

ION C2210

Fast Ethernet Media and Rate Converter Module
10/100Base-TX to 100Base-FX

Installation Guide

Part Number 33416
Revision C October 2024

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For details on the Lantronix warranty policy, go to <http://www.lantronix.com/support/warranty>.

Contacts

Lantronix Corporate Headquarters

48 Discovery, Suite 250
Irvine, CA 92618, USA
Toll Free: 800-526-8766
Phone: 949-453-3990
Fax: 949-453-3995

Technical Support

Online: <https://www.lantronix.com/technical-support/>

Sales Offices

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Revision History

Rev	Date	Description
A	7/29/2010	Initial release.
B	8/31/23	Initial Lantronix re-brand. FW v 1.2.0: add note on DIP switches. Add minor editorial and technical changes. FW v 2.0.0 and Boot Loader v 0.1.5: change slot ID to read an analog voltage to prevent a wrong slot number.
C	10/16/24	Update compliance information and fix typo.

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Product Description

The ION C2210 is a media converter module that provides an interface between 10/100Base-TX ports and 100Base-FX ports, allowing users to integrate fiber optic cabling into 10/100 copper environments. Operating at Layer 2, the data link layer, this converter not only converts copper to fiber, it also provides rate conversion allowing legacy 10Base-T copper devices to connect to 100Base-FX fiber. The ION C2210 is a manageable device when installed in a managed ION chassis.

Ordering Information

Part Number	Port 1 – Copper 10/100-Base-T	Port 2 - Duplex Fiber-Optic 100Base-FX
C2210-1011	RJ-45; 100 m (328 ft)	ST, 1300 nm multimode; 2 km (1.2 miles)*
C2210-1013	RJ-45; 100 m (328 ft)	SC, 1300 nm multimode; 2 km (1.2 miles)*
C2210-1014	RJ-45; 100 m (328 ft)	SC, 1300 nm single mode; 20 km (12.4 miles)
C2210-1019	RJ-45; 100 m (328 ft)	LC, 1300 nm multimode; 2Km (1.2 miles)*
C2210-1039	RJ-45; 100 m (328 ft)	LC, 1300 nm multimode; 20Km (12.4 miles)*
C2210-1040	RJ-45; 100 m (328 ft)	SFP slot (empty)

*Typical maximum cable distance. Actual distance depends on network physical characteristics.

** Install C2210-1029-xx and C2210-1029-xx single-fiber optic in the same network where one is the local converter and the other is the remote converter.

Features

- Fast Ethernet
- One Copper & One Fiber Port
- 10/100Base-TX to 100Base-FX Connectivity
- Auto-Negotiation of speed and duplex on TP port
- Auto-MDI/MDIX on TP port
- Link Pass Through (LPT)
- Far-End-Fault (FEF) detection
- Pause (Software Controlled)
- Automatic Link Restoration
- Field Upgradeable Firmware
- Can be used in any ION Platform Chassis
- Standards based, will link with any Standard 10/100Base-TX and any Standard 100Base-FX ports

Manageable Features

- Report converter status to chassis management software:
 - TP and Fiber Link Status
 - Hardware switch settings
 - Copper Port Speed
 - TP and Fiber Port Duplex
 - Fault condition
- Write operation includes:
 - Power on/off device
 - Auto-Negotiation enable/disable
 - Force 10 Mbps or 100 Mbps
 - Force half or full-duplex
 - Select advertising modes when
 - Auto-Negotiation is enabled

- LPT enable/disable
- FEF enable/disable
- Pause enable/disable
- Auto-MDI/MDIX enable/disable

Note: Manageable Features are available when used in an ION Platform chassis along with an ION Management Module.

Specifications

Standards: IEEE 802.3u, IEEE 802.3x

Data Rate: 10 Mbps; 100 Mbps Layer 2

MAC Address Table: 1K

Frame Buffer Memory: 512 Kbits

Max Frame Size: 2048 bytes

Packet Size: Unicast MAC address: 1K

Maximum packet size:

- 2048 bytes untagged bytes
- 2044 bytes tagged bytes

DIP Switch:

SW1: Auto-Negotiation (UP = enabled)

SW2: Forced 100 Mbps/10 Mbps with Auto-Neg. off (UP = 100 Mbps)

SW3: Forced Full/Half-Duplex with Auto-Neg. off (UP = Full)

SW4: Full/Half-Duplex on fiber port (UP = Full)

SW5: Auto-MDI/MDIX on UTP (UP = enabled)

SW6: Link Pass Through (UP = enabled)

Internal Jumpers: Auto-MDI/MDIX: Enable/Disable

Jumpers:

Hardware: Mode of operation is determined by the settings on the 4-position switch.

Software: Mode of operation is determined by the most recently saved on-board microprocessor settings.

Status LEDs:

FD (Fiber Duplex): ON= Full-duplex on fiber

LACT (Fiber Link/Activity): ON = Fiber Link

PWR (Power): ON=Connection to powered backplane

(TP. Duplex/Link): Yellow = Half duplex, Green = Full-Duplex

(TP. Speed): Yellow = 10Mbps, Green = 100 Mbps

Dimensions: Width: 0.86" [22 mm] x Depth: 6.5" [165 mm] x Height: 3.4"[86 mm]

Power Consumption: 2.5 Watts, 200 mA @ 13.9 VDC

Environment: Environment specs depend on the chassis chosen.

Operating Temp: 0°C to 50°C

Humidity: 5% to 95% (non-condensing)

Altitude: 0 – 10,000 ft.

Weight: 1 lb. [0.45 kg]

MTBF:

Greater than 250,000 hours (MIL-HDBK-217F)

Greater than 667,500 hours (Bellcore)

Certifications: CISPR/EN55022 Class A, FCC Class A, CE Mark, EN55024; TAA Compliant and NDAA Compliant

Warranty: Lifetime

The information in this manual is subject to change. For the most up-to-date information on the C2210 SIC, view the online manual at <https://www.lantronix.com/products/c2210-series/>.

CAUTION: Visible and invisible laser radiation when open. Do not stare into beam or view directly with optical instruments.

CAUTION: Use of controls, adjustments or the performance of procedures other than those specified herein may result in hazardous radiation exposure.

The fiber optic transmitters on this device meet Class I Laser safety requirements per IEC-825/CDRH standards and comply with 21 CFR1040.10 and 21CFR1040.11.

CAUTION: Copper based media ports, e.g., Twisted Pair (TP) Ethernet, USB, RS232, RS422, RS485, DS1, DS3, Video Coax, etc., are intended to be connected to intrabuilding (inside plant) link segments that are not subject to lightening transients or power faults. Copper based media ports, e.g., Twisted Pair (TP) Ethernet, USB, RS232, RS422, RS485, DS1, DS3, Video Coax, etc., are NOT to be connected to interbuilding (outside plant) link segments that are subject to lightening transients or power faults. Failure to observe this caution could result in damage to equipment.

Cable Specifications

The physical characteristics must meet or exceed IEEE 802.3™ specifications.

Fiber cable

Bit Error Rate: <10⁻⁹

Single mode fiber (recommended): 9 μm

Multimode fiber (recommended): 62.5/125 μm

Multimode fiber (optional): 50/125 μm

C2210-1011 1300 nm multimode

Fiber Optic Transmitter Power: min: -19.0 dBm max: -14.0 dBm

Fiber Optic Receiver Sensitivity: min: -30.0 dBm max: -14.0 dBm

Link Budget: 11.0 dB

C2210-1013 1300 nm multimode

Fiber Optic Transmitter Power: min: -19.0 dBm max: -14.0 dBm

Fiber Optic Receiver Sensitivity: min: -30.0 dBm max: -14.0 dBm

Link Budget: 11.0 dB

C2210-1014 1300 nm single mode

Fiber-optic Transmitter Power: min: -15.0 dBm max: -8.0 dBm

Fiber-optic Receiver Sensitivity: min: -31.0 dBm max: -8.0 dBm

Link Budget: 16.0 dB

C2210-1019 1300 nm single mode

Fiber-optic Transmitter Power: min: -15.2 dBm max: -8.0 dBm

Fiber-optic Receiver Sensitivity: min: -32.5 dBm max: -3.0 dBm

Link Budget: 17.3 dB

C2210-1039 1300 nm multimode

Fiber-optic Transmitter Power: min: -19.0 dBm max: -8.0 dBm

Fiber-optic Receiver Sensitivity: min: -30.0 dBm max: -3.0 dBm

Link Budget: 11 dB

The fiber optic transmitters on this device meet Class I Laser safety requirements per IEC-825/CDRH standards and comply with 21 CFR1040.10 and 21CFR1040.11.

Copper cable

Category 3: *(Minimum requirement for 10 Mb/s operation)*

Gauge 24 to 22 AWG

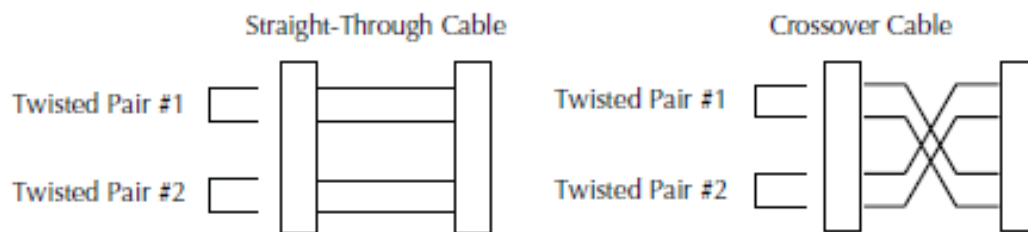
Attenuation 11.5 dB/100m @ 5-10 MHz

Category 5: *(Minimum requirement for 100 Mb/s operation)*

Gauge 24 to 22 AWG

Attenuation 22.0 dB /100m @ 100 MHz

- Straight-through (MDI) or crossover (MDI-X) twisted-pair cable must be used.
- Shielded twisted-pair (STP) or unshielded twisted-pair (UTP) may be used.
- Pins 1&2 and 3&6 are the two active pairs in an Ethernet network .
- Use only dedicated wire pairs for the active pins (e.g., blue/white & white/blue, orange/white & white/orange, etc.)
- Do not use flat or silver satin wire.



Installation

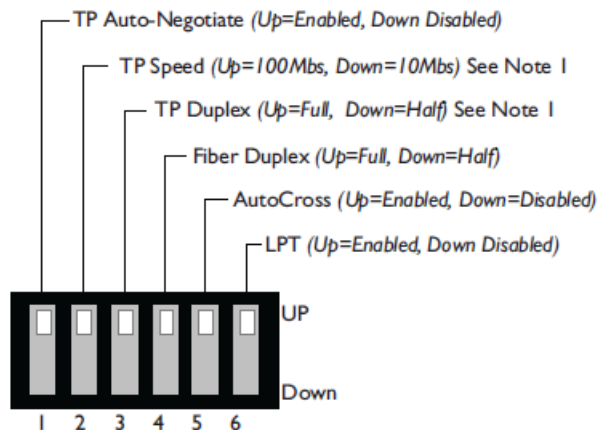
CAUTION: Wear a grounding device and observe electrostatic discharge precautions when setting the 6-position switch, removing and inserting circuit board jumper(s), and installing the SIC. Failure to observe this caution could result in damage to or failure of the SIC.

Set the 6-position DIP Switch

- The 6-position DIP switch is located on the side of the SIC.
- Use a small flat blade screwdriver or a similar tool to set the recessed switches.
- Refer to the drawing to the right for the locations of the individual switches.

Note 1: Auto-Negotiation must be OFF.

1. TP Auto-Negotiation (See Note 1.)
 - up Enables Auto-Negotiation on the copper port.
 - down Disables Auto-Negotiation on the copper port.
2. TP Speed (See Note 1.)
 - up 100 Mbps operation on the copper port.
 - down 10 Mbps operation on the copper port.
3. TP Copper Mode
 - up full duplex operation on the copper port.
 - down half duplex operation on the copper port.
4. Fiber Mode
 - up Forces full duplex operation on the fiber port.
 - down Forces half duplex operation on the fiber port.
5. TP AutoCross
 - up Enabled.
 - down Disabled
6. Link Pass Through (LPT)
 - up Enabled
 - down Disabled



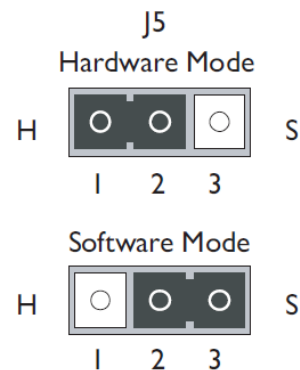
Hardware/Software Mode Jumper

The jumpers are located on the SIC circuit board. Use a small needle-nosed pliers or a similar tool to set the jumper.

The Hardware/Software jumper is labeled “H” for hardware and “S” for software.

Hardware: The mode of operation of the media converter is determined by the 6-position switch settings. The default is the Hardware mode position.

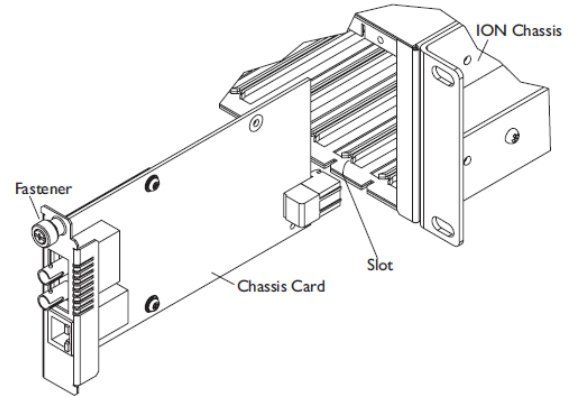
Software: The mode of operation of the media converter is determined by the most recently saved on-board microprocessor settings.



Install the C2210 SIC

To install the C2210 SIC:

1. Locate an empty installation slot on the ION chassis.
2. Carefully slide the module into the installation slot, aligning the module with the installation guides.
3. Ensure that the module is firmly seated to the chassis backplane.
4. Push in and rotate the panel fastener screw to secure the module to the chassis front.



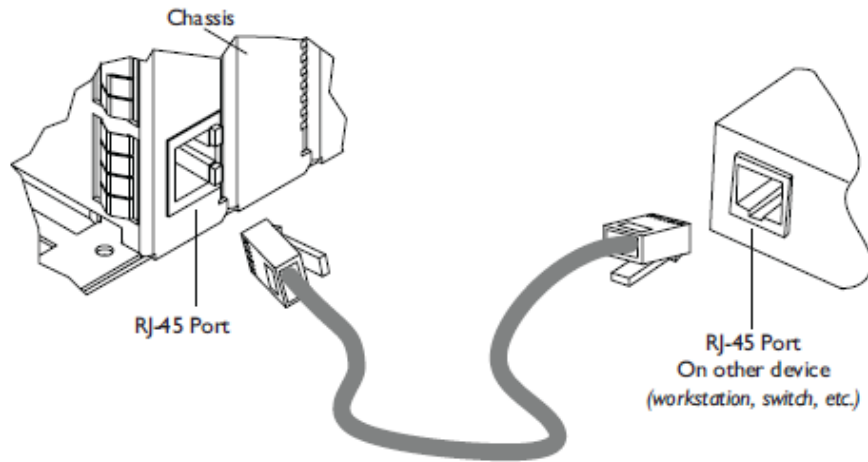
Power the C2210 SIC

The C2210 module SIC is powered through the ION chassis.

Install the Twisted-pair Copper Cable

1. Locate IEEE 803.2 compliant 10Base-T or 100Base-TX cable with RJ-45 connectors installed on both ends.
2. Connect the RJ-45 connector at one end of the cable to the RJ-45 port connector on the SIC.
3. Connect the RJ-45 connector at the other end of the cable to the RJ-45 port connector on the other device (switch, workstation, etc.).

Note: The MDI (straight-through) or MDI-X (crossover) cable connection is configured automatically, when the AutoCross jumper is in the enabled position.



Install the Fiber Cable

1. Locate or build IEEE 803.2™ compliant 100Base-FX fiber cable with male, two-stranded TX to RX connectors installed at both ends.
2. Connect the fiber cables to the C2210 SIC as described:
 - Connect the male TX cable connector to the female TX connector.
 - Connect the male RX cable connector to the female RX connector.
3. Connect the fiber cables to the other device (SIC, hub, etc.) as described:
 - Connect the male TX cable connector to the female RX connector.
 - Connect the male RX cable connector to the female TX connector.



Operation

Status LEDs

Use the status LEDs to monitor the SIC and the network connections.

FD (Fiber Duplex)

- ON = Full duplex fiber connection.
- OFF = Half duplex fiber connection.

LACT (Fiber Link)

- ON = Fiber link connection.
- Blink = Fiber network activity

PWR (Power)

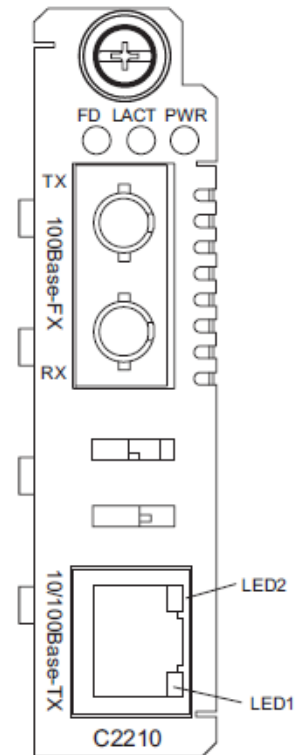
- ON = Power applied to chassis card

TP LED 1 (Twisted-Pair Speed)

- ON Green = 100 Mb/s
- ON Yellow = 10 Mb/s

TP LED 2 (Twisted Pair Duplex)

- ON Green = Full duplex, blink activity
- ON Yellow = Half duplex, blink activity



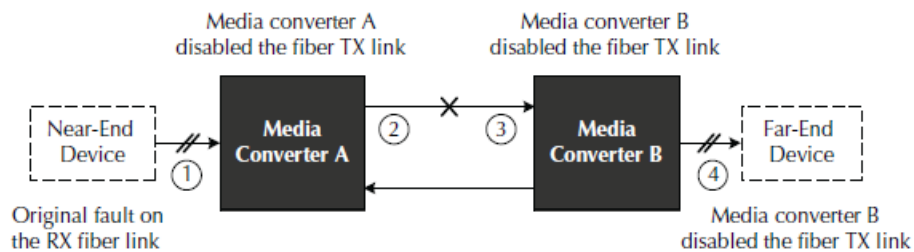
Product features

AutoCross™

The AutoCross feature detects and configures the twisted-pair copper port on the C2210 SIC for the correct straight-through (MDI) or crossover (MDI-X) configuration. This feature allows either MDI or MDI-X cable to connect the SIC to devices such as hubs, transceivers, or network interface cards (NICs). (This feature does not require operator intervention.)

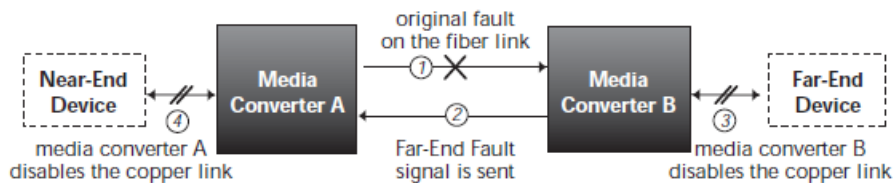
Link pass-through

The Link Pass-Through feature allows the SIC to monitor RX (receive) ports for loss of signal. In the event of a loss of an RX signal on one media port, the SIC will automatically disable the TX (transmit) signal of the other media port, thus “passing through” the link loss.



Far-end fault

When a fault occurs on an incoming fiber link (1), the SIC transmits a Far-End Fault signal on the outgoing fiber link (2). In addition, the Far-End Fault signal also activates Link Pass-Through, which, in turn, disables the link on the copper portion of the network (3) and (4).



Auto-Negotiation

The Auto-Negotiation feature allows the C2210 SIC to automatically configure itself to achieve the best possible mode of operation over a link. The SIC will broadcast its speed (10 Mbps or 100 Mbps) and duplex capabilities (full or half) to the other devices and negotiates the best mode of operation. Auto-Negotiation allows quick and easy installation because the optimal link is established automatically. No user intervention is required to determine the best mode of operation.

A scenario where the SIC is linked to a non-negotiating device, you may want to disable Auto-Negotiation. In this instance, the mode of operation will drop to the least common denominator between the two devices (e.g. 100 Mbps, half duplex). Disabling this feature gives the user the ability to force the connection to the best mode of operation.

Parallel detection

Parallel detection is the method used to link when an auto negotiating port detects a link partner that is in forced mode and therefore cannot participate in the auto negotiating process. Parallel Detection can be set to IEEE Standard half duplex, or the non-standard full duplex. Switch settings for parallel detection are valid in hardware or software mode, only when Auto-Negotiation is enabled.

Per the IEEE method, an auto negotiating port that detects a forced link partner should drop to the detected speed (10Mbps or 100Mbps) and default to HALF DUPLEX. The C2210 allows bypassing the IEEE method by setting the parallel detection default mode to half or full duplex DIP SW 3, disabling SW 1, auto-negotiation and configuring SW 2, speed.

Full duplex network

In a full duplex network, maximum cable lengths are determined by the type of cables that are used.

Half duplex network (512-Bit Rule)

In a half-duplex network, the maximum cable lengths are determined by the round trip delay limitations of each Fast Ethernet collision domain. (A collision domain is the longest path between any two terminal devices, e.g., a terminal, switch, or router, etc.)

The 512-Bit Rule determines the maximum length of cable permitted by calculating the round-trip delay in bit-times (BT) of a particular collision domain. If the result is less than or equal to 512 BT, the path is good.

SNMP

Use SNMP at an attached terminal or at a remote location to monitor the SIC by monitoring:

- Power
- Serial and part number
- Port number
- Copper and fiber link status
- Copper and fiber duplex mode
- Copper port speed
- Hardware switch setting

Also, use SNMP to enter network commands that do the following:

- Enable/disable Auto-Negotiation on copper
- Force 10Mbps or 100Mbps on copper
- Force full duplex or half duplex on copper
- Force full duplex or half duplex on fiber
- Enable/disable Far-End Fault on fiber
- Enable/disable Link Pass Through
- Enable/disable Pause

Troubleshooting

If the C2210 SIC fails, isolate and correct the failure by determining the answers to the following questions and then taking the indicated action:

1. Is the PWR (power) LED lit?

NO

- Is the SIC inserted properly into the chassis?
- Is the power cord properly installed in the chassis and in to the external power source; is the external power source active?
- Contact Technical Support.

YES

- Proceed to step 2.

2. Is the TP LED 1 (twisted-pair) LED lit?

NO

- Check the copper cables for proper connection and pin assignment.
- Contact Technical Support.

YES

- Proceed to step 3.

3. Is the LACT (fiber link) LED lit?

NO

- Check the fiber cable for proper connection.
- Verify that the TX and RX cables are connected to the RX and TX ports, respectively, on the 100Base-FX device.
- Contact Technical Support.

YES

- Proceed to step 4.

4. Is the TP LED 2 (twisted-pair speed) LED lit?

NO

- Check the copper cables for proper connection.
- Off = The SIC has selected 10Mbps operation.
- If the speed is not correct, disconnect and reconnect the twisted pair cable to restart the initialization process.
- Contact Technical Support.

YES

- On = The SIC has selected 100Mbps operation.
- If the speed is not correct, disconnect and reconnect the twisted pair cable to restart the initialization process.
- Contact Technical Support.

Compliance Information

FCC regulations

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at the user's own expense.

Canadian regulations

This digital apparatus does not exceed the Class A limits for radio noise for digital apparatus set out on the radio interference regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la Class A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

European regulations

Warning This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Achtung! Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten. In diesem Fall ist der Benutzer für Gegenmaßnahmen verantwortlich.

Attention! Ceci est un produit de Classe A. Dans un environnement domestique, ce produit risqué de créer des interférences radioélectriques, il appartiendra alors à l'utilisateur de prendre les mesures spécifiques appropriées.



CAUTION: RJ connectors are NOT INTENDED FOR CONNECTION TO THE PUBLIC TELEPHONE NETWORK. Failure to observe this caution could result in damage to the public telephone network.

Der Anschluss dieses Gerätes an ein öffentliches Telekommunikationsnetz in den EGMitgliedstaaten verstößt gegen die jeweiligen einzelstaatlichen Gesetze zur Anwendung der Richtlinie 91/263/EWG zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über Telekommunikationsendeinrichtungen einschliesslich der gegenseitigen Anerkennung ihrer Konformität.



In accordance with European Union Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003, Lantronix will accept post usage returns of this product for proper disposal. The contact information for this activity can be found in the 'Contact Us' portion of this document.

Declaration of Conformity

Manufacturer's Name: Lantronix, Inc.

Manufacturer's Address: 48 Discovery, Suite 250, Irvine, California 92618 USA

Declares that the product(s):

C2210-1011, C2210-1013, C2210-1014, C2210-1015, C2210-1016, C2210-1017, C2210-1019, C2210-1035, C2210-1039, C2210-1040, C2210-1029-A1, C2210-1029-A2, C2210-1029-B1, C2210-1029-B2.

Conforms to the following Product Regulations:

EMC Directive 2004/108/EC; EN 55022:2006+A1:2007 Class A;

EN55024:1998+A1:2001+A2:2003; EN61000-3-2; EN61000-3-3; CFR Title 47 Part

15 Subpart B Class A; Low Voltage Directive: 2006/95/EC; CFR Title 21 Section 1040.10 Class I.

With the technical construction on file at the above address, this product carries the CE Mark

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standard(s).

Place: Irvine, California

Date: April 27, 2023

Signature: *Eric Bass*

Full Name: Eric Bass

Position: Vice President of Engineering

NDA, RoHS, REACH and WEEE Compliance

See the compliance webpage at <https://www.lantronix.com/legal/rohs/>.

Trade Agreement Act (TAA) Compliant Products

See the TAA webpage at <https://www.lantronix.com/legal/rohs/taa-compliant-products/>.

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**Lantronix Corporate Headquarters**

48 Discovery, Suite 250
Irvine, CA 92618, USA
Toll Free: 800-526-8766
Phone: 949-453-3990
Fax: 949-453-3995

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