ZLAC8030L V2.0 SERVO DRIVER

CANOPEN COMMUNICATION QUICK START GUIDE

Version	Description	Date
V1.00	First edition	2023/9/11

CATALOG

一、OUTLINE

This manual only gives a brief introduction to the most commonly used related concepts and precautions in the use of ZLAC8030L, so that users can understand the normal use of ZLAC8030L series products in the shortest time.

Communication Standard followed by ZLAC8030L

● CAN 2.0A Standard
● CANopen Standard protocol DS 301 V4.02
● CANopen Standard protocol DS 402 V2.01

Services supported by ZLAC8030L

● Support SDO service
● Support PDO service: each slave station can be configured with up to 4 TxPDOs and 4 RxPDOs
● Support NMT Slave service
● Device monitor: support heartbeat message

二、WIRING CONNECTION

2.1 Basic Wiring Diagram

Note: Motor power cable sequence is U (Yellow), V (Green), W (Blue).
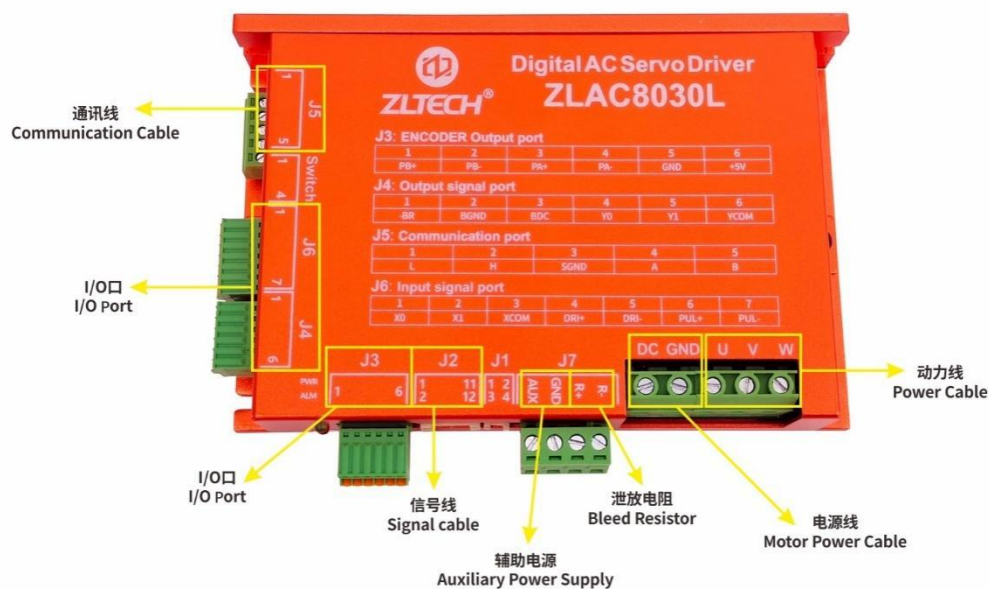
2.2 CANOPEN Port

Note: There is only one set of CAN interface, if the user needs to connect multiple drives, please connect in parallel to CANL (pin1), CANH (pin2) and SGND (pin3), this drive communication is with isolation, the user needs to connect the ground signal SGND

Port	Pin	Symbol	Name	Function
	1	CANL	CAN	CAN/RS485 is an isolated output and is recommended when used while connecting to a common ground
	2	CANH		
	3	SGND	Communication common ground	
	4	A	RS485	
	5	B		

三、PROTOCOL FORMAT

3.1 Communication Setting

Baud rate: 500K, ID: 4 (default)

3.2 CANOPEN Basic Format

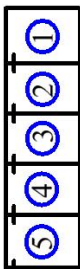Note: ZLAC8030L will send a 700+ID NMT message when it is powered on. Receiving this message indicates successful communication. If this message is not received, please check the wiring connection and baud rate to ensure consistency, or power on again.

No.	Transfer Direction	Time	Status	Name	Frame ID	Format	Type	DLC	Data
0	Receive	15:05:36.526			0x00000704	Data Frame	Standard Frame	0x01	00

3.3 SDO Basic Format

COB-ID	Byte0	Byte1:2	Byte3	Byte4:7
Frame ID	SDO Command Word	Object Index	Object Sub-Index	Data

COB-ID	Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
Master → Slave (Driver)								
0x604	23	FF	60	00	64	00	00	00
Slave (Driver) → Master								
0x584	60	FF	60	00	00	00	00	00

3.3.1 COB-ID Format

Send frame ID: 0x600 + Node address
Return frame ID: 0x580 + Node address

3.3.2 Command word

Command	Function	Type	Data Length
2F	Set	M->S Request	1 Byte
2B	Set	M->S Request	2 Byte
23	Set	M->S Request	4 Byte
60	Set Feedback	S->M Confirm	
40	Read	M->S Request	0 Byte
80	Read Fault	S->M Answer	4 Byte

3.3.3 Index and Data Form

23   FF 60   00   64 00 00 00

INDEX   DATA

Eg: The target speed index FF 60, so the actual value is: 60 FF. The left and right target speed data in the same format as the index.

※Byte Order: Little Endian (Low bit in front, high bit in back).

3.4 Heartbeat Message

Setting instruction:

Frame ID: 604

Data: 2B 17 10 00 E8 03 00 00 (time is 1000ms)

Heartbeat message format is shown as follows:

Heartbeat Producer → Consumer	
COB-ID	**Byte 0**
0x700+Node-ID	Status

The status description is shown as follows:

Status	Description
0x00	Boot-up
0x04	Stop Status
0x05	Operation Status
0x7F	Pre-operation Status

※Note: ZLAC8030L is producer of heartbeat message.

四、 CONTROL MODE

4.1 PROFILE VELOCITY MODE

Master Station (COB-ID:0x604)	Slave Station (COB-ID:0x584)	Function Description
2F 60 60 00 03 00 00 00	60 60 60 00 00 00 00 00	Set velocity mode
2B 40 60 00 06 00 00 00	60 40 60 00 00 00 00 00	Enable
2B 40 60 00 07 00 00 00	60 40 60 00 00 00 00 00	
2B 40 60 00 0F 00 00 00	60 40 60 00 00 00 00 00	
23 FF 60 00 64 00 00 00	60 FF 60 00 00 00 00 00	Set target speed 100rpm
23 FF 60 00 9C FF FF FF	60 FF 60 00 00 00 00 00	Set target speed -100rpm
23 FF 60 00 32 00 00 00	60 FF 60 00 00 00 00 00	Set target speed 50rpm
23 FF 60 00 CE FF FF FF	60 FF 60 00 00 00 00 00	Set target speed -50rpm

4.2 PROFILE RELATIVE POSITION MODE

Master Station (COB-ID:0x604)	Slave Station (COB-ID:0x584)	Function Description
2F 60 60 00 01 00 00 00	60 60 60 00 00 00 00 00	Set position mode
23 81 60 00 3C 00 00 00	60 81 60 01 00 00 00 00	Set max speed 60RPM
2B 40 60 00 06 00 00 00	60 40 60 00 00 00 00 00	Enable
2B 40 60 00 07 00 00 00	60 40 60 00 00 00 00 00	
2B 40 60 00 0F 00 00 00	60 40 60 00 00 00 00 00	
23 7A 60 00 00 7D 00 00	60 7A 60 00 00 00 00 00	Set target positon 32000
2B 40 60 00 4F 00 00 00	60 40 60 00 00 00 00 00	Start relative motion
2B 40 60 00 5F 00 00 00	60 40 60 00 00 00 00 00	
23 7A 60 00 00 83 FF FF	60 7A 60 00 00 00 00 00	Set target positon -32000
2B 40 60 00 4F 00 00 00	60 40 60 00 00 00 00 00	Start relative motion
2B 40 60 00 5F 00 00 00	60 40 60 00 00 00 00 00	

4.3 PROFILE ABSOLUTE POSITION MODE

Master Station (COB-ID:0x604)	Slave Station (COB-ID:0x584)	Function Description
2F 60 60 00 01 00 00 00	60 60 60 00 00 00 00 00	Set position mode
23 81 60 00 3C 00 00 00	60 81 60 01 00 00 00 00	Set max speed 60r/min
2B 40 60 00 06 00 00 00	60 40 60 00 00 00 00 00	Enable
2B 40 60 00 07 00 00 00	60 40 60 00 00 00 00 00	
2B 40 60 00 0F 00 00 00	60 40 60 00 00 00 00 00	
23 7A 60 00 00 7D 00 00	60 7A 60 00 00 00 00 00	Set target positon 32000
2B 40 60 00 0F 00 00 00	60 40 60 00 00 00 00 00	Start absolute motion
2B 40 60 00 1F 00 00 00	60 40 60 00 00 00 00 00	
23 7A 60 00 00 83 FF FF	60 7A 60 00 00 00 00 00	Set target positon -32000
2B 40 60 00 0F 00 00 00	60 40 60 00 00 00 00 00	Start absolute motion
2B 40 60 00 1F 00 00 00	60 40 60 00 00 00 00 00	

4.4 PROFILE TORQUE MODE

Master Station (COB-ID:0x604)	Slave Station (COB-ID:0x584)	Function Description
2F 60 60 00 04 00 00 00	60 60 60 00 00 00 00 00	Set torque mode
2B 40 60 00 06 00 00 00	60 40 60 00 00 00 00 00	Enable
2B 40 60 00 07 00 00 00	60 40 60 00 00 00 00 00	
2B 40 60 00 0F 00 00 00	60 40 60 00 00 00 00 00	
2B 71 60 00 E8 03 00 00	60 71 60 00 00 00 00 00	Set target torque 1000mA/s
2B 71 60 00 18 FC FF FF	60 71 60 00 00 00 00 00	Set target torque -1000mA/s

4.5 GENERAL COMMAND

Master Station (COB-ID:0x604)	Function Description
2B 40 60 00 00 00 00 00	Stop
2B 40 60 00 80 00 00 00	Clear Fault
40 64 60 00 00 00 00 00	Read motor encoder
40 6C 60 00 00 00 00 00	Read motor speed (Unit: 0.1RPM)
40 71 60 00 00 00 00 00	Read motor current (Unit: 0.1A)
40 3F 60 00 00 00 00 00	Read fault code
40 25 20 00 00 00 00 00	Read software version
40 26 20 01 00 00 00 00	Read motor temperature (Unit: 1℃)

4.6 EMERGENCY STOP COMMAND

Master Station (COB-ID:0x604)	Slave Station (COB-ID:0x584)	Function Description
2B 40 60 00 02 00 00 00	60 40 60 00 00 00 00 00	Mtor stops and keep enabled status
2B 40 60 00 0F 00 00 00	60 40 60 00 00 00 00 00	Motor Enable (Release Emergency Stop)

※ Attention: After sending emergency stop command, user needs to send enable command to release the emergency stop status.

五、 FUNCTION SETTING

5.1 Alarm PWM Processing Method

Open Command: Frame ID: 604   Data: 2B 2F 20 01 01 00 00 00
Close Command: Frame ID: 604   Data: 2B 2F 20 01 00 00 00 00
Save Instruction: Frame ID: 604   Data: 2B 09 20 00 02 00 00 00
Trigger Mechanism: When enabling this function,   driver will enter an alarm and short-circuit the motor's power UVW (after the motor power cable UVW short-circuit, it will generate resistance

during motor's rotation)

Function: To prevent the robot from sliding instantly after motor alarms

5.2 Parking Mode

Open Command: Frame ID: 604   Data: 2B 2F 20 04 01 00 00 00

Close Command: Frame ID: 604   Data: 2B 2F 20 04 00 00 00 00

Trigger Mechanism: When enabling this function, the motor output current will not exceed 3A

Function: When the robot is charging or standby, enter this function to prevent the motor from over temperature problem

5.3 Speed Resolution

Setting Instruction: Frame ID: 604   Data: 2B 2F 20 05 0A 00 00 00 (setting range: 0-10) 10 is hexadecimal A

Save Instruction: Frame ID: 604   Data: 2B 09 20 00 02 00 00 00

Rule: Set to A, output speed unit: 1/10=0.1 RPM. Eg: target speed is 100 RPM, and the actual output is 10 RPM

Set to 5, output speed units: 1/5=0.2 RPM. Eg: target speed is 100 RPM, and the actual output is 20 RPM
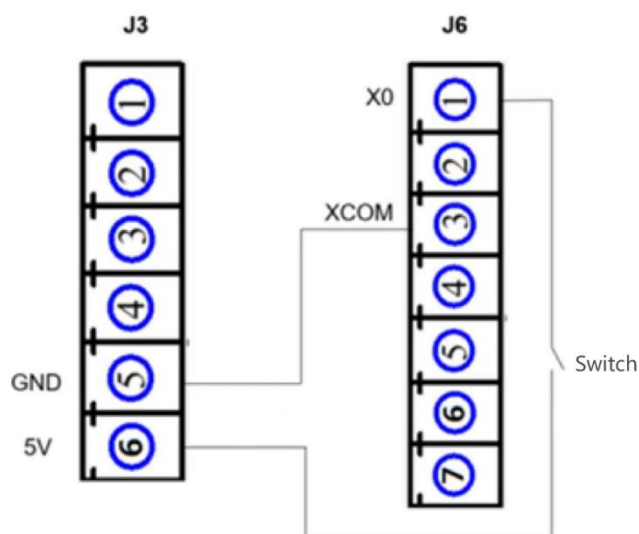
Set to 1, output speed unit: 1/1=1 RPM. Eg: target speed is 100 RPM, and the actual output is 100 RPM

Trigger Mechanism: After enabling the testing function, it must be saved and restarted to be effective

Function: User could use more precise target speed control

5.4 I/O Emergency Stop Processing Method

5.4.1 Wiring Diagram J3,J6

5.4.2 CANOPEN Command Setting

Enable input interface INPUT1 emergency stop function: Frame ID: 604 Data: 2B 30 20 02 09 00 00 00

Enable input interface INPUT2 emergency stop function: Frame ID: 604 Data: 2B 30 20 03 09 00 00 00

Save instruction: Frame ID: 604 Data: 2B 30 20 03 09 00 00 00

Turn on I0 emergency stop and release the shaft function command: frame ID: 604

Data: 2B 2F 20 03 01 00 00 00

Turn off the I0 emergency stop and release the shaft function instruction: frame ID: 604

Data: 2B 2F 20 03 00 00 00 00 00

Save instruction: frame ID: 604

Data: 2B 09 20 00 02 00 00 00 00

Trigger mechanism: After activating this function, and triggering an external emergency stop, the motor will be in an enabled state (0 speed)

Function: When the robot is in an abnormal state, it will trigger an external emergency stop

5.5 Brake Function

5.5.1 Wiring Diagram

Note: 20V-24V DC, brake doesn't have positive or negative poles, and could be wired freely.
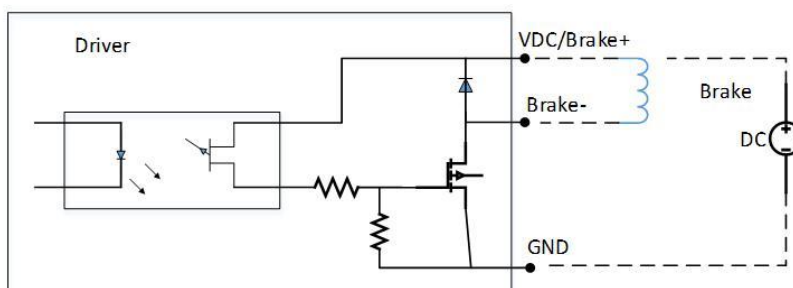
5.5.2 Brake Command Setting

Release brake command: Frame ID: 604 Data: 2B 30 20 0E 00 00 00 00

Close brake command: Frame ID: 604 Data: 2B 30 20 0E 01 00 00 00

Function: If user's motor is equipped with an external electromagnetic brake, this command can be used to relese and close the brake.

六、 PDO MAPPING STEPS

6.1 TPDO MAPPING

Configure 0x606C as TPDO0, for transmission methods, use event trigger (254) or timer trigger (255) respectively

Mater Station(COB-ID:0x604)	Slave Station(COB-ID:0x584)	Function Description
2F 00 1A 00 00 00 00 00	60 00 1A 00 00 00 00 00	Clear TPDO0 mapping
23 00 1A 01 20 00 6C 60	60 00 1A 01 00 00 00 00	Map 0x606C to 0x1A00 01
2F 00 18 02 FE 00 00 00	60 00 18 02 00 00 00 00	Set TPDO0 transmission method to

		event trigger
2B 00 18 03 E8 03 00 00	60 00 18 03 00 00 00 00	Set inhibit time 500ms (unit: 0.5ms)
2F 00 1A 00 01 00 00 00	60 00 1A 00 00 00 00 00	Enable 1 TPDO0 mapping
2B 09 20 00 02 00 00 00	60 09 20 00 00 00 00 00	Save parameters to EEPROM

Mater Station(COB-ID:0x604)	Slave Station (COB-ID:0x584)	Function Description
2F 00 1A 00 00 00 00 00	60 00 1A 00 00 00 00 00	Clear TPDO0 mapping
23 00 1A 01 20 00 6C 60	60 00 1A 01 00 00 00 00	Map 0x606C to 0x1A00 01
2F 00 18 02 FF 00 00 00	60 00 18 02 00 00 00 00	Set TPDO0 transmission method to timer trigger
2B 00 18 05 E8 03 00 00	60 00 18 05 00 00 00 00	Set inhibit time 500ms (unit: 0.5ms)
2F 00 1A 00 01 00 00 00	60 00 1A 00 00 00 00 00	Enable 1 TPDO0 mapping
2B 09 20 00 02 00 00 00	60 09 20 00 00 00 00 00	Save parameters to EEPROM

After the mapping is completed, send the NMT start command.

The format of the NMT enable command is as follows (take ID 4 as an example):
COB-ID: 000   Data: 01+ID (00 represents enabling PDO of all addresses)
Enabling address 4:   Frame ID: 000   Data: 01 04
Enabling all addresses: Frame ID: 000   Data: 01 00

The TPDO upload format is shown in the table below:

Slave Station(COB-ID:0x184)	Function Description
01 02 03 04	The data uploaded to 606C is 01 02 03 04

The format of the NMT close command is as follows:
COB-ID: 000   Data: 80+ID   (00 represents closing PDO of all addresses)
Closing address 4:   Frame ID: 000   Data: 80 04
Closing all addresses: Frame ID: 000   Data: 80 00

※ Note: After closing, TPDO will stop uploading.

6.2 RPDO MAPPING

Configure 0x60FF as TPDO1, transmission method is event trigger (254).

Mater Station(COB-ID:0x604)	Slave Station(COB-ID:0x584)	Function Description
2F 01 16 00 00 00 00 00	60 01 16 00 00 00 00 00	Clear RPDO1 mapping
23 01 16 01 20 00 FF 60	60 01 16 01 00 00 00 00	Map 0x60FF to 0x1601 01
2F 01 16 00 01 00 00 00	60 01 16 00 00 00 00 00	Enable RPDO1 mapping
2B 09 20 00 02 00 00 00	60 09 20 00 00 00 00 00	Save parameters to EEPROM

After the mapping is completed, send the NMT start command.

The format of the NMT enable command is as follows (take ID 4 as an example):
COB-ID: 000　Data: 01+ID (00 represents enabling PDO of all addresses)
Enabling address 4:　　Frame ID: 000　　Data: 01 04
Enabling all addresses:　Frame ID: 000　　Data: 01 00

The RPDO upload format is shown in the table below:

Slave Station (COB-ID:0x304)	Function Description
01 02 03 04	Write 01 02 03 04 to 60FF

The format of the NMT close command is as follows:
COB-ID: 000　Data: 80+ID　(00 represents closing PDO of all addresses)
Closing address 4:　　Frame ID: 000　　Data: 80 04
Closing all addresses:　Frame ID: 000　　Data: 80 00

※**Note: After closing, sending RPDO will be invalid.**

6.3 MAPPING DESCRIPTION

The meaning of "20" in the mapping instruction:

Note: 20 represents the number of digits of the mapped index data type (converting hexadecimal "20" to decimal means "32")

606Ch	00	Actual speed feedback	Current motor speed, Unit: 0.1r/min	I32	RO	YES	0

七、CANOPEN STATUS WORD

7.1 PROFILE VELOCITY MODE STATUS WORD

Status	Byte Definition	Function Description
6041h	Bit0~Bit3	6040=0： xxxx xxxx xxxx 0000 6040=6： xxxx xxxx xxxx 0001 6040=7： xxxx xxxx xxxx 0011 6040=F： xxxx xxxx xxxx 0111
	Bit5	0: Driver is in emergency stop status; 1: Driver is not in emergency stop state; (Command Emergency Stop)
	Bit10	0: Speed is not in place; 1: Speed is in place;
	Bit12	0: Speed is not 0RPM; 1: The speed is 0RPM;
	Bit14	0: The motor is stopping; 1: The motor is running;
	Bit15	0: Not in external emergency stop state; 1: In external emergency stop state;

7.2 PROFILE POSITION MODE STATUS WORD

Status	Byte Definition	Function Description
6041h	Bit0~Bit3	6040=0： xxxx xxxx xxxx 0000 6040=6： xxxx xxxx xxxx 0001 6040=7： xxxx xxxx xxxx 0011 6040=F： xxxx xxxx xxxx 0111
	Bit5	0: Driver is in emergency stop status; 1: Driver is not in emergency stop state; (Command Emergency Stop)
	Bit10	0: Target position is not reached; 1: Target location is reached;
	Bit12	0: The target location is not valid; 1: The target location is valid;
	Bit13	0: The motor is not running in place; 1: The motor is running in place; (It's judged based on the threshold of driver deviation)
	Bit14	0: The motor is stopping; 1: The motor is running;
	Bit15	0: Not in external emergency stop state; 1: In external emergency stop state;

7.3 PROFILE TORQUE MODE STATUS WORD

Status	Byte Definition	Function Description
6041h	Bit0~Bit3	6040=0: xxxx xxxx xxxx 0000 6040=6: xxxx xxxx xxxx 0001 6040=7: xxxx xxxx xxxx 0011 6040=F: xxxx xxxx xxxx 0111
	Bit5	0: Driver is in emergency stop status; 1: Driver is not in emergency stop state; (Command Emergency Stop)
	Bit10	0: The target torque is not reached; 1: Target torque is reached;
	Bit14	0: The motor is stopping; 1: The motor is running;
	Bit15	0: Not in external emergency stop state; 1: In external emergency stop state;

八、FAULT CODE

Index	Fault code	Description	Troubleshooting
603Fh	0000h	No error	Driver is normal.
	0001h	Over-voltage	1. Power supply voltage is too high 2. Excessive back electromotive force (it is recommended to add a bleeder circuit)
	0002h	Under-voltage	1. Power supply voltage is too low 2. Check if the wiring connector is correct 3. Check if the motor parameters are correct
	0004h	Over-current	1. Instantaneous current is too high 2. Motor power cable is loose
	0008h	Overload	1. Check if the motor cable is loose 2. Check if the wiring and motor parameters are correct 3. Motor is stall 4. Motor or driver's problem
	0020h	Encoder value is out of tolerance	1. Motor is stall 2. Encoder's problem
	0080h	Reference voltage error	Reference voltage circuit issue
	0100h	EEPROM read and write error	1. Firmware is upgraded (needs to make factory settings) 2. EEPROM circuit is damaged
	0200h	Hall error	1. Check if the motor cable is loose 2. Motor's problem 3. Driver's problem
	0400h	motor temperature is too	1. The motor current is too high (it is recommended to

			monitor motor's actual current and temperature, and reduce the current in real-time control) 2. Motor's thermistor is damaged 3. Driver's circuit is damaged
	0800h	Encoder error	1. Check if the motor encoder cable is loose 2. Check if the motor encoder cable is disconnected

九、 OBJECT DICTIONARY

Index	Sub-Index	Name	Description	Type	Attribute	PDO Mapping	Default
CiA301 Basic Communication Parameter Group							
1000h	00	Equipment type	This device supports CiA301, CiA402 protocol	U32	RO	NO	0X00040192
1001h	00	Error register	Driver current error status	U8	RO	NO	0
1005h	00	Synchronous message COB identifier	Synchronous message COB identifier	U32	RW	NO	0x80
1009h	00	Hardware version	Hardware version	U16	RO	NO	-
100Ah	00	Hardware version	Hardware version	U16	RO	NO	-
1014h	00	COB-ID emmergency	COB-ID emmergency	U32	RW	NO	0x80
1017h	00	Producer heartbeat interval	Producer heartbeat interval, unit: ms	U16	RW/S	NO	0
1018h	00	Manufacturer Information	Sub-index	U8	RO	NO	5
	01	Vendor ID	Vendor ID	U32	RO	NO	0x0100
	02	Product Code	Product Code	U32	RO	NO	0x0001
1200h	00	Number of sub-indexes	Number of sub-indexes	U8	RO	NO	2
	01	COB-ID (Slave station receives)	COB-ID (Slave station receives)	U32	RO	NO	600h+Node-ID
	02	COB-ID (Slave station sends)	COB-ID (Slave station sends)	U32	RO	NO	580h+Node-ID
1400h	00	Number of sub-indexes	Number of sub-indexes	U8	RO	NO	5
	01	RPDO0-COB-ID	Identifier COB-ID	U32	RO	NO	200+Node-ID
	02	Transmission type	Transmission type	U8	RW/S	NO	FFh
	03	Prohibition time	Prohibition time	U16	RW/S	NO	0
	04	Maintain	Maintain	U8	RW	NO	0
	05	Event timer	Event timer	U16	RW/S	NO	0
1401h	00	Number of sub-indexes	Number of sub-indexes	U8	RO	NO	5
	01	RPDO1-COB-ID	Identifier COB-ID	U32	RO	NO	300+Node-ID
	02	Transmission type	Transmission type	U8	RW/S	NO	FFh
	03	Prohibition time	Prohibition time	U16	RW/S	NO	0
	04	Maintain	Maintain	U8	RW	NO	0

	05	Event timer	Event timer	U16	RW/S	NO	0
1402h	00	Number of sub-indexes	Number of sub-indexes	U8	RO	NO	5
	01	RPDO2-COB-ID	Identifier COB-ID	U32	RO	NO	400+Node-ID
	02	Transmission type	Transmission type	U8	RW/S	NO	FFh
	03	Prohibition time	Prohibition time	U16	RW/S	NO	0
	04	Maintain	Maintain	U8	RW	NO	0
	05	Event timer	Event timer	U16	RW/S	NO	0
1403h	00	Number of sub-indexes	Number of sub-indexes	U8	RO	NO	5
	01	RPDO3-COB-ID	Identifier COB-ID	U32	RO	NO	500+Node-ID
	02	Transmission type	Transmission type	U8	RW/S	NO	FFh
	03	Prohibition time	Prohibition time	U16	RW/S	NO	0
	04	Maintain	Maintain	U8	RW	NO	0
	05	Event timer	Event timer	U16	RW/S	NO	0
1600h	00	Number of sub-indexes	Number of sub-indexes	U8	RO	NO	1
	01	RPDO0-mapping 1	Map to 6040h register	U32	RW/S	NO	60400010h
	02	RPDO0-mapping 2	Not mapped	U32	RW/S	NO	-
	03	RPDO0-mapping 3	Not mapped	U32	RW/S	NO	-
	04	RPDO0-mapping 4	Not mapped	U32	RW/S	NO	-
1601h	00	Number of sub-indexes	Number of sub-indexes	U8	RO	NO	0
	01	RPDO1-mapping 1	Not mapped	U32	RW/S	NO	-
	02	RPDO1-mapping 2	Not mapped	U32	RW/S	NO	-
	03	RPDO1-mapping 3	Not mapped	U32	RW/S	NO	-
	04	RPDO1-mapping 4	Not mapped	U32	RW/S	NO	-
1602h	00	Number of sub-indexes	Number of sub-indexes	U8	RO	NO	0
	01	RPDO2-mapping 1	Not mapped	U32	RW/S	NO	-
	02	RPDO2-mapping 2	Not mapped	U32	RW/S	NO	-
	03	RPDO2-mapping 3	Not mapped	U32	RW/S	NO	-
	04	RPDO2-mapping 4	Not mapped	U32	RW/S	NO	-
1603h	00	Number of sub-indexes	Number of sub-indexes	U8	RO	NO	0
	01	RPDO3-mapping 1	Not mapped	U32	RW/S	NO	-
	02	RPDO3-mapping 2	Not mapped	U32	RW/S	NO	-
	03	RPDO3-mapping 3	Not mapped	U32	RW/S	NO	-
	04	RPDO3-mapping 4	Not mapped	U32	RW/S	NO	-
1800h	00	Number of sub-indexes	Number of sub-indexes	U8	RO	NO	5
	01	TPDO0-COB-ID	Identifier COB-ID	U32	RO	NO	180+Node-ID
	02	Transmission type	Transmission type	U8	RW/S	NO	FFh
	03	Prohibition time	Prohibition time	U16	RW/S	NO	0
	04	Maintain	Maintain	U8	RW	NO	0
	05	Event timer	Event timer	U16	RW/S	NO	0
1801h	00	Number of sub-indexes	Number of sub-indexes	U8	RO	NO	5
	01	TPDO1-COB-ID	Identifier COB-ID	U32	RO	NO	280+Node-ID
	02	Transmission type	Transmission type	U8	RW/S	NO	FFh

	03	Prohibition time	Prohibition time	U16	RW/S	NO	0
	04	Maintain	Maintain	U8	RW	NO	0
	05	Event timer	Event timer	U16	RW/S	NO	0
1802h	00	Number of sub-indexes	Number of sub-indexes	U8	RO	NO	5
	01	TPDO2-COB-ID	Identifier COB-ID	U32	RO	NO	380+Node-ID
	02	Transmission type	Transmission type	U8	RW/S	NO	FFh
	03	Prohibition time	Prohibition time	U16	RW/S	NO	0
	04	Maintain	Maintain	U8	RW	NO	0
	05	Event timer	Event timer	U16	RW/S	NO	0
1803h	00	Number of sub-indexes	Number of sub-indexes	U8	RO	NO	5
	01	TPDO3-COB-ID	Identifier COB-ID	U32	RO	NO	480+Node-ID
	02	Transmission type	Transmission type	U8	RW/S	NO	FFh
	03	Prohibition time	Prohibition time	U16	RW/S	NO	0
	04	Maintain	Maintain	U8	RW	NO	0
	05	Event timer	Event timer	U16	RW/S	NO	0
1A00h	00	Number of sub-indexes	Number of sub-indexes	U8	RO	NO	0
	01	RPDO1-mapping 1	Not mapped	U32	RW/S	NO	-
	02	RPDO1-mapping 2	Not mapped	U32	RW/S	NO	-
	03	RPDO1-mapping 3	Not mapped	U32	RW/S	NO	-
	04	RPDO1-mapping 4	Not mapped	U32	RW/S	NO	-
1A01h	00	Number of sub-indexes	Number of sub-indexes	U8	RO	NO	0
	01	RPDO1-mapping 1	Not mapped	U32	RW/S	NO	-
	02	RPDO1-mapping 2	Not mapped	U32	RW/S	NO	-
	03	RPDO1-mapping 3	Not mapped	U32	RW/S	NO	-
	04	RPDO1-mapping 4	Not mapped	U32	RW/S	NO	-
1A02h	00	Number of sub-indexes	Number of sub-indexes	U8	RO	NO	0
	01	RPDO2-mapping 1	Not mapped	U32	RW/S	NO	-
	02	RPDO2-mapping 2	Not mapped	U32	RW/S	NO	-
	03	RPDO2-mapping 3	Not mapped	U32	RW/S	NO	-
	04	RPDO2-mapping 4	Not mapped	U32	RW/S	NO	-
1A03h	00	Number of sub-indexes	Number of sub-indexes	U8	RO	NO	0
	01	RPDO3-mapping 1	Not mapped	U32	RW/S	NO	-
	02	RPDO3-mapping 2	Not mapped	U32	RW/S	NO	-
	03	RPDO3-mapping 3	Not mapped	U32	RW/S	NO	-
	04	RPDO3-mapping 4	Not mapped	U32	RW/S	NO	-
Factory Custom Parameter Group							
2000h	00	Communication offline time	Driver and host communication offline time setting. Unit: ms Range: 0-32767;	U16	RW/S	YES	1000
2001h	00	Motor default rotation direction	Motor default rotation direction(from shaft side):	U16	RW/S	YES	0

			0: CW; 1: CCW.				
2002h	00	In place signal output control mode and threshold	1-65535	U16	RW	YES	30
2003h	00	Input signal status	2 input signal level status; Bit0-Bit1: X0-X1 input level status;	U16	RO	YES	0
2004h	00	Output signal status	2 output signal level status; Bit0-Bit1: Y0-Y1 Bit2-Bit3：B0-B1 output status;	U16	RO	YES	0
2005h	00	Clear feedback position	Used to clear feedback position in profile position mode 0: invalid; 1: clear the feedback position; Not saved.	U16	RW	YES	0
2006h	00	In absolute position mode, clear the current position	Used to clear the current position in absolute position mode 0: invalid; 1: clear the current position;	U16	RW	YES	0
2007h	00	Limit packing mode	0: stop; 1: emergency stop; 2: invalid;	U16	RW/S	YES	0
2008h	00	Initial speed	The initial speed at which the movement begins; Unit: r/min; Range: 1-300 r/min;	U16	RW/S	YES	1r/min
2009h	00	Register parameter setting	0: invalid; 1: restore factory settings; 2: save all RW attribute parameters to EEPROM;	U16	RW	YES	0
200Ah	00	Maximum speed of motor	Maximum motion speed of the motor Unit: r/min; Range: 1-1000 r/min;	U16	RW/S	YES	1000
200Bh	00	Encoder wire setting	0-4096	U16	RW/S	YES	1024
200Ch	00	Motor pole pairs	4-64	U16	RW/S	YES	15

200Dh	00	CAN custom driver node number	When the external DIP switch is 0, CAN address could be set to 4-127;	U16	RW/S	YES	4
200Eh	00	CAN custom communication high baud rate	0：1000 Kbit/s 1：500 Kbit/s 2：250 Kbit/s 3：125 Kbit/s 4：100 Kbit/s	U16	RW/S	YES	1
200Fh	00	Shaft lock method when power-on	0: not enable, not lock the shaft; 1: not enable, lock the shaft;	U16	RW/S	YES	0
2010h	00	Whether save RW/S parameters in EEPROM synchronously	Whether the communication write function code value will be updated to EEPROM. 0: Parameters with attribute RW/S will be updated to EEPROM synchronously; 1: Not update;	U16	RW	YES	0
2011h	00	Offset angle of motor and Hall	Unit: 1°; Range: -360~+360.	I16	RW/S	YES	0
2012h	00	Overload factor	Range 0-300, Unit: %;	U16	RW/S	YES	200
2013h	00	Number of sub-indexes	Number of sub-indexes	U16	RO	NO	2
	01	Motor temperature protection threshold	Unit: 0.1°C; Range: 0-1200 (* 0.1)	U16	RW/S	YES	800
	02			U16	RW/S	YES	800
2014h	00	Rated current	The rated current output by the driver Unit: 0.1A; Range: 0-150.	U16	RW/S	YES	150
2015h	00	Maximum current	Maximum current output by the driver Unit: 0.1A; Range: 0-300.	U16	RW/S	YES	300
2016h	00	Overload protection time	Driver overload protection time Unit: 10ms; Range: 0-6553.	U16	RW/S	YES	300
2017h	00	Out-of-tolerance alarm threshold	Encoder out-of-tolerance threshold Unit: *10counts; Range: 1-6553.	U16	RW/S	YES	409

2018h	00	Velocity smoothing factor	0-30000	U16	RW/S	YES	1000
2019h	00	Current loop proportional coefficient	0-30000	U16	RW/S	YES	600
201Ah	00	Current loop integral gain	0-30000	U16	RW/S	YES	300
201Bh	00	Feedforward output smoothing coefficient	0-30000	U16	RW/S	YES	100
201Ch	00	Torque output smoothing factor	0-30000	U16	RW/S	YES	100
201Dh	00	Speed proportional gain Kp	0-30000	U16	RW/S	YES	500
201Eh	00	Speed integral gain Ki	0-30000	U16	RW/S	YES	100
201Fh	00	Speed feedforward gain Kf	0-30000	U16	RW/S	YES	1000
2020h	00	Position proportional gain Kp	0-30000	U16	RW/S	YES	50
2021h	00	Position feedforward gain Kf	0-30000	U16	RW/S	YES	200
2022h	00	RS485 custom driver node number	When the external DIP switch is 0, CANopen address could be set to 4-127; When the external DIP switch is 1-3, this bit is invalid.	U16	RW/S	YES	4
2023h	00	RS485 custom communication high baud rate	1：128000bps 2：115200bps 3：57600bps 4：38400bps 5：19200bps 6：9600bps	U16	RW/S	YES	2
2025h	00	Software version	Factory default	U16	RO	NO	-
2026h	00	Number of sub-indexes	Number of sub-indexes	U16	RO	NO	4
	01	Motor temperature	Unit: 0.1°C; Range: -55-120°C	U16	RO	YES	
	02	Driver temperature	Unit: 0.1°C; Range: -55-120°C	U16	RO	YES	
2027h	00	Motor status register	Driver controls motor movement 0: motor is stationary; 1: motor is running;	U16	RO	YES	0
2028h	00	Hall input status	0-7; If 0 or 7 appears, there is	U16	RO	YES	0

			Hall error.				
2029h	00	Bus voltage	Unit: 0.01V	U16	RO	YES	0
202Ah	00	Speed observer coefficient 1	0-30000	U16	RW/S	YES	0
202Bh	00	Speed observer coefficient 2	0-30000	U16	RW/S	YES	0
202Ch	00	Speed observer coefficient 3	0-30000	U16	RW/S	YES	0
202Dh	00	Speed observer coefficient 3	0-30000	U16	RW/S	YES	0
202Eh	00	Number of sub-indexes	Number of sub-indexes	U16	RO	NO	4
	01	Bleed resistor value	Unit 0.1Ω； Range 0-1000（*0.1）	U16	RW/S	YES	50
	02	Bleed resistor power	Unit W； Range 0-1000	U16	RW/S	YES	100
	03	Bleed resistor turns on voltage	Unit 0.1V； Range 360-750（*0.1）	U16	RW/S	YES	700
	04	Bleed resistor turns off voltage	Unit 0.1V； Range 310-700（*0.1）	U16	RW/S	YES	620
	05	Bleed resistor function control	Brake on/off 0: Off 1: Turn on	U16	RW/S	YES	0
202Fh	00	Number of sub-indexes	Number of sub-indexes	U16	R0	NO	2
	01	Alarm PWM processing method	0: Off 1: Turn on	U16	RW/S	YES	0
	02	I/O emergency stop processing method	0: Off 1: Turn on	U16	RW/S	YES	0
	03	Parking mode	0: Lock shaft; 1: Release shaft;	U16	RW/S	YES	0
	04	Set speed resolution	0: Off 1: Turn on	U16	YES	YES	0
	05	I/O emergency stop processing method	1-10 （1： 1RPM 、 10： 0.1RPM）	U16	RW/S	YES	1
2030h	00	Number of sub-indexes	Number of sub-indexes	U16	RO	NO	16

	01	Input terminal effective level	Bit0: input terminal X0 control bit; Bit1: input terminal X1 control bit; Bit2 ~ Bit15: maintain; 0: default; 1: level reversal; The driver defaults that the input terminal level rising edge or high level is effective;	U16	RW/S	YES	0
	02	Input terminal X0 terminal function selection	0: undefined; 1-6: NC; 9: emergency stop signal;	U16	RW/S	YES	9
	03	Input terminal X1 terminal function selection		U16	RW/S	YES	0
	04	NC		U16	RW/S	YES	0
	05	NC		U16	RW/S	YES	0
	0C	Output terminal effective level	Bit0: output terminal Y0 control bit; Bit1: Y1 control bit of output terminal; 0: default; 1: level inversion; The driver's default input terminal level rising edge or high level is valid;	U16	RW/S	YES	0
	0D	Output terminal Y0 terminal function selection	0: undefined 1: alarm signal; 2: drive status signal; 3: NC; 4: In position signal;	U16	RW/S	YES	1
	0E	Output terminal B0 terminal function selection	Holding brake open/close 0: open 1: close;	U16	RW	YES	0
	0F	Output terminal Y1 terminal function selection	0: undefined 1: alarm signal; 2: drive status signal; 3: NC; 4: In position signal;	U16	RW	YES	0
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603Fh	00	Driver last fault code	Factory-defined drive error conditions.	U16	RO	YES	0

			0000H: No error; 0001H: Overvoltage; 0002H: undervoltage; 0004H: Overcurrent; 0008H: overload; 0010H: Current out-of-tolerance (reserved) 0020H: Encoder out-of-tolerance; 0040H: Speed out-of-tolerance (reserved) 0080h: The reference voltage is wrong; 0100h: EEPROM read and write error; 0200h: Hall error; 0400H: Motor overtemperature; 0800H: Driver overtemperature; 1000h: encoder error;				
6040h	00	Control word	Control word	U16	RW	YES	0
6041h	00	Status word	Status word	U16	RO	YES	0
605Ah	00	Quick stop code	Driver processing method after quick stop command 5: stop normally, maintain quick stop state; 6: decelerate suddenly to stop, maintain quick stop state; 7: emergency stop, maintain quick stop state;	I16	RW	NO	5
605Bh	00	Close operation code	Driver processing method after close command 0: invalid; 1: stop normally, turn to ready to switch on state;	I16	RW	NO	1
605Ch	00	Disable operation code	Driver processing method after disable operation command 0: Invalid; 1: stop normally , switch	I16	RW	NO	1

			to switched on state;				
605Dh	00	Halt control register	Driver processing method after the control word Halt command 0: stop normally, maintaining Operation Enabled state; 2: decelerate suddenly stop, maintain Operation Enabled state; 3: emergency stop, maintain Operation Enabled state;	I16	RW	NO	1
6060h	00	Operating mode	0: undefined; 1: profile position mode; 3: profile velocity mode; 6: profile torque mode;	I8	RW	YES	0
6061h	00	Operating mode status	0: undefined; 1: profile position mode; 3: profile velocity mode; 6: profile torque mode;	I8	RO	YES	0
6064h	00	Actual position feedback	Actual position feedback, unit: counts;	I32	RO	YES	0
606Ch	00	Actual speed feedback	Current motor speed, Unit: 0.1r/min	I32	RO	YES	0
6071h	00	Target torque	Unit: mA; Range: -30000~30000;	I16	RW	YES	0
6074h	00	Real-time target torque	Unit: mA; Range:-300~300;	I16	RO	YES	0
6077h	00	Real-time torque feedback	Unit: 0.1A; Range: -30000~30000;	I16	RO	YES	0
607Ah	00	Target position	Range of total pulses operated in position mode: Relatively: -0x7FFFFFFF~0x7FFFFFFF Absolute: -0x3FFFFFFF~0x3FFFFFFF；	I32	RW	YES	0
6081h	00	Max speed	Speed in profile position mode; Range: 1-1000r/min;	U32	RW	YES	120r/min
6082h	00	Start / stop speed in profile position mode	Start / stop speed in profile position mode; Range: 1-1000r/min;	U32	RW	YES	1r/min

6083h	00	S-shaped acceleration time	acceleration time; Range: 0-32767ms;	U32	RW	YES	500ms
6084h	00	S-shaped deceleration time	Deceleration time; Range: 0-32767ms;	U32	RW	YES	500ms
6085h	00	Emergency stop deceleration time	Deceleration time; Range: 0-32767ms;	U32	RW	YES	10ms
6087h	00	Torque slope	Current/1000/second; Unit: mA/s;	U32	RW	YES	300ms
60FFh	00	Target speed	Target speed in profile velocity mode; Range: -1000~1000r/min;	I32	RW	YES	0
Note:							
● U16 means unsigned 16 bits; I16 means signed 16 bits; U32 means unsigned 32 bits; I32 means signed 32 bits.							

Note:

Alarm PWM processing mode: After the drive enters the alarm state, the upper tube is closed and the lower tube is turned on (the three power lines of the motor are short-circuited).

Overload handling method: For example, if the motor I^2t time is 20 seconds, the double overload duration is 6 seconds, and the triple overload duration is 4 seconds.