
Transient protection	1500 W peak
Spike protection	5,000 W (10x for 1000 µs) or 250 V (50x for 100 µs)
Operating temperature range	-40 to +85 ℃
Storage temperature range	-40 to +85 ℃
Humidity (non-condensing)	5 to 95% RH
EMC Requirements	IEC61326-1:1998
Hazardous locations	UL/cUL and FM; Class I, Division 2, Groups A, B, C, D, T4
Packaging (polyamide)	UL 94V-0
Dimensions	See *Dimensions* section in this manual.

Technical Support and Service

For technical support, please follow this link:
www.weedinstrument.com/contact_us/technical.html

Installation and Operation

Our professionals can guide you through the installation and operation of your new product so that it is efficiently operational in the minimum amount of time. Weed Instrument also helps you install options and upgrades to ensure that your product is successfully enhanced with greater performance and new capabilities.

Troubleshooting

Should you have a question regarding the operation of your instrument or perceive a malfunction, the technical support experts will help you determine the issue and offer you the best possible solution. Go to www.weedinstrument.com/contact_us/tech_support/troubleshooting.html and determine if any of the troubleshooting tips solve your problem.

Service, Repairs and Returns

If you need to return units for whatever reason, please follow this link:
www.weedinstrument.com/contact_us/tech_support/service.html

1. Click the link for the RETURN MATERIAL AUTHORIZATION FORM (RMA). This from must be filled out completely in order to obtain an RMA number from Weed Instrument.
2. To ensure prompt service the RMA number must be marked on the outside of your shipping container.
3. You are responsible for fully decontaminating your unit prior to shipment. If we receive a contaminated product we reserve the right to have it removed and destroyed by a HAZ MAT team at the owner's expense.
4. Once the form is complete, please send it to Weed Instrument by clicking on the **Submit** button. You will be given an RMA number within 24 hours. If you need the RMA number immediately, please call us after submitting the RMA form and a Service Administrator will give you the number verbally.

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