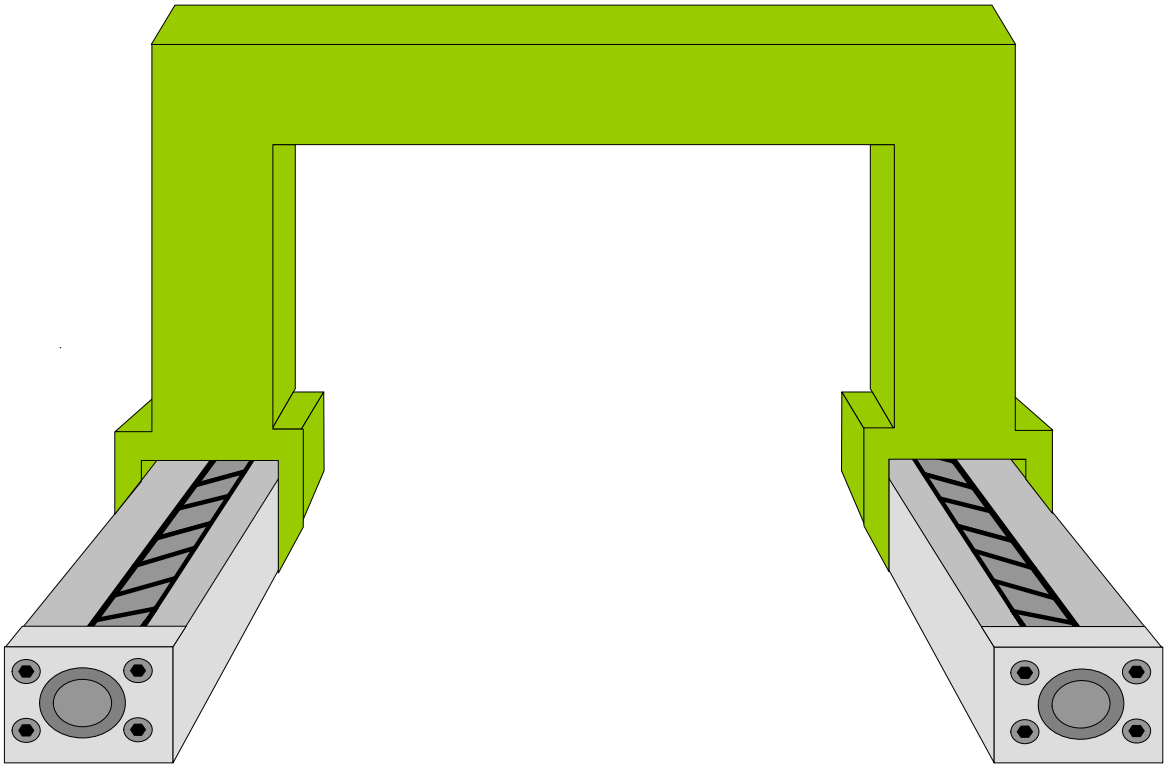
Gantry Control (1)

The Synchronous Movement

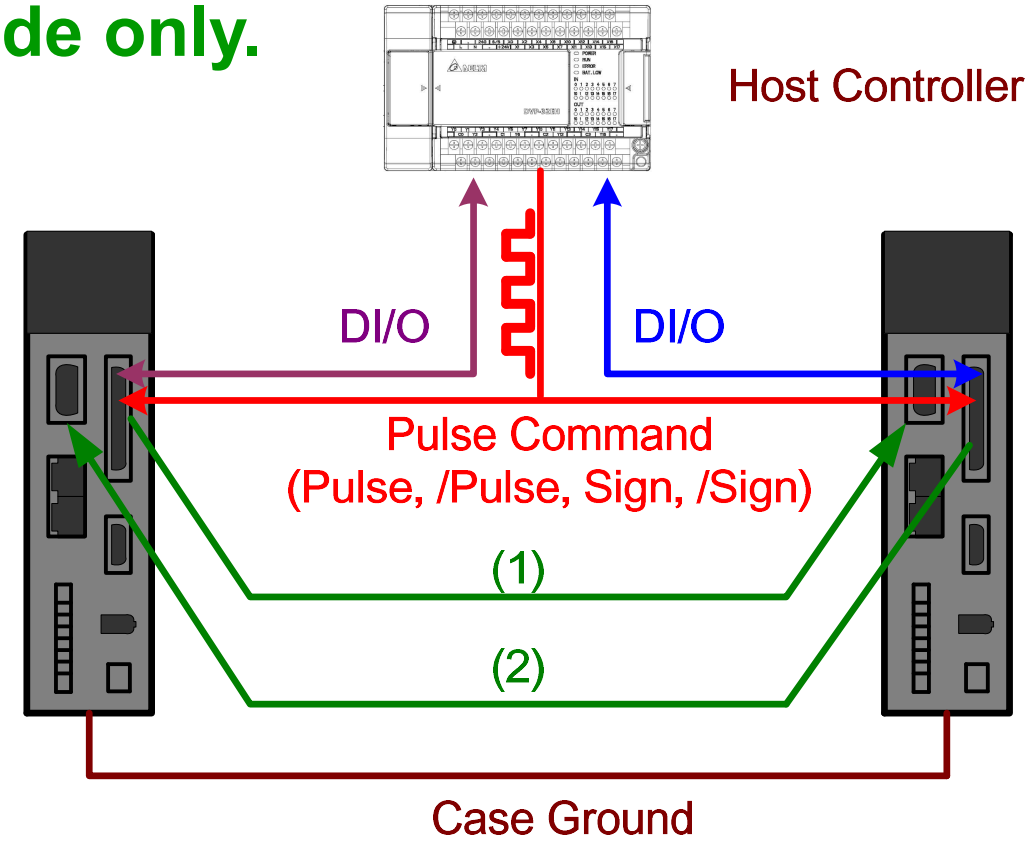
For the application requesting two axes moving synchronously, the gantry is a good solution.



Gantry Control (2)

Delta Solution

This is an awesome solution. The wiring is very simple. The pulse command of host control is shared by both of the two axes. Separate DI/O signals. The monitoring signals are also separate. This function supports PT mode only.



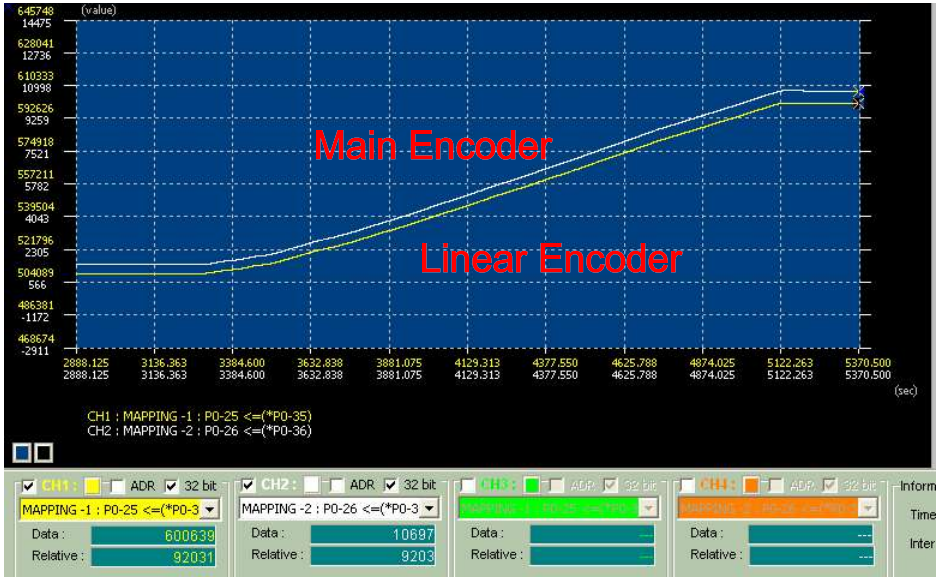
(1) (2)

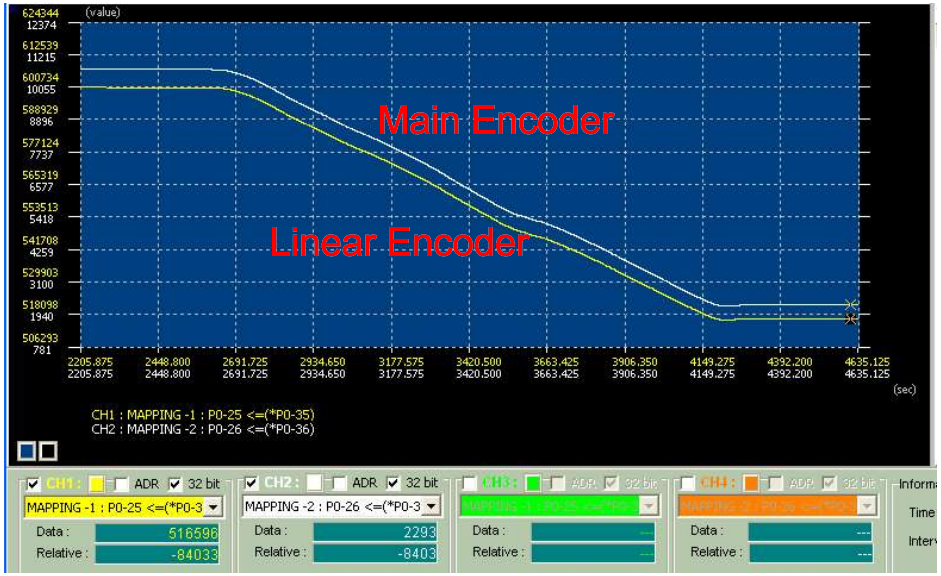
OA, /OA, OB, /OB →
Opt_A, Opt_/A, Opt_B, Opt_/B

Gantry Control (3)

The Pulse Direction

Follow the same procedure in full-closed control to measure the pulse trend in both of the axes. Make sure the trend on both of the axes should be the same.





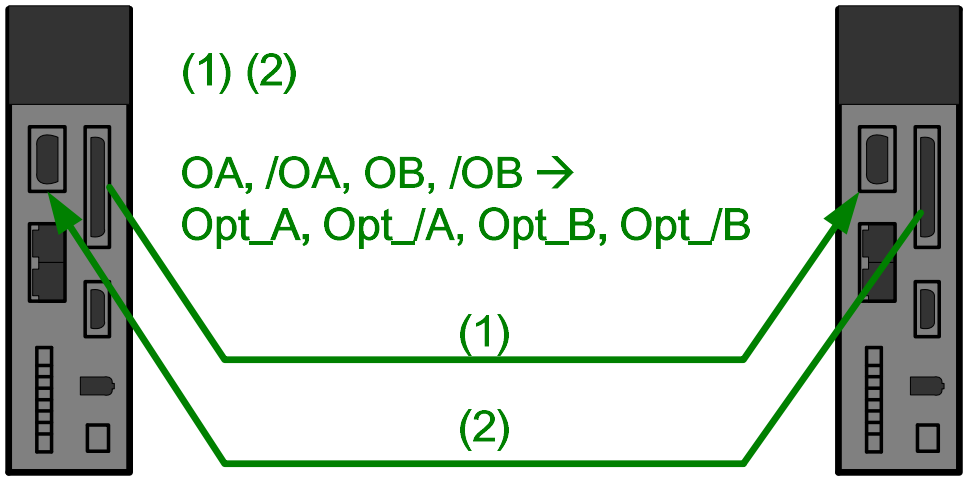
Gantry Control (4)

Monitoring Signal

The limit of port CN5 should be considered with the formula below. A safety coefficient 0.9 is used.

$$\frac{\text{Max. Motor Speed (rpm)}}{60} \times (\text{P1-46}) \times 4 < (8 \times 10^6 \times 0.9)$$

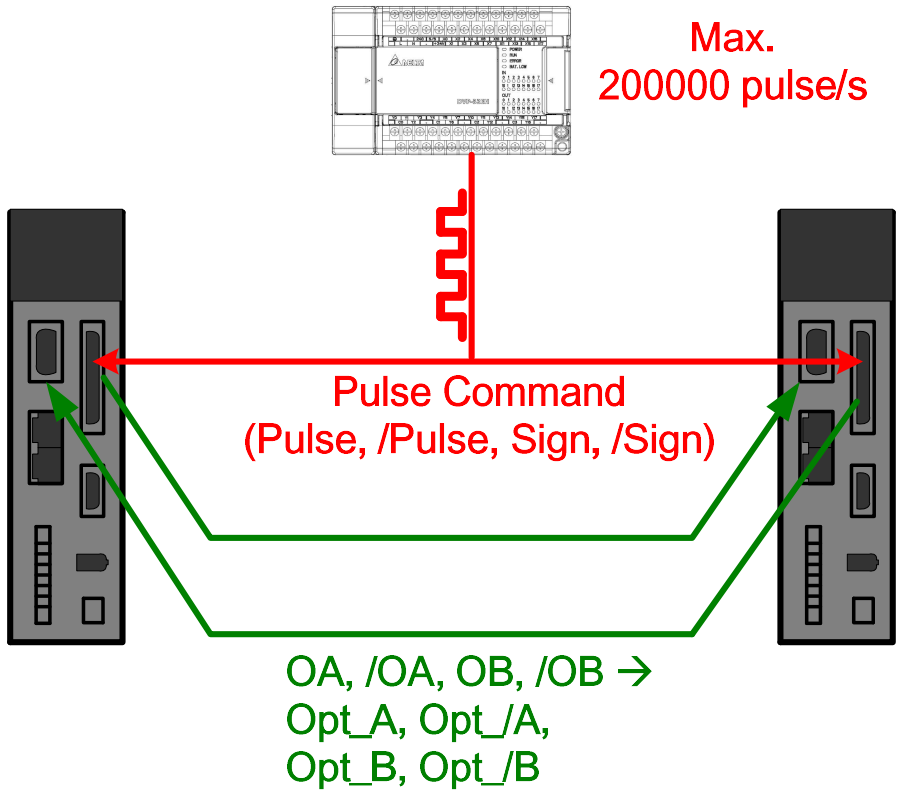
P1-72=4*(P1-46)



Gantry Control (5)

From Command to Evaluate

The command frequency can also be used to evaluate P1-46.



P1-44=128, P1-45=10
100000 PUU / revolution

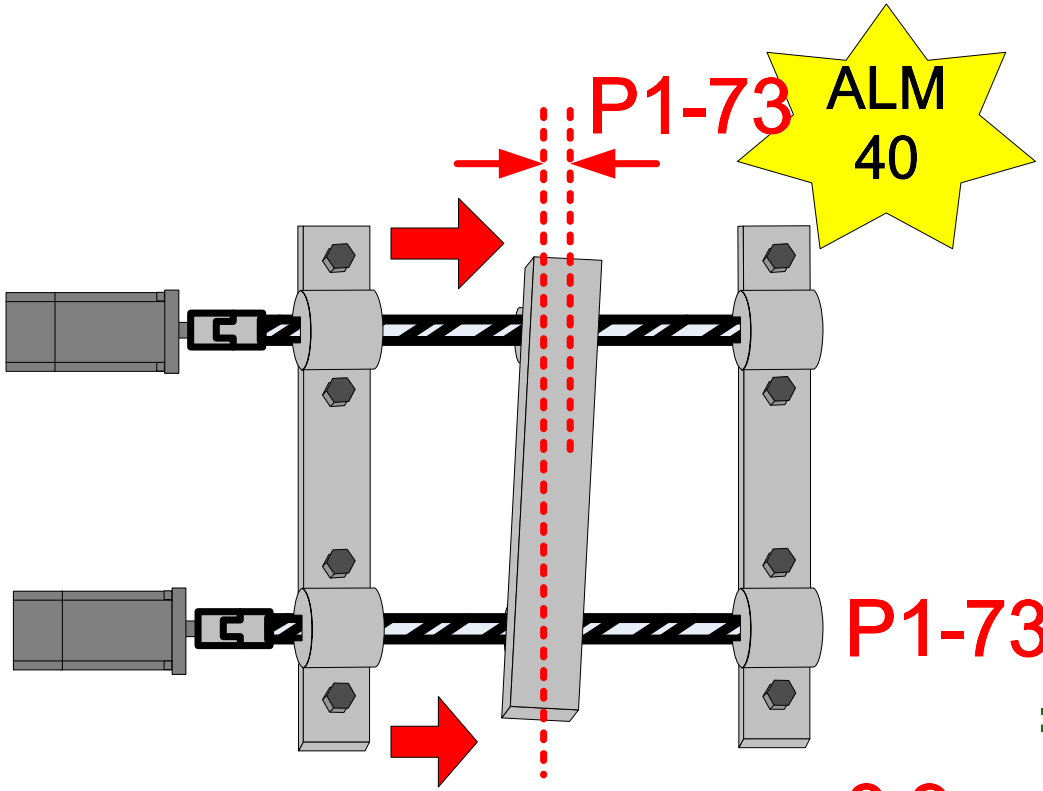
$$\frac{200000}{100000} \times (P1\text{-}46) \times 4 < (8 \times 10^6 \times 0.9)$$

P1-72=4*(P1-46)

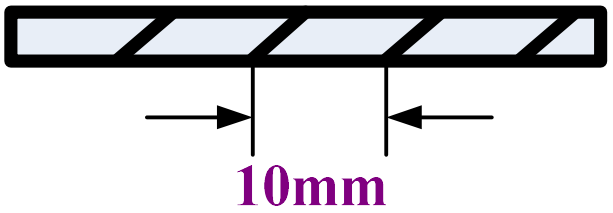
Gantry Control (6)

The Protection of Miss-Synchronization

The parameter P1-73 can be set for the protection. This parameter should be set based on the real mechanism tolerance.



P1-46=60000
P1-72=240000
1.25 mm max.
tolerance

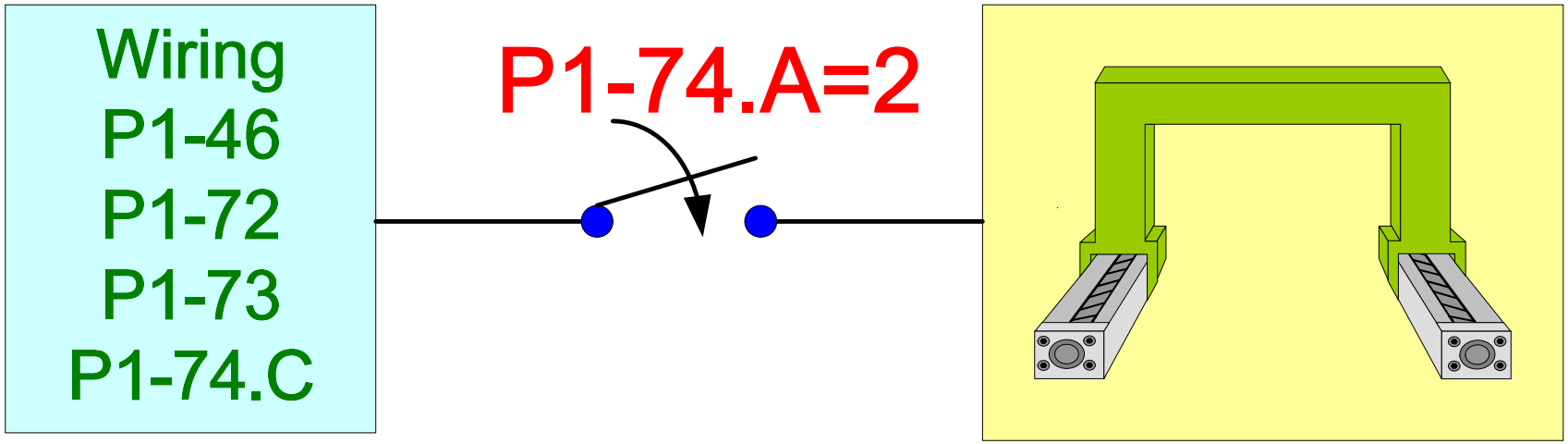


P1-73= 0.9 x1.25 / 10x240000
= 0.9 x30000
0.9 : safety coifficient

Gantry Control (7)

The Switch of Gantry Function

The gantry function is enabled by P1-74.A=2.

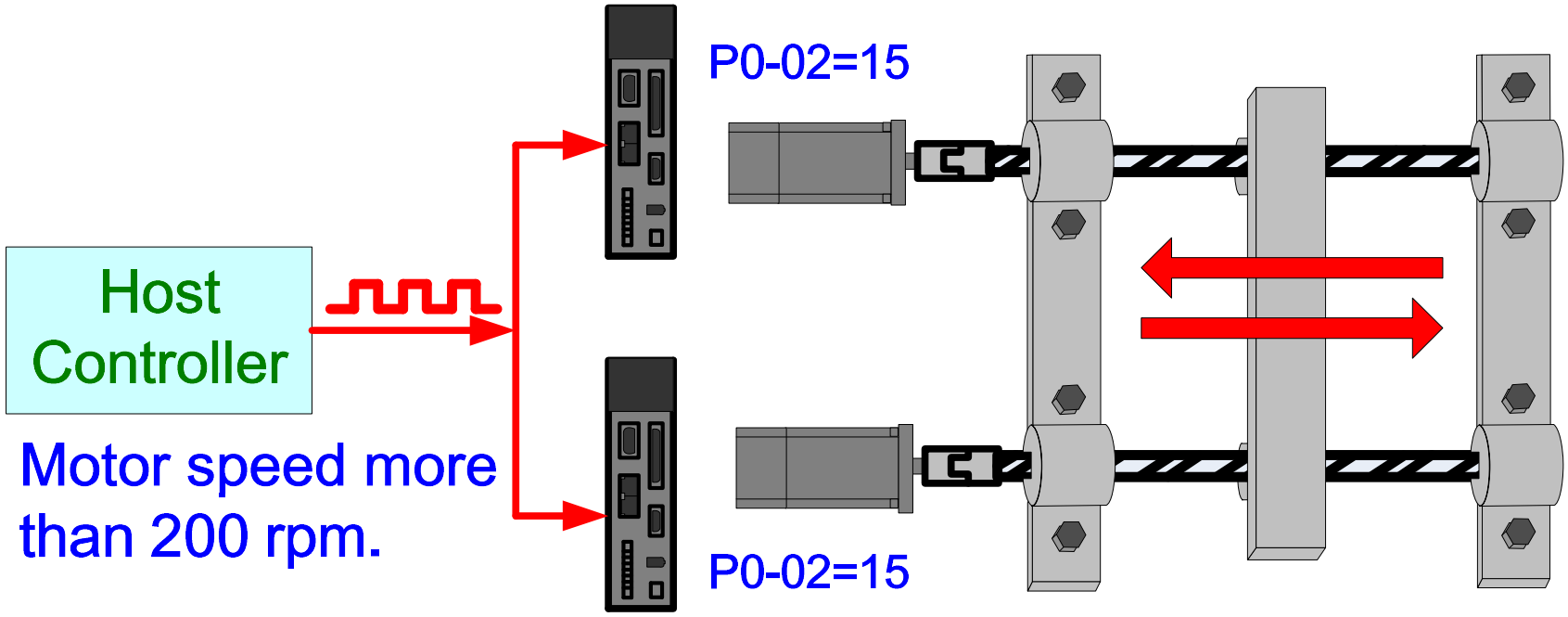


Gantry Control (8)

The Inertial Ratio

Use host controller to control the gantry mechanism moving forward and backward at a speed above 200 rpm and read from the panels for their inertial ratio respectively.

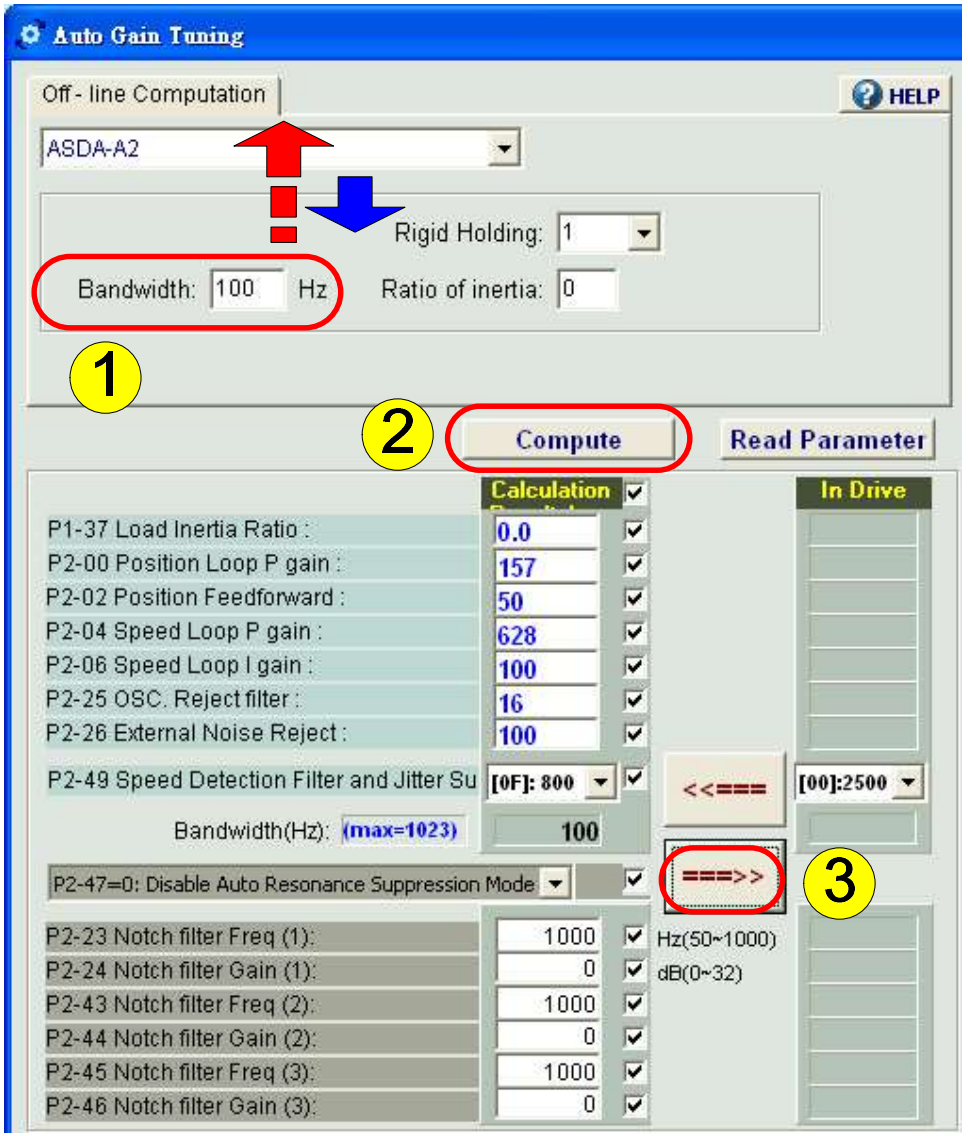
Read from the panel of both servo drives for JL=?



Gantry Control (9)

Test the Maximum Bandwidth

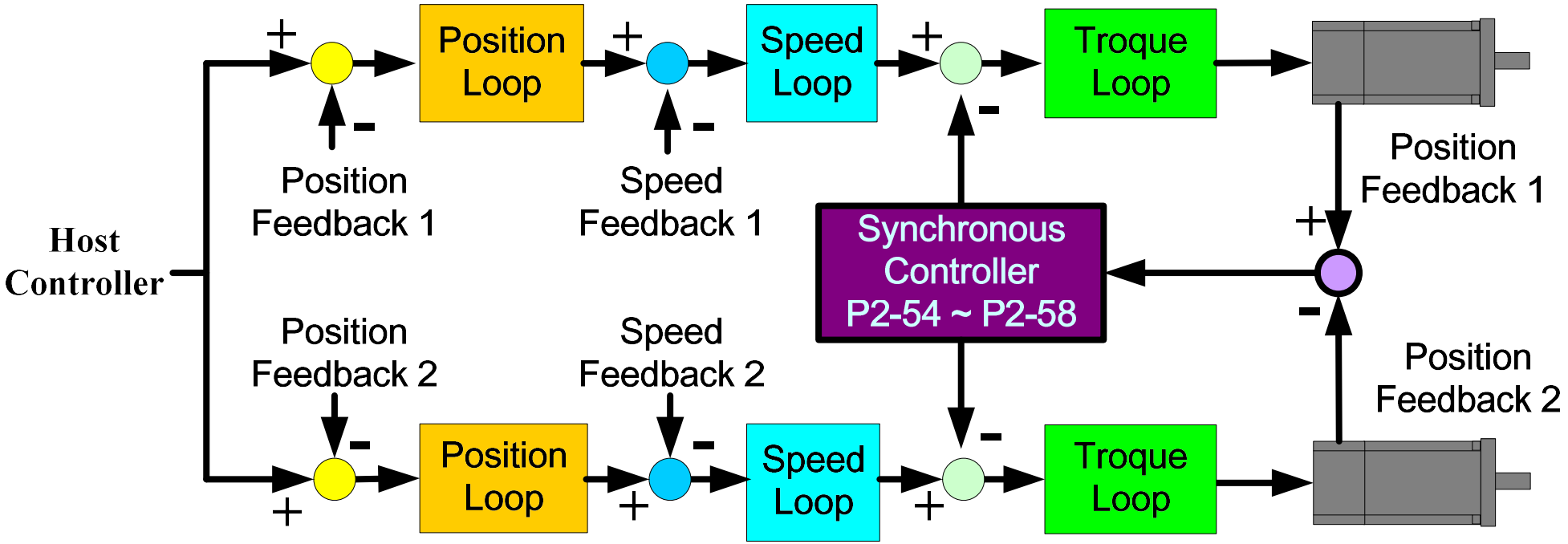
Use the PC software to test the maximum bandwidth of your system. Keep increasing the bandwidth until the sound coming out from the motor and reduce the bandwidth until the acceptable volume of noise heard.



Gantry Control (10)

The Control Skeleton of Gantry

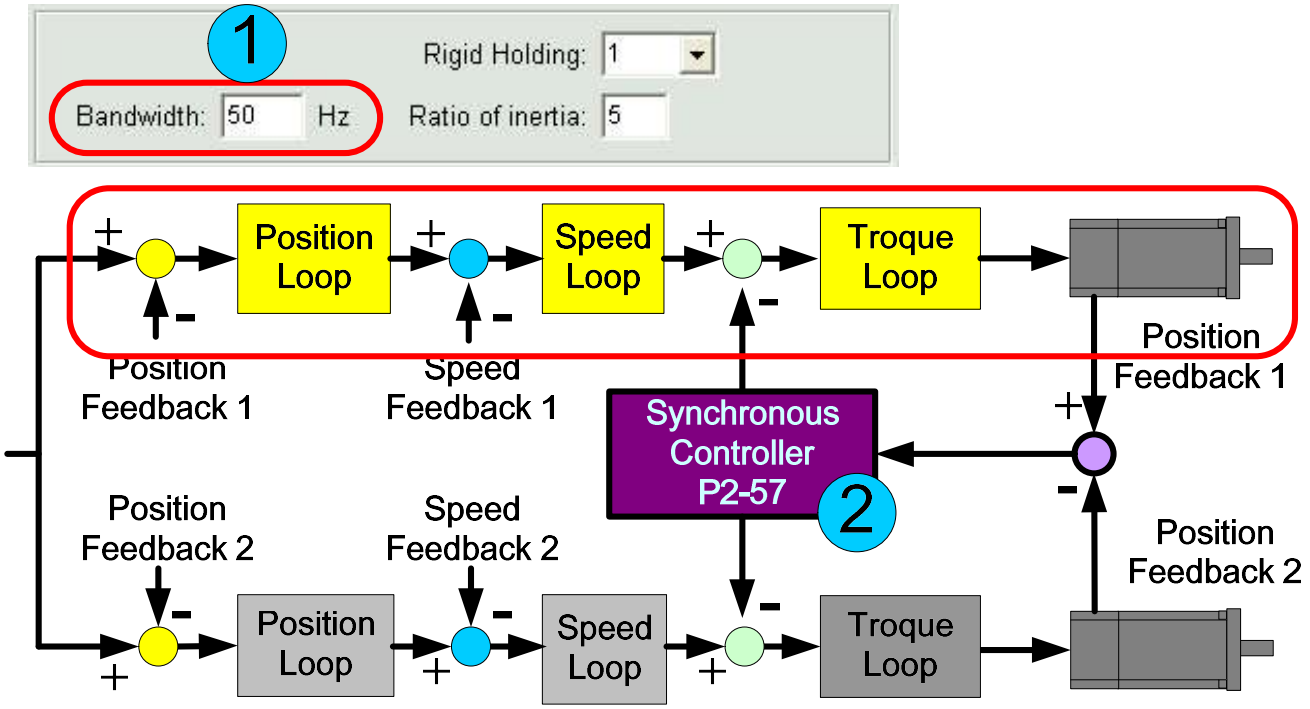
There is a new feature call Synchronous Controller for gantry function. The controller will share the maximum bandwidth with loop controller.



Gantry Control (11)

The Limit of Maximum Bandwidth

It is better to turn the summation of loop gain and synchronous gain not exceeding the maximum bandwidth.



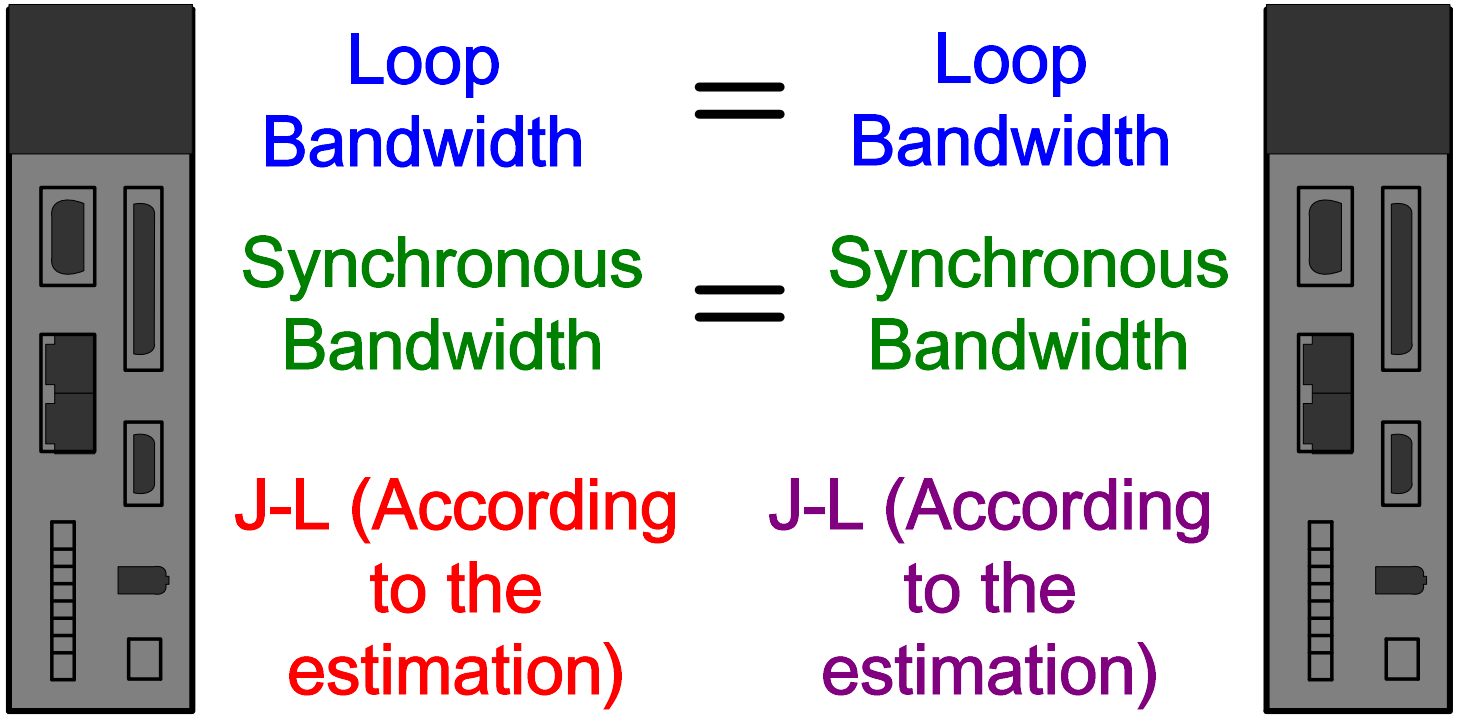
Bandwidth of Loop + Bandwidth of P2-57 <= Max. Bandwidth

1 2

Gantry Control (12)

More on the Bandwidth

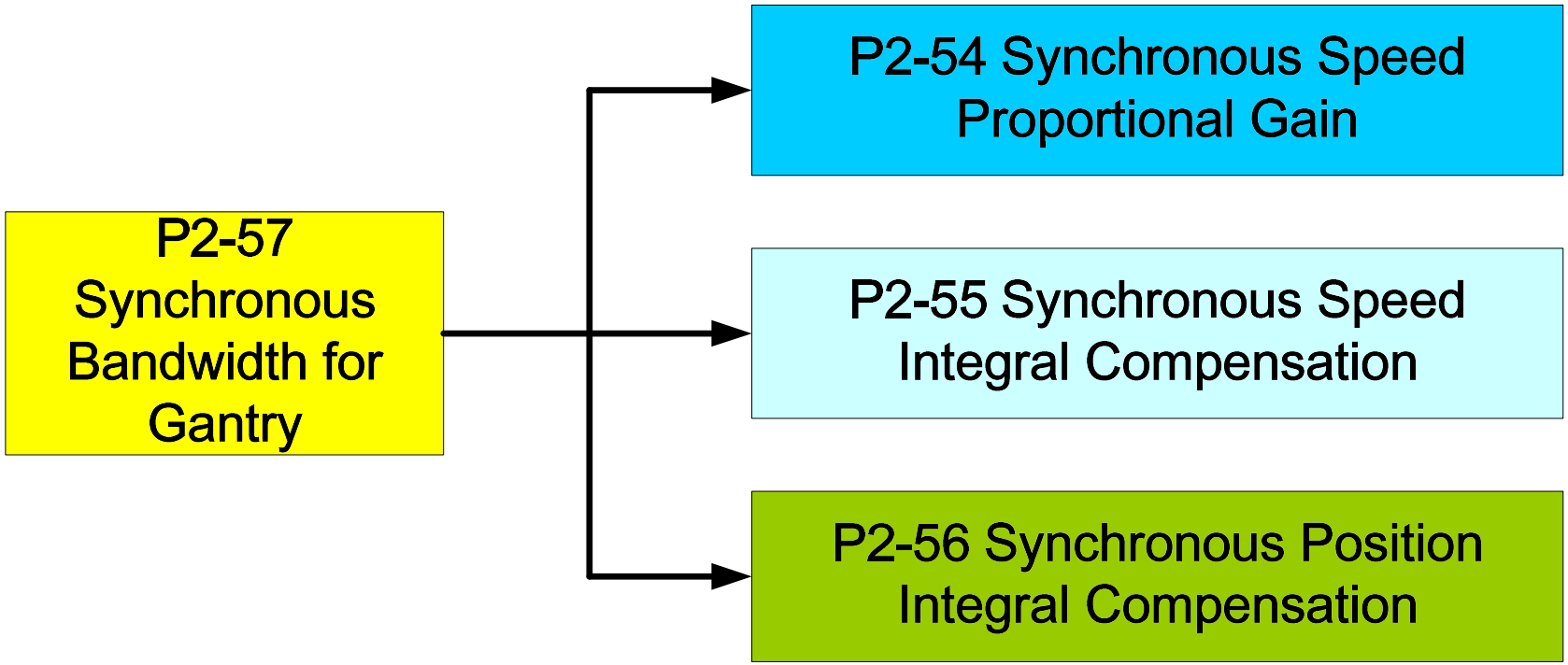
Both of the two drives should be set to the identical bandwidth of loop gain and synchronous gain. The inertial ratio could be different but the bandwidths must the same.



Gantry Control (13)

More on Synchronous Bandwidth

At the moment P2-57 is put, the servo drive will calculate P2-54~P2-56 automatically.



Gantry Control (14)

The Distribution of Maximum Bandwidth

The position displacement tolerance of system is a reference for distributing the bandwidth.

The tolerance set in P1-73

Big  Small

Maximum Bandwidth =
Loop Bandwidth + Synchronous Bandwidth

Loop Bandwidth	100 %	90 %	80 %	70 %	60 %	50 %	40 %	30 %	20 %	10 %
Synchronous Bandwidth	0 %	10 %	20 %	30 %	40 %	50 %	60 %	70 %	80 %	90 %

Gantry Control (15)

The Difference of Mechanism

Once the mechanism exists difference, there are some parameters changed to fix this problem.