



T7 Series AC Servo

Quick Start



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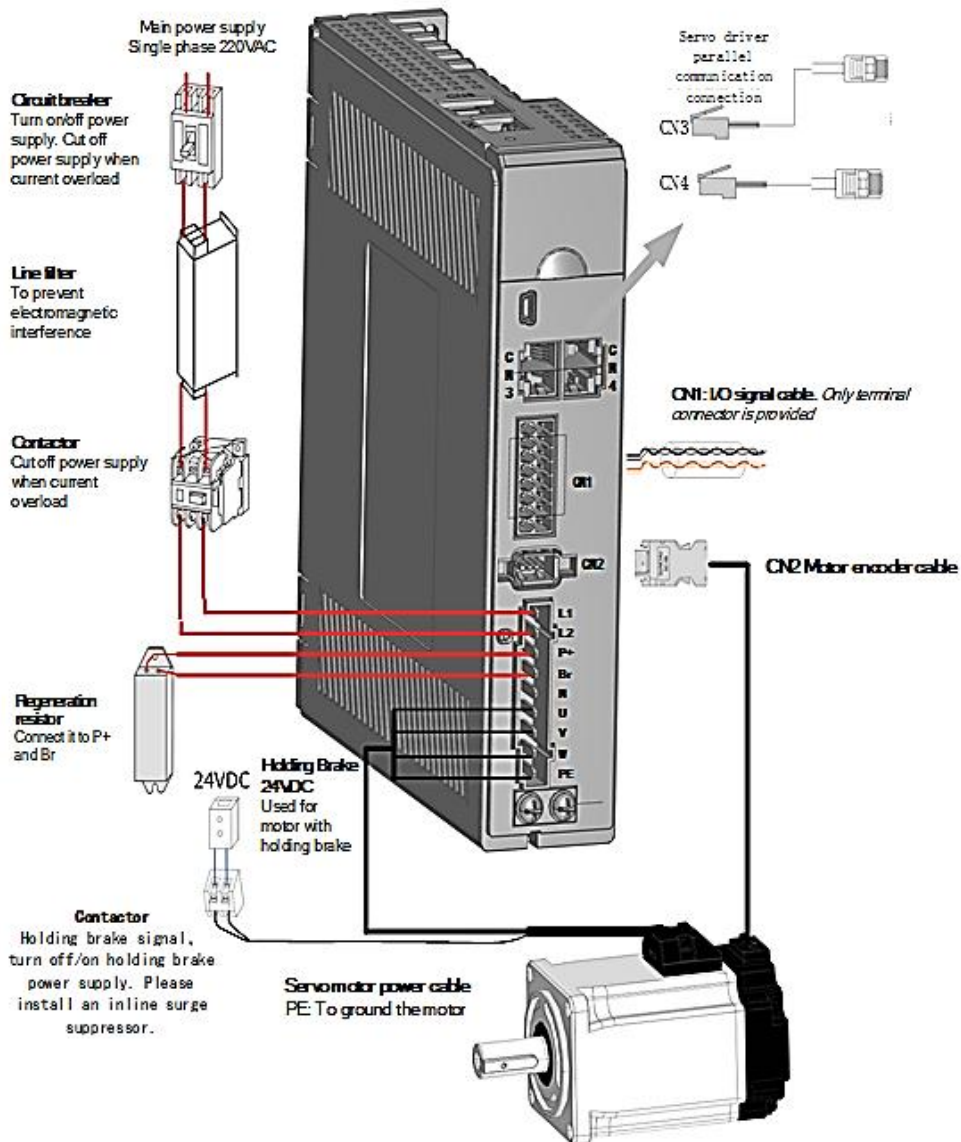
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System requirement to run Motion Studio 2

Operating system: Windows 7 or above
CPU: 1.5GHz or above
RAM: 512MB or above
Hard disk capacity: 10GB or above
Display: Resolution 1024*768, color 24 bit
Communication interface: USB Type-A series adapter

Chapter 1 Set up

1.1 Ports and Connections



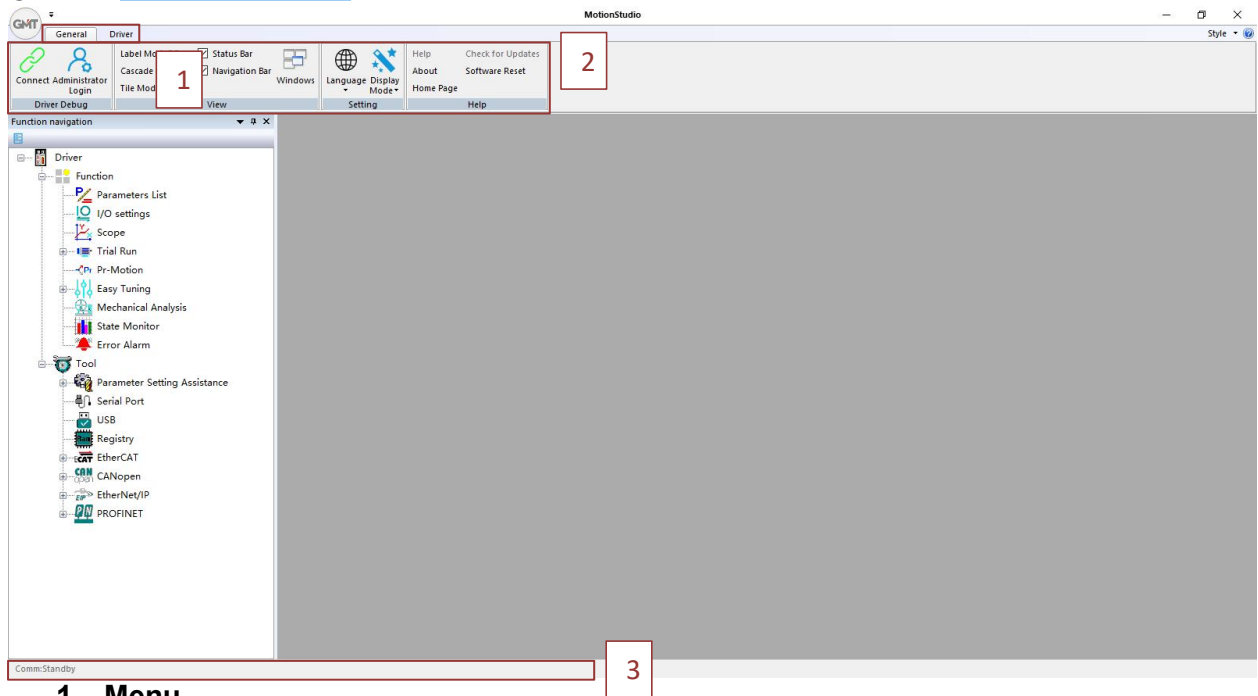
1.2 Connect to Motion Studio 2

Before we start

Please prepare the following items before we start to work with Motion Studio.

1. T7 series AC Servo Drive
2. T6M series AC Servo Motor
3. Data cable: USB Type-C – For T7 series AC servo drives (Please mind that a charging cable might not be able to transfer data).
4. Motor power cables (Direct or Aviation connector depending on motor models)
5. Encoder cables(Direct or Aviation connector depending on motor models)
6. Motion Studio 2

Click on **MotionStudio.exe** to start Motion Studio 2.

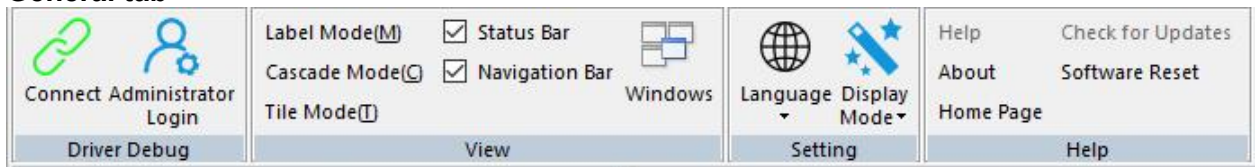


1. Menu



General	Driver connection interface, admin login and software related software such as view, languages, hard reset can be found on this tab
Driver	On the driver tab (display servo drive model when connected), quick access button, functions and tools can be found for more convenient application and settings.

2. General tab



Driver Debug	Connect to driver and login as admin interfaces
View	Users can choose software layout mode as to fit respective working habits. Recommended to turn on both “Status” and “Navigation” bar.
Setting	Switch between English and Chinese. Display mode can also be modified in accordance to personal favor.
Help	Software version, Leadshine Homepage, Software hard reset can be found on this category

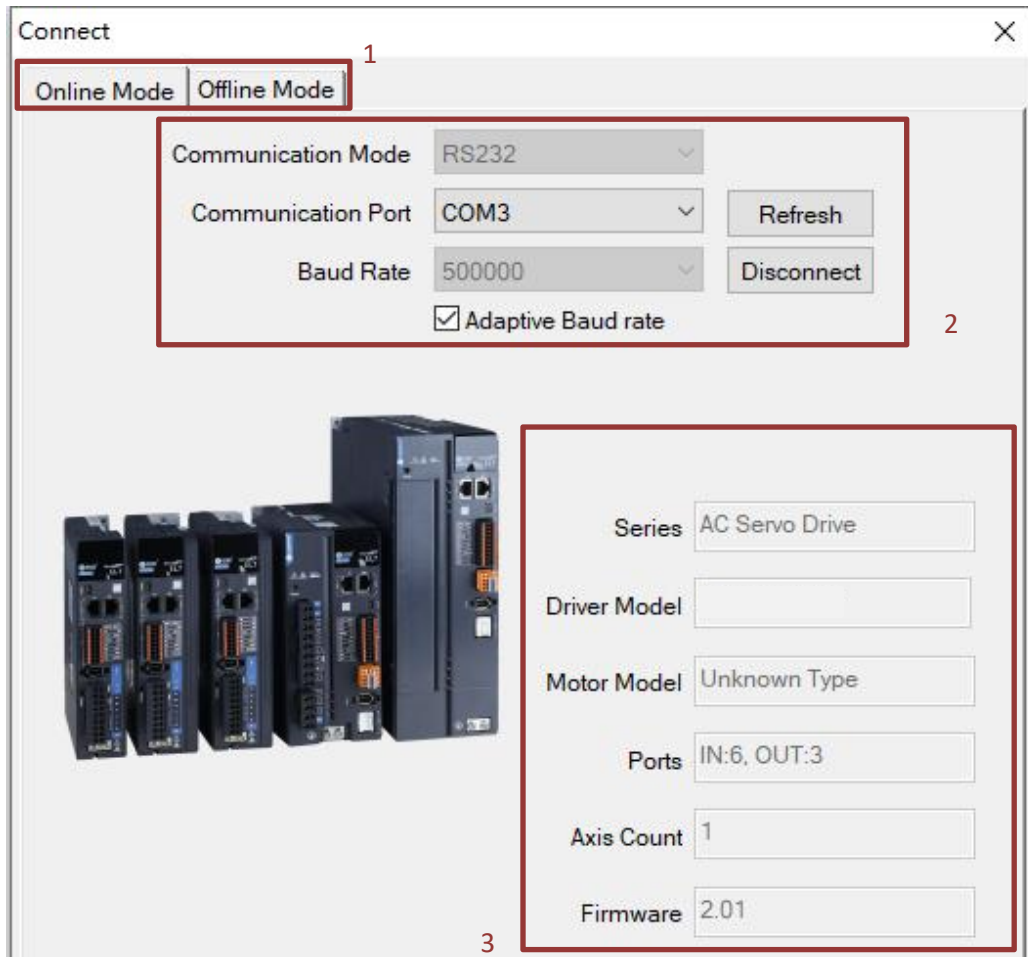
3. Status bar

Comm:Offline		Emergency Stop : NO		Servo:Disable		Alarm:No main power...	
Comm	Show connection status of the servo drive						
Emergency stop	Show emergency stop status of the servo system						
Servo	Show servo drive status						
Alarm	Alarm message. To find out details and recommended solutions to alarms, please navigate to Error Alarm function on Function or on Navigation tree.						

Connect to Servo Drive



1. Click on **Connect**.
2. **“Connect”** pop-up window will appear.



①	<ul style="list-style-type: none"> ▪ Online mode: Driver and motor connecting to USB port automatically identified ▪ Offline mode: Use offline mode to read parameters saved in PC.
②	<ul style="list-style-type: none"> ▪ Only RS232 communication mode is supported for the moment being. ▪ Communication Port can be automatically identified by clicking on “Refresh”. If driver failed to connect, please verify data cable or change to another USB port. ▪ Check “Adaptive Baud rate” and click on “Connect” to connect to servo products. <p><i>Driver can be connected to PC without main power supply.</i></p>
③	<ul style="list-style-type: none"> ▪ Servo products info such as series, model no., ports, axis count and firmware version can be found here.

3. When servo drive is connected to PC through data cable, **Usb** will appear on the front panel of the servo drive. Err0D2 will appear due to no main power supply connected, it doesn't affect most tuning works of the servo drive.

4. Once successfully connected, Comm on status bar will turn to “Comm: Online”.



5. Connect window will close automatically in 3s after successfully connected.

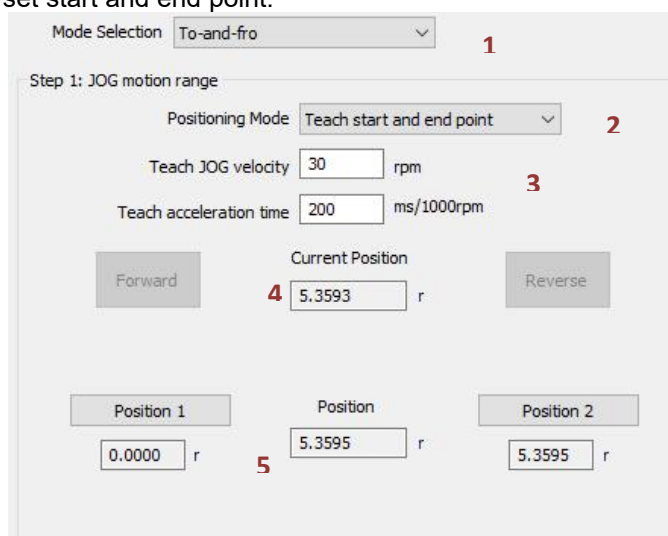
6. If connection failed, please verify:

- a. Data cable. Charging cable might not be able to transfer data.
- b. Change another USB port.
- c. Any alarm error which needs to be reset.

1.3 Test run

Once the driver is connected successfully to Motion Studio 2 without any error, users may proceed with the following test to start off.

Step 1: First, select the **motion mode** of trial run. It can be a to-and-fro (move in both directions) movement or a one-way motion in either negative or positive direction. Under **positioning mode**, you can pick either to teach the start and end point of the run or directly key in the required start/end position or distance. If start and end point are to be taught, please set lower velocity and acceleration if user is not familiar with particular models. Use “Forward” and “Reverse” button to move the motor and “Position 1 / 2” to set start and end point.



Step 2: Set JOG velocity, torque and acceleration (for actual trial run motion). **No. of cycles** would be how many times does the user want the complete trial run motion to perform and waiting time would be the interval time between each motion. Before performing trial run, please enable servo drive (Refer to the instructions below)

Step 2: Position JOG

Pr6.04 JOG trial run velocity command rpm

Pr6.25 Acceleration of trial running ms/1000r

Pr6.03 JOG trial run torque command %

Pr6.22 No. of trial run cycles

Pr6.21 Trial run waiting time ms

Use "Run" to start trial run after the above parameters are set correctly and servo drive is enabled. Please make sure the axis is within safe travel distance with no obstacles in the way.

Step 3:

Enable servo drive by clicking on the button. Indicator on the right will turn to **ON** when servo drive is enabled.

OFF

Please tick on this option to make sure there won't be any other control signal interfering the trial run process.

External enabling disabled



Inertia ratio will be calculated automatically but would not be saved into driver's parameters. If inertia ratio needs to be set, please refer to Inertia Ratio Identification section for further explanations. Motor load rate and speed are shown here for the convenience of monitoring.

Calculated inertia ratio

Motor load rate

Motor speed

Positive limit

Negative limit

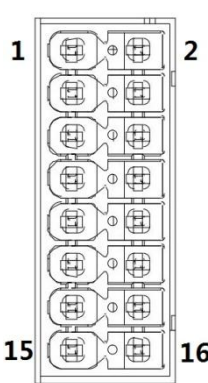
Torque limit

Positive and negative limit of the axis can be monitored here. Torque limit is as set in parameter.

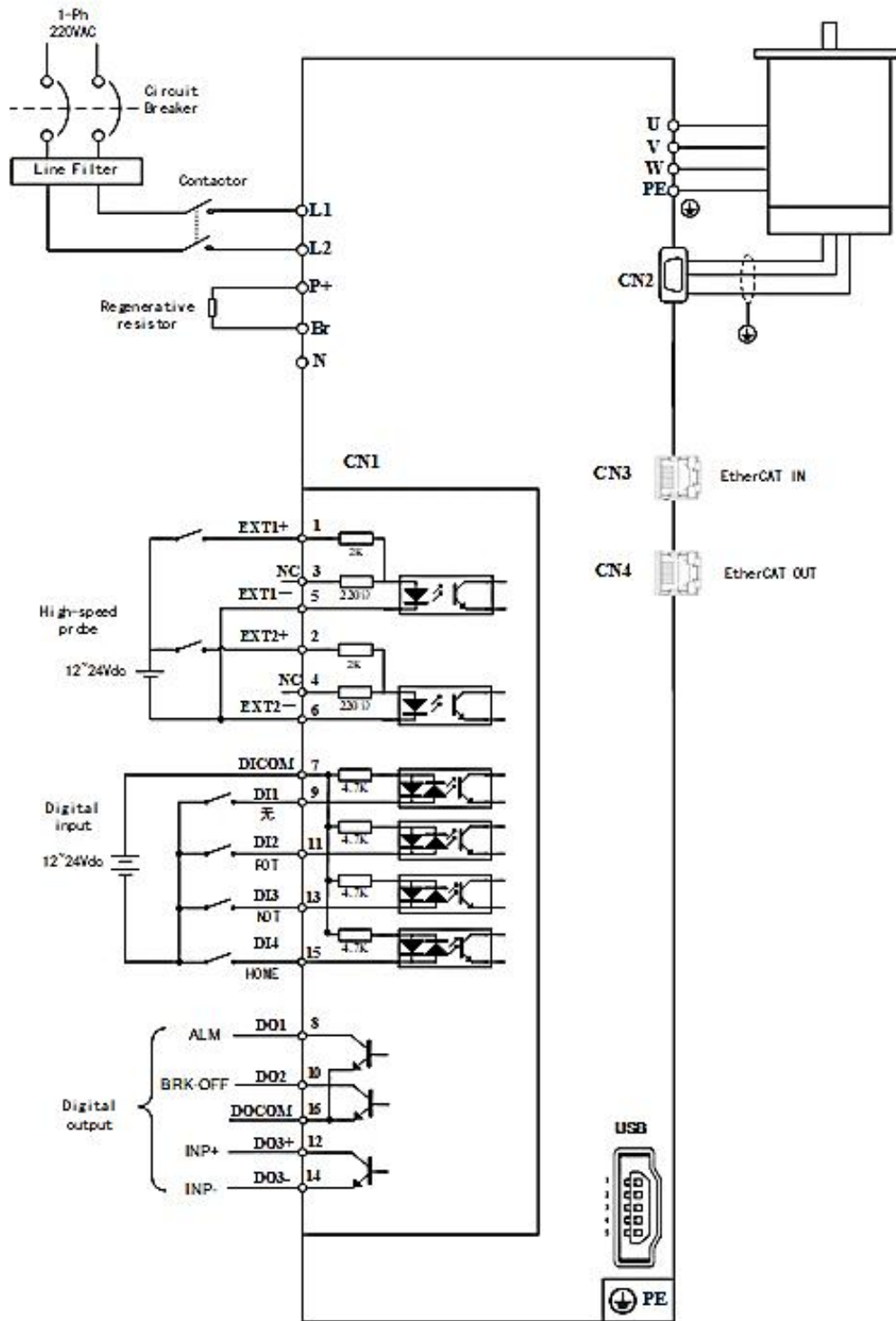
Scope function can be opened using this button.

Chapter 2 Wiring

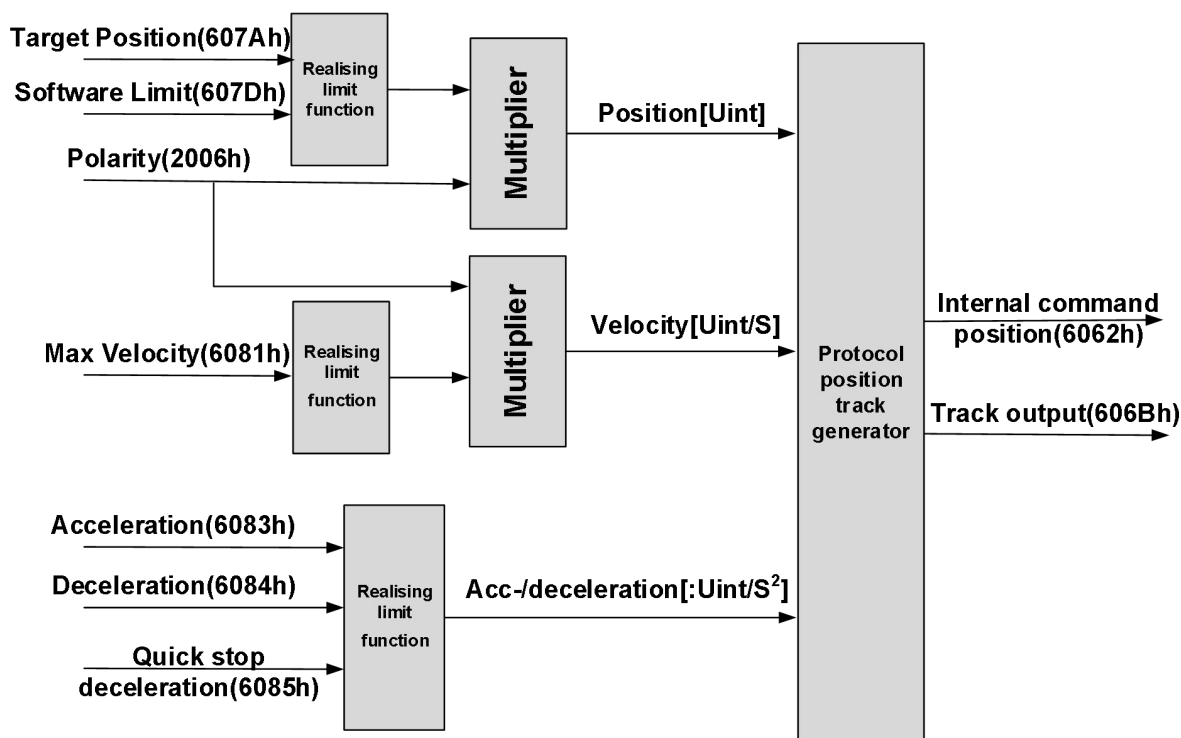
2.1 I/O Port (16-pin spring loaded connector)

Port	Pin	Signal	Description	Remarks
	1	EXT1+	Probe 1 positive terminal	2 high speed probe inputs function
	2	EXT2+	Probe 2 positive terminal	
	3	NC	Reserved	
	4	NC	Reserved	
	5	EXT1 -	Probe 1 negative terminal	
	6	EXT2 -	Probe 2 negative terminal	
	7	DICOM	Common DI	Double-ended common DI Configurable Recommended voltage: 12VDC - 24VDC
	9	DI1	Reserved	
	11	DI2	POT: Positive limit switch	
	13	DI3	NOT: Negative limit switch	
	15	DI4	HOME: Homing done	D01,D02: Single-ended D03: Double-ended Configurable Recommended voltage: 12Vdc – 24Vdc, max 30V Recommended current: 10mA, max 50mA
	8	DO1	ALM: Alarm	
	10	DO2	BRK-OFF: Holding brake activated	
	12	DO3+	INP: Positioning completed	
	14	DO3-		
	16	DOCOM	Common DO	

2.2 T7-EC Series 400W/750W/1000W – 220V Models



PP Block Diagram



Control and status words under PP mode

Control word bits 4~6 definition under PP mode

Bit	Value	Definition
4 (New position)	0→1	Latest target position(607Ah)、 Profile velocity (6081h)、 Acc-/deceleration(6083h/6084h) Starts
5 (Instant trigger)	0	Trigger new position command once current one is completed.
	1	Interrupted current position command and trigger new position command
6(Absolute/ relative)	0	Set target position(607Ah)as absolute position
	1	Set target position(607Ah) as relative position

Status word bits 12-15, 10, 8 definitions under PP mode

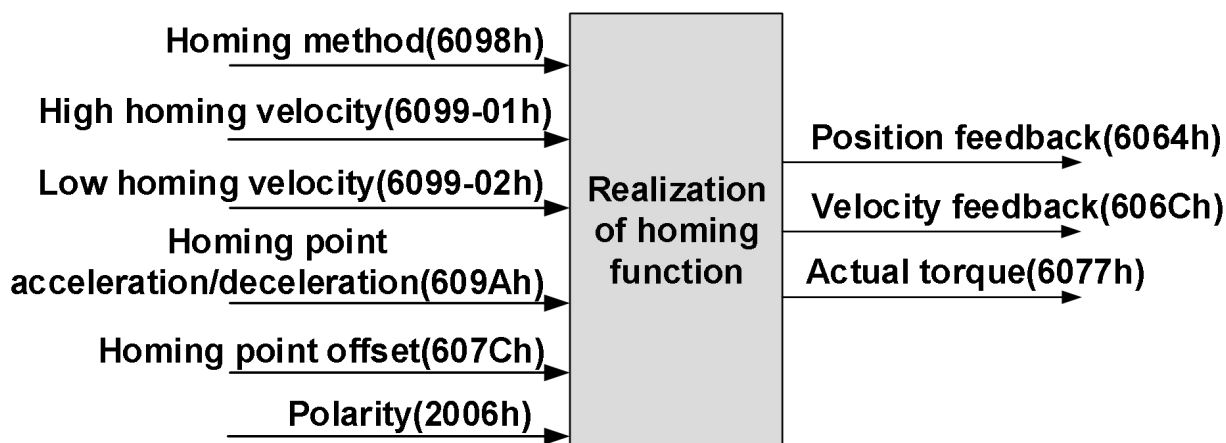
Bit	Value	Definition
8(Abnormal Stoppage)	0	Normal motion
	1	Abnormal stoppage triggered, motor stopped *1)
10(Arrived at position)	0	Motion not completed
	1	Target position reached
12(New position)	0	Current motion completed/interruptible, able to execute new position command *2)
	1	Current motion not completed/interruptible, unable to execute new position command
14(Motion Parameter = 0)	0	Motion parameters valid, necessary parameters all not set to 0.
	1	Parameter = 0 under current motion. One of 3 parameters, Profile velocity (6081h), acceleration (6083h) and deceleration (6084h) = 0.
15(Trigger)	0	Current motion incomplete/uninterruptable, new target position cannot be renewed. *3)
	1	Current motion completed/interruptible, new target position can be renewed.

*1) Bit 8 abnormal stoppage becomes valid when hardware limit, deceleration stoppage and quick stop are triggered.

*2) Bit 12 under control word(6040h)bit 5 valid and bit 4 invalid, motion interruptible.

*3) Bit 15 and bit 12 have inversed logic under PP mode.

HM Block Diagram



Please refer to the user manual for complete list of homing methods available for T7-EC series servo drives.

Control and status words under HM mode

Control word bit 4 definitions under HM mode

Bit	Value	Definition
4(Homing motion starts/stops)	0→1	Homing motion starts
	1 →0	Homing motion stops, motor stops

Status word bits 12-15, 10, 8 definitions under PP mode

Bit	Value	Definition
8(Abnormal Stoppage)	0	Normal motion
	1	Abnormal stoppage triggered, motor stops *1)
10(Arrived at position)	0	Motion not completed
	1	Target position reached
12(Homing done)	0	Homing not done
	1	Homing done, valid after reaching position(bit 10) *2)
14(Motion Parameter = 0)	0	Motion parameters valid, necessary parameters all not set to 0.
	1	Parameter = 0 under current motion. One of 4 parameters, Homing mode (6098h), high homing velocity(6099h-01), low homing velocity (6099h-02) and homing point acc-/deceleration (609Ah) = 0.
15(Trigger)	0	Homing triggered/completed *3)
	1	Homing triggers

*1) Bit 8 abnormal stoppage becomes valid when hardware limit, deceleration stoppage and quick stop are triggered.

*2) Determine if homing is done, determine if bit 10/12 is occupied.

*3) Use to indicate if homing is able to trigger or already triggered.

Realization of Position Control Mode

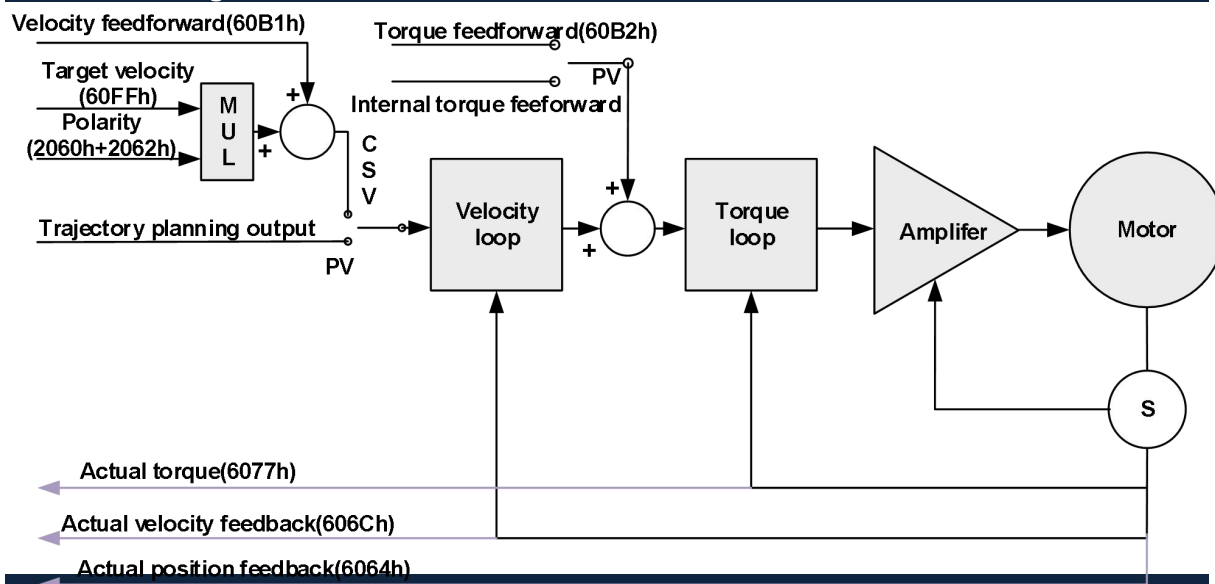
Step 1: Set 6060h to required mode. Please refer to section 2.1

Step 2: Set input motion parameters according to the block diagram of each modes.

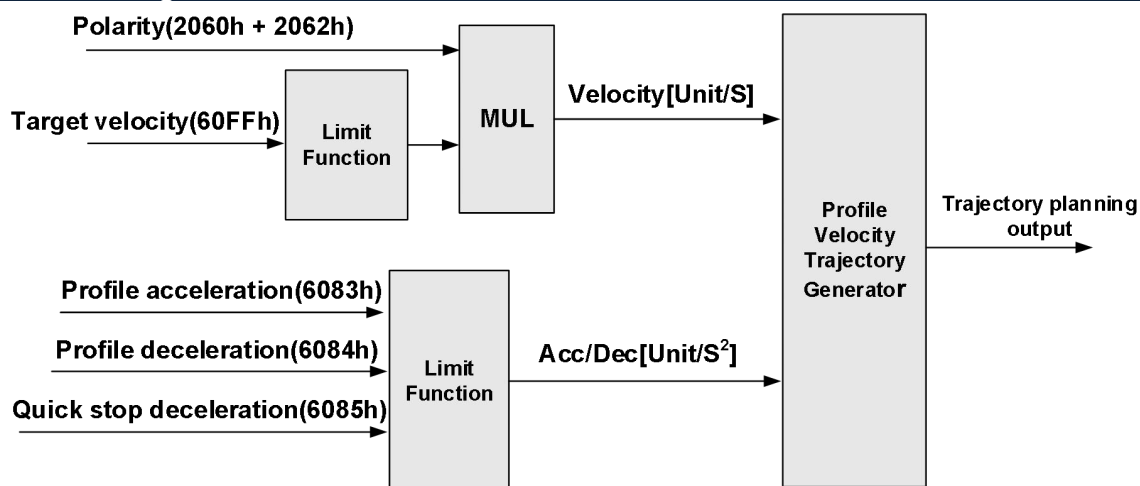
Step 3: Enable servo drive and start motion.

3.3 Velocity Control Mode (CSV / PV)

CSV Block Diagram



PV Block Diagram



Control Word and Status Word for Profile Velocity Mode

The bit6~4 of control words (6040h) associated with the control mode in PV mode are invalid. The motion in PV mode can be triggered as long as the motion parameters (target velocity (60FFh) Acc/Dec (6083h/6084h)) are given after the axis is enabled.

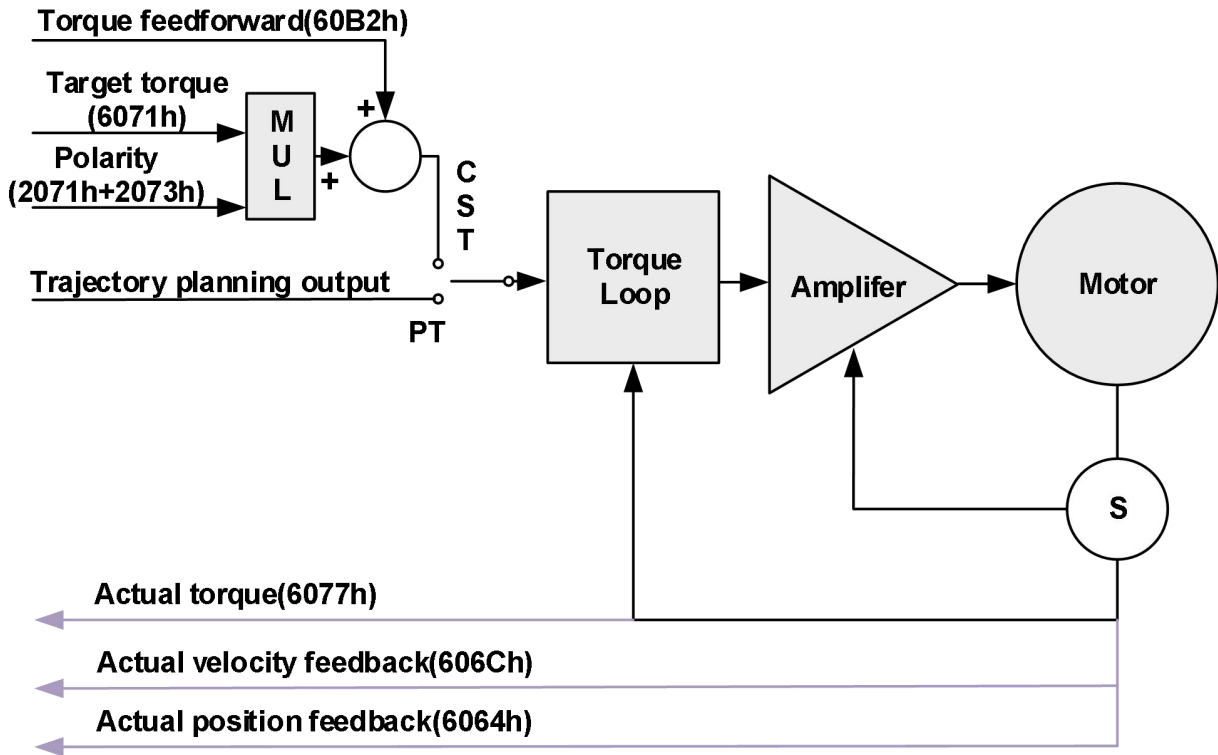
Bit15~12, 10, 8 of Status word (6041h) for Profile Velocity Mode

Bit(Label)	Value	Details
8 (Quick stop)	0	Quick stop invalid
	1	Quick stop valid
10 (Velocity reached)	0	Velocity not yet reached
	1	Velocity reached
12 (Zero speed)	0	It's not zero speed. It's moving.
	1	Zero speed or it's going to slow down to zero speed *1)

*1) Zero speed of bit 12 is generally effective when deceleration stops and hardware limit is valid.

3.4 Torque Control Mode (CST / PT)

CST Block Diagram



PT Block Diagram

