westermo

www.westermo.com

RedFox 7528 Series

Industrial routing 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 5 (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.

PROTECTIVE FUSE

The power supply wiring must be sufficiently fused.

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

POWER SUPPLY CONNECTION

There are safety regulations governing the power source that can be used in conjunction with the product. Refer to chapter Interface Specifications.

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.

CORROSIVE GASES
If the product is placed in a corrosive environment, it is important that all unused connector sockets are protected with a suitable plug, in order to avoid corrosion attacks on the gold plated connector pins.

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).

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/IEC 61000-6-2, Immunity industrial environments • EN/IEC 61000-6-4, Emission industrial environments • FCC Part 15.105 class A
Trackside	• EN 50121-4/IEC 62236-4, Railway signalling and telecommunications apparatus
Safety	• EN/IEC/UL 62368-1, Safety Requirements for audio/video, information and communication technology equipment

2.5.2. 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.

2.5.3. EN/IEC/UL 62368-1 Notice

This product has been tested and found compliant to EN/IEC/UL 62368-1, Safety for Communication Technology. In accordance with the definitions of the standard, this product shall be handled by instructed personnel. Energy source classifications are according to following:

2.5.4. Corrosive Environment

This product has been successfully tested in a corrosion test according to IEC 60068-2-60, method 3. This means that the product meets the requirements to be placed in an environment classified as ISA-S71.04 class G3.

CORROSIVE GASES
If the product is placed in a corrosive environment, it is important that all unused connector sockets are protected with a suitable plug, in order to avoid corrosion attacks on the gold plated connector pins.

2.5.5. 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 RedFox-7528 Industrial Ethernet switch is designed to be a workhorse, providing performance and robustness today and for years to come. In today's world, many applications combine data, voice, and video, and as a result, high performance and reliability are required. The RedFox-7528 high performance industrial Ethernet switches provide an ideal solution for these large-scale industrial networks.

RedFox-7528 is designed for 19" cabinets according to the ETSI standard, which makes it suitable for use in control room networks as well as for cabinets installed along railway trackside installations. In addition to the ultra-rugged IP40 fanless all metal housing, it is equipped with configurable I/O fault contacts, which makes it ideal for easy installation and monitoring in industrial applications.

To ensure long service life and market leading MTBF, only industrial grade components are used. In addition, the switches can withstand constant vibration, extreme temperatures and demanding electrical environments. RedFox-7528 has been tested both by Westermo and external test labs to meet many standards regarding EMC, isolation, vibration and shock, all to the highest levels suitable for heavy industrial environments and rail trackside applications.

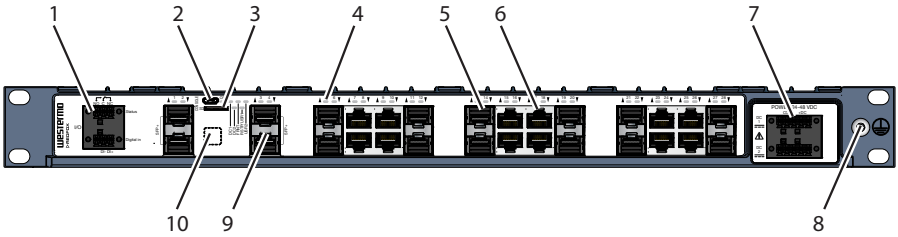
Powered by WeOS, the Westermo network operating system, the switches are flexible, feature-rich as well as easy to install and configure. WeOS has been developed to allow cross-platform and future-proof solutions and can deliver resilient and flexible networks, e.g. the FRNT ring protocol with very fast failover.

Ensuring the security of industrial data communication networks is of paramount importance, especially with the nature of cyberattacks becoming increasingly sophisticated. To reduce risk and increase cyberresilience, RedFox-7528 has an extensive suite of advanced cybersecurity features. These can be used to build networks in compliance with the IEC 62443 standard, which defines technical security requirements for data communication network components.

3.2. Available Models

Art. no.	Model	No. of copper ports	No. of SFP ports	No. of SFP+ ports	Layer
3641-4540	RedFox-7528-F4G10-F12G-T12G-LV	12	12	4	Layer 2
3641-4440	RedFox-7528-E-F4G10-F12G-T12G-LV	12	12	4	Layer 3

3.3. Hardware Overview



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

[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

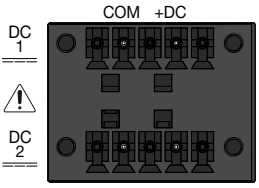
Illustration	Product marking	Direction	Description
	+DC1	Input	Supply voltage
	+DC2	Input	Supply voltage
	-COM	Input	Common
	-COM	Input	Common

Table 2. Power input LV models

3.4.2. I/O Connection

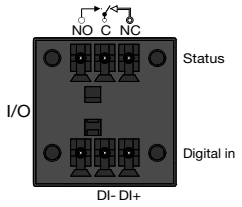
Illustration	Position	Product marking	Direction	Description
	Digital in	DI+	Input	Digital in+
		DI-		Digital in-
	Status	Status NO	Output	Alarm (status) relay contact NO - Normally Open C - Common NC - Normally Closed
		Status C		
		Status NC		

Table 3. I/O connection

The Digital in is an opto-isolated digital input, which can be used to monitor external events.

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 4. Status output

3.4.3. 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.

3.4.4. Micro SD

To insert the micro SD card correctly, turn the gold plated pins upwards.

Figure 4. Insertion of micro SD card

3.4.5. SFP Transceivers

The product supports UL and IEC certified transceivers only. See Westermo's modular transceivers datasheets for supported SFP and 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
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 *WeOS5 User Guide*)
RSTP/ USR1	OFF	RSTP disabled
	GREEN	RSTP enabled
	BLINK	Product selected as RSTP/STP root switch
	USR1	Configurable, see *WeOS5 User Guide*
FRNT	OFF	FRNT disabled
	GREEN	FRNT OK
	RED	FRNT error
	FLASH	Product configured as FRNT focal point
DC1	OFF	Product has no power
	GREEN	Power OK on DC1
	RED	Input voltage is below operating voltage limit
DC2	OFF	Product has no power
	GREEN	Power OK on DC2
	RED	Input voltage is below operating voltage limit
USR2	Configurable, see *WeOS5 User Guide*	
TX/FX 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

Table 5. LED indicators

3.6. Dimensions

Dimensions are stated in mm.

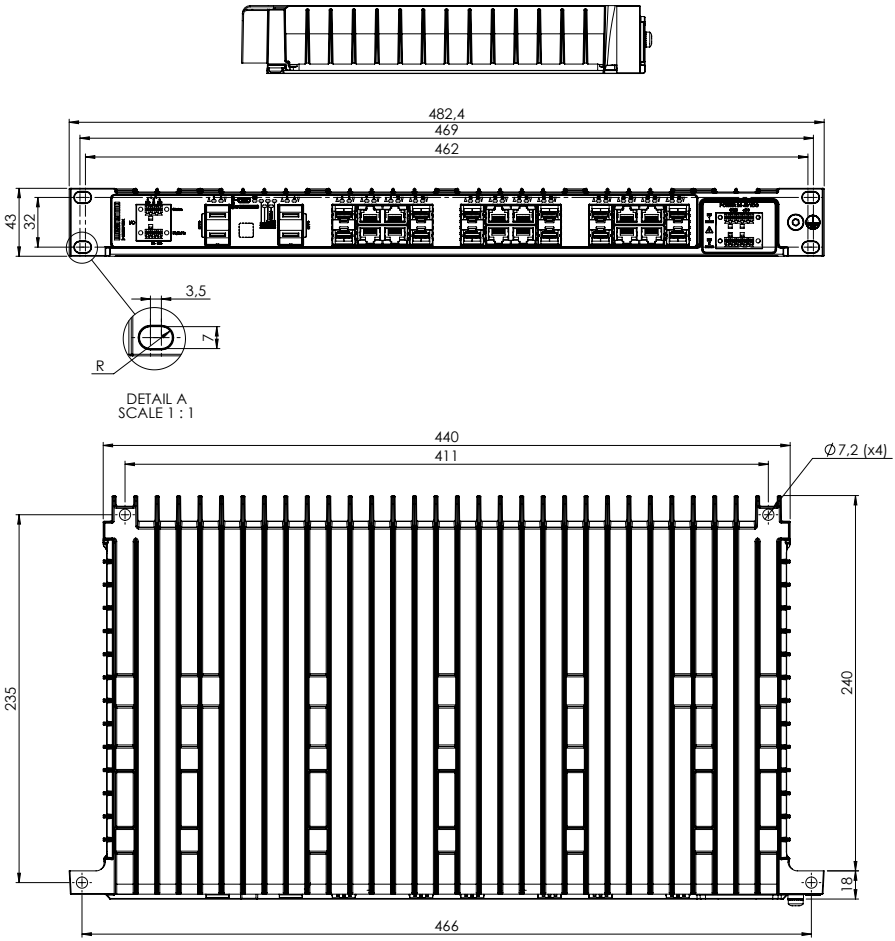


Figure 5. Dimensional drawing, illustrated by a RedFox-7528-F4G10-F12G-T12G-LV

4. Mounting

RedFox is designed for installation in 19" rack solutions according to ETSI standard, with a shallow depth of 240 millimetres. It can also be wall mounted as an installation option.

4.1. Rack Mounting

The product can be mounted in all directions inside a 19" apparatus cabinet. Use supplied M6x25 (Philips no. 3) or 1/4x1" screws.

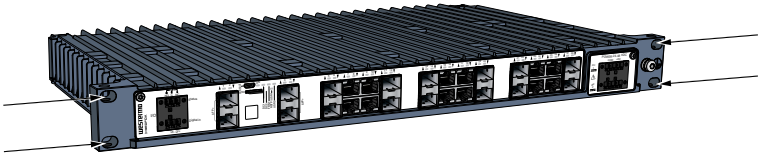


Figure 6. Rack mounted product

4.2. Wall Mounting

The product can be wall mounted in all directions. Use maximum 6.4 mm or 1/4" screws.

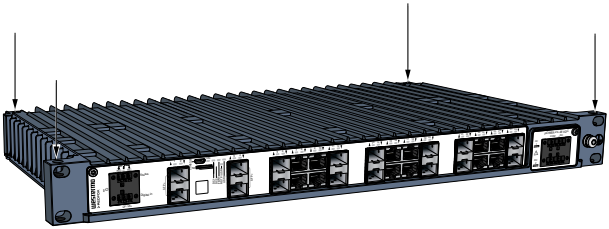


Figure 7. Wall mounted product

4.3. 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.

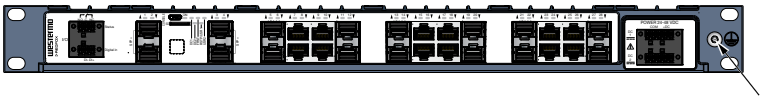


Figure 8. Earth connection

4.4. Cooling

This product relies on convection cooling. To avoid obstruction of the airflow around the product, follow the spacing recommendations.

For mounting in 19" apparatus cabinet without forced ventilation, a minimum spacing of 1U according to IEC 60297 or 45 mm (1.75") above and below is recommended.

For wall mounting in an area without forced ventilation, a minimum spacing of 45 mm (1.75") above and below, and 10 mm (0.4") left and right is recommended.

5. Specifications

5.1. Interface Specifications

Power port	
Rated voltage	24-48 VDC
Operating voltage	18-60 VDC
Rated current	1.39 A at 24 VDC 0.68 A at 48 VDC
Fuse rating Component: U2	4A(T), 125 VDC, breaking capacity 100 A, UL248-14
Rated frequency	DC
Inrush current, I^2t[a.]	75 mA^2s at 24 VDC 365 mA^2s at 48 VDC
Startup current	2x nominal current
Polarity	Reverse polarity protected
Redundant power input	Yes
Isolation	All other ports
Connector	Detachable screw terminal
Conductor cross section	0.5-1.5 mm² (AWG 20-16) 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 +77 °C
Tightening torque, terminal screw	0.34 Nm
Tightening torque, screw flange	0.34 Nm
Shielded cable	Not required

[a.] Measured for 1 second at startup

I/O connection, Digital input	
Isolation to	All other ports
Connector	Detachable screw terminal
Conductor cross section	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 +77 °C
Tightening torque, terminal screw	0.22 - 0.25 Nm
Terminal torque, screw flange	0.3 Nm
Circuit type	SELV
Maximum voltage/ current	60 VDC, I_{IN} ≤ 2.9 mA at 60 VDC
Voltage levels	Logic one: >8 VDC Logic zero: <5 VDC

I/O connection, Relay output	
Connect resistance	Maximum 30 Ω
Isolation to	All other ports
Connector	Detachable screw terminal
Conductor cross section	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 +77 °C
Tightening torque, terminal screw	0.22 - 0.25 Nm
Terminal torque, screw flange	0.3 Nm
Circuit type	SELV
Type of switch	Solid state, DC general use, DC Pilot duty
Maximum withstand across open contacts	60 VDC (continous)
Permissible current	80 mA (continous), 120 mA (short term 1 s.)

Ethernet TX[a.]	
Electrical specification	IEEE std 802.3
Data rate	10 Mbit/s, 100 Mbit/s, 1000 Mbit/s, manual or auto
Duplex	Full or half, manual or auto
Circuit type	TNV-1
Transmission range	Up to 100 m with CAT5e cable or better
Isolation	All other ports
Cabling	Shielded cable CAT5e or better is recommended
Conductive chassis	Yes

[a.] 10/100/1000 Mbit/s ports are: 7-10, 15-18, 23-26

SFP ports[a.]	
Optical/Electrical specification	IEEE std 802.3
Data rate	100 Mbit/s, 1000 Mbit/s[b.]
Duplex	Full or half, manual or auto
Transmission range	Depending on transceiver
Connector	SFP slot holding fibre transceiver

[a.] SFP ports are: 5-6, 11-14, 19-22, 27-28

[b.] 100 Mbit/s or 1000 Mbit/s tranceiver supported

SFP+ ports[a.]	
Optical/Electrical specification	IEEE std 802.3
Data rate	1000 Mbit/s, 10 Gbit/s[b.]
Duplex	Full or half, manual or auto
Transmission range	Depending on transceiver
Connector	SFP+ slot holding fibre transceiver

[a.] SFP+ ports are: 1-4

[b.] 1000 Mbit/s or 10 Gbit/s tranceiver supported

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

Micro SD	
Electrical specification	Secure Digital 2.0
Circuit type	SELV
Maximum supply current	100 mA
Connector	Micro SD connector

5.2. Type Tests and Environmental Conditions

Environmental phenomena	Basic standard	Description	Test levels
ESD	EN 61000-4-2	Enclosure	Contact: ±6 kV Air: ±8 kV
Fast transients	EN 61000-4-4	Power port I/O ports Earth port	± 2 kV, 5 kHz, 100 kHz
Surge 1.2/50 µs	EN 61000-4-5	Power port	L-E: ± 1 kV, 12 Ω, 9 µF L-E: ± 2 kV, 42 Ω, 0,5 µF L-L: ± 0,5 kV, 2 Ω, 18 µF L-L: ± 1 kV, 42 Ω, 0,5 µF
		I/O ports	L-E: ± 2 kV, 42 Ω, 0.5 µF L-L: ± 1 kV, 42 Ω, 0.5 µF
		Ethernet ports	L-E: ± 2 kV, 2 Ω direct on shield
Power frequency magnetic field	EN 61000-4-8	Enclosure	100 A/m, 16.7, 50 and 60 Hz 300 A/m DC
Pulsed magnetic field	EN 61000-4-9	Enclosure	300 A/m
Radiated RF immunity	EN 61000-4-3	Enclosure	20 V/m at (80 MHz to 2.7 GHz) 10 V/m at (2.7 to 6 GHz)
Conducted RF immunity	EN 61000-4-6	Power port Ethernet ports I/O ports Earth port	10 V, 80% AM, 1 kHz; (0.15-80) MHz
Radiated RF emission	CISPR 16-2-3	Enclosure	Class A, (30-6000 MHz)
	ANSI C63.4		Class A (FCC Part 15 B, 30 MHz to 26 GHz)
Conducted RF emission	CISPR 16-2-1	Power port	Class A
	ANSI C63.4		Class A, (FCC Part 15 B)
	CISPR 22	Ethernet ports	Class A
Dielectric strength	EN/IEC/UL 62368-1	Power-, I/O- and Ethernet-ports to all other ports, incl. chassis	1500 VAC rms, 60 s
	IEEE 802.3	Ethernet-ports to all other ports, incl. chassis	1500 VAC rms, 60 s

Table 6. EMC and electrical conditions

Environmental phenomena	Basic standard	Description	Test levels
Temperatures	EN 60068-2-1 EN 60068-2-2	Operational	-40 to +70 °C (-40 to +158 °F)[a.]
		Storage and transport	-40 to +85°C (-40 to +185°F)
Humidity	EN 60068-2-30	Damp heat, cyclic	+25 to 55°C, 95% RH 2 cycles (12+12 hours) = 48 hours
Corrosive gases	IEC 60068-2-60	Operating	Method 3, 21 days[b.]
Altitude		Operational	2000 m/80 kPa
MTBF hours	MIL-HDBK 217F		371,000 hours
	Telcordia		763,000 hours
Vibration	IEC 60068-2-6 (sine)	Operational	5 - 8 Hz: ±7.5 mm 8 - 500 Hz: 2 g 5 sweeps per axis
	IEC 60068-2-64 (random)	Operational, endurance test	5 - 2000 Hz, 2.3 m/s^2 rms 90 minutes per axis
Shock	IEC 60068-2-27	Operational	15 g, 11 ms
Enclosure	EN/IEC/UL 62368-1	Aluminium	Fire enclosure
Weight			3.8 kg
Degree of protection	EN 60529	Enclosure	IP40
Cooling			Convection
Location			Indoor use

[a.] Depending on SFP+ transceiver types, contact Westermo for more information.

[b.] Method 3, 21 days corresponds to Harsh Industrial Environment G3 which is defined in ANSI/ISA 17.04: 2015

Table 7. Environmental and mechanical conditions

6. Revision Notes

Revision	Date	Change description
Rev. E	Jan 2025	Illustrations in chapter 4 updated
Rev. D	Dec 2024	3.2 Available Models updated, 4.4 Cooling updated
Rev. C	April 2023	3.5 LED Indicators updated (ON; Blink deleted)
Rev. B	June 2022	2.5.1 Agency Approvals and Standards Compliance; "pending" removed from EN/IEC/UL 62368-1, 2.5.3 EN/IEC/UL 62368-1 Notice; pending removed, 5.2 Type Tests and Environmental Conditions; test level for operational temperatures updated
Rev. A	May 2022	First version of the user guide

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