NEXTW EtherCAT Slave Module

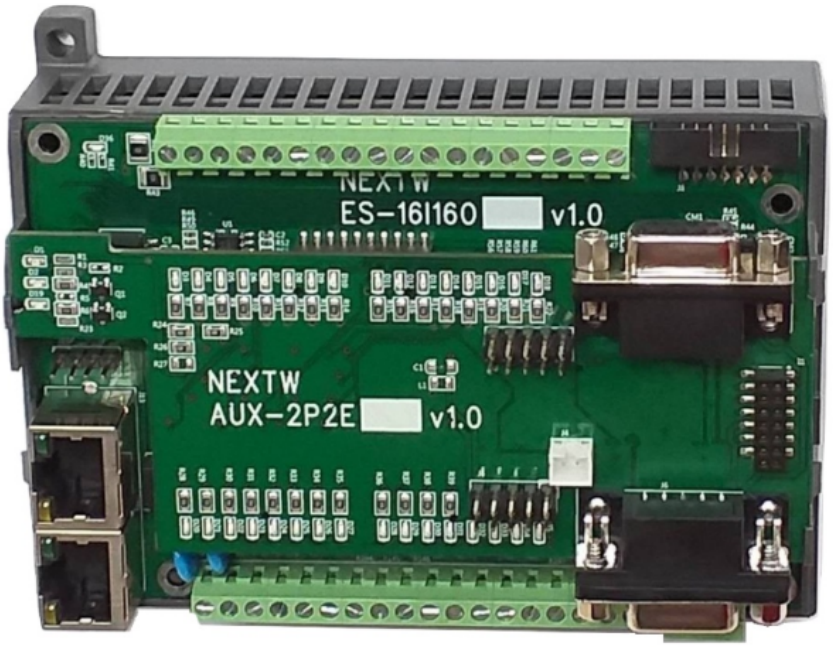
ES-16I16O

AUX-2P2E

USER MANUAL

V1.5

Chapter 1: Product Introduction



Key Features

- Multi-purpose EtherCAT module
- LED indicators for I/O status
- Supports EtherCAT Distributed Clock (DC)
- DI with 3,750 Vrms isolation
- DO with 1,500 Vrms isolation
- Quadrature encoder interface
- 12bits 2 channel ADC
- 2 Channel High Speed Pulse(HSP) output frequency adjustable

1.1 Hardware Specifications

High Speed Pulse Output

- 2 sets of High Speed Pulse output
- Max. output frequency: 500KHz
- Format: CW/CCW, Pulse/Direction

Analog Digital Converter

- 2 sets of Analog Digital Converter
- 12-bit single-ended ADC.
- Analog input voltage range: 0 to 3.3V

Quadrature Encoder Input

- 2 sets of Quadrature Encoder Input
- Type: Incremental
- Format: AB
- Index input
- Data length: 32bits
- Max. input frequency: 20MHz

Digital Input and Output

- 16 input channels and 16 output channels
- Input Voltage Range: 10V~30V
- Optical isolated

Power Requirements

- DC input range: DC 24V ±2V with over-voltage and reversed-voltage protection
- Normal Power Consumption: 24(V) X 100(mA)=2.4(W)

EtherCAT

- Data transfer medium: Ethernet cable (CAT5e), shield type: S/STP or S/UTP
- Ethernet interface: 2x RJ-45
- Data transfer rate: 100Mbps, full duplex
- Protocol: EtherCAT
- Device profile: CiA 402

Environment

- Operating temperature: 0°C to 65°C
- Dimension (mm): 80(W) x 120.5(L) x 63.5(H)

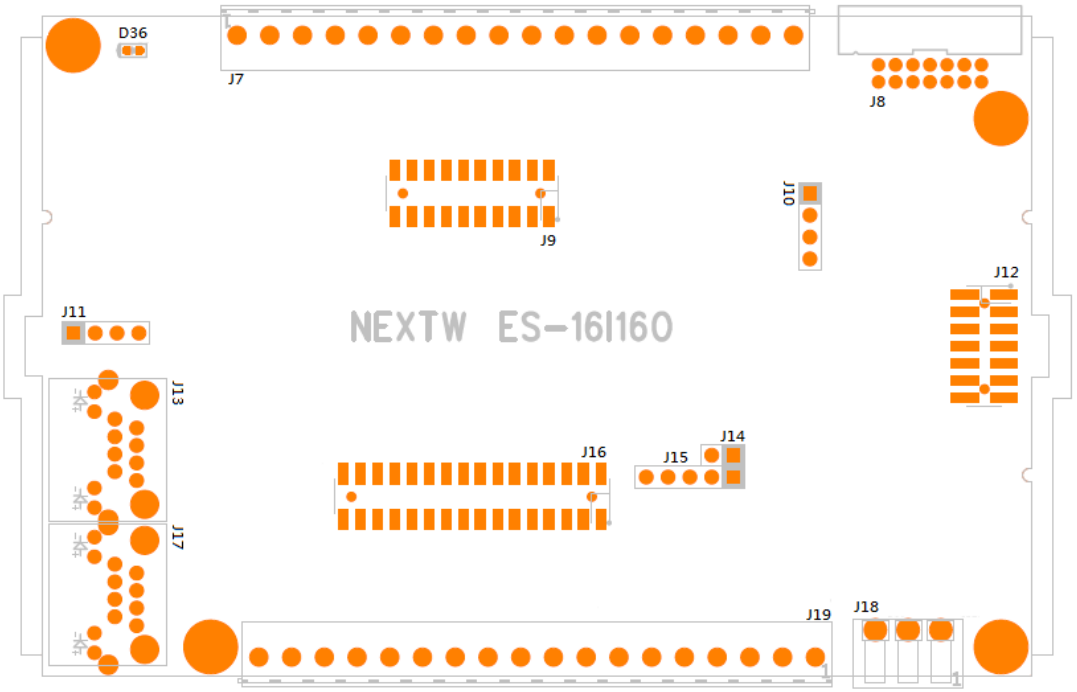
Chapter 2: Connector Pinout Assignments and Wiring Diagrams

2.1 Before You Begin

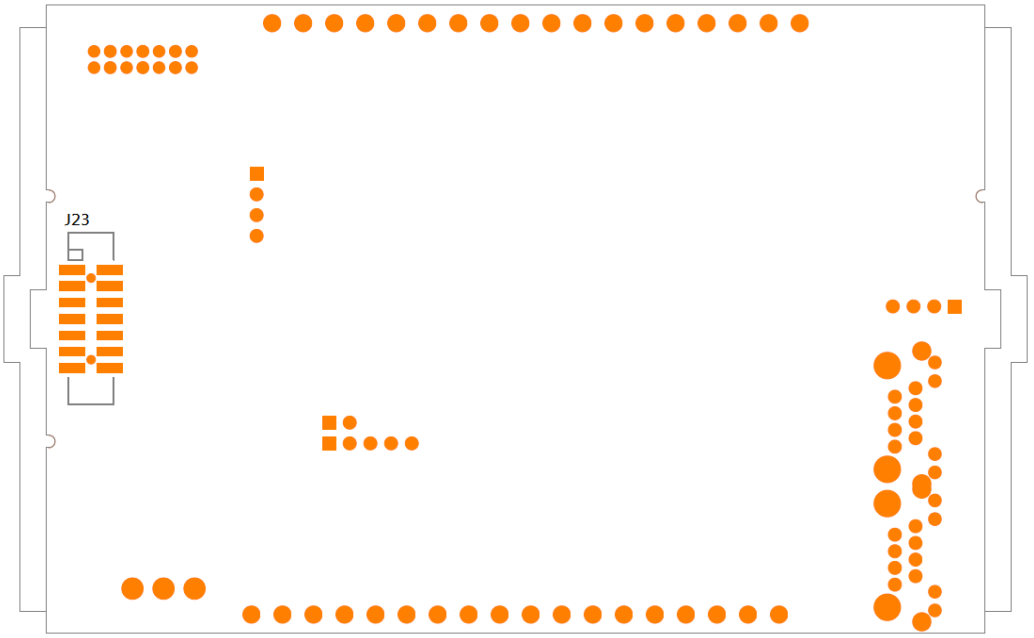
- Ensure you have a stable, clean working environment.
- Before working on any components, make sure that the power is off.
- Ground yourself before touching any components.
- Static electricity can damage many of the electronic components.

2.2 Locations of the Jumpers and Connectors

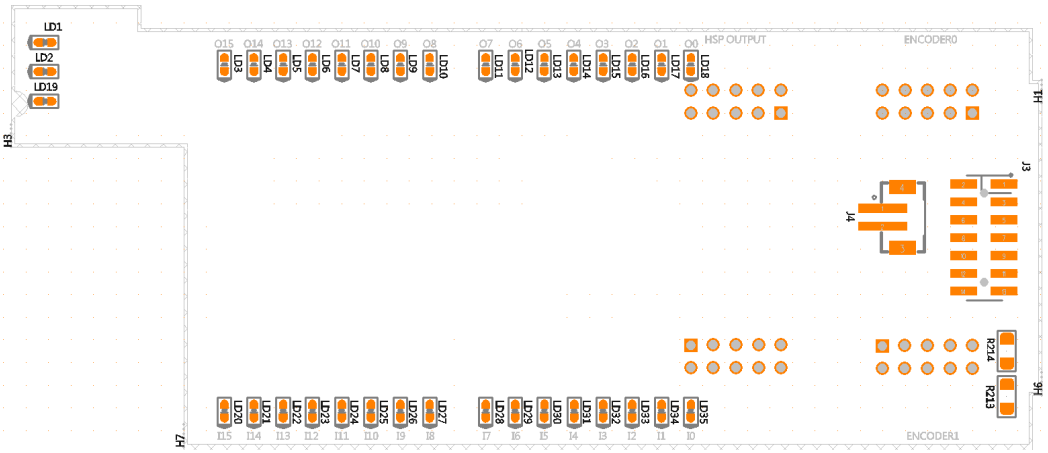
ES-16I16O (Mainboard/FRONT)



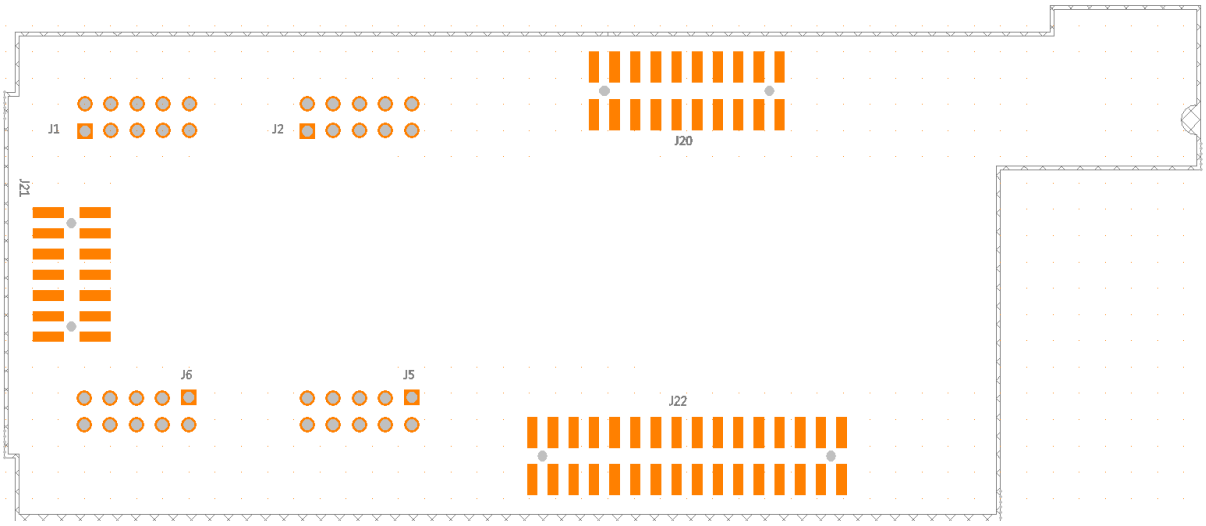
ES-16I16O (Mainboard/BACK)



AUX-2P2E (Top Board/FRONT)



AUX-2P2E (Top Board/BACK)

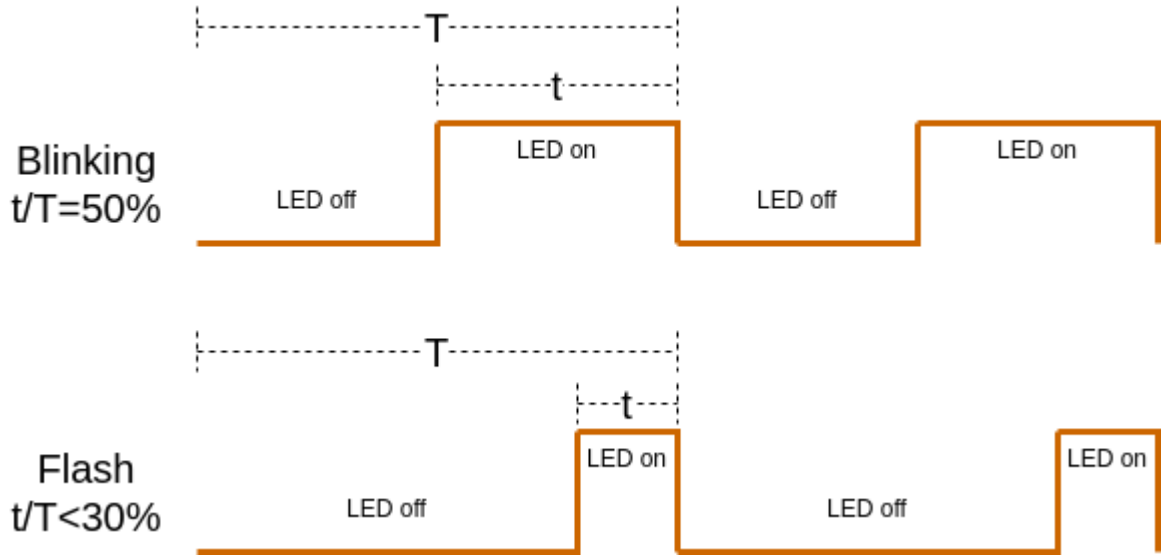


2.3 AUX-2P2E LED Indicators

D1 (LD1)	ON	Power supply has been connected to 24 VDC
	OFF	Power supply is not connected to 24 VDC

D2 (LD2)	RUN LED	
	LED Response	FSM State
	Off	1-Init
	Flash	4-Safe OP
	Blinking	2-PreOp
	On	8-Op

Figure. Definition of blinking/flash

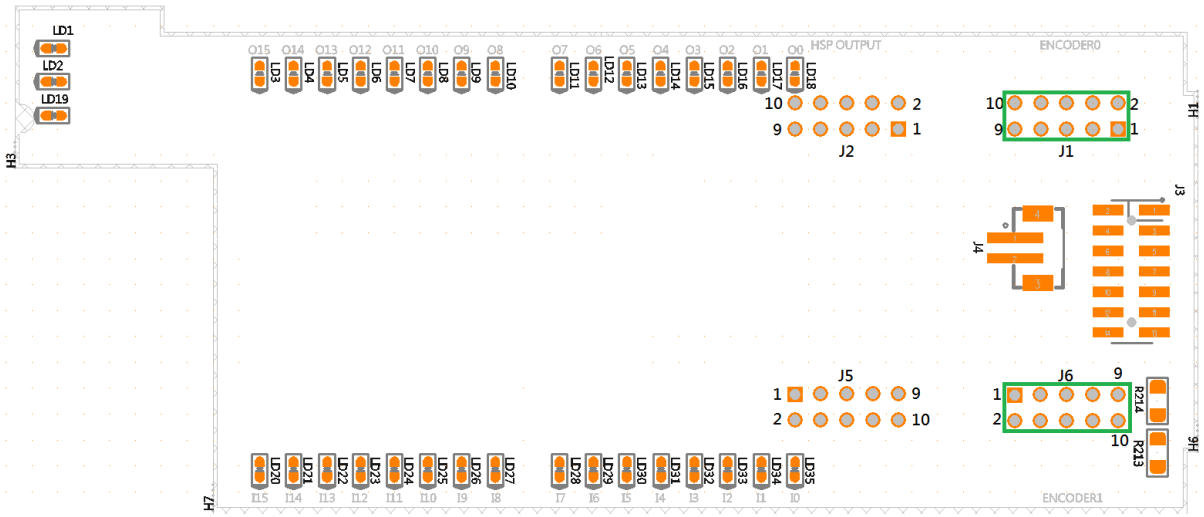


D19 (LD19)	ERR LED	
	LED Response	Error State
	Off	No Error
	Flash	Process Data Watchdog Timeout
	Blinking	PDI configuration unsupported type
	Flickering	I2C EEPROM loading error
	On	PDI Watchdog timeout

2.4 AUX-2P2E ENCODER Connector(J1 / J6)

2.4.1 Version1.1:2X5 PIN HEADERS(J1/J6)

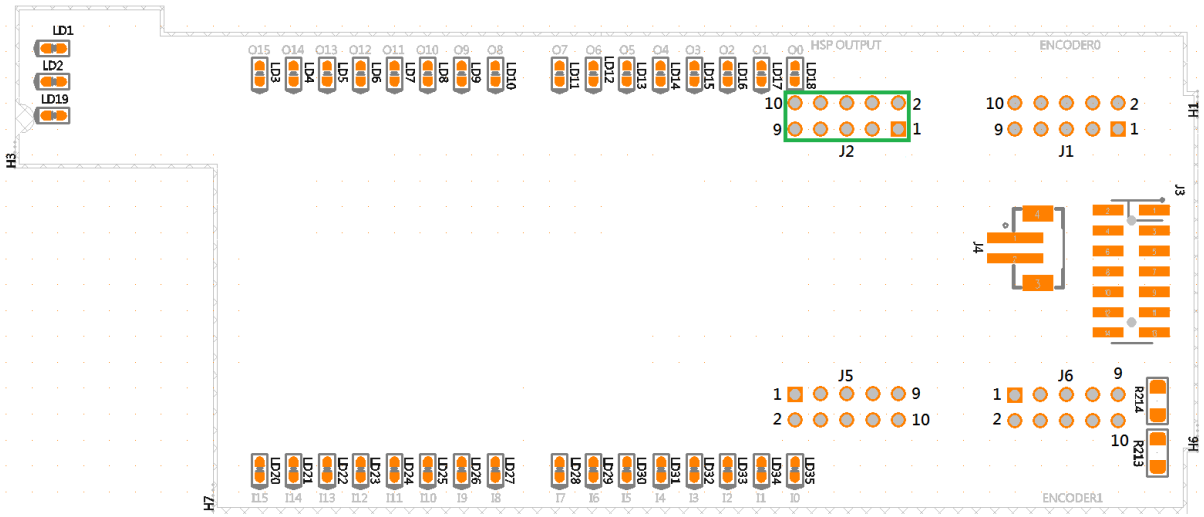
PIN	NAME	TYPE	Definition
1	EAN0/EAN1	IN	Phase A- (5V logic)
2	ECN0/ECN1	IN	Index- (5V logic)
3	EAP0/EAP1	IN	Phase A+ (5V logic)
4	ECP0/ECP1	IN	Index+ (5V logic)
5	EBN0/EBN1	IN	Phase B- (5V logic)
6	GND	PWR	Ground 0V
7	EBP0/EBP1	IN	Phase B+ (5V logic)
8	GND	PWR	Ground 0V
9	5VCC	PWR	VCC 5V Output
10	FG	Chassis ground	Earth Ground



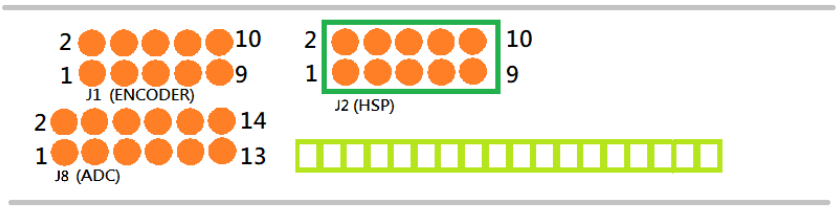
2.5 AUX-2P2E HSP (J2)

2.5.1 Version1.1

PIN	NAME	TYPE	Definition
1	GND	PWR	Ground
2	5VCC	PWR	VCC 5V Output
3	PBP1	OUT	Channel 1 positive line of differential CCW1+ / D1+
4	PBN1	OUT	Channel 1 negative line of differential CCW1- / D1-
5	PAP1	OUT	Channel 1 positive line of differential CW1+ / P1+
6	PAN1	OUT	Channel 1 negative line of differential CW1- / P1-
7	PBP0	OUT	Channel 0 positive line of differential CCW0+ / D0+
8	PBN0	OUT	Channel 0 negative line of differential CCW0- / D0-
9	PAP0	OUT	Channel 0 positive line of differential CW0+ / P0+
10	PAN0	OUT	Channel 0 negative line of differential CW0- / P0-



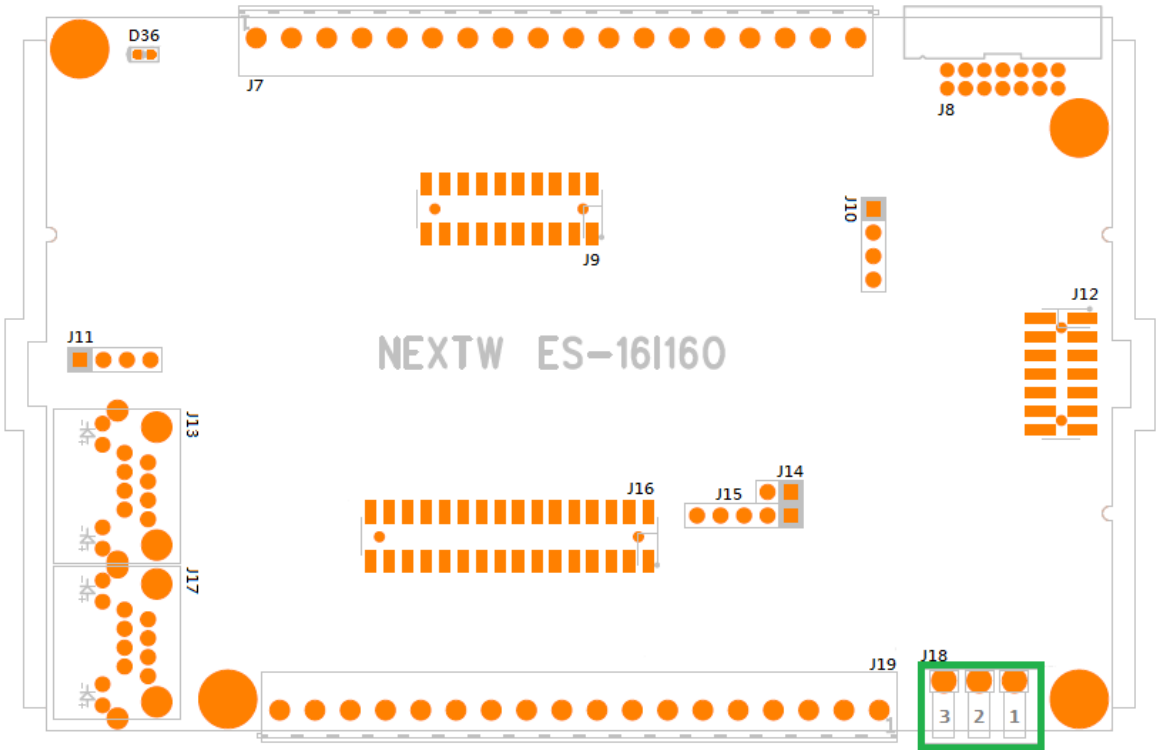
↑ top view



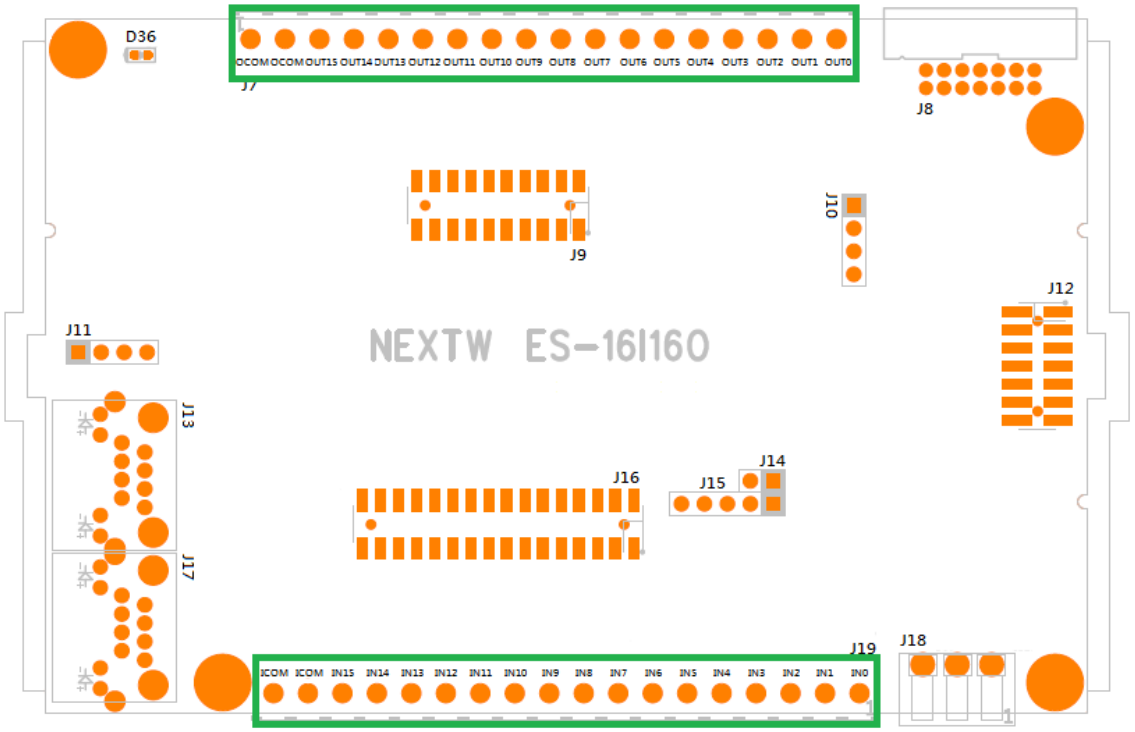
↑ lateral view

2.6 ES-16I16O Power Supply Connector

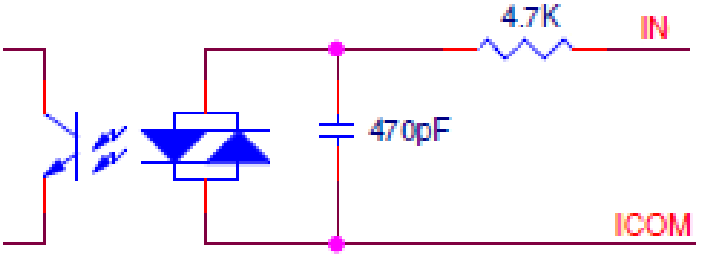
PIN	NAME	TYPE	Definition
1	+24V	PWR	DC Power Supply
2	GND	PWR	DC 0V
3	FG	Chassis ground	Earth Ground



2.7 ES-16I16O GPIO (J19/J7)



2.7.1 J19(GPI)



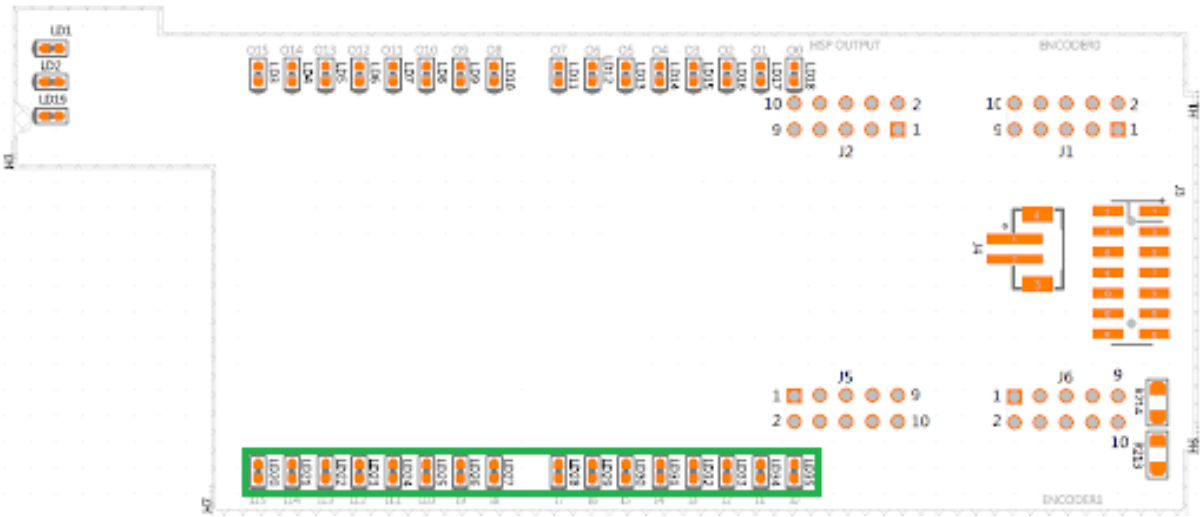
IN0~IN15(PIN1~PIN16):

- Type: Input
- Isolated Input with 3750 Vrms
- Peak forward current : 1A
- Input voltage range: 10V~30V

ICOM(PIN17, PIN18):

- Type: Power
- DC power supply
- Current limit: 2A

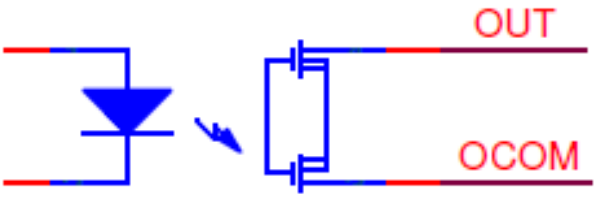
2.7.2 GPI LED



LED	GPI
D35	IN0
D34	IN1
D33	IN2
D32	IN3
D31	IN4
D30	IN5
D29	IN6
D28	IN7

LED	GPI
D27	IN8
D26	IN9
D25	IN10
D24	IN11
D23	IN12
D22	IN13
D21	IN14
D20	IN15

2.7.3 J7(GPO)



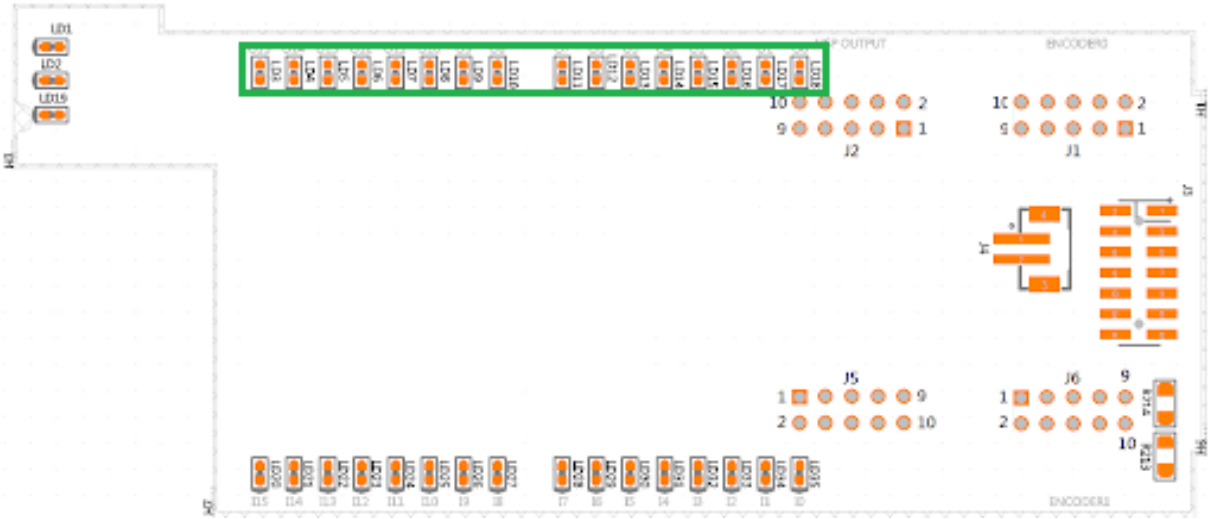
OUT0~OUT15(PIN18~PIN3):

- Type: Output
- DC power supply
- Total current limit : 8A
- Average current 500mA (Total current limit / Number of channels)

OCOM(PIN1~PIN2):

- Type: Power
- Isolated output with 1500 Vrms
- Single max current : 1.3A
- Voltage range: 0V, 5~60V

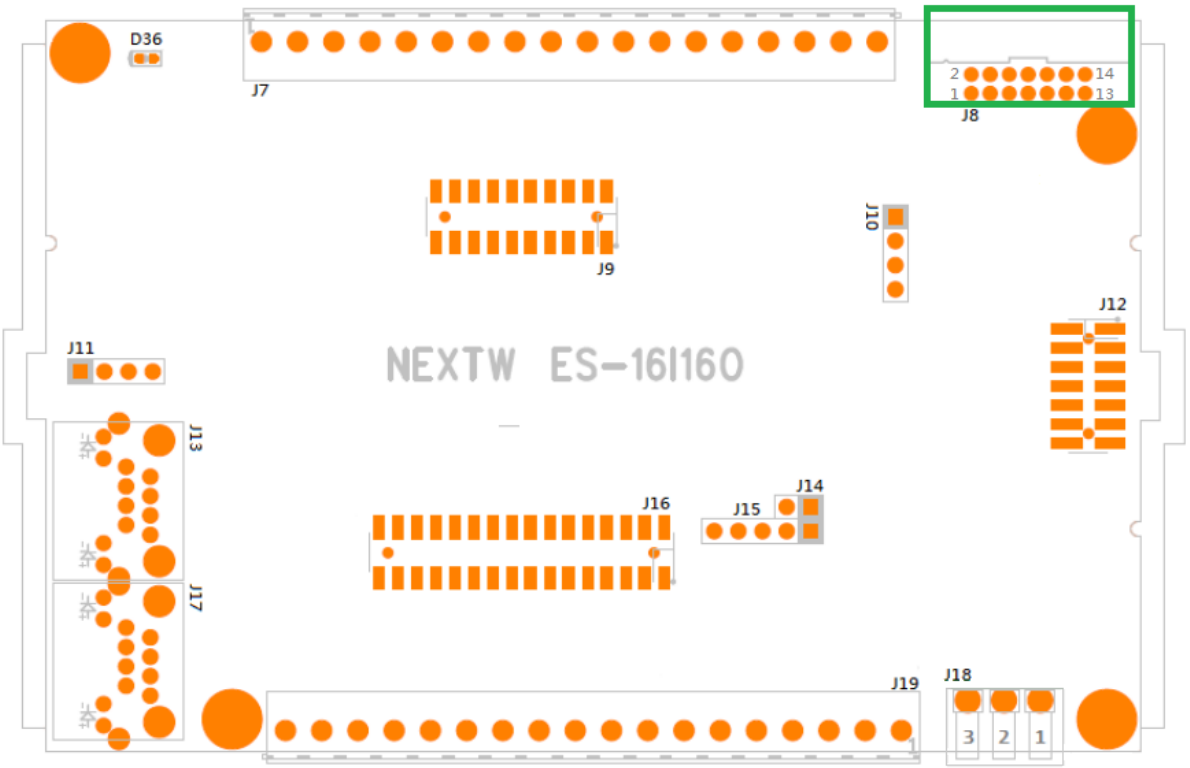
2.7.4 GPO LED



LED	GPO
D18	OUT0
D17	OUT1
D16	OUT2
D15	OUT3
D14	OUT4
D13	OUT5
D12	OUT6
D11	OUT7

LED	GPO
D10	OUT8
D9	OUT9
D8	OUT10
D7	OUT11
D6	OUT12
D5	OUT13
D4	OUT14
D3	OUT15

2.8 ES-16I16O ADC (J8)



PIN	NAME	TYPE	Definition
10	ADC0	IN	Analog to Digital Converter Channel0
12	ADC1	IN	Analog to Digital Converter Channel1
13	GND	POWER	Ground

ADC0(PIN10):
- Type: IN
- Analog input voltage range: 0~3.3V

ADC1(PIN12):
- Type: IN
- Analog input voltage range: 0~3.3V

Chapter 3: Operation with TwinCAT and ECM-SK

3.1 EtherCAT Slave Information (ESI)

According to EtherCAT standard document ETG.2000, every EtherCAT slave must be delivered an ESI file (a XML format to describe EtherCAT slave information) for the EtherCAT Master. The ESI file contains the necessary communication settings for the ES-16I16O and ES-2P2E.
The following file is provided for ES-16I16O:

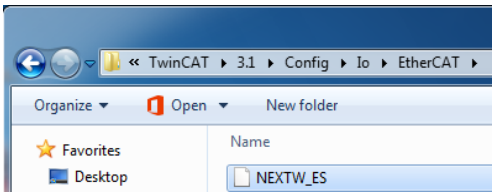
- ES-16I16O_ESI.xml

The following file is provided for ES-2P2E:

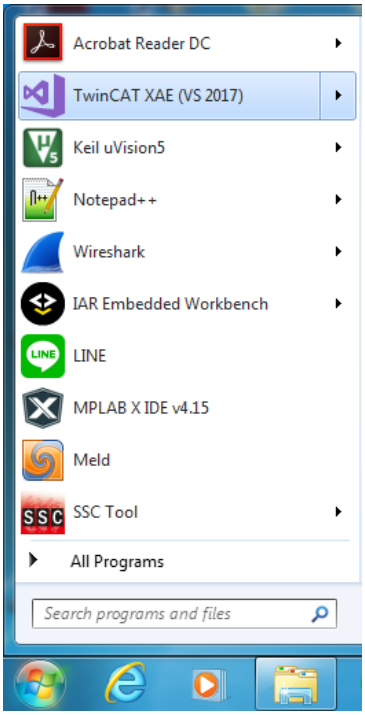
- ES-2P2E_ESI.xml

3.2 Using TwinCAT to Control ES-16I16O&AUX-2P2E

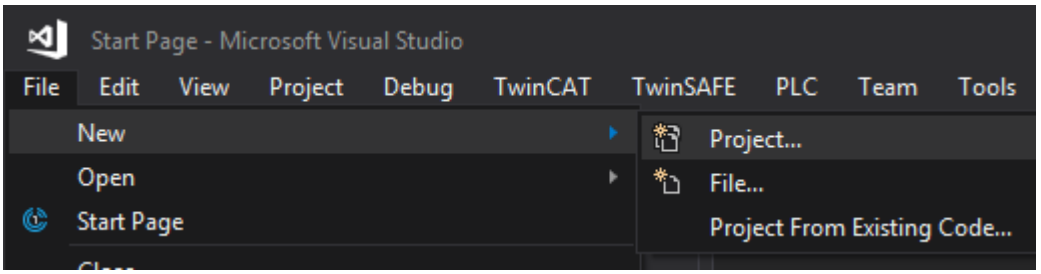
STEP1. Check the ESI file is loaded into TwinCAT Specified path.



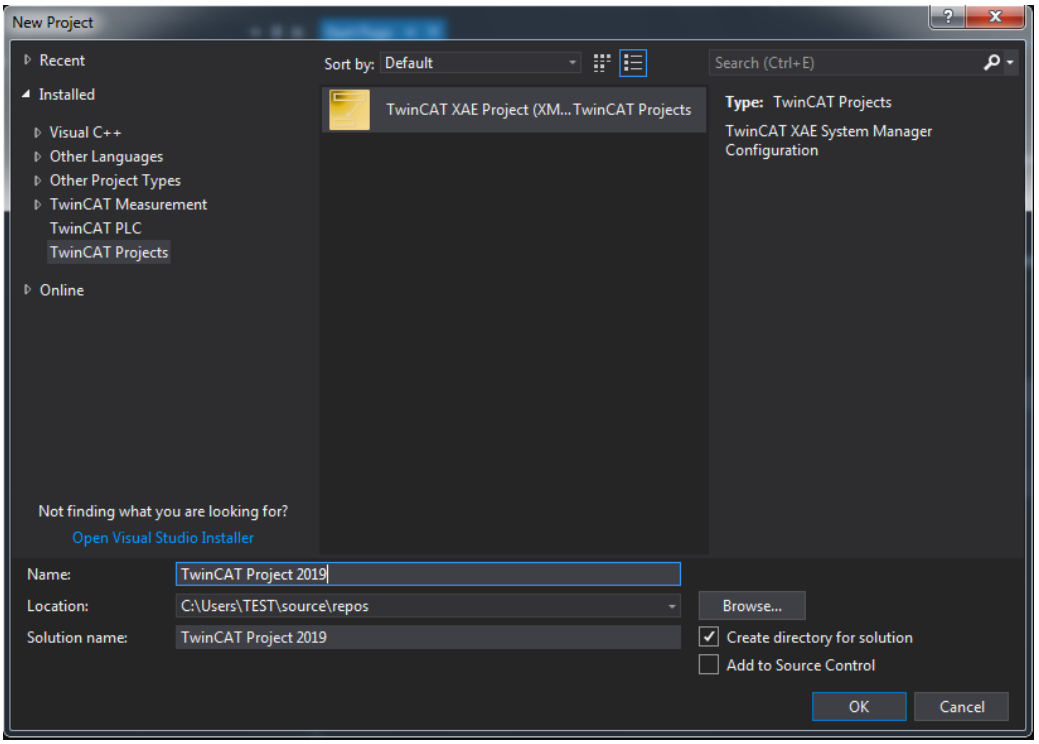
STEP2. Open TwinCAT XAE



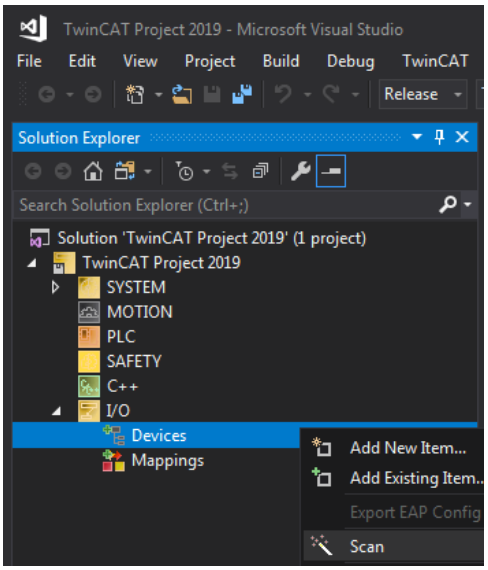
STEP3. Create a new TwinCAT project



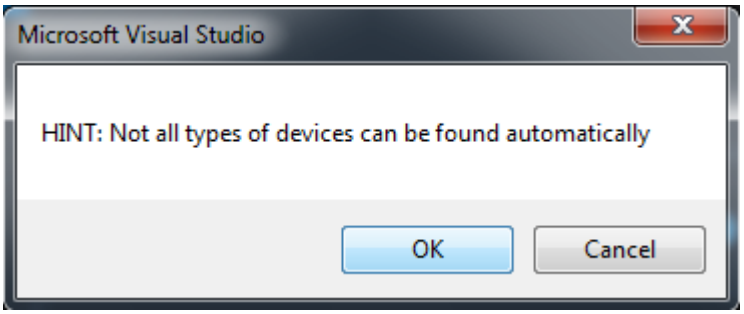
STEP4. Enter the new project name, click “OK”



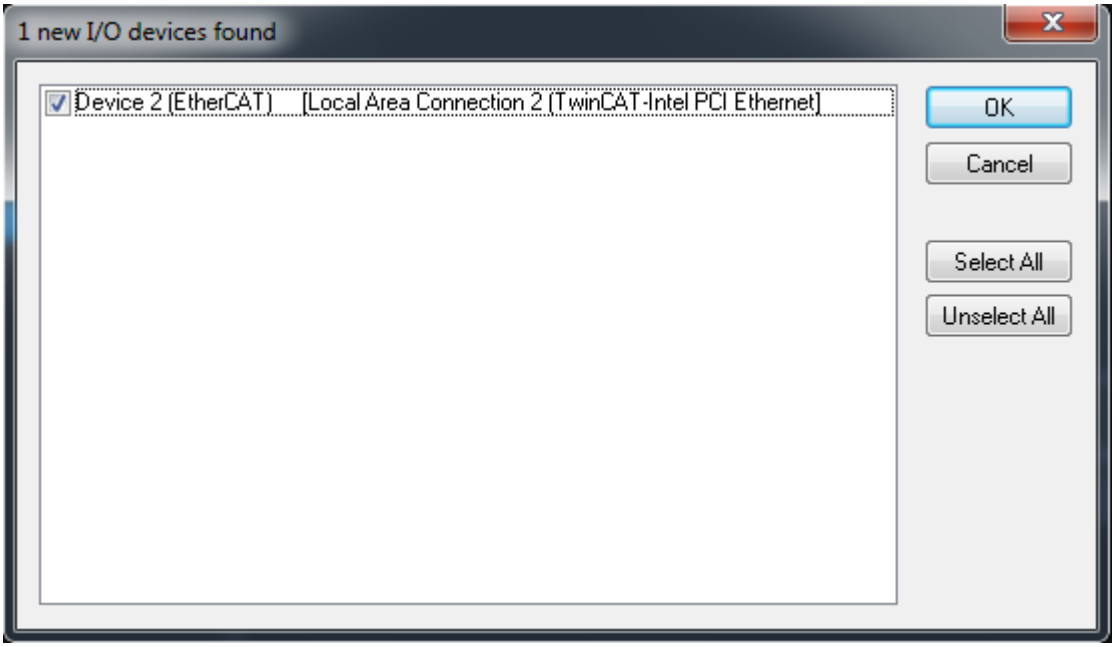
STEP5. Check the ethernet cable is correctly connected and then right click the Devices, click “Scan”



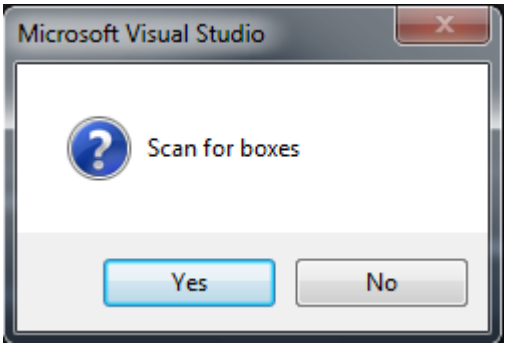
STEP6. Check the Hint, click “OK”



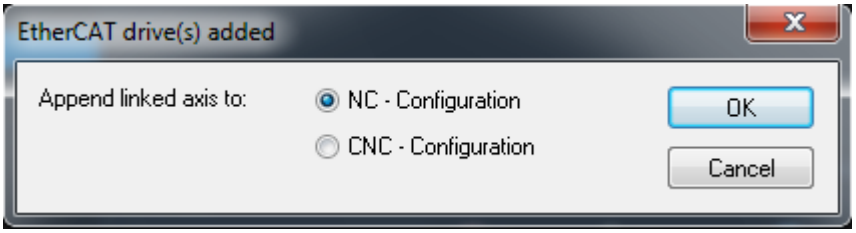
STEP7. Check and tick the box, click “OK”



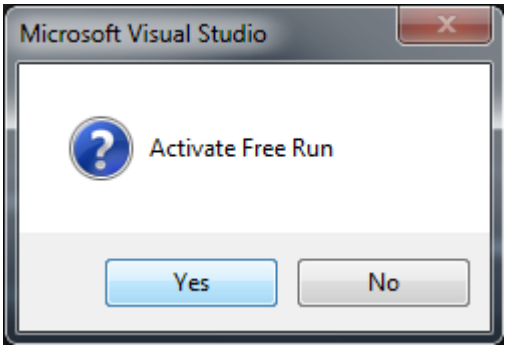
STEP8. Scan for boxes



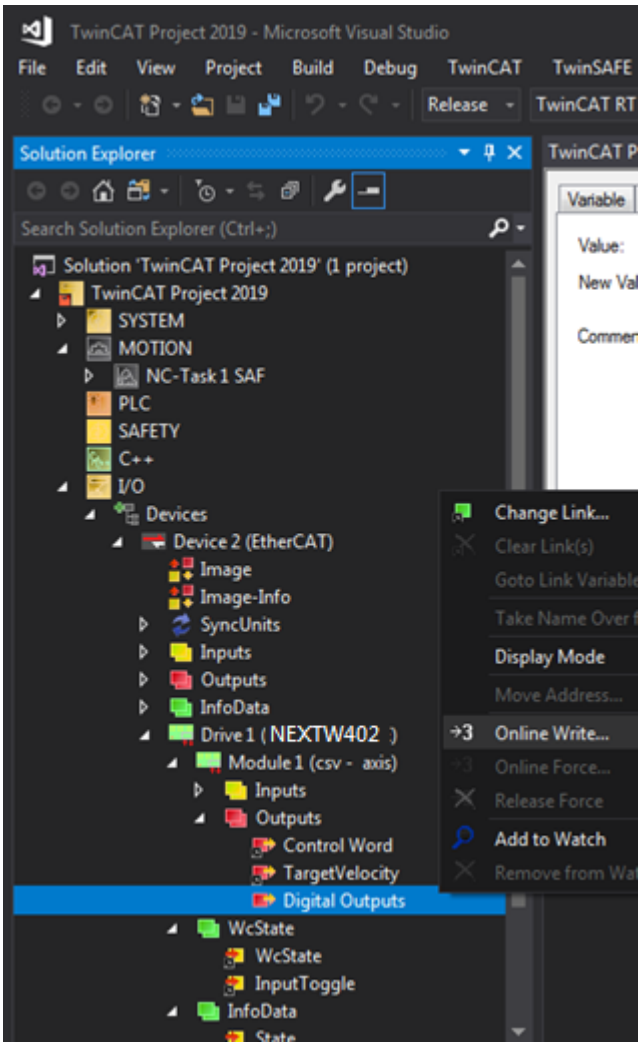
STEP9. EtherCAT driver(s) added, tick the suitable Configuration, click “OK”



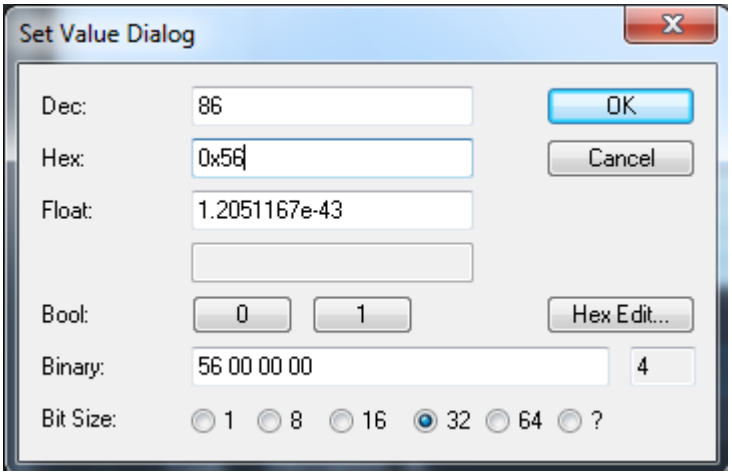
STEP10. Activate Free Run



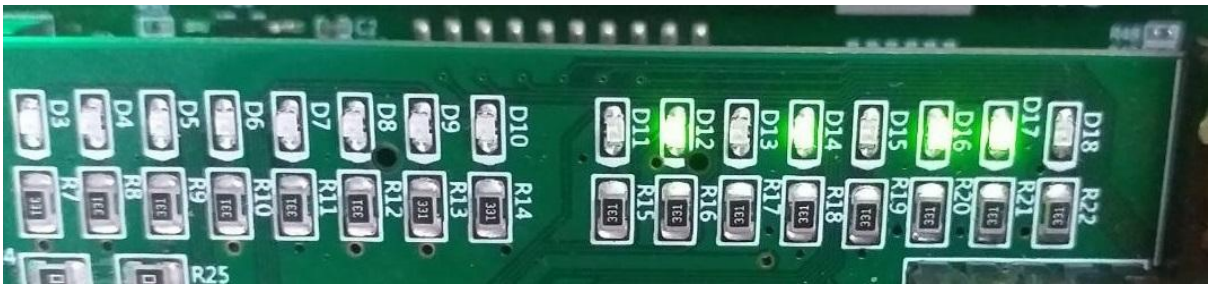
STEP11. After successful scanning, you can see the NEXTW402 in TwinCAT project. Right click the Digital Outputs and click “Online Write”



STEP12. Set the Hex Value: 0x56 (01010110), click “OK”



STEP13. AUX-2P2E show that D12(bit6), D14(bit4), D16(bit2), D17(bit1) are turned on



3.3 Using NEXTW ECM-SK to Scan NEXTW_ES

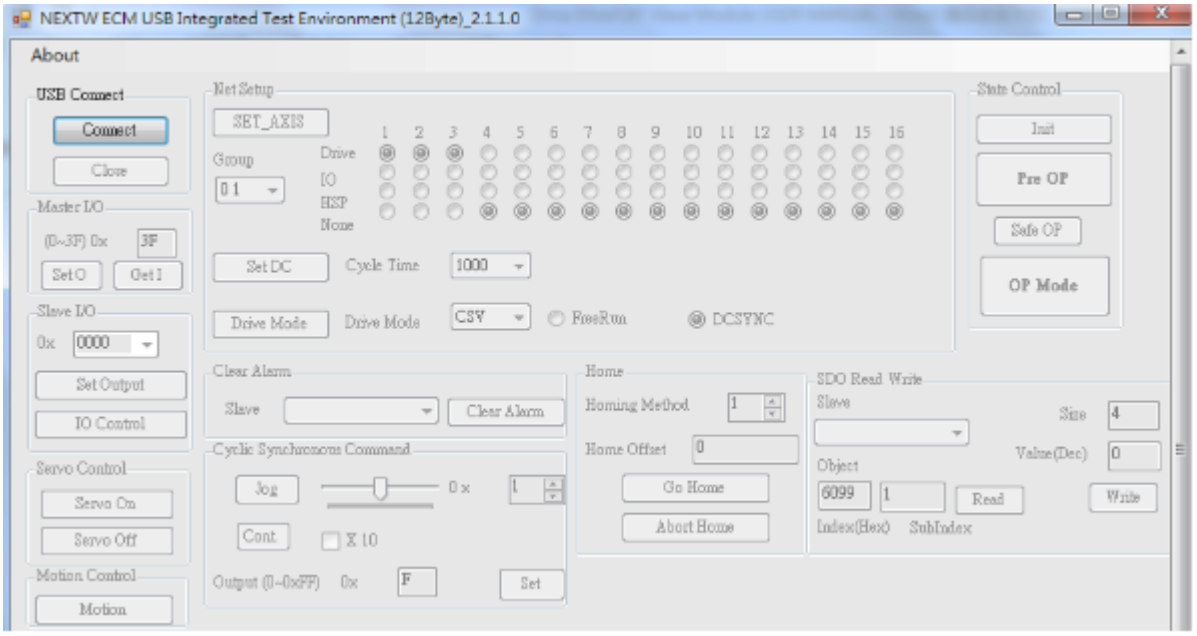
Step1: Execute ECM_USBITE_16B.exe

*The ITE in “USB介面工具範例”can be downloaded from www.nextw.com.tw in “下載中心”

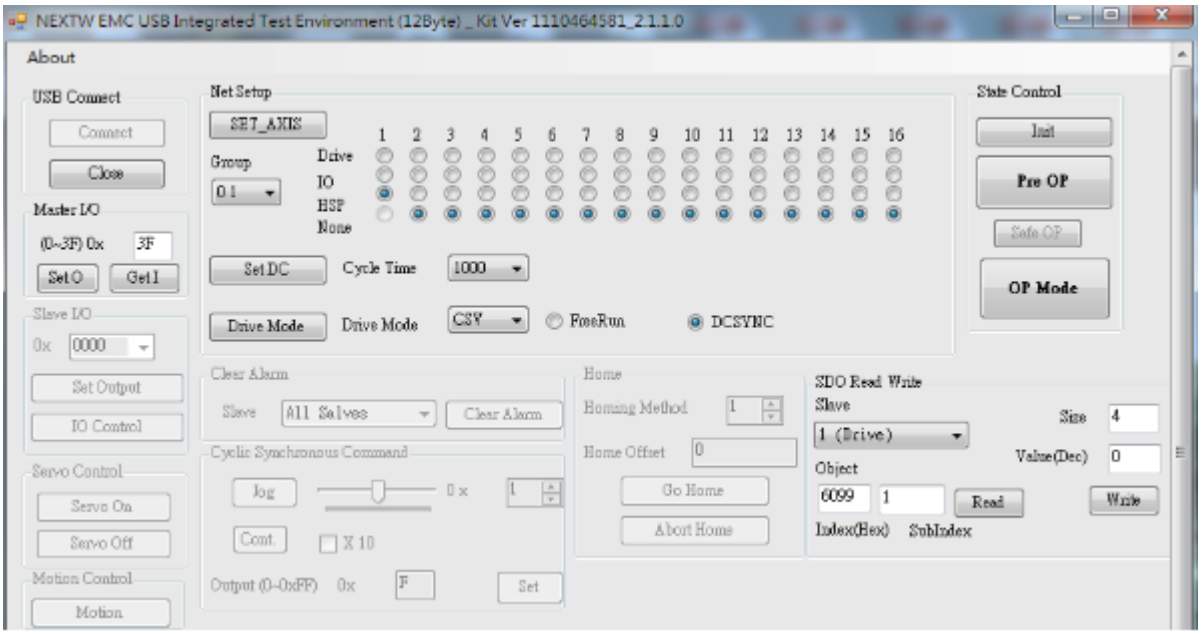
Step2: Connect NEXTW ECM-SK and EtherCAT slave by a RJ45 cable. Then Connect PC and NEXTW ECM-SK through USB to Micro USB cable.

* The host interface of the NEXTW ECM-SK should be set as USB via CONFIG0 pin.

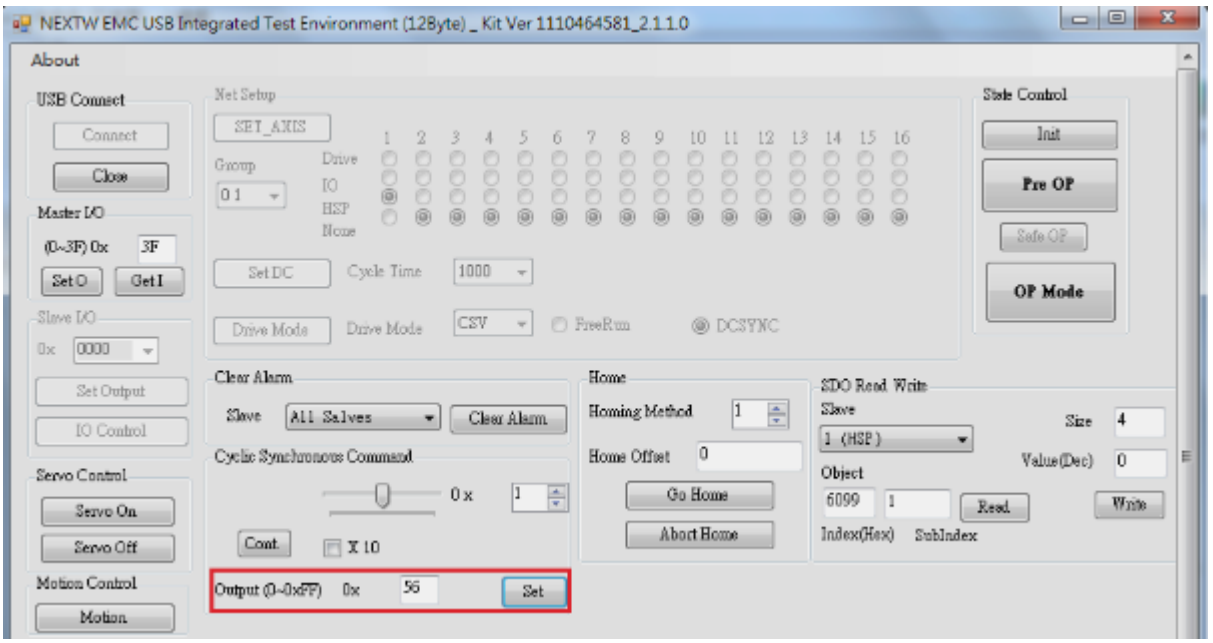
Step3: Click “Connect” button



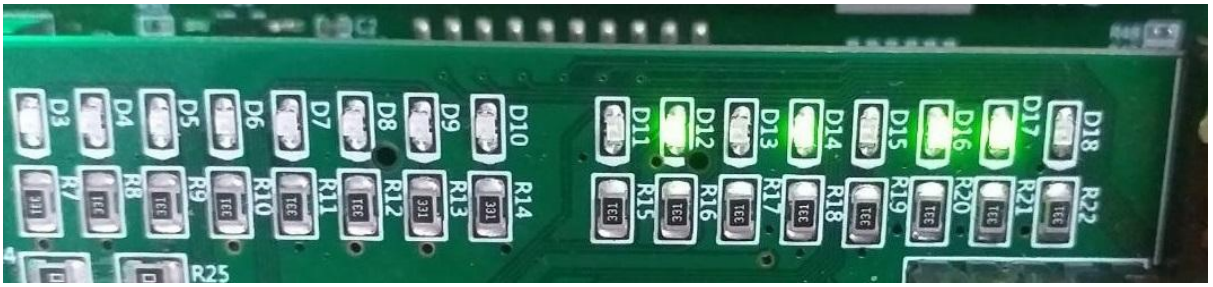
Step4: Select “HSP” for EtherCAT slave. The slave will enter OP mode after clicking “OP Mode” button.



Step5: Set “Output” as 0x56. Then click “Set” button.



STEP6. AUX-2P2E show that D12(bit6), D14(bit4), D16(bit2), D17(bit1) are turned on the EtherCAT slave are turned on.


D3
D4
D5
D6
D7
D8
D9
D10
D11
D12
D13
D14
D15
D16
D17
D18
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
R17
R18
R19
R20
R21
R22
R25

Chapter 4: Object Dictionary

4.1 Architecture of Object Dictionary

Index (Hex)	Meaning
0x0000~0x0FFF	Reserved
0x1000~0x1FFF	CoE communication objects
0x2000~0x5FFF	Manufacturer Specific Objects
0x6000~0x7FFF	CANOpen CiA 402 Profile Specific Objects

4.2 Object Type and Attributes

Code	C/C++ type	Description	Size (byte)	Range
USINT	uint8_t	unsigned byte	1	0~255
UINT	uint16_t	unsigned short integer	2	0~65535
UDINT	uint32_t	unsigned long integer	4	0~4294967295
SINT	int8_t	signed byte	1	-128~127
INT	int16_t	signed short integer	2	-32768~32767
DINT	int32_t	signed long integer	4	-2147483648~ 2147483647
STRING	-	string value	-	-

Attribute	Description

RO	**This object is only for read.**
WO	**This object is only for write.**
RW	**This object can be read and write.**

4.3 Object Dictionary List

Object Dictionaries		**Refer to**
General Objects	**Device Type (1000h)**	**4.4**
	Manufacturer Device Name (1008h)	**4.4**
	Manufacturer Hardware Version (1009h)	**4.4**
	Manufacturer Software Version (100Ah)	**4.4**
	Identity Object (1018h)	**4.4**
	Error Settings(10F1h)	**4.4**
PDO Mapping Objects	**Receive PDO Mapping (1600h to 1602h) &(1610h to 1612h)**	**4.4**
	Transmit PDO Mapping (1A00h to 1A02h) &(1A10h to 1A12h)	**4.4**
Sync Manager	**Sync Manager Type (1C00h)**	**4.4**
Communication Objects	**RxPDO assign (1C12h)**	**4.4**
	TxPDO assign (1C13h)	**4.4**
	SM output parameter (1C32h)	**4.4**
	SM input parameter (1C33h)	**4.4**

Manufacturer Specific Objects	**Pulse Mode (2000h)**	**4.5**
	Accelaration Divisor (2001h)	**4.5**
	Encoder Enable (2004h)	**4.5**
	Analog Input (2010h)	**4.5**
	Pulse Mode (2800h)	**4.5**
	Accelaration Divisor (2801h)	**4.5**
	Encoder Enable (2804h)	**4.5**
	Analog Input (2810h)	**4.5**
Device Control	**Control Word (6040h)**	**4.6**
	Status Word (6041h)	**4.6**
	Quickstop Option Code (605Ah)	**4.6**
	Shutdown Option Code (605Bh)	**4.6**
	Disable Operation Option Code (605Ch)	**4.6**
	Halt Option Code (605Dh)	**4.6**
	Fault Reaction Code (605Eh)	**4.6**
	Modes of Operation (6060h)	**4.6**
	Modes of Operation Display (6061h)	**4.6**
	Supported Drive Modes (6502h)	**4.6**
	Control Word(6840h)	**4.6**
	Status Word(6841h)	**4.6**
	Quickstop Option Code(685Ah)	**4.6**
	Shutdown Option Code (685Bh)	**4.6**
	Disable Operation Option Code (685Ch)	**4.6**
	Halt Option Code (685Dh)	**4.6**
	Fault Reaction Code (685Eh)	**4.6**
	Modes of Operation (6860h)	**4.6**

	Modes of Operation Display (6861h)	4.6
	Supported Drive Modes(6d02h)	4.6
Cyclic Synchronous Position Mode/ Cyclic Synchronous Velocity Mode	Position Actual Value (6064h)	4.6
	Velocity Actual Value (606Ch)	4.6
	Target Position (607Ah)	4.6
	Software Position Limit (607Dh)	4.6
	Max Profile Velocity (607Fh)	4.6
	Profile Acceleration (6083h)	4.6
	Profile Deceleration (6084h)	4.6
	Quick stop Deceleration (6085h)	4.6
	Target Velocity (60FFh)	4.6
	Interpolation Time (60C2h)	4.6
	Position Actual Value (6864h)	4.6
	Velocity Actual Value (686Ch)	4.6
	Target Position (687Ah)	4.6
	Software Position Limit (687Dh)	4.6
	Max Profile Velocity (687Fh)	4.6
	Profile Acceleration (6883h)	4.6
	Profile Deceleration (6884h)	4.6
	Quickstop Declaration (6885h)	4.6
	Target Velocity(68FFh)	4.6
	Interpolation Time (68C2h)	4.6
Homing Mode	Homing Offset (607Ch)	4.6
	Homing Method (6098h)	4.6
	Homing Speed(6099h)	4.6

	Homing Acceleration (609Ah)	4.6
	Homing Offset(687Ch)	4.6
	Homing Method(6898h)	4.6
	Homing Speed(6899h)	4.6
	Homing Acceleration (689Ah)	4.6
Digital Inputs/Outputs	Digital Inputs(60FDh)	4.6
	Digital Outputs(60FEh)	4.6
	Digital Inputs(68FDh)	4.6
	Digital Outputs(68FEh)	4.6

4.4 CoE Communication Objects (0x1000~0x1FFF)

Device type

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x1000	00	Device type	UDINT	RO	N	0x192

• 0x1000:00 Device type: 0x192 (DS402 device)

Device name

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x1008	00	Device name	STRING	RO	N	NEXTW402

Hardware version

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x1009	00	Hardware version	STRING	RO	N	-

Software version

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x100A	00	Software version	STRING	RO	N	-

Identity

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x1018	00	Count	USINT	RO	N	4
	01	Vendor ID	UDINT	RO	N	0x101010
	02	Product code	UDINT	RO	N	0x26483052
	03	Revision	UDINT	RO	N	0
	04	Serial number	UDINT	RO	N	0

Error Settings

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x10F1	00	Count	USINT	RO	N	2
	01	Local Error Reaction	Reserved	-	-	-
	02	Sync Error Counter Limit	UINT	RW	N	4

• 0x10F1:02 Sync Error Counter Limit:

In DC mode, if the local error counter reaches the limit, the EtherCAT state machine will change to SAFEOP state. The local error counter is set to 0 when the state machine changing to OP state. If the slave miss an SM2 event between two Sync0 event, the local error counter increases by 3; otherwise, the counter decreases by 1.

CSP/CSV RxPDO of Axis 0

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x1600	00	Count	USINT	RO	N	5
	01	The 1st RxPDO entry	UDINT	RO	N	0x60400 010
	02	The 2nd RxPDO entry	UDINT	RO	N	0x607A0 020
	03	The 3rd RxPDO entry	UDINT	RO	N	0x60FF0 020
	04	The 4th RxPDO entry	UDINT	RO	N	0x60600 008
	05	The 5th RxPDO entry	UDINT	RO	N	0x00000 008

- **0x1600:01 The 1st RxPDO entry: 0x6040:00 (Control word of Axis 0)**
- **0x1600:02 The 2nd RxPDO entry: 0x607A:00 (Target position of Axis 0)**
- **0x1600:03 The 3rd RxPDO entry: 0x60FF:00 (Target velocity of Axis 0)**
- **0x1600:04 The 4th RxPDO entry: 0x6060:00 (Mode of operation of Axis 0)**
- **0x1600:05 The 5th RxPDO entry: padding byte**

CSP RxPDO of Axis 0

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x1601	00	Count	USINT	RO	N	3
	01	The 1st RxPDO entry	UDINT	RO	N	0x604000 10

	02	The 2nd RxPDO entry	UDINT	RO	N	0x607A0020
	03	The 3rd RxPDO entry	UDINT	RO	N	0x60FE0020

• 0x1601:01 The 1st RxPDO entry: 0x6040:00 (Control word of Axis 0)
• 0x1601:02 The 2nd RxPDO entry: 0x607A:00 (Target position of Axis 0)
• 0x1601:03 The 3rd RxPDO entry: 0x60FE:00 (Digital outputs of channel 0 to 7)

CSV RxPDO of Axis 0

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x1602	00	Count	USINT	RO	N	3
	01	The 1st RxPDO entry	UDINT	RO	N	0x60400010
	02	The 2nd RxPDO entry	UDINT	RO	N	0x60FF0020
	03	The 3rd RxPDO entry	UDINT	RO	N	0x60FE0020

• 0x1602:01 The 1st RxPDO entry: 0x6040:00 (Control word of Axis 0)
• 0x1602:02 The 2nd RxPDO entry: 0x60FF:00 (Target velocity of Axis 0)
• 0x1602:03 The 3rd RxPDO entry: 0x60FE:00 (Digital outputs of channel 0 to 7)

CSP/CSV RxPDO of Axis 1

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x1610	00	Count	USINT	RO	N	5

	01	The 1st RxPDO entry	UDINT	RO	N	0x68400010
	02	The 2nd RxPDO entry	UDINT	RO	N	0x687A0020
	03	The 3rd RxPDO entry	UDINT	RO	N	0x68FF0020
	04	The 4th RxPDO entry	UDINT	RO	N	0x68600008
	05	The 5th RxPDO entry	UDINT	RO	N	0x00000008

- **0x1610:01 The 1st RxPDO entry: 0x6840:00 (Control word of Axis 1)**
- **0x1610:02 The 2nd RxPDO entry: 0x687A:00 (Target position of Axis 1)**
- **0x1610:03 The 3rd RxPDO entry: 0x68FF:00 (Target velocity of Axis 1)**
- **0x1610:04 The 4th RxPDO entry: 0x6860:00 (Mode of operation of Axis 1)**
- **0x1610:05 The 5th RxPDO entry: padding byte**

CSP RxPDO of Axis 1

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x1611	00	Count	USINT	RO	N	3
	01	The 1st RxPDO entry	UDINT	RO	N	0x68400010
	02	The 2nd RxPDO entry	UDINT	RO	N	0x687A0020

	03	The 3rd RxPDO entry	UDINT	RO	N	0x68FE0020

• 0x1611:01 The 1st RxPDO entry: 0x6840:00 (Control word of Axis 1)
• 0x1611:02 The 2nd RxPDO entry: 0x687A:00 (Target position of Axis 1)
• 0x1611:03 The 3rd RxPDO entry: 0x68FE:00 (Digital outputs of channel 8 to 15)

CSV RxPDO of Axis 1

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x1612	00	Count	USINT	RO	N	3
	01	The 1st RxPDO entry	UDINT	RO	N	0x68400010
	02	The 2nd RxPDO entr	UDINT	RO	N	0x68FF0020
	03	The 3rd RxPDO entry	UDINT	RO	N	0x68FE0020

• 0x1612:01 The 1st RxPDO entry: 0x6840:00 (Control word of Axis 1)
• 0x1612:02 The 2nd RxPDO entry: 0x68FF:00 (Target velocity of Axis 1)
• 0x1612:03 The 3rd RxPDO entry: 0x68FE:00 (Digital outputs of channel 8 to 15)

CSP/CSV TxPDO of Axis 0

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x1A00	00	Count	USINT	RO	N	5
	01	The 1st TxPDO entry	UDINT	RO	N	0x60410010

	02	The 2nd TxPDO entry	UDINT	RO	N	0x60640020
	03	The 3rd TxPDO entry	UDINT	RO	N	0x606C0020
	04	The 4th TxPDO entry	UDINT	RO	N	0x60610008
	05	The 5th TxPDO entry	UDINT	RO	N	0x00000008

• 0x1A00:01 The 1st TxPDO entry: 0x6041:00 (Status word of Axis 0)
• 0x1A00:02 The 2nd TxPDO entry: 0x6064:00 (Actual position of Axis 0)
• 0x1A00:03 The 3rd TxPDO entry: 0x606C:00 (Actual velocity of Axis 0)
• 0x1A00:04 The 4th TxPDO entry: 0x6061:00 (Mode of operation display of Axis 0)
• 0x1A00:05 The 5th TxPDO entry: padding byte

csp TxPDO of Axis 0

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x1A01	00	Count	USINT	RO	N	3
	01	The 1st TxPDO entry	UDINT	RO	N	0x60410010
	02	The 2nd TxPDO entry	UDINT	RO	N	0x60640020
	03	The 3rd TxPDO entry	UDINT	RO	N	0x60FD0020

• 0x1A01:01 The 1st TxPDO entry: 0x6041:00 (Status word of Axis 0)
• 0x1A01:02 The 2nd TxPDO entry: 0x6064:00 (Target position of Axis 0)

• 0x1A01:03 The 3rd TxPDO entry: 0x60FD:00 (Digital inputs of channel 0 to 7)

CSV TxPDO of Axis 0

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x1A02	00	Count	USINT	RO	N	3
	01	The 1st TxPDO entry	UDINT	RO	N	0x60410 010
	02	The 2nd TxPDO entry	UDINT	RO	N	0x60640 020
	03	The 3rd TxPDO entry	UDINT	RO	N	0x60FD0 020

• 0x1A02:01 The 1st TxPDO entry: 0x6041:00 (Status word of Axis 0)
• 0x1A02:02 The 2nd TxPDO entry: 0x6064:00 (Target position of Axis 0)
• 0x1A02:03 The 3rd TxPDO entry: 0x60FD:00 (Digital inputs of channel 0 to 7)

CSP/CSV TxPDO of Axis 1

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x1A10	00	Count	USINT	RO	N	5
	01	The 1st TxPDO entry	UDINT	RO	N	0x68410 010
	02	The 2nd TxPDO entry	UDINT	RO	N	0x68640 020
	03	The 3rd TxPDO entry	UDINT	RO	N	0x686C0 020

	04	The 4th TxPDO entry	UDINT	RO	N	0x68610008
	05	The 5th TxPDO entry	UDINT	RO	N	0x00000008

• 0x1A10:01 The 1st TxPDO entry: 0x6841:00 (Status word of Axis 0)
• 0x1A10:02 The 2nd TxPDO entry: 0x6864:00 (Actual position of Axis 0)
• 0x1A10:03 The 3rd TxPDO entry: 0x686C:00 (Actual velocity of Axis 0)
• 0x1A10:04 The 4th TxPDO entry: 0x6861:00 (Mode of operation display of Axis 0)
• 0x1A10:05 The 5th TxPDO entry: padding byte

csp TxPDO of Axis 2

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x1A11	00	Count	USINT	RO	N	3
	01	The 1st TxPDO entry	UDINT	RO	N	0x68410010
	02	The 2nd TxPDO entry	UDINT	RO	N	0x68640020
	03	The 3rd TxPDO entry	UDINT	RO	N	0x68FD0020

• 0x1A11:01 The 1st TxPDO entry: 0x6841:00 (Status word of Axis 1)
• 0x1A11:02 The 2nd TxPDO entry: 0x6864:00 (Target position of Axis 1)
• 0x1A11:03 The 3rd TxPDO entry: 0x68FD:00 (Digital inputs of channel 8 to 15)

CSV TxPDO of Axis 2

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x1A12	00	Count	USINT	RO	N	3

	01	The 1st TxPDO entry	UDINT	RO	N	0x68410010
	02	The 2nd TxPDO entry	UDINT	RO	N	0x68640020
	03	The 3rd TxPDO entry	UDINT	RO	N	0x68FD0020

- 0x1A12:01 The 1st TxPDO entry: 0x6841:00 (Status word of Axis 1)
- 0x1A12:02 The 2nd TxPDO entry: 0x6864:00 (Target position of Axis 1)
- 0x1A12:03 The 3rd TxPDO entry: 0x68FD:00 (Digital inputs of channel 8 to 15)

Sync Manager Type

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x1C00	00	Count	USINT	RO	N	4
	01	Communication type of SM0	USINT	RO	N	1
	02	Communication type of SM1	USINT	RO	N	2
	03	Communication type of SM2	USINT	RO	N	3
	04	Communication type of SM3	USINT	RO	N	4

• 0x1C00:01 Communication type of SM0: 1 (mailbox out)
• 0x1C00:02 Communication type of SM1: 2 (mailbox in)
• 0x1C00:03 Communication type of SM2: 3 (process data out)
• 0x1C00:04 Communication type of SM3: 4 (process data in)

RxPDO assign

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x1C12	00	Number of RxPDO	USINT	RW*	N	2
	01	1st RxPDO	UINT	RW*	N	0x1602
	02	2nd RxPDO	UINT	RW*	N	0x1612

*Writable in only pre-operation state
• 0x1C12:00 Number of RxPDO: 0 to 2
Set to 1 for one-axis mode, or 2 for two-axis mode.
• 0x1C12:01 1st RxPDO: 0x1600 to 0x1602
Set to 0x1600 for CSP/CSV mode, 0x1601 for CSP mode, or 0x1602 for CSV mode.
• 0x1C12:02 2nd RxPDO: 0x1610 to 0x1612
Set to 0x1610 for CSP/CSV mode, 0x1611 for CSP mode, or 0x1612 for CSV mode.

Setup Procedure of RxPDO Mapping:

1. Set object 0x1C12:00 to 0.
2. Set object 0x1C12:01 or 0x1C12:02 if necessary.
3. Set object 0x1C12:00 to 1 for one-axis mode, or 2 for two-axis mode.

TxPDO assign

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x1C13	00	Number of TxPDO	USINT	RW*	N	2

	01	1st TxPDO	UINT	RW*	N	0x1A02
	02	2nd TxPDO	UINT	RW*	N	0x1A12

*Writable in only pre-operation state

• 0x1C13:00 Number of TxPDO: 0 to 2

Set to 1 for one-axis mode, or 2 for two-axis mode.

• 0x1C13:01 1st TxPDO: 0x1A00 to 0x1A02

Set to 0x1A00 for CSP/CSV mode, 0x1A01 for CSP mode, or 0x1A02 for CSV mode.

• 0x1C13:02 2nd TxPDO: 0x1A10 to 0x1A12

Set to 0x1A10 for CSP/CSV mode, 0x1A11 for CSP mode, or 0x1A12 for CSV mode.

Setup Procedure of TxPDO Mapping:

4. Set object 0x1C13:00 to 0.
5. Set object 0x1C13:01 or 0x1C13:02 if necessary.
6. Set object 0x1C13:00 to 1 for one-axis mode, or 2 for two-axis mode.

<u>SM output parameter</u>

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x1C32	00	Count	USINT	RO	N	32
	01	Synchronization Type	UINT	RO	N	0
	02	Cycle Time	UDINT	RO	N	0
	03	Reserved	-	-	-	-
	04	Reserved	-	-	-	-
	05	Minimum Cycle Time	UDINT	RO	N	250000
	06	Reserve	-	-	-	-

		d				
	07	Reserved	-	-	-	-
	08	Reserved	-	-	-	-
	09	Delay Time	UDINT	RO	N	0
	0a	Sync0 Cycle Time	UDINT	RO	N	0
	0b	SM-Event Missed	UINT	RO	N	0
	0c	Reserved	-	-	-	-
	0d~1f	Reserved	-	-	-	-
	20	Sync Error	BOOL	RO	N	0

• 0x1C32:01 Synchronization Type: 0 for free-run mode, 1 for SM-sync mode, or 2 for DC-sync mode.
• 0x1C32:02 Cycle Time: Time between Sync0 events [ns]
• 0x1C32:05 Minimum Cycle Time: 250000 [ns]
• 0x1C32:0B SM-Event Missed: Referred to object 0x10F1
• 0x1C32:20 Sync Error: 1 for sync error ocurrs.

SM input parameter

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x1C33	00	SubIndex 000	uint8	RO	N	32
	01	Synchronization Type	UINT	RO	N	0
	02	Cycle Time	UDINT	RO	N	0

	03	SubIndex 003	Reserved	-	-	-
	04	Synchronization Types supported	Reserved	-	-	-
	05	Minimum Cycle Time	UDINT	RO	N	250000
	06	Calc and Copy Time	Reserved	-	-	-
	07	SubIndex 007	Reserved	-	-	-
	08	Get Cycle Time	uint16	RO	N	0
	09	Delay Time	UDINT	RO	N	0
	0a	Sync0 Cycle Time	UDINT	RO	N	0
	0b	SM-Event Missed	UINT	RO	N	0
	0c	Cycle Time Too Small	UINT	RO	N	0
	0d	Shift Time Too Short	Reserved	-	-	-
	0e~1f	-	Reserved	-	-	-
	20	Sync Error	BOOL	RO	N	0

• 0x1C33:01 Synchronization Type: 0 for free-run mode, 1 for SM-sync mode, or 2 for DC-sync mode.
• 0x1C33:02 Cycle Time: Time between Sync0 events [ns]
• 0x1C33:05 Minimum Cycle Time: 250000 [ns]
• 0x1C33:0B SM-Event Missed: Referred to object 0x10F1
• 0x1C33:20 Sync Error: 1 for sync error ocurrs.

4.5 Manufacturer Specific Objects –General (0x2000~0x2FFF)

Pulse Mode

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x2000	00	Pulse Mode	USINT	RW	N	0

• 0x2000:00 Pulse Mode of Axis 0: 0 to 1
0: Pulse/direction mode
1: CW/CCW mode
Note: This object is loaded from and written to data flash.

Accelaration Divisor

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x2001	00	Accelaration Divisor	UDINT	RW	N	1000

• 0x2001:00 Accelaration Divisor of Axis 0: 1 to 0xFFFFFFFF
The divisor of profile acceleration, homing acceleration, and quick stop accelaration.
Note: This object is loaded from and written to data flash.

Encoder Enable

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x2004	00	Encoder Enable	USINT	RW	N	1

• 0x2004:00 Encoder Enable of Axis 0: 0 to 2
0: Disable encoder mode

1: Enable X4 encoder mode
2: Enable X2 encoder mode
3: Enable X1 encoder mode
Note: This object is loaded from and written to data flash.

Analog Input

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x2010	00	Analog Input	DINT	RO	N	-

• 0x2010:00 Analog Input Channel 0:
12-bit single-ended ADC.
Analog input voltage range: 0 to 3.3V

Pulse Mode

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x2800	00	Pulse Mode	USINT	RW	N	0

• 0x2800:00 Pulse Mode of Axis 1: Referred to Object 0x2000:00
Note: This object is loaded from and written to data flash.

Accelaration Divisor

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x2801	00	Accelara tion Divisor	UDINT	RW	N	1000

• 0x2801:00 Accelaration Divisor of Axis 1: Referred to Object 0x2001:00
Note: This object is loaded from and written to data flash.

Encoder Enable

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x2804	00	Encoder Enable	USINT	RW	N	1

• 0x2804:00 Encoder Enable of Axis 1: Referred to Object 0x2004:00
Note:This object is loaded from and written to data flash.

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x2810	00	Analog Input	DINT	RO	N	-

• 0x2810:00 Analog Input Channel 1: Referred to Object 0x2010:00

4.6 CANOpen CiA 402 Profile Specific Objects (0x6000~0x7FFF)

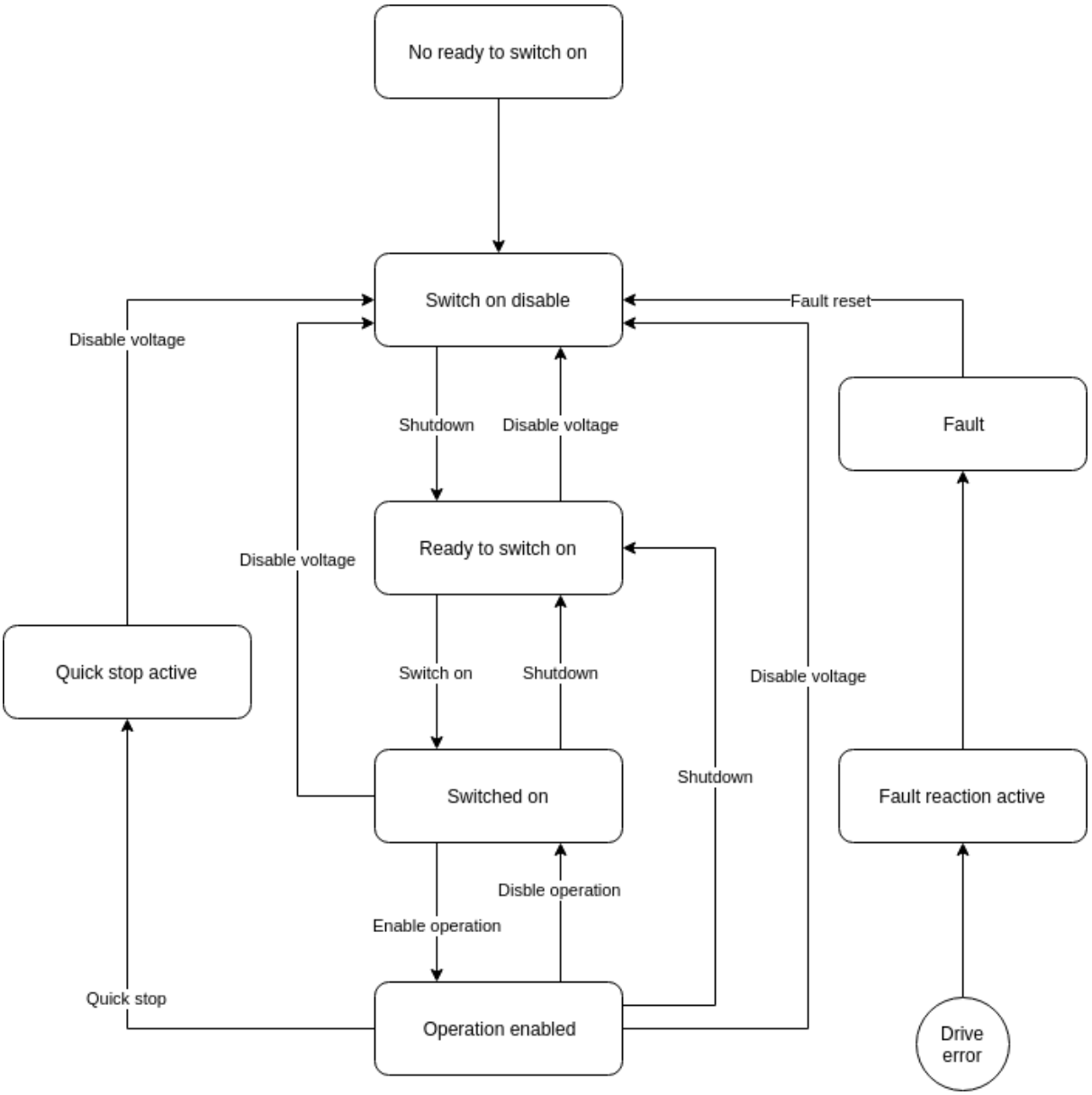
Control Word

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x6040	00	Control Word	UINT	RW	Y	0

• 0x6040:00 Control Word of Axis 0:

Bit 0 to 3 and bit 7: for the controlling command of the drive state

Command	bit 7	bit 3	bit 2	bit 1	bit 0
Shutdown	0	-	1	1	0
Switch on	0	0	1	1	1
Disable voltage	0	-	-	0	-
Quick stop	0	-	0	1	0
Disable operation	0	0	1	1	1
Enable operation	0	1	1	1	1
Fault reset	0→1	-	-	-	-



🔼 **DS402 state machine**

Bit 4, 5, 6, 8 and 9: for the controlling of Homing mode

Bit	Function	Value	Description
4	Homing operation start	0	Stop homing procedure
		1	Start or continue homing procedure
5	-	0	Reserved
6	-	0	Reserved
8	Halt	0	Do not halt homing procedure

		1	Halt homing procedure
9	-	0	Reserved

Bit 4, 5, 6, 8 and 9: for the controlling of CSP/CSV/PV mode

Bit	Function	Value	Description
4	-	0	Reserved
5	-	0	Reserved
6	-	0	Reserved
8	Halt	0	Do not halt CSP/CSV/PV procedure
		1	Halt CSP/CSV/PV procedure
9	-	0	Reserved

Bit 10 to 15: reserved. These bits should be set to 0.

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x6041	00	Status Word	UINT	RO	Y	*(See below)

• 0x6041:00 Status Word of Axis 0:

Bit 0 to 3 and bit 5 to 6: for the current state of the drive

Command	bit 6	bit 5	bit 3	bit 2	bit 1	bit 0
Not ready to switch on	0	0	0	0	0	0
Switch on disabled	1	0	0	0	0	0
Ready to switch on	0	1	0	0	0	1
Switched on	0	1	0	0	1	1
Operation enabled	0	1	0	1	1	1

Quick stop active	**0**	**0**	**0**	**1**	**1**	**1**
Fault reaction active	**0**	**0**	**1**	**1**	**1**	**1**
Fault	**0**	**0**	**1**	**0**	**0**	**0**

Bit 10, 12 and 13: for Homing mode

Bit	Status	Value	Description
10	Target reached	0	Halt (Bit 8 in Controlword) = 0: Target not reached Halt (Bit 8 in Controlword) = 1: Axis decelerates
		1	Halt (Bit 8 in Controlword) = 0: Target reached Halt (Bit 8 in Controlword) = 1: Velocity of axis is 0
12	Homing attained	0	Homing mode not yet complete
		1	Homing mode complete successfully
13	-	-	Reserved

Bit 10, 12 and 13: for Profile velocity mode

Bit	Status	Value	Description
10	Target reached	0	Halt (Bit 8 in Controlword) = 0: Target not reached Halt (Bit 8 in Controlword) = 1: Axis decelerates
		1	Halt (Bit 8 in Controlword) = 0: Target reached Halt (Bit 8 in Controlword) = 1: Velocity of axis is 0
12	-	-	Reserved
13	-	-	Reserved

Quickstop Option Code

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x605A	00	Quickstop Option Code	INT	RW	N	2

• 0x605A:00 Quickstop Option Code of Axis 0:
0: Disable driver function (turns the servo OFF)
1: Slow down on slow down ramp and stay in Operation Enabled. The slow down deceleration is defined as the following object.
    • Cyclic Position, Cyclic Velocity mode: Object 0x6084
    • Homing mode: Object 0x609A
2: Slow down on quick stop ramp and stay in Operation Enabled.
Others: Reserve.

Shutdown Option Code

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x605B	00	Shutdown Option Code	INT	RW	N	0

• 0x605B:00 Shutdown Option Code of Axis 0:
0: Disable driver function (turns the servo OFF)
1: Slow down on slow down ramp and stay in Operation Enabled. The slow down deceleration is defined as the following object.
    • Cyclic Position, Cyclic Velocity mode: Object 0x6084
    • Homing mode: Object 0x609A
Others: Reserved.

Disable Operation Option Code

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x605C	00	Disable Operation Option Code	INT	RW	N	1

• 0x605C:00 Disable Operation Option Code of Axis 0:
0: Disable driver function (turns the servo OFF)
1: Slow down on slow down ramp and stay in Operation Enabled. The slow down deceleration is defined as the following object.
    • Cyclic Position, Cyclic Velocity mode: Object 0x6084
    • Homing mode: Object 0x609A

Others: Reserved.

Halt Option Code

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x605D	00	Halt Option Code	INT	RW	N	1

• 0x605D:00 Halt Option Code of Axis 0:
0: Disable driver function (turns the servo OFF)
1: Slow down on slow down ramp and stay in Operation Enabled. The slow down deceleration is defined as the following object.
    • Cyclic Position, Cyclic Velocity mode: Object 0x6084
    • Homing mode: Object 0x609A
2: Slow down on quick stop ramp and stay in Operation Enabled.
Others: Reserved.

Fault Reaction Code

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x605E	00	Fault Reaction Code	INT	RW	N	2

• 0x605E:00 Fault Reaction Code of Axis 0:
0: Disable driver function (turns the servo OFF)
1: Slow down on slow down ramp and stay in Operation Enabled. The slow down deceleration is defined as the following object.
    • Cyclic Position, Cyclic Velocity mode: Object 0x6084
    • Homing mode: Object 0x609A
2: Slow down on quick stop ramp and stay in Operation Enabled.
Others: Reserved.

Modes of Operation

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x6060	00	Modes of Operation	SINT	RW	Y	0

• 0x6060:00 Modes of Operation of Axis 0:
3: Profile velocity mode.
5: Homing mode.

8: Cyclic synchronous position mode.
9: Cyclic synchronous velocity mode.
Others: Reserved.

Modes of Operation Display

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x6061	00	Modes of Operation Display	SINT	RO	Y	0

• 0x6061:00 Modes of Operation Display of Axis 0:
3: Profile velocity mode.
5: Homing mode.
8: Cyclic synchronous position mode.
9: Cyclic synchronous velocity mode.
Others: Reserved.

Position Actual Value

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x6064	00	Position Actual Value	DINT	RO	Y	0

• 0x6064:00 Position Actual Value of Axis 0: −2147483648 to 2147483647 $[pulse]$

Velocity Actual Value

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x606C	00	Velocity Actual Value	DINT	RO	Y	0

• 0x606C:00 Velocity Actual Value of Axis 0: −2147483648 to 2147483647

$$Actual\ velocity\ = \frac{Object[0x606C{:}00]}{cycle\ time}\ [pulse/sec]$$

Target Position

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value

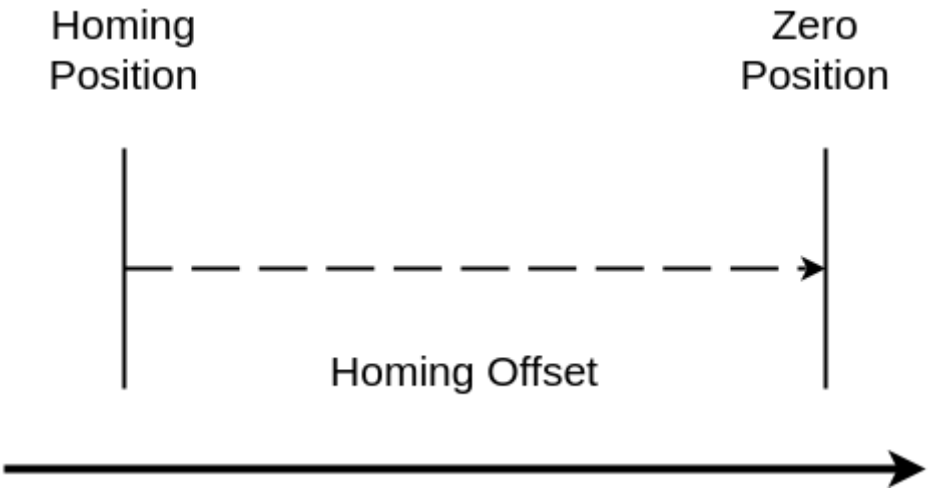
0x607A	**00**	**Target Position**	**DINT**	**RW**	**Y**	**0**

• 0x607A:00 Target Position of Axis 0: −2147483648 to 2147483647 $[pulse]$

Homing Offset

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x607C	**00**	**Homing Offset**	**UDINT**	**RW**	**N**	**0**

• 0x607C:00 Homing Offset of Axis 0: −2147483648 to 2147483647 $[pulse]$
The homing offset = zero position - homing position



Software Position Limit

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x607D	**00**	**Count**	**USINT**	**RO**	**N**	**2**
	01	**Min position limit**	**DINT**	**RW**	**N**	**-2000000000**
	02	**Max position limit**	**DINT**	**RW**	**N**	**2000000000**

• 0x607D:01 Minimun position limit of Axis 0: −2147483648 to 2147483647 $[pulse]$

• **0x607D:02 Maximun position limit of Axis 0: −2147483648 to 2147483647** $[pulse]$

If $Object[0x607D{:}\,01] \geq Object[0x607D{:}\,02]$**, the software limit is disabled.**

Max Profile Velocity

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x607F	00	Max Profile Velocity	UDINT	RW	N	500

• **0x607F:00 Max Profile Velocity of Axis 0: 1 to 4294967295**

$$Max\ profile\ velocity\ = \frac{Object[0x607F{:}00]}{cycle\ time}\ [pulse/sec]$$

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x6083	00	Profile Acceleration	UDINT	RW	N	1

• **0x6083:00 Profile Acceleration of Axis 0: 1 to 4294967295**

$$Profile\ Acceleration\ = \frac{Object[0x6083{:}00]/Object[0x2001{:}00]}{cycle\ time}\ \left[pulse/sec^2\right]$$

Profile Deceleration

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x6084	00	Profile Deceleration	UDINT	RW	N	1

• **0x6084:00 Profile Deceleration of Axis 0: 1 to 4294967295**

$$Profile\ Deceleration\ = \frac{Object[0x6084{:}00]/Object[0x2001{:}00]}{cycle\ time}\ \left[pulse/sec^2\right]$$

Quick stop Deceleration

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x6085	00	Quick stop Decelera	DINT	RW	N	10

		tion				

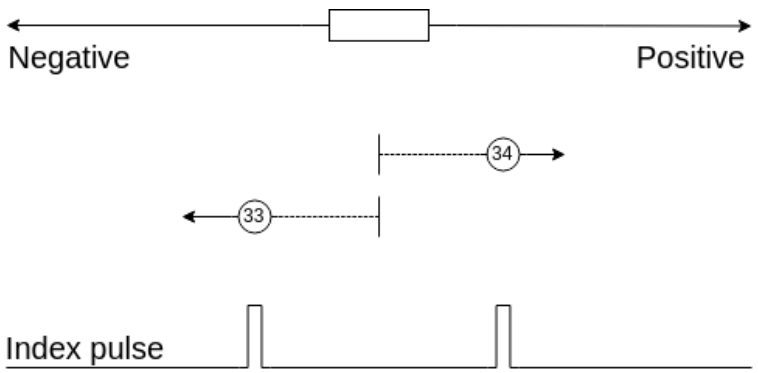
• 0x6085:00 Quick stop acceleration of Axis 0: 1 to 4294967295

$$Quick\ stop\ acceleration\ = \frac{Object[0x6085{:}00]/Object[0x2001{:}00]}{cycle\ time}\left[pulse/sec^2\right]$$

Homing Method

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x6098	00	Homing Method	USINT	RW	N	0

• 0x6098:00 Home Method of Axis 0: 33 to 35.

Value	Definition	Description
33,34	Homing on index pulse	
35	Homing on the current position	In this method, the current position shall be taken to be the home position.

Homing Speeds

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x6099	00	SubInde x 000	USINT	RO	N	2
	01	Switch Speed	UDINT	RW	N	1
	02	Zero Speed	UDINT	RW	N	1

• 0x6099:01 Switch Speed of Axis 0: 1 to 4294967295

$$Finding\ limit\ switch\ speed\ = \frac{Object[0x6099{:}01]}{cycle\ time}\ [pulse/sec]$$

• 0x6099:02 Zero Speed of Axis 0: 1 to 4294967295

$$Finding\ Zero\ switch\ speed\ = \frac{Object[0x6099{:}02]}{cycle\ time}\ [pulse/sec]$$

Homing Acceleration

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x609A	00	Homing Acceleration	UDINT	RW	N	1

• 0x609A:00 Homing acceleration of Axis 0: 1 to 4294967295

$$Homing\ acceleration\ = \frac{Object[0x609A{:}00]/Object[0x2001{:}00]}{cycle\ time}\ \left[pulse/sec^2\right]$$

Interpolation Time

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x60C2	00	Count	USINT	RO	N	2
	01	Interpolation period	USINT	RW	N	1
	02	Interpolation Index	SINT	RW	N	-3

• 0x60C2:01 Interpolation Period of Axis 0: 1 to 250
• 0x60C2:02 Interpolation Index of Axis 0: -6 to -3

$$Interpolation\ time\ = Object[0x60C2{:}\ 01] \times 10^{\ Object[0x60C2{:}02]}\ [sec]$$

This object must be set properly in free run mode.

Digital Inputs

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x60FD	00	Digital Inputs	UDINT	RO	Y	-

• 0x60FD:00 Digital Inputs Channel 0 to 7:
Bit 0 to 7: digital inputs channel 0 to 7. (IN0 to IN7)
Bit 8 to 31: reserved.

Digital Outputs

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x60FE	00	Digital Outputs	UDINT	RW	Y	0

• 0x60FE:00 Digital Outputs Channel 0 to 7:
Bit 0 to 7: digital outputs channel 0 to 7. (OUT0 to OUT7)
Bit 8 to 31: reserved.

Target Velocity

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x60FF	00	Target Velocity	DINT	RW	Y	0

• 0x60FF:00 Target Velocity of Axis 0: 0 to 4294967295

$$Target\ velocity\ = \frac{Object[0x60FF{:}00]}{cycle\ time}\ [pulse/sec]$$

Supported Drive Modes

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x6502	00	Supported Drive Modes	UDINT	RO	N	*(See below)

• 0x6502:00 Supported Drive Modes of Axis 0:
For CSV/CSP PDO mapping, PV/CSV/CSP/Homing modes are supported. (value=0x1a4)
For CSP PDO mapping, CSP/Homing modes are supported. (value=0xa0)
For CSV PDO mapping, PV/CSV/Homing modes are supported. (value=0x124)

Control Word

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x6840	00	Control Word	UINT	RW	Y	0

• 0x6840:00 Control Word of Axis 1: Referred to Object 0x6040:00

Status Word

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x6841	00	Status Word	UINT	RO	Y	*

• 0x6841:00 Status Word of Axis 1: Referred to Object 0x6041:00

Quickstop Option Code

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x685A	00	Quickstop Option Code	INT	RW	N	2

• 0x685A:00 Quickstop Option Code of Axis 1: Referred to Object 0x605A:00

Shutdown Option Code

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x685B	00	Shutdown Option Code	INT	RW	N	0

• 0x685B:00 Shutdown Option Code of Axis 1: Referred to Object 0x605B:00

Disable Operation Option Code

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x685C	00	Disable Operation Option Code	INT	RW	N	1

• 0x685C:00 Disable Operation Option Code of Axis 1: Referred to Object 0x605C:00

Halt Option Code

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x685D	00	Halt Option Code	INT	RW	N	1

• 0x685D:00 Halt Option Code of Axis 1: Referred to Object 0x605D:00

Fault Reaction Code

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x685E	00	Fault Reaction Code	INT	RW	N	2

• 0x685E:00 Fault Reaction Code of Axis 1: Referred to Object 0x605E:00

Modes of Operation

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x6860	00	Modes of Operation	SINT	RW	Y	0

• 0x6860:00 Modes of Operation of Axis 1: Referred to Object 0x6060:00

Modes of Operation Display

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x6861	00	Modes of Operation Display	SINT	RO	Y	0

• 0x6861:00 Modes of Operation Display of Axis 1: Referred to Object 0x6061:00

Position Actual Value

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x6864	00	Position Actual Value	DINT	RO	Y	0

• 0x6864:00 Position Actual Value of Axis 1: Referred to Object 0x6064:00

Velocity Actual Value

Index	Sub	Name	Data	Access	PDO	Default

			Type		Mapping	Value
0x686C	00	Velocity Actual Value	DINT	RO	Y	0

• 0x686C:00 Velocity Actual Value of Axis 1: Referred to Object 0x606C:00

Target Position

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x687A	00	Target Position	DINT	RW	Y	0

• 0x687A:00 Target Position of Axis 1: Referred to Object 0x607A:00

Homing Offset

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x687C	00	Homing Offset	DINT	RW	N	0

• 0x687C:00 Homing Offset of Axis 1: Referred to Object 0x607C:00

Software Position Limit

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x687D	00	SubInde x 000	USINT	RO	N	2
	01	Min position limit	DINT	RW	N	-2000000 000
	02	Max position limit	DINT	RW	N	2000000 000

• 0x687D:01 Minimun position limit of Axis 1: Referred to Object 0x607D:01
• 0x687D:02 Minimun position limit of Axis 1: Referred to Object 0x607D:02

Max Profile Velocity

Index	Sub	Name	Data	Access	PDO	Default

			Type		Mapping	Value
0x687F	00	Max Profile Velocity	UDINT	RW	N	500

• 0x687F:00 Max Profile Velocity of Axis 1: Referred to Object 0x607F:00

Profile Acceleration

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x6883	00	Profile Accelera tion	UDINT	RW	N	1

• 0x6883:00 Profile Acceleration of Axis 1: Referred to Object 0x6083:00

Profile Deceleration

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x6884	00	Profile Decelera tion	UDINT	RW	N	1

• 0x6884:00 Profile Deceleration of Axis 1: Referred to Object 0x6084:00

Quickstop Declaration

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x6885	00	Quicksto p Declarati on	DINT	RW	N	10

• 0x6885:00 Quickstop acceleration of Axis 1: Referred to Object 0x6085:00

Homing Method

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x6898	00	Homing Method	SINT	RW	N	0

• 0x6898:00 Home Method of Axis 1: Referred to Object 0x6098:00

Homing Speeds

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x6899	00	SubInde x 000	USINT	RO	N	2
	01	Switch Speed	UDINT	RW	N	1
	02	Zero Speed	UDINT	RW	N	1

- 0x6899:01 Switch Speed of Axis 1: Referred to Object 0x6099:01
- 0x6899:02 Zero Speed of Axis 1: Referred to Object 0x6099:02

Homing Accelaration

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x689A	00	Homing Accelara tion	UDINT	RW	N	1

- 0x689A:00 Homing acceleration of Axis 1: Referred to Object 0x609A:00

Interpolation Time

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x68C2	00	SubInde x 000	USINT	RO	N	2
	01	Interpola tion period	USINT	RW	N	1
	02	Interpola tion Index	SINT	RW	N	-3

- 0x68C2:01 Interpolation Period of Axis 1: Referred to Object 0x60C2:01
- 0x68C2:02 Interpolation Index of Axis 1: Referred to Object 0x60C2:02

Digital Inputs

Index	Sub	Name	Data	Access	PDO	Default

			Type		Mapping	Value
0x68FD	00	Digital Inputs	UDINT	RO	Y	-

• 0x68FD:00 Digital Inputs Channel 8 to 15:
Bit 0 to 7: digital inputs channel 8 to 15. (IN8 to IN15)
Bit 8 to 31: reserved.

Digital Outputs

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x68FE	00	Digital Outputs	UDINT	RW	Y	0

• 0x68FE:00 Digital Outputs Channel 8 to 15:
Bit 0 to 7: digital outputs channel 8 to 15. (OUT8 to OUT15)
Bit 8 to 31: reserved.

Target Velocity

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x68FF	00	Target Velocity	DINT	RW	Y	0

• 0x68FF:00 Target Velocity of Axis 1: Referred to Object 0x60FF:00

Supported Drive Modes

Index	Sub	Name	Data Type	Access	PDO Mapping	Default Value
0x6D02	00	Supported Drive Modes	UDINT	RO	N	*

• 0x6D02:00 Supported Drive Modes of Axis 1: Referred to Object 0x6502:00

REVISON HISTORY

Date	Revision	Description
2019.09.23	**1.0**	**Initial version.**
2020.02.04	**1.1**	**Add ADC Ground Signal 0x2004 add 3: Enable X1 encoder mode**
2020.08.26	**1.2**	**Add AUX version2**
2020.09.10	**1.3**	**Add GPIO LED description**
2020.12.10	**1.4**	**Modify chapter 3.1**