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Technical Manual for

RTCU M11 / M11G / M11GX

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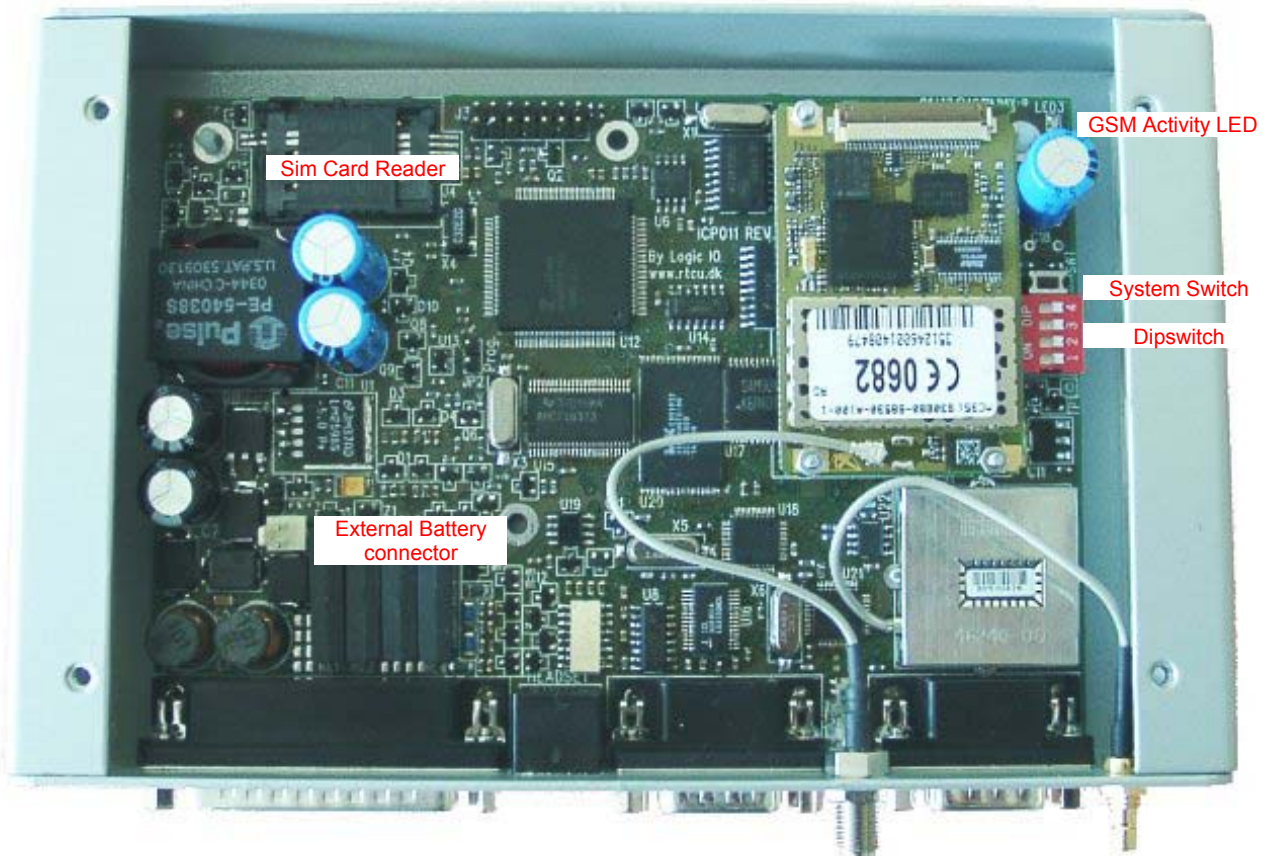
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Introduction

This manual contains technical documentation allowing easy installation and use of the RTCU M11 / M11G / M11GX unit. In the following text "RTCU M11" will refer to the RTCU M11, RTCU M11G and the RTCU M11GX. The only difference between the versions is that the RTCU M11G includes an on-board 8-channel GPS-receiver and the M11GX only has a single input (ignition input) and no outputs.

The RTCU M11 is another member of a growing range of sophisticated and advanced Remote Telemetry and Control Units (RTCU) all based on the same concept. The RTCU M11 extends the usage into the area of mobile tracking / locating applications by the inbuilt GPS-receiver. The RTCU M11 is also an exclusive member of the next-generation of RTCU units that has a full TCP/IP stack implemented to support communicating via. GPRS. For more information about these possibilities and the programming of the unit we ask you to please consult the RTCU Programming Documentation and/or the RTCU IDE Online help.

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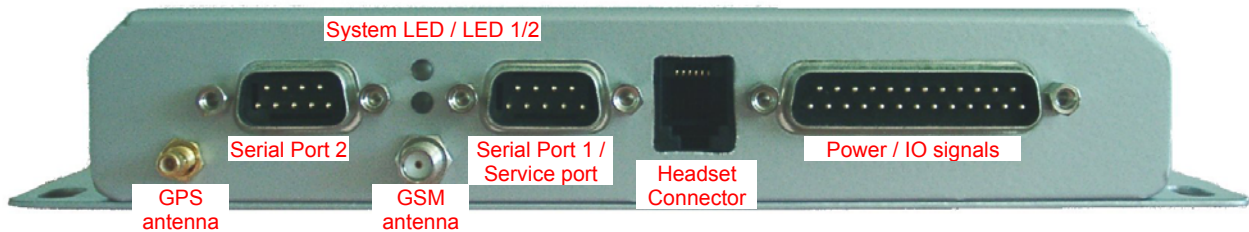
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External connections

Connections to external equipment are done via one 25-pin Male SUB-D connector, two 9-pin Male SUB-D connectors and a 6 pin RJ12 connector (for external Headset). Connection to Dual-band GSM antenna is via a SMA Female and connection to a 3V active GPS antenna is done via the SMB Female connector

All connectors are located at one side of the unit, see picture below:

Power supply

The RTCU-M11 unit is to be supplied with 8..36 VDC from an external DC power source connected to the Power / IO connector, or by the Logic IO battery pack connected to the external battery connector (see graphical view).

Power / IO connector, 25 pins Male connector:

Pin	Name	Description
1	SUPP	Power supply, positive (+) connection
2	SUPP	Power supply, positive (+) connection
14	GND	Power supply, ground (-) connection
15	GND	Power supply, ground (-) connection

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Headset connector

The RTCU-M11 unit has provisions for connecting a Headset to the built-in GSM modem.
Please consult the RTCU-IDE online manual, function gsmHeadset() for more information.

Headset connector, RJ12 connector:

Pin	Name	Description
1	GND	Ground
2	MICP	Microphone input, positive
3	MICN	Microphone input, negative
4	EPP	Loudspeaker output, positive
5	EPN	Loudspeaker output, negative
6	GND	Ground

Analog Inputs
The analog inputs are voltage inputs, with a range from 0V to 5V DC

The input signal is connected between AIn and GND. GND must be connected to the reference of the connected equipment.

Power/IO connector, 25 pin Male connector:

Pin	Name	Description
14	GND	Ground
15	GND	Ground
22	AI1	Analog input number 1
10	AI2	Analog input number 2
23	AI3	Analog input number 3
11	AI4	Analog input number 4

Digital Inputs / Ignition Input

The digital inputs are optically isolated (except the ignition input) from the rest of the RTCU with optocouplers (however, the RTCU shares the GND pin with the inputs) and they are also low-pass filtered and transient protected. To activate the inputs, connect a positive voltage between the input and GND connector. Please note that the DI5/IGN input is a special input. It will function as a "normal" digital input, however, it will also turn on the unit, if the unit is in Powerdown mode (see the PowerDown() function in the RTCU-IDE manual).

Power/IO connector, 25 pins Male connector:

Pin	Name	Description
3	DI1	Digital input number 1
16	DI2	Digital input number 2
4	DI3	Digital input number 3
17	DI4	Digital input number 4
9	DI5/IGN	Digital input number 5 / Ignition input
14	GND	Power supply, ground
15	GND	Power supply, ground

IMPORTANT NOTE:

Do NOT permanently connect Ignition input (DI5) to a positive voltage, so that it will be constantly activated. Doing this will prevent the unit from powering down using the PowerDown() call. In rare cases it can also occur that the GSM recovery mechanism in the RTCU firmware must initiate a power down to regain control. If the Ignition input is permanently activated this recovery power down is not possible and the unit will not be able to recover, which can inhibit the use of the GSM module.

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Digital outputs

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

Power/IO connector, 25 pin Male connector:

Pin	Name	Description
5	R1A	Contact set for relay output number 1
18	R1B	
6	R2A	Contact set for relay output number 2
19	R2B	
7	R3A	Contact set for relay output number 3
20	R3B	
8	R4A	Contact set for relay output number 4
21	R4B	

Serial port 1 / Programming connector

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.

Serial port 1/Programming connector, 9 pin Male connector:

Pin	Name	Description
1	NC	Leave unconnected
2	RxD	RS232 Receive data TO RTCU
3	TxD	RS232 Transmit data FROM RTCU
4	NC	Leave unconnected
5	GND	Ground
6	RSDET	Programming cable detect, normally unconnected (if programming cable, connect to GND)
7	1-Wire	1-Wire bus connection for ID-Button / Temperature sensor
8	NC	Leave unconnected
9	NC	Leave unconnected

Serial port 2 used as RS232 port

This connector can be used as a general-purpose serial port. The pin-out is the same as a standard PC serial COM port. The serial port 2 can be used either as a RS232 port, or as a RS485 port, see below.

Serial port 2, 9 pin Male connector:

Pin	Name	Description
1	DCD	Data Carrier Detect
2	RxD	Receive data
3	TxD	Transmit data
4	DTR	Data Terminal Ready
5	GND	Ground
6	DSR	Data Set Ready
7	RTS	Request To Send
8	CTS	Clear To Send
9	RI	Ring Indicator

Serial port 2 used as RS485 port

The RS485 port is a multidrop port, with maximum 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.

Power/IO connector, 25 pins Male connector:

Pin	Terminal	Description
12	RS485 A+	Positive wire for RS485 port
25	RS485 B-	Negative wire for RS485 port
13	GND	Ground for RS485 port

GSM Activity LED

The GSM Activity LED is placed in the upper right corner of 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: *Voice call*: Connected to remote party. *Data call:* Connected to remote party or exchange of parameters while setting up or disconnecting a call.

Installing SIM card / connecting the GSM and GPS antenna

SIM Card
The RTCU unit contains a standard SIM card reader. It is located in the upper left corner on the printed circuit board (please see the graphical view). 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.

GPS Antenna
The RTCU unit contains an SMB Female connector for connection of a suitable GPS antenna. The GPS antenna must be a 3V active GPS antenna mounted with a SMB Male connector.
When installing the antenna, please make sure that the antenna has a reasonable view of the sky so that it can receive the weak signals from the satellites. Please also consult the installation guide that follows the GPS antenna.

Switches / Indicators

A status indicator is present on 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	The unit is initializing, preparing to start the VPL program
Fast blinking, green (or yellow)	The VPL program is not executing, stopped by the reset/diagnostic switch.
Slow blinking green (or yellow)	The unit is executing the VPL program
Fast blinking, red (or yellow)	A runtime error has been detected in the program
Alternating Fast/Slow, red (or yellow)	The unit has lost its Firmware! This can only happen if, during a firmware upgrade, the RTCU Unit looses 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 GSM-Module (System switch). 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 right of the GSM-module (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.

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Specifications for the RTCU M11

Analog inputs		Min		Max		
		0	-	+5	VDC	Resolution is 10 bits. All inputs are protected against transients and lowpass filtered.

Digital inputs		Min	Typ	Max		
	Logic "High"	8	12	40	VDC	All inputs are protected against transients and lowpass filtered. All inputs are optically isolated
	Logic "Low"	-5	-	3	VDC	

Digital outputs (Relay)	Min		Max		
	-	-	30	Volt	Normally open contacts.
	-	-	1	Amp	

Power supply	Min	Typ	Max		
Operating Voltage	9	-	36	VDC	Protected against wrong polarity.
Unit Active with GSM off Unit in Sleep with GSM off Unit in Powerdown Unit Active with GSM on		80 36 0.28 95	 270	mA mA mA mA	At 12 VDC supply voltage.

Storage temperature	-40	-	+90	ºC	External connections: • SUB-D9M for RS232 port 1 (service-port) • SUB-D9M for RS232 port 2 (general) • SUB-D25M for power, digital, analog and RS485. • SMA-Female for GSM antenna. • RJ12 connector for headset
Operating temperature	-25	-	+55	ºC	
Restricted operation (deviations from the GSM specification may occur)	-29	-	+70	ºC	
Humidity (non condensing)	5	-	90	%	
Weight		0.5		Kg	
External dimensions	W* 170 x H 110 x D 31 mm				*W 202 with mounting flanges
Ingress Protection (IP)	IP54				Steel / Aluminum enclosure
Approvals	EN-50081-1 Emission EN-61000-6-2 Immunity				(E 1) 10R-024063 CE

Technical data subject to change

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Specifications for the RTCU M11G

Analog inputs		Min		Max		
		0	-	+5	VDC	Resolution is 10 bits. All inputs are protected against transients and lowpass filtered.

Digital inputs		Min	Typ	Max		
	Logic "High"	8	12	40	VDC	All inputs are protected against transients and lowpass filtered. All inputs are optically isolated
	Logic "Low"	-5	-	3	VDC	

Digital outputs (Relay)	Min		Max		
	-	-	30	Volt	Normally open contacts.
	-	-	1	Amp	

Power supply	Min	Typ	Max		
Operating Voltage	9	-	36	VDC	Protected against wrong polarity.
Unit Active with GSM/GPS off Unit in Sleep with GSM/GPS off Unit in Powerdown Unit Active with GSM on Unit Active with GPS on Unit Active with GSM/GPS on.		80 36 0.28 95 100 115	 270 290	mA mA mA mA mA mA	At 12 VDC supply voltage.

Storage temperature	-40	-	+90	ºC	External connections: • SUB-D9M for RS232 port 1 (service-port) • SUB-D9M for RS232 port 2 (general) • SUB-D25M for power, digital, analog and RS485. • SMA-Female for GSM antenna. • SMB-Male for active (3V) GPS antenna. • RJ12 connector for headset
Operating temperature	-25	-	+55	ºC	
Restricted operation (deviations from the GSM specification may occur)	-29	-	+70	ºC	
Humidity (non condensing)	5	-	90	%	
Weight		0.510		Kg	
External dimensions	W* 170 x H 110 x D 31 mm				*W 202 with mounting flanges
Ingress Protection (IP)	IP54				Steel / aluminum enclosure
Approvals	EN-50081-1 Emission EN-61000-6-2 Immunity				(E 1) 10R-024063 CE

Technical data subject to change

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Specifications for the RTCU M11GX

Digital input (Ignition)		Min	Typ	Max		
	Logic "High"	8	12	40	VDC	All inputs are protected against transients and lowpass filtered.
	Logic "Low"	-5	-	3	VDC	

Power supply	Min	Typ	Max		
Operating Voltage	9	-	36	VDC	Protected against wrong polarity.
Unit Active with GSM/GPS off Unit in Sleep with GSM/GPS off Unit in Powerdown Unit Active with GSM on Unit Active with GPS on Unit Active with GSM/GPS on.		80 36 0.28 95 100 115	 270 290	mA mA mA mA mA mA	At 12 VDC supply voltage.

Storage temperature	-40	-	+90	ºC	External connections: • SUB-D9M for RS232 port 1 (service-port) • SUB-D25M for power and ignition. • SMA-Female for GSM antenna. • SMB-Male for active (3V) GPS antenna.
Operating temperature	-25	-	+55	ºC	
Restricted operation (deviations from the GSM specification may occur)	-29	-	+70	ºC	
Humidity (non condensing)	5	-	90	%	
Weight		0.510		Kg	
External dimensions	W* 170 x H 110 x D 31 mm				*W 202 with mounting flanges
Ingress Protection (IP)	IP54				Steel / Aluminum
Approvals	EN-50081-1 Emission EN-61000-6-2 Immunity				(E 1) 10R-024063 CE

Technical data subject to change