HCH2 EtherCAT Series PLC User Manual

HNC Electric Limited

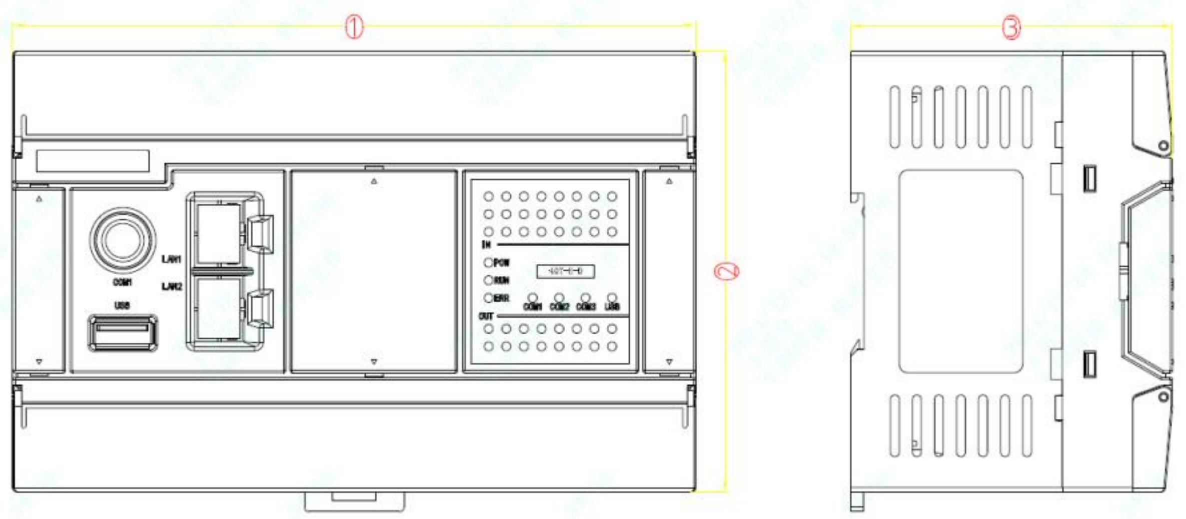
HCH2 series PLC function introduction

Thank you for using HCH2 high-end PLC series programmable controllers. This series provides 14~40 points of MPU and 8~40 points of digital input/output modules.including the MPU and expansion module.the maximum DI/DO can reach up to 512 points totally. It can also be used with AI/AO modules.temperature modules.and weighing modules to meet various applications.

HCH2 series PLC is a multi-axis controller based on EtherCAT field bus. The bus transmission rate is 100Mbps. It adopts distributed clock.and the combination of pulse axis and bus axis can transmit data quickly.accurately and efficiently.which is convenient for users to get started quickly. Through the EtherCAT interface.it can control up to 12 axes.support single-axis motion commands such as position.speed.torque.and origin return.and support multi-axis commands such as electronic gear.electronic cam.linear interpolation.and circular interpolation. Built-in a variety of communication ports.RS232.2 groups of RS485.USB.Ethernet for users to choose.

- The HCH2 series PLC controller EtherCAT has successfully tested the bus servo brands: HNC..INOVANCE.JoTong.Retelligent.Elesy.INVT.Panasonic.Sunfars.

Product size



MPU	Dimension（mm）		
	①	②	③
14-24 points	114	100	73
32-40 points	155	100	73

Model list

Points	Model	Naming rule
32 points	HCH2-32T/R-E-D/A	HCH2 high-end PLC T：Transistor R：Relay E：Ethernet/EtherCAT D：DC24V power supply A：AC220Vpower supply
40 points	HCH2-40T/R-E-D/A	

Electrical Specifications

Model	**I/O points**	**Power supply**	**Output**	**Communication**	**Program capacity**	**Bus and pulse axis number Totally**
HCH2-32T-E-D	32	DC24V	NPN	RS232/ RS485*2/ Ethernet /EtherCAT/USB	60k steps	8
HCH2-32T-E-A	32	AC100V-240V	NPN			8
HCH2-32R-E-D	32	DC24V	Relay			8
HCH2-32R-E-A	32	AC100V-240V	Relay			8
HCH2-40T-E-D	40	DC24V	NPN			8
HCH2-40T-E-A	40	AC100V-240V	NPN			8
HCH2-40R-E-D	40	DC24V	Relay			8
HCH2-40R-E-A	40	AC100V-240V	Relay			8

Model	**Output rated current**	**Number of digital (high-speed) input points**	**Number of digital (high-speed) output points**	**DI maximum frequency**	**DO maximum frequency**
HCH2-40T-E-D	0.5A	24(8)	16(8)	200Khz	200Khz
HCH2-40T-E-A	0.5A	24(8)	16(8)	200Khz	200Khz
HCH2-40R-E-D	5A	24(8)	16(-)	200Khz	200Khz
HCH2-40R-E-A	5A	24(8)	16(-)	200Khz	200Khz

Input points electrical specifications

Specification		HCH2-32T-E-D/A. HCH2-40T-E-D/A	
Input		X0~X7	X10~
Input type		DI	
Input type		DC（NPN）	
Input current		DC24V，5mA	
Input resistance		4.7KΩ	
Max. frequency		200khz	10khz
Response time	Off→ON	<2.5us	<20us
	ON→Off	<5us	<50us

Transistor output points electrical specifications

Specification		HCH2-32T-E-D/A . HCH2-40T-E-D/A	
Output type		NPN	
Output		Y0~Y17（Even 8points.Y0,Y2…）	Y0~Y17（Odd 8points,Y1,Y3…）
Max. frequency		200KHZ	10KHZ
Max. load	Resistive	0.5A/1point	
	Inductive	15W	
Response time	Off→ON	<2us	<20us
	ON→Off	<3us	<30us

Relay output points electrical specifications

Specification	HCH2-32R-E-D/A. HCH2-40R-E-D/A
Output type	Relay
Output	All
Max. Load current	5A
Response time	About 10ms

Bus programming method

4.1. EtherCAT axis configuration

D1500 is defined as follows.configure the number of bus and pulse axes:

System D register	**Set value**	**Pulse axis number**	**Bus start axis**
D1500（Power-down non-retentive）	K4（Default）	4 CH0-CH3（Y0,Y2,Y4,Y6）	CH4（Y10）
	K0	0	CH0（Y0）
	K1	1 CH0（Y0）	CH1（Y2）
	K2	2 CH0-CH1（Y0,Y2）	CH2（Y4）
	……	……	……

Channel	**Pulse**	**Direction**	**Axis. No define**
CH0（Y0,Y1）	Y0	Y1	K0
CH1（Y2,Y3）	Y2	Y3	K1
CH2（Y4,Y5）	Y4	Y5	K2
CH3（Y6,Y7）	Y6	Y7	K3
CH4（Y10,Y11）	Y10	Y11	K4
……	……	……	……

System D register	Function	Description
D1450	Number of detected bus servos	---
D1451	EtherCAT current state	K0: The current state is to restart initialization K9: Bus initialization complete

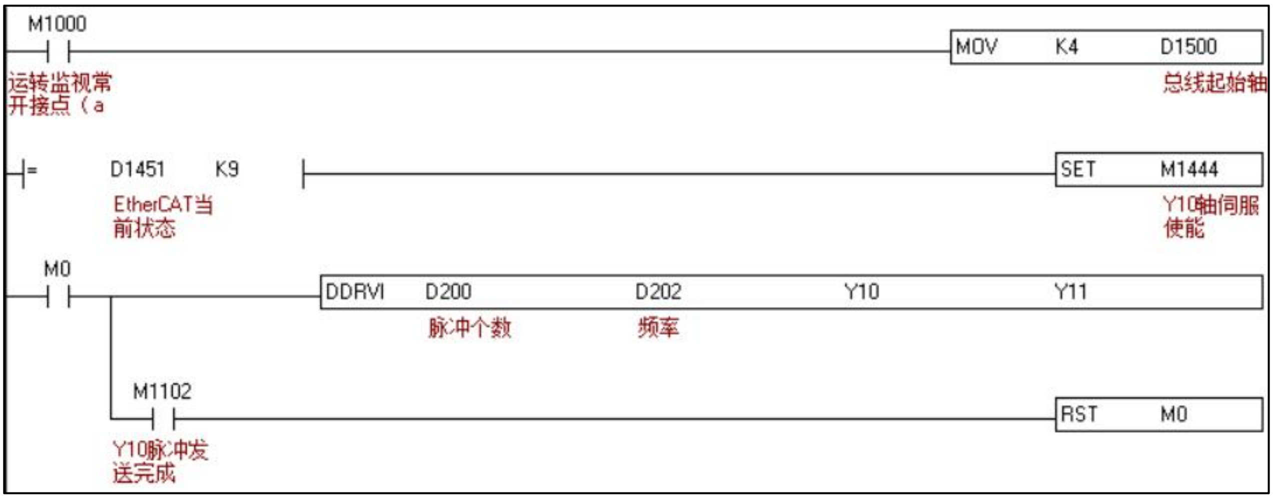
System M register	Function	Description
M1197	EtherCAT initialization flag	Triggering method: After turning ON.will automatically turn OFF.

- D1451 indicates the bus status. M1197 is the bus initialization flag. When M1197 is triggered and turned ON once.D1451 is K0.indicating that the current state is restarting initialization. When D1451 is K9.the initialization is completed.

4.2 Position mode CSP

CSP (Cyclic Synchronous Position Mode).its motion trajectory is calculated by the PLC.and periodically sends the target position to the slave station.

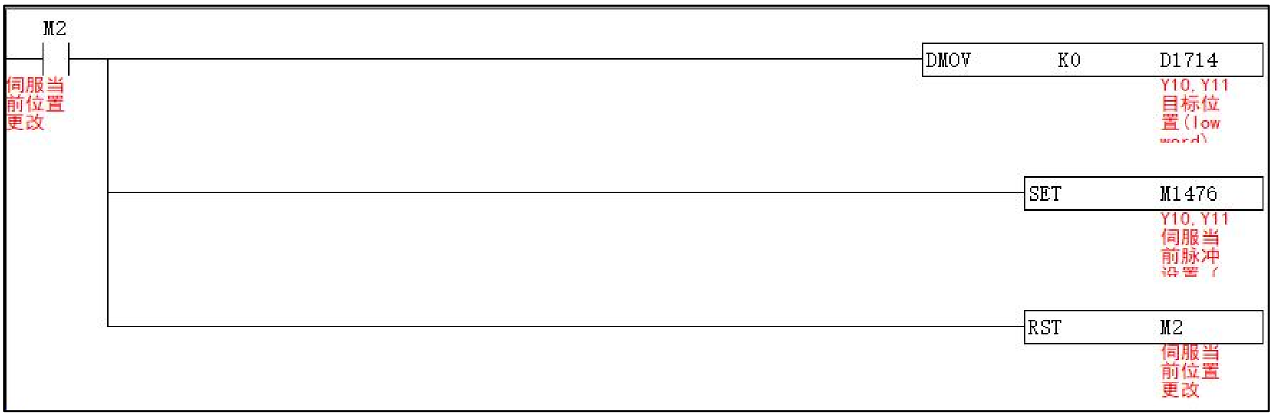
Example:



1） Execute the position command.the program defines D1500 as K4.then the EtherCAT bus Y10 is the starting axis.and the bus axis does not occupy the PLC hardware output port.
2） It is recommended to enable the servo after the EtherCAT initialization is completed.that is.when D1451 is K9 (if the current state is not K9.try to turn on M1197).
3） The bus position mode command is the same as the programming method of the pulse axis positioning command.
4） Write the current position of the servo: If the current position of the servo is cleared or assigned other values.the value of the target position can be directly changed. At the same time.after turning M1476 ON.there is no need to turn OFF the PLC program.the system will automatically turn OFF.and the

current position is written successfully. After that.the current encoder position D1716 corresponding to the Y10 axis and the output current pulse numbers D1712 and D1714 are the same values. The example is as follows:

Note: Take the Y10 axis as an example.if you change the current position of the servo.you cannot directly change the value of the current pulse number D1712.otherwise it will cause a speeding.



- When the bus axis is K0-K15.the system M register and system D register corresponding to the bus positioning command are shown in the following table.

Axis number (channel)	Servo Enable	Clear Servo Alarm	Set the current coordinates of the servo		ECAT encoder position (read-only 32-bit)	Current servo torque (read only 16 bits)	Current servo status 6041h (read only 16 bits)	Current servo alarm code (read only 16 bits)
			Change the coordinate enable flag bit	Coordinate address (R/W 32 bits)				
CH0（Y0,Y1）	M1440	M1456	M1472	D1650	D1652	D1468	D1452	D1484
CH1（Y2,Y3）	M1441	M1457	M1473	D1666	D1668	D1469	D1453	D1485
CH2（Y4,Y5）	M1442	M1458	M1474	D1682	D1684	D1470	D1454	D1486
CH3（Y6,Y7）	M1443	M1459	M1475	D1698	D1700	D1471	D1455	D1487
CH4（Y10,Y11）	M1444	M1460	M1476	D1714	D1716	D1472	D1456	D1488
CH5（Y12,Y13）	M1445	M1461	M1477	D1730	D1732	D1473	D1457	D1489
CH6（Y14,Y15）	M1446	M1462	M1478	D1746	D1748	D1474	D1458	D1490
CH7（Y16,Y17）	M1447	M1463	M1479	D1762	D1764	D1475	D1459	D1491
CH8（Y20,Y21）	M1448	M1464	M1480	D1778	D1780	D1476	D1460	D1492
CH9（Y22,Y23）	M1449	M1465	M1481	D1794	D1796	D1477	D1461	D1493
CH10（Y24,Y25）	M1450	M1466	M1482	D1810	D1812	D1478	D1462	D1494
CH11（Y26,Y27）	M1451	M1467	M1483	D1826	D1828	D1479	D1463	D1495
CH12（Y30,Y31）	M1452	M1468	M1484	D1842	D1844	D1480	D1464	D1496
CH13（Y32,Y33）	M1453	M1469	M1485	D1858	D1860	D1481	D1465	D1497
CH14（Y34,Y35）	M1454	M1470	M1486	D1874	D1876	D1482	D1466	D1498
CH15（Y36,Y37）	M1455	M1471	M1487	D1890	D1892	D1483	D1467	D1499
Effective trigger method	ON（Hold）	ON（Auto OFF）	ON（Auto OFF）					

Channel	**Pulse**	**Direction**	**Current output pulse number**	**Pulse complete flag**	**Pulse sending**	**E-stop without deceleration**	**Start frequency （K10-K32767） default K200**	**Acc/Dec Time (K10-K10000) Default K100**	**Dec Time**
CH0（Y0,Y1）	Y0	Y1	D1648	M1029	M1344	M1308	D1340	D1343	D1936
CH1（Y2,Y3）	Y2	Y3	D1664	M1030	M1345	M1309	D1352	D1353	D1937
CH2（Y4,Y5）	Y4	Y5	D1680	M1036	M1346	M1310	D1379	D1381	D1938
CH3（Y6,Y7）	Y6	Y7	D1696	M1037	M1347	M1311	D1380	D1382	D1939
CH4 (Y10,Y11)	Y10	Y11	D1712	M1102	M1348	M1312	D1400	D1383	D1940
CH5 (Y12,Y13)	Y12	Y13	D1728	M1103	M1349	M1313	D1401	D1384	D1941
CH6 (Y14,Y15)	Y14	Y15	D1744	M1104	M1350	M1314	D1402	D1385	D1942
CH7 (Y16,Y17)	Y16	Y17	D1760	M1105	M1351	M1315	D1403	D1386	D1943
CH8 (Y20,Y21)	Y20	Y21	D1776	M1106	M1352	M1316	D1404	D1387	D1944
CH9 (Y22,Y23)	Y22	Y23	D1792	M1107	M1353	M1317	D1405	D1388	D1945
CH10（Y24,Y25）	Y24	Y25	D1808	M1108	M1354	M1318	D1406	D1389	D1946
CH11（Y26,Y27）	Y26	Y27	D1824	M1109	M1355	M1319	D1407	D1390	D1947
CH12（Y30,Y31）	Y30	Y31	D1840	M1110	M1356	M1320	D1408	D1391	D1948
CH13（Y32,Y33）	Y32	Y33	D1856	M1111	M1357	M1321	D1409	D1392	D1949
CH14（Y34,Y35）	Y34	Y35	D1872	M1112	M1358	M1322	D1410	D1393	
CH15（Y36,Y37）	Y36	Y37	D1888	M1113	M1359	M1323	D1411	D1394	

- When the bus axis is K16-K31.the bus axis building command needs to be used separately. The details are as follows:

JC **500**		**EC.AXIS**					S1 S2 S3 S4 S5									Build axis above 16 axes
	Bit				Byte											
	X	Y	M	S	K	H	KnX	KnY	KnM	KnS	T	C	D	E	F	
S1					*								*			16bits instruction
S2													*			EC.AXIS Continuous execution
S3													*			32bits instruction
S4													*			
S5			*													
The detailed parameters are described as follows																

1、Instruction description

✧ S1: The axis number corresponding to the bus axis that executes this command.the range is: K16-K31.and the axis number is defined as follows:

Channel	**Pulse**	**Direction**	**Axis No.**
CH0（Y0,Y1）	Y0	Y1	K0
CH1（Y2,Y3）	Y2	Y3	K1
CH2（Y4,Y5）	Y4	Y5	K2
CH3（Y6,Y7）	Y6	Y7	K3
CH4（Y10,Y11）	Y10	Y11	K4
……	……	……	……

✧ S2: parameter set

Operation No.	Function	Type
(S2)- S2)+1	The number of pulses of the current axis (same function as D1648)	Read only(32bits)
(S2)+2~ S2)+3	Current axis target position (same as D1650 function)	R/W（32bits）
(S2)+4~ S2)+5	Current axis encoder position (same as D1652 function)	Read only(32bits)
(S2)+6~ S2)+7	Current axis acceleration (floating point) (same as D1654 function)	Read only(32bits)
(S2)+8~ S2)+9	Current axis current speed (floating point number) (same as D1656 function)	Read only(32bits)
(S2)+10~ S2)+11	Current axis target speed (floating point number) (same as D1658 function)	R/W（32bits）
(S2)+12~ S2)+15	System occupy	

✧ S3: parameter set

Operation No.	Function	Type
(S3)- (S3+1	Current axis maximum frequency	R/W（32bits）
(S3)+2	Current axis acceleration time (same as D1343 function)	R/W（16bits）
(S3)+3	Current axis deceleration time (same as D1936 function)	R/W（16bits）
(S3)+4	Current axis start frequency (same as D1340 function)	R/W（16bits）
(S3)+5~ (S3)+9	System occupy	

✧ S4: parameter set。

Operation No.	Function	Type
S_4	Current axis servo status (same as D1452 function)	R/W（16bits）
S_4+1	Current axis servo alarm code (same function as D1484)	Read only(16bits)
S_4+2	Current axis servo torque (same function as D1468)	Read only(16bits)
S_4+3~ S_4+9	System occupy	

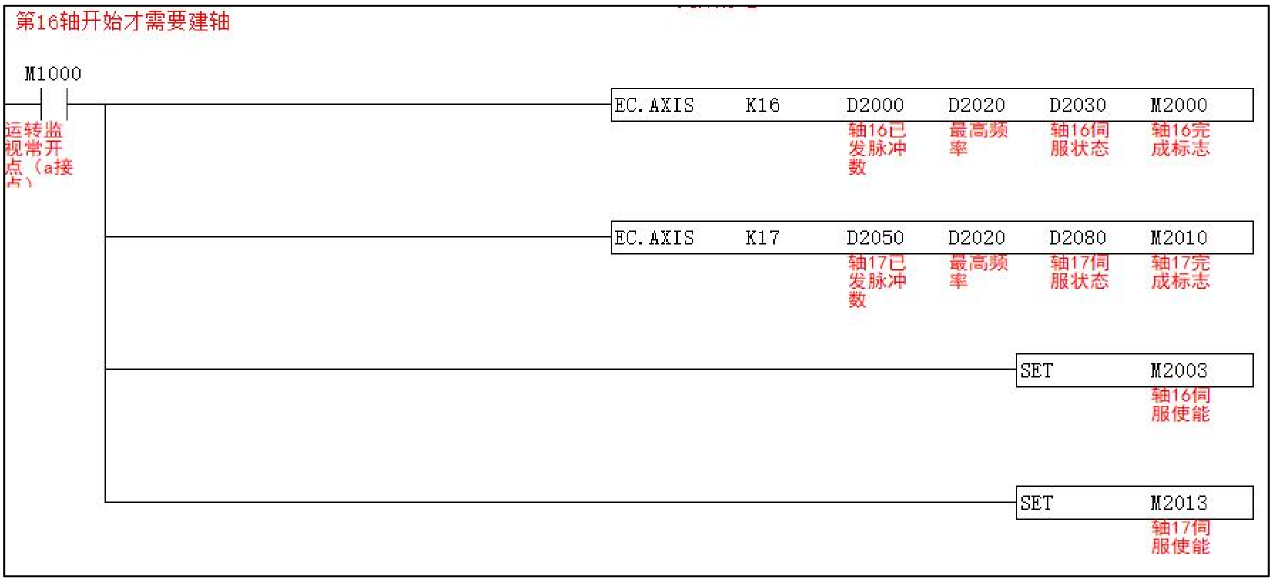
✧ S5（M bit）： Status set

Operation No.	Function	Type
M	Positioning completion mark (same as M1029 function)	Read only
M+1	Pulse sending flag (reserved)	Read only
M+2	E-Stop flag (reserved)	Read only
M+3	SVON (same as M1440 function)	R/W (continuous retention)
M+4	Alarm clear (same as D1456 function)	R/W (triggered.OFF by the system)
M+5	Coordinate setting (same as D1472 function)	R/W (triggered.OFF by the system)

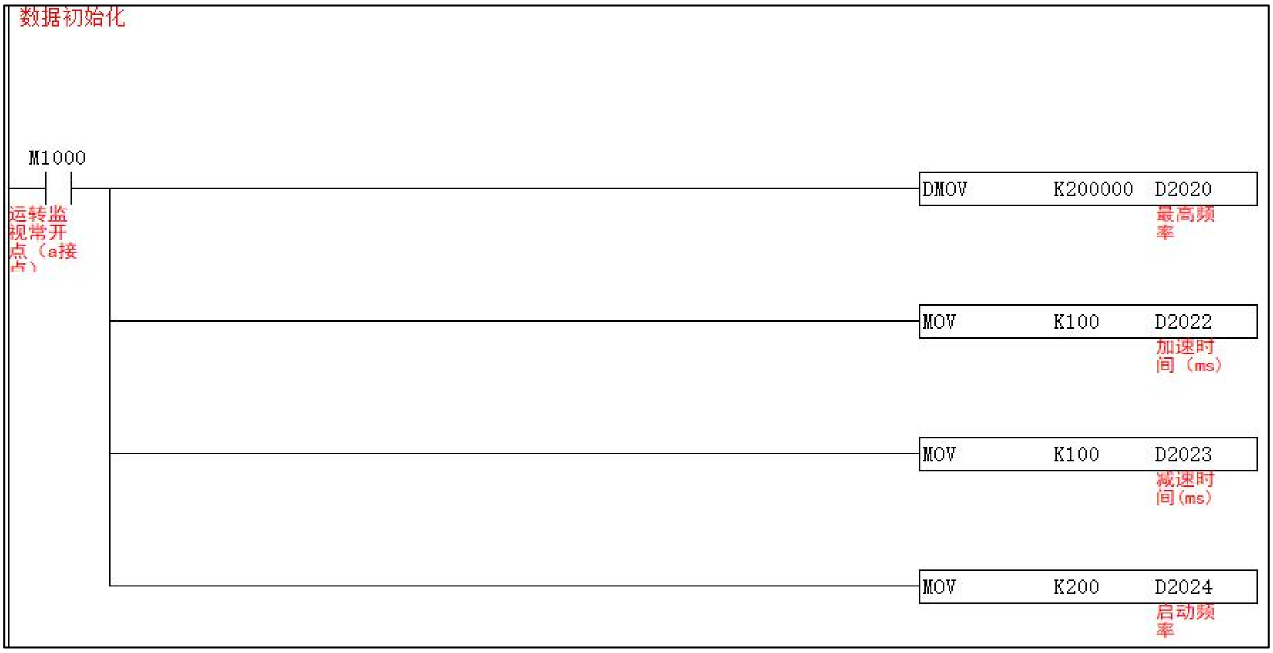
2. Instruction example:

The example is to build the bus axis 16 axis (Y40.Y41).17 axis (Y42.Y43).

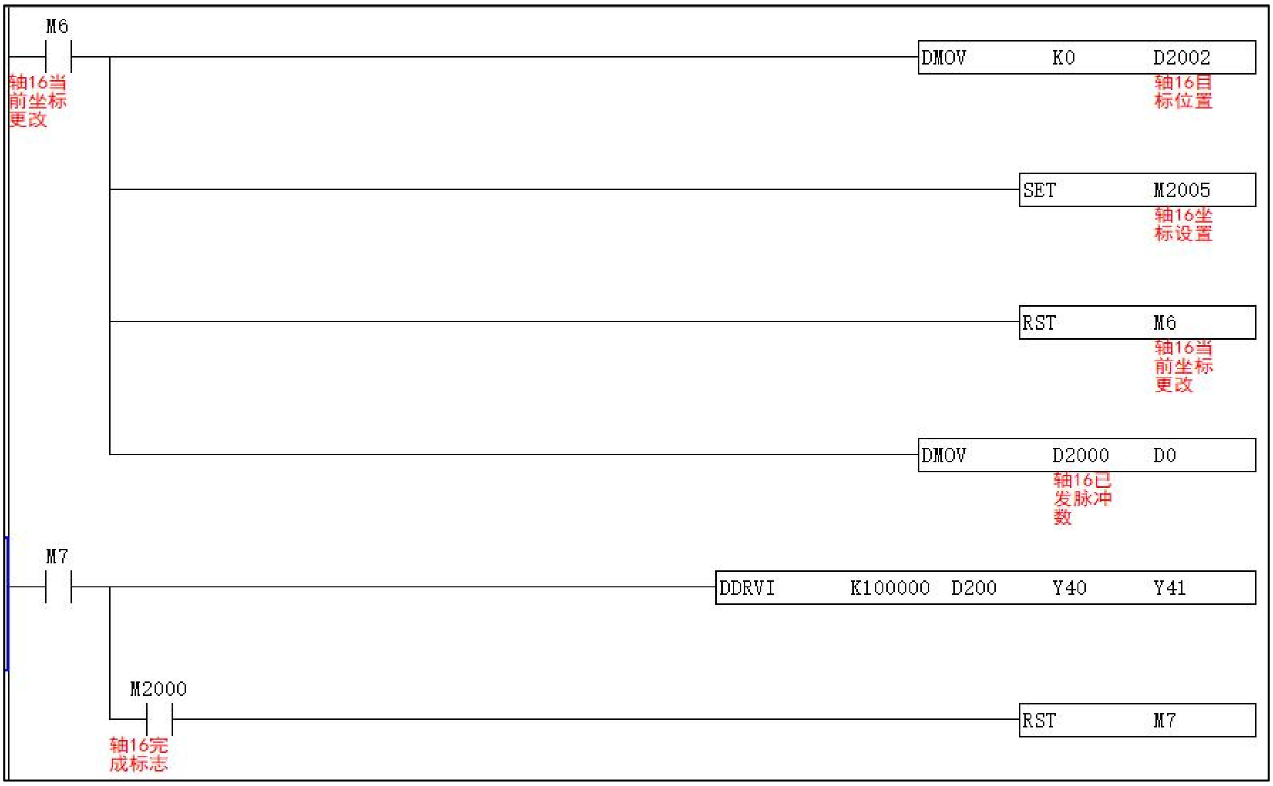
Note: If the parameters corresponding to each axis of S3 need to be the same.it is recommended to set S3 repeatedly.


第16轴开始才需要建轴
M1000
运转监视常开点（a接点）
EC.AXIS K16 D2000 D2020 D2030 M2000
轴16已发脉冲数
最高频率
轴16伺服状态
轴16完成标志
EC.AXIS K17 D2050 D2020 D2080 M2010
轴17已发脉冲数
最高频率
轴17伺服状态
轴17完成标志
SET M2003
轴16伺服使能
SET M2013
轴17伺服使能

Data initialization


数据初始化
M1000
运转监视常开点（a接点）
DMOV K200000 D2020
最高频率
MOV K100 D2022
加速时间（ms）
MOV K100 D2023
减速时间(ms)
MOV K200 D2024
启动频率

Write the current position and send the position command


M6
轴16当前坐标更改
DMOV K0 D2002
轴16目标位置
SET M2005
轴16坐标设置
RST M6
轴16当前坐标更改
DMOV D2000 D0
轴16已发脉冲数
M7
DDRVI K100000 D200 Y40 Y41
M2000
轴16完成标志
RST M7

4.3 Speed mode CSV

CSV (Cyclic Synchronous Speed Mode) gives the speed through PLC to make the motor run at a constant speed.

JC 501		EC.CSV					S1 S2 S3									speed mode
	Bit				Byte											16-bit instructions
	X	Y	M	S	K	H	KnX	KnY	KnM	KnS	T	C	D	E	F	EC.CSV continuous execution type
S1					*								*			32-bit instructions
S2					*								*			None
S3					*								*			Only HCH2.JT5 bus type PLC
S1: axis number S2: set speed S3: current speed																supports

1. Instruction description

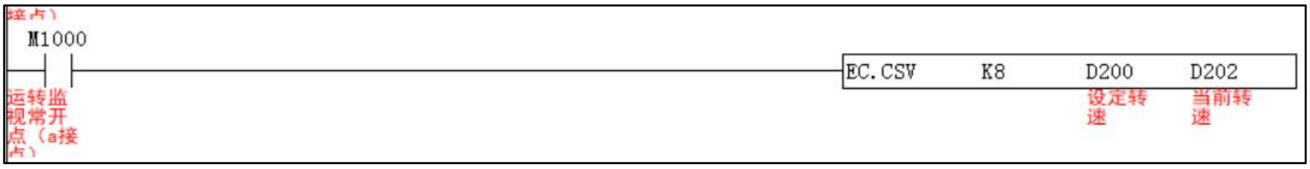
- S1：The bus axis that executes this command corresponds to the axis number.and the definition method of the axis number is as follows:

Channel	**Pulse**	**Direction**	**Axis No.**
CH0（Y0,Y1）	Y0	Y1	K0
CH1（Y2,Y3）	Y2	Y3	K1
CH2（Y4,Y5）	Y4	Y5	K2
CH3（Y6,Y7）	Y6	Y7	K3
CH4（Y10,Y11）	Y10	Y11	K4
……	……	……	……

No.	**Function**	**Range**	**Type**
S1	axis number	0-31	16-bit constant or single-word register
S2	set speed		16-bit constant or single-word register
S3	current speed		16-bit constant or single-word register

2. Instruction example

Define Y20.Y21 bus axis to execute speed mode.so the axis number is defined as K8.



4.4 Torque mode CST

CST (cyclical torque mode) gives torque through controller to make the motor run with constant torque

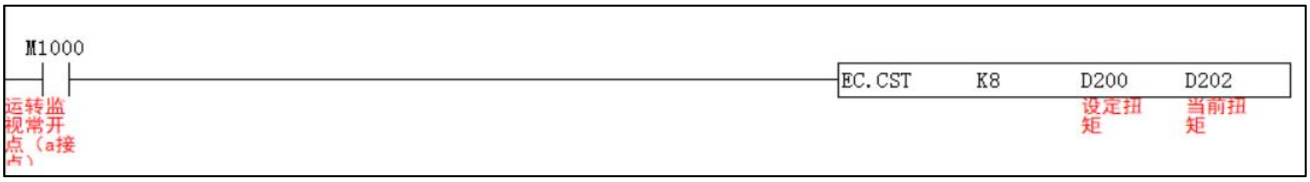
JC **502**	**EC.CST**				S1 S2 S3											Torque mode
	Bit				Byte											
	X	Y	M	S	K	H	KnX	KnY	KnM	KnS	T	C	D	E	F	16-bit instructions
S1					*								*			EC.CST Continuous execution type
S2					*								*			32-bit instructions
S3					*								*			None
S1: Axis No S2: Set torque S3: Current torque																JE bus type does not support

1. Instruction description

- S1: The bus axis that executes this command corresponds to the axis number. For the definition method of the axis number.please refer to 4.1 EtherCAT Axis Configuration Description.

No.	Function	Range	Type
S1	axis number	0-31	16-bit constant or single-word register
S2	set torque		16-bit constant or single-word register
S3	current torque		16-bit constant or single-word register

2. Instruction example



4.5 Homing mode HM

HM mode (i.e. homing mode).used for initialization of the slave position

JC 508		DZRN				S1 S2 S3 D										Homing mode
	Bit				Byte											
	X	Y	M	S	K	H	KnX	KnY	KnM	KnS	T	C	D	E	F	16-bit instructions
S1					*								*			DZRN continuous execution type
S2					*								*			32-bit instructions
S3													*			None
D		*														Only HCH2.JT5 bus type PLC supports
S1: Homing return speed S2: JOG speed S3: Homing mode D: Slave bus axis number																

1、Instruction description

- This command is applicable to the EtherCAT bus application.and the origin signal is connected to the bus servo or stepper driver. If the origin signal is the actual physical point connected to the input of the PLC.please refer to the general JC156 ZRN instruction in the "Programming Manual" for the homing instruction.
- This command starts to perform the origin return operation at the frequency set by S1. When the origin signal is ON.it will run in the opposite direction at the frequency of the jog speed S2 until the origin signal is OFF.and the origin return is completed.
- The homing method is subject to the description in the slave manual of the corresponding brand.

Operand	**associated object**	**Function**	**Range**	**Type**
S1		Homing speed	------	constant or double word register
S2		JOG speed	------	constant or double word register
(S3)+0	RXPDO[0x6098]	Homing method	------	16-bit constant or single-word register
(S3)+1		Reserved	------	16-bit constant or single-word register
(S3)+2~(S3)+3	RXPDO[0x609A]	Homing acceleration	------	constant or double word register
(S3)+4~(S3)+5		Homing position offset	------	constant or double word register
D		Slave bus axis number	0-31	Y device

4.6 Two-axis copy EC.COPY

<table>
<tr><td>JC</td><td></td><td colspan="5" rowspan="2">EC.COPY</td><td colspan="9" rowspan="2">S1 S2</td><td rowspan="2">Two-axis copy</td></tr>
<tr><td rowspan="2">503</td><td></td></tr>
<tr><td colspan="4">Bit</td><td colspan="11">Byte</td><td>16-bit instructions</td></tr>
<tr><td></td><td>X</td><td>Y</td><td>M</td><td>S</td><td>K</td><td>H</td><td>KnX</td><td>KnY</td><td>KnM</td><td>KnS</td><td>T</td><td>C</td><td>D</td><td>E</td><td>F</td><td>EC.COPY Continuous execution type</td></tr>
<tr><td>S1</td><td></td><td></td><td></td><td></td><td>*</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>*</td><td></td><td></td><td>32-bit instructions</td></tr>
<tr><td>S2</td><td></td><td></td><td></td><td></td><td>*</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>*</td><td></td><td></td><td>None</td></tr>
<tr><td colspan="16">S1: Master axis No.　S2：Slave axis No.</td><td>Only HCH2.JT5 bus type PLC supports</td></tr>
</table>

1、Instruction description

- Bind the master axis to the slave axis.copy the axis motion.copy the data of the axis S1 to the S2 axis in real time.and the movement of the S2 axis is completely consistent with the S1 axis.
- This command is only applicable to the case where the one-turn distance and one-turn pulse number of the master axis and the slave axis are consistent.
- Before this command is turned on.the ECAT encoders corresponding to the master and slave axes need to be consistent.and then turn on the EC.COPY command.otherwise it will cause speeding.

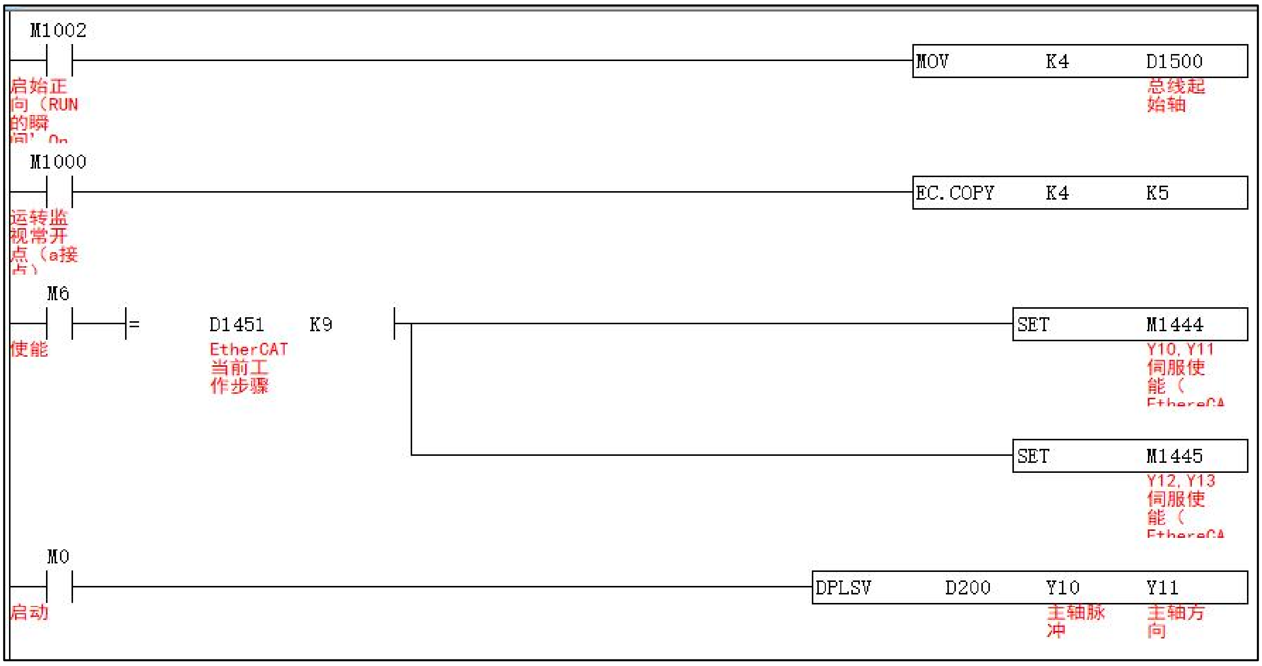
Operand	**Function**	**Range**	**Type**
S1	Master axis No.	0-31	16-bit constant or single-word register
S2	Slave axis No.	0-31	16-bit constant or single-word register

- The axis numbers are defined in the following table:

Channel	**Pulse**	**Direction**	**Axis. No**
CH0（Y0,Y1）	Y0	Y1	K0
CH1（Y2,Y3）	Y2	Y3	K1
CH2（Y4,Y5）	Y4	Y5	K2
CH3（Y6,Y7）	Y6	Y7	K3
CH4（Y10,Y11）	Y10	Y11	K4
……	……	……	……

- The axis number of the master axis must be smaller than that of the slave axis.otherwise the function will be abnormally executed.
- If multiple slave axes need to be bound to the master axis.multiple EC.COPY instructions can be executed. The S1 spindle axis number remains unchanged.and the slave axis number S2 corresponding to each EC.COPY instruction can be changed.

2. Instruction example


M1002
启始正
向（RUN
的瞬
MOV K4 D1500
总线起
始轴
M1000
运转监
视常开
点（a接
EC.COPY K4 K5
M6
使能
= D1451 K9
EtherCAT
当前工
作步骤
SET M1444
Y10, Y11
伺服使
能（
SET M1445
Y12, Y13
伺服使
能（
M0
启动
DPLSV D200 Y10 Y11
主轴脉
冲
主轴方
向

1) First define the bus start axis number.D1500 is K4.that is.the bus start axis is Y10 axis.

2) S1 is K4 and S2 is K5.then the master axis of the EC.COPY instruction is Y10 axis.and the slave axis is Y12 axis.

3) Turn on the enable flag bits M1444 and M1445 corresponding to the Y10 and Y12 axes.and you can refer to the corresponding system M register table of the Position Mode .

4) The master axis Y10 executes the motion control command.and the slave axis Y12 and the master axis keep the same motion.

5) For the usage of relevant position commands.please refer to the description of position mode in section 5.1.

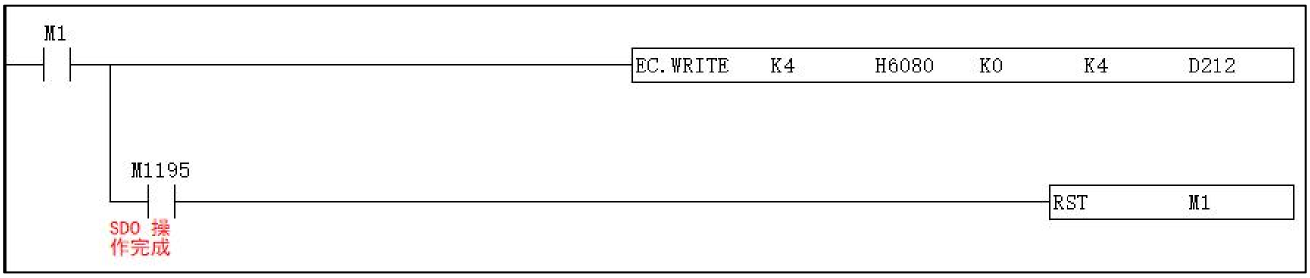
4.7 SDO R/W instruction

JC 504	EC.WRITE				S1 S2 S3 S4 S5											SD0 data wriHTE-in
	Bit				Byte											16-bit instructions EC.WRITE Continuous execution type 32-bit instructions None Flag bit M1195 Only HCH2.JT5 bus type PLC supports
	X	Y	M	S	K	H	KnX	KnY	KnM	KnS	T	C	D	E	F	
S1					*								*			
S2					*	*							*			
S3					*								*			
S4					*								*			
S5													*			
S1: Axis number S2: Object index S3: Object sub-index S4: Object byte number S5: WriHTE-in register																

1. Instruction description

Operand	**Function**	**Range**	**Type**
S1	Axis No.	0-31	16-bit constant or single-word register
S2	Object index	0x1000-0xffff	16-bit constant or single-word register
S3	Object sub-index	0-255	16-bit constant or single-word register
S4	Object byte number	---	16-bit constant or single-word register
S5	WriHTE-in register	---	Single-word register

2. Instruction example



- Note:

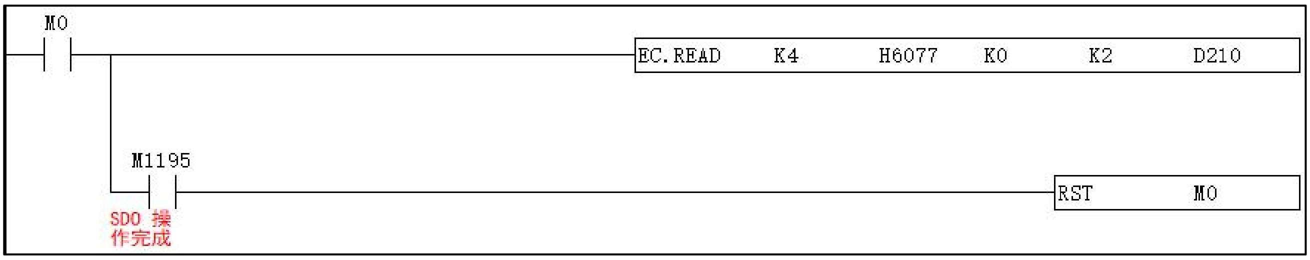
1) Write the starting address of D212 into the slave object dictionary 0x6080:00 corresponding to the current bus axis number four bytes later.
2) M1195 is the SDO operation completion flag.which is turned off by the system.
3) For the definition of the axis number of the S1 bus.see 4.1 EtherCAT axis configuration description.

<table>
<tr><td rowspan="2">JC
505</td><td></td><td colspan="5">EC.READ</td><td colspan="9">S1 S2 S3 S4 S5</td><td>SD0 data read</td></tr>
<tr><td colspan="4">Bit</td><td colspan="11">Byte</td><td rowspan="8">16-bit instructions
EC.READ continuous execution type
32-bit instructions
None
flag bit
M1195</td></tr>
<tr><td></td><td>X</td><td>Y</td><td>M</td><td>S</td><td>K</td><td>H</td><td>KnX</td><td>KnY</td><td>KnM</td><td>KnS</td><td>T</td><td>C</td><td>D</td><td>E</td><td>F</td></tr>
<tr><td>S1</td><td></td><td></td><td></td><td></td><td>*</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>*</td><td></td><td></td></tr>
<tr><td>S2</td><td></td><td></td><td></td><td></td><td>*</td><td>*</td><td></td><td></td><td></td><td></td><td></td><td></td><td>*</td><td></td><td></td></tr>
<tr><td>S</td><td></td><td></td><td></td><td></td><td>*</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>*</td><td></td><td></td></tr>
<tr><td>S4</td><td></td><td></td><td></td><td></td><td>*</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>*</td><td></td><td></td></tr>
<tr><td>S5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>*</td><td></td><td></td></tr>
<tr><td colspan="16">S1: axis number S2: object index S3: object sub-index S4: object byte number
S5: Start register of stored value</td></tr>
</table>

1. Instruction description

Operand	**Function**	**Range**	**Type**
S1	Axis No.	0-31	16-bit constant or single-word register
S2	Object index	0x1000-0xffff	16-bit constant or single-word register
S3	Object sub-index	0-255	16-bit constant or single-word register
S4	Object byte number	---	16-bit constant or single-word register
S5	Start register of stored value	---	Single-word register

2. Instruction example



- Note:

1） Read the value of the slave ESC register address 0x6077:00 corresponding to the current bus axis number to D210.

2） M1195 is the SDO operation completion flag.which is automatically turned off by the system.

3） For the definition of the axis number of the S1 bus.see 4.1 EtherCAT axis configuration description.

4） S4: K2 means that the ESC address corresponds to 2 bytes and 16 bits.which means reading H6077 to D210.and so on.

4.8 I/O Mapping

Mapping digital modules

<table>
<tr><td>JC</td><td></td><td colspan="5" rowspan="2">EC.IO</td><td colspan="10" rowspan="2">S1 D1 D2</td><td rowspan="2">Mapping digital modules</td></tr>
<tr><td rowspan="2">506</td><td></td></tr>
<tr><td colspan="4">Bit</td><td colspan="11">Byte</td><td>16-bit instructions</td></tr>
<tr><td></td><td>X</td><td>Y</td><td>M</td><td>S</td><td>K</td><td>H</td><td>KnX</td><td>KnY</td><td>KnM</td><td>KnS</td><td>T</td><td>C</td><td>D</td><td>E</td><td>F</td><td>EC.IO continuous execution type</td></tr>
<tr><td>S1</td><td></td><td></td><td></td><td></td><td>*</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>32-bit instructions</td></tr>
<tr><td>S1</td><td>*</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>None</td></tr>
<tr><td>S2</td><td></td><td>*</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td rowspan="2">Only HCH2.JT5 bus type PLC supports</td></tr>
<tr><td colspan="16">S1: slave station number D1: input port mapping D2: output port mapping</td></tr>
</table>

1. Instruction description

- S1： The bus axis that executes this command corresponds to the axis number. For the definition method of the axis number.please refer to 4.1 EtherCAT Axis Configuration Description.

Operand	**Function**	**Range**	**Type**
S1	Slave station number	0-31	16-bit constant
D1	Input port mapping address of distributed (remote) IO	-----	
D2	Output port mapping address of distributed (remote) IO	-----	

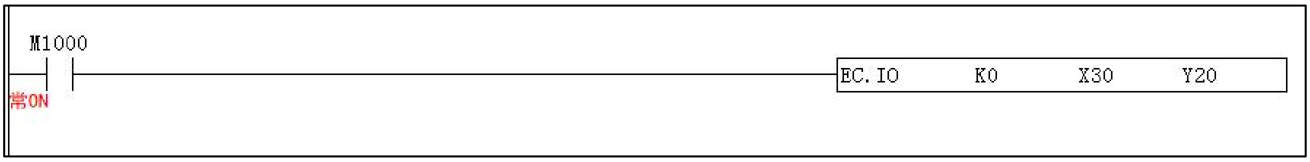
2、 DI/DO definition number assignment

The starting number of the remote I/O input and output of the slave station starts with the last number of the input/output point of the PLC connected to the master station. The numbers of distributed remote I/Os are arranged in sequential order. If the last point of the host PLC is X n□ (the range of numbers in □ is 0-7).the starting number of the remote I/O input is X (n +1)0.the output start number is the same.

Example: If the last point of the PLC host is Y27.the starting number of the output port mapping address of the slave IO is Y30. If the last point of the host is Y34.the starting number of the output port mapping address of the slave IO is Y40.

3、 Instruction example

Use bus type PLC.the model is HCH2-40T-E-D.the input is (X0-X27).and the output is (Y0-Y17). Then the starting number of the mapping address of the first input port of the distributed (remote IO) is X30.and the starting number of the mapping address of the first output port is Y20.



Mapping analog modules

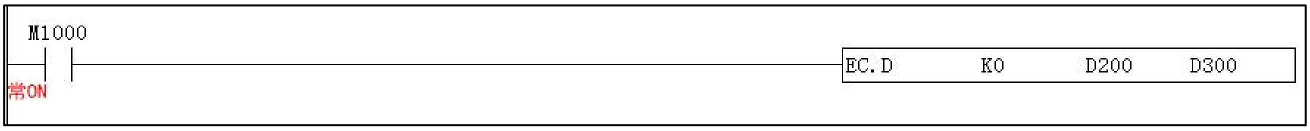
<table>
<tr><td>JC</td><td></td><td colspan="3" rowspan="2">EC.D</td><td colspan="11" rowspan="2">S1 D1 D2</td><td rowspan="2">Mapping analog modules</td></tr>
<tr><td rowspan="2">507</td><td></td></tr>
<tr><td colspan="4">Bit</td><td colspan="11">Byte</td><td>16-bit instructions</td></tr>
<tr><td></td><td>X</td><td>Y</td><td>M</td><td>S</td><td>K</td><td>H</td><td>KnX</td><td>KnY</td><td>KnM</td><td>KnS</td><td>T</td><td>C</td><td>D</td><td>E</td><td>F</td><td>EC.D continuous execution type</td></tr>
<tr><td>S1</td><td></td><td></td><td></td><td></td><td>*</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>32-bit instructions</td></tr>
<tr><td>S1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>*</td><td></td><td></td><td>None</td></tr>
<tr><td>S2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>*</td><td></td><td></td><td rowspan="2">Only HCH2.JT5 bus type PLC supports</td></tr>
<tr><td colspan="16">S1: slave station number D1: input port mapping D2: output port mapping</td></tr>
</table>

1. Instruction description

- S1： The bus axis that executes this command corresponds to the axis number. For the definition method of the axis number.please refer to 4.1 EtherCAT Axis Configuration Description.

Operand	**Function**	**Range**	**Type**
S1	Slave station number	0-31	16-bit constant
D1	AI port mapping address of distributed (remote) IO	-----	
D2	AO port mapping address of distributed (remote) IO	-----	

2、Instruction example



Note: If a slave station is a coupler.and the coupler is connected to both a digital module and an analog module.the EC.D and EC.IO instructions can be directed to the same station number.

4.9 Probe function

The probe function is the position latch function. When the trigger condition is met.the probe function is triggered and the motor encoder value when the condition is triggered is latched. According to the setting of probe control word 60B8.single trigger or multiple trigger can be realized.

<table>
<tr><td>JC</td><td></td><td colspan="4" rowspan="2">EC.PROBE</td><td colspan="10" rowspan="2">S1 S2 S3</td><td rowspan="2">Probe function</td></tr>
<tr><td rowspan="2">509</td><td></td></tr>
<tr><td colspan="4">Bit</td><td colspan="11">Byte</td><td rowspan="6">16-bit instructions
EC.PROBE continuous execution type
32-bit instructions
None
Only HCH2.JT5 bus type PLC supports</td></tr>
<tr><td></td><td>X</td><td>Y</td><td>M</td><td>S</td><td>K</td><td>H</td><td>KnX</td><td>KnY</td><td>KnM</td><td>KnS</td><td>T</td><td>C</td><td>D</td><td>E</td><td>F</td></tr>
<tr><td>S1</td><td></td><td></td><td></td><td></td><td>*</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>*</td><td></td><td></td></tr>
<tr><td>S2</td><td></td><td></td><td></td><td></td><td>*</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>*</td><td></td><td></td></tr>
<tr><td>S3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>*</td><td></td><td></td></tr>
<tr><td colspan="16">S1: Slave bus axis number S2: Probe function S3: Probe status</td></tr>
</table>

1. Instructions

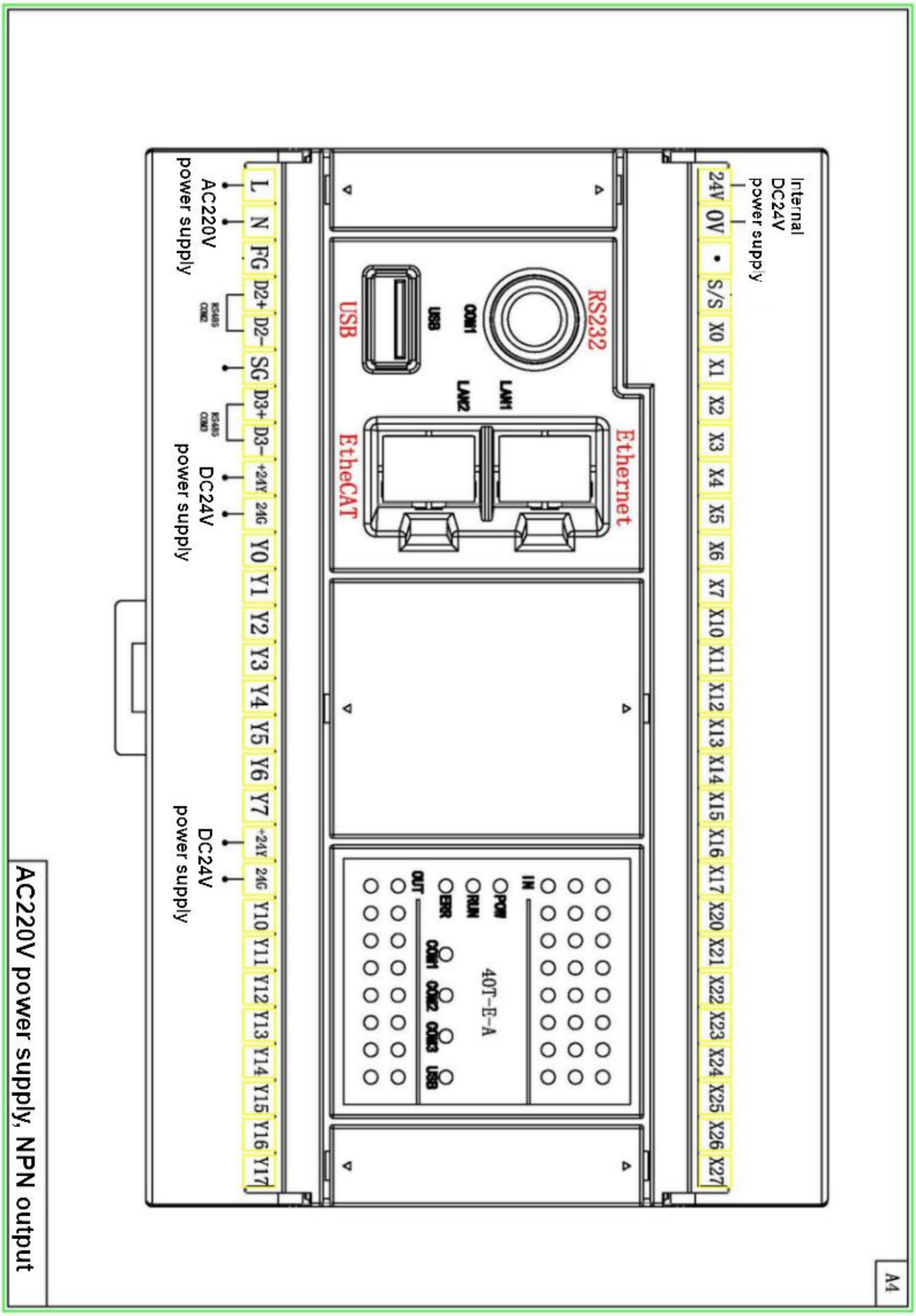
- The probe function is not supported in Hm homing mode. .
- Currently only supports external signal as trigger source.
- The probe function is based on the description in the slave manual of the corresponding brand.

Operand	**Associated object**	**Function**	**Range**	**Type**
S1		Slave bus axis number	0-31	16-bit constant or single-word register(R/W)
S2	RXPDO[0x60B8]	Execute the setting of the Touch probe function	-----	16-bit constant or single-word register(R/W)
S3	TXPDO[0x60B9]	Indicates the status of the Touch probe function	-----	Single-word register(Read only)
(S3)+1		Reserved	-----	
(S3)+2~(S3)+3	TXPDO[0x60BA]	Indicates the rising edge clamping position of Touch probe1	-----	Double-word register(Read only)
(S3)+4~(S3)+5	TXPDO[0x60BC]	Indicates the rising edge clamping position of Touch probe2	-----	Double-word register(Read only)

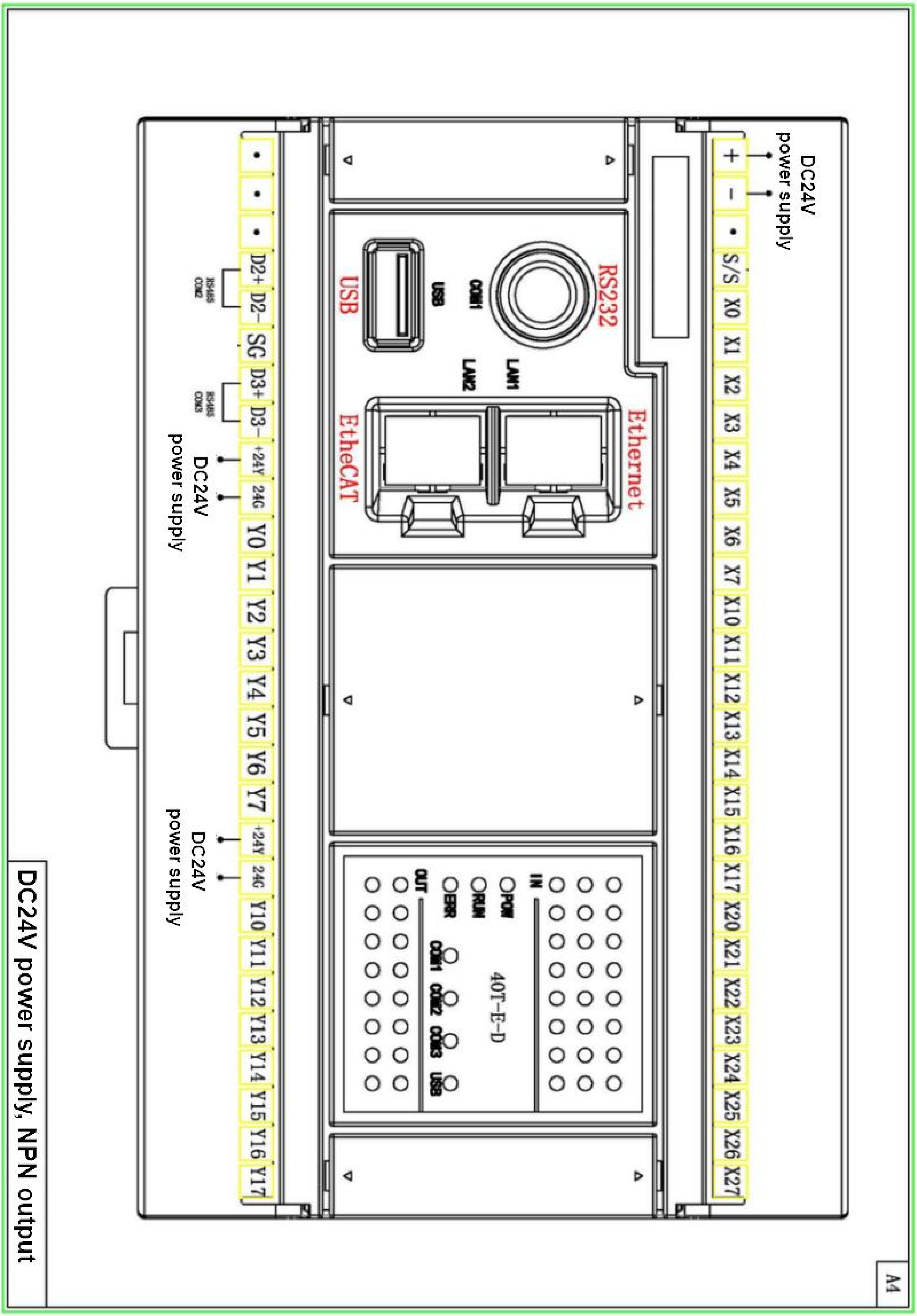
HCH2 series PLC wiring diagram

AC220V power input.transistor NPN output

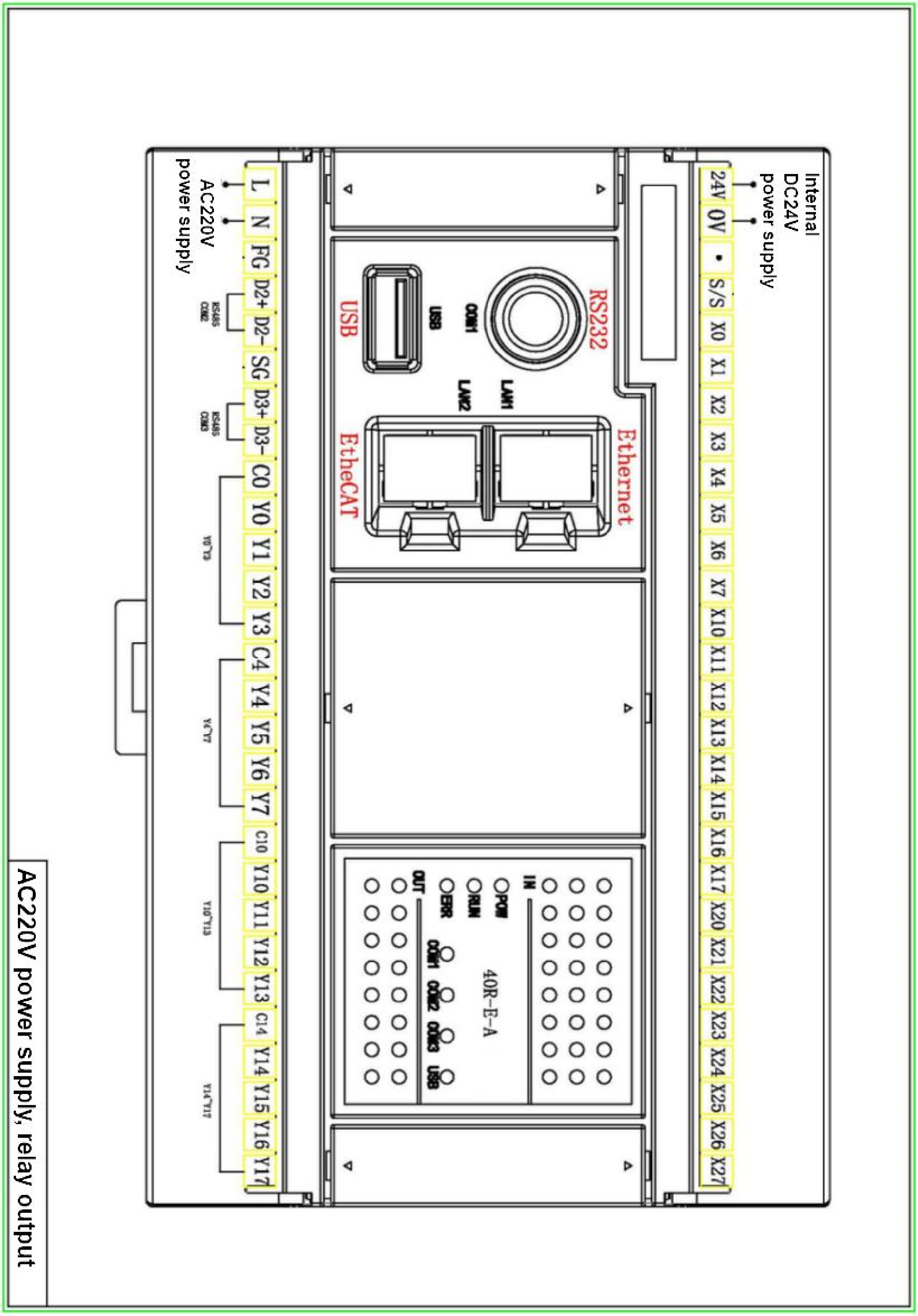
HCH2 series host with dual network ports LAN1 is Ethernet.LAN2 is EtherCAT.


Internal DC24V power supply
24V
0V
•
S/S
X0
X1
X2
X3
X4
X5
X6
X7
X10
X11
X12
X13
X14
X15
X16
X17
X20
X21
X22
X23
X24
X25
X26
X27
RS232
COM1
USB
USB
LAN1
LAN2
Ethernet
EtherCAT
IN
POW
RUN
ERR
OUT
COM1
COM2
COM3
USB
40T-E-A
L
N
FG
D2+
D2-
SG
D3+
D3-
+24V
24G
Y0
Y1
Y2
Y3
Y4
Y5
Y6
Y7
+24V
24G
Y10
Y11
Y12
Y13
Y14
Y15
Y16
Y17
AC220V power supply
RS485 COM2
RS485 COM3
DC24V power supply
DC24V power supply
AC220V power supply, NPN output
A4

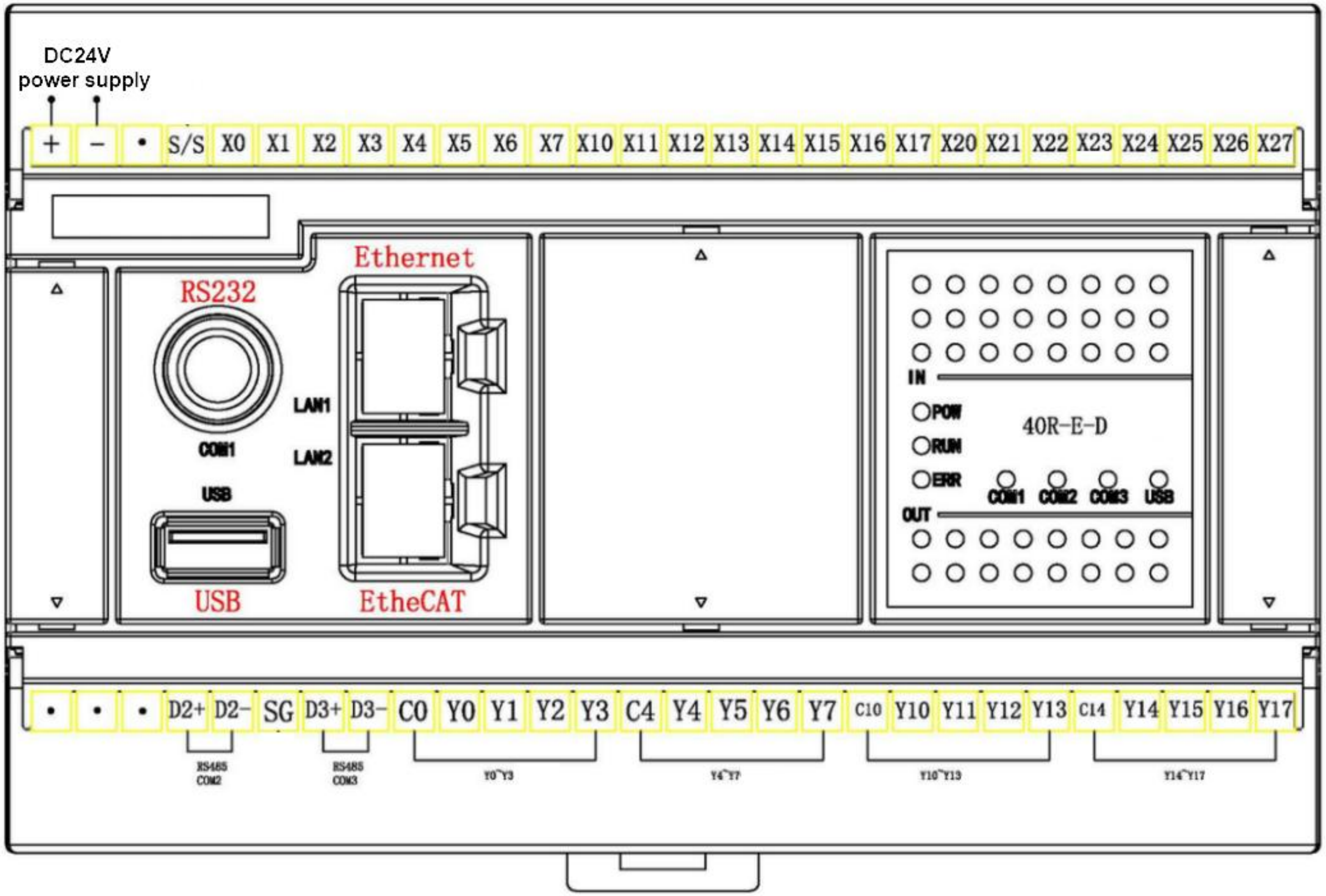
DC24V power input.transistor NPN output


DC24V power supply
+
−
•
S/S
X0
X1
X2
X3
X4
X5
X6
X7
X10
X11
X12
X13
X14
X15
X16
X17
X20
X21
X22
X23
X24
X25
X26
X27
RS232
COM1
USB
USB
LAN1
LAN2
Ethernet
EtheCAT
IN
POW
RUN
ERR
OUT
40T-E-D
COM1
COM2
COM3
USB
D2+
D2−
RS485 COM2
SG
D3+
D3−
RS485 COM3
+24V
24G
DC24V power supply
Y0
Y1
Y2
Y3
Y4
Y5
Y6
Y7
+24V
24G
DC24V power supply
Y10
Y11
Y12
Y13
Y14
Y15
Y16
Y17
DC24V power supply, NPN output
A4

AC220V power input. relay output


Internal
DC24V
power supply
24V
0V
•
S/S
X0
X1
X2
X3
X4
X5
X6
X7
X10
X11
X12
X13
X14
X15
X16
X17
X20
X21
X22
X23
X24
X25
X26
X27
RS232
COM1
USB
LAN1
LAN2
Ethernet
EtheCAT
IN
POW
RUN
ERR
OUT
COM1
COM2
COM3
USB
40R-E-A
L
N
FG
D2+
D2-
SG
D3+
D3-
C0
Y0
Y1
Y2
Y3
C4
Y4
Y5
Y6
Y7
C10
Y10
Y11
Y12
Y13
C14
Y14
Y15
Y16
Y17
RS485 COM2
RS485 COM3
Y0~Y3
Y4~Y7
Y10~Y13
Y14~Y17
AC220V
power supply
AC220V power supply, relay output

DC24V power input. relay output


DC24V
power supply
+
−
S/S
X0
X1
X2
X3
X4
X5
X6
X7
X10
X11
X12
X13
X14
X15
X16
X17
X20
X21
X22
X23
X24
X25
X26
X27
RS232
COM1
USB
USB
Ethernet
LAN1
LAN2
EtheCAT
IN
POW
RUN
ERR
40R-E-D
COM1
COM2
COM3
USB
OUT
D2+
D2−
SG
D3+
D3−
C0
Y0
Y1
Y2
Y3
C4
Y4
Y5
Y6
Y7
C10
Y10
Y11
Y12
Y13
C14
Y14
Y15
Y16
Y17
RS485
COM2
RS485
COM3
Y0~Y3
Y4~Y7
Y10~Y13
Y14~Y17

DC24V power supply, relay output

Edition: V1.0
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