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Lynx RedBox

Industrial switches

WeOS

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1. General Information

1.1. Legal Information

The contents of this document are provided “as is”. Except as required by applicable law, no warranties of any kind are made in relation to the accuracy and reliability or contents of this document, either expressed or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. Westermo reserves the right to revise this document or withdraw it at any time without prior notice.

Under no circumstances shall Westermo be responsible for any loss of data or income or any special, incidental, and consequential or indirect damages howsoever caused.

More information about Westermo can be found at www.westermo.com .

1.2. About This Guide

This guide is intended for installation engineers and users of the Westermo products.

It includes information on safety and regulations, a product description, installation instructions and technical specifications.

1.3. Software Tools

Related software tools are available at https://www.westermo.com/support/product-support.

1.4. License and Copyright for Included FLOSS

This product includes software developed by third parties, including Free/Libre Open Source Software (FLOSS). The specific license terms and copyright associated with the software are included in each software package respectively. Please visit the product web page for more information.

Upon request, the applicable source code will be provided. A nominal fee may be charged to cover shipping and media. Please direct any source code request to your normal sales or support channel.

1.5. WeOS

This product runs WeOS (Westermo Operating System). Instructions for quick start, configuration and factory reset are found in the WeOS user documentation at www.westermo.com.

2.1. Warning Levels

Warning signs are provided to prevent personal injuries and/or damages to the product. The following levels are used:

Level of warning	Description	Consequence personal injury	Consequence material damage
 **WARNING**	Indicates a potentially hazardous situation	Possible death or major injury	Major damage to the product
 **CAUTION**	Indicates a potentially hazardous situation	Minor or moderate injury	Moderate damage to the product
 **NOTICE**	Provides information in order to avoid misuse of the product, confusion or misunderstanding	No personal injury	Minor damage to the product
 **NOTE**	Used for highlighting general, but important information	No personal injury	Minor damage to the product

Table 1. Warning levels

2.2. Safety Information
Before installation:

Read this manual completely and gather all information available on the product. Make sure it is fully understood. Check that your application does not exceed the safe operating specifications for the product.

SAFETY DURING INSTALLATION
The product must be installed and operated by qualified service personnel and installed into an apparatus cabinet or similar, where access is restricted to service personnel only.

Refer to chapter Compliance Information to see the required level of qualified service personnel according to safety standards.

Before energising and connecting communication cables to the product, ensure a protective earthing conductor is first connected to the protective earthing terminal (only valid for metallic housings). Westermo recommends a cross-sectional area of at least 4 mm^2.

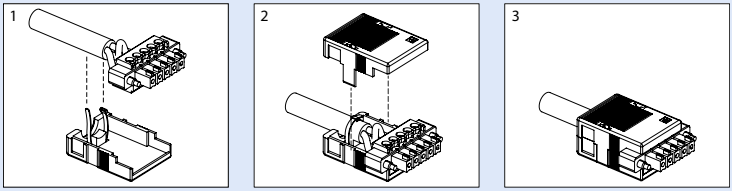
Upon removal of the product, disconnect the product from the power supply and all other communication ports before disconnecting the protective earthing conductor.

HAZARDOUS VOLTAGE
Do not open an energised product. Hazardous voltage may occur when connected to a power supply.

WARNING - PREVENT ACCESS TO HAZARDOUS VOLTAGE CABLE
Apply the protective cap (if delivered with the product) on the power cable and I/O cable, according to the illustrated steps below. The number of pins on the connector plug may vary depending on product.

To prevent accidentally pulling out wires, make sure the power cable and the wires are firmly attached to the protective cap.

For screw connectors, make sure the screws are properly tightened, as well as routing the wires separately from other wires. For connectors with straps, fasten the cable as strain relief, as well as routing the wires separately.



PROTECTIVE FUSE
It must be possible to disconnect manually from the power supply. Ensure compliance to national installation regulations.

Replacing the internal fuse must only be performed by Westermo qualified personnel.

REDUCE THE RISK OF FIRE
To reduce the risk of fire, use only telecommunication line cords with a cable diameter of AWG 26 or larger. Regarding power cable dimensions, see chapter Interface Specifications.

CLASS 1 LASER PRODUCT
Do not look directly into a fibre optical port or any connected fibre, although the product is designed to meet the Class 1 Laser regulations and complies with 21 CFR 1040.10 and 1040.11.

HANDLING OF SFP TRANSCEIVERS
SFP transceivers are supplied with plugs to avoid contamination inside the optical port. They are very sensitive to dust and dirt. If the fibre optic cable is disconnected from the product, a protective plug must be used on the transmitter/receiver. The protective plug must be kept on during transportation. The fibre optic cable must be handled the same way.

ELECTROSTATIC DISCHARGE (ESD)
Prevent electrostatic discharge damage to internal electronic parts by discharging your body to a grounding point (e.g. use a wrist strap).

CABLE TEMPERATURE RATING FOR FIELD TERMINAL WIRES
There may be a requirement on the minimum temperature rating of the cable to be connected to the field wiring terminals, see chapter Interface Specifications.

2.3. Care Recommendations

Follow the care recommendations below to maintain full operation of the product and to fulfill the warranty obligations:

- Do not drop, knock or shake the product. Rough handling above the specification may cause damage to internal circuit boards.
- Use a dry or slightly water-damp cloth to clean the product. Do not use harsh chemicals, cleaning solvents or strong detergents.
- Do not paint the product. Paint can clog the product and prevent proper operation.

If the product is used in a manner not according to specification, the protection provided by the equipment may be impaired.

If the product is not working properly, contact the place of purchase, the nearest Westermo distributor office or Westermo technical support.

2.4. Product Disposal

This symbol means that the product shall not be treated as unsorted municipal waste when disposing of it. It needs to be handed over to an applicable collection point for recycling electrical and electronic equipment.

Proper disposal of the product helps minimize hazardous substances and prevents potential negative impacts on both the environment and human health.

Figure 1. WEEE symbol for treatment of product disposal

2.5. Compliance Information

2.5.1. Agency Approvals and Standards Compliance

Type	Approval/Compliance
EMC	• EN 50121-4/IEC 62236-4, Railway signalling and telecommunications apparatus • EN/IEC 61000-6-2, Immunity industrial environments • EN/IEC 61000-6-4, Emission industrial environments • EN/IEC 61000-6-5, Immunity power station and substation environment
EMI	• FCC Part 15, subpart B
Substation automation	• IEEE 1613, Testing Requirements for Communications Networking Devices Installed in Electric Power Substations • IEC 61850-3, Communication networks and systems for power utility automation – Part 3: General requirements
Safety	• EN/IEC/UL 61010-1, Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements • EN/IEC/UL 61010-2-201, Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 2-201: Particular requirements

Table 2. Agency approvals and standards compliance

2.5.2. EN/IEC 61010-2-201 Notice

This product has been tested and found compliant to EN/IEC 61010-2-201, Safety requirements for electrical equipment for measurement, control, and laboratory use. In accordance with the definitions of the standard, this product shall be handled by skilled service personnel.

2.5.3. FCC Part 15.105 Class A Notice

This product 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 product is operated in a commercial environment.

This product generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the user manual, may cause harmful interference to radio communications. Operation of this product in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at the users own expense.

2.5.4. Simplified Declaration of Conformity

Hereby, Westermo declares that this product is in compliance with applicable EU directives and UK legislations. The full declaration of conformity and other detailed information is available at www.westermo.com/support/product-support.

Figure 2. The European Conformity and the UK Conformity Assessment markings

3. Product Description

3.1. Product Description

The Lynx-RB-FT3G-MV is a compact redundancy box (RedBox) supporting High Availability Seamless Redundancy (HSR) and Parallel Redundancy Protocol (PRP). Its innovative features and robust construction make it the ideal choice for mission critical networks that demand uninterrupted data communication. This device is designed for highest possible system availability and applications that require zero recovery time such as electrical substations. In addition, as cybersecurity threats grow in sophistication, the Lynx-RB-FT3G-MV offers an extensive suite of tools to safeguard your network.

Designed to withstand the toughest environmental conditions, the Lynx-RB-FT3G-MV is resilient against high EMI levels derived from load switching and lightning strikes. It can also endure extreme ambient temperatures and with the use of exclusively industrial-grade components it is ideal for challenging industrial settings where reliability is paramount. Compliance with industry standards is essential, and the Lynx-RB-FT3G-MV fulfills the requirements of IEC 61850 and IEEE 1613 certified by KEMA.

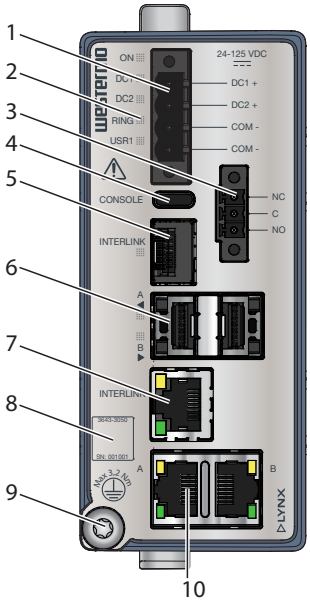
With its compact and DIN-mounted design, the Lynx-RB-FT3G-MV provides easy installation and saves valuable space in industrial environments. It features three combo ports and a wide input redundant power supply, maximizing flexibility and accommodating diverse network configurations.

The Lynx-RB-FT3G-MV industrial network device with RedBox functionality delivers unparalleled performance, reliability, and security for mission-critical industrial applications. Its advanced features, compliance with industry standards, and robust construction make it the ideal choice for ensuring uninterrupted and secure data communication in demanding industrial environments.

3.2. Available Models

Art. no.	Model	Gigabit TX ports	Gbit SFP ports	Rated voltage
3643-3050	Lynx RB-FT3G-MV	3	3	24-125 VDC

3.3. Hardware Overview



No.	Description	No.	Description
1	Power input	2	LED indicators
3	I/O connection	4	Console port
5	100/1000 Mbit/s SFP port Interlink	6	2 x 100/1000 Mbit/s SFP port
7	10/100/1000 Mbit/s TX ports Interlink	8	Label with data matrix[a.]
9	Protective earth	10	2 x 10/100/1000 Mbit/s TX ports

[a.]The base MAC address and production date of the product is included in the front label data matrix.

Figure 3. Location of interface ports and LED indicators

3.4. Connector Information

3.4.1. Power Input

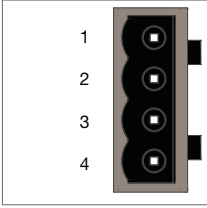
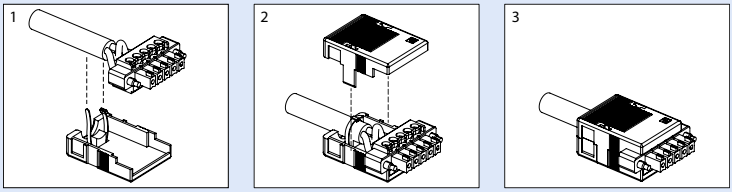
Illustration	Product marking	Direction	Description
	+DC1	Input	Supply voltage
	+DC2	Input	Supply voltage
	-COM	Input	Common
	-COM	Input	Common

Table 3. Power input

WARNING - PREVENT ACCESS TO HAZARDOUS VOLTAGE CABLE
Apply the protective cap (if delivered with the product) on the power cable and I/O cable, according to the illustrated steps below. The number of pins on the connector plug may vary depending on product.

To prevent accidentally pulling out wires, make sure the power cable and the wires are firmly attached to the protective cap.

For screw connectors, make sure the screws are properly tightened, as well as routing the wires separately from other wires. For connectors with straps, fasten the cable as strain relief, as well as routing the wires separately.



CABLE TEMPERATURE RATING FOR FIELD TERMINAL WIRES
There may be a requirement on the minimum temperature rating of the cable to be connected to the field wiring terminals, see chapter Interface Specifications.

3.4.2. Ethernet Connection TX

Illustration	Pin no.	Signal	Direction	Description
	1	BI_DA+	In/Out	Transmitted/Received data
	2	BI_DA-	In/Out	Transmitted/Received data
	3	BI_DB+	In/Out	Transmitted/Received data
	4	BI_DC+	In/Out	Transmitted/Received data
	5	BI_DC-	In/Out	Transmitted/Received data
	6	BI_DB-	In/Out	Transmitted/Received data
	7	BI_DD+	In/Out	Transmitted/Received data
	8	BI_DD-	In/Out	Transmitted/Received data
	Shield	-	-	Connected to PE

Table 4. Ethernet connection TX

The Lynx RedBox is equipped with three combo ports (A+B and Interlink) that support both 10/100/1000BaseT(X) and 100/1000BaseSFP slot connectivity. When a fiber optic cable is plugged in, the device switches to fiber mode, optimizing performance for fiber optic connections. Similarly, when an RJ-45 cable is detected, the device automatically adjusts itself to copper mode, ensuring compatibility with standard Ethernet connections. In cases where both fiber optic and RJ-45 cables are connected, the combo prioritises the first media to establish a link.

3.4.3. I/O Connection, Relay Output

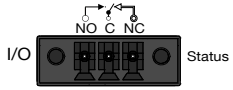
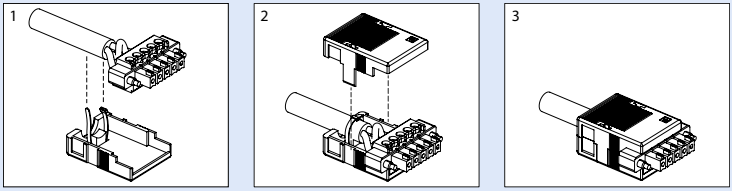
Illustration	Position	Product marking	Direction	Description
	Status	Status NO	Output	Alarm (status) relay contact NO - Normally Open C - Common NC - Normally Closed
		Status C		
		Status NC		

Table 5. I/O connection

WARNING - PREVENT ACCESS TO HAZARDOUS VOLTAGE CABLE
Apply the protective cap (if delivered with the product) on the power cable and I/O cable, according to the illustrated steps below. The number of pins on the connector plug may vary depending on product.

To prevent accidentally pulling out wires, make sure the power cable and the wires are firmly attached to the protective cap.

For screw connectors, make sure the screws are properly tightened, as well as routing the wires separately from other wires. For connectors with straps, fasten the cable as strain relief, as well as routing the wires separately.



The Status output is a potential free, opto-isolated, alternation (Form-C) solid-state relay. This can be configured to monitor various alarm events within the product, see WeOS user documentation at www.westermo.com. An external load in series with an external DC voltage source is required for proper functionality.

Unit condition	Status NO- C	Status NC-C
Unpowered / pre-operational or Alarm active	OPEN	CLOSED
Operational and Alarm inactive	CLOSED	OPEN

Table 6. Status output

3.4.4. Console Port

The console port can be used to connect to the CLI (Command Line Interface). The console connector is a USB cable that connects to a FTDI FT232R USB to serial converter internally. For drivers, refer to www.ftdichip.com and download the appropriate VCP driver.

3.4.5. SFP Transceivers

The product supports UL/IEC/CSA certified and Westermo labelled SA-approved transceivers only. See Westermo's modular transceivers datasheets 100 Mbit and 1 Gbit for SA-approved SFP transceivers, which can be downloaded from the product support pages at www.westermo.com/support/product-support.

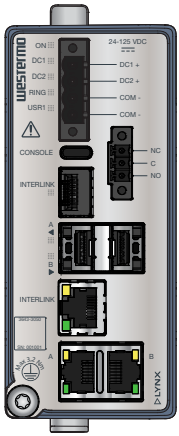
Each SFP slot can hold one SFP transceiver. See *"Transceiver User Guide 6100-0000"* for transceiver handling instructions, which also can be downloaded from the product support pages at www.westermo.com/support/product-support.

In the event of contamination, the optical connectors in the SFP transceivers should only be cleaned by the use of forced nitrogen and some kind of cleaning stick. Recommended cleaning fluids are methyl-, ethyl-, isopropyl- or isobutyl alcohol, hexane or naphtha.

HANDLING OF SFP TRANSCEIVERS

SFP transceivers are supplied with plugs to avoid contamination inside the optical port. They are very sensitive to dust and dirt. If the fibre optic cable is disconnected from the product, a protective plug must be used on the transmitter/receiver. The protective plug must be kept on during transportation. The fibre optic cable must be handled the same way.

3.5. LED Indicators

LED	Status	Description	Illustration
ON	OFF	Product has no power	
	GREEN	All OK, no alarm condition	
	RED	Alarm condition, or until product has started up. (Alarm conditions are configurable, see *WeOS User Guide*)	
DC1 and DC2	OFF	Product has no power	
	GREEN	Power OK	
	RED	Input voltage is below operating voltage limit	
RING	OFF	All ring protocols are disabled	
	GREEN	All ring protocols are OK	
	RED	A ring protocol has an error	
	FLASH	Green flash: All ring protocols are OK. A ring protocol acts as master/focal-point/root. Red flash: A ring protocol has an error. A ring protocol acts as master/focal-point/root.	
USR1	Configurable, see WeOS5 User Guide		
INTERLINK and SFP ports	OFF	No link	
	GREEN	Link established	
	GREEN FLASH	Data traffic indication	
	YELLOW	Port alarm and no link	
	YELLOW FLASH[a]	Location indicator ("Here I am"). Activated when connected to WeConfig tool, or open request from web or/and CLI.	
TX ports	OFF	No link	
	GREEN	Link established	
	GREEN FLASH	Data traffic indication	
	YELLOW	Port alarm, or port is set in blocking state by link redundancy protocol	
	YELLOW FLASH	Location indicator ("Here I am"). Activated when connected to WeConfig tool, or open request from web or/and CLI.	

[a] Only valid for SFP ports

Table 7. LED indicators

3.6. Dimensions

Dimensions are stated in mm.

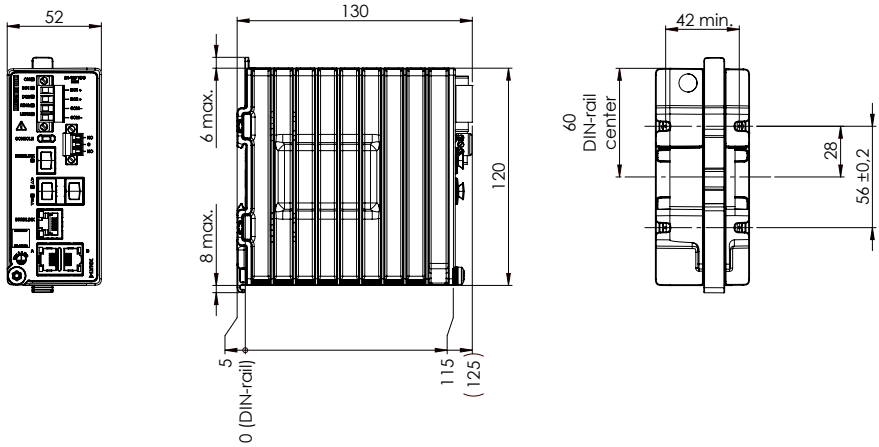


Figure 4. Dimensional drawing

4.1. Mounting

This product should be mounted on a 35 mm DIN-rail, which is horizontally mounted inside an apparatus cabinet or similar dry location.

1. To mount the product, first push the support pin down, then towards the front of the product to lock the support pin.
2. Then, place the product on to the DIN-rail. First the upper part, then the lower part of the product.
3. Lastly, push the support pin forward to lock the product to the DIN-rail. Make sure the products is secured to the DIN-rail.

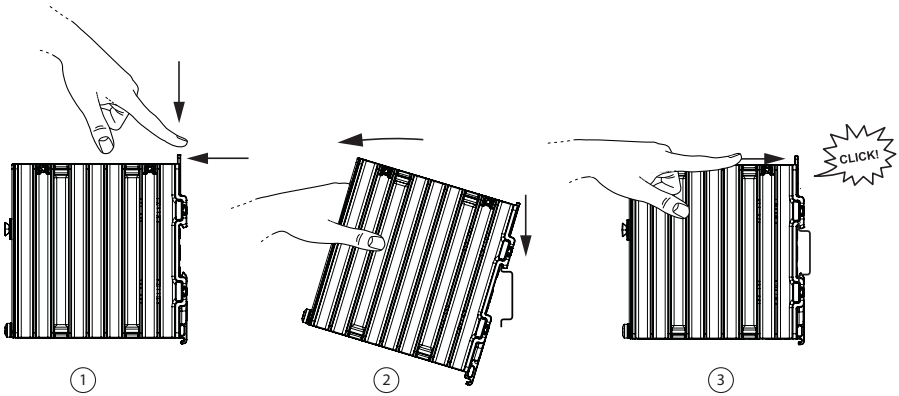


Figure 5. Mounting of product

4.2. Removal of Product

To remove the product, either push the support pin down and towards the front of the product, or press down the support at the back with a screwdriver and lift off the product from the DIN-rail.

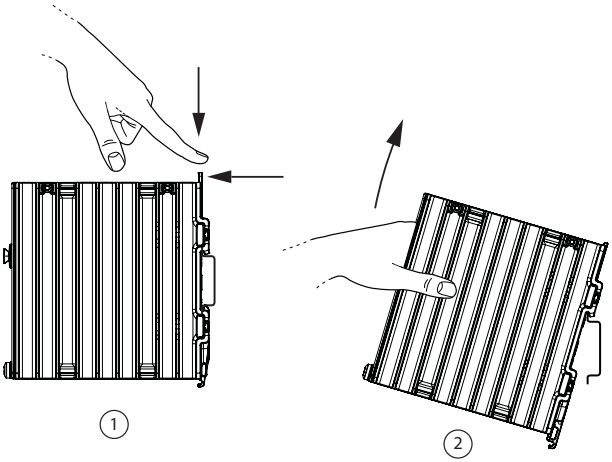


Figure 6. Removal of product by pushing the support pin

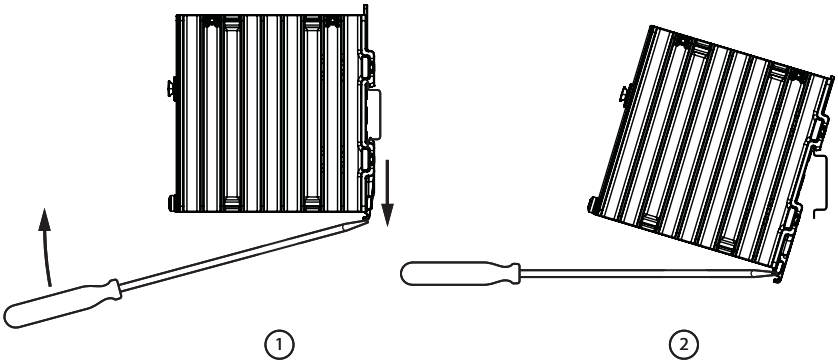


Figure 7. Removal of product with screwdriver

4.3. Panel Mounting

The product can be mounted to a panel with cage nuts made for 5.3 mm square holes with a 1-1.6 mm panel thickness.

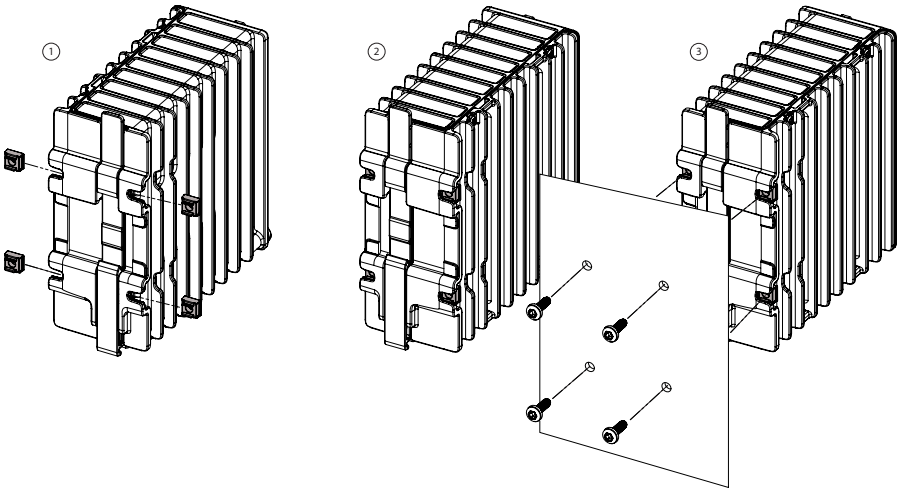


Figure 8. Panel mounting with cage nuts

4.4. Wall Mounting

The product can be mounted to a wall with screws.

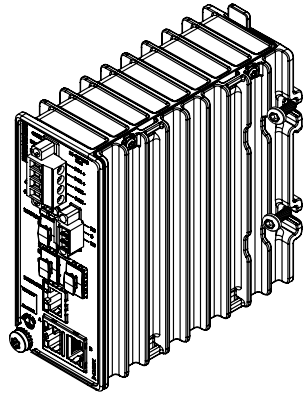


Figure 9. Wall mounting with screws

4.5. Cable Strap

The product has loops on the right side that cable straps can be attached to, to help collecting the connector cables and lead them aside.

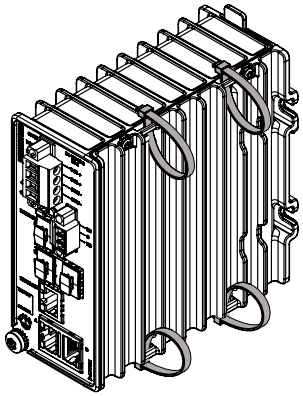


Figure 10. Cable straps

4.6. Protective Earth Connection

For correct function, the earth connection needs to be properly connected to a designated PE rail. Torx: T25 and torque: 3.2 Nm.

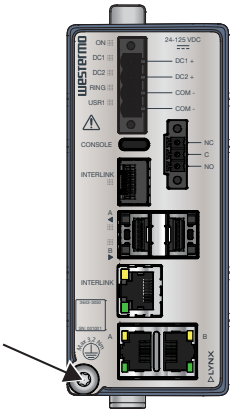


Figure 11. Earth connection

4.7. Cooling

This unit uses convection cooling. Spacing is recommended for the use of unit in full operating temperature range and service life. To avoid obstructing the airflow around the unit, use the following spacing rules. A minimum spacing of 25 mm (1.0 inch) above and below, and 10 mm (0.4 inches) left and right of the unit is recommended.

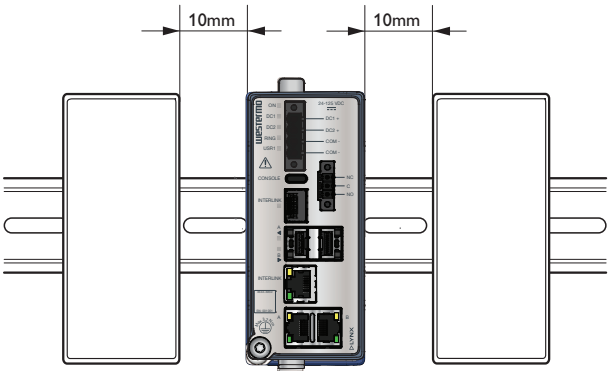


Figure 12. Miminum spacing of product

5. Specifications

5.1. Interface Specifications

Power port	
Rated voltage	24-125 VDC
Operating voltage	19.2 to 137.5 VDC
Rated current[a.]	0.3 A at 24 VDC 0.075 A at 125 VDC
Fuse rating	4A(T), 125 VDC, breaking capacity 100 A, UL248-14
Inrush current, I^2t[b.]	6.8 mA^2s at 24 VDC 95 mA^2s at 125 VDC
Startup current[c.]	2x nominal current
Polarity	Reverse polarity protected
Redundant power input	Yes
Redundant power supply	No
Shielded cable	Not required
Isolation	All other ports
Connector	Detachable screw terminal
Conductor cross section (flexible)	0.5-1.5 mm² (AWG 20-16). Use copper conductors only.
Stripping length cable	6-7 mm
Cable temperature rating	Minimum temperature rating of the cable to be connected to the field wiring terminals is +80 °C
Tightening torque, terminal screw	0.34 Nm
Tightening torque, screw flange	0.34 Nm

[a.] Including SFP transceivers

[b.] Measured for 0.1 second at startup

[c.] Recommended external supply current capability for proper startup

Ethernet TX	
Electrical specification	IEEE std 802.3
Data rate	10 Mbit/s, 100 Mbit/s, 1 Gbit/s, manual or auto
Duplex	Full or half, manual or auto
Circuit type	SELV according to EN/IEC/UL 61010-2-201 PELV according to EN/IEC 60255-27 TNV-1 according to IEC 62151
Transmission range	Up to 100 m with CAT5e cable or better
Isolation	All other ports (except to adjacent Ethernet port)
Cabling	Shielded cable CAT5e or better is recommended
Conductive chassis	Yes

I/O connection, relay output	
Contact resistance	Maximum 30 Ω
Isolation to	All other ports
Connector	Detachable screw terminal
Conductor cross section (flexible)	0.08-1.5 mm² (AWG 28-16). Use copper conductors only.
Stripping length cable	7 mm
Cable temperature rating	Minimum temperature rating of the cable to be connected to the field wiring terminals is +80 °C
Tightening torque, terminal screw	0.22-0.25 Nm
Terminal torque, screw flange	0.3 Nm
Circuit type	HLV
Type of switch	Solid state, DC general use, DC Pilot duty
Maximum withstand across open contacts	125 VDC (continous)
Permissible current	80 mA (continous), 120 mA (short term 1 s.)

SFP ports	
Optical/Electrical specification	IEEE std 802.3
Data rate	100 Mbit/s, 1 Gbit/s
Duplex	Full or half, manual or auto
Transmission range	Depending on transceiver
Connector	SFP slot holding fibre transceiver

Console port	
Electrical specification	USB 2.0 device interface
Data rate	Up to 480 Mbps (high-speed mode)
Circuit type	PELV
Maximum current consumption	100 mA
Connector	USB C connector in device mode

5.2. Type Tests and Environmental Conditions

Environmental phenomena	Basic standard	Description	Test levels
ESD	EN 61000-4-2	Enclosure	Contact: ±8 kV Air: ±15 kV
Fast transients	EN 61000-4-4	DC power port Earth port	±4 kV, direct coupling
		Ethernet ports I/O port	±4 kV, capacitive coupling clamp
Surge	EN 61000-4-5	DC power port	±4.0 kV L-E: 12 Ω/9 µF, 1.2/50 µs ±2.0 kV L-L: 2 Ω/18 µF, 1.2/50 µs
		Ethernet ports	±4.0 kV L-E: 12 Ω/9 µF, 1.2/50 µs
		I/O port	±4.0 kV L-E: 42 Ω/0.5 µF, 1.2/50 µs ±2.0 kV L-L: 42 Ω/0.5 µF, 1.2/50 µs
Power frequency magnetic field	EN 61000-4-8	Enclosure	100 A/m, cont. 1000 A/m, 3 s
Pulsed magnetic field	EN 61000-4-9	Enclosure	300 A/m
Damped oscillatory magnetic field	EN 61000-4-10	Enclosure	300 A/m (peak)
Conducted CM disturbances	EN 61000-4-16	DC power port Ethernet ports I/O port	30 V to 3 V, 15 to 150 Hz 3 V, 150 Hz to 1.5 kHz 3 V to 10 V, 1.5 to 15 kHz 30 V, 15 to 150 kHz
Mains frequency voltage			30V continuous, DC, 50 and 60 Hz, 300V for 1s
Ripple on DC power supply	EN 61000-4-17	DC power port	10% of U_N, 100 Hz and 120 Hz
Damped oscillatory wave	EN 61000-4-18	DC power port	CM: ±2.5 kV 200 Ω/0.5 µF, 1 MHz CM: ±2.0 kV 50 Ω/33 nF, 10 MHz DM: ±2.5 kV 200 Ω/0.5 µF, 1 MHz
		Ethernet ports	CM: ±2.5 kV 200 Ω/1 µF, 1 MHz direct of shield
		I/O port	CM: ±2.5 kV 200 Ω/0.5 µF, 1 MHz DM: ±2.5 kV 200 Ω/0.5 µF, 1 MHz
Voltage dips and interruptions (DC port)	EN 61000-4-29	DC power port	70% U_T, 100 ms 40% U_T, 100 ms 0% U_T, 50 ms
Radiated RF immunity	EN 61000-4-3 IEEE Std C37.90.2	Enclosure	20 V/m, 80% AM (1 kHz) at 80 MHz to 2 GHz, Spot freq.: 80, 160, 380, 450, 900, 1600, 1850 MHz 10 V/m, 80% AM (1 kHz) at 2 to 6 GHz, Spot freq.: 2150, 3800 MHz 20 V/m, pulse keying (2 Hz) at 80 MHz to 1 GHz, Spot freq.: 1732, 1800 MHz

Environmental phenomena	Basic standard	Description	Test levels
			10 V/m, pulse keying (2 Hz), Spot freq.: 2310, 2450, 5800 MHz
Conducted RF immunity	EN 61000-4-6	DC power port	10 V 0.15 to 80 MHz, Spot freq.: 27, 68 MHz
		Ethernet ports	
		Earth port	
		I/O port	
Radiated RF emission	CISPR 16-2-3	Enclosure	Class A (30 MHz to 6 GHz) Class A (FCC Part 15B) DNV-CG; Class B (0.15 to 6 GHz)
	ANSI C63.4		
Conducted RF emission	CISPR 16-2-1	DC Power port	Class A (FCC Part 15B) DNV-CG; Bridge and Deck Zone (0.01 to 30 MHz)
	ANSI C63.4		
	CISPR 32	Ethernet ports	Class A
Compass safe distance	IEC 60945	Enclosure	Minimum safe distance to: standard compass: 15 cm steering compass: 10 cm
Power supply failure	DNV-CG-0339	DC Power port	U_N-100%, 30 s
Power supply variation	DNV-CG-0339	DC Power port	1.3 x U_N (162.5 VDC), 0.75 x U_N (18 VDC), 15 min
Immunity to conducted low frequency interference	DNV-CG-0339	DC Power port	3 Vrms, 0.05 to 10 kHz
Insulation resistance	DNV-CG-0339	DC Power port and Ethernet ports to all other ports, incl. chassis	500 VDC, 60 s
		I/O port to all other ports	
	IEEE 802.3	Ethernet ports to all other ports incl. chassis	
Dielectric strength	IEC 60255-27 IEC 61010-1	DC power port to all other ports	2210 VAC rms, 60 s
		I/O port	
	IEEE 802.3	Ethernet ports to all other ports (except to adjacent Ethernet port)	1500 VAC rms, 60 s
Impulse withstand	IEC 60255-27	DC power port I/O port	5 kV

Environmental phenomena	Basic standard	Description	Test levels
		Ethernet ports	1 kV

Table 8. EMC and electrical conditions

Environmental phenomena	Basic standard	Description	Test levels
Temperatures	EN 60068-2-1 EN 60068-2-2 EN 60068-2-14	Operational	-40 to +70 °C (-40 to +158 °F)
		Storage and transport	-40 to +85 °C (-40 to +185 °F)
Humidity	EN 680068-2-30 EN 60068-2-78	Operational	5-95 % relative humidity
		Storage and transport	
Altitude		Operational	2000 m/80 kPa
Service life		Operational	10 years
MTBF hours	Telcordia		1,023,000
Vibration	IEC 60255-21-1	Operational	Class 2, 10 to 60 Hz at ±0.075 mm, 60 to 150 Hz at 1 g 1 sweep cycle in each axis, 1 octave/min.
		Non-operational, endurance test	Class 2, 10 to 150 Hz at 2 g 20 sweep cycles in each axis, 1 octave/min.
	IEC 60255-21-3, method A	Operational, seismic test	Class 2 Horizontal: 1 to 8 Hz at ±7.5 mm, 8 to 35 Hz at 2 g Vertical: 1 to 8 Hz at 3.5 mm, 8 to 35 Hz at 1 g 1 sweep cycle in each axis (3x5), 1 octave/min
	EN 60068-3-3		5 to 8 Hz at ±7.5 mm 8 to 500 Hz at 2 g 5 sweep cycles in each axis (3x5), 1 octave/min
	EN 60068-2-64	Operational	2.3 m/s^2 random, 5 to 2000 Hz, 3x1.5h
	IEEE 1613	Operational	Class V.S.3 1 to 150 Hz at <30 mm/s
Shock	IEC 60255-21-2	Operational	Class 2, 10 g/11 ms, 3x6 shocks
		Non-operational	Class 2, 30 g/11 ms, 3x6 shocks
Bump			Class 2, 20 g/16 ms, 6x1000 bumps
Fall	IEEE 1613	Non-operational	Height of fall = 100 mm
Device Reliability/ Performance Class	IEC 61850-3		Class 2: Error free, uninterrupted communication
	IEEE 1613		
Enclosure	EN/IEC 61010-1	Zink alloy	Fire enclosure
Weight			960 g
Degree of protection	EN 60529	Enclosure	IP40

Environmental phenomena	Basic standard	Description	Test levels
Cooling			Convection
Pollution degree	EN/IEC 61010-1		PD2 Macro and Micro Environment
Overvoltage category	EN/IEC 61010-1		OVC III
Insulation class	EN/IEC 61010-1		Class I equipment
Location	EN/IEC 61010-1		Indoor use

Table 9. Environmental and mechanical conditions

6. Revision Notes

Revision	Date	Change description
Rev. D	2025-06	DNV approval removed until product is approved
Rev. C	2024-11	Illustrations updated, subtitle of front page updated, 2.2 Safety Information; warning "Prevent access to hazardours voltage cable" updated; warning "Power Supply connection" deleted, 2.5.1 Agency Approvals and Standards Compliance updated, chapter 2.5.3 FCC Part 15.105 Class A Notice added, 3.4.3 I/O Connection; text updated and warning added, 3.5 LED Indicators updated, 5.1 Interface Specifications; Power port updated, I/O connection, Relay output updated, Console port updated, 5.2 Type Tests and Environmental Conditions updated
Rev. B	2024-03	Illustrations updated throughout the user guide, 3.1 Product description updated, 3.2 Available Models updated (art.no), 3.4.3 I/O Connection; new chapter, 3.5 LED Indicators updated, 5.1 Interface Specifications; I/O table added, 5.2 Type Tests and Environmental Conditions updated
Rev. A	2023-05	First version

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