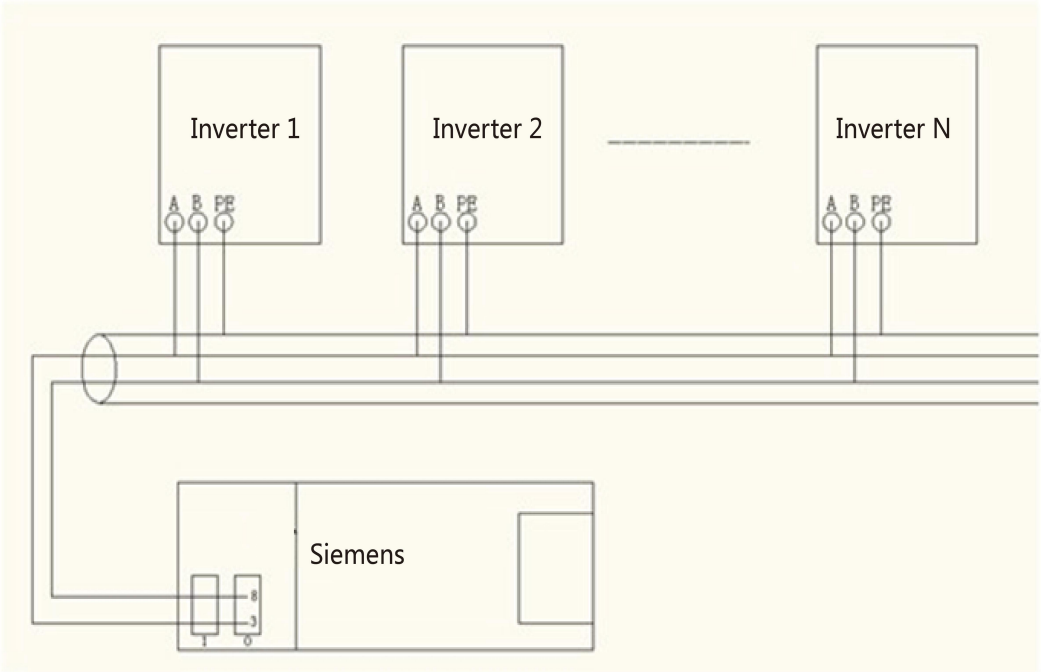
Siemens PLC and ENC Inverter RTU Communication

Equipment introduction

In the industrial automatic control system, the most common application is a combination of PLC and inverter. A variety of modes of PLC to control inverter has been produced, one of which uses RS-485 communication is widely used: because it features strong anti-interference ability, high transmission rate, transmission, long transmission distance and low cost. ENC frequency inverter built-in international standard MODBUS (slave) communication protocol can easily control and supervise single or multiple inverters by remote communication.
Take Siemens S7-200CPU224XP as an example. Here we introduce that PLC and ENC frequency inverter establish communication and realize start, stop, frequency input, and monitoring.

The following preparations must be done when frequency inverter, as Modbus protocol slave, receives communication command from PLC.

1、 Connect serial port communication cable with 9 needle positive plug to the Freeport Prat0 end of the PLC free communication port. Line 3 and line 8 of the other end of the cable must be connected to 485 +, 485 – of frequency inverter RS485. Other cables must be shielded.



2、 Set the following parameters of the frequency inverter in advance:

F0.00=3 //serial port input

F0.02=3 //serial port running command control, Stop command of the keypad is ineffective

F2.14=03 //baud rate 9600, 1-8-1, none

F2.15=01 //frequency inverter address

3、Control command and status communication address of the frequency inverter are as follows:

Variable name	Communication address	Read-write properties	Command data or response value sense
Operation command word	2000H	Write only	1.Jog running 2Jog stop 3.Foreward jog running 4.Reverse jog running 5.Running 6.Stop 7.Foreward running 8.Reverse running 9.Fault resetting 10.Emergency cut-off
Serial frequency given	2001H	Read-write	Lower limit frequency~ upper limit frequency
Inverter status	2100H	Read only	1. Foreward running 2. Reverse running 3. Stop 4. Alarm status
Alarm code	2180H	Read only	0. No alarm 1~23. E001~E023 alarm

Monitoring parameters	Name	Communication address (Read only)
C-00	Setting frequency	1000H
C-01	Output frequency	1001H
C-02	Output current	1002H
C-03	Output voltage	1003H
C-04	DC bus voltage	1004H
C-05	Load motor speed	1005H
C-06	Module temperature	1006H
C-07	Power on running time	1007H
C-08	Accumulative running time	1008H
C-09	Input terminal status	1009H
C-10	output terminal status	100AH
C-11	Analog input the value of VCI	100BH
C-12	Analog input the value of CCI	100CH
C-13	Analog input the value of YCI	100DH
C-14	External impulse frequency	100EH

Instruction of Siemens PLC program

1、 **For Modbus communication** as master station of Siemens PLC, it is required that the program library has commands of "MBUS_CTRL" and "MBUS_MSG". The followings are the meanings of the command:

2、 PLC program

I0.0 Inverter FWD start
I0.1 Inverter REV start
I0.2 Inverter stop
VW1004 Set inverter frequency
VB2000 Read inverter current set frequency
VB2002 Read inverter current run frequency
VB2004 Read motor running rotary speed

```
Network 1 // initial parameter
LD    SM0.1
R     M2.0, 8
R     M4.0, 8
R     M0.0, 2
Network 2 // serial port setting
LD    SM0.0 =    L60.0
LD    SM0.0 =    L63.7
LD    L60.0  CALL  SBR1, L63.7, 9600, 0, 1000, M0.0, MB12

Network 3
LD    SM0.1
MOVB  7, VB1000
MOVB  8, VB1001
MOVB  6, VB1002
MOVW  2000, VW1004

Network 4
LD    M0.0
EUS   M0.1, 1

Network 5 // Read current set frequency
LD    M0.1O    M2.4
=     L60.0
LD    M0.1
EU
LD    M2.4
EU
```

```
OLD
=       L63.7
LD      L60.0
CALL    SBR2, L63.7, 1, 0, 44097, +1, &VB2000, M2.1, MB3
Network 6
LD      M2.1
R       M2.3, 1
R       M0.1, 1
Network 7 // Read current running frequency
LD      M2.1
=       L60.0
LD      M2.1
EU
=       L63.7
LD      L60.0
CALL    SBR2, L63.7, 1, 0, 44098, +1, &VB2002, M2.2, MB4
Network 8
LD      M2.2
R       M2.1, 1
Network 9 // Read current motor rotary speed
LD      M2.2
=       L60.0
LD      M2.2
EU
=       L63.7
LD      L60.0
CALL    SBR2, L63.7, 1, 0, 44102, +1, &VB2004, M2.3, MB5
Network 10
LD      M2.3
R       M2.2, 1
Network 11 // Set motor frequency
LD      M2.3
=       L60.0
LD      M2.3
EU
=       L63.7
LD      L60.0
CALL    SBR2, L63.7, 1, 1, 48194, 1, &VB1004, M2.4, MB16
Network 12
LD      M2.4
R       M2.3, 1
```

```
Network 13 //FWD start motor
LD      I0.0
=       L60.0
LD      I0.0
EU
=       L63.7
LD      L60.0
CALL    SBR2, L63.7, 1, 1, 48193, 1, &VB1000, M10.1, MB13
Network 14 //REV start motor
LD      I0.1
=       L60.0
LD      I0.1
EU
=       L63.7
LD      L60.0
CALL    SBR2, L63.7, 1, 1, 48193, 1, &VB1001, M10.2, MB14
Network 15 //Stop motor
LD      I0.2
=       L60.0
LD      I0.2
EU
=       L63.7
LD      L60.0
CALL    SBR2, L63.7, 1, 1, 48193, 1, &VB1002, M10.3, MB15
```