Intech Micro 2300-Tc8 isolated thermocouple input station MODBUS RTU slave application supplementary manual.

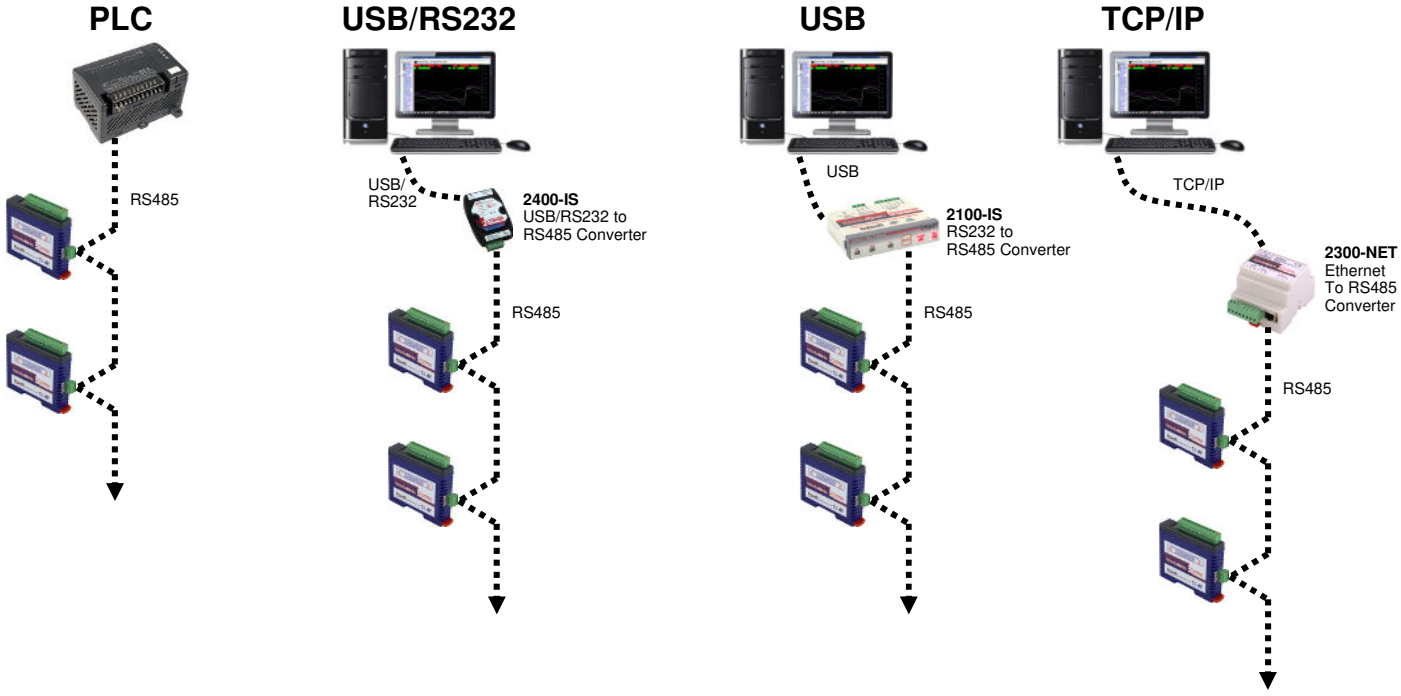
MODBUS supplementary manual to the 2300-Tc8 Installation Guide.

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-Tc8 Specifications.

TC Inputs:	-Input Points		8	
	-Resolution		0.1°C	
	-Drift		100ppm/°C	
	-Isolation		1500Vrms between field and logic	
TC Type:	Note: All inputs are set to the same type.			
	-Number	Type	Range	Accuracy
	-1	J	-150 to 760°C	± 0.2°C
	-2	K	-200 to 1370°C	± 0.3°C
	-3	E	0 to 600°C	± 0.1°C
	-4	T	-200 to 400°C	± 0.3°C
	-5	N	0 to 1300°C	± 0.3°C
	-6	B	400 to 1820°C	± 0.5°C
	-7	S	-50 to 1767°C	± 0.6°C
	-8	R	-50 to 1767°C	± 0.7°C
	-9	mV	0 to 50mV	± 0.1°C
	-10	C	0 to 2315.5°C	± 0.7°C
	-11	D	0 to 2315.5°C	± 0.7°C
	-12	G	0 to 2315.5°C	± 0.9°C
	-13	mV	+/- 100mV	± 0.1%
Cold Junction:	-CJC Error	± 0.5°C Typical after 30 minutes warm up time		

Connectors:	-Logic Power and Comms	4 Pin plug-in connector on side of station
	-Inputs	18 Way screw plug-in connector on top of station
Comms:	-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
Power Supply:	-Logic Supply Voltage	12~24Vdc
	-Logic Supply Current	58mA @ 12V / 31mA @ 24V

Safety and EMC Compliances:	
EMC Compliance	89/336/EEC and Low Voltage Equipment Directive 73/23/EEC
Safety Compliance	IEC 950

General Specifications: (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.

The 2300-Tc8 station is an 8 isolated thermocouple input station. The station uses differential inputs to reduce effects of electrical noise and mains pickup. The thermocouple inputs are isolated from the logic and from each other.

The thermocouple voltage is read by the station circuitry, linearised and converted to degrees Centigrade.
No ranging is required as the station covers the full range as indicated in the TC table. The value that is read from the Modbus register is the actual temperature in degrees centigrade to 0.1°C resolution. ie: a value of 3451 corresponds to a temperature of 345.1°C.

The thermocouple type is setup by writing a value to the TC Type register. The value is obtained from the table below. For example to select type K thermocouples, the value "2" must be written to the TC Type register. All 8 thermocouple inputs adopt the same TC type.

The DIP switch 9 is used to select upscale or downscale burnout. A value of 32768 is used to indicate upscale burnout and a value of -32767 is used to indicate downscale burnout.

The station has built in Cold Junction Compensation. Use must be made of the correct thermocouple extension wire to avoid reading errors.

The thermocouple station can also be configured for a 0 - 50mV input range. The TC Type register must be set to 9 for this option. The value in the register which is read back over the network is 0 - 50,000.

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.

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 from Intech's website: **www.intech.co.nz/software-installation**
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.

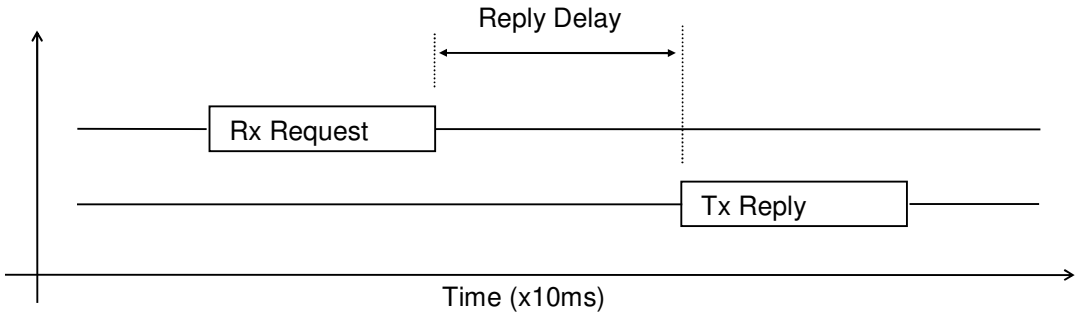
40121	Baud Rate	2400	11520	R/W	2400, 4800, 9600, 19200, 38400, 57600, 115200
40122	Parity	0	2	R/W	0 = none, 1 = even, 2 = odd
40123	Stop Bits	1	2	R/W	1 = 1 stop bit, 2 = 2 stop bits
40124	Reply Delay	0	65535	R/W	(x10ms)

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.

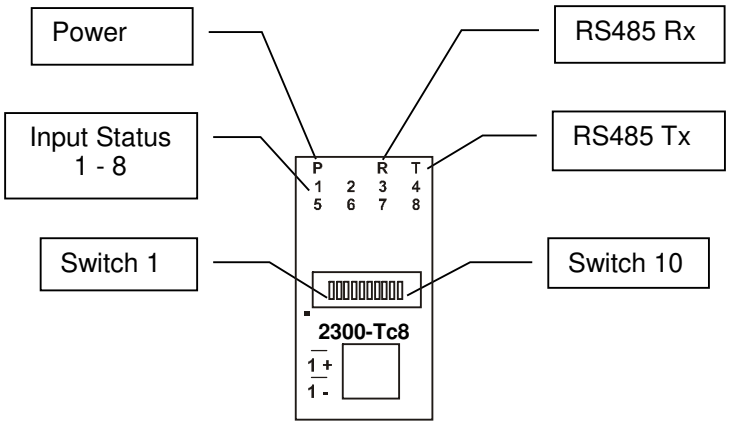
Stop Bits Register (40123)
The number of stop bits can be set to 1 by writing a 1 to the stop bits register or set to 2 by writing a 2 to the stop bits Register.

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.

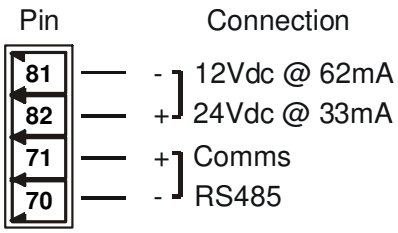


Status Indicators.

Power: Flashes to indicate the CPU is running.
RS485 Rx: Flashes to indicate the unit has received a valid Modbus message.
RS485 Tx: Flashes to indicate the unit has sent a Modbus message.
Input Status: "ON" when the thermocouple is open circuit.
"OFF" when the thermocouple is connected.



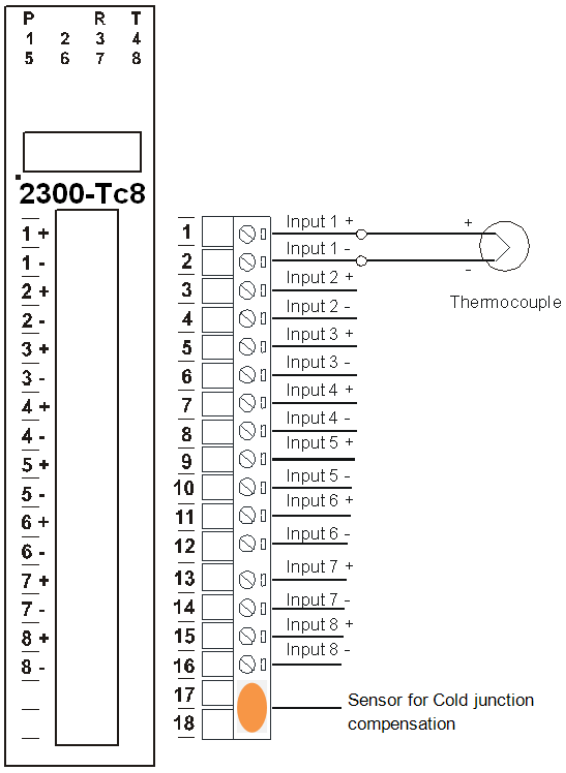
Power and RS485 Comms Wiring.



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

Wiring.

The following diagram shows how the analog inputs are connected to a thermocouple.



Note:
The terminal block used with the 2300-Tc8 must be the Thermocouple type (must have sensor as shown).

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	Not Used	
9	BREAK	TC break. When switched off the TC value will be loaded with -32767 when the TC is faulty. When switched on the TC value will be loaded with 32768.
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 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 = 106
30002	TC Input 1	-xxx.x	yyyy.y	R	Thermocouple Inputs. See table for type/range.
30003	TC Input 2	-xxx.x	yyyy.y	R	Resolution in 0.1°C.
30004	TC Input 3	-xxx.x	yyyy.y	R	"
30005	TC Input 4	-xxx.x	yyyy.y	R	"
30006	TC Input 5	-xxx.x	yyyy.y	R	"
30007	TC Input 6	-xxx.x	yyyy.y	R	"
30008	TC Input 7	-xxx.x	yyyy.y	R	"
30009	TC Input 8	-xxx.x	yyyy.y	R	"
30010	CJC Temp.	-xxx.x	yyyy.y	R	CJC Temperature in 0.1°C resolution.
30011	Input Status	0	65535	R	bit1 = 0(OK),bit1 = 1(error or open circuit)
30100	DIP Switch	0	65535	R	Status of DIP Switch on Front Panel
40101	TC Type	1	13	R/W	See TC Tables below
40102	Line Frequency	50	60	R/W	Line Frequency
40103	CJC Offset	1	199	R/W	100 = zero offset (0.0)
40104	Units Type	1	2	R/W	1=°C, 2=°F
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)

TC Type:	Note: All inputs are set to the same type.			
	-Number	Type	Range	Accuracy
	-1	J	-150 to 760°C	± 0.2°C
	-2	K	-200 to 1370°C	± 0.3°C
	-3	E	0 to 600°C	± 0.1°C
	-4	T	-200 to 400°C	± 0.3°C
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	-10	C	0 to 2315.5°C	± 0.7°C
	-11	D	0 to 2315.5°C	± 0.7°C
	-12	G	0 to 2315.5°C	± 0.9°C
	-13	mV	+/- 100mV	± 0.1%

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