

# **DC integrated moment servo**

**YZ-AIM-CanOpen\_v1\_61**

## First, product characteristics

1. Isolation of the CANOPEN communication, in compliance with the CiA301 V4.2.0 specification.
  - A. Supports SDO, TPDO, and RPDO.
  - B. Support for speed mode, position mode (contour mode, interpolation mode).
  - C. Support heartbeat production and consumption
2. A 15-bit absolute encoder with one-lap pulses up to 32,768.
3. Multiple lap absolute value (battery required). Pulse mode: automatically return to the power off position. Communication mode: the location can be recorded.
4. Multi-stage DD motor structure, large torque output.
5. Integrated servo, simplified wiring, ultra-small size.
6. Low noise, low vibration, high-speed positioning, high reliability.
7. FOC field directional vector control, support position / speed closed loop.
8. Works at a zero lag given a pulse state, following a zero lag.
9. The 16-bit electronic gear function.
10. A CANOPEN upper position computer is provided to monitor the motor status and modify the parameters.
11. Position mode, support the pulse + direction signal, the encoder follows
12. Speed mode, support for PWM duty cycle signal speed modulation
13. With blocking rotation, overcurrent protection, overpressure protection.

## Second, parameter phenotype

Model parameter		42AIM15C	42AIM10C
source	voltage	24VDC±10%	24VDC±10%
	current	2.2A	1.6A
parameter of electric machine	torsion	0.48NM	0.33NM
	rated speed	1000RPM	1000RPM
	maximum speed	1500RPM	1500RPM
	power	50W	35W
return signal		Single loop 15-bit magneto-electric encoder (single loop 32768 pulse)	
cooling-down method		natural cooling	
weight			
Position control mode	Maximum input pulse frequency	500KHz	
	Pulse instruction mode	Pulse + direction, phase A + phase B	
	Electronic gear ratio	Set a range of 1~65535 compared to 1~65535	
	Location sampling frequency	2KHz	
defensive function		Block the alarm	
CI		canopen (CAN communication, rate 1M)	
service environment	ambient temperature	0~40°	
	The motor allows for the maximum temperature of the temperature	85°	
	humidity	5~95%	

Model parameter		57AIM15C	57AIM15CH	57AIM30C	57AIM30CH
source	voltage	24~36VDC	24~36VDC	24~36VDC	24~36VDC
	current	2.2A	2.2A	4.4A	4.4A
parameter of electric machine	torsion	0.48NM	0.24NM	0.96NM	0.48NM
	rated speed	1000RPM	2000RPM	1000RPM	2000RPM
	maximum speed	1500RPM	2500RPM	1500RPM	2500RPM
	power	50W	50W	100W	100W
return signal		Multi-lap absolute encoder (single lap 32768, pulse, single lap 15-bit)			
cooling-down method		natural cooling			
weight					
Position control mode	Maximum input pulse frequency	500KHz			
	Pulse instruction mode	Pulse + direction, phase A + phase B			
	Electronic gear ratio	Set a range of 1~65535 compared to 1~65535			
	Location sampling frequency	2KHz			
defensive function		Block the alarm			
CI		Easycan (CAN communication, rate 1M) Serial port TTL (19200,8, N, 1) (monitoring of motor status and modifying parameters).			
service environment	ambient temperature	0~40°			
	The motor allows for the maximum temperature of the temperature	85°			
	humidity	5~95%			

Model parameter		60AIM25C	60AIM25CH
source	voltage	36VDC±10%	36VDC±10%
	current	7A	7A
parameter of electric machine	torsion	2NM	1NM
	rated speed	1000RPM	2000RPM
	maximum speed	1500RPM	2500RPM
	power	200W	200W
return signal		Single loop 15-bit magneto-electric encoder (single loop 32768 pulse)	
cooling-down method		natural cooling	
weight			
Position control mode	Maximum input pulse frequency	500KHz	
	Pulse instruction mode	Pulse + direction, phase A + phase B	
	Electronic gear ratio	Set a range of 1~65535 compared to 1~65535	
	Location sampling frequency	2KHz	

<b>defensive function</b>		Block the alarm
<b>CI</b>		Easycan (CAN communication, rate 1M) Serial port TTL (19200,8, N, 1) (monitoring of motor status and modifying parameters).
<b>service environment</b>	<b>ambient temperature</b>	0~40°
	<b>The motor allows for the maximum temperature of the temperature</b>	85°
	<b>humidity</b>	5~95%

## two. Drive interface

### 1. Power interface

The integrated servo power supply terminal is shown in the figure below:

Terminal serial number	name	function
1	+V	DC power supply positive electrode, + 24V~36V. Positive, positive and negative connection will directly short circuit the power supply, and may also damage the drive
2	GND	DC power supply ground. Positive, positive and negative connection will directly short circuit the power supply, and may also damage the drive

### 2. Communication and output interface

DB9 male head									
1	2	3	4	5	6	7	8	9	
PU+	PU-	DIR+	DIR-	WR+		ZO	COM	CANL	CANH
blue	bluish dark color	hispid arthraxon	Green black	skewbald		yellow	black and white	palm	white

Terminal serial number	name	function
1	PU+	Pulse control signal: the pulse rising edge is effective; 3.3-5 V at PU-high level, and 0~0.5V at low level. To reliably respond to the pulse signal, the pulse width should be greater than 1.2s.10 If + 12V or + 24V.
2	PU-	
3	DIR+	Direcentration signal: high / low level signal. To ensure reliable direction of motor, the direction signal should precede the pulse signal A minimum of 5s was established.DIR-3.3-5 V at high levels and 0~0.5V at low levels.
4	DIR-	
5	WR+	Alarm signal output, internal optical coupling NPN output. Normal is high resistance, alarm to the COM conduction.

6	ZO	Encoder zero-point output. There is a zero-point signal optical coupling NPN output guide communication signal.
7	COM	The output signal is in common with the 485 power supply.
8	CANL	Can communication port CANL, built-in isolation power supply.
9	CANH	Can communication port CANH, built-in isolation power supply.

### 3. Status indication and alarm

The red light and green light are turned on once to check whether the LED is working normally. Then the green light is on, and the red light is out as normal. If you encounter an alarm state, you can judge the cause by red, or you can read the alarm code through modbus.

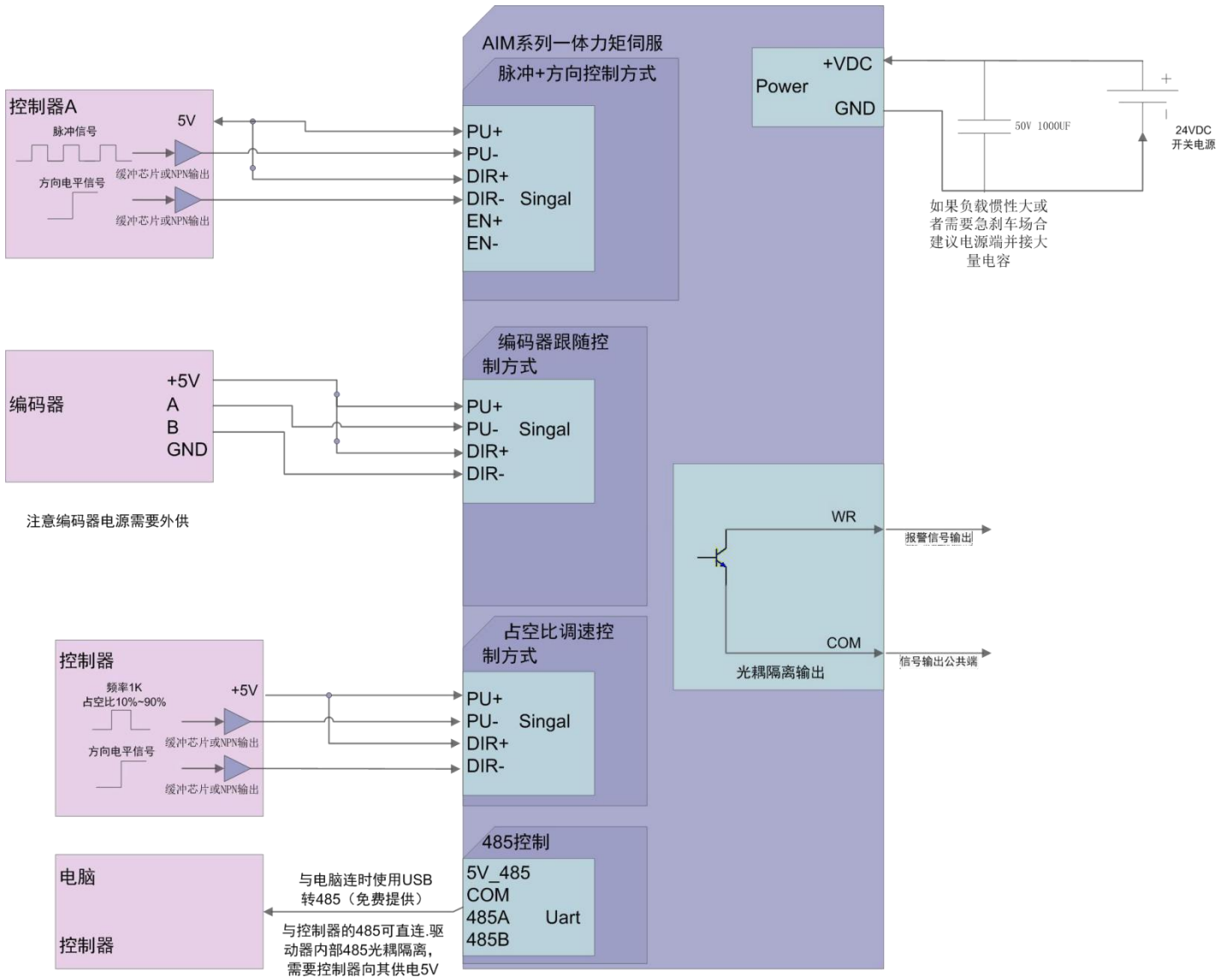
Alarm code	blinking red lamp	The reason for the alarm	Alarm processing
0x20	Two long flash	Communication drop line alarm	Resend the heartbeat packet to recover. Motor shutdown.
0x10	A long flash	Battery off alarm	Resore the circle and origin. The motor is not shut down.
0x12	A long flash, 2 a short flash	Block the alarm	halt.EN enables 1 or control word clear alarm position 1 to recover.
0x14	A long flash, 4, a short flash	stall alarm	halt.EN enables 1 or control word clear alarm position 1 to recover.
0x15	A long flash, five short flashes	Overpressure alarm	Over the 52V alarm. If the power generation causes a boost, add a discharge module.

Note: the blocking alarm, the blocking time can be set, according to the register description.

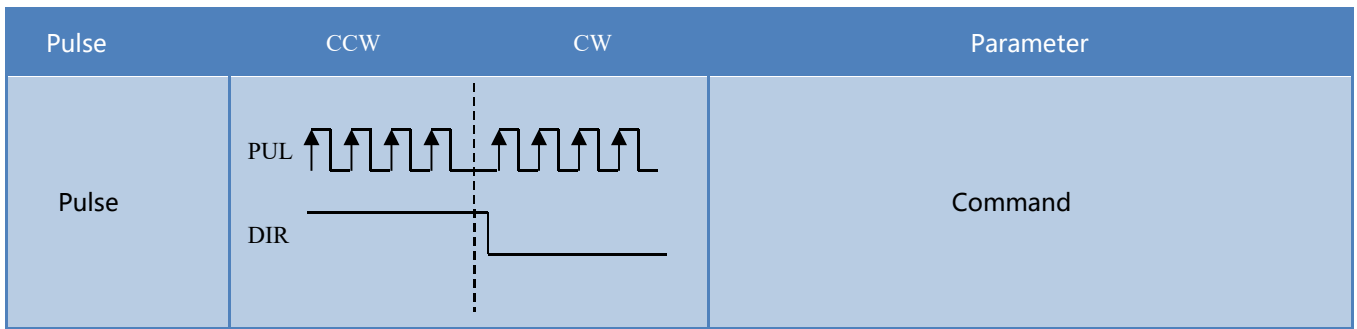
Green light state	Motor state
Often bright	Working properly, the battery is full
twinkle	Work properly and the battery is charging
High frequency flashing	Working properly, the battery is disconnected

## 3. Drive wiring diagram and control mode

### 1. Drive typical wiring diagrams



## 2. Command pulse + directional position control mode



If 3200 is required, the pulse is taken one round

The Electronic gear is set to 32768 (Number of one-ring pulses in the encoder) ratio  
3200 (number of pulses to set): 256 to 25

If 8192 pulse is required (default parameters)

The Electronic gear is set to 32768 (Number of one-ring pulses in the encoder) ratio  
8192 (the number of one-ring pulses to be set) is about divided after: 32768 compared to 8192

After the approximate score is: 4 to 1

Note: can be divided as far as possible, the electronic gear molecule is 32768, the value is too large, will affect the following performance

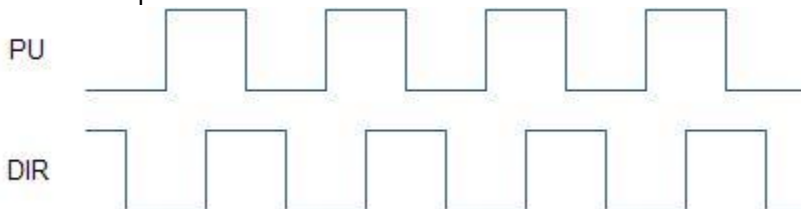
Command pulse frequency = (speed requiring motor operation / 60) \* Number of one-ring pulses, for example: 1000RPM is required to click: 8192

$$\text{Pulse frequency} = 1000 / 60 * 8192 = 136533\text{HZ}$$

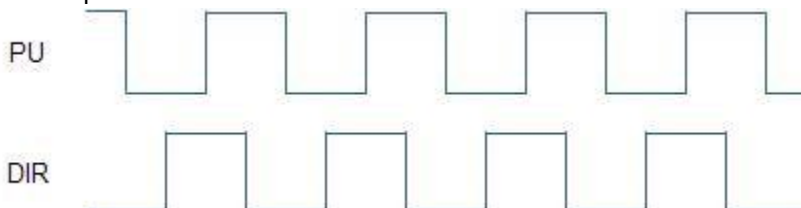
## 3. Orthogonal command pulse position control mode

By setting the special function (0x19 address) to 2, the encoder follows the mode. This mode can be used for the encoder to follow, such as an axis connected to the encoder output to the drive (such as the drive typical drive wiring diagram), the drive can control the servo motor, press the input encoder signal, along with the controlled encoder. The ratio of the encoder and the motor can be set by adjusting the electronic gear.

Positive turn pulse:



Reverse pulse:



The direction of motor rotation: PU rise along the advanced DIR, the rise along is positive. The PU rises along the lagging DIR, and the rising edge is the inversion.

## Iv. Parameter debugging

Depending on the load of the motor, the parameters need to be adjusted to achieve the best results.

### 1. Internal acceleration and deceleration curve

Select whether to use the internal acceleration and deceleration curve according to the different output signal of the controller.

#### Using the internal acceleration curve:

When the motor acceleration is less than 60,000, the drive will enable the internal acceleration and deceleration curve, the specific acceleration size is the same as the set value.

Use occasion: If you use the internal acceleration curve, you will produce the phenomenon of lag pulse, and for some occasions that you do not need to follow in real-time, you can use the internal acceleration curve. Some controllers, the pulse is directly given to the frequency of the corresponding speed, without acceleration and deceleration, the use of internal acceleration and deceleration curve, can reduce the difficulty of controller programming.

#### Prohibit the internal acceleration curve:

When the motor acceleration is greater than or equal to 60,000, the drive the internal acceleration is invalid according to the acceleration and deceleration permit of the external pulse.

Use occasion: For example, in the engraving machine, the pulse output by the controller is added and slowed down, which does not need the acceleration curve inside the drive. If used at this time, it will lag behind the actual pulse.

### 2. Silk rod load

First, introduce the next torque, first use 400W motor, 1.3NM. The load is a 5mm screw, which is the motor shaft turning around for 5mm, so that the load and other power arm =  $5\text{mm} / 3.14 = 1.592\text{ mm}$

The thrust that the motor provides is the

$$\text{Thrust} = 1.3\text{NM} / (1.592\text{mm} * 0.001) = 816\text{ N}$$

The weight that pushes the load is about 80KG, which is vertical, and the flat push can be slightly larger.

Because the rod load motor moves around, the parameters of the drive (acceleration can be larger, such as 20000, position ring KP can be larger, such as 3000). The servo motor is best suitable for this load.

### 3. Belt wheel load

The servo motor is actually not really very suitable for this load. Because the belt pulley is generally relatively large in diameter, such as the diameter of 30mm. The motor turns around, and the load movement distance is  $30\text{mm} * \pi = 94.2$ , many times larger than the 5mm

said above. The thrust that the motor

provides is the

$$\text{Thrust passing through the belt drive} = 1.3\text{NM} / (30\text{mm} * 0.001) = 43.3\text{ N}$$

The weight that pushes the load is about 4.3KG. So the servo motor is actually not suitable for the synchronous wheel, because the synchronous wheel turns a circle of load movement distance is too long, the force arm is long. If this situation is to use a servo motor, you can choose directly as small as possible synchronous wheel or through the motor shaft small synchronous wheel, load terminal connected to the large synchronous wheel, so that slow down several times,

can achieve better results. Such occasion drive parameters (small acceleration setting, such as 5000,) are designed to reduce acceleration and deceleration because the load equivalent inertia is large.

## 4. Disk load

This load servo can not directly drive, generally need to connect the reducer. For example, a 200mm diameter and weight of 10KG disk. The radius is 100mm, and the weight equivalent radius is 50mm. Force arm is very big. If the server is going to take such a load, compare the reducer to the load.

If the disk is not particularly heavy, some positioning accuracy and rigidity can be sacrificed to control. Specific method, the motor acceleration is set to a relatively small size, such as about 1000.velocity KI

Set to 2000, cancel integral. Position KP to 1000. Change these parameters general disk load can be used.

## 5. Power default communication control

As long as the electronic gear molecule is set to 0, saved, re-powered, modbus can default to 1.

## Five, low power consumption and many laps of the absolute value description

### 1. characteristic:

- A. The all-in-one servo 485 / CAN communication version can add multiple loop function.
- B. When the motor has a power supply, there is an internal charging circuit to charge the battery. When the motor is powered off, the consumed battery current is only 0.07mA.
- C. After the motor has no power supply, the motor shaft is driven to rotate to wake up the encoder and continue to remember the position.
- D. Multi-Circle memory range-60,000 to 60,000 laps.
- E. Simple to set the origin, go to any position can be placed as the origin.
- F. A variety of ways back to zero: communication back to zero, power automatically back to zero, output zero point signal.
- G. Error protection: battery power loss alarm.

### 2. Multi-loop absolute value zero-point setting mode

When the battery is out of power or disconnected, the information is lost, and the red light is a short flash, indicating that the multiple circle position is lost. Or the motor is newly installed into the mechanical equipment, the need to set the zero point, can be set in the following way.(It can be set up through the software we provide, or send the CAN command directly)

1. Electronic gear molecule to send 60006
2. Electronic Gear molecule Send 60016

After setting the above steps, the electronic gear molecule will automatically return to the original saved value (32768 by default), and then the total number of PU steps (current position) becomes 0 (or + -single digits). This represents the correct setup. If there are no above results, they need to be reset. After setting the origin, the battery drop alarm will resume.

### 3. Instructions for multicircle absolute values

#### A. Communication control

Under the control of CAN communication, when the motor is powered on, the data of the current position is the position of the motor with multiple circles, so the power on needs to know the position and read the current position. An absolute position command then takes the motor to the desired position.

#### B. Power on automatically back to the origin

The setting method is as follows: special function send 6

Parameter save to send 1

(After the parameter is saved to send 1,2 is displayed, indicating a successful saving)

After the setting is completed, the next power supply opportunity will automatically go back to the origin. If it is automatically back to the origin, one needs to judge the automatic program to be in place. Or the power delay is long enough to make sure the origin is found.

The speed of finding the origin is set by each bit of the motor acceleration. Each bit of 0~9 represents finding the the origin speed of 100~1000RPM. For example, the acceleration is 10005, and the finding origin speed is 600RPM.

#### C. Output origin signal

The COM and ZO pins of the motor are the NPN output signals, and the two pins are highly blocked when the absolute position is higher than 0. At an absolute position less than 0,2 pins pass on. In this way, the PLC or single-chip computer can send a pulse to reverse the motor, to get the ZO signal and stop, and then slowly turn to the signal disappears, here is zero.

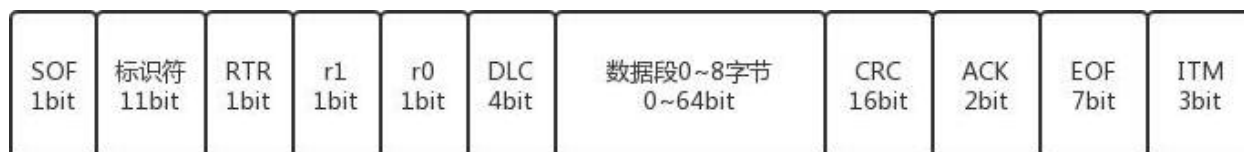
## VI. CANOPEN communication mode

### 5.01 Hardware connection

Plc or controller, CANL / CANH is connected to the motor. Note that there is no 120 ohm resistance inside the motor, and you need a 120 ohm resistance at the farthest distance from the controller.

### 5.02 The CAN communication format

The canopen communication protocol adopts the standard format of the data frame. Data frame format is shown in the following figure:



SOF: Frame interval.

Identifier: range 0~255, indicating the address of the target device. The host sends data to the slave, and the identifier is the slave address. Send data from the machine to the host machine, The identifier is the host address.

RTR: 0: Data Frame.(1: Remote frame).EasyCan uses only data frames.

r1:0: Standard identifier.(1: Extension identifier).EasyCan uses standard identifiers.

The r0: Receiving bit.

DLC: Data Length code.

Data segment: please refer to the following table for the specific agreement.

## 5.03 EDS file specification

The EDS (spreadsheet) file is the identification file or similar code that the PLC is connected to, by which to identify the type of the slave station (which is similar in 401,402,403, or which device in 402). The file contains all the information about the slave station, such as the manufacturer, serial number, software version, support for port rate type, mappable OD, and individual OD attributes, and other parameters, similar to the Profibus GSD file. Therefore, before making the hardware configuration, we first need to import the EDS files from the slave station into the upper bit configuration software.

## 5.04 List of objects

CANopen Address Description:

A complete CANopen address format: 60400010 (control word),

- 60400010 (highlighted): Index (16-bit address).
- 60400010 (Highlight): Subindex (8-seat address) form indicates register address,
- 60400010(Highlighted): digit 0x08 means that this register will store 1 Byte data length, and digit 0x10 means two data lengths  
Byte, digit 0x20 indicates the data stored as 4 Byte,
- R: readable, W: writable, S: servable, M: mappable,

Equipment information class parameter list:

name	Canopen address	read only / read-write	Parameter range	parameter declaration
device type	10000020	read only	0x20192	Parameter meaning: Servo drive, in accordance with the DS402 specification
Number of 0x1018 subindexes	10180010	read only	4	1018 The object has 4 sub-indexes
manufacturer ID	10180120	read only	0x331	Manufacturer ID (Vendor_ID) is 0X331
Product code	10180220	read only	0x1	The product code (Product_code) is 0x1
version number	10180320	read only	0x100	The version number (Version_number) is 0x100

serial number	10180420	read only	0x1	Serial number (serial_number) is 0x1
PDO synchronization ID	10050020	read only	0x80	PDO, the synchronization ID defaults to 0x80

List of heartbeat parameters:

name	Canopen address	read only / read-write	Parameter range	parameter declaration
Heartbeat generation interval time	10170010	RWM	0~65535	0: No heartbeat occurs 1~65535: Interval time, in milliseconds
Number of 0x1016 subindexes	10160008	R	1	Default: 1,1 subindex.
Consumption of the heartbeat interval time	10160120	RWM	See the following figure	

0x10160120

31~24	23~16	15~0bit
of no avail	0~7F (the address of the heartbeat generator) defaults to 7F	Range 0~65535 (0: Non-open heartbeat monitoring 1~65535: unit ms, this time If the heartbeat is not received in the range.) The default is 2000

List of control class parameters:

name	Canopen ground location	modbus address	read only / read-write	Parameter range	parameter declaration
The Modbus enables the	26000010	0x00	read-write	0~1	0: modbus prohibited 1: The modbus enables the
Drive output enables the	26010010	0x01	read-write	0~1	0: Drive output is prohibited 1: Drive output enables
The trapezoidal speed (Position Mode Speed)	60810020	0x02	read-write	0~3000 r/min	Maximum speed when in position mode (working mode 1)
Motor acceleration	60830020	0x04	read-write	0~65535 (r/min)/s	When the parameter is less than 60000, the acceleration and deceleration curve produces inside the drive, and the parameter is greater than At 60,000, no acceleration or deceleration pulse occurs inside the drive
Weak magnetic angle	26040010	0x06	read-write	0~306 r/min	Internal parameters do not require additional settings
Speed loop proportional coefficient	60F90110	0x07	read-write	0~10000	Represents 0.0~10.0 Larger values, more rigid Bbits are even: the pulse input polarity is valid at the break time Bbits are odd: the pulse input polarity is valid at conduction time
The elloop integral time	60F90210	0x08	read-write	2~2000 ms	Integration time of 2 ~ 2,000 ms The smaller the values, the stronger the rigidity
Position ring scale coefficient	60FB0110	0x09	read-write	60~30000	Position KP, the larger the value, the stronger the rigidity Even bits: alarm output constant open (normal normally open, alarm often closed) Oodd: alarm output is normally closed (normally normally closed, alarm normally open)
Speed feed forward	60FB0210	0x0a	read-write	0~12.0V/ KRPM	327 Represents 1V / KRPM and does not need to set it up by itself
DIR polarity	26090010	0x0b	read-write	0~1	0: The external DIR does not rotate clockwise 1: External DIR conduction turns clockwise
Electronic gear molecules	260A0010	0x0c	read-write	0~65535	A 16-bit electronic gear molecule If the electronic gear molecule is 0, special functions can be realized specifically according to the above introduction
Electronic gear denominator	260B0010	0x0d	read-write	1~65535	The 16-bit electronic gear denominator
Incremental position	260C0020	0x0e	read-write		Number of steps required (write to a direct update)
Alarm code	260E0010	0x10	read		

			only		
The actual current	60780010	0x11	RM	0~32767	Actual current is x / 2000 (A)
Actual speed of motor	606C0010	0x12	read only	-30000~30000 r/min	Actual motor speed = current motor speed / 10
system voltage	60790010	0x13	read only	0~32767	Actual voltage: x / 327 (V)
System temperature	26120010	0x14	read only	0~100	degree Celsius
The PWM being output by the system	26130010	0x15	read only	-32768~32767	Representative of -100%~100%
The parameter saves the flag	26140010	0x16	read-write	0~1	0: The parameter is not saved

					1: Save the parameters in the 2: Save it
device address	26150010	0x17	read-write	0~255	Device address (can communication needs to save saved after new address takes effect)
physical location	60640020 60630020	0x18	RM		Current and actual position of the motor
Still maximum allowable output	26180010	0x1a	read-write	0~609	0~609 Corresponding to the allowable maximum output of 0~60.9% bits 1~9 corresponding to the blocking turn alarm Between. Individual position 0 block turn no alarm
specific function	26190010	0x1b	read-write	0~100	0: Pulse + direction mode 2: Encoder following mode 3: Speed mode, duty cycle speed regulation (10%~90% corresponding to 0~1000RPM) 6. With the state of the battery, the power will automatically go back to multiple laps of zero points. 30~32768: The Angle of automatic power transfer to, the algorithm is: $X * 360^\circ / 32768$
Target location cache	607A0020	0x1c	read-write		The CANOPEN location cache. This parameter is used for the incremental position, absolute position, or solid Apply the update, and control by the control words.
Speed mode speed	60FF0020	0x1e	RWM	-3000~3000	Target speed in speed mode (Mode 3).
The Can communication sync control word	261C0010	0x20	read-write	0~65535	0: Turn off the synchronization mode. If greater than 0, synchronize the internal 2ms time reference and switch on the synchronization mode. At a value of 255, the synchronization is synchronized through the DIR signal, and the DIR requires entering a letter of high-and low-level switching once every 0.1ms Number.
maximum permissible current	261D0010	0x21	read-write	0~10009	Unit milliA, the corresponding maximum working allowable current is 0~10.009A bits 1~9, corresponding to the maximum current of 1~9 seconds that alarm shutdown When 10 bits is 0, the maximum current is reached to maintain the maximum current without alarm
Input port status	60FD0010	0x22	RM		
control word	60400010	0x23	RWM		See the table below for more details
status word	60410010	0x24	RM		See the table below for more details
work pattern	60600008	0x25	RWM		work pattern: 1: Location mode 3: Speed mode 6: Find the origin mode 7: CANopen-based motion interpolation
Return to origin method	60980008	0x26	RW	17~21	See 5.09 for origin mode

The control word (6040H) bit is defined as follows:

Position:	15:9	8	7	6	5	4	3	2	1	0
definition:	not have	cease	Fault reset	0: Absolute position 1: Phase position	Location takes effect immediately	Execute the new setting point	Allow operation	Allow a quick stop	Voltage output	firing

Bit0: External pulse control is invalid after setting 1.

Bit4: Every write to 1, run to the new location value. Auto-set 0 after executing the new position value; Bit8: When the value is

1, the motor stops sharply, but the motor is still self-locked.

The status word (6041H) is defined as follows:

Position:	7	6	5	4	3	2	1	0
definition:	not have	not have	Allow a quick stop	Voltage output	Servo alarm	Allow operation	firing	Ready to start
Position:	15	14	13	12	11	10	9	8
definition:	not have	not have	Find the origin error	Find the origin to complete	not have	Target to achieve	not have	not have

Bit10: In position mode, the target position is set to 1. In speed mode, set to 1 when a given speed is reached.

## 5.05 The SDO communication format

SDO is mainly used to transmit low priority objects between devices, which is usually used to configure and manage slave devices, such as modifying the PID parameters of current ring, speed ring, position ring, PDO configuration parameters, etc. This data transmission is the same as MODBUS, that is, after the main station needs to be sent to return the data response from the station. This communication mode is only suitable for setting parameters, but not for data transmission with high real-time requirements.

The SDO communication mode is divided into upload and download. The upper computer computer can read and write the OD inside the server according to the dedicated SDO read and write instructions. In the CANopen protocol, modifications to the contents of the object dictionary can be done through SDO (Service Data Object), as described below is SDO

The structure of the order and the guidelines being followed.

The basic format of the SDO

read command is as

follows: CS command

character:

Host Read Command Character: 0x40= Read.

From the machine reply read command character: 0x4F= Read reply one byte. 0x4B= Read the reply to two bytes. 0x43= Four bytes of read reply.

Host Send (Read data)									
Arbitration section	control section	data segment							
CAN, ID	DLC (Data segment length)	1	2	3	4	5	6	7	8

0x600 + device_ID	0x08	0x40	Object index	subindex	blank space
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From ver answer (read data)									
Arbitration section	control section	data segment							
CAN, ID	DLC (Data segment length)	1	2	3	4	5	6	7	8
0x600 + device_ID	0x08	CS designator	Object index	subindex	Return data				

The basic format of the SDO write command is as follows:

The Host Write Command Character: 0x2F= Write a byte. 0x2B= Write two bytes. 0x23= Write 4 bytes. From er reply write command: 0x60= Write successfully. 0x80= Error.

Host Send (write data)									
Arbitration section	control section	data segment							
CAN, ID	DLC (Data segment length)	1	2	3	4	5	6	7	8
0x600 + device_ID	0x08	CS designator	Object index	subindex	The written data				

From ver answer (write data)									
Arbitration section	control section	data segment							
CAN, ID	DLC (Data segment length)	1	2	3	4	5	6	7	8
0x600 + device_ID	0x08	CS designator	Object index	subindex	blank space				

## 5.06 SDO position mode

### 5.06.1 Absolute position mode SDO control procedure

home address	Variable name	Set the value	Message (ID=1)	remarks
60400010	control word	0xF	<u>601 2B 40 60 00 0F 00</u> <u>581 60 40 60 00</u>	Start-up + voltage output + allowed emergency stop + allowed operation The reply was written successfully
60600008	work pattern	0x1	<u>601 2F 60 60 00 01</u> <u>581 60 40 60 00</u>	Working mode is set to Location mode The reply was written successfully
60640020	Actual location (1)	fetch	<u>601 40 64 60 00</u> <u>581 43 64 60 00 C3 00 00 00</u>	Read the current location Reply to the current position of C3 (decimal 195)
60810020	The trapezoidal speed	1000	<u>601 23 81 60 00 E8 03 00 00</u> <u>581 60 81 60 00</u>	Ladder speed written to 1000RPM (omitted with default value) The reply was written successfully
60830020	The trapezoidal acceleration	20000	<u>601 23 83 60 00 20 4E 00 00</u> <u>581 60 83 60 00</u>	20000 R P M/S (omitted with default) The reply was written successfully
60400010	control word	0x2F	<u>601 2B 40 60 00 2F 00</u> <u>581 60 40 60 00</u>	Absolute position control mode + New position is executed immediately The reply was written successfully
607A0020	Location Cache (2)	50000pu	<u>601 23 7A 60 00 50 C3 00 00</u> <u>581 60 7A 60 00</u>	Position cache writes a 50000 pulse The reply was written successfully
60410010	status word	fetch	<u>601 40 41 60 00</u> <u>581 40 41 60 00 37 04</u>	Read the state word Status word 10BIT is 1, go to the target location

(1) Note: go to the absolute position mode, before execution, you need to read the current position, because the motor encoder is a single loop absolute value, just on the actual position is the single loop position of the encoder. If it is the absolute multi-loop value with the battery, the position of the multi-loop absolute value is read after charging

(2) Note: the new location immediately executed mode, cache write data, power opportunity immediately transferred to the target location.

### 5.06.2 Relative position mode SDO control process

home address	Variable name	Set the value	Message (ID=1)	remarks
60400010	control word	0xF	<u>601 2B 40 60 00 0F 00</u> <u>581 60 40 60 00</u>	Start-up + voltage output + allowed emergency stop + allowed operation The reply was written successfully
60600008	work pattern	0x1	<u>601 2F 60 60 00 01</u> <u>581 60 40 60 00</u>	Working mode is set to Location mode The reply was written successfully
607A0020	Location cache	50000pu	<u>601 23 7A 60 00 50 C3 00 00</u> <u>581 60 7A 60 00</u>	Position cache writes a 50000 pulse The reply was written successfully
60810020	The trapezoidal speed	1000	<u>601 23 81 60 00 E8 03 00 00</u> <u>581 60 81 60 00</u>	Ladder speed written to 1000RPM (omitted with default value) The reply was written successfully

60830020	The trapezoidal acceleration	20000	<u>601 23 83 60 00 20 4E 00 00</u> <u>581 60 83 60 00</u>	20000 R P M/S (omitted with default) The reply was written successfully
60400010	control word	0x4F	<u>601 2B 40 60 00 4F 00</u> <u>581 60 40 60 00</u>	Relative position control mode The reply was written successfully
60400010	control word	0x5F	<u>601 2B 40 60 00 5F 00</u> <u>581 60 40 60 00</u>	Go to the new location point The reply was written successfully
60410010	status word	fetch	<u>601 40 41 60 00</u> <u>581 40 41 60 00 37 04</u>	Read the state word Status word 10BIT is 1, go to the target location

Note: Only send a new position cache and then send 0x5F to the control word. At the target position, the status word 10BIT is 1.

## 5.07 The SDO speed mode

### 5.07.1 The Speed Mode SDO control process

home address	Variable name	Set the value	Message (ID=1)	remarks
60600008	work pattern	3	<u>601 2F 60 60 00 03</u> <u>581 60 40 60 00</u>	Working mode is set to Speed mode The reply was written successfully
60FF0020	Speed mode speed linear measure	1000	<u>601 23 FF 60 00 F4 01 00 00</u> <u>581 60 FF 60 00</u>	Set the running speed of 1000RPM / S The reply was written successfully
60400010	control word	0xF	<u>601 2B 40 60 00 0F 00</u> <u>581 60 40 60 00</u>	toggle speed The reply was written successfully
60410010	status word	fetch	<u>601 40 41 60 00</u> <u>581 4B 41 60 00 37 04</u>	Read the state word The status word 10BIT is 1 to reach the target speed
60400010	control word	0x10F	<u>601 2B 40 60 00 0F 01</u> <u>581 60 40 60 00</u>	cease The reply was written successfully
60410010	status word	fetch	<u>601 40 41 60 00</u> <u>581 4B 41 60 00 37 04</u>	Read the state word The status word 10BIT is 1 to reach the target speed

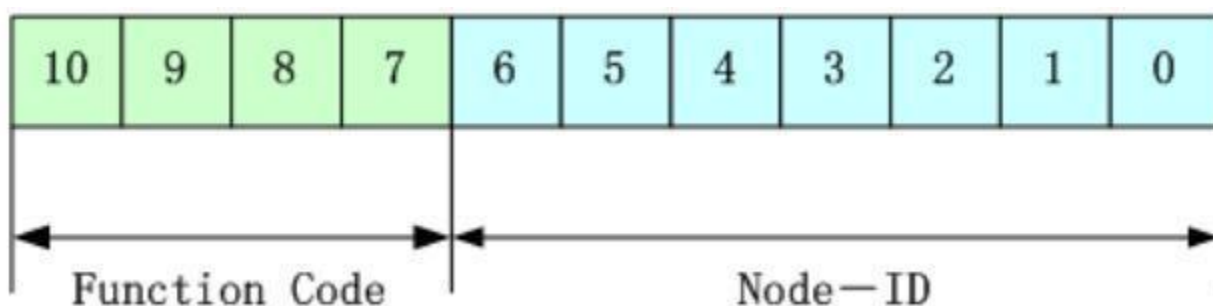
## 5.08 The PDO communication format

The PDO can transmit 8 bytes of data at a time, without other protocol presets (meaning that the data content is pre-defined), and is mainly used to transmit data that requires high frequency exchange. PDO transmission mode broke the existing data quiz transmission concept, adopt the new data exchange mode, the equipment both sides in the transmission before each equipment defined data receiving and sending area, directly send data exchange to the other data receiving area, reduce the quiz query time, thus greatly improve the efficiency of the bus communication, thus get the high bus utilization rate.

### 5.08.1 The PDO COB-ID description

The COB-ID is unique to the CANopen communication protocol, Its full name is the Communication Object Identifier-Communication Object-ID, These COB-ID's define the corresponding transport levels for the PDO, With these levels of transmission, The controller and the servo can define the same transmission level and the transmission content in their respective software configuration, After both the controller and the servo use the same transmission level and transmission content, The transmission of the data is made transparent, Both parties know the data content to be transmitted, Also does not need to transfer the data and also need the other party to reply whether the data is transmitted successfully.

The default ID allocation table is based on a 11-bit CAN-ID (as defined by CANopen 2.0B protocol COB-ID), containing a 4-bit function code section and a 7-bit node ID (Node-ID) section, as shown in the figure below.



**pay attention to:**

The Node-ID —— is the station number of the servo, and the Node-ID range is 1~127;

The function code of Function Code —— data transmission defines the transmission levels of various PDO, SDO and management messages. The smaller the function code, the higher the priority.

**CANopen predefined primary / slave connection set CAN identifier assignment table**

target	COB-ID
SYNC	080H
PDO1 (Send out)	181H-1FFH
PDO1 (received)	201H-27FH
PDO2 (Send out)	281H-2FFH
PDO2 (received)	301H-37FH
PDO3 (sent)	381H-3FFH
PDO3 (received)	401H-47FH
PDO4 (Send out)	481H-4FFH
PDO4 (received)	501H-57FH
SDO (Send / Server)	581H-5FFH
SDO (receive / customer)	601H-67FH
NMT (heartbeat production and heartbeat consumption)	701H-77FH

**5.08.2 RPDO, the configuration description**

RPDO1: receiving PDO relative to the servo refers to the servo received data, these data are sent by the PLC or the controller, the RPDO1 function code

(COB-ID) is: 0x200 + servo station number

Note: The address of the servo motor is automatically set to the station number of the RPDO. The factory default is all 1.

RPDO1 (COB-ID: 0x200 + server station number) Default configuration table (CSP control word working mode destination location):

Host-> Motor (RPDO1)									
Arbitration section	control section	data segment							
CAN, ID	DLC (Data segment length)	1	2	3	4	5	6	7	8
0x200 + device_ID	0x07	Control word (6040)		Working mode (6060)		Target Location Cache (607A)			

RPDO1 index of matrix (Index)	subindex (sub-index)	description (Description)	data type	Parameter range	parameter declaration
1600	00	RPDO1, the number of mapped groups	Unsigned8	3	Default: 3, which cannot be changed.
	01	RPDO1 mapping 1	Unsigned32	60400010	Map to the control word by

					default
	02	RPDO1 Mapping 2	Unsigned32	60600008	Maps to working mode by default
	03	RPDO1 mapping of 3	Unsigned32	607A0020	Map to the destination location cache by default
1400	01	COB-ID: Send / receive the frame ID of this PDO	Unsigned32	0x200+ (0~127)	Actual COB-ID is 0x200 + for this parameter. Set the device address will be through the SDO Also set this value.
	02	Transfer type	Unsigned8	255	255 (Aynchronous mode): Server received Updated immediately later.
	03	Inhibit time Production Ban Restraint time (1 / 10ms)	Unsigned16	1	Default is 1

RPDO2 (COB-ID: 0x300 + servo station number) Default configuration table (PV target position ladder speed):

Host-> Motor (RPDO2)

Arbitration section	control section	data segment							
CAN, ID	DLC (Data segment length)	1	2	3	4	5	6	7	8
0x300 + device_ID	0x08	Target Location Cache (607A)				Ladder Speed (6081)			

RPDO2 index of matrix (Index)	subindex (sub-index)	description (Description)	data type	Parameter range	parameter declaration
1601	00	RPDO2, the number of mapping groups	Unsigned8	2	Default: 2, it cannot be changed.
	01	RPDO2 mapping 1	Unsigned32	607A0020	Map to the destination location cache by default
	02	RPDO2 Mapping 2	Unsigned32	60810020	Default mapping to the ladder speed
1401	01	COB-ID: Send / receive the frame ID of this PDO	Unsigned32	0x300+ (0~127)	The actual COB-ID is 0x300 + for this parameter. Set the device address will be through the SDO Also set this value.
	02	Transfer type	Unsigned8	255	255 (Aynchronous mode): Server received Updated immediately later.
	03	Inhibit time Production Ban Restraint time (1 /	Unsigned16	1	Default is 1

		10ms)			
--	--	-------	--	--	--

RPDO3 (COB-ID: 0x400 + servo station number) Default configuration Table (CSV control word mode target speed):

Host-> Motor (RPDO3)

Arbitration section	control section	data segment							
		CAN, ID	DLC (Data segment length)	1	2	3	4	5	6
0x400 + device_ID	0x07	Control word (6040)	Working mode (6060)		Speed Mode Speed (60FF)				

RPDO3 index of matrix (Index)	subindex (sub-index)	description (Description)	data type	Parameter range	parameter declaration
1602	00	RPDO3, the number of mapping groups	Unsigned8	3	Default: 3, which cannot be changed.
	01	RPDO3 mapping of 1	Unsigned32	60400010	Map to the control word by default
	02	RPDO3 Mapping 2	Unsigned32	60600008	Maps to working mode by default
	03	RPDO3 mapping of 3	Unsigned32	60FF0020	Default mapping to speed mode speed
1402	01	COB-ID: Send / receive the frame ID of this PDO	Unsigned32	0x400+ (0~127)	Actual COB-ID is 0x400 + for this parameter. Set the device address will be through the SDO Also set this value.
	02	Transfer type	Unsigned8	255	255 (Aynchronous mode): Server received Updated immediately later.
	03	Inhibit time Production Ban Restraint time (1 / 10ms)	Unsigned16	1	Default is 1

RPDO4 (COB-ID: 0x500 + server station number) Default configuration table (P destination location):

Host engine-> Motor  
(RPDO4)

Arbitration section	control section	data segment							
		CAN, ID	DLC (Data segment length)	1	2	3	4	5	6
0x500 + device_ID	0x4	Target Location Cache (607A)							

RPDO4 index of matrix (Index)	subindex (sub-index)	description (Description)	data type	Parameter range	parameter declaration
1603	00	RPDO4, the number of mapped groups	Unsigned8	1	Default: 1, it cannot be changed.
	01	RPDO4 mapping of 1	Unsigned32	607A0020	Map to the destination location cache by default
1403	01	COB-ID: Send / receive the frame ID of this PDO	Unsigned32	0x500+ (0~127)	Actual COB-ID is 0x500 + for this parameter. Set the device address will be through the SDO Also set this value.
	02	Transfer type	Unsigned8	1	1 (Synchronization mode): 1 SYNC was received Do the data update after the signal.
	03	Inhibit time Production Ban Restraint time (1 / 10ms)	Unsigned16	1	Default is 1

### 5.08.3 TPDO, the configuration description

TPDO1: sending PDO relative to the servo refers to the servo sent data, these data are sent by the servo motor, the TPDO1 function code

(COB-ID) is: 0x180 + servo station number

Note: The address of the servo motor is automatically set to the station number of the TPDO. The factory default is all 1.

TPDO1 (COB-ID: 0x180 + server station number) Default configuration table (actual location + status word):

Motor-> Main engine (TPDO1)									
Arbitration section	control section	data segment							
CAN, ID	DLC (Data segment length)	1	2	3	4	5	6	7	8
0x180 + device_ID	0x6	Actual location (6064)				Status Word (6041)			

TPDO1 index of matrix (Index)	subindex (sub-index)	description (Description)	data type	Parameter range	parameter declaration
1A00	00	TPDO1, the number of	Unsigned8	2	Default: 2, it cannot be

		mapping groups			changed.
	01	TPDO1 mapping 1	Unsigned32	60640020	Map mapping to actual location
	02	TPDO1 Mapping 2	Unsigned32	60410010	Map to the status word by default
1800	01	COB-ID: Send / receive the frame ID of this PDO	Unsigned32	0x180+ (0~127)	The actual COB-ID is 0x180 + for this parameter. Set the device address will be through the SDO Also set this value.
	02	Transfer type	Unsigned8	255	255 (Asynchronous Prochronous Mode): Servo received Reply to TPDO1 immediately after the RPDO1 data
	03	Inhibit time Production Ban Restraint time (1 / 10ms)	Unsigned16	3	Default is 1

TPDO2 (COB-ID: 0x280 + server station number) Default configuration table (actual location + status word):

Motor-> Main engine  
(TPDO2)

Arbitration section	control section	data segment							
CAN, ID	DLC (Data segment length)	1	2	3	4	5	6	7	8
0x280 + device_ID	0x6	Actual location (6064)				Status Word (6041)			

TPDO2 index of matrix (Index)	subindex (sub-index)	description (Description)	data type	Parameter range	parameter declaration
1A01	00	TPDO2, the number of mapping groups	Unsigned8	2	Default: 2, it cannot be changed.
	01	TPDO2 mapping 1	Unsigned32	60640020	Map mapping to actual location
	02	TPDO2 Mapping 2	Unsigned32	60410010	Map to the status word by default
1801	01	COB-ID: Send / receive the frame ID of this PDO	Unsigned32	0x280+ (0~127)	The actual COB-ID is 0x280 + for this parameter. Set the device address will be through the SDO Also set this value.
	02	Transfer type	Unsigned8	255	255 (Asynchronous Prochronous Mode): Servo received

					Reply to TPDO2 immediately after the RPDO2 data
	03	Inhibit time Production Ban Restraint time (1 / 10ms)	Unsigned16	3	Default is 1

TPDO3 (COB-ID: 0x380 + server station number) Default configuration table (current speed + status word):

Motor-> Main engine (TPDO3)									
Arbitration section	control section	data segment							
CAN, ID	DLC (Data segment length)	1	2	3	4	5	6	7	8
0x380 + device_ID	0x6	Actual location (6064)				Status Word (6041)			

TPDO2 index of matrix (Index)	subindex (sub-index)	description (Description)	data type	Parameter range	parameter declaration
1A02	00	TPDO2, the number of mapping groups	Unsigned8	2	Default: 2, it cannot be changed.
	01	TPDO2 mapping 1	Unsigned32	60640020	Map mapping to actual location
	02	TPDO2 Mapping 2	Unsigned32	60410010	Map to the status word by default
1802	01	COB-ID: Send / receive the frame ID of this PDO	Unsigned32	0x380+ (0~127)	The actual COB-ID is 0x380 + for this parameter. Set the device address will be through the SDO Also set this value.
	02	Transfer type	Unsigned8	255	255 (Asynchronous Prochronous Mode): Servo received Reply to TPDO3 immediately after the RPDO3 data
	03	Inhibit time Production Ban Restraint time (1 / 10ms)	Unsigned16	3	Default is 1

TPDO4 (COB-ID: 0x480 + server station number) Default configuration table (actual location + status word):

Motor-> Main engine (TPDO4)									
Arbitration section	control section	data segment							
CAN, ID	DLC (Data segment length)	1	2	3	4	5	6	7	8
0x480 + device_ID	0x6	Actual location (6064)				Status Word (6041)			

TPDO4 index of matrix (Index)	subindex (sub-index)	description (Description)	data type	Parameter range	parameter declaration
1A03	00	TPDO4, the number of mapping groups	Unsigned8	2	Default: 2, it cannot be changed.
	01	TPDO4 mapping 1	Unsigned32	60640020	Map mapping to actual location
	02	TPDO4 Mapping 2	Unsigned32	60410010	Map to the status word by default
1803	01	COB-ID: Send / receive the frame ID of this PDO	Unsigned32	0x480+ (0~127)	Actual COB-ID is 0x480 + for this parameter. Set the device address will be through the SDO Also set this value.
	02	Transfer type	Unsigned8	255	255 (Asynchronous Prochronous Mode): Servo received Reply to TPDO4 immediately after the RPDO4 data
	03	Inhibit time Production Ban Restraint time (1 / 10ms)	Unsigned16	3	Default is 1

#### 5.08.4 SYNC, the synchronous signal

The SYNC synchronization signal is used for the RPDO4 position cache synchronization execution. After the position motor of the RPDO4 is received, the motor will not execute. The host engine can send the position cache of multiple addresses respectively, and start the operation simultaneously through the SYNC signal after sending it.

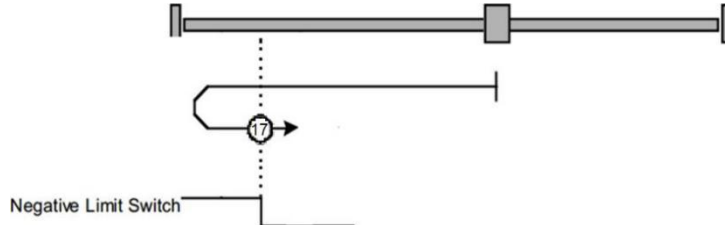
The SYNC signal format is as follows:

Host engine-> Motor (SYNC)									
Arbitration section	control section	data segment							
CAN, ID	DLC (Data segment length)	1	2	3	4	5	6	7	8

## 5.09 Find the origin mode

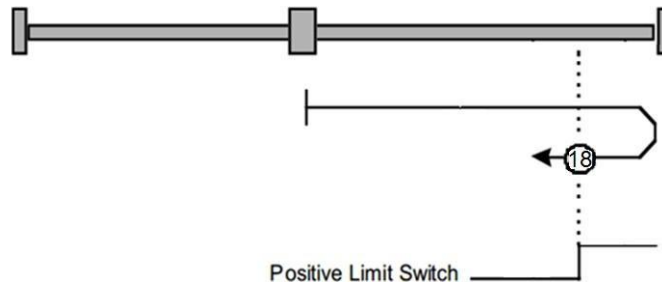
Various zero returns are defined by CANopen DS402 standard protocol, and zero returns 17 to 22 is currently supported. The specific motion tracks of various back to zero modes are as follows:

17: The negative limit is connected to the motor DIR port, and the high level in the figure below indicates the 5V voltage



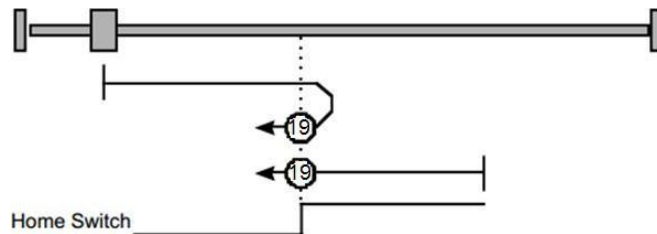
difference between DIR + and DIR-.

18: The positive limit is connected to the motor PU port. What the high level in the figure below indicates is the 5V voltage

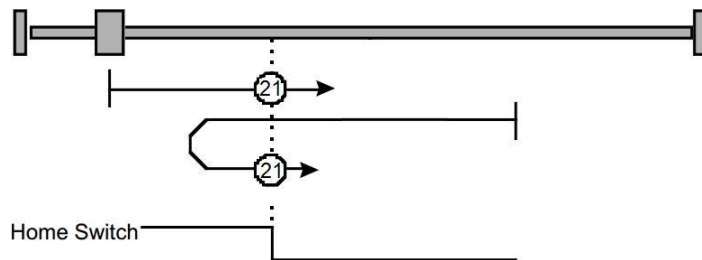


difference between PU + and PU-.

19: The origin switch is connected to the DIR port of the motor. The high level in the figure below indicates the 5V voltage difference between DIR + and DIR-.



21: The origin switch is connected to the DIR port of the motor. The high level in the figure below indicates the 5V



voltage difference between DIR + and DIR-.

Controls the origin-finding process:

control object	Variable name	Set the value	Message (ID=1)	remarks
----------------	---------------	---------------	----------------	---------

60980008	Return to origin method	0x11 (decimal 17)	<u>601 2F 98 60 00 11</u> <u>581 60 98 60 00</u>	The origin-finding method set is 17 The reply was written successfully
60600008	work pattern	0x6	<u>601 2F 60 60 00 06</u> <u>581 60 60 60 00</u>	Working mode is set to find the origin mode The reply was written successfully
60410010	status word	fetch	<u>601 40 41 60 00</u> <u>581 40 41 60 00 14 00</u>	Read the state word The status word 12BIT is 0, and the origin process is still in finding
60410010	status word	fetch	<u>601 40 41 60 00</u> <u>581 40 41 60 00 14 14</u>	Read the state word Status word 12BIT is 1, find the origin to complete

## 5.10 PDO position mode

### 5.10.1 Absolute location mode

Absolute position mode, using RPDO1, RPDO2 with TPDO1, TPDO2. The control process is as follows:

control object	Variable name	Set the value	Message (ID=1)	remarks
Find the origin				Refer to 5.09 for the origin process. This step is omitted if using a multiple-loop absolute value
RPDO2	Target location + trapezoidal speed	50000+1000	<u>301 5C C3 00 00 E8 03 00 00</u>	(Target location 50000) + trapezoid speed 1000
TPDO2	Current Position + Status word	reverting value	<u>281 17 4300 00 04 04</u>	Current position 0x4316 (17175 decimal) + status word 0x404 Note: This command is intended for obtaining the current location. 1. If the motor is an absolute single coil value, the current position range is 0~32768. 2. The number of laps can be recorded if the absolute value of multiple laps with the battery.reply The data can be located for multiple laps. 3. If the process of finding the origin of the limit switch passes, the response value is 0 A number of the left and right.
RPDO1	Control word + working mode + target location	0x2F+0x1+50000	<u>201 2F 00 01 50 C3 00 00</u>	(Absolute position + immediate execution) + Position mode + Target position 50,000
TPDO1	Current Position + Status word	reverting value	<u>181 55 4300 00 37 00</u>	Current position 0x4355 + status word 0x037 Note: The current position does not reach the given 0xc350 status word 10bit Is 0, no target position is reached.
RPDO2	Target location + trapezoidal speed	50000+1000	<u>301 5C C3 00 00 E8 03 00 00</u>	(Target location 50000) + trapezoid speed 1000
TPDO2	Current Position + Status word	reverting value	<u>281 5C c3 00 00 37 04</u>	Current position 0x50c3 (50000 decimal) + status word 0x437 Note: To reach the given position of 0xc350, the status word 10bit is 1, up to

				To the target location.
RPDO2	Target location + trapezoidal speed	10000+1000	<u>301 1C 27 00 00 E8 03 00 00</u>	(Target location 10000) + trapezoid speed 1000
TPDO2	Current Position + Status word	reverting value	<u>281 5C C300 00 37 00</u>	Current position 0x50c3 (50000 decimal) + status word 0x037 Note: New target position 10000 is not reached, status word 10bit is 0, You can continue by issuing the same command,
RPDO2	Target location + trapezoidal speed	10000+1000	<u>301 1C 27 00 00 E8 03 00 00</u>	(Target location 10000) + trapezoid speed 1000
TPDO2	Current Position + Status word	reverting value	<u>281 1C 27 00 00 37 04</u>	Current position 0x2710 (10000 decimal) + status word 0x437 Note: The new target location 10000 arrives, the status word 10bit is 1, but can To start issuing a new location command

### 5.10.2 Speed mode

Speed mode, using RPDO3 together with TPDO3. The control process is as follows:

control object	Variable name	Set the value	Message (ID=1)	remarks
RPDO3	Control word + working mode + target speed	0xF+0x3+600	<u>401 0F 00 03 58 02 00 00</u>	Motor enabling + speed mode + target speed 600
TPDO3	Current Position + Status word	reverting value	<u>381 AF 03 00 00 37 00</u>	Current position:: 943 + status word: 0x037
RPDO3	Control word + working mode + target speed	0xF+0x3+-600	<u>401 0F 00 03 A8 FD FF FF</u>	Motor enable + speed mode + target speed-600
TPDO3	Current Position + Status word	reverting value	<u>381 AF 7C 42 00 37 00</u>	Current position 4357295 + Status word 0x37

If you need to read the current speed, use the SDO read.

### 5.10.3 Location interpolation mode

In the position insertion mode, first set the motor to be controlled to different addresses in advance, for example, first set it to the address 1,2,3. And then send it directly to the RPDO4 of the motor, and send 3 motors respectively. At this time, the position motor is only temporarily stored, and will not work. After the controller sends a SYNC synchronization signal, the motor works simultaneously. The appeal process needs to be completed within 2ms. An interpolation cycle was completed every 2ms.

control object	Variable name	Set the value	Message (ID=1)	remarks
Address: 1, R P D O: 4	target location	50000	<u>501 50 C3 00 00</u>	Target location 50000 Address 1 motor
Address: 1 TPDO4	Current Position + Status word	reverting value	<u>481 78 0D 00 00 37 04</u>	Current position 0xD78 (3448 decimal) + status word 0x437 Note: This command is intended for obtaining the current position. The motor does not perform the same thing 1. If the motor is a single coil absolute value, the current position range is 0 to 32768.

				2. Record the absolute value of multiple laps with a battery.reply The data can be located for multiple laps.
Address # # 2, R P D O # # 4	target location Current Position + Status word	50000 reverting value	<u>501 50 C3 00 00</u> <u>481 4D 18 00 00 37 04</u>	Target Location 50000 Address 2 motor Current position 0x4D18 (6221 decimal system) + status word 0x437
Address: 3, R P D O: 4 Address: 3 TPDO4	target location Current Position + Status word	50000 reverting value	<u>501 50 C3 00 00</u> <u>481 68 29 00 00 37 04</u>	Target Location 50000 Address 3 motor Current position 0x2968 (10600 decimal) + status word 0x437
SYNC	synch	not have	<u>80</u>	Three motors are performed simultaneously.

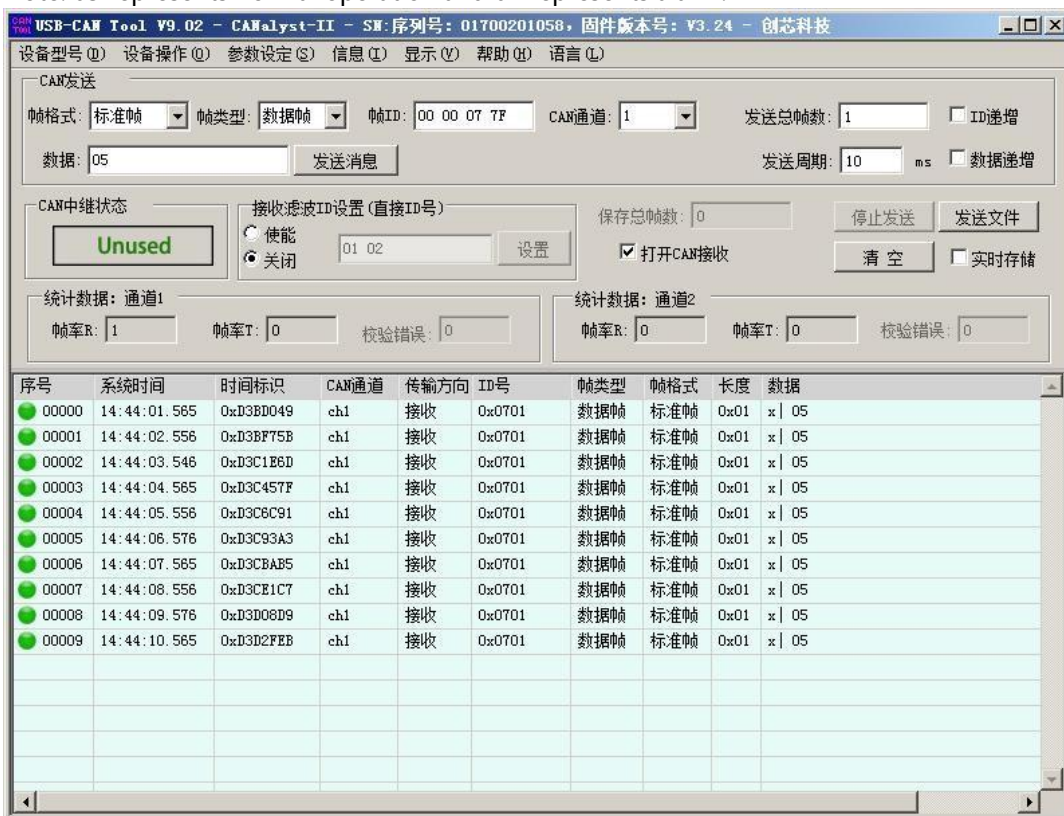
Note: The above procedure is performed every 2ms to complete the interpolation.

## 5.11 Heartbeat production and consumption

### 5.11.1 Heartbeat production

The object that controls heartbeat generation is the heartbeat generation interval (index 0x1017 subindex 0) in milliseconds. The default is 1000ms. Generates a heartbeat packet every second. Plug in the motor and receive a heartbeat packet every second when the communication is normal.as illustrated in following figure:

Note: 05 represents normal operation and 04 represents alarm.

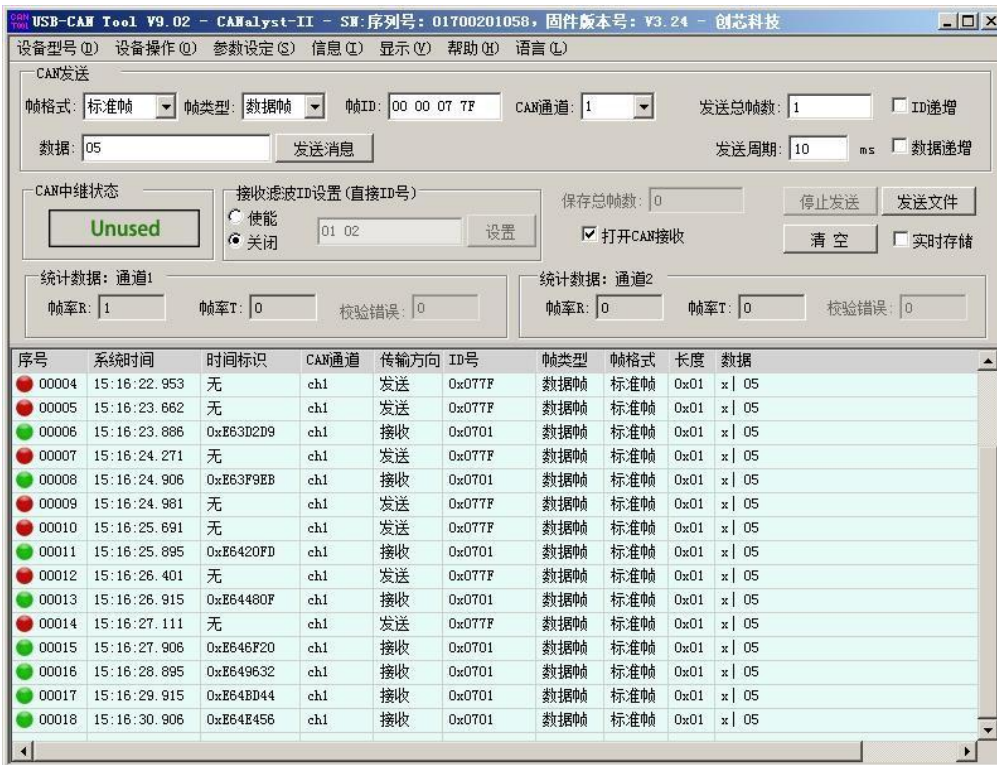


### 5.11.2 Heartbeat consumption

Heartbeat consumption is used to automatically stop after falling off the machine. The objects that control the heartbeat consumption are shown below:

0x10160120		
31~24	23~16	15~0bit
of no avail	0~7F (the address of the heartbeat generator) defaults to 7F	Range 0~65535 (0: Non-open heartbeat monitoring 1~65535: unit ms, this time If the heartbeat is not received in the range.) The default is 2000

The default parameter is 0X7F07D0, and a can instruction must be received every 2 seconds, otherwise the motor alarm shutdown. The motor must be tested after the first day heartbeat packet. If the heartbeat packet is received again



after dropping, the power is resumes.

### 5.12 NMT instruct

Host engine-> Motor (NMT)			
Arbitration section	control section	data segment	
CAN, ID	DLC (Data segment length)	1	2
0x000	0x2	CS	Node-ID

The NMT node status switching command of all CANID is 0x000, with the highest CAN priority, and the data is 2 bytes: the first byte represents the command type:

- 0x01: Start the command (to get the node into the operation state).SDO, PDO, heartbeat is valid (heartbeat sends 0x5).

0x02: Stop command (bring node to stop state).SDO, PDO, no good heartbeat.The NMT instruction is valid.

0x80: Pre-operation command.PDO of no avail.The SDO is valid, and the heartbeat is valid (the heartbeat sends 0x7F).

0x81: Reset the node application layer. Motor parameters recover the saved value. A heartbeat of 0, and another 0x7F.

0x82: Reset the node communication. Re-initialize the CAN device. A heartbeat of 0, and another 0x7F. The second byte represents the node-ID of the controlled node:

0x0: Actions on all the nodes on the network.

0x1~0x7f: Perform the NMT command for the node-ID level of 0x01~0x7F.



## 5.13 Modify the Porter rate

Modimodified Porter rate can be sent via the upper computer software we provide or using other USBCAN s. Send it as follows:

- A. Modbus enable (canopen address 26000010) transmit by radio 1
- B. Motor Acceleration (canopen address 60830020) transmit by radio 803 (Note 803:1M 802:500K 801:250K 800:125K )
- C. Weak magnetic Angle (canopen address 26040010) transmit by radio 129
- D. Modbus enable (canopen address 26000010) transmit by radio 506

Effective after re-charging

Note: No need to save the issue parameter, because this is the internal parameter. Just need to send strictly follow the above steps.