Modbus

SensingTEK

Modbus Protocol_v1.3

User Manual

This document describes the Modbus RTU protocol option included in ModBus series of data acquisition modules. This implementation of the Modbus protocol is a subset of the protocol as described in the Modicon Modbus Protocol Reference Guide PI-MBUS-300 Rev F. Only the RTU version of the protocol has been implemented.

- Available modules
  - AIZ100
  - DIZ100
  - DOZ100
  - RSZ232/COZ232
  - RSZ485/COZ485
  - RTZ232/RSH232
  - THZ100
  - EDP100
  - MDP100
  - COZ100
  - COZ101

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Introduction

- The Modbus protocol was originally developed for Modicon controllers by Modicon Inc in 1979. Detailed information can be found at http://www.modicon.com/techpubs/toc7.html. Visit http://www.modbus.org to find more valuable information.

- The characterization is standardized and open construction. ModBus protocol is widely used in Industrial Automation. Controller can monitor all devices which different manufacturer produce through the Industrial Network. The lead-in system combines ModBus protocol with Wireless Sensor Network (WSN). It lets WSN could be applied in Industrial Control Domain and closer the real market.

- The platform supports ModBus TCP and ModBus RTU. There are nine function codes as Table 1.

- Users can receive sensor values of WSN, including digital input (DI) power on/off status, analog input (AI) value, temperature and humidity value, Node link status, Coordinator status, set digital output (DO) power on/off , write analog output (AO) value through the software of Industrial Chart Control which as Honeywell EBI, i-Fix.

- Specification and Notes as the followings：

1. Support ModBus TCP and ModBus RTU of industrial standardized communication interface.
2. One Coordinator only links one Server.
3. Coordinator will keep the last data before Node is disconnected.
4. Judge whether Node is connected or not through Special Command: Link Status (Function code:02) address 15XXX to get the Node status. For example, 15001 means Node ID:1. If Node is connected, the data value is “1”; if it’s disconnected, the data value is “0”.
5. To read and write single Modbus Command of the maximum is 64 bytes. If ModBus command length is more over than 64 bytes, Coordinator will automatically reply error code “overflow” to server.
6. The transmitting time between Modbus Commands is at least 50ms.

Support ModBus RTU Function

ModBus Series modules support the ModBus RTU protocol. The communication Baud Rates range from 4800bps to 115200bps. SensingTEK ModBus support nine function code types, as Table 1. The function code address is in ModBus RTU Data Sheet

◆ **Table 1 Support ModBus RTU Function.**

Function Code	Description	Function
01	Read Coil Status	Read Digital Output(DO) Status
02	Read Input Status	Read Digital Input(DI) Status
03	Read Holding Registers	Read Analog Output(AO) Data
04	Read Input Registers	Read T&H, e-Diaper and Analog Input(AI) Data
05	Force Single Coil	Set the single DO power on/off Value
06	Preset Single Register	Write the single AO value
15	Force Multiple Coils	Set multiple DO power on/off
16	Preset Multiple Registers	Write multiple AO value
17	Report Slave ID	Report Coordinator information

SensingTEK WSN ModBus RTU Data Sheet

➢ 01 Read Coil Status

- **Usage opportunity: Read Digital Output (DOZ100) status.**

Address	Description
00001 ~ 00004	Node 1 DO
00005 ~ 00008	Node 2 DO
00009 ~ 00012	Node 3 DO
00013 ~ 00016	Node 4 DO
00017 ~ 00020	Node 5 DO
(X-1)*4+1 ~ (X-1)*4+4	Node X DO

X<256

- **Example：**

Address	Description	Address	Description
00001 ~ 00004	Node 1 DO	00021 ~ 00024	Node 6 DO
00005 ~ 00008	Node 2 DO	00025 ~ 00028	Node 7 DO
00009 ~ 00012	Node 3 DO	00029 ~ 00032	Node 8 DO
00013 ~ 00016	Node 4 DO	00033 ~ 00036	Node 9 DO
00017 ~ 00020	Node 5 DO	00037 ~ 00040	Node 10 DO

- **Node ID1 Data Frame**

Address	Description
00001	DO 1 Status
00002	DO 2 Status
00003	DO 3 Status
00004	Reserved

- **Remarks：**

✓ **The Data Sheet of “05 Force Single Coil” and “15 Force Multiple Coils” are the same as “01 Read Coil Status”.**

➢ 02 Read Input Status

- **Usage opportunity: Read Digital Input (DIZ100) status.**

Address	Description
10001 ~ 10004	Node 1 DI
10005 ~ 10008	Node 2 DI
10009 ~ 10012	Node 3 DI
10013 ~ 10016	Node 4 DI
10017 ~ 10020	Node 5 DI
(X-1)*4+1 ~ (X-1)*4+4	Node X DI

X<256

- **Example：**

Address	Description	Address	Description
10001 ~ 10004	Node 1 DI	10021 ~ 10024	Node 6 DI
10005 ~ 10008	Node 2 DI	10025 ~ 10028	Node 7 DI
10009 ~ 10012	Node 3 DI	10029 ~ 10032	Node 8 DI
10013 ~ 10016	Node 4 DI	10033 ~ 10036	Node 9 DI
10017 ~ 10020	Node 5 DI	10037 ~ 10040	Node 10 DI

- **Node ID1 Data Frame**

Address	Description
10001	DI 1 Status
10002	DI 2 Status
10003	DI 3 Status
10004	DI 4 Status

➢ 03 Read Holding Registers

- **Usage opportunity: Read Analog Output (AOZ100) value of registers.**

Coordinator Address	Description
40001 ~ 40006	Node 1 data
40007 ~ 40012	Node 2 data
40013 ~ 40018	Node 3 data
40019 ~ 40024	Node 4 data
40025 ~ 40030	Node 5 data
(X-1)*6+1 ~ (X-1)*6+7	Node X data

- **Example：**

Address	Description	Address	Description
40001 ~ 40006	Node 1 data	40031 ~ 40036	Node 6 data
40007 ~ 40012	Node 2 data	40037 ~ 40042	Node 7 data
40013 ~ 40018	Node 3 data	40043 ~ 40048	Node 8 data
40019 ~ 40024	Node 4 data	40049 ~ 40054	Node 9 data
40025 ~ 40030	Node 5 data	40055 ~ 40060	Node 10 data

- **Node ID1 Data Frame**

Address	Description
40001	DAC 1
40002	DAC 2
40003	DAC 3
40004	Reserved
40005	Reserved
40006	Reserved

- **Remarks：**

  ✓ **The Data Sheet of “06 Preset Single Register” and “16 Preset Multiple Registers” are the same as “03 Read Holding Registers”.**

➢ 04 Read Input Registers

- **Usage opportunity: Read THZ100、EDP100 and Analog Input(AIZ100) value of registers.**

Coordinator Address	Description
30001 ~ 30006	Node 1 data
30007 ~ 30012	Node 2 data
30013 ~ 30018	Node 3 data
30019 ~ 30024	Node 4 data
30025 ~ 30030	Node 5 data
(X-1)*6+1 ~ (X-1)*6+7	Node X data

- **Example：**

Address	Description	Address	Description
30001 ~ 30006	Node 1 data	30031 ~ 30036	Node 6 data
30007 ~ 30012	Node 2 data	30037 ~ 30042	Node 7 data
30013 ~ 30018	Node 3 data	30043 ~ 30048	Node 8 data
30019 ~ 30024	Node 4 data	30049 ~ 30054	Node 9 data
30025 ~ 30030	Node 5 data	30055 ~ 30060	Node 10 data

- **Node ID1 Data Frame**

Address	Description	
30001	THZ100: Operating Voltage value	Data=Real-time value x1000
	EDP100: Operating Voltage value	Data= Real-time value x1000
30002	THZ100: Temperature value	Data= Real-time value x100
	EDP100: Emergency Button(High byte) + Pressure pad(Low byte)	Data(High byte)= Emergency Button Data(Low byte)= Pressure pad
30003	THZ100: Humidity value	Data= Real-time valuex100
	EDP100: Humidity value	Data= Real-time valuex100
30004	AI:AD1	0~65535
30005	AI:AD2	0~65535
30006	AI:AD3	0~65535

➢ 17 Report Slave ID (Only RF Series Supported)

- **Usage opportunity: Read Coordinator basic parameter.**

Response	
ModBus Slave ID	XX
Function Code	17
Byte Count	6
ModBus Slave ID	XX
Run Indicator Status	&H00=OFF, &HFF=ON
Coordinator ID high byte	XX
Coordinator ID low byte	XX
Pan ID high byte	XX
Pan ID low byte	XX

➢ Special Command:02 Link Status(Address：15XXX)

- **Usage opportunity: Read Node Link Status**

Address	Description
15001	Node 1 Link Status
15002	Node 2 Link Status
15003	Node 3 Link Status
15004	Node 4 Link Status
15005	Node 5 Link Status
X	Node X Link Status

Value = 0, it means that Node is **disconnected**

Value = 1, it means that Node is **connected**.

- **Example**：

Address	Description	Address	Description
15001	Node 1 Link Status	15006	Node 6 Link Status
15002	Node 2 Link Status	15007	Node 7 Link Status
15003	Node 3 Link Status	15008	Node 8 Link Status
15004	Node 4 Link Status	15009	Node 9 Link Status
15005	Node 5 Link Status	15010	Node 10 Link Status