

User's manual

BoltGATE 20-31

Modular IoT Edge Gateway for Rolling Stock

Original instructions – Rev: 1-6 2022.07.28 – EN
Code: BTGATE-20-31_MAN_EN_1-6



**FOR SAFE AND PROPER USE,
FOLLOW THESE INSTRUCTIONS.
KEEP THEM FOR FUTURE REFERENCE.**

Intended audience of this document

This document is intended for **system integrators**. System integrator is a term applied to skilled persons who are specialized in linking together, physically or functionally, different computing systems and software applications to operate as a coordinated whole in compliance with the applicable regulations.

Skilled person is a term applied to persons who have training or experience in the equipment technology, particularly in knowing the various energies and energy magnitudes used in the equipment. Skilled persons are expected to use their training and experience to recognize energy sources capable of causing pain or injury and to take action for protection from injury from those energies. Skilled persons should also be protected against unintentional contact or exposure to energy sources capable of causing injury.

How to get technical support

To get technical support, refer to: <https://www.eurotech.com/en/support>.

The following resources are available:

- Return Merchandise Authorization: <https://www.eurotech.com/en/support/rma>
- Downloads: <https://www.eurotech.com/download>
- Support Portal: <https://support.eurotech.com/>

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Revision history

Revision	Description	Date
1-0	First release	2021.02.26
1-1	Updated Chapter 5 - "Regulatory information"	2021.08.02
1-2	Updated figures. Corrected table headers in sections: <ul style="list-style-type: none"> • 4.4.3 - "BoltIO 20-31 Technical Specifications" • 4.4.4 - "BoltSER 20-31 Technical Specifications" 	2021.09.06
1-3	Updated LED information. Updated antennas information.	2022.02.28
1-4	Inserted UKCA, FCC, and ISED information. Inserted section "Labels on the product"	2022.05.20
1-5	Inserted Notice in the sections "Wi-Fi and BT specifications" Updated minimum antenna distance for wireless safety to 25 cm	2022.05.27
1-6	In the file "AIR_Interfaces.htm": removed sentence about the 32-steps potentiometer . In the file "SER_LED.htm": fixed wrong image Removed block diagram section. Updated section "Antenna list"	2022.07.28

HOW TO GET STARTED

To get started with the BoltGATE 20-31 complete this procedure::

1. Read carefully and understand the instructions and warnings contained in this User's manual.

To lower the risk of personal injury, electric shock, fire, or damage to equipment, observe the instructions and warnings contained in this manual.

For more information, refer to: "[Safety-related information](#)" on page 9.

If you have questions about these instructions, refer to: <https://www.eurotech.com/en/support>.

2. Know the BoltGATE 20-31 and its interfaces.

For more information, refer to:

- "[Product Overview](#)" on page 21
- "[Technical specifications](#)" on page 24
- "[Main CPU Module interfaces](#)" on page 41

3. Install the BoltGATE 20-31.

For more information, refer to:

- "[Mechanical specifications](#)" on page 84
- "[Product installation and power supply](#)" on page 81

4. Supply power to the BoltGATE 20-31 respecting all safety instructions.

For more information, refer to: "[How to supply power to the system](#)" on page 86

5. Start developing your IoT applications.

The BoltGATE 20-31 supports the Eurotech Everyware Software Framework (ESF). ESF is a smart application container that enables remote management of IoT gateways and provides a wide range of APIs allowing you to write and deploy your own IoT application.

For more information, refer to:

- "[Eurotech Everyware IoT](#)" on page 91
- <http://esf.eurotech.com/docs>.

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1 SAFETY-RELATED INFORMATION

This chapter gives the following information:

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1.2 Explanation of messages	10
1.3 Safety instructions	11

1.1 Important information

For safe and proper use, obey these instructions. Keep them for future reference.

Failure to obey these instructions, violates the standards of safety, design, manufacture, and intended use of the product.





Eurotech assume no liability for damages caused by failure to obey these instructions.

If you have questions about these instructions, refer to: <https://www.eurotech.com/en/support>.

Additional safety-related information is given in the following chapters.

1.2 Explanation of messages

This User's manual uses these messages:

	DANGER Indicates a hazardous situation that, if not avoided, will result in death or serious injury. Indicates how to avoid the hazardous situation.
	WARNING Indicates a hazardous situation that, if not avoided, could result in death or serious injury. Indicates how to avoid the hazardous situation.
	CAUTION Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury. Indicates how to avoid the hazardous situation.
	NOTICE Used to address practices not related to physical injury.

1.3 Safety instructions

1.3.1 Power supply safety instructions



WARNING

Risk of electric shock. Failure to supply power correctly could result in death or serious injury, and could damage the equipment or other property.
Refer to "[What to do before you supply power to the product](#)" below.

1.3.1.1 *What to do before you supply power to the product*

Before you supply power to the product, obey the following safety instructions:

- Make sure that you have understood any instructions for safety, installation, and for operation
- Make sure that your hands are dry
- Make sure that all the cables to use:
 - meet the product requirements and comply with the relevant standards and regulations
 - are in good condition
 - are placed with care
 - are not placed where they may be trampled or compressed
- Make sure that all power-points and plugs:
 - are in good condition
 - are not overloaded
- Make sure that the product has a proper grounding connection
- Make sure that the power supply source meets the product requirements and complies with the relevant standards and regulations
- Make sure that the product installation is made correctly and in compliance with the relevant standards and regulations
- Make sure that you supply power only after the product installation is completed.

If you have questions about these instructions, refer to: <https://www.eurotech.com/en/support>.

1.3.2 Wireless safety instructions

Install the product's antennas with care:

1. **Make sure that the antennas are at least 25 cm away from nearby persons**
2. Make sure that the equipment (product with antennas installed) do not cause interferences with other electronic devices.

If you cannot obey these instructions, make sure that the equipment is assessed to be compliant with the SAR (Specific Absorption Rate) regulations.

1.3.3 Product handling safety instructions: product's surfaces may become hot



CAUTION

If the product is used at high temperatures, its surfaces become hot. Burn hazard.
Before you touch the product's surfaces, make sure that they are cool.

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2 CONSIGNES DE SÉCURITÉ

Ce chapitre fournit les informations suivantes:

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2.1 Informations importantes

Pour une utilisation sûre et correcte, suivre ces instructions. Les conserver pour référence ultérieure.

Le non-respect de ces instructions constitue une violation des normes de sécurité, de conception, de fabrication et d'utilisation prévue du produit.





Eurotech rejette toute responsabilité pour les dommages causés en cas de non-respect de ces instructions.

En cas de doutes sur ces instructions, consultez le site: <https://www.eurotech.com/fr/support>.

Des informations supplémentaires liées à la sécurité sont fournies dans les chapitres suivantes.

2.2 Explication des messages

Ce User's manual utilise les messages suivants:

	<p style="text-align: center;">DANGER</p> <p>Indique une situation dangereuse qui, si elle n'est pas évitée, entraînera la mort ou un préjudice grave. Indique comment éviter la situation dangereuse.</p>
	<p style="text-align: center;">AVERTISSEMENT</p> <p>Indique une situation dangereuse qui, si elle n'est pas évitée, pourrait entraîner la mort ou un préjudice grave. Indique comment éviter la situation dangereuse.</p>
	<p style="text-align: center;">ATTENTION</p> <p>Indique une situation dangereuse qui, si elle n'est pas évitée, pourrait entraîner un préjudice mineur ou modéré. Indique comment éviter la situation dangereuse.</p>
	<p style="text-align: center;">AVIS</p> <p>Utilisé pour traiter les pratiques non liées à des blessures physiques.</p>

2.3 Instructions de sécurité

2.3.1 Précautions de sécurité pour l'alimentation électrique



AVERTISSEMENT

Risque de choc électrique. Une alimentation électrique incorrecte peut causer la mort ou des blessures graves, et peut endommager l'équipement ou d'autres biens.

Voir "[Que faire avant d'alimenter le produit en électricité](#)" en dessous.

2.3.1.1 Que faire avant d'alimenter le produit en électricité

Avant d'alimenter le produit, respectez les consignes de sécurité suivantes:

- S'assurer que vous avez compris toutes les instructions relatives à la sécurité, à l'installation et au fonctionnement.
- S'assurer que vos mains sont sèches
- S'assurer que tous les câbles à utiliser:
 - Sont conformes aux exigences du produit et aux normes et réglementations en vigueur
 - Sont en bon état
 - Sont placés avec soin
 - Ne sont pas placés dans des endroits où ils peuvent être piétinés ou compressés
- S'assurer que toutes les prises de courant et les connecteurs d'alimentation :
 - Sont en bon état
 - Ne sont pas surchargés
- S'assurer que le produit est correctement relié à la terre
- S'assurer que la source d'alimentation électrique répond aux exigences du produit et est conforme aux normes et réglementations en vigueur.
- Branchez l'alimentation uniquement après avoir terminé l'installation du système
- S'assurer que l'installation du produit est effectuée correctement et en conformité avec les normes et réglementations en vigueur
- S'assurer de ne fournir l'alimentation qu'une fois l'installation du produit terminée.

En cas de doutes sur ces instructions, consultez le site: <https://www.eurotech.com/fr/support>.

2.3.2 Instructions de sécurité pour les communications sans fil

Installez avec soin les antennes utilisées avec ce produit, **en évitant toute interférence avec d'autres appareils électroniques et en maintenant une distance des personnes supérieure à 25 cm**. Si ces exigences ne peuvent être satisfaites, évaluez le produit final par rapport aux réglementations SAR.

2.3.3 Instructions de sécurité pour la manipulation du produit: les surfaces du produit peuvent devenir chaudes



ATTENTION

Si le produit est utilisé à des températures élevées, ses surfaces deviennent chaudes. Risque de brûlure.

Avant de toucher les surfaces du produit, assurez-vous qu'elles sont froides.

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3 TECHNICAL TERMS AND GRAPHICAL SYMBOLS

This chapter gives the following information:

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




3.1 Technical terms (acronyms, abbreviations)

The following technical terms (acronyms, abbreviations) can be used in this User's manual:

Term	Meaning
GND	Ground
#	Active low signal
+	Positive signal; Positive signal in differential pair
-	Negative signal; Negative signal in differential pair
3.3	3.3 V signal level
5	5 V signal level
I	Signal is an input to the system
O	Signal is an output from the system
IO	Signal may be input or output
P	Power and Ground
A	Analog signal
NC	No Connection
R	Use is reserved to Eurotech
Reserved	

3.2 Graphical symbols

The following graphical symbols can be used in this User's manual:

Symbol	Meaning
	Alternating current (AC)
	Direct current (DC)
	Earth; ground
	Functional earthing; functional grounding (US)
	Protective earth; protective ground
	Dangerous voltage

4 TERMES TECHNIQUES ET SYMBOLES GRAPHIQUES

Ce chapitre fournit les informations suivantes:

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




4.1 Termes techniques (acronymes, abréviations)

Les termes techniques suivants (acronymes, abréviations) peuvent être utilisés dans ce manuel:

Terme	Signification
GND	Terre
#	Signal bas actif
+	Signal positif ; signal positif dans la paire différentielle
-	Signal négatif ; Signal négatif dans la paire différentielle
3.3	Niveau de signal 3,3 V
5	Niveau de signal de 5 V
I	Le signal est une entrée du système
O	Le signal est une sortie du système
IO	Le signal peut être une entrée ou une sortie
P	Alimentation et terre
A	Signal analogique
NC	Absence de connexion
R	L'utilisation est réservée à Eurotech
Reserved	

4.2 Graphical symbols

The following graphical symbols can be used in this User's manual:

Symbol	Meaning
	Alternating current (AC)
	Direct current (DC)
	Earth; ground
	Functional earthing; functional grounding (US)
	Protective earth; protective ground
	Dangerous voltage

5 PRODUCT OVERVIEW

This chapter gives the following information:

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5.1 Product description

The BoltGATE 20-31 Family is a modular IoT Edge Gateway system, EN50155-certified, which addresses the challenges of the next-generation applications for smart transportation by combining hardware and software for Edge processing and Cloud connectivity. The Family consists of a main CPU Module and a wide set of Expansion Modules: the main CPU Module can be used stand alone; the Expansion Modules provide a wide set of additional features. CPU and Expansion Modules can be combined to create a flexible system that suits any use case with the ideal solution.

The main CPU Module – the BoltGATE 20-31 – is based on the Intel® Atom™ E3900 processor, with up to 8GB of ECC RAM, up to 32GB of eMMC, and an optional SSD storage module. Interfaces include up to 3x GbE, 2x USB 3.0, Serial, and Display ports; security features include TPM 2.0. A high accuracy GNSS receiver supporting GPS/GLONASS with UDR (Untethered Dead Reckoning) mode is available in selected configurations. A railway certified power supply is integrated into the main CPU Module, with an ultra-wide input voltage range: 24 to 110VDC, EN50155. The power is distributed by the main CPU Module to the Expansion Modules.

The BoltGATE 20-31 adds integrated hardware and software components to support the MVB interface (Duagon chipset, Configurations: ESD+ read-only / ESD+ / EMD read-only / EMD).

The Expansion Modules are:

- BoltAIR 20-31, with up to 3 wireless units and an odometer input
- BoltSER 20-31, with serial & CAN interfaces
- BoltIO 20-31, including up to 16 +16 Digital I/Os

Every module in the BoltGATE 20-31 is fanless and compact, designed to fit in a 3U recess. All modules support -40 to +85°C operating temperature range (EN 50155:2017, class OT4, ST1) and can be installed on a DIN-rail, wall-mounted, or assembled in a 19" rack.

Powered by [Eurotech's IoT Edge Framework, Everyware Software Framework \(ESF\)](#), the BoltGATE 20-31 provides a fast go-to-market solution for IoT transportation applications such as passenger infotainment and entertainment, train-to-ground communications, and fleet management. The Java-based IoT Edge Framework provides a friendly web-based user interface to visually compose powerful data flows to acquire data from the bus, filter, aggregate and analyze it at the Edge, and publish it to the Cloud through the popular MQTT protocol. Optionally, [Everyware Cloud, Eurotech's IoT Integration Platform](#), completes this solution by providing data integration to the applications and by offering complete management of the devices deployed in the field.

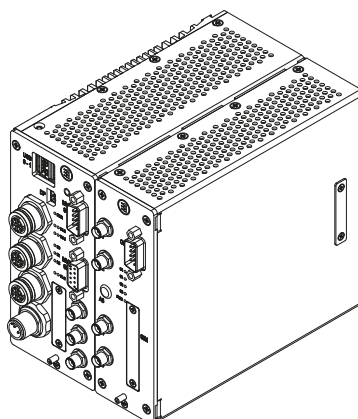


Fig. 1 - BoltGATE 20-31-11 and BoltAIR 20-31-11 attached together

5.2 Intended use and not allowed uses of the product

The product is intended for professional use and must be installed by qualified personnel only.

The product must be installed in a secured location, accessible to authorized personnel only (for example in a cabinet / technical compartment).

5.2.1 Intended use

The product is a modular IoT Edge Gateway system, EN 50155 certified.

The product must:

- Be installed in a secured location, only accessible to authorized personnel (for example in a cabinet/ technical compartment), and not exposed to atmospheric agent
- Be used indoors in railway applications
- Be used with appropriate interconnecting and power cables
- Be used with an external DC power supply source that meets the requirements stated on the identification label of the product
- Be used with the earthing terminals connected to an earth point in the installation.

5.2.2 Not allowed uses

Do not use the product:

- In defense applications
- In automotive applications
- In industrial applications
- Outdoors
- In safety-critical applications
- In environments with potentially explosive atmospheres
- If not installed according to the instructions and warnings contained in this document.

5.3 Technical specifications

5.3.1 BoltGATE 20-31 Technical Specifications

Specifications		Description (according to BTGATE-20-31-xy versions)		
		Version -11	Version -21	Version -31
PROCESSOR	CPU	Intel Atom x5-E3940, 1.60 GHz (1.80 GHz), Quad Core	Intel Atom x5-E3930, 1.30 GHz (1.80 GHz), Dual Core	Intel Atom x5-E3940, 1.60 GHz (1.80 GHz), Quad Core
MEMORY	RAM	8GB DDR3L 1600 MHz with ECC	4GB DDR3L 1600 MHz non ECC	8GB DDR3L 1600 MHz with ECC
STORAGE	Embedded	32 GB eMMC soldered down	16 GB eMMC soldered down	32 GB eMMC soldered down
	Integrated	Factory Option: Integrated 2.5" SSD SATA III		
	Other	1x microSD Slot (Service Panel)		
WIRED INTERFACES	Ethernet	3x 10/100/1000Mbps, M12 X-coded Connector		
	USB	2x USB 3.0 Noise and Surge Protected - 1x USB 2.0 (Service Panel)		
	Serial	1x TTL Serial Console (Service Panel)		
	MVB	ESD+ with "RX only" or "RX/TX" Factory Option: EMD with "RX only" or "RX/TX"	-	-
	Audio	-	Factory Option: 2x Line IN, 1x Stereo Mic IN, 2x Line OUT	
	Video	1x mini DisplayPort		
RADIO INTERFACES	Cellular	1x LTE Global Cat 4, 2G/3G Fallback		
	GPS	GPS/QZSS/GLONASS/BeiDou/Galileo with Untethered Dead Reckoning		
	Wi-Fi / BT	-	WiFi 802.11 a/b/g/n, BLE 4.0	
	Antennas (External)	2x SMA (Cell w/ Ant Diversity) 1x SMA (GPS)	2x SMA (Cellular with Antenna Diversity) 1x SMA (GPS) 2x RP-SMA (Wi-Fi / BT)	
MAINTENANCE INTERFACES	Button	1x Reset		
	SD Card	1x MicroSD Receptacle		
	SIM Card	1x MicroSIM Receptacle		
	Console	1x TTL Serial Console		
OTHER	RTC	Yes, with Supercapacitor (up to 2 Months Retain), Fast Reboot Support		
	System Watchdog	Yes		
	EEPROM	32 KB		
	TPM	TPM 2.0		
	LEDs	1x Power input presence 2x MiniPCIe Slot 3x Ethernet 4x User Programmable		
POWER	Power Input	Ultra-wide input voltage range: 9 to 137.5 VDC, with ignition key sense		
	Consumption	15W Typical, 30W Max		

Specifications		Description (according to BTGATE-20-31-xy versions)		
		Version -11	Version -21	Version -31
ENVIRONMENT	Operating Temperature	-40 to +85°C (EN 50155:2017, class OT4, ST1)		
	Storage Temperature	-40 to +85 °C		
	Non-condensing Humidity	5 to 95% (non-condensing) at +40°C		
CERTIFICATIONS	Regulatory	CE, FCC, ISED, UKCA		
	Vertical	EN 50155, EN 45545		
	Safety	EN 62368-1, UL 60950(\$)		
	Environmental	RoHS3, REACH		
	Wi-Fi / BT Radio	-	RED, FCC, ISED, UKCA	
	Cellular Radio	RED, FCC, ISED, UKCA		
	Ingress Protection	IP30		
MECHANICAL	Enclosure	Material: Aluminum - Color: Black Anodized		
	Dimensions	61x132x150 (WxHxD); mm - Connectors and Mounting Bracket excluded		
SOFTWARE	OS	Eurotech Everywhere Linux or Windows 10 IoT Enterprise		

(\$) UL, NRTL listing Factory Option

5.3.2 BoltAIR 20-31 Technical Specifications

Specifications		Description (according to BTAIR-20-31-11 version)
WIRED INTERFACES	Odometer	1x Odometer input connector
RADIO INTERFACES	Cellular	1x LTE Global Cat 4, 2G/3G Fallback
	Wi-Fi / BT	WiFi 802.11 a/b/g/n, BLE 4.0
	Antennas (External)	2x SMA (Cellular with Antenna Diversity) 2x RP-SMA (Wi-Fi / BT)
MAINTENANCE INTERFACES	SIM Card	1x MicroSIM Receptacle
OTHER	LEDs	1x Power input presence 3x MiniPCle Slot 1x User Programmable
POWER	Power Input	Input voltage: 5 VDC, 12 VDC
	Consumption	5W Typical
ENVIRONMENT	Operating Temperature	-40 to +85°C (EN 50155:2017, class OT4, ST1)
	Storage Temperature	-40 to +85 °C
	Non-condensing Humidity	5 to 95% (non-condensing) at +40°C
CERTIFICATIONS	Regulatory	CE, FCC, ISED, UKCA
	Vertical	EN 50155, EN 45545
	Safety	EN 62368-1, UL 60950(\$)
	Environmental	RoHS3, REACH
	Wi-Fi / BT Radio	RED, FCC, ISED, UKCA
	Cellular Radio	RED, FCC, ISED, UKCA
	Ingress Protection	IP30
MECHANICAL	Enclosure	Material: Aluminum - Color: Black Anodized
	Dimensions	42x132x150 (WxHxD); mm - Connectors and Mounting Bracket excluded

(\$) UL, NRTL listing Factory Option

5.3.3 BoltIO 20-31 Technical Specifications

Specifications		Description
WIRED INTERFACES	Digital I/O	Digital I/O: <ul style="list-style-type: none"> • 12x Digital Inputs • 4x Digital Inputs + 4x Digital Outputs • 12x Digital Outputs Isolation: <ul style="list-style-type: none"> • Inputs: 3.7kV • Outputs: 1.5kV
	OTHER	LED
POWER	Power Input	Input voltage: 5 VDC, 12 VDC
	Consumption	Idle: 15W; Peak: 30W
ENVIRONMENT	Operating Temperature	-40 to +85°C (EN 50155:2017, class OT4, ST1)
	Storage Temperature	-40 to +85 °C
	Non-condensing Humidity	5 to 95% (non-condensing) at +40°C
CERTIFICATIONS	Regulatory	CE, UKCA
	Vertical	EN 50155, EN 45545
	Safety	EN 62368-1, UL 60950(\$)
	Environmental	RoHS3, REACH
	Ingress Protection	IP30
MECHANICAL	Enclosure	Material: Aluminum - Color: Black Anodized
	Dimensions	42x132x150 (WxHxD); mm - Connectors and Mounting Bracket excluded

(\$) UL, NRTL listing Factory Option

5.3.4 BoltSER 20-31 Technical Specifications

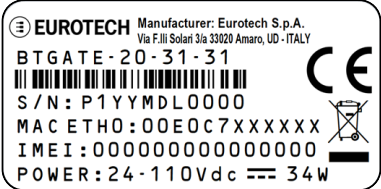

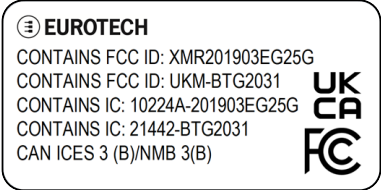
Specifications		Description
WIRED INTERFACES	Serial Ports	Serial Ports: <ul style="list-style-type: none"> • 1x RS-232/422/485 serial port • 1x RS-232/422/485 serial port Isolation: 3.75kV
	CAN Port	CAN Port: <ul style="list-style-type: none"> • 1x Isolated (5kV) CAN FD port Isolation: 5kV
OTHER	LED	1x Power input presence
POWER	Power Input	Input voltage: 5 VDC, 12 VDC
	Consumption	Idle: 15W; Peak: 30W
ENVIRONMENT	Operating Temperature	-40 to +85°C (EN 50155:2017, class OT4, ST1)
	Storage Temperature	-40 to +85 °C
	Non-condensing Humidity	5 to 95% (non-condensing) at +40°C
CERTIFICATIONS	Regulatory	CE, UKCA
	Vertical	EN 50155, EN 45545
	Safety	EN 62368-1, UL 60950(\$)
	Environmental	RoHS3, REACH
	Ingress Protection	IP30
MECHANICAL	Enclosure	Material: Aluminum - Color: Black Anodized
	Dimensions	42x132x150 (WxHxD); mm - Connectors and Mounting Bracket excluded

(\$) UL, NRTL listing Factory Option


5.4 Labels on the product

5.4.1 Labels on the BoltGATE 20-31

The following labels are placed on the product:

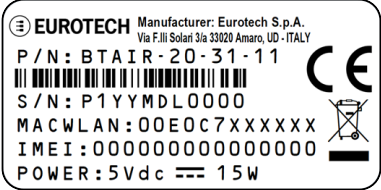

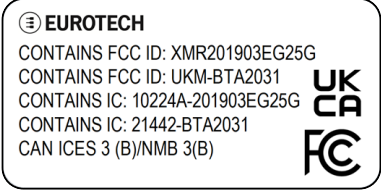
Label type and content	Label position	Label example
Product Label* <ul style="list-style-type: none"> • Eurotech logo • Manufacturer address • Product number • Serial number • Regulatory marks (CE and WEEE) • MAC ETH0 number • IMEI number • Power supply specifications** 	Rear side of the product	 <p> EUROTECH Manufacturer: Eurotech S.p.A. Via F.lli Solari 3/a 33020 Amaro, UD - ITALY BTGATE-20-31-31 S/N: P1YYMDL0000 MAC ETH0: 00E0C7XXXXXX IMEI: 0000000000000000 POWER: 24-110Vdc  34W </p>
FCC Label* <ul style="list-style-type: none"> • Eurotech logo • Contains FCC ID: XMR201903EG25G • Contains FCC ID: UKM-BTG2031 • Contains IC: 10224A-201903EG25G • Contains IC: 21442-BTG2031 • CAN ICES-3 (B)/NMB-3(B) • Regulatory marks (UKCA and FCC) 	Rear side of the product	 <p> EUROTECH CONTAINS FCC ID: XMR201903EG25G CONTAINS FCC ID: UKM-BTG2031 CONTAINS IC: 10224A-201903EG25G CONTAINS IC: 21442-BTG2031 CAN ICES 3 (B)/NMB 3(B) </p>

* Information included in the label depends on the product version


** The symbol  stands for direct current

5.4.2 Labels on the BoltAIR 20-31

The following labels are placed on the product:


Label type and content	Label position	Label example
Product Label* <ul style="list-style-type: none"> • Eurotech logo • Manufacturer address • Product number • Serial number • Regulatory marks (CE and WEEE) • MAC ETH0 number • IMEI number • Power supply specifications** 	Rear side of the product	 <p> EUROTECH Manufacturer: Eurotech S.p.A. Via F.lli Solari 3/a 33020 Amaro, UD - ITALY P/N: BTAIR-20-31-11 S/N: P1YYMDL0000 MAC WLAN: 00E0C7XXXXXX IMEI: 0000000000000000 POWER: 5Vdc  15W </p>
FCC Label* <ul style="list-style-type: none"> • Eurotech logo • Contains FCC ID: XMR201903EG25G • Contains FCC ID: UKM-BTA2031 • Contains IC: 10224A-201903EG25G • Contains IC: 21442-BTA2031 • CAN ICES-3 (B)/NMB-3(B) • Regulatory marks (UKCA and FCC) 	Rear side of the product	 <p> EUROTECH CONTAINS FCC ID: XMR201903EG25G CONTAINS FCC ID: UKM-BTA2031 CONTAINS IC: 10224A-201903EG25G CONTAINS IC: 21442-BTA2031 CAN ICES 3 (B)/NMB 3(B) </p>

* Information included in the label depends on the product version


** The symbol  stands for direct current

5.4.3 Labels on the BoltIO 20-31

The following labels are placed on the product:

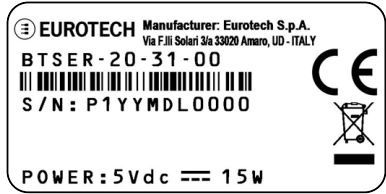
Label type and content	Label position	Label example
Product Label* <ul style="list-style-type: none"> • Eurotech logo • Manufacturer address • Product number • Serial number • Regulatory marks (CE and WEEE) • Power supply specifications** 	Rear side of the product	

* Information included in the label depends on the product version


** The symbol  stands for direct current

5.4.4 Labels on the BoltSER 20-31

The following labels are placed on the product:

Label type and content	Label position	Label example
Product Label* <ul style="list-style-type: none"> • Eurotech logo • Manufacturer address • Product number • Serial number • Regulatory marks (CE and WEEE) • Power supply specifications** 	Rear side of the product	

* Information included in the label depends on the product version

** The symbol  stands for direct current

6 CERTIFICATIONS

This chapter gives the following information:

6.1 Declaration of Conformity	32
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6.1 Declaration of Conformity

Upon request, Eurotech can provide the product Declaration of Conformity. For more information, refer to the Eurotech Technical Support (<https://www.eurotech.com/en/support>).

6.2 CE marking

This product is CE marked and complies with the essential requirements and other relevant requirements of the directives reported in the following sections.

Eurotech does not approve the use of this product with equipment (for example: power supplies, personal computers, etc.) that is not CE marked and that is not compliant with the requirements specified in this User's manual.



6.2.1 Safety

This product complies with the standard EN 62368-1:2014 on the safety requirements in information and communication technology equipment.

6.2.2 RoHS 3 compliance

This product complies with the following Directives:

- Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.
- Commission Delegated Directive (EU) 2015/863 of 31 March 2015 amending Annex II to Directive 2011/65/EU of the European Parliament and of the Council as regards the list of restricted substances

6.2.3 Packaging and packaging waste

This product complies with the European Parliament and Council Directive 94/62/EC of 20 December 1994 on packaging and packaging waste.

6.2.4 Product disposal and recycling

This product, at the end of its life cycle, must be collected separately and managed in accordance with the provisions of the Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste of electrical and electronic equipment (WEEE).

For more information, refer to: "[The WEEE label](#)" below.

6.2.4.1 The WEEE label

This symbol, placed on the product, indicates that the product at the end of its life cycle must be sent to separate collection facilities for recovery and recycling.

Because of the substances present in the product, improper disposal can cause damage to human health and to the environment.

For collecting and recycling information, refer to: <https://www.eurotech.com/en/support>.



6.2.5 RED compliance

This product complies with the Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonization of the laws of the Member States relating to the making available on the market of radio equipment.

Modification statement


Eurotech does not approve any changes or modifications to this product by the user. Any changes or modifications could void the user's authority to operate this product.

6.2.5.1 Class II product and EU restrictions on 5 GHz Wi-Fi usage

According to Commission Decision 2000/299/EC of 6 April 2000, establishing the initial classification of radio equipment and telecommunications terminal equipment and associated identifiers, the product falls within the scope of Class II.

Due to EU restrictions on 5 GHz Wi-Fi bands the product is limited to indoor operation and can only be operated in the frequency band 5150 MHz – 5250 MHz (U-NII-1) covering 20 MHz channels (36,40,44,48), 40 MHz channels (38,46), and 80 MHz channel (42).

Dynamic Frequency selection (DFS) as master or subordinate is not supported by the product.

	AT	BE	BG	CH	CY	CZ	DE
	DK	EE	EL	ES	FI	FR	HR
	HU	IE	IT	IS	LI	LT	LU
	LV	MT	NL	NO	PL	PT	RO
	SE	SI	SK	TR	UK(NI)		

6.3 UKCA marking

This product is UKCA marked and complies with the relevant UK Statutory Instruments and their amendments:

- 2017 No 1206 The Radio Equipment Regulations 2017
- 2012 No 3032 The Restriction of the Use of Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

Eurotech does not approve the use of this product with equipment (for example: power supplies, personal computers, etc.) that is not UKCA marked and that is not compliant with the requirements specified in this User's manual.



6.4 FCC compliance

6.4.1 FCC marking

This product is FCC marked and complies with the regulatory information reported in the following sections.

Eurotech is not responsible for the use of the product together with equipment (for example: power supplies, personal computers, etc.) that are not FCC marked and not compliant with the requirements specified in this instructions for use.

Cet appareil est certifié FCC et est conforme aux exigences réglementaires décrites dans les sections suivantes.

Eurotech n'est pas responsable de l'utilisation du appareil avec des équipements (par exemple : alimentations, ordinateurs personnels, etc.) non certifiés FCC et qui ne sont pas conformes aux exigences spécifiées dans ce instructions d'utilisation.



Modification statement

Eurotech does not approve any changes or modifications to the product by the user. Any changes or modifications could void the user's authority to operate the product.

Eurotech n'approuve aucune modification apportée à l'appareil par l'utilisateur, quelle qu'en soit la nature. Tout changement ou modification peuvent annuler le droit d'utilisation de l'appareil par l'utilisateur.

6.4.2 FCC compliance: Class B Digital Device

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment 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 equipment 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 equipment 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 product and the 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

Cet appareil est conforme à la partie 15 des règlements de la FCC. L'utilisation est soumise aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Remarque: Cet appareil a été testé et déclaré conforme aux limites d'un appareil numérique de classe B, conformément à la partie 15 des règlements de la FCC. Ces limites sont conçues pour fournir une protection raisonnable contre les interférences nuisibles dans une installation résidentielle.

Cet appareil génère, utilise et peut émettre des ondes radio qui peuvent causer des interférences nuisibles s'il n'est pas installé et utilisé conformément aux instructions.

Si néanmoins cet appareil cause des interférences nuisibles à la réception de la radio ou de la télévision, ce qui peut être déterminé en éteignant et en rallumant l'appareil, l'utilisateur est encouragé à essayer de corriger l'interférence par une ou plusieurs des mesures suivantes:

- *Réorienter ou déplacer l'antenne de réception*
- *Augmenter la distance entre le produit et le récepteur*
- *Brancher l'appareil sur une prise de courant différente de celle à laquelle le récepteur est raccordé*
- *Consulter le revendeur ou un technicien radio/TV expérimenté pour obtenir de l'aide.*

6.4.3 RF radiation exposure statement

This device complies with FCC radiation exposure limits set forth for an uncontrolled environment. The antenna should be installed and operated with minimum distance of 25 cm between the radiator and your body.

This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter except in accordance with FCC multi-transmitter product procedures.

Cet appareil est conforme aux limites d'exposition aux rayonnements de la FCC pour un environnement non contrôlé. L'antenne doit être installée de façon à garder une distance minimale de 25 cm entre la source de rayonnements et votre corps.

Cet appareil et son (ses) antenne(s) ne doivent pas être co-localisés ou utilisés en conjonction avec une autre antenne ou un autre émetteur, sauf en conformité avec les procédures du produit multi-émetteur de la FCC.

6.4.4 FCC restrictions on 5 GHz Wi-Fi usage

The product is limited to indoor operation and can only be operated in the frequency bands: 5150 MHz – 5250 MHz and 5745 MHz – 5825 MHz.

Le produit est limité à un fonctionnement en intérieur et ne peut être utilisé que dans les bandes de fréquences 5150 MHz – 5250 MHz et 5745 MHz – 5825 MHz.

6.4.5 FCC labeling information

For the FCC information stated on the product label, see: ["Labels on the product" on page 29.](#)

Pour les informations de la FCC indiquées sur l'étiquette du produit, voir: ["Labels on the product" page 29.](#)

6.5 ISED Canada compliance

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This device has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Le présent appareil a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué pour tout type figurant sur la liste, sont strictement interdits pour l'exploitation de l'émetteur.

6.5.1 ISED compliance: Class B Digital Device

ICES-003 Class B Notice - Avis NMB-003, Classe B.

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

6.5.2 RF radiation exposure statement

This product complies with ISED radiation exposure limits set forth for an uncontrolled environment. The antenna should be installed and operated with minimum distance of 25 cm between the radiator and your body.

This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter except in accordance with ISED multi-transmitter product procedures.

This device complies with Health Canada's Safety Code. The installer of this device should ensure that RF radiation is not emitted in excess of the Health Canada's requirement

Cet appareil est conforme aux limites d'exposition aux rayonnements de la ISED pour un environnement non contrôlé. L'antenne doit être installée de façon à garder une distance minimale de 25 cm entre la source de rayonnements et votre corps.

Cet appareil et son (ses) antenne(s) ne doivent pas être co-localisés ou utilisés en conjonction avec une autre antenne ou un autre émetteur, sauf en conformité avec les procédures du produit multi-émetteur de la ISED.

Cet appareil est conforme avec Santé Canada Code de sécurité 6. Le programme d'installation de cet appareil doit s'assurer que les rayonnements RF n'est pas émis au-delà de l'exigence de Santé Canada

6.5.3 ISED restrictions on 5 GHz Wi-Fi usage

The product is limited to indoor operation and can only be operated in the frequency bands: 5150 MHz – 5250 MHz and 5745 MHz – 5825 MHz.

Le produit est limité à un fonctionnement en intérieur et ne peut être utilisé que dans les bandes de fréquences 5150 MHz – 5250 MHz et 5745 MHz – 5825 MHz.

6.5.4 ISED labeling information

For the ISED information stated on the product label, see: "[Labels on the product](#)" on page 29.

Pour les informations de la ISED indiquées sur l'étiquette du produit, voir: "[Labels on the product](#)" page 29.

6.5.5 Responsible parties: Canadian Representative contact information

The Canadian Representative has the following contact information:

Le Représentant Canadien dispose des coordonnées suivantes:

Contact Information	
Company Name	Canadian Certification Consulting, Inc.
Company Number ¹	10842A
Company Address	2210 Horizon Drive, Suite 17
City	West Kelowna
Province/State	BC
Postal Code	V1Z 3L4
Country	Canada
Contact Name	Jon Hughes
Title	President
Phone Number	1-250-575-1719
Email	info@can-cert.com

¹Company Number is issued by Innovation, Science and Economic Development Canada (formerly Industry Canada).

Le numéro d'entreprise est délivré par Innovation, Science et Développement économique Canada (anciennement Industrie Canada)

6.6 Antennas list

6.6.1 Antennas list for CE compliance




NOTICE

Within the EU, use the antennas in compliance with the RED requirements.

The BoltGATE 20-31 has been CE certified with the following antennas:

Types Types	Manufacturer and Model Fabricant et Modèle	Bands (MHz) Bandes (MHz)	Peak Gain (dBi) Max. Gain (dBi)	VSWR
Wi-Fi/BT	Taoglas MA950.A.LBICG.005	2400 - 2500 4900 - 5850	4.35 4.84	<3
	Linx Technologies ANT-DB1-RAF-RPS	2400 - 2483 5150 - 5825	2.5 4.6	<1.9
	2J Antennas 2J6302MP	2410 - 2490 4920 - 5925	1.7 2.3	1.6 1.5
	2J Antennas 2J4802P	2410 - 2490 4920 - 5925 5925 - 7125	3.5 1.7 1.5	2.3 1.5 1.7
	2J Antennas 2J3024M	698 - 960 1710 - 2170 2500 - 2700	1.0 2.4 2.1	1.9 1.5 1.3
Cellular	Taoglas MA950.A.LBICG.005	698 - 803 824 - 894 880 - 960 1710 - 1880 1850 - 1990 1920 - 2170 2490 - 2690 3300 - 3600	3.18 3.60 2.14 3.98 4.37 4.37 3.70 4.49	<3
	2J Antennas 2JW0124Z-C868B	698 - 960 1710 - 2170 2500 - 2700	0.4 2.6 1.3	2.4 1.6 2.2
	2J Antennas 2JW0124-C868B	698 - 960 1710 - 2170 2500 - 2700	0.4 2.6 1.3	2.4 1.6 2.2
	2J Antennas 2J6983MPa	617 - 960 1427 - 2690 3300 - 5000 5150 - 5925	Cable 1: Cable 2: 2.1 1.6 6.3 6.3 3.7 5.1 2.8 4.4	Cable 1: Cable 2: 3.1 3.1 2.1 2.1 3.1 2.9 3.0 2.3
	2J Antennas 2J5424P	698 - 960 1710 - 2170 2500 - 2700	1.8 2.4 2.1	2.7 2.1 2.0
GNSS	Taoglas MA950.A.LBICG.005	GPS/GALILEO: 1575.42±1.023 GLONASS: 1602±5 BeiDou: 1561.098±2.046	28 28 28	<3
	2J Antennas 2J4301MPGF	1575.42 - 1606	28	1.4

6.6.2 Antennas list for FCC/ISED compliance

	NOTICE
	<p>Within the US/Canada, use the antennas in compliance with the FCC/ISED requirements. <i>Aux États-Unis et au Canada, les antennes doivent être utilisées conformément aux exigences de la FCC/ISED.</i></p>

The BoltGATE 20-31 has been FCC/ISED certified with the following antennas:

Le BoltGATE 20-31 a été certifié FCC/ISED avec les antennes suivantes:

Configuration: SET A

Types Types	Manufacturer and Model Fabricant et Modèle	Bands (MHz) Bandes (MHz)	Peak Gain (dBi) Max. Gain (dBi)	VSWR
Wi-Fi/BT	Linx Technologies ANT-DB1-RAF-RPS	2400 - 2483 5150 - 5825	2.5 4.6	<1.9
Cellular	2J Antennas 2JW0124-C868B	698 - 960 1710 - 2170 2500 - 2700	0.4 2.6 1.3	2.4 1.6 2.2
GNSS	2J Antennas 2J4301MPGF	1575.42 - 1606	28	1.4

Configuration: SET B

Types Types	Manufacturer and Model Fabricant et Modèle	Bands (MHz) Bandes (MHz)	Peak Gain (dBi) Max. Gain (dBi)	VSWR
Wi-Fi/BT	2J Antennas 2J4802P	2410 - 2490 4920 - 5925 5925 - 7125	3.5 1.7 1.5	2.3 1.5 1.7
Cellular	2J Antennas 2J6983MPa	617 - 960 1427 - 2690 3300 - 5000 5150 - 5925	Cable 1: Cable 2: 2.1 1.6 6.3 6.3 3.7 5.1 2.8 4.4	Cable 1: Cable 2: 3.1 3.1 2.1 2.1 3.1 2.9 3.0 2.3
GNSS	2J Antennas 2J4301MPGF	1575.42 - 1606	28	1.4

6.7 REACH compliance

This product is assessed to be compliant with the regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), with the exceptions allowed by the EU Technical Committee.

Eurotech has set in place a monitoring process to assess compliance to REACH regulation.

For details and more information, refer to: <https://www.eurotech.com/en/support>.

6.8 Rail - Rolling stock compliance

This product is manufactured in compliance with the following standards:

Compliance	Reference
Operating temperature	<ul style="list-style-type: none"> Operating temperature class: EN 50155 Class OT3 (-20°C to +70°C) Switch-on extended operating temperature class: EN 50155 Class ST1 (+85°C) Temperature variation class: EN 50155 Class H1
Relative humidity	EN 50155:2017
Shock and vibration	EN 61373 Category 1 class B
Safety	EN 50155:2017
Fire protection	EN 45545-2:2013+A1:2015, HL3
Power supply interruptions	EN 50155:2017 Class S2 (up to 10ms)
EMC emissions	EN 50121-3-2:2016
EMC immunity	EN 50121-3-2:2016

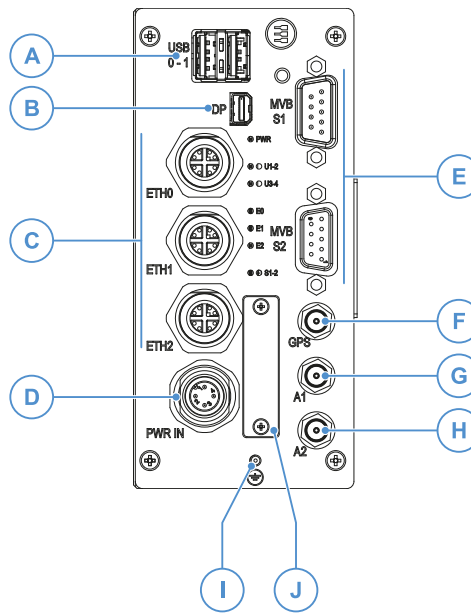
7 MAIN CPU MODULE INTERFACES


This chapter gives the following information:

7.1 Main CPU Module connectors (vers: -11)	42
7.2 Main CPU Module connectors (vers: -21 and -31)	43
7.3 Main CPU Modules Interfaces	44
7.4 Main CPU Module LED indicators	54
7.5 Main CPU Module Service Panel and Service Interfaces	55

7.1 Main CPU Module connectors (vers: -11)

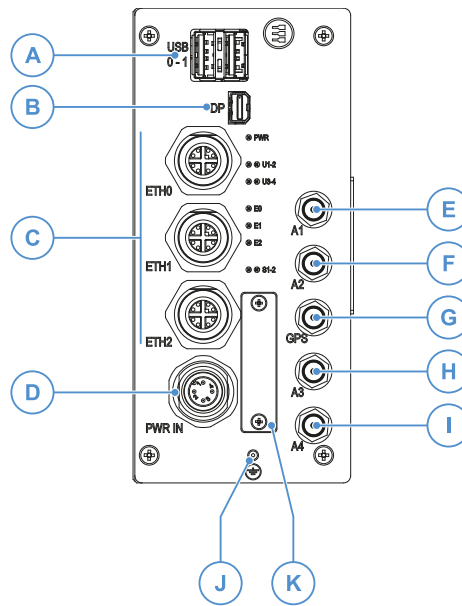
The Main CPU Module connectors are as follows:




Ref #	Label	Description
A	USB0, USB1	USB 3.0 connectors
B	DP	Mini DisplayPort
C	ETH0, ETH1, ETH2	Gb Ethernet connectors
D	PWR IN	Power IN connector
E	MVB S1, MVB S2	MVB EMD RX-only interface
F	GPS	Navigation system antenna connector
G	A1	LTE Main antenna connector
H	A2	LTE Diversity antenna connector
I		Earth connection terminal
J	-	Service Panel: contains the MicroSD Card and the Reset Pushbutton

7.2 Main CPU Module connectors (vers: -21 and -31)

The Main CPU Module connectors are as follows:



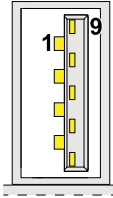
Ref #	Label	Description
A	USB0, USB1	USB 3.0 connectors
B	DP	Mini DisplayPort
C	ETH0, ETH1, ETH2	Gb Ethernet connectors
D	PWR IN	Power IN connector
E	A1	LTE Main antenna connector
F	A2	LTE Diversity antenna connector
G	GPS	Navigation system antenna connector
H	A3	Wi-Fi and Bluetooth Co-existence Main Antenna
I	A4	Wi-Fi (MIMO) Diversity Antenna Connector
J		Earth connection terminal
K	-	Service Panel: contains the MicroSD Card and the Reset Pushbutton

7.3 Main CPU Modules Interfaces

The interfaces availability depends on the Main CPU Modules version

7.3.1 USB0 and USB1: USB 3.0 connectors specifications

Connector Layout:



Connector Specifications:

- USB 3.0 Type-A socket
- Gender: Female

Mating Connector Specifications:

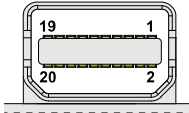
- USB 3.0 Type-A plug
- Gender: Male

Connector Pinout:

Pin #	Signal	Type	Description
1	VBUS	5	+5V
2	D-	IO	Data-
3	D+	IO	Data+
4	GND	P	Ground
5	SSRX-	IO	Full-duplex Receive Data-
6	SSRX+	IO	Full-duplex Receive Data+
7	GND	P	Ground
8	SSTX-	IO	Full-duplex Transmit Data-
9	SSTX+	IO	Full-duplex Transmit Data+

7.3.2 DP: Mini DisplayPort specifications

Connector Layout:



Connector Specifications:

- Mini DisplayPort socket
- Gender: Female

Mating Connector Specifications:

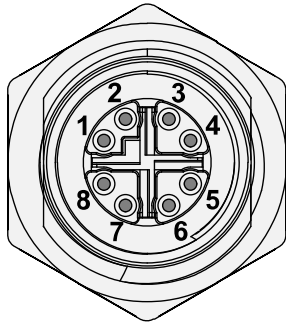
- Cable-Mount Mini DisplayPort plug
- Gender: Male

Connector Pinout:

Pin #	Signal	Type	Description
1	GND1	P	Ground
2	HP	O	Hot Plug Detect
3	L0+	O	Lane 0 (positive)
4	CF1	O	CONFIG1
5	L0-	O	Lane 0 (negative)
6	CF2	O	CONFIG2
7	GND2	P	Ground
8	GND3	P	Ground
9	L1+	O	Lane 1 (positive)
10	L3+	O	Lane 3 (positive)
11	L1-	O	Lane 1 (negative)
12	L3-	O	Lane 3 (negative)
13	GND4	P	Ground
14	GND5	P	Ground
15	L2+	O	Lane 2 (positive)
16	AUX+	O	Auxiliary Channel (positive)
17	L2-	O	Lane 2 (negative)
18	AUX-	O	Auxiliary Channel (negative)
19	GND6	P	Ground
20	PWR	3.3	Power for connector

7.3.3 ETH0, ETH1, ETH2: Gb Ethernet connectors specifications

Connector Layout:



Connector Pinout:

Pin #	Signal	Type	Description	Male RJ45 Pin #
1	TX+_D1	O	Transmit Data +	1
2	TX-_D1	O	Transmit Data -	2
3	RX+_D2	I	Receive Data +	3
4	RX-_D2	I	Receive Data -	6
5	BI+_D4	I/O	Bidirectional Data +	7
6	BI-_D4	I/O	Bidirectional Data -	8
7	BI-_D3	I/O	Bidirectional Data -	5
8	BI+_D3	I/O	Bidirectional Data +	4

Connector Specifications:

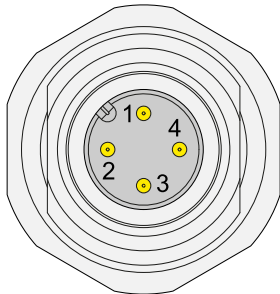
- Panel-mount; M12 series
- Gender: Female
- Type: X-Coded; 8-pin

Mating Connector Specifications:

- Cable-Mount; M12 series
- Gender: Male
- Type: X-Coded; 8-pin
- Example of cable:
Manufacturer: Metz Connect
Part Number: 142M2X10005
(or equivalent)

7.3.4 PWR IN: Power IN connector specifications

Connector Layout:



Connector Pinout:

Pin #	Signal	Type	Description
1	VIN+	P	Power IN +
2	VIN-	P	Power IN -
3	NC	NC	Not Connected
4	KEY	P	Key Signal

Connector Specifications:

- Panel-mount; M12 series
- Gender: Male
- Type: B-Coded; 4-pin

Mating Connector Specifications:

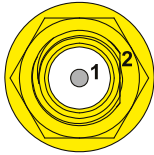
- Cable-Mount; M12 series
- Gender: Female
- Type: B-Coded; 4-pin
- Example of cable:
Manufacturer: Conec
Part Number: 43-00292
(or equivalent)

7.3.5 Navigation system specifications

Feature	Description
Receiver type	72-channel GNSS receiver with Untethered Dead Reckoning (UDR) GPS/QZSS L1 C/A, GLONASS L10FBeiDou B1I, Galileo E1B/CSBAS L1 C/A: WAAS, EGNOS, MSAS, GAGAN
Navigation update rate	Up to 30 Hz
Position accuracy	2.5 m CEP
Acquisition	Cold starts: 26 s Aided starts: 3 s Reacquisition: 1 s
Sensitivity	Tracking & Nav.: -160 dBm Cold starts: -148 dBm Hot starts: -157 dBm
Assistance	AssistNow GNSS Online AssistNow GNSS Offline (up to 35 days) AssistNow Autonomous (up to 6 days) OMA SUPL & 3GPP compliant
Oscillator	Crystal
Sensor	Onboard accelerometer and gyroscope

7.3.5.1 GPS: Navigation system antenna connector specifications

Connector Layout:



Connector Pinout:

Pin #	Description
1	Female inner pin contact
2	Female connector body (outer thread)

Connector Specifications:

- SMA connector
- Gender: Female

Mating Connector Specifications:

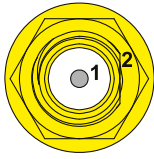
- SMA connector
- Gender: Male

7.3.6 LTE cellular modem specifications

Feature	Description		
Key Features	LTE Cat 4 module optimized for M2M and IoT applications Maximum data rates up to 150Mbps downlink and 50Mbps uplink Worldwide LTE, UMTS/HSPA(+) and GSM/GPRS/EDGE coverage Downlink MIMO (Supports Rx-diversity Antenna)		
Supported Bands	LTE-FDD	B1/ B2/ B3/ B4/ B5/ B7/ B8/ B12/ B13/ B18/ B19/ B20/ B25/ B26/ B28	
	LTE-TDD	B38/ B39/ B40/ B41	
	WCDMA	B1/ B2/ B4/ B5/ B6/ B8/ B19	
	GSM	B2/ B3/ B5/ B8	
Data	LTE	LTE-FDD	Max 150 Mbps (DL)/ Max 50 Mbps (UL)
		LTE-TDD	Max 130 Mbps (DL)/ Max 30 Mbps (UL)
	UMTS	DC-HSDPA	Max 42 Mbps (DL)
		HSUPA	Max 5.76 Mbps (UL)
		WCDMA	Max 384 Kbps (DL)/ Max 384 Kbps (UL)
	GSM	EDGE	Max 296 Kbps (DL)/ Max 236.8 Kbps (UL)
		GPRS	Max 107 Kbps (DL)/ Max 85.6 Kbps (UL)
TX Output Power	Class 4	33dBm±2dB	for GSM850
		33dBm±2dB	for EGSM900
	Class 1	30dBm±2dB	for DCS1800
		30dBm±2dB	for PCS1900
	Class E2	27dBm±3dB	for GSM850 8-PSK
		27dBm±3dB	for EGSM900 8-PS
		26dBm±3dB	for DCS1800 8-PSK
		26dBm±3dB	for PCS1900 8-PSK
	Class 3	24dBm+1/-3dB	for WCDMA bands
		23dBm±2dB	for LTE-FDD bands
		23dBm±2dB	for LTE-TDD bands
Main and RX-diversity Antenna Requirements	VSWR	≤ 2	
	Efficiency	> 30%	
	Max Input Power	50W	
	Input Impedance	50Ω	
	Cable Insertion Loss	< 1dB	for GSM850, EGSM900, WCDMA B5/B6/B8/B19, LTE-FDD B5/ B8/ B12/ B13/ B18/ B19/ B20/ B26/ B28
		< 1.5dB	for DCS1800, PCS1900, WCDMA B1/B2/B4, LTE-FDD B1/ B2/ B3/ B4/ B25/ B39
		< 2dB	for LTE-FDD B7, LTE-TDD B38/ B40/ B41

7.3.6.1 A1: Main antenna connector specifications

Connector Layout:



Connector Pinout:

Pin #	Description
1	Female inner pin contact
2	Female connector body (outer thread)

Connector Specifications:

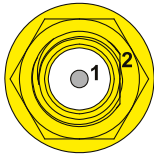
- SMA connector
- Gender: Female

Mating Connector Specifications:

- SMA connector
- Gender: Male

7.3.6.2 A2: Diversity antenna connector specifications

Connector Layout:



Connector Pinout:

Pin #	Description
1	Female inner pin contact
2	Female connector body (outer thread)

Connector Specifications:

- SMA connector
- Gender: Female

Mating Connector Specifications:

- SMA connector
- Gender: Male

7.3.7 Wi-Fi and BT specifications (vers: -21 and -31 only)



NOTICE

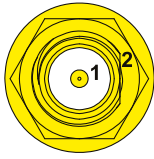
If the country code is in Europe, channels 12/13 of 2.4 GHz frequency are not available for station mode.

Feature	Description
Frequency bands	<p>WLAN:</p> <ul style="list-style-type: none"> 2.4 GHz ISM Bands 2.412 - 2.472 GHz, 2.484 GHz 5.15 - 5.25 GHz (FCC UNII-low band) for US/Canada, Japan and Europe 5.25 - 5.35 GHz (FCC UNII-middle band) for US/Canada and Europe 5.47 - 5.725 GHz for Europe 5.725 - 5.825 GHz (FCC UNII-high band) for US/Canada <p>Bluetooth (BT 4.0 , BLE coexistence):</p> <ul style="list-style-type: none"> 2402-2480MHz
Data Transfer Rates	<p>WLAN 2.4 GHz:</p> <ul style="list-style-type: none"> 11n: Up to 300 Mbps (dynamic) 11g: Up to 54 Mbps (dynamic) 11b: Up to 11 Mbps (dynamic) <p>WLAN 5 GHz:</p> <ul style="list-style-type: none"> 11n: Up to 300 Mbps (dynamic) 11a: Up to 54 Mbps (dynamic) <p>Bluetooth (BT 4.0 , BLE coexistence):</p> <ul style="list-style-type: none"> 1 Mbps, 2 Mbps and Up to 3 Mbps EDR
Media Access Control	CSMA/CA with ACK
Channel	2.4GHz: 1-13 (14 only for Japan) 5GHz: 36-48 149-165 Supports Fast Channel Switch (FTS): 1ms within and 2ms across bands
Channel Spacing	5 MHz
Spreading / Modulation	<p>WLAN:</p> <ul style="list-style-type: none"> 802.11a/g/n: OFDM 802.11b: CCK(11, 5.5Mbps), DQPSK(2Mbps), BPSK(1Mbps) <p>Bluetooth:</p> <ul style="list-style-type: none"> Header GFSK Payload 2M: 4-DQPSK Payload 3M: 8DPSK
RF Output Power	<ul style="list-style-type: none"> 802.11a: Typical 11 dBm at 54M / 15dBm at 6M +/- 2dBm 802.11b: Typical 17dBm +/- 2 dBm 802.11g: Typical 15 dBm at 54M / 17dBm at 6M +/- 2dBm 802.11n 5G HT20 : Typical 9 dBm at MCS7 / 14dBm at MCS0 +/- 2dBm 802.11n 5G HT40 : Typical 9 dBm at MCS7 / 14dBm at MCS0 +/- 2dBm 802.11n 2.4G HT20 : Typical 14 dBm at MCS7 / 17dBm at MCS0 +/- 2dBm 802.11n 2.4G HT40 : Typical 14 dBm at MCS7 / 16dBm at MCS0 +/- 2dBm Bluetooth (BT 4.0 , BLE coexistence; Class 2 Device) $-6 \leq \text{Output Power} \leq +7$ dBm (Conductive)

Feature	Description
RF receive Sensitivity (Typical)	<ul style="list-style-type: none">• 802.11a: 54M less than 68 dBm• 802.11b: 11M less than 78 dBm• 802.11g: 54M less than 68 dBm• 802.11n 2.4G:<ul style="list-style-type: none">◦ HT20 MCS7 less than 64 dBm◦ HT40 MCS7 less than 61 dBm• 802.11n 5G:<ul style="list-style-type: none">◦ HT20 MCS7 less than 64 dBm◦ HT40 MCS7 less than 61 dBm

7.3.7.1 A3: Main antenna connector specifications

Connector Layout:



Connector Pinout:

Pin #	Description
1	Male inner pin contact
2	Female connector body (outer thread)

Connector Specifications:

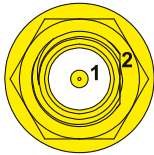
- RP-SMA connector
- Gender: Female

Mating Connector Specifications:

- RP-SMA connector
- Gender: Male

7.3.7.2 A4: Diversity antenna connector specifications

Connector Layout:



Connector Pinout:

Pin #	Description
1	Male inner pin contact
2	Female connector body (outer thread)

Connector Specifications:

- RP-SMA connector
- Gender: Female

Mating Connector Specifications:

- RP-SMA connector
- Gender: Male

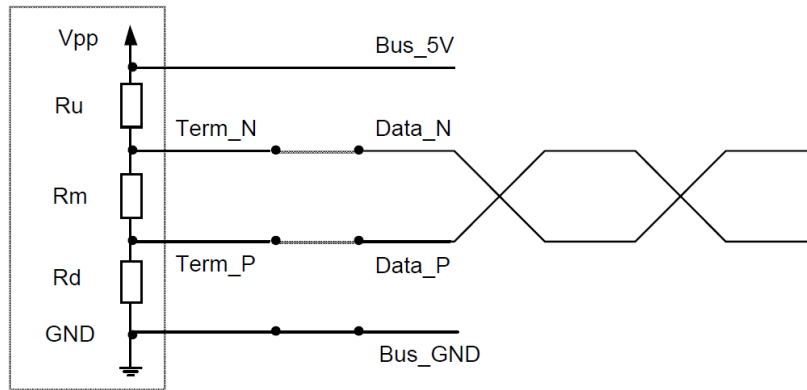
7.3.8 MVB ESD+ ("RX only" or "RX/TX") interface specifications (vers: -11 only)

7.3.8.1 MVB ESD+ Connection Notes

An ESD segment shall be terminated electrically at each end by a terminator.
 The terminator shall present an impedance of $120.0 \Omega \pm 2 \%$ measured at 1.0 BR.

Example of terminator (from the IEC 61375-1: 2007):

The terminator shown in the following figure presents an impedance of 120.5Ω and biases the line with about 0.786 V. Note that the Vpp source shall have a very low inner impedance in the frequency range of 0.5 BT until 2 BT in order that the equivalent terminator impedance seen by the line is within the specified tolerance. Resistors are belonging from the E96 series 1% tolerance.



Components	Type	Value	Connections	Type	Value
Ru	Resistor	383 Ω	Vpp	Supply voltage	5.0 V
Rm	Resistor	143 Ω	GND	Reference voltage	0.0 V
Rd	Resistor	383 Ω			

Fig. 2 - Example of terminator

The terminator shall be included into a connector, to be plugged into the empty receptacle of a device located at the end of the segment, according to the wiring shown in the following figure:

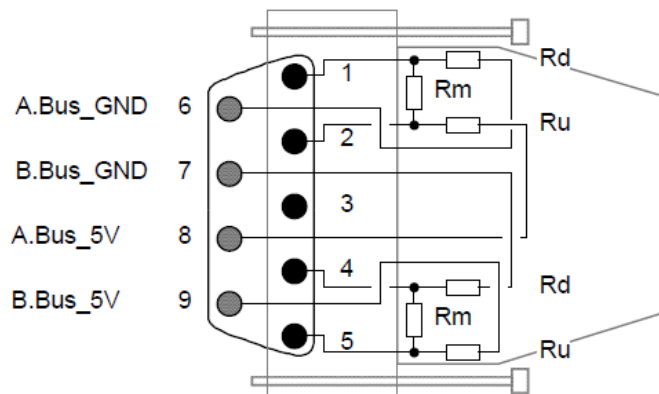
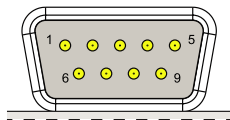


Fig. 3 - ESD terminator connector arrangement

7.3.8.2 MVB S1: connector specifications

Connector Layout:



Connector Specifications:

- Standard 9-Pin D-Sub (plug)
- Gender: Male

Mating Connector Specifications:

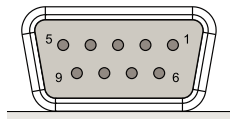
- Standard 9-Pin D-Sub (socket)
- Gender: Female

Connector Pinout:

Pin #	Signal	Type	Description
1	A.Data_P	IO	Line A Data+
2	A.Data_N	IO	Line A Data-
3	NC	NC	No Connection
4	B.Data_P	IO	Line B Data+
5	B.Data_N	IO	Line B Data-
6	A.Bus_GND	P	Ground Line A
7	B.Bus_GND	P	Ground Line B
8	A.Bus_5V	P	Line A Power Supply+
9	B.Bus_5V	P	Line B Power Supply+

7.3.8.3 MVB S2: connector specifications

Connector Layout:



Connector Specifications:

- Standard 9-Pin D-Sub (socket)
- Gender: Female

Mating Connector Specifications:

- Standard 9-Pin D-Sub (plug)
- Gender: Male

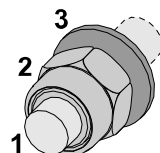
Connector Pinout:

Pin #	Signal	Type	Description
1	A.Data_P	IO	Line A Data+
2	A.Data_N	IO	Line A Data-
3	NC	NC	No Connection
4	B.Data_P	IO	Line B Data+
5	B.Data_N	IO	Line B Data-
6	A.Bus_GND	P	Ground Line A
7	B.Bus_GND	P	Ground Line B
8	A.Bus_5V	P	Line A Power Supply+
9	B.Bus_5V	P	Line B Power Supply+

7.3.9 Earth connection terminal specifications

Always use this terminal to connect the product to an earth point in the installation.

Terminal Layout:



Terminal Label:



Terminal Parts:

Part #	Description
1	M4 stud bolt (length = 6.8 mm)
2	M4 lock nut
3	M4 washer

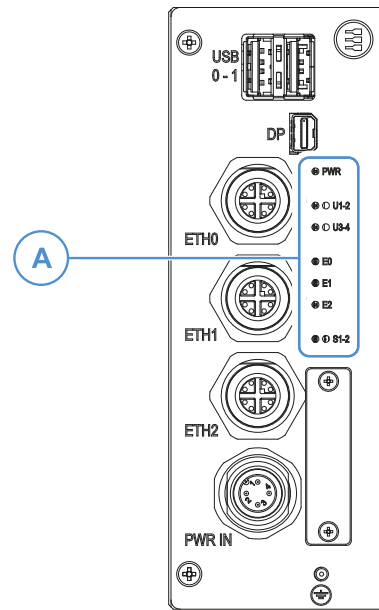


NOTICE

The earthing conductor to be connected to this terminal must have a size of 1 mm².

7.4 Main CPU Module LED indicators

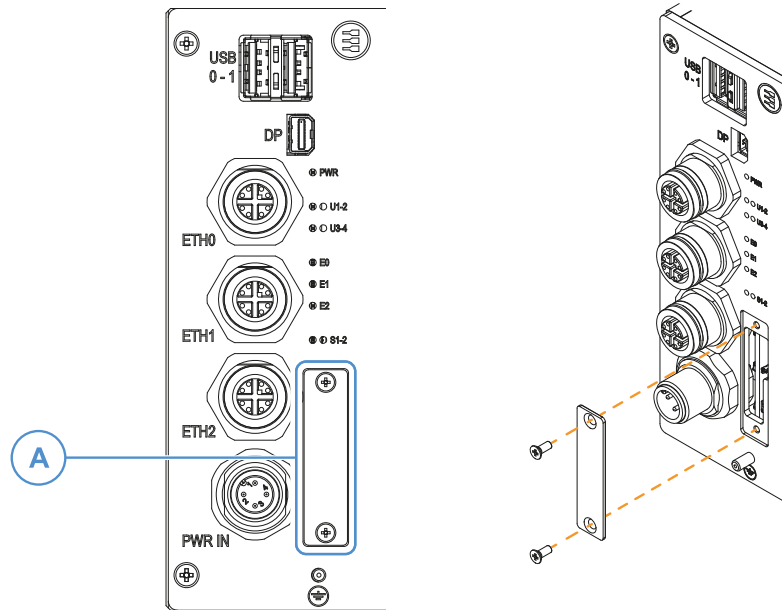
The Main CPU Module LED indicators **A** are as follows:



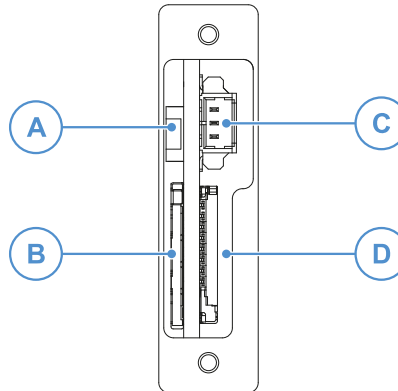
LED	Colour	Description
PWR	Blue	Power input presence
U1	Orange/green	User programmable LED#1
U2	Orange/green	User programmable LED#2
U3	Orange/green	User programmable LED#3
U4	Orange/green	User programmable LED#4
E0	Yellow/green	ETH0 activity
E1	Yellow/green	ETH1 activity
E2	Yellow/green	ETH2 activity
S1	Green	Activity for Mini PCI Express slot #1
S2	Green	Activity for Mini PCI Express slot #2

7.5 Main CPU Module Service Panel and Service Interfaces

The Service Panel **A** is placed on the front side of the Main CPU Module and protects the service interfaces:



The Service Interfaces are as follows:

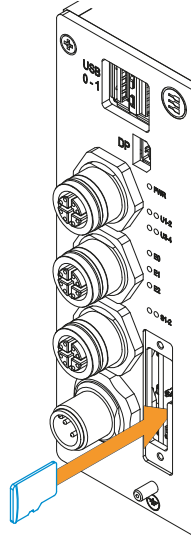


Ref #	Description
A	Reset Pushbutton
B	MicroSIM push-push receptacle (not available)
C	TTL Serial Console (3.3 V TTL compatible)
D	MicroSD push-push receptacle

7.5.1 How to insert a MicroSD card

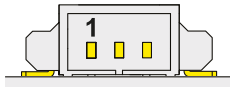
To insert a MicroSD card, complete the following steps:

1. Orient the MicroSD card as in the figure below, with the contacts facing the ETHx connectors
2. Push the MicroSD card in the receptacle to lock it.



7.5.2 TTL Serial Console connector specifications

Connector Layout:



Connector Specifications:

- Shrouded header
- Gender: Male
- Type: Pitch 1.25 mm; 3-pin

Mating Connector Specifications:

- Connector Housing
- Gender: Female
- Type: Pitch 1.25 mm; 3-pin
- Example:
Manufacturer: Molex
Part Number: 51021-0300
(or equivalent)

Connector Pinout:

Pin #	Signal	Type	Description
1	GND	P	Ground
2	TX	O	Transmit Data
3	RX	I	Receive Data

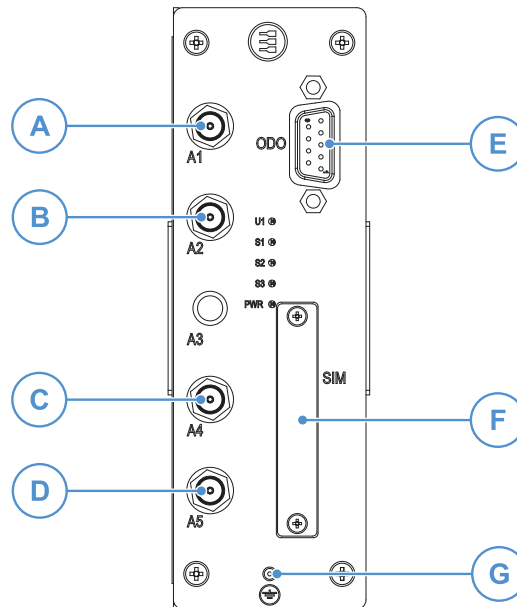
8 BOLT AIR 20-31 INTERFACES


This chapter gives the following information:

8.1 BoltAIR 20-31 connectors	58
8.2 BoltAIR 20-31 LED indicators	66
8.3 BoltAIR 20-31 Service Panel and Service Interfaces	67

8.1 BoltAIR 20-31 connectors

The BoltAIR 20-31 connectors are as follows:



Ref #	Label	Description
A	A1	LTE main antenna connector (SMA Female)
B	A2	LTE diversity antenna connector (SMA Female)
C	A4	Wi-Fi and Bluetooth co-existence main antenna connector (RP-SMA Female)
D	A5	Wi-Fi (MIMO) diversity antenna connector (RP-SMA Female)
E	ODO	Odometer input connector
F	-	Service Panel: contains the MicroSIM receptacle
G		Earth connection terminal

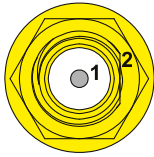
NOTE: Antenna connector labeled A3 is not available.

8.1.1 LTE modem specifications

Feature	Description														
Key Features	LTE Cat 4 module optimized for M2M and IoT applications Maximum data rates up to 150Mbps downlink and 50Mbps uplink Worldwide LTE, UMTS/HSPA(+) and GSM/GPRS/EDGE coverage Downlink MIMO (Supports Rx-diversity Antenna)														
Supported Bands	LTE-FDD B1/ B2/ B3/ B4/ B5/ B7/ B8/ B12/ B13/ B18/ B19/ B20/ B25/ B26/ B28 LTE-TDD B38/ B39/ B40/ B41 WCDMA B1/ B2/ B4/ B5/ B6/ B8/ B19 GSM B2/ B3/ B5/ B8														
Data	LTE <table border="0"> <tr> <td>LTE-FDD</td> <td>Max 150 Mbps (DL)/ Max 50 Mbps (UL)</td> </tr> <tr> <td>LTE-TDD</td> <td>Max 130 Mbps (DL)/ Max 30 Mbps (UL)</td> </tr> </table> UMTS <table border="0"> <tr> <td>DC-HSDPA</td> <td>Max 42 Mbps (DL)</td> </tr> <tr> <td>HSUPA</td> <td>Max 5.76 Mbps (UL)</td> </tr> <tr> <td>WCDMA</td> <td>Max 384 Kbps (DL)/ Max 384 Kbps (UL)</td> </tr> </table> GSM <table border="0"> <tr> <td>EDGE</td> <td>Max 296 Kbps (DL)/ Max 236.8 Kbps (UL)</td> </tr> <tr> <td>GPRS</td> <td>Max 107 Kbps (DL)/ Max 85.6 Kbps (UL)</td> </tr> </table>	LTE-FDD	Max 150 Mbps (DL)/ Max 50 Mbps (UL)	LTE-TDD	Max 130 Mbps (DL)/ Max 30 Mbps (UL)	DC-HSDPA	Max 42 Mbps (DL)	HSUPA	Max 5.76 Mbps (UL)	WCDMA	Max 384 Kbps (DL)/ Max 384 Kbps (UL)	EDGE	Max 296 Kbps (DL)/ Max 236.8 Kbps (UL)	GPRS	Max 107 Kbps (DL)/ Max 85.6 Kbps (UL)
LTE-FDD	Max 150 Mbps (DL)/ Max 50 Mbps (UL)														
LTE-TDD	Max 130 Mbps (DL)/ Max 30 Mbps (UL)														
DC-HSDPA	Max 42 Mbps (DL)														
HSUPA	Max 5.76 Mbps (UL)														
WCDMA	Max 384 Kbps (DL)/ Max 384 Kbps (UL)														
EDGE	Max 296 Kbps (DL)/ Max 236.8 Kbps (UL)														
GPRS	Max 107 Kbps (DL)/ Max 85.6 Kbps (UL)														
TX Output Power	Class 4 33dBm±2dB for GSM850 33dBm±2dB for EGSM900 Class 1 30dBm±2dB for DCS1800 30dBm±2dB for PCS1900 Class E2 27dBm±3dB for GSM850 8-PSK 27dBm±3dB for EGSM900 8-PS 26dBm±3dB for DCS1800 8-PSK 26dBm±3dB for PCS1900 8-PSK Class 3 24dBm+1/-3dB for WCDMA bands 23dBm±2dB for LTE-FDD bands 23dBm±2dB for LTE-TDD bands														
Main and RX-diversity Antenna Requirements	VSWR ≤ 2 Efficiency > 30% Max Input Power 50W Input Impedance 50Ω Cable Insertion Loss < 1dB for GSM850, EGSM900, WCDMA B5/B6/B8/B19, LTE-FDD B5/ B8/ B12/ B13/ B18/ B19/ B20/ B26/ B28 < 1.5dB for DCS1800, PCS1900, WCDMA B1/B2/B4, LTE-FDD B1/ B2/ B3/ B4/ B25/ B39 < 2dB for LTE-FDD B7, LTE-TDD B38/ B40/ B41														

8.1.1.1 A1: Main antenna connector specifications

Connector Layout:



Connector Pinout:

Pin #	Description
1	Female inner pin contact
2	Female connector body (outer thread)

Connector Specifications:

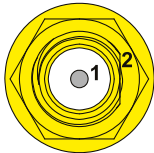
- SMA connector
- Gender: Female

Mating Connector Specifications:

- SMA connector
- Gender: Male

8.1.1.2 A2: Diversity antenna connector specifications

Connector Layout:



Connector Pinout:

Pin #	Description
1	Female inner pin contact
2	Female connector body (outer thread)

Connector Specifications:

- SMA connector
- Gender: Female

Mating Connector Specifications:

- SMA connector
- Gender: Male

8.1.2 Wi-Fi and Bluetooth specifications



NOTICE

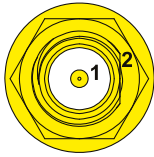
If the country code is in Europe, channels 12/13 of 2.4 GHz frequency are not available for station mode.

Feature	Description
Frequency bands	<p>WLAN:</p> <ul style="list-style-type: none"> 2.4 GHz ISM Bands 2.412 - 2.472 GHz, 2.484 GHz 5.15 - 5.25 GHz (FCC UNII-low band) for US/Canada, Japan and Europe 5.25 - 5.35 GHz (FCC UNII-middle band) for US/Canada and Europe 5.47 - 5.725 GHz for Europe 5.725 - 5.825 GHz (FCC UNII-high band) for US/Canada <p>Bluetooth (BT 4.0 , BLE coexistence):</p> <ul style="list-style-type: none"> 2402-2480MHz
Data Transfer Rates	<p>WLAN 2.4 GHz:</p> <ul style="list-style-type: none"> 11n: Up to 300 Mbps (dynamic) 11g: Up to 54 Mbps (dynamic) 11b: Up to 11 Mbps (dynamic) <p>WLAN 5 GHz:</p> <ul style="list-style-type: none"> 11n: Up to 300 Mbps (dynamic) 11a: Up to 54 Mbps (dynamic) <p>Bluetooth (BT 4.0 , BLE coexistence):</p> <ul style="list-style-type: none"> 1 Mbps, 2 Mbps and Up to 3 Mbps EDR
Media Access Control	CSMA/CA with ACK
Channel	2.4GHz: 1-13 (14 only for Japan) 5GHz: 36-48 149-165 Supports Fast Channel Switch (FTS): 1ms within and 2ms across bands
Channel Spacing	5 MHz
Spreading / Modulation	<p>WLAN:</p> <ul style="list-style-type: none"> 802.11a/g/n: OFDM 802.11b: CCK(11, 5.5Mbps), DQPSK(2Mbps), BPSK(1Mbps) <p>Bluetooth:</p> <ul style="list-style-type: none"> Header GFSK Payload 2M: 4-DQPSK Payload 3M: 8DPSK
RF Output Power	<ul style="list-style-type: none"> 802.11a: Typical 11 dBm at 54M / 15dBm at 6M +/- 2dBm 802.11b: Typical 17dBm +/- 2 dBm 802.11g: Typical 15 dBm at 54M / 17dBm at 6M +/- 2dBm 802.11n 5G HT20 : Typical 9 dBm at MCS7 / 14dBm at MCS0 +/- 2dBm 802.11n 5G HT40 : Typical 9 dBm at MCS7 / 14dBm at MCS0 +/- 2dBm 802.11n 2.4G HT20 : Typical 14 dBm at MCS7 / 17dBm at MCS0 +/- 2dBm 802.11n 2.4G HT40 : Typical 14 dBm at MCS7 / 16dBm at MCS0 +/- 2dBm Bluetooth (BT 4.0 , BLE coexistence; Class 2 Device) -6 ≤ Output Power ≤ +7 dBm (Conductive)

Feature	Description
RF receive Sensitivity (Typical)	<ul style="list-style-type: none">• 802.11a: 54M less than 68 dBm• 802.11b: 11M less than 78 dBm• 802.11g: 54M less than 68 dBm• 802.11n 2.4G:<ul style="list-style-type: none">◦ HT20 MCS7 less than 64 dBm◦ HT40 MCS7 less than 61 dBm• 802.11n 5G:<ul style="list-style-type: none">◦ HT20 MCS7 less than 64 dBm◦ HT40 MCS7 less than 61 dBm

8.1.2.1 A4: Wi-Fi and Bluetooth co-existence main antenna connector specifications

Connector Layout:



Connector Pinout:

Pin #	Description
1	Male inner pin contact
2	Female connector body (outer thread)

Connector Specifications:

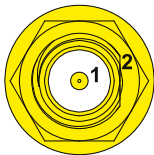
- RP-SMA connector
- Gender: Female

Mating Connector Specifications:

- RP-SMA connector
- Gender: Male

8.1.2.2 A5: Wi-Fi (MIMO) diversity antenna connector specifications

Connector Layout:



Connector Pinout:

Pin #	Description
1	Male inner pin contact
2	Female connector body (outer thread)

Connector Specifications:

- RP-SMA connector
- Gender: Female

Mating Connector Specifications:

- RP-SMA connector
- Gender: Male

8.1.3 Odometer specifications

8.1.3.1 How the odometer input works

The odometer input is a digital interface that counts the input pulses and detect with them the speed of a vehicle.

The input, available on pins ODOM+ and ODOM-, is optically insulated and has a programmable threshold level. The programmable input threshold allows you to configure the best threshold value for your application; the input can be seen as a trigger that counts the input pulses and deletes any spurious.

The ODOM+ input is compared with a programmable reference voltage threshold:

- If the input signal is higher than the programmed high threshold, the logic input is '1'
- If the input signal is lower than the programmed low threshold, the logic input is '0'.

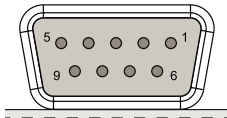
8.1.3.2 Odometer input electrical specifications

The table below shows the electrical specifications odometer input:

Characteristic	Value
Voltage Range	Minimum: 0V Maximum: 32V
Maximum Input Frequency	10 kHz

8.1.3.3 ODO: Odometer input connector specifications

Connector Layout:



Connector Pinout (pins not listed are not connected):

Pin #	Signal	Type	Description
1	ODOM+	I	Odometer positive input
3	ODOM-	I	Odometer negative input

Connector Specifications:

- Standard 9-Pin D-Sub (socket)
- Gender: Female

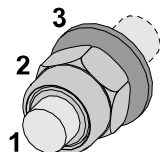
Mating Connector Specifications:

- Standard 9-Pin D-Sub (plug)
- Gender: Male

8.1.4 Earth connection terminal specifications

Always use this terminal to connect the product to an earth point in the installation.

Terminal Layout:



Terminal Label:



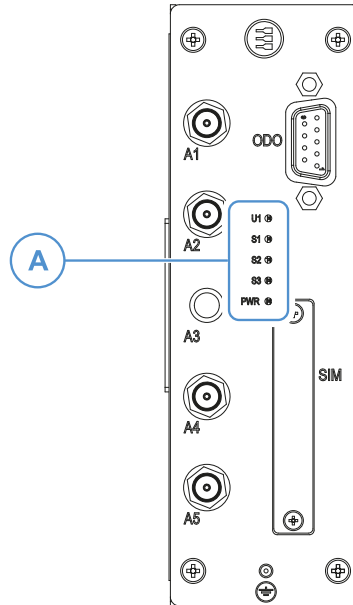
Terminal Parts:

Part #	Description
1	M4 stud bolt (length = 6.8 mm)
2	M4 lock nut
3	M4 washer

	NOTICE
	<p><i>The earthing conductor to be connected to this terminal must have a size of 1 mm².</i></p>

8.2 BoltAIR 20-31 LED indicators

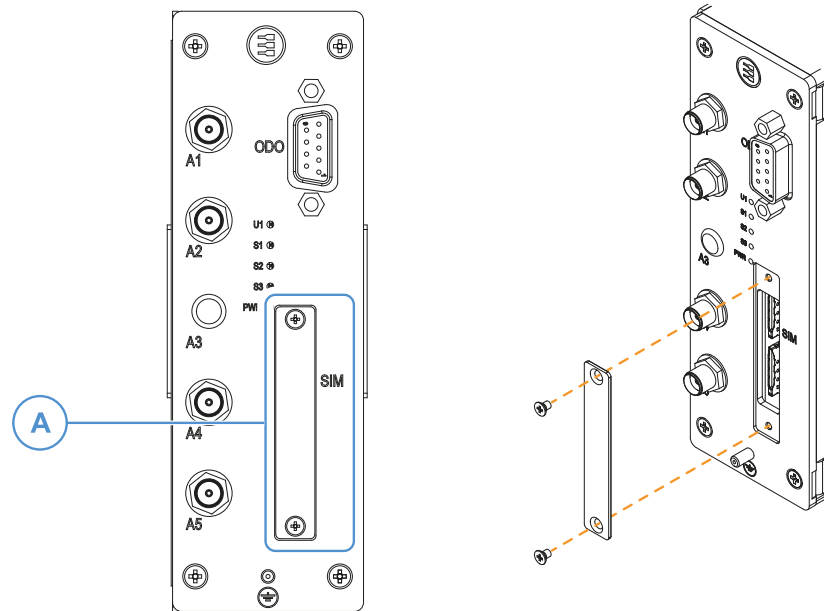
The BoltAIR 20-31 LED indicators **A** are as follows:



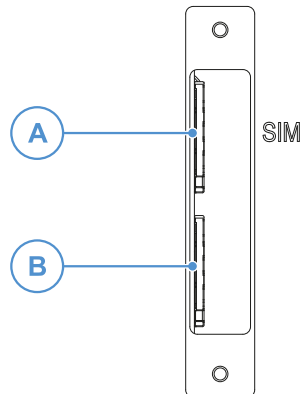
LED	Colour	Description
U1	Green	User programmable LED#1
S1	Green	Mini PCI Express slot #1 activity
S2	Green	Mini PCI Express slot #2 activity
S3	Green	Mini PCI Express slot #3 activity
PWR	Blue	Power input presence

8.3 BoltAIR 20-31 Service Panel and Service Interfaces

The Service Panel **A** is placed on the front side of the BoltAIR 20-31 and protects the service interfaces:



The Service Interfaces are as follows:

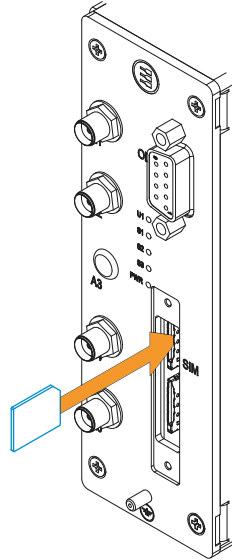


Ref #	Description
A	1st MicroSIM push-push receptacle
B	2nd MicroSIM push-push receptacle (not available)

8.3.1 How to insert a MicroSIM card

To insert a MicroSIM card, complete the following steps:

1. Orient the MicroSIM card as in the figure below, with the contacts facing the antenna connectors and the cut corner **A** facing the receptacle
2. Push the MicroSIM card in the receptacle to lock it.



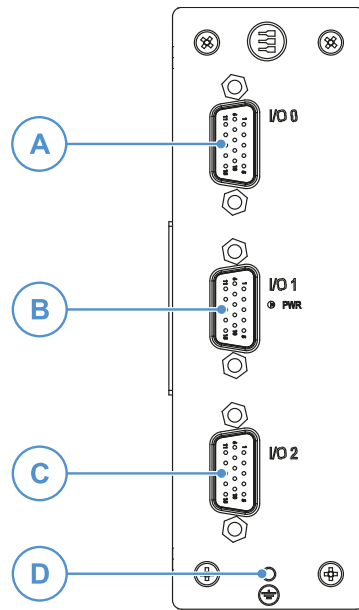
9 BOLTIO 20-31 INTERFACES


This chapter gives the following information:

9.1 BoltIO 20-31 connectors	70
9.2 BoltIO 20-31 LED indicator	74

9.1 BoltIO 20-31 connectors

The BoltIO 20-31 connectors are as follows:



Ref #	Label	Description
A	I/O 0	12x Digital Inputs
B	I/O 1	4x Digital Inputs + 4x Digital Outputs
C	I/O 2	12x Digital Outputs
D		Earth connection terminal

9.1.1 Digital inputs and digital outputs characteristics

Digital I/Os Isolation:

- Inputs 3.7kV
- Outputs: 1.5kV

9.1.2 Insulated Digital Inputs

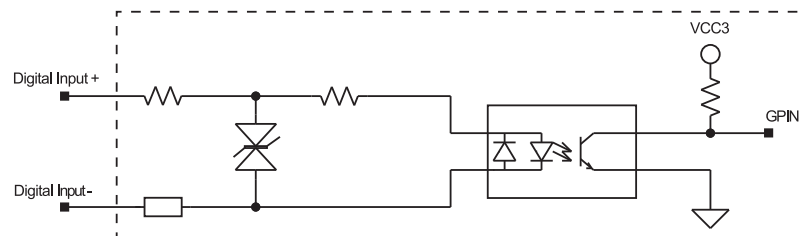
9.1.2.1 Electrical specifications

The table below shows the electrical specifications of the digital inputs at 24 VDC of nominal supply voltage:

Characteristic	Value @ 24 VDC
Logic Zero	$0\text{ V} \leq V_{IN_low} \leq 1.5\text{ V}$
Logic One	$9\text{ V} \leq V_{IN_high} \leq 36\text{ V}$
Minimum duration of the pulse	10 ms
Response Time	5 ms
Input Current	6 mA

9.1.2.2 Electrical schematics

The figure below shows the electrical schematics of one digital input:



9.1.3 Insulated Digital Outputs

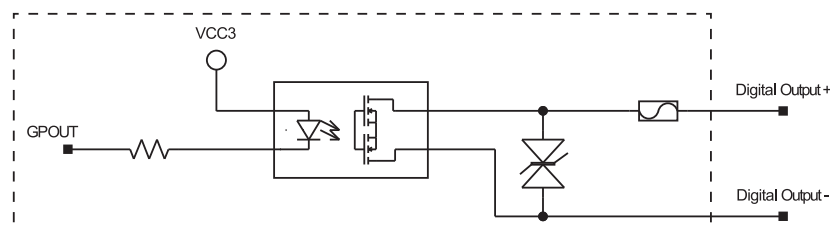
9.1.3.1 Electrical specifications

The table below shows the electrical specifications of the digital outputs at 24 VDC of nominal supply voltage:

Characteristic	Value @ 24 VDC
Maximum Current	250 mA
Output ON Resistance	Typical: 0.85 Ohm Maximum: 2.5 Ohm

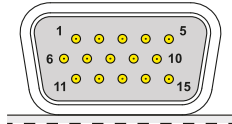
9.1.3.2 Electrical schematics

The figure below shows the electrical schematics of one digital output:



9.1.3.3 I/O 0: 12x Digital Inputs connector specifications

Connector Layout:



Connector Specifications:

- Standard HD 15-Pin D-Sub (plug)
- Gender: Male

Mating Connector Specifications:

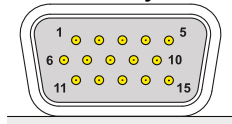
- Standard HD 15-Pin D-Sub (socket)
- Gender: Female

Connector Pinout:

Pin #	Signal	Type	Description
1	IN1	I	Isolated Digital Input 1
2	IN2	I	Isolated Digital Input 2
3	IN3	I	Isolated Digital Input 3
4	IN4	I	Isolated Digital Input 4
5	C1	I	Common for Inputs 1 to 4
6	C2	I	Common for Inputs 5 to 8
7	IN5	I	Isolated Digital Input 5
8	IN6	I	Isolated Digital Input 6
9	IN7	I	Isolated Digital Input 7
10	IN8	I	Isolated Digital Input 8
11	C3	I	Common for Inputs 9 to 12
12	IN9	I	Isolated Digital Input 9
13	IN10	I	Isolated Digital Input 10
14	IN11	I	Isolated Digital Input 11
15	IN12	I	Isolated Digital Input 12

9.1.3.4 I/O 1: 4x Digital Inputs + 4x Digital Outputs

Connector Layout:



Connector Specifications:

- Standard HD 15-Pin D-Sub (plug)
- Gender: Male

Mating Connector Specifications:

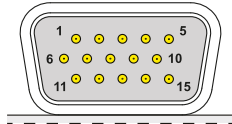
- Standard HD 15-Pin D-Sub (socket)
- Gender: Female

Connector Pinout (pins not listed are not connected):

Pin #	Signal	Type	Description
1	IN13	I	Isolated Digital Input 13
2	IN14	I	Isolated Digital Input 14
3	IN15	I	Isolated Digital Input 15
4	IN16	I	Isolated Digital Input 16
5	C7	I	Common for Inputs 13 to 16
11	C8	O	Common for Outputs 13 to 16
12	OUT13	O	Isolated Digital Output 13
13	OUT14	O	Isolated Digital Output 14
14	OUT15	O	Isolated Digital Output 15
15	OUT16	O	Isolated Digital Output 16

9.1.3.5 I/O 2: 12x Digital Outputs

Connector Layout:



Connector Specifications:

- Standard HD 15-Pin D-Sub (plug)
- Gender: Male

Mating Connector Specifications:

- Standard HD 15-Pin D-Sub (socket)
- Gender: Female

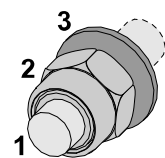
Connector Pinout:

Pin #	Signal	Type	Description
1	OUT1	O	Isolated Digital Output 1
2	OUT2	O	Isolated Digital Output 2
3	OUT3	O	Isolated Digital Output 3
4	OUT4	O	Isolated Digital Output 4
5	C4	O	Common for Outputs 1 to 4
6	C5	O	Common for Outputs 5 to 8
7	OUT5	O	Isolated Digital Output 5
8	OUT6	O	Isolated Digital Output 6
9	OUT7	O	Isolated Digital Output 7
10	OUT8	O	Isolated Digital Output 8
11	C6	O	Common for Outputs 9 to 12
12	OUT9	O	Isolated Digital Output 9
13	OUT10	O	Isolated Digital Output 10
14	OUT11	O	Isolated Digital Output 11
15	OUT12	O	Isolated Digital Output 12

9.1.4 Earth connection terminal specifications

Always use this terminal to connect the product to an earth point in the installation.

Terminal Layout:



Terminal Label:



Terminal Parts:

Part #	Description
1	M4 stud bolt (length = 6.8 mm)
2	M4 lock nut
3	M4 washer

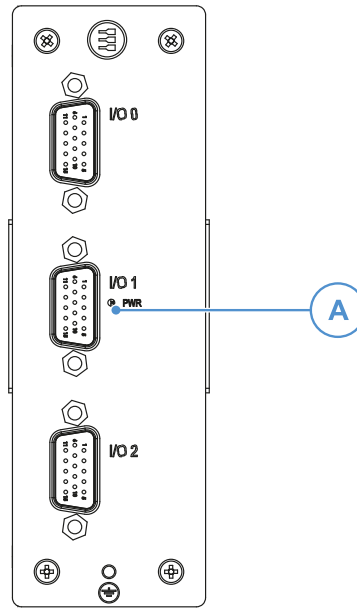


NOTICE

The earthing conductor to be connected to this terminal must have a size of 1 mm².

9.2 BoltIO 20-31 LED indicator

The BoltIO 20-31 LED indicator **A** is as follows:



LED	Colour	Description
PWR	Blue	Power input presence

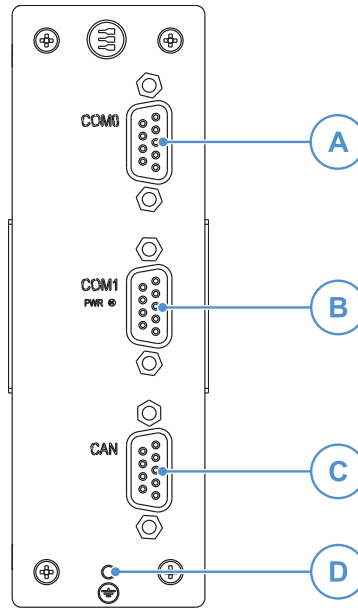
10 BOLT SER 20-31 INTERFACES


This chapter gives the following information:

10.1 BoltSER 20-31 connectors	76
10.2 BoltSER 20-31 LED indicator	79

10.1 BoltSER 20-31 connectors

The BoltSER 20-31 connectors are as follows:



Ref #	Label	Description
A	COM 0	1x RS-232/422/485 serial port
B	COM 1	1x RS-232/422/485 serial port
C	CAN	1x isolated (5kV) CAN FD port
D		Earth connection terminal

10.1.1 Serial Ports characteristics

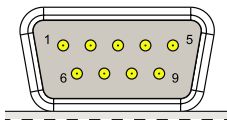
- Isolation: 3.75kV
- RS-485:
 - 120 Ohm internal resistors can be enabled/ disabled by software
 - Automatic direction control
 - Internal failsafe resistors

10.1.2 CAN Port characteristics

- Isolation: 5kV
- 120 Ohm internal resistors can be enabled/ disabled by software
- ISO 11898-2:2003 compliant
- Timing guaranteed for data rates up to 5 Mbit/s in the CAN FD fast phase

10.1.2.1 COM 0: 1x RS-232/422/485 connector specifications

Connector Layout:



Connector Specifications:

- Standard 9-Pin D-Sub (plug)
- Gender: Male

Mating Connector Specifications:

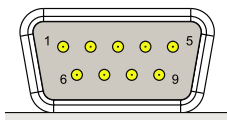
- Standard 9-Pin D-Sub (socket)
- Gender: Female

Connector Pinout:

Pin #	RS-232 mode	RS-422/485 mode full duplex	RS-485 mode half duplex
1	NC	TX-	TX - / RX-
2	RX	TX+	TX + / RX+
3	TX	RX+	NC
4	NC	RX-	NC
5	GND	GND	GND
6	NC	NC	NC
7	RTS	NC	NC
8	CTS	NC	NC
9	NC	NC	NC

10.1.2.2 COM 1: 1x RS-232/422/485 connector specifications

Connector Layout:



Connector Specifications:

- Standard 9-Pin D-Sub (plug)
- Gender: Male

Mating Connector Specifications:

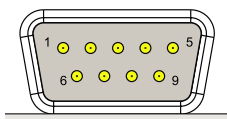
- Standard 9-Pin D-Sub (socket)
- Gender: Female

Connector Pinout:

Pin #	RS-232 mode	RS-422/485 mode full duplex	RS-485 mode half duplex
1	NC	TX-	TX - / RX-
2	RX	TX+	TX + / RX+
3	TX	RX+	NC
4	NC	RX-	NC
5	GND	GND	GND
6	NC	NC	NC
7	RTS	NC	NC
8	CTS	NC	NC
9	NC	NC	NC

10.1.2.3 CAN: 1x isolated (5kV) CAN FD connector specifications

Connector Layout:



Connector Specifications:

- Standard 9-Pin D-Sub (plug)
- Gender: Male

Mating Connector Specifications:

- Standard 9-Pin D-Sub (socket)
- Gender: Female

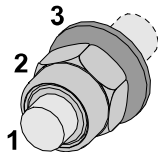
Connector Pinout (pins not listed are not connected):

Pin #	Signal	Type	Description
2	CAN L	IO	CAN Negative Data
3	CAN GND	P	CAN Ground
7	CAN H	IO	CAN Positive Data
9	CAN VDD	P	CAN +5V

10.1.3 Earth connection terminal specifications

Always use this terminal to connect the product to an earth point in the installation.

Terminal Layout:



Terminal Label:



Terminal Parts:

Part #	Description
1	M4 stud bolt (length = 6.8 mm)
2	M4 lock nut
3	M4 washer

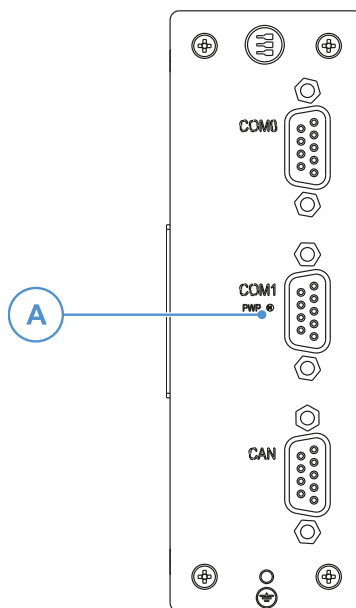


NOTICE

The earthing conductor to be connected to this terminal must have a size of 1 mm².

10.2 BoltSER 20-31 LED indicator

The BoltSER 20-31 LED indicator **A** is as follows:



LED	Colour	Description
PWR	Blue	Power input presence

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11 PRODUCT INSTALLATION AND POWER SUPPLY

This chapter gives the following information:

11.1 Introduction	82
11.2 How to install the product on a DIN Rail	83
11.3 How to remove the product from a DIN Rail	83
11.4 Mechanical specifications	84
11.5 How to supply power to the system	86

11.1 Introduction

The product is intended for professional use and must be installed by qualified personnel only.

The product must be installed in a secured location, accessible to authorized personnel only (for example in a cabinet / technical compartment).

The product includes a Mounting bracket **A** located on its rear side. The Mounting bracket has:

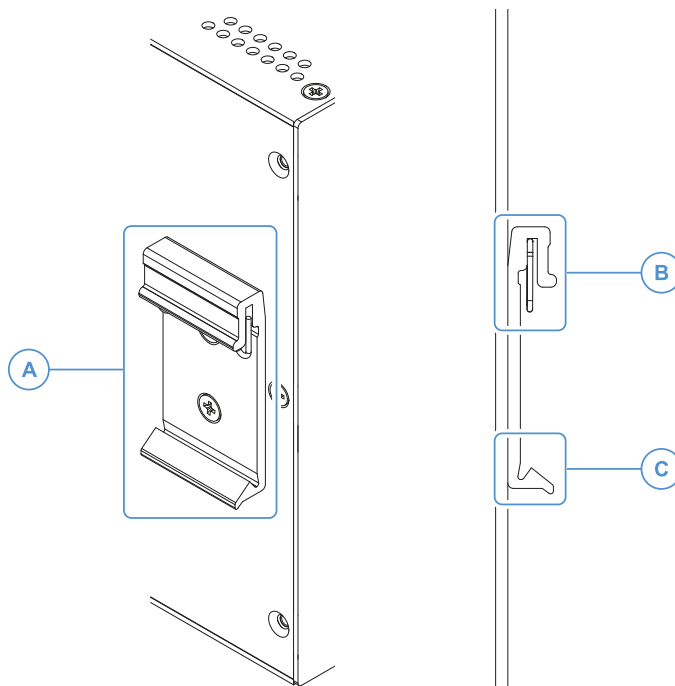
- an upper side provided with a spring **B**, and
- a lower hooked side **C**

Use the Mounting bracket to install the product on a DIN rail.



NOTICE

Make sure that the product is installed vertically (the DIN rail must be placed horizontally).
Make sure that the airflow is sufficient: allow a clearance of at least 1 rack unit above and below the product¹.



¹This is the minimum clearance to allow with a typical installation (BoltGATE 20-31 + BoltAIR 20-31 + BoltSER 20-31). If the number of Expansion Modules increases, the clearance must be higher.

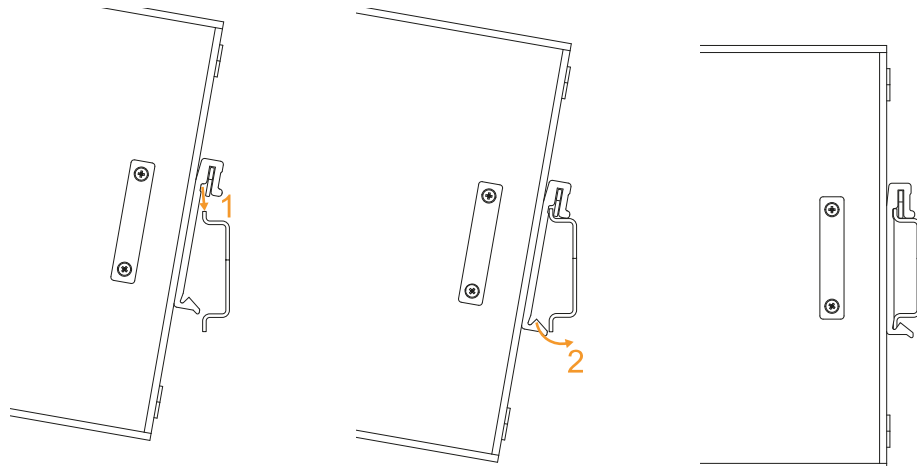
11.2 How to install the product on a DIN Rail

Prerequisite: Make sure that the DIN rail is placed horizontally.

To install the product on a DIN rail, complete the following steps:

1. Position the product so that the upper side of the Mounting bracket hooks on the upper edge of the DIN rail, see step **1**
2. Push the product downwards against the DIN rail until the lower hooked side of the Mounting bracket lock on the lower edge of the DIN rail, see step **2**.

The product is now installed on the DIN rail.

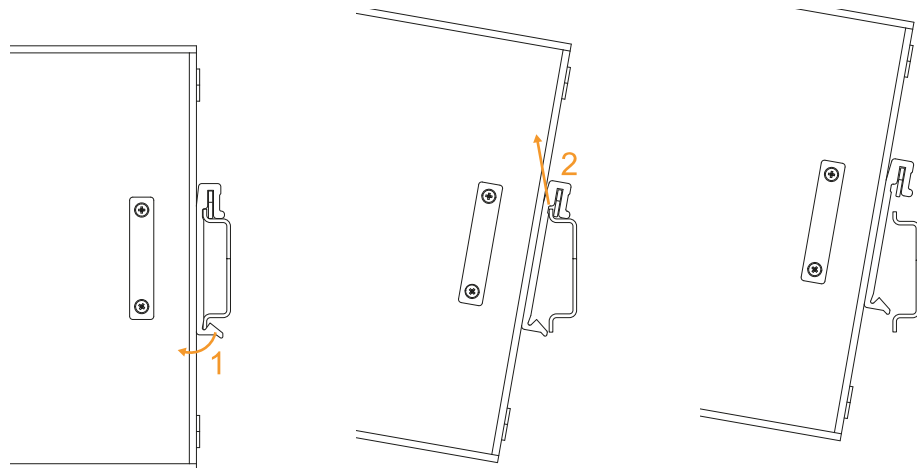


11.3 How to remove the product from a DIN Rail

To remove the product from a DIN rail, complete the following steps:

1. Pull the lower hooked side of the Mounting bracket down so that the product is detached from the lower edge of the DIN rail, see step **1**
2. Lift the product upwards so that the upper side of the Mounting bracket is released from the upper edge of the DIN rail, see step **2**.

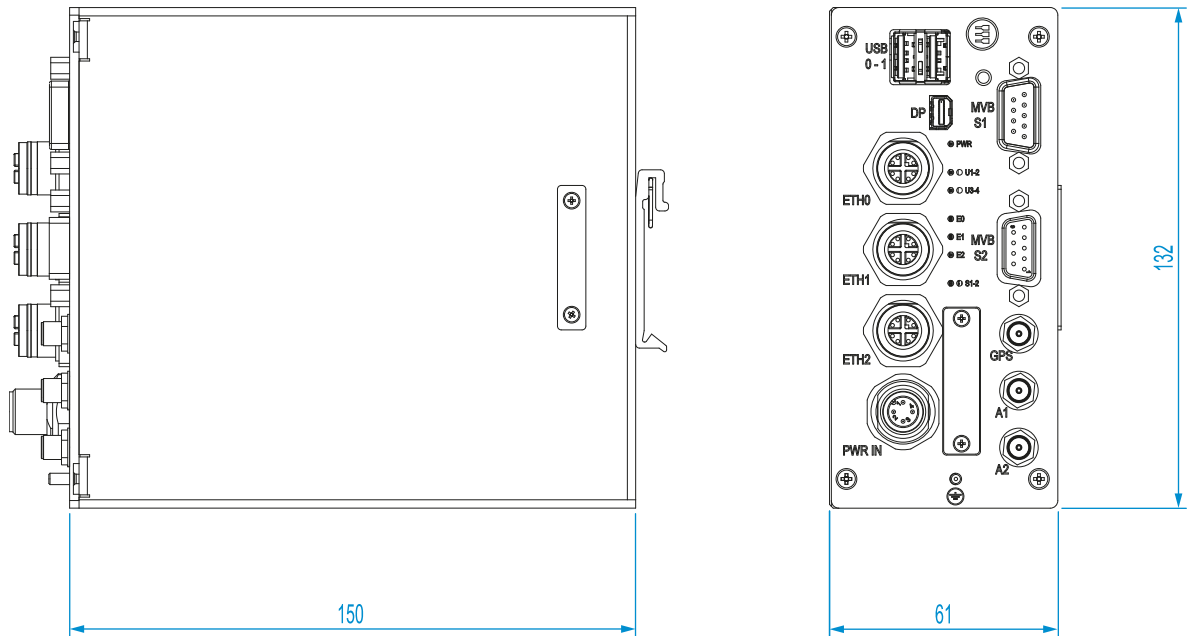
The product has now been removed from the DIN rail.



11.4 Mechanical specifications

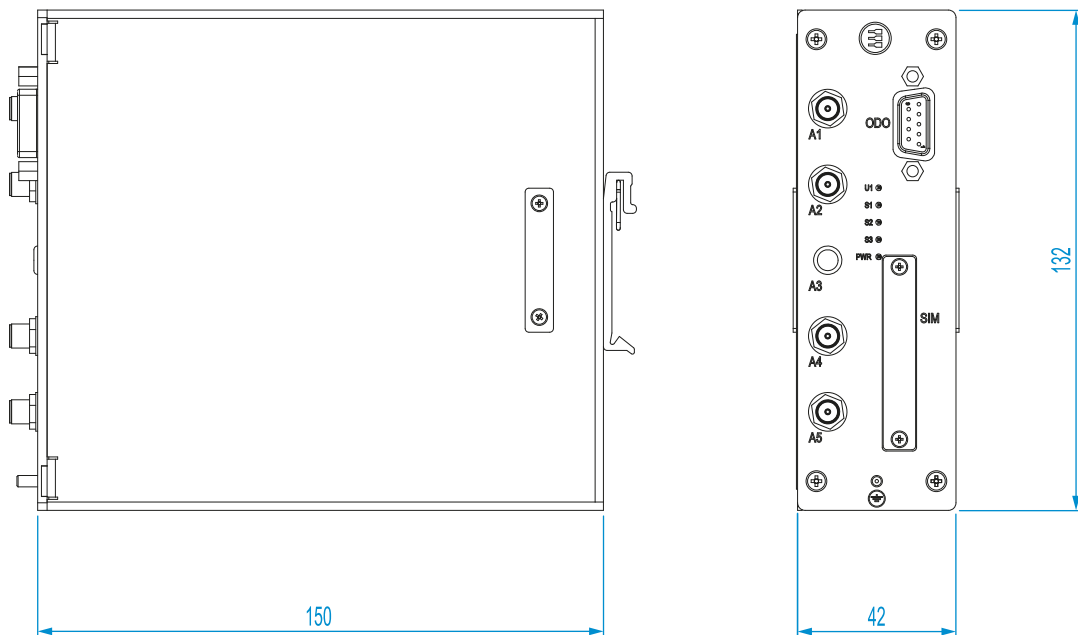
11.4.1 Main CPU Module mechanical dimensions

The mechanical dimensions are as follows (the image shows the Boltage 20-31-11 as an exemple):
61x132x150 (WxHxD); mm - Connectors and Mounting Bracket excluded



11.4.2 BoltAIR 20-31 mechanical dimensions

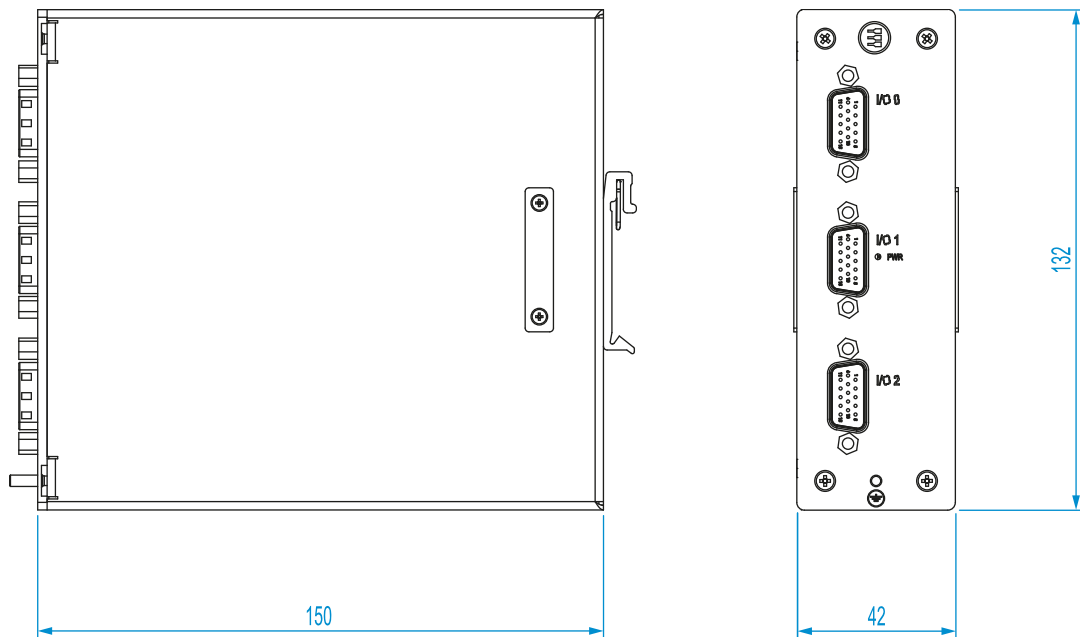
The mechanical dimensions are as follows:
42x132x150 (WxHxD); mm - Connectors and Mounting Bracket excluded



11.4.3 BoltIO 20-31 mechanical dimensions

The mechanical dimensions are as follows:

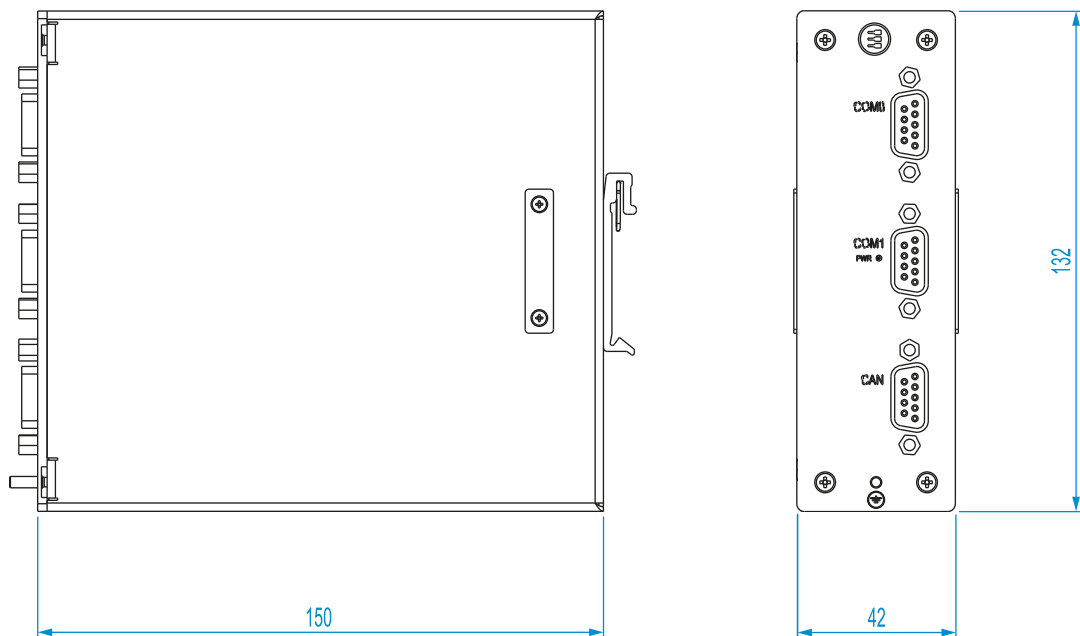
42x132x150 (WxHxD); mm - Connectors and Mounting Bracket excluded



11.4.4 BoltSER 20-31 mechanical dimensions

The mechanical dimensions are as follows:

42x132x150 (WxHxD); mm - Connectors and Mounting Bracket excluded



11.5 How to supply power to the system

The Main CPU Module and the Expansion Modules are not provided with any ON/OFF switch. The Power IN connector on the Main CPU Module is the disconnecting means from the power supply network.

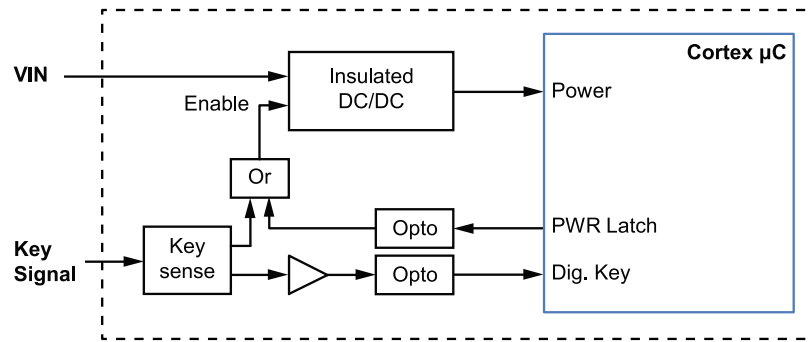
All Expansion Modules are intended to work only if connected to the Main CPU Module.

11.5.1 Power supply specifications

Power Supply	BoltGATE 20-31: Ultra-wide input voltage range: 9 to 137.5 VDC, with ignition key sense Expansion Modules: Input voltage: 5 VDC, 12 VDC
Power Consumption	BoltGATE 20-31: 15W Typical, 30W Max

11.5.2 The Ignition Key (Key Signal)

The Ignition Key is a digital input that enables the system to be turned ON/ OFF according to the following operating principle:



Dig. Key: Digital information of Ignition Key presence
PWR Latch: Power Latch control signal from logic for a safe shutdown

Ignition Key Status	Key Signal Level	System Status
From Off (GND) to On (VIN+)	From 0 to 1	The system turns On
From On (VIN+) to Off (GND)	From 1 to 0	The system turns Off after 120 seconds (default condition)

11.5.3 Main CPU Module and Expansion Modules electrical interconnections

The electrical interconnections between the Main CPU Module and the Expansion Modules is made using high speed card edge connectors, coupled using a PCB.

Each Expansion Module has two card edge connectors:

- the *upstream* port, on the left side: it allows you to connect the Main CPU Module, and
- the *downstream* port, on the right side: it allows you to connect a further Expansion Module.

The Main CPU Module has only the downstream port, thus it is always the leftmost Module in the installation.

Upstream and downstream ports share the same pinout and signals: there is a logical pass-through connection of the signals from the upstream port to the downstream port.

The signals carried on the card edge connectors are:

- Communication signals:
 - 1x PCI Express lane
 - 1x I2C
- I/O signals:
 - Used for several purposes, depending on the module
- Power signals:
 - +5 VDC
 - +12 VDC
 - Power-good output
 - Suspend input

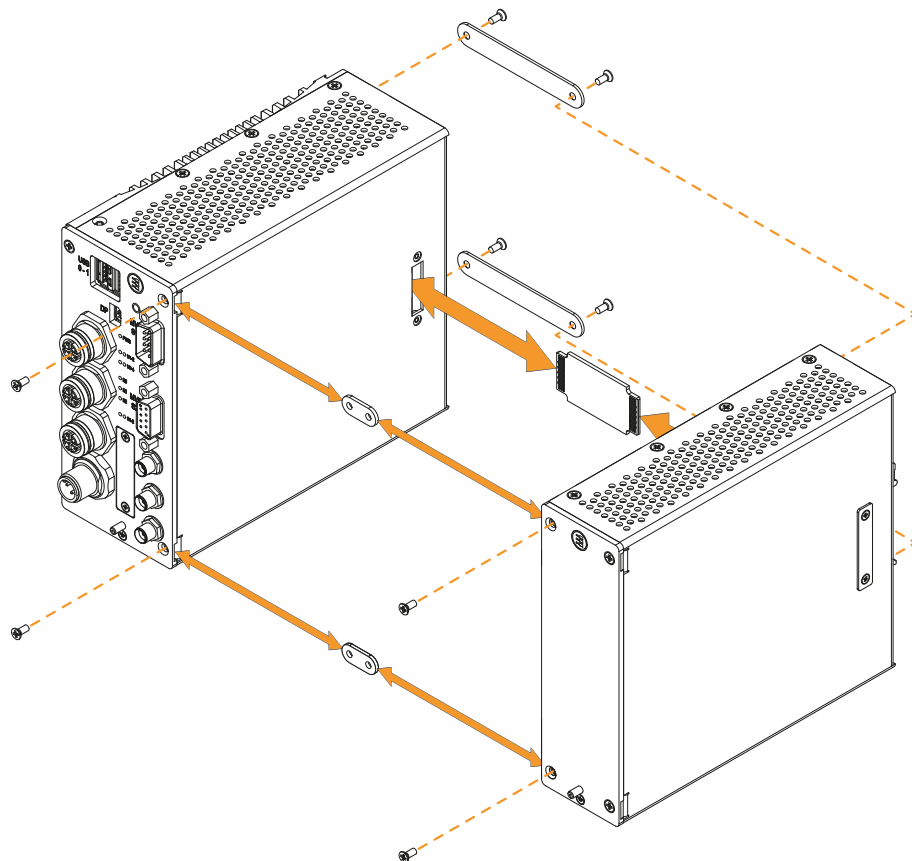


Fig. 4 - Example of modules electrical interconnection

11.5.4 Power supply safety instructions



WARNING

Risk of electric shock. Failure to supply power correctly could result in death or serious injury, and could damage the equipment or other property.

Refer to "[What to do before you supply power to the product](#)" below.

11.5.4.1 What to do before you supply power to the product

Before you supply power to the product, obey the following safety instructions:

- Make sure that you have understood any instructions for safety, installation, and for operation
- Make sure that your hands are dry
- Make sure that all the cables to use:
 - meet the product requirements and comply with the relevant standards and regulations
 - are in good condition
 - are placed with care
 - are not placed where they may be trampled or compressed
- Make sure that all power-points and plugs:
 - are in good condition
 - are not overloaded
- Make sure that the product has a proper grounding connection
- Make sure that the power supply source meets the product requirements and complies with the relevant standards and regulations
- Make sure that the product installation is made correctly and in compliance with the relevant standards and regulations
- Make sure that you supply power only after the product installation is completed.

If you have questions about these instructions, refer to: <https://www.eurotech.com/en/support>.



NOTICE

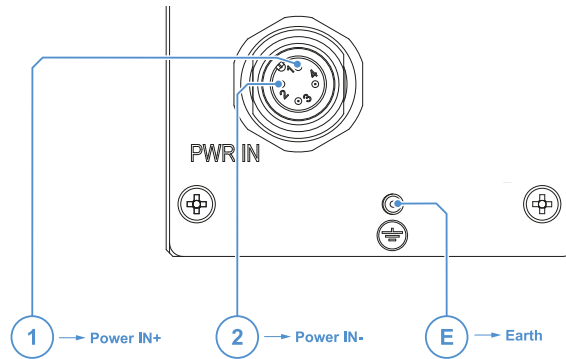
The negative line of the used power supply source will be connected to ground.

11.5.5 How to supply power and turn ON the product

To supply power and turn ON the system, complete the following steps:

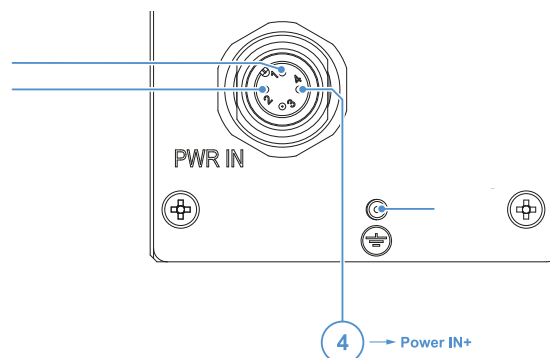
1. Setup a DC power source that:
 - Meets the system power requirements
 - Has the negative line connected to ground
 - Delivers minimum power of 30 W
2. Check the input voltage as close as possible to the PWR IN connector. This is to compensate for any cable losses, caused by cable length and other cable characteristics
(continued on next page...)

3. **Make sure that the DC power source is turned OFF**
4. **Setup an external fuse on the line coming from the negative terminal of the DC power source**
5. Turn ON the DC power source. The system remains OFF
6. Connect the Earth connection terminal (Ref# E in the table below) to an earth point in the installation
7. Connect the PWR IN connector to the DC power source terminals (Ref# 1 and 2 in the table below)



Ref#	Description
1	PWR IN: pin 1; Positive power supply input (VIN+)
2	PWR IN: pin 2; Negative power supply input (VIN-)
E	Earth connection terminal

8. Turn ON the DC power source. The system remains OFF
9. Connect the KEY pin (Ref# 4 in the table below) to "Power IN +".
The BoltGATE 20-31 automatically turns ON and the PWR LED turns ON.
When connecting Pin 4 to "Power IN +", keep it connected for at least 10 seconds. If you disconnect "Power VIN +" from the Pin 4 before 10 seconds have passed, the start-up procedure will not be completed correctly and an immediate and unsafe power down will occur



Ref#	Description
4	Power IN: pin 4; Key Signal Input (KEY)

10. To keep the BoltGATE 20-31 turned ON, make sure that Pin 4 keeps connected to "Power VIN +".

11.5.6 How to turn OFF the system

There are two ways to turn OFF the system:

- By executing the `poweroff` Linux command
- By turning OFF the Ignition Key

To turn OFF the system by executing the `poweroff` command, complete the following steps:

1. Login the Administration Console
2. Execute the `poweroff` command. The system turns OFF (only if the ignition key is OFF otherwise it reboots.) To turn OFF the CPU while the ignition key is on, execute this command first:

```
echo 0 >/sys/class/hwmon/hwmonX/cpu_sleep_action
```

3. Remove the power from the Power IN connector.

To turn OFF the system by turning OFF the Ignition Key, complete the following steps:

1. Turn OFF the Ignition Key. The system turns OFF after 120 seconds (default condition). If you want to change the 120 seconds timeout execute this command:

```
echo xx >>/sys/class/hwmon/hwmonX/ignition_key_timeout
```

xx is the new value in seconds. [0....19999999]

2. Remove the power from the Power IN connector.

11.5.7 How to trigger a hardware reset of the system

To trigger a hardware reset of the system, push the reset pushbutton.

12 EUROTECH EVERYWARE IOT

This chapter gives the following information:

12.1 Everyware IoT	92
12.2 Everyware Software Framework (ESF)	92
12.3 The ESF Web UI	92
12.4 The ESF Wires application	93
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12.1 Everyware IoT

Everyware IoT is an IoT platform providing hardware and software building blocks with an open, integrated and managed core to allow flexibility and interoperability across different vendors, to reduce time to market and for seamless integration between OT (operational technology) domain and IT (information technology) domain.

12.2 Everyware Software Framework (ESF)

The enterprise-ready IoT Edge Framework Everyware Software Framework (ESF) is a high-level, multi-platform, and flexible application development environment for Edge Computers and IoT Gateways. ESF connects and interfaces with field devices thanks to its ready-to-use field protocol libraries. Field data can be processed at the edge through rich Java APIs or a web-based visual programming environment.

12.3 The ESF Web UI

ESF gives a web-based user interface with several functions, such as: monitor the gateway status, manage the network configuration, oversee the installed application(s) and services.

The ESF Web UI is available on port 80 of the gateway IP.

The default user is: *admin*

The default password is: *admin*

The following picture shows an example of the ESF Web UI:

The screenshot displays the ESF Web UI interface. On the left is a navigation sidebar with sections for 'System' and 'Services'. The 'System' section includes links for Status, Device, Network, Firewall, Cloud Services, Drivers and Assets, Wires, Packages, and Settings. The 'Services' section includes a search bar and a list of services: Simple Artemis MQTT Broker, ActiveMQ Artemis Broker, ClockService, DeploymentService, CommandService, WebConsole, and DiagnosticsService. The main content area is titled 'Status' and features a 'Refresh' button. Below this, there are two main sections: 'Cloud Services' and 'Wireless Settings'. The 'Cloud Services' section shows a table with columns for 'Connection Name' and 'Service Status'. The 'Wireless Settings' section shows a table with columns for 'wlan0' and its configuration details. The 'Ethernet Settings' section shows a table with columns for 'eth1' and 'eth0' and their respective configurations.

Cloud Services	
Connection Name	org.eclipse.kura.cloud.CloudService
Service Status	CONNECTED
Auto-connect	ON (Retry Interval is 60s)
Broker URL	ssl://broker-sandbox.everyware-cloud.com:8883
Account	[REDACTED]
Username	[REDACTED]
Client ID	[REDACTED]

Wireless Settings	
wlan0	Subnet Mask: Mode: LAN IP Acquisition: DHCP Router Mode: Wireless Mode:Station Mode SSID: ET-CMD-WIFI01

Ethernet Settings	
eth1	192.168.3.136 Subnet Mask: 255.255.255.0 Mode: WAN IP Acquisition: DHCP Router Mode:
eth0	172.16.0.1 Subnet Mask: 255.255.255.0 Mode: LAN IP Acquisition: Manual

12.4 The ESF Wires application

ESF gives also a dataflow programming model: **Wires**.

Wires simplifies the development of Edge Computing Applications leveraging reusable configurable components.

In the dataflow programming model, the application logic is expressed as a directed graph (flow) where each node can have inputs, outputs and independent processing units.

The processing unit of a node executes independently and does not affect the execution of other nodes. Thus, the nodes are highly reusable and portable.

The following picture shows an example of the Wires application:

The screenshot displays the ESF Wires application interface. On the left is a navigation sidebar with sections for System, Services, and a search bar. The main area is titled 'Wire Graph' and contains a directed graph with three nodes: 'TIMER', 'MODBUSASSET', 'LOGGER', and 'PUBLISHER'. The flow is from 'TIMER' to 'MODBUSASSET', which then branches to 'LOGGER' and 'PUBLISHER'. Below the graph, there are tabs for 'Asset - modbusAsset' and 'Driver - modbusDriver'. The 'Driver - modbusDriver' tab is active, showing a table of channels.

Channels (modbusDriver)							
name	type	value type	unit.id	primary.table	memory.address	data.ori	
Temperature	READ	INTEGER	1	INPUT_REGISTERS	1000	MSW	
Humidity	READ	INTEGER	1	INPUT_REGISTERS	1500	MSW	
Pressure	READ	INTEGER	1	INPUT_REGISTERS	2000	MSW	

12.5 Everyware Cloud (EC)

Everyware Cloud (EC) is the IoT Integration Platform distributed and supported by Eurotech. It gives all the services required for the management of IoT gateways and devices in the field, including configuration management, application life-cycle management and remote access. It also connects the data collected by field-deployed devices to enterprise applications and analytics leveraging reliable and open protocols.

12.6 For more information

For more information and tutorials about ESF and EC, refer to the following links:

Resource	Available at
Everyware Software Framework (ESF)	https://www.eurotech.com/en/products/iot/iot-edge-framework/everyware-software-framework
Everyware Cloud (EC)	https://www.eurotech.com/en/products/iot/iot-edge-management-platform/everyware-cloud

13 PRODUCT MAINTENANCE

This chapter gives the following information:

13.1 How to maintain the product	96
13.2 How to safely remove the power supply	96
13.3 How to verify the installation of the product	96
13.4 How to clean the product	96


13.1 How to maintain the product

Periodically inspect the product to verify its integrity and to ensure proper operation.

To maintain the product, complete this procedure:

1. Carefully read and understand the instructions contained in the section "[Safety-related information](#)" on page 9
2. Safely remove the power supply.
For more information, refer to: "[How to safely remove the power supply](#)" below
3. Verify the installation of the product.
For more information, refer to: "[How to verify the installation of the product](#)" below
4. Clean the product.
For more information, refer to: "[How to clean the product](#)" below

13.2 How to safely remove the power supply

WARNING	
	<p>Electric shock hazard</p> <p>Failure to safely remove the power supply from the product:</p> <ul style="list-style-type: none"> • could result in death or serious injury • could damage the equipment or other property. <p>To safely remove the power supply from the product, complete this procedure:</p> <ol style="list-style-type: none"> 1. Make sure that your hands are dry 2. Turn OFF all the power supply sources 3. Disconnect all the cables 4. Make sure that all the circuits are discharged.

13.3 How to verify the installation of the product

To verify the installation of the product, complete this procedure:

1. Make sure that the product is clean and not damaged
2. Make sure that the LED indicators are visible and not damaged
3. Make sure that all the locking parts (for example: screws, bolts, nuts) are correctly fastened
4. Make sure that the product is installed correctly.

13.4 How to clean the product

To clean the product, obey these instructions:

- Do not use detergents, aerosol sprays, solvents or abrasive sponges
- To remove the dust, use a dry lint-free cloth
- To remove the dirt, use water-based non-flammable cleaning products.



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