# Q-series Remote Extension Modules HCQX-ST1505-D2

ST1505

| | |
|---|---|
| ManualNo. | HPPP1370000EN |
| Version | 1.3 |
| Date | Apr.2022 |

Thank you for purchasing and using the Q series remote extension modules HCQX-ST1505-D2 independently developed and produced by HCFA Technology.

Applicable readers

For the users of HCFA Q series extension modules, refer to this manual to perform the wiring, installation, diagnosis and maintenance and requires the users to have the certain knowledge of electrical and automation.

This manual gives the necessary information for the use of HCFA Q series extension modules, please read this manual carefully before use and make the correct operation with full attention to safety.

## 1. Safety Precautions

### 1.1 Safety symbols

When using this product, please follow the following safety precautions and instructions strictly. Users can check more specific safety guidelines in sections such as mounting, wiring, communication, etc.

In this manual, the following safety guidelines must be followed.

**⚠ DANGER**
- Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury or significant property damage

**⚠ WARNING**
- Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or physical damage.

**⚠ CAUTION**
- Indicates that incorrect handling may cause slight injury or property damage.

**⚠ NOTE**
- Indicates that incorrect handling may cause damage to the environment / equipment or data loss.

Note: Key points or explanations to help with better operation and understanding of product.

### 1.2 Safety precautions

STARTUP AND MAINTENANCE PRECAUTIONS

**⚠ DANGER**
- Do not touch any terminal while the PLC's power is on. Doing so may cause electric shock or malfunctions.
- Before cleaning or retightening terminals externally cut off all phases of the power supply. Failure to do so may cause electric shock.
- Before modifying or disrupting the program in operation or Forced output, RUN, STOP etc., carefully read through this manual and the associated manuals and ensure the safety of the operation. An operation error may damage the machinery or cause accidents.

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STARTUP AND MAINTENANCE PRECAUTIONS

**⚠ CAUTION**
- Do not disassemble or modify the PLC. Doing so may cause fire, equipment failures, or malfunctions.For module repair, contact our HCFA distributor.
- Turn off the power to the PLC before connecting or disconnecting any extension cable. Failure to do so may cause equipment failures or malfunctions
- Turn off the power to the PLC before attaching or detaching the following devices. Failure to do so may cause equipment failures or malfunctions
  - —Display module, peripheral devices, expansion boards
  - —Extension blocks and special adapters
  - —Battery, terminal block and memory cassette

DISPOSAL PRECAUTIONS

**⚠ CAUTION**
- Please contact a certified electronic waste disposal company for the environmentally safe recycling and disposal of your device.

TRANSPORT AND STORAGE PRECAUTIONS

**⚠ CAUTION**
- The PLC is a precision instrument. During transportation, avoid impacts larger than those specified in Section 3.1. Failure to do so may cause failures in the PLC. After transportation, verify the operations of the PLC.

## 2. Product Overview

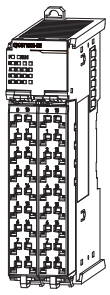
### 2.1 Model name description

HC QX – ST X XXX – D

| | |
|---|---|
| Company info. | |
| HC | HCFA controller |
| Module series | |
| QX | QX series modules |
| Function module | |
| ST | High-speed counter |
| Number of channel | |
| 1 | 1 axis |
| 2 | 2 axis |
| Power type | |
| D | DC power |
| A | AC power |
| Voltage+current※ | |
| 1st digit | x10=Max. working voltage |
| 2nd &3rd digit | Peak current |

Note: For example: 505 means that the maximum working voltage is 50V, and the output peak current is 5A





❶ MODEL: HCQX-ST1505-D2
❷ POWER: DC24~48V/0~5A
❸ QBUS POWER: 3.6W(Max.)
❹ INPUT: NONE
❺ OUTPUT: 0~5A peak
❻ S/N:XXXXXX
P/N:XXXXXX
❼
MADE IN CHINA

Figure 1 Model name and nameplate description

① Model name
② Working voltage and current
③ QBUS power consumption
④ Input parameters
⑤ Output parameters
⑥ Barcode, S/N &P/N
⑦ QR code (model name, serial number)

### 2.2 Part name description

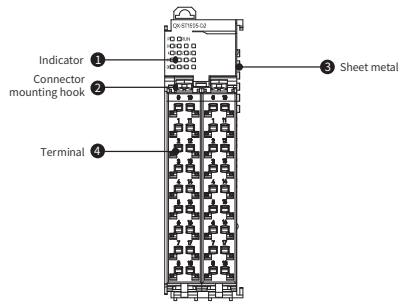



Figure 2 Interface diagram for HCQX-ST1505-D2

Table1 HCQX-ST1505-D2interfacedescription

| No. | Name | Function |
|---|---|---|
| (1) | Indicators | Used to display module and terminal status |
| (2) | Connector mounting hook | Fix the connector on the module |
| (3) | Sheet metal | Transmit QBUS signal and controlcircuit current, donot support hot swap |
| (4) | Terminal | Insert the cable, input/output signal |

#### 2.2.2 Indicator arrangements for HCQX-ST1505-D2

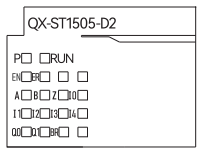



Table2 Indicator description for HCQX-ST1505-D2

| Symbol | Indicator color | Indicator status | Channel description |
|---|---|---|---|
| P | Green | OFF | Control power error or main power supply not input |
| | | ON | Power supply is normal |
| RUN | Red | OFF | Initial status or software upgrade status |
| | | Flashing | PREOP status |
| | | Single Flash | SAFEOP status |
| | | ON | OP status |
| EN | Red | OFF | Motor not enabled |
| | | ON | Motor enabled |
| ER | Red | OFF | No alarms have occurred |
| | | ON | PDI error |
| A | Red | ON | Input indication of encoder A |
| B | Red | ON | Input indication of encoderB |
| Z | Red | ON | Input indication of encoderC |
| I0 | Red | ON | Digital input I0 is valid |
| I1 | Red | ON | Digital input I1 is valid |
| I2 | Red | ON | Digital input I2 is valid |
| I3 | Red | ON | Digital input I3 is valid |
| I4 | Red | ON | Digital input I4 is valid |
| Q0 | Red | ON | Digital input Q0 is valid |
| Q1 | Red | ON | Digital input Q1 is valid |
| BR | Red | ON | Brake output is valid |

#### 2.2.3 HCQX-ST1505-D2 terminal description

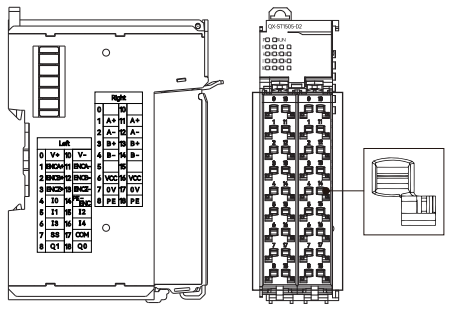


Figure3 Terminal description for HCQX-ST1505-D2



Table 3 Left terminals description for HCQX-ST1505-D2

| CPU board terminals | | | | | | |
|---|---|---|---|---|---|---|
| Description | Definition | NO | | | Definition | Description |
| Encoder power 5V output | V+ | 0 | | 10 | V- | Encoder power GND |
| Encoder A-phase differential positive input | ENCA+ | 1 | | 11 | ENCA- | Encoder A-phase differential negative input |
| Encoder B-phase differential positive input | ENCB+ | 2 | | 12 | ENCB- | Encoder B-phase differential negative input |
| Encoder Z-phase differential positive input | ENCZ+ | 3 | | 13 | ENCZ- | Encoder Z-phase differential negative input |
| Low-speed input 0 | I0 | 4 | | 14 | PE-ENC | Shielded wire |
| Low-speed input 1 | I1 | 5 | | 15 | I2 | Low-speed input 2 |
| Low-speed input 3 | I3 | 6 | | 16 | I4 | Low-speed input 4 |
| Input Common | SS | 7 | | 17 | COM | Output common |
| General output 1 | Q1 | 8 | | 18 | Q0 | General output 0 |

Table 4 Right terminals description for HCQX-ST1505-D2

| Driver board terminals | | | | | | |
|---|---|---|---|---|---|---|
| Description | Definitio n | NO | | | Definitio n | Description |
| N/A | | 0 | | 10 | | N/A |
| Drive A-phase positive output | A+ | 1 | | 11 | A+ | Drive A-phase positive output |
| Drive A-phase negative output | A- | 2 | | 12 | A- | Drive A-phase positive output |
| Drive B-phase positive output | B+ | 3 | | 13 | B+ | Drive B-phase positive output |
| Drive B-phase negative output | B- | 4 | | 14 | B- | Drive B-phase negative output |
| N/A | | 5 | | 15 | | N/A |
| Drive power supply input | VCC | 6 | | 16 | VCC | Drive power supply input |
| Drive power supply 0V | 0V | 7 | | 17 | 0V | Drive power supply 0V |
| PE | PE | 8 | | 18 | PE | PE |

### 2.3 Wiring Instruction

#### 2.3.1 Cable selection

| Item | | Specification |
|---|---|---|
| Mounting method | | Push-in mounting |
| Push-in force (single contact) | | 10N |
| Cable Type | | Copper wire only (aluminum wirenot allowed) |
| Cable Length | | 7-9 mm |
| Cross Section | Single stranded wire | 0.08-1.50 mm²/28-16 AWG |
| | Multi-stranded wire | 0.25-1.50 mm²/24-16 AWG |
| | Wiring Sleeve | 0.25-0.75 mm²/24-20 AWG |

#### 2.3.2 Digital I/O wiring diagram

■ Input internal circuit diagram

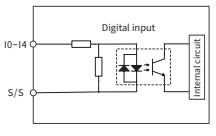



Figure 4 Input circuit diagram for HCQX-ST1505-D2

■ Output internal circuit diagram

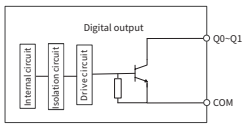



Figure 5 Output circuit diagram for HCQX-ST1505-D2

■ External I/O wiring diagram

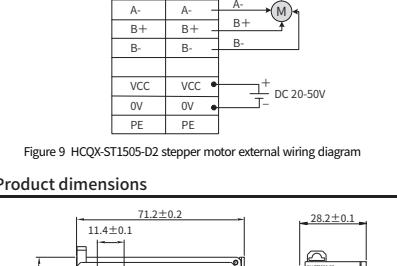



Figure 6 External I/O wiring diagram for HCQX-ST1505-D2

#### 2.3.3 Encoder wiring diagram

■ Encoder internal circuit diagram

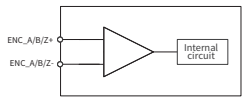



Figure7 Internal circuit diagram for HCQX-ST1505-D2

■ Encoder external circuit diagram

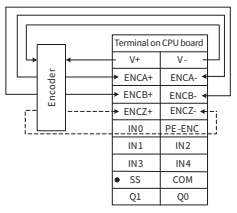



Figure 8 HCQX-ST1505-D2 encoder external circuit diagram

#### 2.3.4 Stepper motor wiring diagram

■ Stepper motor wiring diagram

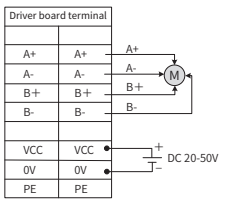



Figure 9 HCQX-ST1505-D2 stepper motor external wiring diagram

### 2.4 Product dimensions

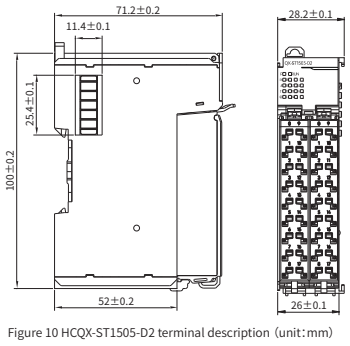



Figure 10 HCQX-ST1505-D2 terminal description（unit:mm）



## 3. Specification parameters

### 3.1 Electrical specifications

| Item | | Specifications | |
|---|---|---|---|
| Insulation resistance | Input to Output | 1MΩ | |
| Electromagnetic compatibility requirements | Electrostatic discharge | Contact ±4kV, Air ±8kV, | |
| | Electric Fast Pulse Cluster | Control power | ±4kV 5~100kHz |
| | | signal cable | ±2kV 5~100kHz |
| | Surge | DC 0.5kV | |

### 3.2 Environmental specifications

| Item | Specifications |
|---|---|
| Operating temperature | 0~55℃ |
| Storage temperature | -25~75℃ |
| Relative Humidity | 95% non-condensation |
| Altitude | Under 2km |
| Atmospheric pressure | 108kPa~66kPa |
| Noise resistance | ±2kV 5~100kHz |
| Sine vibration | 9Hz<f<100Hz，1.0 acceleration, constant amplitude |
| Drop down | 1m，10 times during packaging and transportation |

### 3.3 Power specifications

| Item | Specifications |
|---|---|
| QBUS rated voltage | DC 12V |
| QBUS consumption current | Typ：100mA (without encoder)<br>Max：300mA（(with encoder) |
| Rated voltage atdriver side | DC 24V~48V |
| Input Voltage Range | DC 20V~50V |
| Input current Ipeak | >5A |

### 3.4 Control specifications

| Item | Specifications |
|---|---|
| Control Protocol | CiA402 protocol |
| Communication scan cycle | 250μs、500μs、1ms、2ms、4ms、6ms、8ms |
| Segmentation levels | 32~256 step |
| Power supply toencoder | 4.5~5V，200mA（Max） |
| Encoder input type | Differential Input |
| Encoder maximum response frequency | 200kHz |
| Motor control mode | PP、PV、CSP、Homing |
| Digital input | I0~I4，Single-ended 24Vdc，Maximum pulse frequency 5kHz |
| Digital output | Q0~Q1, Collector open leakage，Maximum 30V/250mA，Maximum pulse frequency 2kHz |
| Motor parameters | Motor parameters are detected automatically |

### 3.5 Drive specifications

| Item | Specifications |
|---|---|
| Power output type | Dual H-Bridge |
| Current control | PWM frequency 25kHz |
| Output current | Continuous maximum peak current 5A |
| Input voltage | 20Vdc~50Vdc |
| Protection | Overcurrent protection, undervoltage protection, overvoltage protection, overtemperature protection |

### 3.6 Terminal and Wiring specifications

| Item | Specifications |
|---|---|
| QBUS interface | QBUS_IN、QBUS_OUT |
| Encoder interface | V+、V-、ENA+、ENA-、ENB+、ENB-、ENZ+、ENZ- |
| Digital input | I0、I1、I2、I3、I4、SS |
| Digital output | Q0、Q1、COM |
| Drive output | A+、A-、B+、B- |
| Drive power input | VCC、0V、PE |

## 4. Installation Instructions

### 4.1 Installation Instructions

#### 4.1.1 Control cabinet installation

When performing installation inside the equipment control cabinet, please pay attention to the following matters.

（1）Please make sure the installation direction is perpendicular to the wall, use natural convection or fan to cool the equipment, and mount the module firmly on the 35MM international rail through the snap mechanism.

（2）To ensure that cooling can be carried out by natural convection or fan, please refer to the following diagram and leave enough space around the equipment. In order not to make the ambient temperature of the equipment appear locally too high, the temperature inside the electric cabinet needs to be kept even.

（3）When installed side-by-side, it is recommended to leave more than 10mm spacing on each side (if the installation space is limited, you can choose not to leave spacing).




#### 4.1.2 Module mounting and dismounting

- Module Installation

1 Align the extension module side slots with the Q-Series controller slots, then lower it as shown and gently press the extension module.



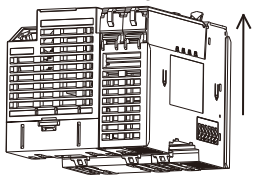




2 After the installation is completed, the following figure shows.

• Module dismounting

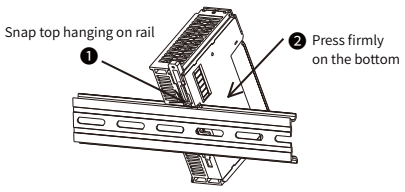
When disassembly is required, press the Q series controller on the left side by hand and pull out the module vertically upward by applying force from the bottom to the top (direction shown in the figure).



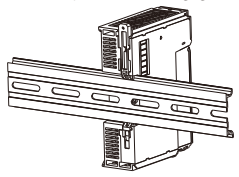
### 4.1.3 (Un)Installation of guide rails

• Guide rail installation

1 The bottom part of the extension module rail slot aligned with the 35MM international rail, so that the upper part of the snap hanging on the international rail, and then press the bottom of the extension module, when you can clearly hear the "click" sound, indicating that the bottom of the snap has been snapped together with the international rail, at this time the extension module installation is complete (installation should ensure that the snap is in a contracted state, otherwise may lead to installation failure).

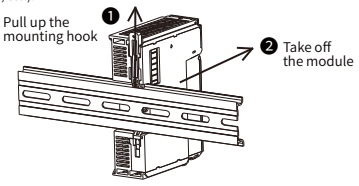



2 After the installation is completed, the following figure shows:



• Guide rails uninstallation

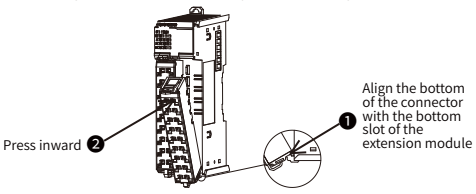
When disassembly is required, pull up the snap for about 5.8MM (when clearly hear the "click" sound, indicating that the snap has been pulled).At this time, the machine can be removed directly to complete the disassembly of the machine (auxiliary tools can be used when pulling the two-way linkage snap, such as: screwdriver, etc.).




### 4.1.4 (Un)installation of connector

• Connector installation

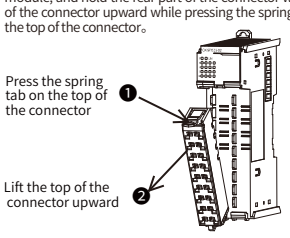
Align the bottom of the connector with the bottom slot of the extension module, align and insert it, press down above the terminal in the direction shown below, and when you hear the "click" that completes the assembly of the connector.



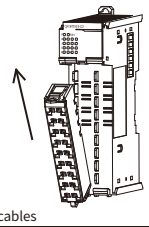



• Connector uninstallation

1 Press the spring tab on the top of the connector firmly with the index or middle finger downward to disengage the top of the connector from the extension module, and hold the rear part of the connector with the thumb and lift the top of the connector upward while pressing the spring tab to completely disengage the top of the connector。



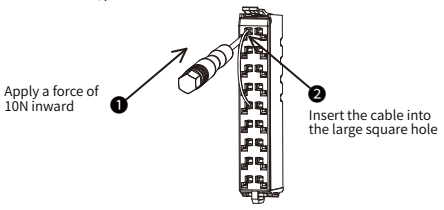

2 Lift the top of the connector so that the connector is at an angle greater than 45° to the extension module, and finally remove the connector in an oblique upward direction, until the connector is completely removed.



### 4.1.5 (Dis)connection of cables

• Cable connection

1 First insert the small screwdriver into the small square hole, apply a force of 10N inward, and subsequently insert the cable into the large square hole. After the cable is inserted, pull out the small screwdriver.

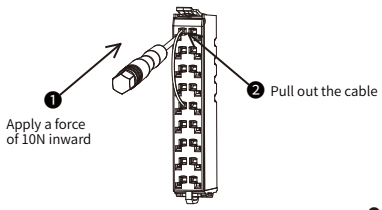



2 After the installation is completed, gently tug the cable, the cable does not fall off, then the installation is complete.




• Cable disconnection

First insert the screwdriver into the small square hole, apply a force of 10N inward, and subsequently pull out the cable and finally pull out the screwdriver.






## Appendix: Object dictionary list

| Object dictionary | Sub-index | Name | Prop-erties | Type | Range | Default Value | Unit | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0x1000 | 00 | Device type | R | UDINT | 0~32767 | 0x40912 | - | 402 |
| 0x1001 | 00 | Error Register | R | USINT | 0~255 | 0 | -- | |
| 0x1008 | 00 | Device name | R | STRING | 0~32767 | | - | HCQX_ST1505-D2 |
| 0x1009 | 00 | Hardware Version | R | STRING | 0~32767 | -- | - | |
| 0x100A | 00 | Software Version | R | STRING | 0~32767 | -- | - | |
| 0x1600 | 00 | Number of sub-indexes | R/W | USINT | 0~32767 | 3 | - | Group 1 Number of default mapped objects |
| | 01~12 | RXPDO Mapped Object Group 1 | R/W | UDINT | 0~0xFFFFFFFF | Omitted | - | Group 1 Default RXPDO mapping object |
| 0x1601 | 00 | Number of sub-indexes | R/W | USINT | 0~32767 | 6 | - | Group 2 Number of default mapped objects |
| | 01~12 | RXPDO mapped object group 2 | R/W | UDINT | 0~0xFFFFFFFF | Omitted | - | Group 2 default RXPDO mapped objects |
| 0x1602 | 00 | Number of sub-indexes | R/W | USINT | 0~32767 | 5 | - | Group 3 Number ofdefault mapped objects |
| | 01~12 | RXPDO mapped object group 2 | R/W | UDINT | 0~0xFFFFFFFF | Omitted | - | Group 3 Default RXPDO Mapped Objects |
| 0x1603 | 00 | Number of sub-indexes | R/W | USINT | 0~32767 | 7 | - | Group 4 Number of default mapped objects |
| | 01~12 | RXPDO mapped object group 3 | R/W | UDINT | 0~0xFFFFFFFF | Omitted | - | Group 4 default RXPDO mapped objects |
| 0x1A00 | 00 | Number of sub-indexes | R/W | USINT | 0~32767 | 7 | - | Group 1 Number of default mapped objects |
| | 01~12 | TXPDO mapped object group 1 | R/W | UDINT | 0~0xFFFFFFFF | Omitted | - | Group 1 default TXPDO mapped objects |
| 0x1A01 | 00 | Number of sub-indexes | R/W | USINT | 0~32767 | 0 | - | Group 2 Number of default mapped objects |
| | 01~12 | TXPDO mapped object group 2 | R/W | UDINT | 0~0xFFFFFFFF | Omitted | - | Group 1 default TXPDO mapped objects |
| 0x1C00 | 00 | Number of sub-indexes | R | USINT | 0~32767 | 4 | - | N/A |
| | 01 | Mailbox output type | R | USINT | 0~32767 | 1 | - | N/A |
| | 02 | Mailbox output type | R | USINT | 0~32767 | 2 | - | N/A |
| | 03 | Process data output type | R | USINT | 0~32767 | 3 | - | N/A |
| | 04 | Process data input type | R | USINT | 0~32767 | 4 | - | N/A |
| 0x1C12 | 0~04 | RXPDO distribution | R/W | UINT | 0~32767 | 1600 | - | N/A |
| 0x1C13 | 0~02 | TXPDO distribution | R/W | UINT | 0~32767 | 1A00 | - | N/A |
| 0x1C32 | 0~0A | RXPDO management parameters | R | UINT | 0~32767 | Omitted | - | N/A |
| 0x1C33 | 0~0A | TXPDO management parameters | R | UINT | 0~32767 | Omitted | - | N/A |
| 0x2001 | 00 | Motor full step pulse number | R/W | UINT | 0~51200 | 200 | -- | Sets the full step resolution of the motor connected to the drive. It defaults to 200, as most motors are 1.8° |
| 0x2002 | 00 | Fine fraction | R/W | UINT | 0-8 | 0-256<br>1-128<br>2-64<br>3-32<br>4-16<br>5-8<br>6-4<br>7-2<br>8-Whole step | -- | Default 0:256 subdivision. If the full step of the motor is 200, it takes 200*256=51200 pulses to rotate one revolution after subdivision |
| 0x2003 | | Current global scaling | R/W | UINT | 32~255 | 0 | -- | 0: Full range<br>1...31 : invalid<br>32...255 : 32 / 256...255 / 256 of the maximum current |
| 0x2004 | 00 | Holding current | R/W | UINT | 0~31 | 0 | -- | Motor current ratio at standstill (0=1/32...31=32/32)<br>Example: When the global current = full range, the maximum drive current = 4.6A, set theratio to 6<br>Then the current = 4.6 * 7/32<br>Note: The maximum drive current is determined by the hardware and is fixed |
| 0x2005 | 00 | Run current | R/W | UINT | 0~31 | 100 | -- | Motor running current ratio (0=1/32...31=32/32)<br>Conversion method is the same as holdingcurrent |
| 0x2006 | 00 | Delay time between when the motor stops and when the current starts to drop | R/W | UINT | 2~255 | 10 | 2^18 tCLK | The delay time between when the motor comes to rest and when the motor starts to drop current. |
| 0x2007 | 00 | Number of cycles of current drop when the motor stops | R/W | UINT | 0~15 | 2 | 2^18 tCLK | The number of clock cycles after the motor stops and the current starts to drop. This avoids motor jumps caused by current changes when the motor is not really stopped. (Duration)<br>0: instantaneous current drop<br>1...15: decaying current every 2^18 clock multiples |
| 0x2008 | 00 | Motor running direction | R/W | UINT | 0~1 | 0 | -- | 0 - the direction of operation remains unchanged; 1- the direction of operation is reversed |
| 0x2009 | 00 | Driver chip version number | R | UINT | 0-255 | 0 | -- | Driver internal driver chip version number 0x30 |
| 0x200A | 00 | Over-temperature alarm level | R/W | UINT | 0~2 | | | 00: 150°C<br>01: 143°C<br>02: 136°C (not recommended when VSA > 24V) |
| 0x200B | 00 | Motor reference speed | R | UINT | 0~65535 | 0 | pps | Motor rotating speed |
| 0x200C | 00 | Actual measurement time between two stepper input signals TSTEP | R | DINT | 0~( 2^20 ) – 1 | - | -- | In units of 1 / fCLK and 256 microsteps<br>Note: Valid in PP/PV mode |
| 0x2010 | 00 | A1 | R/W | UINT | 0~(2^16)-1 | | -- | Acceleration between start-up speed and V1<br>Note: Valid in PP/PV mode |
| 0x2011 | 00 | V1 | R/W | DINT | 0~(2^20)-1 | | -- | First acceleration/deceleration phase threshold speed<br>0 :A1 and D1 are invalid, only acceleration and deceleration speeds are used<br>Note: Valid in PP/PV mode |
| 0x2012 | 00 | D1 | R/W | UINT | 0~(2^16)-1 | | -- | Acceleration between stop speed and and V1<br>Note: Valid in PP/PV mode |
| 0x2013 | 00 | Motor starting speed | R/W | DINT | 0···(2^18)-1 | 0 | -- | Start-up speed<br>Valid in PP/PV mode |
| 0x2016 | 00 | FILT_ISENSE: | R/W | USINT | 0~3 | 0 | -- | The filtering time constant of the sampling opamp. If motor chopping noise is generated due to crosscoupling of the two coils, increase the setting<br>00 : Low - 100ns |

| Object dictionary | Sub-index | Name | Prop-erties | Type | Range | Default Value | Unit | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 01 : - 200ns<br>10 : - 300ns<br>11 : High - 400ns |
| 0x2017 | 00 | Dead-zone time | R/W | USINT | 0~24 | 0 | -- | The minimum setting according to the switching time is safe and avoids a direct pass of the bridge arm. Keep a margin of approx. 30 %<br>0=minimum (100ns) ... 16 (200ns) ... 24=maximum (375ns), not recommended<br>Settings larger than 24 |
| 0x2018 | 00 | Enable PWM mode | R/W | USINT | 0~1 | 1 | -- | StealthChop mode switch<br>Note: Switching in stationary state |
| 0x2019 | 00 | Enables automatic current regulation | R/W | USINT | 0~1 | 1 | -- | Automatic current regulation is recommended |
| 0x2020 | 00 | PWM frequency | R/W | USINT | 0~3 | 0 | -- | %00: fPWM=2/1024 fCLK (reset default value)<br>%01: fPWM=2/683 fCLK<br>%10: fPWM=2/512 fCLK<br>%11: fPWM=2/410 fCLK |
| 0x2021 | 00 | Custom PWM amplitude | R/W | USINT | 0~255 | 0 | -- | User-defined, velocity-dependent gradient for adjusting PWM amplitude |
| 0x2022 | 00 | Custom PWM Amplitude Offset | R/W | USINT | 0~255 | 30 | -- | User-defined PWM Amplitude Offset ( 0-255 ) |
| 0x2025 | 00 | Intelligent current speed threshold | R/W | DINT | 0-2^20-1 | | -- | CoolStep will be enabled when the actual speed (0x200C value) exceeds this speed. Page51 is not enabled when the actual speed is lower than this value<br>Note: Adjust this value according to the value of 0x200C when using. |
| 0x2026 | 00 | Low-speed silent mode (StealthChop mode) speed threshold | R/W | DINT | 0-2^20-1 | | -- | When the actual speed (value of 0x200C) exceeds this speed, turn off the silent chopper mode and switch to the periodic chopper mode<br>Note: Adjust this value according to the value of 0x200C when using. |
| 0x2027 | 00 | THIGH | R/W | DINT | 0~( 2^20 ) – 1 | 0 | -- | TSTEP ⩽ THIGH:<br>CoolStep off<br>StealthChop off<br>If vhighchm is set, the chopper will switch to chm = 1, TFD = 0 (constant off time for slow decay only) If vhighfs is set, the motor runs in full-step mode and the blocking detection switches<br>switch to DcStep stall detection |
| 0x2028 | 00 | Chopper off timeTOFF | R/W | USINT | 0~15 | 5 | -- | Duration of slow decay phase<br>NCLK= 24 + 32*TOFF<br>%0000: Drive output off, all bridge arms off<br>%0001:1 - only if TBL ⩾ 2<br>%0010 ... %1111: 2 ... 15 |
| 0x2029 | 00 | Hysteresis start value HSTRT | R/W | USINT | 0~7 | 4 | -- | |
| 0x2030 | 00 | Hysteresis end value HEND | R/W | USINT | 0~15 | 1 | -- | |
| 0x2031 | 00 | Extinction time TBL | R/W | USINT | 0~3 | 2 | -- | Extinction time |
| 0x2039 | 00 | Encoder position | R | DINT | -2^31~+(2^31)-1 | 0 | -- | Actual encoder position, with symbol |
| 0x2040 | 00 | Encoder accumulation constants | R/W | UINT | 0~65535 | 0 | -- | -- |
| 0x2041 | 00 | Overpressure threshold | R/W | UINT | 0~65535 | 5000 | -- | Input voltage maximum, exceeding will alarm, 5000=50V |
| 0x2042 | 00 | Drive Global Alarm Register | R/W | USINT | 0~255 | 0 | -- | Bit0:<br>Bit1:<br>Bit2:<br>This register can beviewed when the drive is in alarm |
| 0x2043 | 00 | Drive error status register | R | DINT | 0-2^31 | -- | -- | This register can be viewed when the drive is in alarm |
| 0x2057 | 00 | Clear current alarm | R/W | USINT | 0~1 | 0 | -- | 0: Do not clear 1: Clear the current alarm |
| 0x2152 | 01 | Enter 1 Select | R/W | UINT | 0~255 | 0x17 | -- | 0x00:Invalid<br>0x17:Probe 1<br>0x18:Probe 2<br>0x16:Home input<br>0x01:Positive limit<br>0x02:Negative limit<br>0x14:Emergency stop<br>0x19:Custom |
| | 02 | Enter 2 Select | R/W | UINT | 0~255 | 0x18 | -- | -- |
| | 03 | Enter 3 Select | R/W | UINT | 0~255 | 0x16 | -- | -- |
| | 04 | Enter 4 Select | R/W | UINT | 0~255 | 0x01 | -- | -- |
| | 05 | Enter 5 Select | R/W | UINT | 0~255 | 0x02 | -- | -- |
| 0x2153 | 01 | Input 1 Filter time | R/W | UINT | 50—60000 | 50 | ms | Set the input port filter time |
| | 02 | Input 2 Filter time | R/W | UINT | 50—60000 | 50 | ms | Set the input portfilter time |
| | 03 | Input 3 Filter time | R/W | UINT | 50—60000 | 50 | ms | Set the input port filter time |
| | 04 | Input 4 Filter time | R/W | UINT | 50—60000 | 50 | ms | Set the input port filter time |
| | 05 | Input 5 Filter time | R/W | UINT | 50—60000 | 50 | ms | Set the input port filter time |
| 0x2154 | 00 | Input IO polarity configuration | R/W | UINT | 0—65535 | 0 | -- | 0: Normally open, 1 normally closed<br>Polarity control, bit0 corresponds to input 1, and so on |
| 0x2155 | 00 | Input IO Physical Status | R | UINT | 0~255 | 0 | -- | Level state, bit0 corresponds to input 1,and so on |
| 0x2156 | 01 | Output port 1 Function selection | R/W | USINT | 0~255 | 1 | -- | 0:Invalid<br>1: Alarm output<br>4: In place output<br>8:Hold output<br>16: Custom output |
| | 02 | Output port 2 Function selection | R/W | USINT | 0~255 | 4 | -- | -- |
| | 03 | Output port 3 Function selection | R/W | USINT | 0~255 | 8 | -- | -- |



| Object dictionary | Sub-index | Name | Prop-erties | Type | Range | Default Value | Unit | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0x2158 | 00 | Output port output polarity configuration | R/W | UINT | 0~255 | 0 | -- | Polarity control, bit0/bit corresponds to output 1/2 |
| 0x2159 | 00 | Action when not enabled | R/W | UINT | 0~1 | 0 | -- | 0:Motor not locked;.<br>1:Motor locked; |
| 0x2203 | 00 | Bus voltage value | R | USINT | | -- | V | Current driver supply voltage, expanded 100 times |
| 0x2210 | 00 | ESC port 0 receive error count register | R | USINT | 0~255 | 0 | -- | For debugging |
| 0x2211 | 00 | ESC port 1 receive error count register | R | USINT | 0~255 | 0 | -- | For debugging |
| 0x2212 | 00 | ESC port 2 receive error count register | R | USINT | 0~255 | 0 | -- | For debugging |
| 0x2213 | 00 | ESC port 3 receive error count register | R | USINT | 0~255 | 0 | -- | For debugging |
| 0x2214 | 00 | ESC port 4 receive error count register | R | USINT | 0~255 | 0 | -- | For debugging |
| 0x2215 | 00 | ESC port 5 receive error count register | R | USINT | 0~255 | 0 | -- | For debugging |
| 0x2216 | 00 | ESC port 6 receive error count register | R | USINT | 0~255 | 0 | -- | For debugging |
| 0x2217 | 00 | ESC port 0 lost link count register | R | USINT | 0~255 | 0 | -- | For debugging |
| 0x2218 | 00 | ESC port 1 lost link count register | R | USINT | 0~255 | 0 | -- | For debugging |
| 0x2219 | 00 | ESC watchdog count register | R | USINT | 0~255 | 0 | -- | For debugging |
| 0x221A | 00 | ESC register F28_F31-1 | R | USINT | 0~255 | 0 | -- | For debugging |
| 0x221B | 00 | ESC register F28_F31-1 | R | USINT | 0~255 | 0 | -- | For debugging |
| 0x221C | 00 | ESC register F28_F31-1 | R | USINT | 0~255 | 0 | -- | For debugging |
| 0x221D | 00 | ESC register F28_F31-1 | R | USINT | 0~255 | 0 | -- | For debugging |
| 0x4003 | 00 | Release delay time of holding brake | R/W | UINT | 0~3000 | 50 | ms | Enable to release holding signal time |
| 0x4004 | 00 | Locking time delay of holding brake | R/W | UINT | 0~3000 | 50 | ms | Time from non-enabling to holding brake lock |
| 0x5000 | 00 | Target arrival status | R | USINT | 0~255 | -- | -- | Bit0=0: not arrived<br>Bit0=1: Arrived<br>Bit1=0: no blocking occurred<br>Bit1=1: blocking occurred |
| 0x5001 | 01-06 | Firmware compilation date time | R | UINT | 0~32767 | -- | -- | -- |
| 0x6040 | 00 | Control word | R/W | UINT | 0~65535 | 0 | -- | |
| 0x6041 | 00 | Control word | R | UINT | 0~65535 | 0 | -- | |
| 0x605A | 00 | Quick Stop Code | R/W | INT | 0~65535 | 6 | -- | -- |
| 0x6060 | 00 | Operation Mode | R/W | USINT | 0~255 | 8 | -- | 1—pp,3—pv,6—Home,8--CSP |
| 0x6061 | 00 | Operation mode display | R | USINT | 0~255 | 8 | -- | -- |
| 0x6062 | 00 | Command Position | R | DINT | -2^31~ (2^31)-1 | 0 | P | P indicates pulse unit |
| 0x6064 | 00 | Actual Position | R | DINT | -2^31~ +(2^31)-1 | 0 | P | -- |
| 0x606A | 00 | Encoder selection | R/W | INT | -1~0 | -1 | -- | -1:No encoder, 0:Use encoder |
| 0x606B | 00 | Command speed | R | DINT | 0~(2^23)-512 | 0 | P/S | -- |
| 0x606C | 00 | Actual speed | R | DINT | +-(2^23)-1 | 0 | P/S | -- |
| 0x607C | 00 | Origin Offset | R/W | DINT | -2^31~ +(2^31)-1 | 0 | P | Home mode Origin offset |
| 0x607D | 01 | Soft limit in negative direction | R/W | DINT | -2^31~ +(2^31)-1 | 0 | P | -- |
| 0x607D | 02 | Soft limit in positive direction | R/W | DINT | -2^31··· +(2^31)-1 | 0 | P | -- |
| 0x607A | 00 | Target position | R | DINT | -2^31~ +(2^31)-1 | 0 | P | pp mode target position |
| 0x60FF | 00 | Target speed | R | DINT | 0~(2^23)-512 | 0 | P/S | pv mode maximum speed |
| 0x6081 | 00 | Trapezoidal speed | R/W | UDINT | 0~(2^23)-512 | 5120 | P/S | pp mode maximum speed |
| 0x6082 | 00 | Start/Stop Speed | R/W | UDINT | 0~(2^18)-1 | 0 | P/S | pp mode jumpingspeed |
| 0x6083 | 00 | Acceleration | R/W | UDINT | 0~(2^16)-1 | 4096 | P/S^2 | pp、pv mode acceleration |
| 0x6084 | 00 | Deceleration | R/W | UDINT | 0~(2^16)-1 | 4096 | P/S^2 | pp、pv mode deceleration |
| 0x608F | 00 | Encoder resolution | R/W | UDINT | 200~20000 | 4000 | -- | 1000 line encoder, 4xfrequency |
| 0x6098 | 00 | Origin Method | R/W | UINT | 1~100 | 19 | -- | Home mode origin method |
| 0x6099 | 01 | Homing speed 1 | R/W | UDINT | 0~(2^23)-512 | 50000 | P/S | Home mode to find limit switch speed |
| | 02 | Homing speed 2 | R/W | UDINT | 0~(2^23)-512 | 25000 | P/S | Home mode to find theorigin signal speed |
| 0x609A | 00 | Return to zero plus or minus speed | R/W | UINT | 0~(2^16)-1 | 25000 | P/S^2 | Home mode plus or minus speed |
| 0x60FD | 00 | Input IO state | R | UDINT | 0~4294967296 | 0 | -- | Input IO function logic state |
| 0x60FE | 01 | Physical output on | R/W | UDINT | 0~4294967296 | 0 | -- | Master output signal control word |
| 0x60FE | 02 | Physical Output Enabled | R/W | UDINT | 0~4294967296 | 0 | -- | Master output signal control word |
| 0x6502 | 00 | Support operation mode | R | UDINT | 0~4294967296 | 165 | -- | Control modes supported by the drive |