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Ibex-3510 Series

EN 50155 Wi-Fi 6E Access Point

IBEX

Table of Contents

1. General Information

1.1. Legal Information

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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.

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.

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.

Note that this product can be connected to two different power sources.

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. The fuse must be IEC 60127 certified and rated for T1.6 A and 250 V.

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

This product has no internal fuse and should be connected via an external fuse for protection.

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.

RADIO PRODUCTS

Observe the usage limitations of radio products at filling stations, in chemical plants, in systems with explosives or potentially explosive locations.

The product may not be used in airplanes. Exercise particular caution near personal medical aids, such as pacemakers and hearing aids. Never perform work on the antenna system during a thunderstorm.

To fulfill human safety, a minimum separation distance of 20 cm or more should be maintained between the antenna of the product and personnel during operation.

HOT SURFACE

Be aware that the surface of this product may become hot. When it is operated at high temperatures, the external surface may exceed Touch Temperature Limit according to the product's relevant electrical safety standard.

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.

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.

NOTE
Devices not used shall be kept in the factory sealed moisture barrier bag. Open, unsealed devices should not be kept unpowered for more than 30 days.

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.

By ensuring the product is disposed of correctly, you will help to reduce hazardous substances and prevent potential negative consequences to both the environment and human health, which could be caused by inappropriate disposal.

Figure 1. WEEE symbol for treatment of product disposal

2.5. Compliance Information

REGULATORY NOTICE
Any changes or modifications shall be approved by the party responsible for compliance. If not, users could void the user's authority to operate the equipment. Country code and antenna gain need to be set properly for correct functionality in the installed country.

2.5.1. Agency Approvals and Standards Compliance

Approvals and Standards	
Climate	• EN 50155, class OT4 Railway applications - Electronic equipment used on rolling stock
EMC	• EN 50155, Railway applications - Electronic equipment used on rolling stock • EN 50121-3-2, Railway applications – Electromagnetic compatibility, Part 3-2: Rolling stock – Apparatus • ETSI EN 301 489-1, Electromagnetic compatibility (EMC) and Radio spectrum Matters (ERM) for radio equipment and services - Part 1: Common technical requirements • ETSI EN 301 489-17, Electromagnetic compatibility (EMC) and Radio spectrum Matters (ERM) for radio equipment - Part 17: Specific conditions for Broadband Data Transmission Systems
Mechanical (Shock and vibration)	• EN 61373, category 1, class B
Insulation (Coordination and test)	• EN 50155, Railway applications - Electronic equipment used on rolling stock
Radio communication	• ETSI EN 300 328, Wideband transmission systems; Data transmission equipment operating in the 2.4 GHz ISM band and using wide band modulation techniques • ETSI EN 301 893, 5 GHz RLAN • ETSI EN 300 440, 5.8GHz, Short Range Devices • ETSI EN 303 687, 6 GHz RLAN • IEEE802.11, Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications
Safety	• EN/IEC 61010-1, Safety requirements for electrical equipment for measurement, control, and laboratory use • EN 45545-2, Fire protection on railway vehicles

2.5.2. 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 Ibex-3510 is a concurrent tri-band 802.11ax WLAN access point and client product for onboard and stationary applications. The access points provides reliable efficient high-speed data transfers, it can be used for passenger hotspot applications, remote maintenance access, data offloading or as part of a TCMS network.

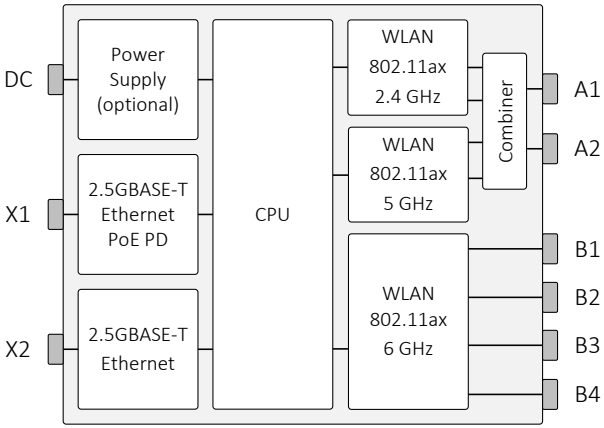


Figure 3. Ibex-3510 block diagram

The Westermo configuration management tool, WeConfig, can be used for discovery and basic configuration and maintenance. The configuration can be done locally or remotely via SNMP or via WebGUI/API. The status information is available in local LED status indicators, and through SNMP or WebGUI/API.

The Ibex-3510 access point is designed to withstand tough onboard environmental conditions.

Integrating hardware, software and network design support tools, this access point platform offers advanced capabilities, the lowest total cost of ownership and will create the most reliable and resilient networks.

The access point is engineered to maintain uninterrupted data communication, even in exceptionally harsh environments. Tested and certified to withstand extreme temperatures, vibrations and shocks, these products only use industrial grade components which contributes towards a market leading mean time between failure (MTBF), maximized service life, and reduced operational and life cycle costs.

3.2. Available models

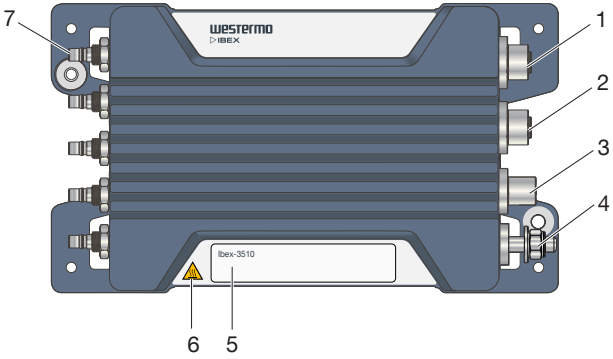
Art. no.	Model	Region	PoE Port	Rated voltage
3628-35101	Ibex-3510-T2G2.5 EU	Europe	X1	24-110 VDC
3628-35102	Ibex-3510-T2G2.5 NA[a.]	North America	X1	24-110 VDC
3628-35111	Ibex-3510-T2G2.5-PoE EU	Europe	X1	-
3628-35112	Ibex-3510-T2G2.5-PoE NA[a.]	North America	X1	-

[a.] FCC approval pending

Table 2. List of available models

3.3. Hardware Overview

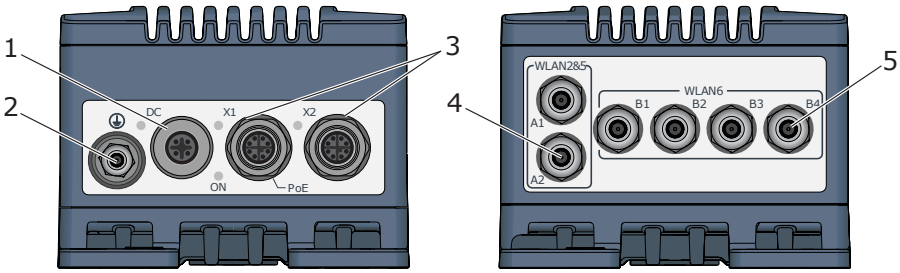
3.3.1. Frontside Overview



No.	Description	No.	Description
1	2.5 Gigabit Ethernet port X2	2	2.5 Gigabit Ethernet port X1 (PoE)
3	Power input DC (optional)[a.]	4	Protective earth terminal
5	Frontside label	6	Warning symbol for surface temperatures above +60°C
7	Antenna ports A1 - A2 (2.4 GHz / 5 GHz) Antenna ports B1 - B4 (6 GHz)		

Table 3. Location of interface ports

3.3.2. Interface Ports View



No.	Description	No.	Description
1	Power input DC (optional)[a.]	2	Protective earth terminal
3	Ethernet 2.5GBase-T ports (X1 PoE)	4	Antennas A1 - A2, 2.4 GHz / 5 GHz
5	Antennas B1 - B4, 6 GHz		

[a.]DC power supply not included in "PoE only" product variants

Table 4. Interface ports view

3.4. Connector Information

3.4.1. Power Input Connection

The Ibex-3510 product variants can be equipped with a DC dual input power port that meets the following specifications. Refer also to the LED status indicators.

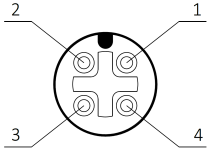
Marking	Position	Direction	Description	
DC	1	+DC1	Positive terminal	
	2	+DC2	Positive terminal	
	3	-DC	Negative terminal	
	4	-DC	Negative terminal	
	Housing	Shield	Chassis of product (ground)	

Table 5. M12 A-coded 4-pin male power connector according to IEC 61076-2-101

3.4.2. Ethernet Ports

The product includes two Ethernet ports X1 and X2 which supports auto-negotiated 10 Mbit/s, 100 Mbit/s, 1000 Mbit/s and 2500 Mbit/s operation. Automatic MDI/MDIX crossover is supported for 10BASE-T, 100BASE-T, 1000BASE-T and 2500BASE-T operation.

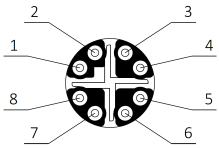
Marking	Position	Direction	Description	
X1/X2	1	In/Out	DA+	
	2	In/Out	DA-	
	3	In/Out	DB+	
	4	In/Out	DB-	
	5	In/Out	DD+	
	6	In/Out	DD-	
	7	In/Out	DC-	
	8	In/Out	DC+	
	Housing	Shield	Chassis of product (ground)	

Table 6. M12 X-coded 8-pin female Ethernet connector according to IEC 61076-2-109

Position	Device mode A	Device mode B
1	+DC	
2	+DC	
3	-DC	
4	-DC	
5		-DC
6		-DC
7		+DC
8		+DC

Table 7. Ethernet PoE connection on X1

NOTE
If the Ethernet function is not used, the protective dust cap which is part of the delivery must be closed to protect the interface from water or dust ingress.

3.4.3. Antenna Ports

The antenna connectors are identified on the product with A1 to A2 and B1 to B4.

A1 and A2 are combined antenna ports for 2.4 GHz and 5 GHz WLAN communication. At least A1 must be connected to an external WLAN antenna. The antenna configuration is made through the software interface.

B1 to B4 are used for WLAN communication at 6 GHz. At least B1 must be connected to an external WLAN antenna. The antenna configuration is made through the software interface.

NOTICE
Any unused antenna ports must be properly terminated with 50 Ohm, otherwise the product might be damaged when power is applied to a non-terminated antenna port.

NOTE
To ensure specified IP protection, suitable QMA connectors/cables and terminations must be used.

3.5. LED Indicators

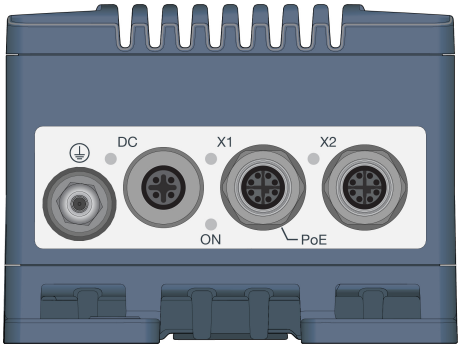


Figure 4. LED indicators

LED	Description
DC	Power status
ON	Operation status
X1	Ethernet status for X1 port
X2	Ethernet status for X2 port

Table 8. LED indicators

NOTE
The power status LED is green if both input power sources are available. The LED lights up red if only one power input source is provided.

NOTE
Refer to management guide for detailed LED status indication.

3.6. Dimensions

Dimensions are stated in mm and are regardless of variants.

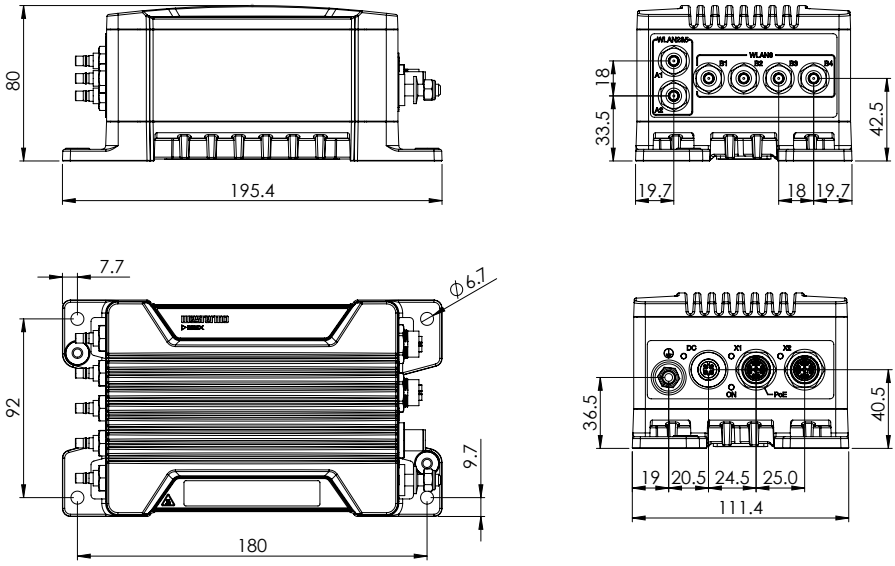


Figure 5. Dimensional drawing

4. Installation

4.1. Mounting

The product is fixed with the four fixing points located at the corners of the product. M6 screws are used for the fixation of the product. The screws are tightened with min. 3.0 Nm (fixing screw ISO 898/1, quality class 8.8).

NOTICE
All four specified fixing points must be used for fixing. The installation surface should be flat to have all fixing points connected to the surface.

NOTE
For indoor installation, consider additional protection against dust to ensure proper heat dissipation.

NOTE
For outdoor installation, consider additional protection against sun radiation, dust and dirt to optimize ambient temperature range.

NOTE
Unused connectors must be covered by a protective cap (delivered with the product), tightened to the specified torque in order to fulfill the specified ingress protection code.

4.2. Factory Reset

To reset the product into factory default settings, a reset adapter is needed which is plugged into one of the Ethernet ports X1 or X2 during startup.

Art. no.	Description
3623-0799	Factory Reset Plug, X-coded

Factory reset procedure

1. Plug the factory reset adapter to one of the Ethernet interfaces.
2. Power the product.
3. Wait until factory reset adapter is detected. This is indicated by a solid RED ON LED.
4. Remove factory reset adapter within 15 seconds.
5. Successful initiation of the factory reset is indicated by blinking RED ON LED.

4.3. Earth connection

For correct function, the earth connection at the grounding point needs to be properly connected to a solid ground. An M6 grounding screw at the housing is used for grounding. A short wire with a cross section of at least 4 mm2 shall be used. The grounding wire is set below the rip-lock washer. The nut is fixed for good reliable grounding contact. The tightening torque of the grounding nut should not exceed 10 Nm.

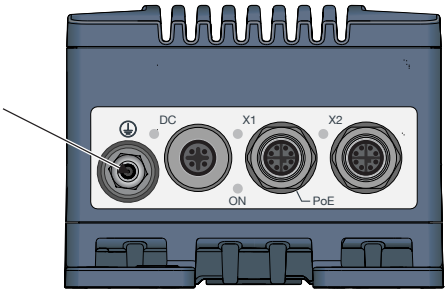


Figure 6. Earth connection

NOTICE
Do not use equipment without protective earth connection.

4.4. Connection of Cables

Recommended tightening torque for the M12 connectors is 0.6 Nm. All M12 connections are screw connections.

When connecting the power cable, ensure that the pins are connected correctly before tightening the power cable to the unit.

NOTE
This product has no replaceable fuse and should be connected via an external fuse for protection.

4.5. Cooling

This product uses convection cooling. Make sure that it is installed so that the ambient temperature is within the specified temperature range, e.g. by avoiding obstruction of the airflow around the product.

It is recommended to install the product in areas where the natural convection airflow is not blocked and that there is enough spacing around the product.

When operating the product at high ambient temperatures, it is recommended to mount the product to a metallic base plate to improve the heat dissipation. The base plate increases the surface to spread the heat.

NOTICE
Limited air flow is rising the product temperature and may lower the upper limit of the operating temperature range.

NOTICE
Temperature is dependent on the operational parameters, like RF output power, amount of traffic.

NOTICE
This product has integrated temperature sensors for monitoring the internal device temperatures. If temperature limits are exceeded, alarms are sent through the SW interface.

NOTICE
The operating conditions shall be ensured so that the normal operation does not cause temperature alarms. Improve installation conditions or RF parameters in case of any temperature alarms.

4.6. Replacement of Product

The device cannot be repaired. In case of a malfunction, it must be replaced.

Disconnect all cables and unscrew the product from the wall. Mount the replacement product and reconnect all cables, observing the instructions in Connection of Cables.

MTTR (Mean Time To Repair), i.e. time for replacement of product is: < 10 minutes.

HOT SURFACE

Be aware that the surface of this product may become hot. When it is operated at high temperatures, the external surface may exceed Touch Temperature Limit according to the product's relevant electrical safety standard.

5. Specifications

5.1. Interface Specifications

DC, Power port	
Connector	M12 A-coded male
Rated voltage	24 to 110 VDC, Class 1
Operating voltage	16.8 to 143 VDC
Rated power	17 W
Rated frequency	DC
Startup current	2 x rated current
Polarity	Reverse polarity protected
Redundant power input	Dual input port
Conductor cross section (flexible)	> 0.5 mm² (AWG 20)
Cable temperature rating	-40 to +70°C
Shielded cable	Not required

PoE (on X1)	
Connector	M12 X-coded female
Device mode	A and B
Rated voltage	48 VDC
Operating voltage	37 to 57 VDC
Power classification	Class 4

Ethernet	
Connector	M12 X-coded female
Electrical specification	IEEE std 802.3
Data rate	10 Mbit/s, 100 Mbit/s, 1000 Mbit/s, 2500 Mbit/s manual or auto
Duplex	Full or half, manual or auto
Transmission range	Up to 100 m with CAT5e cable or better
Cabling	Shielded cable CAT5e or better is recommended
Conductive chassis	Yes

NOTE
The product is to be connected to internal Ethernet networks without exiting a facility and being subjected to TNVs.

NOTICE
To avoid damages on the Ethernet interfaces, ensure that the far end side of the Ethernet cable shield itself is connected to protective earth.

Antenna WLAN (A1 to A2, B1 to B4)	
Connector	QMA female
Direction	Transmit and receive
Cabling	50 Ohm coaxial cable and WLAN antenna required
Conductive chassis	Yes
WLAN interfaces	2x2 MU-MIMO for 2.4 GHz and 5 GHz, 802.11a/g/n/ac/ax Access Point 4x4 MU-MIMO for 6 GHz, 802.11ax Access Point
WLAN frequency bands	2.400 to 2.4835 GHz 5.150 to 5.350 GHz, 5.470 to 5.725 GHz, 5.725 to 5.850 GHz 5.925 to 7.125 GHz
Transmitting power[a.]	2.4 GHz and 5 GHz: up to 25 dBm, per port: 22 dBm 6 GHz: up to 26 dBm, per port: 20 dBm

[a.] Max. conducted transmit power within the whole frequency range and for all data rates

NOTICE
Depending on the installation country there are frequency/band restrictions and output power limitations.

NOTICE
Unused antenna port must be terminated with 50 Ohm terminations.

NOTICE
To avoid damages on the antenna interfaces, ensure that the far end side of the antenna cable and/or the antenna itself is connected to protective earth.

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	DC power port	± 2 kV, direct coupling
		Ethernet ports	± 2 kV, capacitive coupling clamp
		Antenna ports	
Surge	EN 61000-4-5	DC power port	L-E: ± 1 kV, 12 Ω, 9 µF, 1.2/50 µs L-E: ± 2 kV, 42 Ω, 0.5 µF, 1.2/50 µs L-L: ± 1 kV, 12 Ω, 9 µF, 1.2/50 µs L-L: ± 2 kV, 42 Ω, 0.5 µF, 1.2/50 µs
		Ethernet ports	Shield-E: ± 2 kV, 2 Ω, 1.2/50 µs
		Antenna ports	
Power frequency magnetic field	EN 61000-4-8	Enclosure	300 A/m continues, DC, 16.7 Hz, 50 Hz, 60 Hz
Radiated RF immunity	EN 61000-4-3	Enclosure	20 V/m, 80% AM (1kHz) at 80 MHz to 6 GHz 30 V/m, PM 200 Hz square at 380 MHz to 385 MHz 30 V/m, PM 200 Hz square at 390 MHz to 395 MHz
Conducted RF immunity	EN 61000-4-6	DC power port	10 V, 80% AM (1 kHz) from 0.15 to 80 MHz
		Ethernet ports	
		Antenna ports	
Radiated RF emission	EN 55032	Enclosure	Class A
Conducted RF emission	EN 55032	DC power port	Class A
		Ethernet ports	
Insulation resistance	EN 50155	Power port (DC) to all other ports	> 100 MOhm
Dielectric strength	EN 50155	Power port (DC) to all other ports	2200 VDC, 60 s

Table 9. 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)[a.]
		Storage and transport	-55 to +85°C (-67 to +185°F)
Humidity	EN 60068-2-30	Operational	5-95 % relative humidity
		Storage and transport	
Altitude		Operational	3000 m
MTBF	IEC TR 62380		319,000 hours 377,000 hours (PoE product variant only)
Vibration	EN 60068-2-64 (random)	Operational, endurance test	11.44 m/s^2 random, 5 to 150 Hz, 3 x 5 h
Shock[b.]	EN 60068-2-27	Operational	100 m/s^2, 30 ms, 3 x 6 shocks (half sine)
	MIL STD 810, M516.7		20 g, 11 ms, 3 x 6 shocks (saw tooth)
Weight			1650 gr
Degree of protection	EN 60529	Enclosure	IP66[c.]
Cooling			Convection
Pollution degree	EN 61010-1		PD2
Conformal coating type	IPC-A-610	Electronic modules	AR (Acrylic)

[a.] Refer to "Safety and Regulations" chapter regarding touch temperature

[b.] The power and Ethernet cables need to be fastened 200 mm or closer to the unit. The same recommendation applies to the Antenna cables.

[c.] Provided all connectors are connected with IP66 cabling or fitted with protective caps (delivered with the unit) and tightened to the specified torque

Table 10. Environmental and mechanical conditions

6. Abbreviations and Terms

Abbreviation	Description
6E	Wi-Fi 6 extended capabilities supporting 6 GHz channels.
AM	Amplitude Modulation
AREMA	American Railway Engineering and Maintenance-of-Way Association
AWG	American Wire Gauge
CAT5e	Category 5 Enhanced Cable
CE	Conformité Européenne
CPU	Central Processing Unit
DC	Direct Current
EMC	Electromagnetic Compatibility
EN	European Standard
ERR	Error
ESD	Electro Static Discharge
ETSI	European Telecommunications Standards Institute
FCC	Federal Communication Commission
FLOSS	Free/Libre Open Source Software
IEC	International Engineering Consortium
IC	Industry Canada
ID	Identification
I/O	Input / Output
IP	Ingress Protection
ISO	International Standardization Organisation
LAN	Local Area Network
LED	Light Emitting Diode
MIMO	Multiple Input, Multiple Output
MTBF	Mean Time between Failure
MTTR	Mean Time to Repair
OPR	Operation
QR	Quick Response
RF	Radio Frequency
SN	Serial Number
SNMP	Simple Network Management Protocol
TNV	Telephone Network Voltage

Abbreviation	Description
WebAPI	Web Application Programming Interface
WebGUI	Web Graphical User Interface
WeConfig	Westermo Configuration Tool
WEEE	Waste Electrical and Electronics Equipment
Wi-Fi	Wireless Fidelity
WLAN	Wireless Local Area Network

Table 11. Abbreviations and terms

7. Revision Notes

Revision	Date	Change description
Rev. A	2024-02	First revision

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