

06/26/2023

# Bosch Rexroth Connectivity Unit (RCU) | RE95430



# 1 BODAS Connect

**Bosch Rexroth Digital Application Solutions – BODAS** stands for the entire portfolio of IoT solutions, software and electronic hardware for the off-highway market.

BODAS Connect is Bosch Rexroth's integrated telematics solution that **enables** machine **OEMs**

- to **gain** internal R&D and customer support **efficiency**,
- to establish external **data driven business** models

both based on a **industry-proven infrastructure**, which OEMs can fully customize to leverage their **core competencies**.

The respective BODAS Connect packages are described in:

- Rexroth Connectivity Unit (RCU): RE95430
- Device Connectivity (Device Management for RCU): RE95406
- All-In-One Connectivity (Data Management and features for off-highway applications): RE95407

BODAS Connect is a modular end-to-end connectivity solution to transfer data from and to the mobile machine. Unbundled and freely selectable services consisting of device management, data management and ready to use apps for fleet management, vehicle health, remote R&D services and vehicle operation workflows.



It is built on the Linux-based Bosch Rexroth Connectivity Unit (RCU), which is remotely managed and administrated via the Bosch Device Management Portal. Data storage, processing and analysis are performed via the data management in Bosch IoT Insights, which is an integral part of the Bosch IoT Suite.

Depending on customer requirements, BODAS Connect is flexibly customizable and offers both specific device management and data management functions.

The following figure shows an overview and the classification of the Bosch Rexroth IoT solution with the two products "Device Connectivity" for device management and "All-in-One Connectivity", which adds data management on top.

# BODASConnect<sup>®</sup>

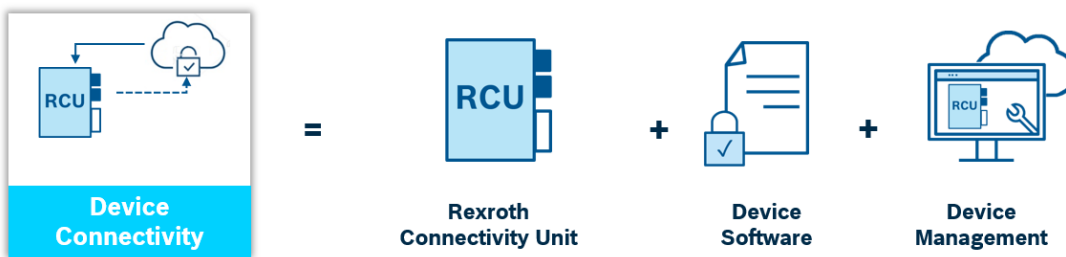
## The Comprehensive IoT Solution for Off-Highway Applications



### 1.1 Device Connectivity

The digital transformation of the off highway market is already well underway and has given rise to new challenges for mobile machines. In our continuous effort to support clients as a strong partner and solutions provider, Bosch Rexroth combines in depth applications expertise and the BODAS software and hardware portfolio to create an integrated Internet of Things (IoT) solution BODAS Connect.

As an integral part of BODAS Connect, Device Connectivity uses the Rexroth Connectivity Unit (RCU) to enable numerous options to wirelessly access the control networks of off highway vehicles. Interactions include flashing, diagnosis and parametrization of Rexroth Controllers (RC). For customers with preexisting data management, BODAS Connect Device Connectivity offers an ideal package for connecting their mobile machines.



### 1.2 All-in-one Connectivity

BODAS Connect All-in-one Connectivity extends the functions of BODAS Connect Device Connectivity with industry-proven data management services. Based on the BOSCH IoT Suite with over 10 million connected vehicles, this fully integrated IoT solution for mobile machinery handles, processes and stores data obtained from Rexroth Connectivity Units (RCU). It provides an ever-growing variety of off-the-shelf fleet management and condition monitoring services. Our REST-API and MATLAB interfaces as well as our customizable front end, Bosch IoT Insights, offer even more data analysis options.



## 2 Variants of the RCU's

The Bosch Rexroth Connectivity Unit (RCU) provides wireless connectivity in an off-highway machine and enables the development, remote deployment and operations of end-to-end IoT use cases and digital services.

Rexroth Connectivity Units are available in different variants:

- Series 10:
  - RCU4-2A/10: 4G mobile network and 2 CAN interfaces
  - RCU4-3A/10: 4G mobile network and 3 CAN interfaces
  - RCU4-3A/10-E: 4G mobile network and 3 CAN interfaces, with M12 Connector for Ethernet
  - RCU4-3W/10: 4G mobile network, 3 CAN interfaces, WiFi and Bluetooth connectivity
  - RCU4-3X/10: 4G mobile network, 3 CAN interfaces, WiFi and Bluetooth connectivity, 1GB RAM, 2GB NAND, TPM, 9- Axis ACC
- Series 20:
  - RCU4-3Q/20: 4G mobile network, 3 CAN interfaces, WiFi and Bluetooth connectivity, 2GB RAM, 1GB NAND, 8GB eMMC, TPM, 6-Axis ACC
  - RCU4-4Q/20-W: 4G mobile network, 4 CAN interfaces, ext. WiFi and Bluetooth connectivity, 2GB RAM, 1GB NAND, 8GB eMMC, TPM, 6-Axis ACC
  - RCU4-4Q/20-TW: 4G mobile network, 4 CAN interfaces, ext. WiFi and Bluetooth connectivity, 2GB RAM, 1GB NAND, 8GB eMMC, TPM, 6-Axis ACC (customized)

### Common features of the RCU's:

- GSM: 4G - LTE
- GNSS
- external Antenna for GSM and GNSS
- eSim
- IP67
- Container based **device management engine**
- **Programming languages**  
C, C++, Java, Python, Javascript, Golang, Dotnet

RCU-Model	2A/10	3A/10	3A/10-E	3W/10	3X/10	3Q/20	4/20-W	4/20-TW
<b>Processor</b>	ARM Cortex A8					ARM Cortex A53		
<b>Core Count</b>	1					4		
<b>Frequency</b>	800 MHz					1600 MHz		
<b>Architecture</b>	32 bit					64 bit		
<b>RAM</b>	512MB DDR3				1GB DDR3	2GB DDR4		
<b>Storage</b>	1GB NAND Flash				2GB NAND Flash	1GB NAND Flash + 8GB eMMC		

RCU-Model	2A/10	3A/10	3A/10-E	3W/10	3X/10	3Q/20	4/20-W	4/20-TW
<b>Operating System</b> Linux Kernel and File system	<b>Debian 10</b>					<b>Debian 11</b>		
<b>Connectivity</b>								
<b>4G LTE Mobile Network with 2G Fallback</b>	✓							
<b>WI-FI</b> IEEE802.11 a/b/g/n/ac	✗			✓		✓   external Antenna		
<b>Bluetooth</b>	✗			<b>Version 4.2</b>		<b>Version 5.0</b>		
<b>Plug in SIM</b>	✓							
<b>eSIM</b>	✓							
<b>Ethernet 100BASE</b>	✗		<b>TX</b>			<b>T1</b>		
<b>SIM Card / Micro SD Dual Slot</b>	✓							
<b>RS232</b>	<b>3</b>					<b>2</b>		
<b>USB (for development)</b> <i>No external access</i>	✗		<b>Version 2.0</b>			<b>Version 3.0 @900mA</b>		
<b>Features</b>								
<b>TPM 2.0 (ISO/IEC 11889)</b>	✗				✓			
<b>GNSS (GPS, GLONAS, BeiDou, GALILEO, QZSS)</b>	✓							
<b>Inertial measurement</b>	✗		<b>3 axis accelerometer</b>		<b>9 axis</b>		<b>6 axis</b> • accelerometer	

RCU-Model	2A/10	3A/10	3A/10-E	3W/10	3X/10	3Q/20	4/20-W	4/20-TW
<b>unit (IMU)</b> configurable					<ul style="list-style-type: none"> <li>• accelero meter</li> <li>• gyroscop e</li> <li>• compass (magnet)</li> </ul>		<ul style="list-style-type: none"> <li>• gyroscope</li> </ul>	
<b>Connections</b>								
<b>Machine Connector</b> 35 pin AMPSEAL TE automotive connector Socket housing part number: 776164-1 Contact part number: 770520-1	✓							
<b>Main FAKRA plug</b> Male type D LTE/2G Antenna (bordeaux)	✓							
<b>Aux FAKRA plug</b> Male type D LTE/2G Antenna (bordeaux)	✓							
<b>FAKRA plug</b> Male Type C (GNSS Antenna, blue)	✓							
<b>CAN</b> Interface V2.0B	2					✗		
<b>CAN-FD</b> Interface V2.0B	✗	1				3		4
<b>K-Line</b> (can be used as LIN)	✗	1				✗		
<b>Ignition Input</b> <i>Ignition Input is multiplexed</i>	1							



RCU-Model	2A/10	3A/10	3A/10-E	3W/10	3X/10	3Q/20	4/20-W	4/20-TW
<i>with a Digital I / O 0</i>								
<b>ON/OFF Input</b>	<b>1</b>							
<b>Digital I / O</b>	✘	<b>10</b>				<b>12</b>		
<b>Analog Inputs</b> <i>Analog input 1 is multiplexed with a Digital I / O 1</i>	✘	<b>4</b>						
<b>Specification</b>								
<b>Battery Back-up</b> for RTC and GNSS data retention, (Internal, Non rechargeable) <i>The RTC will be maintained for 10 years</i>	✔							
<b>High Capacity Battery</b> (optional) <i>Li-ion 3350mAh and 13400mAh high capacity battery back-up</i>	✔							
<b>Power Supply</b>	<b>9V – 36V</b>							
<b>Temperature Range</b> (internal operating temperature)	<b>-40°C to +85°C</b>							
<b>Measurements (W x L x H)</b>	<b>149 x 135 x 58mm</b>					<b>188 x 154 x 62mm</b>		
<b>Weight</b>	<b>630g</b>					<b>770g</b>		
<b>Material</b>	<b>Glass reinforced polyester</b>							

RCU-Model	2A/10	3A/10	3A/10-E	3W/10	3X/10	3Q/20	4/20-W	4/20-TW
<b>IP67</b> (EN60529) Protection								

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Linux Torvalds

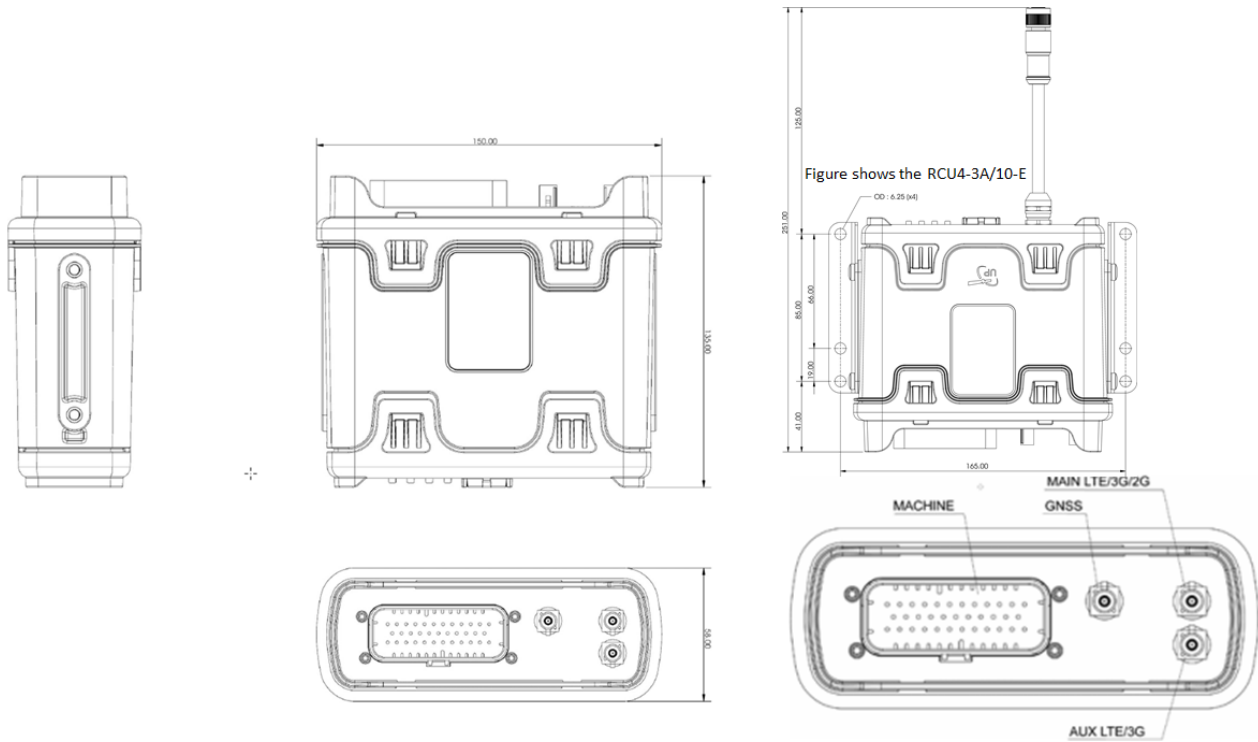
Linux is a registered trademark of

## 3 Physical Description

### 3.1 RCU Series 10

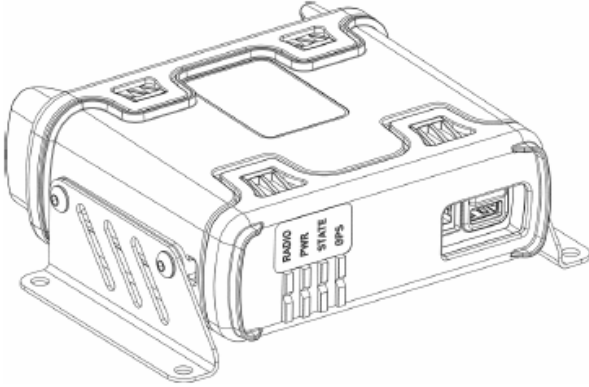
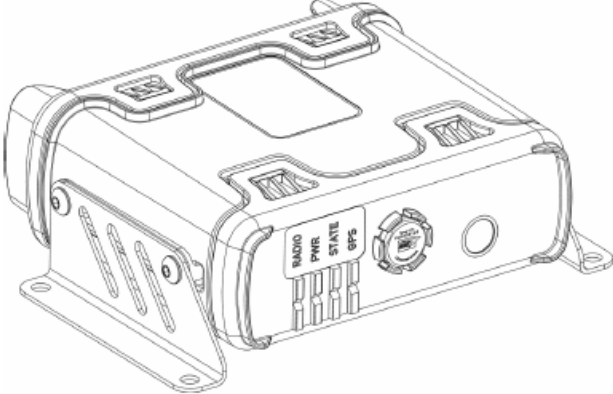
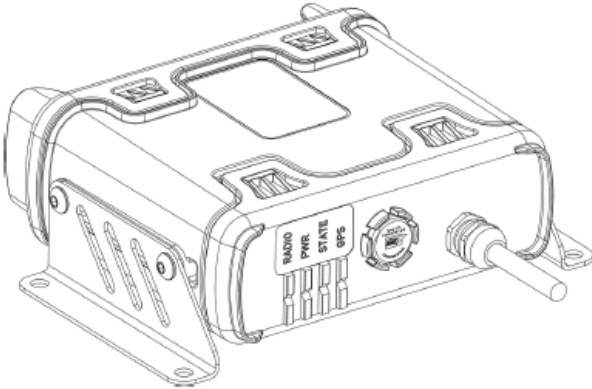
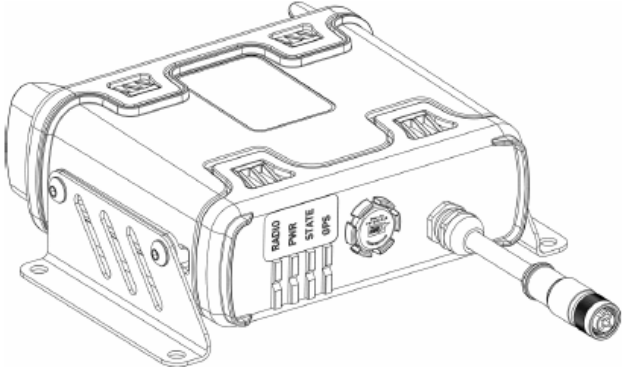
The standard unit has external GSM and GNSS antenna connectors, as shown in the following image, while Bluetooth and WiFi antennas are internal.

#### 3.1.1 Physical Description



The 3 mounting holes are not available on all units, from 2022 in series

### 3.1.2 Rear back cover types

<p><b>No IP67 rear back cover (access to ethernet connector)</b></p>	<p><b>IP67 rear back cover (NO access to ethernet connector)</b></p>
	
<p><b>IP67 rear back cover with ethernet cable gland</b></p>	<p><b>IP67 rear back cover with ethernet cable gland and M12 connector</b></p>
	

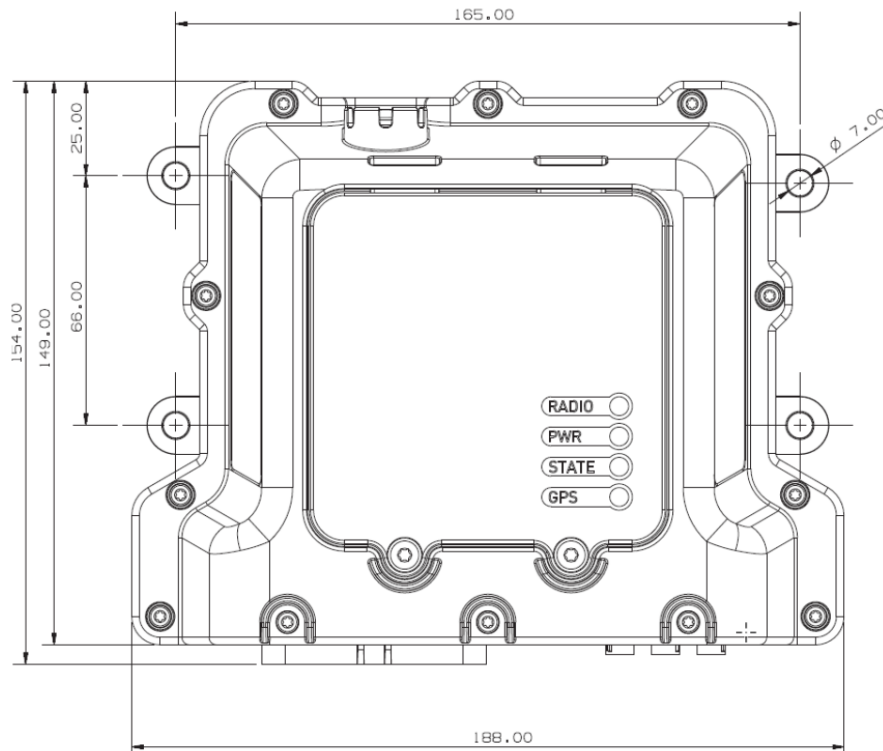
## 3.2 RCU Series 20

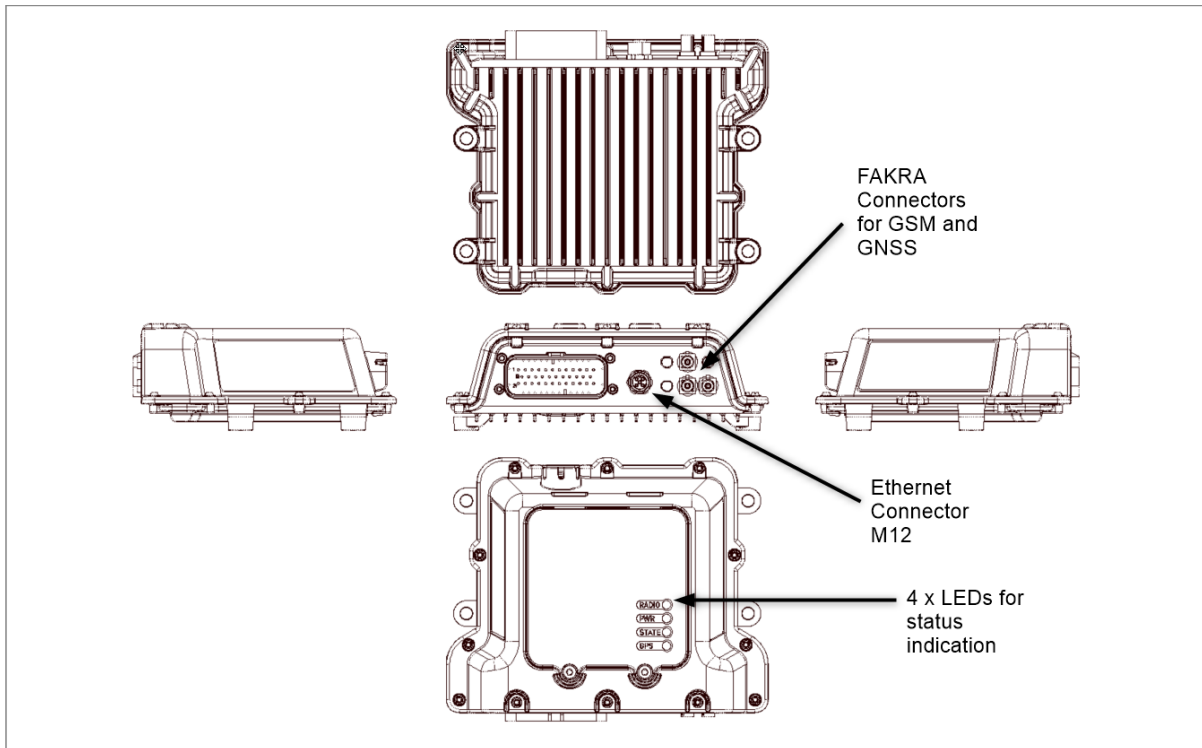
The standard unit has external antenna connectors for GSM and GNSS, while Bluetooth and WiFi antennas are internal.

The RCU4-4Q/20-W and RCU4-4Q/20-TW has a external WiFi antenna (see chapter "External WiFi-Connector")

### 3.2.1 Physical Description

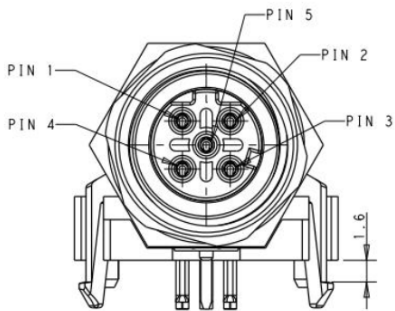
Height: 62 mm





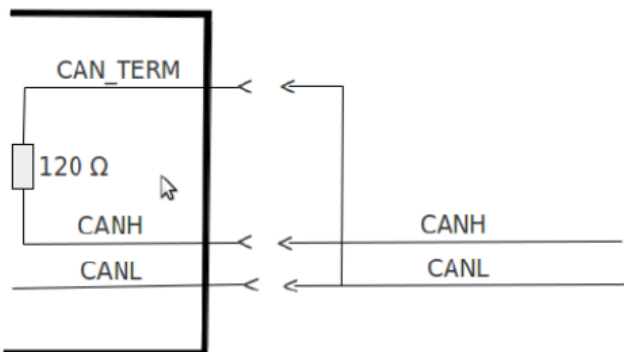
### 3.2.2 Ethernet 100BaseT1

M12 D CODED FEMALE owa5x 100BASET1 connector pinout is:



1	TRX-P
2	
3	TRX-N
4	

### 3.2.3 CAN\_Terminated-Inputs (PIN9/10)



### 3.2.4 External WiFi-Connector

Applies to models **RCU4-3Q/20-W** and **RCU4-4Q/20-TW**

Some variants feature an external WiFi antenna. The connector is either a SMA Connector or a FAKRA-E Connector, which depends on the version and customer request.

Typically, the RCU has a SMA Connector to connect the preferred and certified antenna *ANT-DB1-RAF-RPS*. *For the use of other antennas, please get in contact with Bosch Rexroth to clarify details to this request.*



*ANT-DB1-RAF-RPS*

## 4 Technical features (RCU Series 10 / Series 20)

### 4.1 Connectivity

#### 4.1.1 GSM/GPRS System

RCU provides GSM communication (LTE). Audio calls, data calls and Short Message Service are the features supported by GSM.

LTE is a widely deployed value added service of the cellular infrastructure that enables direct access to public and private data networks (Internet, corporate networks, private networks...). Using the RCU LTE service instead of simple GSM service significantly reduces traffic cost since resources are only allocated when data is to be sent/received.

2G Fallback (GPRS and EDGE) is available.

#### GSM Antenna

RCU products have a built-in GSM module. Use only external GSM active antenna with two connectors, connected to the GNSS connector provided in the front panel.

<b>Connector type</b>	FAKRA Plug male type D (bordeaux)
<b>Mating connector</b>	FAKRA jack female type D (bordeaux)
<b>Location</b>	Front panel

#### 4.1.2 GNSS

The actual term for all satellite navigation systems is GNSS - Global Navigation Satellite Systems. Over time, GPS has become a synonym for this technology.

GNSS (Global Navigation Satellite System) includes most of the available regional systems composed of a constellation of satellites orbiting the Earth, such as GPS, GLONASS, Galileo and Beidou, transmitting signals that allow the GNSS receivers to determine the receiver position (longitude, latitude and height) and time (Universal Time Coordinated, UTC).

With the GNSS module included in RCU, accurate position and time information is provided for Location Based Applications. The default datum used by the GNSS is WGS-84.

The GNSS can work in 2D navigation (viewing 3 satellites) or 3D navigation (viewing at least 4 satellites). When the GNSS starts up, it gives a valid position as soon as it sees 3 satellites, but it can only know the altitude once it sees 4 satellites. This is the reason why in the starting process, there is the possibility of a position jump. This position jump is more likely to happen the greater the altitude is.

The GNSS outputs the altitude as HAE ("Height Above Ellipsoid") ( i.e. WGS- 84). But since an ellipsoid cannot model the shape of the earth perfectly, one can see some deviation from the so-called "Mean Sea Level" altitude. MSL refers to the actual sea level. The difference between these two altitudes can exceed 100m.



## GNSS Antenna

RCU products have a built-in GNSS module. Use only external GNSS active antenna, connected to the GNSS connector provided in the front panel.

<b>Connector type</b>	FAKRA Plug male type C (blue)
<b>Mating connector</b>	FAKRA jack female type C (blue)
<b>Location</b>	Front panel

### Information

By means of internal circuitry, the RCU is able to detect if the GNSS antenna is operating correctly, if there is an open circuit or a short circuit.

To keep the IP67 waterproof features, a special FAKRA connection is needed, with code AIMMET 3659NTG14C1. Please contact Bosch Rexroth to get more information on this connector.

IP67 can only be guaranteed if all sockets are connected to the specified connectors and the main connector is correctly wired and fitted.

## RTC and GNSS Data Battery

This is a small dedicated non-rechargeable battery which is supplied with all RCU units to provide backup of the RTC and GNSS data. The RTC battery is designed for a usage of 10 years. The GNSS data is continuously backed-up.

### 4.1.3 MicroSD / SIM Card Tray

The MicroSD card holder is for the GSM service in case you want to use an external SIM-Card and/or in case you want to use a Micro SD Memory Card.

An eSIM (MFF2) is the standard in the RCU. In case of using an external SIM Card for GSM, please contact us.

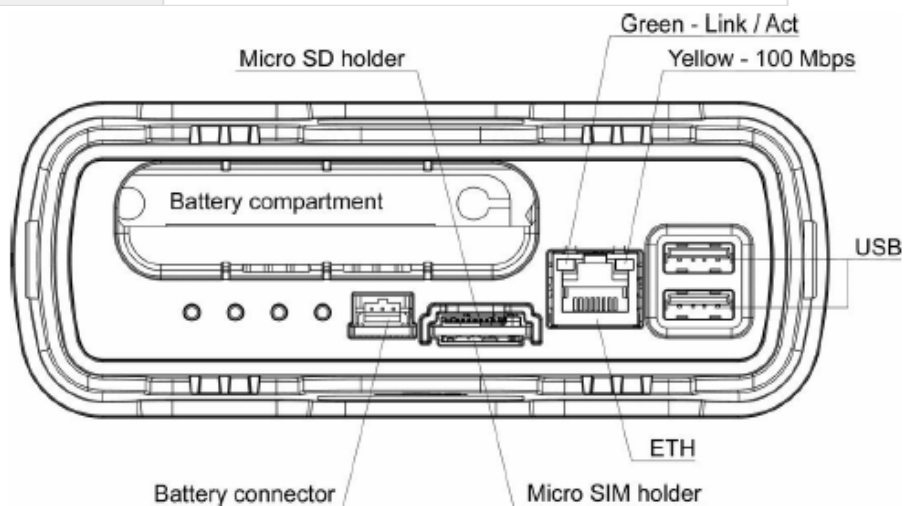
#### SIM Card for GSM-Services:

Both 3V and 1,8V SIMs are supported. Insert the SIM card with the connectors facing upwards in its slot. The SIM Card Holder is a push-push connector and it is for the GSM service.

#### Micro SD Memory Card:

Sometimes there is need to use a Micro SD Memory Card (e.g. local SW-Update). It is located at the bottom of the holder.

<b>Connector type</b>	Push-Push MicroSD card holder
<b>Card type supported</b>	3V and 1.8V
<b>Location</b>	<b>Series 10:</b> Rear panel <b>Series 20:</b> Top of the unit

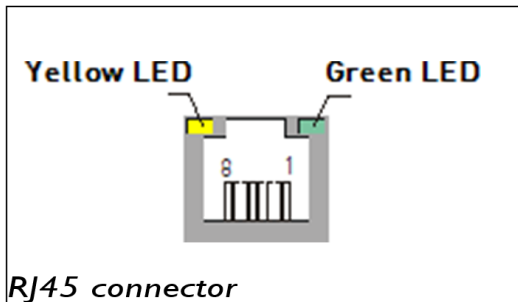


## 4.1.4 Bluetooth/WiFi Antennas

### Information

The Bluetooth and WiFi antennas are typically internal. The RCU4-4Q/20-W and RCU4-4Q/20-TW has a external WiFi antenna (see chapter "External WiFi-Connector")

## 4.1.5 Ethernet RJ45 (valid only for Series 10)



Pin	Signal	Function
1	TX+	Transmission Positive
2	TX-	Transmission Negative
3	RX+	Reception Positive
4	-	Reserved
5	-	Reserved
6	RX-	Reception Negative
7	-	Reserved
8	-	Reserved
<b>Connector type</b>		RJ45, 8 pin socket
<b>Mating connector</b>		RJ45 jack
<b>Location</b>		Rear panel

## 4.1.6 USB interface

Only available for development. For other usage, please get in contact with Bosch Rexroth.

USB connector with mass storage functionality.



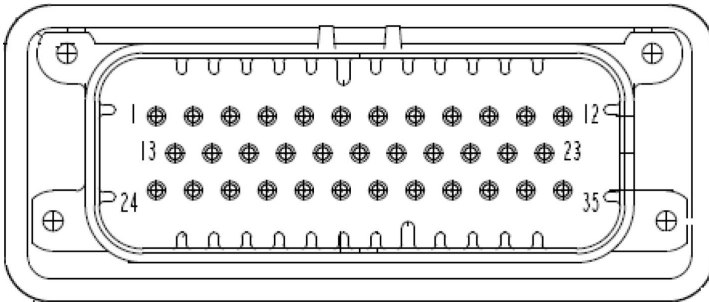
Pin	Signal	Function
1	VBUS	+5 V
2	D-	Data -
3	D+	Data +
4	GND	Ground
<b>Connector type</b>		USB type A
<b>Mating connector</b>		Male A type
<b>Location</b>		<b>Series 10:</b> Back panel <b>Series 20:</b> Top of the unit

## 4.2 Hardware Interfaces

RCU is able to interface with many different devices through an extensive range of hardware signals, grouped into several connectors. Here every connector pin-out is depicted together with a brief description of every signal and electrical specifications and advice of use.

### 4.2.1 Machine Connector

To provide maximum flexibility, a 35 pin TE automotive connector is provided with power input, several RS232 interfaces, digital and analog I/Os and a CAN bus connection.



Mating connector manufacturer part number: TE 776164-1  
Crimps: TE 770520-1

Pi n	Signal	Type	Low Level	High Level	Max Ran ge	2A/ 10	3A/ 10	3A/10- E	3W/ 10	3X/ 10	3Q/ 20
1	V_OUT 5V	Power output	4.5V @500 mA	5.2V @500 mA		✓	✓	✓	✓	✓	✓
2	ON/OFF (not for ignition switch)	Input	OFF 0V	ON Open		✓	✓	✓	✓	✓	✓
3	AIN2	Input Imp: 110K	0V	5.12V / 30.72V	0V to 50V	✗	✓	✓	✓	✓	✓
4	AIN3	Input Imp: 110K	0V	5.12V / 30.72V	0V to 50V	✗	✓	✓	✓	✓	✓
5	CAN_H1 (CAN-FD for series 20)	BUS			-36V to 36V	✓	✓	✓	✓	✓	✓
6	CAN_L1 (CAN-FD for series 20)	BUS			-36V to 36V	✓	✓	✓	✓	✓	✓

Pin	Signal	Type	Low Level	High Level	Max Range	2A/10	3A/10	3A/10-E	3W/10	3X/10	3Q/20
7	<b>CAN_H2</b> (CAN-FD for series 20)	BUS			-36V to 36V	✓	✓	✓	✓	✓	✓
8	<b>CAN_L2</b> (CAN-FD for series 20)	BUS			-36V to 36V	✓	✓	✓	✓	✓	✓
9	<b>CAN1_Terminated</b>	BUS			-36V to 36V	✗	✗	✗	✗	✗	✓
10	<b>CAN2_Terminated</b>	BUS			-36V to 36V	✗	✗	✗	✗	✗	✓
11	<b>CAN_H4</b> (FD for series 20) (Only Version -4Q)	BUS			-36V to 36V	✗	✗	✗	✗	✗	✓
12	<b>CAN_L4</b> (FD for series 20) (Only Version -4Q)	BUS			-36V to 36V	✗	✗	✗	✗	✗	✓
13	<b>GND</b>	POWER				✓	✓	✓	✓	✓	✓
14	<b>GND</b>	POWER				✓	✓	✓	✓	✓	✓
15	<b>AIN0</b>	Input Imp: 110K	0V	5.12V / 30.72V	0V to 50V	✗	✓	✓	✓	✓	✓
16	<b>DIO-0</b> Ignition Signal/ KL15	Input Imp: 220K	0-6V	9V to 50V	0V to 50V	✓	✓	✓	✓	✓	✓
	<b>DIO-0</b>	Open Drain Output (LowSide)	0,6V @200 mA			✗	✓	✓	✓	✓	✓

Pin	Signal	Type	Low Level	High Level	Max Range	2A/10	3A/10	3A/10-E	3W/10	3X/10	3Q/20
17	DIO-1	Input Imp: 180K	0V - 2V	3.3V to 50V	0V to 50V	✗	✓	✓	✓	✓	✓
	DIO-1	Open Drain Output (LowSide)	0,6V @200 mA			✗	✓	✓	✓	✓	✓
	AIN1	Input Imp: 68K	0	5.12V / 30.72V	0V to 50V	✗	✓	✓	✓	✓	✓
18	CAN_L3 (CAN-FD for series 10 and series 20)	BUS			-36V to 36V	✗	✓	✓	✓	✓	✓
19	CAN_H3 (CAN-FD for series 10 and series 20)	BUS			-36V to 36V	✗	✓	✓	✓	✓	✓
20	DIO-4	Input Imp: 180K	0V - 2V	3.3V to 50V	0V to 50V	✗	✓	✓	✓	✓	✓
	DIO-4	Open Drain Output (LowSide)	0,6V @200 mA			✗	✓	✓	✓	✓	✓
21	DIO-5	Digital Input	0V - 2V	3.3V to 50V	0V to 50V	✗	✓	✓	✓	✓	✓
	DIO-5	Open Drain Output (LowSide)	0,6V @200 mA			✗	✓	✓	✓	✓	✓
22	DIO-6	Input Imp: 1K to +5V	0V - 1V	1.6V to 50V	0V to 50V	✗	✓	✓	✓	✓	✓

Pin	Signal	Type	Low Level	High Level	Max Range	2A/10	3A/10	3A/10-E	3W/10	3X/10	3Q/20
	<b>DIO-6</b>	Open Drain Output (LowSide)	<b>0,6V @200 mA</b>			✗	✓	✓	✓	✓	✓
23	<b>DIO-7</b>	Input Imp: 180K	<b>0V - 2V</b>	<b>3.3V to 50V</b>	<b>0V to 50V</b>	✗	✓	✓	✓	✓	✓
	<b>DIO-7</b>	Open Drain Output (LowSide)	<b>0,6V @200 mA</b>			✗	✓	✓	✓	✓	✓
24	<b>V_IN</b>	POWER			<b>9V to 36V</b>	✓	✓	✓	✓	✓	✓
25	<b>DIO-8 (high side)</b>	Input Imp: 180K	<b>0V - 2V</b>	<b>3.3V to 50V</b>	<b>0V to Vin</b>	✗	✓	✓	✓	✓	✓
	<b>DIO-8 (high side)</b>	High Side Output 1A		<b>VIN (1A)</b>		✗	✓	✓	✓	✓	✓
26	<b>DIO-9 (high side)</b>	Input. Imp: 180K	<b>0V - 2V</b>	<b>3.3V to 50V</b>	<b>0V to Vin</b>	✗	✓	✓	✓	✓	✓
	<b>DIO-9 (high side)</b>	High Side Output 1A		<b>VIN (1A)</b>		✗	✓	✓	✓	✓	✓
27	<b>TXD-4   Series 10</b>	RS232				✓	✓	✓	✓	✓	✓
	<b>TXD-1   Series 20</b>										
28	<b>RXD-4   Series 10</b>	RS232				✓	✓	✓	✓	✓	✓
	<b>RXD-1   Series 20</b>										



Pin	Signal	Type	Low Level	High Level	Max Range	2A/10	3A/10	3A/10-E	3W/10	3X/10	3Q/20
29	TXD-5	RS232				✓	✓	✓	✓	✓	✗
	RTS-4   Series 10 RTS-1   Series 20	RS232				✓	✓	✓	✓	✓	✓
30	RXD-5	RS232				✓	✓	✓	✓	✓	✗
	CTS-4   Series 10 CTS-1   Series 20	RS232				✓	✓	✓	✓	✓	✓
31	TXD-1   Series 10 TXD-2   Series 20	RS232				✓	✓	✓	✓	✓	✓
	RXD-1   Series 10 RXD-2   Series 20	RS232				✓	✓	✓	✓	✓	✓
33	KLINE_1	BUS				✗	✓	✓	✓	✓	✗
33	DIO-10	Input Imp: 220K	0V - 6V	9V to 50V	0V to 50V	✗	✗	✗	✗	✗	✓
	DIO-10	Open Drain Output (LowSide)	0,6V @200 mA			✗	✗	✗	✗	✗	✓
34	DIO-11	Input Imp: 220K	0V - 6V	9V to 50V	0V to 50V	✗	✗	✗	✗	✗	✓
	DIO-11	Open Drain Output (LowSide)	0,6V @200 mA			✗	✗	✗	✗	✗	✓

<b>Pin</b>	<b>Signal</b>	<b>Type</b>	<b>Low Level</b>	<b>High Level</b>	<b>Max Range</b>	<b>2A/10</b>	<b>3A/10</b>	<b>3A/10-E</b>	<b>3W/10</b>	<b>3X/10</b>	<b>3Q/20</b>
<b>35</b>	<b>NC</b>										

## 4.2.2 Power Supply

Power supply in pin 24 of the machine connector is used to supply power to RCU. Signals used for this purpose are:

Pin	Signal	Type	Min level	Max level
24	V <sub>in</sub>	Power in	9V	36V
13	GND	Ground	-	-
16	DIO-0	Ignition Signal/KL15	OFF = 0-6V or Leave OPEN	ON = 9V-50V

V<sub>in</sub> and GND should be connected to a clean, stable supply between 9.0 and 36.0 VDC. A cable with a current rating of more than 5A should be used.

The power supply can be made with a battery or continuous voltage supply with reinforced isolation, and limited in power to a maximum of 8A and 100 VA.

**Ignition Signal (Pin16 - DIO-0):** Power Control Input signal for Off-Highway applications. When ON the RCU boots up, When OFF the RCU is safely shutdown.

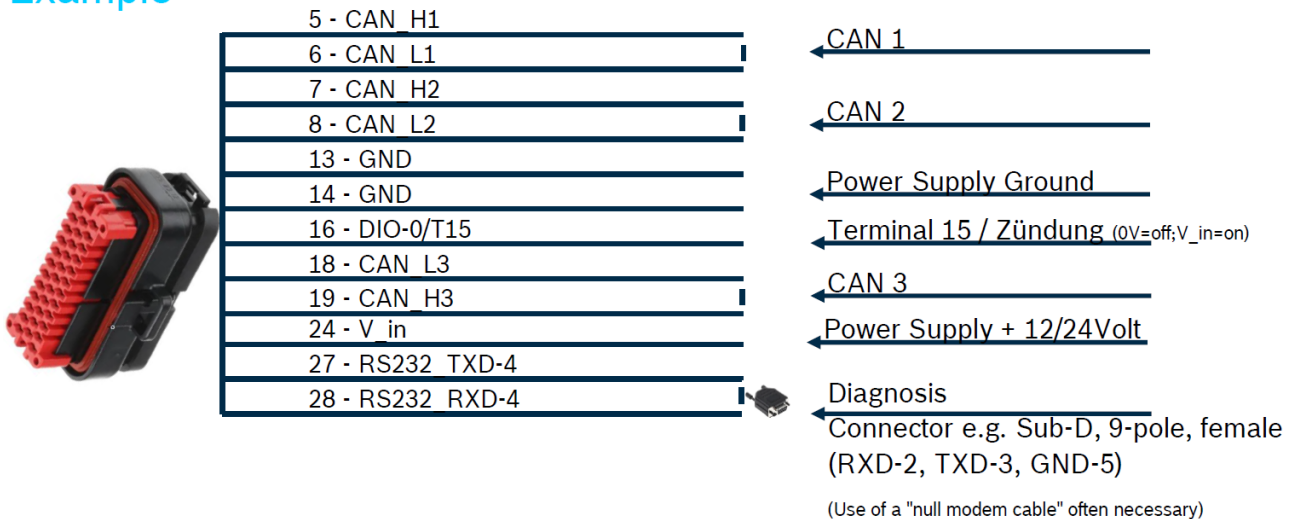
### Information

Make sure to use DIO-0 as Ignition Input for your Off-Highway Machine.

## 4.2.3 Wiring Example

### RCU - cable harness

#### Example



### Hint

This example shows the basic wiring of the RCU. If additional PINs are used, the info for wiring can be found in the table above.

**ON/OFF (Pin 2):** Power Control Input signal. Leave open for ON, Connect to ground for OFF. Use an open collector transistor or switch to ground, but do not drive high. This input will turn the unit ON or OFF. When running from battery back- up, this signal can only be used to turn the unit OFF. If the signal is then released and there is no power on Vin, then the unit will remain OFF.

#### Warning

ON/OFF shall be used for power control, additionally to DIO-0, only if you have a use case for it. If you are not sure, contact us [connect.bodas@boschrexroth.de](mailto:connect.bodas@boschrexroth.de).

## 4.2.4 Digital Inputs/Outputs (DIO 0..11)

The RCU provides up to 12 configurable digital Input/Outputs, from DIO0 to DIO11 (depends of the series).

#### Hint

These pins can be configured as inputs or as outputs. Note that if the pin is configured as an output it cannot be used as an input, and may be damaged if a voltage is applied while it is configured as an output. Hence ensure that the corresponding output pin is OFF before using it as an input.

The digital inputs are not TTL compatible, and they can withstand inputs up to 50V so that sensors and switches with high voltages can be used. For example, in an automotive application, a switch may be connected to the positive supply giving an input of 14V or 28V. The input impedance is 180K, except for DIN\_0 with 220K and DIN\_6, which has 1K to +5V.

All inputs are inverted except DIO6, and the range is also different when using this pin as input (see connector table).

#### Hint

If the digital output is set to 1 in the software it will be OFF and the transistor will pull the output pin to ground giving a low level. If it is set to 0 in the software it will be ON and the transistor will be open. Note that there are no pull-ups on these pins so to obtain a high level when the output is ON requires an external pull-up to a positive supply.

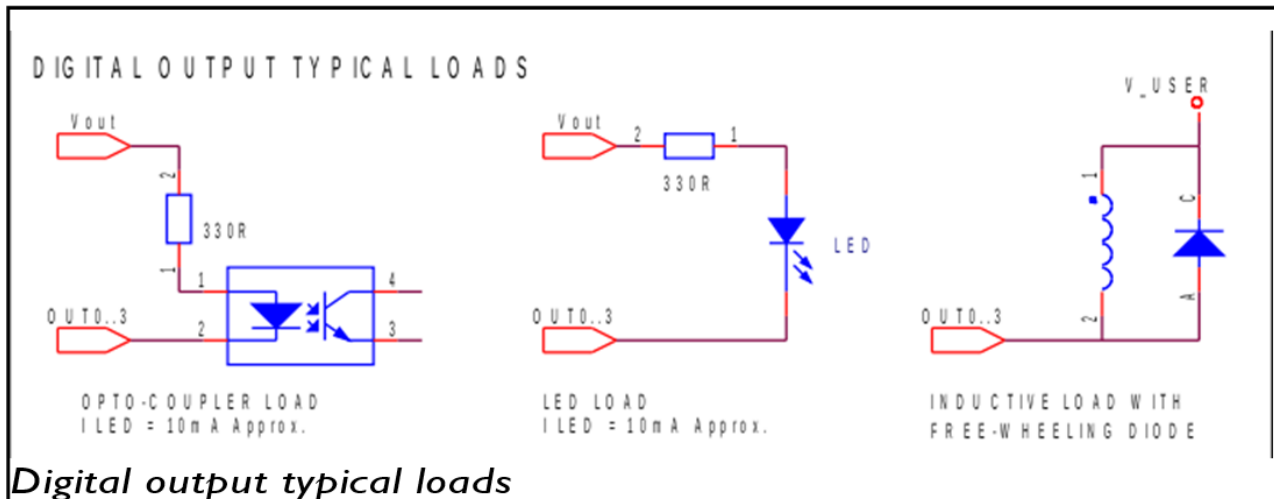
#### Hint

The DIO-0 to DIO-7 outputs are open collector transistor type capable of switching up to 50V and sinking up to 100mA. Do not place a load that will draw more than 200mA or damage to the unit may result.

With these open collector outputs the load should be connected between the output pin and a positive supply. The positive supply could be provided by the user, or from the pin  $V_{out}$  (pin 23). The maximum output current from  $V_{out}$  is 500mA, which should be sufficient to drive up to 8 LEDs, Opto-couplers or Solid State Relays at 10-12mA each. A typical connection for one output is shown below.

#### Hint

For an inductive load (such as a relay or motor) it is mandatory to connect a free-wheeling diode to provide a return path to the supply for the inductive energy, as shown below. Otherwise the resulting voltage spikes during switch off could damage the output circuitry.



DIO8 and DIO9 are high side switched digital outputs with  $V_{in}$  as input voltage and with a maximum of 1A current can be drawn from them. If loads with higher power are required, the user can connect them to these outputs. The maximum inductive load is 100 mH.

## 4.2.5 Analog Inputs

The 4 analog inputs AIN0 to AIN3 present the following characteristics:

<b>Resolution</b>	12 bits
<b>Input range</b>	0-5.12V (1.25mV per bit) or 0-30.72V (7.5mV per bit)
<b>Accuracy</b>	±1% typ. @ 25°C
<b>Input impedance</b>	110K (AIN1 68K)
<b>Sample frequency</b>	800Hz (max.)

## 4.2.6 CAN

The RCU includes up to 4 CAN transceivers

- Series 10: bit speed up to 1 Mbaud.
- Series 20: bit speed up to 5 Mbaud.

## 4.2.7 KLine

Only valid for **Series 10**.

To connect to a tachograph or a KLine communicating device the RCU provides one KLine interface.

- 1 bidirectional KLine, indicated as KLine\_1, on pin 33 of the machine connector to transmit and receive KLine data.

## 4.2.8 Ground

RCU provides a ground connection for all interfaces, digital I/Os, RS232, CAN and analog inputs.

## 4.3 Hardware Features




### 4.3.1 LED's


There are 6 LED's, 4 at the front (series 10) / top (series 20) of the RCU. 2 are located at the rear with the Ethernet RJ45 connector (only for series 10).

These are the LED's colors and functions:

Name	Color	Indication	Comment
<b>GNSS</b>	Orange	GNSS activity	More details in the table below
<b>STATE</b>	Red	As defined by application	More details in the table below
<b>PWR</b>	Green	As defined by application	More details in the table below
<b>RADIO</b>	Yellow	Radio activity	More details in the table below
<b>LINK</b>	Green	Ethernet Link	Controlled by ETH (only for series 10)
<b>100 Mbps</b>	Yellow	Ethernet 100Mbps	Controlled by ETH (only for series 10)



#### Front/Top LED indicators

LED	Name	Module	Patterns
	<b>PWR</b>	<b>POWER</b>	<p><b>OFF:</b> Device is in Boot-UP or Shutdown, depending on Terminal 15 state.</p> <p><b>ON:</b> Core system has booted and essential applications have been started. Start of system services has been triggered.</p>
	<b>RADIO</b>	<b>GSM</b>	<p><b>OFF:</b> GSM inactive</p> <p><b>SLOW BLINKING (LED ON TIME &lt; OFF TIME):</b> Searching for network</p> <p><b>SLOW BLINKING (LED ON TIME &gt; OFF TIME):</b> Connected, but idle</p> <p><b>FAST BLINKING (LED ON TIME = OFF TIME):</b> Connected, and transferring data</p> <p><b>ALWAYS ON:</b> Voice Call (not used)</p>
	<b>GPS</b>	<b>GNSS</b>	<p><b>OFF:</b> No GPS coverage or no fix yet</p> <p><b>ONE PULSE PER SECOND:</b> valid GPS fix</p>

LED	Name	Module	Patterns
	STATE	n/a	currently only used to indicate unconfigured gateway with default configuration and default password.

### Rear LED indicators - Ethernet (only for series 10)

Ethernet activity is indicated by means of the two LEDs.

RCU State	Yellow LED 	Green LED 
OFF	OFF	OFF
Link OK	-	ON
Ethernet 100Mbps	ON	-
Activity	-	ON (blinking)

## 4.3.2 Internal Temperature

The RCU has an internal sensor to measure its internal temperature. This temperature sensor cannot be used to measure external environment temperature due to the difference between this temperature and the RCU internal temperature.

Values measured by the sensor are made available to other applications.

- Temperature range: -40°C to +85°C
- Accuracy: ±5°C

## 4.3.3 System Time and HW time

The RCU unit is provided with two different clocks:

- The **CPU system time**: This clock is able to maintain system time in normal operation but loses the time when RCU is powered off or is put into a low power mode.
- The **RTC module**: This is a dedicated Real Time Clock (RTC) module which is battery backed up so that the time remains correct even when power is removed.  
The RTC battery is designed for a usage of 10 years.

When the RCU returns from OFF or STANDBY modes, the CPU system time is automatically updated with the value in the RTC time. Hence any changes to the time should be performed on the RTC time as this is the 'master'. RCU models have an additional and more precise time reference that is obtained from GNSS data. Time values are made available to other applications.

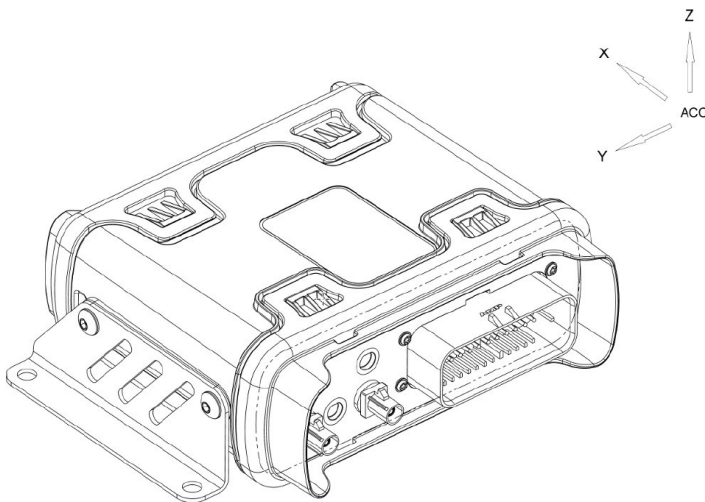
## 4.3.4 Inertial measurement unit (IMU)

### Accelerometer (for RCU series 10 and 20)

The RCU carries by default a 3 axis accelerometer with  $\pm 2g/\pm 4g/\pm 8g/\pm 16g$  configurable ranges and 1mg/2mg/4mg/12mg sensitivity respectively.

The accelerometer can be set in the wake up mask of Standby or OFF mode, in order to wake up when there is a movement bigger than the preconfigured one.

Values measured by the sensor are made available to other applications.



### Gyroscope (for RCU series 10 and - 20)

For the gyroscope the scales are in dps (degrees per seconds) angular rate full scale are:

Series 10:

- 3D gyroscope with selectable full scale:  $\pm 245 / \pm 500 / \pm 2000$  dps

Series 20:

- 3D gyroscope with selectable full scale:  $\pm 125/\pm 250/\pm 500/\pm 1000/\pm 2000$  dps

### Compass / magnetometer (only for RCU series 10)

For the magnetometer the scales are  $\pm 4/\pm 8/\pm 12/\pm 16$  Gauss:

→ For more detailed information, please get in contact with Bosch Rexroth

## 4.3.5 Watchdog

There is a HW watchdog and a SW watchdog.

## 4.3.6 Trusted Platform Module (TPM)

Applies to models **RCU4-3X/10** and **RCU Series 20**

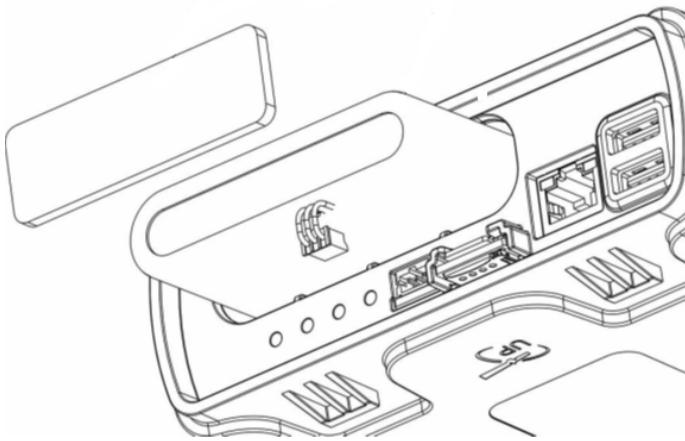
Some models feature an integrated TPM2.0 (ISO/IEC 11889). This TPM is tamper resistant against invasive silicon, fault injection and side channel attacks, and provides protected storage, device hardware identity, secure generation of cryptographic keys and a random number generator.



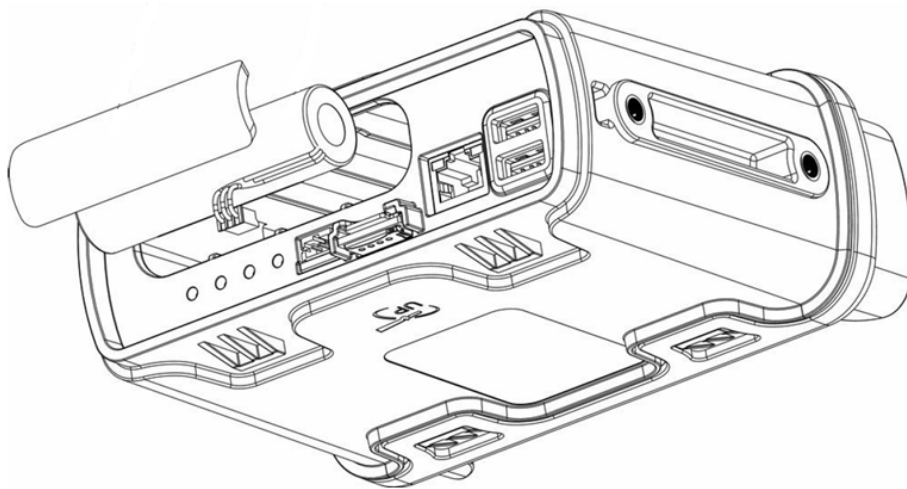
### 4.3.7 High Capacity Battery (optional for series 10 and series 20)

Optional Li-ion batteries are available for the RCU. 3,3 Ah and 13,4 Ah high capacity battery back-up can be installed, which allows continuous operation when the main power is lost. This enables the RCU to e.g. make a final call before going into low power mode, or a similar procedure, as defined by the customer application software. If the battery back-up is not pre-installed inside the unit, then insert it as it is shown in the figure below (Figure show Battery for series 10 RCU's).

The battery is only intended for use with the RCU.



Battery 13,4 Ah



Battery 3,3 Ah

## 5 Installation

### 5.1 Mounting the unit

#### 5.1.1 Antenna Location and installation

Permanently installed antennas are preferred over magnetic, glass or body lip mounts for anything other than for low power or temporary installations. However, a magnetic mount antenna is a good tool for checking the proposed fixed antenna location for unwanted effects.

Glass mounted antennas are suitable for mounting on machines. In this case they should be kept as high as possible in the centre of the rear window or wind-shield. Some machines use glass that contains a thin metallic coating for defrosting or to control solar gain; glass mount antennas may NOT function properly when mounted on this type of glass.

If a magnetic mounted antenna is used, take care to locate the magnetic base in a location which avoids interference to the compass mechanism, since magnets may affect the accuracy or operation of the compass. If metallic panels are used, do not block the reception paths for installed antennas such as Global Position Satellite Receivers, if so equipped.

For an optimum performance of antennas, consider these aspects:

- The antennas should have an unobstructed view of the sky, especially for GNSS receivers. The antennas should not be shielded by any metal object or other impenetrable material.
- The antennas have to be safe from damage during normal machine operation and maintenance.
- GNSS antenna should not be shielded from satellite signals by metal objects or other impenetrable materials.
- Separate GSM and GNSS antenna at least 50 cm.
- Choose a location with access both above and below the antenna-mounting surface. This access is required for installing fasteners and for routing the antenna cable.
- Keep the antenna as separate as possible from a microphone and loudspeaker when hands-free option is used.

When using either WiFi or Bluetooth functionality, try to make sure that the installation lets a free view of this side of the unit. The front should also not be in contact or very close of metallic surfaces.

**Series 10:** The “UP” mark shows the side that must be upwards.

**Series 20:** The plastic cover shows the side that must be upwards

#### 5.1.2 Antenna tuning

It is important that the antenna is properly tuned and Voltage Standing Wave Ratio (VSWR) less than 2.0:1, and to avoid RF current on the antenna cable shield.

#### 5.1.3 Antenna Cable Routing

Always use a high quality, one-piece coaxial cable. Connector quality and termination techniques are quite important.

The antenna cables should be treated in the same way as the control and power cables. Avoid sharp edges and pinches and keep the cable as short as possible. Also avoid routing the antenna cable in parallel with other control or power wiring over long distances. If it is necessary to cross over wiring, cross at right angles.

## 5.2 Power connection

To connect RCU cables follow these instructions:

- Allow enough cabling to enable the removal of the equipment.
- Ensure cables are not corrupted or rubbing against sharp objects.

## 5.3 Choosing a mounting location

Choose a mounting location for RCU which allows for convenient routing and connection of the antenna and interface cables, and which has access to power source and status LEDs. When selecting a mounting location, avoid the following hazards:

- Direct exposure to weather.
- Excessive heat or cold.
- Excessive humidity.
- High vibration areas.
- Corrosive fluids and gases.
- Direct exposure to water.
- Direct exposure to solar radiation.
- Do not obstruct drivers view or impede operation.

## 5.4 Mounting and fixing the unit

Always keep cabling as short as possible. The RCU can be mounted horizontally, vertically, or in any convenient orientation, but it is advisable to maintain the indicator lights in sight, since this comes as an advantage when troubleshooting the unit.

The two metal brackets are fixed in the sides of the RCU. The screws to mount it are not provided, as the installation scenario can vary significantly.

Take care not to blind the internal WiFi/BT antenna, placing the brackets in the upper side of the RCU, so that the antenna has an open view. See the “satellites up” signal on one of the sides to guide on the installation of the units, as this signal must have the open view.

## 6 Technical Data Summary

### 6.1 Mechanical Description

Item	Specification (Series 10)	Specification (Series 20)
<b>Dimensions (mm.)</b>	L=149 x W=135 x H=58	L=154 x W=188 x H=62 mm
<b>Weight</b>	630 gr	770 gr
<b>Material</b>	Glass reinforced polyester	Glass reinforced polyester

### 6.2 Power Interface

Item	Specification (Series 10)	
<b>Power supply</b>	9 to 36 Vdc	
<b>Power Consumption (Typical average)</b>	<b>Mode</b>	<b>Consumption @ 24V (mA)</b>
	RUN	47
	RUN + ETH connected	59
	RUN + GNSS + ETH	67
	RUN + GSM + ETH	65
	RUN + GSM + GNSS	63
	RUN + GSM on call + ETH	92
	STANDBY	9.88
	OFF	0.335

## 6.3 GSM/GPRS Specifications

### 6.3.1 LTE (4G) specifications for Series 10

Item	Specification					
<b>Frequency bands</b>	LTE-FDD: B1/B2/B3/B4/B5/B7/B8/B12/B13/B18/B19/B20/B25/B26/B28 LTE-TDD: B38/B39/B40/B41					
<b>Power (max ratings)</b>	2.8 Watt at LTE					
<b>LTE (Cat.4)</b>	LTE-FDD: (UL) LTE-TDD: (UL)	Max Max	150Mbps 130Mbps	(DL), (DL),	Max Max	50Mbps 30Mbps
<b>Operations</b>	Audio calls, Short Message Service, data session					
<b>SIM</b>	Integrated micro-SIM holder, 3 V <i>Do not user pre-cut mini/micro/nano-SIM cards, use true microSIM cards.</i>					
<b>Antenna Connector</b>	2 x Fakra plug Male type D					

### 6.3.2 2G/3G specification as Fallback

Item	Specification
<b>Frequency bands</b>	Quad Band GSM 850/ EGSM900 / GSM1800/ GSM1900. UMTS: B1/B2/B4/B5/B6/B8/B19
<b>Power</b>	2W at GSM850/EGSM900 1W GSM1800/GSM 1900 2.1W at WCDMA
<b>GPRS</b>	multi-slot class 33 Class B Class 10 (4+2)
<b>UMTS</b>	DC-HSDPA: Max 42Mbps (DL) HSUPA: Max 5.76Mbps (UL) WCDMA: Max 384Kbps (DL), Max 384Kbps (UL)
<b>Operations</b>	Audio calls, Data calls, Short Message Service
<b>SIM</b>	Integrated holder, 3 V
<b>Antenna Connector</b>	Fakra plug Male type D

## 6.4 GNSS Specifications

Item	Specification
<b>Receiver</b>	72-channel GPS L1C/A SBAS L1C/A QZSS L1C/A GLONASS L1C BeiDou B1 GALILEO E1B/C SBAS: WAAS, EGNOS, MSAS, GAGAN
<b>Update Rate</b>	10Hz or 5Hz if receiving more than one satellite system
<b>Accuracy</b>	2 meters CEP
<b>Signal Acquisition</b>	Cold Start: 26 sec Hot Start: 1.5 s Signal Reacquisition: < 1 sec
<b>Datum</b>	WGS-84
<b>Sensitivity</b>	Tracking & reacquisition: -167 dBm Cold start: -148 dBm
<b>Operational limits</b>	Speed: 500 m/s (972 knots) Altitude: 50,000 m
<b>Antenna Connector</b>	FAKRA plug Male Type C
<b>Antenna Requirements</b>	Active antenna. Impedance: 50Ω Active Antenna recommended gain:15 dB Frequency: 1575.42MHz VSWR: Max 2.0:1  <i>The use of a passive antenna would require to connect a DC block between the RCU connector and GNSS antenna.</i>
<b>Active antenna detection circuitry</b>	Active Antenna Power Supply: +3.0V @ 30mA current <ul style="list-style-type: none"> <li>• open circuit detection: &lt; 0.5 mA</li> <li>• short-circuit detection: &gt; 100 mA</li> </ul>

## 6.5 Environmental Specifications

Item	Specification
<b>Internal operating temperature</b>	<b>-40°C to +85°C</b>
<b>Safe ambient operation temperature</b> without Li-ion Battery	<b>-40°C to +73°C</b>
<b>Safe purpose temperature range</b> with Li-ion Battery	<b>-40°C to +55°C</b> / from external power supply <b>-20°C to +55°C</b> / from Li-ion battery (-40°C to -20°C internally limited with battery protection) <b>0°C to +45°C</b> / Li-ion battery charge (internally controlled)
<b>Storage Temperature</b>	<b>-40°C to +85°C</b>

## 6.6 Hardware customization

Please contact us for specific requirements and a potential customization of hardware.

## 7 Safety and other precautions

**IMPORTANT: FOR THE EFFICIENT AND SAFE OPERATION OF YOUR RCU MODULE, READ THIS INFORMATION BEFORE USE!**

### 7.1 General

Care must be taken when handling the unit. It must not be dropped or exposed to excessive heat. Only authorized staff can disassemble the product. In case the product was disassembled by non-authorized people, the warranty is no longer valid.

Do not push objects into openings of your device. Doing so can cause fire or electric shock by shorting out interior components.

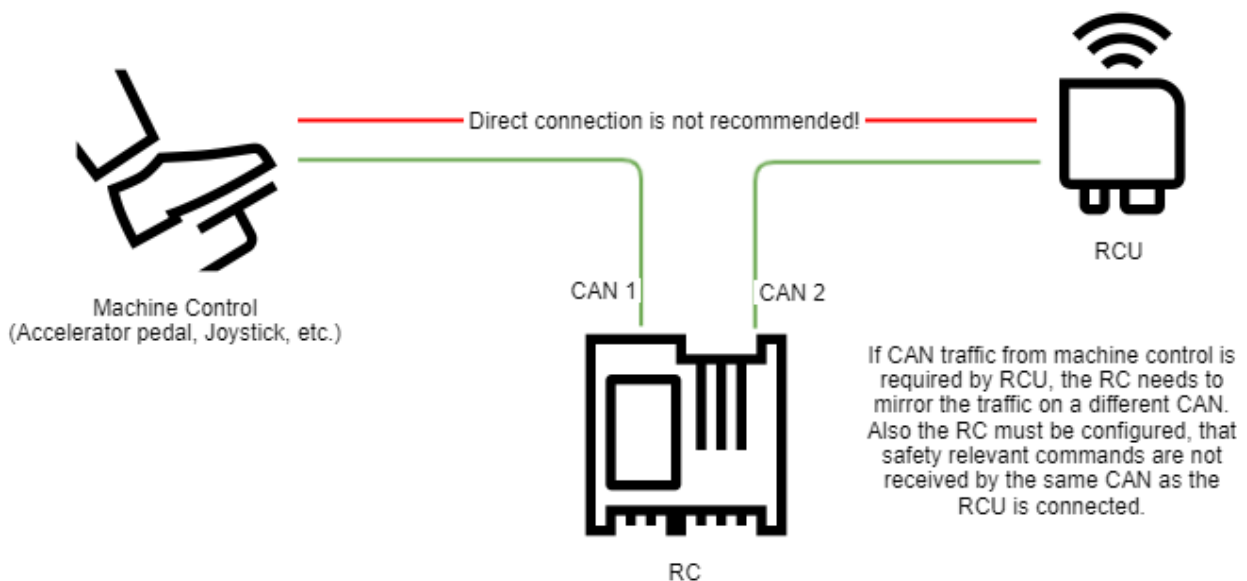
If the RCU product is exposed to severe conditions beyond the limits specified in this document, the product could be damaged.

Keep the device away from radiators and heat sources. Do not use the RCU in wet or humid environments. The device may become hot during normal operation, so switch it off and wait for a while before handling it. Do not clean the device when powered. Clean it with a soft cloth. Do not use liquid or aerosol cleaners, which may contain flammable substances.

### 7.2 CAN

When installing the RCU, it is important to consider the E/E architecture of machine or vehicle. The RCU shall not be connected to the same CAN network as control units like joysticks, pedals, and so on. Otherwise, the RCU would have the opportunity to send CAN frames, which may interfere with the machine control commands. Also, an attacker gaining access to the RCU would be able to control the machine.

Since the RCU is not a safety-certified device, no safety-relevant functions may be implemented and used on the RCU. The connected devices must be designed in such a way that safe operation of the machine is always ensured.





## 7.3 Physical Interfaces

All interfaces are secured by the BODAS Connect software. However, precautions need to be taken to ensure that only authorized personnel has access to the RCU. Only trained users should access and work on the RCU's physical interfaces (e.g. Ethernet, USB, SD Card, SIM card, cable harness).

## 7.4 Protective Measures

To reduce residual risks, all users of either the RCU or the BODAS Connect software need to be trained about protective measures with regards to IT security.

## 7.5 Strong Passwords

Weak passwords are a common source for cyber attacks (e.g. brute-force attacks). Therefore, user shall always choose a strong password complying to below suggestions.

- Use of lower- and uppercase letters
- Use of numbers
- Use of special characters (e.g. / , \$ , & , % , ...)
- Use a long password of more than 15 characters
- Avoid character sequences (e.g. 12345 , abcde , qwerty , ...)
- Avoid personal related words (e.g. pet names, spouse names, birthdays)

## 7.6 Regional availability & limitations

The RCU and the BODAS Connect services are available for a lot of regions and countries around the world. Due to ever-changing legal boundary conditions check the latest availability status in the document:

- BODAS Connect Countries List: RE95408

### Hint

If the RCU is installed in a machine, the national regulations for radio equipment in combination with the machine must be observed.

## 7.7 RCU connections

The highest internal voltage applied to the RCU unit can be 36V DC and complies with low voltage European directive.

The power supply can be made with a battery or continuous voltage supply with reinforced isolation, and limited in power to a maximum of 8A and 100VA.

Before you connect the device to a power supply, check the voltage and current rating to ensure that the required ones match the available power source. Exceeding the specified input range may cause unexpected operation and/or irreversible damage to RCU.

To remove the device from all power sources turn the device off and disconnect it from the power supply. Be sure that nothing rests on the connected cables and that the cables are not located where they can be tripped over or stepped on.

Applying loads outside of the range specified may result in unintended operation and/or possible permanent damage to RCU. If there is any uncertainty, please contact **Bosch Rexroth** Customer Support at [Connect.BODAS@boschrexroth.de](mailto:Connect.BODAS@boschrexroth.de).

## 7.8 RCU protections

The RCU inputs have some protections to avoid damages when for example erroneously connecting to a power supply for example or due to voltage peaks:

- Power supply input (V\_IN) reverse voltage protection and overvoltage protection Zener diode. External fuse of 2 A should be added.
- Power output (V\_OUT) overcurrent protection.
- DIOs overcurrent protection.

## 7.9 EMC Instructions

Use shielded signal cables to ensure that you maintain the appropriate EMC classification for the intended environment.

Keep cables as short as possible, not longer than 3 meters.

## 7.10 Exposure of humans to RF Energy

Minimize RF energy exposure by limiting the duration of GSM and operating the unit efficiently.

The antenna must be mounted in such a position that no part of the human body rests close to any part of the antenna. The RCU is intended to be used with an external GSM antenna, located at least at 20 cm away from any part of the human body. Users performing the installations not complying with this requirement are responsible for providing SAR measurement reports and corresponding declaration.

Do not hold the antenna during an active connection since it affects connection quality and can cause the module to operate at a higher power level than needed.

## 7.11 RF Antenna care and replacement.

Do not use the RCU with a damaged antenna because when the antenna comes into contact with the skin, a minor burn may result. Replace the antenna immediately.

Use only antennas that comply to the technical specifications. Antennas that do not fulfill the specifications could damage the RCU and may contravene local RF emissions regulations or invalidate type approval.

## 7.12 Exposure of electronic devices to RF energy

Most electronic devices are shielded from RF energy. However RF energy may cause some malfunctioning of improperly shielded electronic devices.

When the RCU is mounted in a machine, check your machine to determine that all on board electronic equipment is adequately shielded from RF energy.

In the same way, when the RCU is in the proximity of medical devices (hospitals, etc.) check with the manufacturer of medical equipment to determine if they are properly shielded.

This equipment must not be operated on an aircraft.

## 7.13 Blasting areas

To avoid interfering with blasting operations, turn the unit OFF in these kind of areas or in areas marked "turn off your two way radio".

Construction crews often use remote control RF devices to set off explosives.

## 7.14 Explosive atmospheres

Do not operate this product in environments containing explosive materials or vapor. This includes petrol service stations.

The unit accessories could generate sparks that can cause an explosion or fire resulting in bodily injury or even death.

Do not transport or store flammable gas, liquid or explosives, in the compartment of your machine which contains RCU or its accessories.

## 7.15 Children

Do not allow children to play with RCU. It is not a toy and they could hurt themselves or others. Children could also damage the unit.

## 7.16 Handling the device

Observe the following safe-handling guidelines to prevent damage to RCU:

- When setting up the device for work, place it on a flat level surface.
- Protect the device from environmental hazards such as dirt, dust, food, liquids, temperature extremes, and overexposure to sunlight.
- When you move your device between environments with very different temperature and/or humidity ranges, condensation may form on or within the device. To avoid damaging it, allow sufficient time for the moisture to evaporate before using the device.
- When taking the device from low-temperature conditions into a warmer environment or from high-temperature conditions into a cooler environment, allow the device to acclimate to room temperature before turning on power.
- When disconnecting a cable, pull on its connector or on its strain-relief loop, not on the cable itself. As you pull out the connector, keep it evenly aligned to avoid bending any connector pins. Also, before you connect a cable make sure both connectors are correctly oriented and aligned.

## 7.17 Intellectual Property Rights

The RCU comprises of electronic components and/or related software, supplied or provided by sub-suppliers, which are based on *standards* that may make use of third party intellectual property rights. Unless otherwise agreed, licenses to use such third party intellectual property rights and corresponding indemnifications for claims against the buyer and/or user of the RCU based on such third party intellectual property rights, are not part of Bosch Rexroth's deliverables. The buyer and/or user may be required to obtain licenses from the owners of these third party intellectual property rights directly.

“*Standards*” in above context shall mean technical specifications or functions adopted by a standards organization (inter alia ETSI or IEEE), defined by research institutes, industrial companies or other market participants to ensure technical conformity or compatibility, or established by common practice in a particular technical field.

At the request of the buyer and/or user, Bosch Rexroth will inform the buyer and/or user about any integrated electronic components and/or related software, supplied or provided by sub-suppliers, which are based on *standards* that may make use of third party intellectual property rights. In the event of alleged infringements in this context, Bosch Rexroth shall reasonably provide the buyer and/or user with relevant information on request against such allegations. This includes the provision of any documents which Bosch Rexroth controls and is entitled to provide to the buyer and/or user.

## 7.18 Note for professional disposal

- The RCU and packaging must be disposed of in accordance with the national environmental regulations of the country in which the device is used.

## 8 Glossary

<b>API</b>	Application Programming Interface
<b>AIN</b>	Analog Input
<b>CAN</b>	Controller Area Network
<b>CEP</b>	Circular Error Probability
<b>CPU</b>	Central Processing Unit
<b>DDR</b>	Double Data Rate
<b>DIO</b>	Digital Input Output
<b>DTE</b>	Data Terminal Equipment
<b>EDGE</b>	Enhanced Data GSM Environment
<b>EMC</b>	Electromagnetic Compability
<b>GPRS</b>	General Packet Radio Service
<b>GNSS</b>	Global Navigation Satellite System
<b>GSM</b>	Global System Mobile
<b>HAE</b>	Height Above Ellipsoid
<b>HSDPA</b>	High-Speed Downlink Packet Access
<b>HW</b>	Hardware
<b>IoT</b>	Internet of Things
<b>LTE</b>	Long-Term Evolution
<b>MIPS</b>	Millions of Instructions Per Second
<b>MMU</b>	Memory Management Unit
<b>NC</b>	Not Connected
<b>O&amp;M</b>	Operation and Maintenance

<b>OS</b>	Operating system
<b>PWM</b>	Pulse Width Modulation
<b>RF</b>	Radio Frequency
<b>RCU</b>	Bosch Rexroth Connectivity Unit
<b>RTC</b>	Real Time Clock
<b>SAR</b>	Specific Absorption Rate
<b>SIM</b>	Subscriber Identity Module
<b>SMS</b>	Short Message System
<b>SW</b>	Software
<b>TPM</b>	Trusted Platform Module
<b>TTY</b>	TeleType Writer
<b>UMTS</b>	Universal Mobile Telecommunications System
<b>USB</b>	Universal Serial Bus
<b>VSWR</b>	Voltage Standing Wave Ratio

## 9 Note

### Information on the manufacturer of the RCU:

RCU is manufactured by

#### Owasys

Advanced Wireless Devices  
Parque Tecnológico, 207-B  
48160 Derio – Bizkaia (Spain)  
Tel: +34 94 602 53 31  
Mob: +34 63 730 24 96  
www.owasys.com

### Information on the declaration of conformity:

For the latest conformity documentation please refer to Owasys' homepage:

- RCU4-2A/10, RCU4-3A/10 and RCU4-3A/10-E: <https://www.owasys.com/bundles/owasysweb/docs/products/owa4x/owa4x-4G.DoC.en.latest.pdf>
- RCU4-3W/10, RCU4-3X/10 <https://www.owasys.com/bundles/owasysweb/docs/products/owa4x/owa4x-4G-WiFi.DoC.en.latest.pdf>
- RCU4-3Q/20: <https://www.owasys.com/en/developers-zone/owa5x>

### Information to the correlation of the Rexroth labeling and the Owasys labeling

Rexroth material number	Rexroth labeling	Owasys References (label model)
R917012851	RCU4-2A/10	owa4x-4G/100
R917012849	RCU4-3A/10	owa4x-4G/101
R917014165	RCU4-3A/10-E	owa4x-4G/102
R917012850	RCU4-3W/10	owa4x-4G/201
R917014169	RCU4-3X/10	owa4x-4G/202
R917014167	RCU4-3Q/20	owa547-W/001