

COMMAND FORMAT

1.Instruction

S2000 can be connected with PLC and PC performing Serial Communication by using MODBUS protocol at 1:1 or 1:N (add a SI-K2 interface card , N maximum up to 31) transmission type.

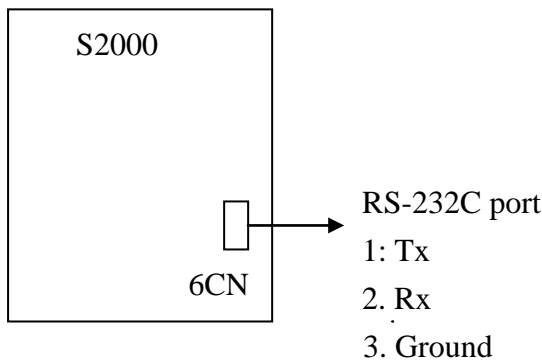
PLC or PC is defined as MASTER, and inverter is the SLAVE. The SLAVE's address must be defined before communicating.

The master sends commands to the SLAVE, and the SLAVE response to the master accordingly.

S2000 is RS-232C built-in. It is available for RS-485 when WI-K2 interface card is added.

2.Diagram

RS-232C



RS-485, please see instruction manual

3.The related parameters for Serial Communication

Parameter	Function name	Description	Factory setting
C1-01	Frequency reference selection	0:Operator 1:Terminal 2:Serial Com 3:Option PCB	1 (Remark 1)
C1-02	Operation method selection	0:Operator 1:Terminal 2:Serial Com 3:Option PCB	1 (Remark 1)
F5-01	Station address	Range:0~20H	1F (Remark 2)
F5-02	Communication speed	0:1200bps	2

	selection	1:2400bps 2:4800bps 3:9600bps	
F5-03	Communication parity selection	0:No parity 1:Even parity 2:Odd parity	0
F5-04	Stopping method after communication error	Selects the stopping method at transmission error detected. 0:Decel to stop (decel time:C1-02) 1:Emergency stop (decel time:C1-09) 2:Coast to stop 3:Continuous operation (displayed only)	3
F5-05	Timer over	0:With detection 1:Without detection	1
G1-03	Frequency units of reference setting and monitor	Units for frequency related reference or monitor could be selected as shown below. 0:0.01Hz 1:0.01% 2 to 39:r/min(0 to 3999) $r/min=120 \times \text{frequency reference(Hz)}/01-03$ (01-03: Number of motor (02- poles) Effective except when in flux vector control.	0 (Remark 3)
G1-04	Frequency units of constant setting	V/f related constant(E1-04 , 06 , 07 and 09) Setting unit can be changed to r/min 0:Setting monitor Unit : Hz 1:Setting monitor Unit : rpm	0
Table 1			

4.Message Format

This format is used to read and write parameters with the logical address, it is composed by follows:

Slave Address
Function Code
Data
Error Check

A: The “Slave Address” is from 0 up to 31. Each SLAVE against only one address. When the Slave Address is "0", the four types of information, (operation command, external default, abnormal reset and frequency reference) are sent to all SLAVES with no feedback, loop-back test disable, and 30000/100% is fixed.

B: Function Code

Function Code	Function	Max data number	Remark
03H	PC read data from inverter	16	
08H	Loop-back check	-	
10H	PC write data to inverter	16	One-time input

C. Data

The contents of the command sent by MASTER.

D. Error Check

Detecting the transmitted message from the MASTER.

Executed by following CRC-16.

Error Code	
01H	<u>Function code error</u> The function code output from PLC out of 03H, 08H and 10H.
02H	<u>Register number error</u> (not exist) <ul style="list-style-type: none"> • None of register number is registered. • The started number out of 0000H, 0001H, and 0002H.
03H	<u>Data unit place error</u>

	<ul style="list-style-type: none"> R/W data digits not in the range of 1 to 16. Data units place not the multiple of "2" at "Input" mode.
21H	<u>Data setup error</u> <ul style="list-style-type: none"> Control data Upper/Lower limitation setup incorrect. Input constants setup error.
22H	<u>Data input mode incorrect</u> <ul style="list-style-type: none"> PLC data or command input to inverter when the inverter is running. When CPF03, constants out of A1-00 , E1-03 and O2-04 input from PLC. Input data to unwritable registers.
23H	<u>Writing data when under voltage</u> <ul style="list-style-type: none"> Input data or commands from PLC when voltage is low.
24H	<u>Writing data when inverter is busy</u> <ul style="list-style-type: none"> Input data from PLC when data is saving.

5.Data transmission time

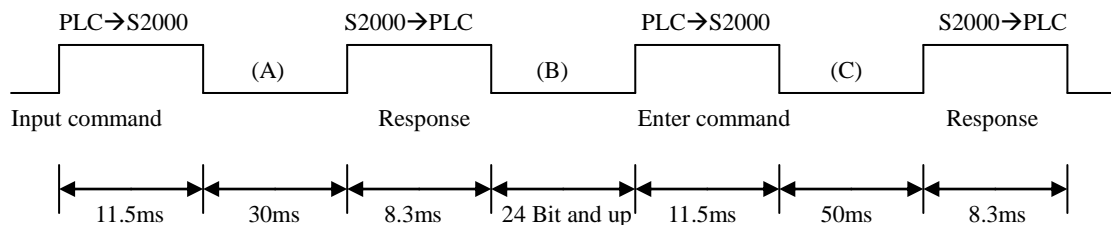
The transmission time between S2000 and PLC (or PC) according to operation mode and data size.

Example: Baud Rate: 9600 bps

Vector Control without PG

Input command:1(D1-01)

The transmission time as follows:



6.Read / Write message format (03H)

Read and response between inverter and PLC (or PC)

Example: Read 0100H~0103H from the register of SLAVE 2

ℓ Command from PLC (or PC)

Slave Address	02H (inverter address)
Function Code	03H ("read" command)
Address to Read	Upper : 01H Lower : 00H
Quantity to Read	Upper : 00H Lower : 04H
CRC-16 Check Sum	Upper : 45H Lower : C6H

ℓ Response from inverter when normal

Slave Address	02H
Function Code	03H
Data (feedback)	08H
Initial Register	Upper : 00H Lower : 01H
Next Register	Upper : 00H Lower : 02H
Next Register	Upper : 00H Lower : 00H
Next Register	Upper : 00H Lower : 00H
CRC-16 Check Sum	Upper : F3H Lower : 93H

ℓ Response from inverter when abnormal

Slave Address	02H
Function Code	83H
Data (error code)	03H
CRC-16 Check Sum	Upper : F1H Lower : 31H

P.S. 0100H tA1-11 (Select Language) 0001 (Chinese)
 0101H tA1-01 (Access Level) 0002 (quick-start)
 0102H tA1-02 (Control Method) 0000(v/f control)
 0103H tA1-03 (Initial Parameters) 0000

7. Write to inverter and response

Example: Write to 0280H~0281H register in SLAVE 1

ℓ Commands from PLC (or PC)

Slave Address	01H
Function Code	10H
Address to Read	Upper : 02H Lower : 80H
Quantity to Read	Upper : 00H Lower : 02H
Data (feedback)	04H
Initial Data	Upper : 02H Lower : 58H
Next Data	Upper : 01H Lower : F4H
CRC-16 Check Sum	Upper : 62H Lower : D3H

ℓ Response from inverter when normal

Slave Address	01H
Function Code	10H
Address to Read	Upper : 02H Lower : 80H
Quantity to Read	Upper : 00H Lower : 02H
CRC-16 Check Sum	Upper : 41H Lower : 98H

ℓ Response from inverter when abnormal

Slave Address	01H
Function Code	90H
Error Code	02H
CRC-16 Check Sum	Upper : CDH Lower : C1H

Note: When "Slave Address" is 00H, all SLAVES will execute the command without response.

8.The format of "ENTER" command

ℓ Data saved into EEPROM

Slave Address	01H
Function Code	10H
Address to Read	Upper : FFH Lower : FDH
Quantity to Read	Upper : 00H Lower : 01H
Data (feedback)	02H
Enter	Upper : 00H Lower : 00H
CRC-16 Check Sum	Upper : BBH Lower : D2H

ℓ Data do not saved into EEPROM

Slave Address	01H
Function Code	10H
Address to Read	Upper : FFH Lower : DDH
Quantity to Read	Upper : 00H Lower : 01H
Data (feedback)	02H
Enter	Upper : 00H Lower : 00H
CRC-16 Check Sum	Upper : 38H Lower : BAH

Note: EEPROM life is limited about 100,000 times saving.

9.The format of "Loop-back" test (08h)

Example: register 1 "Loop-back" test

ℓ Command from PLC

Slave Address	01H
Function Code	08H
Test Code	Upper : 00H Lower : 00H
Data (feedback)	Upper : A5H Lower : 37H
CRC-16 Check Sum	Upper : DAH Lower : 8DH

ℓ Response from inverter when normal

Slave Address	01H
Function Code	08H
Test Code	Upper : 00H Lower : 00H
Data (feedback)	Upper : A5H Lower : 37H
CRC-16 Check Sum	Upper : DAH Lower : 8DH

ℓ Response from inverter when abnormal

Slave Address	01H
Function Code	88H
Error Code	01H
CRC-16 Check Sum	Upper : 86H Lower : 50H

10. Register Address

(1) Command Data (R/W)

Register Address	(BIT) Content
0000H	Run command
	0 1:Forward run
	1 1:Reverse run
	2 1:External terminal 3 closed
	3 1:External terminal 4 closed
	4 1:External terminal 5 closed
	5 1:External terminal 6 closed
	6 1:External terminal 7 closed
	7 1:External terminal 8 closed
8-F Not in use	
0001H	Frequency Command
0002H-0006H	Not in use
0007H	Analog output 1 setup (-11v/-726~11v/726 , H4-01 active when 1F)
0008H	Analog output 2 setup (-11v/-726~11v/726 , H4-04 active when 1F)
0009H	Output points setup
	0 1:Closed when output (terminal 9,10) 1:Frequency/moniter according to 01-03
	1 1:Closed when PHC1 (terminal 25,27)
	2 1:Closed when PHC2 (terminal 26,27)
	3-5 Not in use
	6 1:Break down points (terminal 18,20) according to bit7
	7 1:Bresk point closed
	8-F Not in use
000EH	Not in use
000FH	Command selection setup
	0 0:Frequency/Monitor is 0.1Hz
	1-B Not in use
	C 1:Simultaneous sent terminal 5 active
	D 1:Simultaneous sent terminal 6 active
	E 1:Simultaneous sent terminal 7 active
	F 1:Simultaneous sent terminal 8 active

ℓ When register 000FH BIT=0, frequency unit is 0.1Hz.

When register 000FH BIT=1, frequency unit according to 01-03 setup.

Note: When register is receiving the data, give the unused BIF"0", and do not input any data into the candidate register.

ℓ Command to all SLAVES simultaneously format

Register Address		
0001H	Run Command	
	0	Run command 1:Run 0:Stop
	1	Reverse command 1:Run 0:Stop
	2	Not in use
	3	Not in use
	4	Abnormal input 1:Abnormal (H1-01)
	5	Abnormal Reset 1:Reset command (depend on H1-02)
	6-B	Not in use
	C	Terminal 5 input active (Register 000FH active when BIT C=1)
	D	Terminal 6 input active (Register 000FH active when BIT D=1)
	E	Terminal 7 input active (Register 000FH active when BIT E=1)
	F	Terminal 8 input active (Register 000FH active when BIT F=1)
0002H	Frequency Command 30000/100% fixed unit	

ℓ If BIT not defied, the inverter would take its inside command.

(2) Status Data (possible output signal)

Register Address	(BIT) Content	
0010H	0	1:Running
	1	1:Zero speed
	2	1:Reverse run
	3	1:Reset input
	4	1:
	5	1:Inverter stand by
	6	1:Break down
	7	1:Fierce bread down
	8-F	Not in use
0011H	Operator Status	
	0	1:OPE
	1	1:ERR
	2	1:PRG Mode
	3,4	1 CN Status 00:Jvop-130 01:Jvop-132 10:Jvop-100 11:
5-f	Not in use	
0012H	OPE Number	
0013H	Not in use	

0014H	Abnormal 1		
	0	FU	FUSE melted
	1	UV1	Main circuit under voltage
	2	UV2	
	3	UV3	Break down
	4	SC	Load shorted circuit
	5	GF	Grounded
	6	OC	Over current
	7	OV	Over voltage
	8	OH	Inverter over heat
	9	OH1	Inverter over heat
	A	OL1	Motor over heat
	B	OL2	Inverter over load
	C	OL3	Over torque1
	D	OL4	Over torque2
E	RR	Bread transistor abnormal	
F	RH	Break resistor over heat	
0015H	Abnormal2		
	0	EF3	Ext. abnormal 3
	1	EF4	Ext. abnormal 4
	2	EF5	Ext. abnormal 5
	3	EF6	Ext. abnormal 6
	4	EF7	Ext. abnormal 7
	5	EF8	Ext. abnormal 8
	6	FAN	Cooling fan abnormal
	7	OS	Over speed
	8	DEV	Speed with big deflection
	9	PGO	Open
	A	PF	Input phase short age
	B	LF	Output phase short age
	C		Not in use
	D	OPR	Operator disconnected
E	ERR	EEPROM Input abnormal	
F		Not in use	
0016H	Abnormal 3		
	0	CE	MODBUS transmission error
	1-3		Not in use
	4	CF	Abnormal control
	5	SVE	ZEROSERVO
	6-F		Not in use
0017H	CPF Content 1		
	0		Not in use
	1		Not in use
	2	CPF02	
	3	CPF03	
	4	CPF04	
	5	CPF05	
6	CPF06		

	7-F		Not in use
0018H	CPF Content 2		
	0	CPF20	
	1	CPF21	
	2	CPF22	
	3	CPF23	
	4-F		Not in use
0019H	Light fault 1		
	0	UV	Under voltage
	1	OV	Over voltage
	2	OH	Inverter over heat
	3	OH2	Inverter over heat precaution
	4	OL3	Over torque 1
	5	OL4	Over torque 2
	6	EF	Input abnormal
	7	BB	In base block
	8	EF3	External fault 3
	9	EF4	External fault 4
	A	EF5	External fault 5
	B	EF6	External fault 6
	C	EF7	External fault 7
	D	EF8	External fault 8
	E	FAN	Cooling fan abnormal
	F	OS	Over speed
001AH	Light fault 2		
	0	DEV	Speed with big deflection
	1	PGO	PG open
	2	OPR	Operator disconnected
	3	CE	MODBUS transmission error
	4		Not in use
	5		Not in use
	6	OL1	Motor over load
	7	OL2	Inverter over load
	8-F		Not in use