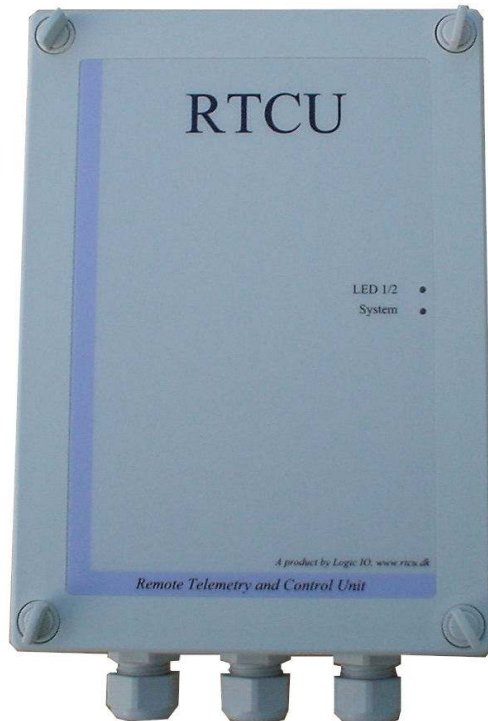




# Technical Manual for RTCU-A9i

Version 2.06





## Introduction

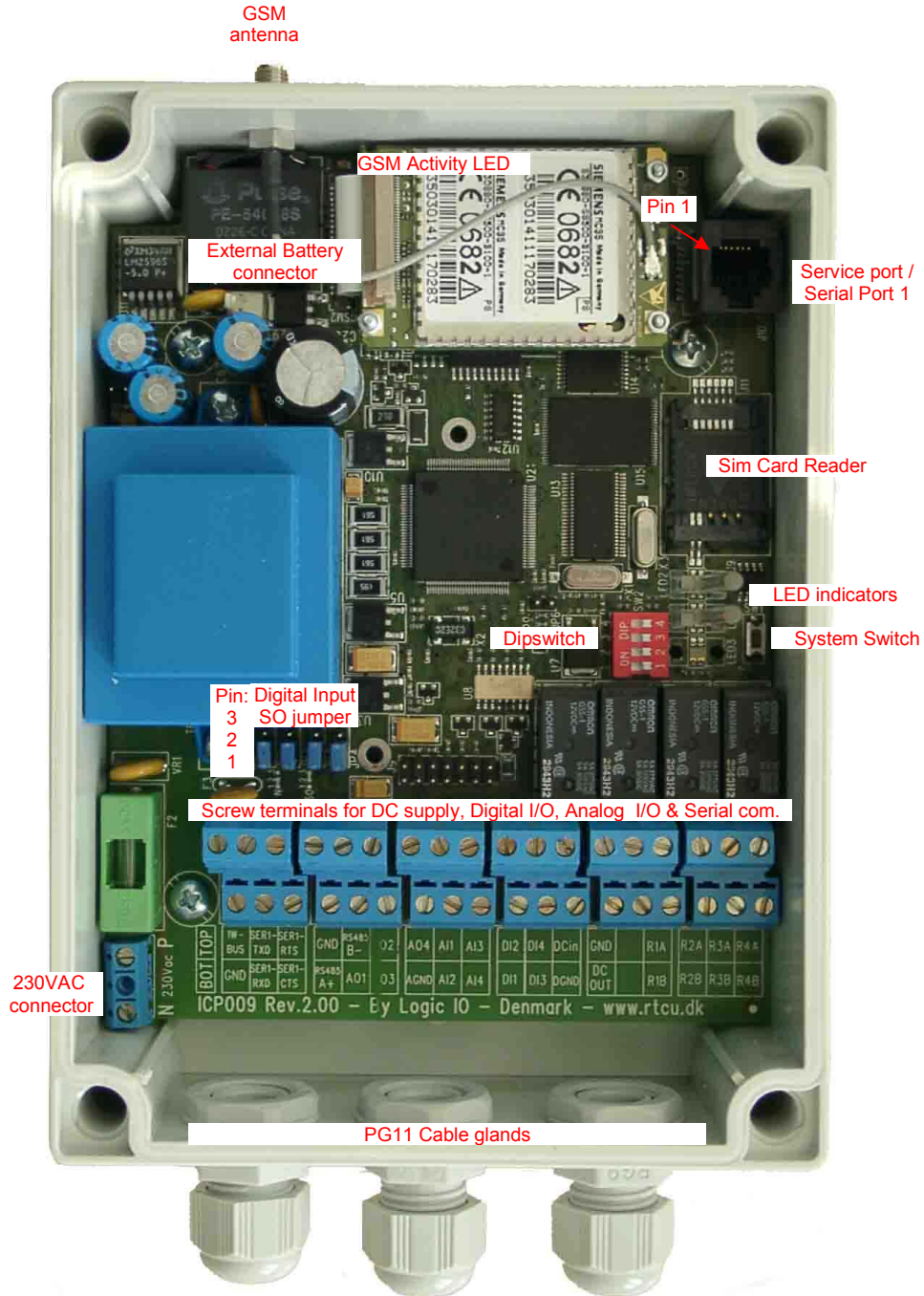
The RTCU-A9i offers an impressive list of features and possibilities. The product is a unique combination of a powerful Programmable Logic Controller (PLC) and a GSM phone tightly connected in a single easy programmable unit. The RTCU-A9i product provides the user-friendly answer to your remote monitoring, remote control, surveillance and data logging needs.

This manual contains technical documentation allowing easy installation and use of the unit. For programming information please consult the RTCU Programming Documentation and/or the RTCU IDE Online help

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### Graphical view



## External connections

All connections to external equipment (except the GSM antenna) is done using screw terminals, located at the bottom of the unit, see picture below:



### Power supply

The RTCU-A9i unit can be supplied either by 230VAC 50Hz or via 18..26 VDC. Depending on the power source used, the connections are as follows:

#### 230 VAC Supply:

The 230VAC supply is connected to the P and N terminals on the unit (These are found to the left on the unit, in a separate block, with the "230 VAC" listed in front of them).

Terminal	Description
N	Neutral connection for 230 VAC
P	Phase connection for 230 VAC

#### 18..26 VDC Supply:

The 18..26 VDC supply is connected to the DCin and GND terminals on the unit (These are found approximately in the middle of the right block of terminals, upper row).

Optionally the RTCU-A9i can be operated at 12V DC but IEC 62053-31-A, battery charger and the 12V DC output is not supported at this voltage.

A 12 V output from built-in power supply is available on the screw terminals. The maximum output current is 100 mA. Note the 12V output is not guaranteed when the RTCU-A9i unit is operated below 18V supply voltage.

Terminal	Description
Dcin	Positive (+) connection from DC power supply
GND	Negative (-) connection from DC power supply
DCOut	12V DC for external equipment, maximum current draw is 100 mA !

*Multiple power sources - Please notice:*

*It is not recommended to have the two power sources connected to the RTCU-A9i unit at the same time. This will lead to possible damage to the electrical circuit of the RTCU-A9i unit and/or the connected power sources. If it is necessary to have two power sources connected at the same time, a Logic IO dual power sources connector must be used.*

*Powerdown power save feature – Please notice:*

*If the RTCU has been powered down with the powerdown function and external power is removed the unit will not be able to wake-up before the powerdown time has elapsed. Even a power cycle (remove and re-apply) will not make the RTCU operational. The only recovery method is to temporarily install a jumper on JP5.*



**Battery operation / Battery charger:**

It is possible to connect a rechargeable battery at connector J2 (see graphical view) for battery operation.

The RTCU-A9i unit contains a battery charger and a battery voltage measurement circuit, which is controlled from the VPL program. Please consult the RTCU-IDE documentation for details on the battery charger- and battery voltage measurement functions.

The battery charger charges with a constant current of 47mA. There must be a minimum voltage difference of approximately 4V between the battery voltage and supply voltage in order to charge the battery. Be aware that all operations are controlled manually from the VPL program and there is NOT implemented any overcharge protection. For more information on battery charging techniques contact Logic IO or your rechargeable battery supplier.

Terminal	Description
1	Positive (+) connection from battery
2	Negative (-) connection from battery



**Analog Inputs**

The analog inputs are all voltage inputs with a range from 0V to 5V DC. The input signal is connected between AI<sub>n</sub> and AGND. AGND must be connected to the reference of the connected equipment.

Terminal	Description
AI1	Analog input number 1
AI2	Analog input number 2
AI3	Analog input number 3
AI4	Analog input number 4
AGND	Analog ground

**Analog Outputs**

Like the analog inputs, the analog outputs supports a voltage range of 0V to 5V DC. The output signal is taken from AO<sub>n</sub> and AGND. AGND must be connected to the reference of the connected equipment.

Terminal	Description
AO1	Analog output number 1
AO2	Analog output number 2
AO3	Analog output number 3
AO4	Analog output number 4
AGND	Analog ground

**Digital Inputs**

The digital inputs are isolated from the RTCU with optocouplers and they are also low-pass filtered and transient protected. Using the jumpers located at each input, it is possible to configure each input as a normal input, or as a S0-A (jumper installed at position 2+3) compatible input (S0 configurations supply a current to the input connector, so that a simple switch between GND and the input will activate it). If configured as normal inputs (jumper installed at position 1+2), connect a positive voltage between the input and DGND connector.

Terminal	Description
DI1	Digital input number 1
DI2	Digital input number 2
DI3	Digital input number 3
DI4	Digital input number 4
DGND	Digital ground



**Digital outputs**

The digital output interfaces to the outside world via relay contacts. All outputs have a Normally Open contact set.

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

**Serial port 1 / Service port**

The connection to the service port/RS232 port, is done using the RJ11 connector in the upper right corner on the RTCU Unit (see graphical view)

This connector can be used as a general-purpose serial port, and as a programming connector. In order to use the connector as a programming connector, the RSDet pin (pin 6) must be connected to GND. When using this connector as a general-purpose serial port, the RSDet pin (pin number 6) must be left unconnected, or it can be tied to the VCC pin (recommended).

Serial port 1/service port, RJ11 6 pin connector:

Pin	Name	Description
1	VCC	+5V from RTCU. Normally unconnected.
2	TxD	RS232 Transmit data FROM RTCU
3	GND	Ground
4	RxD	RS232 Receive data TO RTCU
5	NC	Leave unconnected
6	RSDet	Programming cable detect, normally unconnected (if programming cable, connect to GND)



**Serial port 2 used as RS232 port**

This connector can be used as a general-purpose serial port. The serial port 2 can be used either as a RS232 port, or as a RS485 port, see “Serial port 2 used as RS485 port” below for details.

The RS232 signals (RXD, TXD, RTS, CTS and GND) are available at the screw terminals (see graphical view).

**Serial port 2 used as RS485 port**

The RS485 port is a multidrop port, with a maximum of 32 units connected simultaneously to the line. The RS485 connection contains the A (positive) and B (negative) signals, as well as a signal ground, which always needs to be connected to the common signal ground for all units connected to the RS485 bus! The RS485 port is shared with the Serial port 2, if the RS485 port is used, the RS232 interface cannot be used, and vice versa. The maximum cable length for the RS485 bus is approx 400 meters, however this limit can be influenced by the quality of the cable, signaling rate, noise etc.

The RS485 signals (RS485 A+, RS485 B- and GND) are available at the screw terminals (see graphical view).

**1-Wire bus**

A Maxim 1-wire bus signal is available. Please consult Logic IO for availability. The connections are made on the screw terminals.





### GSM Activity LED

The GSM Activity LED is placed to the right of the GSM Antenna connector on the PCB (see previous picture) and shows the current activity of the GSM module as follows:

LED mode	Operating Status
Off	The GSM module is turned off
600 ms On / 600 ms Off	No SIM card inserted or no PIN code entered, or network search in progress, or ongoing user authentication, or network logon in progress.
75 ms On / 3 s Off	Logged to the network. No call in progress.
75 ms On / 75 ms Off / 75 ms On / 3 s OFF	A GPRS session is active
Flashing	Indicates GPRS data transfer. When a GPRS transfer is in progress the LED goes on 1 second after data packets were exchanged. Flash duration is approx. 500 ms.
On	Depending on type of call: <i>Voice call:</i> Connected to remote party. <i>Data call:</i> Connected to remote party or exchange of parameters while setting up or disconnecting a call.



## Installing SIM card / connecting the GSM antenna

### SIM Card

The RTCU unit contains a standard SIM card reader. It is located to the right on the printed circuit board, just below the programming connector. The SIM card reader is opened by carefully pressing down on the lid of the reader, and at the same time, pressing the lid towards the screw terminals. It is then possible to open the SIM card reader, and insert your SIM card into it. Close the lid by pressing it down, while at the same time, pressing it towards the programming connector.

### GSM Antenna

The RTCU unit contains an SMA Female connector for connection of a suitable GSM Dual band antenna (900/1800 MHz). When installing the antenna, 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. Please consult the installation guide that follows the GSM antenna.

## Switches / Indicators

A status indicator is present on the front of the unit (see the graphical view). Different colors/blinking patterns are used to signal different types of errors/status change in the RTCU unit:

**Fastest blinking, green**  
**Fast blinking, green (or yellow)**

The unit is initializing, preparing to start the VPL program  
 The VPL program is not executing, stopped by the reset/diagnostic switch.

**Slow blinking, green (or yellow)**  
**Fast blinking, red (or yellow)**  
**Alternating Fast/Slow, red (or yellow)**

The unit is executing the VPL program  
 A runtime error has been detected in the program  
 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.



If the color of the status indicator is yellow, the unit is actively communicating with for example, the RTCU-IDE program (or another program, supporting the RTCU protocol, RACP).


The RTCU unit contains a combined reset/diagnostic switch. This switch is located just to the right of the two light pipes. When this switch is activated during reset of the unit (or power on), the VPL program/project uploaded to the unit will not be started. The status indicator indicates this. If the switch is activated for more than 3 seconds, the unit will reset (same as power on).

A two-colored (red/green) indicator is visible above the status indicator. This indicator can be controlled from within the VPL program in the unit. The green part is accessed as LED1 and the red part as LED2.

The RTCU unit contains a dipswitch. The dipswitch is located just to the left of the LED indicators (see the graphical view). To use the dipswitch in the RTCU-IDE declare a Boolean input variable, and define it as a dipswitch in the RTCU-IDE Job variable configuration dialog.



## Specifications

Analog inputs		Min	Typ	Max		Resolution is 10 bits. All inputs are protected against transients and lowpass filtered.
		0	-	+5	VDC	
Analog outputs		0	-	+5	VDC	Resolution is 10 bits. All outputs are protected against transients and lowpass filtered.
Digital inputs	Logic "High"	8	10	40	VDC	All inputs are protected against transients and lowpass filtered
	Logic "Low"	-5	-	5	VDC	
Digital outputs (Relay SPST)		-	-	5	A	@ 250 VAC
		0.0	-	5	A	@ 30 VDC
Operating Voltage DC		18	-	26	VDC	Protected against wrong polarity. Self healing fuse.
Restricted Operating Voltage DC		12			VDC	IEC 62053-31-A and battery charger is not supported at this voltage.
Mains voltage (instead of DC)			230		VAC	Fused
U* Act. + GSM off + DO*not set. U* Act. + GSM on + DO* not set. U* Act. + GSM on + DO* set U* DS* + GSM off + DO* not set Unit in PowerDown			80 90 210 70 0,3	350	mA mA mA mA mA	@ 24 VDC supply voltage  *U = Unit *DO = Digital Outputs *DS = Deep Sleep
Storage temperature		-40	-	+90	°C	External connections: • 3 PG11 cable glands for cable entry • SMA-Female for GSM antenna.
Operating temperature (According to GSM 11.10 specification)		-20	-	+55	°C	
Restricted operation (Deviations from the GSM specification may occur)		-29	-	+70	°C	
Humidity (non condensing)		5	-	90	%	
Weight		0.88			Kg	
External dimensions		W 130 x H 180 x D 60 mm				
Ingress Protection (IP)		IP67				
Approvals		EN-50081-1 Emission EN-61000-6-2 Immunity			Unit is CE Approved 	

Technical data subject to change