

ZE300_GUI software user guide V3.03d

The host software functions are implemented based on the custom RS485 communication protocol. For more details, refer to the custom RS485 communication protocol document. The refresh rate of real-time motion and status information depends on the communication baud rate.

The screenshot displays the ZE300_GUI software interface, version V3.03d. The interface is divided into several sections:

- Connection Setup:** Port: COM39, Address: 1, Baud: 115200. Buttons: Connect, Firmware: xxxx, RS485 Protocol: xxxx, Boot Ver: xxxx, Hardware: xxxx, CAN Protocol: xxxx, UID: xxxx. A language selector for 简体中文 is present.
- Real Time Info:** Displays a circular gauge for Single Turn Angle (000.000°) and Multi Turn Angle (000.000°). It also shows Bus Voltage (00.00V), Bus Current (00.00A), Temperature (00°C), Run Status (xxxx), Motor Status (xxxx), Fault Code (xxxx), Velocity (0000.00Rpm), and Iq Current (00.000A).
- Configuration:** Includes tabs for Motor, Stabilization, Profile, and Update. It contains settings for Encoder, Change Direction, Enable 2nd Encoder, Velocity LPF-tf, Device Address, RS485 Baud, CAN Baud, C_LoopGain, and various fault settings (Voltage, Current, Temperature) with Max Value and Over Time parameters. It also includes Read only info for Elec Angle Offset, Mechanical Offset, and Phase U, V, W Offsets. Buttons for Read and Write And Save are provided.
- Current Velocity Position MIT Sine Test Other:** Displays Iq Current (0.000 A) and Current Slope (0.000 A/s). It includes a Tip: Torque = Iq * torque constant.
- Command:** Features buttons for Clear Fault, Back Home By Shortest, Set Home Position, Calibrate Encoder, Restore Parameters, Restart, and a prominent MOTOR OFF button. A Timeout: 0 indicator is shown.
- Stabilization:** Contains PID Control settings (Kp, Ki, Output Limit) for Position and Velocity, and MIT Control settings (MIT Position Max, MIT Velocity Max, MIT Torque Max, MIT Pos KP Max, MIT Vel KD Max). Buttons for Read, Write, and Write And Save are included.
- Update:** Includes a Name field, Pole-pair, Phase resistance, Phase inductance, Torque constant, and Gear ratio settings. It features an Import JSON parameters button and Read/Write And Save buttons.
- Instructions:** A text area providing steps for connecting the serial port, reading the version, selecting firmware, writing the firmware, and restarting the machine. A Clear button is also present.

Current	Velocity	Position	MIT	Sine Test	Other
Tip: Torque= Iq * torque constant. Iq Current: 0.000 A Current Slope: 0.000 A/s Send Cmd					
Current	Velocity	Position	MIT	Sine Test	Other
Velocity: 0.00 Rpm Acceleration: 0.00 Rpm/s Send Cmd					
Current	Velocity	Position	MIT	Sine Test	Other
Tip: The Count value for 360 degrees is 16384. Control Type: Absolute position control Count: 0 Count Send Cmd					
Current	Velocity	Position	MIT	Sine Test	Other
Target Position: 0.000 rad Target Speed: 0.000 rad/s Position Gain KP: 0.000 Velocity Gain KD: 0.000 Target Torque: 0.000 Nm Send Cmd					
Current	Velocity	Position	MIT	Sine Test	Other
Test Type: Iq Current Control Frequency: 0.000 Hz Iq Amplitude: 0.000 A Start Test Stop Test					
Current	Velocity	Position	MIT	Sine Test	Other
Brake Control: Brake Engaged Brake Status: XXXX Send CMD					

➤ Serial connection settings ("Connection Setup")

If the product does not include a USB interface, prepare a USB-to-RS485 adapter. Power the product before connecting it to the host software; the supply voltage depends on the product model. The factory-default device address is 1 and the baud rate is 115200. If the current device address is unknown, use common address 255 to connect. Click Connect to establish communication between the host software and the product.

➤ Version information

- 1) Software version: Version number of the application software.
- 2) Hardware model: Manufacturer's internal hardware code for the current drive board.
- 3) RS485 protocol version: The first 2 digits indicate the custom protocol version, and the last two digits indicate the Modbus protocol version. "00" indicates that the current application software version does not support the protocol.
- 4) CAN protocol version: The first 2 digits indicate the custom CAN protocol version, and the last two digits indicate the CANopen protocol version. "00" indicates that the current application software version does not support the protocol.
- 5) Boot version: Version of the boot firmware used for firmware updates.
- 6) UID: Unique serial number of the product. Click it to copy the current serial number.

➤ Interface language

The interface can be switched between Chinese and English. When the system

language is Chinese, the software starts with the Chinese interface; for other system languages, it starts with the English interface.

- Real-time information ("Real Time Info")
 - 1) Single-turn absolute angle: Displays the motor's current single-turn absolute position. (The Count value for one motor revolution is 16384.)
 - 2) Multi-turn absolute angle: Multi-turn absolute angle accumulated while the motor operates after power-on; not retained after power loss. (The Count value for one motor revolution is 16384.)
 - 3) Rotational speed: Current motor speed.
 - 4) Q-axis current: Torque = Q-axis current * torque constant. Indicates the current motor output torque. Refer to the product documentation for the torque constant.
 - 5) DC bus voltage: Product supply voltage.
 - 6) DC bus current: Supply current during product operation. (This current value is invalid during encoder calibration.)
 - 7) Operating temperature: System operating temperature.
 - 8) Operating state: Indicates the product's current operating mode.
 - 9) Motor state: Indicates whether the motor is enabled or disabled.
 - 10) Fault code: Displays the current fault. Hover over the fault code to view fault information.

- User parameters ("Configuration" tab)
 - 1) Encoder: For products without an encoder, use this parameter to configure the encoder model installed on the motor.
 - 2) Reverse encoder direction: Changes the motor's rotation direction.
 - 3) Enable second encoder: When the hardware supports a second encoder, this setting enables or disables it.
 - 4) Speed filter coefficient: Used for speed filtering. Range: 0~1; default: 0.4.
 - 5) Device address: Device address for RS485 or CAN bus communication.
 - 6) RS485 baud rate: Baud rate for RS485 communication.
 - 7) CAN bit rate: Bit rate for CAN communication.
 - 8) Maximum voltage/current/temperature: Thresholds for DC bus voltage, DC bus current, and operating temperature.
 - 9) Voltage/current/temperature fault delay: A fault is reported when the DC bus voltage, DC bus current, or operating temperature exceeds its configured threshold for longer than the configured duration. Unit: seconds.
 - 10) Current-loop bandwidth (C_LoopGain): Adjusts the current-loop gain to set the current-loop bandwidth.
 - 11) Electrical angle offset: Parameter obtained from encoder calibration.
 - 12) Mechanical angle offset: Parameter obtained by setting the current position as the origin.
 - 13) UVW phase-current offset: Parameter obtained from phase-current calibration.

- 14) Read: Reads the saved user parameters.
- 15) Write and save: Writes and saves the user parameters.

- Motor hardware parameters ("Motor" tab)

For products with an integrated motor and drive, do not modify the motor hardware parameters arbitrarily. For products with a separate motor and drive, configure or import parameters for the actual motor being used. Contact sales for importable motor parameter files in JSON format.
- Motion-control parameters ("Stabilization" tab)
 - 1. PID parameters for motor position-loop and speed-loop control. Adjust the PID parameters for the actual load and operating conditions so that product operation meets the application requirements.
 - 2. Configure the parameters related to MIT control.
 - ① Read: Reads the saved user parameters.
 - ② Write: Writes the current parameters without saving them; the written parameters take effect immediately. The motor remains enabled.
 - ③ Write and save: Writes and saves the parameters to the system. The motor does not remain enabled.
- Firmware update ("Update" tab)

Contact sales for the latest firmware. Follow the instructions in the interface information box to update the firmware. Real-time motion and status information is not refreshed during the firmware update.
- Q-axis current control ("Current" tab)

$\text{Torque} = \text{Q-axis current} * \text{torque constant}$. Controlling Q-axis current controls torque. Current slope ("Current Slope" in the interface): If the target Q-axis current is 2A and the current slope is 1A/S, the drive linearly increases the Q-axis current to the target value over 2 seconds.
- Speed control ("Velocity" tab)

Controls motor rotational speed. Acceleration: If the target speed is 100Rpm and the acceleration is 10Rpm/S, the drive linearly increases the output speed to the target value over 10 seconds.
- Position control ("Position" tab)
 - 1) Absolute position control: Rotates relative to the multi-turn absolute angle. If the current multi-turn absolute angle is 100° and the absolute position control target angle is 90°, the motor rotates 10° in reverse.
 - 2) Relative position control: Rotates relative to the current angle. If the relative position control target angle is 90°, the motor rotates 90 degrees forward.

- MIT control ("MIT" tab)

Set the target position, velocity feedforward, proportional gain K_p , derivative gain K_d , and torque feedforward to achieve hybrid force-position control.
- Holding brake control ("Other" tab)

Reads the current holding-brake state and controls the brake on/off state.
- Control commands
 - 1) Restore default parameters ("Restore Parameters" button): Restores system parameters to their default values. The device address and encoder calibration parameters are not restored.
 - 2) Encoder angle calibration ("Calibrate Encoder" button): Encoder calibration can be performed only when the system operating state is idle. During calibration, the motor rotates forward and in reverse for approximately 30~90 seconds. Ensure that the motor is unloaded and can rotate freely during this period.
 - 3) Set current position as origin ("Set Home Position" button): Sets the current position as the motor's mechanical origin.
 - 4) Return motor to origin by shortest path ("Back Home By Shortest" button): The motor returns to the origin by the shortest path, rotating no more than 180° .
 - 5) Clear current faults ("Clear Fault" button): Clears the current faults.
 - 6) System restart ("Restart" button): Restarts the drive board.
- Disable motor ("MOTOR OFF" button)

Click this button to disable the motor when motor output needs to be turned off or motor rotation needs to be stopped in an emergency.
- Communication timeout ("Timeout")

Indicates whether communication is operating normally. The value increments when a communication timeout or error occurs.