westermo

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IBEX

Ibex-RT-330 Series

EN 50155 LTE Router

Contents

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 www.westermo.com.

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 Safety and Regulations

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.

This product relies on 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.

	**WARNING – SAFETY DURING INSTALLATION** The product must be installed and operated by qualified service personnel and installed info an apparatus cabinet or similar, where access is restricted to service personnel only. For Ibex products outdoor installation is allowed. During installation, 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. If the product does not have a protective earthing terminal, then the DIN-rail must be connected to protective earth. Upon removal of the product, ensure that the protective earthing conductor, or the connection to earth via the DIN-rail, is disconnected last.
	**WARNING - HAZARDOUS VOLTAGE** Do not open a connected product. Hazardous voltage may occur when connected to a power supply.
	**WARNING - 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.
	**WARNING - POWER SUPPLY CONNECTION** There are safety regulations on which power sources that shall be used in conjunction with the product.

	**WARNING – RADIO PRODUCTS** Observe the usage limitations of radio products at filling stations, in chemical plants, in systems with explosives or potentially explosives locations. The devices 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 personell during operation.
	**CAUTION - HOT SURFACE** Be aware of 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.
	**CAUTION - 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 goldplated connector pins.
	**CAUTION - CABLE TEMPERATURE RATING** There may be a requirement on the minimum temperature rating of the cable to be connected to the field wiring terminals, see 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.
- Do not use harsh chemicals, cleaning solvents or strong detergents to clean the product.
- 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, 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 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.

2.5.1 Agency Approvals and Standards Compliance

Type	Approval/Compliance
Climate	• EN 50155, class OT4, Railway applications – Electronic equipment used on rolling stock
EMC	• 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 301 489-19, Electromagnetic Compatibility (EMC) standard for radio equipment and services - Part 19: Specific conditions for Receive Only Mobile Earth Stations (ROMES) operating in the 1,5 GHz band providing data communications and GNSS receivers operating in the RNSS band (ROGNSS) providing positioning, navigation, and timing data • ETSI EN 301 489-24, Electromagnetic compatibility (EMC) and Radio spectrum Matters (ERM) for radio equipment and services - Part 24: Specific conditions for IMT-2000 CDMA Direct Spread (UTRA) for Mobile and portable (UE) radio and ancillary equipment • ETSI EN 301 489-52, Electromagnetic Compatibility (EMC) standard for radio equipment and services - Part 52: Specific conditions for Cellular Communication Mobile and portable (UE) radio and ancillary equipment • EN 50155, Railway applications, Approval/Compliance
Mechanical (Shock and vibration)	• EN 61373, category 1, class A and B • EN 60068-2-27, 100 m/s^2, 30 ms • MIL STD 810G Method 516.7, 10 g, 11 ms
Insulation (Coordination and test)	• EN 50124-1, Railway applications – Insulation coordination • EN 50155, Railway applications - Electronic equipment used on rolling • stock
Radio Communication	• FCC-47-15, Radio frequency devices • FCC-47-22, Public mobile services • FCC-47-24, Personal communications services • FCC-47-27, Miscellaneous wireless communications services • ETSI EN 301 908-1 • 3GPP LTE Advanced standard
Safety	• EN/IEC 62368-1, Safety Requirements for audio/video, information and communication technology equipment • EN 45545-2, Requirements for fire behaviour of materials and components on railway vehicles • NFPA 130, Fire protection and life safety requirements for fixed guideway transit and passenger rail systems

Table 2 Agency approvals and standards compliance

2.5.2 United States - FCC

The enclosed device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (i.) this device may not cause harmful interference and (ii.) this device must accept any interference received, including interference that may cause undesired operation.

To satisfy FCC RF exposure requirements for mobile transmitting devices, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance, operations at closer distances than this are not recommended.

This product has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This product generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this product does cause harmful interference to radio or television reception, which can be determined by turning the product off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the unit and receiver
- Connect the product into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

NOTE
This product contains FCC ID XMR201901EM12G (LTE).

2.5.3 United States - AREMA

The product has been tested according to AREMA Part 11.5.1 and 11.5.2 environmental class I and exposure class Internal.

2.5.4 Canada - IC

This device complies with Industry Canada’s license-exempt RSSs. Operation is subject to the following two conditions:

- This device may not cause interference.
- This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

- l'appareil ne doit pas produire de brouillage.
- l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.
-

	NOTE This product contains the IC Certification number 10224A-201901EM12G (LTE).

2.5.5 Europe - Simplified Declaration of Conformity

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

CE

Figure 2 The European conformity marking

3 Product Description

3.1 Product Description

The Ibex-RT-330 is an EN50155 LTE Router, developed for demanding industrial and railway applications. It makes full use of the 3G and 4G cellular networks.

The device utilizes a high performance GNSS receiver with concurrent reception of up to 3 GNSS signals from GPS, Galileo, GLONASS or BeiDou systems.

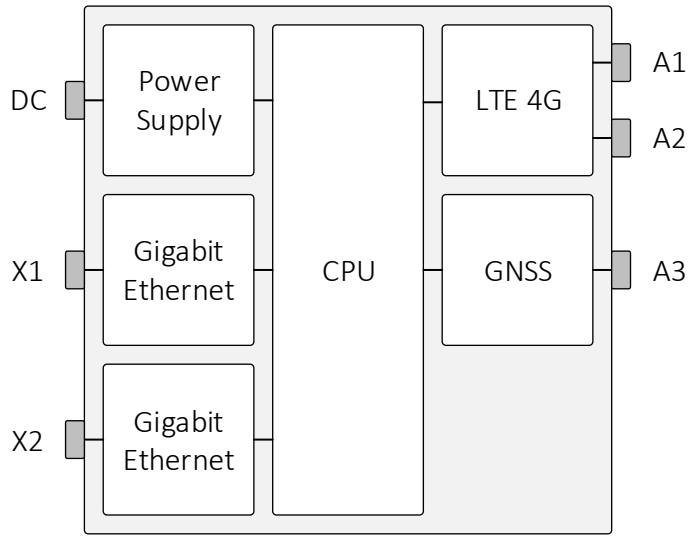


Figure 3 Ibex-RT-330-LV / Ibex-RT-330-HV block diagram

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

The Mobile Communication Gateway router is designed to withstand the tough onboard environmental conditions and can be remotely managed using web browser or SNMP management tools.

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

The router is engineered to maintain uninterrupted data communication, even in exceptionally harsh environments. Tested and certified to withstand extreme temperatures, vibrations and shocks, these routers 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.

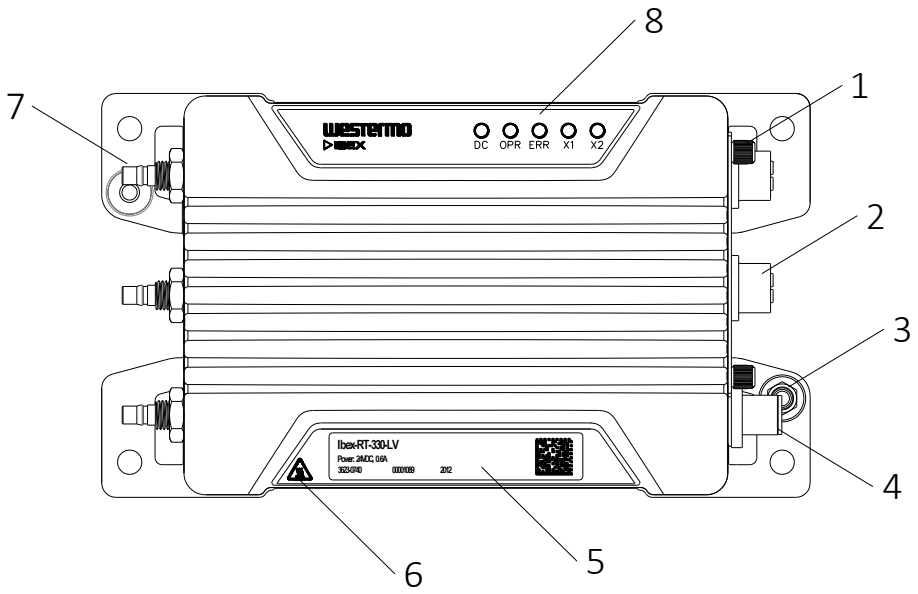
3.2 Available Models

Art. no.	Model	PoE port	Rated voltage
3623-0740	Ibex-RT-330-LV	X2	24VDC
3623-0741	Ibex-RT-330-HV	-	72-110VDC

Table 3 Available Models

3.3 Hardware Overview

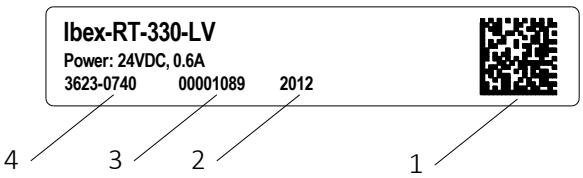
3.3.1 Front Side View



No.	Description	No.	Description
1	SIM card slot	2	Gigabit Ethernet ports X1 and X2
3	Protective earth terminal	4	Power input DC
5	Front side label	6	Warning symbol for surface temperatures above +60°C
7	Antenna ports A1-A3	8	LED indicators

Figure 4 Location of interface ports and LED indicators

3.3.2 Front Side Label



No.	Description	Remarks
1	Article number	
2	QR code	The data matrix is: AAAAAAAAA-1-VV-SSSSSSSS-YYWW AAAAAAAAA = Article number VV = Product revision SSSSSSSS = Serial number YY = Manufacturing Year WW = Manufacturing Week
3	Manufacturing date	The Date Format is: YYWW YY = Manufacturing Year WW = Manufacturing Week
4	Serial number	

Figure 5 Front side label content

3.3.3 Rear Side Label

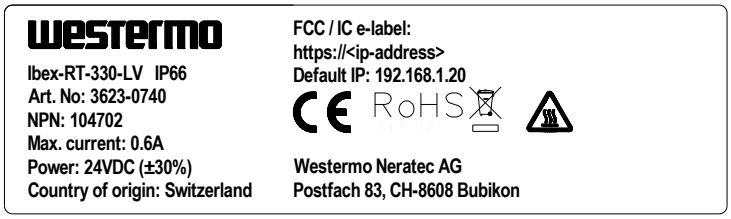


Figure 6 Rear side label content

3.3.4 Interface Ports View

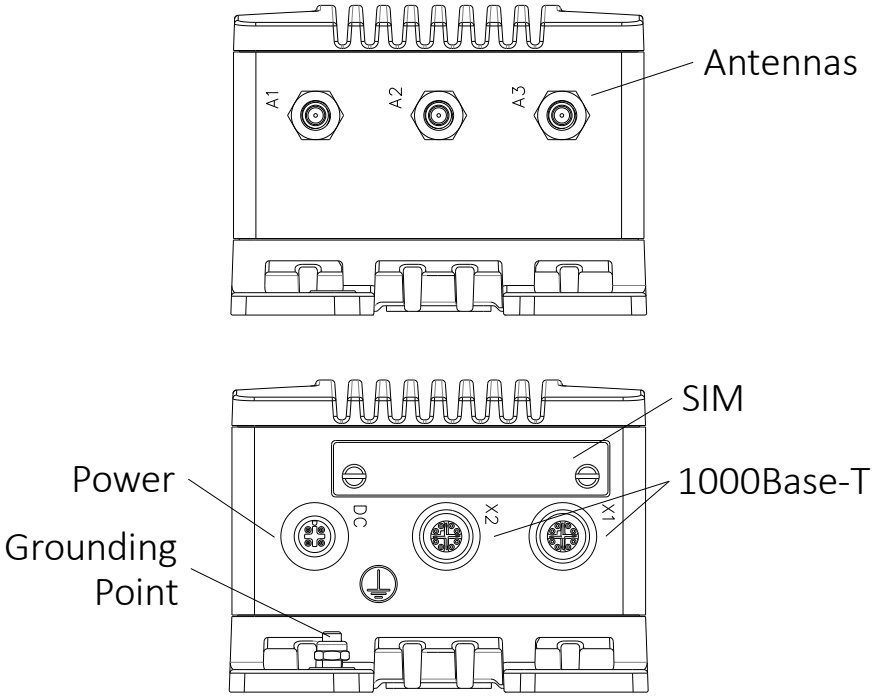


Figure 7 View to interface ports

3.4 Connector Information

3.4.1 Power Input and I/O Connection

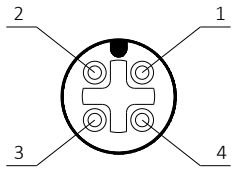
M12 A-coded 4-pin male power connector according to IEC 61076-2-101				
Marking	**Position**	**Direction**	**Description**	
DC	1	+DC	Positive terminal	
	2	-		
	3	-DC	Negative terminal	
	4	-		
	Housing	Shield	Chassis of product (ground)	

Table 4 Power input connection

NOTE
If device is powered by PoE, the protective dust cap which is part of the delivery must be closed to protect the power interface from water or dust ingress.

3.4.2 SIM Card Slot

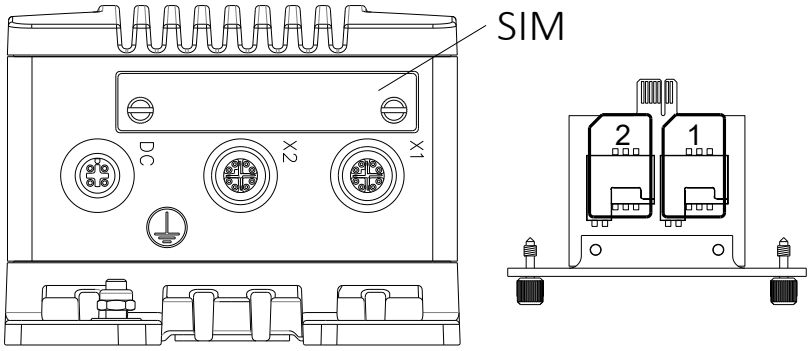


Figure 8 SIM card slot

To remove the SIM card drawer, untighten the two knurled screws until they are loose and not anymore connected to the unit frame. Carefully move the drawer out of the frame. Place the SIM cards into the sockets in slot 1 and/or slot 2 with the contacts facing down. Let chamfered corners align according markings on the drawer.

Put the SIM card drawer back into the unit, ensuring that it fits into place and tighten the knurled screws on both sides until the drawer is fully inserted and plane with the unit frame.

NOTICE
To use the device in its specified temperature range it is important to use a robust industrial SIM card with extended temperature range.

NOTICE
In order to guarantee proper IP against dust and water, please check carefully that the drawer is fully inserted and screws are properly tightened.

NOTICE
Before removing and inserting the SIM drawer, ensure that power has been turned off by removing the power connector from the unit.

NOTE
The sim cards must be fully inserted into the sockets until the mechanical stop.

NOTE
The product supports two SIM cards with the restriction that only one SIM card is active.

3.4.3 Ethernet Ports

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

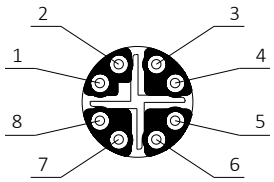
M12 X-coded 8-pin female Ethernet connector according to IEC 61076-2-109				
Marking	**Position**	**Direction**	**Description**	
X1 / X2	1	In / Out	DA+	
	2	In / Out	DA-	
	3	In / Out	DB+	
	4	In / Out	DB-	
	5	In / Out	DD+	
	6	In / Out	DD-	
	7	In / Out	DC-	
	8	In / Out	DC+	
	Housing	Shield	Chassis of product (ground)	

Table 5 Ethernet connection

PoE connection on X2 (Ibex-RT-330-LV only)		
Position	**Device mode A**	**Device mode B**
1	+DC	
2	+DC	
3	-DC	
4	-DC	
5		-DC
6		-DC
7		+DC
8		+DC

Table 6 Ethernet X2 PoE connection

NOTE
PoE is supported on X2 for the LV product variant only.

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.

3.4.4 Antenna Ports

The antenna connectors are identified on the product with A1 to A3. QMA industrial standard connector is used.

A1 and A2 are used for LTE communication. Both antennas ports must be used and connected to external LTE antennas.

A3 is used for the included GNSS receiver. The antenna port must be connected to an external GNSS antenna.

NOTICE
Any unused antenna ports must be properly terminated with 50-Ohms, otherwise the device 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

LED	Description
DC	Power status
OPR	Operation status
ERR	Error status
X1	Ethernet status for X1 port
X2	Ethernet status for X2 port

NOTE
Refer to management guide for detailed LED status indication.

3.6 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 X1 during startup.

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

Table 7 Factory reset plug

3.6.1 Factory Reset Procedure

Step	Description
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 solid ORANGE OPR LED and RED ERR LED
4	Remove factory reset adapter within 15 seconds
5	Successful initiation of the factory reset is indicated by blinking ORANGE OPR LED and RED ERR LED

Table 8 Factory reset procedure

3.7 Dimensions

Dimensions are stated in mm and are regardless variants.

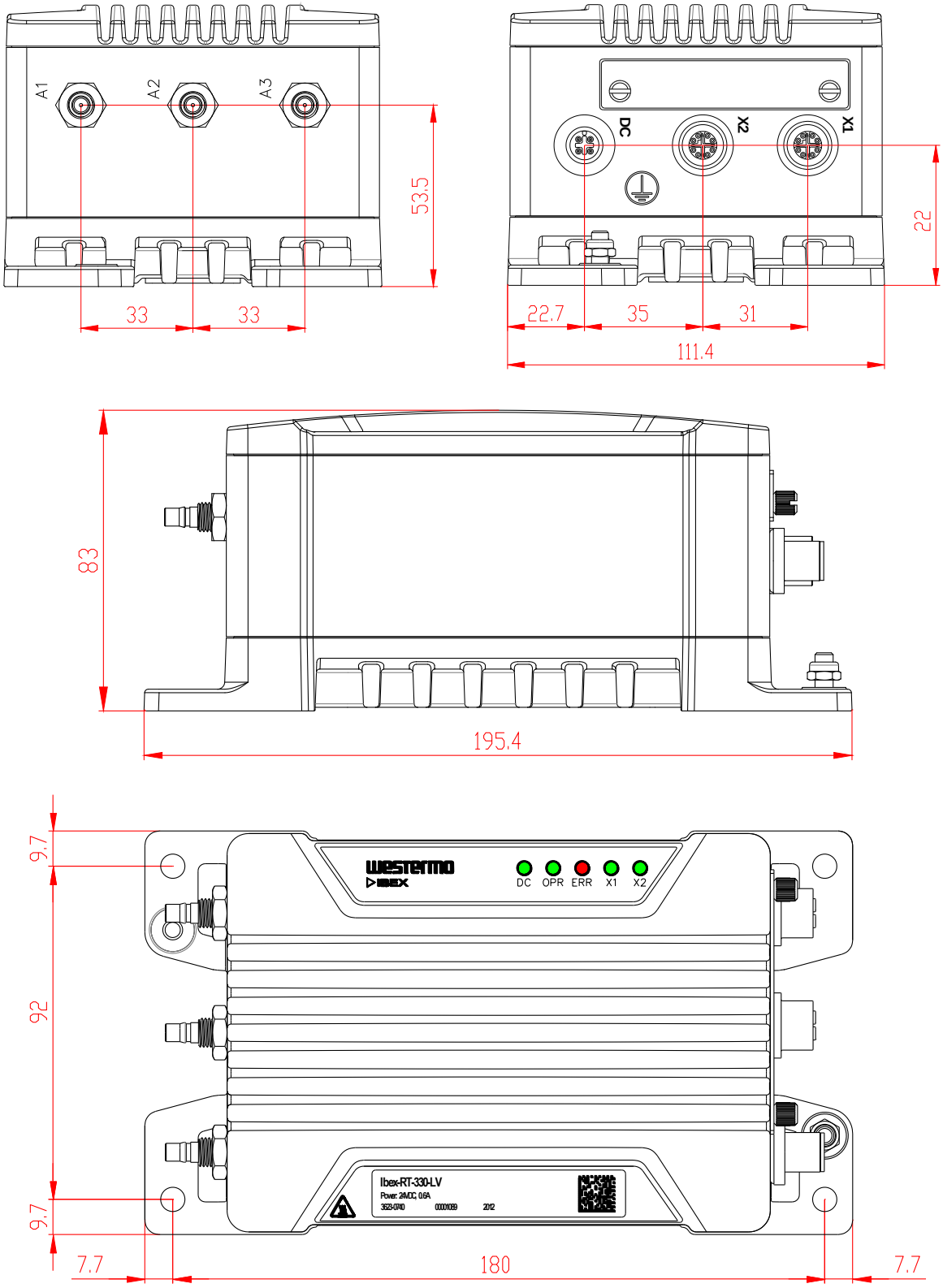


Figure 9 Dimensional drawing

4 Installation

4.1 Mounting

The product is fixed with the four fixing points located at the corners of the product. M5 or 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 Earth Connection

For correct function, the earth connection at the grounding point needs to be properly connected to a solid ground. An M5 grounding screw at the housing is used for grounding. A short wire with a cross section of at least 4 mm^2 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 nut shall be 2.0 Nm.

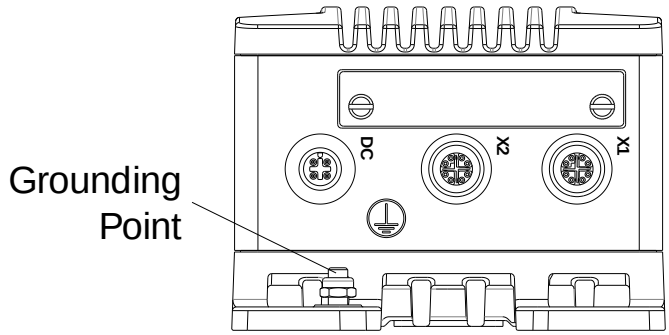


Figure 10 Earth connection

	NOTICE Do not use equipment without protective earth connection.

4.3 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.

4.4 Cooling

This unit uses convection cooling. 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 device.

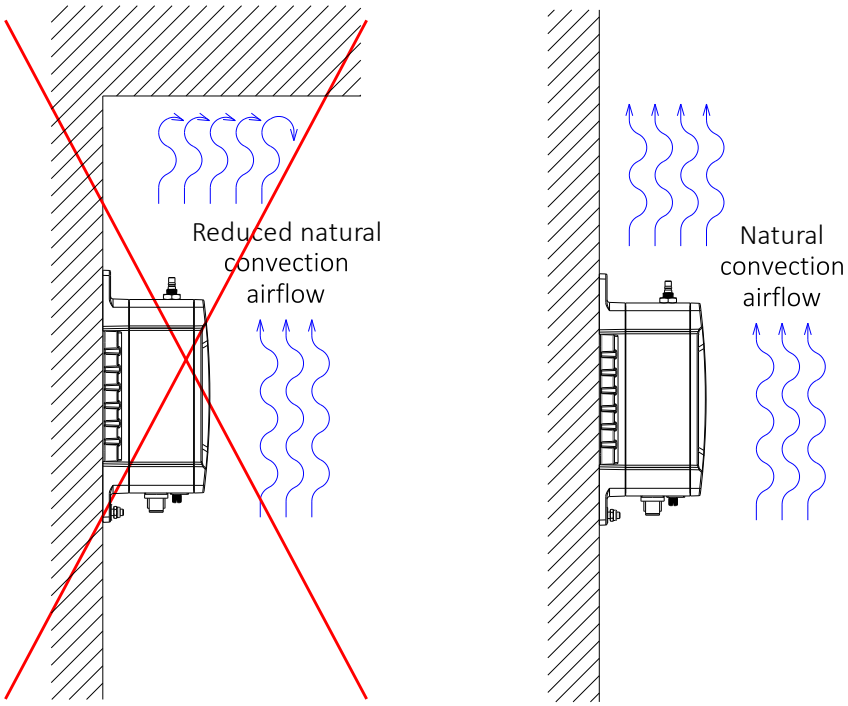


Figure 11 Installation with natural convection airflow

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

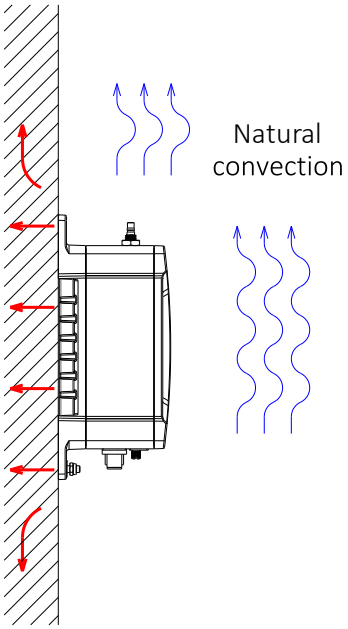


Figure 12 Improved heat transfer based on fixing plate

NOTICE
Limited air flow is rising the device 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.

4.5 Replacement of Product

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.

CAUTION - HOT SURFACE
Be aware of 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.

This product complies with Touch Temperature Limits throughout its operational temperature range.

5 Specifications

5.1 Interface Specifications

DC, Power port	Ibex-RT-330-LV	Ibex-RT-330-HV
Connector	M12 A-coded male	
Rated voltage	24 VDC, Class III	72 to 110 VDC, Class I
Operating voltage	16 to 30 VDC	50 to 138 VDC
Rated current	0.6 A	0.2 A
Rated frequency	DC	
Inrush current, I^2t	39 mA^2s at 24 VDC	4 mA^2s at 72 VDC 13 mA^2s at 110 VDC
Startup current[1]	2 x nominal current	
Polarity	Reverse polarity protected	
Redundant power input	No	
Conductor cross section (flexible)	> 0.5mm² (AWG 20)	
Cable temperature rating	-40 to + 70°C	
Shielded cable	Not required	

PoE (PoE Powered device - Ibex-RT-330-LV only on X2)	
Connector	M12 X-coded female
Device mode	A and B
Rated voltage	48 VDC
Operating voltage	37 VDC - 57 VDC
Power classification	Class 3

Ethernet TX	
Connector	M12 X-coded female
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
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.

[1] Recommended external supply current capability for proper startup

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.

SIM Card	
SIM type	Mini-SIM 2FF
Temperature rating	Industrial grade

Antenna LTE (A1..A2)	
Connector	QMA
Direction	Transmit and receive
Cabling	50-ohm coaxial cable and LTE antenna required
Conductive chassis	Yes
Mobile interface	2x2 MIMO LTE-A Cat 12, 3GPP E-UTRA Release 12
Mobile frequency bands	LTE-FDD: B1/B2/B3/B4/B5/B7/B8/B9/B12/B13/B14/B17/B18/B19/B20/B21/B25/B26/B28/B29/B30/B32/B66 (B29 and B32 support Rx only) LTE-TDD: B38/B39/B40/B41 WCDMA: B1/B2/B3/B4/B5/B8/B9/B19
LTE-A Carrier Aggregation	DL 2×CA / DL inter-band 2CA: B1+B3/B5/B18/B19/B20/B21/B26; B2+B4/B5/B12/B13/B14/B17/B29/B30/B66; B3+B5/B7/B8/B19/B20/B28; B4+B5/B12/B13/B17/B29/B30; B5+B7/B25/B30/B66; B7+B20/B28; B12+B25/B30; B13+B66; B19+B21; B20+B32; B25+B26/B41; B29+B30; B39+B41; B66+B12/B29/B30/B5; B14+B30/B66; (B29 and B32 are for secondary component carrier only) DL 2×CA / DL intra-band 2CA: B2+B2; B3+B3; B4+B4; B7+B7; B25+B25; B38+B38; B39+B39; B40+B40; B41+B41; B66+B66; DL 3×CA / DL inter-band 3CA: B2+B4+B5; B2+B4+B13; B2+B5+B30; B2+B12+B30; B2+B29+B30; B3+B7+B20; B3+B7+B28; B3+B7+B8; B4+B5+B30; B4+B12+B30; B4+B29+B30; B5+B66+B2; B13+B66+B2; B66+B12+B30; B66+B29+B30; B66+B5+B30; B2+B14+B66; DL 3×CA / DL intra-band plus inter-band 3CA:

	B3+B3+B7; B3+B7+B7; B3+B3+B20; B3+B3+B28; B3+B3+B1; B4+B4+B5; B4+B4+B13; B7+B7+B28; B5+B66+B66; B13+B66+B66; B66+B66+B2; B39+B39+B41; B39+B41+B41; B14+B66+B66; B25+B25+B26; B25+B41+B41; DL intra-band 3CA: B40+B40+B40; B41+B41+B41; B66+B66+B66; UL CA: B3C (operating temperature range limited to -25°C to +65°C)
Transmitting power	Class 3 (23 dBm) for LTE-FDD bands Class 3 (23 dBm) for LTE-TDD bands Class 3 (24 dBm) for WCDMA

Antenna GNSS (A3)	
Connector	QMA
Direction	Receive
LNA supply voltage	max. 3.7 VDC (DC voltage for active antenna)
LNA supply current	max. 70 mA (DC current for active antenna)
Cabling	50-ohm coaxial cable and GNSS antenna required
Conductive chassis	Yes
GNSS receiver	GPS: L1C/A SBAS: L1C/A QZSS: L1C/A, L1 SAIF GLONASS: L1OF BeiDou: B1I Galileo: E1B/C
Supported GNSS constellations	GPS GPS+Galileo GPS+Galileo+GLONASS GPS+Galileo+BeiDou GPS+GLONASS GPS+BeiDou Galileo Galileo+GLONASS+BeiDou Galileo+BeiDou GLONASS GLONASS+BeiDou BeiDou

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	L-E: ± 1 kV, 2 Ω, 18uF, 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
Pulsed magnetic field	EN 61000-4-9	Enclosure	300 A/m
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 3 V/m, PM 200 Hz square at 104, 136, 165, 200, 260, 330, 430, 560, 715 ± 1, 920 ± 1 MHz
Conducted RF immunity	EN 61000-4-6	DC power port	10 V, 80% AM (1kHz) from 0.15 to 80 MHz
		Ethernet ports	
		Antenna ports	
Radiated RF emission	CISPR 16-2-3	Enclosure	Class B FCC Part 15 B, Class B
Conducted RF emission	CISPR 16-2-1	DC power port	Ibex-RT-330-LV: Class B Ibex-RT-330-HV: Class A
		Ethernet ports	
Insulation resistance	EN 50155	DC power port to all other ports	> 100 MOhm
Dielectric strength	EN 50155	DC power port to all other ports	Ibex-RT-330-LV: 750 VDC, 60 s Ibex-RT-330-HV: 2250 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)[2]
		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	2000 m
MTBF	IEC TR 62380		236153 hours
Vibration	MIL STD 810, M514.7 (sine)	Operational	5 to 10 Hz, 7.62 mm 10 to 200 Hz, 1.5 g 20 sweep cycles in each axis, 0.9 octave/min
	EN 60068-2-64 (random)	Operational, endurance test	11.44 m/s^2 random, 5 to 150 Hz, 3 x 5 h
Shock[3]	EN 60068-2-27	Operational	100 m/s^2, 30 ms, 3 x 6 shocks (half sine)
	MIL STD 810, M516.7		10 g, 11 ms, 3 x 6 shocks (saw tooth)
Weight			1540 gr
Degree of protection	EN 60529	Enclosure	IP66[4]
Cooling			Convection
Pollution degree	EN 62368-1		PD2
Conformal coating type	IPC-A-610	Electronic modules	AR (Acrylic)

Table 10 Environmental and mechanical conditions

[2] Refer to "Safety Information" chapter regarding touch temperature

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

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

6 Abbreviations and Terms

Abbreviation	Description
3GPP	3rd Generation Partnership Project
AM	Amplitude Modulation
AREMA	American Railway Engineering and Maintenance-of-Way Association
AWG	American Wire Gauge
BeiDou	Chinese Global Positioning System
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
FLOSS	Free/Libre Open Source Software
FCC	Federal Communication Commission
Galileo	European Global Positioning System
GNSS	Global Navigation Satellite System
GLONASS	Russian Global Positioning System
GPS	US Global Positioning System
HV	High Voltage
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
LTE	Long Term Evolution (4G) Standard for Wireless Broadband Communication
LV	Low Voltage
MTBF	Mean Time between Failure
MTTR	Mean Time to Repair
OPR	Operation
PM	Pulse Modulated
PoE	Power over Ethernet
QMA	Quick-connect RF Connectors
QR	Quick Response
QZSS	Quasi-Zenith Satellite System
RF	Radio Frequency
TNV	Telephone Network Voltage
SBAS	Satellite-Based Augmentation System
SIM	Subscriber Identity Module
SN	Serial Number

SNMP	Simple Network Management Protocol
VPN	Virtual Private Network
WebGUI	Web Graphical User Interface
WeConfig	Westermo Configuration Tool
WEEE	Waste Electrical and Electronics Equipment

Table 11 Abbreviations and terms

7 Revision Notes

Revision	Date	
Rev. A	2020-06	First revision
Rev. B	2020-10	Updated frontpage

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