

# Intech Micro 2300-AO8I analogue output station MODBUS RTU slave application Manual.

## **MODBUS Manual - 2300-AO8I**

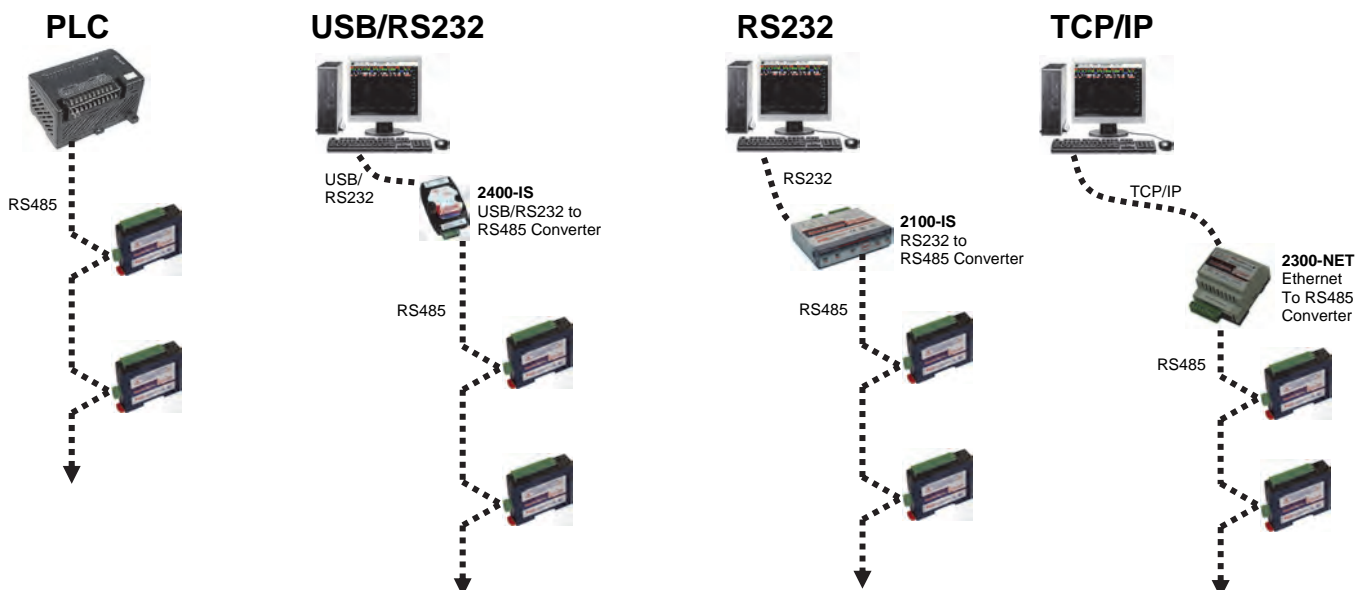
The 2300 series stations are designed to connect as slaves to MODBUS RTU masters such as PC's or PLC's to offer an economical I/O solution.

### **Intech Micro 2300 Series I/O stations:**

- 2300-A8II** - 8 Isolated Current Inputs.
- 2300-A8VI** - 8 Isolated Voltage Inputs.
- 2300-Tc8** - 8 Isolated Thermocouple Inputs.
- 2300-RTD6** - 6 RTD Inputs.
- 2300-MULTI** - 2 RTD, 2 AI, 1 AO, 4 DI, 2 DO.
- 2300-D16** - 16 Digital Inputs.
- 2300-RO4** - 4 Relay Outputs.
- 2300-AO8I** - 8 Current Outputs.
- 2300-NET** - Isolated Ethernet TCP/IP to RS485.



### **Intech Micro 2300 Series - Connection Examples.**



## 2300-AO8I Specifications.

<b>Current Outputs:</b>	-Output Points	8
	-Output Current	0(4)~20mA
	-Resolution	12 bits
	-Drift	100ppm/°C
	-Accuracy	0.05% of span
	-Isolation	1500Vrms between field and logic
<b>Connectors:</b>	-Logic Power and Comms	4 Pin plug-in connector on side of station
	-Outputs	18 Way screw plug-in connector on top of station
<b>Comms:</b>	-Protocols	RS485, Modbus RTU
	-Baud Rate	2400, 4800, 9600, 19200, 38400, 57600, 115200
	-Format	Parity: 0 = none, 1 = even, 2 = odd Stop Bits: 1 = 1 stop bit, 2 = 2 stop bits
<b>Power Supply:</b>	-Logic Supply Voltage	12~24Vdc
	-Logic Supply Current	32mA @ 12V / 18mA @ 24V
	-Field Supply Voltage	24Vdc
	-Field Supply Current	175mA
<b>Safety and EMC Compliances:</b>		
EMC Compliance	89/336/EEC and Low Voltage Equipment Directive 73/23/EEC	
Safety Compliance	IEC 950	
<b>General Specifications:</b> (Unless otherwise stated in other input specifications).		
Operating Temperature	-10~50°C	
Storage Temperature	-40~85°C	
Operating Humidity	Up to 95% non condensing	
Housing	-Dimensions	L=97.5, W=22.6, H=109mm
	-Mounting	35mm Symmetrical Mounting Rail.

Note 1. Contact INTECH INSTRUMENTS for more detailed programming information.

**Product Liability.** This information describes our products. It does not constitute guaranteed properties and is not intended to affirm the suitability of a product for a particular application. Due to ongoing research and development, designs, specifications, and documentation are subject to change without notification. Regrettably, omissions and exceptions cannot be completely ruled out. No liability will be accepted for errors, omissions or amendments to this specification. Technical data are always specified by their average values and are based on Standard Calibration Units at 25C, unless otherwise specified. Each product is subject to the 'Conditions of Sale'.

**Warning: These products are not designed for use in, and should not be used for patient connected applications. In any critical installation an independent fail-safe back-up system must always be implemented.**

## Modbus Register Types.

There are 4 types of variables which can be accessed from the station. Each station has one or more of these data variables.

Type	Start Address	Variable	Access
1	00001	Digital Outputs	Read & Write
2	10001	Digital Inputs	Read Only
3	30001	Input registers (Analog)	Read Only
4	40001	Output registers (Analog)	Read & Write (Holding type)

**Note:** The Modbus message length must be limited to 100 consecutive read or write registers. If more registers are required then a new poll group must be added for the next xxx registers.

The 2300-AO8I remote station has 8 current outputs. Each channel can be set to output a current in the range 0 - 20mA. The outputs are isolated from the logic and share a common negative terminal.

The standard setting for the 2300-AO8I station is 0~20mA output current which represents an output value of 0 - 4095 (12 bits) in the corresponding Modbus register. To obtain an output value of 0 to 4095 for an output signal of 4 to 20mA the offset switch is switched on.

For an input signal of 0~20mA the offset switch is switched off (see *Dip Switch Settings* on page 14.29.M-5).

## Communications Settings.

The data in the station is stored in 16 bit registers. These registers are accessed over the network using the MODBUS RTU communication protocol.

### Communications Settings with DIP Switch 10 OFF (IOStudio Mode)

BAUD RATE        9600  
DATA BITS        8  
PARITY            NONE  
STOP BITS        1

### Communications Settings with DIP Switch 10 ON (Programmed Baud Rate, MicroScan SCADA Factory Default)

BAUD RATE        2400, 4800, 9600, 19200, 38400, 57600, 115200  
DATA BITS        8  
PARITY            None, Even, Odd  
STOP BITS        1, 2

Note: To change these settings, download the free **IOStudio 2300 Series MODBUS Configuration** software via the link from the Intech website: [www.intech.co.nz/2300](http://www.intech.co.nz/2300)

During this mode, DIP Switch 10 should be turned OFF so that the PC can communicate with the 2300 station using the IOStudio Mode communications settings. Once the Communications Settings are programmed, power down the 2300 station and change DIP Switch 10 to the ON position. Restore the power to the 2300 station and the configured Communications Settings will be ready for use.

**Warning:** Only program ONE 2300 station at a time!

## Communications Settings Registers.

40121	Baud Rate	2400	11520	R/W	2400, 4800, 9600, 19200, 38400, 57600, 115200
40122	Parity	0	2	R/W	0 = none, 1 = even, 2 = odd
40123	Stop Bits	1	2	R/W	1 = 1 stop bit, 2 = 2 stop bits
40124	Reply Delay	0	65535	R/W	(x10ms)

### Baud Rate Register (40121)

The baud rate value is programmed directly into the baud rate register. The only exception is the 115200 baud rate where the value 11520 is used.

### Parity Register (40122)

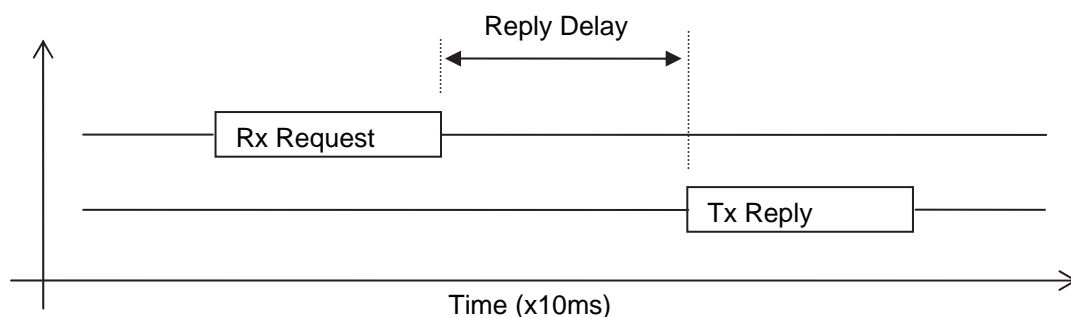
The parity can be set to none by writing a 0 to the parity register, set to even by writing a 1 to the parity Register or set to odd by writing a 2 to the parity register.

### Stop Bits Register (40123)

The number of stop bits can be set to 1 by writing a 1 to the stop bits register or set to 2 by writing a 2 to the stop bits Register.

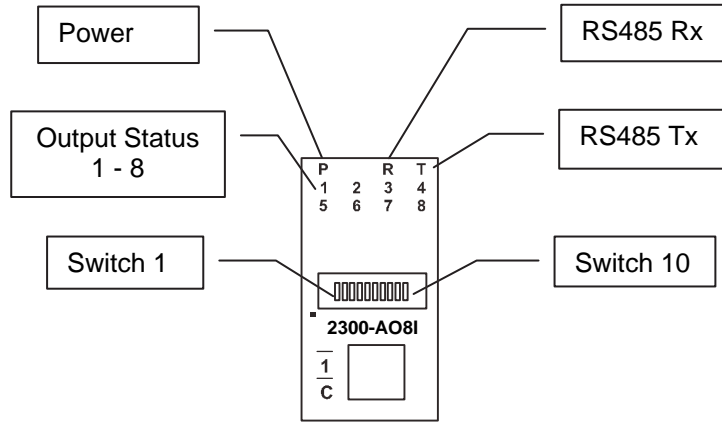
### Reply Delay Register (40124)

The reply delay is a time delay between the Modbus message received to the reply being sent. In some applications where a modem or radio is used in the RS485 network, it may be necessary to add a reply delay due to turn around delays in the equipment.



## Status Indicators.

<b>Power:</b>	Flashes to indicate the CPU is running.
<b>RS485 Rx:</b>	Flashes to indicate the unit has received a valid Modbus message.
<b>RS485 Tx:</b>	Flashes to indicate the unit has sent a Modbus message.
<b>Input Status:</b>	<p>“ON” when the input is zero.</p> <p>“OFF” when the input is greater than zero and less than 4095.</p> <p>“Flashing” when the input is over range, greater or equal to 4095</p>



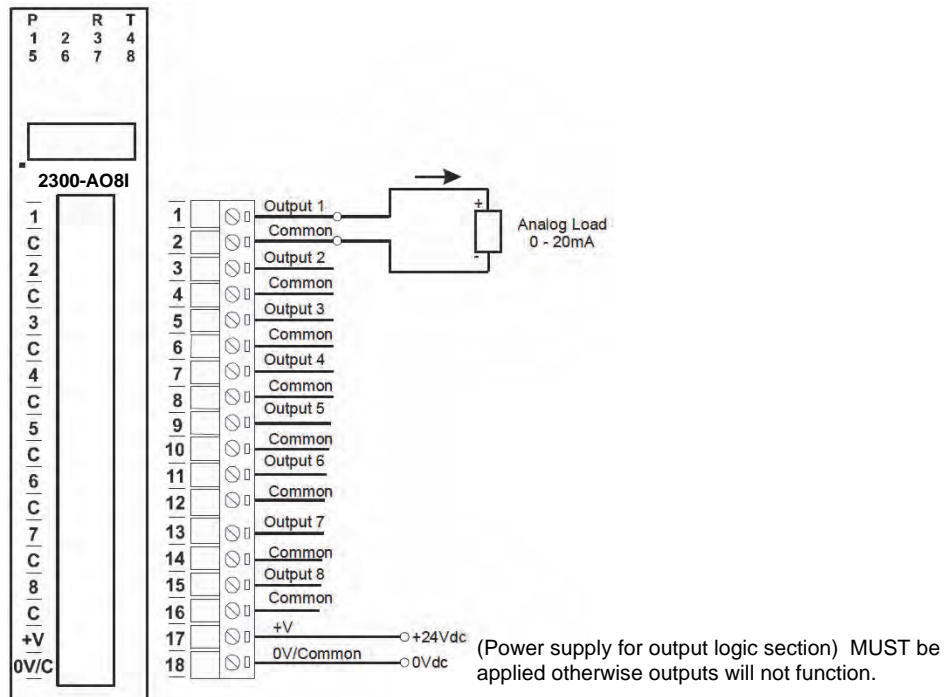
## Power and RS485 Comms Wiring.

Pin	Connection
81	- 12Vdc @ 32mA
82	+ 24Vdc @ 18mA
71	+ Comms
70	- RS485

**Warning:** If the power/communication connections are reversed, the remote station may become faulty.

## Wiring.

The following diagram shows how the analog outputs are connected to a load:



**Note:** Logic power output (terminals 17 & 18) range 24Vdc. The logic power supply output must be isolated and completely separate to the power supply that powers the 2300-AO8I on terminals 81 & 82. Failure to do so will cause the comms to stop.

## Dip Switch Settings.

DIP SWITCH	FUNCTION	DESCRIPTION
1	STATION ID	+1 Station ID's from 0 to 127 are set up using switches 1 to 7
2	STATION ID	+2 “
3	STATION ID	+4 “
4	STATION ID	+8 “
5	STATION ID	+16 “
6	STATION ID	+32 “
7	STATION ID	+64 “
8	OFF SET	When switched ON the outputs are scaled to accept a 4mA offset
9	MODE	Slave (Off)
10	BAUD RATE	Selects 9600 in OFF position (IOStudio Mode) or Programmed Baud Rate in ON position (MicroScan SCADA Factory Default) See Page 3 'Communications Settings.' for more information.

Note: See any 2300 series Installation Guide for the *Station ID Table* (Dip Switch Settings).

## Data Registers.

Modbus Address	Register Name	Low Limit	High Limit	Access	Description
30001	S/W Version / Module Type	N/A	N/A	R	High Byte = Software Version Low Byte = 110
40002	Current Output 1	0	4095	R/W	Current Outputs. 0 - 4095 = 0(4) - 20mA
40003	Current Output 2	0	4095	R/W	"
40004	Current Output 3	0	4095	R/W	"
40005	Current Output 4	0	4095	R/W	"
40006	Current Output 5	0	4095	R/W	"
40007	Current Output 6	0	4095	R/W	"
40008	Current Output 7	0	4095	R/W	"
40009	Current Output 8	0	4095	R/W	"
40010	Output Status	0	65535	R	bit2 = 0(0), bit2 = 1(4095) bit1 = 0(OK), bit1 = 1(error)
30100	DIP Switch	0	65535	R	Status of DIP Switch on Front Panel
40101	Watchdog Timer	0	255	R/W	Timer in seconds. 0 = Disabled, 1 - 255 = enabled
40121	Baud Rate	2400	11520	R/W	2400, 4800, 9600, 19200, 38400, 57600, 115200
40122	Parity	0	2	R/W	0 = none, 1 = even, 2 = odd
40123	Stop Bits	1	2	R/W	1 = 1 stop bit, 2 = 2 stop bits
40124	Reply Delay	0	65535	R/W	0 = Disable, >0 = Enable. (x10ms)