MIKRODEV®

Innovation in Automation

RTU300

HARDWARE MANUAL

- RTU301
- RTU310
- RTU320
- RTU330
- RTU340

RTU Series

06 / 2023

MIKRODEV_HM_RTU300_EN

v1.5

CONTENTS

FIGURES LIST

Preface

Mikrodev RTU300 series RTUs can monitor and control Intelligent Electrical Devices (protection relays, reclosing cutters, energy and quality analyzers ... etc) via industry standard protocols like IEC 61850, Modbus TCP and Modbus RTU. Thay can also communicate with SCADA or control center software via IEC 60870, DNP3 and MODBUS TCP protocols. With its easy, flexible and fast programming capabilities and expandable I/O capability up to 1024 points, Mikrodev RTU products are preferred for electrical applications. Mikrodev RTU300 Series RTUs are programmed mainly using Function Block Diagram - FBD language which is defined in IEC 61131-3 standard. Thanks to programming with FBD language, you can develop applications easily and quickly with drag and drop logic.

Please follow our website www.mikrodev.com for the up to date version of the document.

About Mikrodev

Since 2006, MIKRODEV has been developing and manufacturing industrial control and communication products. MIKRODEV serves the system integrators in the public and private sector, OEM and end users. Our products are manufactured complying with the quality standards required by the industrial automation industry and the quality of our products are proved on the field for many years MIKRODEV is one of the few companies in the world that has its own designed IEC 61131- 3 compliant library for its programmable logic control devices. In addition, the open, flexible, programmable SCADA solution developed by MIKRODEV is also available to customers. MIKRODEV products' performance and wide range of applications make them possible for customers to achieve faster, simplified and cost-effective results.

WARNING!

- ✓ Please take care of the following issues when using Mikrodev devices.
- ✓ Since the unit operates with 24 VDC (12-36 VDC) voltage, you should take care of the voltage level that the unit is connected to. If a voltage above this voltage level is applied, the device may be damaged and may be out of warranty.
- ✓ Make sure that the energy connection of your device is connected to the ground or to a properly grounded terminal.
- ✓ Make sure that the environment in which your device is being used is free of moisture, electric shock, vibration and dust.
- ✓ Pay attention to the supply voltage and the connections of the product. Mikrodev is not responsible for any issues due to power failure since there is no auxiliary supply (UPS) on the device.
- ✓ The fuse to be used must be a FF super fast type and current limit value 1A.
- ✓ Do not use the device under conditions other than the environmental conditions specified in the "Electrical Specifications" section (humidity, dust, liquid and temperature, etc.)
- ✓ Removing the warranty label on the product or removing the protective case will void the warranty.
- ✓ Products that are damaged, boxes have been changed and other brand labels are affixed are not covered by the warranty.
- ✓ The appliance must not be cleaned with solvents (thinner, benzine, acid etc.) or with abrasive cleaning agents.
- ✓ Only dry cloth should be used when cleaning the appliance.
- ✓ Do not open the device by removing the case of the appliance, do not interfere with the electronic components and circuits. There is no user-replaceable part inside the device.
- ✓ If there is a problem or malfunction on your device, it should only be repaired by an authorized service. Installation and electrical connections must be made by technical personnel in accordance with the instructions in the operating manual.

Failure to comply with these rules may result in death, serious injury or property damage

Mounting Information

DIN Rail Mounting

First, the upper part of the device is mounted on the DIN rail. Then, with the help of the springs behind the device, when a lightly force is applied to the lower part, the device locates into the DIN rail easily and the montage is completed (See Figure 1).

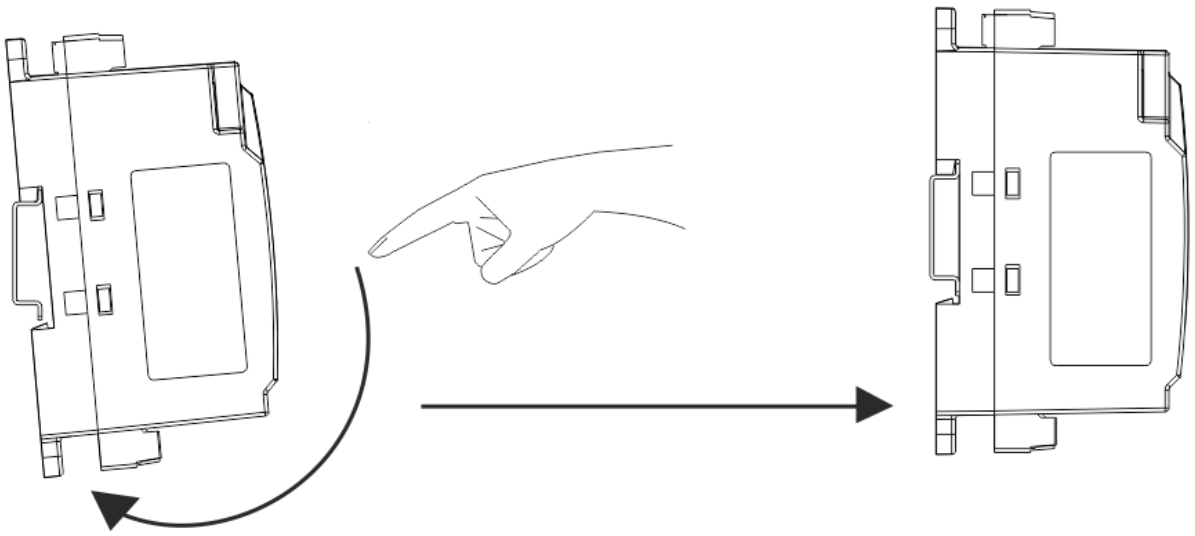

Figure 1 DIN Rail Mounting

Expansion Installation

Assembly between RTU300 series RTU products and XIO211 series expansion modules is carried out by sliding the tabs over the rail so that the tabs overlap each other

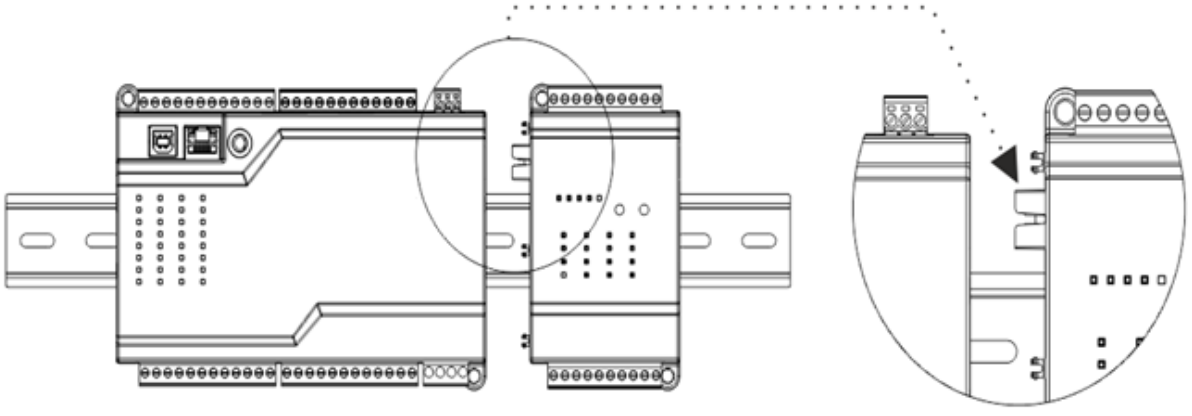

Figure 2 Expansion Module Mounting

1 RTU300 GENERAL INFORMATION

1.1 GA1 Board Type Physical Interface

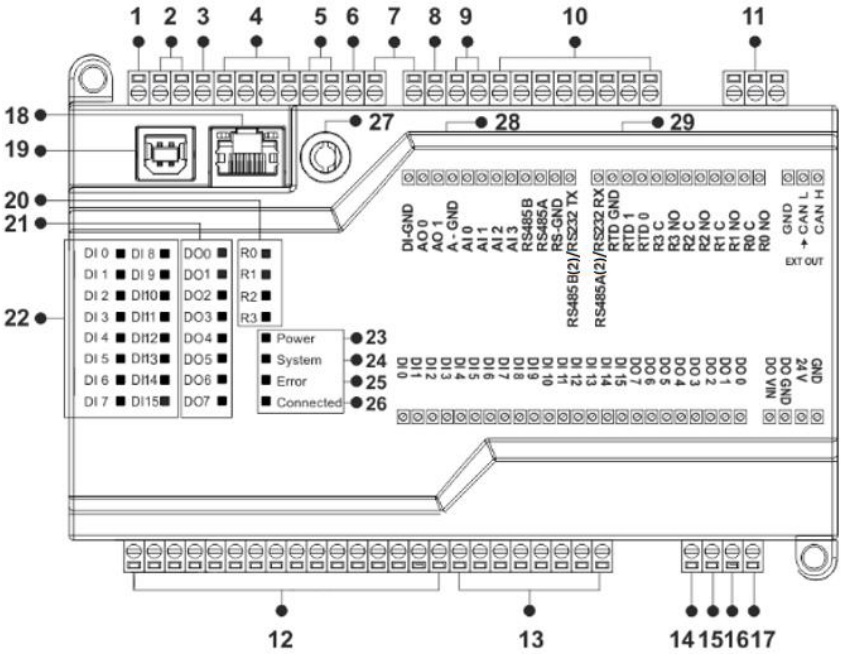

Figure 3 GA1 Board Type Connector and Physical Interface

1	Digital Input GND Connection	**16**	Device Power (V+) Connection
2	Analog Output Connections	**17**	Device Power (V-) Connection
3	Analog GND Connection	**18**	Ethernet Port
4	Analog Input Connection	**19**	USB Port
5	RS485 Connections	**20**	Relay Status Information LED
6	RS232 GND Connections	**21**	Digital Output Status Information LED
7	RS232 TX-RX Connections	**22**	Digital Input Status Information LED
8	N/A	**23**	System Power LED
9	N/A	**24**	System Running LED
10	Relay Connections	**25**	System Error LED
11	CANBUS Connection	**26**	Protocol Data Transfer LED
12	Digital Input Connections	**27**	Antenna Connection
13	Digital Output Connections	**28**	SIM Card Slot
14	Digital Output Supply(Vin) Connection	**29**	SD Card Slot
15	Digital Output GND Connection		

1.2 GA2 Board Type Physical Interface

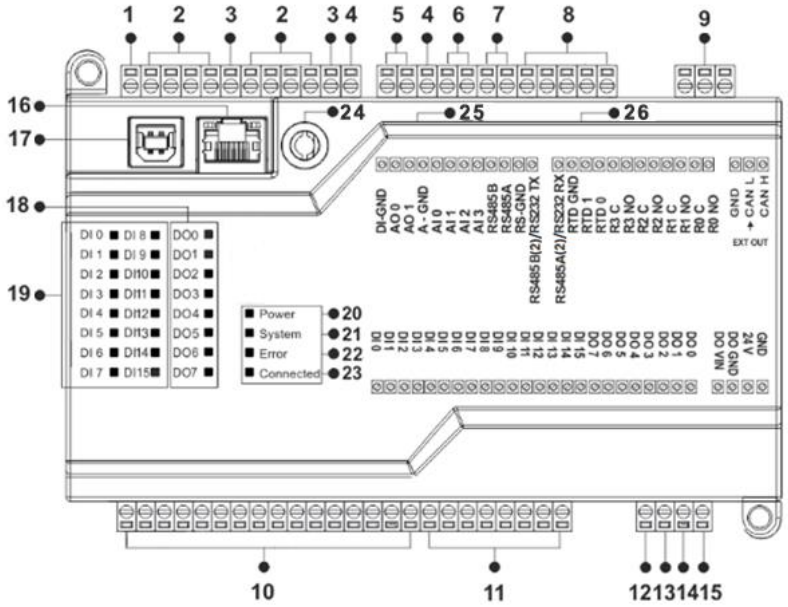

Figure 4 GA2 Connector and Physical Interface

1	Digital Input GND Connection	**14**	Device Power (V+) Connection
2	Analog Input Connection	**15**	Device Power (V-) Connection
3	Analog Input GND Connection	**16**	Ethernet Port
4	RS485 GND Connections	**17**	USB Port
5	RS485 Port 1 Connections	**18**	Digital Output Status Information LED
6	RS485 Port 2 Connections	**19**	Digital Input Status Information LED
7	RS422 Connections	**20**	System Power LED
8	RS232 TX-RX Connection	**21**	System Running LED
9	CANBUS Connection	**22**	System Error LED
10	Digital Input Connections	**23**	Protocol Data Transfer LED
11	Digital Output Connections	**24**	Antenna Connection
12	Digital Output Supply(Vin) Connection	**25**	SIM Card Slot
13	Digital Output GND Connection	**26**	SD Card Slot

1.3 GA4 Board Type Physical Interface

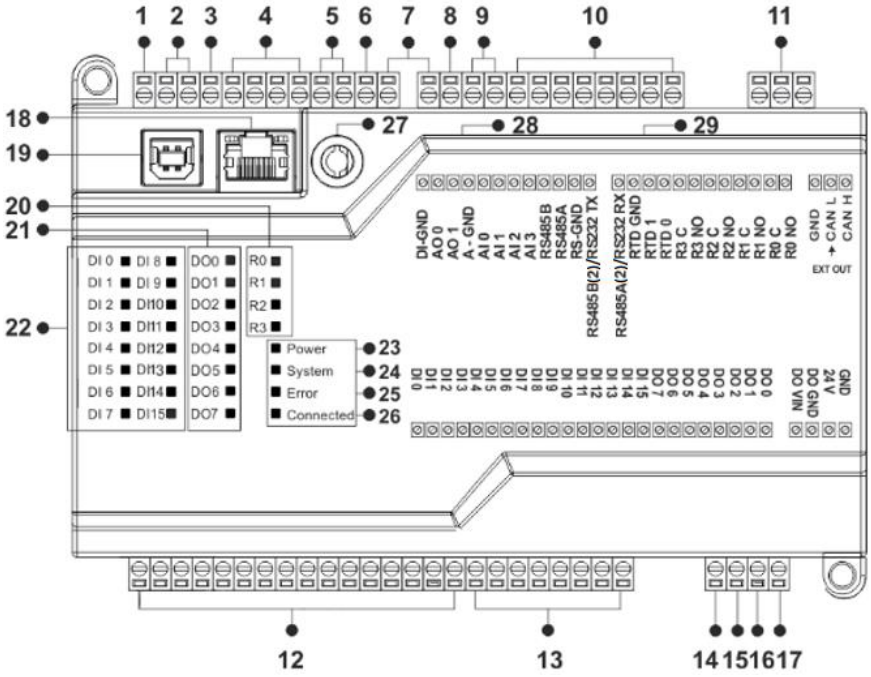

Figure 5 GA4 Board Type Connector and Physical Interface

1	Digital Input GND Connection	**16**	Device Power (V+) Connection
2	Analog Output Connections	**17**	Device Power (V-) Connection
3	Analog GND Connection	**18**	Ethernet Port
4	Analog Input Connection	**19**	USB Port
5	RS485 Connections	**20**	Relay Status Information LED
6	N/A	**21**	Digital Output Status Information LED
7	RS485(2) Connections	**22**	Digital Input Status Information LED
8	N/A	**23**	System Power LED
9	N/A	**24**	System Running LED
10	Relay Connections	**25**	System Error LED
11	CANBUS Connection	**26**	Protocol Data Transfer LED
12	Digital Input Connections	**27**	Antenna Connection
13	Digital Output Connections	**28**	SIM Card Slot
14	Digital Output Supply(Vin) Connection	**29**	SD Card Slot
15	Digital Output GND Connection		

1.4 GA5 Board Type Physical Interface

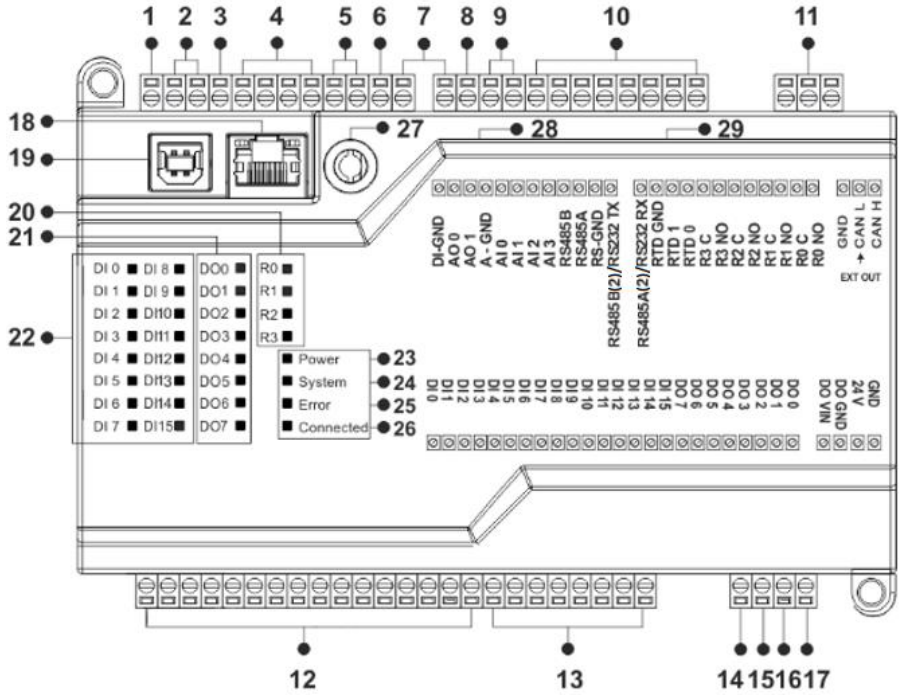

Figure 6 GA5 Board Type Connector and Physical Interface

1	Digital Input GND Connection	**16**	Device Power (V+) Connection
2	N/A	**17**	Device Power (V-) Connection
3	N/A	**18**	Ethernet Port
4	N/A	**19**	USB Port
5	RS485 Connections	**20**	Relay Status Information LED
6	RS232 GND Connections	**21**	Digital Output Status Information LED
7	RS232 TX-RX Connections	**22**	Digital Input Status Information LED
8	N/A	**23**	System Power LED
9	N/A	**24**	System Running LED
10	Relay Connections	**25**	System Error LED
11	CANBUS Connection	**26**	Protocol Data Transfer LED
12	Digital Input Connections	**27**	Antenna Connection
13	Digital Output Connections	**28**	SIM Card Slot
14	Digital Output Supply(Vin) Connection	**29**	SD Card Slot
15	Digital Output GND Connection		

1.5 GA6 Board Type Physical Interface

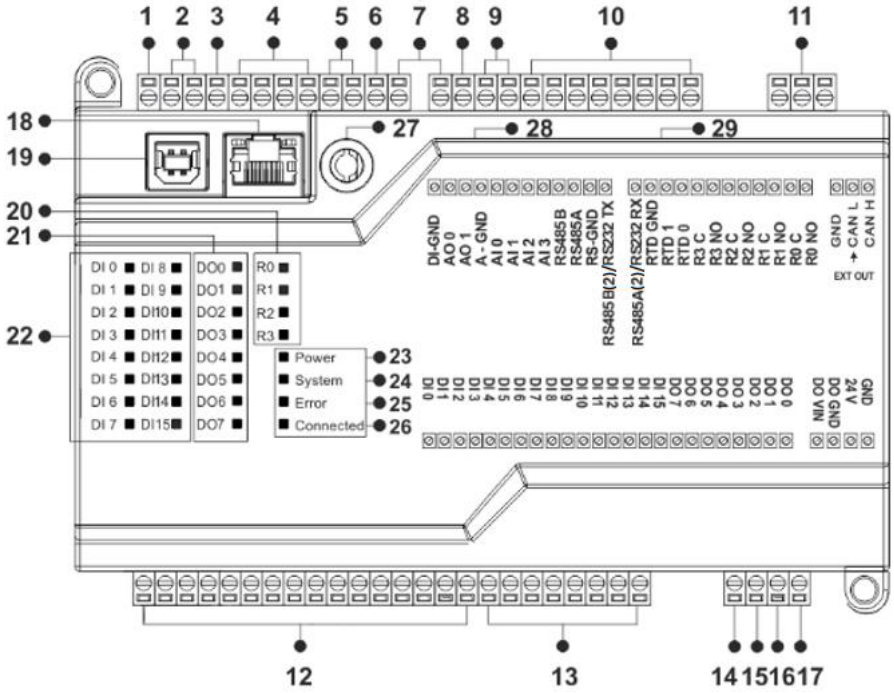

Figure 7 GA6 Board Type Connector and Physical Interface

1	Digital Input GND Connection	**16**	Device Power (V+) Connection
2	N/A	**17**	Device Power (V-) Connection
3	Analog GND Connection	**18**	Ethernet Port
4	Analog Input Connection	**19**	USB Port
5	RS485 Connections	**20**	N/A
6	RS232 GND Connections	**21**	Digital Output Status Information LED
7	RS232 TX-RX Connections	**22**	Digital Input Status Information LED
8	N/A	**23**	System Power LED
9	N/A	**24**	System Running LED
10	N/A	**25**	System Error LED
11	CANBUS Connection	**26**	Protocol Data Transfer LED
12	Digital Input Connections	**27**	Antenna Connection
13	Digital Output Connections	**28**	SIM Card Slot
14	Digital Output Supply(Vin) Connection	**29**	SD Card Slot
15	Digital Output GND Connection		

1.6 GA7 Board Type Physical Interface

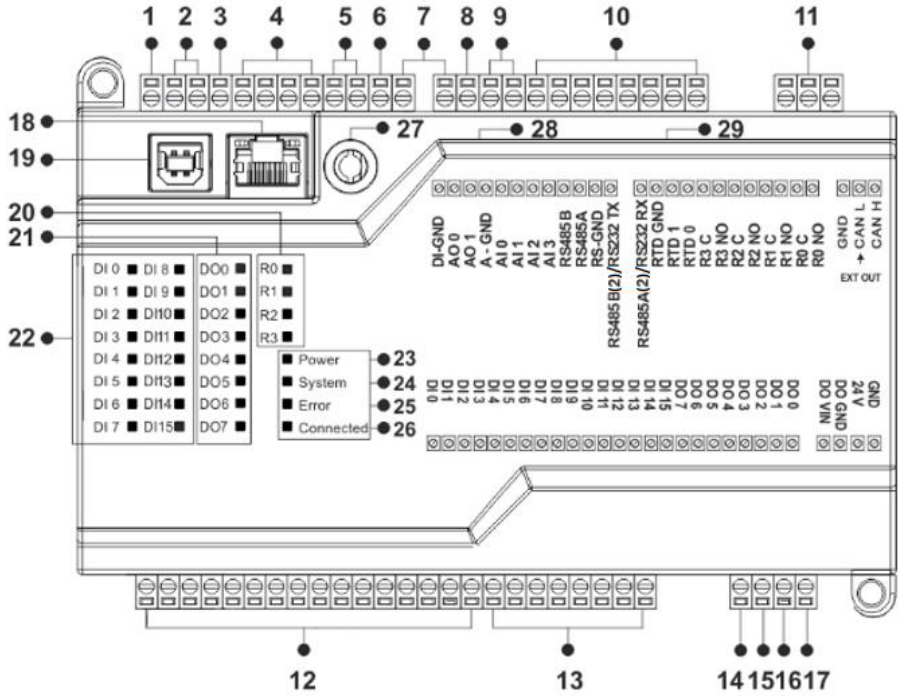

Figure 8 GA7 Board Type Connector and Physical Interface

1	Digital Input GND Connection	**16**	Device Power (V+) Connection
2	N/A	**17**	Device Power (V-) Connection
3	Analog GND Connection	**18**	Ethernet Port
4	Analog Input Connection	**19**	USB Port
5	RS485 Connections	**20**	N/A
6	N/A	**21**	Digital Output Status Information LED
7	RS485(2) Connections	**22**	Digital Input Status Information LED
8	N/A	**23**	System Power LED
9	N/A	**24**	System Running LED
10	N/A	**25**	System Error LED
11	CANBUS Connection	**26**	Protocol Data Transfer LED
12	Digital Input Connections	**27**	Antenna Connection
13	Digital Output Connections	**28**	SIM Card Slot
14	Digital Output Supply(Vin) Connection	**29**	SD Card Slot
15	Digital Output GND Connection		

1.7 General Device Specifications

SPECIFICATION	ITEM	DESCRIPTION			
Processor	Processor Architecture	ARM Cortex M4			
	Processor Internal RAM	196 KB			
	CPU Speed	168 MHz			
	Adressing Architecture	Little Endian Addressing			
Electrical	Supply	24 VDC (12-36VDC)			
	Power	<13W @ 24V DC			
	Real Time Clock	Integrated			
Input / Output	Board Type	GA1, GA4	GA2	GA5	GA6, GA7
	Digital Input	16 Channel, PNP	16 Ch.	16 Ch.	16 Ch.
	Digital Output*	8 Channel, Max. 0.5A@24VDC per Channel, PNP	8 Ch.	8 Ch.	8 Ch.
	Analog Input	4 Channel, 0-20 mA, 4-20 mA	8 Ch.		4 Ch.
	Analog Output	2 Channel, 0-20 mA, 4-20 mA			
	Relay Output	4 Channel, Max. 3A@30VDC - 5A@250VAC per Channel		4 Ch.	
Enviromental Conditions	Operating Temperature	-25…+75 C			
	Storage Temperature	-30…+85 C			
	Humidity	5…95 RH			
	Operating Altitude	0…2000 m			
Memory	SD Card Support**	Micro SD			
	Retentive Memory	4 KB, 128 Block/Register			
	Max Event Log	20000			
	Program Memory	4 MBit			
Communication Ports	Board Type	GA1, GA5, GA6	GA2	GA4, GA7	
	Ethernet Port	10/100 Mbps	10/100 Mbps	10/100 Mbps	

	RS485	1 Port, ESD Protection, 8 kV Direct, 25 kV Air Discharge	2 Port, ESD Protection, 8 kV Direct, 25 kV Air Discharge or 1 port RS485 and 1 port RS422	2 Port, ESD Protection, 8 kV Direct, 25 kV Air Discharge
	RS232	1 Port	1 Port (with flow control)	
Wireless Communication	GSM/LTE**	LTE Modem		
Expansion Capacity	DIN Rail Type-CANBUS Expansion	Up to 1024 I/O Points		

**The digital outputs are 125 mA per channel in production prior to serial number 761800.*
***Optional selection*

1.8 Power Connection Diagram

1.8.1 Supply Connection

Board Type:	GA1, GA2, GA4, GA5, GA6, GA7
Supply:	12-36 VDC, Protected
Power:	<13 W

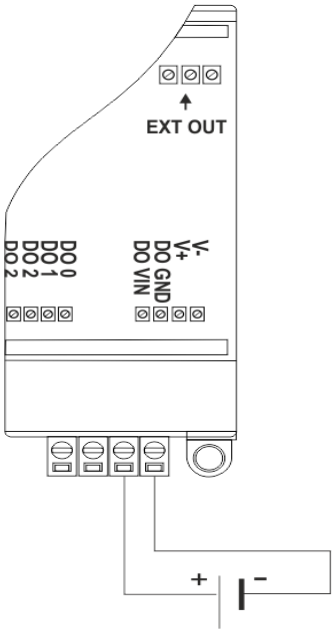

Figure 9 RTU300 Power Connection Diagram

1.9 Digital Inputs

Board Type:	GA1, GA2, GA4, GA5, GA6, GA7
Module Input:	16 Channel, PNP
Voltage Range:	0-36V DC
ON Voltage Level:	12-36V DC
OFF Voltage Level:	0-10V DC
Input Impedance:	>2M
Isolation:	Optical
OFF to ON Response:	20 us
ON to OFF Response:	90 us

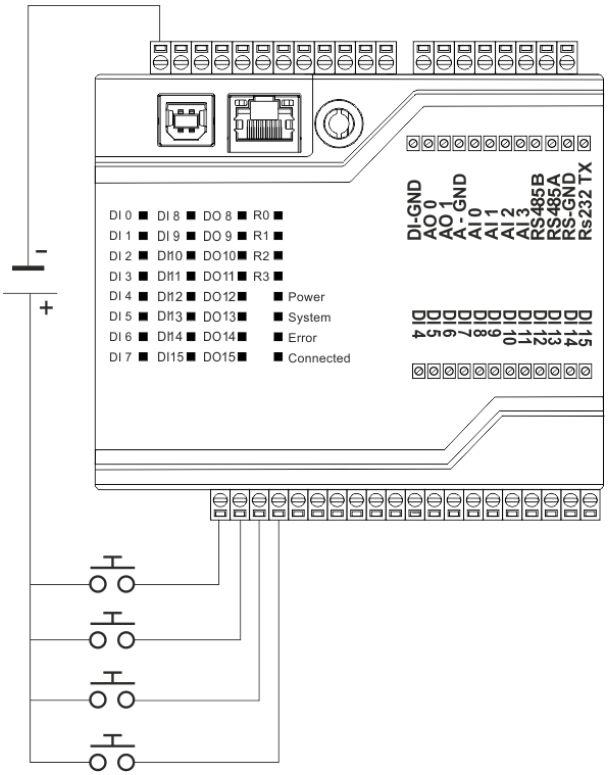

Figure 10 RTU300 Digital Input Connection Diagram

1.10 Digital Outputs

Board Type:	GA1, GA2, GA4, GA5, GA6, GA7
Module Output:	8 Channel, Mosfet Output
Module Output Type:	PNP Transistor
Voltage Range:	12-36V DC
Max. Output Current:	0.5A@24VDC per Channel
Isolation:	Optical

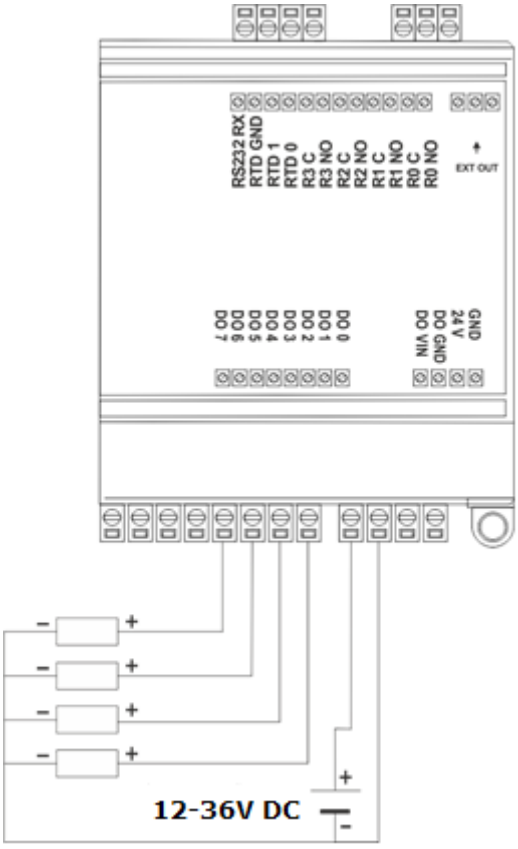

Figure 11 RTU300 Digital Output Connection Diagram

1.11 Relay Outputs

Board Type:	GA1, GA4, GA5
Module Output:	4 Channel
Relay Contact Outputs:	NO(Normally Open) Contact
Contact Max. Current:	3A@30VDC – 5A@250VAC per Channel
Isolation	Dry Contact

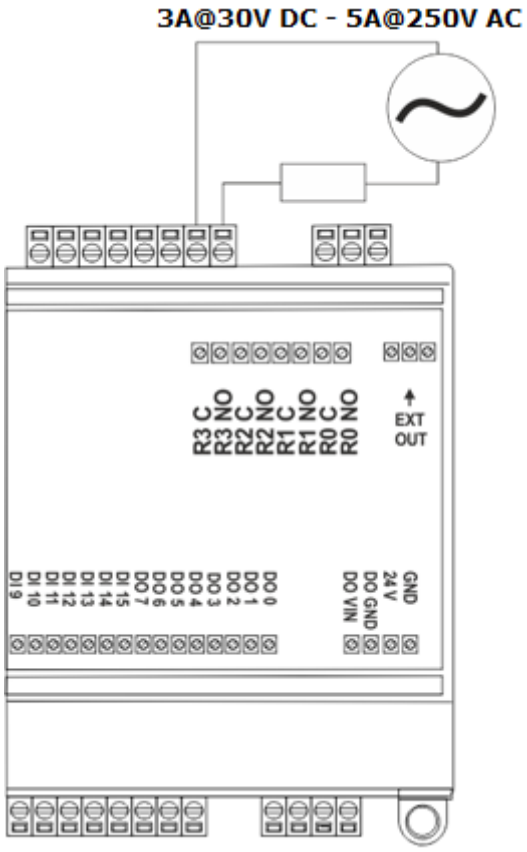

Figure 12 RTU300 Relay Connection Diagram

1.12 Analog Inputs

Board Type:	GA1, GA4	GA2	GA6, GA7
Module Input:	4 Channel	8 Channel	4 Channel
Analog Input Type:	0-20 mA, 4-20 mA	0-20 mA, 4-20 mA	0-20 mA, 4-20 mA
Analog Input Resolution:	16 Bit	16 Bit	12 Bit
Analog Input Precision:	%1 Precision	%1 Precision	%1 Precision
Common Input GND:	1 GND (4 Point / Common)	2 GND (8 Point / Common)	1 GND (4 Point / Common)

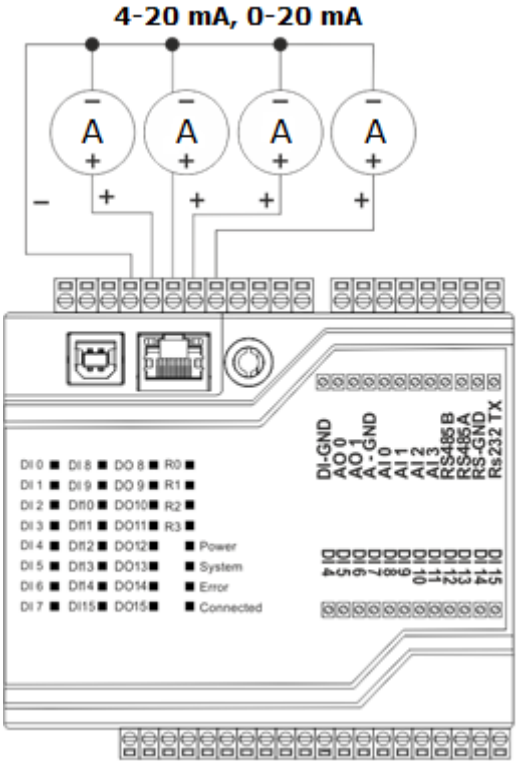

Figure 13 RTU300 Analog Input Connection Diagram

1.13 Analog Outputs

Board Type:	GA1, GA4
Module Output:	2 Channel
Analog Output Type:	0-20 mA, 4-20 mA
Analog Output Resolution:	12 Bit
Current Output Precision:	%1 Precision
Common Output GND:	1 GND (2 Point / Common)

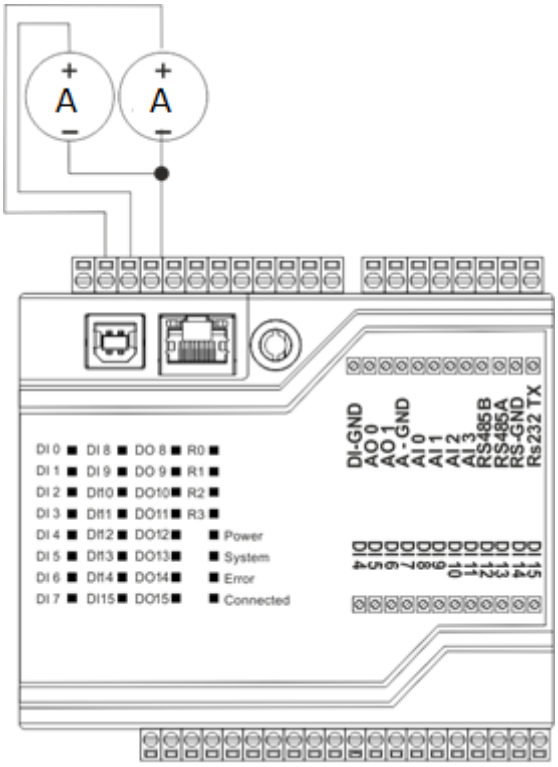

Figure 14 RTU300 Analog Output Connection Diagram

1.14 Serial Ports

1.14.1 RS485 Serial Port

Board Type:	GA1, GA5, GA6	GA2	GA4,GA7
RS485 Port Count:	1 Port	2 Port RS485 or 1 Port RS485 and 1 Port RS422	2 Port
Maximum Slave Count	Limited to Hardware		
Isolation:	ESD Protection, 8 kV Direct, 25 kV Air Discharge		
Communication Distance:	1000 m		
Data Bits:	7-8		
Stop Bits:	1-2		
Parity:	None-Even-Odd		
Baudrate:	300 bps to 200 kbps		

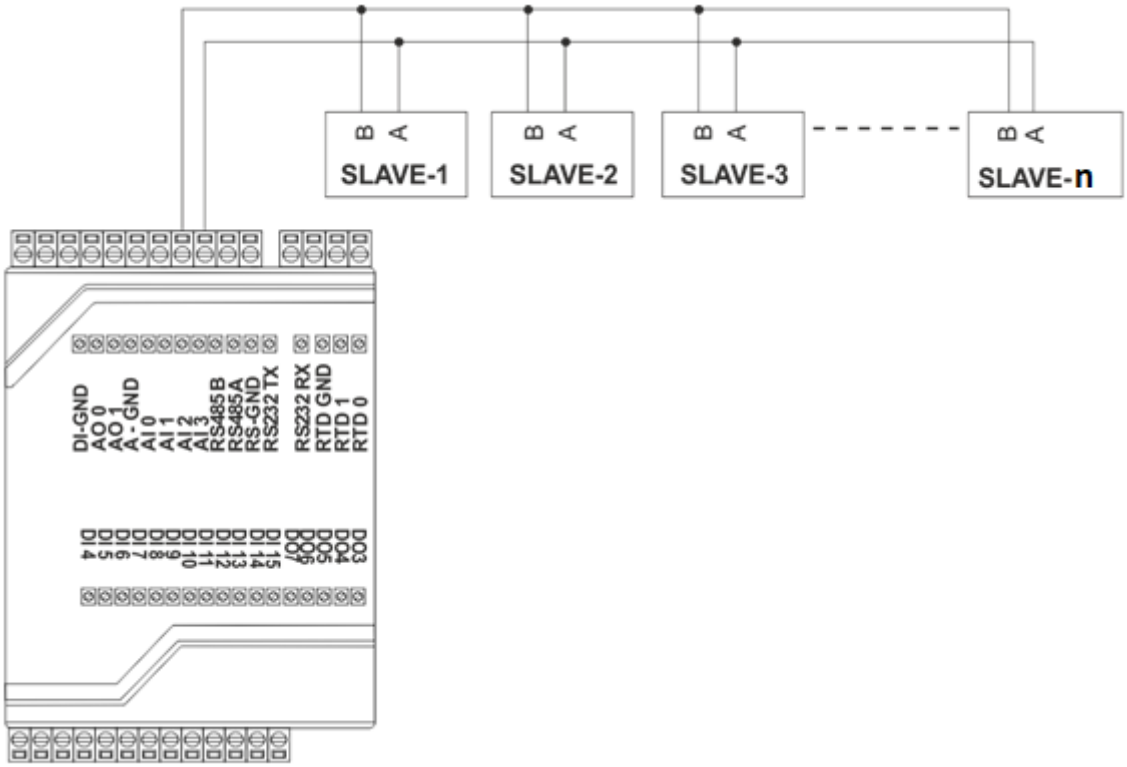

Figure 15 RTU300 RS485 Serial Port Connection Diagram

1.14.2 RS232 Serial Port

Board Type:	GA1, GA5, GA6	GA2
RS232 Port Count:	1 Port	1 Port (with flow control)
Communication Distance:	10 m	
Data Bits:	7-8	
Stop Bits:	1-2	
Parity:	None-Even-Odd	
Baudrate:	300 bps to 200 kbps	

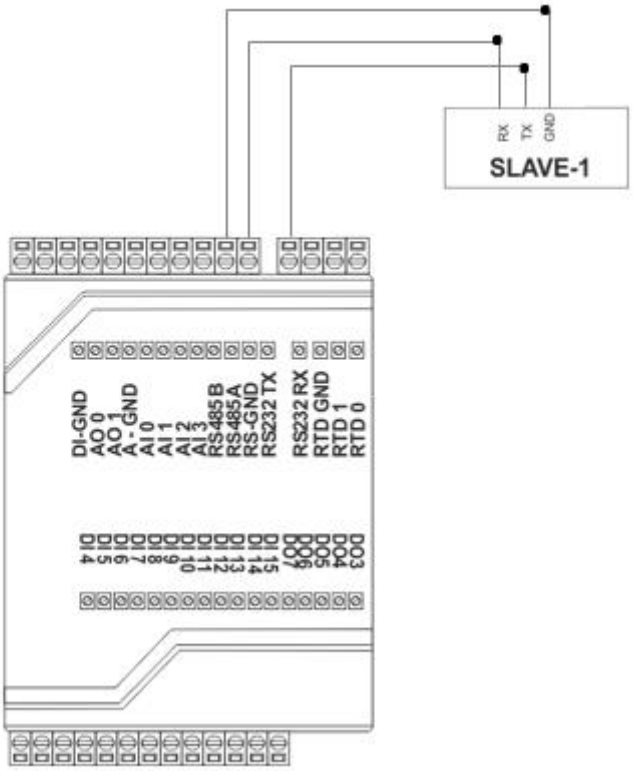

Figure 16 RTU300 RS232 Serial Port Connection Diagram