# EtherCAT Master Software Manual

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## WARRANTY

All products manufactured by ICP DAS are warranted against defective materials for a period of one year from the date of delivery to the original purchaser.

## WARNING

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## CONTACT US

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## SUPPORT

ECAT-M801-8AX
ECAT-M801-16AX
ECAT-M801-32AX
ECAT-M801-8AX/S
ECAT-M801-16AX/S
ECAT-M801-32AX/S

# Contents

# 1. Gantry Utility

User has to build network information via ECAT Utility before using Gantry Utility.

Gantry Utility provides users to adjust the Gantry Pi coefficient for better results.

## 1.1.1. Gantry Control

The output of Gantry Control is output to the 0x60b1 (velocity offset) of the driver. If the driver does not support 0x60b1, or if it has 0x60b1 but does not support the velocity feedforward function, there is no way to adjust the Gantry Pi coefficient.
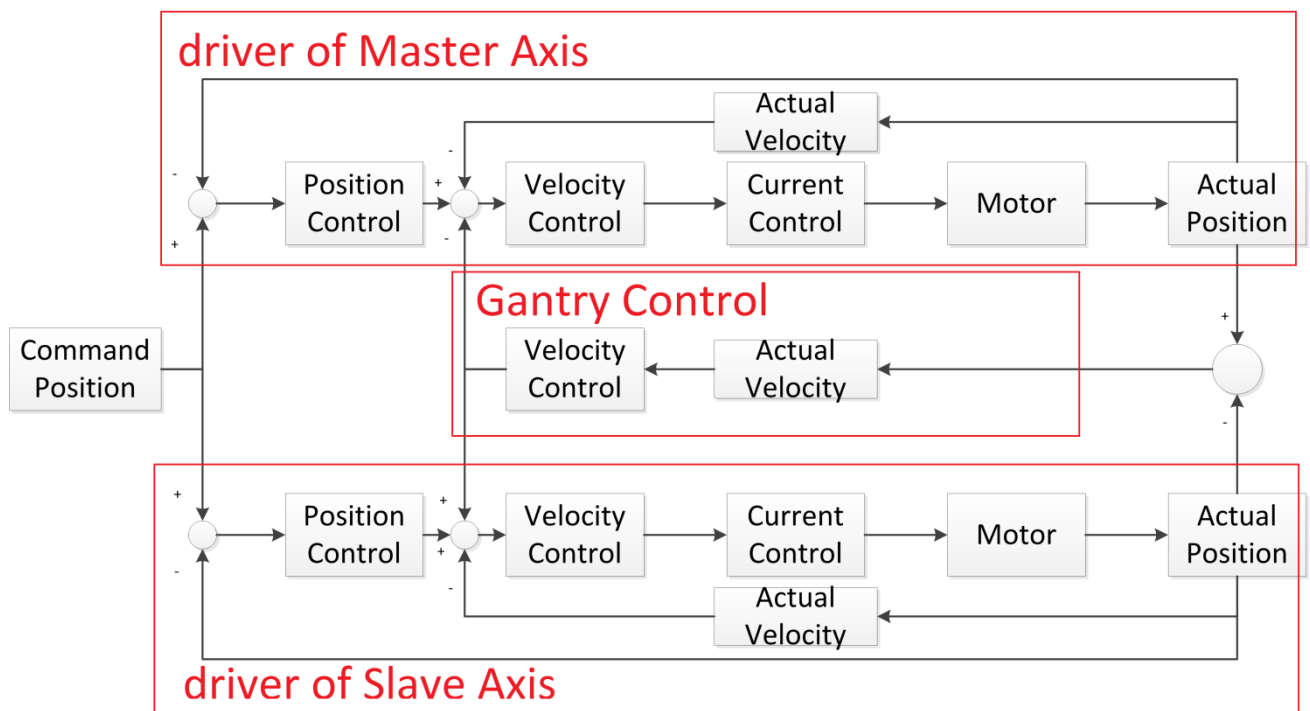
## 1.1.2. Device init steps
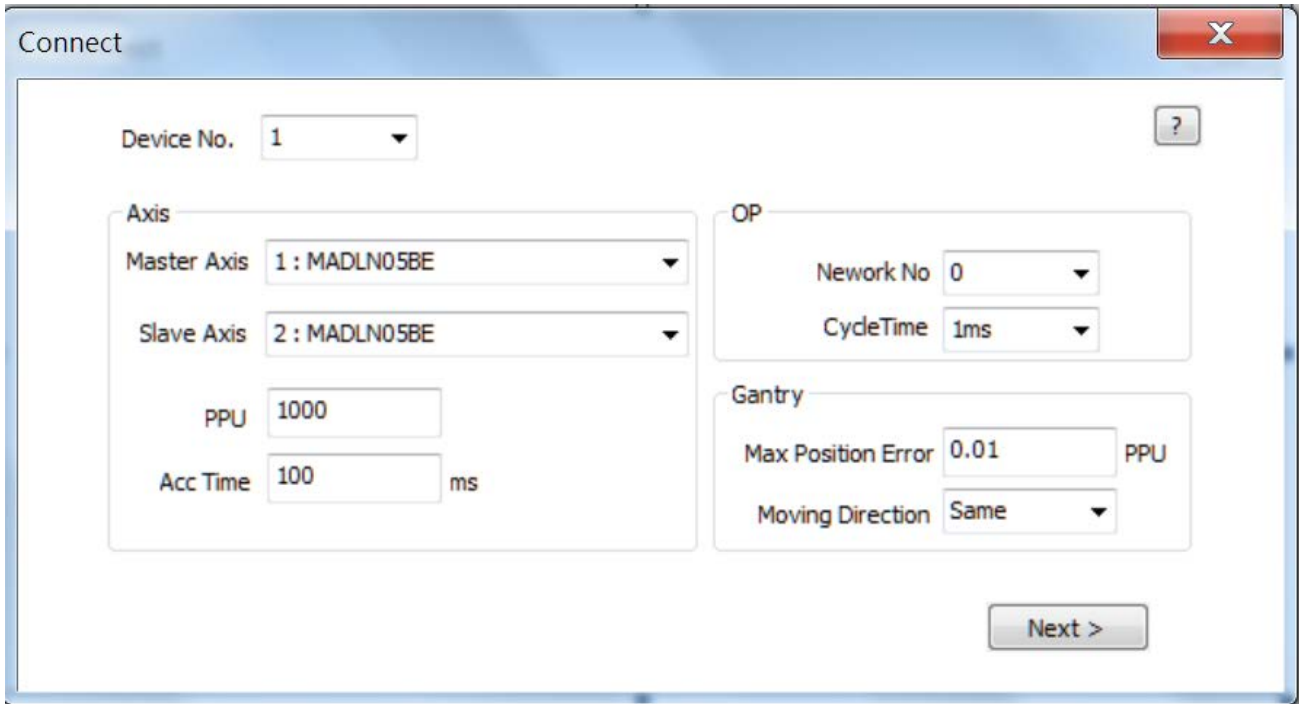


1.  Click [Device No. 1 ▼] and select the device number from the list.

2.  Click [Master Axis 1 : MADLN05BE ▼] and select the Master axis from the list.

    [1 : MADLN05BE] ,"1:" Means the module is the second module in the EtherCAT network,"MADLN05BE" Means the name of this module.

3.  Click [Slave Axis 2 : MADLN05BE ▼] and select the Slave axis from the list.

    [2 : MADLN05BE] ,"2:" Means the module is the third module in the EtherCAT network,"MADLN05BE" Means the name of this module.

4.  Set PPU, most of the motion control commands are in PPU

    Assume that the motor needs 1000 pulses for one revolution,

    If the PPU is set to 1000, when the command goes 1 PPU in the positive direction, it means goes 1 round in the positive direction;

    If the PPU is set to 100, when the command goes 10 PPU in the positive direction, it means goes 1 round in the positive direction.

5.  Set Acc Time, the acceleration and deceleration time of the motion control,Range: 1~999ms.

    Assume that the acceleration/deceleration time is 100ms.

When the command starts the motor to run at 1 PPU/s, the speed command will increase from 0 PPU/s, and the speed command will reach 1 PPU/s after 100ms, When stopped, the speed command will decrease from 1 PPU/s down, and the speed command will reach 0 PPU/s after 100ms. There is also a quick stop function that can be stopped directly without deceleration.

6. Set the NetWork No network information number. When using EcatUtility to establish the device network information, you can choose to save the network information to the specified network information number. When entering the OP, the selected network information needs to be the same as actual network to enter the OP, otherwise it returns -1009.

7. Set the CycleTime. After entering the OP, the master station and the slave station will start the cycle communication.

8. Set Gantry Max Position Error. When the difference between the Master and the Slave axis is too large, the current motion will be stopped immediately, and Servo On will be maintained.

9. Set Moving Direction. In Gantry mode, if the direction of motion of the master and slave axis is the same, set "Same"; if the master and slave axis move in the opposite direction, set "Oppisite".

10. Press Next > to enter OP mode.

### 1.1.3. Vibration display
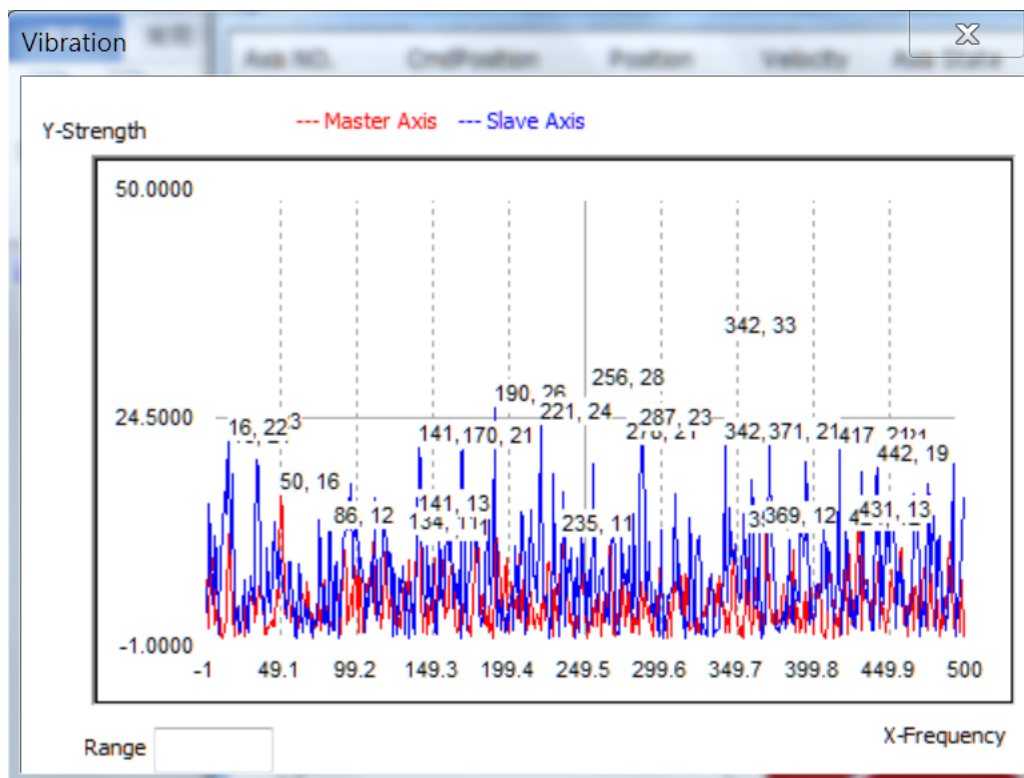


The vibration display box shows vibration of motors.
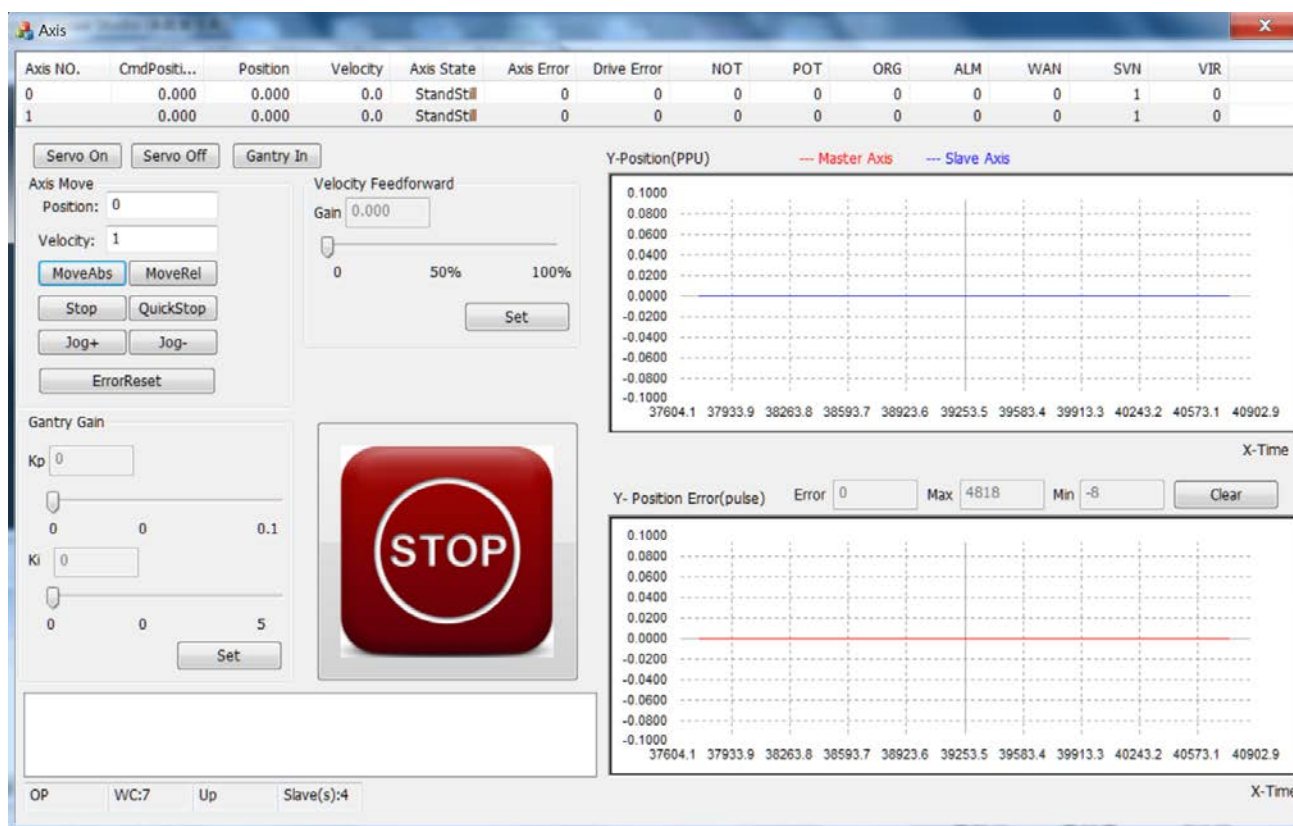
Red: vibration of Master axis

Blue: vibration of Slave axis

X axis: Frequency, unit: Hz

Y axis: Strength, uint: pulse/s
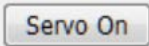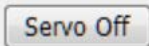
# 1.1.4. Motion Control- Interface description



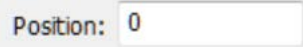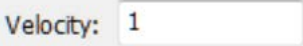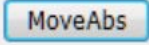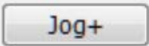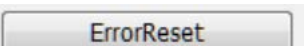## description



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| item | Description |
|------|-------------|
| Axis No. | Axis number |
| Position | Axis position |
| Velocity | Axis velocity |
| Axis State | Axis state |
| Axis Error | Axis last error |
| Drive Error | Axis drive error |
| NOT | Negative limit switch |
| POT | Positive limit switch |

| ORG | Home switch |
| --- | --- |
| ALM | Alarm |
| WAN | Warning |
| SVN | Servo ON/OFF state |
| VIR | Virtual Axis (when slave number is 65535) |
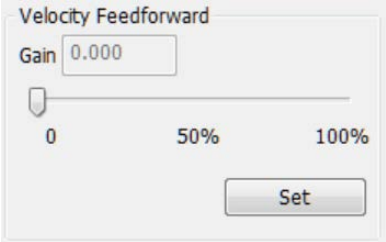
- **Servo On** : Master axis and Slave axis will be sequentially Servo On

- **Servo Off** : Master axis and Slave axis will be sequentially Servo Off

- **Gantry In** : Gantry in

- Position: 0 / Velocity: 1 : Target position and target velocity

- **MoveAbs** **MoveRel** : Absolute move and relative move

- **Stop** **QuickStop** : Deceleration stop and quick stop

- **Jog+** **Jog-** : Positive/Negtive direction jog motion, the motor will continue to run after clicking, and release the button will not stop running.

- **ErrorReset** : Clear the error. A motion command cannot be started when the error occurs. It needs to be cleared before starting a motion command. The error will be displayed in Axis Error and Drive Error. The definition of Axis Error can be found in the software manual. The definition of Drive Error is found in the manual of the driver.

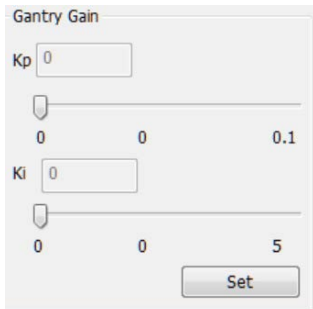- **STOP** : The emergency stop button, the movement stops immediately after pressing, and Servo Off, an error -1030 appears.
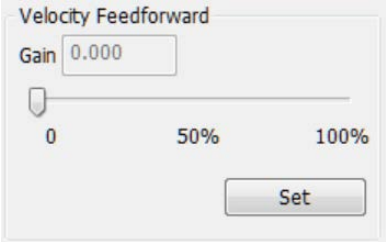
- Velocity Feedforward / Gain 0.000 / Set : Velocity feedforward adjustment, increased velocity feedforward can make the actual position closer to the command position.

 : Gaintry Gain settings

 :
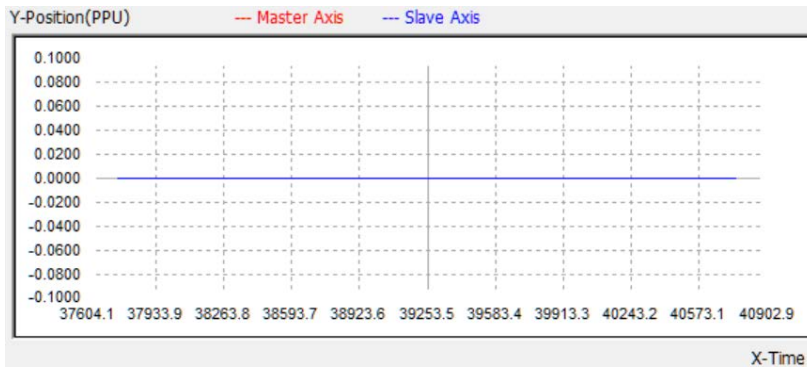
Position display, Shows actual position of Master axis (red) and Slave axis (blue) (unit: PPU)

 :

Position error display, Shows position error between master axis and slave axis
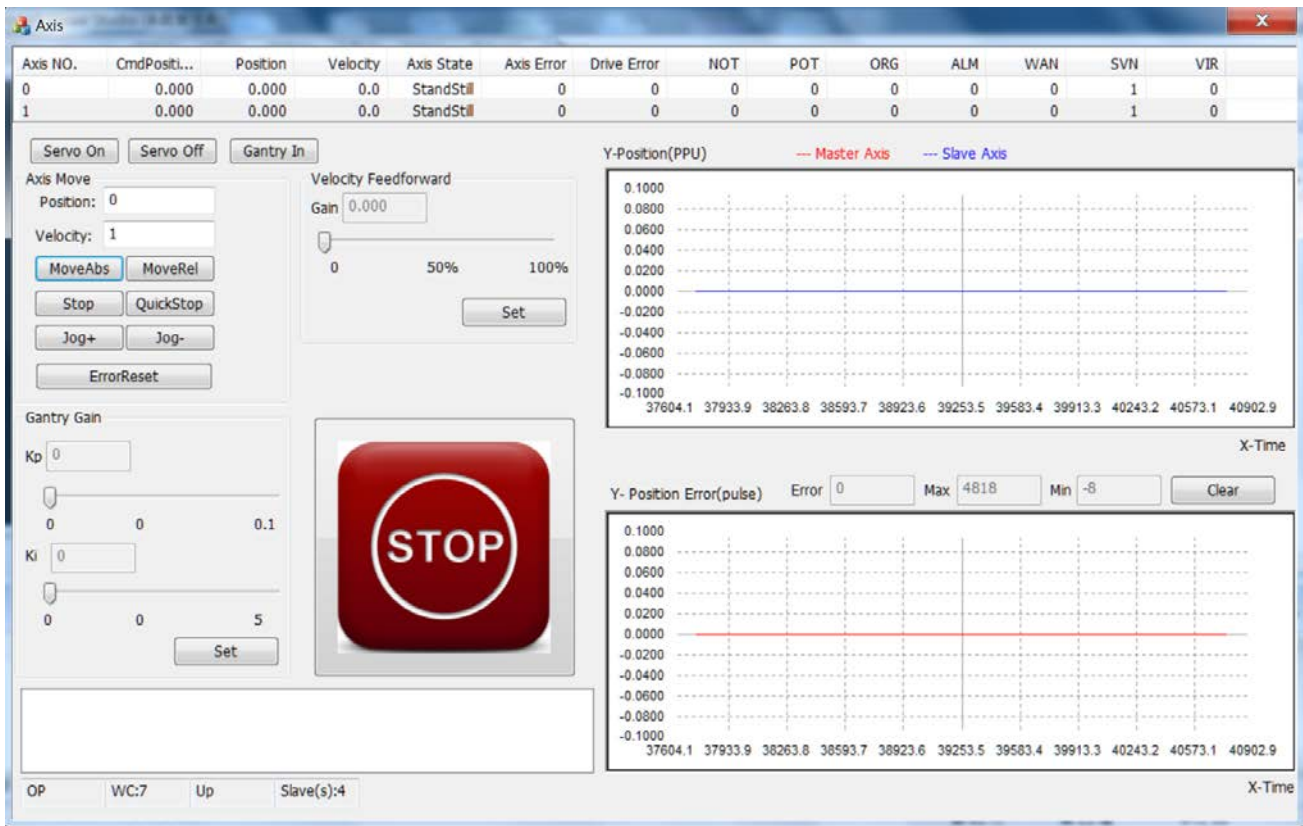
Error: current error

Max: Maximum error

Min: Minmum error

Clear button can clear value of Max and min

## 1.1.5. Motion control - Operation steps



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### Steps

1. Click ![Servo On] to servo on Max axis and Slave axis

2. Click ![Gantry In] to Gantry in, Master axis: Axis No.0, Slave axis: Axis No.1, At this point, the Axis State of the slave axis (Axis No. 1) will change to SyncMotion, After GantryIn, the slave axis cannot receive the motion command. When the master receives the motion command, the slave axis will follow the master axis.

   If the position of the main axis and the slave axis are different, GaintryIn will produce a positional shift, and the positional shift will always exist during the movement, For example: the current command position of master axis: 1 PPU, the current command position of the slave axis: 0 PPU, press GantryIN, then

   (1) Situation 1: The master axis relatively moves 10 PPU in the positive direction, and the slave axis also moves 10 PPU. The command position of the spindle at this time: 11 PPU, the command position of the slave axis: 10 PPU

   (2) Situation 2: The master axis absolute moves to 10 PPU in the positive direction and the

slave axis also moves. The command position of the spindle at this time: 10 PPU, the command position of the slave axis: 9 PPU

(3)

3.

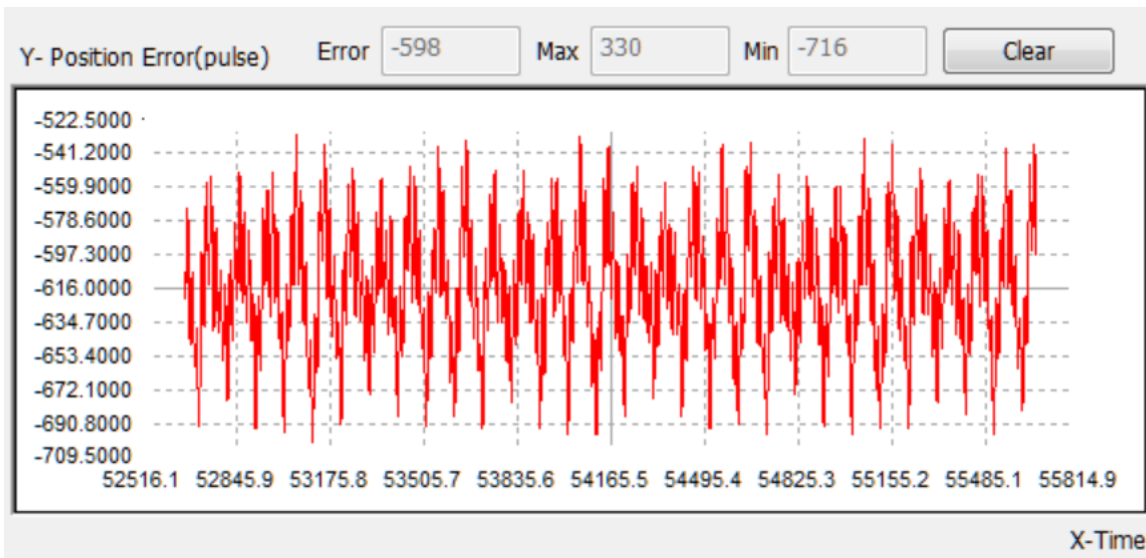| Axis NO. | CmdPositi... | Position | Velocity | Axis State | Axis Error | Drive Error | NOT | POT | ORG | ALM | WAN | SVN | VIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.000 | 0.000 | 0.0 | StandStill | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 1 | 0.000 | 0.000 | 0.0 | StandStill | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |

: Click Master axis (Axis No.0)

Position: 1

Velocity: 1

4. Start the test, please enter the command position and command speed ,
press [MoveAbs] or [MoveRel] to start a motion command.

Y- Position Error(pulse)　　Error -598　　Max 330　　Min -716　　Clear



X-Time

5.
Observe the position error display box. When the motor moves in the positive direction, if the display value is negative, indicating that the master axis is behind, the velocity feedforward of the master can be increased, so that the master axis keeps up the position command

(1) Click axis (Axis No.1)

| Axis NO. | CmdPosition | Position | Velocity | Axis State | Axis Error | Driver Error | NOT | POT | ORG | ALM | WAN | SVN | VIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 13686.000 | 13686.000 | 0.2 | StandStill | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 1 | 13686.000 | 13686.000 | 0.0 | SyncMotion | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |

(2) Increase Velocity feed forward of master axis.

Velocity Feedforward

Gain 0.400

0　　50%　　100%

Set

(3) After increase velocity feed forward of master axis, positon error between master axis and slave axis is smaller
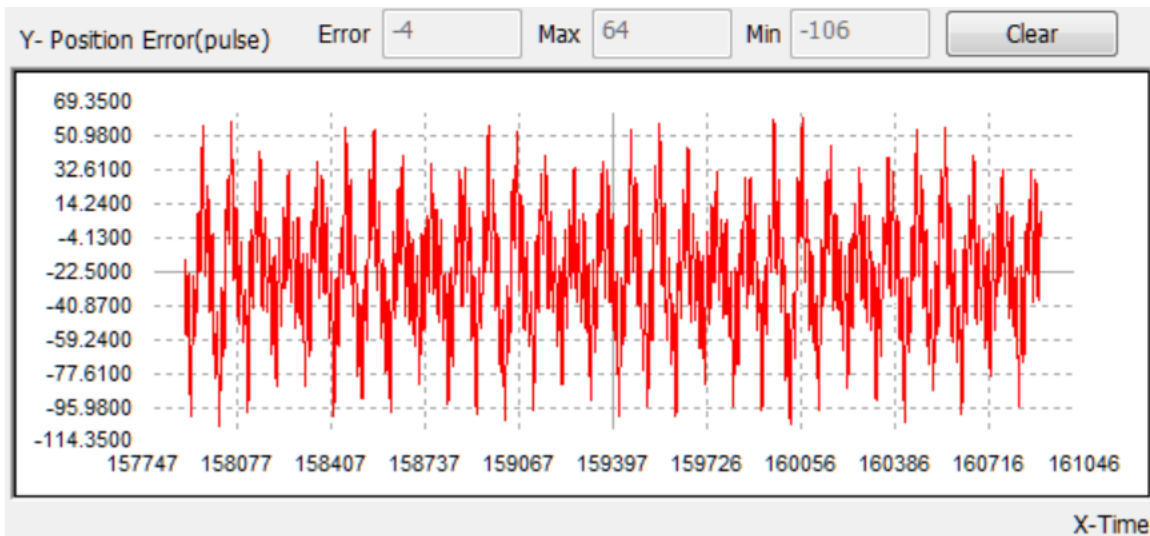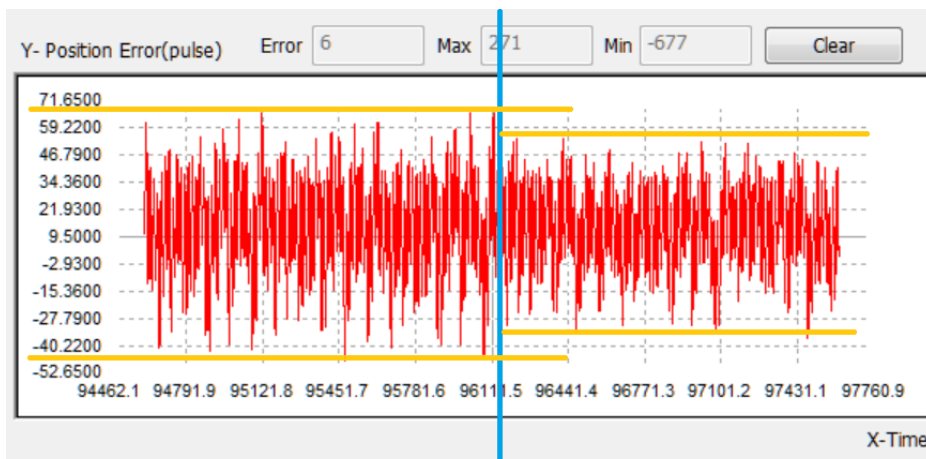


6. Gantry Kp settings

(1) Warning: Excessive KP may cause motor vibration, please set KP carefully, do not add more than 0.1 at a time. The vibration display shows the vibration of motors. If there is motor vibration during the adjustment of KP, please press the emergency button and adjust from 0.



Kp = 0                                    Excessive Kp cause motor oscillation
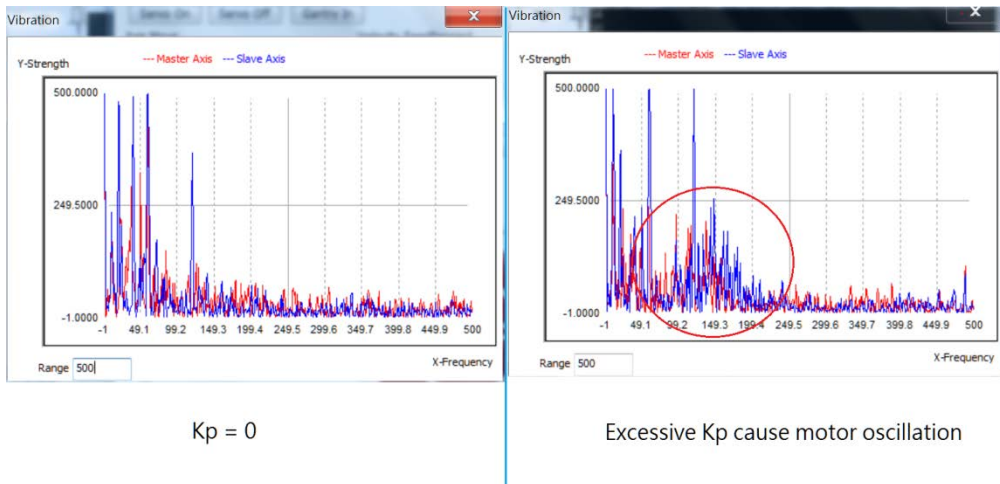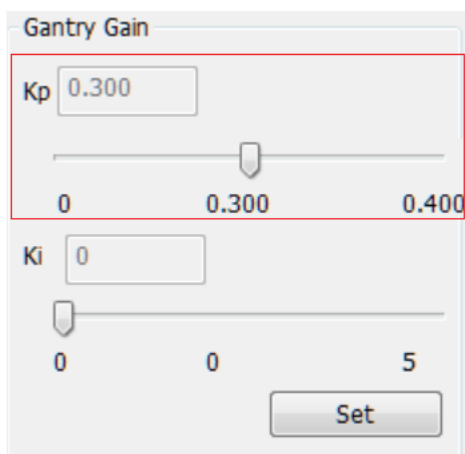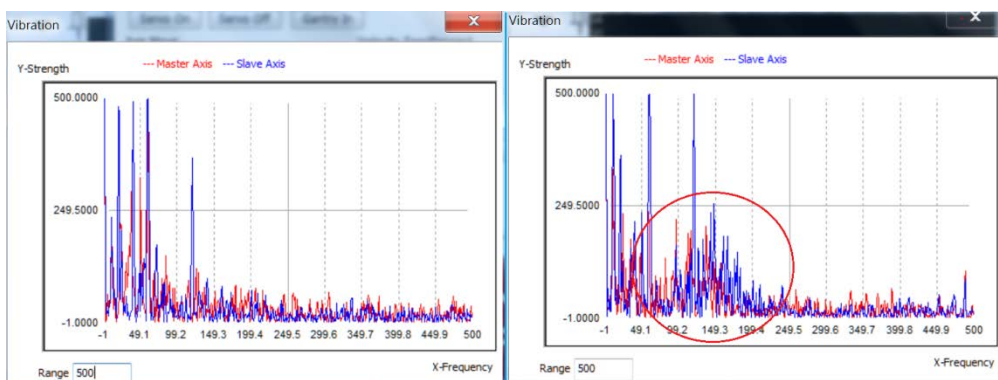
(2) Adjust Kp to reduce vibration

Kp = 0                    After tunning Kp

(3) Adjust the Kp slider and press Set (shared with Ki) to set Kp
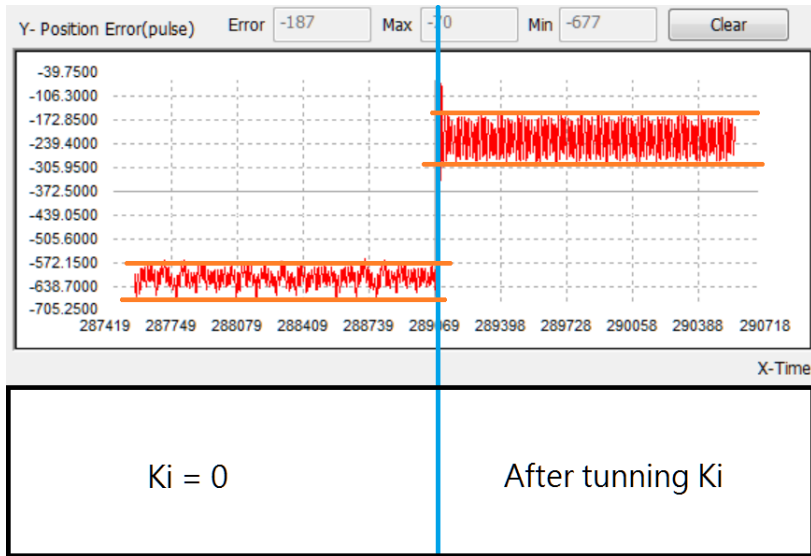


(4) Check there is no motor oscillation



Kp = 0                    Excessive Kp cause motor oscillation

7. Gantry Ki settings

   (1) Adjust Ki will reduce position error, but will increase motor oscillation

| Ki = 0 | After tunning Ki |

(2) Adjust the Ki slider and press Set (shared with Kp) to set Ki