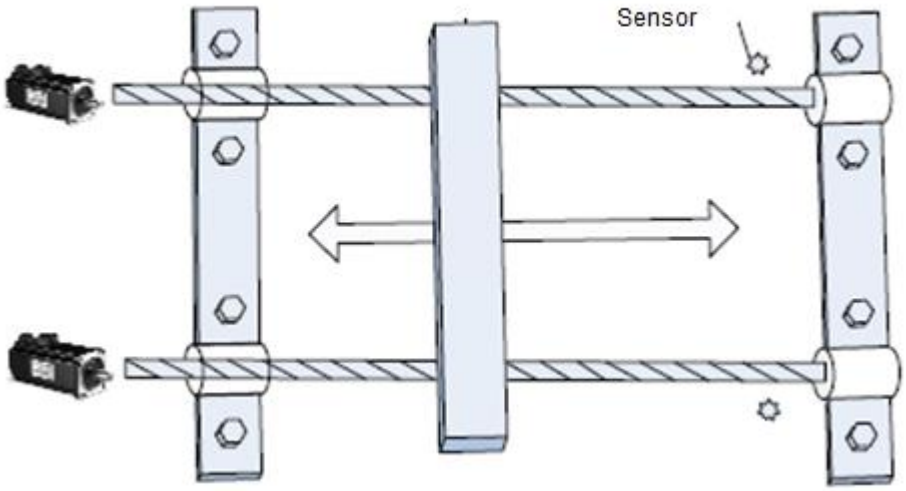
Gantry synchronization function

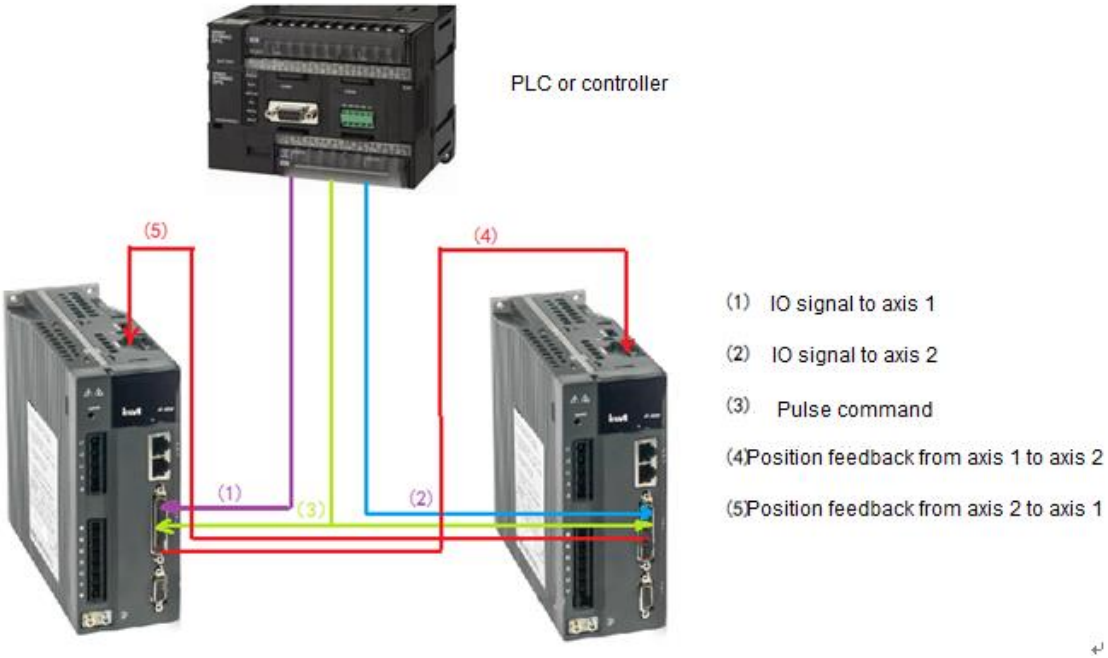
1. Gantry synchronization introduction

The use of gantry synchronization focuses on controlling the constant speed movement of two mobile platforms. If the movement between the two shafts is too different, it will cause damage to the mechanism, so the synchronous movement control between the two shafts is the first priority for the synchronous use of the gantry.



The gantry synchronization control function provided by DA200 series of INVT can enable users to meet the requirements of this application smoothly. In the condition of gantry synchronization, when the position deviation (R0.53: gantry synchronization position deviation) exceeds the set value (P4.64: the mixed deviation is too large), a warning will be issued and the system will be stopped running.

The following figure shows the system wiring, the controller sends position instructions to two servo drives at the same time, the frequency division output of the master drive is connected to the second encoder interface of the slave machine, and the frequency division output of the slave drive is also connected to the second encoder interface of the master drive.

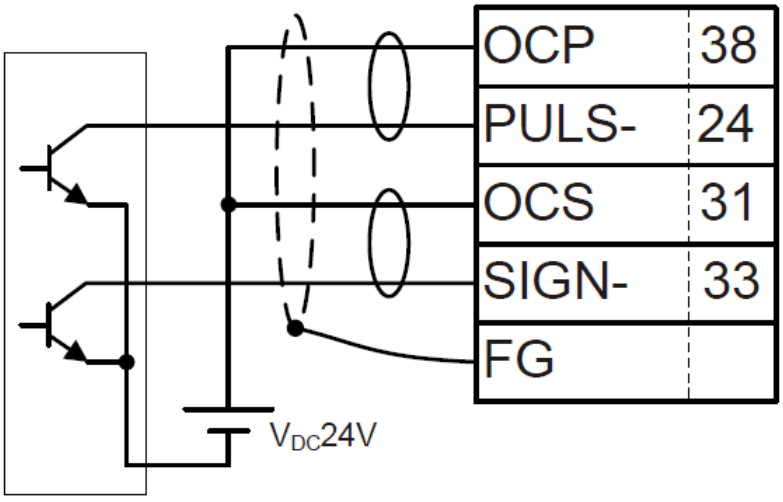


System wiring figure

2. CN1 control pins connection

2.1 Pulse signal connection

The green cable (3) above is the same pulse signal. The controller connects the CN1 pin as follows: PLC output low level signal as an example wiring, the specific pulse wiring can check the instructions for the pulse part of the wiring instructions.



2.2 Frequency division signal wiring

In the figure, the red cable (4) is the master frequency division to the slave position feedback signal, and the red cable (5) is the slave frequency division

		Master						Slave			
44	0A+		3	EXA+	Slave CN5	44	0A+		3	EXA+	Master CN5
43	0A-		4	EXA-		43	0A-		4	EXA-	
41	0B+		10	EXB+		41	0B+		10	EXB+	
42	0B-		9	EXB-		42	0B-		9	EXB-	

2.3 Gantry servo IO connection

In the figure, purple cable(1) and blue cable(2) connection

Master drive					Slave drive			
PIN	SIGN	FUNCTION	FUNCTION SIGN		PIN	SIGN	FUNCTION	FUNCTION SIGN
2	COM+	Control signal power+	-		2	COM+	Control signal power+	-
12	COM-	Control signal power-	-		12	COM-	Control signal power-	-
16	DI1	Master drive homing trigger	0x18		16	DI1	Slave drive homing trigger	0x18
37	DI2	Master drive homing switch	0x2E		37	DI2	Slave gantry remove	0x2D
10	DI3	Slave drive homing switch	0x2F					
39	DI4	External fault	0x14		39	DI4	External fault	0x14
14	DO1	Fault alarm	0x03		14	DO1	Fault alarm	0x03
15	DO2	Slave gantry remove	0x1E					
11	DO3	Homing completed	0x0F					
5	GND	Signal ground	-		5	GND	Signal ground	-

As shown above, the basic wiring can run the basic functions of the gantry.
Special note: the master drive homing return start signal is the rising edge signal, and the reset signal can be reset back to zero after the reset signal is completed, or the gantry removing signal can be reset back to homing start signal.

3. Homing mode of the gantry synchronization

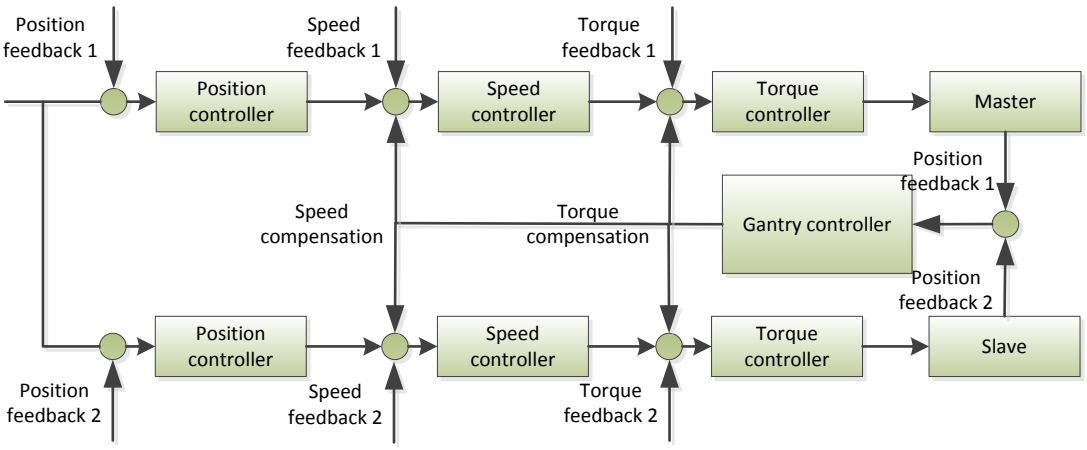
Master drive: run at P6.39 [gantry synchronous backward speed] set speed, look for gantry synchronous alignment sensor, find the sensor and then stop; run back at the distance of P6.38 [gantry synchronous backward distance] with P6.39 [gantry synchronous backward speed]. Then P6.40 [gantry synchronization alignment speed] is used to set the speed to find the gantry synchronous alignment sensor and then stop. While the master drive controls its own operation, it controls the slave operation and gives the pulse signal to the slave by second encoder.

Slave drive: receives the pulse instruction sent by the master drive and complete the homing mode.

After homing, the slave gantry removing signal of the master drive becomes 0, and the master-slave machine enters the gantry synchronization state.

4. Gantry synchronization control principle

As shown in the following figure, the gantry synchronization controller will read the position signal between the master and the slave in real time, thus obtaining the position and speed difference between the master and the slave, and then outputting the speed and torque compensation instructions to achieve the effect of synchronous operation between the master and the slave.



Schematic diagram of gantry synchronous control

Set parameters from P6.31 to P6.35 in master drive.

P6.30	Gantry synchronization switch		Disable
P6.31	Synchronous speed control gain		0.0
P6.32	Synchronous speed control integral		1,000.0
P6.33	Synchronous position control gain		0.0
P6.34	Synchronous compensation torque filter		0.00
P6.35	Synchronous compensation speed filter		0.00
P6.36	Synchronous control bandwidth ratio		0.0
P6.37	Gantry synchronization master/slave node		Slaver
P6.38	Gantry synchronous alignment retreat distance		10000
P6.39	Gantry synchronous alignment retreat speed		60
P6.40	Gantry synchronous alignment approaching speed		5
P6.41	Gantry synchronous alignment direction		Forward