

# SG2V3 ModBus Protocol

(V type: RS485 port)

Series: SG2 V type  
Version: V 0 3

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**1. Communication Data Frame**

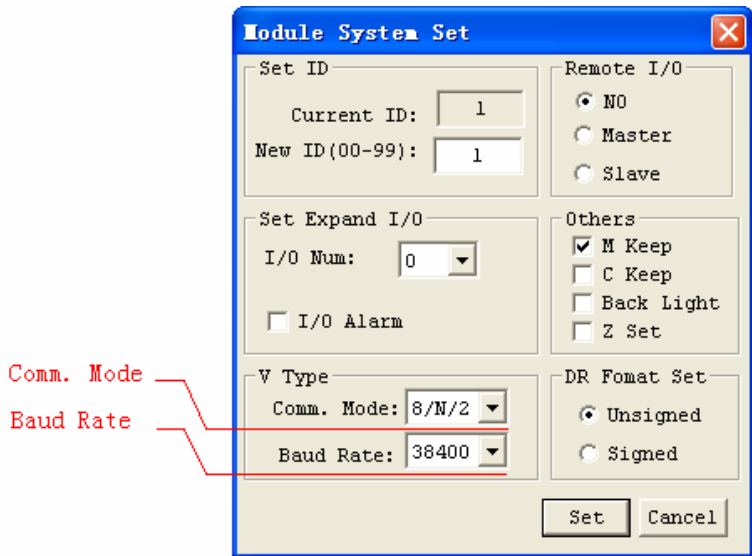
SG2 series PLC can be communication controlled by the PC or other controller with the communication protocol, ModBus RTU Mode, RS485.

**1.1 Communication parameter**

SG2 provides different communication parameter to satisfy your needs. And there are two ways to set that parameter.

1. Setting communication parameter via SG2 Client.

- ◆ Insert the plastic connector end of the programming cable into the SG2 smart relay. Connect the opposite end of the cable to an RS232 serial port on the computer.
- ◆ In SG2 Client Soft Select Operation>>Module System Set, to open the dialog box as show below.

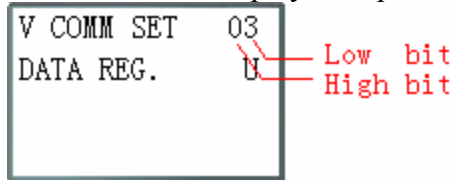


- ◆ As the illustration show, you can set Communication Mode and Baud Rate.
- ◆ In the table below, list the options which you can choose from.

Comm. Mode	8/N/2	Data 8bit, No Parity, 2 Stop bit.
	8/E/1	Data 8bit, Even Parity, 1 Stop bit.
	8/O/1	Data 8bit, Odd Parity, 1 Stop bit.
	8/N/1	Data 8bit, No Parity, 1 Stop bit.
Baud Rate.	4800 bps 9600 bps 19200 bps 38400 bps 57600 bps 115200 bps	

2. Set communication format and Baud Rate on SG2.

- ◆ Press ESC to enter main menu.
- ◆ Press UP/DOWN to choose SET menu, and press OK to enter it.
- ◆ Press UP/DOWN makes the LCD to display the options as show below.



- ◆ Changing high bit would set Comm. Mode; changing low bit would set Baud Rate.

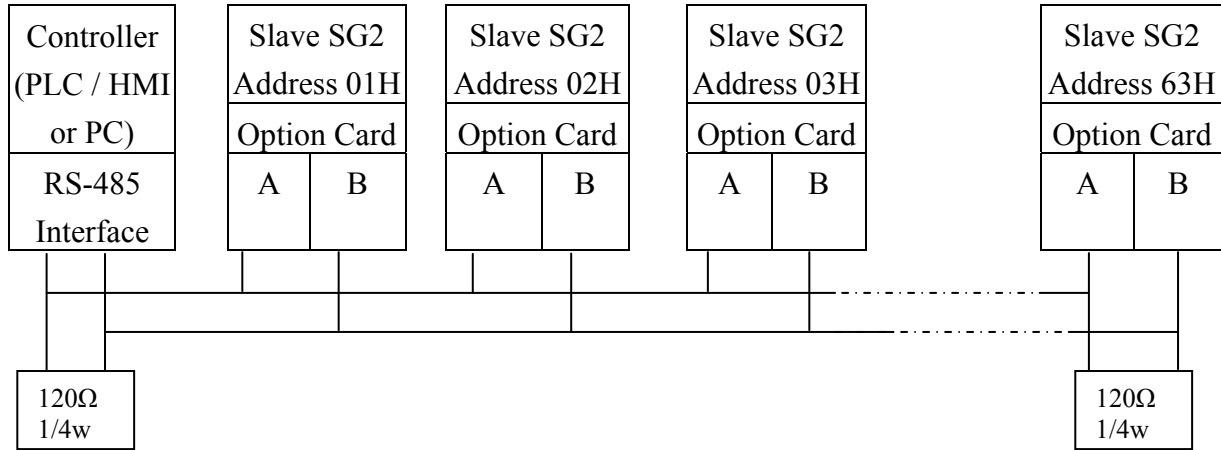
Content	Data	meaning
High bit	0	8/N/2 Data 8bit, No Parity, 2 Stop bit.
	1	8/E/1 Data 8bit, Even Parity, 1 Stop bit.
	2	8/O/1 Data 8bit, Odd Parity, 1 Stop bit.
	3	8/N/1 Data 8bit, No Parity, 1 Stop bit.
Low bit	0	4800 bps
	1	9600 bps
	2	19200 bps
	3	38400 bps
	4	57600 bps
	5	115200 bps

3. SG2 RS485 port default communication parameter as table show below:

Baud rate	38400bps
Data bit	8
Stop bit	2
Parity	No
Frame length maximum	128 bytes

- ◆ SG2 V2 RS485 port communication parameter as table show above.
- ◆ The communication parameter setting takes effect after power up again.

**1.2 Hardware Installation**



\*It is necessary to connect the terminal impedance (120Ω, 1/4W) at both ends of the communication wire.

**1.3 Data frame for RTU Mode**

MASTER (PLC etc.) send request to SLAVE, whereas SLAVE response to MASTER. The signal receiving is illustrated here. The data length is varied with the command (Function).

SLAVE Address	1byte
Function Code	1byte
DATA	nbyte
CRC16 CHECK	2byte
Signal Interval	Signal Interval

\*\* The interval should be maintained at 10ms between command signal and request.

**1.4 SLAVE Address**

- 00H : Broadcast to all the drivers
- 01H : to the No.01 Driver
- 0FH : to the No.15 Driver
- 10H : to the No.16 Driver
- and so on....., Max to No.99(63H)

**1.5 Function Code**

- 01H: Read coils status
- 03H: Read registers
- 05H: Write single coil
- 06H: Write single register
- 08H: Diagnostic
- 10H: Write multiple registers

## 2. CMS (Checksum and time-out definition)

### 2.1 CRC CHECK:

CRC check code is from Slave Address to end of the data. The calculation method is illustrated as follow:

- (1) Load a 16-bit register with FFFF hex (all 1's). Call this the CRC register.
- (2) Exclusive OR the first 8-bit byte of the message with the low-order byte of the 16-bit CRC register, putting the result in the CRC register.
- (3) Shift the CRC register one bit to the right (toward the LSB), Zero-filling the MSB, Extract and examines the LSB.
- (4) (If the LSB was 0): Repeat Steps (3) (another shift) (If the LSB was 1): Exclusive OR the CRC register with the polynomial value A001 hex (1010 0000 0000 0001).
- (5) Repeat Steps (3) and (4) until 8 shifts been performed. When this is done, a complete 8-bit byte will be processed.
- (6) Repeat Steps (2) through (5) for next 8-bit byte of the message, Continue doing this until all bytes have been processed. The final content of the CRC register is the CRC value. Placing the CRC into the message: When the 16-bit CRC (2 8-bit bytes) is transmitted in the message, the low-order byte will be transmitted first, followed by the high-order byte, For example, if the CRC value is 1241 hex, the CRC-16 (Low) put the 41h, the CRC-16 (Hi) put the 12h.

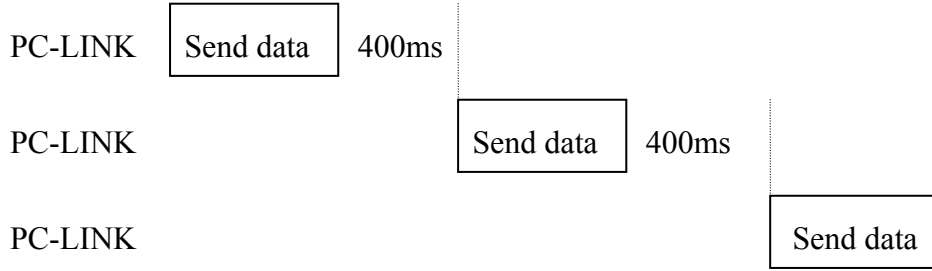
### ● CRC calculation application program

```

UWORD ch_sum ( UBYTE long , UBYTE *rxdbuff ) {
    BYTE i = 0;
    UWORD wkg = 0xFFFF;
    while ( long-- ) {
        wkg ^= rxdbuff++;
        for ( i = 0 ; i < 8; i++ ) {
            if ( wkg & 0x0001 ) {
                wkg = ( wkg >> 1 ) ^ 0xa001;
            }
            else {
                wkg = wkg >> 1;
            }
        }
    }
    return( wkg );
}

```

**2.2 TIME-OUT (400ms) & RETRY (max. : 2 times)**



**3. Command**

**3.1 01H Read Coils**

This function code is used to read from 1 to 960 contiguous statuses of coils in a remote device.

PC → PLC			PLC→PC(OK)			PLC→PC(ERROR)		
SLAVE Address	01 H		SLAVE Address	01H		SLAVE Address	01H	
Function Code	01H		Function Code	01H		Function Code	81H	
Starting Address	High	05H	Byte count	02H		Exception Code	51H	
	Low	40H		Outputs status M8~1	45H		CRC-16	Low
Quantity of coils	High	00H	Outputs status MF~9	34H		High		ACH
	Low	10H	CRC-16	Low	8AH			
CRC-16	Low	3CH		High	BBH			
	High	DEH						

\*: User set the start address equal multiple of 10H, and quantity of coils also equal multiple of 10H (read word coil status).

Sample: M8~1=45H (01000101B), coil M8~M1 status is OFF-ON-OFF-OFF, OFF-ON-OFF-ON;

**3.2 03H Read Registers**

This function code is used to read the contents of from 1 to approx. 61 contiguous block of holding registers in a remote device.

PC → PLC			PLC→PC(OK)			PLC→PC(ERROR)		
SLAVE Address	01H		SLAVE Address	01H		SLAVE Address	01H	
Function Code	03H		Function Code	03H		Function Code	83H	
*Register Address	(High)	00H	Data (byte)	26H		Exception Code	52H	
	(Low)	00H	*Send out the data				CRC-16 (Lo)	C0H
Data Length ( Hi )	00H		CRC-16 (Lo)	?		CRC-16 (Hi)		CDH
Data Length ( Lo )	13H		CRC-16 (Hi)	?				
CRC-16 (Lo)	04H							
CRC-16 (Hi)	07H							



**3.3 05H Write Single Coil**

This function code is used to write a single output to either ON or OFF in a remote device.

SLAVE Address	01H	
Function Code	05H	
Coil Address	High	05H
	Low	02H
Coil Value	High	FFH
	Low	00H
CRC-16	Low	2DH
	High	36H

SLAVE Address	01H	
Function Code	05H	
Coil Address	High	05H
	Low	02H
Coil Value	High	FFH
	Low	00H
CRC-16	Low	2DH
	High	36H

SLAVE Address	01H	
Function Code	85H	
Exception Code	52H	
CRC-16	Low	C3H
	High	6DH

A value of 0xFF00 requests the coil to be ON.

A value of 0x0000 requests the coil to be OFF.

**3.4 06H Write single Register**

This function code is used to write a single holding register in a remote device.

SLAVE Address	01 H	
Function Code	06H	
*Register Address	(High)	01H
	(Low)	02H
Write Data	High	17H
	Low	70H
CRC-16 (Lo)	27H	
CRC-16 (Hi)	E2H	

SLAVE Address	01H	
Function Code	06H	
*Register Address	High	01H
	Low	02H
Write Data	High	17H
	Low	70H
CRC-16 (Lo)	27H	
CRC-16 (Hi)	E2H	

SLAVE Address	01H	
Function Code	86H	
Exception Code	52H	
CRC-16 (Lo)	C3H	
CRC-16 (Hi)	9DH	

**3.5 08H Diagnostic**

The function code 08 provides a series of tests for checking the communication system between a client (Master) device and a server (Slave), or for checking various internal error conditions within a server.

Sub-Function 00:Return Query Data

Address	01 H	
Function Code	08H	
Sub Function	High	00H
	Low	00H
DATA	High	A5H
	Low	37H
CRC-16	High	DAH
	Low	8DH

Address	01H	
Function Code	08H	
Sub Function	High	00H
	Low	00H
DATA	High	A5H
	Low	37H
CRC-16	High	DAH
	Low	8DH

Address	01H	
Function Code	88H	
Exception Code	20H	
CRC-16	High	47H
	Low	D8H

Data is a random word.

**3.6 10H Write multiple Registers**

This function code is used to write a block of contiguous registers (1 to approx. 59 registers) in a remote device.

PC → PLC		PLC→PC(OK)		PLC→PC(ERROR)	
Address	01H	Address	01H	Address	01H
Function Code	10H	Function Code	10H	Function Code	90H
*Register	(High) 00H	*Register	(High) 00H	Exception Code	52H
Address	(Low) 00H	Address	(Low) 00H	CRC-16 (Lo)	ACH
Data Length ( Hi )	00H	Data Length ( Hi )	00H	CRC-16 (Hi)	3DH
Data Length ( Lo )	13H	Data Length ( Lo )	13H		
Byte counters	26H	CRC-16 (Lo)	81H		
Send out the data		CRC-16 (Hi)	C4H		
CRC-16 (Lo)	?				
CRC-16 (Hi)	?				

**3.7 Exception Code**

Under communication linking, the controller responses the Exception Code and send Function Code add 80H to main system if there is error happened.

Exception Code	Description
51	Frame error (Function Code error, Register Encoding error, Data Quantity Error)
52	Run mode and command disable
53	Secret mode and command disable
54	Data value over rang
55	SG2 system ROM error
56	SG2 RTC not exist, can't operate RTC
57	SG2 the other error
58	Commands do not match SG2 edit mode
59	Brand ID error

4. Register Address

4.1 00xxH: Coil Status Address (word)

Register Address	Data Length	Usable Comm.	Content																
			F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	
0000H	1	03H 06H 10H	R10	R0F	R0E	R0D	R0C	R0B	R0A	R09	R08	R07	R06	R05	R04	R03	R02	R01	
0001H	1		G10	G0F	G0E	G0D	G0C	G0B	G0A	G09	G08	G07	G06	G05	G04	G03	G02	G01	
0002H	1		T10	T0F	T0E	T0D	T0C	T0B	T0A	T09	T08	T07	T06	T05	T04	T03	T02	T01	
0003H	1		C10	C0F	C0E	C0D	C0C	C0B	C0A	C09	C08	C07	C06	C05	C04	C03	C02	C01	
0004H	1		M10	M0F	M0E	M0D	M0C	M0B	M0A	M09	M08	M07	M06	M05	M04	M03	M02	M01	
0005H	1		Z04	Z03	Z02	Z01	I0C	I0B	I0A	I09	I08	I07	I06	I05	I04	I03	I02	I01	
0006H	1		-	-	-	-	X0C	X0B	X0A	X09	X08	X07	X06	X05	X04	X03	X02	X01	
0007H	1		-	-	-	-	-	-	-	-	Q08	Q07	Q06	Q05	Q04	Q03	Q02	Q01	
0008H	1		-	-	-	-	Y0C	Y0B	Y0A	Y09	Y08	Y07	Y06	Y05	Y04	Y03	Y02	Y01	
0009H	1		N10	N0F	N0E	N0D	N0C	N0B	N0A	N09	N08	N07	N06	N05	N04	N03	N02	N01	
000AH	1		H10	H0F	H0E	H0D	H0C	H0B	H0A	H09	H08	H07	H06	H05	H04	H03	H02	H01	
000BH	1		W10	W0F	W0E	W0D	W0C	W0B	W0A	W09	W08	W07	W06	W05	W04	W03	W02	W01	
000CH	1		W20															W11	
000DH	1		W30															W21	
000EH	1		W40															W31	
000FH	1		-	-	-	-	-	-	-	P02	P01	L08	L07	L06	L05	L04	L03	L02	L01
0010H	1	03H (Only FBD)	B16	B15	B14	B13	B12	B11	B10	B09	B08	B07	B06	B05	B04	B03	B02	B01	
0011H	1		B32																B17
0012H	1		B48																B33
0013H	1		B64																B49
0014H	1		B80																B65
0015H	1		B96																B81
0016H	1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	B99	B98	B97

Z can't be written.

4.2 01xxH: Control register Address

Register Address	Data Length	Usable Comm.	Content															
			F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
0100H	1	03H	00								S1							
		06H	RUN / STOP : S1=0 STOP															
		10H	S1=1 RUN															

0101H	1	03H	BRANDID								GENIEMODE							
			GENIE MODE (Hex) Only V-Type model 30=20VR-D,                      70=20VR-12D 34=20VT-D,                      74=20VT-12D															
0102H	1	03H 06H 10H	A	Z	I1	I0	L3	L2	L1	L0	-	S1	S2	B	-	-	D1	D0
			STATUS1: A: alarm at expand I/O No. unmatched =0: alarm =1: don't alarm Z: Z set =0: Z disable =1: Z enable I1I0: expand I/O No.(0~3) L3 L2 L1 L0: language =1 : English =2 : French =3 : Spanish =4 : Italian =5 : German =6 : Portugal =7 : Chinese B: Backlight on/off =0 : auto on/off =1 : always on s1:Power down retain(M coil) =1 : unretain =0 : retain S2:run/stop retain(Counter current value) =1 : retain =0 : unretain D1D0:Data communication mode =0: data link =1: remote I/O master =2: remote I/O slave															

			PA	Errorcode
0103H	1	03H	STATUS2 (PA,Error) Error code: 0 = OK 1 = ROM error 2 = RAM error 3 = EEPROM error 4 = Program error 5 = Program logic error 6 = Watchdog error 7 = Expand error 8 = Communication error 9 = RTC error  PA: 0 = PASSWORD OFF 1 = PASSWORD ON	
0104H	1	03H 10H	A01_GAIN_H	A01_GAIN_L
0105H	1		A01_OFFSET	
0106H	1		A02_GAIN_H	A02_GAN_L
0107H	1		A02_OFFSET	
0108H	1		A03_GAIN_H	A03_GAIN_L
0109H	1		A03_OFFSET	
010AH	1		A04_GAIN_H	A04_GAN_L
010BH	1		A04_OFFSET	
0110H	1	06H	0	1
		10H	CLEARCODE	
0120H	1	03H 10H	A01_GAIN_H	A01_GAIN_L
0121H	1		A01_OFFSET	
0122H	1		A02_GAIN_H	A02_GAN_L
0123H	1		A02_OFFSET	
0124H	1		A03_GAIN_H	A03_GAIN_L
0125H	1		A03_OFFSET	
0126H	1		A04_GAIN_H	A04_GAN_L
0127H	1		A04_OFFSET	
0128H	1		A05_GAIN_H	A05_GAIN_L
0129H	1		A05_OFFSET	

012aH	1		A06_GAIN_H	A06_GAN_L	
012bH	1		A06_OFFSET		
012cH	1		A07_GAIN_H	A07_GAIN_L	
012dH	1		A07_OFFSET		
012eH	1		A08_GAIN_H	A08_GAN_L	
012fH	1		A08_OFFSET		
			Analog config:Note:		
			A_GAIN=(0~999) A_OFFSET=(-50~50) (complement)		

4.3 02XXH: Current value Address

Register Address	Data Length	Usable Comm.	Content		Remark
<b>Timer Current value</b>					
0200H	1	03H	Timer01		Scale: 00000~09999
0201H	1		Timer02		
.....	.....		.....		
020EH	1		Timer0F		
<b>Counter Current value</b>					
0210H	2	03H	Counter01		*1 Scale: 000000~999999
0211H	2		Counter02		
....	....		....		
021EH	2		Counter0F		
<b>RTC Current value</b>					
0220H	1	03H, 10H	CURRENT_YEAR	CURRENT_MOON	Scale: Year:00~99 Month:01~12 Day:01~31 Week:00~06 Hour:00~23 Minute:00~59 Second:00~59
0221H	1		CURRENT_DAY	CURRENT_WEEK	
0222H	1		CURRENT_HOUR	CURRENT_MINUTE	
0223H	1		CURRENT_SECOND	00	
0224H	1		00	CURRENT_YEAR	
0225H	1		00	CURRENT_MOON	
0226H	1		00	CURRENT_DAY	
0227H	1		00	CURRENT_WEEK	
0228H	1		00	CURRENT_HOUR	
0229H	1		00	CURRENT_MINUTE	
022AH	1		00	CURRENT_SECOND	
<b>ANALOG Current value</b>					
0230	1	03H	A01_VALUE_H	A01_VALUE_L	
0231	1		A02_VALUE_H	A02_VALUE_L	

0232	1	03H	A03_VALUE_H	A03_VALUE_L	Scale: 0000~0999
0233	1		A04_VALUE_H	A04_VALUE_L	
0234	1		A05_VALUE_H	A05_VALUE_L	
0235	1		A06_VALUE_H	A06_VALUE_L	
0236	1		A07_VALUE_H	A07_VALUE_L	
0237	1		A08_VALUE_H	A08_VALUE_L	
<b>PWM current value</b>					
0260H	3H	03H	00	PWM_RUN_NUM	Scale: PW: 0~32767 PT: 1~32767
			PW_H	PW_L	
			PT_H	PT_L	

**4.4 03XXH: User character Address (Chinese lattice)**

Register Address	Data Length	Usable Comm.	Content	Remark
0300H	10H	03H 10H	Character_5	
0301H	10H		Character_6	
....	....			
033BH	10H		Character_64	

**4.5 04XXH: Preset value Address**

Register Address	Data Length	Usable Comm.	Content	Remark
<b>Timer Preset value</b>				
0400H	1H	03H 10H	Timer01	Scale: 00000~09999
0401H	1H		Timer02	
0402H	1H		Timer03	
.....	.....		.....	
040EH	1H		Timer0F	
<b>Counter Preset value</b>				
0410H	2H/5H	03H 10H	Counter01	<u>*2</u>
0411H	2H/5H		Counter 02	
....	....		....	
041EH	2H/5H		Counter 0F	
<b>RTC Preset value</b>				
0420H	3H	03H 10H	RTC01	<u>*3</u>
0421H	3H		RTC02	
...	....		....	
042EH	3H		RTC0F	

ANALOG Preset value				
0430H	1H	03H 10H	ANALOG 01	Scale: 0~9999
0431H	1H		ANALOG 02	
.....	.....		.....	
043EH	1H		ANALOG 0F	
PWM Preset value				
0460H	10H	03H 10H	PWM01	*4

4.6 05xxH: Coils Address (bit)

Register Address	Data Length	Usable Comm.	Content	Remark
0500H~050FH	10H (Read)	01H 05H	R01~R10	
0510H~051FH			G01~G10	
0520H~052FH			T01~T10	
0530H~053FH			C01~C10	
0540H~054FH			M01~M10	
0550H~055FH			I01~I0C,Z01~Z04	Z01~Z04 can't be written;
0560H~056FH			X01~X0C	056CH~056FH, reserved;
0570H~057FH			Q01~Q08	0578H~057FH, reserved;
0580H~058FH			Y01~Y0C	058CH~058FH, reserved;
0590H~059FH			N01~N10	
05A0H~05AFH			10H (Read)	01H 05H
05B0H~05BFH	W01~W16			
05C0H~05CFH	W17~W32			
05D0H~05DFH	W33~W48			
05E0H~05EFH	W49~W64			
05F0H~05FFH	L01~L08,P01~P02,S01	05FBH~05FFH, reserved;		

\*: 01H: user set the start address equal multiple of 10H, and quantity of coils also equal multiple of 10H (01H: read word coil status).

Z can't be written. Reserved address can't be written.



4.7 06xxH: Coil Status Address (word) for V3 type only

Register Address	Data Length	Usable Comm.	Content																
			F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0	
0600H	1	03H 06H 10H	R10	R0F	R0E	R0D	R0C	R0B	R0A	R09	R08	R07	R06	R05	R04	R03	R02	R01	
0601H	1		-	R1F	R1E	R1D	R1C	R1B	R1A	R19	R18	R17	R16	R15	R14	R13	R12	R11	
0602H	1		G10	G0F	G0E	G0D	G0C	G0B	G0A	G09	G08	G07	G06	G05	G04	G03	G02	G01	
0603H	1		-	G1F	G1E	G1D	G1C	G1B	G1A	G19	G18	G17	G16	G15	G14	G13	G12	G11	
0604H	1		T10	T0F	T0E	T0D	T0C	T0B	T0A	T09	T08	T07	T06	T05	T04	T03	T02	T01	
0605H	1		-	T1F	T1E	T1D	T1C	T1B	T1A	T19	T18	T17	T16	T15	T14	T13	T12	T11	
0606H	1		C10	C0F	C0E	C0D	C0C	C0B	C0A	C09	C08	C07	C06	C05	C04	C03	C02	C01	
0607H	1		-	C1F	C1E	C1D	C1C	C1B	C1A	C19	C18	C17	C16	C15	C14	C13	C12	C11	
0608H	1		M10	M0F	M0E	M0D	M0C	M0B	M0A	M09	M08	M07	M06	M05	M04	M03	M02	M01	
0609H	1		M20	M1F	M1E	M1D	M1C	M1B	M1A	M19	M18	M17	M16	M15	M14	M13	M12	M11	
060AH	1		M30	M2F	M2E	M2D	M2C	M2B	M2A	M29	M28	M27	M26	M25	M24	M23	M022	M21	
060BH	1		-	M3F	M3E	M3D	M3C	M3B	M3A	M39	M38	M37	M36	M35	M34	M33	M32	M31	
060CH	1		N10	N0F	N0E	N0D	N0C	N0B	N0A	N09	N08	N07	N06	N05	N04	N03	N02	N01	
060DH	1		N20	N1F	N1E	N1D	N1C	N1B	N1A	N19	N18	N17	N16	N15	N14	N13	N12	N11	
060EH	1		N30	N2F	N2E	N2D	N2C	N2B	N2A	N29	N28	N27	N26	N25	N24	N23	N22	N21	
060FH	1		-	N3F	N3E	N3D	N3C	N3B	N3A	N39	N38	N37	N36	N35	N34	N33	N32	N31	
0610H	1		-	-	-	-	I0C	I0B	I0A	I09	I08	I07	I06	I05	I04	I03	I02	I01	
0611H	1		-	-	-	-	X0C	X0B	X0A	X09	X08	X07	X06	X05	X04	X03	X02	X01	
0612H	1		-	-	-	-	Y0C	Y0B	Y0A	Y09	Y08	Y07	Y06	Y05	Y04	Y03	Y02	Y01	
0613H	1		-	-	-	-	-	-	-	-	Q08	Q07	Q06	Q05	Q04	Q03	Q02	Q01	
0614H	1		-	-	-	-	-	-	-	-	-	-	-	-	Z04	Z03	Z02	Z01	
0615H	1		H10	H0F	H0E	H0D	H0C	H0B	H0A	H09	H08	H07	H06	H05	H04	H03	H02	H01	
0616H	1		-	H1F	H1E	H1D	H1C	H1B	H1A	H19	H18	H17	H16	H15	H14	H13	H12	H11	
0617H	1		-	-	-	-	-	-	-	-	L08	L07	L06	L05	L04	L03	L02	L01	
0618H	1		-	-	-	-	-	-	-	-	-	-	-	-	-	S01	P02	P01	
0619H	1		W10	W0F	W0E	W0D	W0C	W0B	W0A	W09	W08	W07	W06	W05	W04	W03	W02	W01	
061AH	1		W20	W1F	W1E	W1D	W1C	W1B	W1A	W19	W18	W17	W16	W15	W14	W13	W12	W11	
061BH	1		W30	W2F	W2E	W2D	W2C	W2B	W2A	W29	W28	W27	W26	W25	W24	W23	W22	W21	
061CH	1		W40	W3F	W3E	W3D	W3C	W3B	W3A	W39	W38	W37	W36	W35	W34	W33	W32	W31	
0620H	1		03H (Only FBD)	B16	B15	B14	B13	B12	B11	B10	B09	B08	B07	B06	B05	B04	B03	B02	B01
0621H	1			B32															
0622H	1	B48																	B33
0623H	1	B64																	B49
0624H	1	B80																	B65

0625H	1	03H (Only FBD)	B96																B81			
0626H	1		B112																B97			
0627H	1		B128																B113			
0628H	1		B144																B129			
0629H	1		B160																B145			
062AH	1		B176																B161			
062BH	1		B192																B177			
062CH	1		B208																B193			
062DH	1		B242																B209			
062EH	1		B240																B243			
062FH	1		B256																B241			
0630H	1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	B260	B259	B258	B257

Z can't be written.

4.8 07xxH: Control register Address for V3 type only

Register Address	Data Length	Usable Comm.	Content																	
			F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0		
0100H	1	03H	00								S1									
		06H	RUN / STOP: S1=0 STOP																	
		10H	S1=1 RUN																	
0101H	1	03H	BRANDID								GENIE MODE									
			GENIE MODE (Hex) Only V-Type model 30=20VR-D,                      70=20VR-12D 34=20VT-D,                      74=20VT-12D																	
0102H	1	03H 06H 10H	A	Z	I1	I0	L3	L2	L1	L0	-	S1	S2	B	-	-	D1	D0	STATUS1: A: alarm at expand I/O No. unmatched =0: alarm =1: don't alarm Z: Z set =0: Z disable =1: Z enable I1I0: expand I/O No.(0~3) L3 L2 L1 L0: language =1: English =2: French =3: Spanish =4: Italian	

			=5 : German =6 : Portugal =7 : Chinese B: Backlight on/off =0 : auto on/off =1 : always on s1:Power down retain(M coil) =1 : unretain =0 : retain S2:run/stop retain(Counter current value) =1 : retain =0 : unretain D1D0 :Data communication mode =0 : data link =1 : remote I/O master =2 : remote I/O slave	
0103H	1	03H	PA	Error code
			STATUS2 (PA,Error) Error code: 0 = OK 1 = ROM error 2 = RAM error 3 = EEPROM error 4 = Program error 5 = Program logic error 6 = Watchdog error 7 = Expand error 8 = Communication error 9 = RTC error PA: 0 = PASSWORD OFF 1 = PASSWORD ON	
0104H	1	03H 10H	A01_GAIN_H	A01_GAIN_L
0105H	1		A01_OFFSET	
0106H	1		A02_GAIN_H	A02_GAN_L
0107H	1		A02_OFFSET	
0108H	1		A03_GAIN_H	A03_GAIN_L
0109H	1		A03_OFFSET	
010AH	1		A04_GAIN_H	A04_GAN_L
010BH	1		A04_OFFSET	

0110H	1	06H	0	1
		10H	CLEARCODE	
0120H	1	03H 10H	A01_GAIN_H	A01_GAIN_L
0121H	1		A01_OFFSET	
0122H	1		A02_GAIN_H	A02_GAIN_L
0123H	1		A02_OFFSET	
0124H	1		A03_GAIN_H	A03_GAIN_L
0125H	1		A03_OFFSET	
0126H	1		A04_GAIN_H	A04_GAIN_L
0127H	1		A04_OFFSET	
0128H	1		A05_GAIN_H	A05_GAIN_L
0129H	1		A05_OFFSET	
012aH	1		A06_GAIN_H	A06_GAIN_L
012bH	1		A06_OFFSET	
012cH	1		A07_GAIN_H	A07_GAIN_L
012dH	1		A07_OFFSET	
012eH	1		A08_GAIN_H	A08_GAIN_L
012fH	1		A08_OFFSET	
		Analog config: Note: A_GAIN=(0-999) A_OFFSET=(-50~50) (complement)		

**4.9 08xxH~11xxH: Current value Address for V3 type only**

Register Address	Data Length	Usable Comm.	Content	Remark
<b>Timer Current value (08xxH)</b>				
0800H	1H	03H	Timer01	Scale: 00000~09999
0801H	1H		Timer02	
...	...		.....	
081EH	1H		Timer1F	Only FBD mode
081FH	1H		Timer20	
...	...		...	
08F9H	1H		TimerFA	

Counter Current value (09xxH~0AxxH)					
0900H	1H	03H	C01_current_V_M	C01_current_V_L	Scale: 000000~999999
0901H	1H		00	C01_current_V_H	
0902H	1H		C02_current_V_M	C02_current_V_L	
0903H	1H		00	C02_current_V_H	
....	....		.....		
093CH	1H		C1F_current_V_M	C1F_current_V_L	
093DH	1H		00	C1F_current_V_H	Only FBD mode
093EH	1H		C20_current_V_M	C20_current_V_L	
093FH	1H		00	C20_current_V_H	
....	....		.....		
0AF2H	1H		CFA_current_V_M	CFA_current_V_L	
0AF3H	1H		00	CFA_current_V_H	
(0BxxH) RTC,A,PWM,AG,AT,AQ Current value					
RTC Current value (0B0xH)					
0B00H	1	03H, 10H	CURRENT_YEAR	CURRENT_MOON	Scale: Year:00~99 Month:01~12 Day:01~31 Week:00~06 Hour:00~23 Minute:00~59 Second:00~59
0B01H	1		CURRENT_DAY	CURRENT_WEEK	
0B02H	1		CURRENT_HOUR	CURRENT_MINUTE	
0B03H	1		CURRENT_SECOND	00	
0B04H	1		00	CURRENT_YEAR	
0B05H	1		00	CURRENT_MOON	
0B06H	1		00	CURRENT_DAY	
0B07H	1		00	CURRENT_WEEK	
0B08H	1		00	CURRENT_HOUR	
0B09H	1		00	CURRENT_MINUTE	
0B0AH	1		00	CURRENT_SECOND	
ANALOG Current value (0B1xH)					
0B10H	1H	03H	A1_VALUE_H	A1_VALUE_L	Scale: 0000~0999
0B11H	1H		A2_VALUE_H	A2_VALUE_L	
0B12H	1H		A3_VALUE_H	A3_VALUE_L	
0B13H	1H		A4_VALUE_H	A4_VALUE_L	
0B14H	1H		A5_VALUE_H	A5_VALUE_L	
0B15H	1H		A6_VALUE_H	A6_VALUE_L	
0B16H	1H		A7_VALUE_H	A7_VALUE_L	
0B17H	1H		A8_VALUE_H	A8_VALUE_L	

PWM Current value (0B2xH)							
			mode 1		mode 2		
0B20H	1H	03H	00H	PWM1_Coil	00H	00H	Scale:
0B21H	1H		PW1_H	PW1_L	PLSY1_H	PLSY1_L	PWM_PW: 0~32767
0B22H	1H		PT1_H	PT1_L	PLSY1_H	PLSY1_L	PWM_PT: 1~32767
0B23H	1H		00H	PWM2_Coil	-	-	PLSY_FREQ: 0001~1000
0B24H	1H		PW2_H	PW2_L	-	-	PLSY_PLSN: 00000~32767
0B25H	1H		PT2_H	PT2_L	-	-	
AT (Analog Temperature) Current value (0B3xH)							
0B30H	1H	03H	AT01				Scale: -1000~6000
0B31H	1H		AT02				
0B32H	1H		AT03				
0B33H	1H		AT04				
AQ (Analog Output) Current value (0B4xH)							
0B40H	1H	03H	AQ01				Scale: Voltage mode: 0~1000 Current mode: 0~500
0B41H	1H		AQ02				
0B42H	1H		AQ03				
0B43H	1H		AQ04				
AS (ADD-Subtract) Current value (0CxxH)							
0C00H	1H	03H	AS01				Scale: -32768~32767
0C01H	1H		AS02				
...	...		...				
0C1EH	1H		AS1F				Only FBD mode
0C1FH	1H		AS20				
...	...		...				
0CF9H	1H	ASFA					
MD (Multiply-Divide) Current value (0DxxH)							
0D00H	1H	03H	MD01				Scale: -32768~32767
0D01H	1H		MD02				
...	...		...				
0D1EH	1H		MD1F				Only FBD mode
0D1FH	1H		MD20				
...	...		...				
0DF9H	1H	MDFA					

<b>PID (PID control) Current value (0ExxH)</b>				
0E00H	1H	03H	PID01	Scale: -32768~32767
0E01H	1H		PID02	
...	...		...	
0E0EH	1H		PID0F	Only FBD mode
0E0FH	1H		PID10	
...	...		...	
0E1DH	1H		PID1E	
<b>MX (Data multiplexer) Current value (0FxxH)</b>				
0F00H	1H	03H	MX01	Scale: -32768~32767
0F01H	1H		MX02	
...	...		...	
0F1EH	1H		MX1F	Only FBD mode
0F1FH	1H		MX20	
...	...		...	
0FF9H	1H		MXFA	
<b>AR (Analog ram control) Current value (10xxH)</b>				
1000H	1H	03H	AR01	Scale: 0~32767
1001H	1H		AR02	
...	...		...	
100EH	1H		AR0F	Only FBD mode
100FH	1H		AR10	
...	...		...	
101DH	1H		AR1E	
<b>DR (Data register) Current value (11xxH)</b>				
1100H	1H	03H	DR01	Scale: Signed: -32768~32767 Unsigned: 0~65535
1101H	1H		DR02	
...	...		...	
11EFH	1H		DRF0	

4.10 12xxH~26xxH: Preset value Address for V3 type only

Register Address	Data Length	Usable Comm.	Content		Remark	
<b>Timer Preset value (12xxH)</b>						
1200H	1H	03H	Timer01		Scale: 00000~09999	
1201H	1H		Timer02			
...	...		.....			
121EH	1H	06H	Timer1F		Only FBD mode	
121FH	1H	10H	Timer20			
...	...		.....			
12F9H	1H		TimerFA			
<b>Counter Preset value (13xxH~14xxH)</b>						
1300H	1H	03H	C01_PRESET_V_M	C01_PRESET_V_L	Scale: 000000~999999	
1301H	1H		00	C01_PRESET_V_H		
....	....		....			
133CH	1H	06H	C1F_PRESET_V_M	C1F_PRESET_V_L	Can't read or write mode8	
133DH	1H		00	C1F_PRESET_V_H		
....	....		....			
133EH	1H	10H	C20_PRESET_V_M	C20_PRESET_V_L	Only FBD mode	
133FH	1H		00	C20_PRESET_V_H		
....	....		....			
14F2H	1H		CFA_PRESET_V_M	CFA_PRESET_V_L		
14F3H	1H		00	CFA_PRESET_V_H		
<b>RTC Preset value (15xxH~17xxH)</b>						
1500H	1H	03H	RTC01		*3	
1501H	1H					
1502H	1H					
...	....		.....			
155AH	1H	06H	RTC1F		Only FBD mode	
155BH	1H					
155CH	1H					
155DH	1H	10H	RTC20		Only FBD mode	
155EH	1H					
155FH	1H					
...	....		.....			
17EBH	1H		RTCFA			
17ECH	1H					
17EDH	1H					



Analog Preset value (18xxH)				
1800H	1H	03H 06H 10H	ANALOG01	
...	...		...	
181EH	1H		ANALOG1F	
181FH	1H		ANALOG20	
...	...		...	
18F9H	1H		ANALOGFA	
Scale: 00000~09999				
Only FBD mode				
PWM Preset value (19xxH)				
			PWM mode	PLSY mode
1900H	1H	03H 06H 10H	PWM1_PW1	PLSY1_FREQ1
1901H	1H		PWM1_PT 1	PLSY1_PLSN1
1902H	1H		PWM1_PW2	0
1903H	1H		PWM1_PT2	0
...	...		.....	
190EH	1H		PWM1_PW8	0
190FH	1H		PWM1_PT8	0
1910H	1H			PWM2_PW1
1911H	1H			PWM2_PT 1
1912H	1H			PWM2_PW2
1913H	1H			PWM2_PT2
...	...		.....	
191EH	1H			PWM2_PW8
191FH	1H			PWM2_PT8
Scale: PWM mode				
PWM_PW: 0~32767				
PWM_PT: 1~32767				
PLSY mode				
PLSY_FREQ: 0001~1000				
PLSY_PLSN: 00000~32767				
AS (ADD-Subtract) Preset value (1AxxH~1CxxH)				
1A00H	1H	03H 06H 10H	AS_01_V1	
1A01H	1H		AS_01_V2	
1A02H	1H		AS_01_V3	
...	...		...	
1A5AH	1H		AS_1F_V1	
1A5BH	1H		AS_1F_V2	
1A5CH	1H		AS_1F_V3	
1A5DH	1H		AS_20_V1	
1A5EH	1H		AS_20_V2	
1A5FH	1H		AS_20_V3	
...	...		...	
1CEBH	1H		AS_FA_V1	
1CECH	1H		AS_FA_V2	
1CEDH	1H		AS_FA_V3	
Scale: V1:-32768~32767				
V2:-32768~32767				
V3:-32768~32767				
Only FBD mode				

MD (Multiply-Divide) Preset value (1DxxH~1FxxH)			
1D00H	1H	03H 06H 10H	MD 01 V1
1D01H	1H		MD 01 V2
1D02H	1H		MD 01 V3
...	...		...
1D5AH	1H		MD 1F V1
1D5BH	1H		MD 1F V2
1D5CH	1H		MD 1F V3
1D5DH	1H		MD 20 V1
1D5EH	1H		MD 20 V2
1D5FH	1H		MD 20 V3
...	...		...
1FEBH	1H		MD FA V1
1FECH	1H	MD FA V2	
1FEDH	1H	MD FA V3	
Scale: V1:-32768~32767 V2:-32768~32767 V3:-32768~32767			
Only FBD mode			
PID Preset value (20xxH)			
2000H	1H	03H 06H 10H	PI 01 TARG
2001H	1H		PI 01 MEAG
2002H	1H		PI 01 SAMP
2003H	1H		PI 01 PV
2004H	1H		PI 01 IV
2005H	1H		PI 01 DV
...	...		...
2054H	1H		PI 0F TARG
2055H	1H		PI 0F MEAG
2056H	1H		PI 0F SAMP
2057H	1H		PI 0F PV
2058H	1H		PI 0F IV
2059H	1H	PI 0F DV	
205AH	1H	PI 10 TARG	
205BH	1H	PI 10 MEAG	
...	...	...	
20AEH	1H	PI 1E TARG	
20AFH	1H	PI 1E MEAG	
20B0H	1H	PI 1E SAMP	
20B1H	1H	PI 1E PV	
20B2H	1H	PI 1E IV	
20B3H	1H	PI 1E DV	
Scale: TARG:-32768~32767 MEAG:-32768~32767 SAMP:1~32767 PV:1~32767 IV:1~32767 DV:1~32767			
Only FBD mode			

MX (Data multiplexer) Preset value (21xxH~24xxH)			
2100H	1H	03H 06H 10H	MX_01_V1
2101H	1H		MX_01_V2
2102H	1H		MX_01_V3
2103H	1H		MX_01_V4
...	...		...
2178H	1H		MX_1F_V1
2179H	1H		MX_1F_V2
217AH	1H		MX_1F_V3
217BH	1H		MX_1F_V4
217CH	1H		MX_20_V1
...	...		...
24E4H	1H		MX_FA_V1
24E5H	1H		MX_FA_V2
24E6H	1H		MX_FA_V3
24E7H	1H		MX_FA_V4
AR (Analog ram control) Preset value (25xxH)			
2500H	1H	03H 06H 10H	AR_01_LEVEL1
2501H	1H		AR_01_LEVEL2
2502H	1H		AR_01_MAXL
2503H	1H		AR_01_StSp
2504H	1H		AR_01_Rate
2505H	1H		AR_01_A
2506H	1H		AR_01_B
...	...		...
2564H	1H		AR_0F_MAXL
2565H	1H		AR_0F_StSp
2566H	1H		AR_0F_Rate
2567H	1H		AR_0F_A
2568H	1H		AR_0F_B
2569H	1H		AR_10_LEVEL1
256AH	1H		AR_10_LEVEL2
...	...		...
25CEH	1H	AR_1E_StSp	
25CFH	1H	AR_1E_Rate	
25D0H	1H	AR_1E_A	
25D1H	1H	AR_1E_B	

Scale:  
V1:-32768~32767  
V2:-32768~32767  
V3:-32768~32767  
V4:-32768~32767

Only FBD mode

Scale:  
LEVEL1:  
-10000~20000  
LEVEL2:  
-10000~20000  
MAXL:  
-10000~20000  
StSp:0~20000  
Rate: 0~10000  
A: 0~01000  
B:-10000~10000

Only FBD mode

DR (Data register) Preset value (26xxH)			
2600H	1H	03H 06H 10H	DR_01
2601H	1H		DR_02
...	...		...
26EFH	1H		DR_F0
Scale: Signed: -32768~32767 Unsigned: 0~65535			
AQ (Analog Output) Preset value (27xxH)			
2700H	1H	03H 06H 10H	AQ_01
2701H	1H		AQ_02
2702H	1H		AQ_03
2703H	1H		AQ_04
Scale: Voltage mode: 0~1000 Current mode: 0~500			

**4.11 2BxxH~2DxxH: Coils Address (bit) for V3 type only**

Register Address	Data Length	Usable Comm.	Content	Remark
2B00H~2B1FH	10H (Read)	01H 05H	R01~R1F	2B1FH, reserved;
2B20H~2B3FH			G01~G1F	2B3FH, reserved;
2B40H~2B5FH			T01~T1F	2B5FH, reserved;
2B60H~2B7FH			C01~C1F	2B7FH, reserved;
2B80H~2BBFH			M01~M3F	2BBFH, reserved;
2BC0H~2BFFH			N01~N3F	2BFFH, reserved;
2C00H~2C0FH			I01~I0C	2C0CH~2C0FH, reserved;
2C10H~2C1FH			X01~X0C	2C1CH~2C1FH reserved;
2C20H~2C2FH			Y01~Y0C	2C2CH~2C2FH, reserved;
2C30H~2C3FH			Q01~Q08	2C38H~2C3FH, reserved;
2C40H~2C4FH			Z01~Z04	Z01~Z04 can't be written; 2C44H~2C4FH, reserved;
2C50H~2C6FH			H01~H31	2C6FH, reserved;
2C70H~2C7FH			L01~L08	2C78H~2C7FH, reserved;
2C80H~2C8FH			P01,P02 ,S01	2C83H~2C8FH, reserved;
2C90H~2CCFH			W01~W64	
2D00H~2E0FH			B001~B260	2E04H~2E0FH, reserved; FBD only

\*: 01H: user set the start address equal multiple of 10H, and quantity of coils also equal multiple of 10H (01H: read word coil status).

Z can't be written. Reserved address can't be written.

5. NOTE

5.1 Note 1: Counter current value

High bytes	Low bytes
C current V M	C current V L
00	C current V H

Counter value:0~999999(0~0F423FH)

5.2 Note 2: Counter Preset Value

	High bytes	Low bytes
COUNTER MOD 1~7 (Data Length=2H)	C PRESET V M	C PRESET V L
	00	C PRESET V H
COUNTER MOD8 (Data Length=5H)	FIX TIM H	FIX TIM L
	C ON PRESET V M	C ON PRESET V L
	00	C ON PRESET V H
	C OFF PRESET V M	C OFF PRESET V L
	00	C OFF PRESET V H

Counter value: 0~999999(0~0F423FH);

5.3 Note 3: RTC Preset Value

	High bytes	Low bytes
RTC MOD1	Turn on week	Turn off week
RTC MOD2	Turn on time(hour)	Turn on time(min)
	Turn off time(hour)	Turn off time(min)
RTC MOD3	Turn on year	Turn off year
	Turn on month	Turn on day
	Turn off month	Turn off day
RTC MOD4 ( 30-second adjustment )	00	Round time ( week )
	Round time ( hour )	Round time ( minute )
	00	Round time ( second )

Year: 00~99

Month: 01~12

Day: 01~31

Week: 00~06

Hour: 00~23

Minute: 00~59

Second: 00~59

**5.4 Note 4: PWM Preset Value**

	High bytes	Low bytes
1	PW1_H	PW1_L
2	PT1_H	PT1_L
3	PW2_H	PW2_L
4	PT2_H	PT2_L
5	PW3_H	PW3_L
6	PT3_H	PT3_L
7	PW4_H	PW4_L
8	PT4_H	PT4_L
9	PW5_H	PW5_L
10	PT5_H	PT5_L
11	PW6_H	PW6_L
12	PT6_H	PT6_L
13	PW7_H	PW7_L
14	PT7_H	PT7_L
15	PW8_H	PW8_L
16	PT8_H	PT8_L

**PW:** Pulse Width Value (00000~32767)

**PT:** Period Value (00001~32767)

**6. Which is important**

2006.07.05, add command : read or write analog set ( A1~A8 gain + offset ) .

2006.08.14, add write single coil status.

The protocol is applicable to SG2 which version about V1.7 (include V1.7).

2006-9-22, add RTC mode4 ( V1.8 ) ;

2009-4-10, add SG2 V3 type;