

RTCU LX9 pro

Advanced Industrial M2M/IoT Gateway



Technical Manual

Version 1.00

Introduction

The **RTCU LX9 pro** is an advanced Industrial M2M / IoT Gateway designed for the most demanding professional applications. As the successor to the RTCU NX-900, it is **plug-compatible** with its predecessor while delivering significant improvements in processing power, storage capacity, and security.

Next-Generation Architecture

The device is built on the latest **LX hardware architecture**, featuring a powerful **32-bit ARM processor** with hardware floating-point and DSP capabilities. It operates under a highly optimized Linux variant and utilizes the **NX32L (NX32 for Linux)** execution architecture. This ensures full backward compatibility, allowing field-tested NX32 applications to run without modification while leveraging the new platform's increased performance.

Robust Connectivity and I/O

Engineered for versatile communication, the RTCU LX9 pro integrates a worldwide LTE Cat. 4 cellular engine, Wireless LAN (Wi-Fi), and Bluetooth LE 5.3. Precise positioning is provided by a multi-constellation GNSS engine supporting GPS, GLONASS, GALILEO, and QZSS.

The device offers an extensive array of wired interfaces and I/O:

- **Wired Networking:** 100 Mbps Ethernet LAN interface.
- **Serial Ports:** Dual RS232 and dual RS485 channels.
- **Analog I/O:** 4 x analog inputs and 4 x analog outputs (0..10V/0..20mA).
- **Digital I/O:** 5 x digital inputs and 4 x high-power AC/DC relay outputs.
- **Expandability:** 1-Wire bus and Modbus support allow for easy expansion.



Industrial Reliability and Security

Designed for mission-critical deployments, the RTCU LX9 pro is housed in a **ruggedized IP66-rated encapsulation** suitable for outdoor use. It features a wide supply operating range (8 to 36 VDC or 100 to 260 VAC) and includes an internal **2 Ah Li-Ion battery backup** for uninterrupted operation.

To meet modern security challenges, the platform includes:

- An embedded firewall and hardware-assisted encryption (AES, DES, RSA).
- Full TLS/SSL support across all major protocols, including MQTT, HTTP, and SMTP.
- A 4 GB internal flash drive for extensive data logging and storage.

Documentation & Resources

This manual provides documentation for installing and using the RTCU LX9 pro. For software development and platform-level configuration, please refer to the following:

- **Development Environment:** Use the free **RTCU M2M Studio** for application development.
- **Communication & Deployment:** Refer to the **RTCU Communication Hub** and **RTCU Deployment Server** documentation for managing field devices.
- **Platform:** For information on the architecture, consult the *RTCU M2M Platform* datasheet.

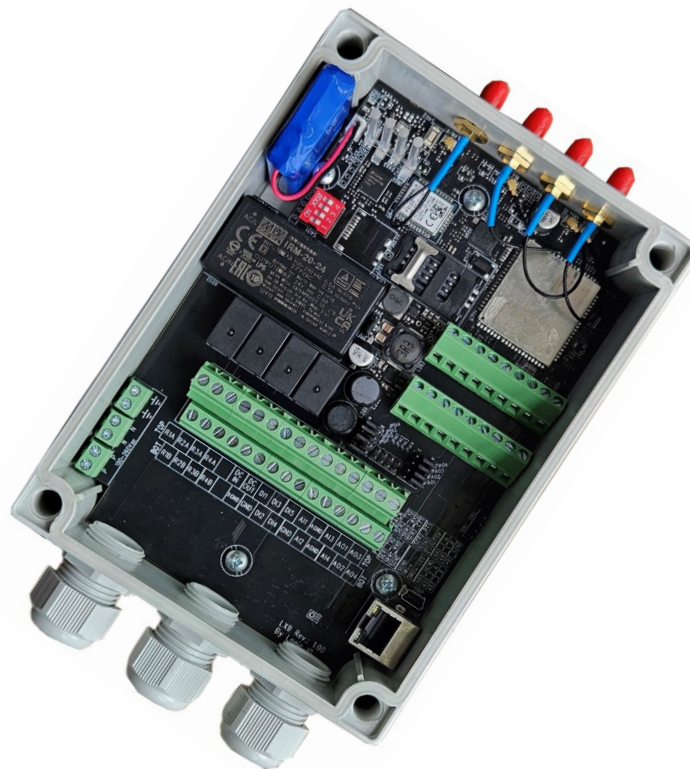
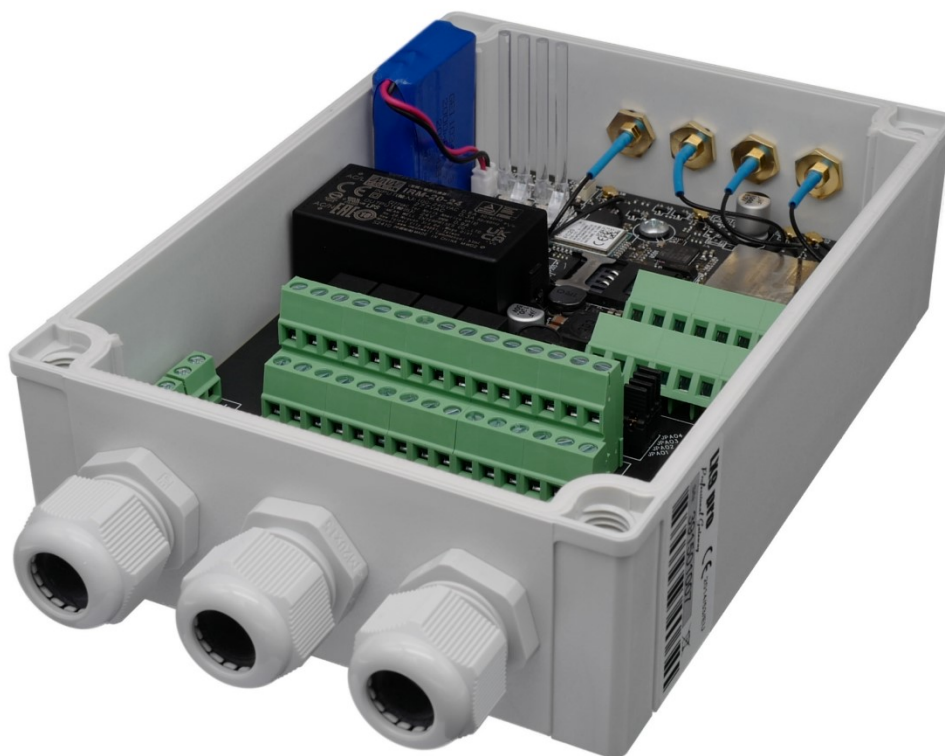


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Important Information



Thank you very much for using a product from Logic IO Aps. Our products are designed for professional use; therefore, this manual assumes technical knowledge and practice working with such products.

This documentation does not entail any guarantee on the part of Logic IO Aps with respect to technical processes described in the manual or any product characteristics set out in the manual. We do not accept any liability for any printing errors or other inaccuracies in the manual, unless it can be proven that we are aware of such errors or inaccuracies, or that we are unaware of these as a result of gross negligence, and Logic IO Aps has failed to eliminate these errors or inaccuracies for this reason.

This product is a complex and sensitive electronic product. Please act carefully and ensure that only qualified personnel will handle and use the device. In the event of damage to the device caused by failure to observe the information in this manual and on the device, Logic IO Aps shall not be required to honor a warranty claim, even during the warranty period, and shall be exempted from the statutory accident liability obligation. Any attempts to repair or modify the product also void all warranty claims. Do not open the product. There is no user-serviceable part inside.

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Difference between the RTCU LX9 pro and the RTCU NX-900

The table below lists the differences between the RTCU LX9 pro and the RTCU NX-900:

Feature	RTCU LX9 pro	RTCU NX-900																																								
Bluetooth LE 5.3	√	X																																								
Classic Bluetooth	Optional (under development)	√																																								
ISM RF	X	√																																								
Mass Storage	4 GB Internal Drive	SD-card																																								
Angled terminals	<table border="1"> <thead> <tr> <th>FRONT</th> <th>BACK</th> </tr> </thead> <tbody> <tr> <td>SER1_TXD</td> <td>SER2_TXD</td> </tr> <tr> <td>SER1_RXD</td> <td>SER2_RXD</td> </tr> <tr> <td>SGND</td> <td>SER2_CTS</td> </tr> <tr> <td>SGND</td> <td>SER2_RTS</td> </tr> <tr> <td>1Wire</td> <td>SGND</td> </tr> <tr> <td>1Wire-LED</td> <td>DCOUT5V</td> </tr> <tr> <td>485_SGND</td> <td>485_1_A</td> </tr> <tr> <td>485_2_A</td> <td>485_1_B</td> </tr> <tr> <td>485_2_B</td> <td>485_SGND</td> </tr> </tbody> </table>	FRONT	BACK	SER1_TXD	SER2_TXD	SER1_RXD	SER2_RXD	SGND	SER2_CTS	SGND	SER2_RTS	1Wire	SGND	1Wire-LED	DCOUT5V	485_SGND	485_1_A	485_2_A	485_1_B	485_2_B	485_SGND	<table border="1"> <thead> <tr> <th>FRONT</th> <th>BACK</th> </tr> </thead> <tbody> <tr> <td>SER1_TXD</td> <td>SER2_TXD</td> </tr> <tr> <td>SER1_RXD</td> <td>SER2_RXD</td> </tr> <tr> <td></td> <td>SER2_CTS</td> </tr> <tr> <td>SGND</td> <td>SER2_RTS</td> </tr> <tr> <td>1Wire</td> <td>SGND</td> </tr> <tr> <td>1Wire-LED</td> <td>DCOUT5V</td> </tr> <tr> <td>SGND</td> <td>RS485_1A</td> </tr> <tr> <td>RS485_2A</td> <td>RS485_1B</td> </tr> <tr> <td>RS485_2B</td> <td>SGND</td> </tr> </tbody> </table>	FRONT	BACK	SER1_TXD	SER2_TXD	SER1_RXD	SER2_RXD		SER2_CTS	SGND	SER2_RTS	1Wire	SGND	1Wire-LED	DCOUT5V	SGND	RS485_1A	RS485_2A	RS485_1B	RS485_2B	SGND
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Technical Highlights

Platform:

- Based on the RTCU M2M Platform.
- **NX32L** (NX32 for Linux) execution architecture.
 - RTCU M2M Studio development tool.
 - Operates under a full and highly optimized Linux variant.
 - Open and extendable with Platform SDK.

LX Hardware Core:

- Cortex-A7 32-bit ARM processor operating at up to 1 GHz.
- Cortex-M4 32-bit co-processor for advanced power management.
- Hardware floating-point and DSP instructions.
- 128 MByte RAM.
- 512 MByte NAND Flash (system boot, persistent memory, and file-systems).
- Real-time clock with a dedicated backup battery.

Security:

- Embedded firewall.
- TLS/SSL support with full certificate management.
- TLS/SSL support for all major TCP protocols, such as SMTP, MQTT, and sockets.
- Hardware assisted encryption/authentication: AES-128, AES-192, AES-256, DES, TripleDES, HASH, RND and RSA signature.

Wireless Communication:

- LTE Cat. 4 Worldwide Multi-Band Cellular Engine.
- Internal SIM-card reader and support for eSIM.
- Wireless LAN (Wi-Fi).
- Bluetooth Low Energy 5.3.
- Optional: Classic Bluetooth.
- Multi-constellation GNSS with GPS, GLONASS, and GALILEO.

Wired Communication:

- 100 Mbps Ethernet LAN interface.
- 1-Wire bus for accessories such as ID-button reader, temperature sensors, etc.
- 2 x RS232 channels and 2 x RS485 channels.

I/O Interfaces:

- 4 x analog inputs with 0..10 volt / 0..20 mA with 12 bit precision.
- 4 x analog outputs with 0..10 volt / 0..20 mA.
- 5 x digital inputs and 4 x high-power relays.
- Up to 4 digital inputs can be configured as IEC62053-31 Class A compliant.
- Expandable I/O with standard Modbus modules.

Sensors:

- 3-axis Accelerometer with 16g scale.
- Temperature sensor.

User Interaction:

- 4 x bi-colour LED and 4 x position DIP-switch.
- High-speed Mini-USB service-port connector.

Audio:

- Fully digitized audio system.
- Digitized cellular audio.
- DTMF support for Interactive Voice Response applications.

Storage:

- Internal eMMC flash drive with 4 GB capacity.
- Persistent memory and circular datalogger.

Power and Battery:

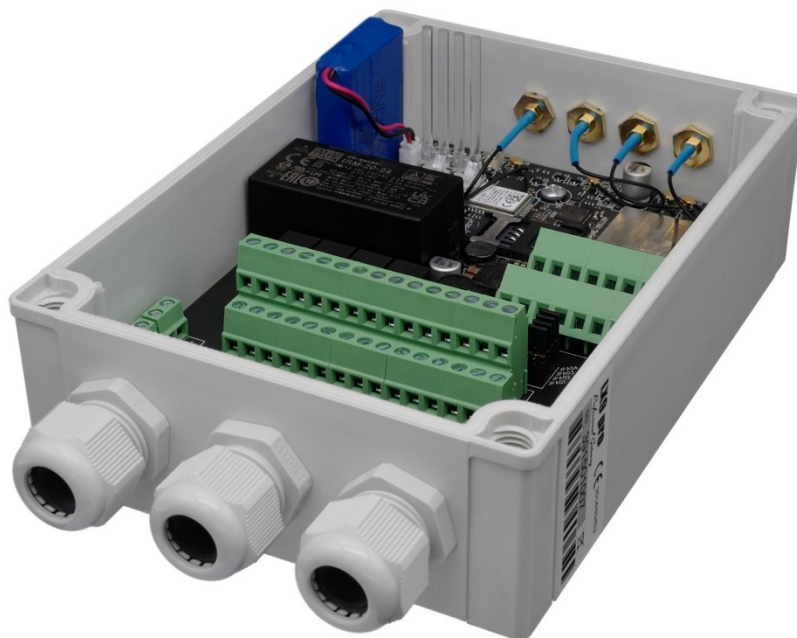
- Wide AC/DC power operating range from 100..260VAC / 8..36 VDC.
- Onboard 2 Ah Li-Ion battery with intelligent charging.
- 5/12/24 Volt DC-out capability for powering external equipment.

Encapsulation:

- Housed in a ruggedized plastic encapsulation with cable glands.
- IP65 protected for outdoor usage.

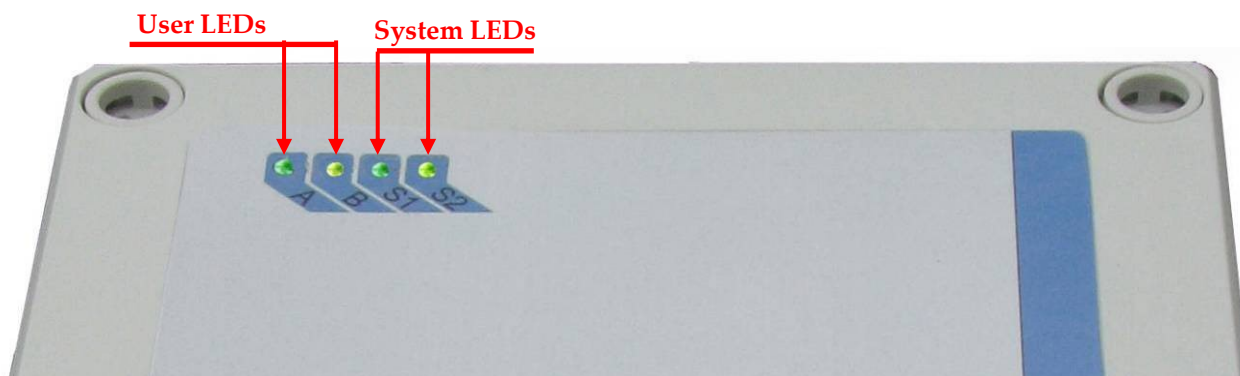
Regulatory Approvals:

- Radio Equipment Directive, RED 2014/53/EU.
- EMC Directive, 2014/30/EU.
- 2011/65/EU RoHS Directive.

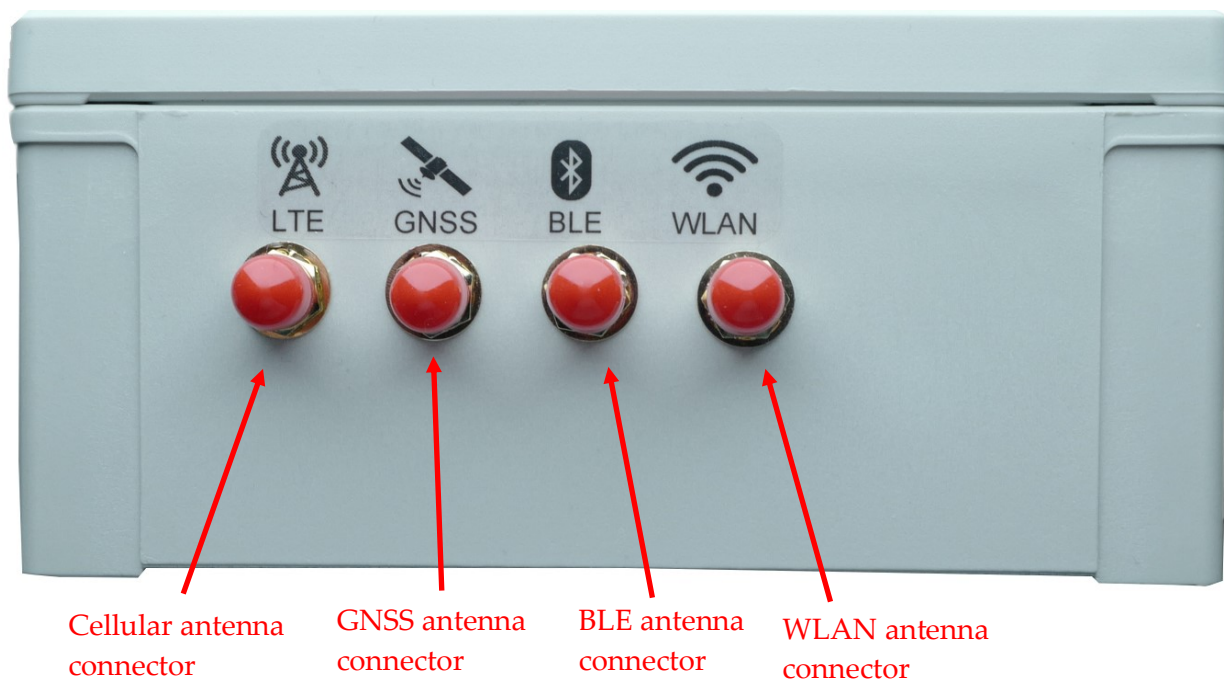


Graphical Overview

There are four user-controlled LEDs and four system LEDs for simple information and status on front of the RTCU LX9 pro:



The external antenna connectors are located at the top-side of the device as shown below:



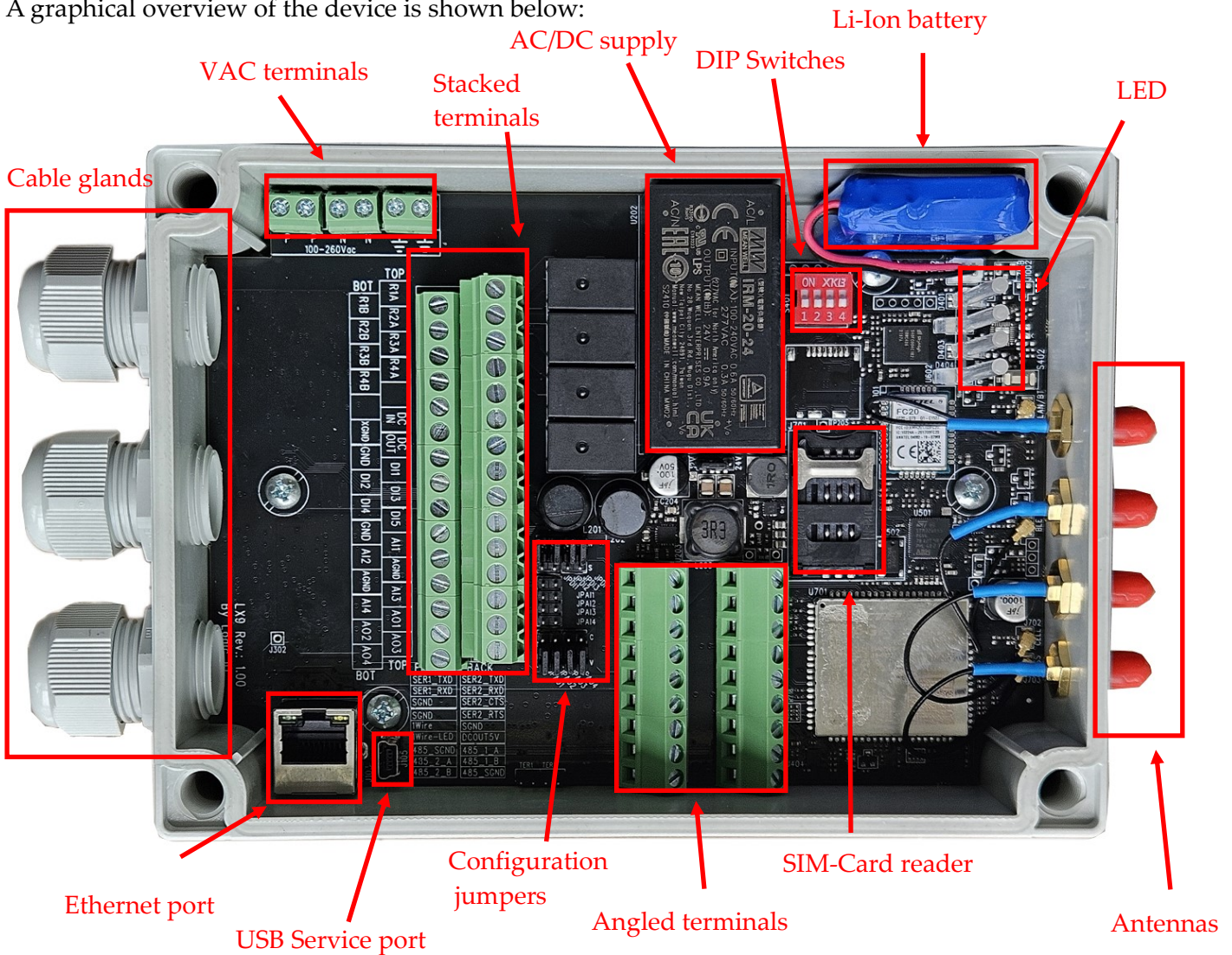
Connections

Overview

Connections to external equipment are done via large and easy-to-use screw terminal blocks which are accessible when the lid is removed. The placement of the terminals makes installation easy by using the cable glands and thereby maintaining the IP-65 protection.

The RTCU LX9 pro is delivered with three M20 cable glands.

A graphical overview of the device is shown below:



The stacked terminals contain connections for: analog and digital inputs/outputs, 12V/24 DC-Output and DC power input.

The angled terminals contain connections for the communication interfaces: RS232 Port 1, RS232 Port 2, RS485 Port 1, RS485 Port 2, 1-Wire and the +5V DC-Output.

Stacked terminal overview

Terminal Name		Description
TOP row	BOT row	
R1A		Contact set for relay output 1.
	R1B	
R2A		Contact set for relay output 2.
	R2B	
R3A		Contact set for relay output 3.
	R3B	
R4A		Contact set for relay output 4.
	R4B	
N.C		Not connected.
	N.C	Not connected.
DCIN		DC power supply, positive (+) connection.
	XGND	DC power ground, negative (-) connection.
DCOUT		12V / 500mA or 24V / 250mA DC output for external equipment.
	GND	Signal ground.
DI1		Digital input 1 / S0 input 1.
	DI2	Digital input 2 / S0 input 2.
DI3		Digital input 3 / S0 input 3.
	DI4	Digital input 4 / S0 input 4.
DI5		Digital input 5 / Wakeup (<i>ignition</i>) input.
	GND	Signal ground.
AI1		Analog input 1.
	AI2	Analog input 2.
AGND		Analog ground.
	AGND	Analog ground.
AI3		Analog input 3.
	AI4	Analog input 4.
AO1		Analog output 1.
	AO2	Analog output 2.
AO3		Analog output 3.
	AO4	Analog output 4.



Angled terminal front row overview

Terminal Name	Description
SER1_TXD	Transmit data from serial port 1, RS232 compatible.
SER1_RXD	Receive data for serial port 1, RS232 compatible.
SGND	Signal ground.
SGND	Signal ground.
1Wire	1-Wire bus.
1Wire-LED	1-Wire ID-Button LED output.
485_SGND	RS485 Signal ground.
485_2_A	RS485 non-inverting signal for RS485 port 2.
485_2_B	RS485 inverting signal for RS485 port 2.

Angled terminal back row overview

Terminal Name	Description
SER2_TXD	Transmit data from serial port 2, RS232 compatible.
SER2_RXD	Receive data for serial port 2, RS232 compatible.
SER2_CTS	Clear-To-Send for serial port 2, RS232 compatible.
SER2_RTS	Request-To-Send for serial port 2, RS232 compatible.
SGND	Signal ground.
DCOUT5	+5V / 300mA DC output for external equipment.
485_1_A	RS485 non-inverting signal for RS485 port 1.
485_1_B	RS485 inverting signal for RS485 port 1.
485_SGND	RS485 Signal ground.

VAC terminal overview

Terminal Name	Description
N	100-260VAC (50/60Hz) Null input.
N	<i>(internally tied together)</i>
P	100-260VAC (50/60Hz) Phase input.
P	<i>(internally tied together)</i>
	Protective earth terminal for the AC power.
	<i>(internally tied together)</i>

Connector Mini USB-B

The USB port is for programming and communication with the RTCU M2M Studio (RACP compliant application). A standard USB cable with a connector length of 10mm on the USB-B end can be used between the device and the PC

Connector Ethernet

This is a standard 10Base-T/100Base-TX IEEE 802.3 compliant Ethernet connector. Please use an appropriate connector and cable, such as a standard CAT-5 twisted pair patch cable

Power supply

The RTCUCX9 pro device can be supplied with either 100-260VAC (50/60Hz) or 8-36VDC or both supply types simultaneously.

The RTCUCX9 pro also contains an internal high-capacity backup battery, which will supply the RTCUCX9 pro if the external power should fail or be disconnected. By default, the RTCUCX9 pro is powered down when a power fail occurs. This setting, however, can be changed. Please consult the RTCUCX9 pro M2M Studio documentation for more information.

When the wakeup/ignition input is activated with a logical high, the RTCUCX9 pro device will wake up if it was in power down mode.

There are six different ground labels:

- External DC Supply Ground (XGND)
- Signal Ground (SGND)
- Digital Ground (GND)
- Analog Ground (AGND)
- RS485 Ground (485_SGND)
- AC Supply Ground (Protective Earth, PE)

The signal ground (SGND), digital ground (SGND), and analog ground (AGND) are filtered from the power ground.

The external DC supply ground (XGND) must be used only as the DC power supply return path. The RS485 ground (485_SGND) is connected to the system ground through a 1 Mohm resistor to protect the system.

The AC supply ground (PE) is used to provide a common reference between the external AC-powered system and the internal system.

The digital ground (GND) is used as a ground reference for digital I/Os, the signal ground is used as a ground reference for serial interfaces, and the analog ground is used as a low-noise ground reference for analog inputs.

Dual Supply Note:

The RTCUCX9 pro can be supplied with both VAC and VDC simultaneously. The device will run on the VAC supply if the VDC supply voltage is < +24VDC. If the VDC supply voltage is higher, it will run on the VDC supply.

Please refer to the RTCUCX9 pro M2M Studio documentation on how to check the supply type from within an application.

DC Supply

The RTCU LX9 pro can be supplied with 8-36VDC from an external DC power source. Positive power is applied to the DCIN pin, and ground is connected to the XGND pin.

The DC supply of the RTCU LX9 pro is protected against wrong polarity. If a system ground is connected to either SGND or AGND, a wrong polarity on the supply lines will destroy the internal GND connection.

Please Note:

- A minimum 15 VDC supply is required for the 0-10V analog output and the 12V DC out.
- A minimum 16 VDC supply is required for digital inputs 1-4 to operate as S0-compliant inputs.

VDC Supply terminals

Terminal Name	Description
DCIN	Power supply, positive (+) connection.
XGND	Power ground, negative (-) connection.

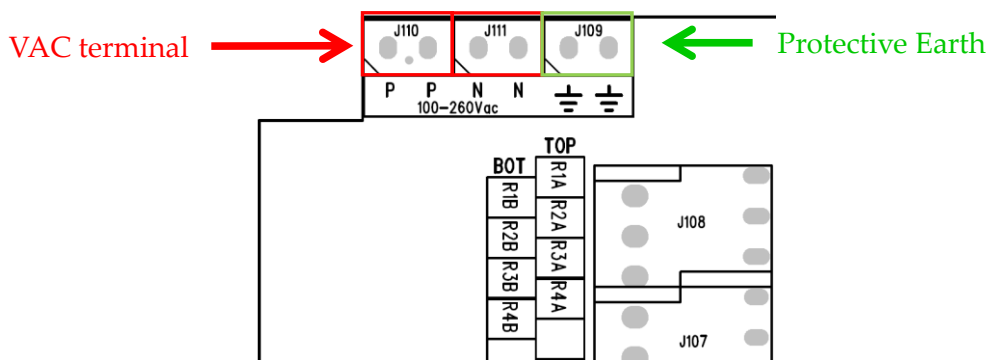
AC Supply

The RTCU LX9 pro device can be supplied with 100-265VAC (50/60Hz) from a standard wall plug or any other high-voltage VAC power rail.

The AC supply of the RTCU LX9 pro is a highly efficient switch-mode power supply, and the AC input is protected internally with a 2A/250V fast-acting non-replaceable fuse.

AC power must be applied between the **N** and **P** on the designated screw terminals.

Protective Earth (**PE**) connection terminals are labeled with the sign \perp .



VAC Supply terminals

Terminal Name	Description
N	100-260 VAC (50/60Hz) Neutral input
N	(internally tied together)
P	100-260 VAC (50/60Hz) Phase input
P	(internally tied together)
\perp	Protective Earth connector

Please Note:

The two pairs of **N** and **P** terminals, and the terminal marked with \perp are internally connected.




There is high voltage in certain areas of the PCB (Printed Circuit Board) when supplied with AC mains. There is a risk of electrical hazard; therefore, avoid touching the PCB and components during operation.

Be aware that the supply filter contains capacitors that may remain charged after the equipment is disconnected from the supply. Although the stored energy is within the approved safety requirements, a slight shock may be felt if the plug pins are touched immediately after removal.

Refer all servicing and handling to qualified personnel.

Please note:

The DC ground of the RTCUCX9 pro is isolated from the AC ground because of the nature of the AC-to-DC conversion. As these two grounds are not tied together anywhere in the RTCUCX9 pro, the DC ground may appear as a "floating ground" to the outside if the RTCUCX9 pro ground is not connected to the same reference as the outside, potentially causing a potential difference. This difference can disrupt the device's behavior and, in the worst case, damage that part of the device. This must be taken into consideration when the RTCUCX9 Pro devices are supplied with an AC supply. When the RTCUCX9 pro is supplied with DC voltage, this "potential difference" issue may not be observed, as the DC power supply usually has the same potential as the rest of the system.

To avoid this, the Earth connection on the AC supply rail can be connected to the terminal marked with the symbol .

For circuitry in situations where significant Earth-ground currents can flow, isolating the DC ground from Earth ground may be desired. In this case, the DC ground may be tied to Earth ground through a high-impedance connection.

For the best EMI performance/ESD immunity when using a common reference, it is recommended to connect DC ground and Earth with a low-inductance connection.

Digital I/O

The RTCUCX9 pro has five digital inputs and four normally-open relay outputs. The outputs are high-performance relays with strong current-handling capabilities.

Digital input 1-4 have multiple operating modes. Please refer to the digital input section for additional information.

Relay outputs

The digital outputs control four relays, which act as normally open contacts: one side must be connected to a source to be switched, and the other contact terminal is the output. The source can be either VAC or VDC, but the maximum switchable voltage and current must not be exceeded. Please refer to the specification page.

There are no internal connections to the relay outputs, so a source must always be connected to one of the relay terminals for the output to work.

The RTCUCX9 pro device offers very advanced power management, allowing one or more outputs to remain enabled while the RTCUCX9 pro is in low-power mode. Please consult the RTCUCX9 pro M2M Studio documentation for more information. The relays are fully operational when the device is operating from the internal battery.

Relay output terminals

Terminal Name	Description
R1A R1B	Contact set for relay output 1.
R2A R2B	Contact set for relay output 2.
R3A R3B	Contact set for relay output 3.
R4A R4B	Contact set for relay output 4.

Load noise

If highly inductive loads (such as high-power contactors) are connected to the relays, it may be necessary in certain cases to externally connect a clamping diode in parallel with each inductive DC load, or to connect an RC snubber circuit in parallel with each inductive AC load.

For DC applications, Vishay UF5405-E3/54 or a similar part is recommended; for AC applications, AMPOHM FE-SP-HDR23-47/100 (47 nF/100 ohm) or a similar part is recommended.

Digital inputs / S0 inputs / Ignition input

The five digital inputs are all low-pass filtered and transient-protected. A positive voltage is connected between the corresponding input (DINx) and GND to activate the inputs.

Digital input 1-4 can be configured individually as S0 input (IEC62053-31, Class A) and DIN5 can work as wakeup (*ignition*) input.

By default, the digital inputs are configured as normal inputs. Please refer to the configuration guide in Appendix A for the placement and configuration of the hardware jumpers inside the device.

S0 compliant inputs (IEC62053-31, Class A compatible)

In S0 configuration the relevant RTCU LX9 pro input will act as a 'pulse input device', and a current is supplied into the input connector so that a simple switch between GND and the appropriate input will activate it. This is used in most electricity metering equipment.

Please note: The RTCU LX9 dlc device must be supplied with a minimum of 16 VDC or AC power for the S0 mode to comply with the standard.

S0 is disabled by default and must be enabled by the application.

Wakeup (*ignition*) input

The DI5 / wakeup (*ignition*) input is special because it also serves as the ignition. If the input is activated to a logical high while the RTCU LX9 pro is in power-down mode, it will wake the device. A power apply will also wake the device from power-down mode.

In the other power-saving modes, all inputs and power apply/fail can be used to wake the device, with individually configured falling- or rising-edge detection. Please consult the RTCU M2M Studio documentation for more information.

For placement and configuration of the hardware jumpers inside the device, please refer to the device configuration guide in Appendix A.

Digital input terminals

Terminal Name	Description	Jumper Setting
DI1	Digital input 1 or S0 input 1	JPDI1 in position N (<i>default</i>) JPDI1 in position S
DI2	Digital input 2 or S0 input 2	JPDI2 in position N (<i>default</i>) JPDI2 in position S
DI3	Digital input 3 or S0 input 3	JPDI3 in position N (<i>default</i>) JPDI3 in position S
DI4	Digital input 4 or S0 input 4	JPDI4 in position N (<i>default</i>) JPDI4 in position S
DI5	Digital input 5 and Wakeup (<i>ignition</i>) input	
GND	Digital Ground	

Specification for each digital input

	Min.	Typ.	Max.	Unit	
Logic "High"	8	12	40	VDC	Protected against transients and low-pass filtered
Logic "Low"	-5	-	3	VDC	
Bandwidth (normal)	-	15	-	kHz	@ 12 VDC input voltage level
Bandwidth (s0)	-	3	-	kHz	
Input impedance	-	13.8	-	k Ω	In "normal digital input" mode

Analog I/O

Analog inputs

The RTCU LX9 pro device has four analog inputs, which can be configured individually as voltage or current measurement inputs using the configuration jumper. The range in voltage mode is 0-10VDC, and in current mode 0-20mA. The conversion resolution is 12 bits.

By default, the analog inputs are configured as voltage inputs and are converted to a 10-bit digital value before being presented to the application (0..1023). The application can change the resolution to the full 12-bit (0..4095). Please consult the RTCU M2M Studio documentation for further details.

The input signal is connected between AI_x and AGND. AGND must be connected to the reference of the connected equipment. Please be aware that deviations may occur due to the system's high noise sensitivity. Avoid long, unshielded wires and high-current, fast-changing signals routed parallel to the analog signals.

The inputs are low-pass filtered, ESD- and transient-protected.

By default, the inputs are configured as voltage inputs. Please refer to the device configuration guide in Appendix A for the placement and configuration of the hardware jumpers inside the device.

Analog input terminals

Terminal Name	Description	Jumper Setting
AI1	Analog input 1 – Voltage	JPAI1 not installed (<i>default</i>)
	Analog input 1 – Current	JPAI1 installed
AI2	Analog input 2 – Voltage	JPAI2 not installed (<i>default</i>)
	Analog input 2 – Current	JPAI2 installed
AI3	Analog input 3 – Voltage	JPAI3 not installed (<i>default</i>)
	Analog input 3 – Current	JPAI3 installed
AI4	Analog input 4 – Voltage	JPAI4 not installed (<i>default</i>)
	Analog input 4 – Current	JPAI4 installed
AGND	Analog ground	
AGND	Analog ground	

Specification for each analog input (voltage mode)

	Min.	Typ.	Max.	Unit	
	0	-	10	VDC	Protected against transients and low-pass filtered Accuracy is based on measurements @ 25 °C
Resolution	-	-	12	Bit	
Accuracy	-	0.2	0.25	%FSR	
Cut-off frequency	-	4.5	-	kHz	
Input impedance	-	40	-	kΩ	

Specification for each analog input (current mode)

	Min.	Typ.	Max.	Unit	
	0	-	20	mA	Protected against transients and low-pass filtered Accuracy is based on measurements @ 25 °C
Resolution	-	-	12	Bit	
Accuracy	-	0.2	0.25	%FSR	
Cut-off frequency	-	4.5	-	kHz	
Input impedance	-	500	-	Ω	

Analog outputs

The RTCU LX9 pro device has four analog outputs, which can be configured individually as voltage or current measurement outputs using the configuration jumper. The range in voltage mode is 0-10VDC, and in current mode 0-20mA. The conversion resolution is 12 bits.

By default, the outputs are configured as voltage outputs. For placement and configuration of the hardware jumpers inside the device, please refer to the device configuration guide in Appendix A.

The default resolution is 10 bits (0.1023). The application can change the resolution to the full 12 bit (0.4095). The decimal values for 10V/20mA and 5V/10mA outputs are 1023 and 512, respectively. Please consult the RTCU M2M Studio documentation for further details.

The output signal is connected between AOx and AGND. AGND must be connected to the reference of the connected equipment. Please be aware that deviations may occur, as the system is very noise sensitive. Avoid long, unshielded wires and high-current, fast-changing signals routed parallel to the analog signals.

Each output is ESD- and transient-protected.

Please note: The RTCU LX9 pro device must be supplied with a minimum of 15 VDC or AC to ensure the analog outputs operate according to specifications.

Analog output terminals

Terminal Name	Description	Jumper Setting
AO1	Analog output 1 – Voltage	JPAO1 in position V (<i>default</i>)
	Analog output 1 – Current	JPAO1 in position C
AO2	Analog output 2 – Voltage	JPAO2 in position V (<i>default</i>)
	Analog output 2 – Current	JPAO2 in position C
AO3	Analog output 3 – Voltage	JPAO3 in position V (<i>default</i>)
	Analog output 3 – Current	JPAO3 in position C
AO4	Analog output 4 – Voltage	JPAO4 in position V (<i>default</i>)
	Analog output 4 – Current	JPAO4 in position C
AGND	Analog ground	
AGND	Analog ground	

Specification for each analog output (voltage mode)

	Min.	Typ.	Max.	Unit	
	0	-	10	VDC	Protected against transients and low-pass filtered
Resolution	-	-	12	Bit	
Accuracy	-	0.1	0.15	%FSR	Accuracy is based on measurements
Load	-	-	20	mA	@ 25 °C

Specification for each analog output (current mode)

	Min.	Typ.	Max.	Unit	
	0	-	20	mA	Protected against transients and low-pass filtered
Resolution	-	-	12	Bit	
Accuracy	-	0.1	0.15	%FSR	Accuracy is based on measurements
Load	-	-	400	Ω	@ 25 °C

USB programming port

The mini-USB port is for programming and communicating with the RTCU M2M Studio (or other RACP-compliant applications). A standard USB cable can be used between the device and the PC.

RS232 communication ports (EIA/TIA-232 and V.28/V.24 compatible)

Two general-purpose RS232 ports are available on the RTCU LX9 pro device. Both are compliant with the EIA/TIA-232 and V.28/V.24 standard.

RS232 port 1

This port is a general-purpose RS232 serial port and does not support handshaking. The signals are available at the angled front-row terminals.

SER1 terminals

Terminal Name	Description
SER1_TXD	Transmit data from serial port 1, RS232-compatible.
SER1_RXD	Receive data for serial port 1, RS232-compatible.
SGND	Signal ground.

This RS232 port must be addressed as **port 0** when using the VPL API, such as the serOpen function.

RS232 port 2

Serial port 2 is a general-purpose RS232 port with RTS/CTS handshaking signals present. The signals are available at the angled back-row terminals.

SER2 terminals

Terminal Name	Description
SER2_TXD	Transmit data from serial port 2, RS232-compatible.
SER2_RXD	Receive data for serial port 2, RS232-compatible.
SER2_CTS	Clear-To-Send.
SER2_RTS	Request-To-Send.
SGND	Signal ground.

This RS232 port must be addressed as **port 1** when using the VPL API, such as the serOpen function.

RS485 communication ports (EIA/TIA-485-A compatible)

RS485 is a multi-drop network with up to 32 devices connected to the bus simultaneously. The RS485 bus contains an RS485+ (*non-inverting*) and an RS485- (*inverting*) signal as well as a signal ground which must always be connected to the common signal ground for all devices connected to the RS485 bus.

The maximum cable length for the RS485 bus is defined by the EIA/TIA-485-A standard (max. 1200m @ <100kbit); the quality of the cable, signaling rate, noise, etc., highly influences this limit.

At longer cable lengths, in noisy environments, or at high communication speeds, it might be necessary to terminate the transmission line with a 120 ohm resistor at each end to avoid signal reflections.

When the RTCU LX9 pro device is used as an endpoint device, the hardware jumpers TER1 and TER2 can be installed to terminate the RS485 communication lines with 120 ohm resistors.

Both RS485 ports can be used as a general-purpose RS485 serial port or as I/O extension module(s) port. When used with supported MODBUS IO extension modules, general-purpose use is disabled. The RS485 port signals are available on the angled terminals.

Further details on the MODBUS I/O extension modules and their use are available in the RTCU M2M Studio documentation.

By default, the RS485 communication lines are not terminated with 120 Ω. Please refer to the configuration guide in Appendix A for the placement and configuration of the hardware jumpers inside the device.

RS485 port 1

RS485 signals are available on the angled back terminals.

If TER1 jumper is inserted, a 120Ω endpoint resistor is enabled. For the location of TER1 refer to Appendix A

RS485 port 1 terminals

Terminal Name	Description
485_1A	RS485 non-inverting signal (A)
485_1B	RS485 inverting signal (B)
485_SGND	Signal ground / cable shield connection

This RS485 port must be addressed as **port 2** when using the VPL API, such as the serOpen function.

RS485 port 2

The RS485 port is available on the angled front terminals.

If TER2 jumper is inserted, a 120Ω endpoint resistor is enabled. For the location of TER2 refer to Appendix A

RS485 port 2 terminals

Terminal Name	Description
485_2A	RS485 non-inverting signal (A)
485_2B	RS485 inverting signal (B)
485_SGND	Signal ground / cable shield connection

This RS485 port must be addressed as **port 3** when using the VPL API, such as the serOpen function.

1-Wire

The 1-Wire bus is available on the angled front row terminals. All 1-Wire communication occurs over a single connection, and all 1-Wire devices connected to it receive power directly from the bus (parasitic power). For this, only two wires are needed – the 1-wire signal and the ground reference - thus allowing minimal cable installation.

A dedicated output is available for 1-Wire ID-Button readers, which include a built-in LED. Please consult the RTCU M2M Studio for further information.

For further information regarding the modular 1-wire concept, please refer to the document "Modular 1-Wire Concept Technical Manual" on the Logic IO webpage.

1-Wire terminals

Name	Description
1Wire	1-Wire bus.
1Wire-LED	1-Wire ID-Button LED output.
SGND	Signal ground.

Specification of the 1-Wire bus:

	Max.	Unit
Total weight ¹	65	m

DC-Out

Two DC outputs are available on the RTCU LX9 pro for supplying external equipment: a 5V and a 12V/24V output. It is possible to control these DC outputs to save power.

Both DC outputs are short-circuit- (to ground), ESD-, and transient-protected.

Make sure not to exceed the current output specifications, and be aware that inrush currents from external equipment may exceed the specifications.

The DC outputs must be enabled from the application. Please consult the RTCU M2M Studio documentation for more information.

5V DC-Out

The +5V DC output can supply up to 300 mA and is available at the angled back-row terminals. This output is named boardDCOut in the RTCU M2M Studio documentation.

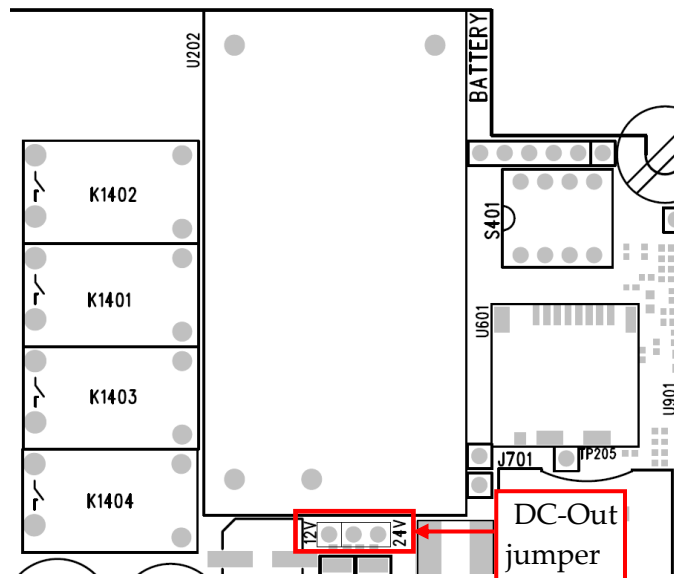
¹³ The term of weight has been described in "Modular 1-wire concept – Technical Manual" document.

12V/24V DC-Out

When using the jumper JP101, either 12V or 24 DC is available on the DC-out terminal. The 12V DC output can supply up to 500 mA, and the 24V DC output can supply up to 250 mA. The DC-Out is available on the top row of the stacked terminals. This output is named boardDCOut2 in the RTCU M2M Studio documentation.

The 12V DC-out requires a DC supply voltage of at least 14 VDC, and the 24V DC-out requires an AC supply.

The jumper that switches the DC-out voltage level between 12V DC and 24V DC is located at the front of the communication terminal rows, as shown below:



DC-Out terminals

Terminal Name	Description
DCOUT5	+5V / 300 mA DC output for external equipment.
DCOUT	+12V/ 500 mA / +24V/250 mA DC output for external equipment.
SGND	Signal ground.

Ethernet

The RTCU LX9 pro offers an onboard IEEE 802.3 compatible 100BASE-T Ethernet MAC controller and transceiver for communication with peripherals and back-end systems over standard Ethernet. Please refer to the RTCU M2M Studio for details on using this interface.

3D movement sensor

The RTCU LX9 pro device includes a 3-axis accelerometer to detect vibration and motion. It enables detection of movement and position changes in 3 directions (X, Y, Z) with an acceleration force as high as 16g.

Please consult the RTCU M2M Studio documentation for more detailed information.

The positions of the three axes are as follows:



Specification:

		Unit	
Resolution	±16	g	The acceleration can be set as relative to motion,
Precision	12	bit	or relative to earth gravity

LED Indicators

Four bi-colored (red and green) LED indicators are present on the front of the device (see graphical overview).

Two bi-colored LEDs (A and B) are available to the user, and the remaining two LEDs (S1 and S2) indicate the RTCU device's status and possible errors.

User LED A and B

LED A and B are composed of four individually controllable LEDs:

- LED named A on the front consists of LED 1 (green) and LED 2 (red).
- LED named B on the front consists of LED 3 (green) and LED 4 (red).

They are easily accessed from within the application program, and it is possible to mix the LEDs to obtain a third color: yellow. Please consult the RTCU M2M Studio for more information.

Fault mode

When a runtime error occurs, the device enters fault mode. This mode is indicated by a fast-blinking RED of both User LEDs A and B. Please use the RTCU M2M Studio to obtain the fault log.

System LED S1 and S2

The RTCU is equipped with two system LEDs that indicate the device's status and possible errors.

The different patterns are listed in the table below. If the system LED S1 is yellow, the device is actively communicating with the RTCU M2M Studio (or another program that supports the RTCU RACP protocol).

The LED S2 indicates either cellular module activity or, if all other LEDs are off, that the RTCU is in the "wait for event" low-power state.

S1: System LED1 pattern overview

Pattern	Description
Fastest blinking, green	The device is initializing, preparing to start the application.
Fast blinking, green S2 On, green	The device is installing an update. Depending on the kind of update, it may take some time.
Fast blinking, green ¹	The device has been forced into recovery mode using the system switch. The application is not executing.
500ms On / 500ms Off green ¹	The device is executing the application program.
1.5s On / 0.5s Off. Green ¹	The device executes the application program while charging the internal backup battery.
Alternating Fast/Slow, green/orange	The device has lost its firmware! This can only happen if the RTCU device loses power or if communication is completely lost during a firmware upgrade. In this case, re-upload the firmware to the device.
On yellow (and all other LEDs OFF)	The device is booting, initializing the system

S2: System LED2 pattern overview (Cellular activity and "Wait For Event")

Pattern	Operating Status
Off	The cellular engine is turned off
600 ms On / 600 ms Off green	Missing SIM card or PIN code. Network search and logon in progress.
75 ms On / 3 s Off green	Logged on to the network.
75 ms On / 75 ms Off / 75 ms On / 3 s OFF green	A Packet/GPRS session is active.
Flashing green	Indicates Packet/ data transfer.
On green (and all other LEDs OFF)	The system is booting into recovery mode
10 s OFF / 50 ms ON green (and all other LEDs OFF)	The RTCU device is in a low-power "Wait For Event" state.

¹ Or yellow when communicating with the RTCU M2M Studio or another program, supporting the RTCU RACP protocol).

Switches

DIP-Switch

The RTCX LX9 pro device has four dip switches, and three are available for application use. The dip-switches are located inside the device (see the graphical overview).

System Switch (RST)

The RTCX LX9 pro device contains a combined reset/diagnostic switch. This switch is accessible from the inside of the device.

The RTCX device will perform a full reset by activating the switch shortly.

If the reset switch is held down for approximately 3 seconds¹, the device will instead enter recovery mode², and the application will not be started. The system will automatically turn on the cellular engine in recovery mode to connect to the network and the RTCX Communication Hub (if configured).

Pressing reset will also activate the device when in power-down mode. If external power is removed and the backup battery is disabled, the reset switch can still be used to boot into recovery mode as long as the battery has enough power.

¹ System LED S2 will flash green three times when this state is entered.

² System LED S1 will indicate this state by fast blinking green or yellow.

Internal Li-Ion Backup Battery

The RTCU features an internal Li-Ion battery that ensures continued operation during external power failures, allowing the device to report power loss events. By default, the device is configured to power down when external power is removed; however, this behaviour can be customized using RTCU M2M Studio.

During power failures, digital inputs in S0 mode and analog outputs are disabled, as the internal battery cannot provide the required supply voltage for these circuits.

Battery management is fully automated. To minimize downtime, the device utilizes a high charge current; ensure that your power supply and cabling are rated for this load. The user application can monitor several battery parameters, including low battery alerts, charger enablement, and charging status.

Temperature and Lifecycle Constraints:

- **Standard Range:** Charging occurs between 0°C and 45°C. If the temperature exceeds 45°C, charging is suspended until the unit cools.
- **Extended Range:** A specialized algorithm allows for charging down to -10°C to protect battery chemistry.
- **Capacity:** Battery capacity is highly sensitive to temperature—dropping to approximately 60% at 0°C—and usage. Expect capacity to reach approximately 80% of its original rating after 300 charge/discharge cycles.

Caution: Battery Safety and Maintenance:

- **Protection Circuitry:** Improper use of the RTCU device may damage the integrated battery protection circuit.
- **Temperature Extremes:** Avoid placing the device in high-temperature environments, such as direct sunlight or near engines. Prolonged exposure to heat will degrade battery performance and significantly shorten its lifespan.
- **Moisture Protection:** Do not expose the device to water or saltwater, and ensure the battery remains dry at all times.
- **Physical Handling:** Protect the device from strong impacts, drops, and mechanical shocks.

Wireless Communication

Worldwide LTE Cat. 4 Cellular Engine

The RTCU LX9 pro uses an LTE/UMTS/HSPA engine with the following features:

- Max. 150Mbps down / 50Mbps upload (Cat 4)
- 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: 850/900/1800/1900 MHz
- SMS (Text and PDU)
- UMTS release 7, max. 42Mbps down / 5.76Mbps upload, (Cat 6)
- Digitized audio / DTMF capability.

The Cellular Engine is designed for Worldwide deployment.

Bluetooth LE

The LX9 pro has an onboard Bluetooth LE 5.3-certified radio operating in the standard 2.4 GHz spectrum.

WLAN and Classic Bluetooth

The RTCU LX9 pro device contains a combined WLAN and Bluetooth radio that shares the same antenna interface.

WLAN Technical Data

- WLAN at 2.4 GHz ISM band
- IEEE 801.11 a/b/g/n/ac.
- WPA/WPA2/WPA3 encryption.
- Up to 433 Mbps.
- AP and STA modes supported.

The Classic Bluetooth feature is optional and under development.

GNSS Receiver

Qualcomm Cellular GNSS engine

General:	55 tracking channels. Multi GNSS engine for GPS, GLONASS, GALILEO, and QZSS	
Update Rate:	NMEA @ up to 4 Hz	
Accuracy:	Position	<2.5m CEP-50.
	Velocity	<0.1m/s
Sensitivity:	Tracking/navigation	-157 dBm
	Reacquisition	-158 dBm
	Cold Start (Autonomous) (Chipset reference parameters)	-145 dBm
Time-To-First-Fix ¹ :	Autonomous Operation in Standard Sensitivity Mode	
	Reacquisition ²	< 1 sec.
	Hot Start ³	< 2 sec.
	Warm start ⁴	< 26 sec.
	Cold start ⁵	< 35 sec.
Interface protocol:	NMEA 0183 v3.01 with GGA, VTG, GLL, GSA, GSV, and RMC.	

¹ All satellites at open sky.

² Time to get a fix when signal has been blocked for a short period of time.

³ The GNSS engine has been powered down for less than 2 hours and the stored position and time are valid.

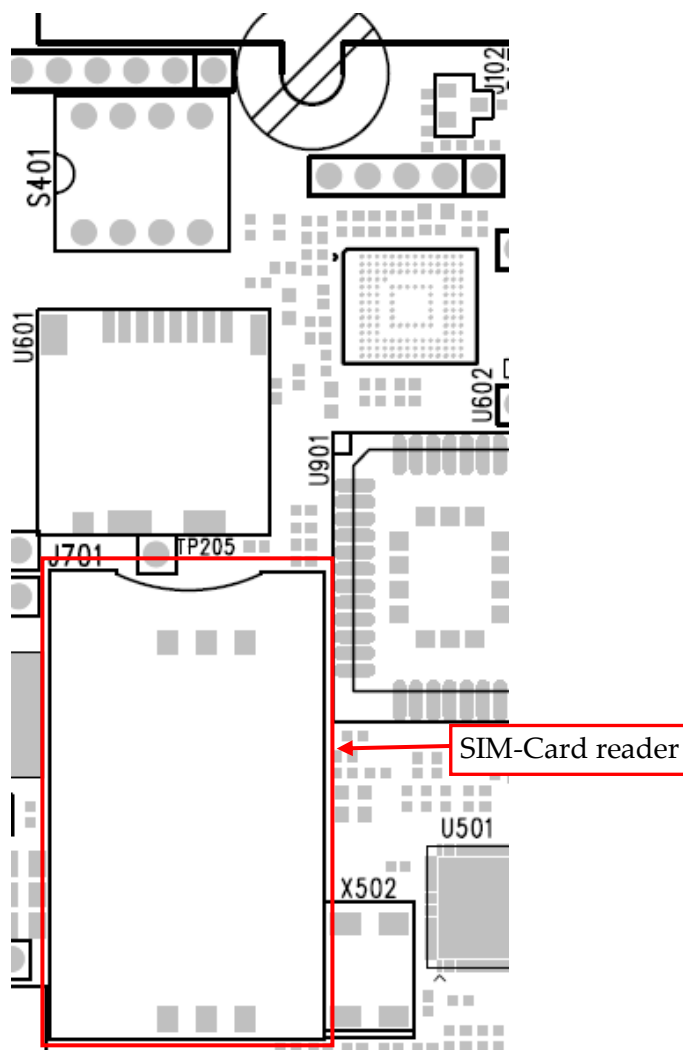
⁴ The GNSS engine has been powered down for more than one hour, but has stored information about its current position and time.

⁵ The GNSS engine has no valid navigation data.

Internal SIM-Card reader

The RTCX LX9 pro device includes a standard mini-SIM card reader located inside the device (see drawing below or graphical overview) and is easily accessible. The SIM card reader is lid-based with a mechanical lock system for secure SIM card installation. Please refer to Appendix B for the SIM card installation guide. The RTCX LX9 pro supports an internal eSIM that shares the SIM card signals with the SIM reader. Please get in touch with Logic IO for this option.

If the SIM card is removed while the device is in cellular service, the device will be rejected by the network shortly thereafter.



Antennas

Cellular Antenna

The RTCX LX9 pro device contains an SMA female connector for connecting a suitable LTE-compliant antenna. When installing the antenna, please ensure it is not close to metallic parts or anything else that could affect its efficiency.

Please consult the installation guide that follows the antenna.

GNSS Antenna

The RTCX LX9 pro requires a suitable GNSS antenna. The connection is with an SMA female connector, and the GNSS antenna must be a 3V active antenna with an SMA male connector.

When installing the antenna, please ensure it has a clear view of the sky so it can receive weak satellite signals. Please also consult the installation guide that follows the antenna.

Bluetooth LE Antenna

The RTCX LX9 pro device contains an RP-SMA female connector for connecting a suitable Bluetooth antenna.

When installing the antenna, please make sure it is not in close proximity to metallic parts or anything else that could affect its efficiency. Please consult the installation guide that follows the antenna.

WLAN Antenna

The LX9 pro device includes an RP-SMA connector for connecting a suitable Wi-Fi antenna.

When installing the antenna, please make sure it is not in close proximity to metallic parts or anything else that could affect its efficiency. Please consult the installation guide that follows the antenna.

Product Identification Label with Barcode

The RTCU LX9 pro product identification on the device's exterior includes a unique serial number in a readable format and a barcode.

The first three digits of the serial number identify the device type; for the RTCU LX9 pro, this unique code is **391**.

Barcode format used: 2/5 Interleaved with check-digit.

Power Consumption

The table below provides detailed information on the RTCU LX9 P device's typical power consumption while operating.

Typical power consumption: Device operating in normal mode

	12V	24V	BAT	
Device active	55	30	140	mA
Device active with Cellular on*	60	30	160	mA idle @ -63dBm* (2G)
Device active with GPRS session*	145	75	400	mA @ -65dBm, Battery not charging*
Device active with GNSS on	80	45	210	mA Mode 3
Device active with WLAN on	60	30	150	mA Connected to AP, in idle
Device active with Ethernet on	110	60	280	mA Connected to switch, in idle
Device active while charging	450	250	-	mA

Note: Values marked with (*) are averages and should be considered guidelines, as they may vary depending on cellular signal strength.

Note: Power consumption from a fully charged battery

AC power consumption: Device operating in normal mode

	220V AC		
Device active	1	W	
Device active with Cellular on*	1.5	W	idle @ -63dBm* (2G)
Device active with GPRS session*	3	W	@ -65dBm, Battery not charging*
Device active with GNSS on	1.5	W	Mode 3
Device active with WLAN on	1.5	W	Connected to AP, in idle
Device active with Ethernet on	2	W	Connected to a switch, in idle
Device active while charging	6.5	W	

Note: Values marked with (*) is average and should be considered as guidelines, as they may vary depending on the cellular signal strength.

The table below provides detailed information on the RTCU LX9 pro device's typical power consumption in power-saving modes.

The following power-saving modes are used:

- Mode 1: LED blinks every ~10 s, resumes the application when it is awoken.
- Mode 3: Does not blink, resets the device when it is awoken.

Please refer to the RTCU M2M Studio documentation for information on using the power-saving modes.

DC power consumption: Device operating in power-saving modes

Wake-up source	Mode 1			Mode 3			
	12V	24V	BAT	12V	24V	BAT	
Cellular*	2	1.5	5.5	-	-	-	mA
RS232 1 Mode 1	2.1	1.1	6.0	-	-	-	mA
RS232 2 Mode 1	0.9	0.6	2.7	-	-	-	mA
RS485 Mode 1	0.9	0.5	2.6	-	-	-	mA
Din 1-4 S0	15.5	14.5	-	-	-	-	mA
Din 1-5	0.8	0.5	2.2	0.3	0.2	0.9	mA
Vibration	0.8	0.5	2.2	0.3	0.2	0.9	mA
Power Failure	0.8	0.5	2.2	0.3	0.2	0.9	mA
Power Apply	0.8	0.5	2.2	0.3	0.2	0.9	mA
Time	0.8	0.5	2.2	0.3	0.2	0.9	mA

Note: Power consumption from the battery @ 3.8V

Note: Values marked with (*) are averaged and should be considered guidelines, as they vary depending on the signal strength.

AC power consumption: Device operating in power-saving modes

The power consumption from external AC is less than 1 W in all the power-saving modes.

Appendices

Appendix A – Device configuration guide

The RTCU LX9 pro has many features, some of which require configuration via hardware jumpers inside the device. An overview over the jumper settings can be found in the following table.

Feature	Jumper	State	Default state
Communication	TER1 (RS485_1)	Installed	120Ω resistor enabled.
		Not installed	120Ω resistor disabled (<i>default</i>).
	TER2 (RS485_2)	Installed	120Ω resistor enabled.
		Not installed	120Ω resistor disabled (<i>default</i>).
Analog input	JPAI1	Installed	AI1 current measurement.
		Not installed	AI1 voltage measurement (<i>default</i>).
	JPAI2	Installed	AI2 current measurement.
		Not installed	AI2 voltage measurement (<i>default</i>).
JPAI3	Installed	AI3 current measurement.	
	Not installed	AI3 voltage measurement (<i>default</i>).	
JPAI4	Installed	AI4 current measurement.	
	Not installed	AI4 voltage measurement (<i>default</i>).	
Analog output	JPAO1	Position C	AO1 current.
		Position V	AO1 voltage (<i>default</i>).
	JPAO2	Position C	AO2 current.
		Position V	AO2 voltage (<i>default</i>).
JPAO3	Position C	AO3 current.	
	Position V	AO3 voltage (<i>default</i>).	
JPAO4	Position C	AO4 current.	
	Position V	AO4 voltage (<i>default</i>).	
Digital input	JPDI1	Position S	DI1 S0.
		Position N	DI1 normal (<i>default</i>).
	JPDI2	Position S	DI2 S0.
		Position N	DI2 normal (<i>default</i>).
JPDI3	Position S	DI3 S0.	
	Position N	DI3 normal (<i>default</i>).	
JPDI4	Position S	DI4 S0.	
	Position N	DI4 normal (<i>default</i>).	
DC-Out voltage	JP101	Position 12V Position 24V	12V DC out. 24V DC out.

TER1 and TER2

Enables/disables onboard 120Ω line termination resistors, which are according to standards; RS485 communication requires a proper line termination value (120Ω *assuming a CAT5 twisted pair cable is used*) resistors in both ends of the bus. If the RTCU LX9 pro device is used as an endpoint, the relevant jumper can be installed.

JPAI1, JPAI2, JPAI3 and JPAI4

These jumpers are used to select between current and voltage input. With a jumper installed on the relevant analog input, it will measure current between 0 and 20mA.

JPAO1, JPAO2, JPAO3 and JPAO4

These jumpers are used to select either current or voltage output. With the relevant jumper installed in position "C" the output is a current between 0-20mA, when installed in position "V", output is a voltage between 0-10V.

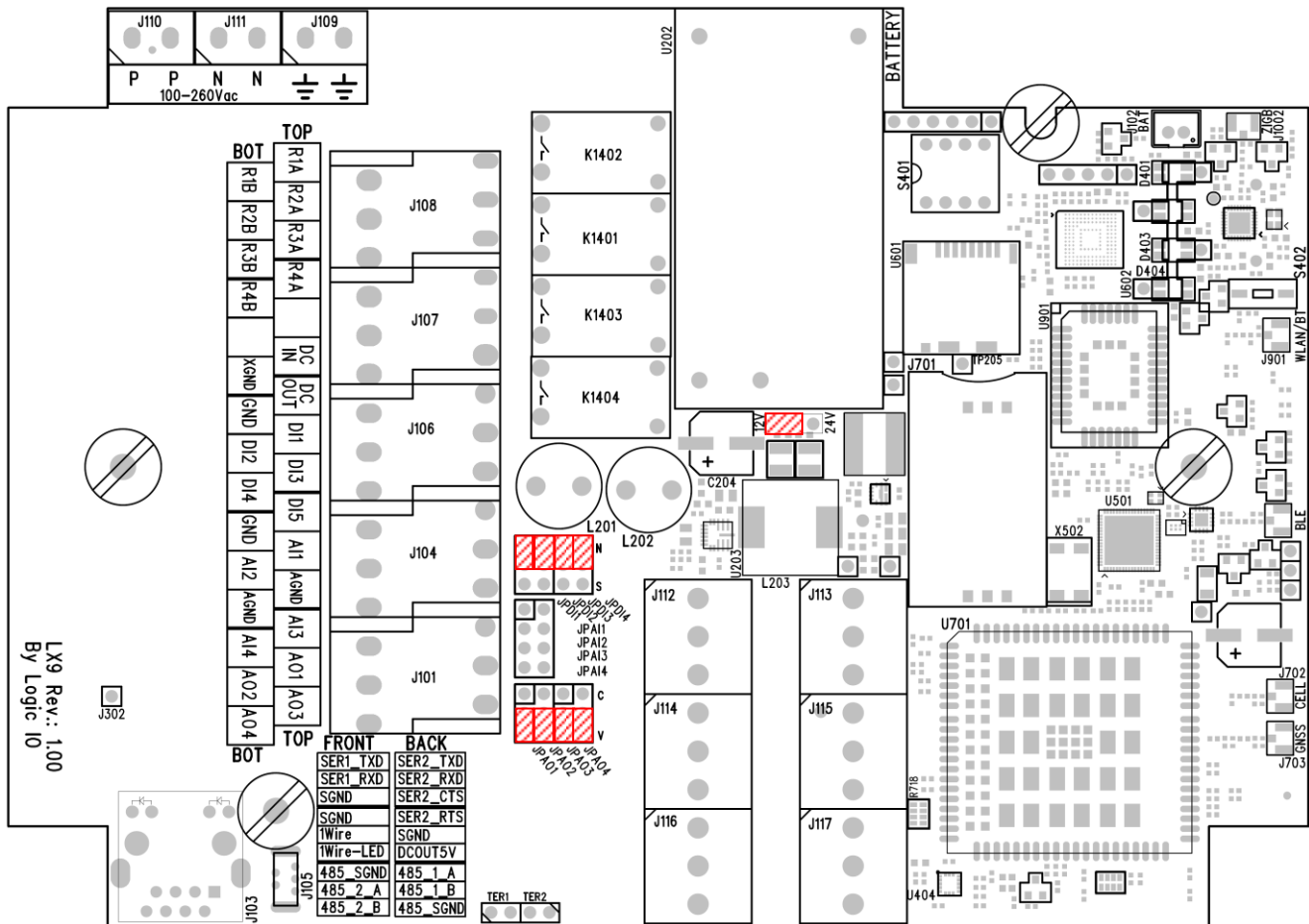
JPDI1, JPDI2, JPDI3 and JPDI4

These select either normal or Class A S0 input for DIN1-4. With the relevant jumper installed in position "S", the input is configured to S0; when installed in position "N", it is a normal digital input.

12V and 24V

These jumpers are used for connecting the DC OUT terminal to 12V or 24V.

The following figure shows the location of the jumpers when the lid of the device is removed. Red lined boxes show the default state of the jumpers.



Appendix B – Installing the SIM-card

The SIM card reader is a lid-based type with a mechanical lock for securely installing the SIM card.

Open the hinged lid of the SIM card reader, orient the card as shown below, and insert it into the card reader. Close the lid and slide the metal locking mechanism to the locked position, as shown by the arrow and text on the lid, until a click is heard.

To remove the card, slide the metal locking mechanism to the unlocked position, as shown by the arrow and text on the lid, and open the lid. The SIM card can now be removed.



Appendix C - Open-Source Disclaimer

The RTCUCX9 pro products include several open-source software tools. The terms and conditions of the applicable open-source license govern this open-source software. You are bound by the terms and conditions of the appropriate open-source license in connection with your use and distribution of the open-source software in this product.

Please refer to the separate document "[RTCUCX9 Open Source Licenses.pdf](#)" for detailed information about the packages used.

RTCU LX9 pro Specifications

RTCU M2M Platform

- NX32 for Linux - NX32L.
- Fully NX32 compatible.
- Larger capacity and higher performance compared to NX32.
- Open and user-extendable API.
- RTCU M2M Platform SDK.

LX Hardware Core

- Powerful 32-bit ARM processor.
- Hardware floating point and DSP.
- 128 Mbyte RAM.
- 512 Mbyte system NAND flash.
- Real-time clock with battery-backup.

Security

- Embedded firewall.
- TLS/SSL support with full certificate management.
- TLS/SSL support for SMTP, MQTT, FTP, HTTP, RTCU Communication Hub and TCP/IP sockets.
- Hardware assisted strong encryption/authentication: AES-128, AES-192, AES-256, DES, TripleDES, HASH, RND and RSA signature.

Storage

- 4 GB Internal flash drive.
- Persistent data flash.
- Non-volatile SRAM.
- Circular datalogger.

Cellular Engine

- **LTE Cat.4 Engine (Worldwide).**
 - Max 150 Mbps(DL)/Max 50 Mbps(UL).
 - LTE FDD: 15 bands.
 - LTE-TDD: 4 bands.
 - WCDMA: 7 bands.
 - GSM: Quad-band.
- DTMF decoding / transmission.
- Digitized voice playback / IVR.
- Internal mini SIM-card reader.
- Mini-SIM 1.8/3 volt
- Optional eSIM.

Bluetooth

- Bluetooth Low Energy 5.3.
- IEEE 802.15.4-2011 PHY
- Optional: Classic Bluetooth.

Wireless LAN

- WiFi at 2,4 GHz ISM bands.
- IEEE 802.11 a/b/g/n/ac.
- WPA/WPA2/WPA3 encryption.
- Up-to 433 Mbps.
- AP and STA modes supported.

GNSS

- GPS, GLONASS, GALILEO and QZSS.
- Active 3 volt GNSS antenna.
- Antenna and short-circuit detection.

Sensors

- Temperature sensor.
- 3-axis accelerometer. 12 bit @ ±16g.

Wired Communication

- 100BASE-T Ethernet interface.
- 2 x RS232. One with control signals.
- 2 x RS485.
- 1-Wire bus.
- USB service/programming port.

Audio

- Fully digitized audio system.
- Transfer, store and play audio.
- Digitized cellular audio.

User Interaction

- 4 x bi-colour LED (external).
- DIP-switches.
- I/O configuration jumpers for analog and digital operating modes.
- Jumpers for RS485 termination
- Reset / recovery switch.



Digital I/O Interface

- 4 x relay output.
Max. 5A @ 250VAC / 30 VDC
- 5 x digital inputs.
Logic high: 8 to 40 VDC.
Logic low: -5 to 3 VDC.
Impedance: 13.8kohm @ 12V.
- 4 x IEC62053-31 Class A input.
- I/O expansion Modbus modules.

Analog I/O Interface

- 4 x analog inputs.
Range is 0..10VDC or 0..20 mA
Resolution: 12 bit
Accuracy: Typ. $\pm 0.2\%$ FSR @ 25°C
Impedance: 40 kohm (V)/500 ohm (C).
- 4 x analog outputs.
Range is 0..10VDC or 0..20 mA
Resolution: 12 bit
Accuracy: Typ. $\pm 0.1\%$ FSR @ 25°C.
- Protected against transients and low-pass filtered.
- I/O expansion Modbus modules.

Electrical

- Supply operating range:
8 to 36 VDC.
100 to 260 VAC.
- Short and reverse power protected.
- 12/24V DC-out @ 500/250 mA.
- 5 V DC-out @ 300 mA.

Battery and Charger

- On-board 2 Ah (nominal) Li-Ion battery.
- Intelligent charger with temperature throttle and sub-zero degrees support.
- On-board temperature sensor.

Power Management

- Low-power modes.
- Wait for Event: Timer, Digital input, RS232/RS485, Cellular, Power change.
- Power consumption:
down to 0.3 mA@12V.
- Supervision of supply voltage / type.

Internal Interfaces

- Plug-compatible with the NX-900.
- Mini SIM-card slot.
- Service-port (Mini USB-B).
- RJ45 for LAN with LED indicators.
- Screw-terminals for:
Power, I/O and DCOUT.
- Angled screw-terminals for:
RS232, RS485, 1-Wire and DC-out.
- Jumpers for RS485, I/O and DC-out operating modes.

External Interfaces

- 3 x M20 cable glands.
- SMA female connector for cellular.
- SMA female connector for GNSS.
- RP-SMA female connector for BLE.
- RP-SMA female connector for WLAN.

Physical Characteristics

- Encapsulation:
Durable Polycarbonate plastic.
- TPE gasket.
- Colour: RAL 7035—light grey.
- Approx. 690 gram without accessories.
- W 130 x H 180 x D 60 mm.
(without external connectors)

Environmental Specification

- Operating temperature: -40 to 60°C.
- Battery charge temperature:
-10 to 45 °C
- Recommended storage temperature:
0 to 45°C.
- Humidity: 5..90% (non condensing).
- Impact resistance: IK08 (EN62262)
- UV resistance: UL 508.
- Flammability Rating: UL746C 5"
- Ingress Protection: IP65 (EN60529).

Approvals

- 2014/53/EU Radio Equipment Directive.
- 2014/30/EU EMC Directive
- 2011/65/EU RoHS Directive.
- Cellular:
GCF/CE/FCC/PTCRB/IC/Anatel/SRRC/NAL/
CCC/KC/NCC/JATE/TELEC/RCM/IFETEL/
FAC/NBTC/ICASA.

Warranty

- Two-years return to factory parts and labor.
- Optional warranty up to 5 years.
(restrictions apply).



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