Modbus protocol data acquisition module

BSMseries

Features

- adopt standardModbus RTUProtocol
- Switch value acquisition is compatible with high and low level signal input methods
- Made of translucent engineering plastic shell
- Can be installed on standardDIN35on guide rail
- Each channel has aledindicator light
- Have aRS232and aRS485interface and can be used simultaneously

Performance specifications

project		Performance specifications
voltage		DC 9 ~ 48V(Analog function moduleDC12~48V)
Switching output type		Relay dry contact/NPNtype transistor
Switch signal collection		DC 5V ~ 24V
Analog input type*1		0 ~ 20mA / 0 ~ 10V
Analog output type*1		0 ~ 20mA / 0 ~ 10V
Communication baud rate		default value:9600bps(Can be modified through software, up to115200bps)
Station No		default value:1(Can be modified through software, range: 1 ~255)
Communication response time		15ms(9600bps) 3ms(115200bps)
shell material		Engineering plastics
Installation method		DIN35Rail installation
Maximum output current	relay	5A
	transistor	200mA
Output response time*2	relay	20msthe following
	transistor	15msthe following
Use ambient temperature		-40 ~ +70℃ (no icing, no condensation)
Use ambient humidity		5~85%RH

* 1.Some models have analog input and output functions, please refer to the "Model List" for details.

* 2.Measurement conditions: Communication parameter is baud rate9600bps, stop bit1bit, measurement result without calibration.

Model standard

BSM-□□□□RB-□AD -□DA

① ② ③ ④

① Number of digital input channels

②Number of digital output channels

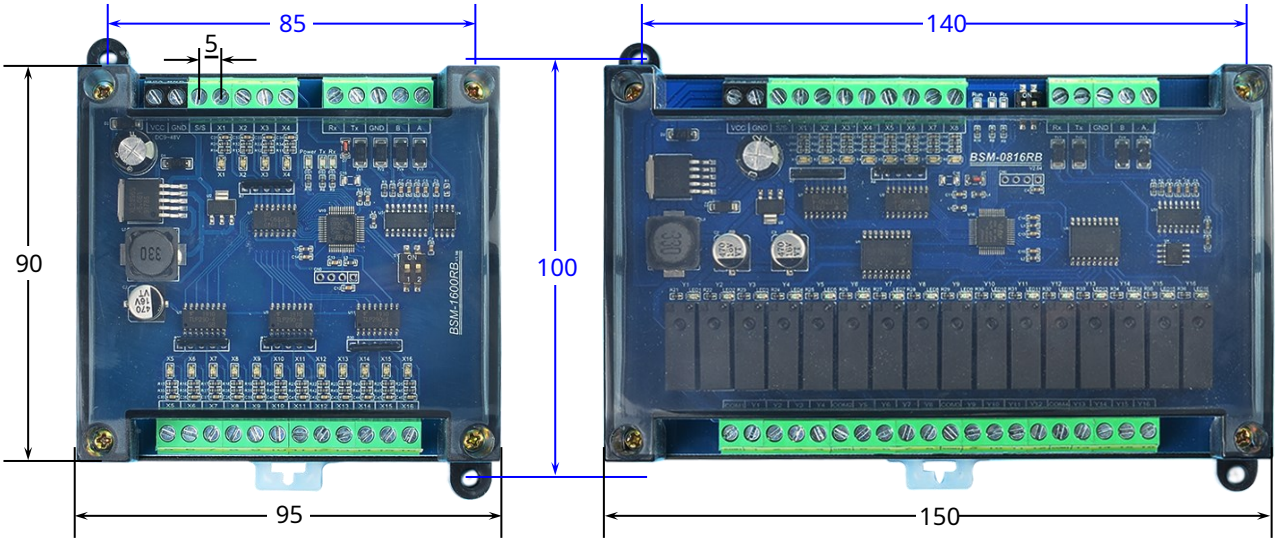
③ Number of analog input channels

④Number of analog output channels

Model list

model	Digital input and output	Digital output type	Analog input	Analog output	Wiring diagram	Dimensions
BSM-1600RB	16enter	none	none	none	A1	Atype
BSM-0404RB	4enter/4output	relay	none	none	A1.B1	Atype
BSM-0404RB - 2AD-2DA	4enter/4output	relay	0~10Vor 4 ~ 20mA 2road	0 ~ 10V 1road 4 ~ 20mA 1road	A1.B1.CD	Atype
BSM-0410RB	4enter/10output	Relay/Transistor	none	none	A1.B2	Atype
BSM-0808RB	8enter/8output	relay	none	none	A1.B1	Btype
BSM-0816RB	8enter/16output	Relay/Transistor	none	none	A1.B2	Btype
BSM-1616RB	16enter/16output	Relay/Transistor	none	none	A1.B2	Btype

Appearance and installation dimensions



Atype housing front view

Btype housing front view

Installation hole distance

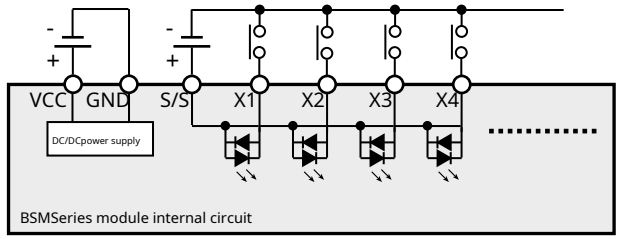
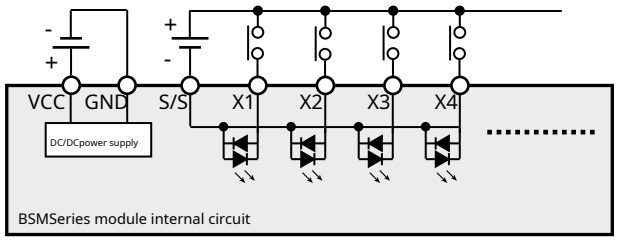
Dimensions

A,Btype housing side view

Input/output wiring

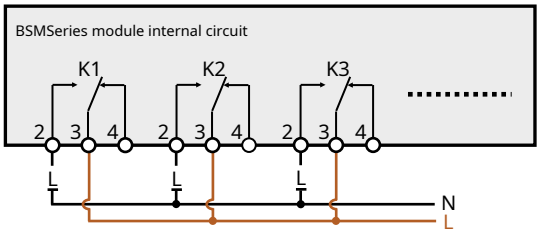
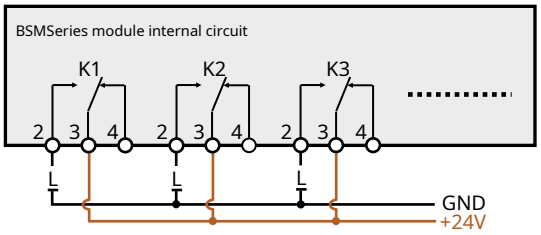
A1.Input and power terminal wiring diagram

The module uses a wide voltageDC 9 ~ 48VPower supply, modules with analog input or output functions use DCDC12~48Vpowered by. The voltage range of the switching signal input isDC9~24V.S/STThe terminal is the common terminal of the switch input signal. WhenS/SWhen the terminal is connected correctly, the input signal is valid at low voltage. S/SWhen the terminal is connected to negative, the input signal is valid at high voltage.

NPNswitch signal input	PNPswitch signal input
	

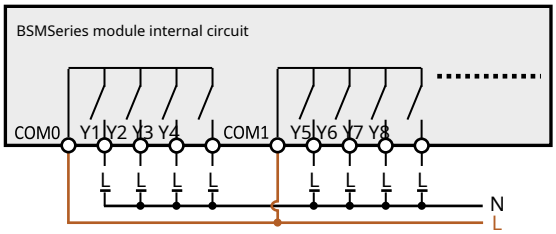
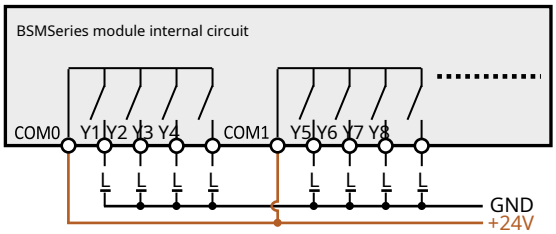
B1.Relay output wiring diagram

The output of the switching relay is the dry contact signal of the relay, with voltage resistance250V, the maximum allowable current is5A. Each output channel has an independent open and closed contact, terminal3is the output common terminal, the terminal2forNONormally open contact, terminal4It is a normally closed contact.

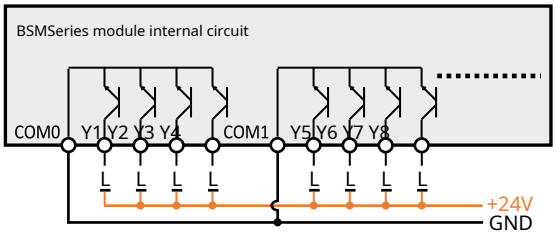
Relay output controls AC load	Relay output controls DC load
	

B2.Relay/Transistor Output Wiring Diagram

The output of the switching relay is the dry contact signal of the relay, with voltage resistance250V, the maximum allowable current is3A. Multiple output channels share oneCOMCommon terminals, and all are normally open contacts.

Relay output controls AC load	Relay output controls DC load
	

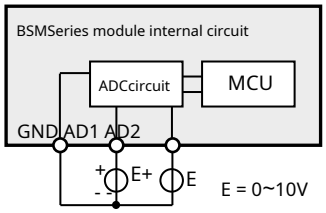
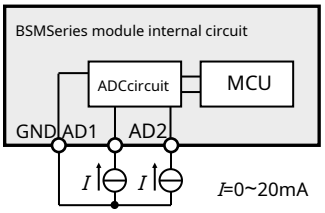
The transistor output usesNPNType open collector output mode, DC withstand voltage30V, the maximum allowable current is500mA. Multiple output channels share oneCOMCommon terminal, and the common terminal must be connectedGND.

Transistor output controls DC load


◆ C.Analog input wiring diagram

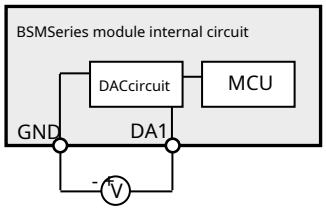
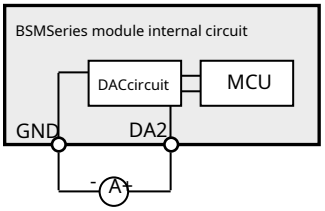
Analog input is divided into0~10Vvoltage input type and4~20mATwo input modes: current input type.

0~10VVoltage input type internal impedance ≥200 K 4 ~ 20mACurrent input type internal impedance≤500Ω

0~10VAnalog input	0~20mAAnalog input
	

◆ D.Analog output wiring diagram

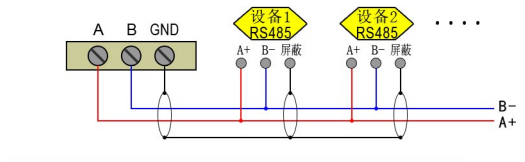
Analog output is divided into0~10Vvoltage output type and4~20mACurrent output type has two output modes.

0~10VAnalog output	0~20mAAnalog output
	

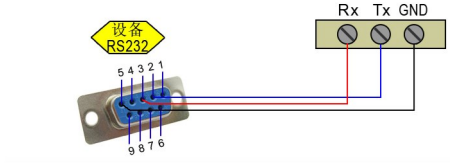
Communication interface wiring

BSMSeries modules also have aRS232and aRS485interface, and the two serial ports are relatively independent and can be used at the same time. useRS232The theoretical communication distance of serial communication method cannot exceed15meters, and oneModbusThe master device and a slave module can only form1:1network. useRS485The theoretical communication distance of serial communication method does not exceed one thousand meters, which can realize a ModbusThe master station device is composed of multiple slave station modules.1:Nnetwork of.

RS485级联接线图：



RS232接线图：



Communication parameter settings

BSMThe default communication parameters of the series modules are, baud rate9600, data bits8bit, no parity, stop bit1Bit,ModbusStation No1. The communication parameters of this product can be passedModbus_BSISoftware settings.

After the parameter setting is completed, the module power needs to be disconnected and then powered on again, and the module will run with the new communication parameters. The steps for setting communication parameters will be introduced in detail below.

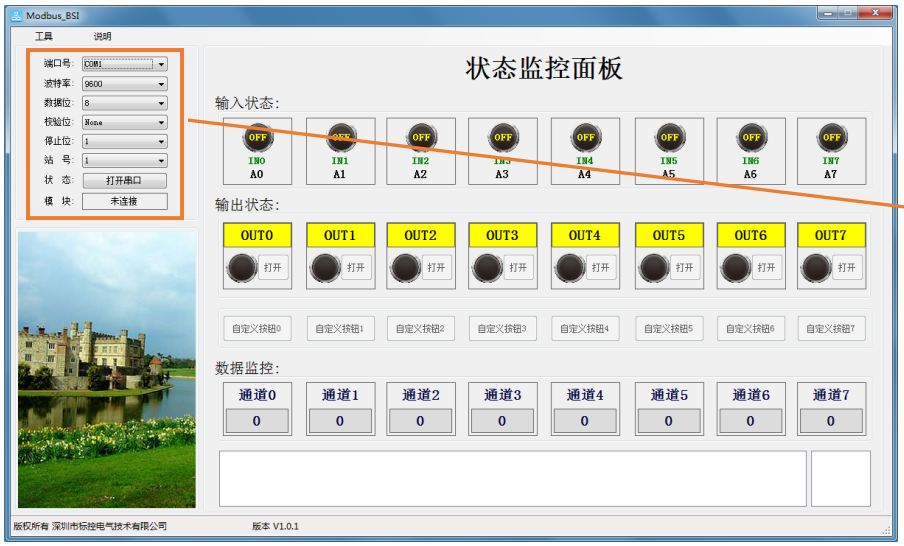
Step 1: Preparation

Open the module shell and turn all the DIP switches on the circuit board toOFF(Default communication parameter mode). Connect the communication cable between the computer and the module, and turn on the module power.

picture2.41

Step 2: Open the software

Open the product package providedModbus_BSIsoftware (pictured)2.41shown), the software interface is as shown in the figure below.



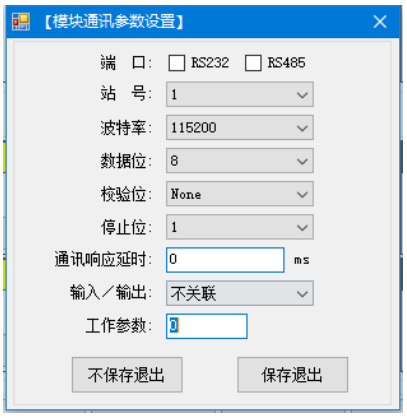
picture2.42

picture2.43

Select the port number used by the computer connection module, and then set the baud rate in sequence9600, data bits8, check bitNone, stop bit1,Station No1(As shown in the picture2.42shown). After the settings are completed, click the "Open Serial Port" button. If the module status changes from "not connected" to "connected" (as shown in the figure2.43shown), indicating that the computer has been successfully connected to the module.

Step 3: Modify communication parameters

Click "Tools" → "Module Communication Parameters" to open the communication parameter setting window (as shown in the figure)2.44shown). In the pop-up "Module Communication Parameter Settings" window, set the communication parameters required for module operation. After completion, click the "Save and Exit" button.



picture2.44

Step 4: Exit and power on again

Close the serial port and exitModbus_BSIsoftware. Disconnect the power supply of the module and turn all the DIP switches on the module toON(Run mode). Finally close the case and power up the module again. At this time, the module will work with the previously set communication parameters.

Protocol

This product uses standardModbusRTUCommunication protocol, if you need to customize the protocol, please contact the product supplier.ModbusThe communication protocol is one of the most commonly used communication protocols in the field of industrial serial communication. For details of the communication protocol, users can refer to "ModbusAgreement (full version)".

In order to shorten the reading time of users, the following is only for the use of this productModbusThe protocol is briefly explained and explained. The main site in the following content represents the user's computer, microcontroller orPLCetc., a device that can actively send data. The slave station in the following content represents this product.

Note: If not requiredCRCVerification, you can change the last bit in the master request frame2byteCRCIf all verification data is written00, the module will not proceedCRCCheck calculation.

1. Read the input point status

Read the input point status corresponding toModbusThe function code is02function code. The format of the request frame sent by the master station and the response frame of the slave station are as follows:

Main site request format:

Station No	function code	initial address	Number of reads	CRCcheck
1byte	0x02	2byte	2byte	2byte

Slave response format:

Station No	function code	Number of bytes	input point status	CRCcheck
1byte	0x02	1byte	Nbyte	2byte

example1: The master station device needs to read the slave station number as1of equipment, the1To the third8The status of the input point (Note: No.1The address of the input point is0).

Master request frame (16base):01 02 00 00 00 08 79 CC

slave response frame (16base):01 02 01 89 60 2E

In the slave response frame, it represents the status of the input point.16base number89, converted into2The base system is10001001. From this it can be seen that the slave device8,4,1The status bit of the input point1, the status of other input points is0.

2. Read the output point status

Read the output point status corresponding toModbusThe function code is01The usage of function code is similar to that of reading the input point status. The format of the request frame sent by the master station and the response frame of the slave station are as follows:

Main site request format:

Station No	function code	initial address	Number of reads	CRCcheck
1byte	0x01	2byte	2byte	2byte

Slave response format:

Station No	function code	Number of bytes	input point status	CRCcheck
1byte	0x01	1byte	Nbyte	2byte

example1: The master station device needs to read the slave station number as1Equipment, No.1to the first8The status of the output point (note: the1The address of the output point is0).

Master request frame (16base):01 01 00 00 00 08 3D CC

slave response frame (16base):01 01 01 B8 51 FA

In the slave station response frame, it represents the status of the output point.16base numberB8, converted into2The base system is10111000. From this it can be seen that the slave device8,6,5,4The status bit of the output point1, the status of other output points is0.

3. Write a single output point

Write the corresponding state of a single output pointModbusThe function code is05Function code, used to change the state of a specified output point in the slave device. The format of the request frame sent by the master station and the response frame of the slave station are as follows:

Main site request format:

Station No	function code	write address	status value	CRCcheck
1byte	0x05	2byte	2byte	2byte

Slave response format:

Station No	function code	write address	status value	CRCcheck
1byte	0x05	2byte	2byte	2byte

example1: The station number needs to be1Among the slave devices, the1The output point status is set toON(Note: Chapter1The address of the output point is0).

Master request frame (16base):01 05 00 00 FF 00 8C 3A

slave response frame (16base):01 05 00 00 FF 00 8C 3A

example2: The station number needs to be1Among the slave devices, the6The output point status is set toON(Note: Chapter6The address of the output point is5).

Master request frame (16base):01 05 00 05 FF 00 9C 3B

slave response frame (16base):01 05 00 05 FF 00 9C 3B

example3: The station number needs to be1Among the slave devices, the8The output point status is set toOFF(Note: Chapter8The address of the output point is7).

Master request frame (16base):01 05 00 07 00 00 7C 0B

slave response frame (16base):01 05 00 07 00 00 7C 0B

4. Write multiple output points

Write corresponding to the status of multiple output pointsModbusThe function code is15Function code, used to change the status of a certain continuous output point in the slave device. The format of the request frame sent by the master station and the response frame of the slave station are as follows:

Main site request format:

Station No	function code	initial address	Number of writes	Number of bytes	write value	CRCcheck
1byte	0x0F	2byte	2byte	1byte	Nbyte	2byte

Slave response format:

Station No	function code	initial address	Number of writes	CRCcheck
1byte	0x0F	2byte	2byte	2byte

example1: Change the station number to1Among the slave devices, the1to the first8The status of all output points is set toOFF.

Master request frame (16base):01 0F 00 00 00 08 01 00 FE 95

slave response frame (16base):01 0F 00 00 00 08 54 0D

example2: Change the station number to1Among the slave devices, the1to the first8The status of all output points is set toON.

Master request frame (16base):01 0F 00 00 00 08 01 FF BE D5

slave response frame (16base):01 0F 00 00 00 08 54 0D

example3: Change the station number to1Among the slave devices, the1,2,4,8The output point status is set toON, No.3,5,6,7The status of each output point is set toOFF.

Master request frame (16base):01 0F 00 00 00 08 01 8B BE F2

slave response frame (16base):01 0F 00 00 00 08 54 0D

5. Read analog input (3x)

Read the analog input value corresponding toModbusThe function code is04Function code, used to read the analog input value in the slave device. The analog quantity collection accuracy of this series of modules is 12bit, that is, the data read at full scale is4000. The format of the request frame sent by the master station and the response frame of the slave station are as follows:

Main site request format:

Station No	function code	initial address	Read quantity	CRCcheck
1byte	0x04	2byte	2byte	2byte

Slave response format:

Station No	function code	Number of bytes	Read value	CRCcheck
1byte	0x04	1byte	Nbyte	2byte

example1: Change the station number to1Among the slave devices, the1to the first4The analog input value of each channel.

Master request frame (16base):01 04 00 00 00 04 F1 C9 slave response

frame (16base):01 04 08 0B BE 00 00 00 00 00 00 3B B5

In the slave response frame,0B BEConvert to decimal as3006. From this it can be seen that the slave device1The analog input value of the channel is3006, No.2,3,4The analog input value of the channel is0.

6. Write a single analog output (4x)

Write a single analog output value corresponding toModbusThe function code is06Function code, used to modify the output value of the analog channel in the slave device. The starting address of the analog output channel of this series of modules is500, the output accuracy is12bit, that is, the data is4000When the module's analog channel output reaches the maximum value. The format of the request frame sent by the master station and the response frame of the slave station are as follows:

Main site request format:

Station No	function code	initial address	data input	CRCcheck
1byte	0x06	2byte	2byte	2byte

Slave response format:

Station No	function code	initial address	data input	CRCcheck
1byte	0x06	2byte	2byte	2byte

example1: Change the station number to1The slave module in the1The value of the analog output channel is changed to3000. (No. of the module1The address of the analog output channel is500, converted to16 The base system is01 F4, value3000converted to16The base system is0B B8.) The format of the request frame sent by the master station and the response frame of the slave station are as follows:

Master request frame (16base):01 06 01 F4 0B B8 CE 86

slave response frame (16base):01 06 01 F4 0B B8 CE 86

After the writing is successful, the slave station returns the same data as the master station request frame.

appendix1:4xRegister map

BSMAll states of the series modules are mapped to4xwithin the interval register. Users can read or modify by4xThe value of the interval register enables monitoring of the input and output status of the module.

address	parameter name	Set range	Parameter Description	read/write
0	Modbus station number	1~255	Module station number	R/W
1	status bit	0	bit0:232 communication bit1:485 communication	R/W
2	baud rate	48~1152	48:4800bps 98:9600bps 192:19200bps	R/W
3	Check Digit	0	0: No parity 1: Even parity 2: Odd parity	R/W
4	Data return delay	0~1000	The interval for returning data after receiving the command (unit: ms)	R/W
5	Operating mode	0~100	0: Not relevant (please refer to the working mode manual for details)	R/W
6	Working parameters	0~32767	For detailed introduction, please refer to the working mode manual.	R/W
7	reserve	0		R/W
8	reserve	0		R/W
9	Write to Flash	0	111:Write parameters into Flash	R/W
10	Module serial number 1	0~	The module's globally unique 96-digit serial number, digits 1 to 16	R
11	Module serial number 2	0	The module's globally unique 96-digit serial number, digits 17 to 32	R
12	Module serial number 3	0	The module's globally unique 96-digit serial number, digits 33 to 48	R
13	Module serial number 4	0	The module's globally unique 96-digit serial number, 49th to 64th digits	R
14	Module serial number 5	0	The module's globally unique 96-digit serial number, 65th to 80th digits	R
15	Module serial number 6	0	The module's globally unique 96-digit serial number, digits 81 to 96	R
400	Switch input 1 count L	0	Switch input 1 count value low bit	R/W
401	Switch input 1 count H	0	Switch input 1 count value high bit	R/W
402	Switch input 2 count L	0	Switch input 2 count value low bit	R/W
403	Switch input 2 count H	0	Switch input 2 count value high bit	R/W
404	Switch input 3 count L	0	Switch input 3 count value low bit	R/W
405	Switch input 3 counts H	0	Switch input 3 count value high bit	R/W
406	Switch input 4 counts L	0	Switch input 4 count value low bit	R/W
407	Switch input 4 counts H	0	Switch input 4 count value high bit	R/W
408	Switch input 5 counts L	0	Switch input 5 count value low	R/W
409	Switch input 5 counts H	0	Switch input 5 count value high bit	R/W
410	Switch input 6 counts L	0	Switch input 6 count value low bit	R/W
411	Switch input 6 counts H	0	Switch input 6 count value high bit	R/W
412	Switch input 7 counts L	0	Switch input 7 count value low	R/W
413	Switch input 7 counts H	0	Switch input 7 count value high bit	R/W
414	Switch input 8 counts L	0	Switch input 8 count value low bit	R/W
415	Switch input 8 counts H	0	Switch input 8 count value high bit	R/W
500	Analog 1 output value	0~4000		R/W
501	Analog 2 output value	0~4000		R/W
502	Analog 3 output value	0~4000		R/W
503	Analog 4 output value	0~4000		R/W
504	Analog 5 output value	0~4000		R/W
505	Analog 6 output value	0~4000		R/W
506	Analog 7 output value	0~4000		R/W
507	Analog 8 output value	0~4000		R/W
520	Analog 1 input value	0~4000		R
521	Analog 2 input value	0~4000		R
522	Analog 3 input value	0~4000		R
523	Analog 4 input value	0~4000		R
524	Analog 5 input value	0~4000		R
525	Analog 6 input value	0~4000		R
526	Analog 7 input value	0~4000		R
527	Analog 8 input value	0~4000		R

address	parameter name	Set range	Parameter Description	read/write
560	Switching output 1	0~1	Switch output status bits 1~16	R/W
561	Switching output 2	0~1	Switch output status bits 17~32	R/W
562	Switching output 3	0~1	Switch output status bits 33~48	R/W
563	Switching output 4	0~1	Switch output status bits 49~64	R/W
564	Switching output 5	0~1	Switch output status bit 65~80	R/W
565	Switching output 6	0~1	Switch output status bits 81~96	R/W
566	Switching output 7	0~1	Switch output status bits 97~112	R/W
567	Switching output 8	0~1	Switch output status bits 113~128	R/W
568	Switching output 9	0~1	Switch output status bits 129~144	R/W
569	Switching output 10	0~1	Switch output status bit 145~160	R/W
570	Switching output 11	0~1	Switch output status bits 161~176	R/W
571	Switching output 12	0~1	Switch output status bits 177~192	R/W
572	Switching output 13	0~1	Switch output status bits 193~208	R/W
573	Switching output 14	0~1	Switch output status bits 209~224	R/W
574	Switching output 15	0~1	Switch output status bit 225~240	R/W
575	Switching output 16	0~1	Switch output status bits 241~256	R/W
576	Switching output 17	0~1	Switch output status bits 257~272	R/W
577	Switching output 18	0~1	Switch output status bit 273~280	R/W
578	Switching output 19	0~1	Switch output status bits 281~304	R/W
579	Switching output 20	0~1	Switch output status bit 305~320	R/W
630	Switch input 1	0~1	Switch input status bits 1~16	R
631	Switch input 2	0~1	Switch input status bits 17~32	R
632	Switch input 3	0~1	Switch input status bits 33~48	R
633	Switch input 4	0~1	Switch input status bits 49~64	R
634	Switch input 5	0~1	Switch input status bit 65~80	R
635	Switch input 6	0~1	Switch input status bits 81~96	R
636	Switch input 7	0~1	Switch input status bits 97~112	R
637	Switch input 8	0~1	Switch input status bits 113~128	R
638	Switch input 9	0~1	Switch input status bits 129~144	R
639	Switch input 10	0~1	Switch input status bit 145~160	R
640	Switch input 11	0~1	Switch input status bits 161~176	R
641	Switch input 12	0~1	Switch input status bits 177~192	R
642	Switch input 13	0~1	Switch input status bits 193~208	R
643	Switch input 14	0~1	Switch input status bits 209~224	R
644	Switch input 15	0~1	Switch input status 225~240 bits	R
645	Switch input 16	0~1	Switch input status bits 241~256	R
646	Switch input 17	0~1	Switch input status bits 257~272	R
647	Switch input 18	0~1	Switch input status bit 273~280	R
648	Switch input 19	0~1	Switch input status bits 281~304	R
649	Switch input 20	0~1	Switch input status bits 305~320	R