

Q

100

|            |                                                                 |      |   |  |            |
|------------|-----------------------------------------------------------------|------|---|--|------------|
|            | Q                                                               |      | Q |  |            |
|            |                                                                 |      |   |  | -          |
|            | -                                                               |      |   |  | 2025-11-11 |
|            |                                                                 |      |   |  |            |
| Q          | HCP Works3 V1.3.0                                               |      |   |  |            |
|            | Q                                                               |      |   |  |            |
|            | HCQXB-CAN-BD   HCQXB-RTC-BD   HCQXB-2RS232-BD   HCQXB-2RS485-BD |      |   |  |            |
| Q          |                                                                 |      |   |  |            |
|            |                                                                 |      |   |  |            |
|            |                                                                 |      |   |  |            |
| 2025-11-11 |                                                                 | V1.0 |   |  |            |
|            |                                                                 |      |   |  |            |
|            |                                                                 |      |   |  |            |

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S

\$

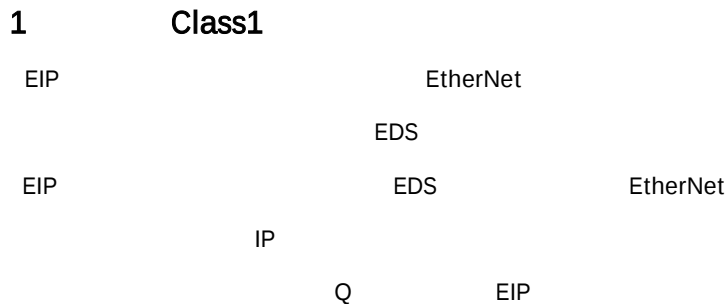
|     |                                                 |       |       |
|-----|-------------------------------------------------|-------|-------|
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|    |     |       |    |
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| 3. |     | ..... | 36 |
| 4. |     | ..... | 38 |
| 5. | UPS | ..... | 41 |

## 1. EIP

|   |  |      |      |                   |     |      |
|---|--|------|------|-------------------|-----|------|
| 1 |  |      |      |                   |     |      |
| 2 |  |      |      |                   |     |      |
| 3 |  |      |      | HCP Works3 V1.3.0 |     |      |
| 4 |  | 1514 | IO   | <=1400            |     |      |
| 5 |  | 61   |      |                   | 505 | /509 |
| 6 |  | 253  | 255- | -                 |     |      |

## 2. EIP



## 3. EIP

**3**

## Class3

EtherNetIP\_Tag\_V1.0.3

EtherNetIPScanner

Case

```

1 //实例客户端功能块
2 EtherNetIPScanner_0(
3   bEnable:=bEnable , //使能连接
4   bAutoReconnect:=TRUE , //自动重连
5   sIpAddress:= '192.168.88.210', //服务器ip
6   uiPort:= , //服务器端口, 默认44818不用修改
7   bTcpActive=> , //TCP通讯正常
8   bEipCipActive=> , //EIP通讯正常
9   bBusy=> ,
10  bDataReady:=bDataReady
11)
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
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100
  
```

## 4. EIP

—IP

PRG05\_Unit20\_L.ACT11\_AutoChild\_装卸

GVL

Ethernet x

Ethernet Device

: 有一条诊断消息待定。

上一条诊断信息

确认

EthDiag

Ethernet diagnostic information

Current IP

'192.168.22.226'

Current subnet mask

'255.255.252.0'

Current gateway address

'192.168.20.254'

IP changes

1

Amount of IP configuration changes since startup (IP or gateway address or subnet mask)

| 严重 | 时间戳                 | 描述                                                                | 组件            |
|----|---------------------|-------------------------------------------------------------------|---------------|
| 1  | 08.09.2024 13:38:19 | IoDrvEthernet: IP settings of Ethernet node aren't as configured. | IoDrvEthernet |
| 1  | 08.09.2024 09:38:15 | IoDrvEthernet: IP settings of Ethernet node aren't as configured. | IoDrvEthernet |

## 5. EIP —Extended Status 16#112

RPI RPI Adapter IOTask

1 Adapter RPI>=n\*IOTask(n 0 )

2 Scanner Adapter RPI>=n\*ScannerIOTask(n 0 )

| 严重 | 时间戳                     | 描述                                                    | 组件           |
|----|-------------------------|-------------------------------------------------------|--------------|
| 1  | 28.05.2024 19:09:01.... | IoDrvEthernetIP: Connection failure. (16#1)           | IoDrvEtherNe |
|    |                         | Extended Status: 16#112                               |              |
| 1  | 28.05.2024 19:01....    | IoDrvEthernetIP: Open Connection with serial number 1 | IoDrvEtherNe |
| 1  | 28.05.2024 19:09....    | IoDrvEthernetIP: Connection failure. (16#1)           | IoDrvEtherNe |
| 1  | 28.05.2024 19:09....    | IoDrvEthernetIP: Open Connection with serial number 1 | IoDrvEtherNe |

## 6. EIP Invalid O->T size 16#127 O

EXUq69 219 T s1T Jc en m

1000

1der

## 10. Modbus

|   |           |           |    |     |     |
|---|-----------|-----------|----|-----|-----|
| 1 | ModbusTCP |           |    |     |     |
| 2 | IP        | ModbusTCP |    |     |     |
| 3 | ModbusTCP | 16        |    | 64  |     |
| 4 | ModbusTCP | 64        | 99 | 125 | 123 |
| 5 | ModbusRTU | 100       |    |     |     |
| 6 | ModbusRTU | 31        |    |     |     |

## 11. ModbusTCP

Connection aborted:socket keep-alive expired

|                           |     |            |
|---------------------------|-----|------------|
| ModbusTCP                 | 1   | 1          |
| IP                        | IP  |            |
| socket keep-alive expired | TCP | keep-alive |

| 严重 | 时间戳                 | 描述                                                                                  | 组件                |
|----|---------------------|-------------------------------------------------------------------------------------|-------------------|
|    | 17.06.2024 16:07:18 | Modbus/TCP Slave[0] (192.168.188.2): Connected.                                     | Modbus TCP Master |
|    | 17.06.2024 16:07:11 | Modbus/TCP Slave[0] (192.168.188.2): Connection aborted: socket keep-alive expired! | Modbus TCP Master |
|    | 17.06.2024 16:07:05 | Modbus/TCP Slave[0] (192.168.188.2): Connected.                                     | Modbus TCP Master |
|    | 17.06.2024 16:06:57 | Modbus/TCP Slave[0] (192.168.188.2): Connection aborted: socket keep-alive expired! | Modbus TCP Master |
|    | 17.06.2024 16:06:52 | Startup finished: All slaves in operational!                                        | IoDrvEtherCAT     |
|    | 17.06.2024 16:06:52 | All slaves operational                                                              | IoDrvEtherCAT     |
|    | 17.06.2024 16:06:52 | Set operational mode                                                                | IoDrvEtherCAT     |
|    | 17.06.2024 16:06:52 | All slaves safe-operational                                                         | IoDrvEtherCAT     |
|    | 17.06.2024 16:06:52 | Safe-operational                                                                    | IoDrvEtherCAT     |
|    | 17.06.2024 16:06:52 | Synchronize Slaves                                                                  | IoDrvEtherCAT     |
|    | 17.06.2024 16:06:50 | Configure distributed clock settings                                                | IoDrvEtherCAT     |
|    | 17.06.2024 16:06:50 | All slaves pre-operational                                                          | IoDrvEtherCAT     |
|    | 17.06.2024 16:06:50 | prepare slaves                                                                      | IoDrvEtherCAT     |

## 12. ModbusTCP

IP

UpdateCommunicationSettings

IP

| PROGRAM P03_ChangeTCPSlave |                                                                        |
|----------------------------|------------------------------------------------------------------------|
| 1                          | VAR                                                                    |
| 2                          |                                                                        |
| 3                          | iStep :INT;                                                            |
| 4                          | bChange :BOOL;                                                         |
| 5                          | ipAddr :ARRAY[0..3] OF BYTE := [192;168;188;2];                        |
| 6                          | uiPort :UINT:=502;                                                     |
| 7                          |                                                                        |
| 8                          | END_VAR                                                                |
| 9                          |                                                                        |
| 10                         | CASE iStep OF                                                          |
| 11                         | 0://开始判断                                                               |
| 12                         | IF bChange THEN                                                        |
| 13                         | bChangeOK:=FALSE;                                                      |
| 14                         | bChange:=FALSE;                                                        |
| 15                         | iStep:=10;                                                             |
| 16                         | END_IF                                                                 |
| 17                         | 10://关闭从站使能                                                            |
| 18                         | Modbus_TCP_Slave.Enable:=FALSE;                                        |
| 19                         | IF Modbus_TCP_Slave.ComState=0 THEN                                    |
| 20                         | iStep:=20;                                                             |
| 21                         | END_IF                                                                 |
| 22                         | 20://改变IP和端口                                                           |
| 23                         | udResult:=Modbus_TCP_Slave.UpdateCommunicationSettings(ipAddr,uiPort); |
| 24                         | IF udResult THEN                                                       |
| 25                         | bChangeOK:=TRUE;                                                       |
| 26                         | iStep:=1;                                                              |
| 27                         | END_IF                                                                 |
| 28                         | 30://开始从站使能                                                            |
| 29                         | Modbus_TCP_Slave.Enable:=TRUE;                                         |
| 30                         | iStep:=1;                                                              |
| 31                         | END_CASE                                                               |

13. ModbusTCP

Modbus\_TCP\_Slave x

| 通用         | 通道索引 | 名称        | 访问类型                               | 触发器 | 读偏移     | 长度 | 错误处理  | 写偏移     | 长度 | 注释 |
|------------|------|-----------|------------------------------------|-----|---------|----|-------|---------|----|----|
| Modbus从站通道 | 0    | Channel 0 | Read Holding Registers (函数代码 03)   | 应用  | 16#0000 | 1  | 保持最后值 |         |    |    |
|            | 1    | Channel 1 | Write Multiple Registers (函数代码 16) | 应用  |         |    |       | 16#0064 | 1  |    |

Modbus从站初始化

ModbusTCP Slave 参数

ModbusTCP Slave 映射

ModbusTCP Slave 注释

ModbusTCP Slave 注释

状态

信息

Modbus通道

通道名称: Channel 1

访问类型: Write Multiple Registers (函数代码 16)

触发器: 应用

主站: 16#0000

读寄存器: 16#0000

偏移: 16#0000

长度: 1

错误处理: 保持最后值

写寄存器: 16#0064

偏移: 16#0064

长度: 1

周期时间 (ms):

确定 (O) 取消 (C)

ModbusChannel

P04\_TriggerModbusTCPChannel x

```
1 PROGRAM P04_TriggerModbusTCPChannel
2 VAR
3     ModbusChannel_0      :ModbusChannel;
4     ModbusChannel_1      :ModbusChannel;
5     bRead                 :BOOL;
6     bWrite                :BOOL;
7 END_VAR

1 ModbusChannel_0(
2     slave:=Modbus_TCP_Slave , //从站名
3     xExecute:=bRead ,         //上升沿触发
4     xAbort:= ,
5     iChannelIndex:=0 ,        //通道索引
6     xBusy=> ,
7     xDone=> ,
8     xError=> ,
9     xAborted=> ,
10    ModbusError=> );

12 ModbusChannel_1(
13     slave:=Modbus_TCP_Slave , //从站名
14     xExecute:=bWrite ,         //上升沿触发
15     xAbort:= ,
16     iChannelIndex:=1 ,        //通道索引
17     xBusy=> ,
18     xDone=> ,
19     xError=> ,
20     xAborted=> ,
21    ModbusError=> );
```

14. Modbus

|  |  |  |  |  |
|--|--|--|--|--|
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

15. HCQX-RS02-D4-M

RS485 ID

16. ModbusTCP

STOP PLC Stopping STOP

17. Socket

- 1 TCP\_Read.pData TCP\_Read.szSize
- 2 TCP\_Read.xEnable TCP\_Client.xActive
- 3 TCP\_Client.xEnable NOT TCP\_Read.XError

18. Socket 0

TCP\_Write szSize SIZEOF

szSize LEN szSize

19. Socket TCP\_Cilent TIME\_OUT

TCP\_Write udiTimeOut 1000us

TIME\_OUT udiTimeOut

FB\_SocketTCP\_Client x

Device.Application.P01\_Socket\_TCP\_Client.FB\_SocketTCP\_Client\_0

| 表达式          | 类型             | 值        | 注释 |
|--------------|----------------|----------|----|
| TCP_Client_0 | NBS.TCP_Client |          |    |
| SUPER^       | LTrig          |          |    |
| udiTimeOut   | UDINT          | 1000     |    |
| ipAddr       | IP_ADDR        |          |    |
| uiPort       | UINT           | 20000    |    |
| eError       | ERROR          | TIME_OUT |    |
| xActive      | BOOL           | FALSE    |    |
| hConnection  | DWORD          | 0        |    |
| TCP_Read_0   | NBS.TCP_Read   |          |    |
| TCP_Write_0  | NBS.TCP_Write  |          |    |

```
1 //建立连接
2 ipAddr.sAddr :=strIP '192.168.88';
3 TCP_Client_0{
4   xEnable:=bEnable AND NOT TCP_Read_0.xError AND NOT TCP_Write_0.xError
5   udiTimeOut:=1000:=udiTimeOut*1000,
6   ipAddr:=ipAddr,
7   uiPort:=20000:=uiPort,
8   xDone=>,
9   xBusy=>,
10  xError=>,
11  eError=>,
12  xActive:=bConnect_OK,
13  hConnection=>};
```

20. Q0 COM

Q0 COM1 COM2 COM2

COM1 COM2

# 1.

|   |                   |        |   |
|---|-------------------|--------|---|
| 1 | Retain/Persistent |        |   |
| 2 | Persistent        | Retain | / |
| 3 | IO                |        | 2 |

# 2.

PLC

U

U

U

U

PORT0

# 3. BOOL

“ ”

1

2

3

# 4.

|             |             |
|-------------|-------------|
| Q0          | V1.04.03.01 |
| Q1          | V3.40.20.00 |
| Q0P/Q1P     |             |
| Q3P         | V1.00.01.14 |
| Q5P/Q7P/Q9P | V1.01.00.02 |

# 5.

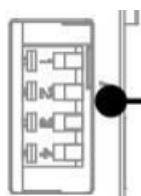
|   |         |         |               |
|---|---------|---------|---------------|
|   | STRING  | WSTRING |               |
| 1 | STRING  | 80      | 81 + 1        |
| 2 | WSTRING | 80      | 162 + 2       |
|   |         |         | 10 STRING(10) |

11

# 6.

IP

|    |     |     |    |
|----|-----|-----|----|
| Q0 | SW1 | SW2 | FN |
|----|-----|-----|----|



⑤ 拨码开关

|         |   |      |
|---------|---|------|
| Q1-322  | 5 |      |
| Q1-330+ | 5 | 0000 |
|         |   | 0    |
| Q5      | 5 |      |

| Q0P/Q1P | FN            | 3s                 | IP                                                   |
|---------|---------------|--------------------|------------------------------------------------------|
| 12      | FN/RUN/STOP开关 | FN/RUN/STOP switch | 拨到FN为复位EtherNet通讯接口IP地址，拨到RUN为运行控制器程序，拨到STOP为停止控制器程序 |

| Q3P/Q5P/Q7P/Q9P | FN               | 3s                      | IP                                                            |
|-----------------|------------------|-------------------------|---------------------------------------------------------------|
| 10              | STOP/RUN/FN 拨码开关 | STOP/RUN/FN dial switch | 功能拨码，向左为控制器停止状态，中间为运行状态，向右拨至FN并停留3s为恢复Port1/port2/port4 IP默认值 |

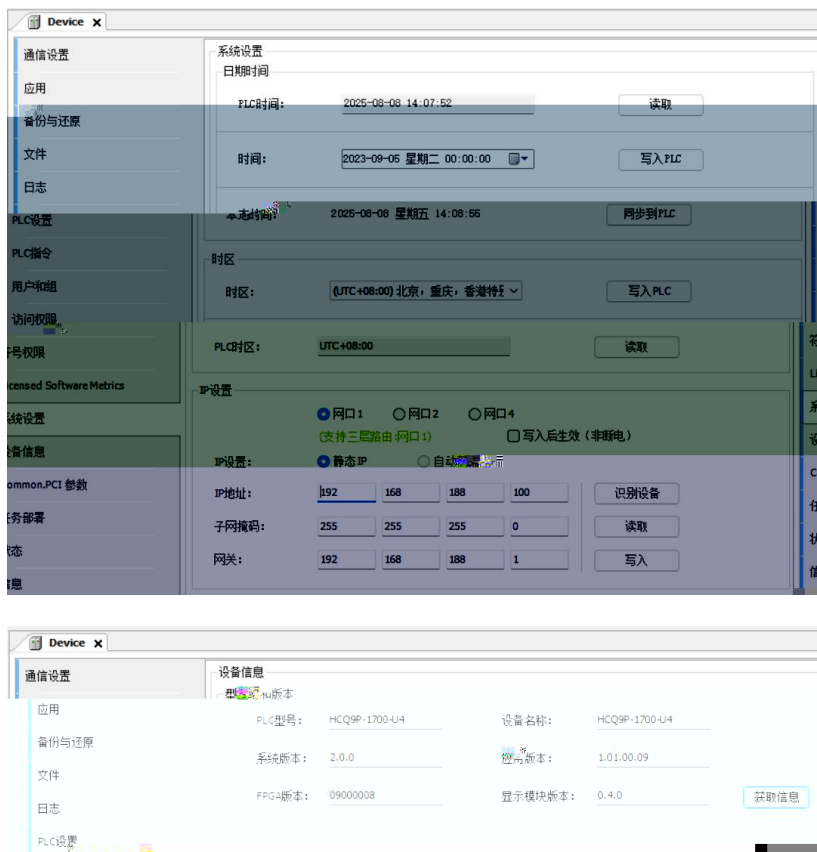
7.

\_XWORD/\_XINT/\_UXINT      32                      4                      64

8

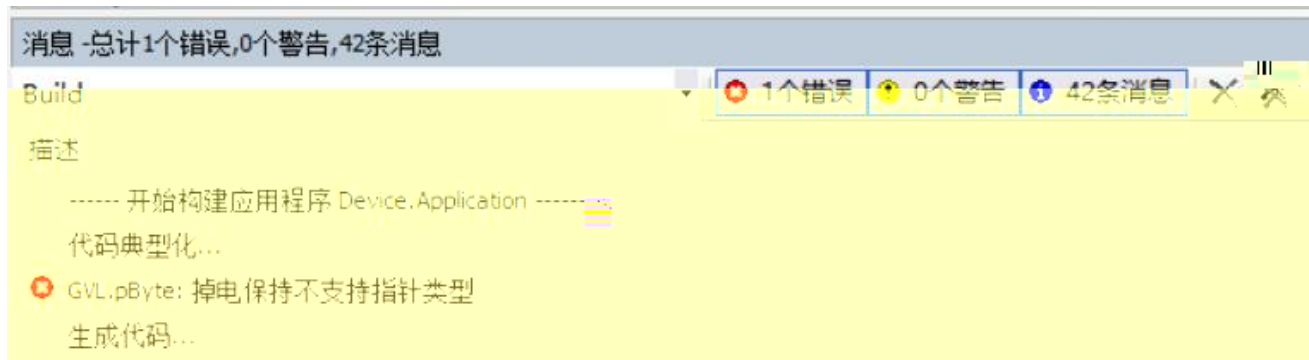
8.

16                                      Byte\_To\_HexStr ^tH p



11.

POINTER TO



12.

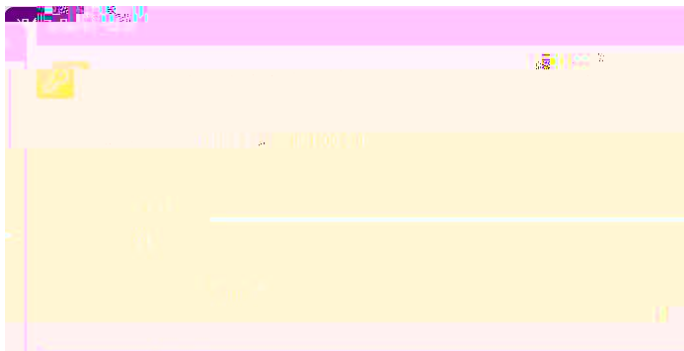
‘ \$ ’

\r\n                      CODESYS                      \$L/\$I                      \$N/\$n



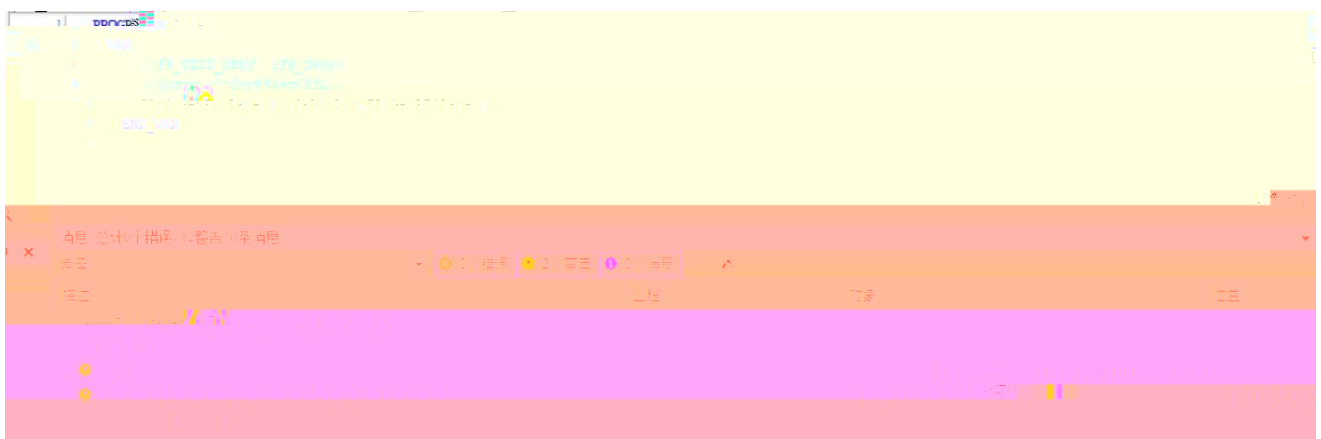
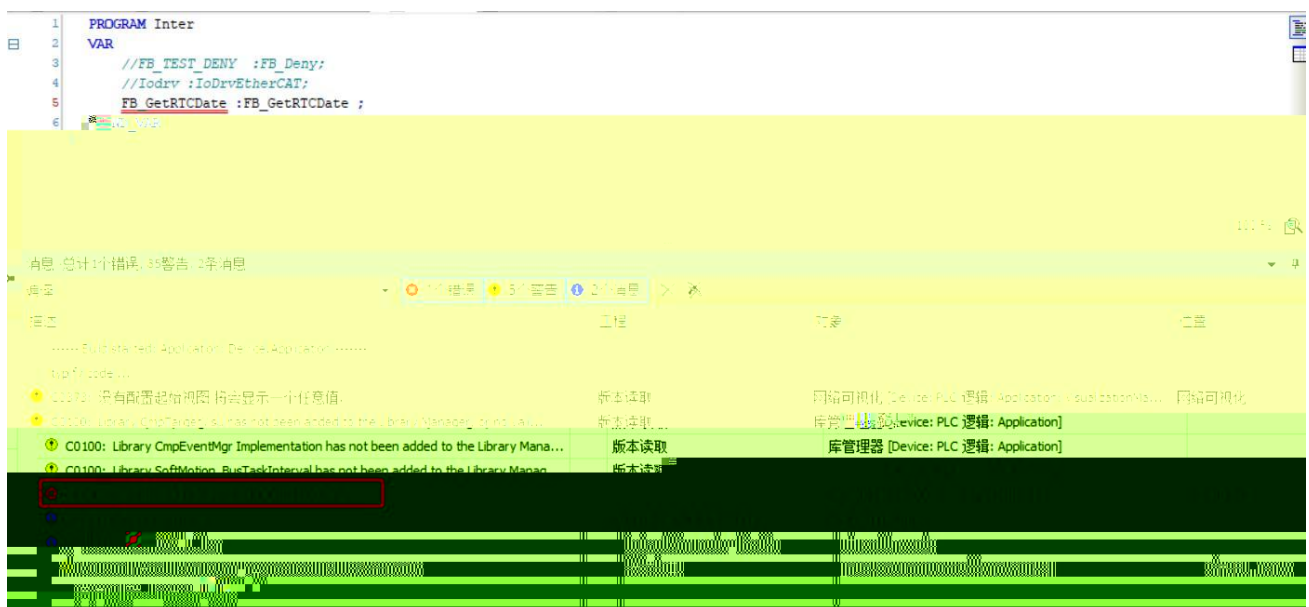
14.

Device “ [device] ”



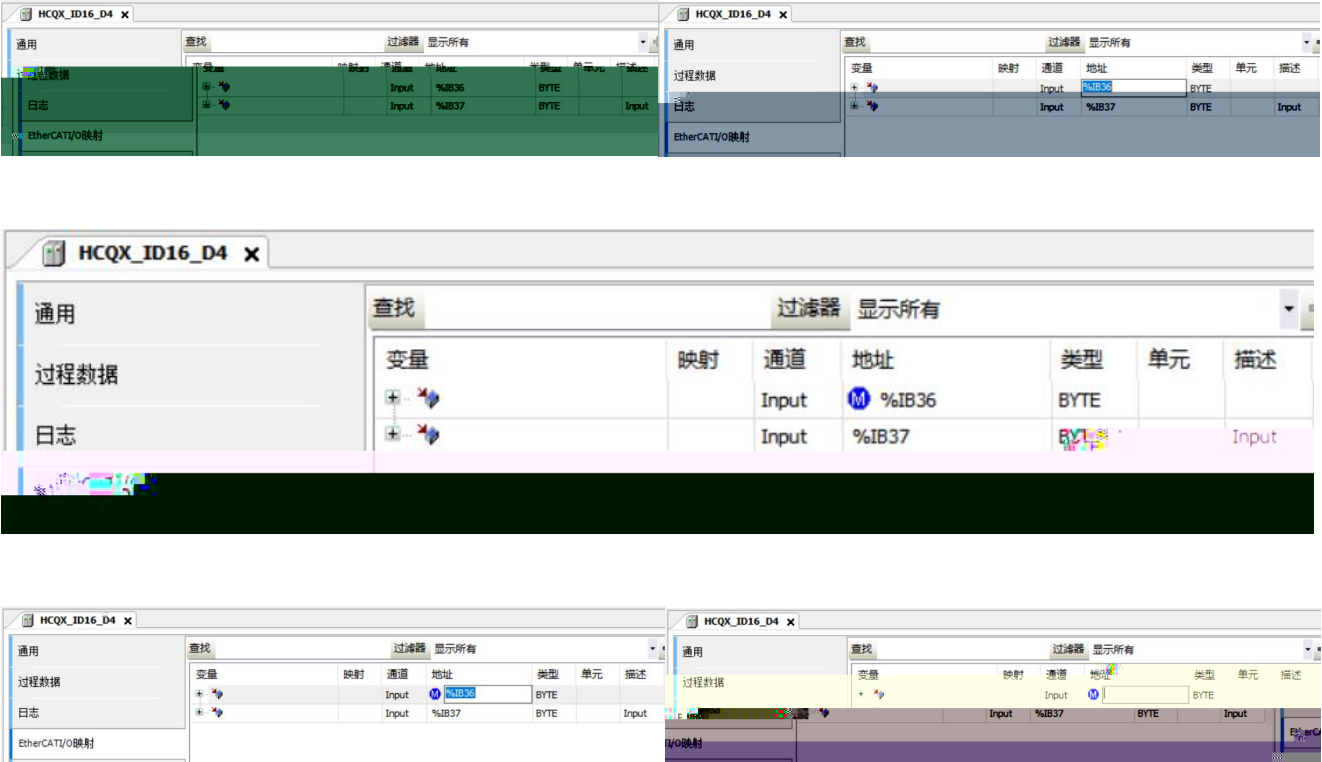
15.

C0136 ambiguous use of name “ ”



16. IO

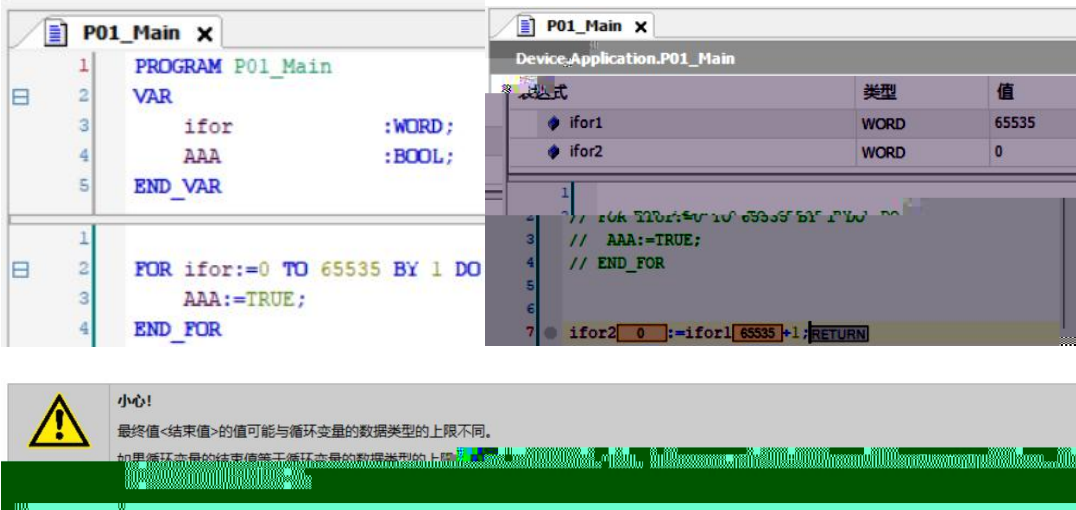
IO



17. FOR

ifor 65535 word FOR +1 ifor

+1 65535+1 ifor 0 word 0-65535



小心!  
最终值<结束值>的值可能与循环变量的数据类型上限不同。  
如果循环变量的结束值等于循环变量的数据类型上限

18. 255

Standard LEN 255 255









//复位—需要轴处于错误状态，并且通讯状态正常

```
MC_Reset_0(
    Axis:=Axis_0 ,
    Execute:=bReset AND Axis_0.nAxisState=1 AND Axis_0.wCommunicationState=100 ,
    Done=> ,
    Busy=> ,
    Error=> ,
    ErrorID=> );
```

//驱动器复位—当总线异常时可以执行复位驱动器

```
SMC3_ReinitDrive_0(
    Axis:=Axis_0 ,
    bExecute:=bReset AND Axis_0.wCommunicationState<>100 ,
    bVirtual:= ,
    bDone=> ,
    bBusy=> ,
    bError=> ,
    nErrorID=> );
```

//回原—需要防止轴处于未使能 (Power\_off)、错误状态 (Errorstop)、停止状态 (Stopping) 下被触发

```
MC_Home_0(
    Axis:=Axis_0 ,
    Execute:=bHome AND Axis_0.nAxisState>1,
    Position:=0 ,
    Done=> ,
    Busy=> ,
    CommandAborted=> ,
    Error=> ,
    ErrorID=> );
```

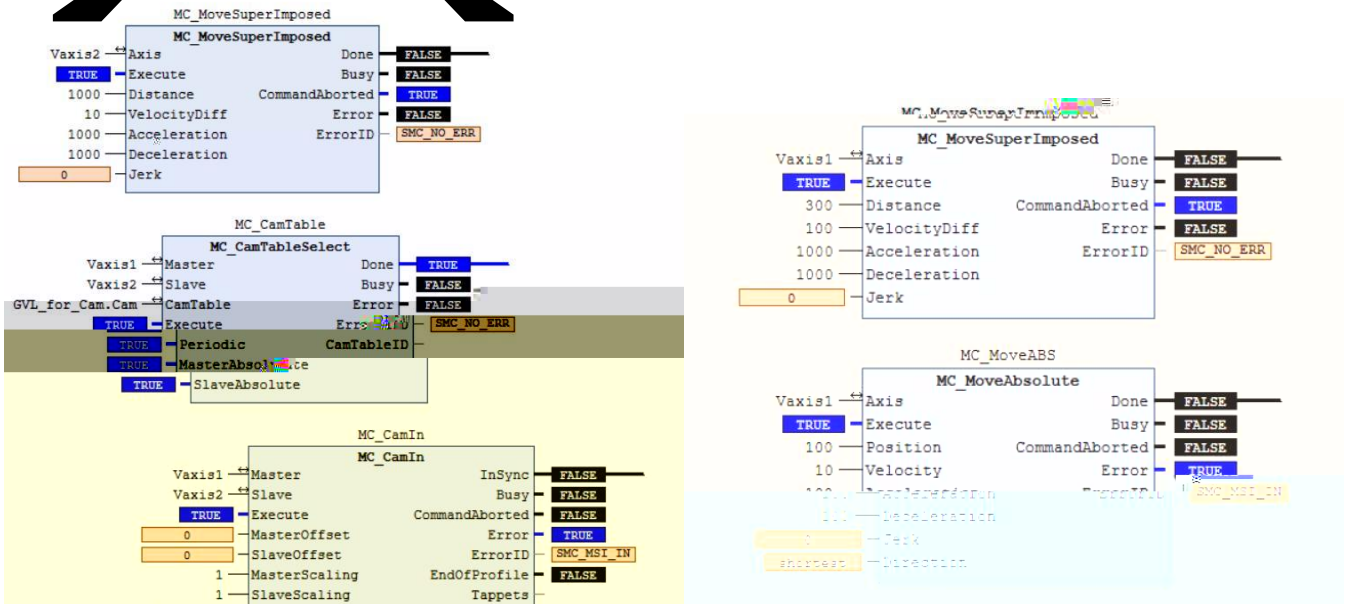
//暂停—需要防止轴处于未使能 (Power\_off)、错误状态 (Errorstop)、停止状态 (Stopping) 下被触发

```
MC_Halt_0(
    Axis:=Axis_0 ,
    Execute:=bHalt AND Axis_0.nAxisState>1 ,
    Acceleration:=1000 ,
    Jerk:= ,
    Done=> ,
    Busy=> ,
    CommandAborted=> ,
    Error=> ,
    ErrorID=> );
```

//运动—需要防止轴处于未使能 (Power\_off)、错误状态 (Errorstop)、停止状态 (Stopping)、回原 (Homing) 下被触发

```
MC_Jog_0(
    Axis:=Axis_0 ,
    JogForward:=bJogF AND Axis_0.nAxisState>2 AND Axis_0.nAxisState<>7 ,
    JogBackward:=bJogB AND Axis_0.nAxisState>2 AND Axis_0.nAxisState<>7 ,
    Acceleration:=1000 ,
    Deceleration:=1000 ,
    Jerk:=1000 ,
    Jerk:= ,
    Done=> ,
    Busy=> ,
    CommandAborted=> ,
    Error=> ,
    ErrorID=> );
```

|                 |                 |                     |                 |        |   |
|-----------------|-----------------|---------------------|-----------------|--------|---|
| MC_MoveAbsolute | MC_MoveRelative | MC_MoveSuperImpsied | MC_MoveAdditive | MC_Jog | , |
| Power_off       | Errorstop       | Stopping            | Homing          |        |   |



3. standstill

0

standstill 60I\_

EtherCAT

PDO

16#607F

16#6080

| Object 6080 <sub>n</sub> :最大电机转速 |        |        |        |
|----------------------------------|--------|--------|--------|
| 对象描述                             |        | 对象入口描述 |        |
| 属性                               | 值      | 属性     | 值      |
| 索引                               | 6080   | 名称     | 最大电机转速 |
| 名称                               | 最大电机转速 | 索引     | 6080   |

softmotion

轴类型与限制

☐ 虚轴模式

☐ 模态

☒ 线性

软件限位

☒ 激活

负向 [u]:  
正向 [u]:

-10  
1000.0

软件错误处理

减速 [u/s²]:  
最大距离 [u]

0  
0

动态限制

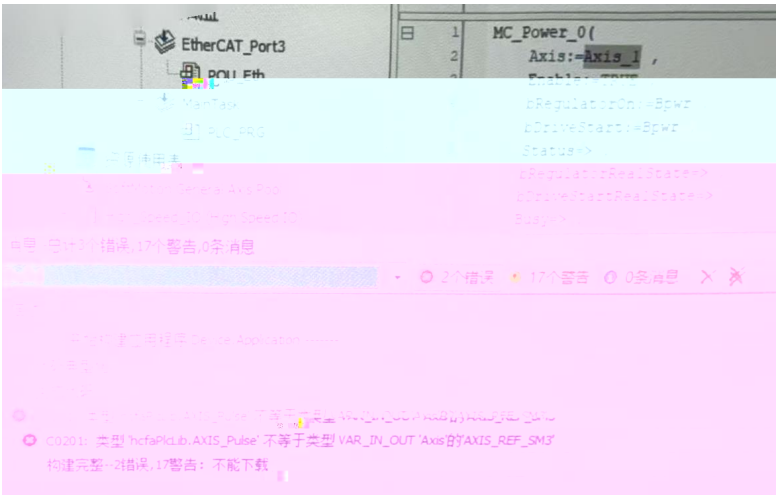
速度 [u/s]:  
1000

加速度 [u/s²]:  
1000

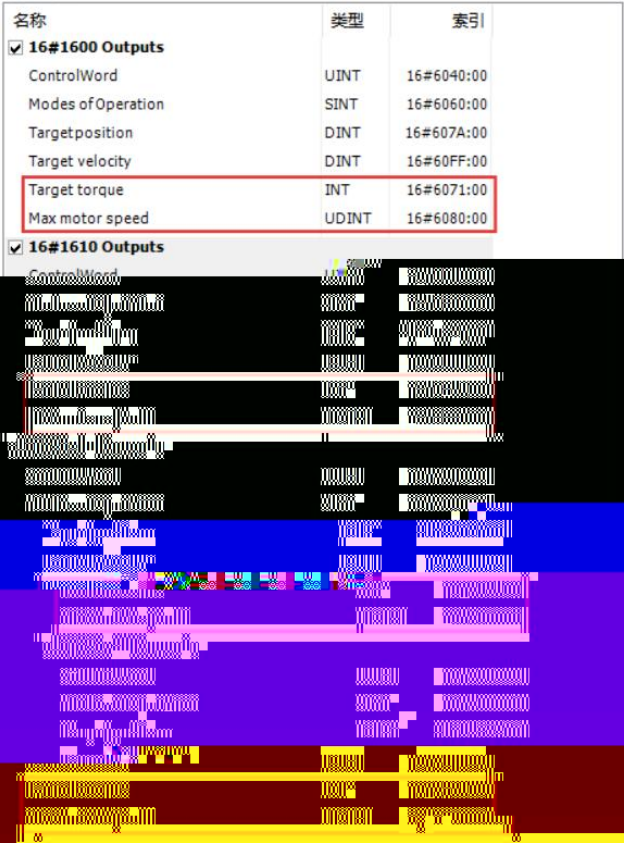
减速度 [u/s²]:  
1000

加加速度 [u/s³]:  
10000

|     |                   |          |                   |
|-----|-------------------|----------|-------------------|
| 11. | Codesys           | Port4    | Port3             |
|     | Codesys           | EtherCAT | EtherCAT          |
|     | Port3             | EtherCAT | EtherCAT          |
| 12. | HCP Works3 V1.3.0 |          |                   |
|     | Softmotion        | 4.10.0   | Codesys           |
|     |                   |          | Softmotion        |
|     |                   |          | HCP Works3 V1.3.0 |



|     |        |         |         |
|-----|--------|---------|---------|
| 13. | SV730W |         |         |
|     | SV730W | XML     | PDO     |
|     |        | 16#6071 | 16#607F |
|     |        | 16#6080 |         |



14.

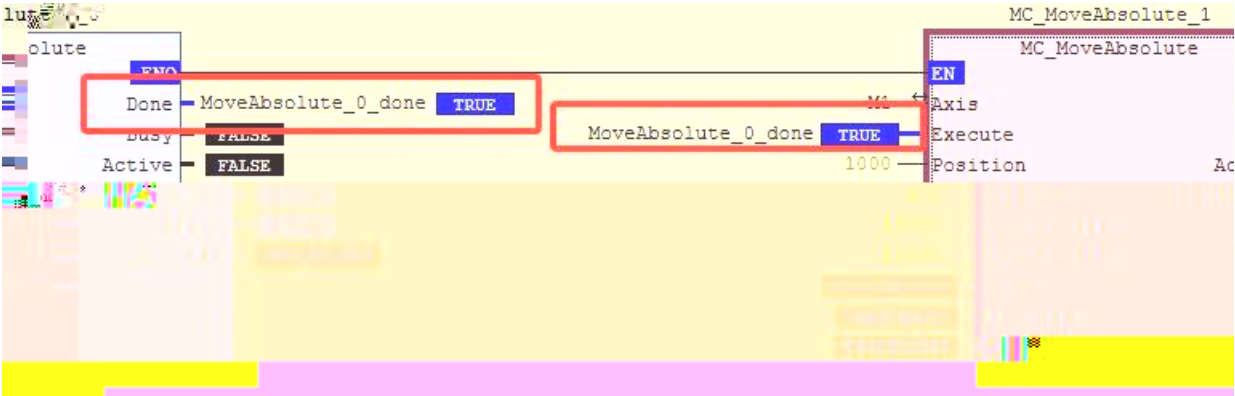
dò

9ò\$\$S}p

2

|     |   |      |    |    |  |      |   |      |      |    |
|-----|---|------|----|----|--|------|---|------|------|----|
| 15. |   |      |    |    |  |      |   |      |      |    |
|     | X |      | Nm | Y7 |  |      | X |      | 6076 | Y7 |
|     |   | 6076 |    |    |  | 6071 |   | 6076 | 0    |    |

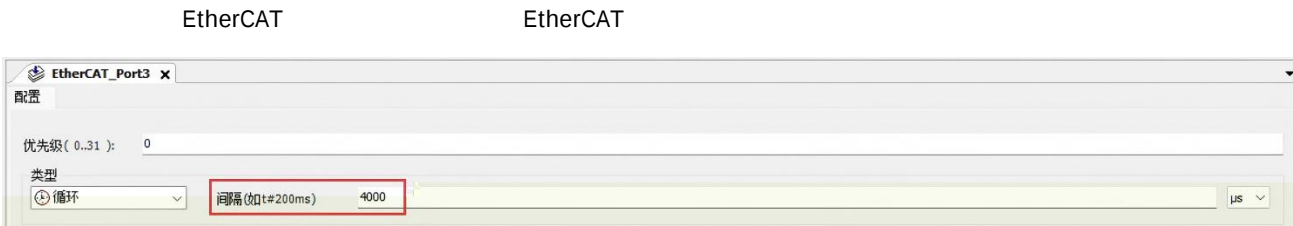
16. BufferMode

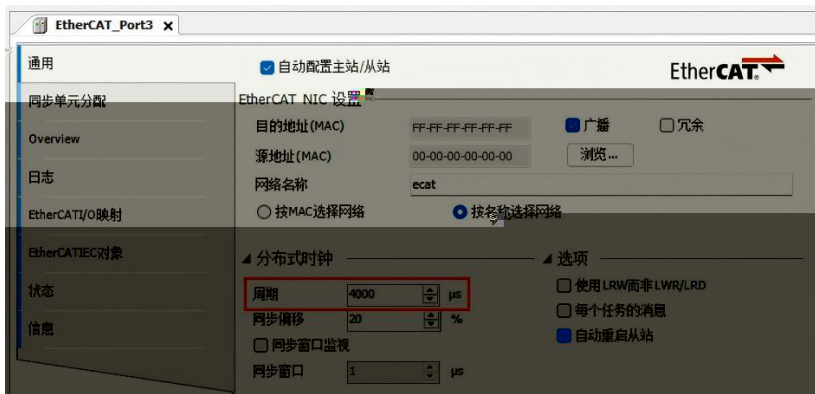


17.

|  |                                                                                                                                                                                                                                                    |         |                         |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------------------------|
|  | IO                                                                                                                                                                                                                                                 | 16#60FD | Axis.in.dwDigitalInputs |
|  | Y7S                                                                                                                                                                                                                                                |         |                         |
|  | <div><div>b负限位 :=Axis_0.in.dwDigitalInputs.0;</div><div>b正限位 :=Axis_0.in.dwDigitalInputs.1;</div><div>b原点 :=Axis_0.in.dwDigitalInputs.2;</div><div>b探针1 :=Axis_0.in.dwDigitalInputs.11;</div><div>b探针2 :=Axis_0.in.dwDigitalInputs.12;</div></div> |         |                         |

18. EtherCAT





## 19. SMC\_MOVING\_WITHOUT\_ACTIVE\_MOVEMENT

SMC\_SetControllerMode Done

Done

Halt Stop

Softmotion

4.4.0.2

softmotion

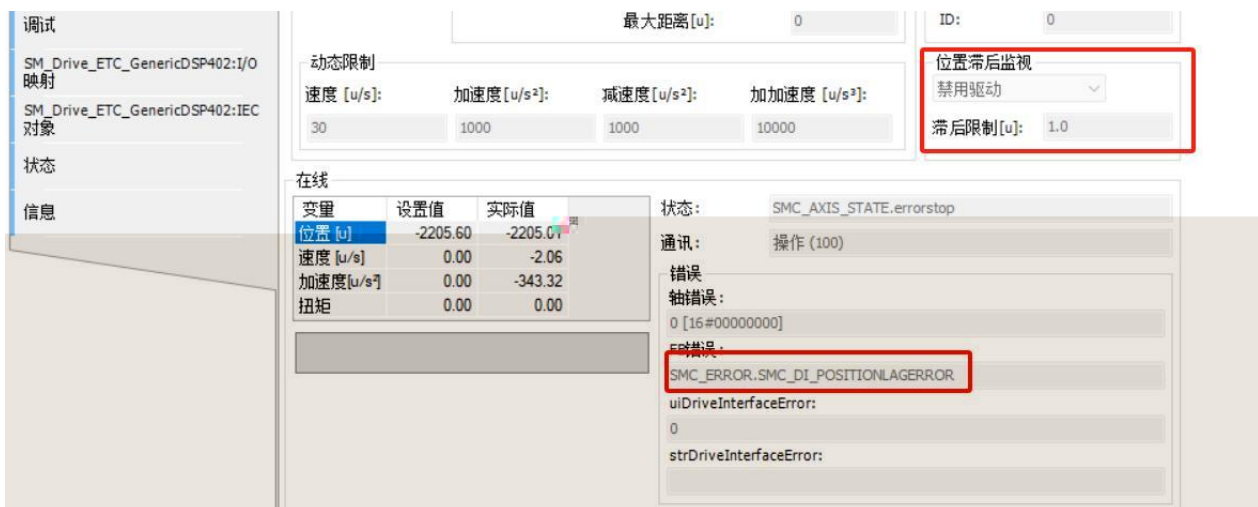
4.10.0.0 softmotion

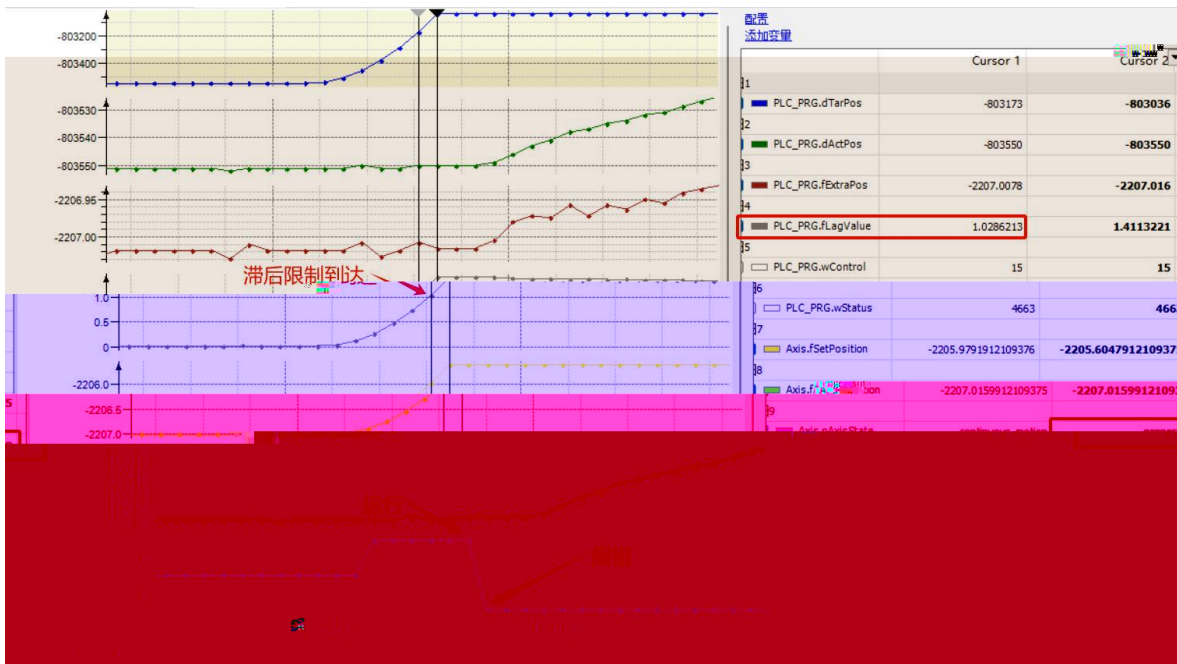
```
SMC_SetControllerMode_0(
    Axis:=Axis_0 ,
    bExecute:= ,
    nControllerMode:=3 ,
    bDone=> ,
    bBusy=> ,
    bError=> ,
    nErrorID=> );

MC_Stop_0(
    Axis:=Axis_0 ,
    Execute:=SMC_SetControllerMode_0.kickoff
    Deceleration:=10000 ,
    Jerk:= ,
    Done=> ,
    Busy=> ,
    Error=> ,
    ErrorID=> );
```

## 20. SMC\_DI\_POSITIONLAGERROR

$\text{abs}(f\text{SetPositon}-f\text{ActPositon})>$





#### “位置滞后监督”

定义系统的检测滞后误差后的反应。当额定位置和补偿的实际位置之间的差值超过滞后限制就会产生滞后误差。实际位置的计算公式：

$\text{Extrapolated actual position} := \text{actual position} + \text{actual velocity} * \text{cycle time} * \text{Axis.fSetActTimeLagCycles}$

这个值等于轴的结构体中的fSetActTimeLagCycles 周期（“功能块 AXIS\_REF\_SM3”）补偿用于因为通讯而导致设置值与当前值之间的偏差。检测到滞后误差可能出现的反应是：

- “停用”：没有任何反应，因为滞后监督被取消。
- “禁用驱动器”：位bRegulatorOn被强制为 FALSE（与 MC\_Power 输入比较），这导致驱动器被禁用（当然依据驱动器减速度实现方式）。
- “执行快速停止”：位bDriveStart被强制为 FALSE（与 MC\_Power 输入比较），这导致驱动器快速停止。
- “保留当前状态”：驱动器保持位于当前状态，但是停止所有运动。

“滞后限制”：定义滞后限制。

21. 1020 SMC\_RAG\_ERROR\_DURING\_STARTUP 20 1020 SMC\_ERROR  
“ Error at startup of the axis group ” SDO

MC\_ReadAxisError MC\_ReadParameter MC\_WriteParameter



SDO SDO SDO  
SDO CRC SDO

| 状态和状态转化                               | 操作                                                                          |
|---------------------------------------|-----------------------------------------------------------------------------|
| 初始化(Init)                             | 应用层没有通讯，从站只能读写 SMC 芯片寄存器。                                                   |
| 初始化向预运行转化<br>Init To Pre-OP(IP)       | 如果支持邮箱通讯，配置邮箱相关寄存器。<br>如果支持分布式时钟，配置 DC 相关寄存器。<br>主站写入状态控制寄存器，以请求 Pre-OP 状态。 |
| 预运行(Pre-OP)                           | 应用层邮箱通讯                                                                     |
| 预运行向安全运行状态转化<br>Pre-OP To Safe-OP(PS) | 主站使用邮箱初始化过程数据映射。<br>主站配置过程数据使用的 SM 通道。<br>主站写入状态控制寄存器，请求 Safe-OP 状态。        |
| 安全运行(Safe-OP)                         | 应用层支持邮箱通讯。<br>有过程数据通讯，但只允许读入数据，不产生输出信号。                                     |
| 安全运行向运行状态转化<br>Safe-OP To Op(SO)      | 主站发送有效输出数据。<br>主站写入状态控制寄存器，请求 Op 状态。                                        |
| 运行状态(Op)                              | 输入输出全部有效                                                                    |

26.03.2024 20:37:05

SDO write ok: Address: 1002 Index: 16

26.03.2024 20:37:05

SDO write ok: Address: 1002 Index: 16

26.03.2024 20:37:05

SDO write ok: Address: 1002 Index: 16

26.03.2024 20:37:05

SDO write ok: Address: 1002 Index: 16

26.03.2024 20:37:04

All slaves init mode

1020

SDO

SDO

softmotion 4.10.0.0 14 17 SMC3\_ReinitDrive

SMC3\_ReinitDrive SDO MC\_ReadAxisError 603F 20

1020

22. SMC\_CGR\_INVALID\_POSPERIOD

$$= \frac{2^{32} \times \times}{\times} \div 2$$

18432

轴类型为旋转模式

单位换算公式：

参考

脉冲数(pulse) = 
$$\frac{(1) \text{ 电机旋转一圈的指令脉冲数 [DINT]}}{(2) \text{ 工作台旋转一圈的工作行程 [LREAL]}} \times \frac{(4) \text{ 齿轮比分子 [DINT]}}{(3) \text{ 齿轮比分母 [DINT]}} \times \text{移动距离 [用户单位]}$$

M:电机 W:工作台

工作台旋转一圈的工作行程：  
(2) 360

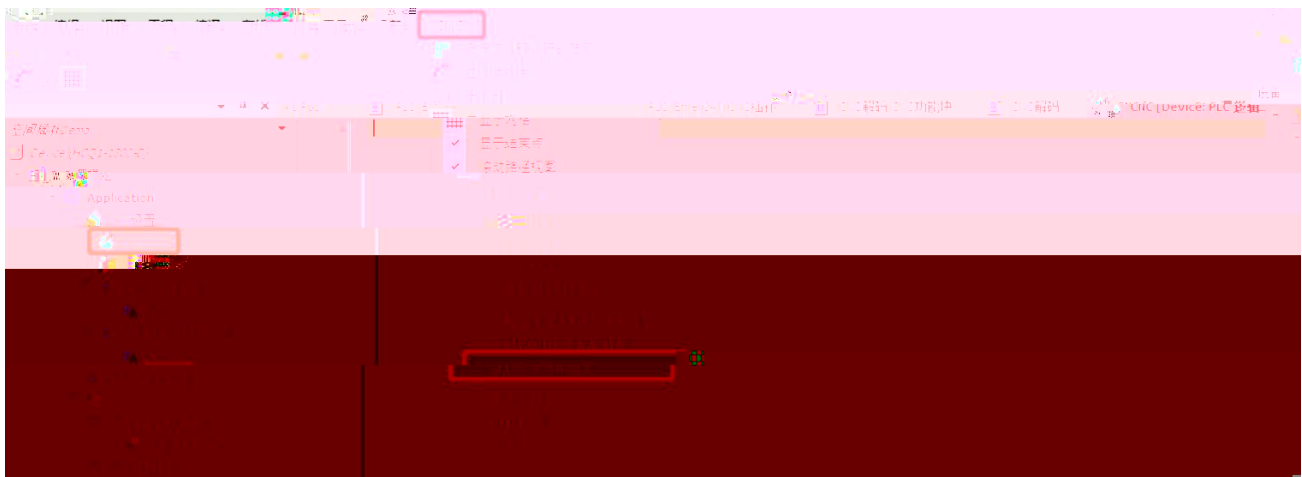
齿轮比分母（齿数）：  
5 (3)

齿轮比分子（齿数）：  
(4) 1

23. CNC DXF

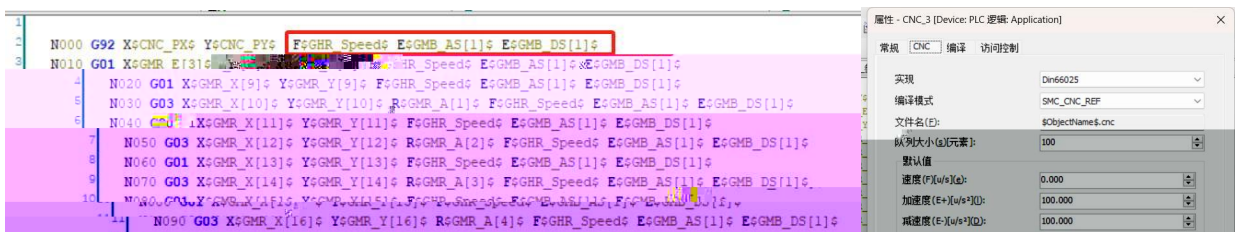
Codesys CAD DXF G CNC-

CNC - DXF - DXF



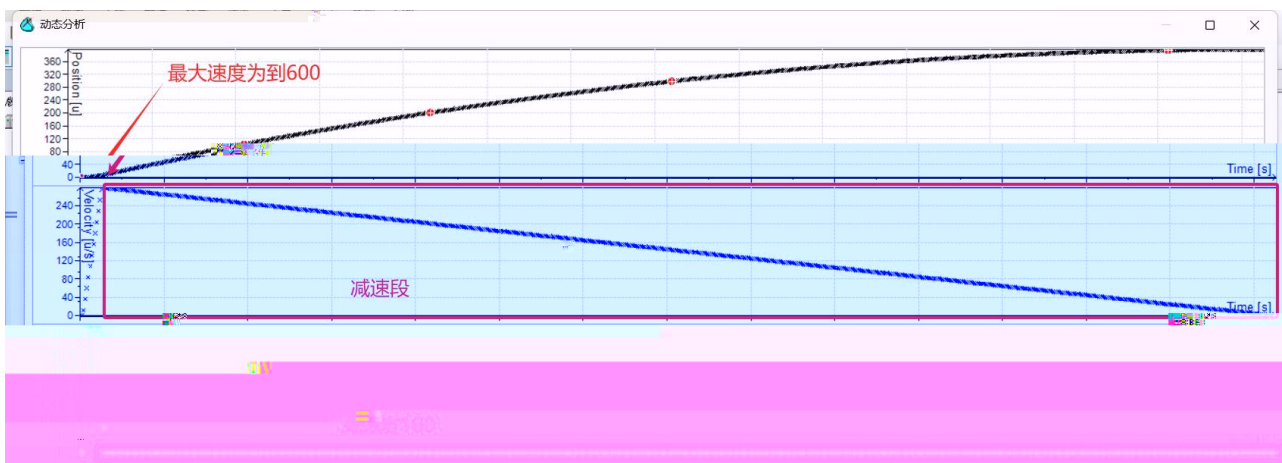
## 24. CNC

100



600

6



## 25.

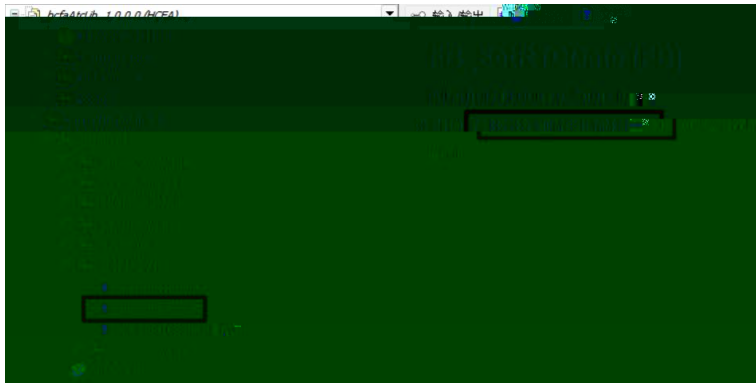
## EtherCAT

FB\_SetRTCDate

EtherCAT

EtherCAT

SMC\_DI\_FIELDBUS\_LOST\_SYNCRONICITY



## 26. EtherCAT

EtherCAT

F2

xRestart

EtherCAT

```

23
24 EtherCAT_Port3(
25     xRestart:= ,
26     xStopBus:= ,
27     xConfigFinished=> ,
28     xDistributedClockInSync=> ,
29     xError=> ,
30     xSyncInWindow=> );
31
32
33
34
35
36
37
38

```

## 27. ATC FB\_GetEtcSlaveState pMaster Buffer

ATC

FB\_GetEtcSlaveState

pMaster

Buffer

\_stEtcSlaveState

NumSlave

\_stEtcSlaveState

ETCSlaveState

Null

## 28. EtherCAT

hcfaAtcLib

FB\_EtherCATManager

stECATSlave

LocalEtherCATDevice

```

GVL_PersVars X
1  //{attribute 'qualified_only'}
2  VAR_GLOBAL RETAIN PERSISTENT
3      bSlave_Disable AT %MB131072 : ARRAY [1..4] OF BOOL
4  END_VAR

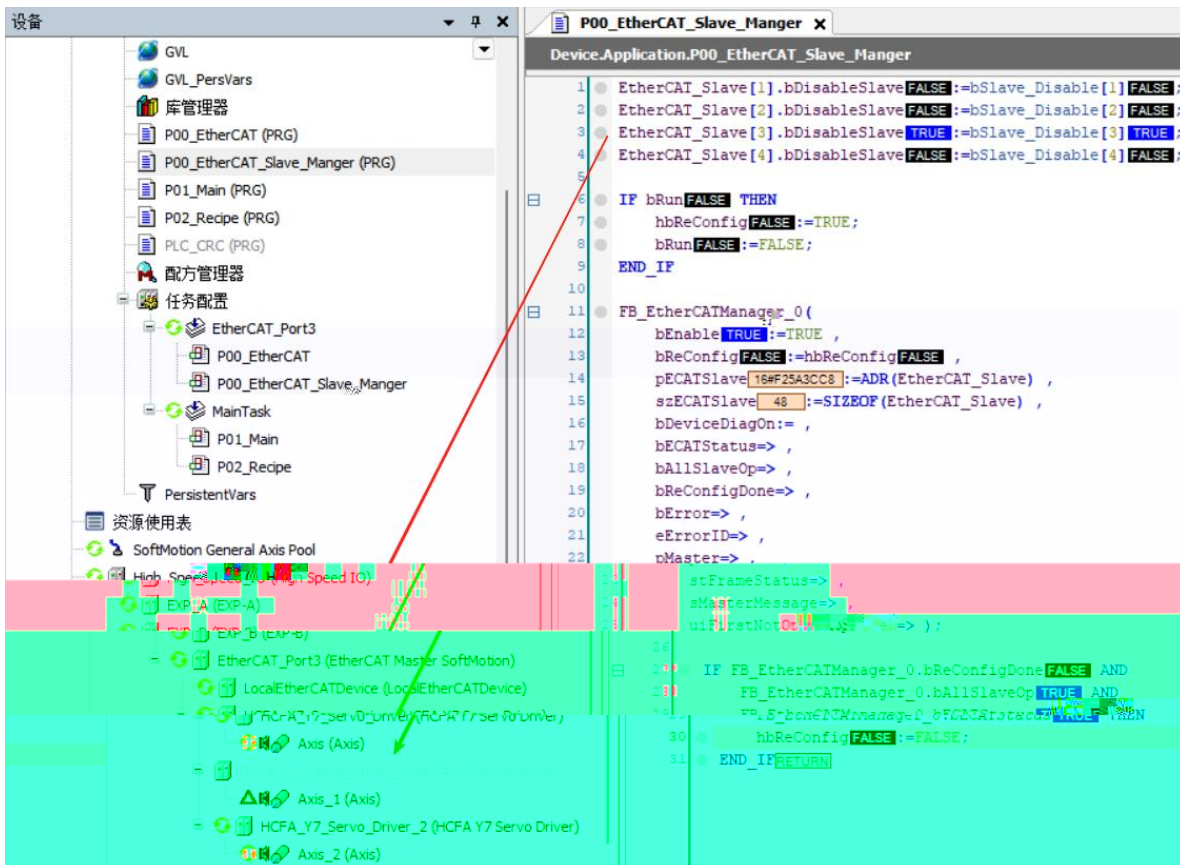
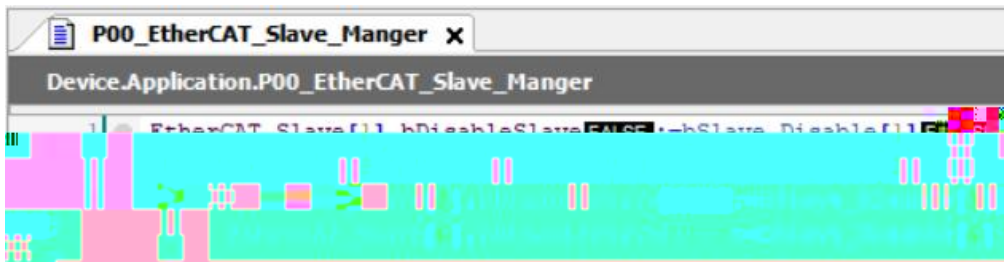
P00_EtherCAT_Slave_Manger X
1  PROGRAM P00_EtherCAT_Slave_Manger
2  VAR
3      FB_EtherCATManager_0      :FB_EtherCATManager;
4      EtherCAT_Slave           :ARRAY[1..4] OF stECATSlave;
5      bRun                     :BOOL:=TRUE;
6      hbReConfig               :BOOL;
7  END_VAR

1  EtherCAT_Slave[1].bDisableSlave:=bSlave_Disable[1];
2  EtherCAT_Slave[2].bDisableSlave:=bSlave_Disable[2];
3  EtherCAT_Slave[3].bDisableSlave:=bSlave_Disable[3];
4  EtherCAT_Slave[4].bDisableSlave:=bSlave_Disable[4];

5
6  IF bRun THEN
7      hbReConfig:=TRUE;
8      bRun:=FALSE;
9  END_IF

10
11  FB_EtherCATManager_0(

```



SetEnabled

```
EtherCAT_Port3(
    xRestart:=bRestart ,
    xStopBus:= ,
    xConfigFinished=> ,
    xDistributedClockInSync=> ,
    xError=> ,
    xSyncInWindow=> );
```

```
HCFA_Y7_Servo_Driver_1.SetEnabled(pConnector:=HCFA_Y7_Servo_Driver_1.m_pConnector,xEnabled:=NOT bEnable);
HCFA_Y7_Servo_Driver_1.SetEnabled(pConnector:=Axis_1.m_pConnector,xEnabled:=NOT bEnable);
```

29.                      DXF                      CNC

                         CAM                      DXF                      CNC                      CNC                      U    \SD                      CNC



1.

\_\_\_\_\_

ER0000

Q0P/Q1P

ERR

2.

\_\_\_\_\_

ER0051

PLC

FOR

FOR

3.

\_\_\_\_\_

ER0102 ER0152

FPU DevisionByZero

|                     |                                                                                      |            |
|---------------------|--------------------------------------------------------------------------------------|------------|
| 12.09.2023 13:21:41 | *SOURCEPOSITION* App=[Application] area=3, offset=2931                               | CmpIecTask |
| 12.09.2023 13:21:41 | *EXCEPTION* [FPU DevisionByZero] occurred: App=[Application], Task=[EtherCAT Task 1] | CmpIecTask |

POU

REAL/LREAL

POU

fData

NaN

:=fData2

0

/fData2

0

;

RETURN

4.

\_\_\_\_\_

HCFA

HCFA

HCFA

5. EtherCAT

\_\_\_\_\_

CRC

Port0

Port1

Link Lost Counter

6. EtherCAT

\_\_\_\_\_

“

”

XML

XML

7. EtherCAT

\_\_\_\_\_

1

In

Out

2

3

STOP

4

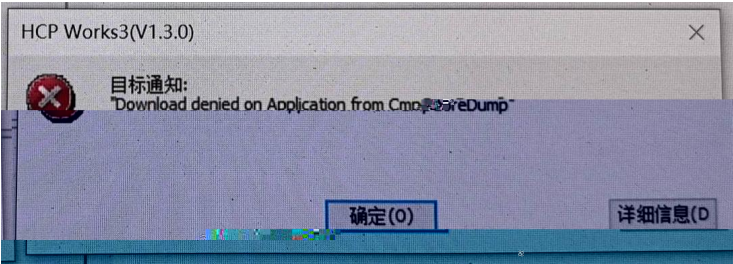
5

8. EtherCAT

\_\_\_\_\_



9. —Download Denied on Application from CmpCoreDump



“ EXCEPTION ”

| 厂牌 | 时间戳                 | 消息                                                                            | 操作     |
|----|---------------------|-------------------------------------------------------------------------------|--------|
| x  | 24.11.2023 22:51:38 | *SOURCEPOSITION* App=[Application] area=3, offset=1145650                     | CmpApp |
|    | 24.11.2023 22:51:38 | *EXCEPTION* [GlobalExit] code: App=[Application], Exception=[AccessViolation] | CmpApp |

- 1 PLC STOP
- 2 PLC Device →
- 3

10. —

GlobalInit

| 严重                                                                                | 时间标记                | 描述                                                                            | 组件     |
|-----------------------------------------------------------------------------------|---------------------|-------------------------------------------------------------------------------|--------|
|  | 28.03.2024 02:29:58 | *SOURCEPOSITION* App=[Application] area=3, offset=1707470                     | CmpApp |
|  | 28.03.2024 02:29:58 | *EXCEPTION* [GlobalInit] code: App=[Application], Exception=[AccessViolation] | CmpApp |

44

44

ARM

32

64

```
{attribute 'pack_mode' := '0'}
TYPE AAA :
STRUCT
  Data :REAL;
END_STRUCT
END_TYPE
```

11.

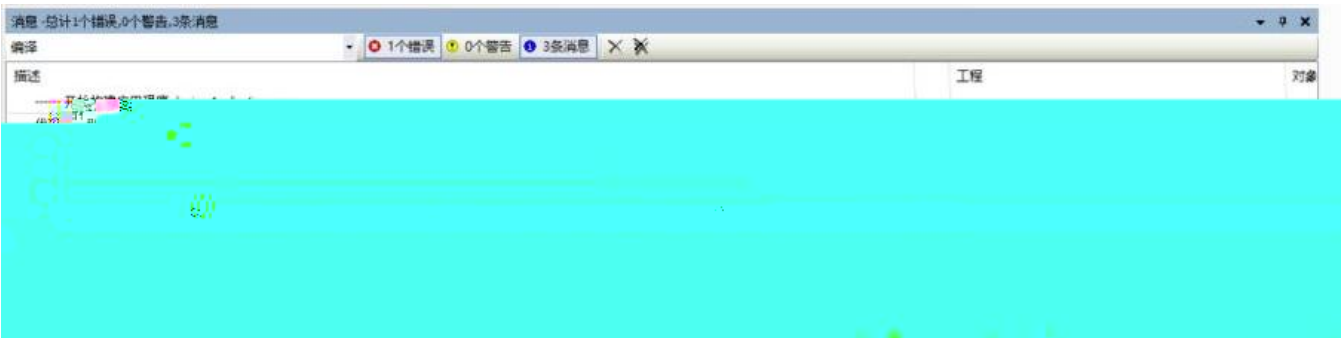
——

'sm3basic,4.10.0.0...

12.

——Internal error:System.NullReferenceException

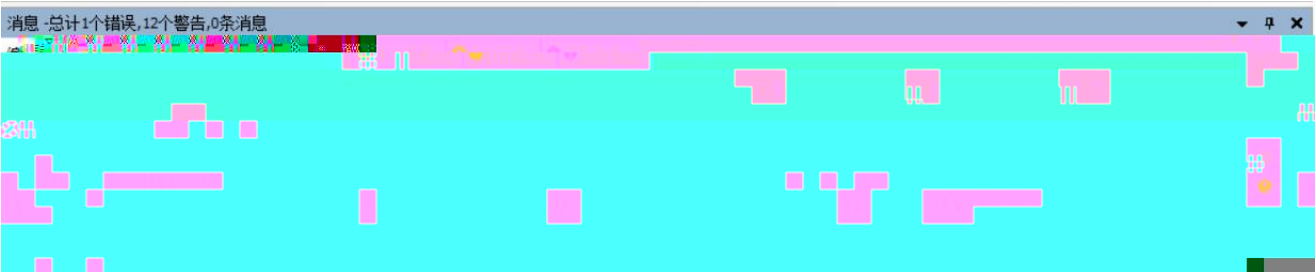
softmotion



13.

——The Library \*\*\* is only supported in 32 bit applications

32



23

32

64

system23

32

system

32 /64

14.

——Not enough persistent memory

消息: 总计1个错误, 617个警告, 0条消息

Build 1个错误 117个警告 0条消息

| 描述                                      | 工程             | 对象                      | 位置 |
|-----------------------------------------|----------------|-------------------------|----|
| ----- 开始构建应用程序 Device.Application ----- |                |                         |    |
| 代码典型化...                                |                |                         |    |
| C0414: Not enough persistent memory     | 京东20格口40+4程... | PersistentVars [Devi... | 8行 |
| 构建完整--1错误, 117警告: 不能下载                  |                |                         |    |

/ / Codesys  
POU / / /Lrange

|     |     |              |     |     |
|-----|-----|--------------|-----|-----|
| POU |     | " no_check " |     | POU |
|     | POU |              | POU |     |

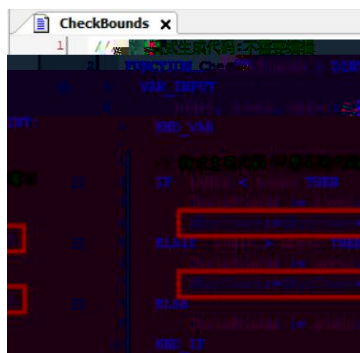
```

1  {attribute 'no_check'}
2  PROGRAM P00_EtherCAT
3  VAR
4      tonEtherCAT          :TON;
5      SMC3_PersistPosition_0 :SMC3_PersistPosition;
6      FB_GetEtcSlaveState_0 :FB_GetEtcSlaveState;
7      EtherCAT_SlaveState   :ARRAY[0..9] OF _stEtcSlaveState;
8      bRestart              :BOOL;
9      bEnable                :BOOL;
10 END_VAR

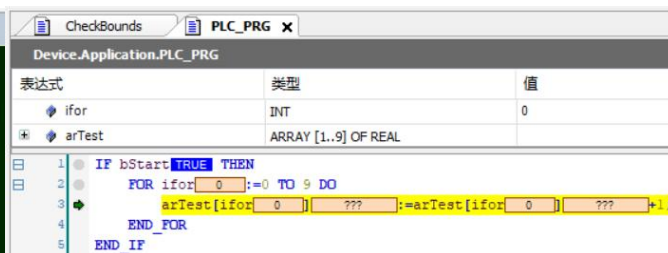
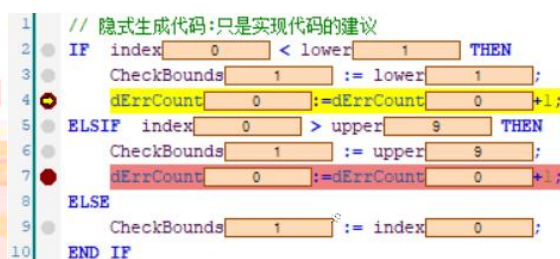
```

dErrCount

## 1 dErrCount



dErrCount 0



PLC

## 2. PID

PIDLIB 2.0.0.0.compiled-library

PID PWS

PID

```
rActValue:=TO_REAL($IW2)/10;
```

```
PID_0{
```

```
  RUN:=bRun ,
```

//功能块开始运行

```
  ManualCtrl:=FALSE ,
```

```
  AutoTune:=bAutoTune ,
```

//开始自动调整

```
  SV:=rSetValue ,
```

```
  PV:=rActValue ,
```

```
  CycleTime:=LTIME#100MS ,
```

```
  Proportional:=rP ,
```

//在自调整时随便给个值，但不能为0，给个初始值就好

```
  IntegrationTime:=ltI ,
```

//在自调整时随便给个值，但不能为0，给个初始值就好

```
  DerivativeTime:=ltD ,
```

//在自调整时随便给个值，但不能为0，给个初始值就好

```
  RangLow:=0 ,
```

//输入下限

```
  RangUp:=300 ,
```

//输入上限

```
  MVLow:=0 ,
```

//输出下限

```
  MVUp:=100 ,
```

//输出上限

```
  ManualMV:=rManualMV ,
```

```
  Direction:= ,
```

```
  Options:= ,
```

```
  ATDone=> ,
```

```
  ATBusy=> ,
```

```
  Error=> ,
```

```
  ErrorID=> ,
```

```
  MV=> );
```

//输出值的范围是0-100

```
PWM_0{
```

```
  Enable:=bOut ,
```

```
  OnTime:=REAL_TO_INT(PID_0.MV*10) ,
```

//PID输出值\*10就是相当干将ON时间调成在1s中所占百分比

```
  CycleTime:=1000ms ,
```

//周期为1000ms

```
  Out=>$QX0.0 );
```

//执行RUN，功能块开始运行。ATBUSY输出代表该块正在启动或运行

//当ATDone被置位代表运算完成，PID新的参数也会生成，结果会覆盖到比例系数，微分时间，积分时间引脚上

//如需下次使用该组参数无需自调节，将AutoTune复位，直接run即可使用该组PID参数

3.

PersistentVars

PersistentVars

PersistentVariables

PersVars

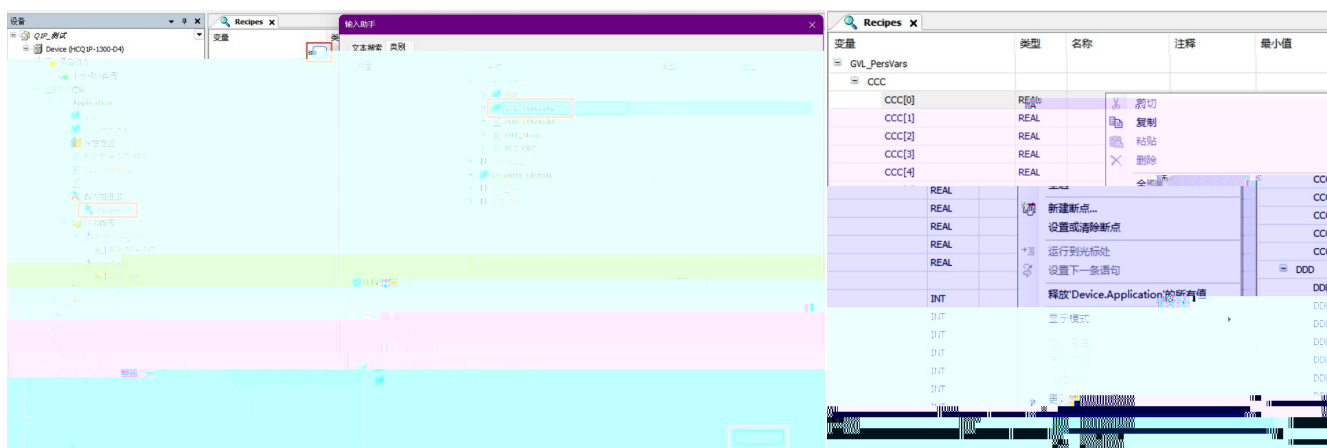
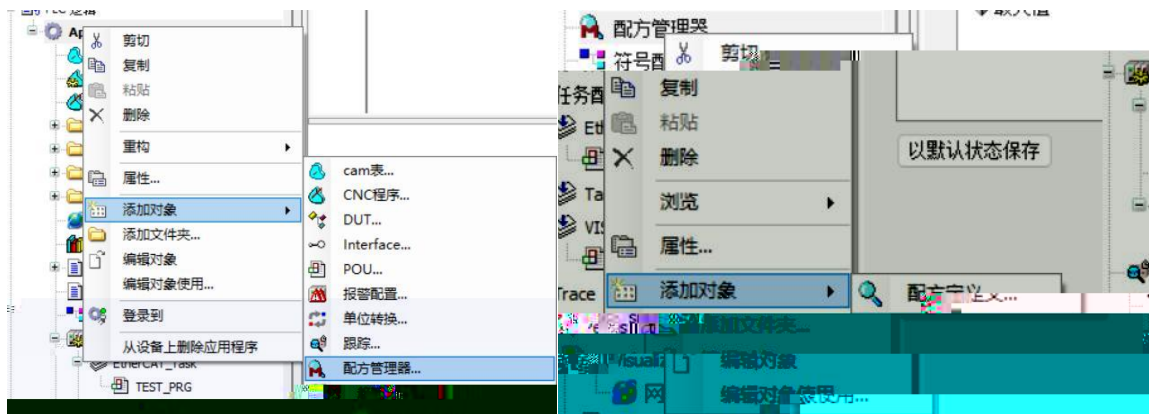
| 表达式     | 类型                   | 值  | 注释 | 地址 |
|---------|----------------------|----|----|----|
| CCC[0]  | REAL                 | 1  |    |    |
| CCC[1]  | REAL                 | 2  |    |    |
| CCC[2]  | REAL                 | 3  |    |    |
| CCC[3]  | REAL                 | 4  |    |    |
| CCC[4]  | REAL                 | 5  |    |    |
| CCC[5]  | REAL                 | 6  |    |    |
| CCC[6]  | REAL                 | 7  |    |    |
| CCC[7]  | REAL                 | 8  |    |    |
| CCC[8]  | REAL                 | 9  |    |    |
| CCC[9]  | REAL                 | 10 |    |    |
| CCC[10] | REAL                 | 11 |    |    |
| CCC[11] | REAL                 | 12 |    |    |
| CCC[12] | REAL                 | 13 |    |    |
| CCC[13] | REAL                 | 14 |    |    |
| CCC[14] | REAL                 | 15 |    |    |
| CCC[15] | REAL                 | 16 |    |    |
| DDD[0]  | ARRAY [0..7] OF DINT |    |    |    |
| DDD[1]  | DINT                 | 11 |    |    |
| DDD[2]  | DINT                 | 22 |    |    |
| DDD[3]  | DINT                 | 33 |    |    |
| DDD[4]  | DINT                 | 44 |    |    |
| DDD[5]  | DINT                 | 55 |    |    |
| DDD[6]  | DINT                 | 66 |    |    |
| DDD[7]  | DINT                 | 77 |    |    |
| DDD[8]  | DINT                 | 88 |    |    |

PersistentVars

Application

→

→



PLC

RecipeManagement.library

## RecipeManCommands

“FlashFiles/”

```
//实例调用
RecipeManCommands_0();

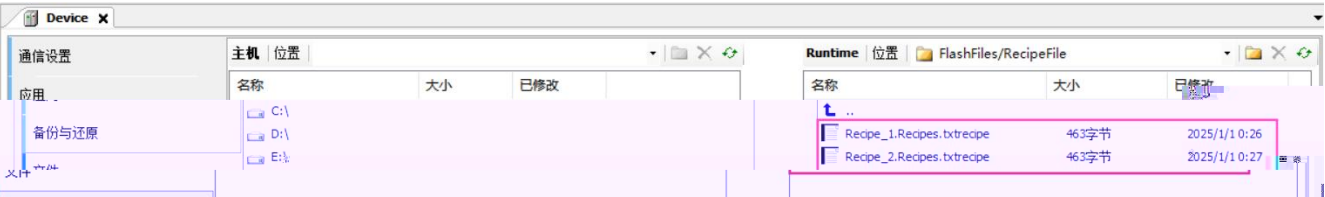
//设置存储路径
IF bSetStoragePath THEN
    IF RecipeManCommands_0.SetStoragePath(stPath:='FlashFiles/RecipeFile/') THEN
        bSetStoragePath_OK:=TRUE;
        bSetStoragePath:=FALSE;
    END_IF
END_IF

//生成配方名称
strRecipeNum:=TO_STRING(wRecipeNum);
strRecipeName:=CONCAT('Recipe_',strRecipeNum);

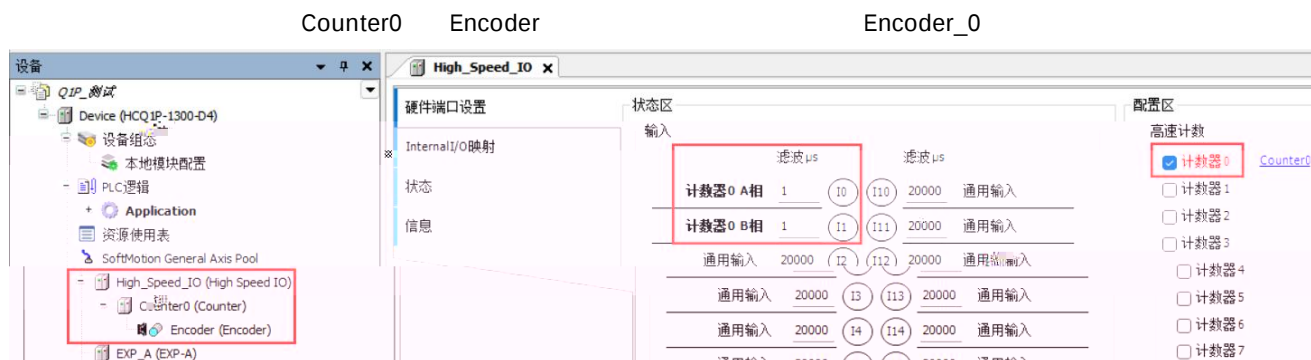
//创建配方文件
IF bCreateRecipe AND bSetStoragePath_OK THEN
    IF RecipeManCommands_0.CreateRecipe(RecipeDefinitionName:='Recipes'
        strRecipe_1:=Recipe_1;
        strRecipe_2:=Recipe_2;
    END_IF
END_IF

//删除配方文件，并保存配方文件
IF bDeleteRecipe AND bSetStoragePath_OK THEN
    IF RecipeManCommands_0.DeleteRecipe(RecipeDefinitionName:='Recipes'
        strRecipe_1:=Recipe_1;
        strRecipe_2:=Recipe_2;
    END_IF
END_IF

//保存配方文件，并保存配方文件
IF bSaveRecipe AND bSetStoragePath_OK THEN
    IF RecipeManCommands_0.SaveRecipe(RecipeDefinitionName:='Recipes'
        strRecipe_1:=Recipe_1;
        strRecipe_2:=Recipe_2;
    END_IF
END_IF
```

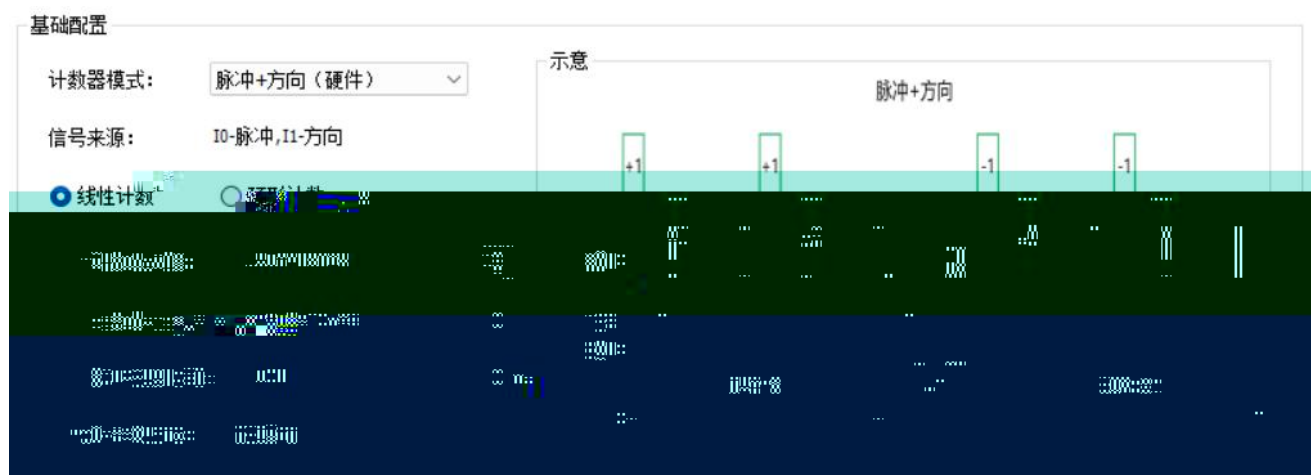


|    |            |                            |            |
|----|------------|----------------------------|------------|
| 1  | EtherCAT   | PLC                        | 100ms      |
| 2  |            |                            |            |
| 3  |            | " FlashFiles/RecipeFile/ " | FlashFiles |
|    |            | RecipeFile                 |            |
| 4  | FlashFiles |                            |            |
| 4. |            | High_Speed_IO              | 0          |



Counter0 A/B 1 2 4 CW/CCW +

-2147483648~2147483647



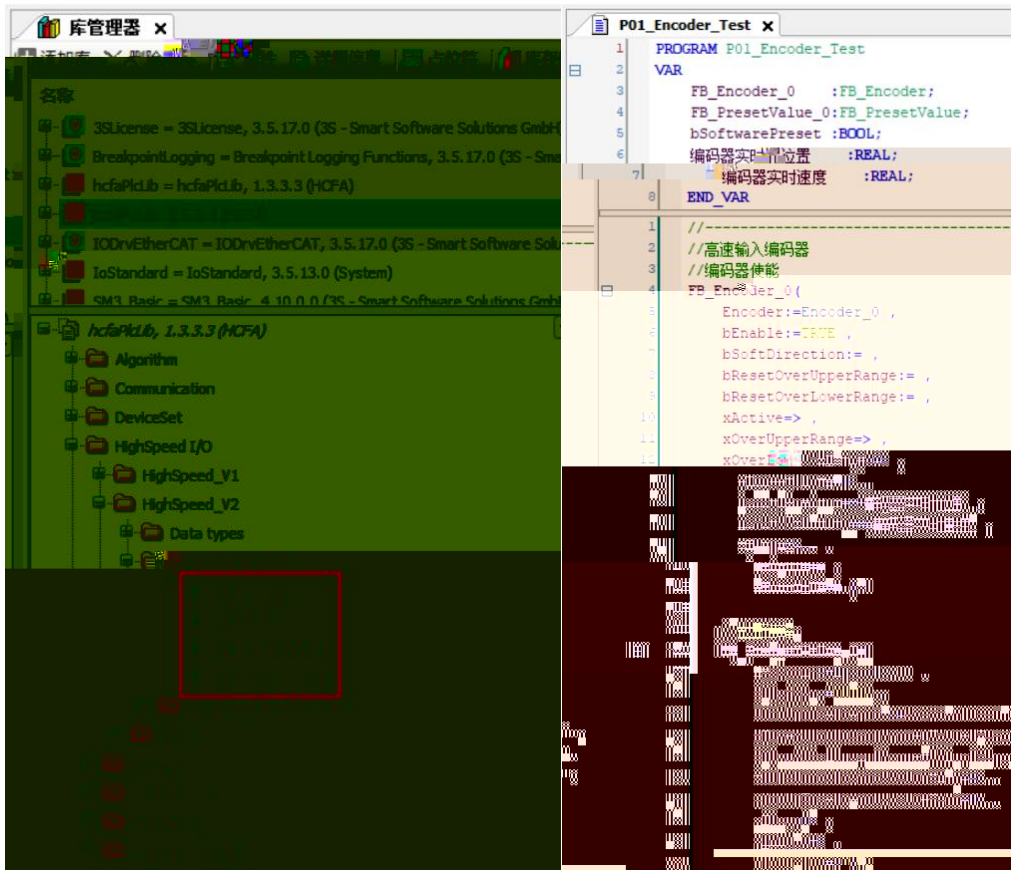
IO



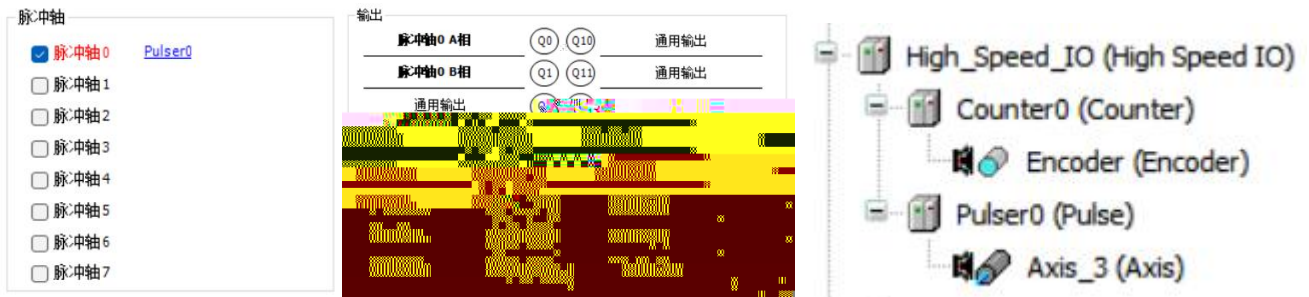
IO FB\_PresetValue

Encoder 2 FB\_Latch





High\_Speed\_IO 0  
Pulser0 Axis



Pulser0 + CW/CCW A/B



Codesys

MC

MC\_Home

EtherCAT

```

1  PROGRAM P00_Pulser_Test
2  VAR
3      MC_Power_0      :MC_Power;
4      MC_Jog_0         :MC_Jog;
5      bPower           :BOOL;
6      bJogF            :BOOL;
7      bJogB            :BOOL;
8      rJogVel          :REAL;
9  END_VAR

1 //-----
2 //高速输出轴
3 //脉冲轴使能
4 MC_Power_0(
5     Axis:=Axis_0 ,
6     Enable:=TRUE ,
7     bRegulatorOn:=bPower ,
8     bDriveStart:=bPower ,
9     Status=> ,
10    bRegulatorRealState=> ,
11    bDriveStartRealState=> ,
12    Busy=> ,
13    Error=> ,
14    ErrorID=> );
15
16 //脉冲轴点动
17 MC_Jog_0(
18     Axis:=Axis_0 ,
19     JogForward:=bJogF ,
20     JogBackward:=bJogB ,
21     Velocity:=rJogVel ,
22     Acceleration:=1000 ,
23     Deceleration:=1000 ,
24     Jerk:=10000 ,
25     Busy=> ,
26     CommandAborted=> ,
27     Error=> ,
28     ErrorID=> );

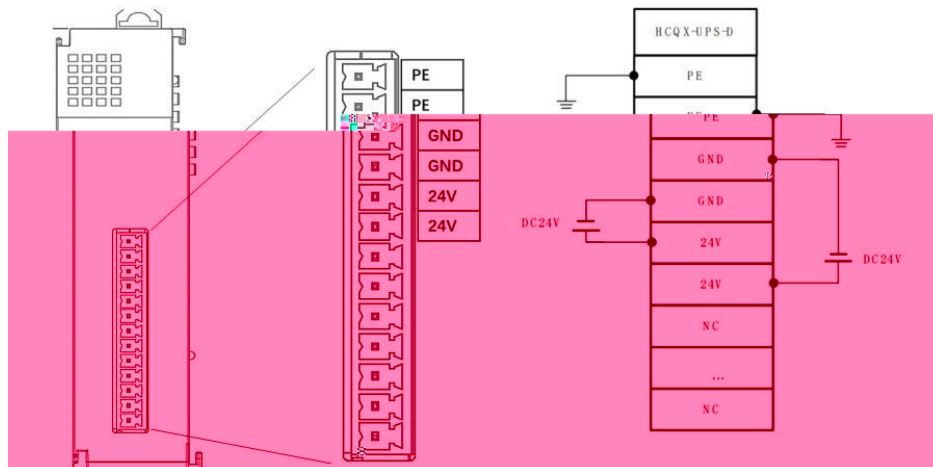
```

## 5. UPS

UPS

HCQX-UPS-D-T05

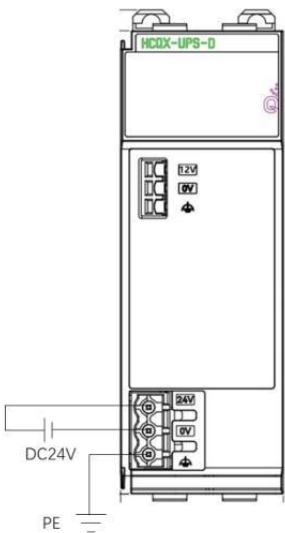
96W(MAX)



HCQX-UPS-D-T09

16

60.48W(MAX)



HCQX-UPS-D-T09

HCQX-UPS-D-TRF

16

HCQX-UPS-D-TRF

表三 中转模块 HCQX-UPS-D-TRF 端子排列说明

| 说明  | NO. |    | 说明  |
|-----|-----|----|-----|
| GND | 0   | 10 | 12V |
|     | 1   | 11 |     |
|     | 2   | 12 |     |
|     | 3   | 13 |     |
|     | 4   | 14 |     |
|     | 5   | 15 |     |
|     | 6   | 16 |     |
|     | 7   | 17 |     |
| PE  | 8   |    | PE  |

注：PE（8，18）之间内部导通，任意接一个即可

