EtherCAT Master Gantry Software Manual

English Ver. 2.0.0, Feb. 2022

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.

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SUPPORT

ECAT-M801 Series

EMP-9000 Series

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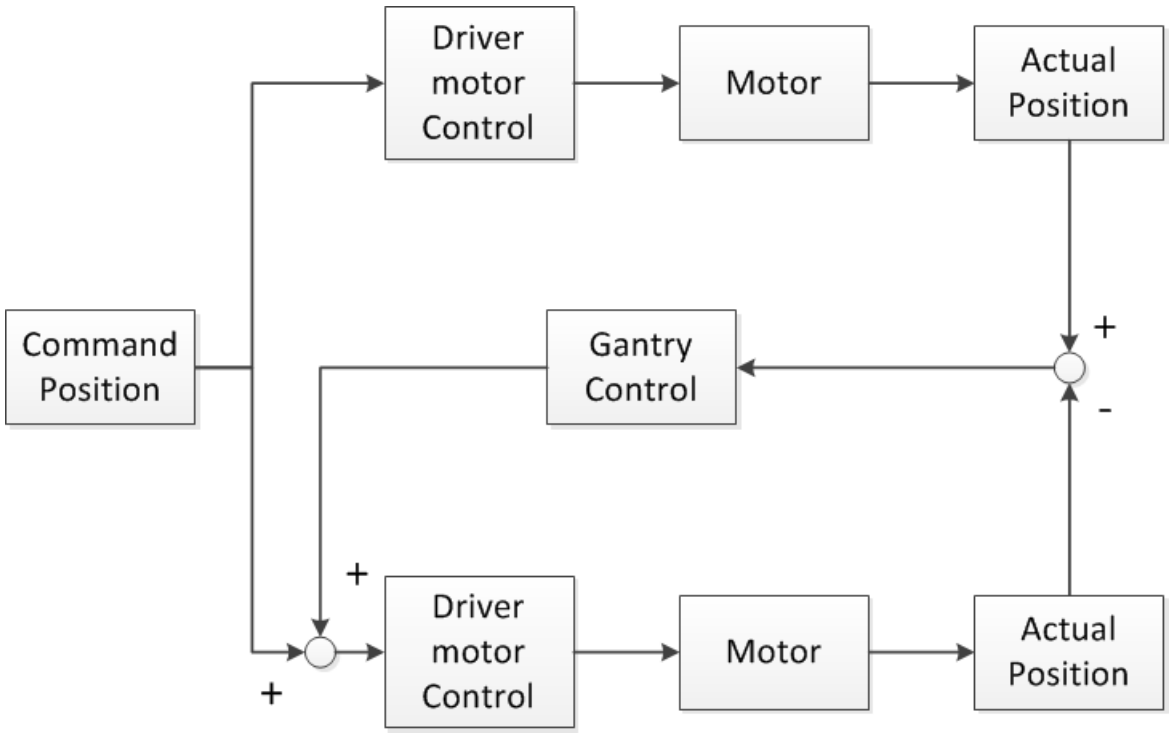
1. Gantry Utility

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

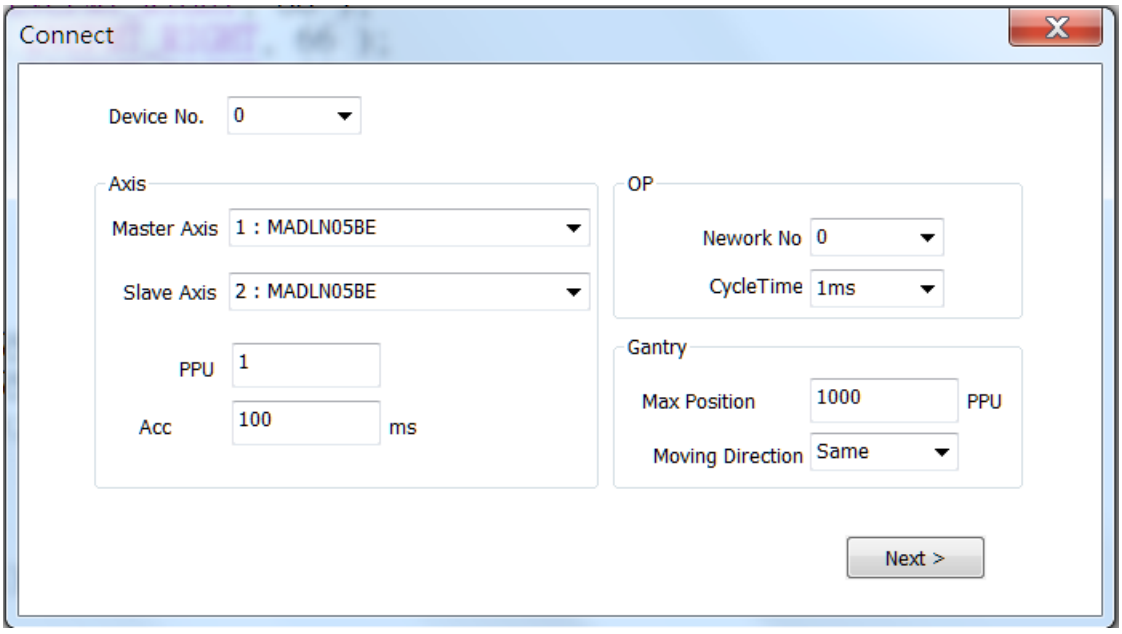
The output of Gantry Control is output to the command position of the slave driver.



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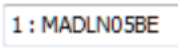
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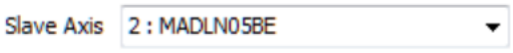
1.1.2. Device init steps

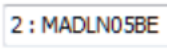


1. Click  and select the device number from the list.

2. Click  and select the Master axis from the list.



,"1:" Means the module is the second module in the EtherCAT network,"MADLN05BE" Means the name of this module.
3. Click  and select the Slave axis from the list.



,"2:" Means the module is the third module in the EtherCAT network,"MADLN05BE" Means the name of this module.
4. Set PPU, if you are used to using pulse as the unit during operation, you can set it to 1. 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.

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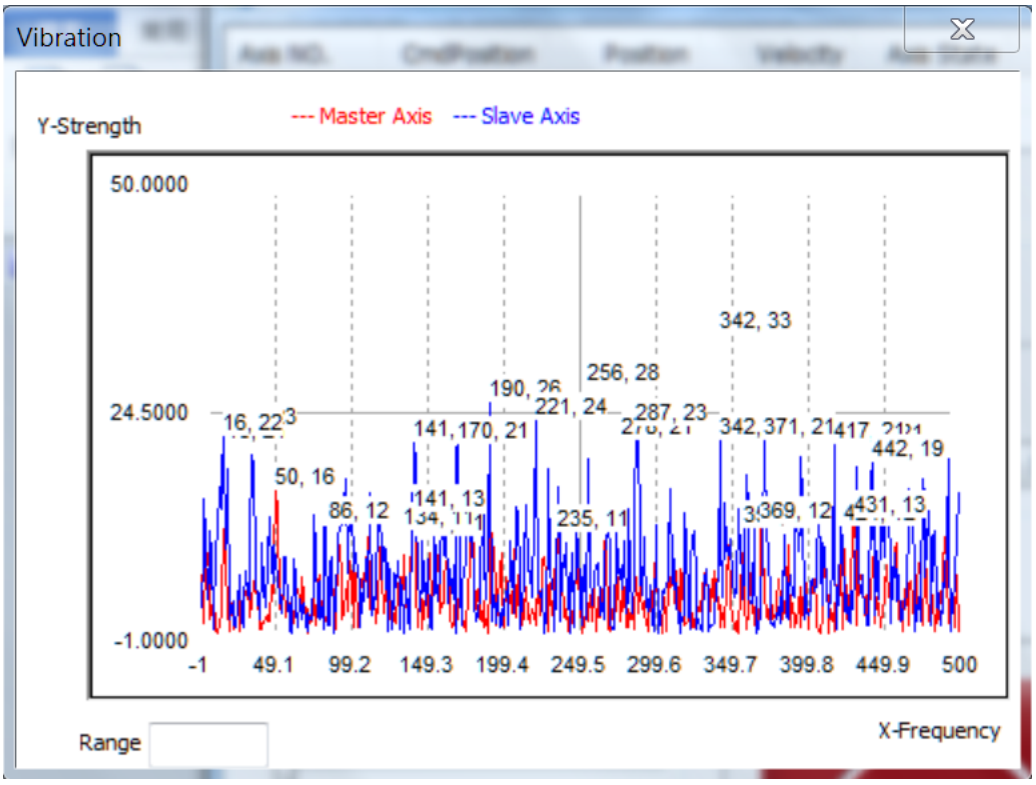
When the command starts the motor to run at 1 PPU/s, the speed command will increase from 0 PPU/s, and the speed command will reach 1 PPU/s after 100ms, when stopped, the speed command will decrease from 1 PPU/s down, and the speed command will reach 0 PPU/s after 100ms. There is also a quick stop function 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.

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1.1.3. Vibration display



The vibration display box shows vibration of motors.

Red: vibration of Master axis

Blue: vibration of Slave axis

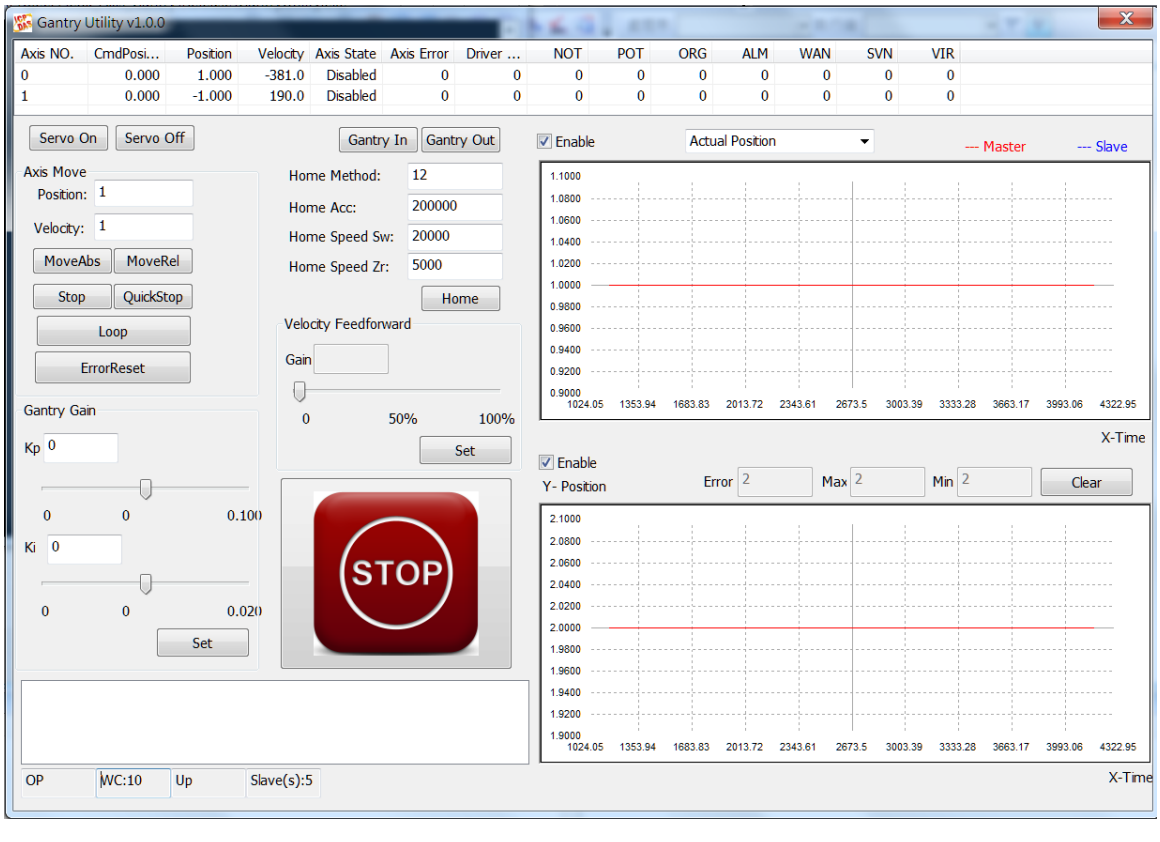
X axis: Frequency, unit: Hz

Y axis: Strength, uint: pulse/s

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1.1.4. Motion Control- Interface description



description

-

Axis NO.	CmdPosition	Position	Velocity	Axis State	Axis Error	Drive Error	NOT	POT	ORG	ALM	WAN	SVN	VIR
0	0.000	0.000	0.0	Disabled	0	0	0	0	0	0	0	0	1
1	0.000	0.000	0.0	Disabled	0	0	0	0	0	0	0	0	1

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

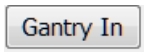
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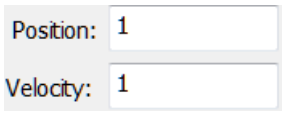
ALM	Alarm
WAN	Warning
SVN	Servo ON/OFF state
VIR	Virtual Axis (when slave number is 65535)

- 

: Master axis and Slave axis will be sequentially Servo On
- 

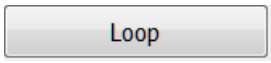
: Master axis and Slave axis will be sequentially Servo Off
- 

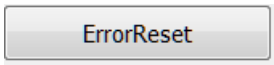
: Gantry in
- 

: Gantry out
- 

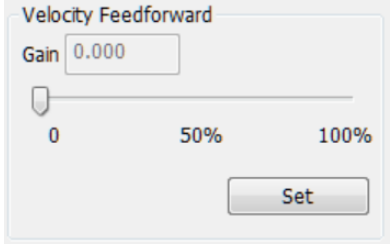
: Target position and target velocity
- 

: Absolute move and relative move
- 

: Deceleration stop and quick stop
- 

: Start to move back and forth at point AB, point A is the current position, and point B is the target position
- 

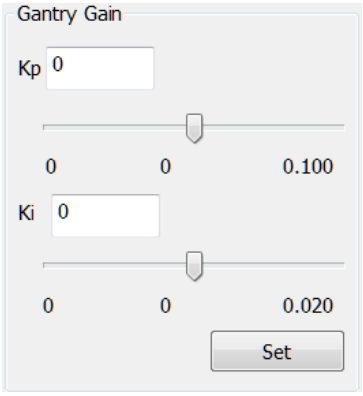
: Clear the error. A motion command cannot be started when the error occurs. It needs to be cleared before starting a motion command. The error will be displayed in Axis Error and Drive Error. The definition of Axis Error can be found in the software manual. The definition of Drive Error is found in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

: The emergency stop button, the movement stops immediately after pressing, and Servo Off, an error -1030 appears.
- 

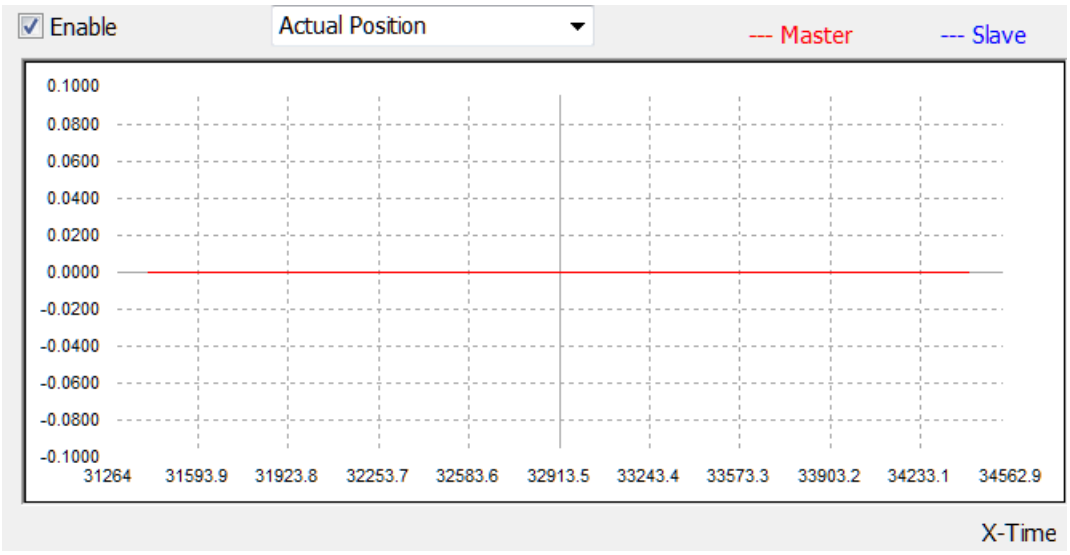
: Velocity feedforward adjustment, increased velocity feedforward can make the actual position closer to the command position.

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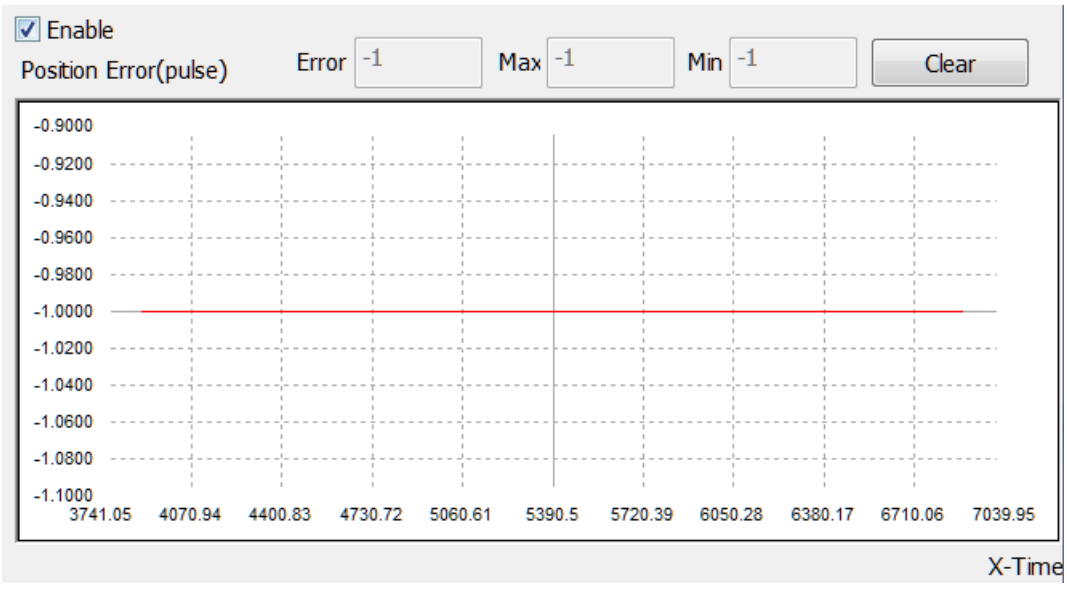


- : Gaintry Gain settings



- :

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

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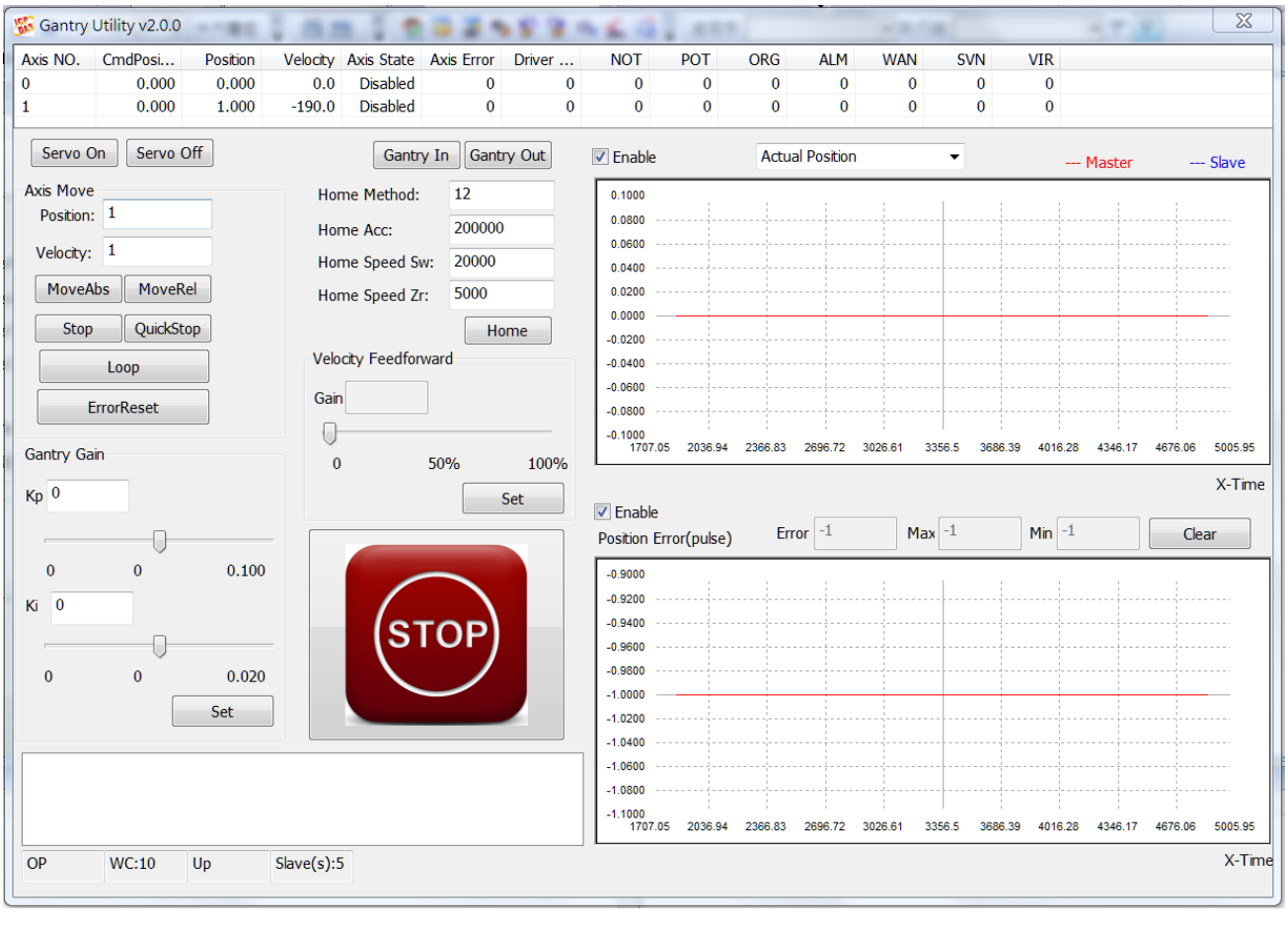
Min: Minmum error

Clear button can clear value of Max and min

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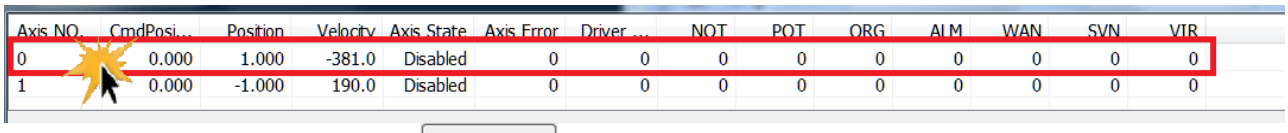
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1.1.5. Motion control - Operation steps

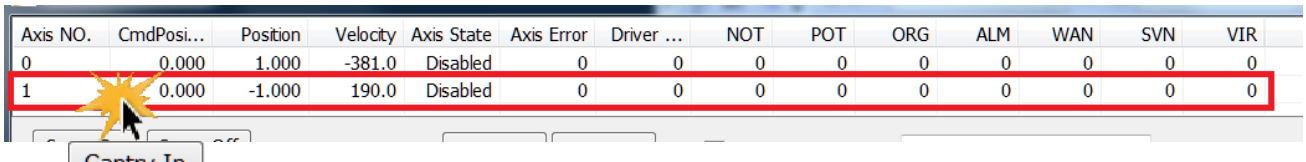


Steps

1. Click Master axis (Axis No.0) and Servo On to servo on Master axis



2. Click Slave axis (Axis No.1) and Servo On to servo on Slave axis



3. 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.

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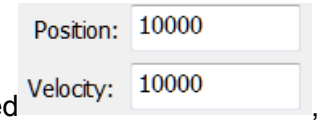
If the position of the main axis and the slave axis are different, GaintryIn will produce a positional shift, and the positional shift will always exist during the movement, For example: the current command position of master axis: 1 PPU, the current command position of the slave axis: 0 PPU, press GantryIN,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

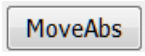
(1) Situation 1: The master axis relatively moves 10 PPU in the positive direction, and the slave axis also moves 10 PPU. The command position of the spindle at this time: 11 PPU, the command position of the slave axis: 10 PPU

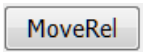
(2) Situation 2: The master axis absolute moves to 10 PPU in the positive direction and the slave axis also moves. The command position of the spindle at this time: 10 PPU, the command position of the slave axis: 9 PPU

4. Click Master axis (Axis No.0)

Axis NO.	CmdPosi...	Position	Velocity	Axis State	Axis Error	Driver ...	NOT	POT	ORG	ALM	WAN	SVN	VIR
0	0.000	0.000	-19.0	StandStill	0	0	0	0	0	0	0	1	0
1	0.000	0.000	0.0	SyncM...	0	0	0	0	0	0	0	1	0

5. Start the test, please enter the command position and command speed 

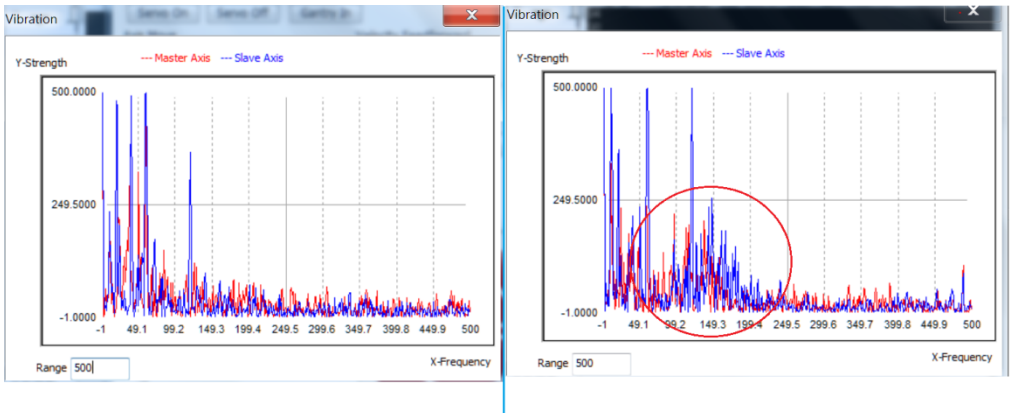
, click 

or 

to start a motion command.

6. Gantry Kp setting

(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.

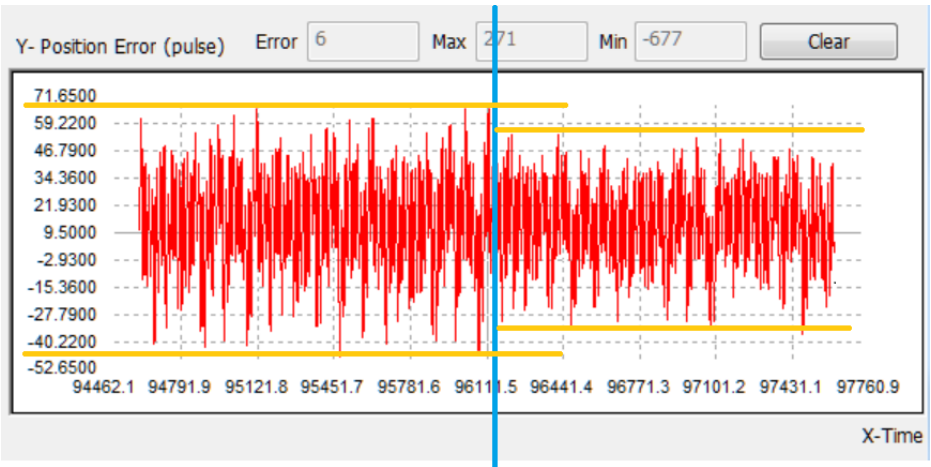


Kp = 0 Excessive Kp cause motor oscillation

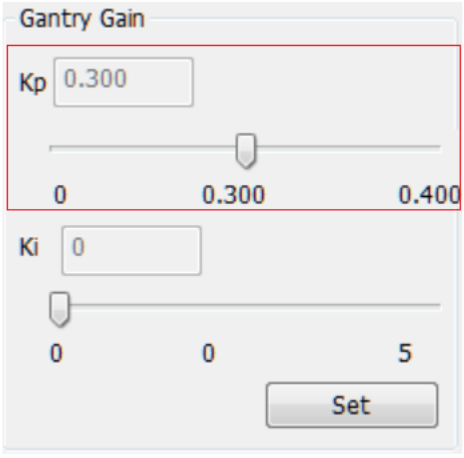
(2) Adjust Kp to reduce vibration

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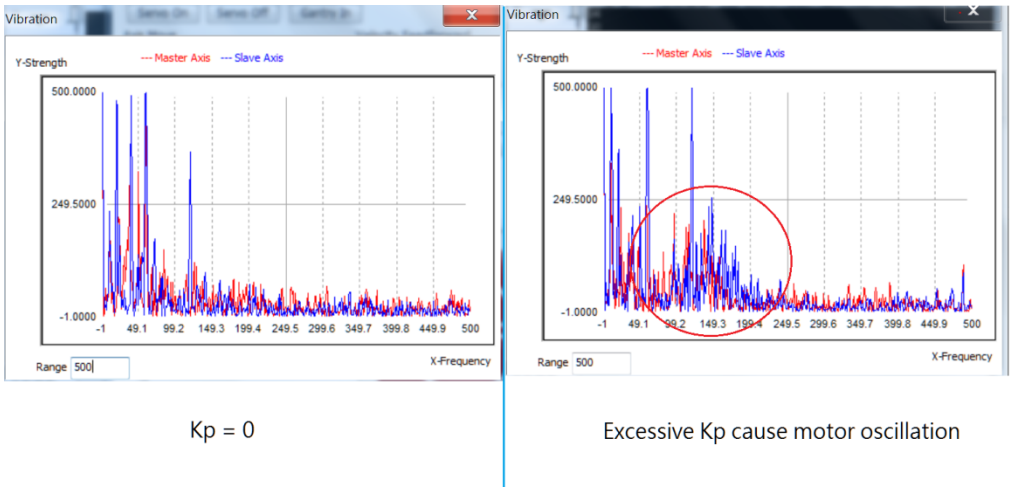
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(3) Adjust the Kp slider and press Set (shared with Ki) to set Kp



(4) Check there is no motor oscillation

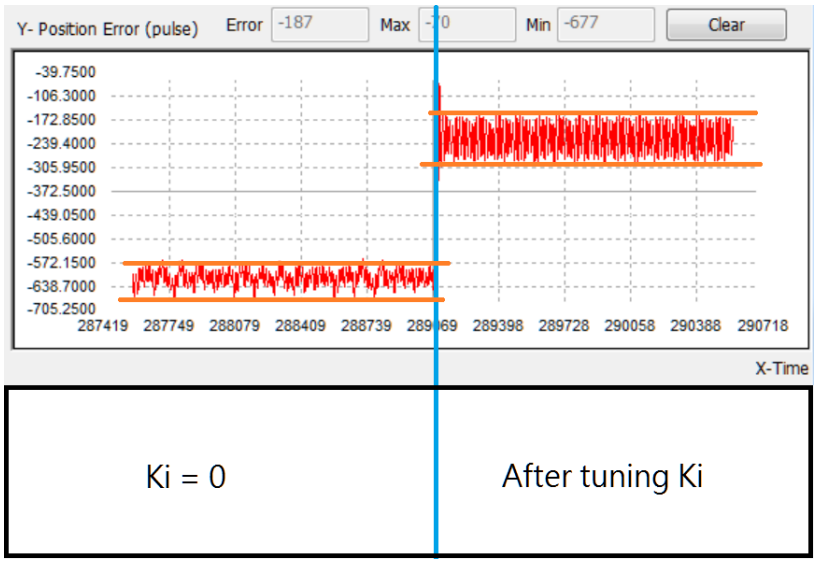


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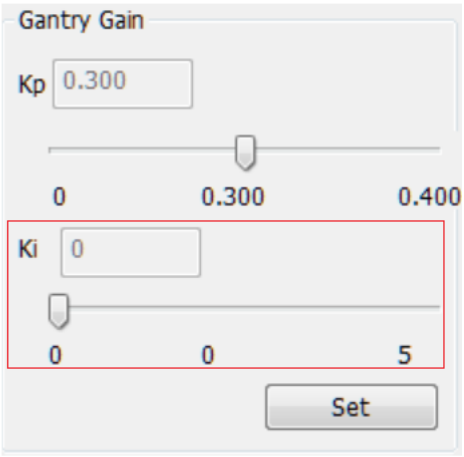
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7. Gantry Ki setting

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



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



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