

## Advantech AE Technical Share Document

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<b>Category</b>	<input checked="" type="checkbox"/> FAQ <input type="checkbox"/> SOP	<b>Related OS</b>	N/A
<b>Abstract</b>	How to check WISE-4051 RS-485 communication status by using Modbus TCP Client		
<b>Keyword</b>	Serial communication; RS-485; Modbus/RTU		
<b>Related Product</b>	WISE-4051		

■ **Problem Description:**

This document explains that how to check WISE-4051 communication status with other RS-485 sensors by querying Modbus address.

In the IO status page, choose COM1 for RS-485 IO. In the “Modbus RTU Configuration” tab, one could set up 8 different rules in the sub-tab “Rule Setting”. Each rule is one kind of query command, and one could set the Slave ID and the function call. For example, Rule 0 could be set as querying Slave ID 1, from address 1 to 4, and it would be mapped to WISE-4051 RS-485 channel 0 to 3. In total, the 20 RS-485 rules of WISE-4051 can query 64 # channels.

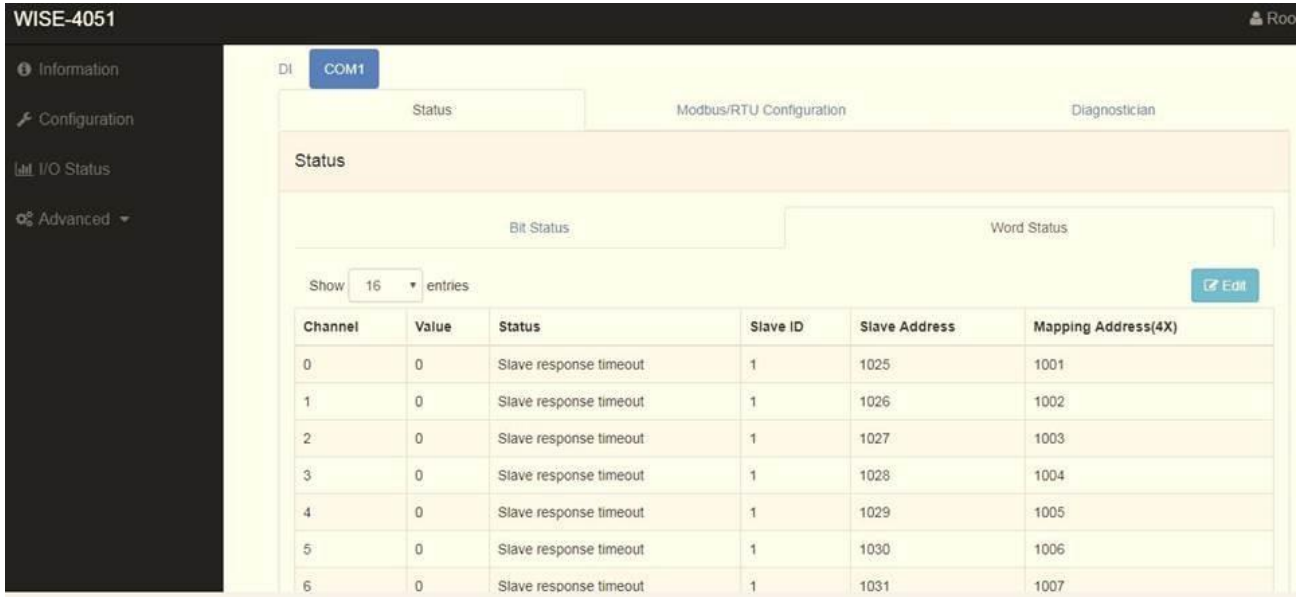
IO Status

The screenshot shows the 'Modbus/RTU Configuration' interface. At the top, there are tabs for 'Status', 'Modbus/RTU Configuration', and 'Diagnostician'. The 'Modbus/RTU Configuration' tab is active, and within it, the 'Rule Setting' sub-tab is selected. A table lists 8 rules with the following columns: Rule, Slave ID, Type, Start Address, Length, R/W, Scan Interval, Mapping Channel, Log, and Rule Status.

Rule	Slave ID	Type	Start Address	Length	R/W	Scan Interval	Mapping Channel	Log	Rule Status
0	1	03 Holding register	1	4	R	1000	0	<input checked="" type="checkbox"/>	✔
1	2	01 Coil status	1	4	R	1000	8	<input checked="" type="checkbox"/>	✔
2	2	01 Coil status	5	3	R	1000	12	<input checked="" type="checkbox"/>	✔
3	1	Disable	1	1	R	1000	0	<input type="checkbox"/>	✘
4	1	Disable	1	1	R	1000	0	<input type="checkbox"/>	✘
5	1	Disable	1	1	R	1000	0	<input type="checkbox"/>	✘
6	1	Disable	1	1	R	1000	0	<input type="checkbox"/>	✘
7	1	Disable	1	1	R	1000	0	<input type="checkbox"/>	✘

■ **Answer:**

The following image shows the utility page of COM1 Status.



If the status shows “**Slave response timeout**” in the “Word status”, how could we get the communication status by querying Modbus address?

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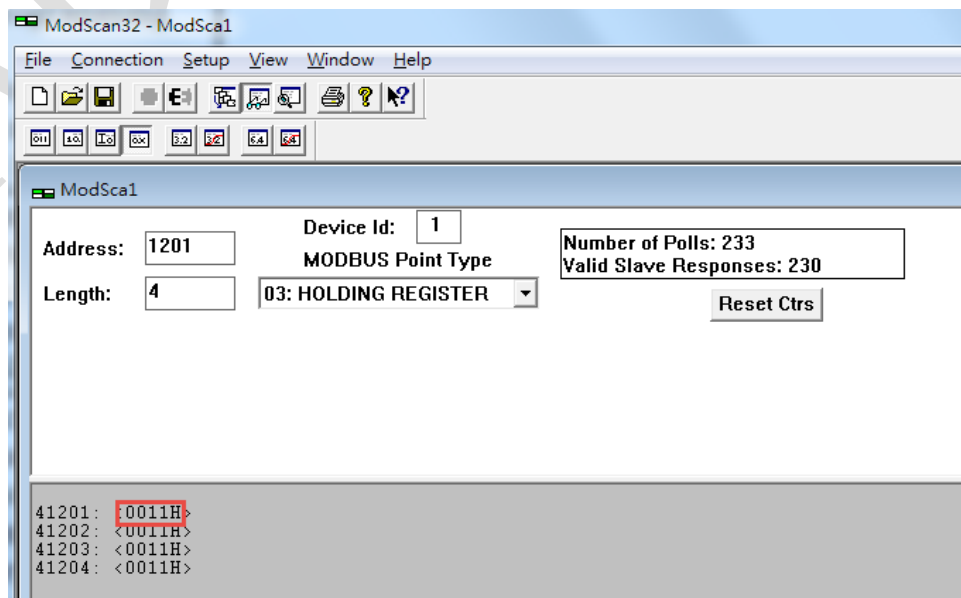
If we want to check the Word Status of Channel 0, we could query Modbus address **1201**.

01001~01032		Expansion Bit	R/W
05001		Low Battery Status	Read
<hr/>			
Address 4X	Channel	Description	Attribute
40211	-	Module Name 1	Read
40212	-	Module Name 2	Read
<hr/>			
40301	All DI	DI Value	Read
<hr/>			
40001~40002	0		R/W
40003~40004	1		R/W
40005~40006	2		R/W
40007~40008	3	Counter/Frequency Value	R/W
40009~40010	4		R/W
40011~40012	5		R/W
40013~40014	6		R/W
40015~40016	7		R/W
<hr/>			
41001~41032		Expansion Word	R/W
<hr/>			
41101~41132		Expansion Bit Error Code	Read
<hr/>			
41201~41232		Expansion Word Error Code	Read
<hr/>			
45101		Data Log Status	Read

The address **1001** records the **Expansion Word** (value) of Channel 0, while the address **1201** records the **Expansion Word Error Code** (status) of Channel 0.

To be more specifically, for **Analog value** (Expansion Word), the values of 32 channels are recorded in the Modbus address 1001~1032. The communication status (Expansion Word Error Code) of Analog value is recorded in the Modbus address 1201~1232.

We could also use Modbus address 1001~1032 to query **Digital value** (Expansion Bit), and use 1101~1132 to query Expansion Bit Error Code.



If we use ModScan application program to query address 1201, as the sample situation in the page 1, we get 11 (Hex), and we could transfer it to 17 (Decimal).

Refer to the below table, we could verify that the Error Code 17 means “Slave response timeout.”

Event Value (bit 6~0)	Description
0 (0x00)	No error
1 (0x01)	Illegal function
2 (0x02)	Illegal data address
3 (0x03)	Illegal data value
4 (0x04)	Slave device failure
5 (0x05)	Acknowledge
6 (0x06)	Slave device busy
7 (0x07)	Negative acknowledge
8 (0x08)	Memory parity error
9 (0x09)	Reserved
10 (0x0A)	Gateway path unavailable
11 (0x0B)	Gateway target device failed to respond
12 ~15	Reserved
16 (0x10)	Unavailable
17 (0x11)	Slave response timeout
18 (0x12)	Checksum error
19 (0x13)	Received data error
20 (0x14)	Send request fail
21(0x15)	Unprocessed
22(0x16)	Read only
23(0x17)	In processing

In the Modbus specification, there already defined 11 kinds of exception code.

<http://www.simplymodbus.ca/exceptions.htm>

The exception codes as explained in the Modbus specification are:

<b>Exception Code</b>	<b>Name</b>	<b>Meaning</b>
01 (01hex)	Illegal Function	The function code received in the query is not an allowable action for the slave. This may be because the function code is only applicable to newer devices, and was not implemented in the unit selected. It could also indicate that the slave is in the wrong state to process a request of this type, for example because it is unconfigured and is being asked to return register values. If a Poll Program Complete command was issued, this code indicates that no program function preceded it.
02 (02hex)	Illegal Data Address	The data address received in the query is not an allowable address for the slave. More specifically, the combination of reference number and transfer length is invalid. For a controller with 100 registers, a request with offset 96 and length 4 would succeed, a request with offset 96 and length 5 will generate exception 02.
03 (03hex)	Illegal Data Value	A value contained in the query data field is not an allowable value for the slave. This indicates a fault in the structure of remainder of a complex request, such as that the implied length is incorrect. It specifically does NOT mean that a data item submitted for storage in a register has a value outside the expectation of the application program, since the MODBUS protocol is unaware of the significance of any particular value of any particular register.
04 (04hex)	Slave Device Failure	An unrecoverable error occurred while the slave was attempting to perform the requested action.
05 (05hex)	Acknowledge	Specialized use in conjunction with programming commands. The slave has accepted the request and is processing it, but a long duration of time will be required to do so. This response is returned to prevent a timeout error from occurring in the master. The master can next issue a Poll Program Complete message to determine if processing is completed.
06 (06hex)	Slave Device Busy	Specialized use in conjunction with programming commands. The slave is engaged in processing a long-duration program command. The master should retransmit the message later when the slave is free..
07 (07hex)	Negative Acknowledge	The slave cannot perform the program function received in the query. This code is returned for an unsuccessful programming request using function code 13 or 14 decimal. The master should request diagnostic or error information from the slave.
08 (08hex)	Memory Parity Error	Specialized use in conjunction with function codes 20 and 21 and reference type 6, to indicate that the extended file area failed to pass a consistency check. The slave attempted to read extended memory or record file, but detected a parity error in memory. The master can retry the request, but service may be required on the slave device.
10 (0Ahex)	Gateway Path Unavailable	Specialized use in conjunction with gateways, indicates that the gateway was unable to allocate an internal communication path from the input port to the output port for

		processing the request. Usually means the gateway is misconfigured or overloaded.
11 (0Bhex)	Gateway Target Device Failed to Respond	Specialized use in conjunction with gateways, indicates that no response was obtained from the target device. Usually means that the device is not present on the network.

BTW, in the data logger of WISE-4051, the Error Code would be recorded as I/O-type “33”, and its value is the Error Code.

The screenshot shows the WISE-4051 data logger interface. On the left is a navigation menu with options: Information, Configuration, I/O Status, and Advanced. The main area displays a 'Data' section with a table of log entries. The table has columns for Log Type, Timestamp, UUID, Slot, Channel, I/O-type, and Value. A red box highlights the 'I/O-type' and 'Value' columns for several entries, showing values like 32, 33, 0, and 17.

Log Type	Timestamp	UUID	Slot	Channel	I/O-type	Value
128	2017-08-16T13:12:54+08:00	WISE-4051_00D0C9FAB2FA	0	0	32	0
128	2017-08-16T13:12:54+08:00	WISE-4051_00D0C9FAB2FA	0	0	33	17
128	2017-08-16T13:12:54+08:00	WISE-4051_00D0C9FAB2FA	0	1	32	0
128	2017-08-16T13:12:54+08:00	WISE-4051_00D0C9FAB2FA	0	1	33	17
128	2017-08-16T13:12:54+08:00	WISE-4051_00D0C9FAB2FA	0	2	32	0
128	2017-08-16T13:12:54+08:00	WISE-4051_00D0C9FAB2FA	0	2	33	17
128	2017-08-16T13:12:54+08:00	WISE-4051_00D0C9FAB2FA	0	3	32	0
128	2017-08-16T13:12:54+08:00	WISE-4051_00D0C9FAB2FA	0	3	33	17
128	2017-08-16T13:13:31+08:00	WISE-4051_00D0C9FAB2FA	0	0	32	0
128	2017-08-16T13:13:31+08:00	WISE-4051_00D0C9FAB2FA	0	0	33	17

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