**Logic IO**
*www.logicio.com*

# Technical documentation for

# RTCU-D4

Version 1.07

## Introduction

The RTCU-D4 unit is an advanced unit in the RTCU product line with an impressive list of features and possibilities. The product is a unique combination of a powerful PLC and a GSM phone tightly connected in a single easy programmable unit. The RTCU-D4 product provides the user-friendly answer to your remote monitoring, remote control, surveillance and datalogging needs.
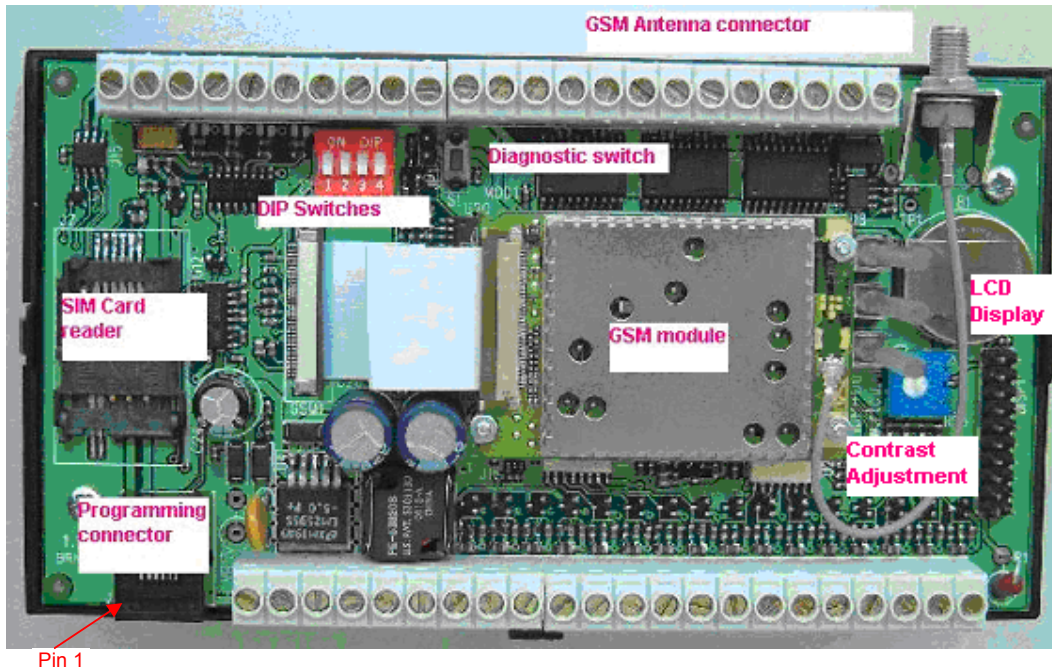
The RTCU-D4 allows rapid development of custom specified applications combining control / monitoring / datalogging with advanced communication techniques such as voice / DTMF interaction (voice response systems), alarm/messages send to / from the unit as SMS (both as SMS and PDU) messages or via data-transfer directly to / from Windows applications.

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

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## External connections

All connections to external equipment (except the GSM antenna) are done using screw terminals, located at the top and bottom of the unit (see graphical view). Each terminal is numbered. The number is visible on the plastic top cover.

### Power supply

The RTCU-D4 unit must be supplied with a DC voltage between 8 and 36 Volt. The connections are as follows:

8..36 VDC Supply:
The 8..36 VDC supply is connected to the DCin and GND terminals on the unit (These are found to the left, in the bottom row of screw terminals)

| Terminal | Number | Description |
|----------|--------|-------------|
| GND | 5 | Negative (-) connection from DC power supply |
| DCin | 6 | Positive (+) connection from DC power supply |
| GND | 7 | Negative (-) connection from DC power supply |

### Analog Inputs

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

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

| Terminal | Number | Description |
|----------|--------|-------------|
| AGND | 8 | Analog ground |
| AI1 | 9 | Analog input number 1 |
| AI2 | 10 | Analog input number 2 |
| AI3 | 11 | Analog input number 3 |
| AI4 | 12 | Analog input number 4 |
| AGND | 13 | 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 AOn and AGND. AGND must be connected to the reference of the connected equipment.

| Terminal | Number | Description |
|----------|--------|-------------|
| AO1 | 30 | Analog output number 1 |
| AO2 | 31 | Analog output number 2 |
| AO3 | 32 | Analog output number 3 |
| AO4 | 33 | Analog output number 4 |
| AGND | 34 | Analog ground |

## Digital Inputs

The digital inputs are galvanic isolated from the RTCU with optocouplers and they are also low-pass filtered and transient protected. For the inputs to be logical "high", supply a voltage between the Din and DGND terminal, as per the requirements in the Specifications section.

| Terminal | Number | Description |
|----------|--------|-------------|
| DGND | 14 | Digital input ground |
| DI1 | 15 | Digital input number 1 |
| DI2 | 16 | Digital input number 2 |
| DI3 | 17 | Digital input number 3 |
| DI4 | 18 | Digital input number 4 |
| DI5 | 19 | Digital input number 5 |
| DI6 | 20 | Digital input number 6 |
| DI7 | 21 | Digital input number 7 |
| DI8 | 22 | Digital input number 8 |
| DI9 | 23 | Digital input number 9 |
| DI10 | 24 | Digital input number 10 |
| DI11 | 25 | Digital input number 11 |
| DI12 | 26 | Digital input number 12 |

### Digital outputs

The digital outputs interface to the outside world via solid-state drivers. The digital outputs have their own separate power supply terminal, and must be supplied with a voltage between 5 and 34 VDC to operate correctly.

| Terminal | Number | Description |
|----------|--------|-------------|
| DOSUPP | 35 | Digital output supply |
| DOSUPP | 36 | Digital output supply |
| DOSUPP | 37 | Digital output supply |
| DO1 | 38 | Digital output number 1 |
| DO2 | 39 | Digital output number 2 |
| DO3 | 40 | Digital output number 3 |
| DO4 | 41 | Digital output number 4 |
| DO5 | 42 | Digital output number 5 |
| DO6 | 43 | Digital output number 6 |
| DO7 | 44 | Digital output number 7 |
| DO8 | 45 | Digital output number 8 |
| DO9 | 46 | Digital output number 9 |
| DO10 | 47 | Digital output number 10 |
| DO11 | 48 | Digital output number 11 |
| DO12 | 49 | Digital output number 12 |

### Programming port (RS232) / RS485 port

The programming port (RS232) is shared with the RS485 port, if the RS485 port is used, the RS232 port cannot be used, and vice versa.

The connection to the programming port (RS232) is done using the RJ11 connector in the lower left 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 must be left unconnected, or it can be tied to the VCC pin (recommended).

Programming port (RS232) / 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) |

The connection to the **optional** RS485 port is done using 3 screw terminals (see Graphical view). 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 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.

| Terminal | Number | Description |
|----------|--------|-------------|
| RS485 B- | 27 | Negative wire for RS485 port |
| RS485 A+ | 28 | Positive wire for RS485 port |
| GND | 29 | Ground for RS485 port |

## Using the LCD-Display.

The RTCU-D4 includes as standard a LCD-Display with permanent backlighting. The display has 2 lines by 16 characters and can be accessed from the VPL program using the standard display functions available. Please consult the RTCU IDE on-line help for more information. The LCD-Display is connected to the "DISP1" connector with a flat cable on the RTCU D4 baseboard.

### Contrast Adjustment

If the contrast of the display needs to be adjusted the small potentiometer (R95) located just to the left of the display connector can be adjusted with a small screwdriver.

### I/O Status Display

The LCD-display will by default show the status of the analog and digital I/O of the unit. The display is used in the following way:

Line 1:
```
1234567890ABCDEF
```
Line 2:
```
GHIJKLMNOPQRSTUV
```

**Line 1** shows the status of the analog and digital outputs. **1,2,3,4** show the status of the analog outputs using the 8 vertical lines of the character to show a scaled status of the four analog outputs. **5,6,7,8,9,0,A,B,C,D,E,F** shows the status of the 12 digital outputs in numerical order.

**Line 2** shows the status of the analog and digital inputs. **G,H,I,J** shows the status of the analog inputs using the 8 vertical lines of the character to show a scaled status of the four analog inputs. **K,L,M,N,O,P,Q,R,S,T,U,V** shows the status of the 12 digital inputs in numerical order.

The I/O Status Display will be continuously updated 2 times per second and will be disabled totally when the VPL program running in the unit takes control and accesses the display.

## Installing SIM card / connecting the GSM antenna

### SIM Card
The RTCU unit contains a standard SIM card reader. It is located to the lower left on the printed circuit board, close to the edge. 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** | 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 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).

Two-colored (red/green) indicators are visible above the status indicator. These indicators can be controlled from within the VPL program in the unit. The green part of the upper LED is accessed as LED1 and the red part as LED2, and the green part of the lower LED is accessed as LED3 and the red part as LED4.

The RTCU unit contains a dipswitch. The dipswitch is located near to upper row of screw terminals (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 | | Max | | |
|---|---|---|---|---|---|---|
| | | 0 | - | +5 | VDC | Resolution is 10 bits. All inputs are protected against transients and lowpass filtered. |
| Analog outputs | | Min | | Max | | |
| | | 0 | - | +5 | VDC | Resolution is 10 bits. All outputs are protected against transients and lowpass filtered. |
| Digital inputs | | Min | Typ | Max | | |
| | Logic "High" | 8 | 10 | 40 | VDC | All inputs are protected against transients and lowpass filtered |
| | Logic "Low" | -5 | - | 5 | VDC | |
| Digital outputs | | Min | Typ | Max | | |
| | | 5 | - | 34 | VDC | All outputs are protected against short-circuit. |
| | | - | - | 1000 | mA | |
| Power supply | | Min | Typ | Max | | |
| Operating Voltage | | 8 | - | 36 | VDC | Protected againts wrong polarity, self healing fuse |
| Unit Active with GSM off Unit Active with GSM on Unit in Sleep with GSM off | | | 75 80 50 | 150 | mA mA mA | At 24 VDC supply voltage |
| Storage temperature | | -40 | - | +90 | ºC | For mounting on standard DIN rail (EN50022). |
| Operating temperature (According to GSM 11.10 specification) | | -20 | - | +55 | ºC | SMA-Female connector for Dual band (900/1800 MHz) GSM antenna. |
| Restricted operation (deviations from the GSM specification may occur) | | -29 | - | +70 | ºC | |
| Humidity (non condensing) | | 5 | - | 90 | % | |
| Weight | | | 0.3 | | Kg | |
| External dimensions | | W 157 x H 86 x D 58 mm | | | | Standard M36 DIN enclosure |
| Ingress Protection (IP) | | IP20 | | | | |
| Approvals | | EN-50081-1 Emission EN-61000-6-2 Immunity | | | | Unit is CE Approved  C E |

*Technical data subject to change*