

RT10 EA Series AC Servo Drive

User Manual



A&TS TECHNOLOGY CORPORATION LIMITED

<https://www.a-ts.ltd>

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Version	Product	Release Date	Note
V-20-01	RT10	10.07.2020	N/A
V-21-02	RT10	21.04.2021	N/A
V-23-01	RT10-EA	08.09.2023	N/A
V-25-01	RT10-EA	19.09.2025	N/A

Forward

The RT10 series AC servo is provided by the A&TS Technology Corporation Limited in China.

To have a thorough understanding, please read this manual carefully and follow all safety precautions before moving, installing, operating and maintaining the servo.

This manual provides guidance on safety precautions, product specifications, installation and wiring, keyboard operation, parameter settings, alarms, trouble-shooting, routine maintenance etc. It doesn't include all the security matters or considerations.

Local laws and regulations

All the local laws, regulations, and codes of practice should be obeyed first, besides the instructions in the manual.

Disclaimer of Liability




We have reviewed the contents of this publication to ensure consistency with the hardware and software described.

Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Thank you for choosing A&TS.

A&TS, automation technologies, at your services.

In this document, the following symbols may appear. The represented meaning is as follows.

Symbol	Instructions
 DANGER	Attention, please! If there is improper operation, it may cause serious consequences such as personal safety, equipment safety or environmental safety.
 WARNING	Be careful! If there is improper operation, it may cause major accident, such as equipment damage or physical injury.
 ATTENTION	If there is misoperation, it may cause bad effects or cannot be operated normally. Generally speaking, the issues caused could be solved.
INSTRUCTIONS	It is widely used. It reminds the instructions and prompts.
EXAMPLE	For the better understanding of the users, to show a brief example
NOTE	It indicates small functions and tips unnoticeable that are very convenient to use.

1 Safety Precautions

1.1 General precautions

This manual provides guidance on safety precautions, product specifications, installation and wiring, keyboard operation, parameter settings, alarms, trouble-shooting, routine maintenance etc. It doesn't include all the security matters or considerations.

When installing, operating, and maintaining the RT10 series ac servo, please follow all the safety instructions in this manual, especially where there is safety symbols. All the safety symbols are the tips to the safety precautions. It doesn't include all the security matters or considerations.

For any injury or loss caused by improper operation, the A&TS technology will not take the responsibility. The A&TS technology is not legally bound in any manner either.

Basic installation requirement

- Only qualified or strictly trained engineers are allowed to install, operate and maintain equipment.
- Only qualified professionals are allowed to dismantle devices and repair equipment.
- Replacing or changing hardware and software must be carried out by the authorized engineers.
- The operator shall report the failure or error to the person in charge in time promptly.

Grounding requirement

The following requirements are for devices that need to be grounded only.

- Before installing the equipment, grounding first. When removing the equipment, keep the grounding until the end.
- It is forbidden to damage the grounding conductor.
- It is forbidden to operate equipment without the grounding conductor.
- The equipment shall be grounded always. Before operating, make sure the electrical connection is fine and reliable.

Equipment safety

- Before operation, the equipment should be fixed in the electric cabinet or on other stable objects firmly, such as the table or floor.
- When the system is running, make sure the air vent is unobstructed.
- When installing the equipment, to tighten the screws, use the tool.
- After complete the installation, please take all the empty packing materials area away.

2 Product Information

2.1 Product introduction

RT10 series servo is all digital ac servo drive, with high reliability, performance and cost effectiveness.

- RT10 servo drive, working at single-phase or three-phase 220V AC voltage, with 220V three-phase AC servo motor.
- Supports position control, speed control and torque control mode.

- Supports ABZ incremental encoder, standard incremental encoder, absolute encoder including Tamagawa, Panasonic, BISS, EnDat and Nikon, and ME (magnetolectricity encoder).
- EA series supports the EtherCAT industrial fieldbus interface.
- The EA bus series product supports to extend the internal I/O to the PLC I/O interface.
- Supports internal speed mode and demonstration running mode.



WARNING

RT servo products are general industrial products, please do not use on equipment that may endanger personal safety. If the user needs to apply it to specific applications such as medical or aerospace equipment, please contact A&TS.

2.2 Model Designation

RT10 – EA 030 L – E02 – X C X

RT10 series ac servo drive

Series

Power level

Voltage

Encoder type

Version code

Code	Series
PA	Pulse series A type
EA	EtherCAT bus series A type

Code	Peak current
005	6.4A
010	10.6A
015	15.6A
030	20.2A
040	25.8A
050	48.0A

Code	Voltage level
L	Low voltage, single/three-phase 220V
H	High voltage, three-phase 380V

Code	Incremental	ABZ incremental	Absolute encoder type				
			BISS	Tamagawa	Panasonic	Nikon	ME
E00	●	●	x	●	x	x	x
E01	x	x	●	x	x	x	x
E02	●	●	x	●	●	x	●
E04	x	x	x	x	x	●	x

Figure 2- 1 RT10 series AC servo drive type designation

INSTRUCTIONS

- Support this feature.
- × Don't support this feature.

Version code: In XCX, X represents the default configuration model, B represents type B, and C represents type C.

2.3 Technical specifications

Table 2- 1 RT10 EA series AC servo drive technical specification

Model	RT10 EA series AC Servo Drive					
RT10-EA□□□L-XB	005	010	015	030	040	050
Power supply	Single/Three-phase AC220V, -15%~+10%, 50/60Hz			Three-phase AC220V, -15%~+10%, 50/60Hz		
Rated current RMS value (A)	1.6	2.8	5.5	11.6	14.0	21.0
Peak current (rmsA)	6.4	10.6	15.6	20.2	25.8	48.0
Maximum peak current (A)	9.0	15.0	27.0	28.5	35.0	68.0
RT10-EA□□□L-XC	/	010	015	030	040	050
Power supply	Single AC220V, -15%~+10%, 50/60Hz			Single/Three-phase AC220V, -15%~+10%, 50/60Hz		
Rated current RMS value (A)	/	3.5	5.9	8.0	12.0	16.0

Peak current (rmsA)	/	10.6	15.6	20.2	25.8	48.0
Maximum peak current (A)	/	15.0	22.0	28.0	36.6	56.0
Environment	Temperature	Working 0-55°C (If the ambient temperature is between 45~55°C, the average load should not exceed 80%.) Storage -20°C-65°C				
	Humidity	Working 40%-80% (No condensation) Storage Less than 93% (No condensation)				
Protection grade	IP20					
Control method	PWM sine wave vector control					
Regenerative braking	External	Optional, built-in or external				
Feedback	ABZ incremental encoder, Standard incremental encoder, and Absolute encoder					
Fieldbus	EA series supports the EtherCAT industrial fieldbus interface The fieldbus interface product supports to extend the internal I/O to the PLC I/O interface					
Control mode	Position/Speed/Torque/Homing(Return origin)					
Control input	Up to 7/5 input terminals (optoelectronic isolation). Servo-enable, alarm clearance, CWL, CCWL, forward torque limitation, reverse torque limitation, zero speed clamp, internal speed selection 1, internal speed selection 2, mode switch 1, mode switch 2, forward jog, backward jog, torque command direction setting, speed command direction setting, electronic gear selection 1, electronic gear selection 2, positional deviation clearance, pulse input prohibition, return origin(homing) trigger, return origin (homing) reference point, external hand wheel pulse generator, touch-probe function					
Control output	Up to 5/3 output terminals (optoelectronic isolation).					

		Servo ready (S-RDY), alarm, zero speed, positioning complete, speed reached, torque reached, electromagnetic brake, servo in operation, positioning nearby, torque in limitation, speed in limitation, return origin (homing) complete.
Position	Command source	Internal position command, Bus command
	Electronic gear ratio	Numerator, 1-32767 Denominator, 1-32767
Speed	Command ACC/DEC	Parameter setting
	Command source	Internal speed command, bus command
Torque	Speed limitation	Parameter setting
	Command source	Internal torque command, bus command
Special function		Touch-probe function, Homing (return origin), gain switch, mechanical resonance notch filter
Monitoring function		Rotation speed, current position, position deviation, motor torque, motor current, etc.
Protection function		Over speed, over voltage, over current, over load, braking abnormal, encoder abnormal, position out of tolerance, etc.

3 Installation and Wiring

3.1 Installation

When installing, operating and maintaining the RT series ac servo drive, please follow the instructions in the manual.

3.1.1 Installation environment

- Working temperature 0-55°C
- Working humidity below 80% RH (no condensation)
- Storage temperature -20°C-65°C
- Storage humidity below 80% RH (no condensation)
- Vibration below 4.9 m/s²
- Altitude below 2000m
- Install in a well-ventilated place with little humidity and dust
- Install in the place without corrosive gas, flammable gas, pyrophoric gas, oil gas, cutting fluid, cutting powder, or iron powder etc.



WARNING

- When in a vibration environment, to prevent transmitting vibration to the servo drive, please install the anti-rattle device on the mounting surface of the servo drive.
- When it has to be used in a corrosive gas environment, please try to keep corrosive gas out of the devices. The corrosive gas will cause the

aging of electronic components and circuit boards.

3.1.2 Products appearance and dimensions

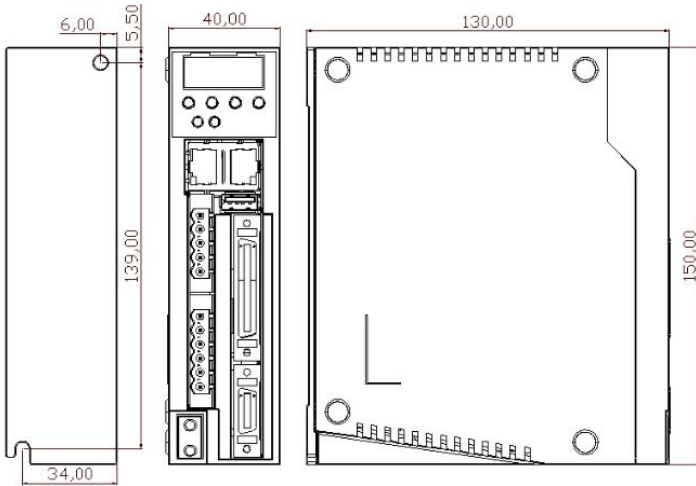


Figure 3-1 RT10-EA005L-XB appearance and dimensions (Unit, mm)

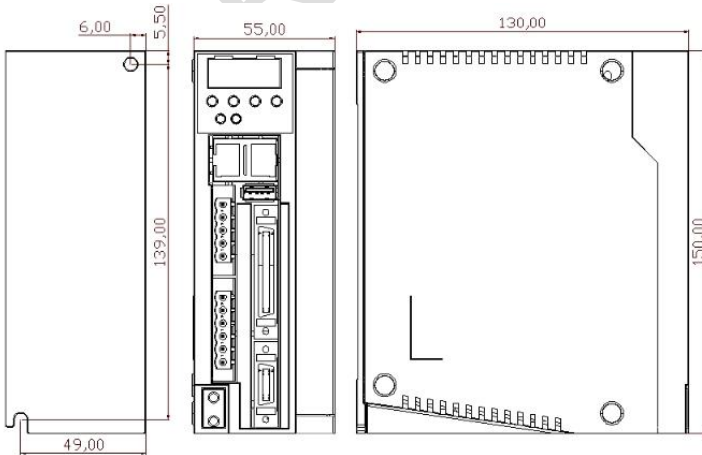


Figure 3-2 RT10-EA010L-XB appearance and dimensions (Unit, mm)

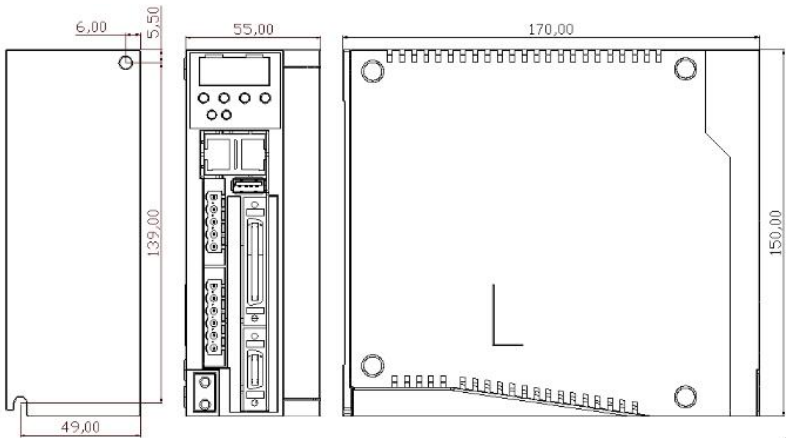


Figure 3-3 RT10-EA015L-XB appearance and dimensions (Unit, mm)

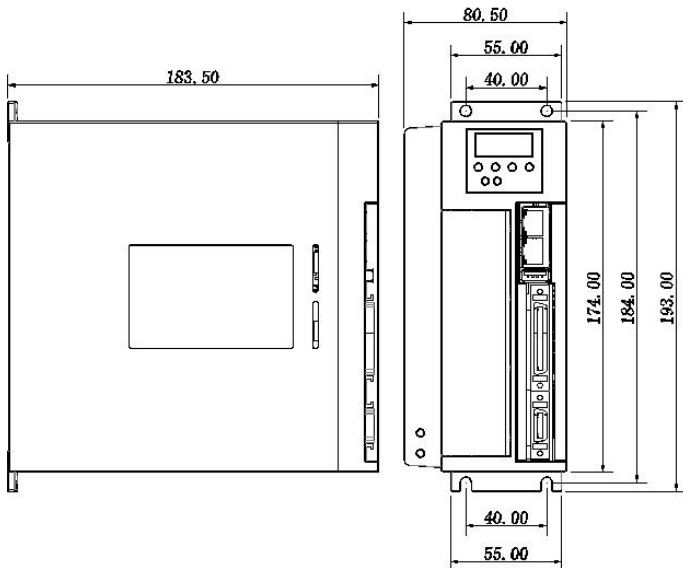


Figure 3-4 RT10-EA030L-XB appearance and dimensions (Unit, mm)

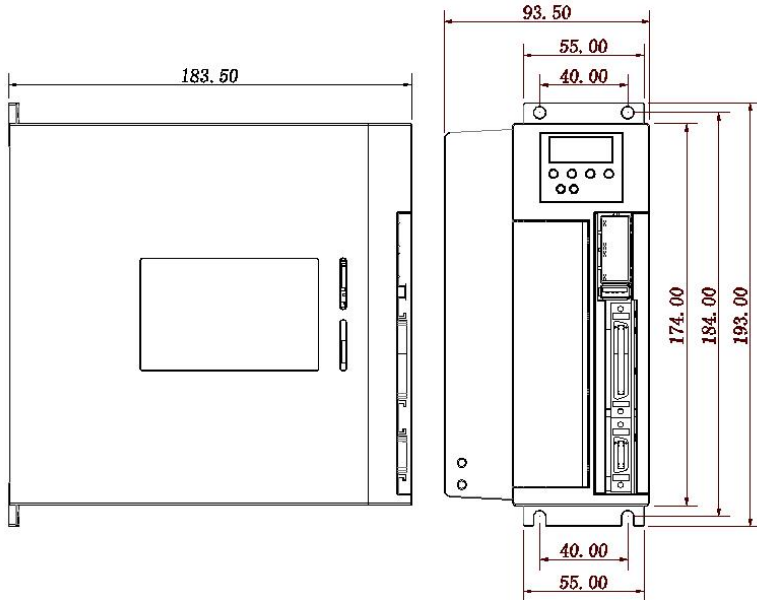


Figure 3-5 RT10-EA050L-XB appearance and dimensions (Unit, mm)

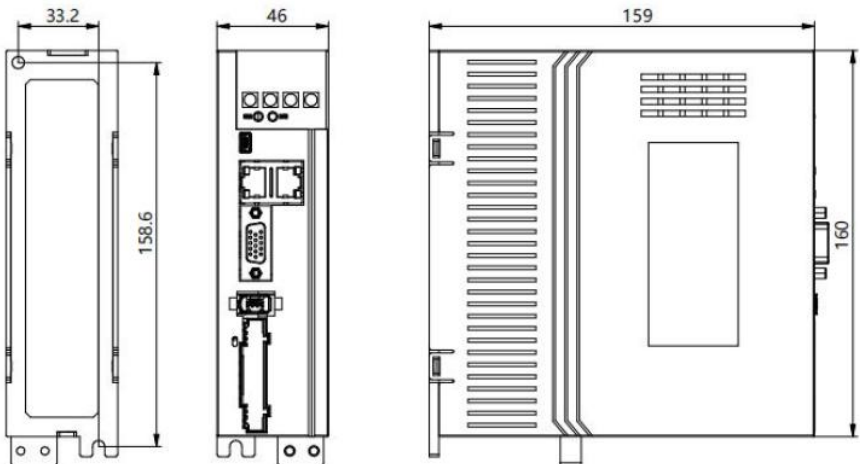


Figure 3-6 RT10-EA010L-XC and RT10-EA015L-XC appearance and dimensions (Unit, mm)

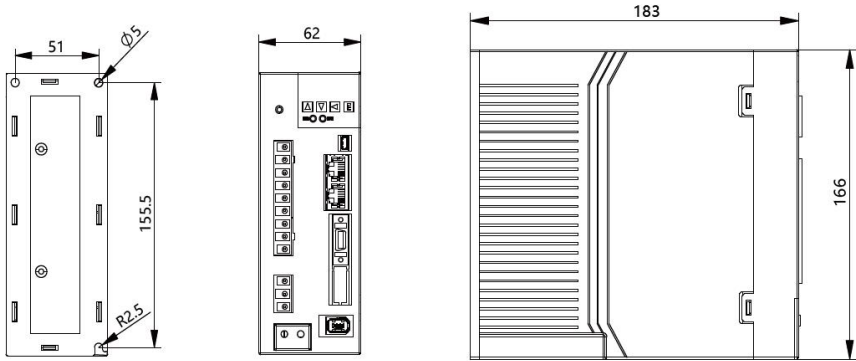


Figure 3-7 RT10-EA030L-XC appearance and dimensions (Unit, mm)

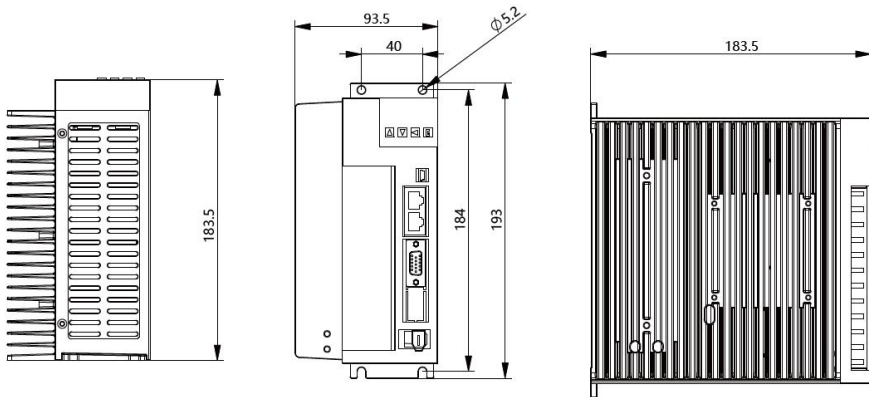


Figure 3-8 RT10-EA040L-XC and RT10-EA050L-XC appearance and dimensions (Unit, mm)

3.2 Wiring and terminals

3.2.1 Wiring diagram

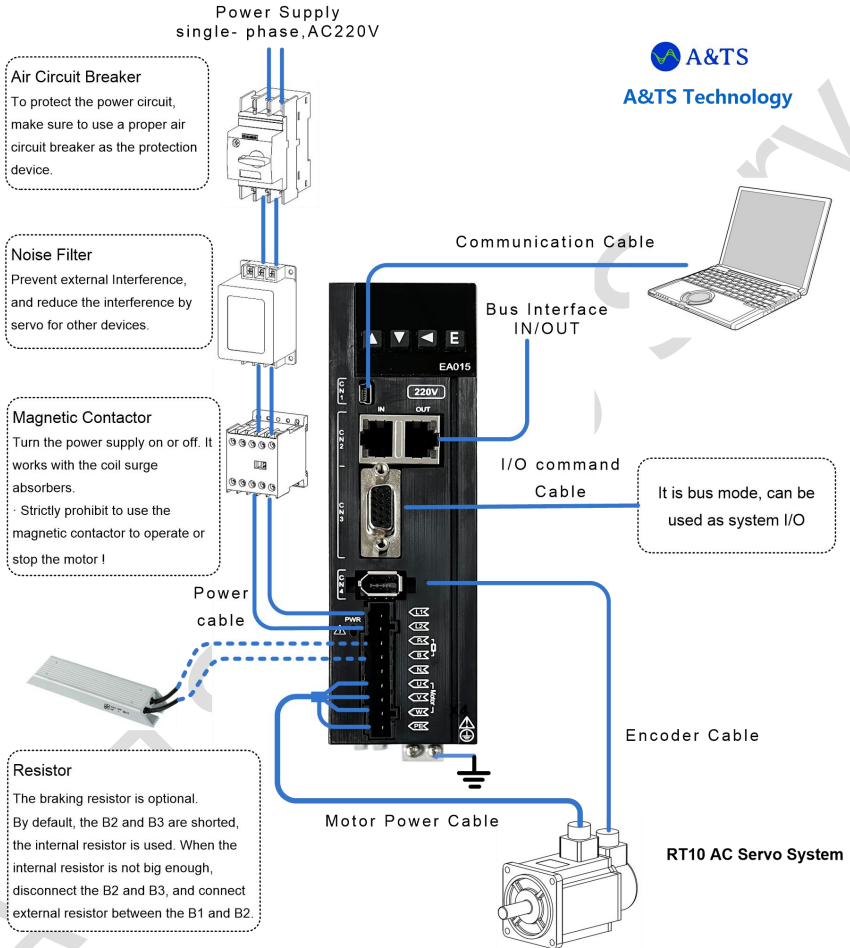


Figure 3- 12 RT10-EA-XC series AC servo system wiring diagram



- Wiring operation should be performed by professional technicians.

- In order to avoid electric shock, after turn off the power, wait for more than 5 minutes, and then disassemble the drive.
- Please connect the servo drive and servo motor after completing the installation, otherwise it may cause electric shock.
- Do not damage the cable, apply excessive pressure to it, hang heavy objects or squeeze, etc., otherwise it may cause electric shock.
- To avoid electric shock, please insulate the power terminal wiring.
- The specifications and installation methods of external wiring must be complied with all the local regulations.
- Make sure to ground the entire system.

**WARNING**

- Please wire correctly and carefully, otherwise it will cause abnormal operation of the servo motor and may cause injury.
- Do not make mistakes in the connection terminals, otherwise it may cause cracks and damage.
- Do not connect 380V power supply to the drive, otherwise it will cause damage to the servo drive.

INSTRUCTIONS

- RT-STP is the RT Servo Tuning Program. It's a tuning and debugging software provided by the A&TS Technology. For more details, please contact with us at www.a-ts.ltd.

4 Display and Keyboard Operation

4.1 Basic operation

The operation panel consists of a five-digit LED tube, two indicator lights and four buttons, as shown in the Figure 4-1.

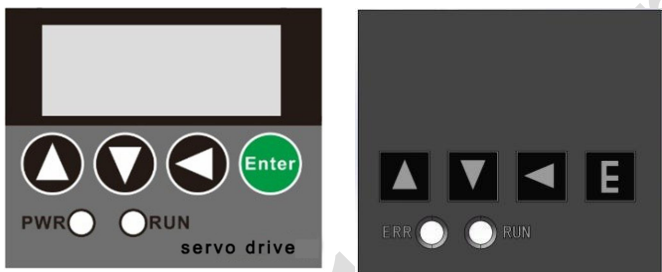


Figure 4-1 Operation panel

ERR: The indicator lights up to show that the servo drive has an alarm.

RUN: The indicator lights up to show that the servo drive has been enabled and the motor is powered on.

Five-digit LED tube

The LED digital tube is used to display the states and parameters of the servo drive.




If the decimal point of the rightmost eight-segment digital tube flashes, it means there are alarms in the servo system.

Numeric display

The numerical value is displayed by 5 digital tubes, and there are prefix characters in front of some display items. If the displayed value is a negative number, the decimal point of the displayed value will be lit, and when the

decimal value is greater than -10000, the highest digit will display a negative sign '-'.
-

EXAMPLE

 represents the positive number 12345;  represents the negative number -12345;  represents the negative number -2345.

Four keys



Up key, turn up the display page, increase the serial number or value.



Down key, scroll down the display page, reduce the serial number or value.



Return key, return, cancel.



Enter key, Enter or OK.

Two LED indicator

PWR, Indicates that the main circuit of the RT servo driver has been powered on.

RUN, Indicates that the RT servo drive has been enabled and the servo motor is powered on.

4.2 First level menu

The first-level menu is used to select the operation mode. Use the up or down key to cycle through 7 operating modes. Press the OK key to enter the

second-level menu, and press the return key to return to the first-level menu. The detailed switching method is shown in Figure 4-2.

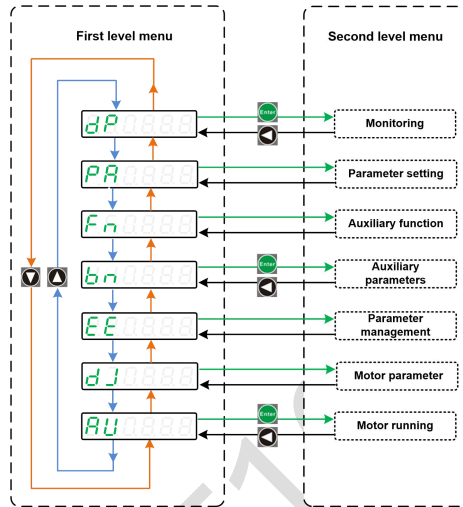


Figure 4-2 First level menu

5 Running

Trial running without load

The purpose of trial running is to confirm whether the following items are correct.

- The servo drive power supply wiring
- The servo motor wiring
- Encoder wiring
- The servo motor running direction and speed

5.1 Wiring and inspection

Before power on, please check the motor.

- Confirm that the motor is unloaded. Do not install a load on the motor shaft. If it has been installed on a machine, please disengage the coupling.
- Since the motor vibrates during acceleration and deceleration, the motor must be fixed.
- Wire as shown below and check the following items before turning on the power.

(1) Is the wiring correct? In particular, do the L1/L2/L3 wiring and U/V/W wiring correspond to the motor one-to-one?

(2) Is the input voltage correct?

(3) Is the encoder cable wiring correct?

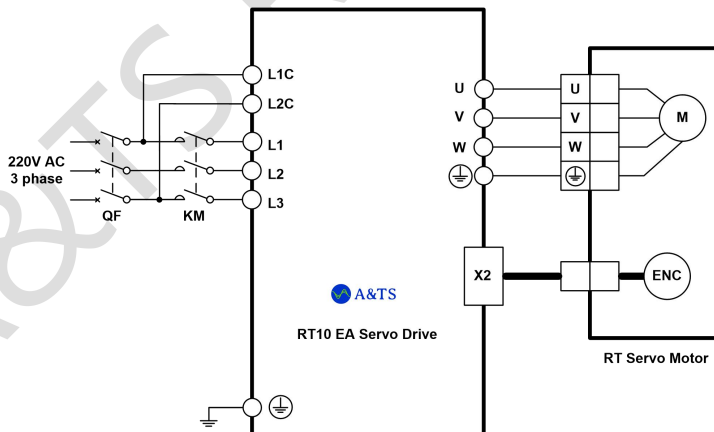


Figure 5-1 RT10-XB servo drive wiring diagram

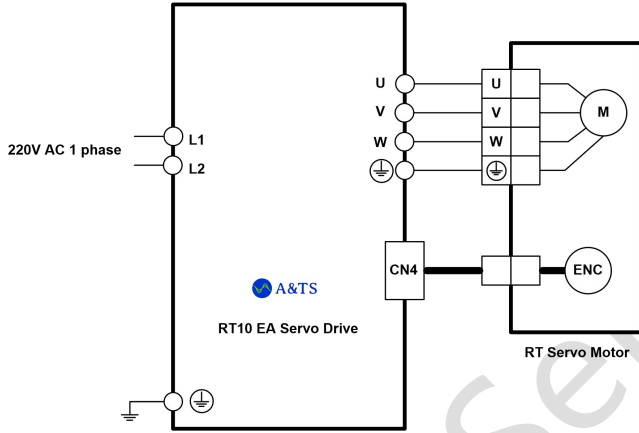


Figure 5-2 RT10-XC servo drive wiring diagram

5.2 Electromagnetic brake

The electromagnetic brake is used to lock the vertical or tilted workbench connected to the motor to prevent the workbench from falling after the servo power is lost. To realize this function, users need to use a motor with a brake. Brakes should only be used to hold the table and should never be used to slow down or stop machine movement.

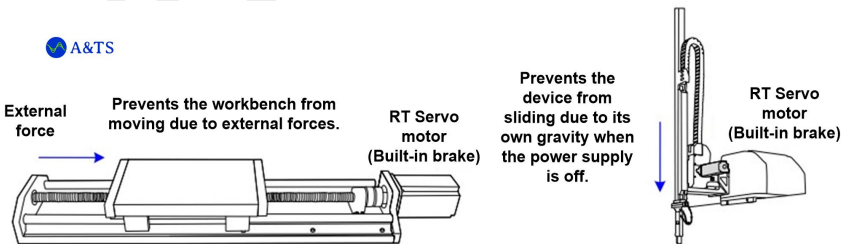


Figure 5-3 Electromagnetic brake application diagram

Figure 5-3 is the brake wiring diagram. The brake signal BRK of the servo drive is connected to the relay coil, and the relay contacts are connected to

the brake power supply. Brake power is provided by the user and needs to have sufficient capacity. It is recommended to install a surge absorber to suppress the surge voltage caused by the on/off operation of the relay. Diodes can also be used as surge absorbers, but be aware that this will cause a slight braking delay.

Under normal circumstances, after the servo motor comes to a stop, the servo is turned off. At this time, the servo motor continues to be powered on to maintain the position. After the brake has stabilized from the released state to the braking state for a period of time (the time is set by parameter PA47), the power supply to the servo motor is removed.

When the motor is running and the speed is greater than 30r/min, the servo motor current is cut off and the brake continues to be released. After a delay, the brake starts braking. At this time, the motor is decelerated from high-speed rotation to low-speed rotation, and then the electromagnetic brake is activated to avoid damaging the brake. The actual delay time is the time set by parameter PA48 or the time required for the motor speed to decelerate to the speed set by parameter PA49, whichever is smaller. Please refer to Figure 5-4 to Figure 5-6 for the specific timing diagram of brake action.

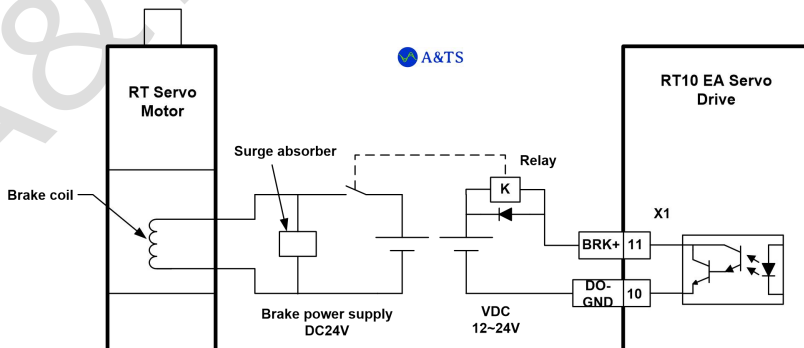


Figure 5-4 The electromagnetic brake wiring diagram

Table 5-3 The parameters related to the electromagnetic brake

Parameter	Name	Set value	Factory value	Unit
PA47	When the servo motor is stationary, the waiting time for enabling disconnection	0-5000	0	ms
PA48	When the motor is running, the waiting time for the electromagnetic brake to start braking	0-5000	50	ms
PA49	The operating speed of the brake when the motor is running.	0-3000	100	rpm
PA50	Delay for brake opening when the motor is enabled.	0-3000	20	ms

5.3 Regenerative braking resistor setting

When the directions of motor speed and torque are opposite, the energy feeds back to the drive from the motor. It will rise the busbar voltage of the RT servo drive. When it reaches the braking threshold value, the energy can only be consumed by the braking resistor. The braking energy must be consumed according to the braking requirements, otherwise the servo drive will be damaged. The braking resistor can be built-in or external, but not at the same time.

Table 5-4 Specification of the brake resistor, for RT10 series drive

Servo drive model	Built-in braking resistor specification		The minimum allowable resistance of external braking resistor (Ω)
	Resistance value(Ω)	Power(W)	

RT10_005L-XB	Null	Null	40
RT10_010L-XB	Null	Null	40
RT10_010L-XC	40	50	40
RT10_015L-XB	40	40	40
RT10_015L-XC	40	50	40
RT10_030L-XB	40	50	30
RT10_030L-XC	100	80	40
RT10_050L-XB	50	60	20

INSTRUCTIONS

When the RT10 servo drive reports errors Err14 (braking fault) or Err16 (regenerative resistor braking ratio is too high), first reduce ACC/DEC time in the system. If the error continues, use the external braking resistor. The two ends of the braking resistor are connected to terminal B1 and B2 respectively, and remove the short wiring between terminal B2 and B3. After the braking resistor is connected, the related parameters must be set properly. Otherwise it may cause the abnormal.

Table 5-5 Parameters related to regenerative braking resistor

Parameter	Name	Set value	Factory value	Parameter description
PA51	Braking resistor selection	0-3	0	0-Internal braking resistor 1-External braking resistor
PA69	The external braking resistor value	1-750	50	Ohm(Ω)

PA70	The external braking resistor power	0-100 00	50	Watts(W)
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6 Communication

6.1 EtherCAT overview

EtherCAT (short for Ethernet for Control Automation Technology) is an Ethernet based fieldbus system. The protocol is standardized in IEC 61158 and is suitable for both hard and soft real-time computing requirements in automation technology. It uses the open network communication between the master and slave stations of real-time Ethernet. It is developed by Beckhoff Automation GmbH and is managed by ETG (EtherCAT Technology Group).

The connection form of EtherCAT is a network system that connects the master station (FA controller) and multiple slave stations linearly (Other connection form, please consult the A&TS company directly).

The number of nodes that the slave station is allowed to be connected to the master station depends on the processing or communication cycle capability (the number of bytes transferred, etc.) of the master station. Please check the master station specifications to confirm.

The master station generates EtherCAT Network Information (ENI) based on EtherCAT Slave Information (ESI) (using Configuration tool) provided by the A&TS company, and uses ENI to form an EtherCAT network.

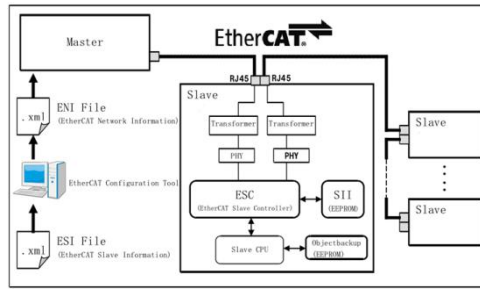


Figure 6-1 EtherCAT network

1. EtherCAT Slave Information (ESI)

The XML format file is provided by the A&T Company. It contains the built-in information of the slave station (supplier information, product information, profile, object, process data, with or without synchronization, SyncManager settings, etc.).

2. EtherCAT Network Information (ENI)

The file is generated by the master station. It contains identification information (supplier information, etc.) and initialization information for each slave station. The master station initializes and builds the network based on the information contained in ENI.

3. Slave Information Interface (SII)

ESC connects to the EEPROM that stores the SII data. In this EEPROM (SII), related information is set, such as the initialization information of the ESC (EtherCAT Slave Controller), the communication setting value of the slave station (the data size of the Mailbox), the mapping of the process data, etc.

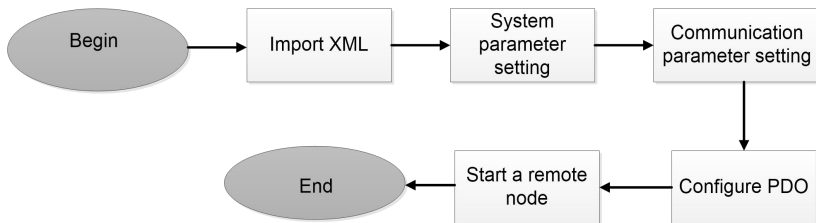


Figure 6-2 EtherCAT setup flow chart

6.2 EtherCAT communication

6.2.1 EtherCAT frame structure

EtherCAT is based on Ethernet. It is an industrial communication protocol that can be controlled in real time. It only expands the IEEE 802.3 Ethernet specification, and does not make any changes to the basic structure. So it can transfer the standard Ethernet data frames.

Because the EtherType of the Ethernet Header is 0x88A4h, the subsequent Ethernet Data is handled as an EtherCAT frame. The EtherCAT frame is composed of the EtherCAT frame header and at least one EtherCAT sub-message. Further, subdivide the EtherCAT sub-messages. Only EtherCAT frames with the Type=1 frame header are processed according to the ESC.

6.2.2 ESM (EtherCAT State Machine)

The state of EtherCAT application layer (ESM state) is shown in the figure below.

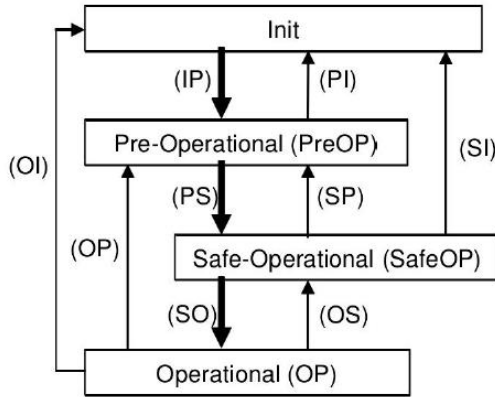


Figure 6-3 EtherCAT state transition diagram

7 Adjustment

7.1 Summary

The servo drive needs to drive the motor as fast as possible to track the instructions from the host computer or internal settings. In order to meet this requirement, the servo gain must be adjusted reasonably.

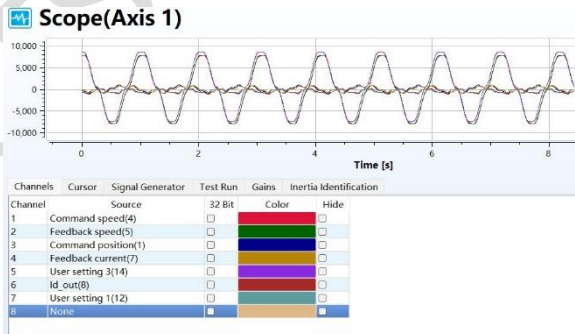


Figure 7-1 Different parameter settings form different waveforms

The servo gain is set through a combination of multiple parameters, including position loop, speed loop gain, current loop, load inertia ratio, etc.,

and they influence each other. Therefore, the user must consider the balance between each parameter setting value when setting the servo gain.

The general process for adjusting the servo gain is as follows.

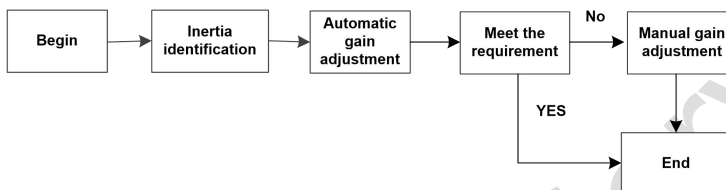


Figure 7-2 Gain adjustment flowchart

8 Function Application

8.1 Motor continuous rotation function

Function for setting upper limit value of multi-turn data of the absolute encoder.

No.	Name	Parameter range	Factory value	Unit	Applicability
PA99	Absolute multi-turn data upper limit	0-32000	0	/	All

When it is set to 0, the upper limit value of multi-turn is 65535. When it is set to a non-zero value, if the multi-turn data exceeds this set value, the multi-turn data is changed to 0. Conversely, if 0 is the next rotation, the multi-turn data is changed to this value.

For motors with absolute encoder, in the absolute position control mode (PA14=3), there will be overflow in the multi-turn position. At this time, the

tracking error alarm (Err4) will appear in the servo drive. The multi-turn position of the encoder is 65535, which is in the multi-turn position. (Note: This problem does not occur in the incremental position control mode)

The internal position control of the RT servo drive adopts 64-bit commands and feedback, and interacts with the system using 32-bit commands and feedback. In the absolute position control mode, system can read the absolute feedback position of the motor after power off and restart. In the incremental position control mode, after power off and restart the motor feedback position is 0 that is read by the system.

In order to avoid the Err4 alarm in the absolute position control mode, the encoder multi-turn position and the feedback position (angle_parameter.PstFdb) for position loop control need to be processed as follows.

- Add the maximum number of rotations parameter (parameter PA99).
- The encoder multi-turn position is cleared at the maximum number of rotations.
- The feedback position used for the position loop control is changed to the absolute position after re-incremental processing. (Initial assignment and incremental assignment).

8.2 Touch probe

This function is to select the trigger signal from external input (EXT1/EXT2) or Z phase, and to lock the feedback position. (In semi-closed loop control, the 1-turn data of the rotary encoder is the position of 0, and in full-closed

loop control, it is the Z-phase position of the external incremental grating ruler.)

9 Parameters

9.1 Parameter list

INSTRUCTIONS

- The applicability column indicates which control modes are applicable. P means position control is applicable, S means speed control is applicable, T means torque control is applicable, ALL means position, speed and torque control are applicable.
- The parameter number with '★' means that the parameter value needs to be saved after being modified, and it will not take effect until the servo is restarted and powered on. If there is no '★' after the parameter number, it means that the parameter value will take effect immediately after being modified.
- When there is '▲' after the parameter value, it means that the factory value of the parameter may be different depending on the model of the servo drive.

Parameters usually used are

Trial running parameters: PA4, PA21, PA53

Motor parameters: PA1, PA18, PA45, PA61

Operating parameters: PA4, PA81, PA84

Tuning parameters: PA5, PA6, PA9, PA29, PA33, Fn40

Bus parameters: PA4, PA14, PA82, PA87

10 Fault Alarm

10.1 Alarm code list

INSTRUCTIONS

1. Adding '★' after the alarm code means that the alarm cannot be cleared by resetting, and it can only be cleared after removing the cause of the alarm and powering on again.
2. When the digital tube displays Err x, 'x' represents the alarm code, and the user can view the alarm through the current interface of the digital tube. When the digital tube displays r 0. (a decimal point flashes in the lower right corner of 0, which means there is an alarm currently), the user can view the alarm through the 19Err value under the Dp menu.

Table 10-1 Alarm list

Alarm code	Alarm name	Description
0	Normal	/
Err 1	Over speed	Servo motor speed exceeds the set value (PA23)

Err 2	Main voltage is under overvoltage	Main circuit power supply voltage is too high
Err 3	Motor vibration detected	The RT servo drive has detected vibration that exceeds the set threshold
Err 4	Position out of tolerance	The value of the position deviation counter exceeds the set value (PA17)
Err 5	Motor average load current alarm	The average load current of the motor is too large
Err 6	Speed amplifier saturation fault	Speed regulator is saturated for a long time
Err 7	CCWL/CWL abnormal	CCWL/CWL input are OFF
Err 8	IPM over temperature alarm	IPM temperature exceeds the set value
Err 9A/B/C	Encoder A/B/Z phase error	Encoder A/B/Z phase signal error
Err 10 ★	Motor parameter error	Motor parameter is out of range
Err 11 ★	IPM is faulty	IPM (Intelligent Power Module) module is faulty
Err 12	Over current	The motor current is too large
Err 13	Over load	The servo drive and motor are overloaded (instantaneous overheating)
Err 14	Braking fault	Brake circuit is faulty
Err 15	Encoder count error	Encoder count is abnormal
Err 16	Braking resistor braking rate is too high	Braking rate is outside the range of reasonable values
Err 18	Absolute encoder alarm	The absolute encoder communication is faulty

Err 19 ★	Absolute encoder battery failure	Battery voltage is lower than 2.5V, multi-turn position information has been lost
Err 20 ★	EEPROM error	EEPROM error
Err 21 ★	Phase A current sampling error	Phase A current sampling error
Err 22 ★	Parameter is out of range	There is servo parameter out of specified range.
Err 23 ★	Phase B current sampling error	Phase B current sampling error
Err 24 ★	Absolute encoder parameter read/write error	Motor encoder EEPROM parameter error
Err 25	Absolute encoder feedback is abnormal	Absolute encoder feedback frequency is too high
Err 26	IO input terminal function configuration is abnormal	Different IO input terminals are configured with the same function
Err 27	Absolute encoder battery alarm	Battery voltage is lower than 3.1V, the battery voltage is low
Err 28	Absolute encoder communication timeout alarm	Absolute encoder communication feedback timed out
Err 29	Torque overload	Motor load exceeds the value and duration set by user
Err 30 ★	Encoder Z pulse lost	Encoder Z pulse signal is lost
Err 31 ★	Encoder UVW signal error	Encoder UVW signal is incorrect or does not match with the encoder
Err 32 ★	Encoder UVW signal encoding is invalid	UVW signal keeps at all high level or all low level

Err 33 ★	Dynamic memory allocation error	Dynamic memory allocation error
Err 34 ★	Flash reads CRC error	Flash reads CRC error
Err 35 ★	Motor adaptation error	A non-adaptive motor is connected to the RT servo drive
Err 36	Watchdog error	RT servo drive internal watchdog error.
Err 37 ★	Motor initial zero position lock error	Motor initial zero position lock error
Err 38 ★	External braking resistance value is incorrect	The resistance of the external braking resistor is less than the minimum allowable value
Err 40	Bus communication error	In the periodic communication state, 3 consecutive frames of data are incorrect.
Err 41	Bus connection is interrupted	The physical connection to the network is disconnected, or the connection status changes.
Err 43	The control mode is not written before switching the OP state	The control mode is not written before switching the OP state
Err 44	Bus state machine switching is abnormal	Abnormal switching of the bus state machine
Err 45 ★	Bus cycle configuration is abnormal	Bus cycle is not an integer multiple of 0.2ms
Err 46	DC synchronization alarm	DC sync signal not received within 6.5 seconds
Err 51	Multi-turn data exceeds the set value	Multi-turn data exceeds the set value
Err 52	Main power supply under voltage alarm	In the enabled state, the bus voltage is lower than 245V

Err 53	AC main power supply of servo system loses power	The power supply lines L1, L2, and L3 of the RT servo drive are powered off.
Err 54	AC main power supply of the servo system is phase loss.	The power supply lines L1, L2, and L3 of the RT servo drive are phase loss.
Err 55 ★	Dynamic braking overcurrent	Dynamic braking overcurrent error
Err 56	Internal D5V undervoltage	The voltage supplying the control board is less than 5 V
Err 57	Encoder multi-turn exceeds 32-bit command	Encoder multi-turn exceeds 32-bit command
Err 58	Unsupported homing /return origin mode	The unsupported homing/return origin mode is used
Err 61	Fan alarm	Fan alarm
Err 62	Motor speed deviation is too large	The difference between command speed and actual speed is too large
Err 63	ABZ incremental encoder UVW abnormality	ABZ incremental encoder UVW abnormality
Err 64	Multi-turn value overflow alarm	The actual multi-turn value of the motor overflow
Err 65	Motor average load current alarm	The continuous current reaches 1.2 times the rated current for 40s, 1.5 times for 30s, and 2 times for 10s.
Err 66	Motor average load current alarm	The continuous current reaches 1.15 times the rated current for more than 400s.
Err 67	Phase current alarm 1	The phase current exceeds threshold 1.
Err 68	Phase current alarm 2	The phase current exceeds the maximum current of the servo IPM.

Err 69	Phase current alarm 1	The phase current exceeds threshold 1.
Err 70	Phase current alarm 2	The phase current exceeds the maximum current of the servo IPM.

The End



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