RTCU AX9i eco
Technical Manual
Version 1.01

logic IO
The M2M Enabler

Introduction

This manual contains technical documentation which allows for easy installation and use of the **RTCU AX9i eco** product. For information on the programming and software configuration of the product please refer to the RTCU IDE documentation.

The RTCU AX9i eco has been designed from the ground up for professional wireless industrial applications with its strong on-board I/O capabilities and multiple communication interfaces such as: 1-Wire, RS232 and USB. For world-wide usage in any network environment the RTCU AX9i eco offers a full quad-band GSM engine with a switchable dual antenna design supporting both an on-board as well as an external GSM antenna.

The RTCU AX9i eco is based on the X32 Execution Architecture offering high performance and a large memory capacity for both program and data - meeting the requirements of today's most demanding and sophisticated M2M/IoT applications.

The RTCU AX9i eco rests on the **RTCU M2M Platform** that brings all the necessary tools together to develop, implement and maintain today's sophisticated M2M/IoT applications.

The development task is supported by the **free RTCU IDE development environment** complimented by a large and comprehensive documentation and application example library.

The **RTCU Gateway 2** is the corner-stone of the communication infrastructure ensuring reliable two-way device communication in any network environment.

Deploying and maintaining new application and firmware versions for devices in the field are handled by the powerful **RTCU Deployment Server**.

For detailed information on the powerful RTCU M2M Platform, please refer to the *RTCU M2M Platform datasheet*.

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The technical highlights of the RTCU AX9i eco:

- ➢ Based on the **RTCU M2M Platform**[1]
- ➢ **X32 execution architecture**.
  - o RTCU IDE development tool with a full featured device simulator.
  - o Huge standard API with more than 800+ functions.
  - o Comprehensive protocol support, including:
    TCP-UDP/IP, FTP, SMTP, RACP, MQTT.
- ➢ World-wide **Quad-band GSM engine**.
- ➢ **Internal and external antenna** connector. Selectable from application.
- ➢ Internal SIM-card reader.
- ➢ **Digitized audio** can be played over GSM.
- ➢ **DTMF** support for implementation of Interactive Voice Response applications.
- ➢ Large data-flash/logger memory with a capacity **of 4.5 MB**.
- ➢ Internal **4 MB FAT32 flash drive**.
- ➢ **1 x RS232** channel.
- ➢ **2 x analog inputs** with 0..10 volt / 0..20 mA with **12 bit precision**.
- ➢ **5 x digital** inputs and **4 x high-power relays**.
- ➢ Up to 4 digital inputs can be configured as IEC62053-31 Class A compliant.
- ➢ **1-Wire bus** for accessories such as ID-button reader, temperature sensors, etc.
- ➢ Wide AC/DC power operating range from **85..265VAC / 8..36 VDC**.
- ➢ On-board **Li-Ion battery**.
- ➢ Advanced **power-management** with wake-up on a wide range of events.
- ➢ High-speed **USB programming** connector.
- ➢ Housed in a **ruggedized plastic** encapsulation with cable glands.
- ➢ **IP65** water protected for outdoor usage.
- ➢ Fully supported by the **RTCU Gateway 2** and the **RTCU Deployment Server**.

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1 Please see "The **RTCU M2M Platform**" data sheet for more information.

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Graphical view

On the front of the RTCU AX9i eco are four user controlled LED's and three system LED's for simple information and status.
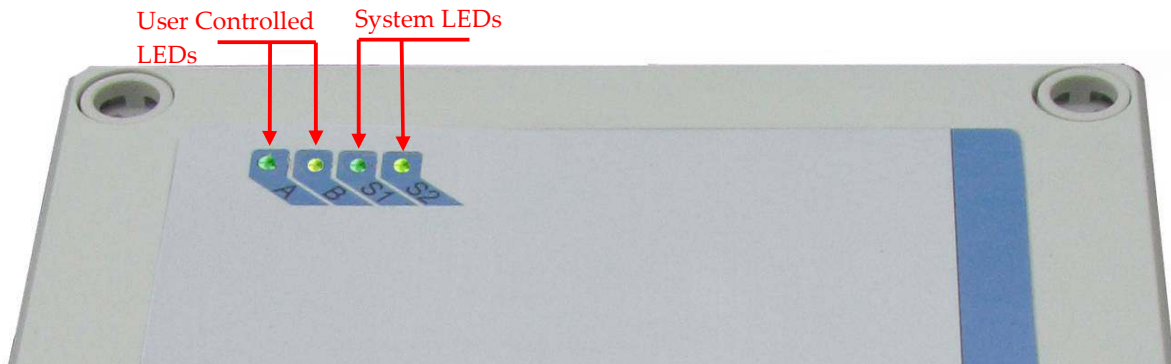
The external GSM antenna connector is located at the side of the device as shown below:

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Connection 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 using the PG glands and thereby maintaining the IP-67 protection.

The RTCU AX9i eco is delivered with three PG11 glands and additional two PG9 blind plugs that can be replaced with PG9 glands if additional cable entry capacity should be required.
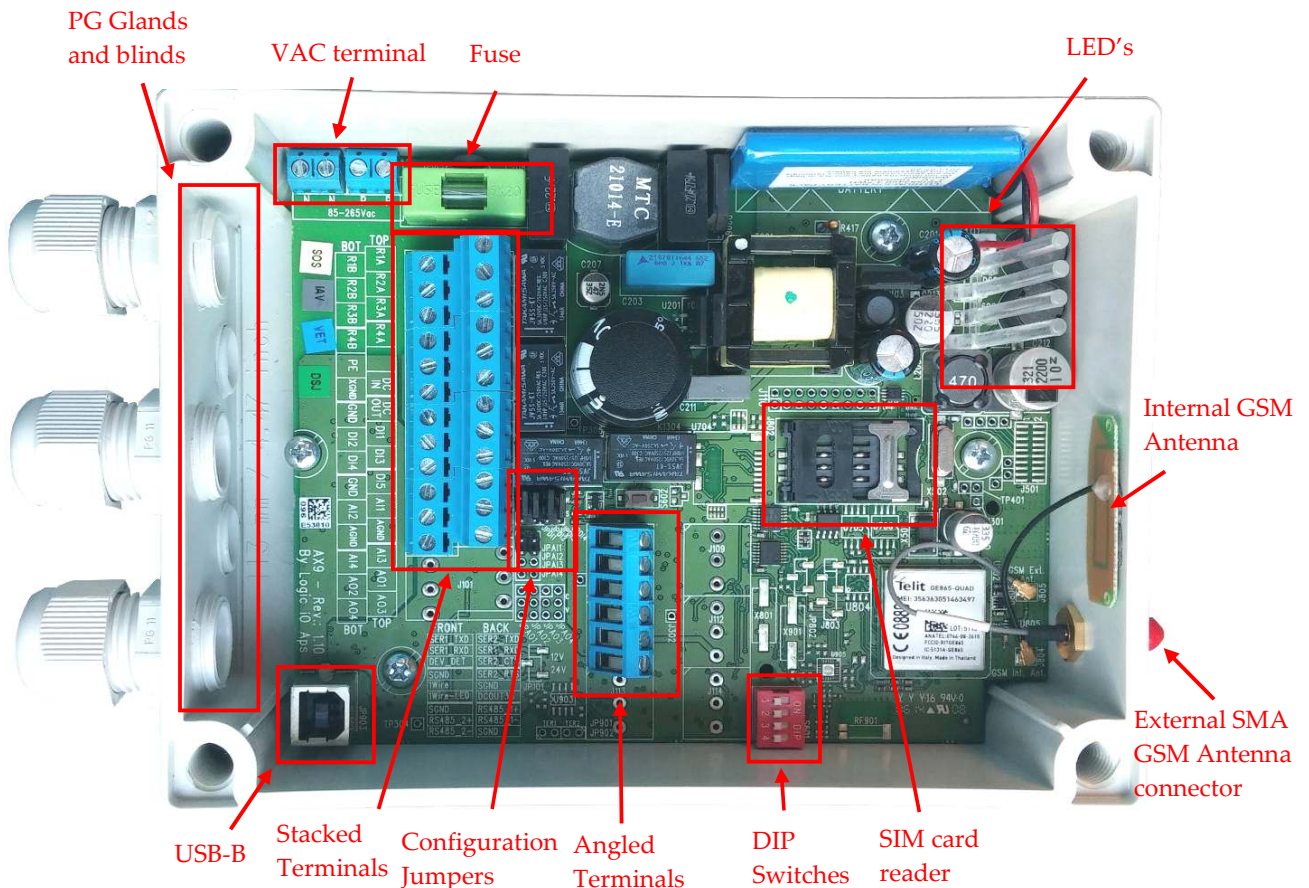
The stacked terminals contain connections for: digital inputs/outputs, analog inputs and DC power input.

The angled terminals contain connections for the communication interfaces: RS232 Port 1 and 1-Wire.

Also located inside the RTCU AX9i eco are the SIM card reader, DIP switches and a USB-B high-speed programming connector.

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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
	PE	Protective Earth terminal for AC supply.
DCIN		DC power supply, positive (+) connection
	XGND	DC power ground, negative (-) connection
DCOUT12		*Internally not connected*
	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 (*ignition*) input
	GND	Signal ground
AI1		Analog input 1
	AI2	Analog input 2
AGND		Analog ground
	AGND	Analog ground

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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
DEV_DET	Reserved for accessories.
SGND	Signal ground
1Wire	1-Wire bus for ID-Button / Temperature sensor
1Wire-LED	1-Wire ID-Button LED output

VAC terminal overview

Terminal Name	Description
N	85-265VAC (50/60Hz) **N**ull input
N	*(internally connected)*
P	85-265VAC (50/60Hz) **P**hase input
P	*(internally connected)*

USB-B connector

This is a standard USB-B connector and is used for communicating with the RTCU IDE (or other RACP compliant application).

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Power supply

The RTCU AX9i eco unit can be supplied with either 85-265VAC (50/60Hz) or 8-36VDC or both supply types simultaneously.

The RTCU AX9i eco also contains an internal low capacity backup battery, which will supply the RTCU if the external power should fail or be disconnected. By default the RTCU AX9i eco is powered down when a power fail occur. This setting however can be changed. Please consult the RTCU-IDE on-line help for more information.

When the wakeup/ignition input is activated with a logical high, the RTCU AX9i eco unit will wake up if it was in power down mode.

There are five different ground labels: External Ground (XGND), Signal Ground (SGND), Digital Ground (GND), Analog Ground (AGND) and AC power ground (PE). The signal, digital and analog grounds are filtered from the power ground. The signal, digital and analog grounds are filtered from the power ground. External ground must only be used as DC power supply return path. The digital ground is used as ground reference for digital I/O's, signal ground is used as ground reference for serial interfaces, and the analog ground is used as a low noise analog ground reference for the analog inputs.

Dual Supply Note:
The RTCU AX9i eco unit can be supplied with both VAC and VDC at the same time. The unit will run on the VAC supply if the VDC supply voltage is < +16VDC. If the VDC supply voltage is higher it will run on the VDC supply.

Please refer to the RTCU on-line help for information on how to check the supply type from within an application.

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DC Supply

The RTCU AX9i eco unit 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 AX9i eco is protected against wrong polarity. If a system ground are connected to either SGND or AGND a wrong polarity on the supply lines will destroy the internal GND connection.

Please Note:
Minimum 16VDC supply is necessary for digital inputs 1-4 to work as S0 compliant inputs.

VDC Supply terminals

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

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AC Supply

The RTCU AX9i eco unit can be supplied with 85-265VAC (50/60Hz) from a standard wall plug or any other high-voltage VAC power rail. The AC supply of the RTCU AX9i eco is a high-efficient switch mode power supply and the AC input is protected with a 1A/250V Fast Acting fuse.

The AC must be applied between the **N** and **P** on the separate located screw terminals. A Protective Earth (**PE**) connection exists on the bottom row of the stacked terminals.
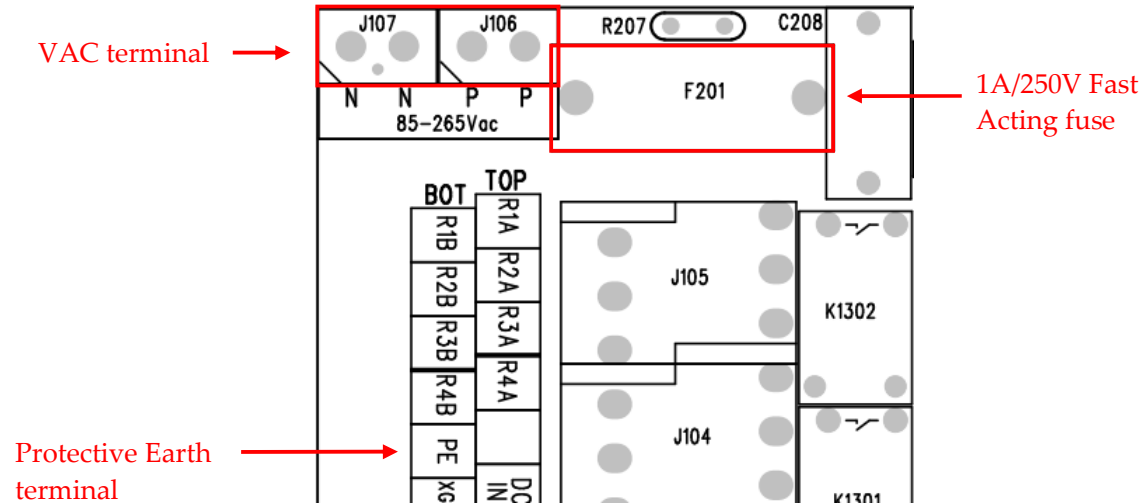
VAC Supply terminals

Terminal Name	Description
N	85-265VAC (50/60Hz) **N**ull input
N	*(internally connected)*
P	85-265VAC (50/60Hz) **P**hase input
P	*(internally connected)*
PE	Protective Earth connector

Please Note:
The two pairs of **N** and **P** terminals are internally connected.

There is high voltage on certain areas of the PCB (Printed Circuit Board) when supplied with AC mains. There is risk of electrical hazard, avoid touching the PCB and the 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.

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Please Note:

The DC ground of the AX9 series is isolated from the AC ground because of the nature of AC-to-DC converting. As these two grounds are not tied together anywhere in the AX9, the DC ground may appear as "floating ground" to the outside if the AX9 ground is not connected to the same reference as the outside, and a potential difference may occur. This difference can interrupt the behavior of the unit, and in worst case can damage the part of the unit. This must be taken in consideration when the AX9 series are supplied with AC supply. When the AX9 is supplied with DC voltage this "potential difference" issue may not be observed, as the DC power supply has usually the same potential as the rest of the system.

In order to avoid the potential difference the **Earth** connection on the AC supply rail can be connected to the terminal that has been labeled "**PE**".

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

In other situations where a common reference needed the best EMI performance and ESD immunity can be achieved connecting the DC ground and Earth ground with a low-inductance connection.

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Digital I/O

The RTCU AX9i eco unit has five digital inputs and four normally-open relay outputs. The outputs are high performance relays with good current handling capabilities.

Digital input 1-4 offers several operation modes. Please refer to the digital input section for additional information.

Relay outputs

The digital outputs control four relays and they act like a normally-open contact, where one side must be connected to a source that needs switching 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 specification page.

There are no internal connections to the relay outputs and therefore a source must always be connected to one of the relay terminals for the output to work. If power is removed or a power-fail occurs on the RTCU AX9i eco will switch to normally-open.

The RTCU AX9i eco unit offers a very advanced power management, which makes it possible to have one or more outputs enabled while the RTCU is in low power mode. Please consult the RTCU IDE on-line help for more information.

Relay output terminals

Terminal Name	Description
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	

Load Noise

If highly inductive loads (such as high power contactors) are connected to the relays it is recommended to externally connect a clamping diode in parallel with each inductive DC load or connect an RC snubber circuit in parallel with each inductive AC load.

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

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Digital inputs / S0 inputs / wakeup (*ignition*) input

The five digital inputs are all low-pass filtered (*450kHz*) and transient-protected. To activate the inputs, connect a positive voltage between the corresponding input (DINx) and SGND.

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

As default the digital inputs are configured as normal inputs. For placement and configuration of the hardware jumpers inside the unit, please refer to the configuration guide in Appendix A.

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

In S0 configuration the relevant RTCU AX9i eco input will act as a 'pulse input device', and a current is supplied into the input connector so that a simple switch between SGND and the appropriate input will activate it. This is used in most electricity metering equipment.

Please note: The RTCU AX9i eco unit must be supplied with a minimum of 16 VDC or AC power for the S0 mode to work correctly.
S0 is enabled by default and may be disabled by the application to save power.

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Wakeup (*ignition*) input

The DIN5 / wakeup (*ignition*) input is a special input in that it also functions as the wakeup input. If the input is activated with a logical high or low (Wait For Event mode only) when the RTCU AX9i eco is in low-power mode it will wake-up the unit. A power apply will also wake the unit up if it is in power-down mode or in Wait For Event mode with power Apply and/or ignition selected for wakeup. The input is de-bounced with a period between 1-2 ms when used as a digital input. So any logical level applied to this input must be greater than 2 ms to be valid.

The power management allows for the possibility of configuring a wakeup on one or more digital inputs with individually configured falling- or rising edge detection. Please consult the RTCU IDE on-line help for more information.

Digital input terminals

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

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

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Analog input

The RTCU AX9i eco unit has two analog inputs which can be configured individually to work either as voltage or current measurement inputs by using the configuration jumper. The range in voltage mode is 0-10VDC and in current mode it is 0-20mA.
The conversion resolution is 12 bit.

By default the analog inputs are configured as voltage inputs, and are converted to a digital value with a resolution of 10-bit 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 IDE for further details.

The input signal is connected between AINx 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.

Analog input terminals

Terminal Name	Description	Jumper Setting
AI1	Analog input 1 – Voltage	JPAI1 not installed (*default*)
	Analog input 1 – Current	JPAI1 installed
AI2	Analog input 2 – Voltage	JPAI2 not installed (*default*)
	Analog input 2 – Current	JPAI2 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
Resolution	-	-	12	Bit	low-pass filtered
Precision	-1.5	-	1.5	%FSR	Precision is based on
Cut-off frequency	-	4.5	-	kHz	measurements @ 25 ˚C
Input impedance	-	40	-	kΩ	

Specification for each analog input (current mode)

	Min.	Typ.	Max.	Unit	
	0	-	20	mA	Protected against transients and
Resolution	-	-	12	Bit	low-pass filtered
Precision	-1.5	-	1.5	%FSR	Precision is based on
Cut-off frequency	-	4.5	-	kHz	measurements @ 25 ˚C
Input impedance	-	504	-	Ω	

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

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USB programming port

The USB port is for programming and communicating with the RTCU IDE (or other RACP compliant application). A standard USB cable can be used between the unit and the PC.

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

One general purpose RS232 ports available on the RTCU AX9i eco unit. The serial input is compliant with the EIA/TIA-232 standard.

RS232 port 1

This port is a general-purpose RS232 serial port and does not support handshaking.
The signals are available on 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

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1-Wire bus

The 1-Wire bus is available on the angled front row terminals. All 1-Wire communication goes through a single connection, and all 1-Wire devices connected to this connection retrieves its power directly from the bus (called parasitic power). For this only two wires are needed – the 1-wire signal and the ground reference – allowing minimal cable installations.

For 1-Wire ID-Button readers, which include a built-in LED, a dedicated output is available for this purpose. Please consult the RTCU IDE documentation for further information.

For further information regarding 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

LED Indicators

Three bi-colored (red and green) and a single yellow LED indicators are present on the front of the unit (see graphical view section).

Two bi-colored LED's (A and B) are available to the user and the remaining two LED's (S1 and S2) are indicating the status and possible errors of the RTCU unit.

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 LED's to obtain a third color: yellow. Please consult the RTCU IDE documentation for more information.

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System LED S1 and S2

The RTCU is equipped with two system LED's which shows the status and possible errors of the RTCU unit.

The different patterns are listed in the table below. If the color of the system LED S1 is yellow, the unit is actively communicating with the RTCU IDE (or another program, supporting the RTCU RACP protocol).

The single yellow LED is signaling either the GSM module activity, or if all other LED's 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 unit is initializing, preparing to start the application.
Fast blinking, green[2]	The unit has been forced into recovery mode with the use of the system switch. The application is not executing.
500ms On / 500ms Off green[2]	The unit is executing the application program
1.5s On / 0.5s Off. green[2]	The unit is executing the application program, while charging the internal back-up battery.
Fast blinking, red[2]	A runtime error has been detected in the program. Use the RTCU IDE to obtain the fault log.
Alternating Fast/Slow, red[2]	The unit has lost its firmware! This can only happen if, during a firmware upgrade, the RTCU unit loses power or the communication is lost completely. In this case, simply upload the firmware to the unit again.
75ms On / 925ms Off, green	Execution speed is different from full-speed.

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

Pattern	Operating Status
Off	The GSM module is turned off
600 ms On / 600 ms Off	Missing SIM card or PIN code. Network search and logon in progress.
75 ms On / 3 s Off	Logged on to the network.
75 ms On / 75 ms Off / 75 ms On / 3 s OFF	A GPRS session is active.
Flashing	Indicates GPRS data transfer.
On	A voice or CSD session is active.
8 s OFF / 10 ms ON (and all other LED's OFF)	The RTCU unit is in low-power "Wait For Event" state.

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2 Or yellow when communicating with the RTCU IDE or another program, supporting the RTCU RACP protocol).

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Switches

DIP-Switch

The RTCU AX9i eco unit contains four dipswitches, where three of them are available for the application to use (*fourth dipswitch is reserved for GSM antenna switching.*) The dipswitches are located inside the unit (*see drawing below or graphical view*)

System switch (RST)

The RTCU AX9i eco unit contains a combined reset/diagnostic switch. This switch is accessible from the inside of the unit (*see drawing below or graphical view*) It's necessary to use a small object, for example the tip of a pencil.

By activating the switch shortly the RTCU unit will do a complete reset, as if the power was removed and reapplied.

If the reset switch is held down for approx. 3 seconds[3] the unit will enter recovery mode[4] where the application will not be started. In recovery mode the system will automatically turn on the GSM module to establish a connection to the GSM network and RTCU Gateway (if configured). This method will also activate the unit when the unit is in power-down mode.

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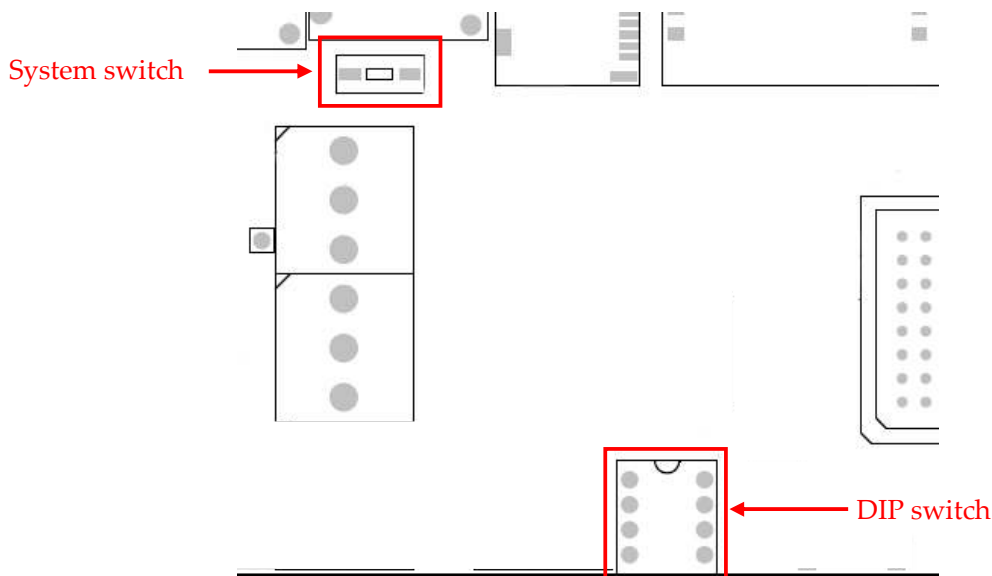
3 System LED S2 will flash three times when this state is entered.

4 System LED S1 will indicates this state by fast blinking green or yellow.

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Internal Li-Ion battery

The RTCU contains an internal Li-Ion battery for operation even when the external power is absent making it possible to report power loss etc. Please note that when external power is removed, the unit will be powered down by default. This setting can be changed as documented in the RTCU IDE documentation.

The relay outputs will be disabled when a power fail occurs as the internal battery cannot provide the supply voltage needed.

The battery charging is completely automated and handled internally by the RTCU unit – leaving no need for user interaction. Different kinds of functions (Battery low, Charger enable, Charging status, etc.) are available to the user application.

The charge current is relatively high, for a shorter charge time, as specified in the technical specification. Make sure both power supply and cables can handle the high current.

The battery will be charged whenever a power fail has occurred to establish the capacity thus making the battery ready for the next power fail. A maintenance charge will start every 20 days after the last charge. This is to compensate for the battery self-discharge etc.

By default the battery cannot be charged above 45°C or below 0°C. The RTCU offers charging down to -10 °C using a specialized algorithm to protect the battery.

If the temperature is above 45°C the charging will not start and will be postponed until it is below this threshold.

The temperature has a very high influence on the battery capacity. At 0°C the capacity has dropped to 60% of the initial capacity and it falls dramatically at lower temperatures.

The battery cycle (numbers of charges and discharges) also influences the capacity. After 300 cycles the capacity has dropped to approximately 80% of the initial capacity.

Warning
Misusing the RTCU unit may cause the built-in battery security circuit to be damaged.
- *Do not place the RTCU unit in high temperature locations such as in direct sunlight or near engines. Using the RTCU unit in this environment may result in loss of battery performance and a shortened life expectancy.*
- *Do not expose the unit to water, salt water or allow the battery to get wet.*
- *Avoid strong impacts and shocks.*

For more information regarding the environmental limitations, see "Specifications for RTCU AX9i eco" below or consult the RTCU AX9i eco datasheet.

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GSM

For GSM and GPRS communication an industry leading QUAD band (850/900/1800/ 1900MHz) GSM module is used.
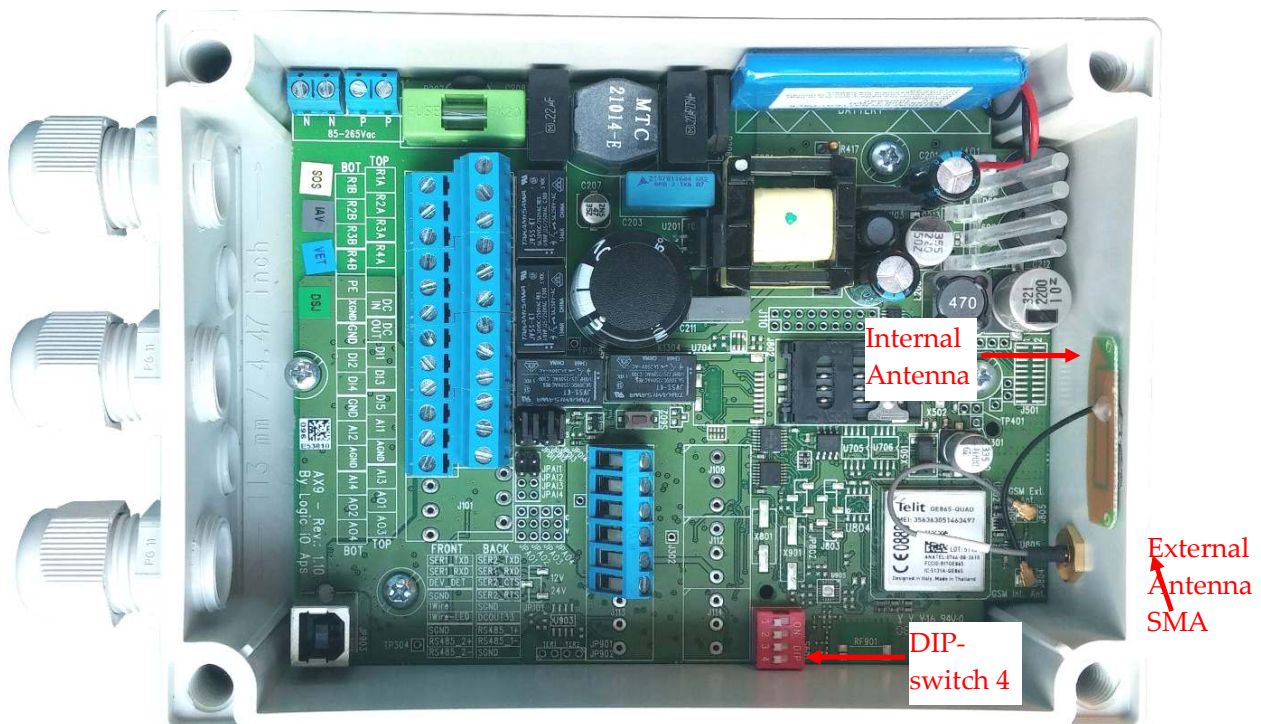
The RTCU AX9i eco supports:
- Digitized voice
- SMS (Text and PDU)
- GPRS Multislot class 10. Support for simultaneous Voice and GPRS (suspended)
- CSD (Datacall)

GSM Antenna

The RTCU AX9i eco offers support for both an on-board internal GSM antenna and a user supplied external antenna connected to the SMA female connector at the top of the encapsulation.

The active antenna can be selected by the application using the **gsmSetAntennaMode** function or alternatively with a DIP switch. By default when the unit is delivered the active antenna can be selected by DIP switch 4 and is set for external antenna.

Location of the internal/external GSM antenna and the DIP-switch 4:

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GSM antenna selection

gsmAntennaMode	DIP-switch 4	GSM Antenna
1	Ignored	Internal antenna
2	Ignored	External antenna
3	On	Internal antenna
	Off	External antenna

Please refer to the RTCU IDE online help for further information on **gsmSetAntennaMode**.

When installing the RTCU AX9i eco please make sure that the antenna is not in close proximity of metallic parts or anything else that can influence the efficiency of the GSM antenna.

SIM-Card

The RTCU AX9i eco unit contains a standard SIM card reader which is located inside the unit (*see graphical view*) and is easily accessed. The SIM card reader is lid based with a mechanical lock system for secure installation of the SIM card. Please refer to Appendix B for SIM card installation guide.

Barcode / unit type

The barcode label found on the RTCU AX9i eco unit contains the serial number.
The first three digits in the serial-number identify the unit type, as follows:

- **268:** RTCU AX9i eco

The barcode format used: 2/5 Interleaved with Check Digit

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Power consumption

Detailed information on the maximum power consumption of the RTCU AX9i eco unit in different states and different supply types is listed below.

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

External DC supply

When the RTCU AX9i eco unit is powered from an external DC power source the power consumptions will be as follows.

Maximum power consumption

	8V	12V	30V		
Unit active	65	50	20	mA	
Unit active with GSM on*	80	60	25	mA	GSM idle @ -67dBm*
Unit active RF sending	65	55	20	mA	
Unit active while charging	870	530	290	mA	
Unit in power-down	1.3	0.8	0.4	mA	Restart on DIN5, RTC
Unit in "wait for event"	1.3	0.8	0.4	mA	Resume on DIN, RTC
Unit in "wait for event"	10	6	3	mA	Resume on RS232
Unit in "wait for event"	26	20	8	mA	Resume on GSM activity

Internal battery

If the external power source is removed and the internal battery is enabled the power consumption from the battery will be as listed below.

Maximum power consumption

	BAT		
Unit active	85	mA	
Unit active with GSM on*	105	mA	GSM idle @ -67dBm*
Unit in power-down	1.5	mA	Restart on DIN5, RTC
Unit in "wait for event"	1.5	mA	Resume on DIN, RTC
Unit in "wait for event"	12	mA	Resume on RS232
Unit in "wait for event"	35	mA	Resume on GSM activity

Note: Power consumption from a fully charged battery.

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External AC supply

When the RTCU AX9i eco unit is powered from an external AC the power consumptions will be as follows:

Maximum power consumption

	220VAC		
Unit active	8	VA	
Unit active with GSM on*	8.5	VA	GSM idle @ -67dBm*
Unit active RF sending	8.3	VA	
Unit active while charging	17.2	VA	
Unit in power-down	6.6	VA	Restart on DIN5, RTC
Unit in "wait for event"	6.6	VA	Resume on DIN, RTC
Unit in "wait for event"	7	VA	Resume on RS232
Unit in "wait for event"	7	VA	Resume on GSM activity

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Appendix A – Unit configuration guide

The RTCU AX9i eco has many features and some of them require configuration by using hardware jumpers inside the unit. A brief overview over the jumper settings can be found on the following table:

Feature	Jumper	State	Default state
Analog input	JPAI1	Installed	AI1 current measurement
		Not installed	AI1 voltage measurement (*default*)
	JPAI2	Installed	AI2 current measurement
		Not installed	AI2 voltage measurement (*default*)
Digital input	JPDI1	Position S	DI1 S0
		Position N	DI1 normal (*default*)
	JPDI2	Position S	DI2 S0
		Position N	DI2 normal (*default*)
	JPDI3	Position S	DI3 S0
		Position N	DI3 normal (*default*)
	JPDI4	Position S	DI4 S0
		Position N	DI4 normal (*default*)

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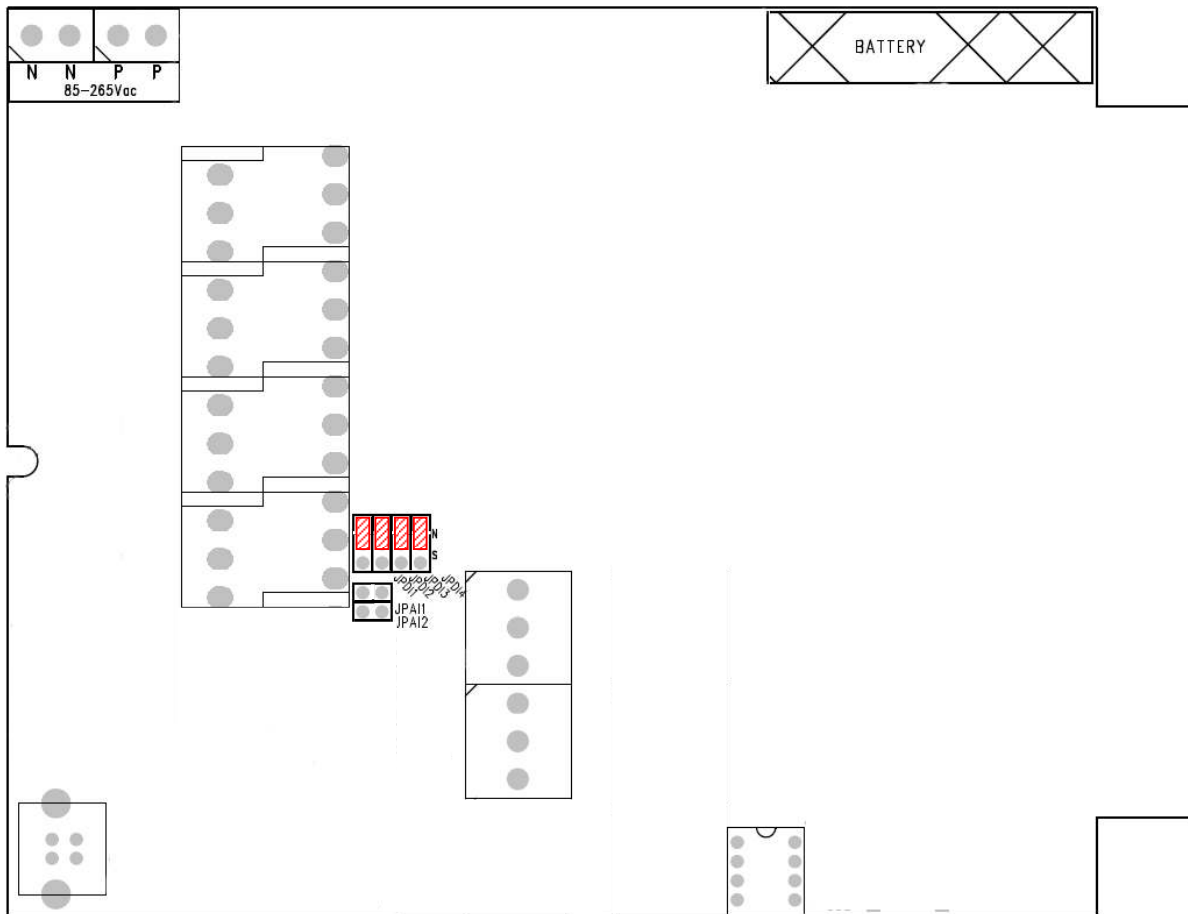Denmark   www.logicio.com

JPAI1 and **JPAI2**

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 0-20mA.

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**" the input is a normal digital input.

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

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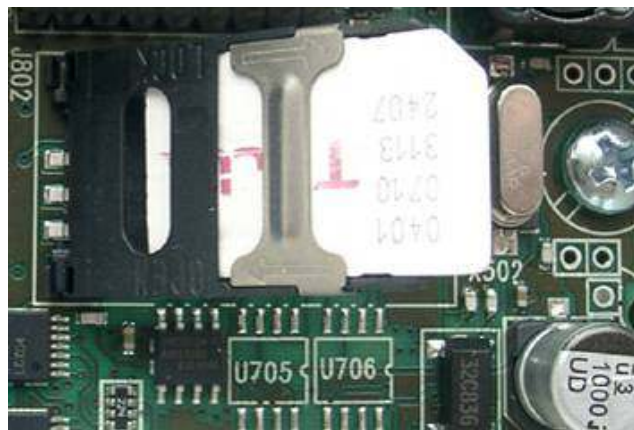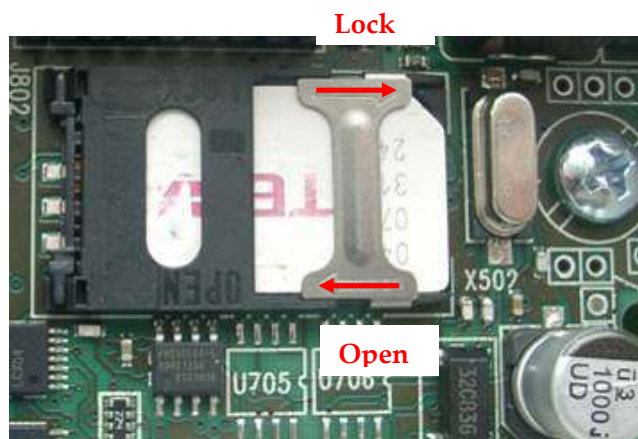
Appendix B – Installing the SIM card

The SIM card reader is a lid based type with a mechanical lock for secure installation of the SIM card.

Open the hinged lid of the SIM card reader, orientate the card as showed below, and insert it into the lid of the card reader. Close the lid, and slide the metal locking mechanism to the locked position as shown with an 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 with an arrow and text on the lid, and open the lid. The SIM card can now be removed.

SIM card orientation.

SIM inserted and locked

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RTCU AX9i eco Specifications

Processor and Main-memory
- Powerful 32-bit ST ARM7 processor.
- 1088 KB fast execution RAM.
- 2304 KB Flash for firmware/application.

Storage
- 3.5 MB persistent data flash.
- 4 MB internal FAT32 flash drive.
- 1 MB circular automatic datalogger.
- 8 KB FRAM with fast access / unlimited write endurance.

GSM
- Quad-band GSM engine. 850/900/1800/1900 MHz.
- GPRS Class B, Multislot 10.
- CSD with up to 19 Kbps.
- SMS / PDU.
- DTMF decoding / transmission.
- Digitized voice playback / IVR.
- Micro-SIM 1.8/3 volt.
- Internal SIM card-reader.
- Internal quad-band GSM antenna.
- External or internal antenna selectable by DIP-switch or user application.
- Optional Gemalto SIM-on-chip.

User Interaction
- 3 x bi-colour LED.
- Yellow status LED.
- DIP-switches.
- Reset/recovery switch.
- Antenna selection dip-switch.
- Configuration jumpers.
- USB-B for service port.

Electrical Specification.
- Supply operating range:
  8 to 36 VDC.
  85 to 265 VAC.
- Short and reverse power protected.

Battery and Charger
- On-board 1Ah (nominal) Li-Ion battery.
- Intelligent charger with temperature throttle and sub-zero degrees support.

Digital/Analog Interface
- 4 x relay output.
  Max. 5A @ 250VAC / 30 VDC
- 5 x digital inputs.
  Logic high: 6 to 40 VDC.
  Logic low: -5 to 3 VDC.
- 4 x IEC62053-31 Class A input.
- Digital input #5 can be used as ignition.
- 2 x analog inputs.
  Range is 0..10VDC or 0..20 mA
  Resolution: 12 bit
  Precision: ±1.5% FSR @ 25°C
- Protected against transients and low-pass filtered.

Communication
- 1 x RS232.
- 1-Wire bus.

Power Management
- 5 execution speeds.
- Wait for Event: Timer, Digital input, RS232, GSM, power change state.
- Wait for event, from: 600 uA@12V.
- Supervision of supply voltage / type.

Internal Interfaces.
- Screw-terminals for: Power and I/O.
- Angled screw-terminals for: RS232 and 1-Wire.

External Interfaces.
- SMA Female connector for external GSM antenna.
- 3 x PG11 cable glands.
- 2 x PG9 blind plugs.

Physical Characteristics
- Encapsulation: Durable Polycarbonate plastic.
- Approx. 640 gram without accessories.
- W 130 x H 180 x D 60 mm. (wihout SMA and PG connectors.

Environmental Specification
- Operating temperature: -30 to 60°C.
- Battery charge temperature: -10 to 45 °C
- Recommended storage temperature: 0 to 45°C.
- Humidity: 5..90% (non condensing).
- Ingress Protection: IP65.

Approvals
- CE. EU EMC directive 2004/108/EU.
- Applied R&TTE directive.
- GSM engine: CE/GCF/FCC/PTCRB.

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

Technical data are subject to changes.

* * * * END OF DOCUMENT * * * *

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