ZHAFIR

Fully Electrical Injection Molding Machine

Maintenance manual for VE series

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Prepared by _____ Date _____

Reviewed by _____ Date _____

Approved by _____ Date _____

Ningbo Zhafir Plastics Machinery Co., Ltd.

NINGBO ZHAFIR VENUS series fully electrical injection molding machine maintenance handbook

Preface

This handbook is specially used as an instruction of repairing key components of fully electrical injection molding machinnes, including servo motor, synchronization belt and synchronization wheel, servo inverter, PLC(C-IPC) and other key components.

Compared to hydraulic machines, the fully electrical injection molding machine has essential differences. Its highly precision and special requirements on shielding demand maintenance strictly under this handbook to do step by step very carefully. Even an oversight in any step or parameter might issue in whole system losses. If any accidental problem doesn’t been explained in this handbook, please contact our technical engineers.

Notice

1、 Before any exchanging of related components, please do confirm the code、type and parameters, in order to make sure that they are the same components.

2、 During exchanging, please be careful and patient. Any careless or wrong operation may lead bad effects on the machine or even cause broken of related components.

3、 Fully electrical molding machine EMChas very high requires, so it makes shielding grounding wire revert to type, while exchanging the components. Any question, please consult with our technical engineers. Please do not neglect any detail notice.

4、 After exchanging, it needs to find out the servo motor reference, so it is better for maintainers to learn some computer knowledge, and with some operation experience.

5、 While exchanging of related components of Sigmatek controller, please ensure out of electric power. Do not touch the live plug. Meanwhile, please treat components carefully and keep them clean.

Chapter 1 Summary and Components Introduction

1.1 Introduction of control principles of fully electrical injection molding machine

Control components of fully electrical injection molding machine contain human-machine interface, logic controller, C-IPC, servo drivers, temperature controller and sensor. Fully electrical injection molding machine controls the whole machine by servo inverters, then drive servo motors, and drive synchronization wheels by synchronization belts, at last drive ballscrews to work.

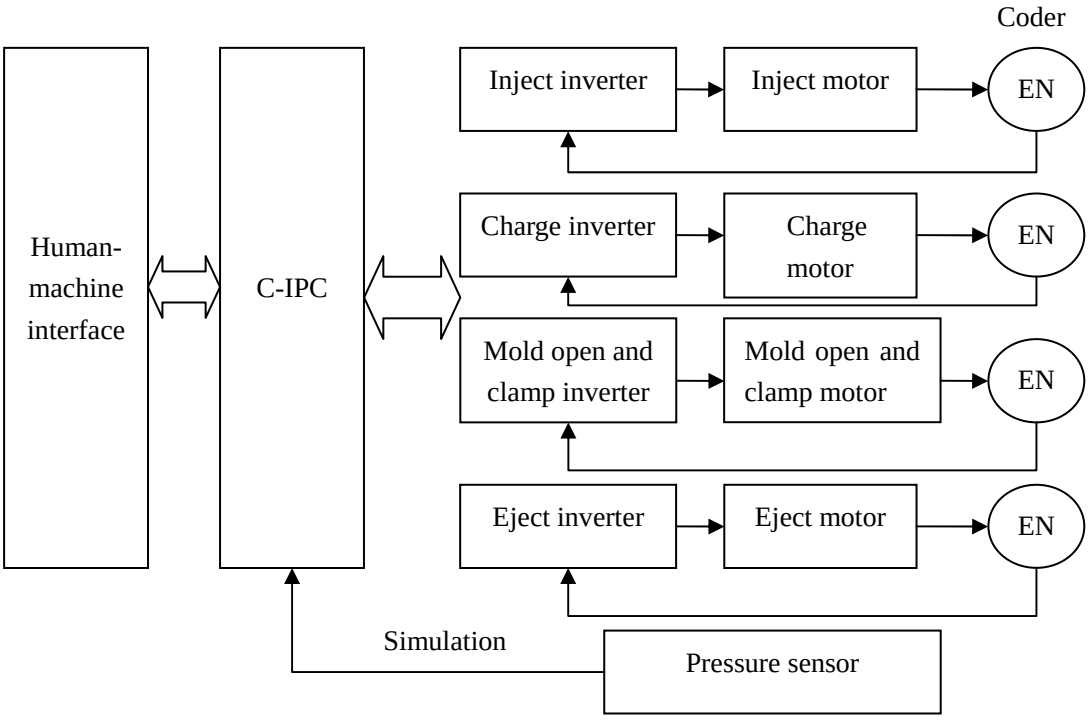


Fig 1.1 Illustrative diagram of the controller

1.2 Introduction of control components of fully electrical injection molding machine

From fig 1.1, we can separate a whole machine into following key components: controller, servo inverter, servo motor, synchronization belt, synchronization wheel and ballscrews. Referring to Zhafir's fully electrical injection molding machine, they are Sigmatek controller (human-machine interface and C-IPC) KEB inverter, servo motor, synchronization belt, synchronization wheel and ballscrews.

Fig 1.2(1) Sigmatek human-machine interface (touchable display and keyboard)

Fig 1.2(2) C-IPC

Fig 1.2(3) DKI module

Fig 1.2(4) KEB inverter

Chapter 2 Motor Malfunctions

2.1 Basic steps of changing the motor

1、Take down the broken servo-motor;
2、Install a new servo-motor;
3、Connect KEB inverter;
4、Test the servo-motor and adjust the rotation direction;
5、Install synchronous-belt and adjust the tension;
6、Check the mechanical reference;
7、Trial run of whole machine;
8、Finish.

2.2 Concrete operations

2.2.1 Dismantle the motor from full-electric injection molding machine

1、Below sketch shows how to install a motor on the fully electrical injection molding machine
At least four servo-motors and two normal motors install on one fully electrical injection molding machine, including:
①Clamping servo-motor ②Plastification servo-motor ③Carriage motor ④Ejector servo-motor ⑤Injection servo-motor ⑥Mold adjusting motor
Take VE900 for example to explain position of these motors (As other types are different, circumstances alter cases):

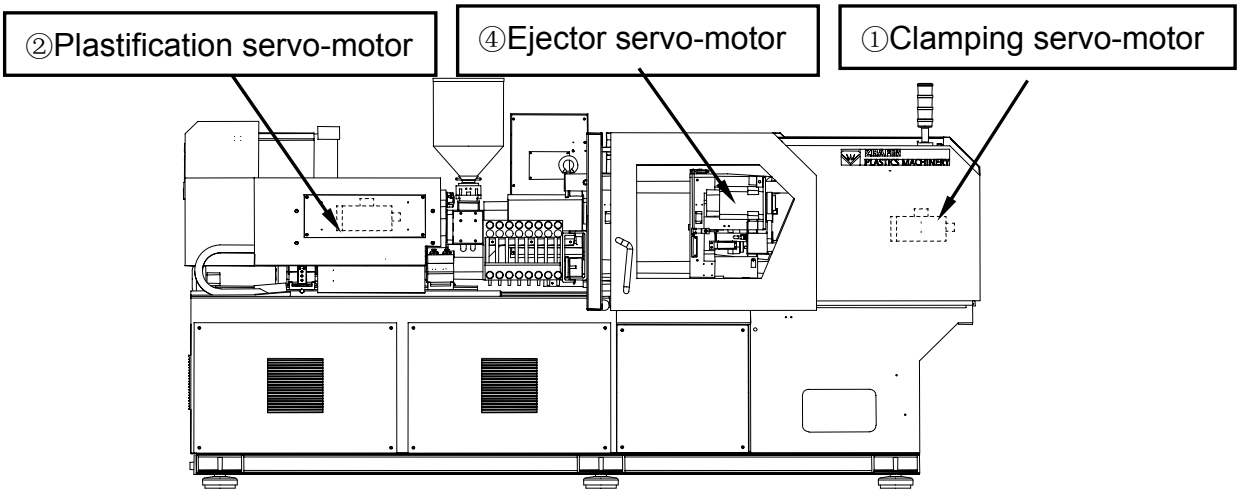


Fig 2.2.1(1) Motor Layout (1)

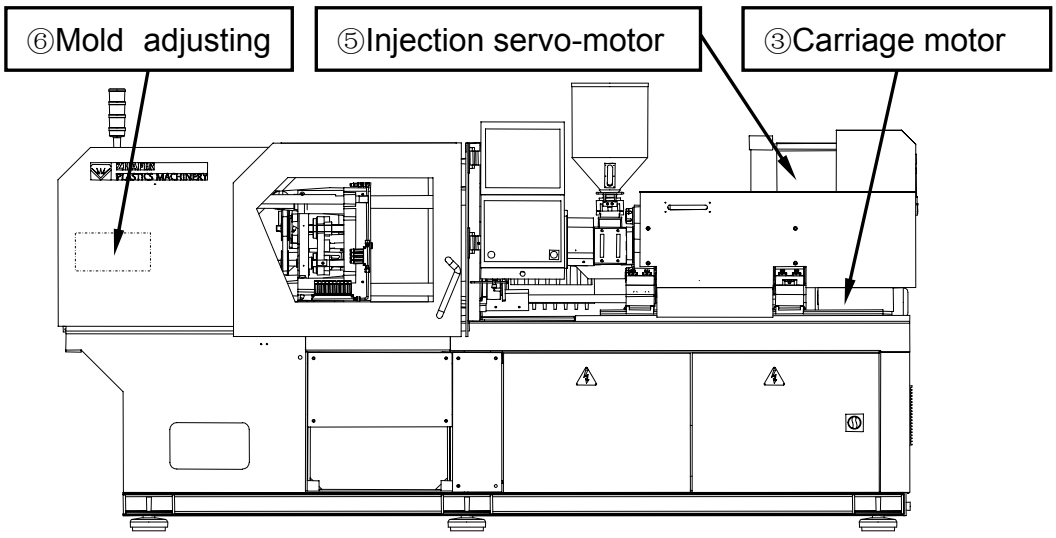


Fig 2.2.1(2) Motor Layout (2)

2、Installation drawing of servo-motor on full-electric injection molding machine

(1)、Clamping unit

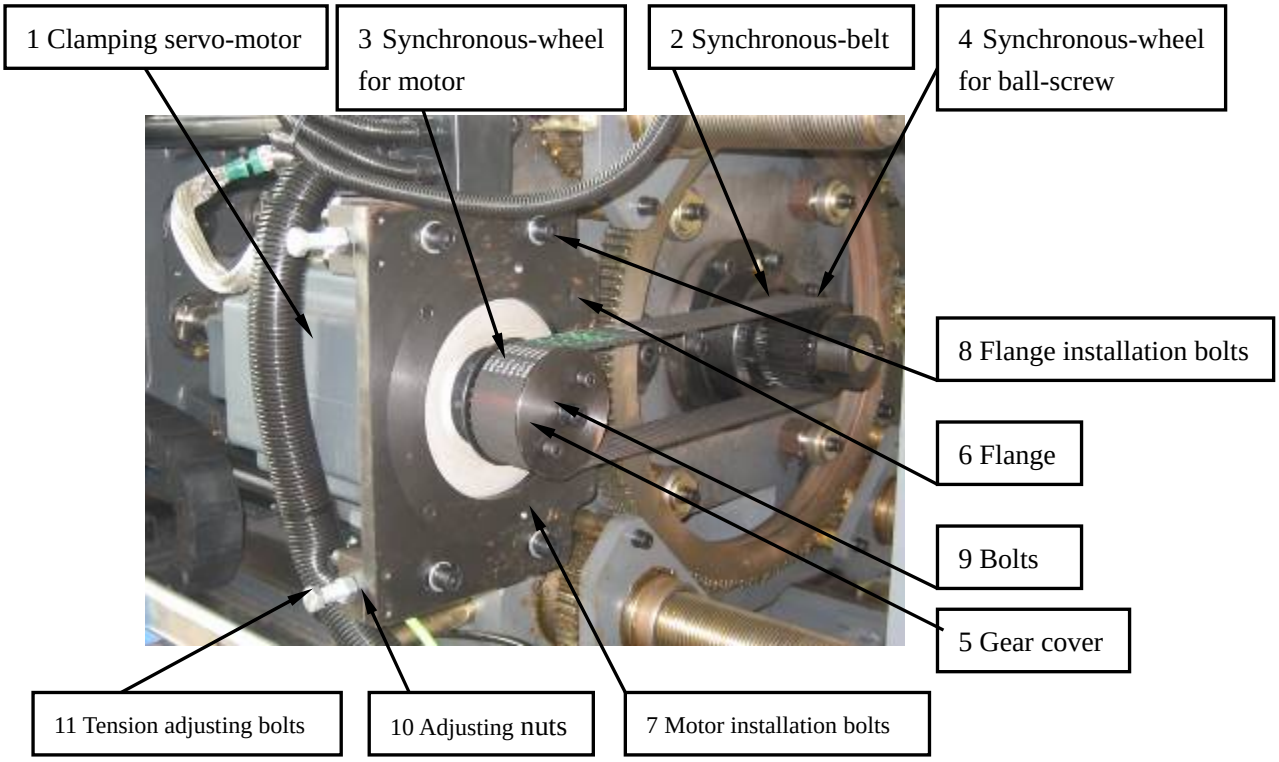


Fig 2.2.1(3) Clamping unit

(2)、Plastification unit

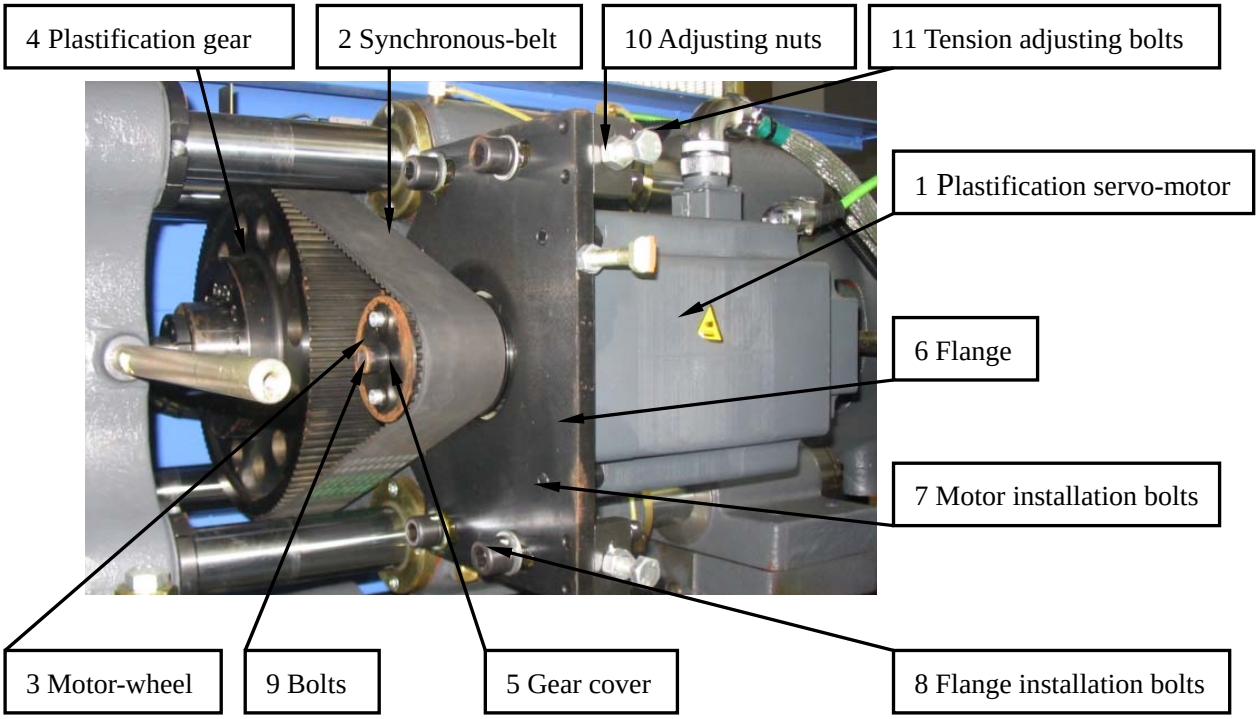


Fig 2.2.1(4) Plastification unit

(3)、Ejector unit

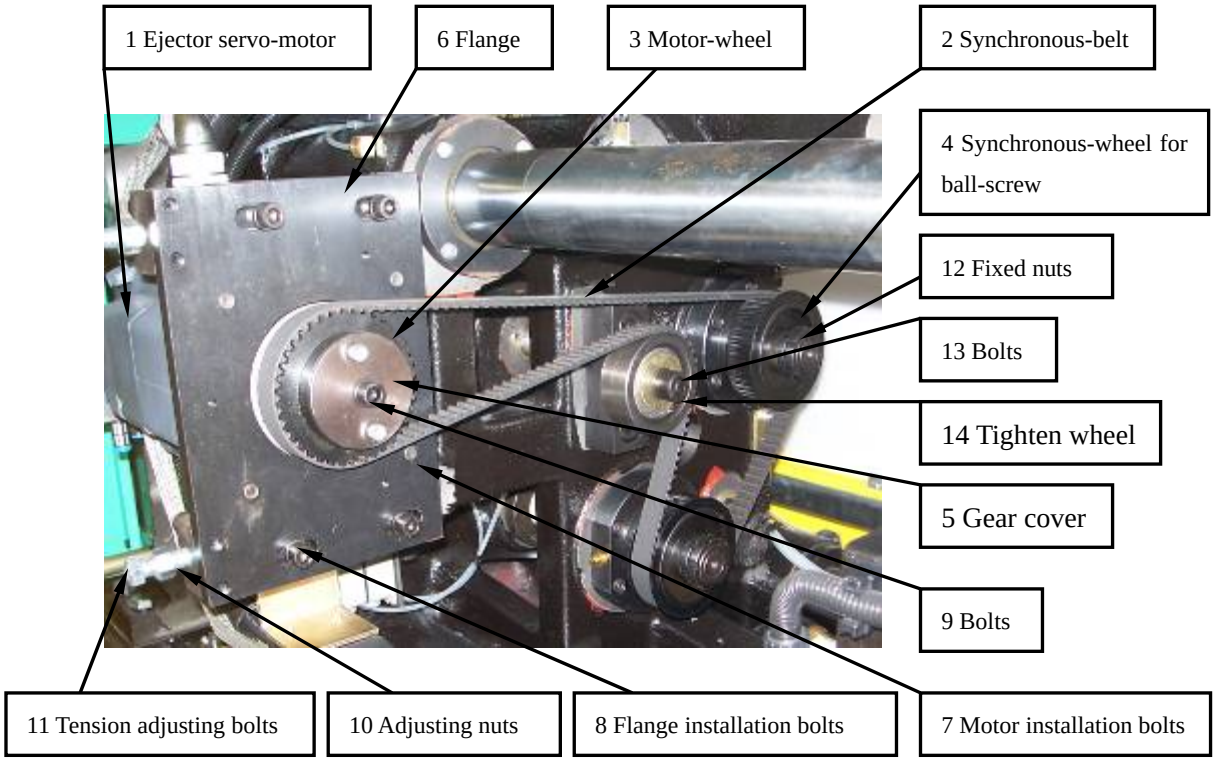


Fig 2.2.1(5) Ejector unit

(4)、Injection unit

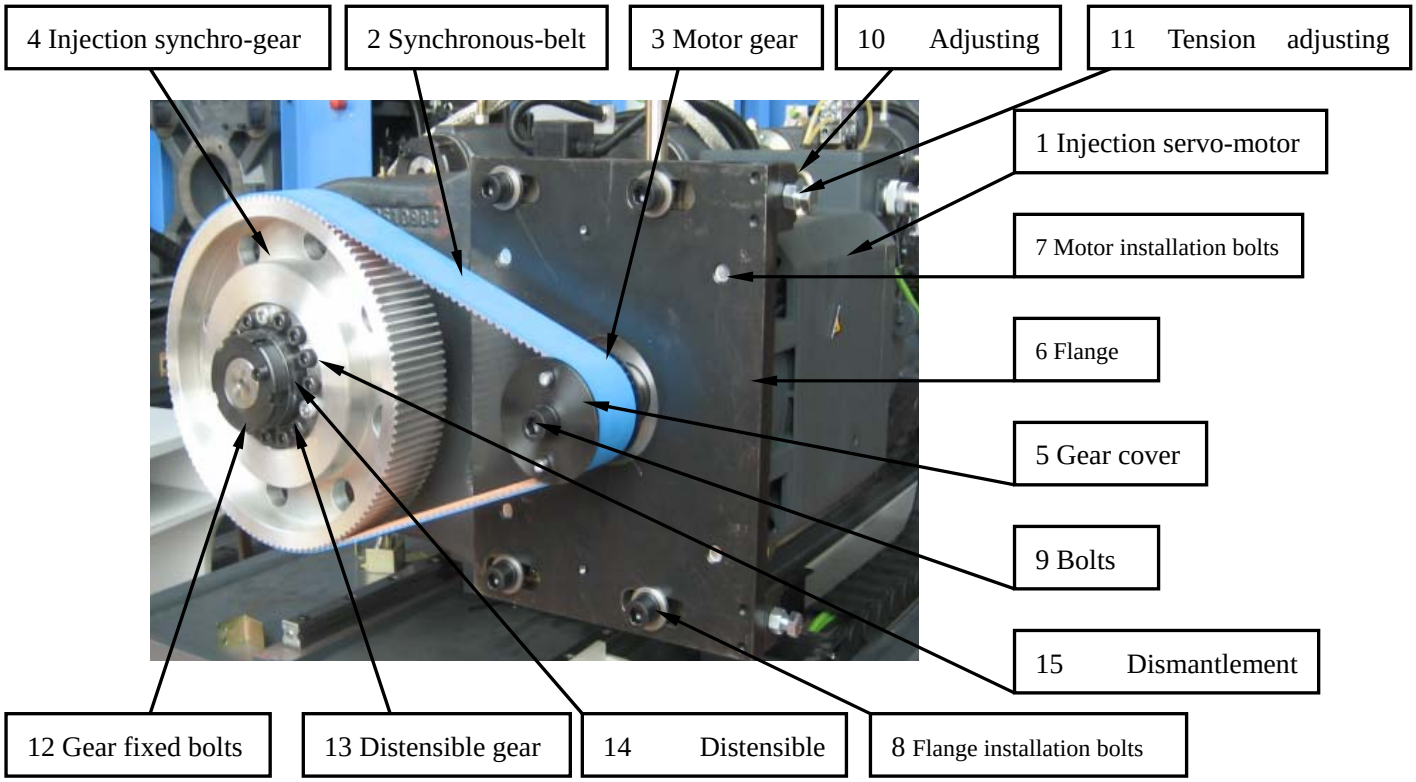


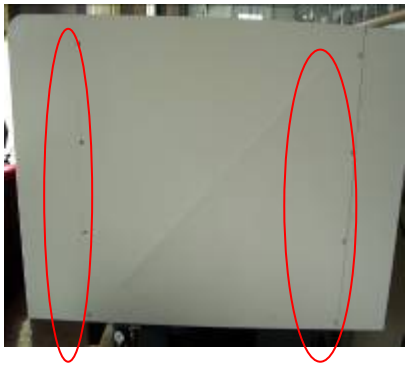
Fig 2.2.1(6) Injection unit

3、Dismantle synchronous-belt and servo-motor

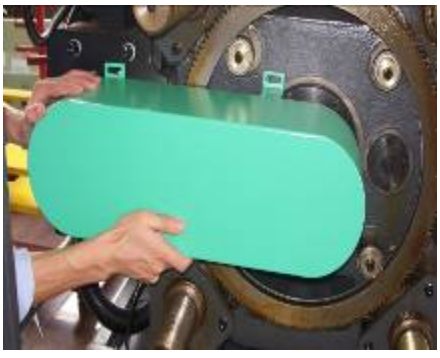
Take the clamping servo-motor for example to explain the process of dismantle synchronous-belt and servo-motor.

(1)、Clamping servo-motor

Step 1：Dismantle safety cover and gear protection cover



① Dismantle rear cover



② Dismantle gear protection cover

Step2：Dismantle synchronous-belt

①Loosen adjusting screw nuts

②Loosen tension adjusting bolts

③Loosen flange connection bolts

④Loosen cover bolts remove gear cover

⑤Push clamping motor to the machine to loosen synchronous-belt

⑥Take out the synchronous-belt slowly and softly

Step3: Dismantle motor

①Dismantle synchronous-belt with wheel

② Dismantle tension adjusting bolts (2 pieces)

③ Dismantle flange installation ground, bolts(4 pieces)

④Take down the motor and place on flat then dismantle motor installation bolts (4pieces), and at last take out the motor

(2)、Plastification servo-motor

Step1: Dismantle safety cover;

Step2: Dismantle synchronous belt.

Because of same construct, the dismantle method is the same as above.

About assembly codes, please see Fig 2.2.1(4) plastification unit

① Loosen adjusting nuts10 (2 pieces);

② Loosen tension adjusting bolts 11(2 pieces);

③ Loosen flange connection bolts 8(4pieces);

④ Loosen cover bolts 9 (3 pieces); remove gear cover 5;

⑤ Push plastification motor 1 to the machine to loosen synchronous-belt;

⑥ Take out the synchronous-belt 2 slowly and softly.

Step3: Dismantle motor

① Dismantle synchronous-belt with wheel 3

② Dismantle tension adjusting bolts 11 (2 pieces);

③ Dismantle flange installation bolt 8 (4 pieces);

④ Take down the motor 1 and place on flat ground, then dismantle motor installation bolts 7, and at last separate the motor from flange.

(3)、Ejector servo-motor

Step1: Dismantle safety cover;

Step2: Dismantle synchronous belt.

Because of same construct, the dismantle method is the same as above.

About assembly codes, please see Fig 2.2.1(6) ejector unit

① Loosen adjusting nuts10 (2 pieces);

② Loosen tension adjusting bolts 11(2 pieces);

③ Loosen flange connection bolts 8(4pieces);

④ Loosen cover bolts 9 (3 pieces); remove gear cover 5;

⑤ Push plastification motor 1 to the machine to loosen synchronous-belt;

⑥ Take out the synchronous-belt 2 slowly and softly.

Step3: Dismantle motor

① Dismantle synchronous-belt with wheel 3

② Dismantle tension adjusting bolts 11 (2 pieces);

③ Dismantle flange installation bolt 8 (4 pieces);

④ Take down the motor 1 and place on flat ground, then dismantle motor installation bolts 7, and at last separate the motor from flange.

(4)、Injection servo-motor

Because of same construct, the dismantle method is the same as above.

About assembly codes, please see 2.2.1(7) injection unit

Step1: Dismantle safety cover;

Step2: Dismantle synchronous belt

① Loosen adjusting nuts10 (2 pieces);

② Loosen tension adjusting bolts 11(2 pieces);

③ Loosen flange connection bolts 8(4pieces);

④ Loosen cover bolts 9 (3 pieces); remove gear cover 5;

⑤ Push plastification motor 1 to the machine to loosen synchronous-belt;

⑥ Take out the synchronous-belt 2 slowly and softly.

Step3: Dismantle motor

① Dismantle synchronous-belt with wheel 3

② Dismantle tension adjusting bolts 11 (2 pieces);

③ Dismantle flange installation bolt 8 (4 pieces);

④ Take down the motor 1 and place on flat ground, then dismantle motor installation bolts 7, and at last separate the motor from flange.

4、Mold adjusting motor

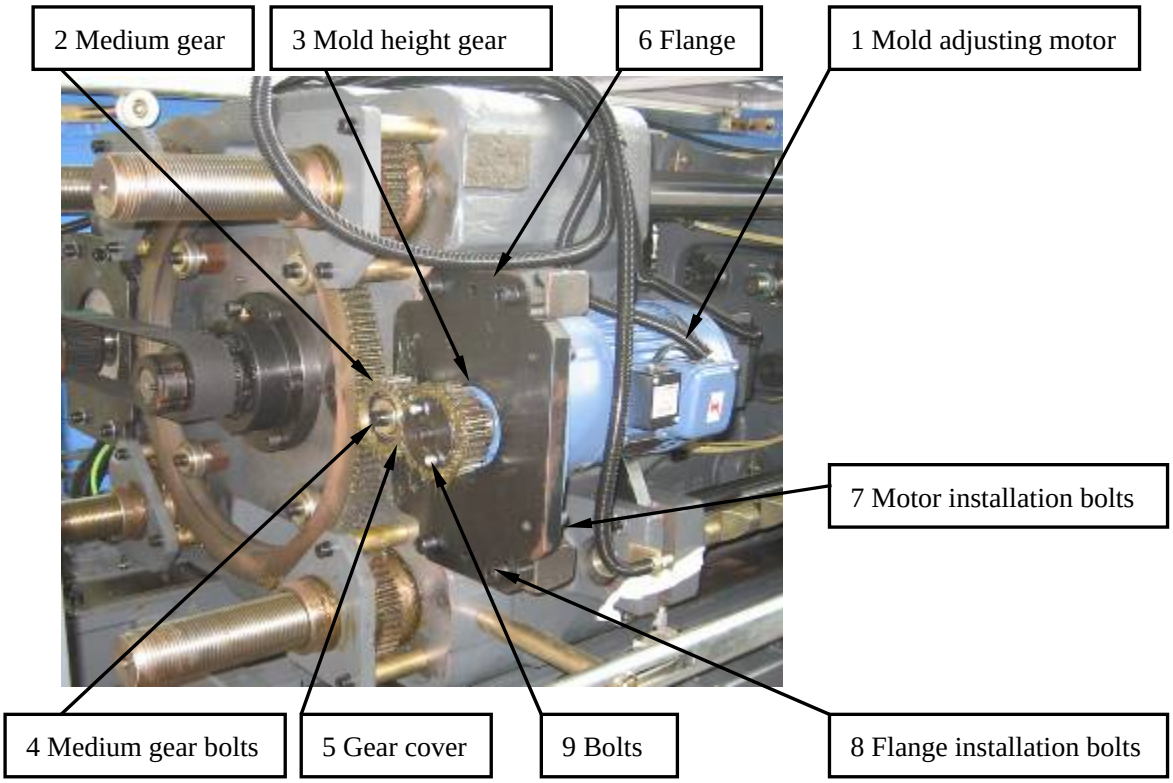


Fig 2.2.1(8) Mold height adjusting equipments

Because of same construct, the dismantle method is the same as above.
About assembly codes, please see Fig 2.2.1(8) mold height adjusting equipments
Step1: Dismantle safety cover;
Step2: Dismantle motor
① Screw off bolts9 (3 pieces);
② Take down gear cover5 and mold height Gear3;
③ Screw off flange installation bolts8 (4 pieces);
④ Place motor1 and flange6 on ground carefully;
⑤ Dismantle motor installation bolts7, then separate motor from flange.
5、Attentions
(1)、Attentions of dismantling synchronous-belt.
A、Make sure that synchronous-belt has been loosened before dismantling. Do not draw it hard.
B、Keep both hands clean while dismantling the synchronous-belt. Greasy hands must not touch the synchronous-belt.
C、Dismantled synchronous-belt should be placed carefully. No twist.
(2)、Attentions of dismantling motor.
A、Please pay attention to dismantle motor, especially to dismantle flange installation bolts which connect motor with the machine.
B、Place the motor gently to avoid unnecessary damages.
(3)、Attentions of dismantling synchronous-belt gear.
A、If synchronous-belt gear is too tight to take out by hands, on the premise of not to damage the gear, can use other assistant equipments, hard hammers or some other hard stuffs are forbidden. (A rubber hammer is recommended.)

2.2.2 Install a new servo-motor

1、Clamping servo-motor.

①Install motor installation bolts7 (4 pieces)

②Install flange connect bolts8 (4 pieces)

2、Plastification servo-motor

Because of same construct, the dismantle method is the same as above.

About assembly codes, please see Fig 2.2.1(4) plastification unit.

① Install motor installation bolts7 (4 pieces)

② Install flange connect bolts8 (4 pieces)

3、Ejector servo-motor

Because of same construct, the dismantle method is the same as above.

About assembly codes, please see Fig 2.2.1 (6) ejector unit.

① Install motor installation bolts7 (4 pieces)

② Install flange connect bolts8 (4 pieces)

4、Injection servo-motor

Because of same construct, the dismantle method is the same as above.

About assembly codes, please see Fig 2.2.1 (7) injection unit.

① Install motor installation bolts7 (4 pieces)

② Install flange connect bolts8 (4 pieces)

5、Mold height adjusting motor

Because of same construct, the dismantle method is the same as above.

About assembly codes, please see Fig 2.2.1 (8) mold height adjusting equipments.

① Install motor installation bolts7 (4 pieces)

② Install flange connect bolts8 (4 pieces)

2.2.3 Search for the servo motor's reference by a laptop

Steps:
1、Electrify;
2、Connect KEB inverter with a laptop;
3、Search for the reference of servo motor;
4、Warnings and solutions of searching for the reference.
Detail explanations

1、Electrify

First, make sure all electric down-leads of the full-electrical injection molding machine are well-connected. Then turn on the air on-off in the right front of the machine. (Notice: Do not turn on the motor when the machine starts.)

2、Connect KEB inverter with a laptop

(1)、Connect DKI module with an end of HSP5 line, see fig 2.2.3(2).
(2)、Connect serial port of the laptop with the other end of HSP5 line, see fig 2.2.3(3).
Get hardware connection between the laptop and KEB inverter.
(3)、Double click the shortcut 

on the desktop to open the software.
(4)、Get software connection between the laptop and KEB inverter, see fig 2.2.3(5).

Fig2.2.3(1)　HSP5 line

Fig2.2.3(2) Connect the DKI module with an end of HSP5 line

Fig2.2.3(3) Connect the serial port of a laptop with the other end of HSP5 line

Fig2.2.3 (4) be connected

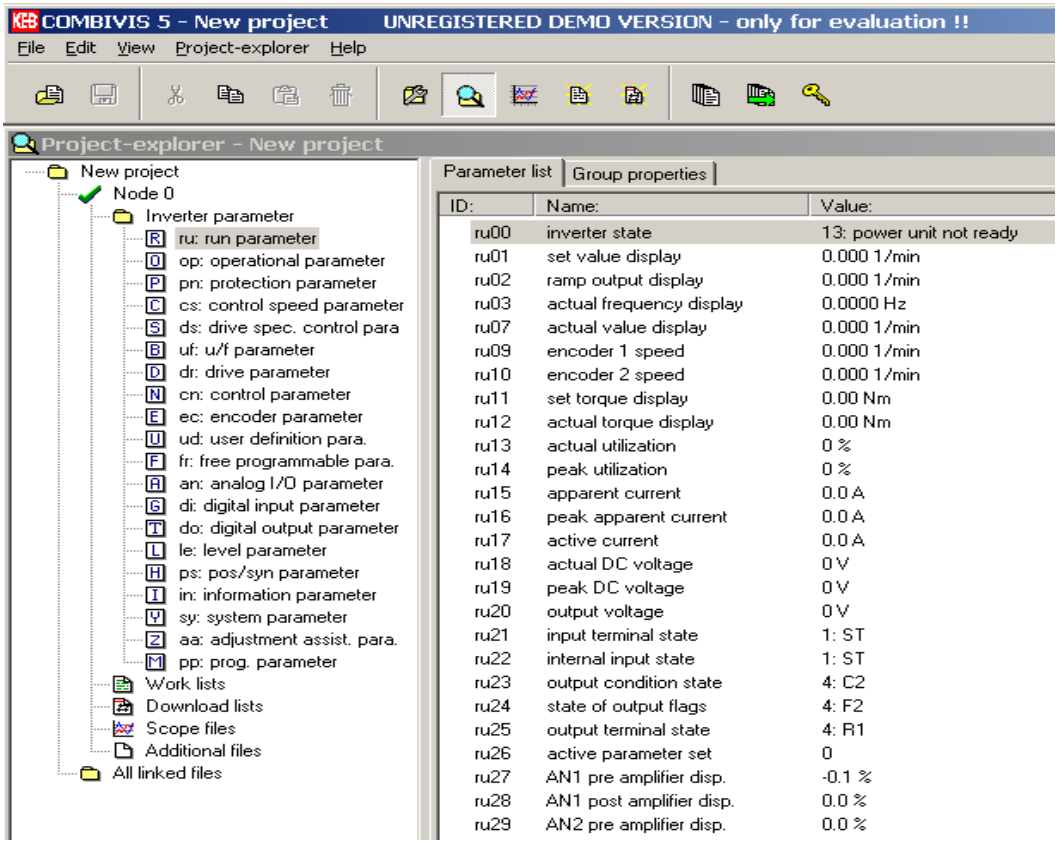


Fig2.2.3(5) Get software connection between the laptop and KEB inverter

3、Search for the reference of servo motor

Main steps including:

(1)、Reset the KEB inverter (set up the control bit, **di02**=0).

(2)、Electrify

(3)、Input start codes to search for the reference. (Set up parameter **Ec02** to 2206)

(4)、Set up KEB inverter to work state (clear the inverter's control bit, di02=1)

(5)、Observe the state to the end of searching.

(6)、Reset the KEB inverter (set the inverter's control bit to zero, **di02**=0).

Detail explanations as below:

(1)、Reset the KEB inverter

Set up the control bit, **di02**=0

A、Set up parameter **di** (see fig2.2.3(6)).

Click parameter **di** on the left of below dialog box.

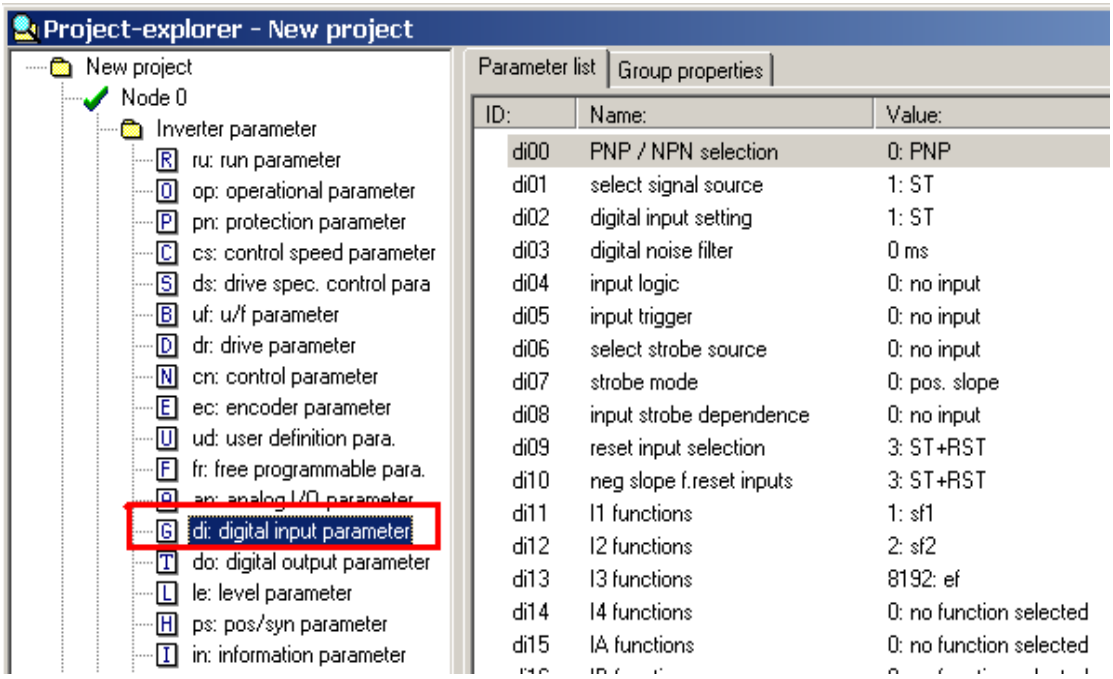


Fig2.2.3(6) Click **di** parameter

B、Set up parameter **di02** to zero (see fig2.2.3(7)).

Double click parameter **di02**→input zero to the value box→click OK.

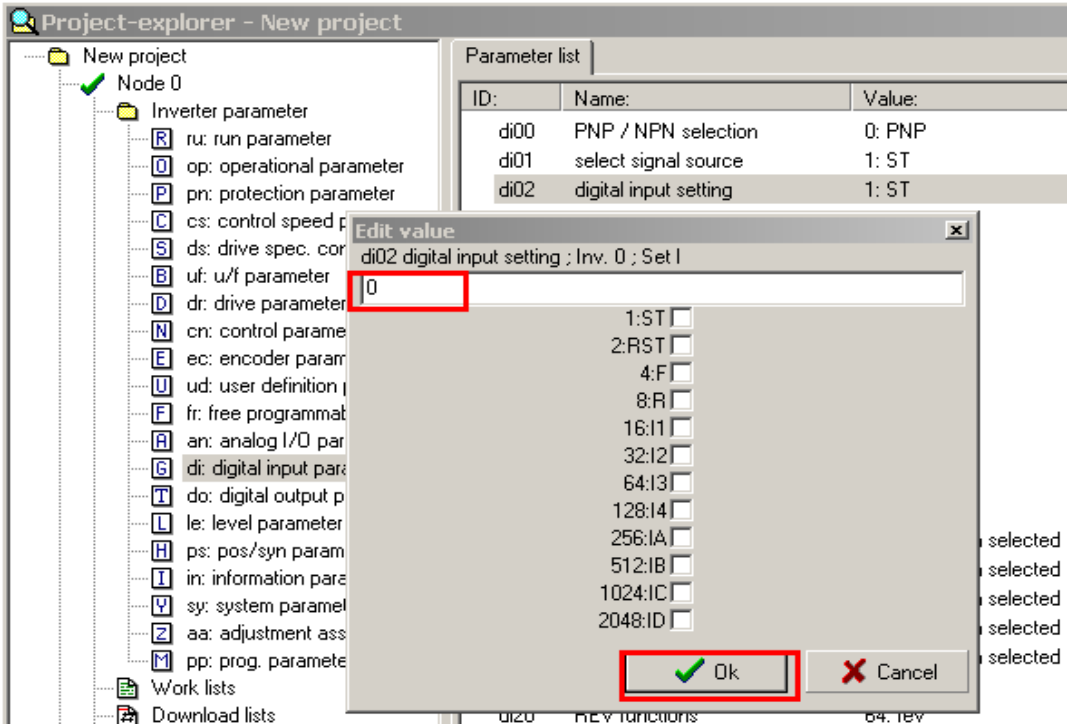


Fig2.2.3(7) set up parameter **di02** to zero

(2)、Electrify

Turn on “motor on” on the controller to let the driver work.

(3)、Input start codes to search for the reference. (Set up parameter **Ec02** to 2206)

A、Set up parameter **Ec** (see fig2.2.3(8)).

Click **Ec** on the left of below dialog box.

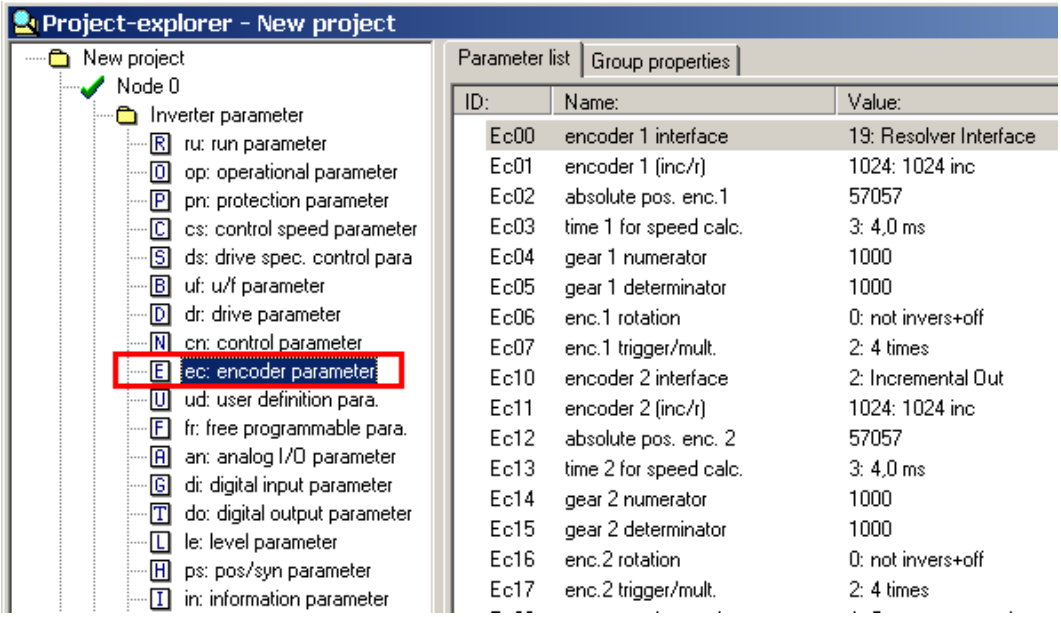


Fig2.2.3(8) set up parameter **Ec**

B、Set up parameter **Ec02** 2206 (see fig2.2.3(9))

Double click parameter **Ec**→input 2206 to the value box→click OK.

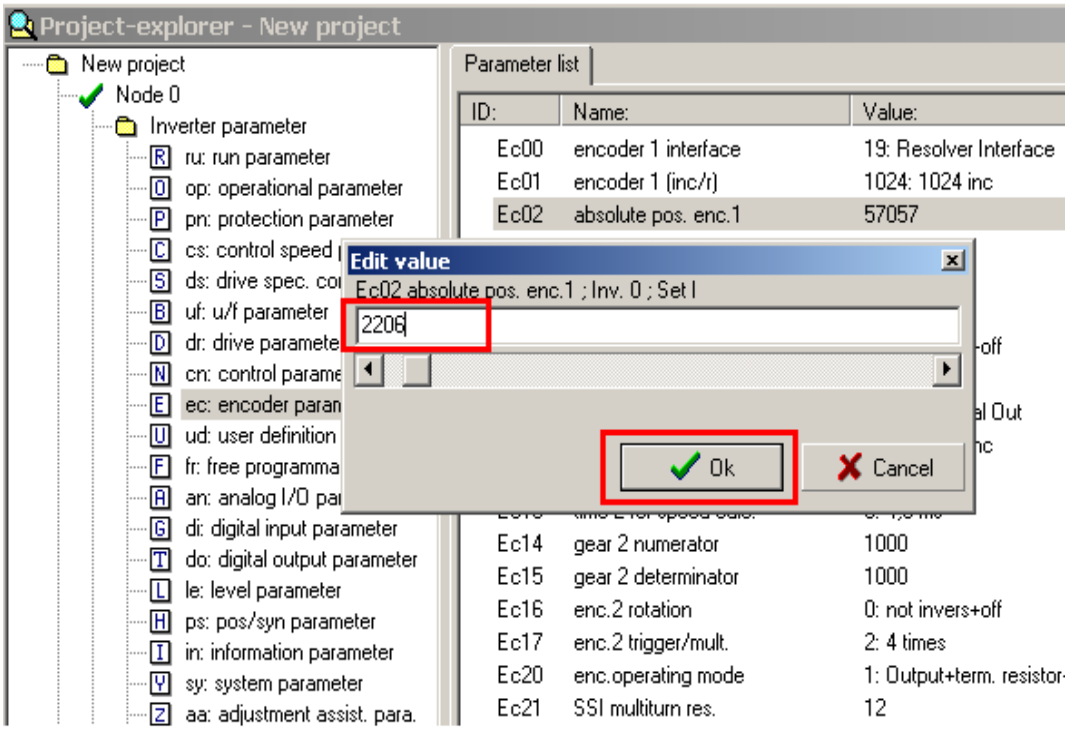


Fig2.2.3(9) set up parameter Ec02 to 2206

(4)、Set up KEB inverter to work state

Clear the inverter's control bit, di02=1

Then the inverter is ready to work.

A、Set up parameter **di** (see fig2.2.3(10)).

Click the parameter **di** in the left of dialog box.

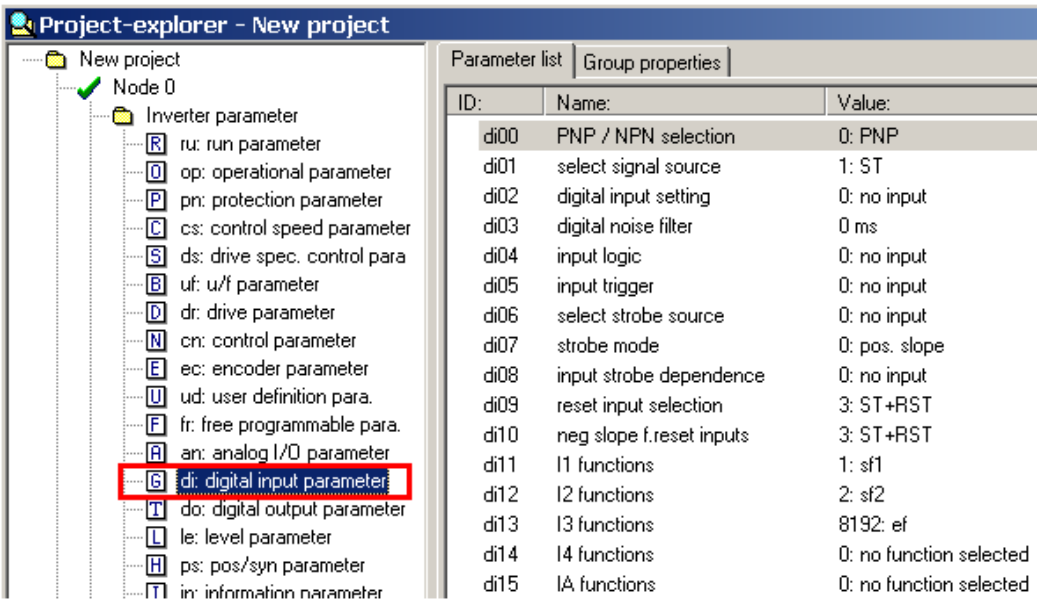


Fig2.2.3(10) set up the parameter **di**

B、Set the parameter **di02** 1 (as the fig2.2.3(11)).

Double click parameter **di02**→input 1 to the dialog box→click the OK button.

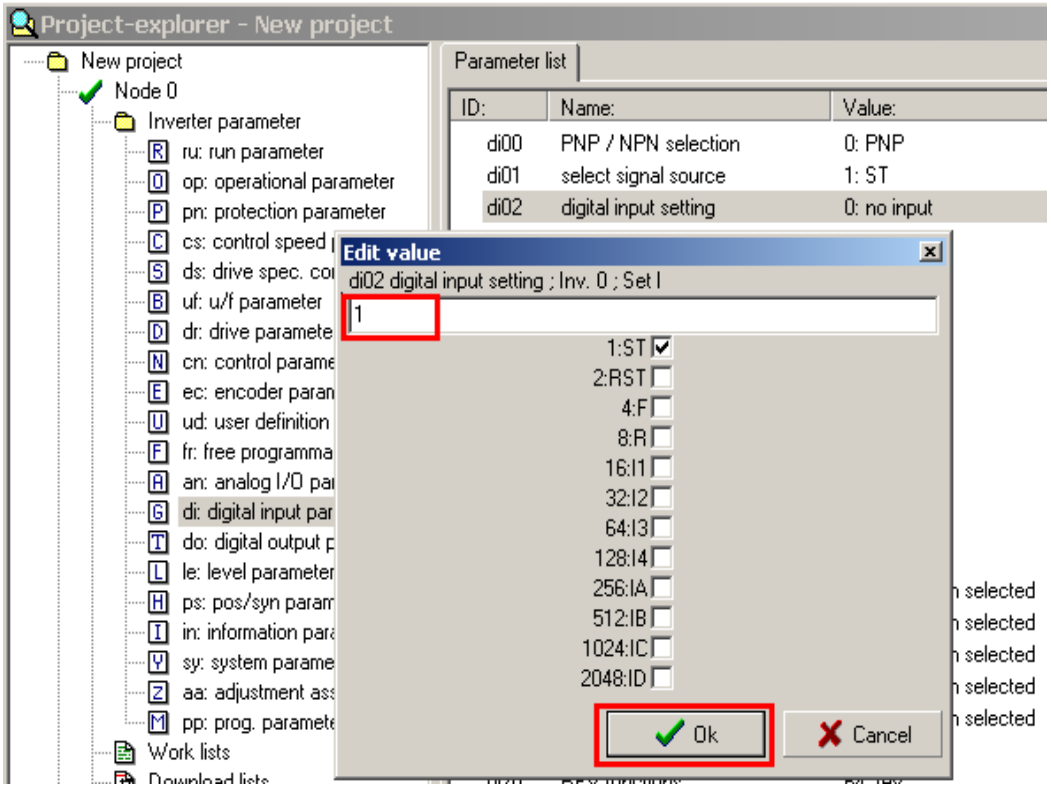


Fig2.2.3(11) set up parameter **di02** to 1

(5)、Observe the state to the end of searching.

The state of searching for zero can be judged by observing parameter as following:

Parameter	Parameter's content	Parameter's state
ru00	inverter state	calculate drive data
ru15	apparent current	Increase from zero to the rated current
EC02	absolute pos. enc.1	Changing

Table2.2.3(1) parameters in searching

The inverter works well when actual parameters are the same as table 2.2.3(1). After a while (about 20 or 30 seconds), observe parameter **Ec02**. It is the reference of the inverter' software when parameter **Ec02** is fixed.

(6)、Reset the KEB inverter (set the inverter's control bit to zero, **di02=**0). Operate following step 1.

2.2.4 Trial test of servo motor

Steps:

1、Cut off communication with the controller;

2、Low speed test;

3、High speed test;

4、Resume communication with the controller;

5、Warnings and solutions in this course.

Detail explanations

1、Cut off communication with the controller

Set up parameter Sy**24** –1. Cut off communication with the controller.

A、Set up the parameter Sy**24** (see fig2.2.4(1)).

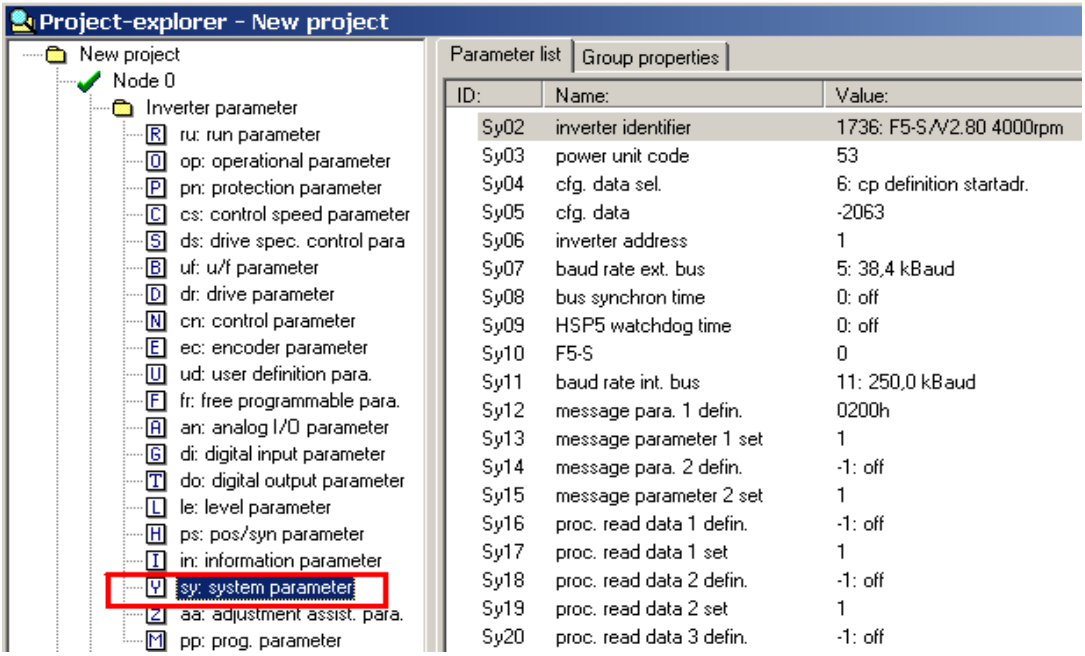


Fig2.2.4(1) set up parameter Sy24

B、Set up parameter **Sy24** –1 (see fig 2.2.4(2)).

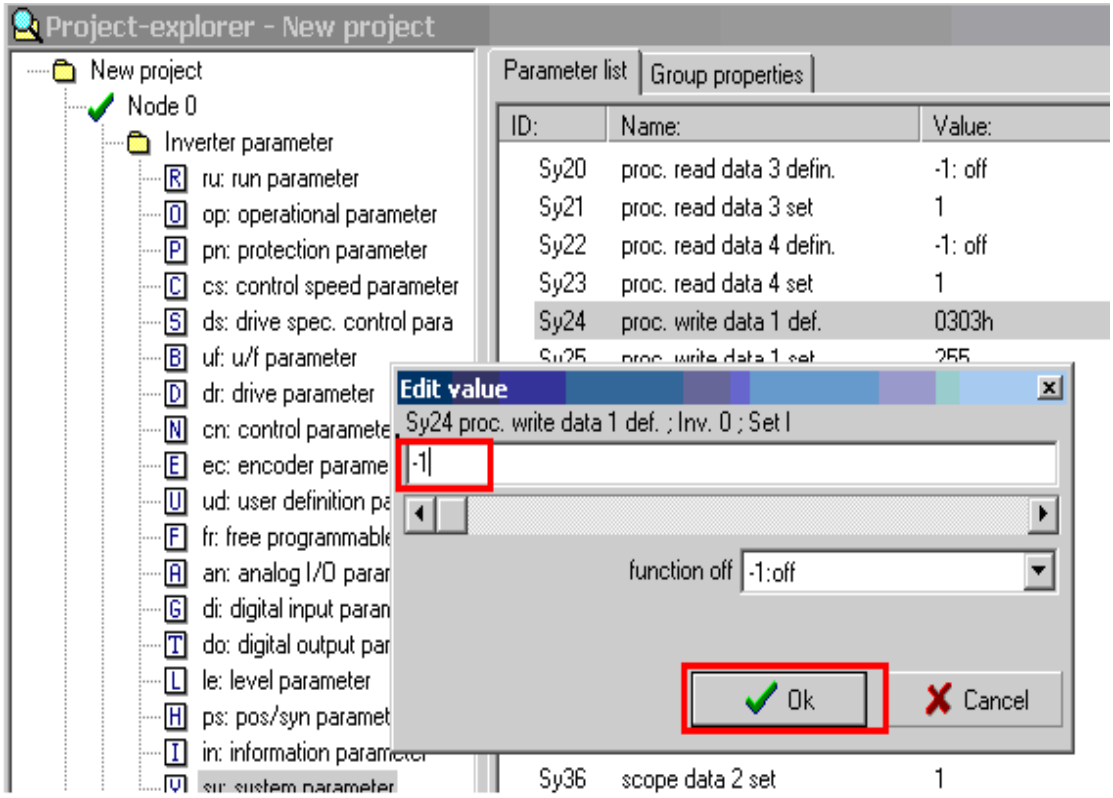


Fig2.2.4(2) set up parameter **Sy24** –1

2、Low speed test

(1)、Set up parameter **oP03** 50. It means let the motor rotate 50 rotations per

minute.

A、Click parameter **op** (see fig2.2.4(3)).

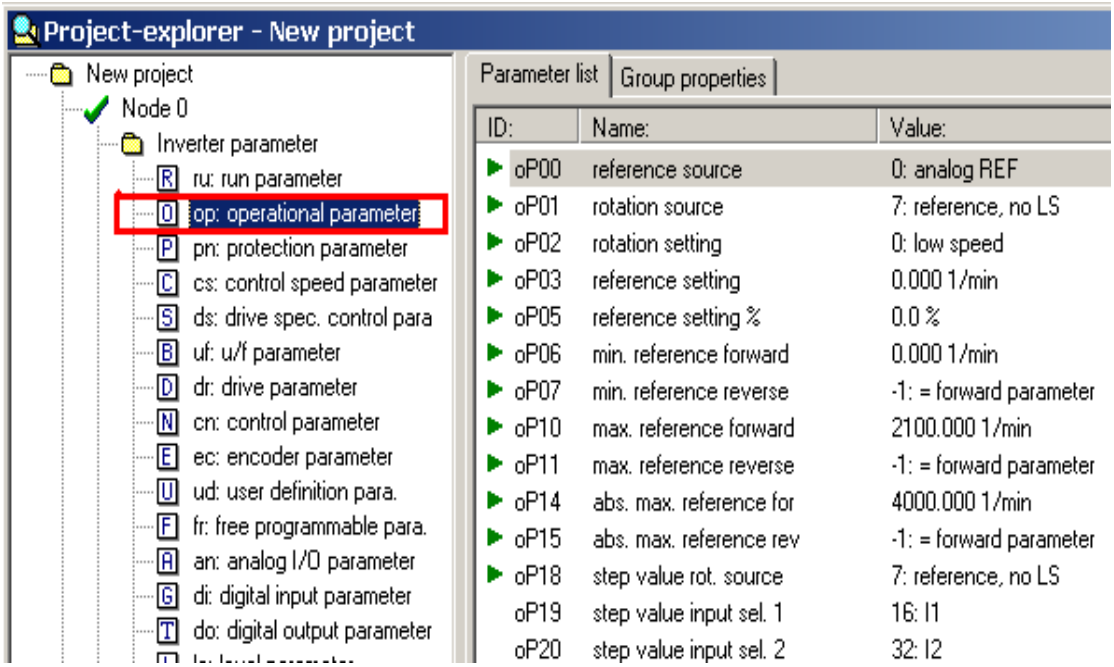


Fig2.2.4(3) click parameter **op**

B、Set up parameter **oP03** 50 (see fig2.2.4(4)).

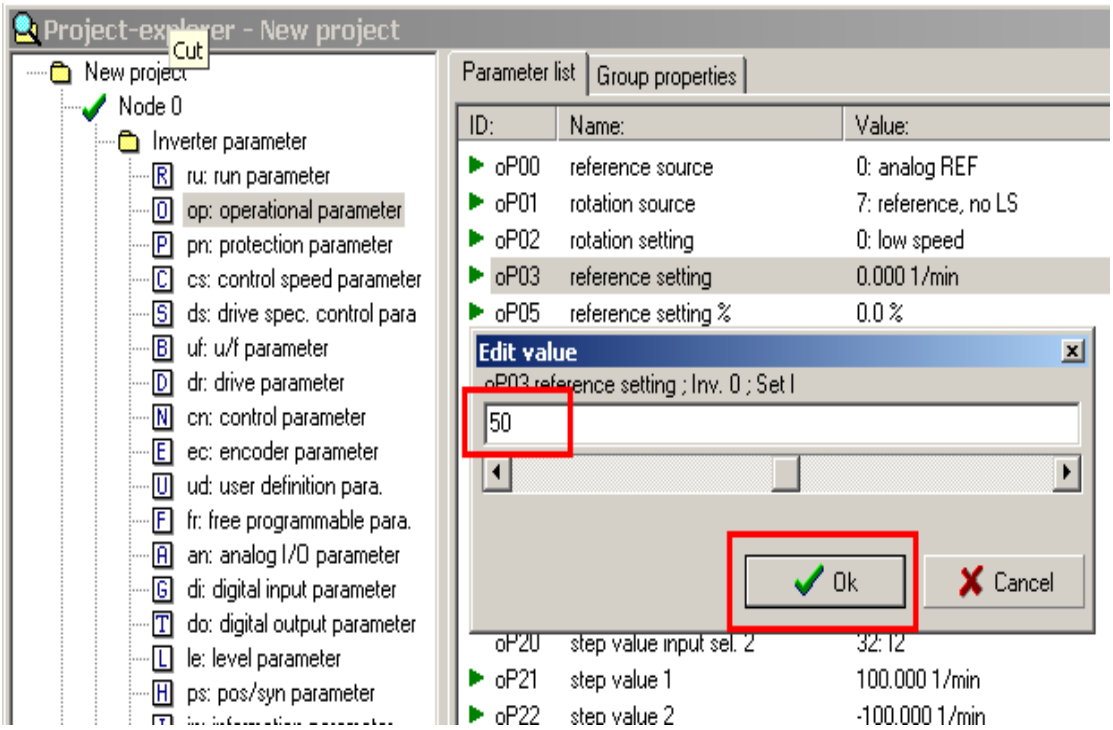


Fig2.2.4(4) set up parameter **oP03** 50

(2)、Set up KEB inverter to work state (clear inverter's control bit, **di02**=1).

A、Click parameter **di** (see fig2.2.4(5)).

B、Set up parameter **di02** 1(see fig2.2.4(6)).

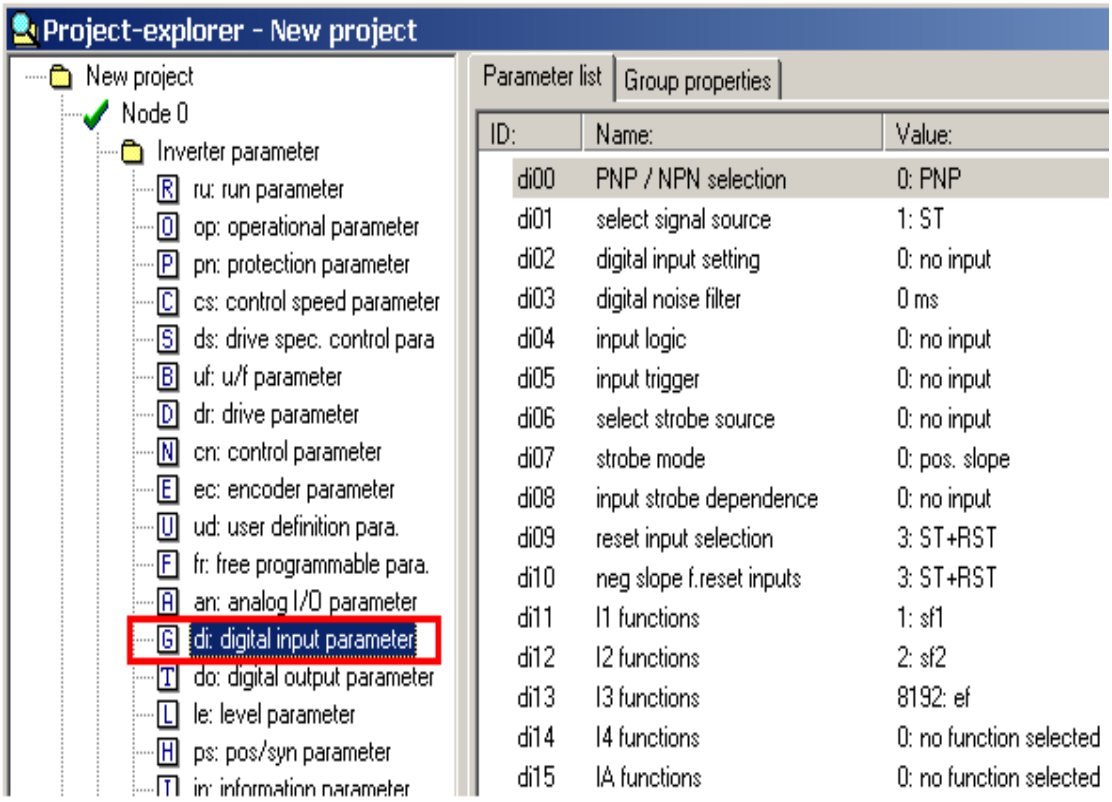


Fig2.2.4(5) click parameter **di**

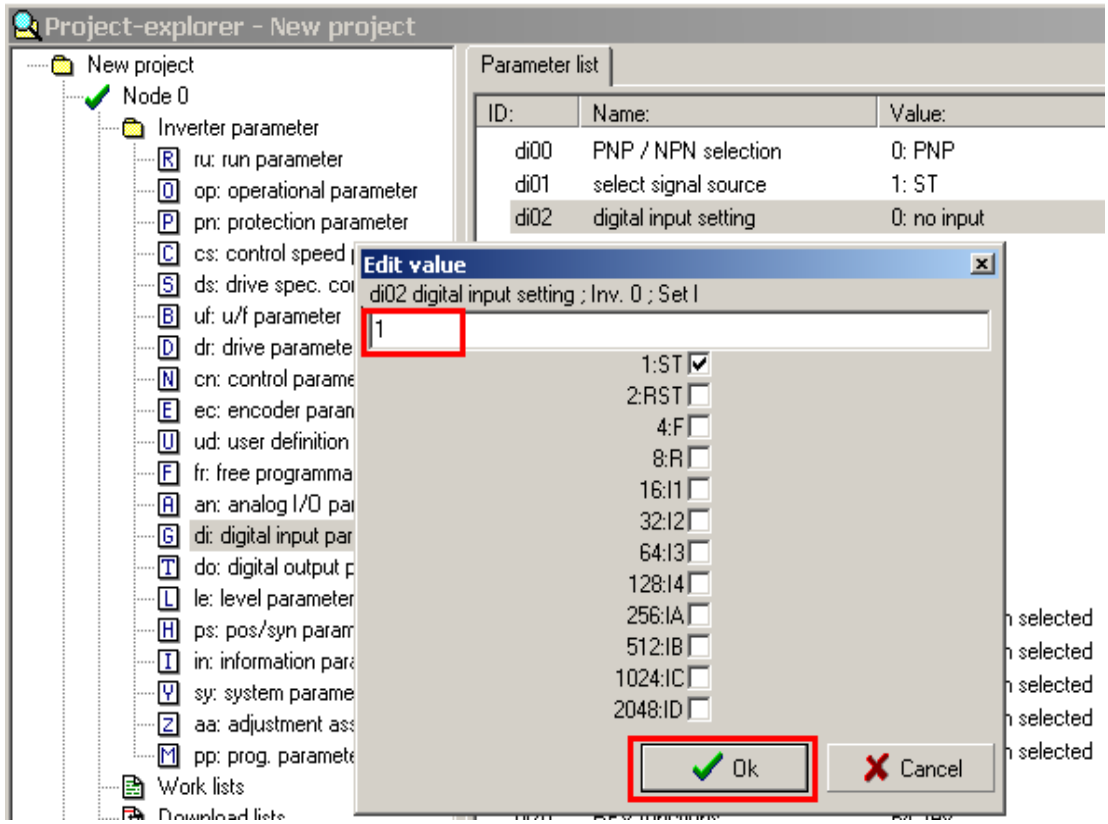


Fig2.2.4(6) set up parameter **di02** 1

(3)、Observe the state of motor

When the inverter is in working state, servo motor starts to run. We can

observe the state of motor by parameters as following:

Parameter	Parameter's content	Parameter's state
ru00	Inverter state	forward constant
ru02	Ramp output display	Fifty
ru09	Encoder 1 speed	About fifty
ru15	Apparent current	Infinitesimal current

Table 2.2.4(1) parameters of working motor

Servo motor and inverter work well when actual parameters are the same as table 2.2.4(1).

(4)、Set up rotation direction of the motor.

Observe rotation direction of the motor from the side of axial direction when the motor works at low speed.

Fig 2.2.4(7) shows concept of the axial direction:

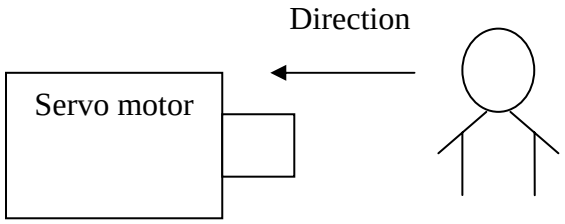


Fig 2.2.4(7) concept of the axial direction

If the rotation direction isn't correct, adjust parameter Ec06

motor	axial direction				
	VE600	VE900	VE1200	VE1500	VE4100
Inject servo motor	anticlockwise	anticlockwise	anticlockwise	anticlockwise	anticlockwise
Mould servo motor	anticlockwise	anticlockwise	anticlockwise	anticlockwise	anticlockwise
Charge servo motor	clockwise	clockwise	clockwise	clockwise	Clockwise
Eject servo motor	clockwise	anticlockwise	anticlockwise	anticlockwise	anticlockwise

Table 2.2.4(2) axial directions of different motors

Set-up steps:

ⅰ、Reset the KEB inverter (set up parameter di02 to zero).

A、Click parameter **di** (see fig 2.2.4(8)).

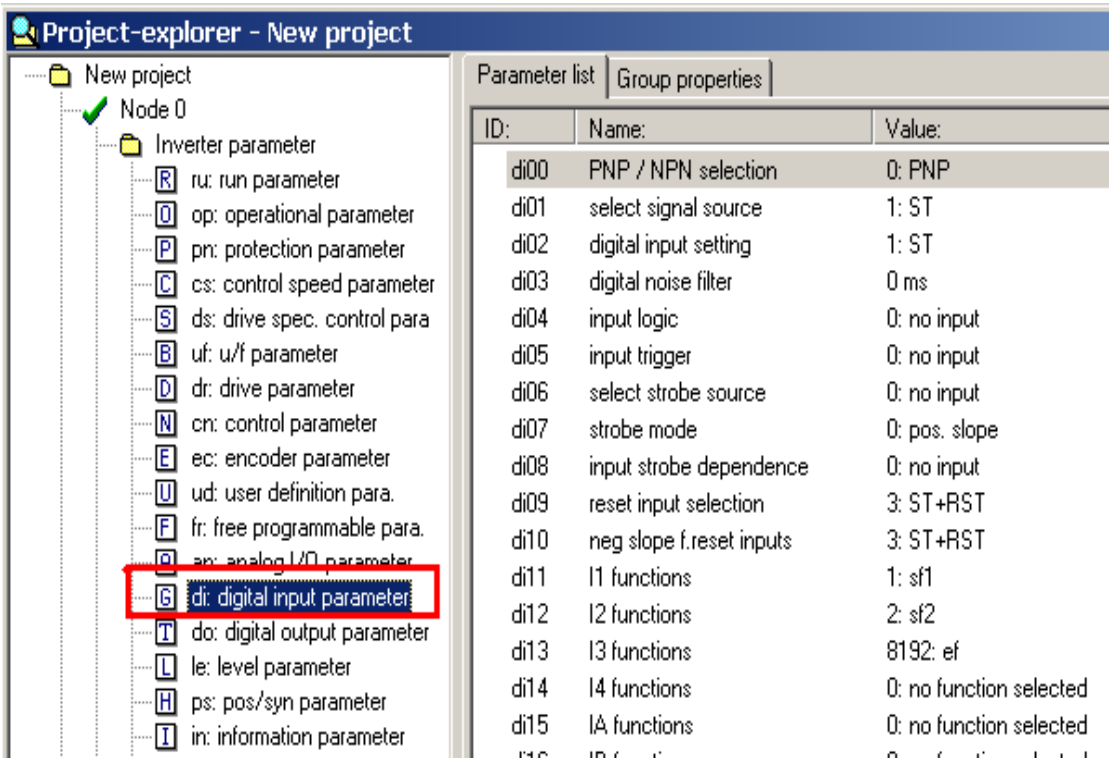


Fig 2.2.4(8) click parameter **di**

B、Set up parameter **di02** to zero (see fig 2.2.4(9)).

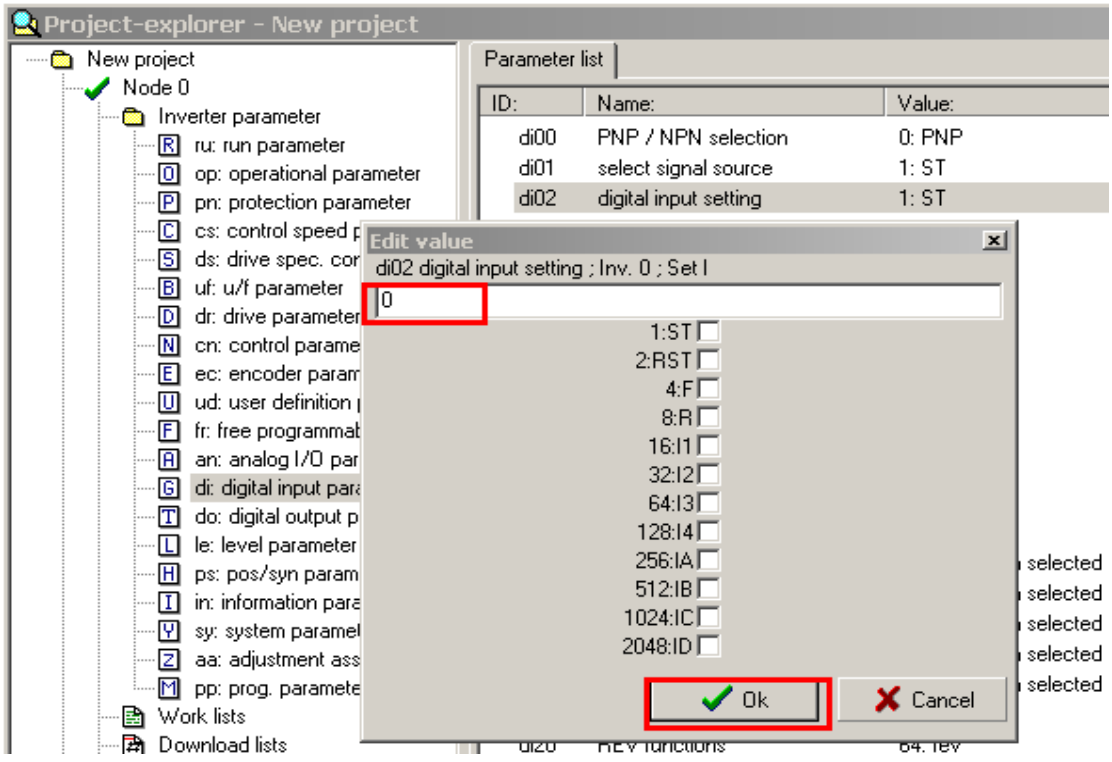


Fig2.2.4(9) set up parameter **di02** to zero

ii、Set up parameter **Ec06.**

A、Click parameter **Ec.**

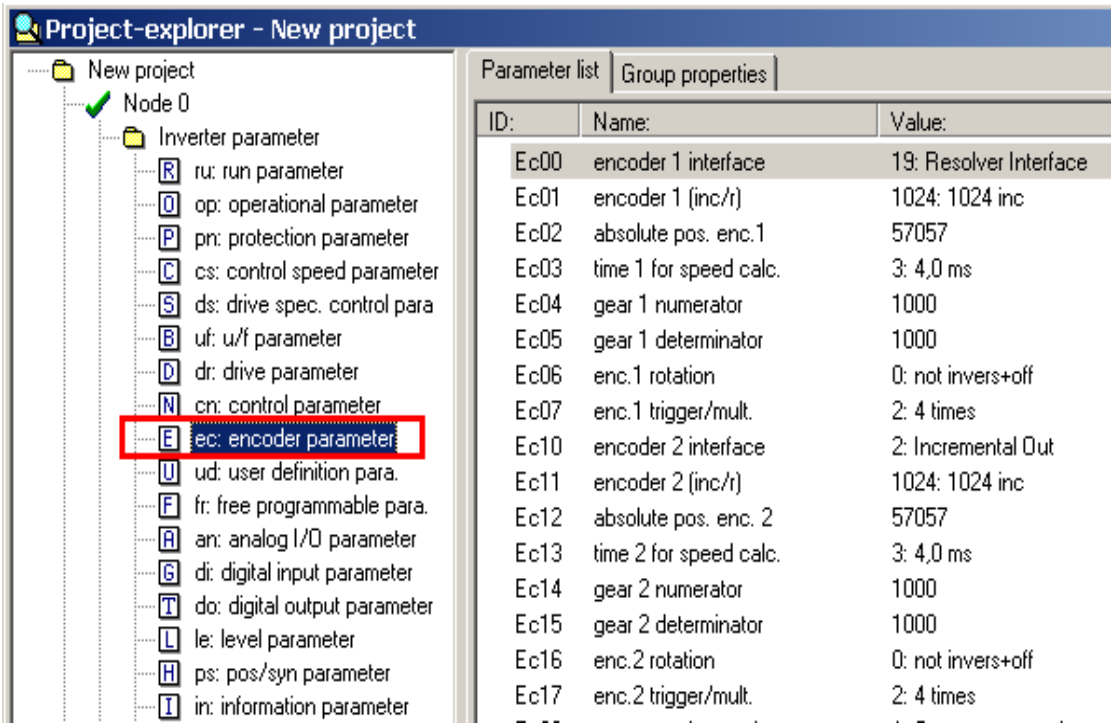


Fig 2.2.4(10) click the parameter **ec**

B、Double click parameter **Ec06**→change state of the inverter system (change on to off or change off to on) →click OK (see fig2.2.4 (11)).

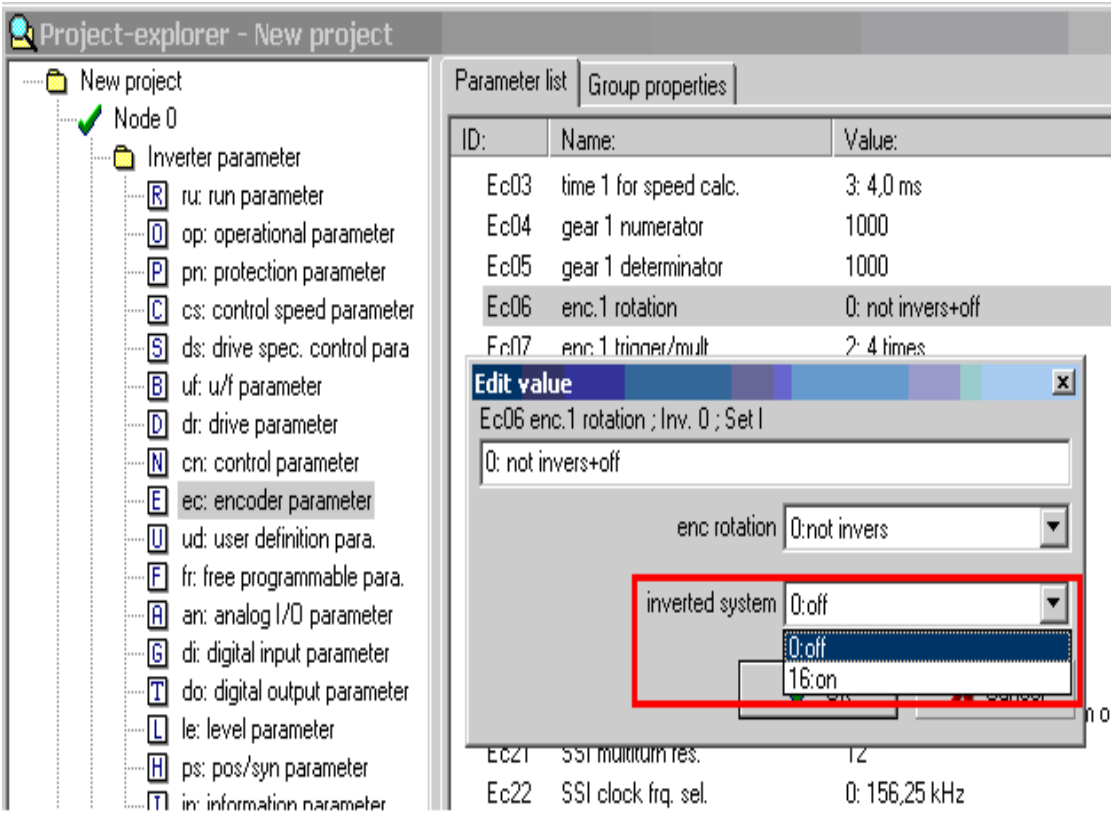


Fig 2.2.4(11) set up parameter **Ec06**

ⅲ、Set up the inverter to working state (set up parameter **di02** to zero).

A、Click parameter **di** (see fig 2.2.4(12)).

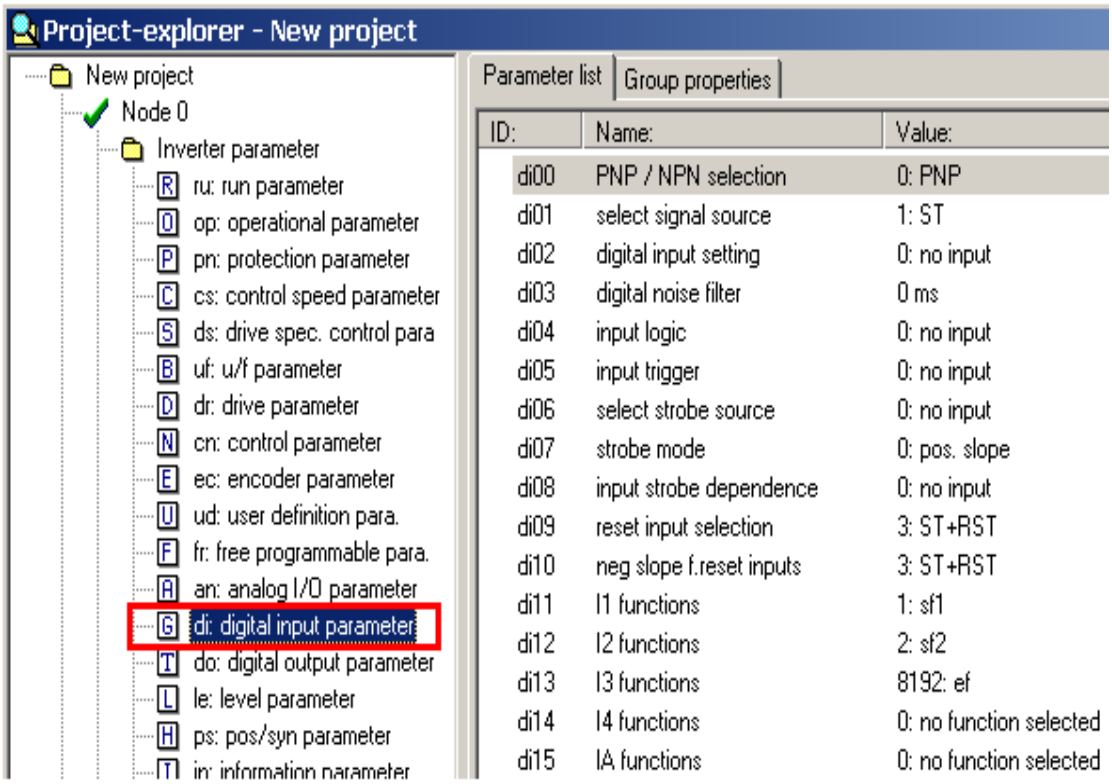


Fig 2.2.4(12) click parameter **di**

B、Set up parameter **di02** 1(see fig2.2.4 (13)).

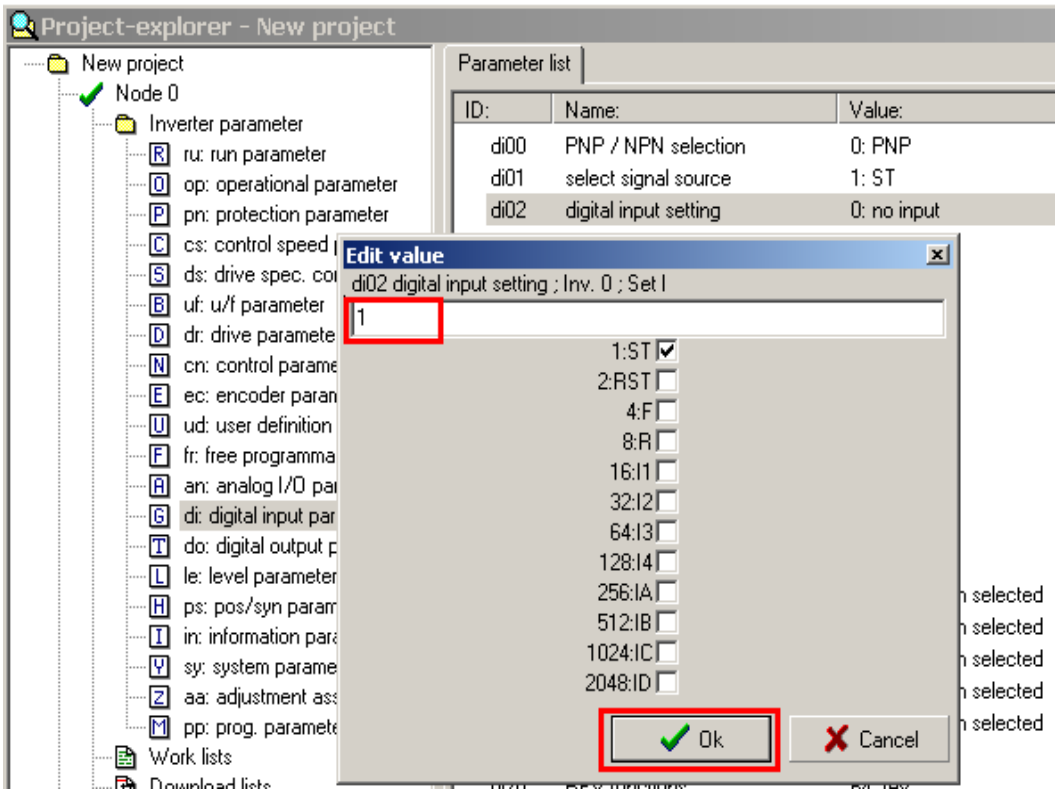


Fig 2.2.4(13) set the parameter **di02** one

ⅳ、Make sure the motor rotates in correct direction.

(5)、Finish the low speed test.

Click parameter 'op'. Set up parameter oP03 to zero. Stop the motor. (See fig2.2.4(14)).

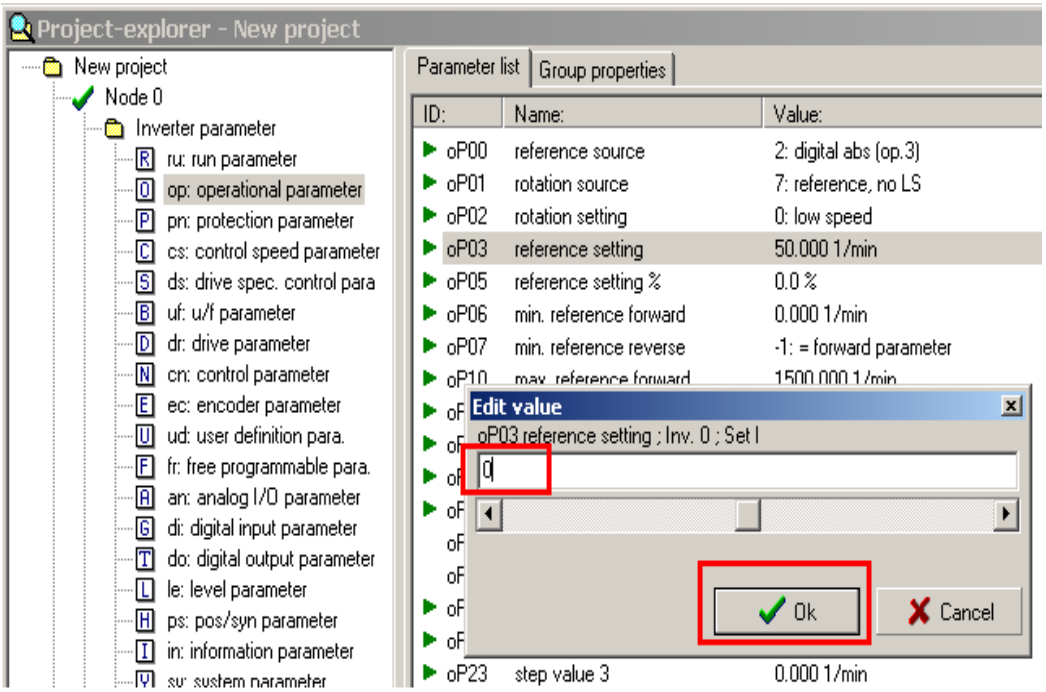


Fig 2.2.4(14) set up parameter **oP03** zero

3、High speed test

Refer to steps 2 in low speed test to set up parameter **oP03,** and test servo motor in high speed.

(1)、Run the servo motor in high speed (500r/m).

Click parameter **op**. Set up parameter **oP03** to 500. (See fig2.2.4(15)).

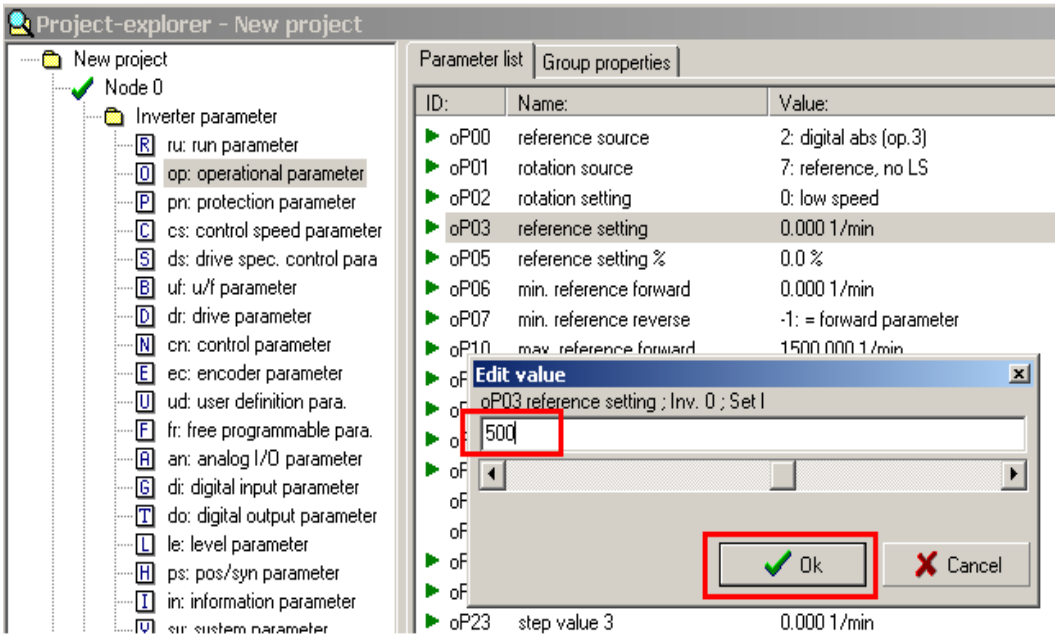


Fig 2.2.4(15) set up parameter **oP03** to 500

Observe parameters as following:

Parameter	Parameter's content	Parameter's state
ru00	inverter state	forward constant
ru02	ramp output display	500
ru09	encoder 1 speed	About 500
ru15	apparent current	Infinitesimal current

Table 2.2.4(3) observe the parameters in a high speed

The servo motor works in normal state if no shake and abnormal noises.

(2)、Let the motor work in rated speed. (**oP03=dr24**).

A、Click parameter **dr**. Observe **dr24.** (See fig2.2.4(16))

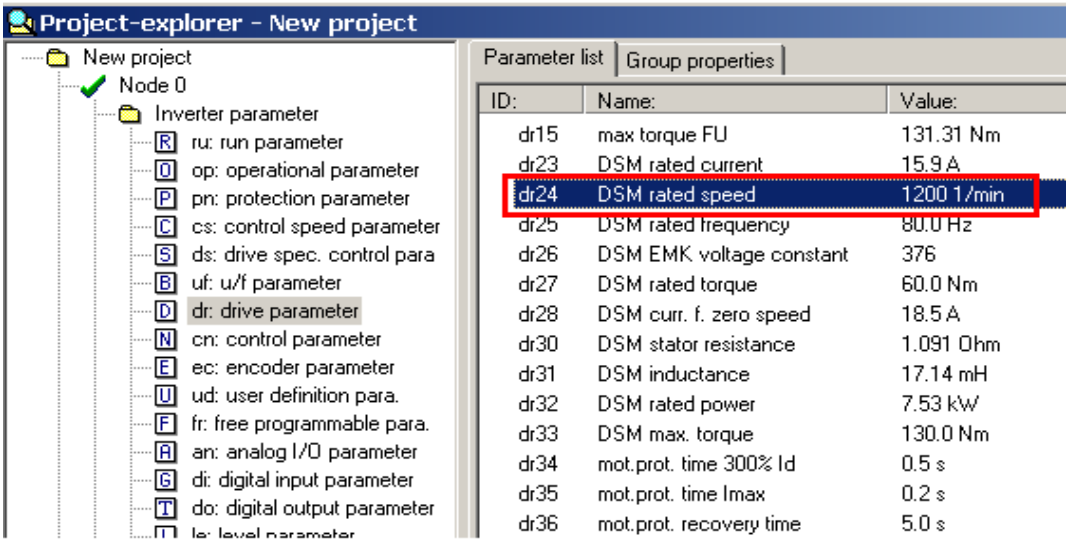


Fig 2.2.4(16) click parameter **dr24**

B、Click parameter **op**. Set parameter **oP03** and parameter **dr24** equivalent (see fig 2.2.4(17))

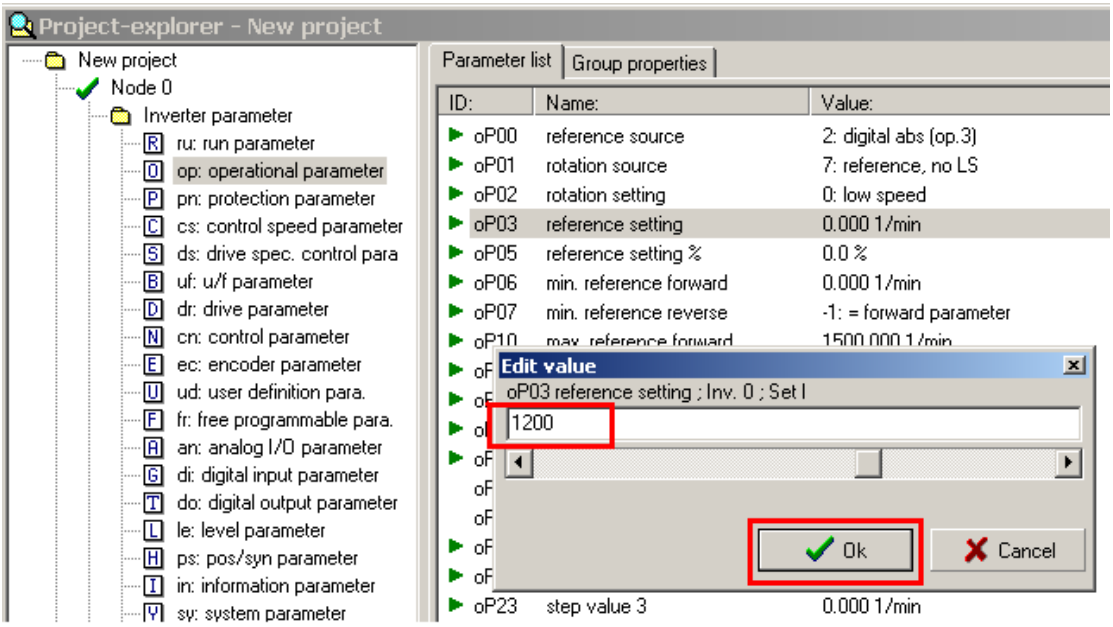


Fig 2.2.4(17) set the parameter **oP03** as the same as the parameter **dr24**

(3)、If no abnormal, the servo motor will work normally.

4、Resume communication with the control

Click parameter **sy.** Set up parameter **sy** 0303h. (See fig2.2.4(18))

Double click parameter**Sy24**→Input 0303h to the value box→Click OK

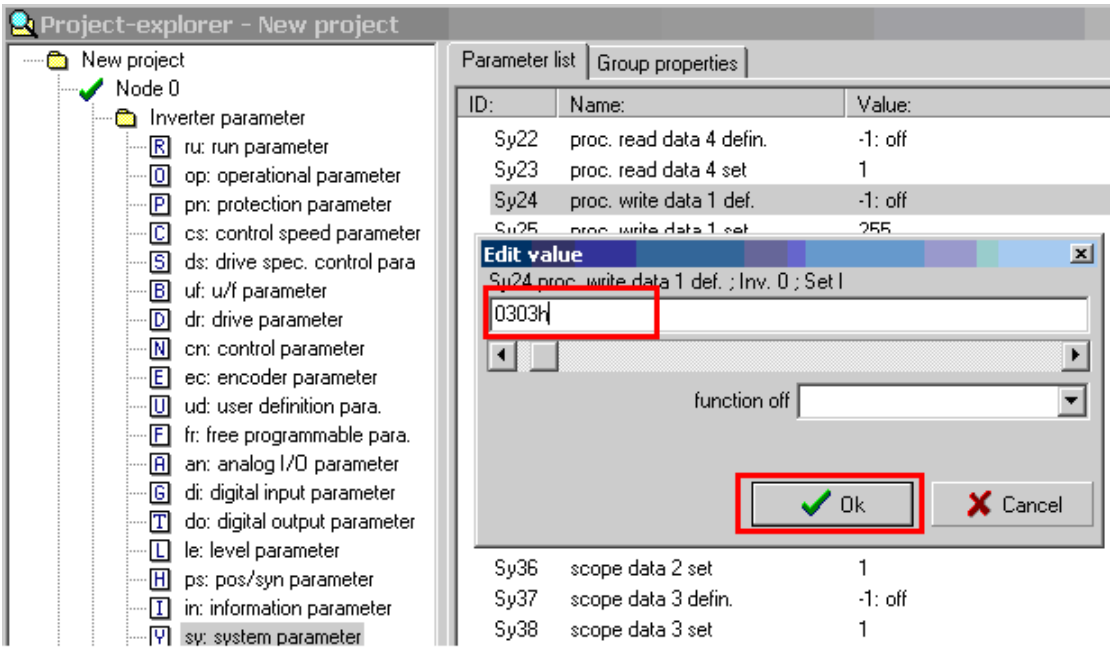


Fig 2.2.4(18) set up parameter **sy** 0303h

2.2.5 Search for the motor's reference and trial test running of the motor by Sigmatek controller

Notice

Please make sure the synchronous belt is off before searching or will cause serious ecological consequences.

Ⅰ、Search for the motor reference by Sigmatek controller

Main steps of searching for the motor reference of VENUS:

1、 Electrify

2、 Search for the motor's reference.

Detail explanations:

1、Electrify

(1) Weak electricity on

Make sure there are no short-curcuit on the whole electric circuitry, then turn on the switch of chief line on the front of the machine. See fig2.2.5(1).

Fig 2.2.5(1)

Notice: Don't press 'motor on' on the keyboard when power is on.

(2) Force electricity on

Under the situation that all I/O signals are normal, turn on two bottons【heat on】and【motor on】on the keyboard. See fig 2.2.5(2).

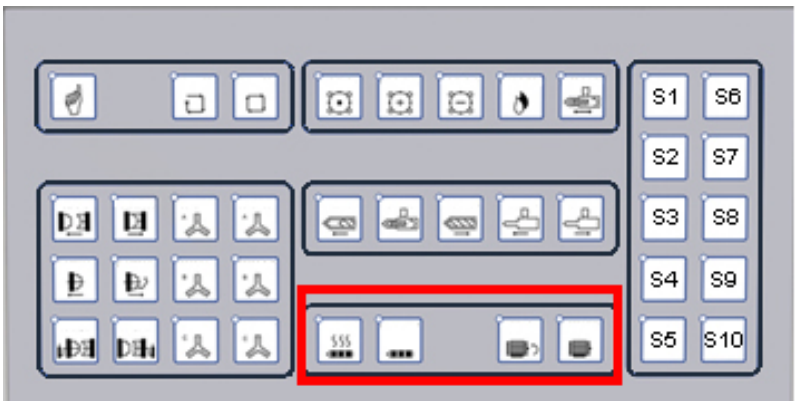


图 2.2.5（2）

Notice：

In order to ensure the injection part on fully electrical injection machine safe, the programmes include security designs of injection and storing parts that demand VENUS has to meet two requirements as below.

① If the tempreture deviation between the setted value and current value is within the allowed scope or not. See fig 2.2.5(3) in which the tempreture has reached the setted one.

② Screw cold boot to prevent delay time to the setted one. See fig2.2.5(4) in which the delay time is 100s. Then start the inverter.

See fig2.2.5(5), if the inverter enables, then『inverter on』lights on; otherwise, 『inverter on』lights off.

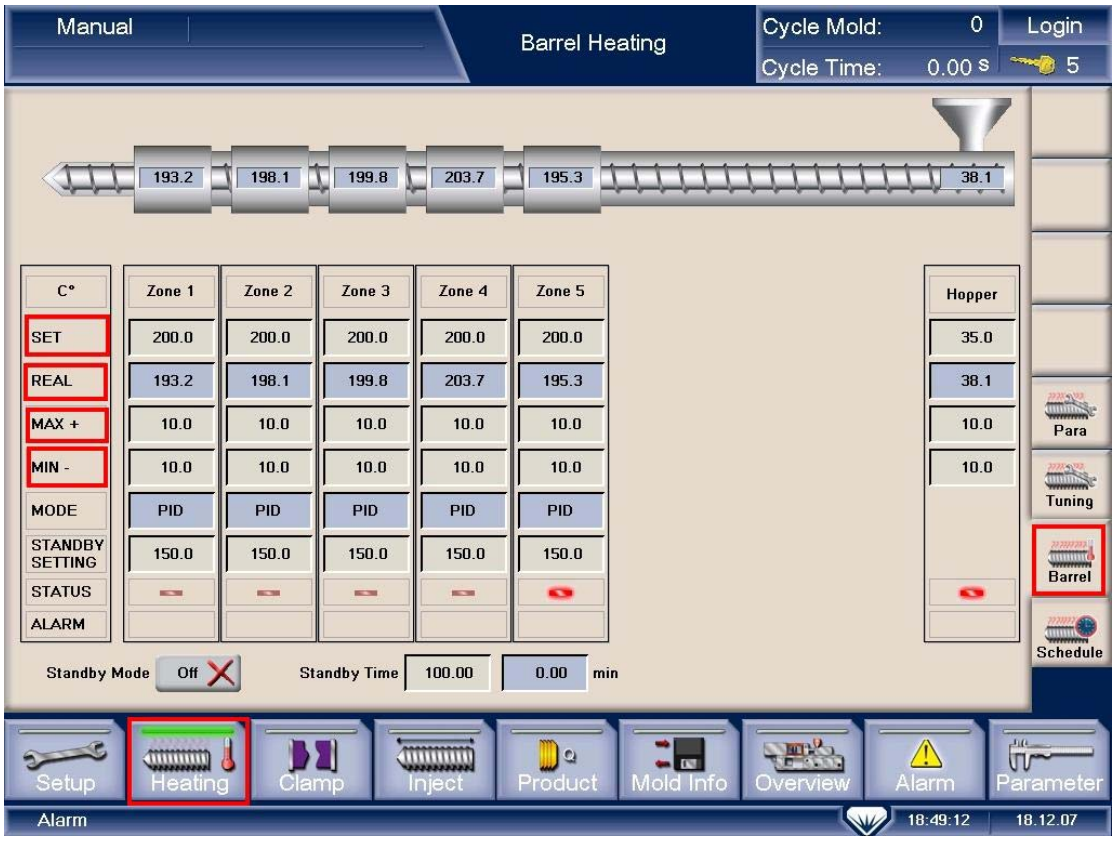


Fig 2.2.5(3)

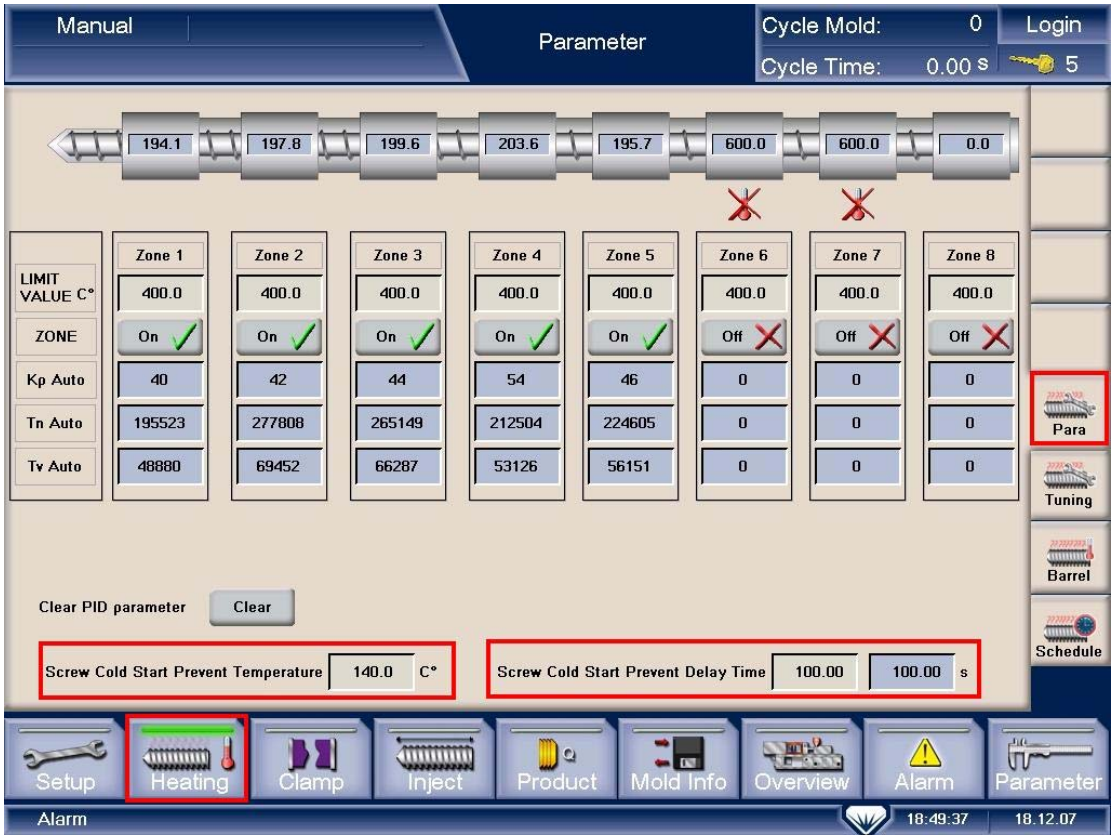


Fig 2.2.5(4)

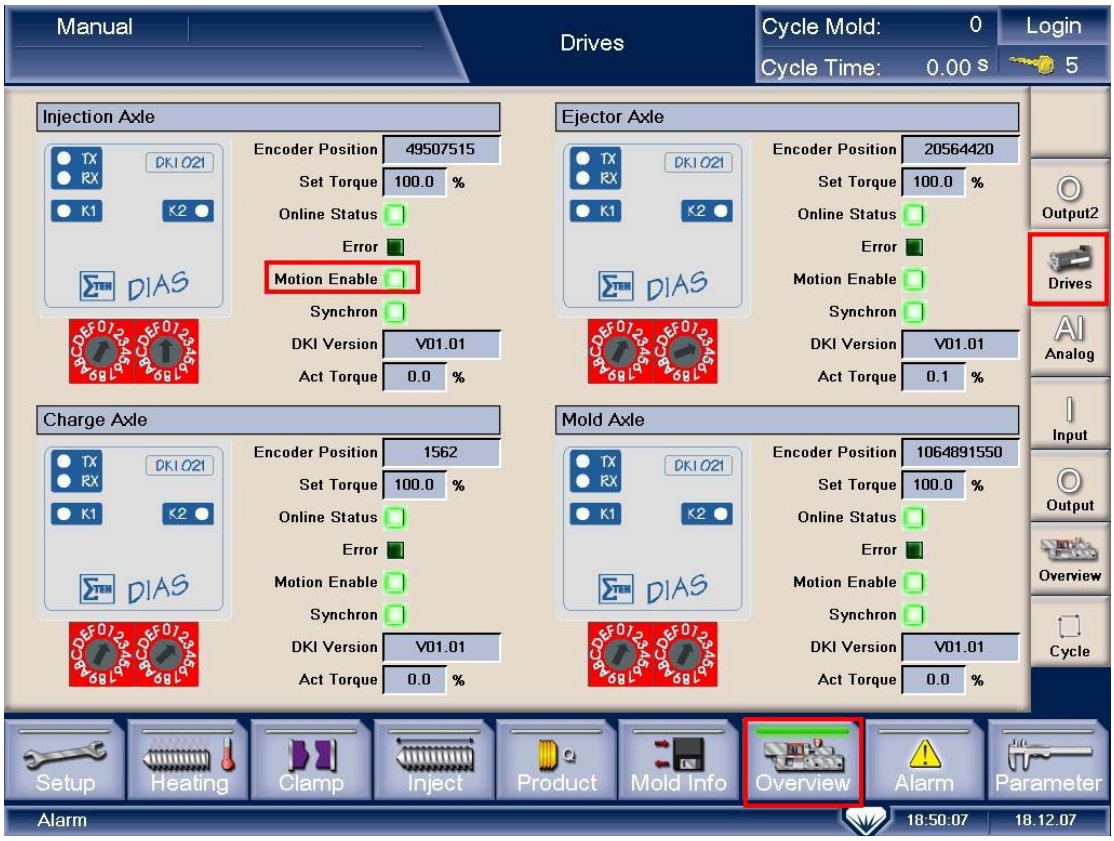


Fig 2.2.5(5)

2、Search for the motor's reference.

(1) Start searching

Click 'update' on 'inject KEB parameter' menu, with green lights on. Then click the button 'Motor Reference', and click 'start' in the dialog box to start searching. See fig 2.2.5(7)

Notice: Please check again that the belt is off, otherwise, it will cause serious damage to machine parts. Meanwhile, 'update' must be turned on with operators near by while searching.

(2) During searching

Fig 2.2.5(8) shows midway on searching and 2.2.5(9) shows the end of searching.

While searching, consult fig 2.2.5(6) to check if the searching process is normal and if the searching is finish.

Observing parameter **ru00**, while the value reaches 82, then it means reference starting.

(3) End of searching

Observe parameter **Ec02.** It is the reference of the inverter' software when parameter **Ec02** is fixed.
After searching, set di02=0, then set di02=1.
Turn off "motor off:
Turn on "motor on"
The reference searching is finish now.

Parameter	Content of parameter	Parameter state display
Ru00	inverter state	82
Ru15	Apparent current	0——rated current
Ec02	absolute pos. enc.1	Dynamic changing

Fig 2.2.5(6)

Other 3 servo motors have the similar searching process, so do not describe here any more.

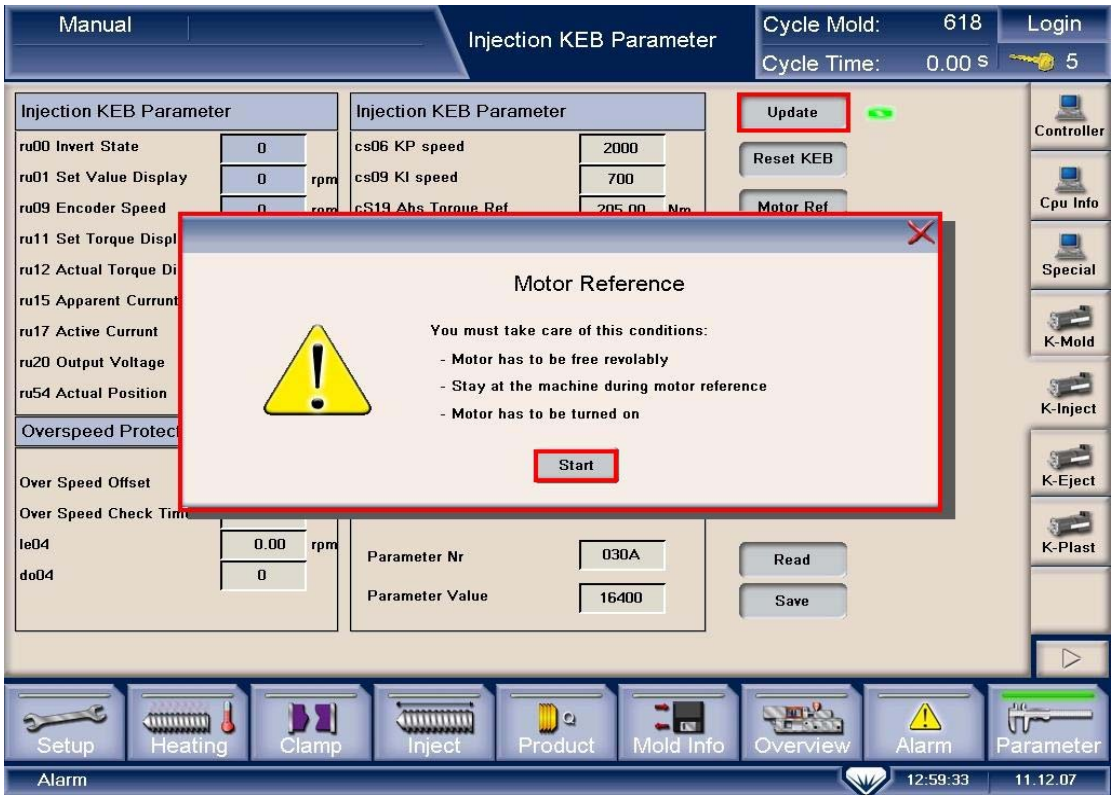


Fig 2.2.5(7) dialog boxes of searching for the reference

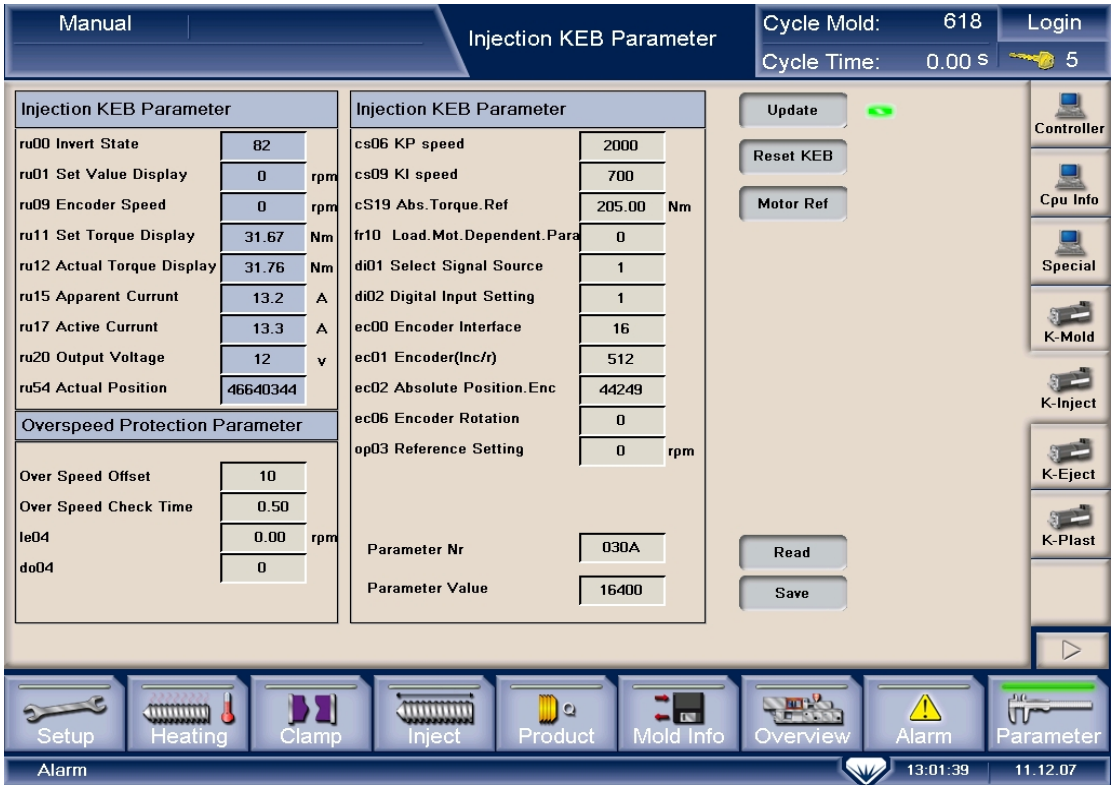


Fig 2.2.5(8) midway on searching

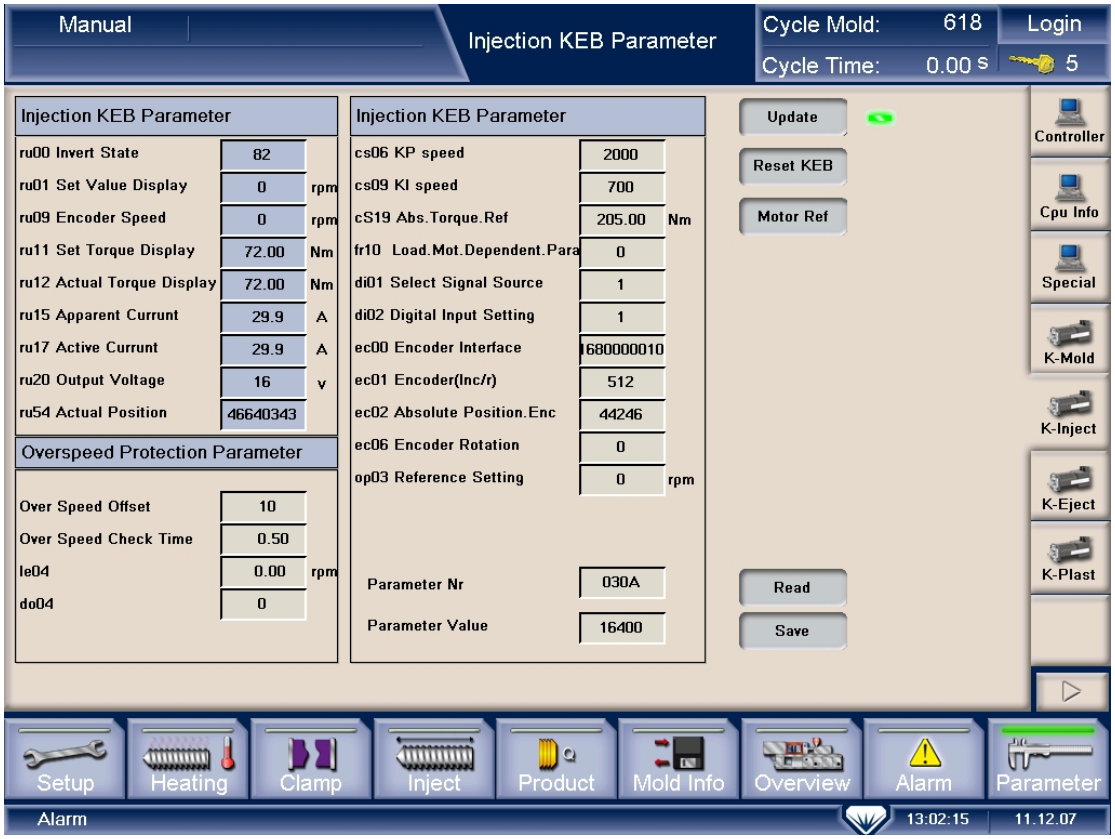


Fig 2.2.5(9) the end of searching

Ⅱ、Test running of the servo motor

Venus has 4 servo motors in all. Here, mainly introduce test running process of the injection servo motor, while other three are similar.

⑴、Test running of the injection servo motor

Steps as following:

1. Return to mechanical reference
2. Test running at low speed
3. Test running at middle speed
4. Test running at high speed

1、Return to mechanical reference

Enter into menu “Zero Setting”. Choose “On” in the dialog of “Zero Status”, and then click “Zero End” of “Injection Axis” with “Encoder Value” to 0.00mm. See fig 2.2.5(10).

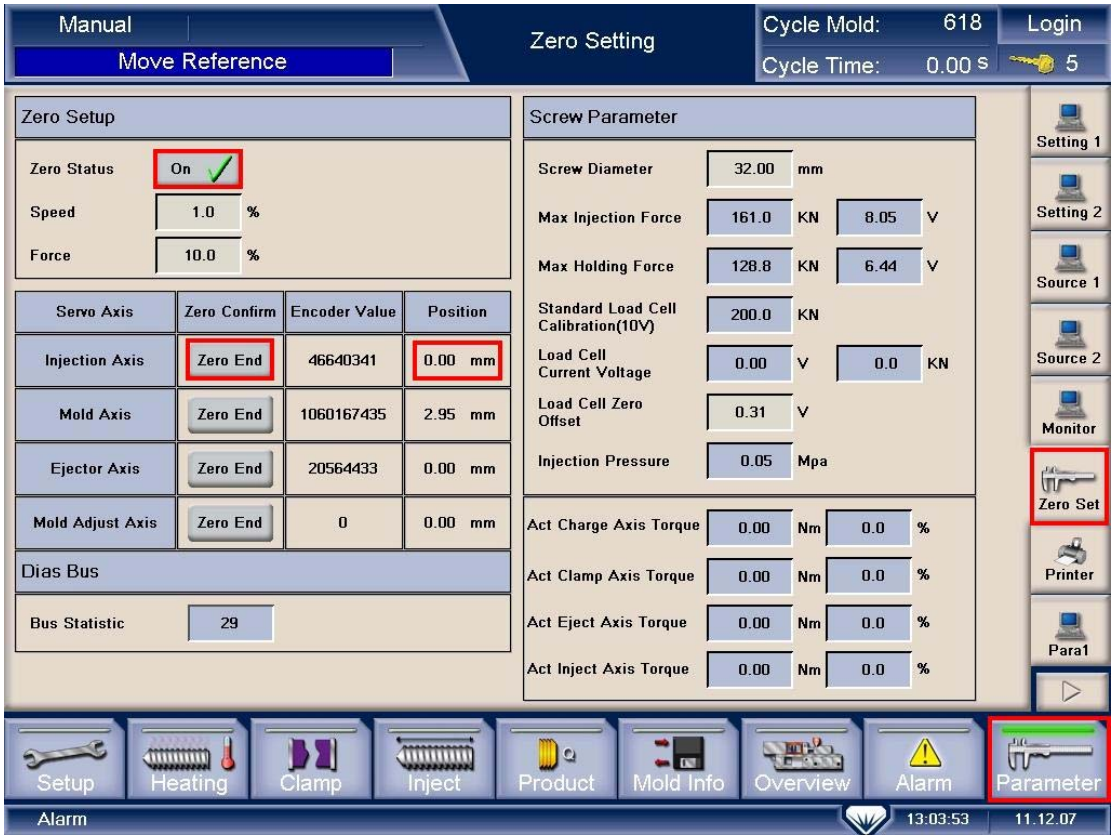


Fig 2.2.5(10)

2、Test running at low speed

(1) “Suck back” settings

Enter into menu ‘Charge’. Set up ‘Zones’ to ‘1’, then set up ‘SE’ to maximal. (For this machine the maximal injection stroke is 115mm)

Next set up the suck back speed to 15mm/s (We set 10% of the maximal speed as low speed in test running, while maximal speed is 150mm/s). At last set up ‘Safety Time’ to ‘20s’. See fig 2.2.5(11).

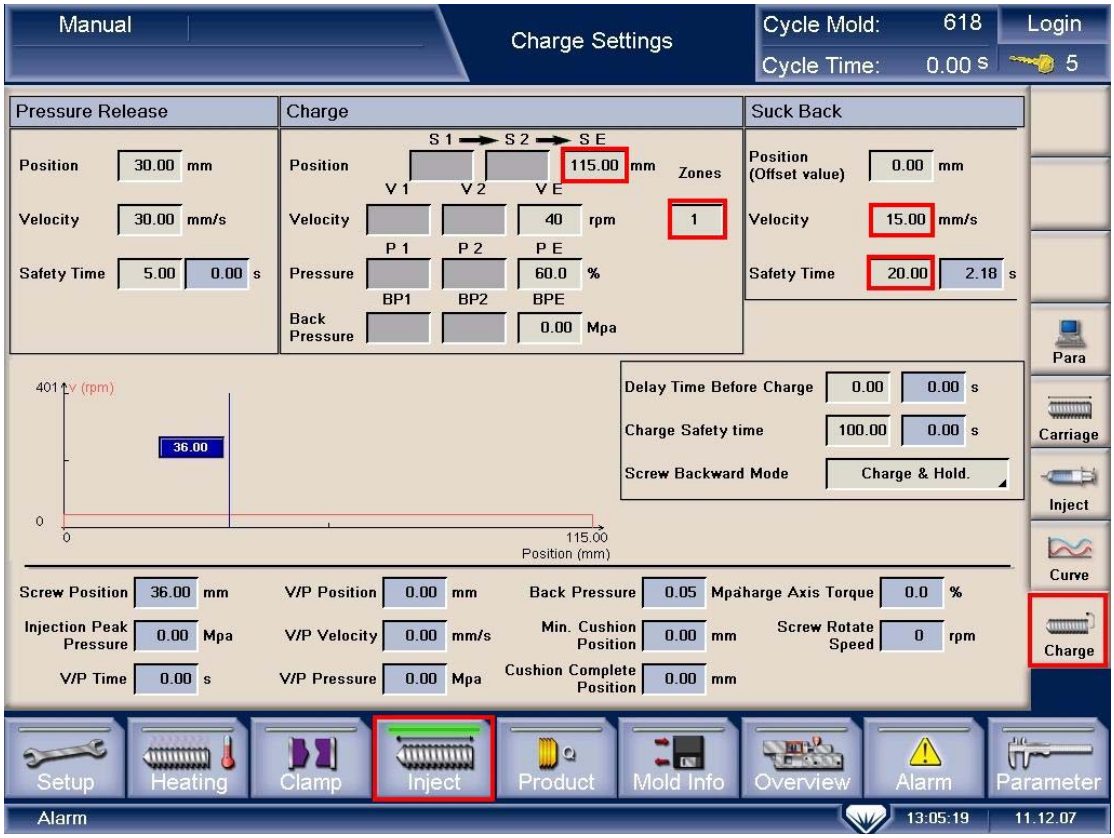


Fig 2.2.5(11)

(2) “Injection” settings

Enter into ‘Injection’ of menu “Injection settings”. Enter into ‘position mode’ of menu ‘V/P mode’, and set up ‘V/P time’ to 20s. Then set up injection ‘speed’ with 15mm/s (This speed is 10% of the maxium speed, the same as the suck back speed). Set up ‘pressure’ with 100Mpa (Notice: This value cannot be 0Mpa). At last set up ‘zones’ to 3. See fig 2.2.5(12)

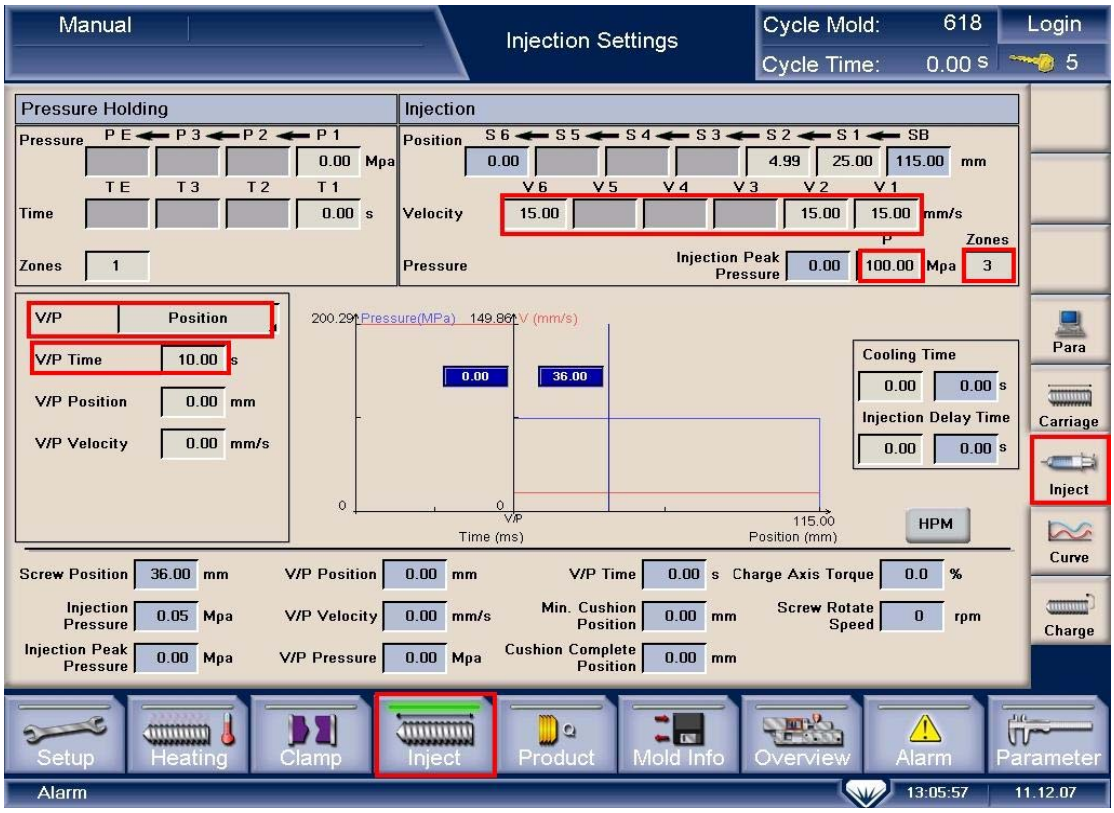


Fig 2.2.5(12)

(3) Observe the running status

Turn on ‘heating’ and ‘motor on’ on the keyboard. Press buttons ‘inject’ and ‘suck back’ to rotate motor. Enter into menu ‘Injection KEB Parameter’ to observe the running status.

If actual parameters correspond with those in table 2.2.5(13) and there is no vibration or noise, then the motor and the inverter both work well.

Parameter	Content of parameter	Parameter state display
Ru00	inverter state	66
Ru01	setpoint value display	±1600
Ru09	encoder 1 speed	close to±1600
Ru15	apparent current	less than 1 A

Fig 2.2.5(13)

(4) Set the direction of motor rotation.

Press the button ‘inject’ and ‘suck back’ on the keyboard. Observe the motor’s rotation from the axis direction. Fig 2.2.5(14) gives the concept of axis

direction.

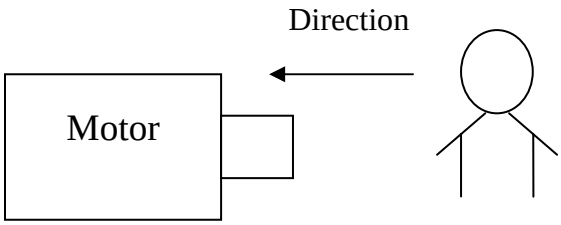


Fig 2.2.5(14)

Motor	Direction of the axis			
	VE400——VE4100			
Injection Servo Motor	Inject	Anticlockwise	Suck back	Clockwise

Fig 2.2.5(15)

If the direction is as fig 2.2.5(15), then it is correct. If not we have to adjust it, and the method is as fig 2.2.5(16).

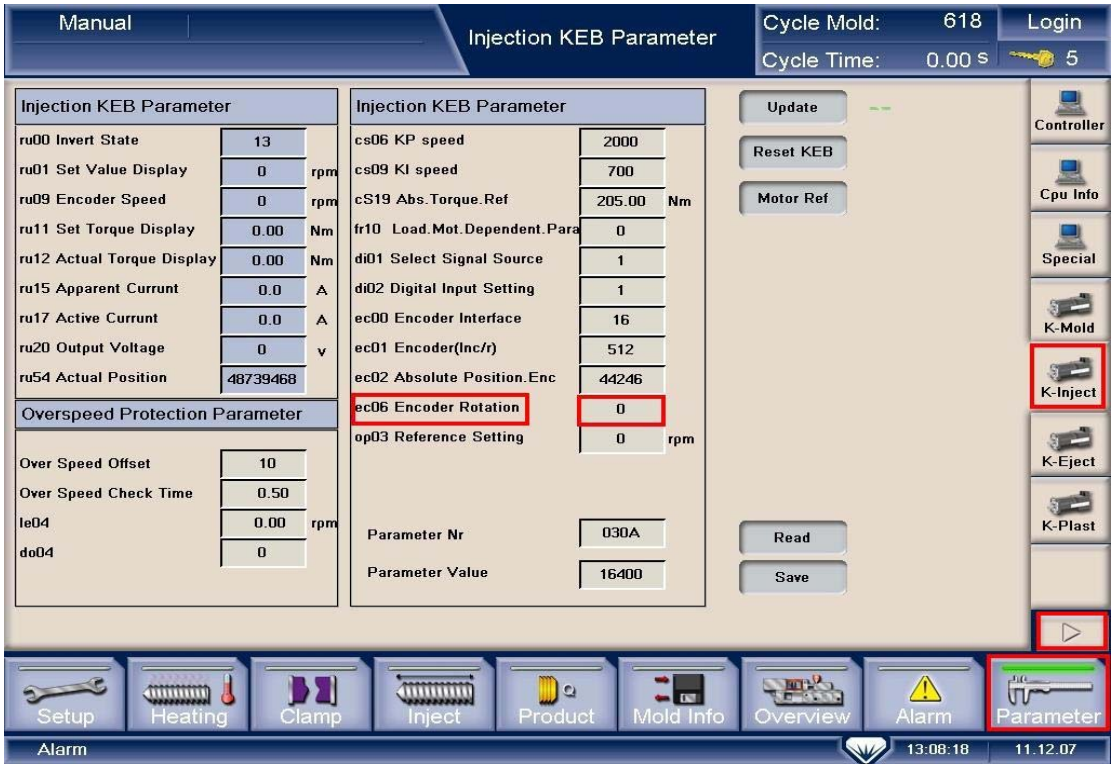


Fig 2.2.5(16)

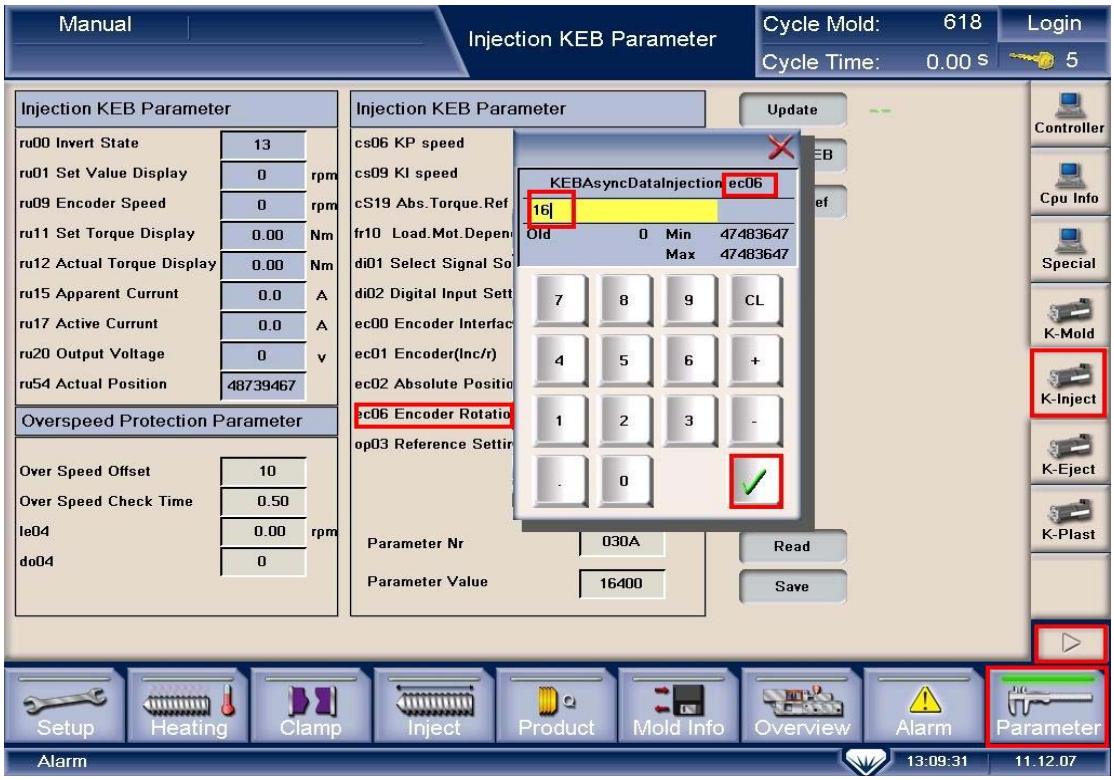


Fig 2.2.5(17)

Set up the value of ‘ec06’ to adjust the direction.

If the current value of ‘ec06’ is ‘0’, then change the value to ‘16’ to adjust the direction;

If the current value of ‘ec06’is ‘16’, then change the value to ‘0’ to adjust the direction;

If the current value of ‘ec06’ is ‘1’, then change the value to ‘17’ to adjust the direction;

If the current value of ‘ec06’ is ‘17’, then change the value to ‘1’ to adjust the direction.

Please reconfirm the directions of inject and suck back.

See fig 2.2.5(17).

3、Test running at middle speed

Turn on “motor off” and set up the speed of ‘inject’ and ‘suck back’ into ‘50%’, which is 75mm/s here.

Turn on “Motor on” and choose “Inject” and “Suck back” on the keyboard. Then enter into menu ‘‘Injection KEB Parameter’ to observe the status. If actual

parameters correspond with those in table 2.2.5(18), but no vibration or noise, then the motor and the inverter both work well.

Parameter	Content of parameter	Parameter state display
Ru00	inverter state	66
Ru01	setpoint value display	±8000
Ru09	encoder 1 speed	close to±8000
Ru15	apparent current	less than 1 A

Table 2.2.5(18)

4、Test running at high speed

Turn on “motor off” and set up the speed of ‘inject’ and ‘suck back’ to the maximal speed, which is 15mm/s here.

Turn on “Motor on” and choose “Inject” and “Suck back” on the keyboard. Then enter into menu ‘‘Injection KEB Parameter’ to observe the status. If actual parameters correspond with those in table 2.2.5(19), but no vibration or noise, then the motor and the inverter both work well.

Parameter	Content of parameter	Parameter state display
Ru00	inverter state	66
Ru01	setpoint value display	±16000
Ru09	encoder 1 speed	close to±16000
Ru15	apparent current	less than 1 A

Table 2.2.5(19)

Now, test running of servo motor has been finished have finished. Next is to install the synchronous belt on servo motor.

(2). Test running of other motors

Preplastic axis doesn’t need to return to the mechanical reference.

Test running of the charge motor has following steps:

1. Test running at low speed
2. Test running at middle speed

3. Test running at high speed

1. Test running at low speed

(1) Charge settings

Enter into the nemu “charge settings”

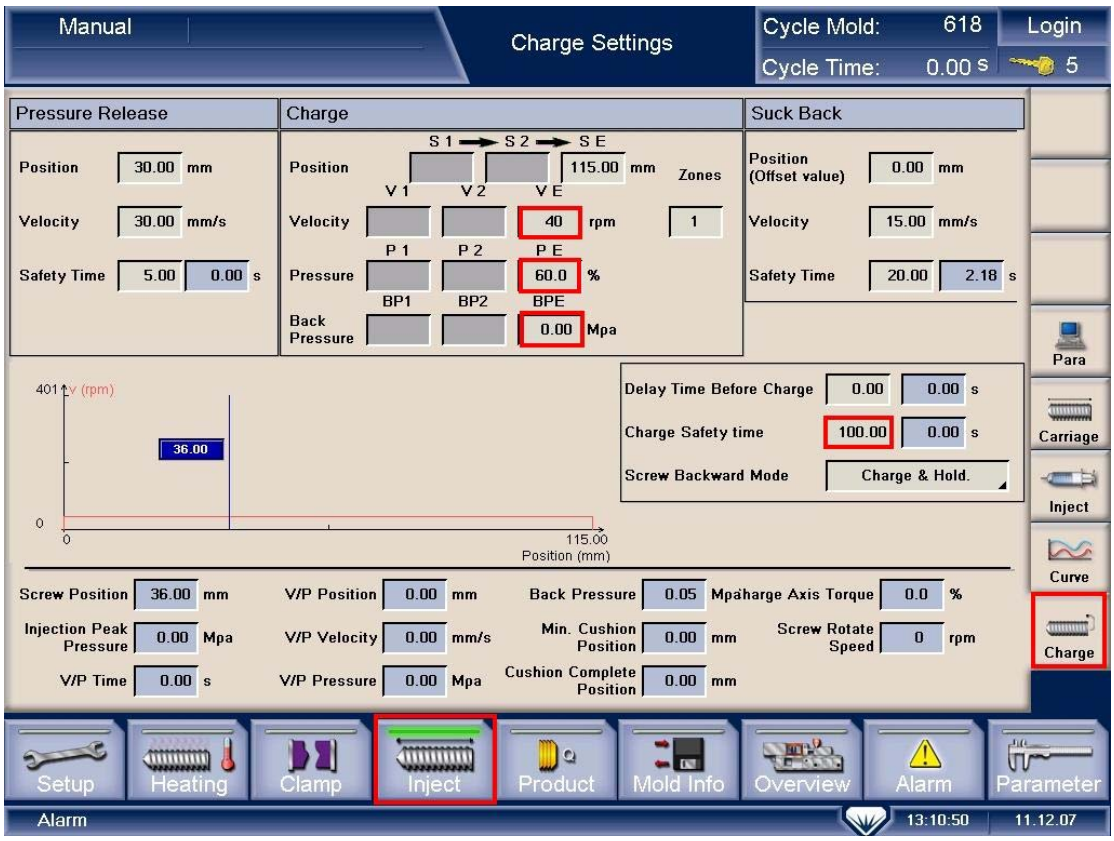


Fig 2.2.5(20)

Set up charge ‘Velocity’ to 40 (10% of the maximal speed), ‘Pressure’ to 60%, ‘Back pressure’ to 0, and ‘Charge safty time’ to 100s.

See fig 2.2.5(20).

(2) Observe the running status

Turn on ‘Heating on’ and ‘Motor On’. Press the button ‘Charge’ on the keyboard, so the motor rotate. Enter into menu ‘Charge KEB Parameter’ to observe the running status.

If actual parameters correspond with those in table2.2.5(21) and there is no vibration or noise, then the motor and the inverter both work well.

Parameter	Content of parameter	Parameter state display
Ru00	inverter state	66
Ru01	setpoint value display	±1600
Ru09	encoder 1 speed	close to±1600
Ru15	apparent current	less than 1 A

Table 2.2.5(21)

(3) Set the direction of motor's rotation.

Observe motor's rotation from axis direction.

Motor	Direction of the axis	
	40T——410T	
Charge Servo Motor	Charge	Clockwise

Table 2.2.5(22)

If the direction is opposite, please see also the injection motor adjustment.

2. Test running at middle speed

Turn on "Motor off" and set up the charge 'Velocity' to 200rpm (50% of the maximal speed).

Turn on "Motor on', and then click 'Charge' on the keyboard to rotate the motor.

Enter into menu 'Inject KEB Parameter' to observe the running status.

If actual parameters correspond with those in table2.2.5(23) and there is no vibration or noise, then the motor and the inverter both work well.

Parameter	Content of parameter	Parameter state display
Ru00	inverter state	66
Ru01	setpoint value display	±8000
Ru09	encoder 1 speed	close to±8000
Ru15	apparent current	less than 1 A

Table 2.2.5(23)

3. Test running at high speed

Turn on "Motor off" and set up the charge 'Velocity' to the maximal. Here is 400rmp.

Turn on "Motor on" and click 'Charge' on the keyboard to rotate the motor.

Enter into menu ‘Inject KEB Parameter’ to observe the running status.

If actual parameters correspond with those in table2.2.5(24) and there is no vibration or noise, then the motor and the inverter both work well.

Parameter	Content of parameter	Parameter state display
Ru00	inverter state	66
Ru01	setpoint value display	±16000
Ru09	encoder 1 speed	close to±16000
Ru15	apparent current	less than 1 A

Table 2.2.5(24)

Till now, test running of charge motor has been finished. After the charge motor starts working, the synchronous belt can be put on

(3). Test running of mold motor

Main steps:

1. Return to the mechanical reference
2. Test running at low speed
3. Test running at middle speed
4. Test running at high speed

1. Return to the mechanical reference

See also test running of injection servo motor.

2. Test running at low speed

(1) Mold open settings

Set ‘Zones’ to 3, ‘Safty time’ to 12s and ‘Velocity’ to 10%. See fig 2.2.5(25)

(2) Mold close settings

Set ‘Zones’ to 4, ‘Safty time’ to 15s and ‘Velocity’ to 10%. See fig 2.2.5(26)

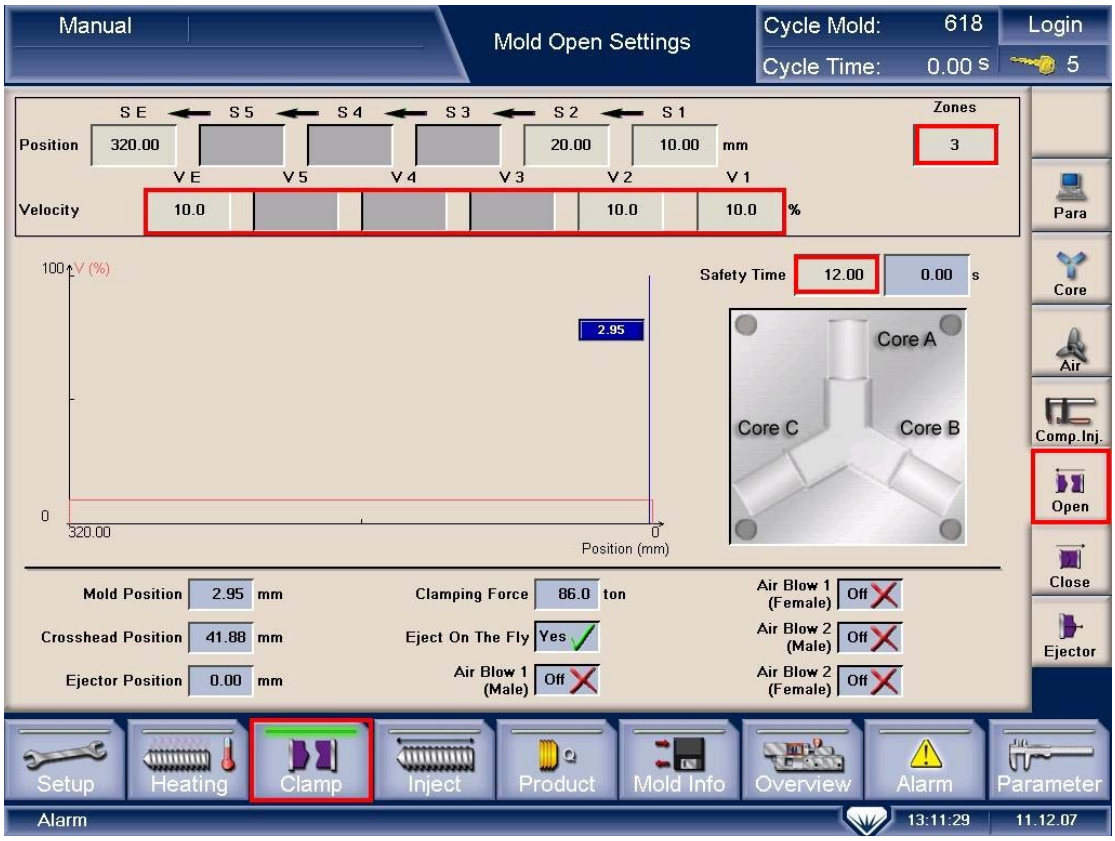


Fig 2.2.5(25)

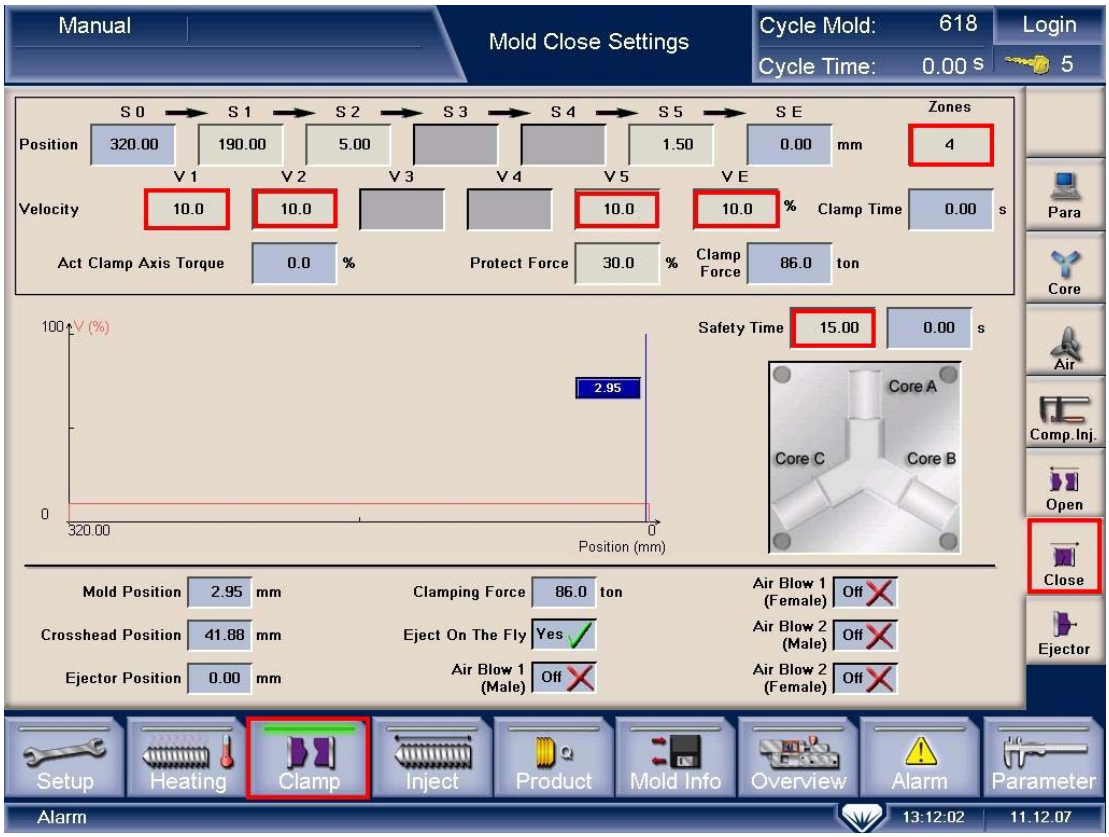


Fig 2.2.5(26)

(3) Observe running status

Turn on “Motor on” and click ‘Mold open’ and’ Mold close’on the keyboard to rotate the motor.

Enter into menu ‘Mold KEB Parameter’ to observe the running status.

If actual parameters correspond with those in table2.2.5(27) and there is no vibration or noise, then the motor and the inverter both work well.

Parameter	Content of parameter	Parameter state display
ru00	inverter state	66
ru01	setpoint value display	±1600
ru09	encoder 1 speed	close to±1600
ru15	apparent current	less than 1 A

Table 2.2.5(27)

(4) Set up the rotating direction

At low speed, observe the motor’s rotation from the axis direction. See fig2.2.5(28).

Motor	Direction of the axis			
	40T——410T			
Mold Servo Motor	Mold Open	Clockwise	Mold clamp	Anticlockwise

Table 2.2.5(28)

If the direction is opposite, please see also the injection motor adjustment.

3. Test running at middle speed

Turn on “Motor off” and set up mold ‘Velocity’ to 50%.

Turn on “Motor on’, and then click ‘Mold open’ and ‘Mold close’ on the keyboard to rotate the motor. Enter into menu ‘Mold KEB Parameter’ to observe the running status.

If actual parameters correspond with those in table2.2.5(29) and there is no vibration or noise, then the motor and the inverter both work well.

Parameter	Content of parameter	Parameter state display
ru00	inverter state	66
ru01	Setpoint value display	±8000
ru09	encoder 1 speed	close to±8000
ru15	apparent current	less than 1 A

Table 2.2.5(29)

4. Test running at high speed

Turn on “Motor off” and set up mold ‘Velocity’ to 100%.

Turn on “Motor on” and click ‘Mold open’ and ‘Mold close’on the keyboard to rotate the motor.

Enter into menu ‘Mold KEB Parameter’ to observe the running status.

If actual parameters correspond with those in table2.2.5(30) and there is no vibration or noise, then the motor and the inverter both work well.

Parameter	Content of parameter	Parameter state display
ru00	inverter state	66
ru01	Setpoint value display	±16000
ru09	encoder 1 speed	close to±16000
ru15	apparent current	less than 1 A

Table 2.2.5(30)

Till now, test running of mold motor has been finished. After the mold motor starts working, the synchronous belt can be put on

(4). Test running of ejector motor

Main steps:

1. Return to the mechanical reference
2. Test running at low speed
3. Test running at middle speed
4. Test running at high speed

1. Return to the mechanical reference

See also test running of injection servo motor.

2. Test running at low speed

(1) Ejector settings

Set up eject forward ‘Zones’ to 1, ‘Position’ to the maximal position (Which is 80mm here), ‘Velocity’ to 10%. Set up eject backward ‘Zones’ to 1, ‘position’ ‘SE’ to 0,’Velocity’ to 10%. Set ‘Eject Mode’ to semi eject, ‘Eject Counter’ to 1, and ‘Safety Time’ to 12s. See fig 2.2.5(31).

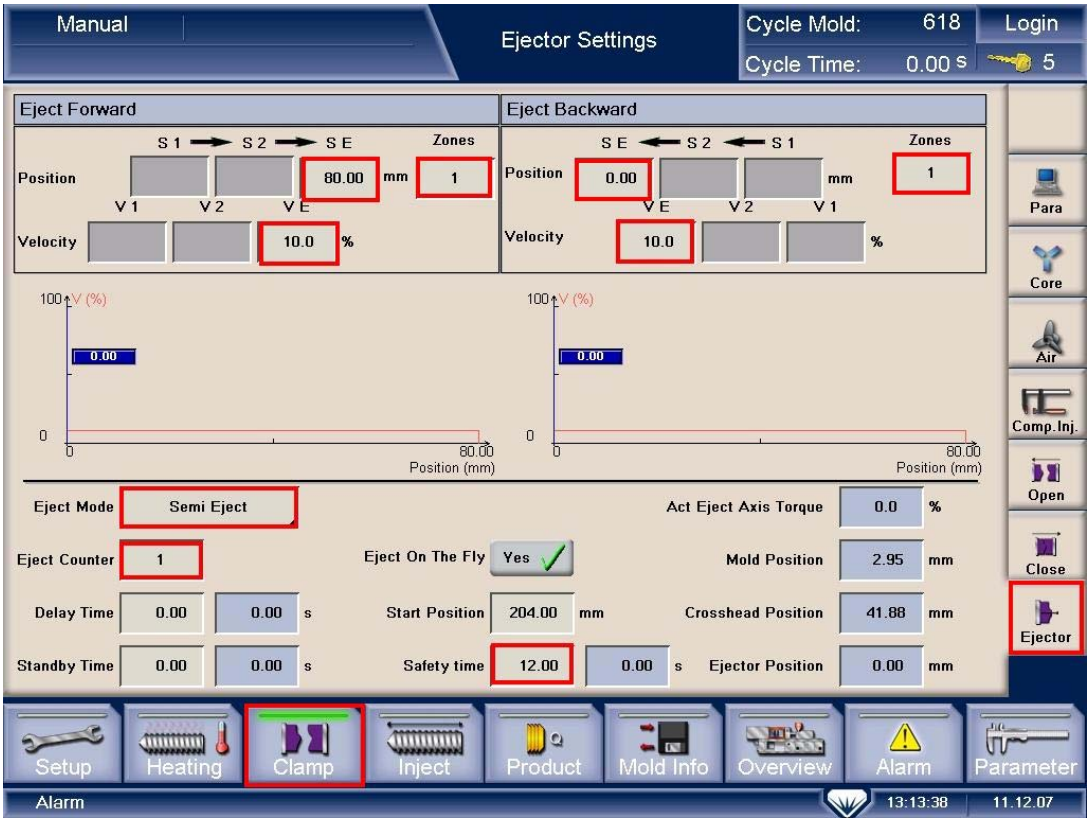


Fig 2.2.5(31)

(2) Observe running status

Turn on “Motor on” and click ‘Eject Forward’ and ‘Eject Backward’ on the keyboard to rotate the motor.

Enter into menu ‘Eject KEB Parameter’ to observe the running status.

If actual parameters correspond with those in table2.2.5(32) and there is no vibration or noise, then the motor and the inverter both work well.

Parameter	Content of parameter	Parameter state display
ru00	inverter state	66
ru01	setpoint value display	±1600
ru09	encoder 1 speed	close to±1600
ru15	apparent current	less than 1 A

Table 2.2.5(32)

(3) Set the direction of motor's rotation

At low speed, observe the motor's rotation from the axis direction. See fig 2.2.5(33)

Motor	Direction of the axis			
	40T——410T			
Ejector Servo Motor	Ejector Forward	Anticlockwise	Ejector Backward	Clockwise

Table 2.2.5(33)

If the direction is opposite, please refer to the injection motor adjustment.

3. Test running at middle speed

Turn on "Motor off" and set up eject forward and eject backward to 50%.

Turn on "Motor on', and then click 'Eject Forward' and 'Eject Backward' on the keyboard to rotate the motor. Enter into menu 'Eject KEB Parameter' to observe the running status.

If actual parameters correspond with those in table2.2.5(34) and there is no vibration or noise, then the motor and the inverter both work well.

Parameter	Content of parameter	Parameter state display
ru00	inverter state	66
ru01	Setpoint value display	±8000
ru09	encoder 1 speed	close to±8000
ru15	apparent current	less than 1 A

Table 2.2.5(34)

4. Test running at high speed

Turn on "Motor off" and set up eject forward and eject backward to 100%.

Turn on "Motor on', and then click 'Eject Forward' and 'Eject Backward' on the

keyboard to rotate the motor. Enter into menu ‘Eject KEB Parameter’ to observe the running status.

If actual parameters correspond with those in table2.2.5(35) and there is no vibration or noise, then the motor and the inverter both work well.

Parameter	Content of parameter	Parameter state display
ru00	inverter state	66
ru01	Setpoint value display	±16000
ru09	encoder 1 speed	close to±16000
ru15	apparent current	less than 1 A

Table 2.2.5(35)

Till now, test running of eject motor has been finished. After the eject motor starts working, the synchronous belt can be put on

Remarks: The value display of ‘ru01’ and ‘ru09’ is based on motor’s ‘rated speed’, which is 2000/rpm in this example.

1、For test running at low speed;

Ru01=2000×10%×8=1600rpm, |Ru09| is close to 1600rpm.

2、For test running at middle speed;

Ru01=2000×50%×8=8000rpm, |Ru09| is close to 8000rpm.

3、For test running at middle speed;

Ru01=2000×100%×8=16000rpm, |Ru09| is close to 16000rpm.

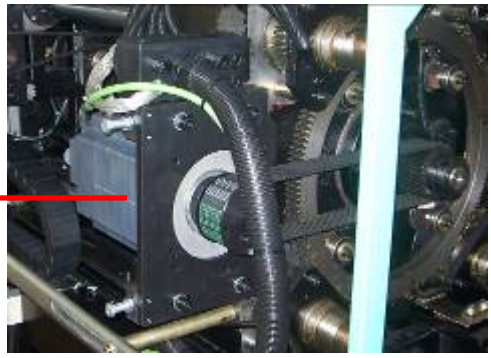
It is the same to calculate values of other rated speed motors.

2.2.6 Install synchronous-belt and test the tension

1、Clamping unit (Codes of components, see Fig 2.2.1(4) clamping unit.)
(1)、Install synchronous-belt for clamping unit.

①Put a belt on one gear, then tighten the belt and put the belt on the other gear.

②Install bolts (3 pieces) and gear cover.



③ Strain the synchronous-belt by moving the motor outward (as the arrow shows).

④Tighten flange installation bolts (4bolts must be tightened at same time)

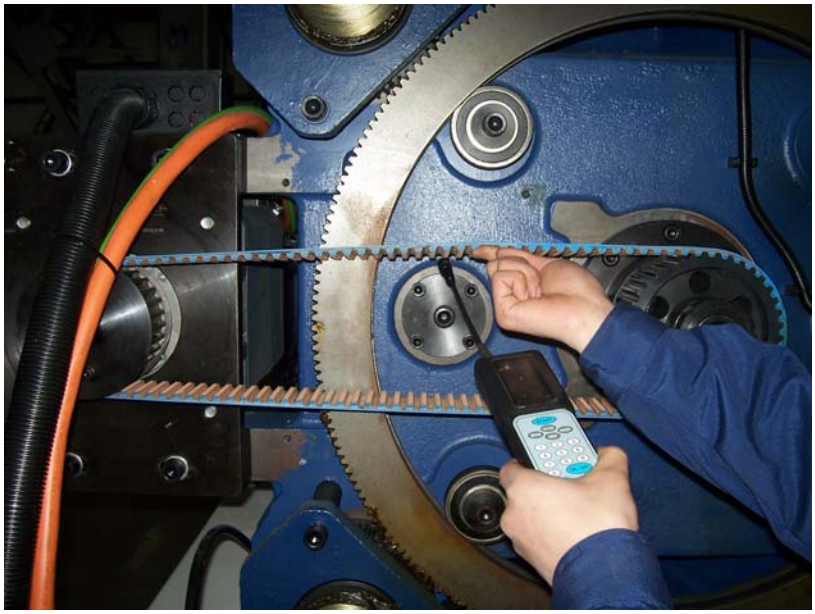


Fig 2.2.6(1) Test method of tensiometer

(2)、Test on clamping synchronous-belt tension.

⑤ Put the professional tensiometer. See fig 2.2.6(1). (Tensiometer directions refer to appendix II) away from the synchronous-belt about 10mm, and the best position is in the middle of tow gears, then tension the belt by hands. The tensiometer displays tension values by measuring air vibration. Then compare to synchronous-belt tension-form (appendix I), to check if the belt tension is right or not.

⑥ If actual value is bigger, then it means the belt is too tight. First, loosen flange installation bolts; second, loosen tension adjusting bolts, at last do remember to tighten flange installation bolts before testing again. If the value is smaller, then it means the belt is to loose. First, loosen flange installation bolts; second, screw down the tension adjusting bolts; at last do remember to tighten flange installation bolts before testing again. Adjust the tension until its value is equal to the standard.

⑦If the value is right, then tighten nuts first, and then screw down flange installation bolts.

> ⚠ **Notice**
>
> Two tension adjusting bolts should be screwed down synchronously, to avoid imbalance and damage to the synchronous-belt while working.

2、Plastification unit

(1)、Install synchronous-belt for plastification unit. (See Fig 2.2.1(3) plastification unit for codes of components)

① Put the belt on one gear, then tighten the belt and put the belt on the other gear.

② Install bolts (3 pieces) and gear cover.

③ Strain the synchronous-belt by moving the motor outward.

④ Tighten flange installation bolts (the four bolts must be tightened synchronously).

(2)、Plastification synchronous-belt tension testing.

⑤ Put the professional tensiometer. See fig 2.2.6(1). (Tensiometer directions refer to appendix II) away from the synchronous-belt about 10mm, and the best position is in the middle of tow gears, then tension the belt by hands. The tensiometer displays tension values by measuring air vibration. Then compare to synchronous-belt tension-form (appendix I), to check if the belt tension is right or not.

⑥ If actual value is bigger, then it means the belt is too tight. First, loosen flange installation bolts; second, loosen tension adjusting bolts, at last do remember to tighten flange installation bolts before testing again. If the value is

smaller, then it means the belt is to loose. First, loosen flange installation bolts; second, screw down the tension adjusting bolts; at last do remember to tighten flange installation bolts before testing again. Adjust the tension until its value is equal to the standard.

⑦ If the value is right, then tighten nuts first, and then screw down flange installation bolts.

3、Ejector unit

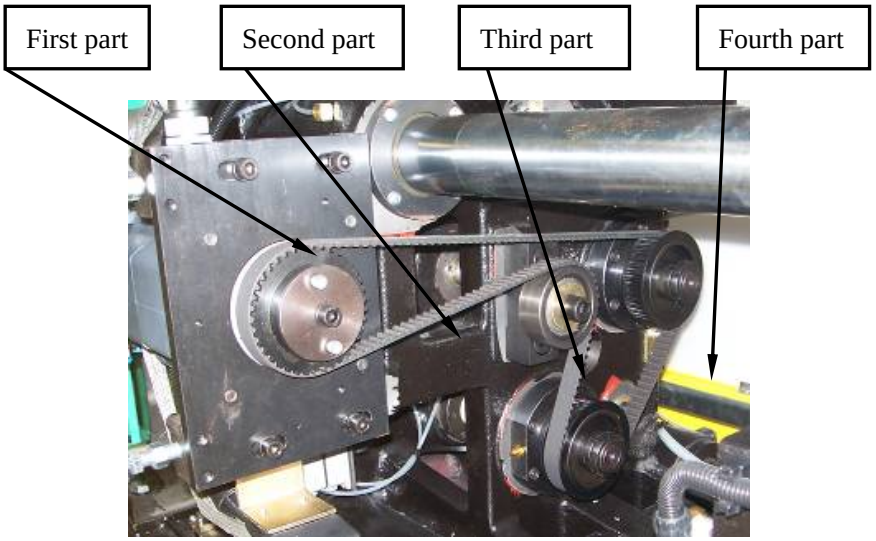


Fig 2.2.6(2) Ejector unit and the four parts of the belt (1)

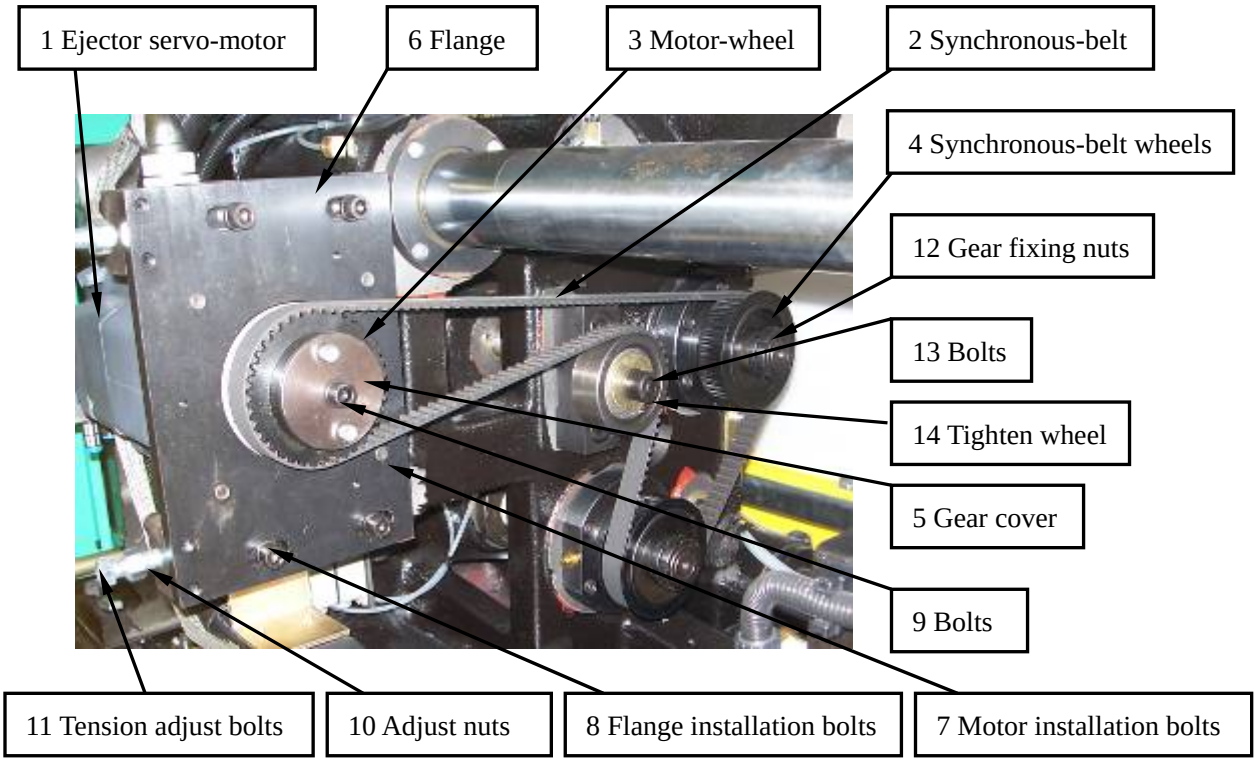


Fig 2.2.6(3) Ejector unit and the four parts of the belt (2)

(1)Install synchronous-belt.
①Rotate the synchronous-belt wheels4 (2 pieces) by hands. Let the ejector guide-panel on limit position (front-end or back-end).
②Put the belt on synchronous-belt wheels. Notice: tighten the first and third part of belt to keep the belt tension. Then the belt goes around tighten wheels, at the same time tighten the first and second part of belt to keep the belt tension. Finally put the belt on motor-wheel3 and keep the belt tension.
(2)、Test on ejector synchronous-belt tension.
Divide the ejector synchronous-belt into fours parts, as Fig2.2.6(1). If the belt is well installed, according to the theory, when the belt is zero-distortion, the tension of each part should be same. So it is ok to test the first part which is longest part.
Testing approaches:
Tighten flange installation bolts (the four bolts must be tightened simultaneously).
⑤Put the professional tensiometer (Tensiometer directions refer to appendix II) away from the synchronous-belt about 10mm, and the best position is in the middle of tow gears, then tension the belt by hands. The tensiometer displays tension values by measuring air vibration. Then compare to synchronous-belt tension-form (appendix I), to check if the belt tension is right or not.
⑥ If actual value is bigger, then it means the belt is too tight. First, loosen flange installation bolts4; second, loosen tension adjusting bolts, at last do remember to tighten flange installation bolts before testing again. If the value is smaller, then it means the belt is to loose. First, loosen flange installation bolts; second, screw down the tension adjusting bolts; at last do remember to tighten flange installation bolts before testing again. Adjust the tension until its value is equal to the standard.

Notice: Two tension adjusting bolts should be screwed down synchronously, to avoid imbalance and damage to the synchronous-belt while working.
⑦ If the value is right, then tighten nuts first, and then screw down flange installation bolts. Installation and adjustment are finished.

4、Injection unit.
(1)、Install synchronous-belt for injection unit.(Codes of components see Fig 2.2.6(3) injection unit.)
① Put the belt on one gear, then tighten the belt and put the belt on the other gear.
② Install the bolts (3 pieces) and gear cover.
③ Strain the synchronous-belt by moving the motor outward.
④ Tighten flange installation bolts. (Four bolts must be tightened synchronously)
(2)、Injection synchronous-belt tension testing.

⑤Put the professional tensiometer (Tensiometer directions refer to appendix II) away from the synchronous-belt about 10mm, and the best position is in the middle of tow gears, then tension the belt by hands. The tensiometer displays tension values by measuring air vibration. Then compare to synchronous-belt tension-form (appendix I), to check if the belt tension is right or not.
⑥ If actual value is bigger, then it means the belt is too tight. First, loosen flange installation bolts4; second, loosen tension adjusting bolts, at last do remember to tighten flange installation bolts before testing again. If the value is smaller, then it means the belt is to loose. First, loosen flange installation bolts; second, screw down the tension adjusting bolts; at last do remember to tighten flange installation bolts before testing again. Adjust the tension until its value is equal to the standard.

Notice: Two tension adjusting bolts should be screwed down synchronously, in order to avoid imbalance and damage to the synchronous-belt while working.
⑦ If the value is right, then tighten nuts first, and then screw down flange installation bolts. Installation and adjustment are finished.

5、Notice

> ⚠ **Notice**
>
> 1、Do not use a rubber hammer to hit the belt when testing the belt to avoid absorbing the vibration wave.
> 2、Test the belt finally after tighten all screws to avoid unnecessary errors.

2.2.7 Search for the mechanical reference

Searching Steps:
1、Login the dialog box of zero set;
2、After choosing zero set function, move related mechanical components to the reference;
3、Set the reference and adjust the proximity switch;
4、Test the machine to check the actual stroke;
5、Finish..
Detail explanations:
1、Login the fourth level
(1)、Electrify (Turn off the motor);
(2)、Click ‘login’ on the screen;
(3)、Type login passwords ‘020808’ to the dialog box;
(4)、Enter.
(See fig2.2.7(1))

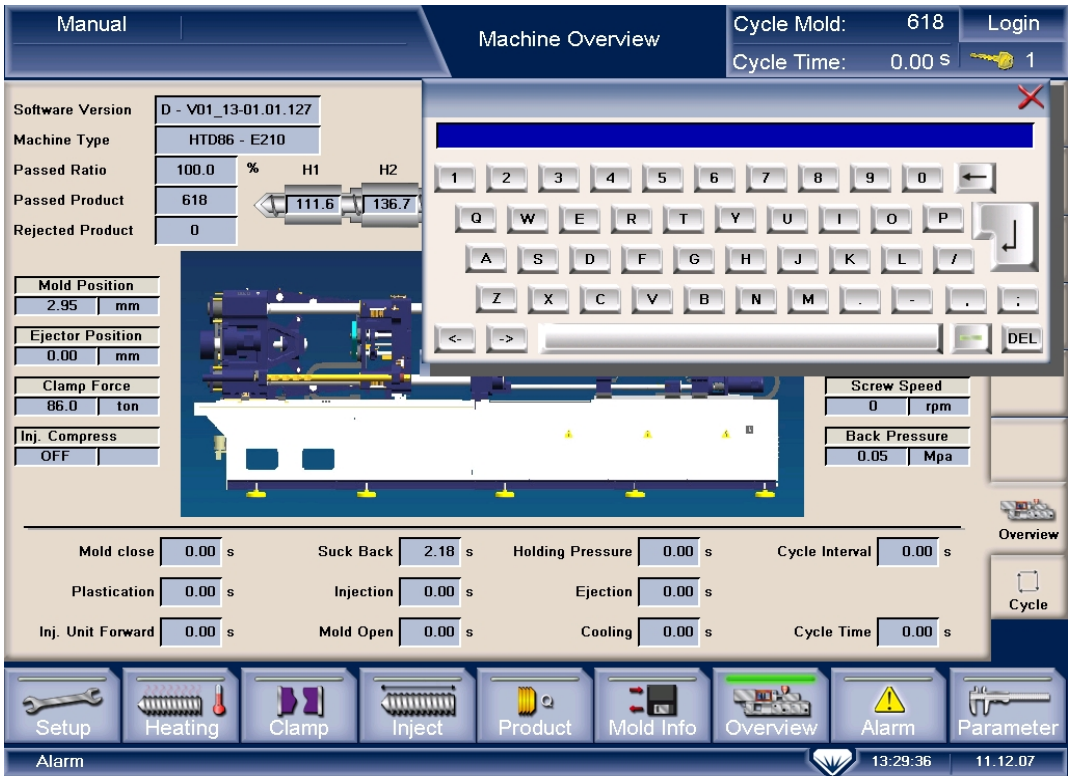


Fig 2.2.7(1) login the fourth level

2、Login the menu of zero setting

(1)、Click ‘parameter’ on the right of the screen;

(2)、Click ‘zero set’ on the right of parameter menu.(See fig2.2.7(2))

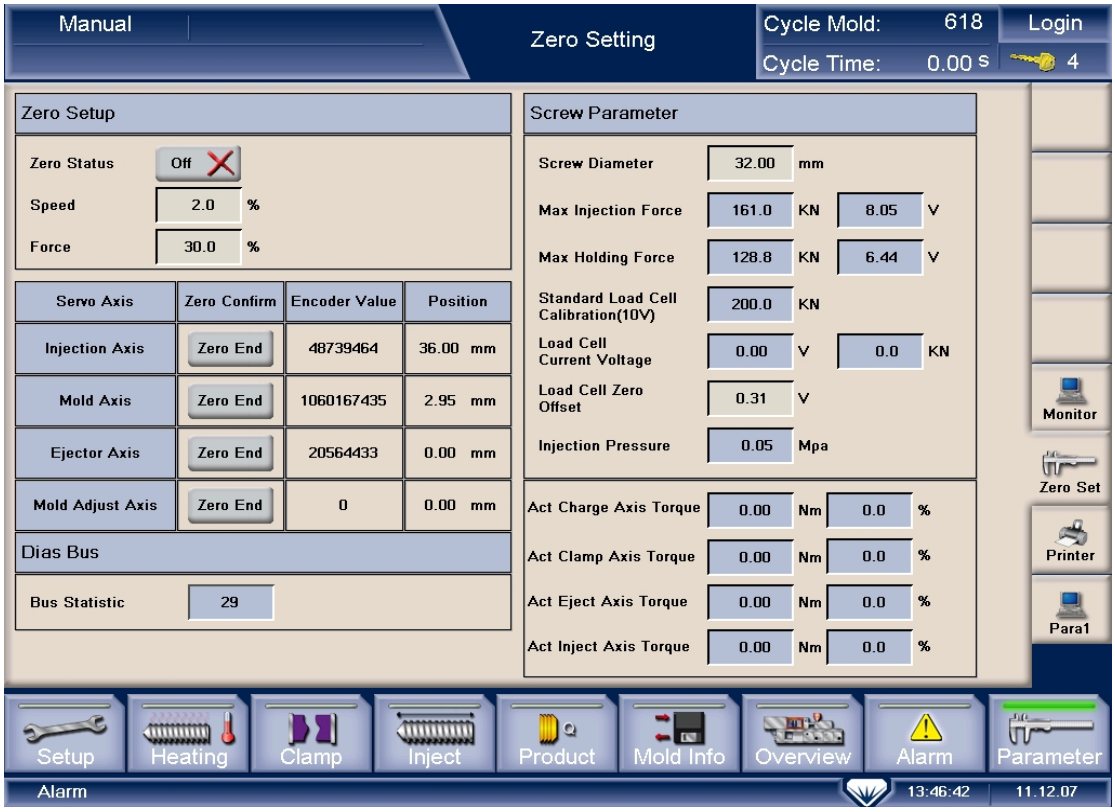


Fig 2.2.7(2) zero setting menu

3、Set up speed and pressure of zero set

(1)、Click dialog box of speed;
(2)、Click '2' in the dialog box;
(3)、Click green hook;
(4)、Set up the pressure to 30.
(See fig2.2.7(3))

Fig 2.2.7(3) set up speed and pressure

4、Click 'on' and move to the reference

(1)、Click 'motor on';
(2)、Click 'zero set', and then click 'on';
(3)、Choose the axis. Operations as following:
(See fig 2.2.7(5))

axis needs to set	Set zero	motion
Injection axis	Inject	Suck back
Mold axis	Mold chose	Mold open
Ejection axis	Eject back	Eject forward

Table 2.2.7(4) operational keys

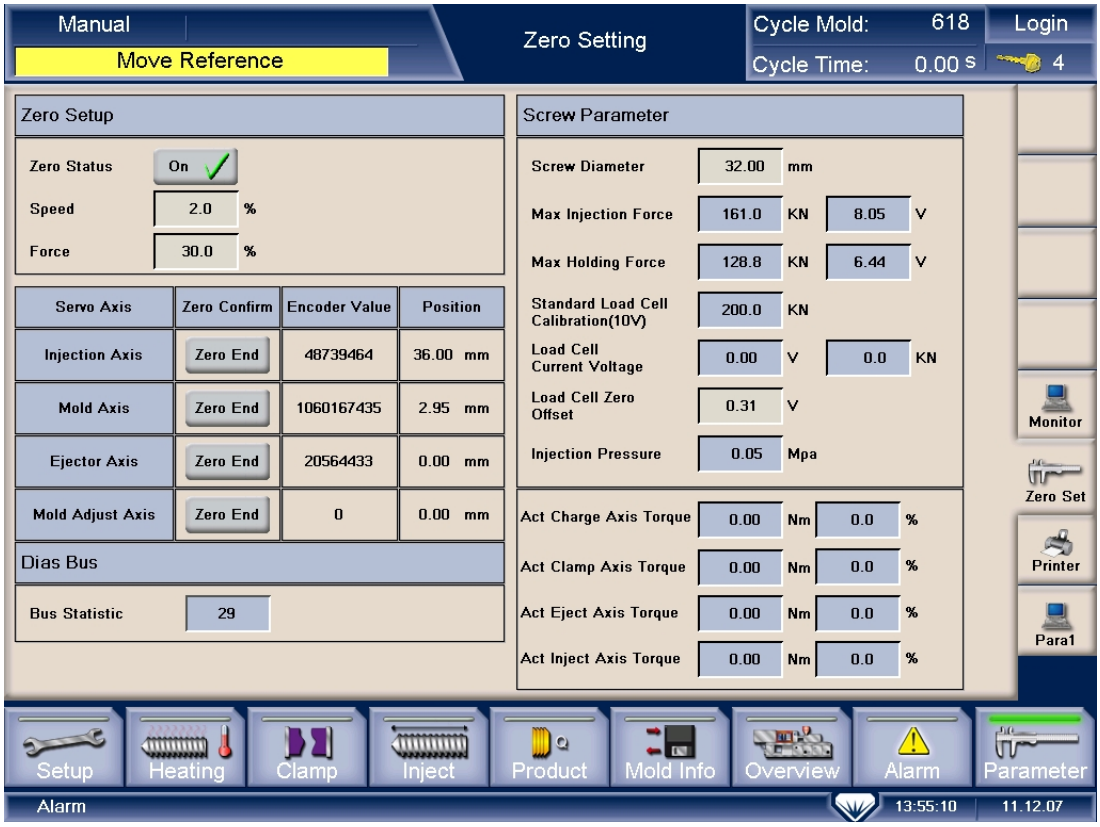


Fig 2.2.7(5) zero setting menu

5、Click operational keys of zero setting and move the axis to the reference

(1)、Dismantle the two proximity switches corresponding to axis loosely. Make sure it does not affect zero set.

(2)、According to table 2.2.7(4), press the key until the axis move to the reference, and then press ‘Zero End’. Then “actual reference” shows ‘zero’. (Until it can’t move)

(3)、According to table 2.2.7(4), press the key of clamping. When the numeric value of actual reference is between 2mm and 3mm, press the key of ‘zero set’ again. It’s the actual mechanical reference.

(4)、Turn on the proximity switch of zero set to. Then fix them up.

(5)、Move the model axis. When the numeric value of the actual reference is between 5mm and 10mm, press the key of zero set. Observe the proximity switch when actual reference is zero. If the light is not on, trim the sensor till all lights on.

(6)、Move the model axis. Observe actual reference, and wait until it reaches to the maximum stroke. The system will stop.

(7)、If actual reference doesn’t reach maximum, adjust it as step 3.

(8)、Adjust the proximity switch to make them on at stroke end.

(9)、Click ‘off’ to quit.

6、Test the machine to check the actual stroke

(1)、Set the axis stroke from zero to maximum stroke.

(2)、Observe the maximal stroke to check whether it is the same as actual stroke.
(3)、Observe the zero stroke to check whether it is the same as actual stroke.
7、Finish

> ⚠ **Attention**
>
> During zero setting, operated speed must be below 3% of speed and operated pressure below 30% of pressure. Otherwise, the machine will be broken.

2.2.8 Test running of full-electrical injection moulding machine

(1)、At the manual model, test the machine at low speed and pressure and with full stroke. In the test, set speed about 10% and pressure about 30%.
(2)、At the manual model, test the machine at middle speed and pressure and with full stroke. In the test, set speed about 30%, pressure about 50%.
(3)、At the manual model, test the machine at high s speed and pressure and with full stroke. In the test, set speed about 99%, pressure about 100%.
(4)、Finish.

> ⚠ **Notice**
>
> During tests, please press ‘Stop’ button immediately if any abnormal happens. Find out the reason, and then do tests again.

2.2.9 Finish

1、Clean up the machine.
2、Fix the belt, protective covering and protective door.
3、Finish changing the servo motor.

Chapter 3 Synchronous-belt Malfunctions

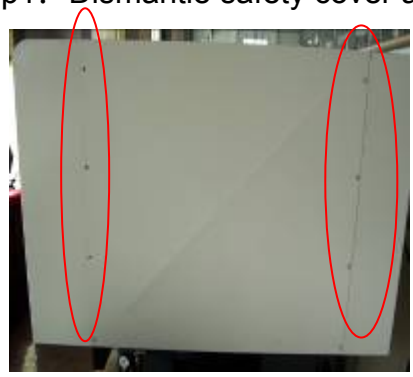
3.1 Approaches of changing synchronous-belt

1、Dismantle the broken synchronous-belt;
2、Install synchronous-belt and adjust the tension;
3、Check the mechanical reference;
4、Test running of the machine;
5、Finish.

3.2 Change synchronous-belt in detail

3.2.1 Take down the synchronous-belt from the machine

(1)、Synchronous-belt for clamping unit.
Step1：Dismantle safety cover and gear protection cover;



① Dismantle rear cover

② Dismantle gear protection cover

Step2：Dismantle synchronous-belt.

① Loosen adjusting nuts (2 pieces)

② Loosen tension adjusting bolts (2 pieces)

③ Loosen flange installation bolts (4 pieces)

④ Screw off bolts (3 pieces), and take down the gear cover

⑤ Push clamping motor to the machine. Loosen synchronous-belt

⑥Take out the synchronous-belt slowly and softly

(2)、Synchronous-belt for plastification unit.

Step1: Dismantle safety cover;

Step2: Dismantle synchronous belt.

Because of same construct, the dismantle method is the same.

About assembly codes, please see Fig 2.2.1(4) plastification unit

① Loosen adjusting nuts10 (2 pieces);

② Loosen tension adjusting bolts 11(2 pieces);

③ Loosen flange connection bolts 8(4pieces);

④ Loosen cover bolts 9 (3 pieces); remove gear cover 5;

⑤ Push plastification motor 1 to the machine to loosen synchronous-belt;

⑥ Take out the synchronous-belt 2 slowly and softly.

(3)、Synchronous-belt for ejector unit.

Step1: Dismantle safety cover;

Step2: Dismantle synchronous belt.

Because of same construct, the dismantle method is the same.

About assembly codes, please see Fig 2.2.1(6) ejector unit.

① Loosen adjusting nuts10 (2 pieces);

② Loosen tension adjusting bolts 11(2 pieces);

③ Loosen flange connection bolts 8(4pieces);

④ Loosen cover bolts 9 (3 pieces); remove gear cover 5;

⑤ Push plastification motor 1 to the machine to loosen synchronous-belt;

⑥ Take out the synchronous-belt 2 slowly and softly.

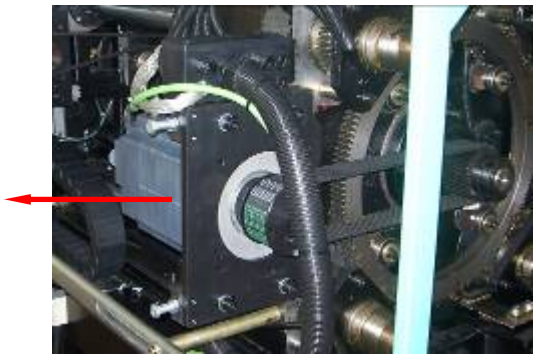
(4)、Synchronous-belt for injection unit
Because of same construct, the dismantle method is the same.
About assembly codes, please see 2.2.1(7) injection unit
Step1: Dismantle safety cover;
Step2: Dismantle synchronous belt
① Loosen adjusting nuts10 (2 pieces);
② Loosen tension adjusting bolts 11(2 pieces);
③ Loosen flange connection bolts 8(4pieces);
④ Loosen cover bolts 9 (3 pieces); remove gear cover 5;
⑤ Push plastification motor 1 to the machine to loosen synchronous-belt;
⑥ Take out the synchronous-belt 2 slowly and softly.

3.2.2 Install synchronous-belt and test the tension

1、Clamping unit (Codes of components, see Fig 2.2.1(4) clamping unit.)
(1)、Install synchronous-belt for clamping unit.

①Put a belt on one gear, then tighten the belt and put the belt on the other gear.

②Install bolts (3 pieces) and gear cover



③ Strain the synchronous-belt by moving the motor outward (the arrow shows).

④Tighten flange installation bolts (four bolts must be tightened synchronously)

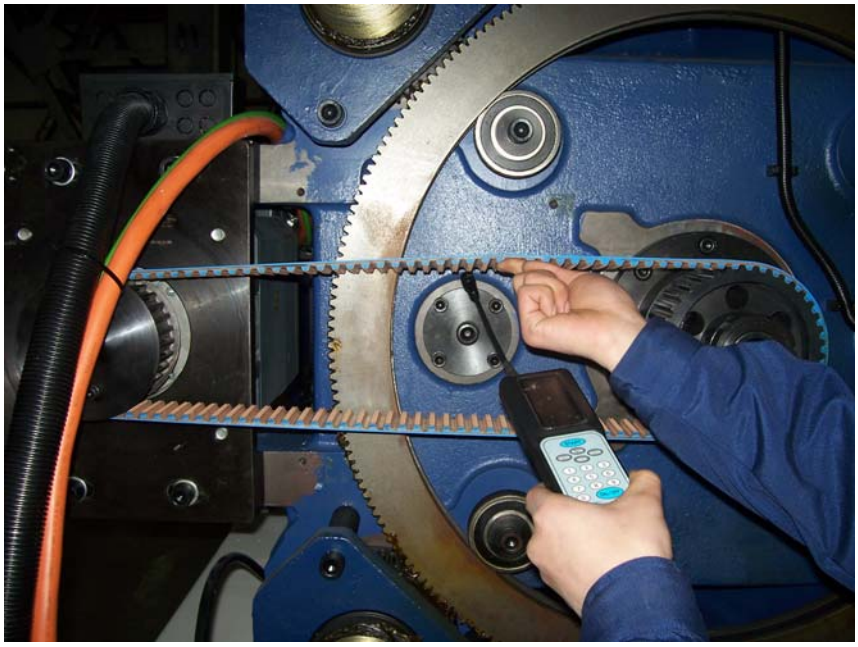


Fig 3.2.2(1) Test methods of tensiometer

(2)、Test on clamping synchronous-belt tension.

⑤Put the professional tensiometer. See fig 3.2.2(1). (Tensiometer directions refer to appendix II) away from the synchronous-belt about 10mm, and the best position is in the middle of tow gears, then tension the belt by hands. The tensiometer displays tension values by measuring air vibration. Then compare to synchronous-belt tension-form (appendix I), to check if the belt tension is right or not.

⑥If actual value is bigger, then it means the belt is too tight. First, loosen flange installation bolts; second, loosen tension adjusting bolts, at last do remember to tighten flange installation bolts before testing again. If the value is smaller, then it means the belt is to loose. First, loosen flange installation bolts; second, screw down the tension adjusting bolts; at last do remember to tighten flange installation bolts before testing again. Adjust the tension until its value is equal to the standard.

⑦ If the value is right, then tighten nuts first, and then screw down flange installation bolts.

Notice

Two tension adjusting bolts should be screwed down synchronously, to avoid imbalance and damage to the synchronous-belt while working.

2、Plastification unit

(1)、Install synchronous-belt for plastification unit.(Codes of components see Fig 2.2.1(3) plastification unit)

① Put the belt on one gear, then tighten the belt and put the belt on the other gear.

② Install bolts (3 pieces) and gear cover.

③ Strain the synchronous-belt by moving the motor outward.

④ Tighten flange installation bolts (the four bolts must be tightened synchronously).

(2)、Plastification synchronous-belt tension testing.

⑤ Put the professional tensiometer. See fig 3.2.2(1) (Tensiometer directions refer to appendix II) away from the synchronous-belt about 10mm, and the best position is in the middle of tow gears, then tension the belt by hands. The tensiometer displays tension values by measuring air vibration. Then compare to synchronous-belt tension-form (appendis I), to check if the belt tension is right or not.

⑥ If actual value is bigger, then it means the belt is too tight. First, loosen flange installation bolts; second, loosen tension adjusting bolts, at last do remember to tighten flange installation bolts before testing again. If the value is smaller, then it means the belt is to loose. First, loosen flange installation bolts; second, screw down the tension adjusting bolts; at last do remember to tighten flange installation bolts before testing again. Adjust the tension untill its value is equal to the standard.

⑦ If the value is right, then tighten nuts first, and then screw down flange installation bolts.

.

3、Ejector unit

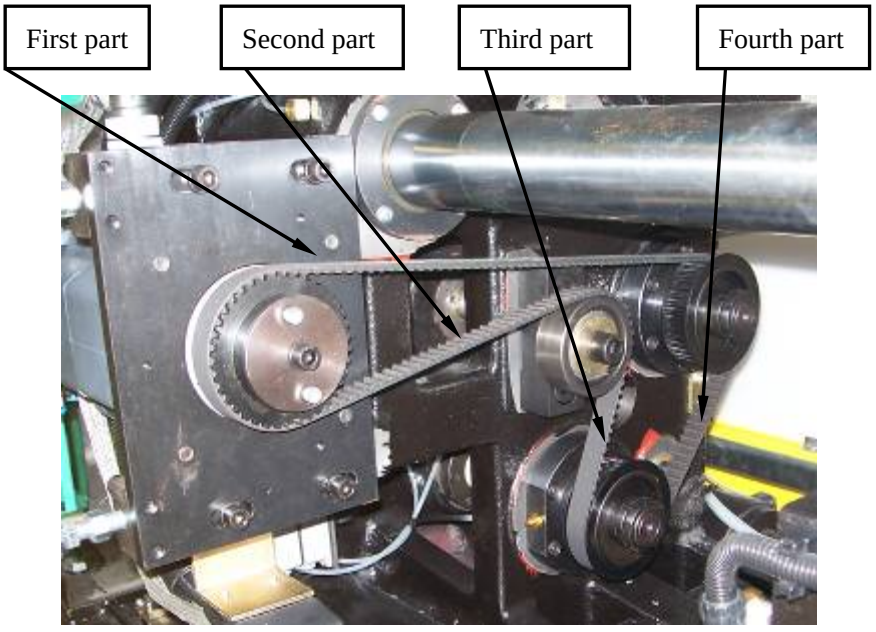


Fig 3.2.2(2) Ejector unit and the four parts of the belt

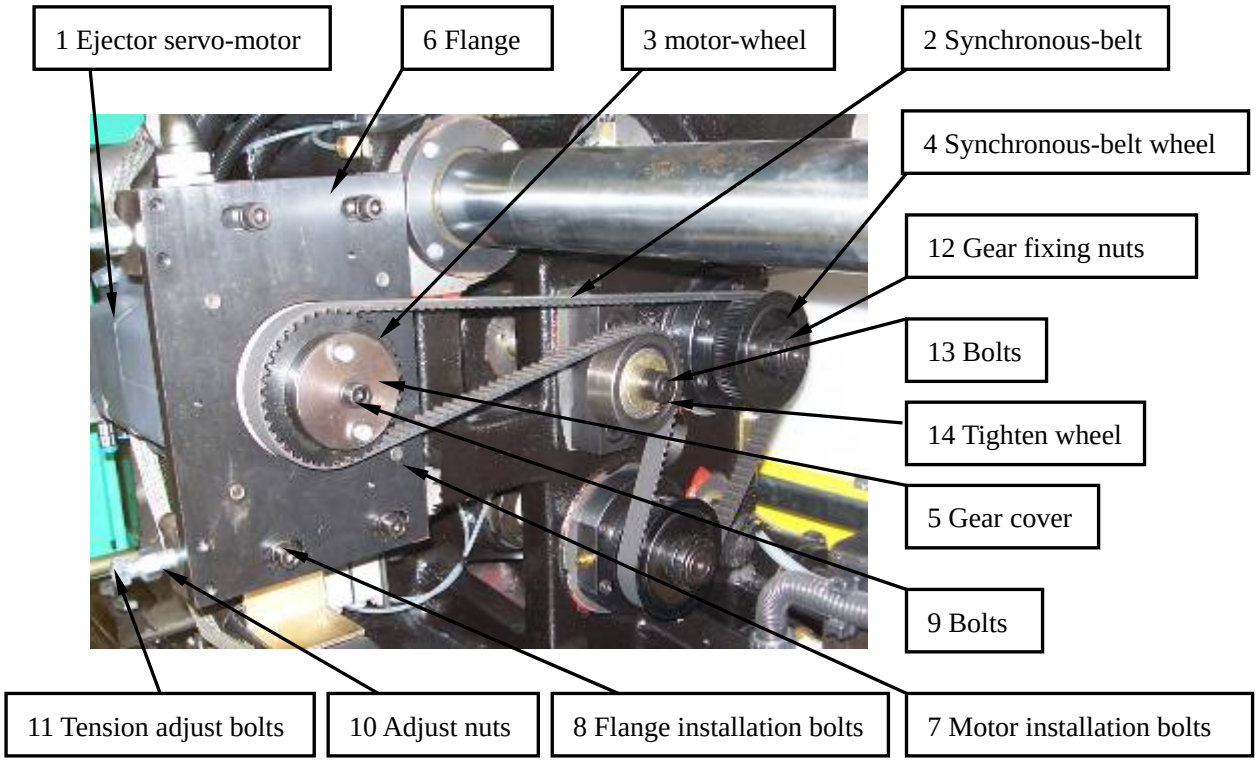


Fig 3.2.2(3) Ejector unit and the four parts of the belt

(1)Install synchronous-belt.

①Rotate the synchronous-belt wheels4 (2 pieces) by hands. Let the ejector guide-panel on limite position (front-end or back-end).

②Put the belt on synchronous-belt wheels. Notice: tighten the first and third part of belt to keep the belt tension. Then the belt goes around tighten wheels, at the same time tighten the first and second part of belt to keep the belt tension. Finally put the belt on motor-wheel3 and keep the belt tension.

(2)、Test on ejector synchronous-belt tension.

Divide the ejector synchronous-belt into fours parts, as Fig3.2.2(2). If the belt is well installed, according to the theory, when the belt is zero-distortion, the tension of each part should be same. So it is ok to test the first part which is longest part.

Testing approaches:

Tighten flange installation bolts (the four bolts must be tightened simultaneously).

⑤Put the professional tensiometer (Tensiometer directions refer to appendix II) away from the synchronous-belt about 10mm, and the best position is in the middle of tow gears, then tension the belt by hands. The tensiometer displays tension values by measuring air vibration. Then compare to synchronous-belt tension-form (appendis I), to check if the belt tension is right or not.

⑥ If actual value is bigger, then it means the belt is too tight. First, loosen flange installation bolts4; second, loosen tension adjusting bolts, at last do remember to tighten flange installation bolts before testing again. If the value is smaller, then it means the belt is to loose. First, loosen flange installation bolts;

second, screw down the tension adjusting bolts; at last do remember to tighten flange installation bolts before testing again. Adjust the tension untill its value is equal to the standard.

Notice: Two tension adjusting bolts should be screwed down synchronously, to avoid imbalance and damage to the synchronous-belt while working.

⑦ If the value is right, then tighten nuts first, and then screw down flange installation bolts. Installation and adjustment are finished.

4、Injection unit.

(1)、Install synchronous-belt for injection unit.

(Codes of components see Fig 3.2.2(7) injection unit.)

① Put the belt on one gear, then tighten the belt and put the belt on the other gear.

② Install the bolts (3 pieces) and gear cover.

③ Strain the synchronous-belt by moving the motor outward.

④ Tighten flange installation bolts. (Four bolts must be tightened synchronously)

(2)、Injection synchronous-belt tension testing.

⑤ Put the professional tensiometer (Tensiometer directions refer to appendix II) away from the synchronous-belt about 10mm, and the best position is in the middle of tow gears, then tension the belt by hands. The tensiometer displays tension values by measuring air vibration. Then compare to synchronous-belt tension-form (appendis I), to check if the belt tension is right or not.

⑥ If actual value is bigger, then it means the belt is too tight. First, loosen flange installation bolts4; second, loosen tension adjusting bolts, at last do remember to tighten flange installation bolts before testing again. If the value is smaller, then it means the belt is to loose. First, loosen flange installation bolts; second, screw down the tension adjusting bolts; at last do remember to tighten flange installation bolts before testing again. Adjust the tension untill its value is equal to the standard.

Notice: Two tension adjusting bolts should be screwed down synchronously, to avoid imbalance and damage to the synchronous-belt while working.

⑦ If the value is right, then tighten nuts first, and then screw down flange installation bolts. Installation and adjustment are finished.

5、Notice:

⚠ Notice

1、Do not use a rubber hammer to hit the belt when testing the belt to avoid absorbing the vibration wave.

2、Test the belt finally after tighten all srews to avoid unnecessary errors.

3.2.3 Search for the mechanical reference

Searching Steps:
1、Login the dialog box of zero set;
2、After choosing zero set function, move related mechanical components to the reference;
3、Set the reference and adjust the proximity switch;
4、Test the machine to check the actual stroke;
5、Finish.
Detail explanations:
1、Login the fourth level
(1)、Turn on the power supply. (Don't turn on the button 'Motor on' on the keyboard.)
(2)、Click 'login' on the screen;
(3)、Type login passwords '020808' to the dialog box;
(4)、Enter.
(See fig 3.2.3(1))

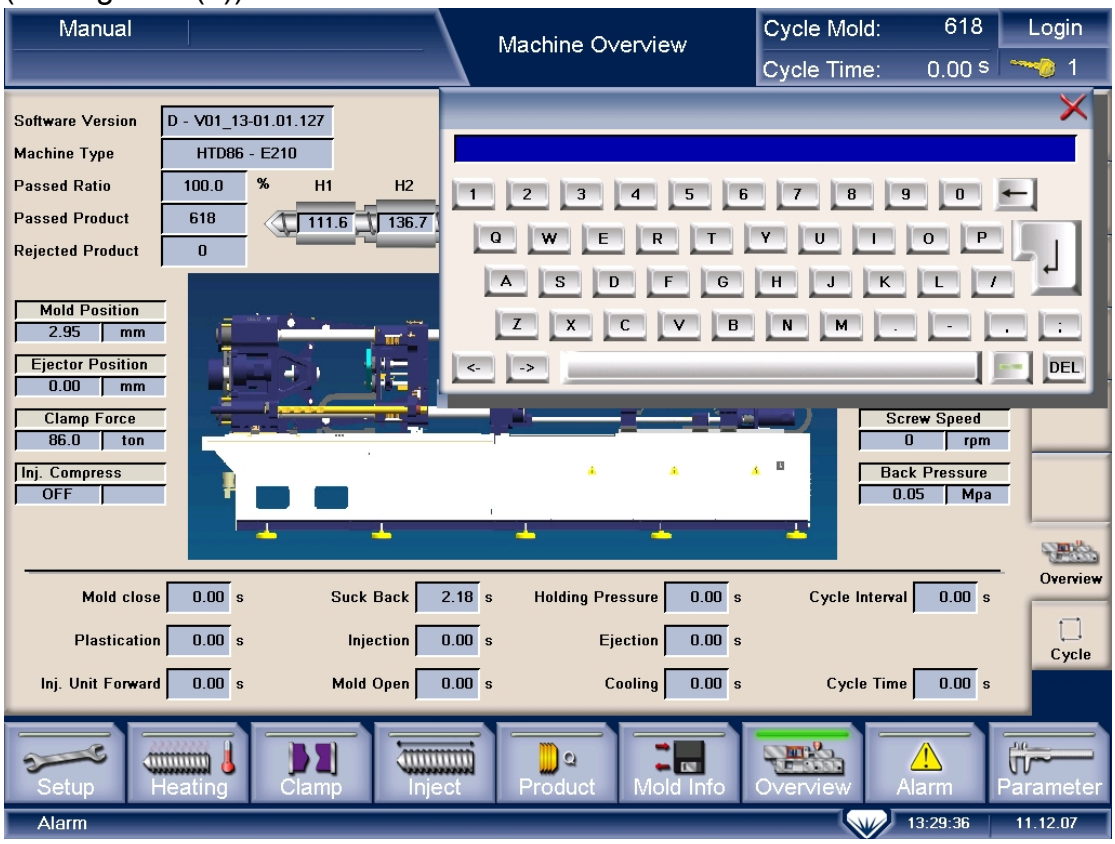


Fig3.2.3(1) login the fourth level

2、Login the menu of system's zero set
(1)、Click 'parameter' on the right of the screen;
(2)、Click 'zero set' on the right of parameter menu.
(See fig3.2.3(2))

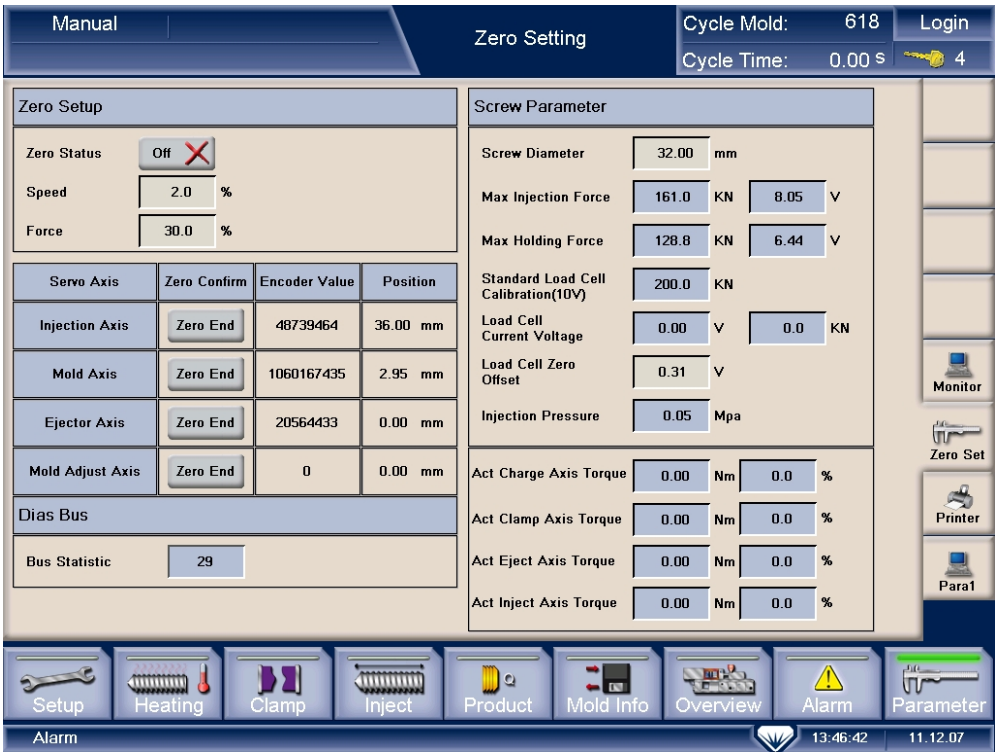


Fig3.2.3(2) zero setting menu

3、Set up speed and pressure of zero set

(1)、Click dialog box of speed;

(2)、Click '2' in the dialog box;

(3)、Click green hook;

(4)、Set up the pressure to 30.

(See fig3.2.3(3))

Fig3.2.3(3) set speed and pressure

4、Click 'on' and move to the reference

(1)、Click 'motor on';

(2)、Click 'zero set', and then click 'on';

(3)、Choose the axis which need be setted zero. Operations as following: (See fig 3.2.3(5))

axis needs to set	Set zero	motion
Injection axis	Inject	Suck back
Mold axis	Mold chose	Mold open
Ejection axis	Eject back	Eject forward

Table 3.2.3(4) operational keys

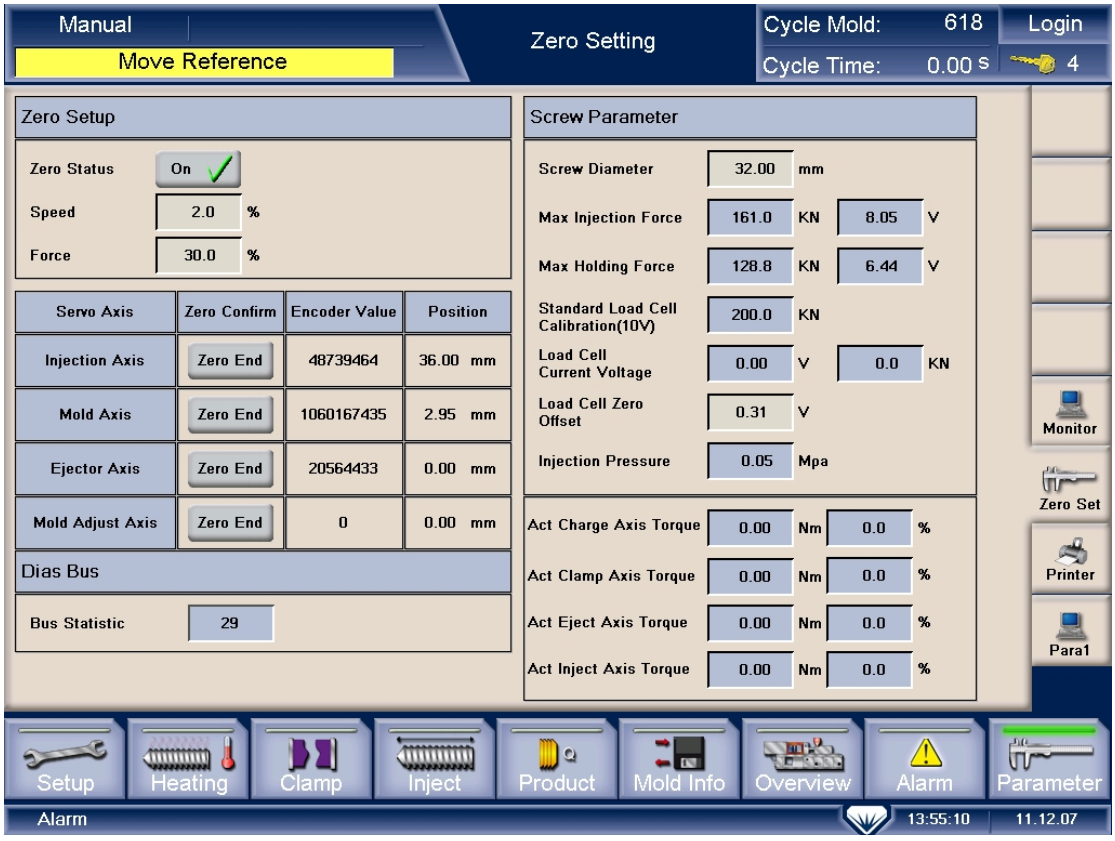


Fig3.2.3(5) zero setting menu

5、Click operational keys of zero setting and move the axis to the reference

(1)、Dismantle the two proximity switches corresponding to axis loosely. Make sure it does not affect zero set.

(2)、According to table 3.2.3(1), press the key until the axis move to the reference, and then press 'Zero End'. Then "actual reference" shows 'zero'. (Until it can't move)

(3)、According to table 3.2.3(1), press the key of clamping. When the numeric value of actual reference is between 2mm and 3mm, press the key of 'zero set' again. It's the actual mechanical reference.

(4)、Turn on the proximity switch of zero set to. Then fix them up.

(5)、Move the model axis. When the numeric value of the actual reference is between 5mm and 10mm, press the key of zero set. Observe the proximity switch when actual reference is zero. If the light is not on, trim the sensor till all lights on.
(6)、Move the model axis. Observe actual reference, and wait until it reaches to the maximum stroke. The system will stop.
(7)、If actual reference doesn't reach maximum, adjust it as step 3.
(8)、Adjust the proximity switch to make them on at stroke end.
(9)、Click 'off' to quit.

6、Test the machine to check the actual stroke

(1)、Set the axis stroke from zero to maximum stroke.
(2)、Observe the maximum stroke to check whether it is the same as actual stroke.
(3)、Observe the zero stroke to check whether it is the same as actual stroke.

7、Finish

> ⚠ **Notice**
>
> During zero setting, operated speed must be below 3% of speed and operated pressure below 30% of pressure. Otherwise, the machine will be broken.

3.2.4 Test running of full-electrical injection molding machine

(1)、At the manual model, test the machine at low speed and pressure and with full stroke. In the test, set speed about 10% and pressure about 30%.
(2)、At the manual model, test the machine at middle speed and pressure and with full stroke. In the test, set speed about 30%, pressure about 50%.
(3)、At the manual model, test the machine at high s speed and pressure and with full stroke. In the test, set speed about 99%, pressure about 100%.
(4)、Finish.

> ⚠ **Notice**
>
> During tests, please press 'stop' button immediately if any abnormal happens. Find out the reason, and then do tests again.

3.2.5 Finish

1、Clean up the machine; tighten all wires;
2、Dismantle protective cover of the synchronous belt and install it rightly;
3、Dismantle the protective door and install it rightly;
4、Finish changing.

Chapter 4 Synchronous-wheel Malfunctions

4.1 Approaches of changing synchronous- wheel

1、Dismantle the broken synchronous- wheel;
2、Install synchronous-belt and adjust the tension;
3、Check the mechanical reference;
4、Test running of the machine;
5、Finish.

4.2 Change synchronous-wheel in detail

4.2.1 Take down the synchronous-wheel from the machine

1、Synchronous-wheel for the clamping unit
Methods of dismantling the synchronous-belt and motor-wheel have already been introduced in chapter 2.2.1, so here mainly explain methods of dismantling another synchronous-wheel which fixed on the ball screw.

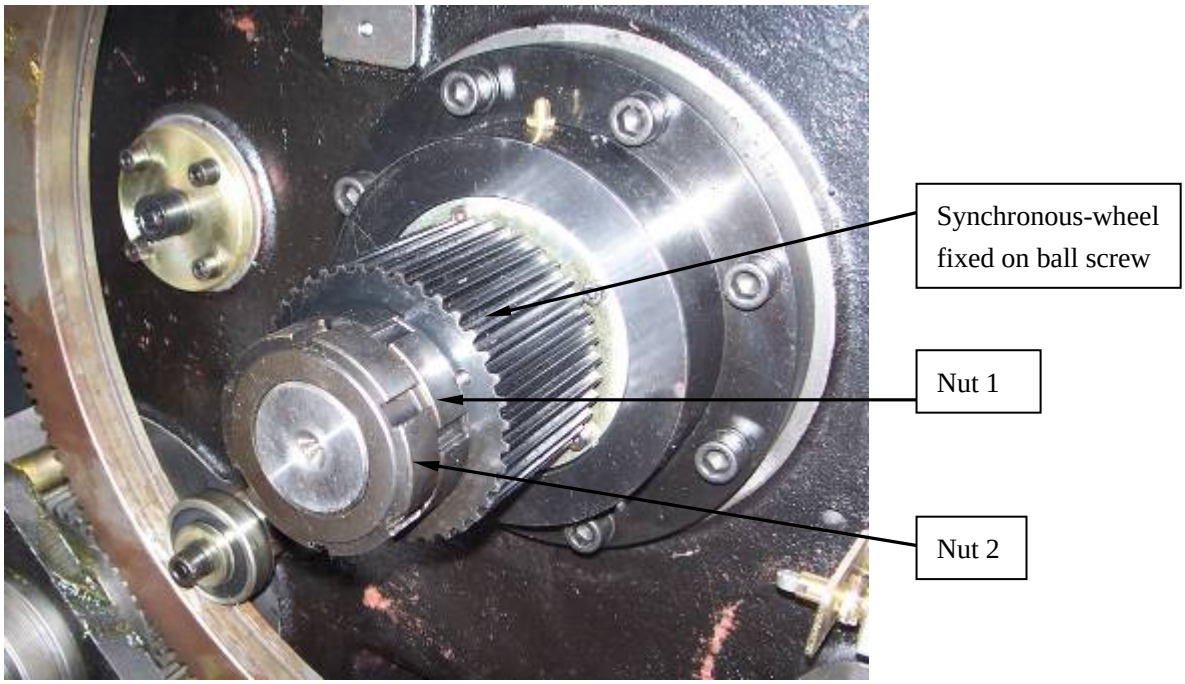


Fig 4.2.1(1) synchronous-wheel for clamping unit

①Dismantle the nut1 and nut2;
②Dismantle the synvhronous-wheel.
2、Synchronous-wheel for the plastification unit

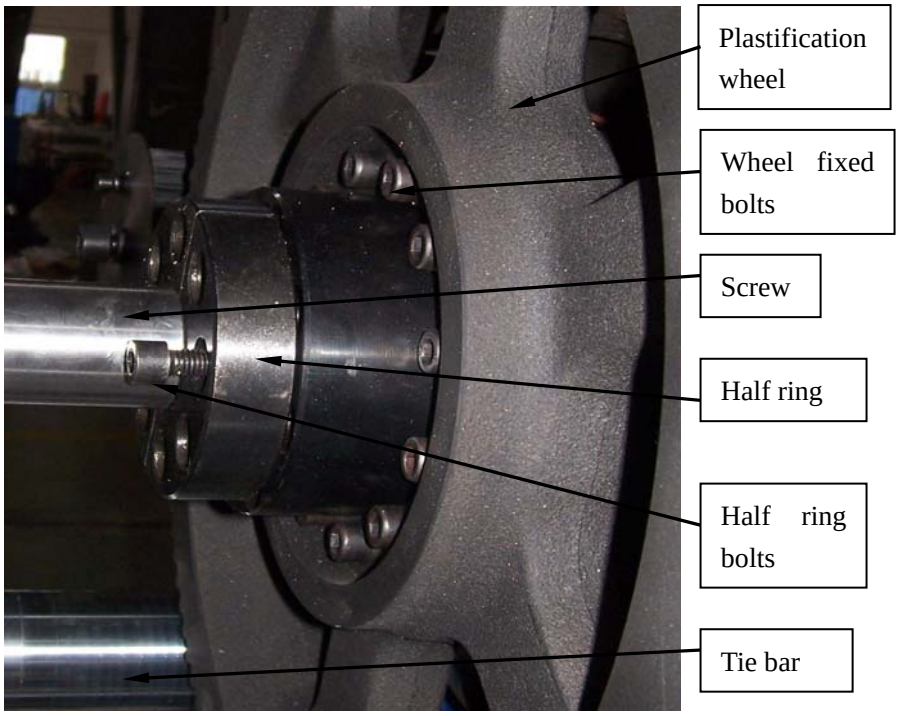


Fig 4.2.1(2) synchronous-wheel for plastification unit

① Because the space of plastification unit is small, it's better to plastify backwards to the end before dismantling.

② It's better to measure the diameter of the wheel and the distance of tie bars before dismantling to check if a tie bar need be taken off or not.

③ Dismantle half ring

④ Take out the screw.

⑤ Dismantle the wheel fixed bolts and plastification wheel.

3、Ejector unit

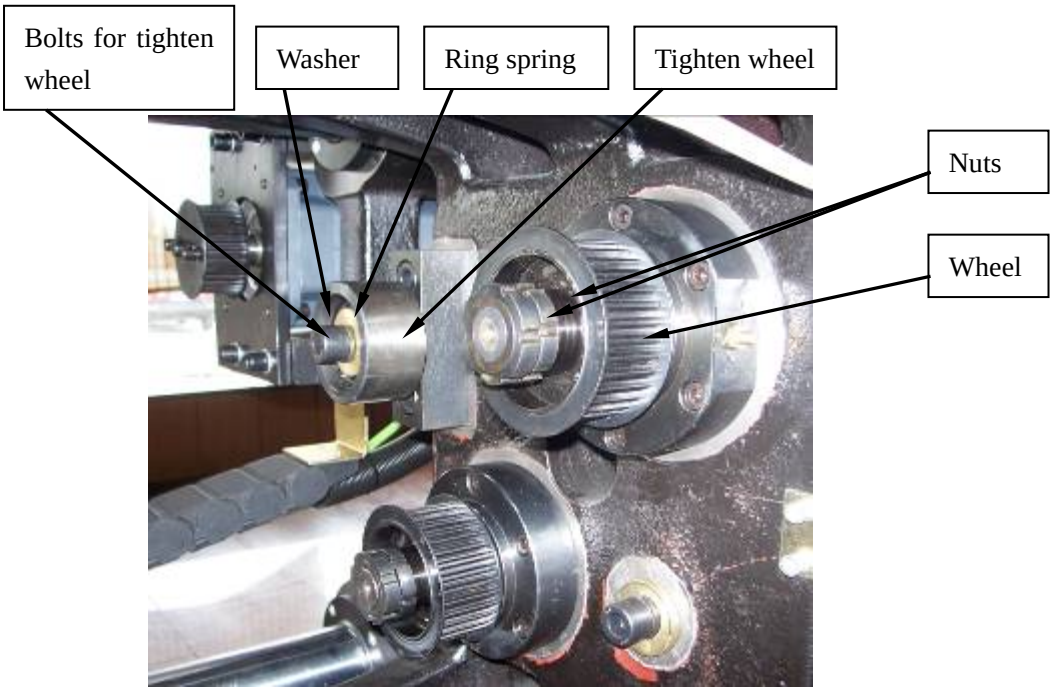


Fig 4.2.1(3) synchronous-wheel for ejector unit

Because of the same construct, the dismantling methods are the same.
① Dismantle the nuts (2 pieces).
② Dismantle the synvhronous-wheel from the shaft.
4、Injection unit

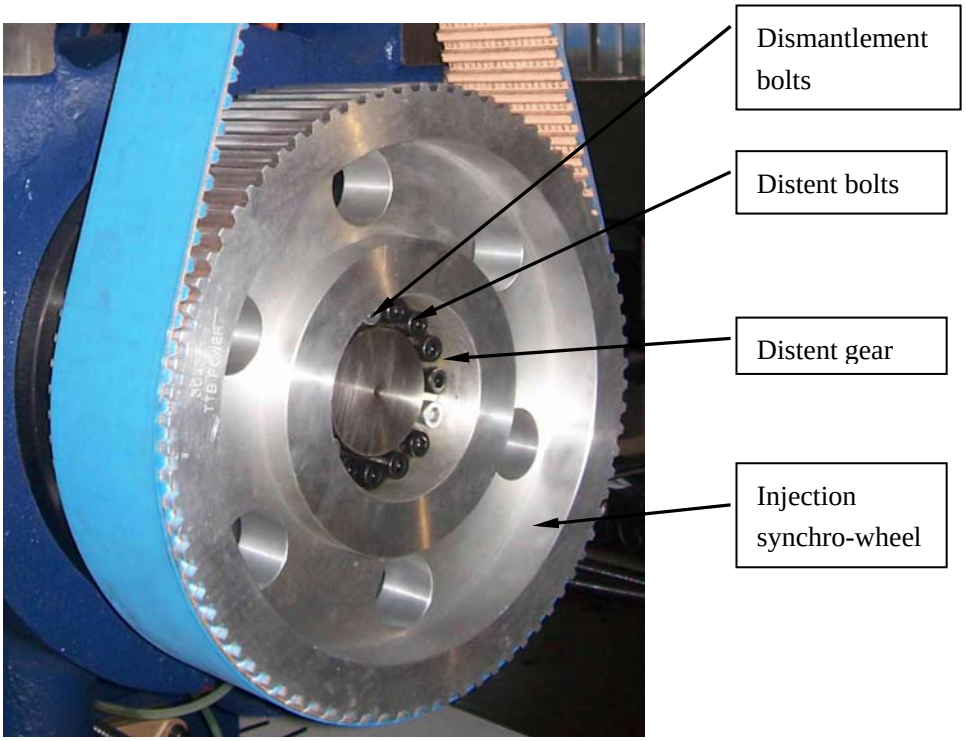


Fig 4.2.1(4) synchronous-wheel for injection unit

①Loosen the distant gear: loosen the distant bolts, 12 pieces in Fig4.2.1(4) (bolts quantities may be different according to different types of machines) ， and then screw down the white dismantlement bolt to eject the distensible gear.
(Remarks：Don‘t need to dismantle the nuts，but just the distant gear)
②Dismantle the injection synchro-wheel.

4.2.2 Install synchro-wheel

1、The installation methods of injection synchro-wheel(because of the distant gear) are different from others. The installation methods of other synchro-wheel are opposite.
2、Following is mainly to explain how to install and adjust the injection wheel:
Installation methods as follow:
Use a **torque spanner** to tighten in cross-type and tighten for 3 times.
According to the sequence of tighten times, the torque for each time is one **1/3, 2/3** and **one time** of needed torque.
Take VE600-120 as an example:

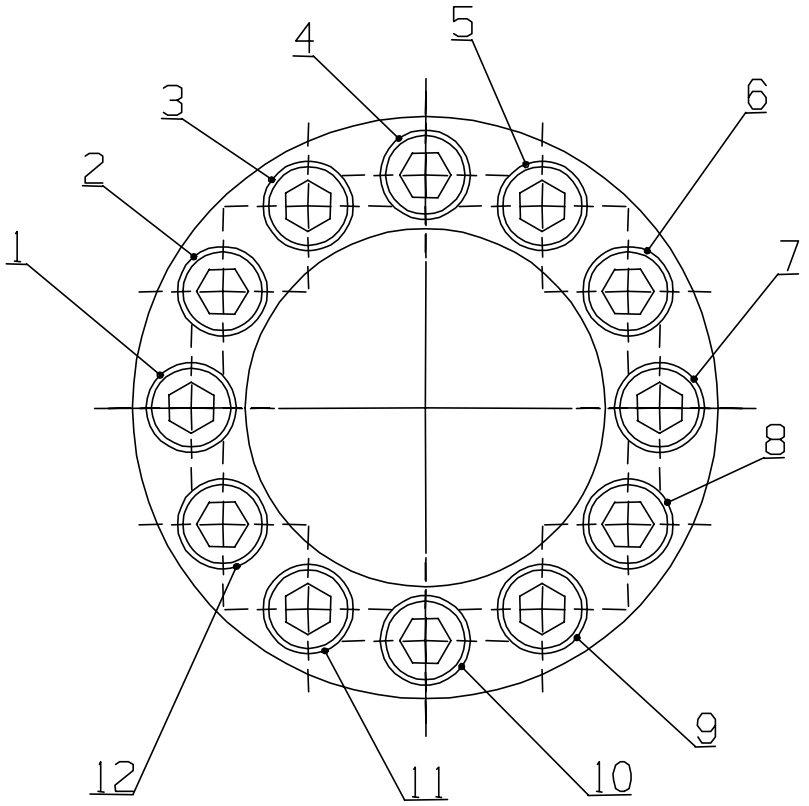


Fig 4.2.2(1) screws place on synchronous-wheel

(1)、Injection seat capacity is **120/120h**

There are 12 distant bolts, marked as bolt1, bolt2, bolt3, bolt4, bolt5, bolt6, bolt7, bolt8, bolt9, bolt10, bolt11, and bolt12.The torque needed by each bolt is 15(N.M).

Bolts should be screwed down for the first time by following orders: bolt1, bolt7, bolt2, bolt8, bolt3, bolt9, bolt4, bolt10, bolt5, bolt11, bolt6, bolt12. In this time, the torque of each bolt is 15×(1/3) =5(N.M).

Bolts should be screwed down for the second time by following orders: bolt12, bolt6, bolt11, bolt5, bolt10, bolt4, bolt9, bolt3, bolt8, bolt2, bolt7, bolt1. In this time, the torque of each bolt is 15×(2/3) =10(N.M).

Bolts should be screwed down for the third time by following orders: bolt1, bolt7, bolt2, bolt8, bolt3, bolt9, bolt4, bolt10, bolt5, bolt11, bolt6, bolt12. In this time, the torque of each bolt is 15×1=15(N.M).

(2)、Injection seat capacity is **210/210h**

There are 8 pieces distant gears. Orders as following:
First time: bolt1, bolt5, bolt2, bolt6, bolt3, bolt7, bolt4, bolt8.
Second time: bolt8, bolt4, bolt7, bolt3, bolt6, bolt2, bolt5, bolt1.
Third time: bolt1, bolt5, bolt2, bolt6, bolt3, bolt7, bolt4, bolt8.

(3)、Injection seat capacity is **300/300h, 430/430h, 580/580h, 750/750h**
There are 9 pieces distant gears. Orders as following:
First time: bolt1, bolt5, bolt2, bolt6, bolt3, bolt7, bolt4, bolt8, bolt9.
Second time: bolt9, bolt4, bolt8, bolt3, bolt7, bolt2, bolt6, bolt1, bolt5.
Third time: bolt1, bolt5, bolt2, bolt6, bolt3, bolt7, bolt4, bolt8, bolt9.

As to the installation methods of other machines, please refer to the above.

Type of machine	Quantity of bolts (pcs)	The torque need of each bolt(N.M)
VE600-120	12-M6	15
VE900-210	8-M8	35
VE1200-320	9-M8	35
VE2300-820	9-M10	70
VE4100-1500	10-M12	100

Table 4.2.2(2) synchronous-wheel

(4)、Notice

Notice

1、Please install the distant gear according to the torque given in the table, otherwise, synchro-wheel may be broken or serious results.
2、If the type of machine doesn't be listed in the table above, please contact supplier's service department.

4.2.3 Search for the mechanical reference

Steps:
1、Login the dialog box of zero set;
2、After choosing zero set function, move related mechanical components to the reference;
3、Set the reference and adjust the proximity switch;
4、Test the machine to check the actual stroke;
5、Finish.
Detail explanations:
1、Login the fourth level
(1)、Turn on the main power supply. (Do not turn on the button 'Motor on')
(2)、Click 'login' on the screen;
(3)、Type login passwords '020808' to the dialog box;
(4)、Enter.
(See fig4.2.3(1))

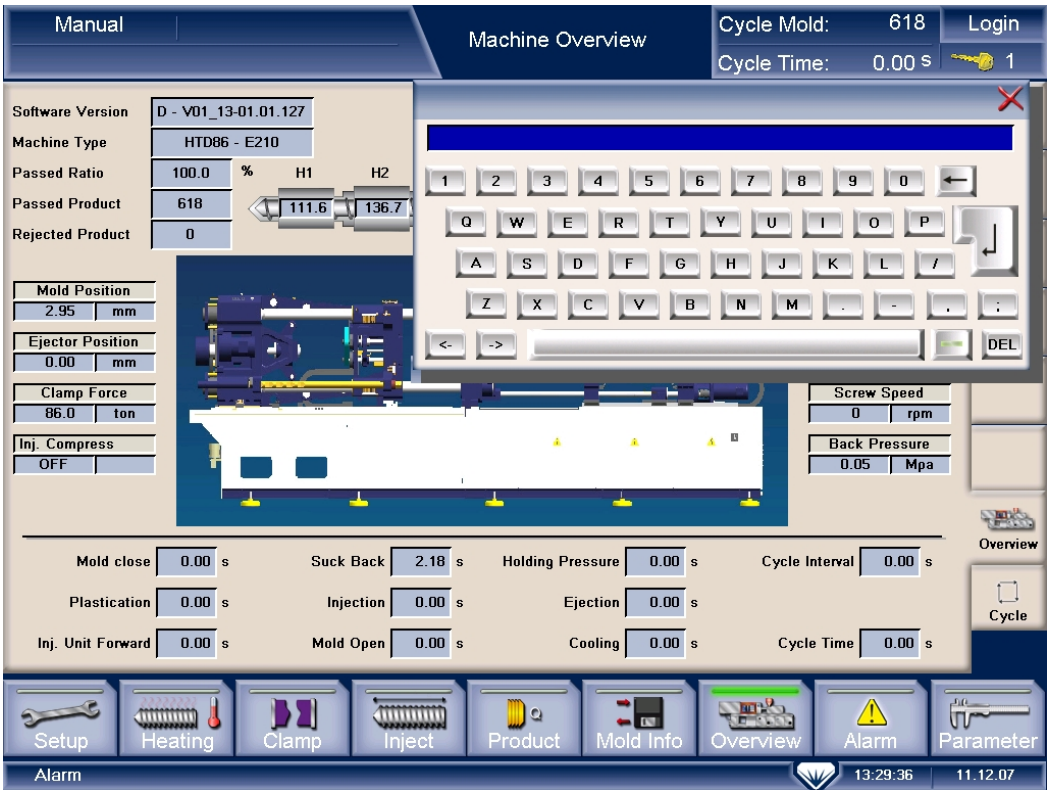


Fig 4.2.3 (1) login the fourth level

2、Login the menu of system's zero set

(1)、Click 'parameter' on the right of the screen;

(2)、Click 'zero set' on the right of 'parameter' menu.

(See fig4.2.3 (2))

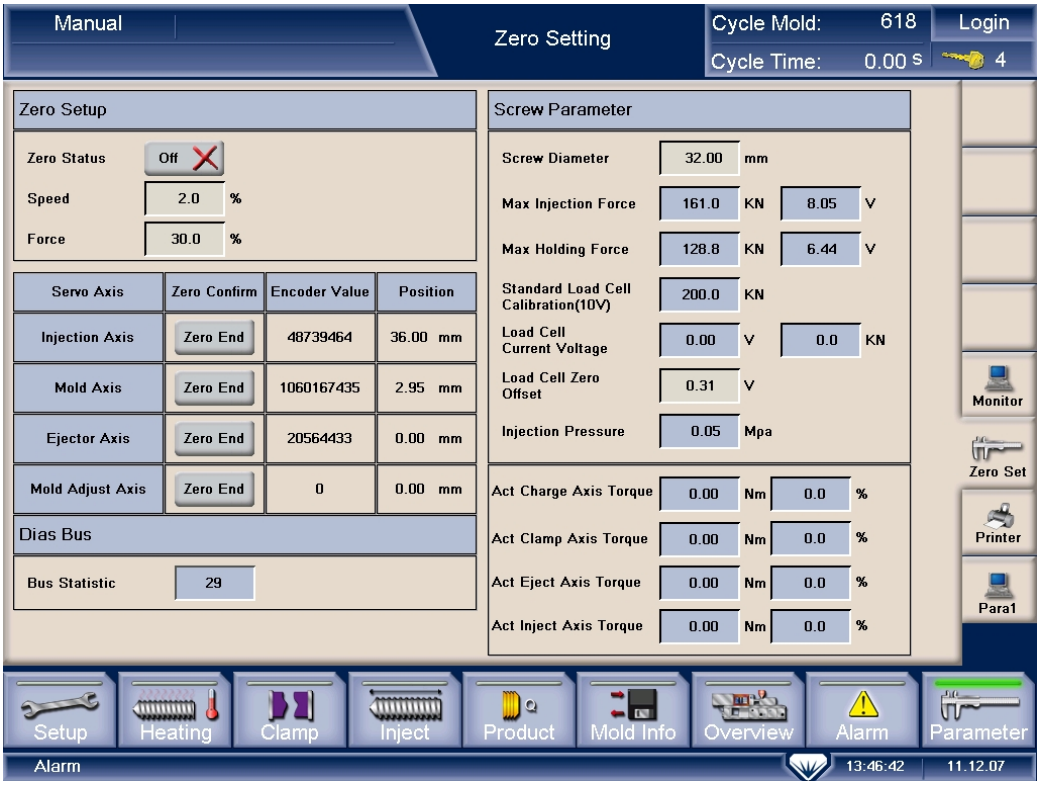


Fig 4.2.3(2) zero setting menu

3、Set up speed and pressure of zero set

(1)、Click dialog box of ‘speed’;
(2)、Click ‘2’ in the dialog box;
(3)、Click ‘green hook’;
(4)、Set up ‘pressure’ to 30.
(See fig4.2.3(3))

Fig 4.2.3(3) set up speed and pressure

4、Click ‘on’ and move to the reference

(1)、Click ‘motor on’;
(2)、Click ‘zero set’, and then click ‘on’;
(3)、Choose the axis which need be setted zero. Operations as following:
(See fig 4.2.3(5))

axis needs to set	Set zero	motion
Injection axis	Inject	Suck back
Mold axis	Mold chose	Mold open
Ejection axis	Eject back	Eject forward

Table 4.2.3(4) operational keys

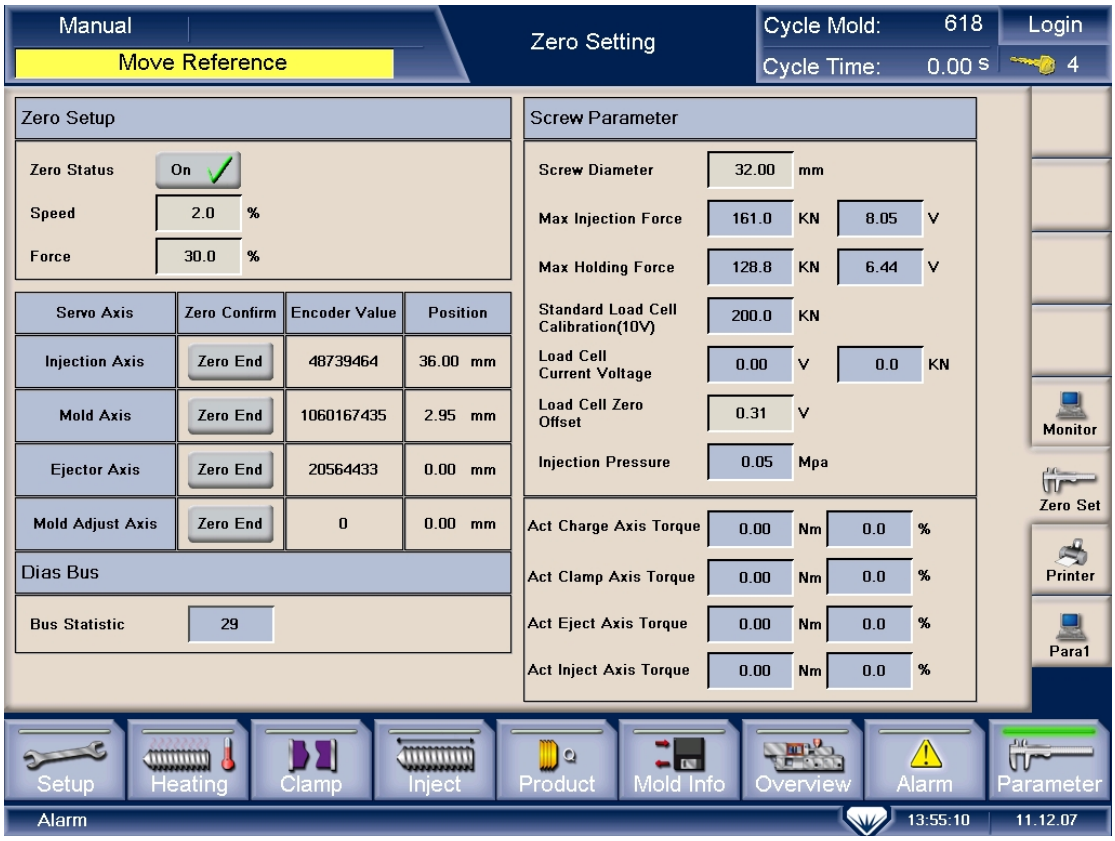


Fig 4.2.3(5) zero setting

5、Click operational keys of zero setting and move the axis to the reference

(1)、Dismantle the two proximity switches corresponding to axis loosely. Make sure it does not affect zero set.

(2)、According to table 4.2.3(4), press the key until the axis move to the reference, and then press 'Zero End'. Then "actual reference" shows 'zero'. (Until it can't move)

(3)、According to table 4.2.3(4), press the key of clamping. When the numeric value of actual reference is between 2mm and 3mm, press the key of 'zero set' again. It's the actual mechanical reference.

(4)、Turn on the proximity switch of zero set to. Then fix them up.

(5)、Move the model axis. When the numeric value of the actual reference is between 5mm and 10mm, press the key of zero set. Observe the proximity switch when actual reference is zero. If the light is not on, trim the sensor till all lights on.

(6)、Move the model axis. Observe actual reference, and wait until it reaches to the maximum stroke. The system will stop.

(7)、If actual reference doesn't reach maximum, adjust it as step 3.

(8)、Adjust the proximity switch to make them on at stroke end.

(9)、Click 'off' to quit.

6、Test the machine to check the actual stroke

(1)、Set the axis stroke from zero to maximum stroke.

(2)、Observe the maximum stroke to check whether it is the same as actual stroke.
(3)、Observe the zero stroke to check whether it is the same as actual stroke.
7、Finish

> ⚠ **Notice**
>
> During zero setting, operated speed must be below 3% of speed and operated pressure below 30% of pressure. Otherwise, the machine will be broken.

4.2.4 Test running of full-electrical injection moulding machine

(1)、At the manual model, test the machine at low speed and pressure and with full stroke. In the test, set speed about 10% and pressure about 30%.
(2)、At the manual model, test the machine at middle speed and pressure and with full stroke. In the test, set speed about 30%, pressure about 50%.
(3)、At the manual model, test the machine at high s speed and pressure and with full stroke. In the test, set speed about 100%, pressure about 100%.
(4)、Finish.

> ⚠ **Notice**
>
> During tests, please press ‘stop’ button immediately if any abnormal happens. Find out the reason, and then do tests again.

4.2.5 Finish

1、Clean up the machine; tighten all wires;
2、Dismantle protective cover of the synchronous belt and install it rightly;
3、Dismantle the protective door and install it rightly;
4、Finish changing.

Chapter 5 KEB Malfunctions

5.1 Steps of changing KEB

1、Demount the broken KEB;
2、Replace a good KEB;
3、Upload KEB parameters;
4、Connect a laptop with KEB, then search for the servo motor reference;
5、Test running of servo motor;
6、Set up the synchronization belt and adjust the tension;
7、Search for the mechanical reference;
8、Test running;
9、Finish.

5.2 Changing KEB in detail

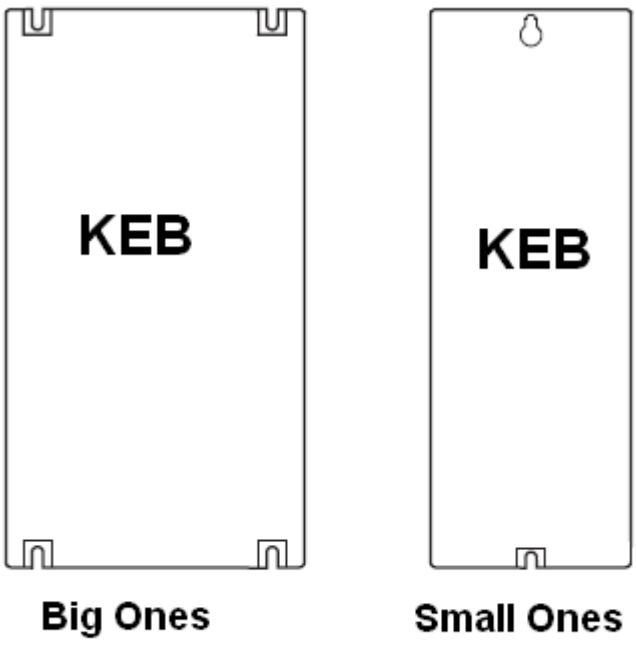


Fig 5.2 Fixing KEB

5.2.1 Demount the broken KEB

1、Open the back cabinet;
2、Remove DKI's wires which are connected to KEB, then remove KEB from inverter;

3、Pull out signal terminals of KEB on the back of DKI and remove wires at the bottom of KEB;
4、Remove setscrews;
5、Take care of the replaced KEB.

> ⚠ **Notice**
>
> Be careful when remove KEB, and keep it clean.

5.2.2 Replace a good KEB

> ⚠ **Warning**
>
> After replace a new KEB, don't electrify before checking out broken reasons, otherwise, it will also make the new KEB broken easily.

1、Install KEB to the cabinet;
2、Connect wires to right terminals, according to below diagram;

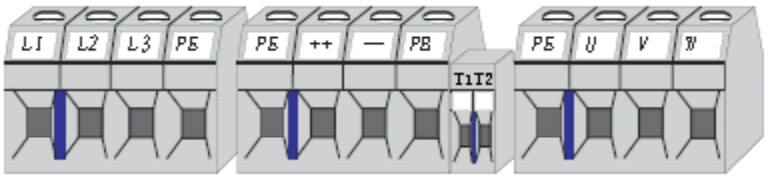


Fig 5.2.2(1) KEB's power terminals

'L1、L2、L3' is connected to three face power supply, '＋、－' is connected to DC, 'PB、＋' is connected to trig resistance, 'T1、T2' is connected to servo motor's PTC's, and 'U、V、W' is connected to servo motor.

Fig 5.2.2(2) KEB's control terminals

1: analog '1+'; 2: analog '1-'; 5: analog output '1+'; 7: 10V power output; 8: analog grounding; 16: enable; 20: 24V power output; 21: 24V power input; 22: digital grounding.
3、Insert KEB enable terminal;
4、Insert DKI to KEB, and make circuitry well connected;
5、Check terminals and EMC.

5.2.3 Upload KEB parameters

Steps of uploading KEB parameters：
1、Set up parameter Ud02, and select KEB's mode
2、Open up dw5 file which needs to be uploaded
3、Upload
4、Turn off power supply after uploading, then connect hardware enable terminals.

Detail explanations:
1、Set up parameter **Ud02**, and select KEB's mode
A. Choose parameter ud (as fig 5.2.3(1)).

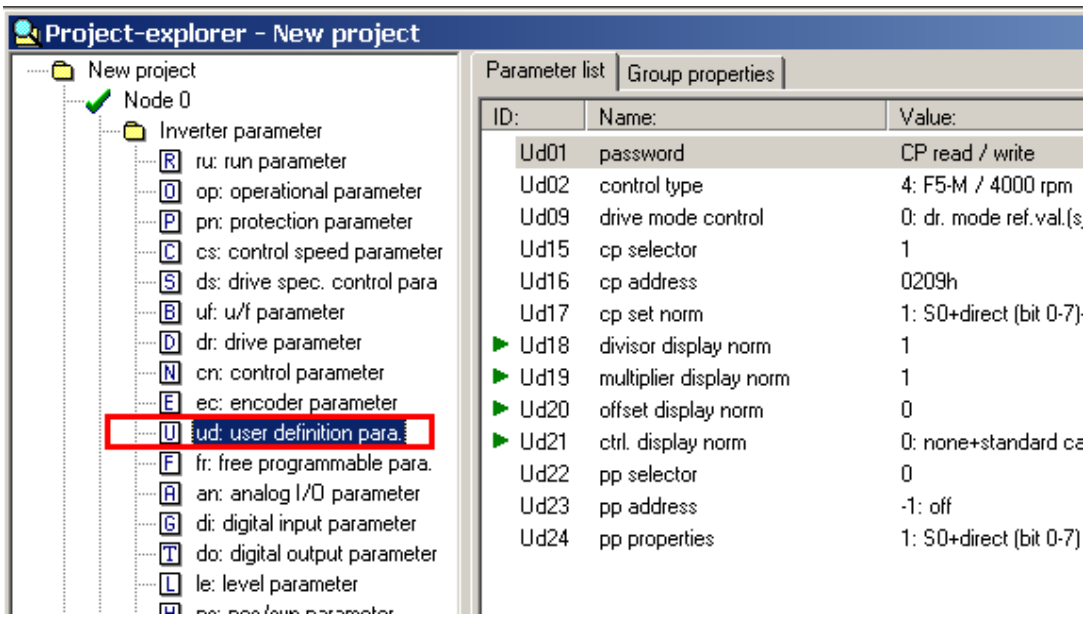


Fig 5.2.3(1) Choose parameter ud

B、Set parameter Ud02 to 8.
Double click 'Ud02'→input 8→click 'ok'.
(See Fig 5.2.3(2))

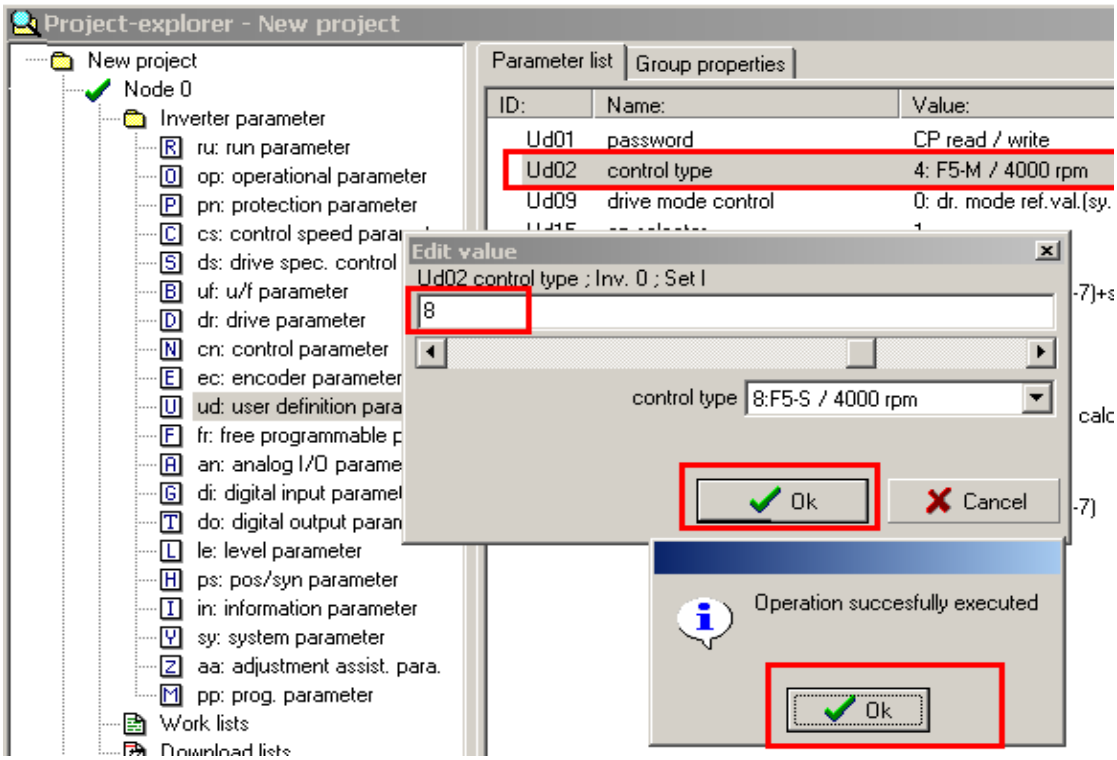


Fig 5.2.3(2) set up parameter ud

C、After a few seconds, click 'Use new CFG-ID' in the dialog box. (See Fig 5.2.3(3))

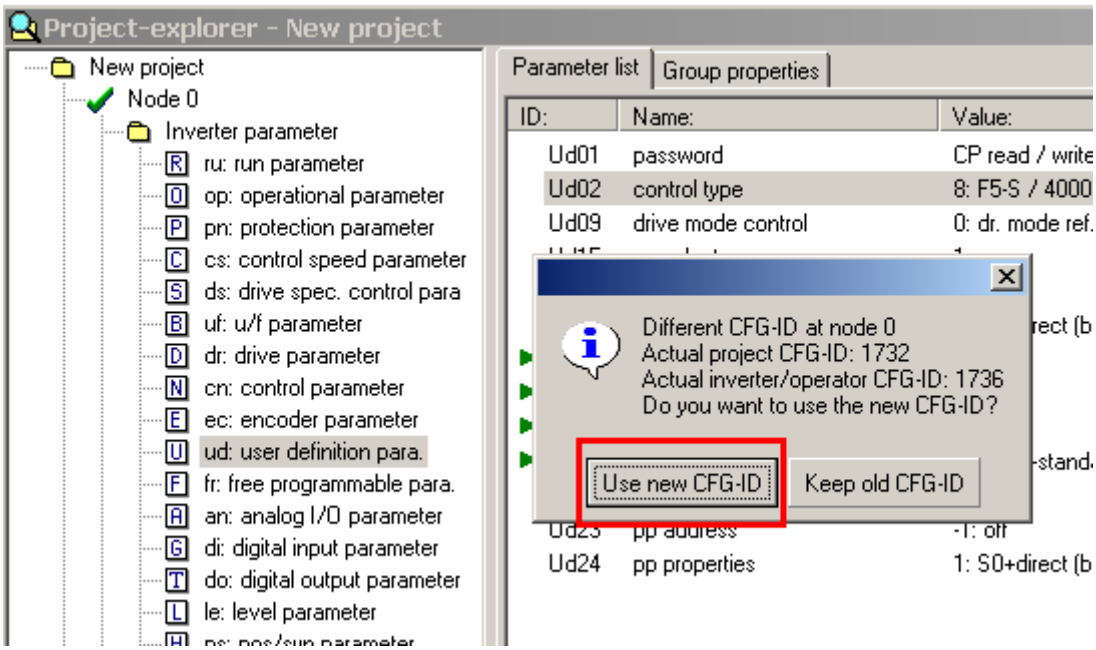


Fig 5.2.3(3) choose new edition

2、Open up **dw5** file which needs to be uploaded

Click 'open' in KEB software→select dw5→click. (See Fig 5.2.3(4))

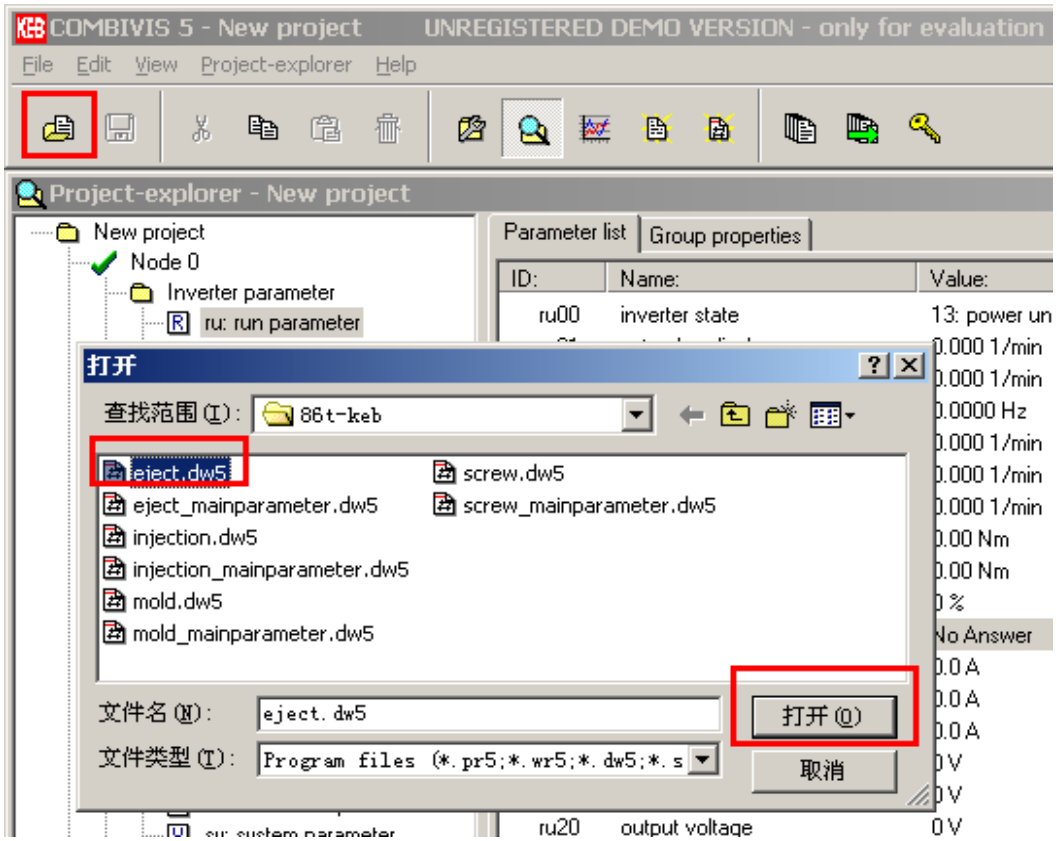


Fig 5.2.3(4) choose new edition

3、Upload

A、Click ‘down arrowhead’ marked by red→click ‘Yes’.

(See Fig 5.2.3(5), Fig 5.2.3(6))

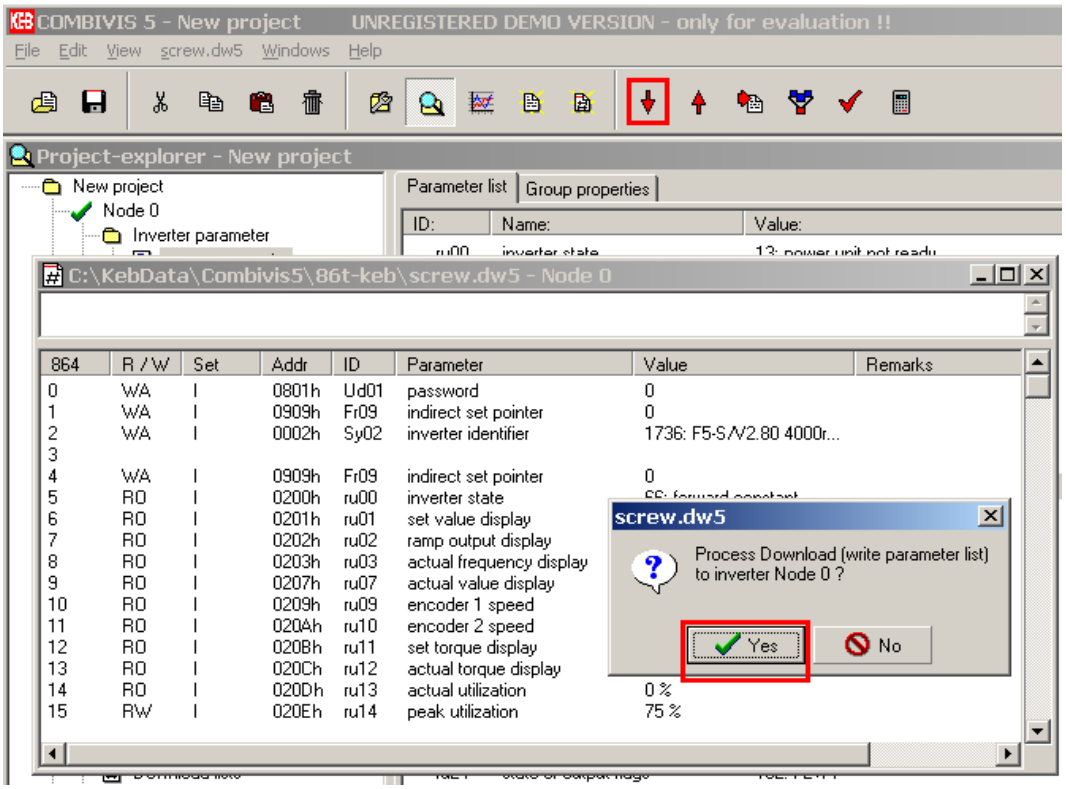


Fig5.2.3(5) upload inverter parameters

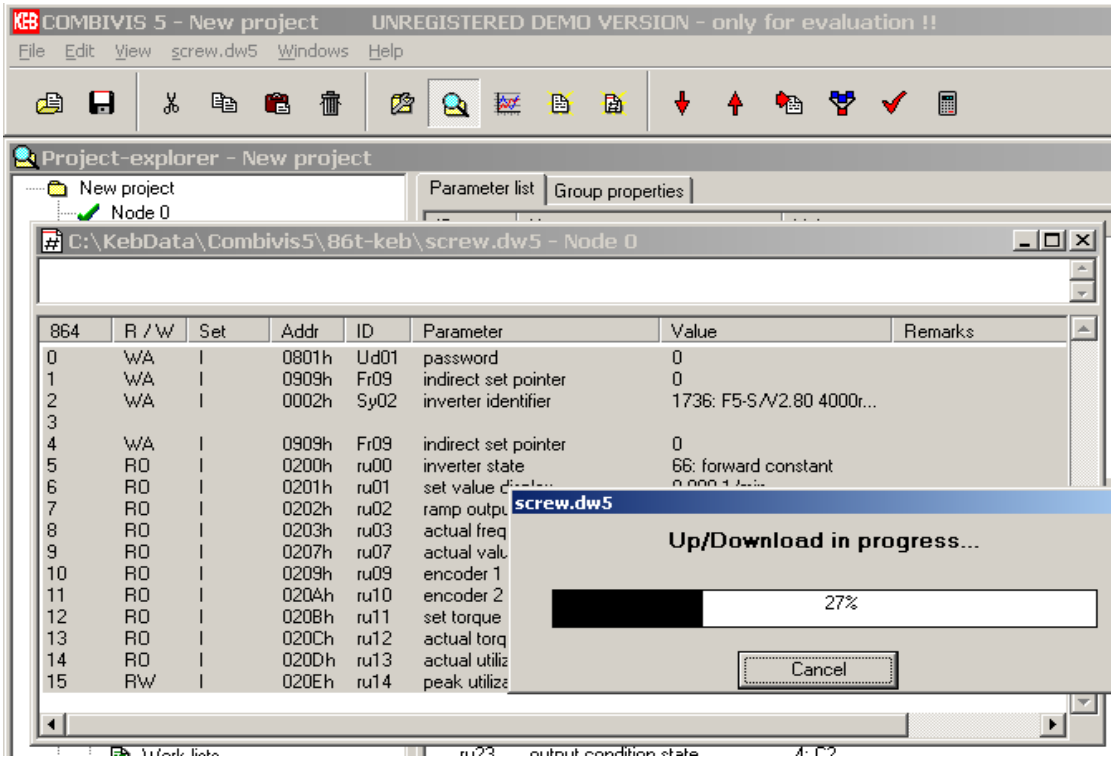


Fig 5.2.3(6) process of uploading

B、Click ‘ok’ to finish.

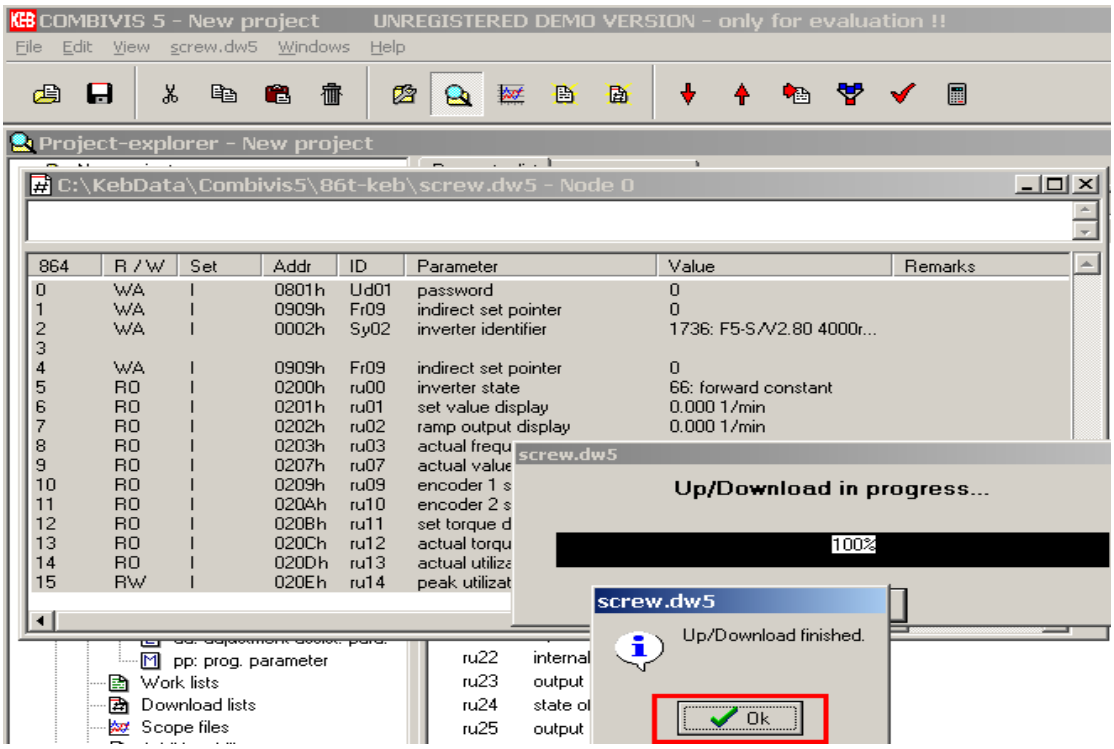


Fig 5.2.3(7) uploading finish

4、Turn off power supply after uploading, then connect hardware enable terminals.

Hardware enable terminals are 16 and 20 terminations of the inverter.

5.2.4 Search for the servo motor reference by a laptop

Steps:
(1)、Reset KEB inverter (set up inverter's enable control bit to zero, **di02**=0)
(2)、Electrify
(3)、Input start codes for searching the reference.(Set up parameter **Ec02** 2206)
(4)、Set KEB inverter to work (clear inverter's enable control, di02=1)
(5)、Observe the searching status
(6)、Reset KEB inverter (Set up inverter's enable control bit to zero)

Detail explanations:
(1) Reset KEB inverter (Set up inverter's enable control bit to zero, **di02**=0)
A、Choose parameter **di.** (See fig 5.2.4(1))
Click parameter **di** in the left dialog box.

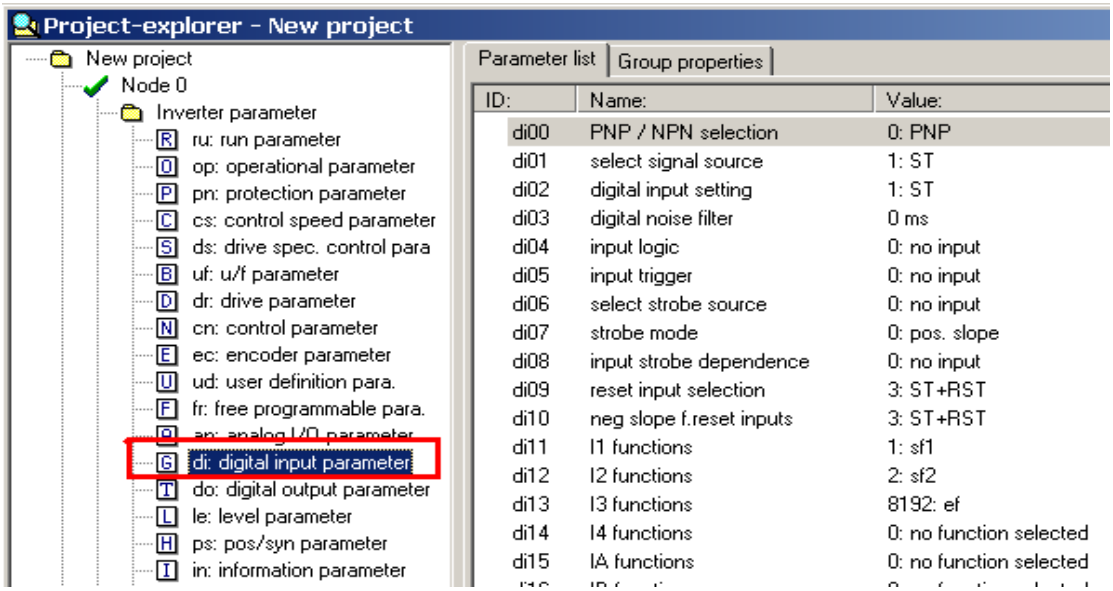


Fig 5.2.4(1) choose the parameter di

B、Set parameter **di02** to zero. (See fig 5.2.4(2))
Double click parameter **di02**→type zero into the dialog box→click 'OK'.

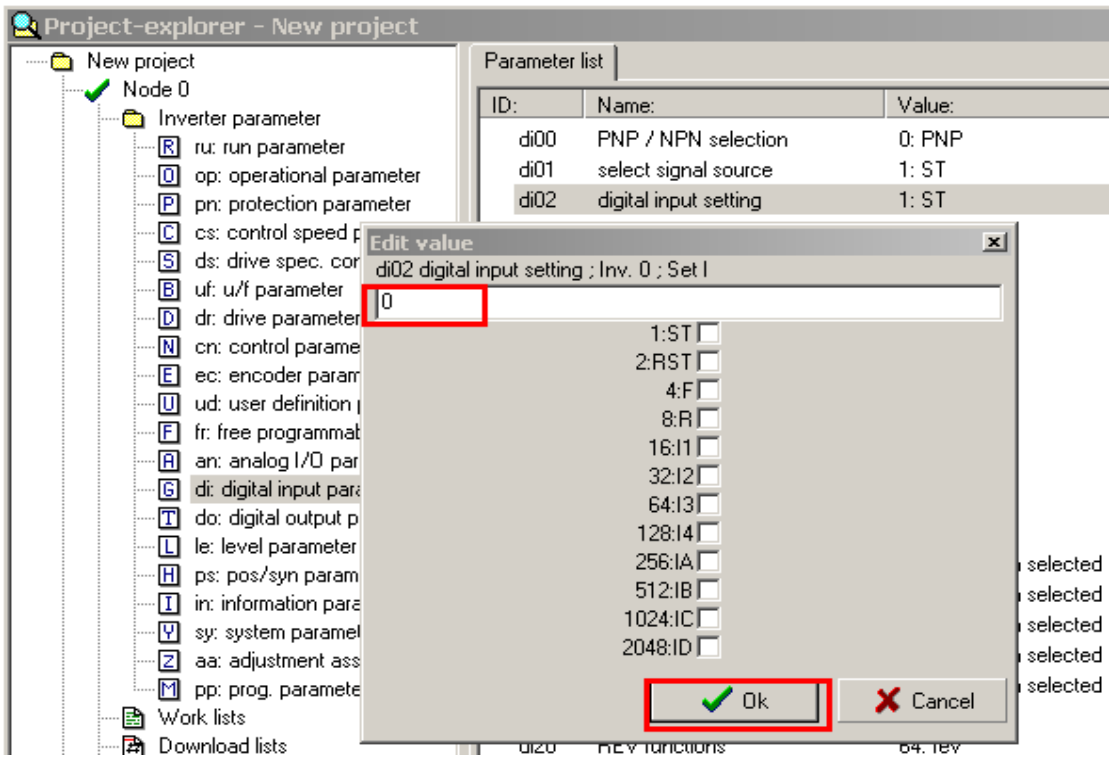


Fig 5.2.4(2) set parameter **di02** to zero

(2)、Electrify

Click 'motor on' to let drivers work.

(3)、Input start codes for searching the reference. (Set up parameter **Ec02** 2206)

A、Set up parameter **ec** (See fig 5.2.4(3))

Click parameter **ec** in the left of the dialog box.

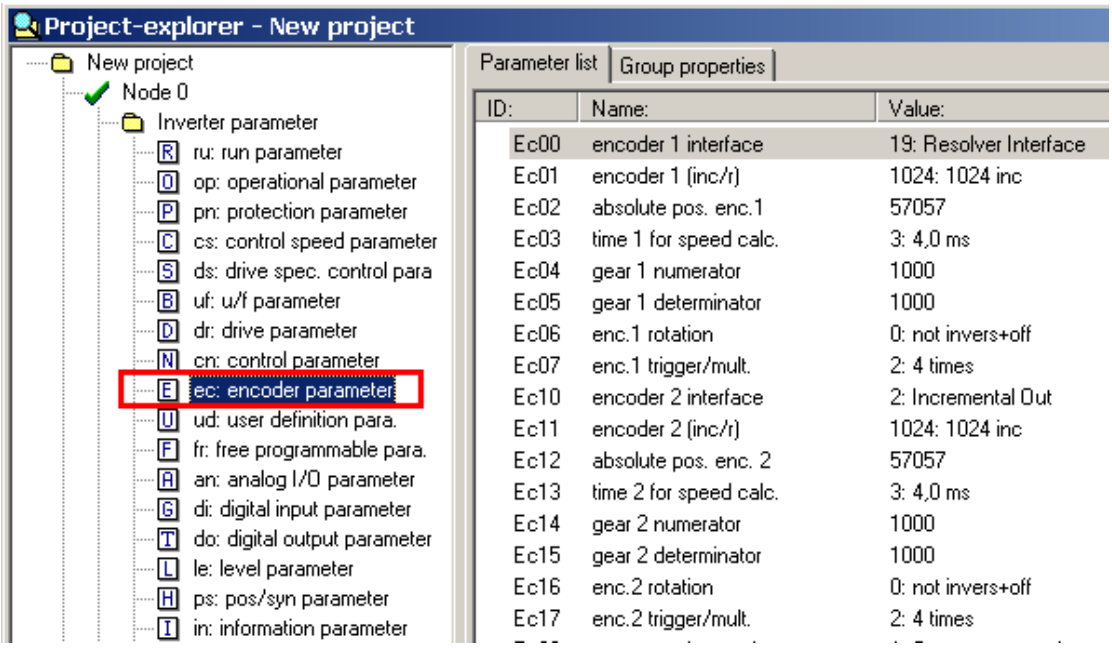


Fig 5.2.4(3) set parameter **Ec**

B、Set up parameter **Ec02** 2206. (See fig 5.2.4(4))

Double click parameter **Ec**→type 2206 into the dialog box→click 'OK'.

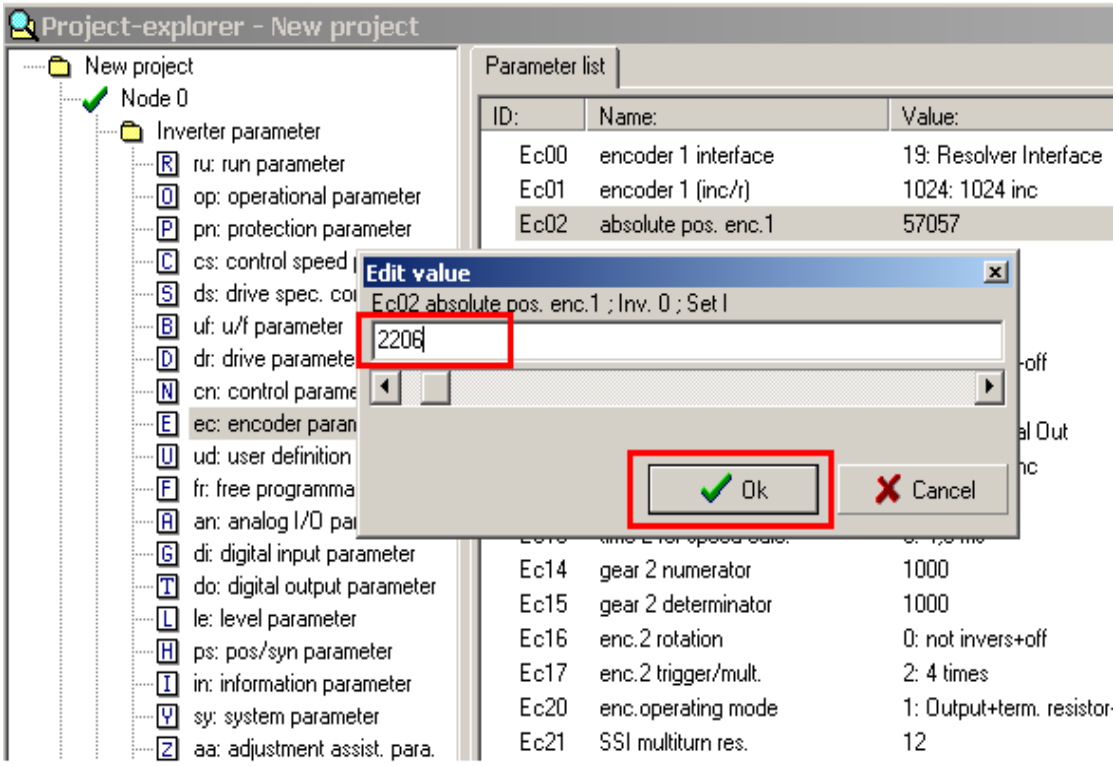


Fig 5.2.4(4) set parameter Ec02 2206

(4)、Set KEB inverter to work (clear inverter's enable control, di02=1)

The inverter is ready to work.

A、Set up parameter **di.** (See fig5.2.4(5))

Click the parameter **di** in the left of dialog box.

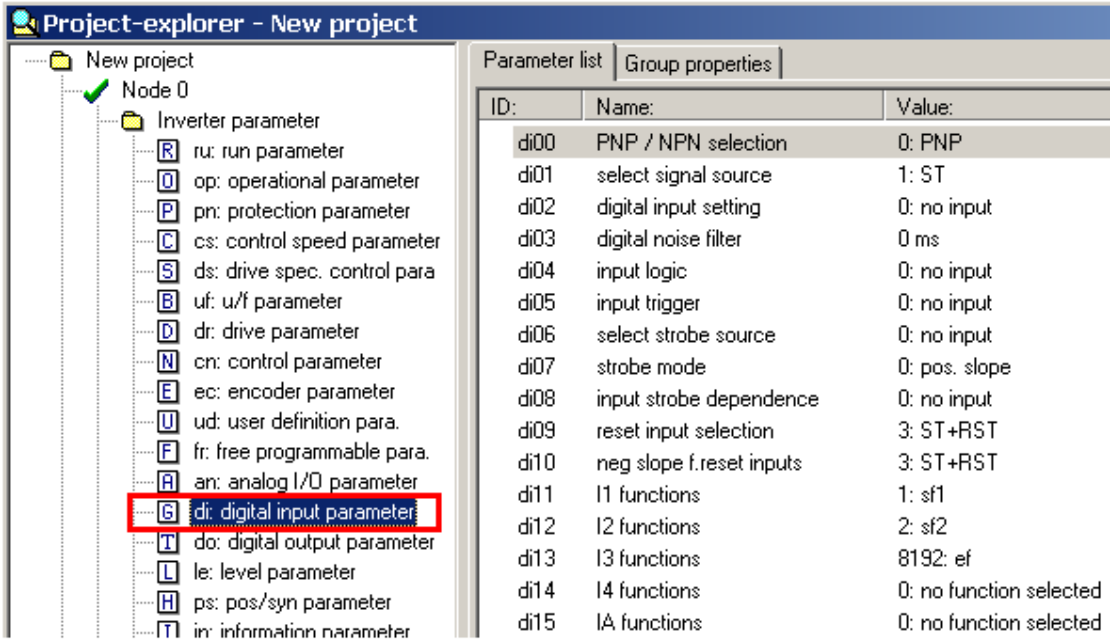


Fig 5.2.4(5) set the parameter **di**

B、Set up parameter **di02** 1. (See fig5.2.4(6))

Double click parameter **di02**→input 1 to the dialog box→click 'OK'.

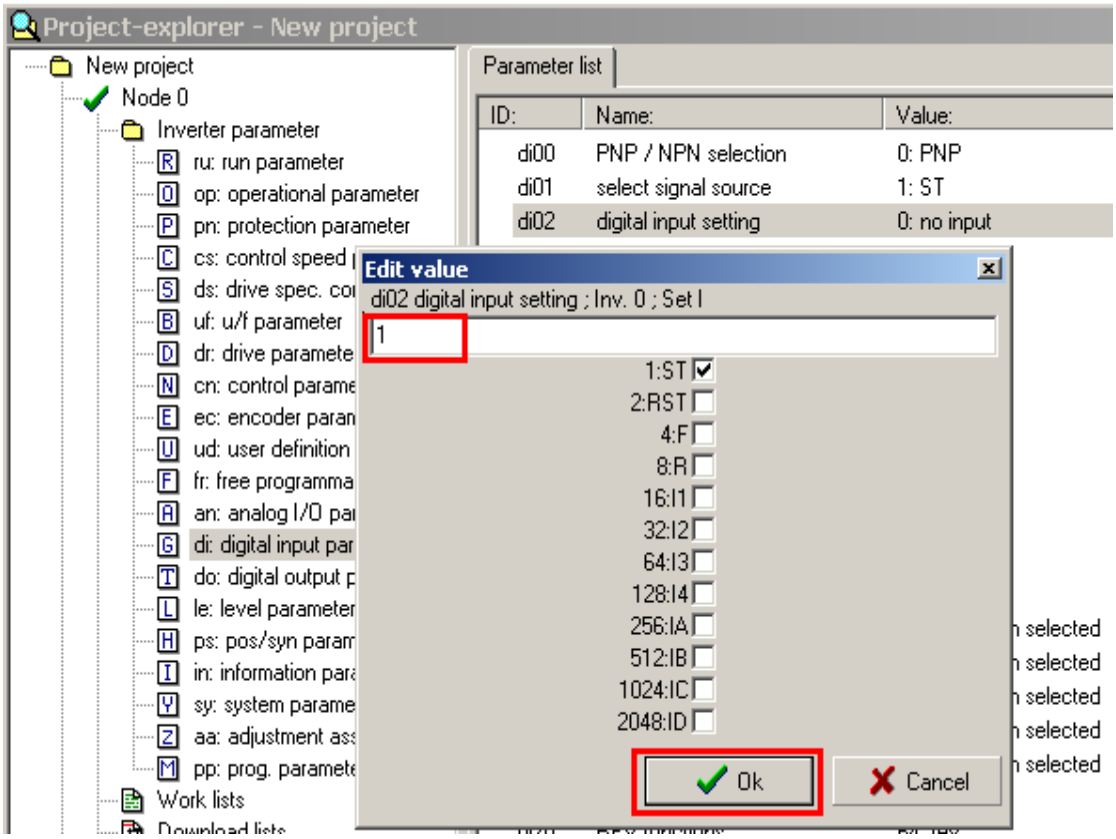


Fig 5.2.4(6) set the parameter **di02** 1

(5)、Observe the searching status

The status could be judged by observing parameters as following

parameter	Parameter's content	Parameter's state
ru00	inverter state	calculate drive data
ru15	apparent current	Increase from zero to rated current
EC02	absolute pos. enc.1	changing

Table 5.2.4(1) parameters in the state of finding

The inverter is in the right state when the parameter is the same as the content of table 2.2.3(1). Wait for a while (about between 20 to 30 seconds) to observe the parameter **Ec02**. It is the reference of the inverter' software when parameter **Ec02** is fixed.

(6)、Reset KEB inverter (set up inverter's enable control bit to zero, **di02**=0)

Refer to step 1.

5.2.5 Test running of servo motor

Steps:

1、Cut off communication with the control;

2、Test running at low speed;

3、Test running at high speed;

4、Resume communication with the control;

5、Warnings and solutions.

Detail explanations.

1、Cut off communication with the control

Set up parameter Sy**24** –1. Cut off communication with the control.

A、Set up parameter Sy**24.** (See fig5.2.5(1))

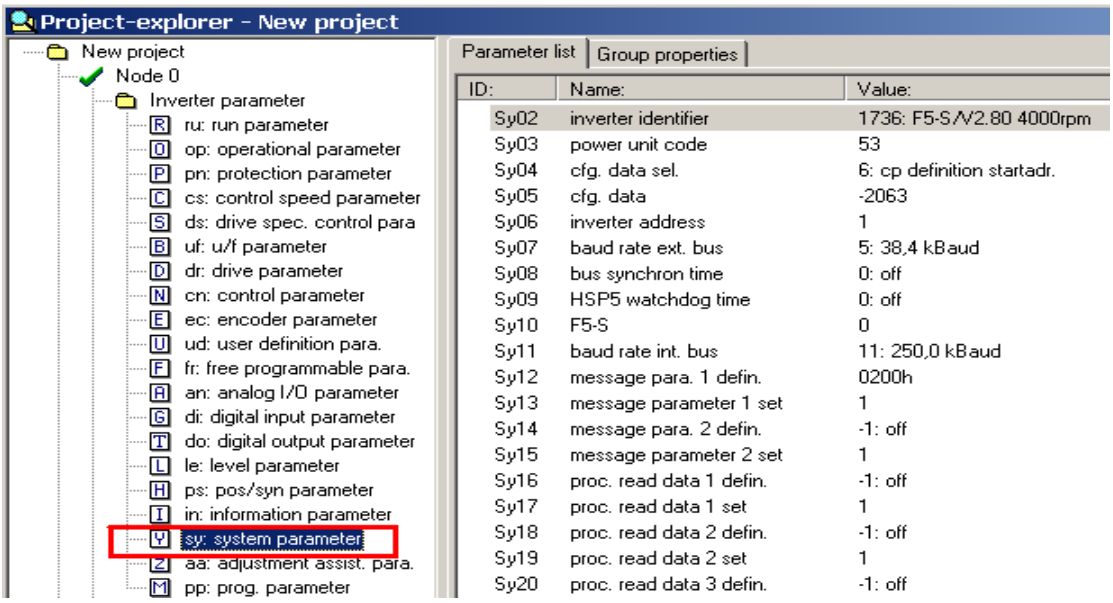


Fig 5.2.5(1) set the parameter Sy24

B、Set up parameter **Sy24** –1. (See fig 5.2.5(2))

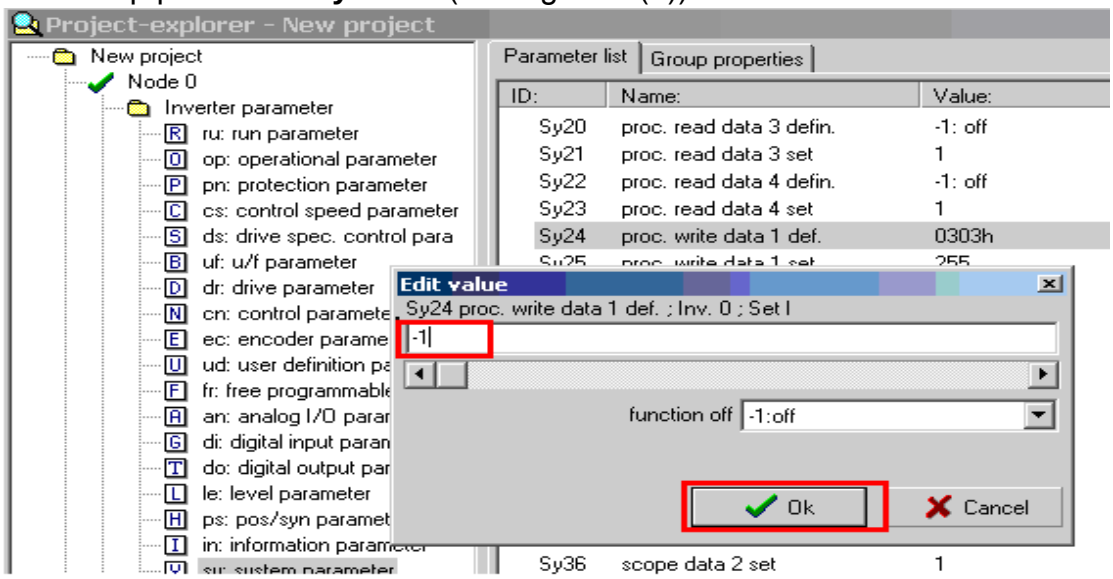


Fig 5.2.5(2) set the parameter **Sy24** –1

2、Test running at low speed

(1)、Set up parameter **oP03** 50, which means let the motor rotates by 50 rotation per minter.

A、Click parameter **op.** (See fig5.2.5(3))

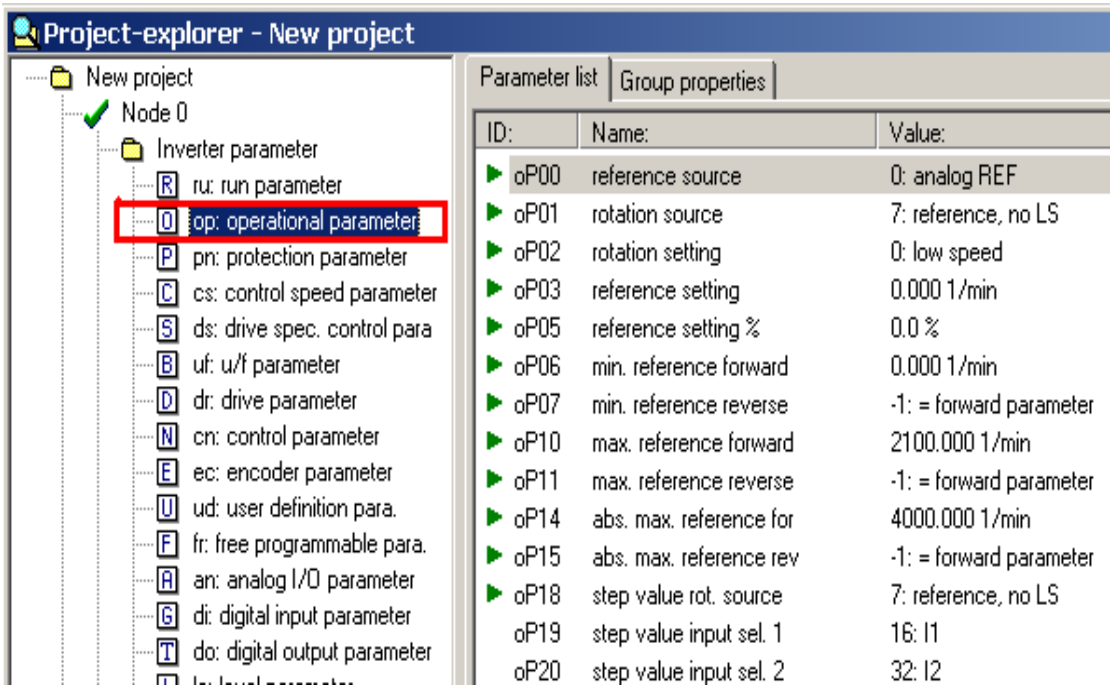


Fig 5.2.5(3) click the parameter **op**

B、Set up parameter **oP03** 50. (See fig 5.2.5(4))

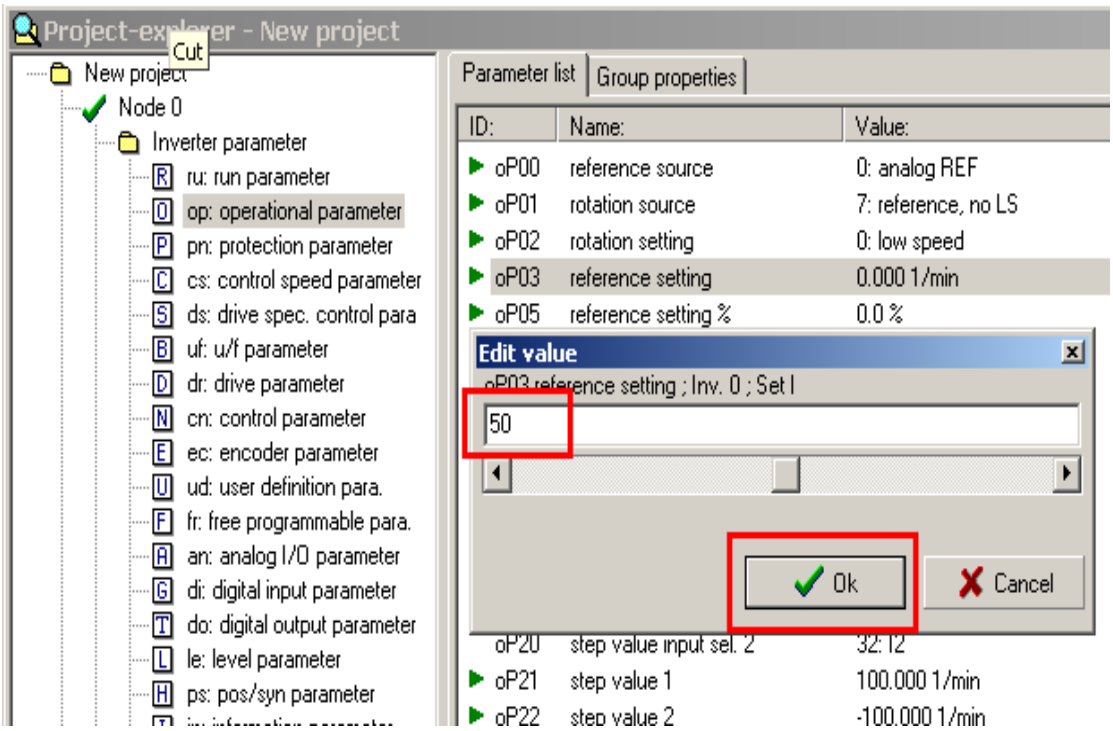


Fig 5.2.5(4) set the parameter **oP03** 50

(2)、Set up KEB inverter into work state. (Clear the inverter's enable control, **di02**=1)

A、Click parameter **di.**(See fig 5.2.5(5))

B、Set up parameter **di02** to 1. (See fig 5.2.5(6))

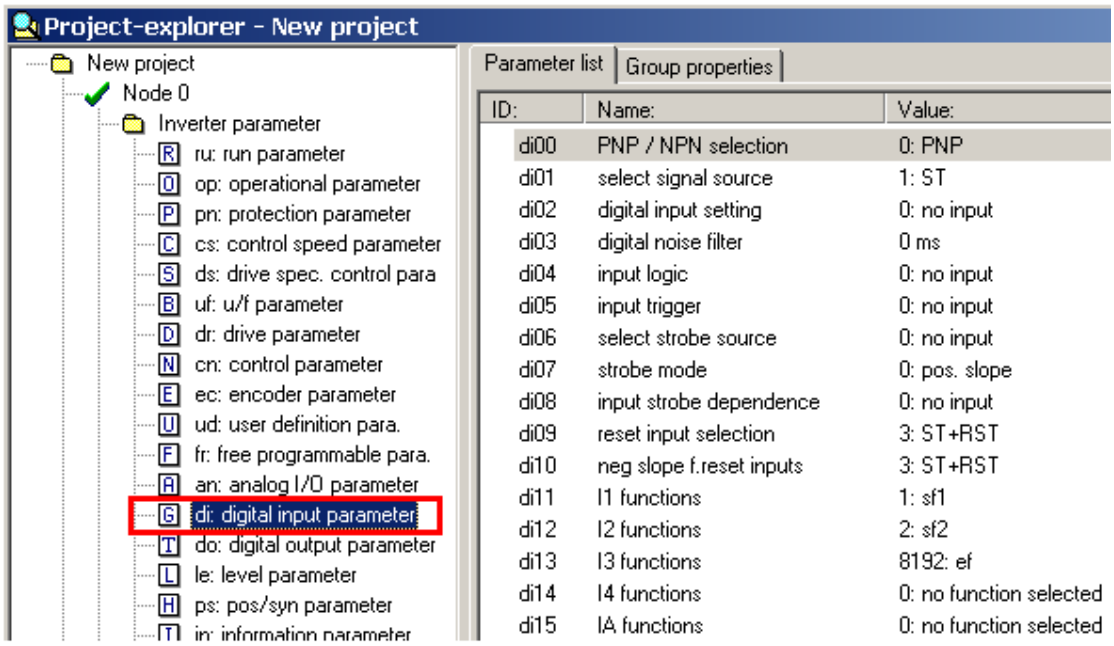


Fig 5.2.5(5) choose parameter **di**

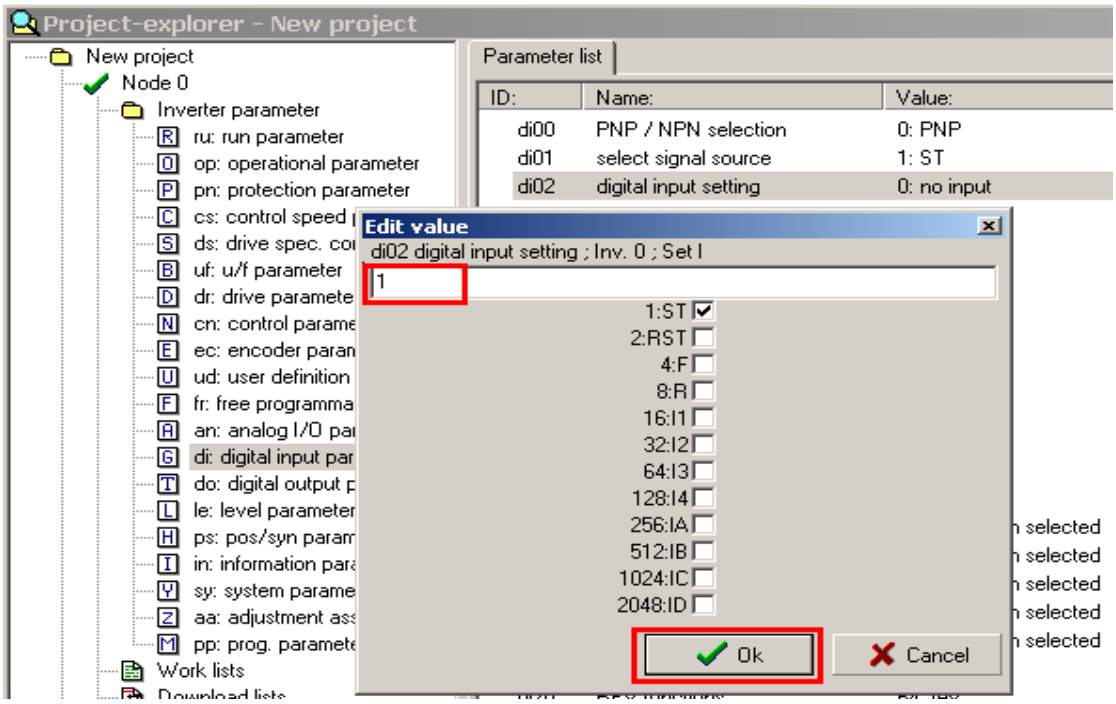


Fig 5.2.5(6) set up parameter **di02** to 1

(3)、Observe the state of the motor.

While the inverter is working, servo motor starts to run. We can observe the state of the motor by parameters as following.

Parameter	Parameter's content	Parameter's state
ru00	Inverter state	forward constant
ru02	Ramp output display	Fifty
ru09	Encoder 1 speed	About fifty
ru15	Apparent current	Infinitesimal current

Table 5.2.5(1) parameters while the motor is working

When actual parameters are the same as, it means both servo motor and inverter run exactly.

(4)、Set direction of the motor' rotation.

Observe rotation direction from the side of axial direction when the motor works at low speed.

Fig 5.2.5(7) shows the concept of axial direction:

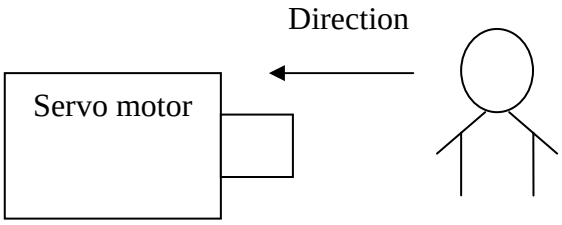


Fig 5.2.5(7) the concept of axial direction

If the rotation direction isn't correct, adjust parameter Ec06.

Motor	axial direction				
	VE600	VE900	VE1200	VE1500	VE4100
Inject servo motor	anticlockwise	anticlockwise	anticlockwise	anticlockwise	anticlockwise
Mould servo motor	anticlockwise	anticlockwise	anticlockwise	anticlockwise	anticlockwise
Charge servo motor	clockwise	clockwise	clockwise	clockwise	clockwise
Eject servo motor	clockwise	anticlockwise	anticlockwise	anticlockwise	anticlockwise

Table 5.2.5(2) axial directions of different motors

Set-up procedures:

ⅰ、Reset KEB inverter. (Set up parameter di02 to zero)

A、Click parameter **di.** (See fig 5.2.5(8))

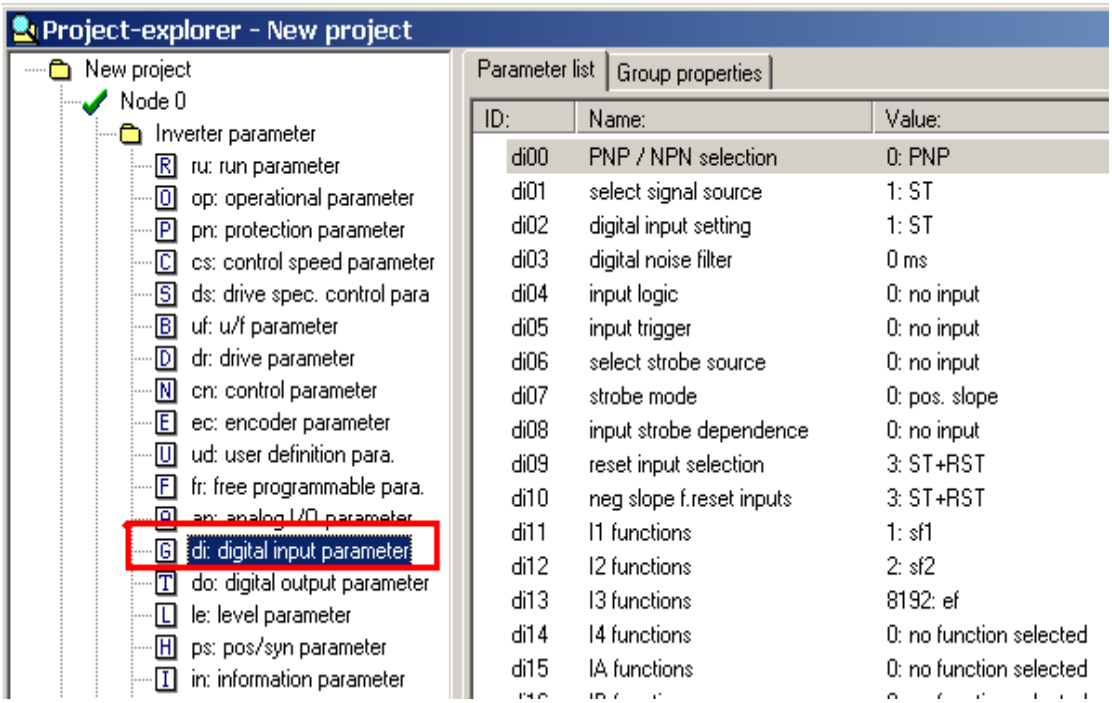


Fig 5.2.5(8) click the parameter **di**

B、Set up parameter **di02** to zero. (See fig 5.2.5(9))

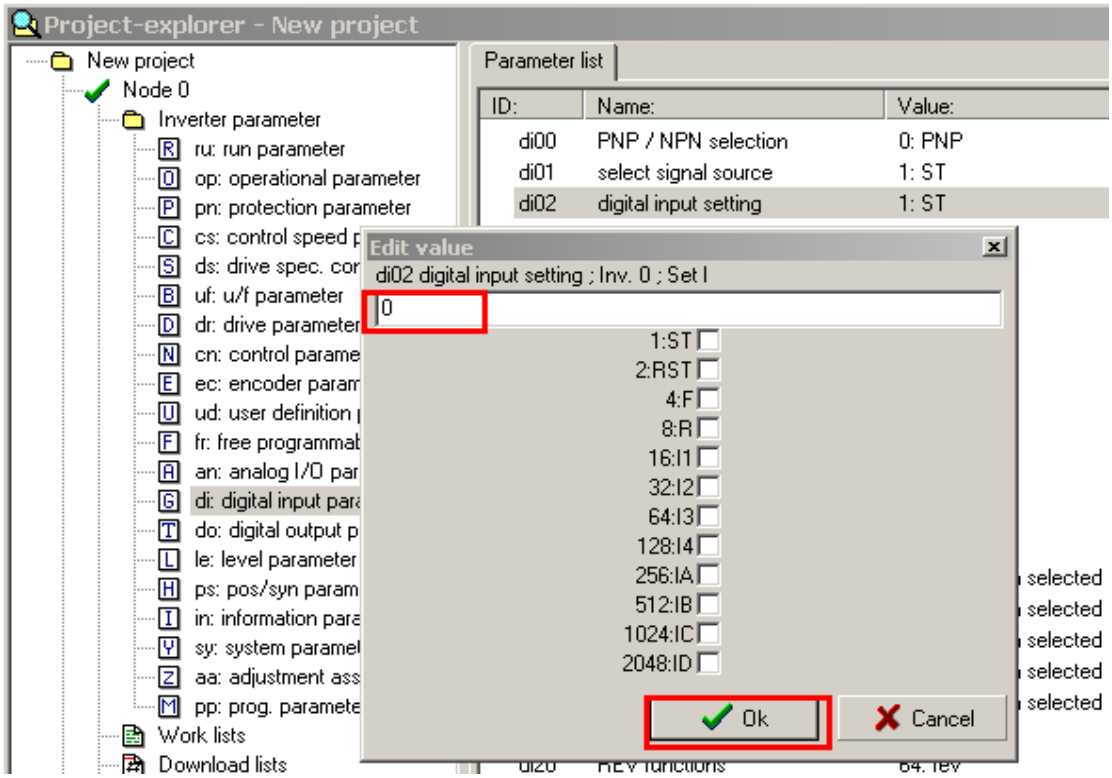


Fig 5.2.5(9) set the parameter **di02** zero

ii、Set up parameter **Ec06.**

A、Select parameter **ec.**

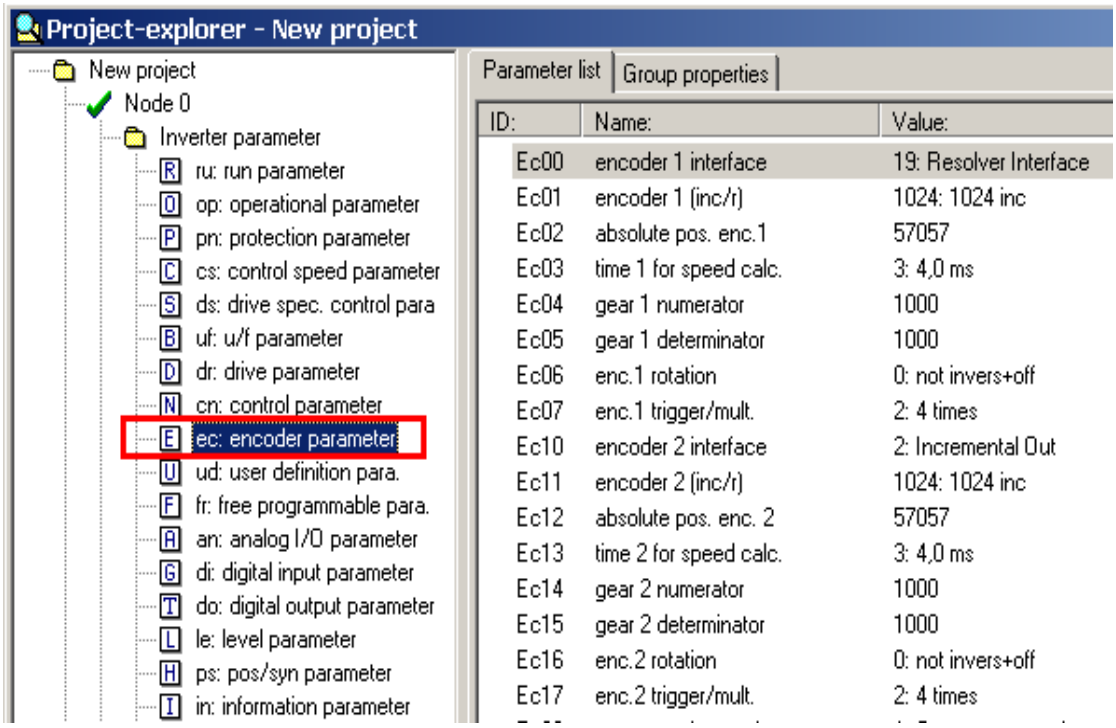


Fig 5.2.5(10) click the parameter **ec**

B、Double click parameter **Ec06**→change the state of the inverter system (change 'on' to 'off 'or 'off 'to 'on') →click 'OK' (See fig5.2.5(11)).

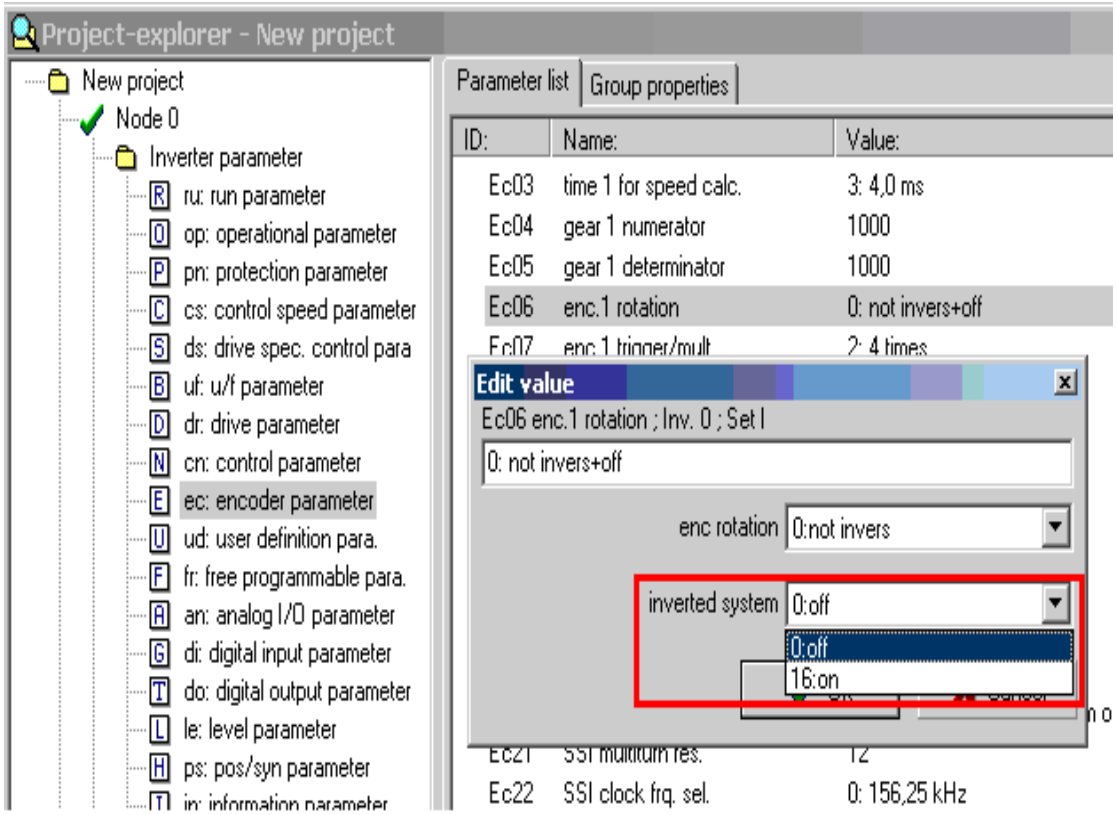


Fig 5.2.5(11) set the parameter **Ec06**

iii、Set the inverter to work. (Set up parameter **di02** to zero)

A、Click parameter **di.** (See fig 5.2.5(12))

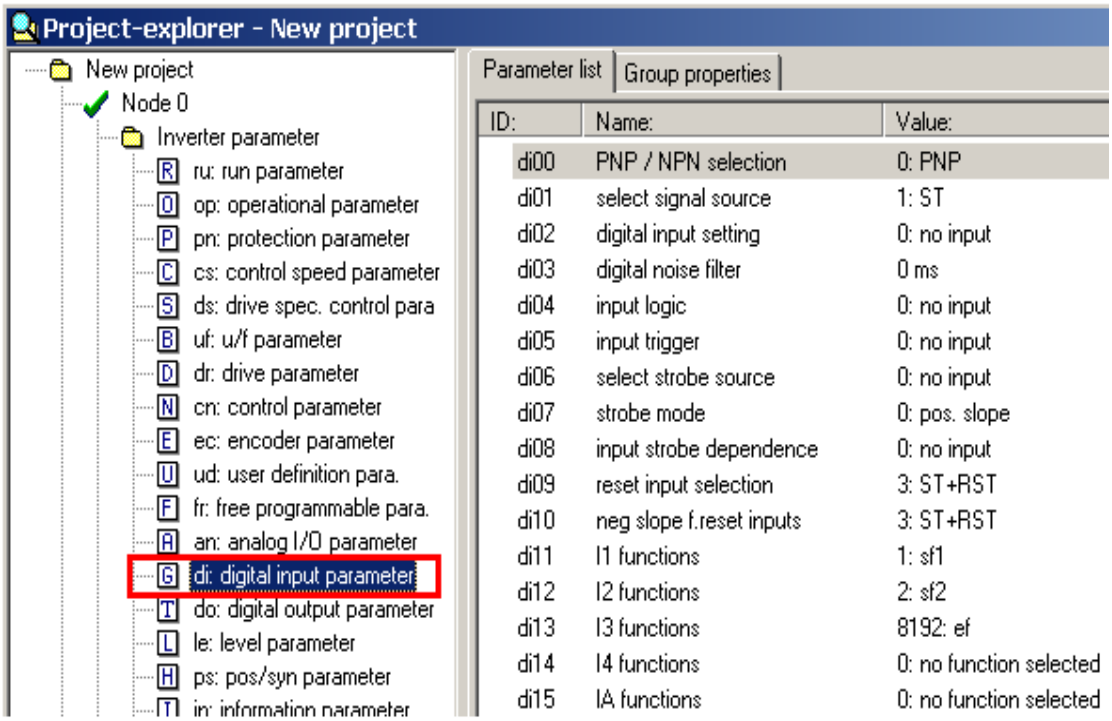


Fig 5.2.5(12) click the parameter **di**

B、Set up parameter **di02** to 1. (See fig5.2.5(13))

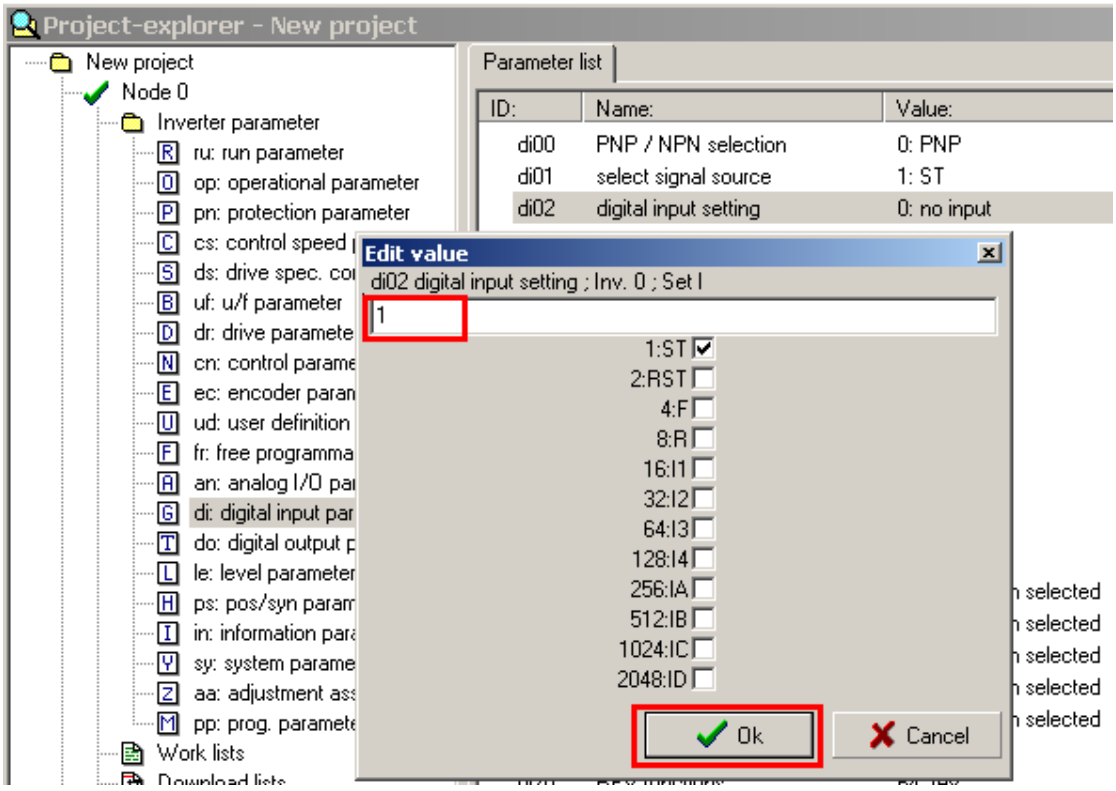


Fig 5.2.5(13) set the parameter **di02** one

ⅳ、Make sure the motor rotates in correct direction.

(5)、Finish the low speed test

Click parameter 'op'. Set up parameter op03 to zero. At last stop the motor. (See fig5.2.5(14))

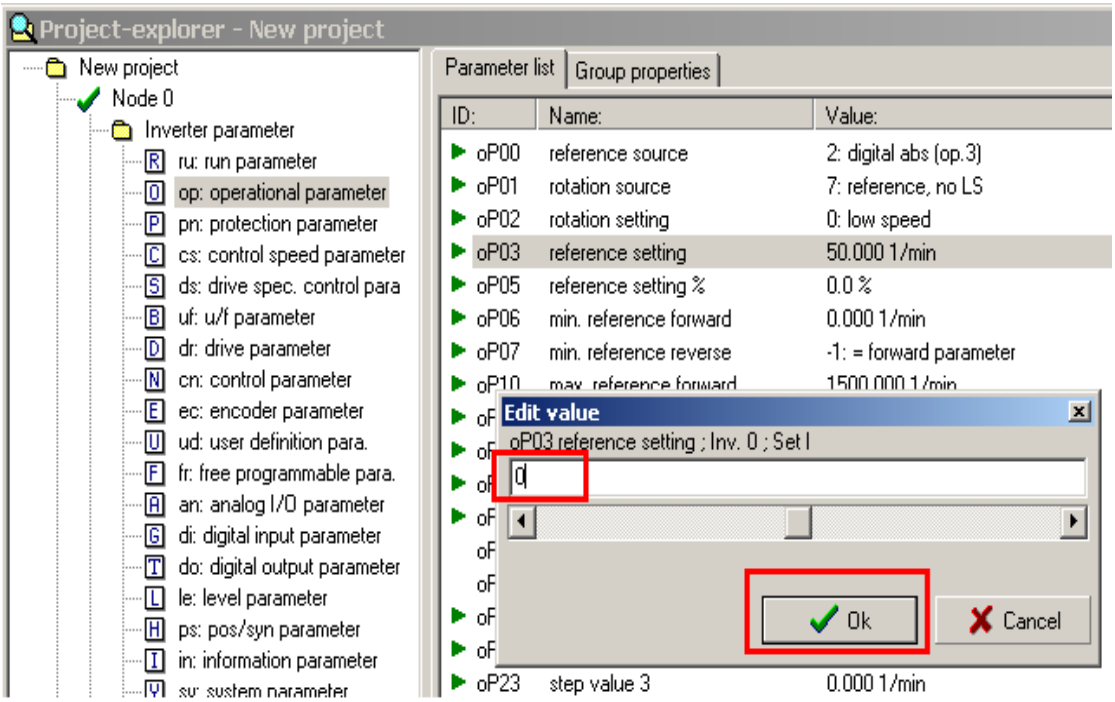


Fig 5.2.5(14) set the parameter **oP03** zero

3、Test running at high speed

Set up parameter **oP03** to test the servo motor at a high speed.

(1)、Run the servo motor at high speed. (500r/m)

Click parameter **op**. Set parameter **oP03** to 500. (See fig5.2.5(15))

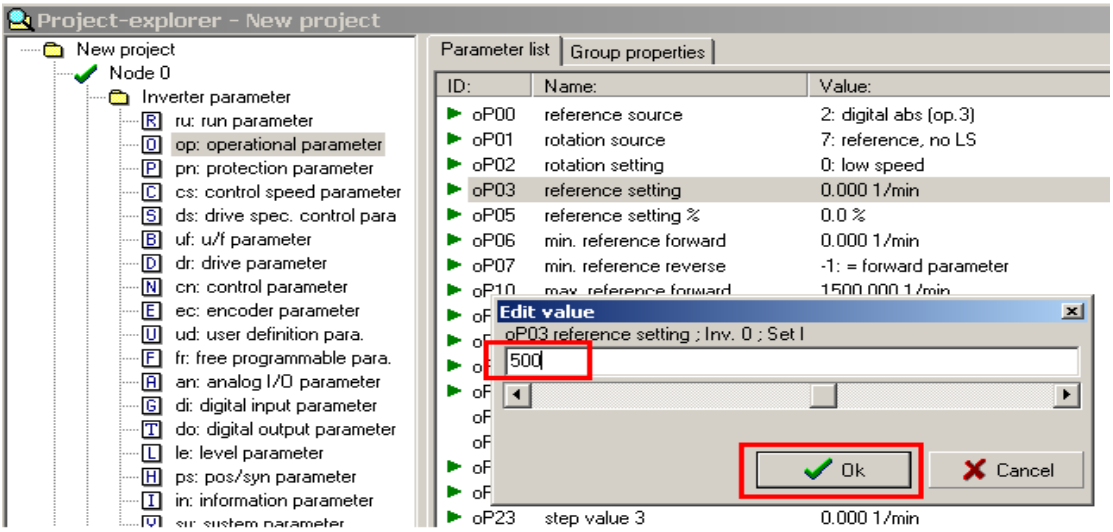


Fig 5.2.5(15) set the parameter **oP03** five hundred

Observe parameters as following:

Parameter	Parameter's content	Parameter's state
ru00	inverter state	forward constant
ru02	ramp output display	500
ru09	encoder 1 speed	About 500
ru15	apparent current	Infinitesimal current

Table 5.2.5(3) observe the parameters in a high speed

The servo motor works well if there is no shake or abnormal noise.

(2)、Let the motor work at rated speed. (**oP03=dr24**)

A、Click parameter **dr**, and select parameter **dr24.** (See fig5.2.5(16))

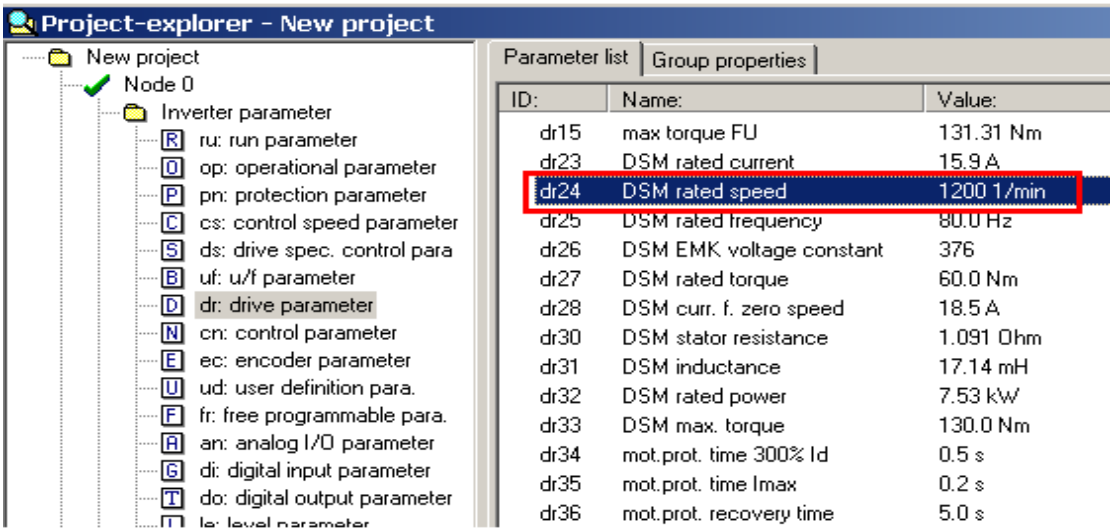


Fig 5.2.5(16) click the parameter **dr24**

B、Click parameter **op**. Set parameter **oP03** the same as parameter **dr24**. (See fig5.2.5 (17))

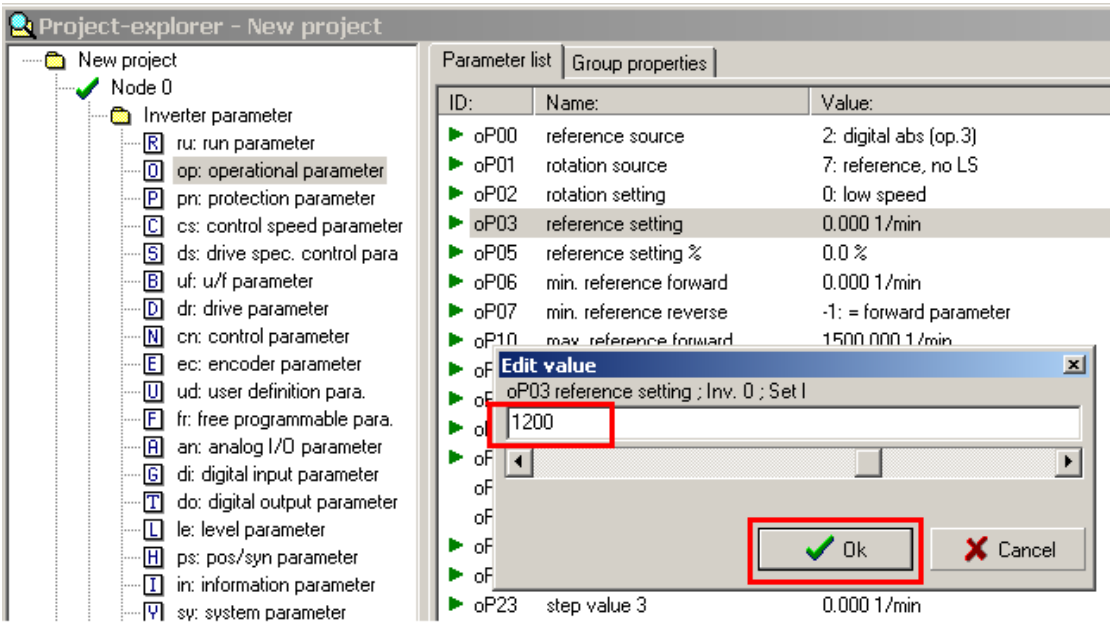


Fig 5.2.5(17) set parameter **oP03** the same as parameter **dr24**

(3)、The servo motor works well if there is no shake or abnormal noise. Select parameter **op.** Set up **Op03** to 0, and then the motor stops working.

4、Resume communication with the control

Click parameter **sy**. Set up parameter **sy** 0303h. (See fig5.2.5(18))

Double click parameter **Sy24**→Type 0303h into the dialog box→Click 'OK'.

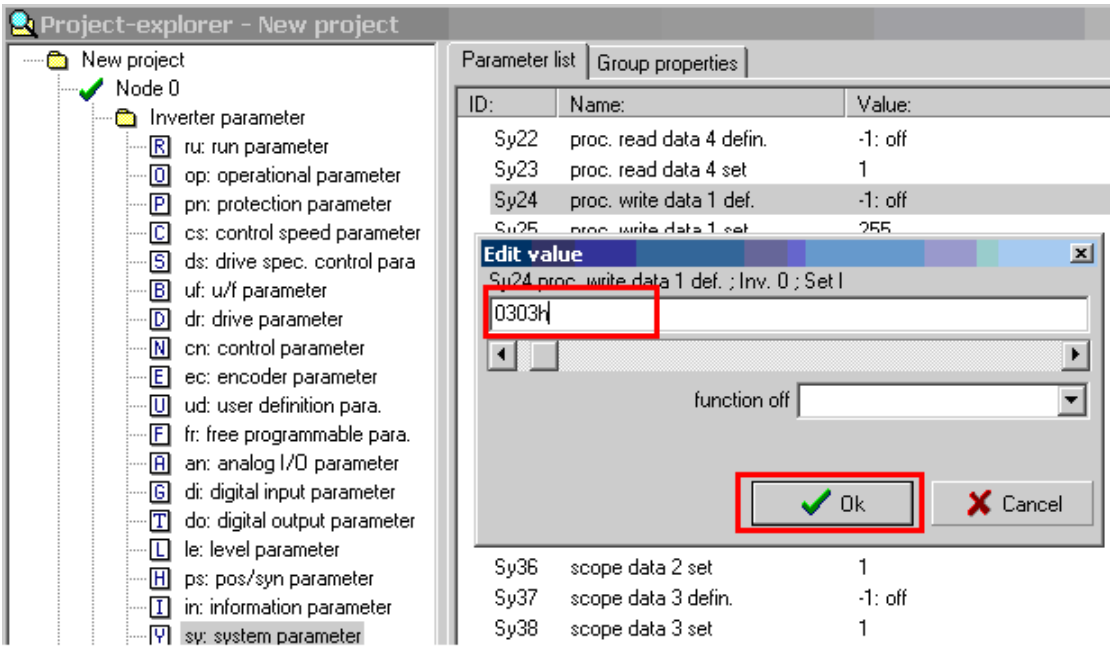


Fig 5.2.5(18) set up parameter **sy** 0303h

5.2.6 Search for the motor's reference and trial test running of the motor by Sigmatek controller

> **Notice**
>
> Please make sure the synchronous belt is off before searching or will cause serious ecological consequences.

Ⅰ、Search for the motor's reference by Sigmatek controller

Main steps of searching for the motor reference of VENUS:

1、 Electrify

2、 Upload related parameters of servo motor

3、 Search for the motor's reference

Detail explanations:

1、Electrify

(1) Weak electricity on

Make sure that whole electric circuitry is ok. Then turn on the switch of chief line on the front of the machine. See fig 5.2.6(1).

Notice: Don't press 'motor on' on the keyboard when power is on.

(2) Force electricity

Under the situation that all I/O signals are normal, turn on two bottons【heat on】and【motor on】on the keyboard. See fig 5.2.6（2）.

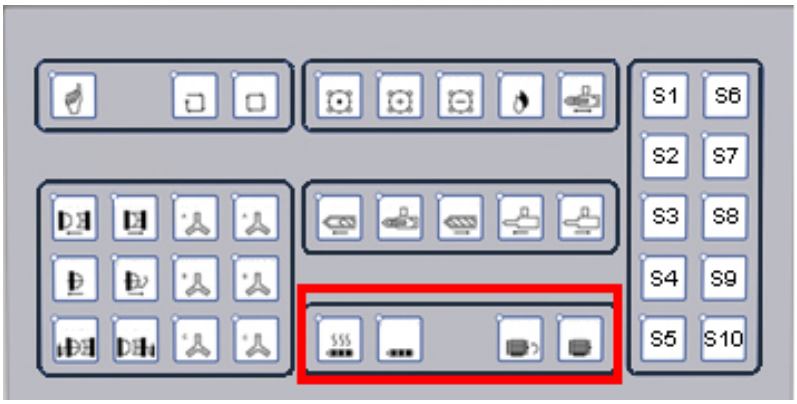


图 5.2.6（2）

Notice：

In order to ensure the injection part on fully electrical injection machine safe, the programmes include security designs of injection and storing parts that demand VENUS has to meet two requirements as below.

① If the tempreture deviation between the setted value and current value is within the allowed scope or not. See fig 5.2.6(3) in which the tempreture has reached the setted one.

② Screw cold boot to prevent delay time to the setted one. See fig5.2.6(4) in which the delay time is 100s. Then start the inverter.

See fig5.2.6(5), if the inverter enables, then『inverter on』lights on; otherwise, 『inverter on』lights off.

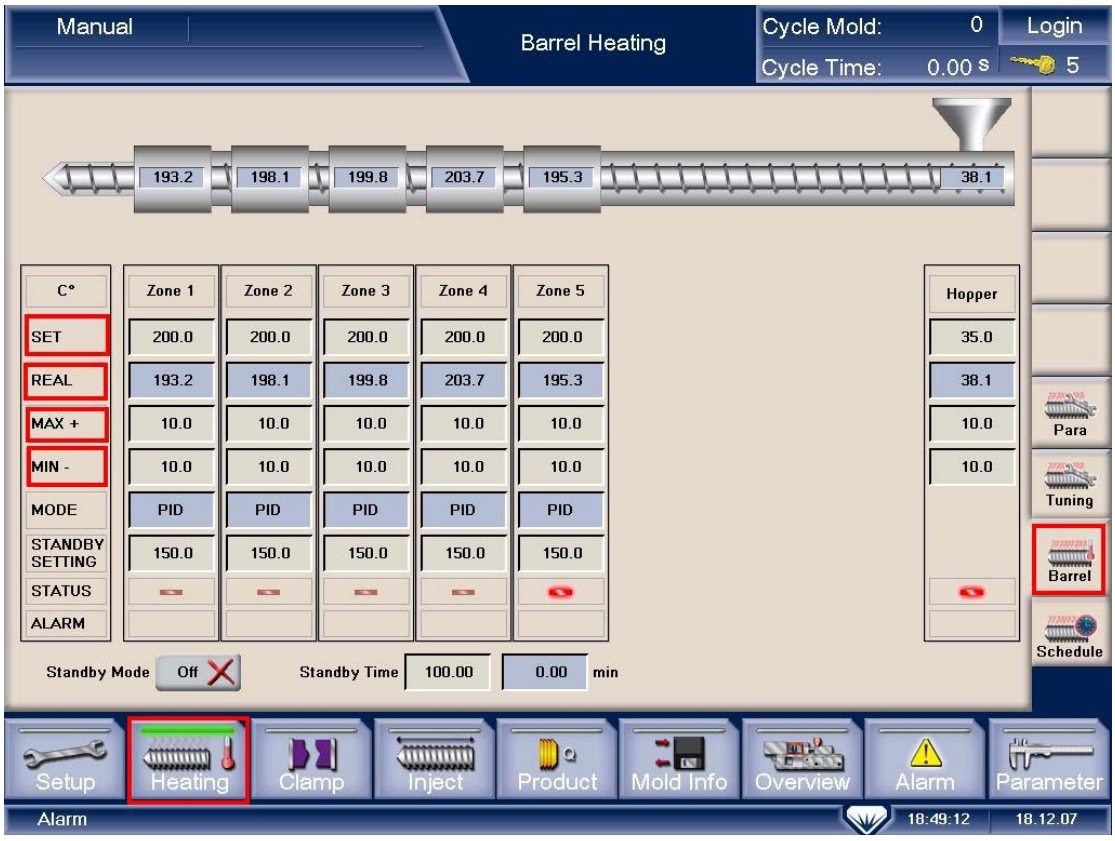


Fig 5.2.6(3)

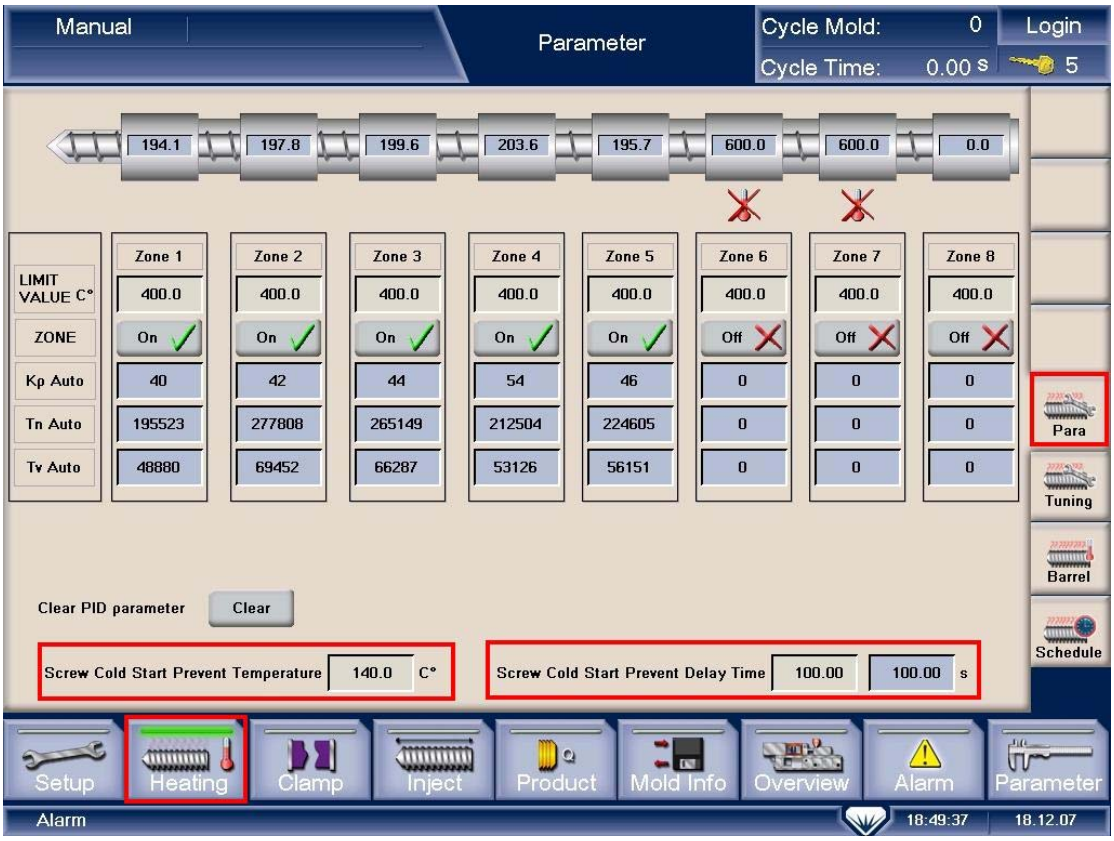


Fig 5.2.6(4)

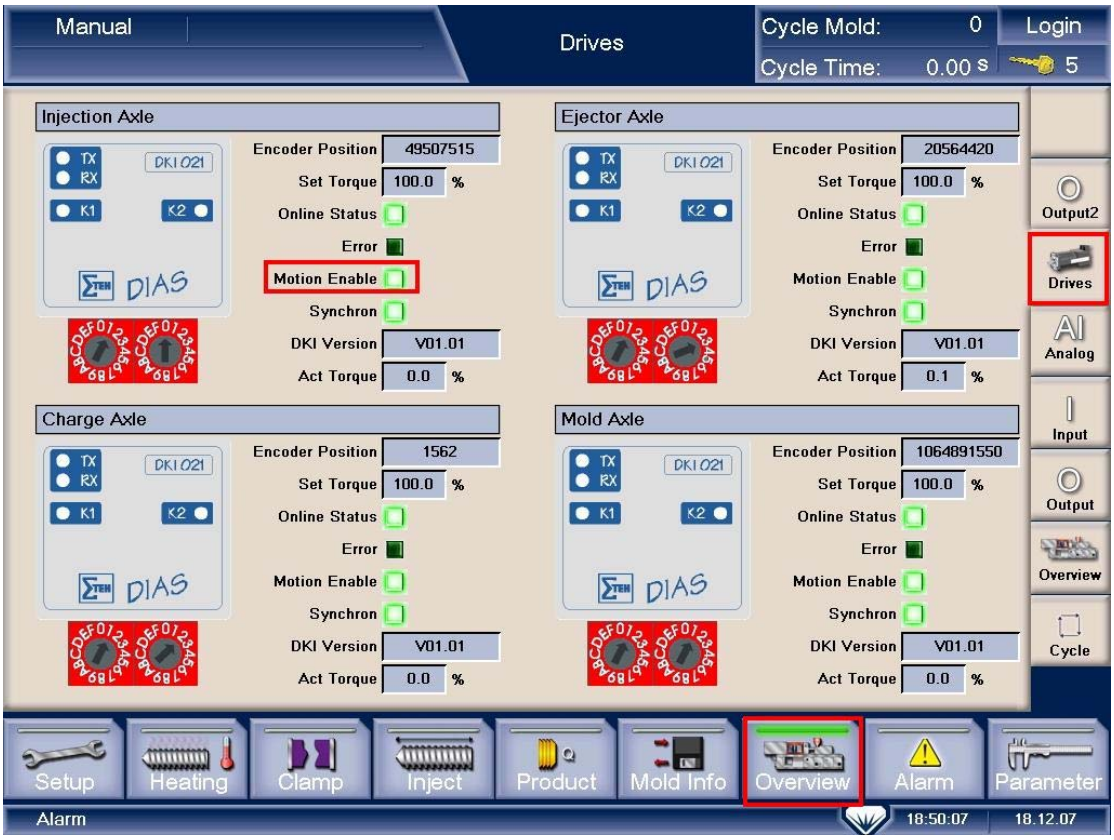


Fig 5.2.6(5)

2、Upload related parameters of servo motor

(1)、Connect the computer with a special U disk. See fig 5.2.6(6)

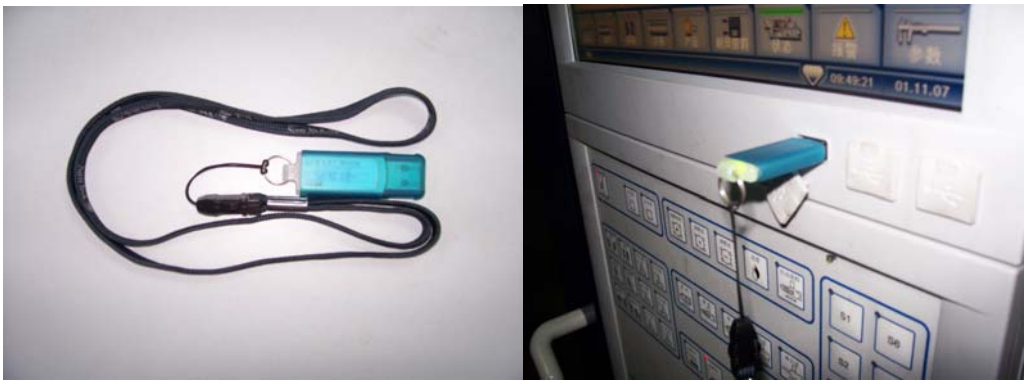


Fig 5.2.6(6) Connect the USB connecter with a special U disk

(2)、Reset KEB inverter

Before uploading motor's parameters to KEB inverter, we must resume KEB settings, called RESET KEB.

Steps as following:

① After entering into the main menu, click 'Parameter' to enter into 'Parameter-setting' menu. See fig 5.2.6(8)

② Click 'Triangle button' on bottom right to turn to 'Confidential parameter' menu. See fig 5.2.6(8)

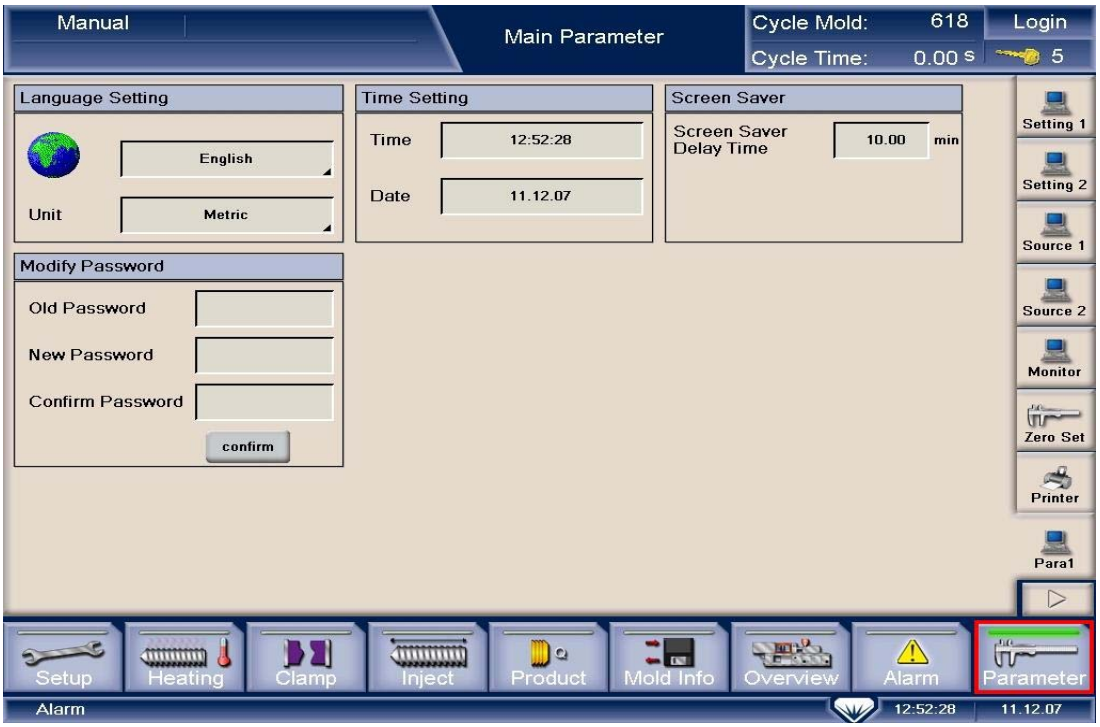


Fig 5.2.6(8) Parameter-setting menu

③ Click ‘KEB-Inject’ to enter into ‘Injection KEB parameter’ menu.

See fig 5.2.6(9)

Notice: ‘KEB-Inject’ corresponds to the servo inverter.

④ Click ‘Reset KEB’, then click ‘Yes’ in the dialog area to reset KEB. The screen and keyboard will reboot.

See fig 5.2.6(10) and fig 5.2.6(11)

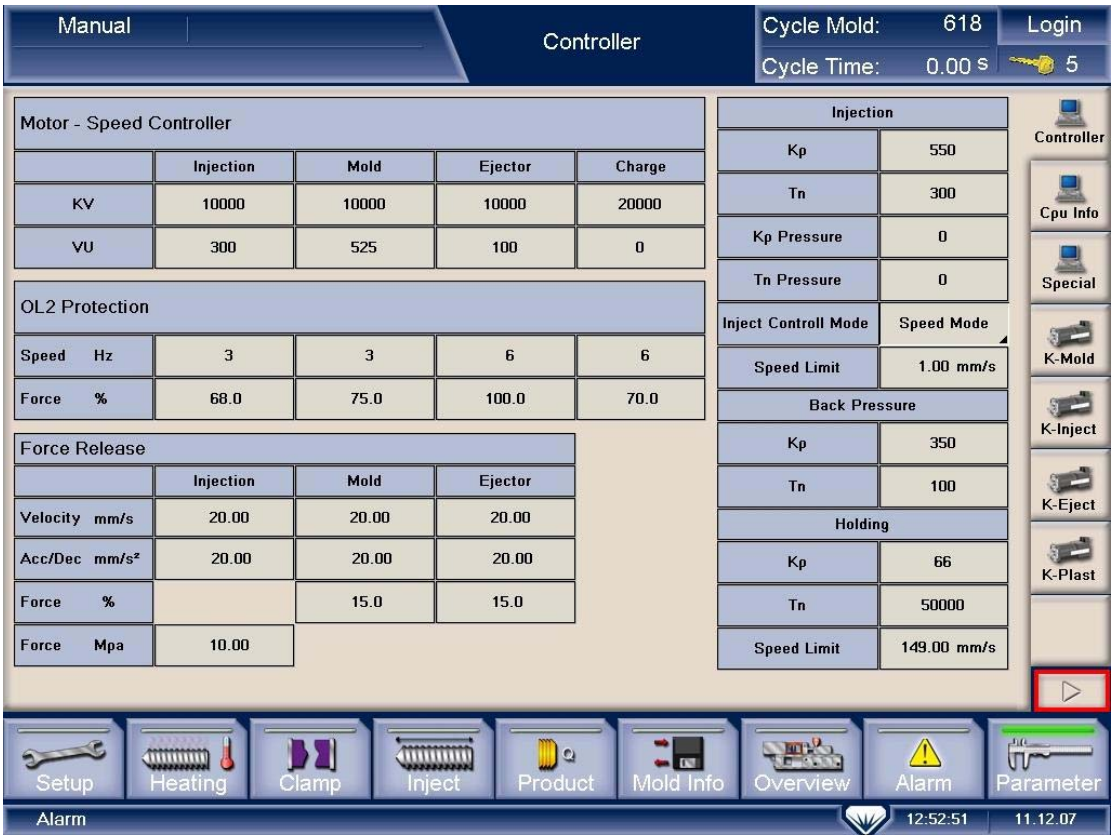


Fig 5.2.6(9) selecting menu of inverter

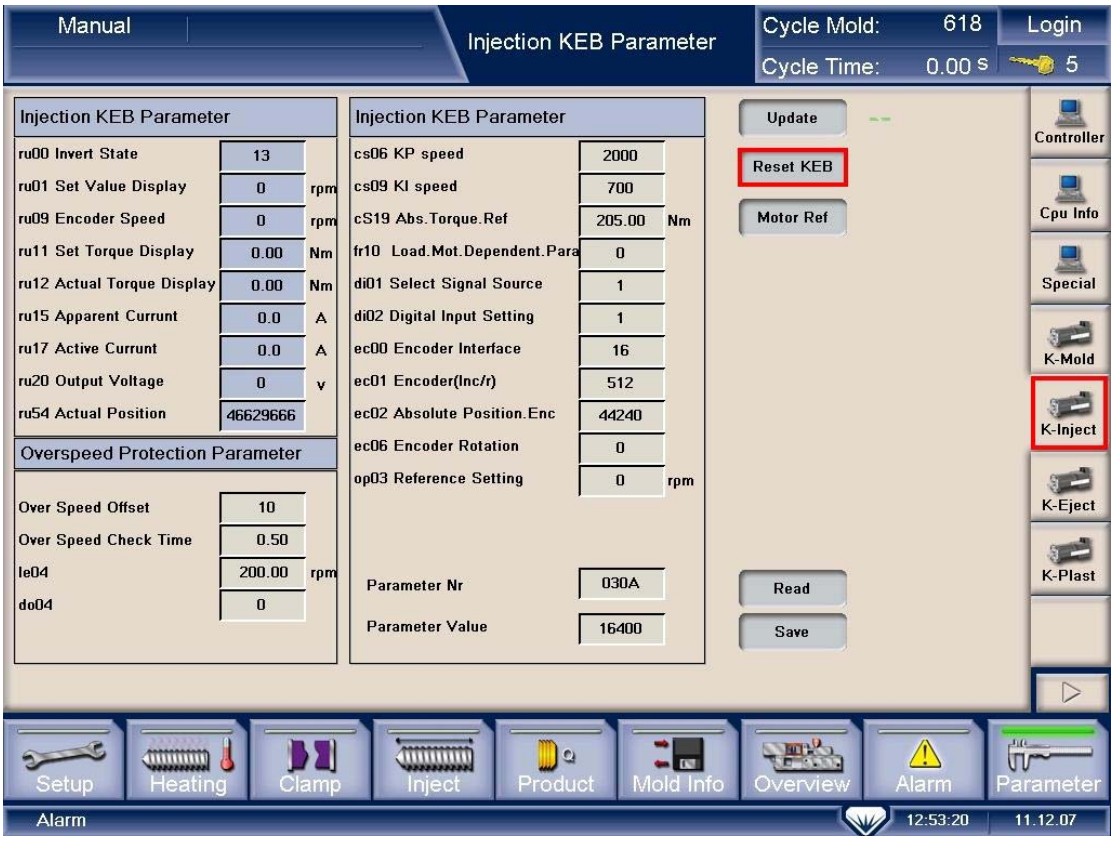


Fig 5.2.6(10) KEB parameter menu of injection

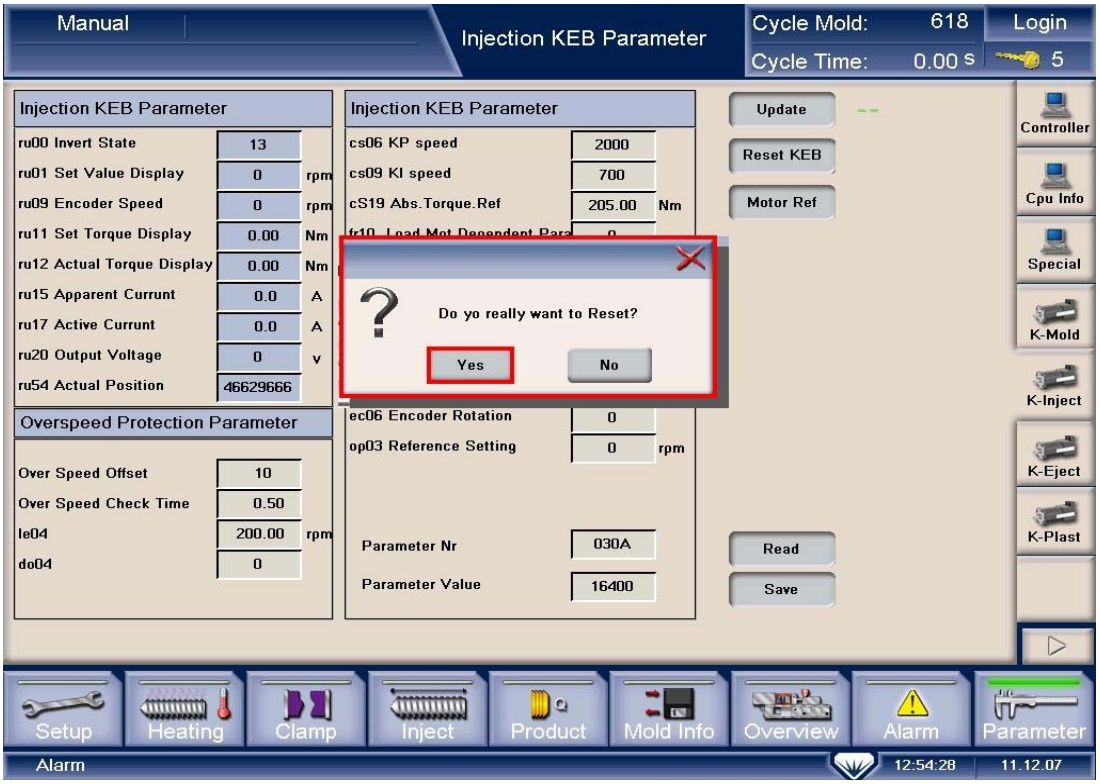


Fig 5.2.6(11) KEB reset dialog box

(3)、Search for the motor's reference

① After reboot, click 'mold info'. See fig 5.2.6(12).

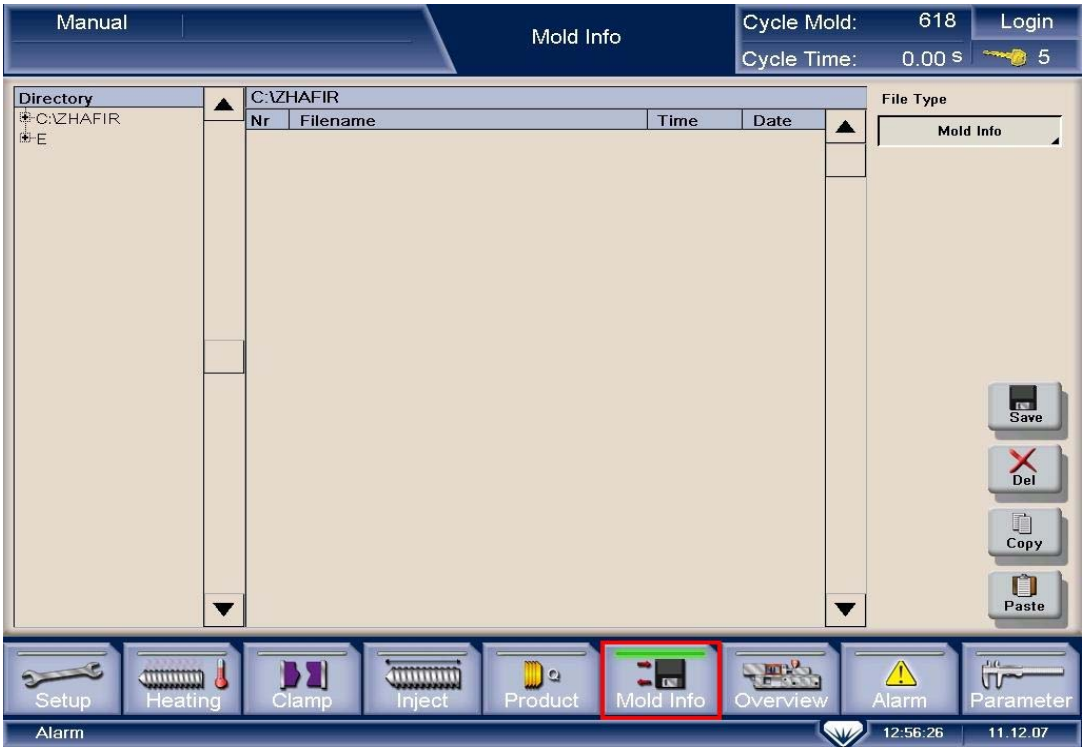


Fig 5.2.6(12) menu of mould data

② On the left of the menu there is a 'Directory'. Select 'E' disc after insert an USB. Then select the files in which contains motor parameters, that is E——KEB Motor Parameter—ALPHA60 (Notice: ALPHA60 includes four motor parameter files). Select 'KEB Injection File' which is in the 'File Type' option. Then there appears a file in the middle of the menu named 'INJECT.IK'. See fig5.2.6(13).

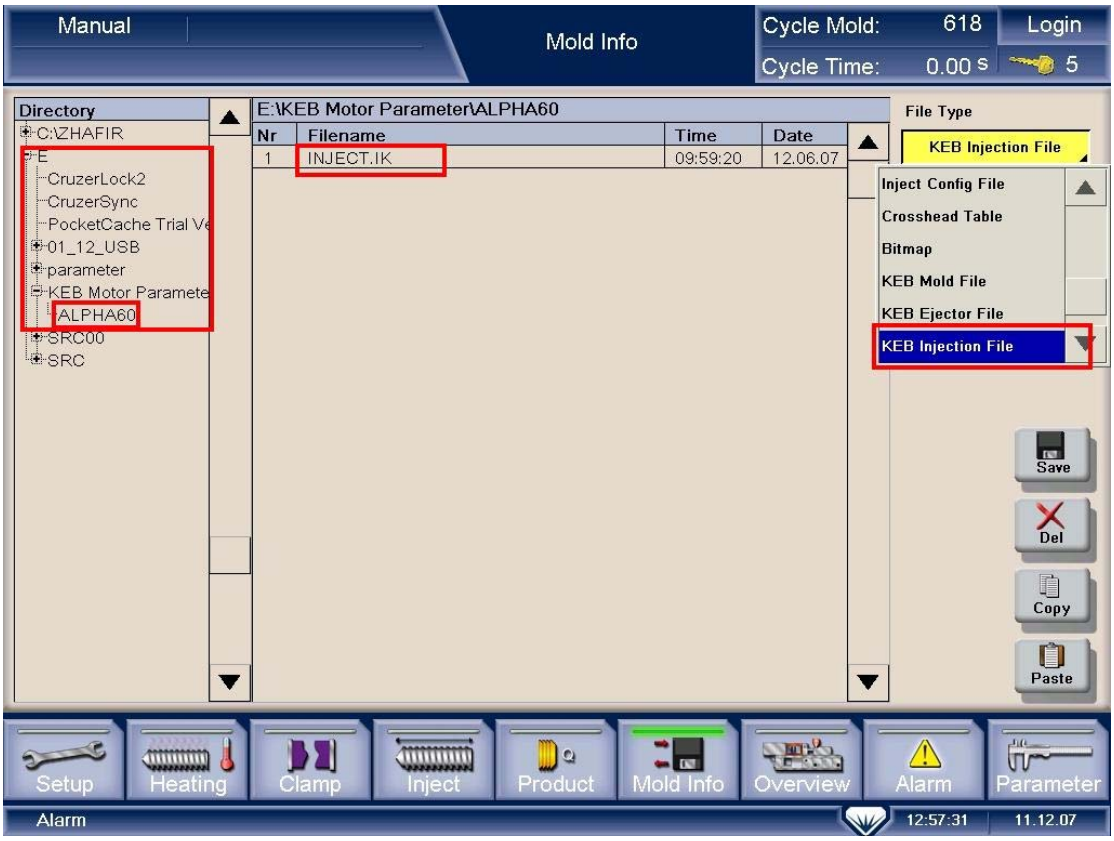


Fig 5.2.6(13) steps before parameter uploading

③ Double-click ‘INJECT.IK’. There will appear a dialog box. Select ‘Yes’ to upload injection motor parameters to KEB inverter, and click ‘OK’ when uploading completes.

See fig 5.2.6(13) and fig 5.2.6(14)

Now, preparative works of searching for the reference have been done.

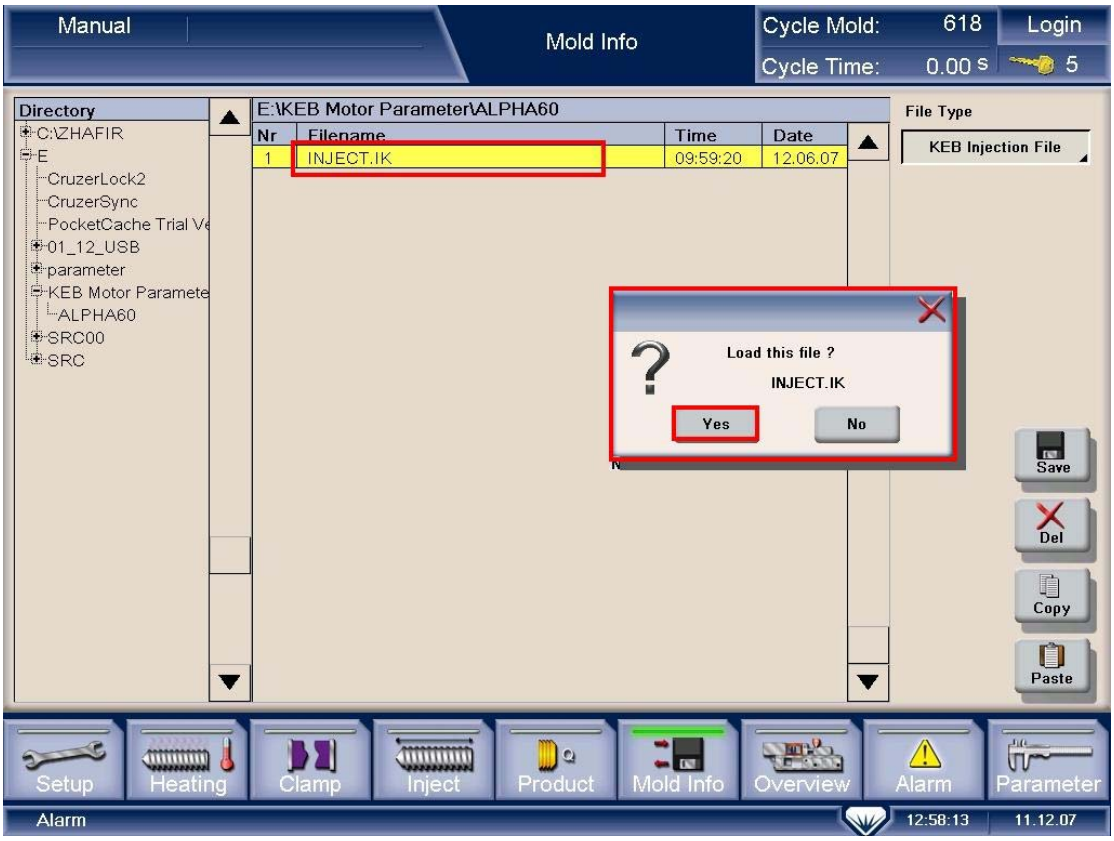


Fig 5.2.6(14) upload dialog box

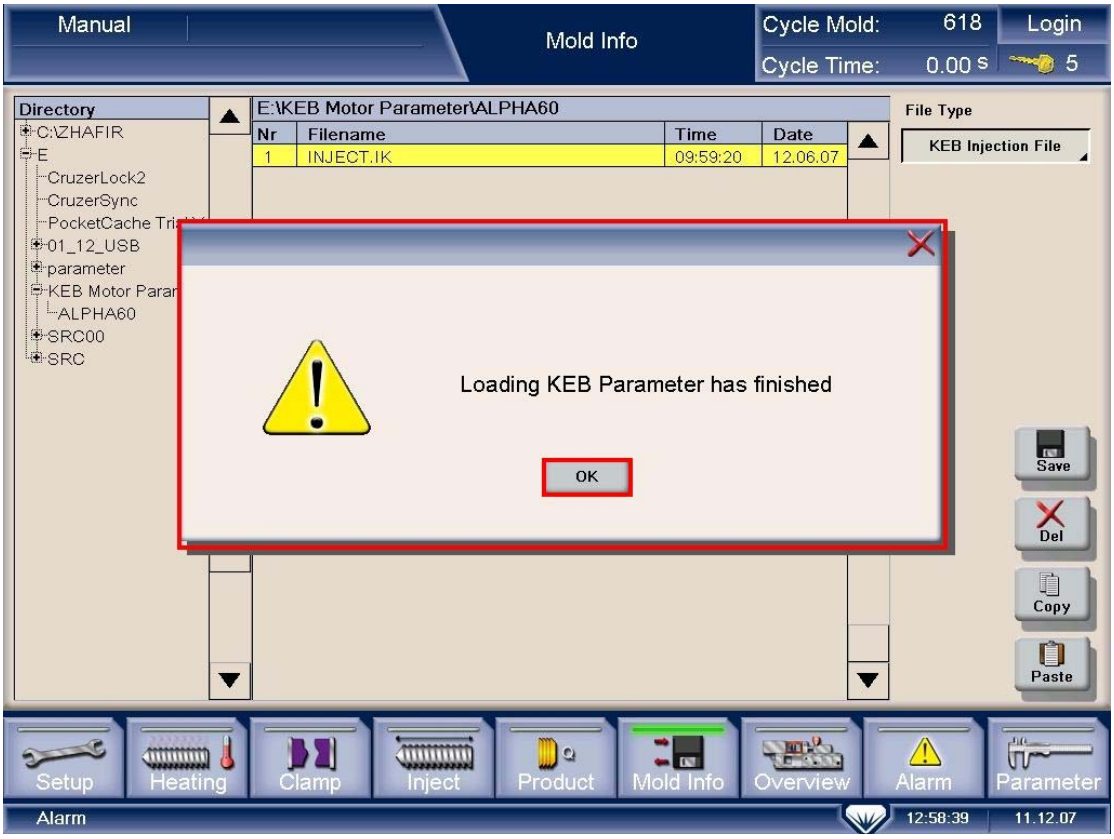


Fig 5.2.6(15) uploading finished

3、Search for the motor's reference.

(1) Start searching

Click 'update' on 'inject KEB parameter' menu, with green lights on. Then click the button 'Motor Reference', and click 'start' in the dialog box to start searching. See fig 5.2.6(16)

Notice: Please check again that the belt is off, otherwise, it will cause serious damage to machine parts. Meanwhile, 'update' must be turned on with operators near by while searching.

(2) During searching

Fig 2.2.5(17) shows midway on searching and 5.2.6(18) shows the end of searching.

While searching, consult fig 5.2.6(15) to check if the searching process is normal and if the searching is finish.

Observing parameter **ru00**, while the value reaches 82, it means reference starting.

(3) End of searching

Observe parameter **Ec02.** It is the reference of the inverter' software when parameter **Ec02** is fixed.
After searching, set di02=0, then set di02=1.
Turn off "motor off:
Turn on "motor on"
The reference searching is finish now.

Parameter	Content of parameter	Parameter state display
Ru00	inverter state	82
Ru15	apparent current	0——rated current
Ec02	absolute pos. enc.1	Dynamic changing

Table 5.2.6(15)

Other 3 servo motors have the similar searching process, so do not describe here any more.

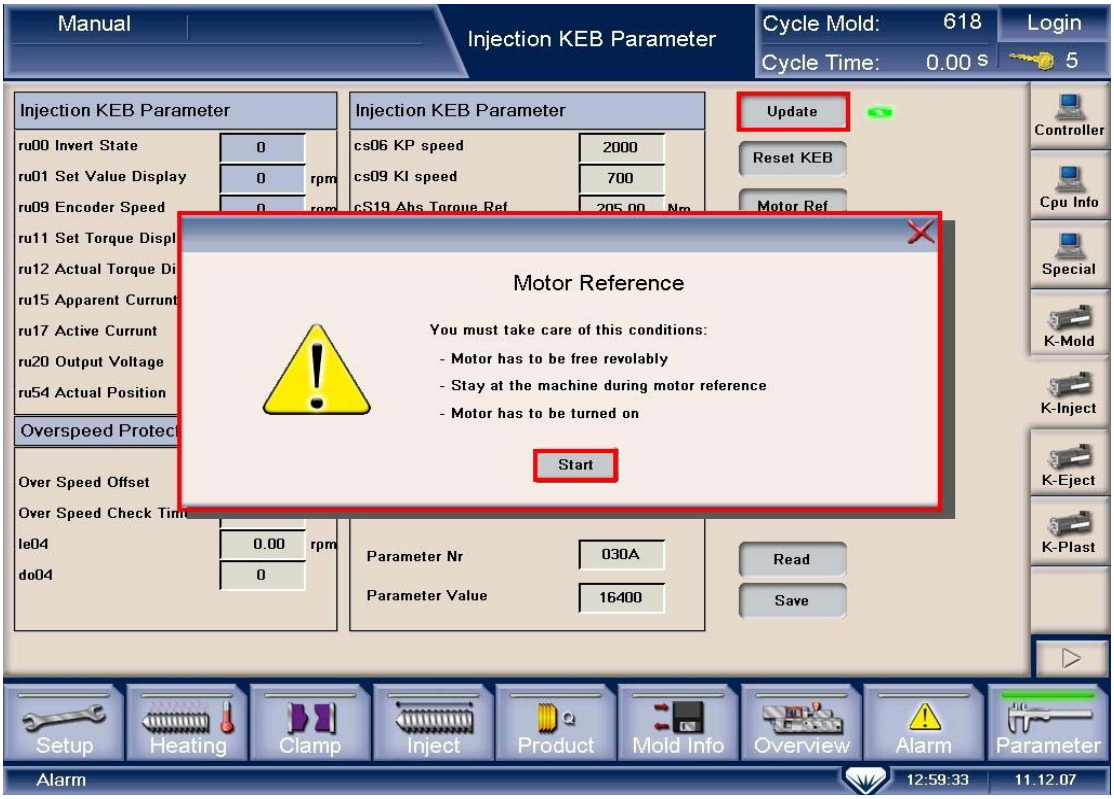


Fig 5.2.6(16) dialog boxes of searching for the reference

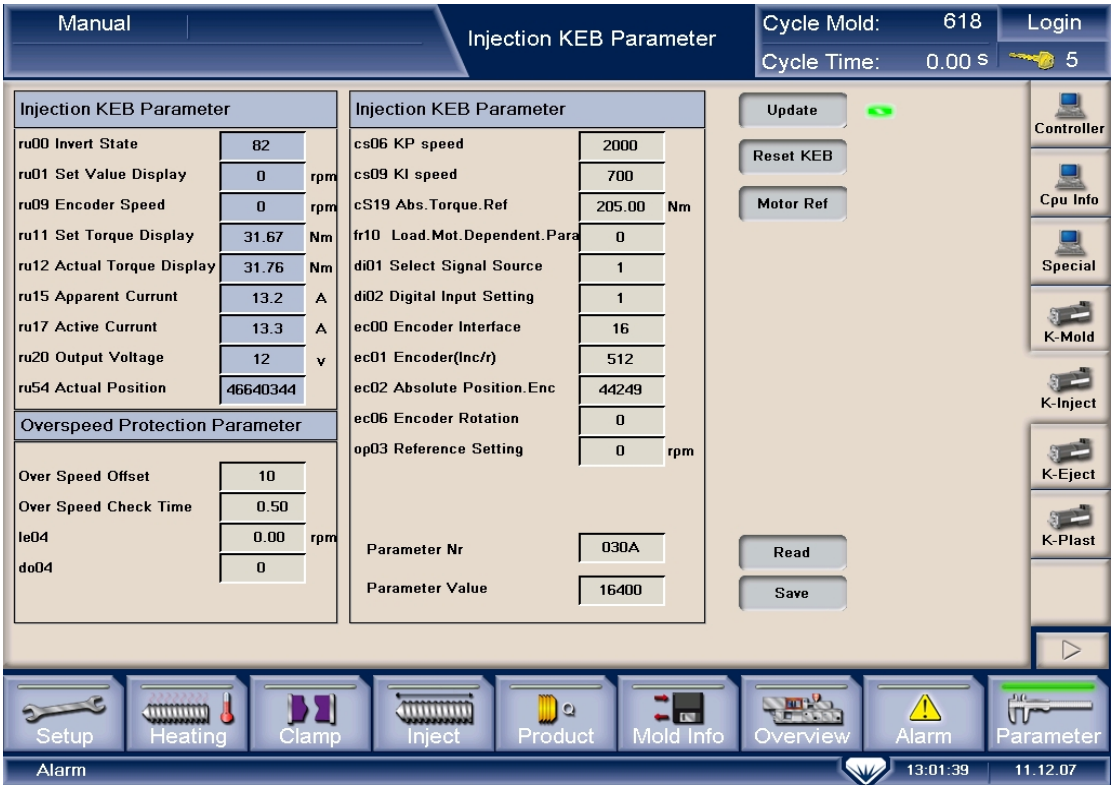


Fig 5.2.6(17) midway on searching

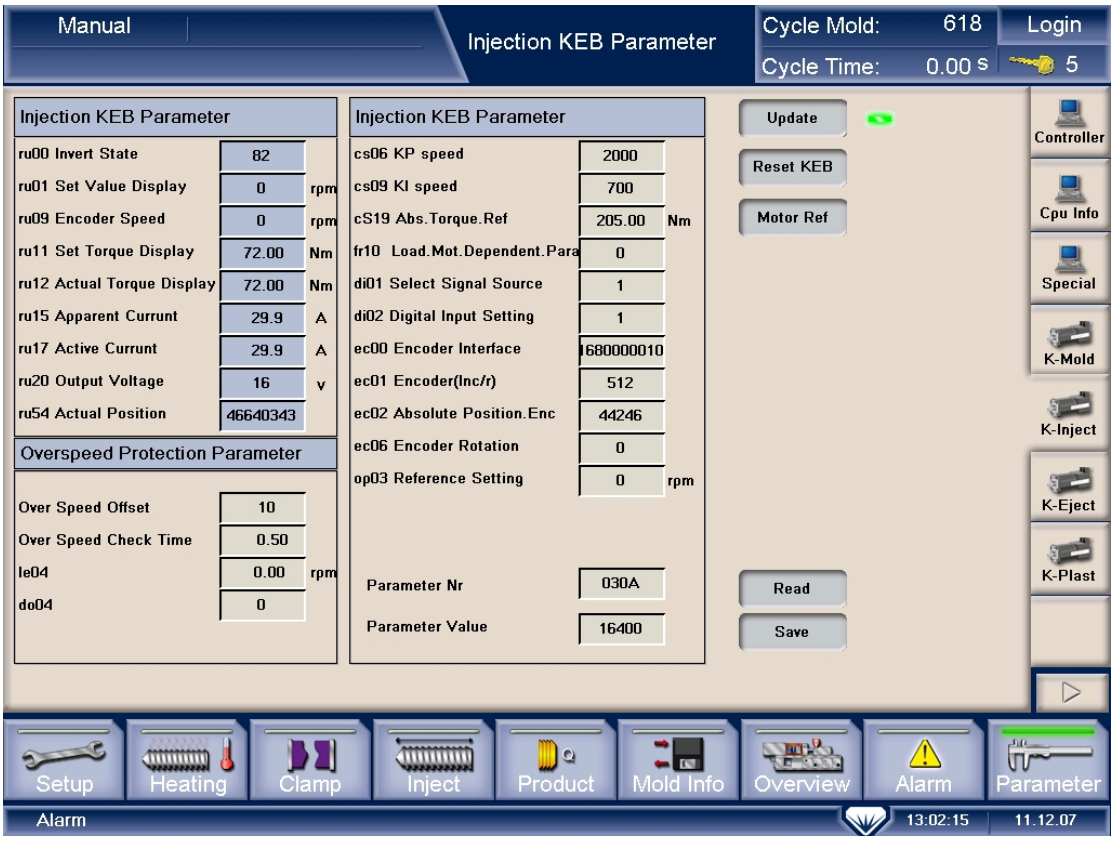


Fig 5.2.6(18) the end of searching

Ⅱ、Test running of the servo motor

Venus has 4 servo motors in all. Here, mainly introduce test running process of the injection servo motor, while other three are similar.

(1)、Test running of the injection servo motor

Steps as following:

1. Return to mechanical reference

2. Test running at low speed

3. Test running at middle speed

4. Test running at high speed

1、Return to mechanical reference

Enter into menu “Zero Setting”. Choose “On” in the dialog of “Zero Status”, and then click “Zero End” of “Injection Axis” with “Encoder Value” to 0.00mm. See fig
5.2.6(19).

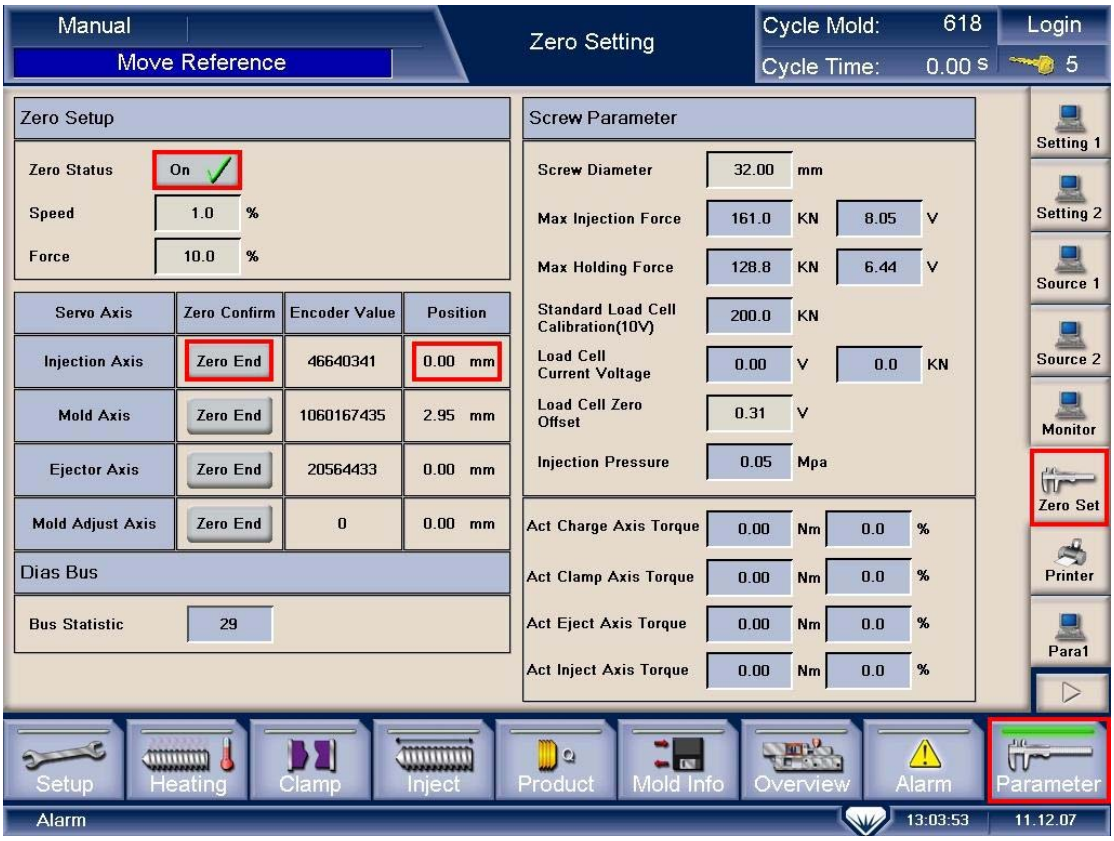


Fig 5.2.6(19)

2、Test running at low speed

(1) “Suck back” settings

Enter into menu ‘Charge’. Set up ‘Zones’ to ‘1’, then set up ‘SE’ to maximal. (For this machine the maximal injection stroke is 115mm)

Next set up the suck back speed to 15mm/s (We set 10% of the maximal speed as low speed in test running, while maximal speed is 150mm/s). At last set up ‘Safety Time’ to ‘20s’. See fig 5.2.6(20).

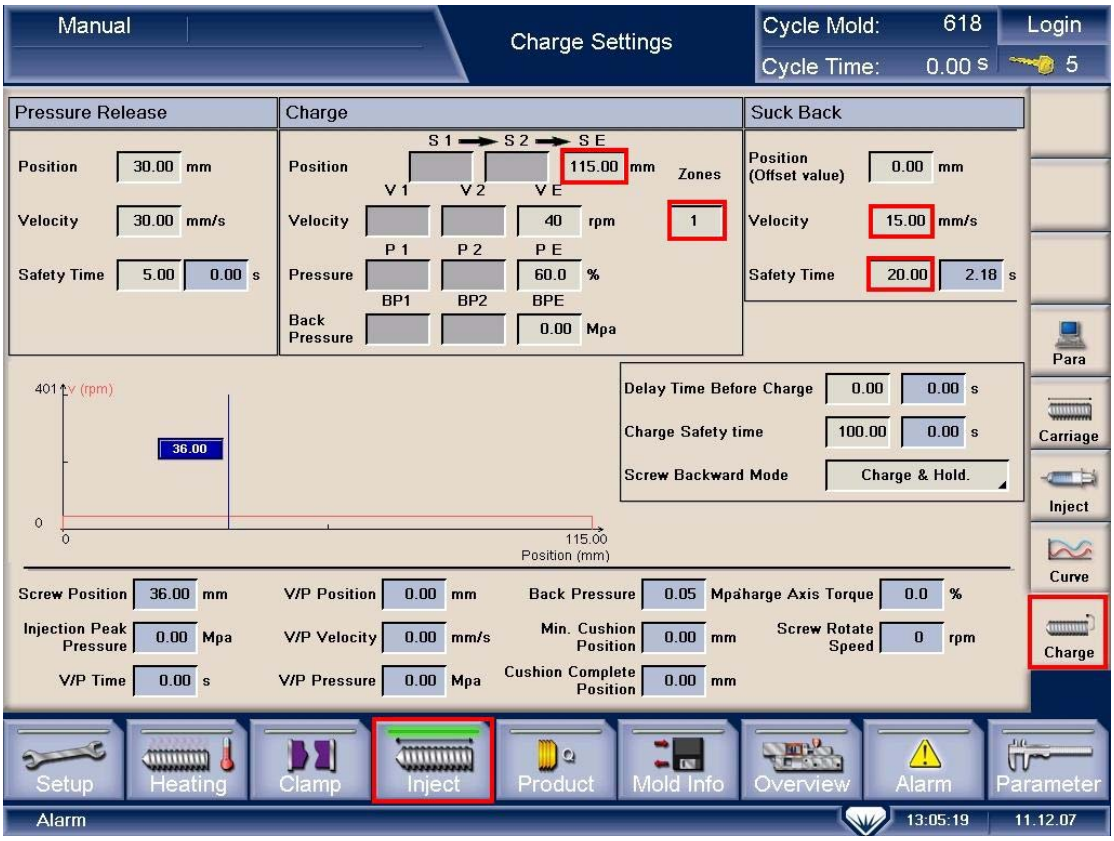


Fig 5.2.6(20)

(2) “Injection” settings

Enter into ‘Injection’ of menu “Injection settings”. Enter into ‘position mode’ of menu ‘V/P mode’, and set up ‘V/P time’ to 20s. Then set up injection ‘speed’ with 15mm/s (This speed is 10% of the maxium speed, the same as the suck back speed). Set up ‘pressure’ with 100Mpa (Notice: This value cannot be 0Mpa). At last set up ‘zones’ to 3. See fig 5.2.6(21)

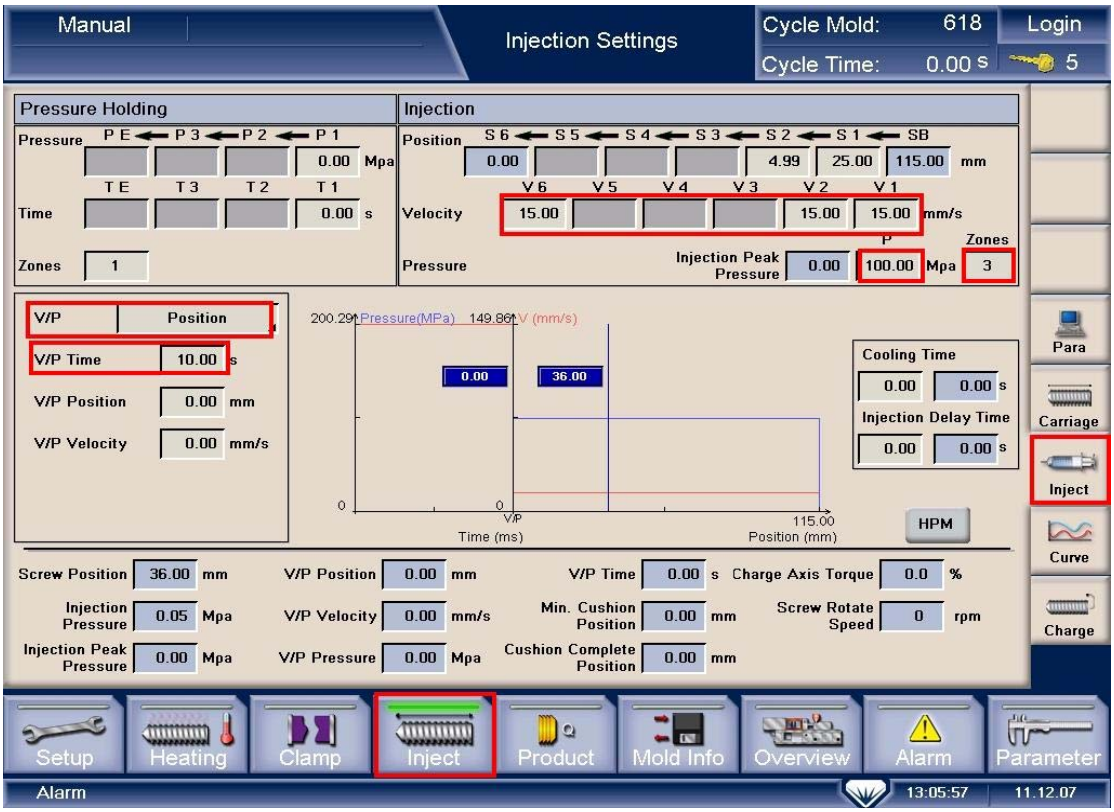


Fig 5.2.6(21)

(3) Observe the running status

Turn on ‘heating’ and ‘motor on’ on the keyboard. Press buttons ‘inject’ and ‘suck back’ to rotate motor. Enter into menu ‘Injection KEB Parameter’ to observe the running status.

If actual parameters correspond with those in table 5.2.6(22) and there is no vibration or noise, then the motor and the inverter both work well.

Parameter	Content of parameter	Parameter state display
Ru00	inverter state	66
Ru01	setpoint value display	±1600
Ru09	encoder 1 speed	close to±1600
Ru15	apparent current	less than 1 A

Table 5.2.6(22)

(4) Set the direction of motor rotation.

Press the button ‘inject’ and ‘suck back’ on the keyboard. Observe the motor’s rotation from the axis direction. Fig 5.2.6(23) gives the concept of axis

direction.

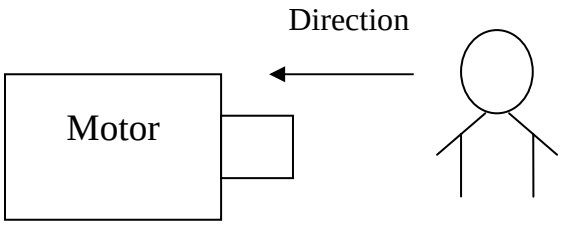


Fig 5.2.6(23) the concept of axis direction

Motor	Direction of the axis			
	40T——410T			
Injection Servo Motor	Inject	Anticlockwise	Suck back	Clockwise

Table 5.2.6(24)

If the direction is as fig 5.2.6(24), then it is correct. If not, we have to adjust it.

Methods as following:

Enter into 'Injection KEB Parameter'. See fig 5.2.6(25).

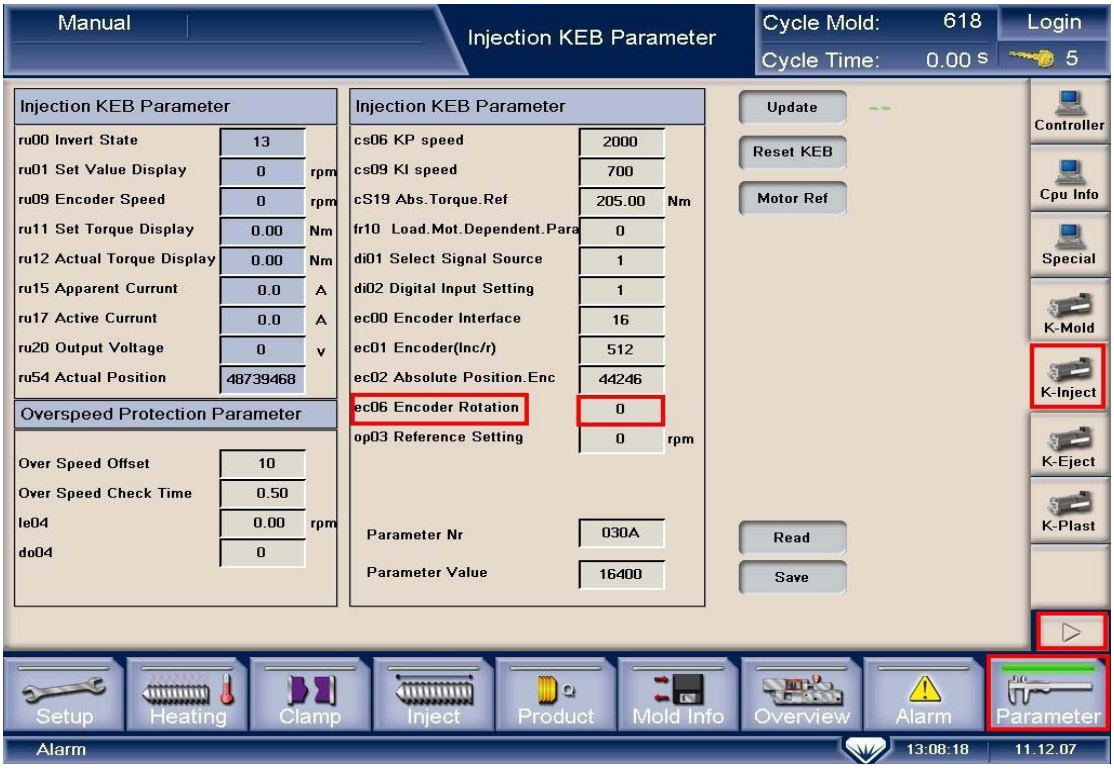


Fig 5.2.6(25)

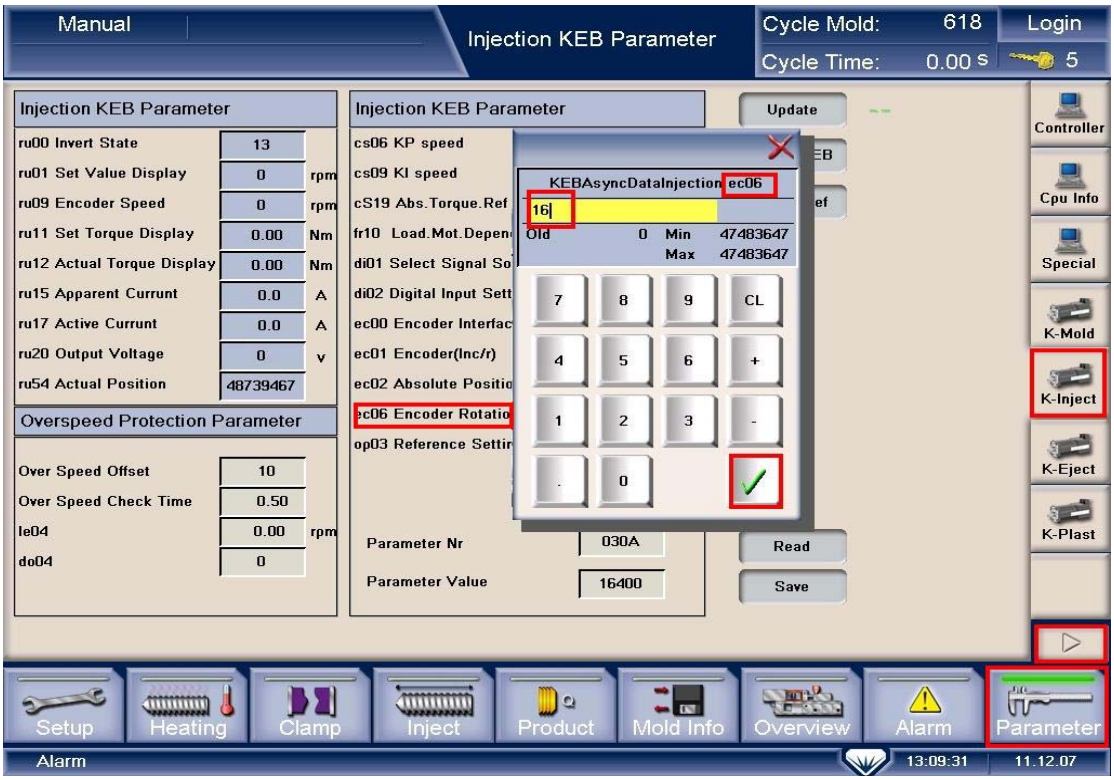


Fig 5.2.6(26)

Set up the value of ‘ec06’ to adjust the direction.

If the current value of ‘ec06’ is ‘0’, then change the value to ‘16’ to adjust the direction;

If the current value of ‘ec06’is ‘16’, then change the value to ‘0’ to adjust the direction;

If the current value of ‘ec06’ is ‘1’, then change the value to ‘17’ to adjust the direction;

If the current value of ‘ec06’ is ‘17’, then change the value to ‘1’ to adjust the direction.

Please reconfirm the directions of inject and suck back.

See fig 5.2.6(26).

3、Test running at middle speed

Turn on “motor off” and set up the speed of ‘inject’ and ‘suck back’ into ‘50%’, which is 75mm/s here. Turn on “Motor on” and choose “Inject” and “Suck back” on the keyboard. Then enter into menu ‘‘Injection KEB Parameter’ to observe the status. If actual parameters correspond with those in table 5.2.6(27), but no

vibration or noise, then the motor and the inverter both work well.

Parameter	Content of parameter	Parameter state display
Ru00	inverter state	66
Ru01	Setpoint value display	±8000
Ru09	encoder 1 speed	close to±8000
Ru15	apparent current	less than 1 A

Table 5.2.6(27)

4、Test running at high speed

Turn on “motor off” and set up the speed of ‘inject’ and ‘suck back’ to the maximal speed, which is 15mm/s here.

Turn on “Motor on” and choose “Inject” and “Suck back” on the keyboard. Then enter into menu ‘‘Injection KEB Parameter’ to observe the status. If actual parameters correspond with those in table 5.2.6(28), but no vibration or noise, then the motor and the inverter both work well.

Parameter	Content of parameter	Parameter state display
Ru00	inverter state	66
Ru01	Setpoint value display	±16000
Ru09	encoder 1 speed	close to±16000
Ru15	apparent current	less than 1 A

Table 5.2.6(28)

Now, test running of servo motor has been finished have finished. Next is to install the synchronous belt on servo motor.

(2)、Test running of charge motor

The charge axis need not return to mechanical reference.

Steps:

1、 Test running at low speed

2、 Test running at middle speed

3、 Test running at high speed

1、Test running at low speed

(1) Charge settings

Enter into menu ‘Charge settings’.

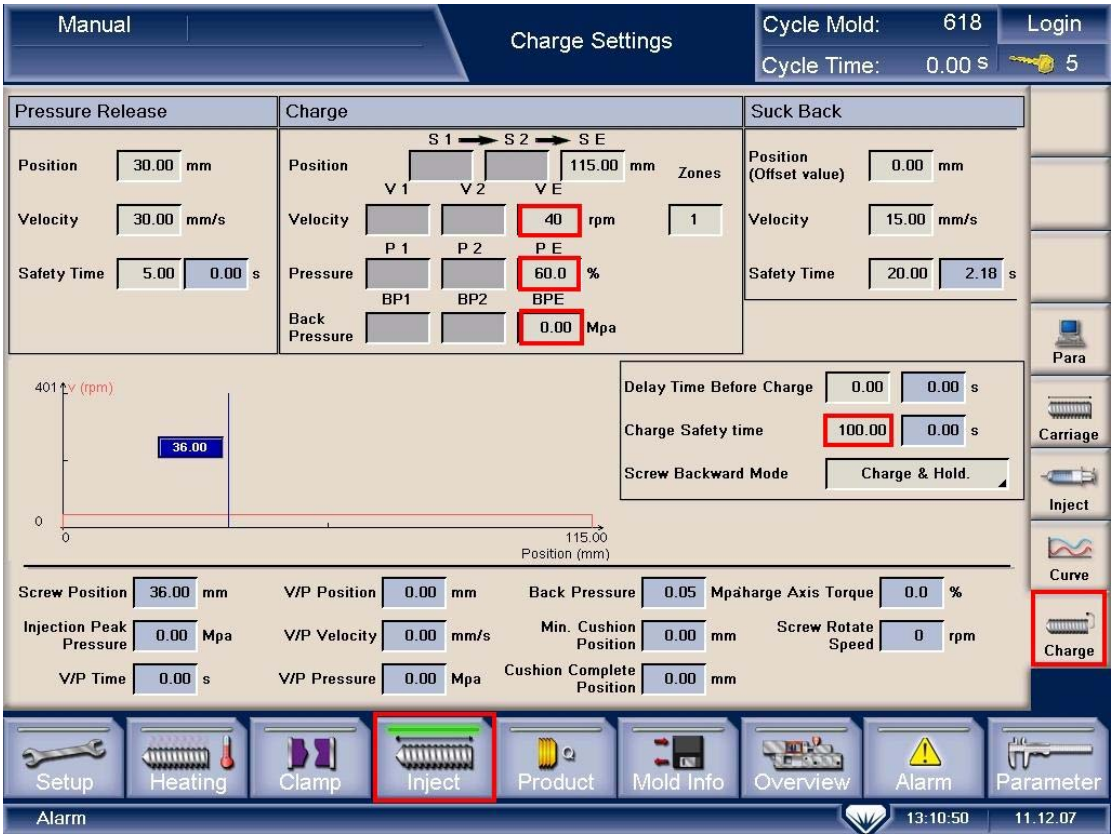


Fig 5.2.6(29)

Set ‘Velocity’ to ‘40rpm’ (10% of the maximal speed), ‘Pressure’ to ‘60%’, ‘Back pressure’ to 0 and ‘Charge Safety Time’ to ‘100s’. See fig 5.2.6(29)

(2) Observe running status

Turn on ‘Heating’ and ‘Motor On’ on the keyboard and click ‘Charge’ to rotate the motor. Enter into the menu ‘Charge KEB Parameter’.

If actual parameters correspond with those in table 5.2.6(30) and there is no vibration or noise, then the motor and the inverter both work well.

Parameter	Content of parameter	Parameter state display
ru00	inverter state	66
ru01	Setpoint value display	±1600
ru09	encoder 1 speed	close to±1600
ru15	apparent current	less than 1 A

Table 5.2.6(30)

(3) Set the direction of motor's rotation.

Observe the motor's rotation from the axis direction.

Motor	Direction of the axis	
	40T——410T	
Charge Servo Motor	Charge	Clockwise

Fig 5.2.6(31)

If the direction is as fig 5.2.6(31), then it is correct. If not, we have to adjust it. Methods refer to injection motor.

2、Test running at middle speed

Turn on 'motor off' and set charge 'Velocity' to 50%, which is 200rmp in this example.

Turn on 'Motor on' and choose 'Charge' on the keyboard to rotate the motor. Then enter into menu ''Injection KEB Parameter' to observe the status. If actual parameters correspond with those in table 5.2.6(32), but no vibration or noise, then the motor and the inverter both work well.

Parameter	Content of parameter	Parameter state display
ru00	inverter state	66
ru01	Setpoint value display	±8000
ru09	encoder 1 speed	close to±8000
ru15	apparent current	less than 1 A

Fig 5.2.6(32)

3、Test running at high speed

Parameter	Content of parameter	Parameter state display
ru00	inverter state	66
ru01	Setpoint value display	±16000
ru09	encoder 1 speed	close to±16000
ru15	apparent current	less than 1 A

Fig 5.2.6(33)

Turn on 'motor off' and set charge 'Velocity' to 100%, which is 400rmp in this example.

Turn on ‘Motor on’ and choose ‘Charge’ on the keyboard to rotate the motor. Then enter into menu ‘‘Injection KEB Parameter’ to observe the status. If actual parameters correspond with those in table 5.2.6(33), but no vibration or noise, then the motor and the inverter both work well.

Now, test running of servo motor has been finished have finished. Next is to install the synchronous belt on servo motor.

(3)、Test running of mold motor

Steps:

1、 Return to mechanical reference

2、 Test running at low speed

3、 Test running at middle speed

4、 Test running at high speed

1、Return to mechanical reference

Please refer to injection servo motor.

2、Test running of low speed

(1) Mold Open Settings

Set ‘Zones’ to 3, ‘Safty time’ to 12s, ‘Velocity’ to 10%. See fig 5.2.6(34).

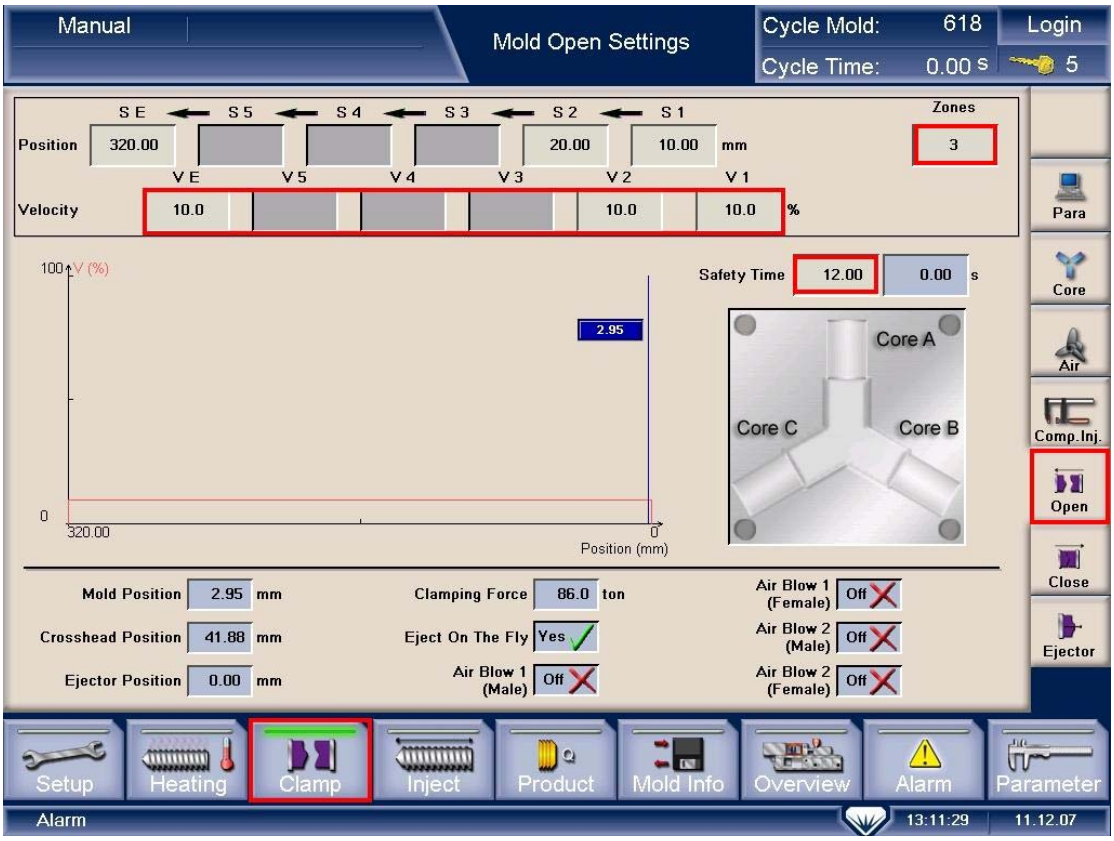


Fig 5.2.6(34)

(2) Mold Close Settings

Set ‘Zones’ to ‘4’, ‘Safety Time’ to ‘12s’ and ‘Velocity’ to‘10%’. See fig 5.2.6(35).

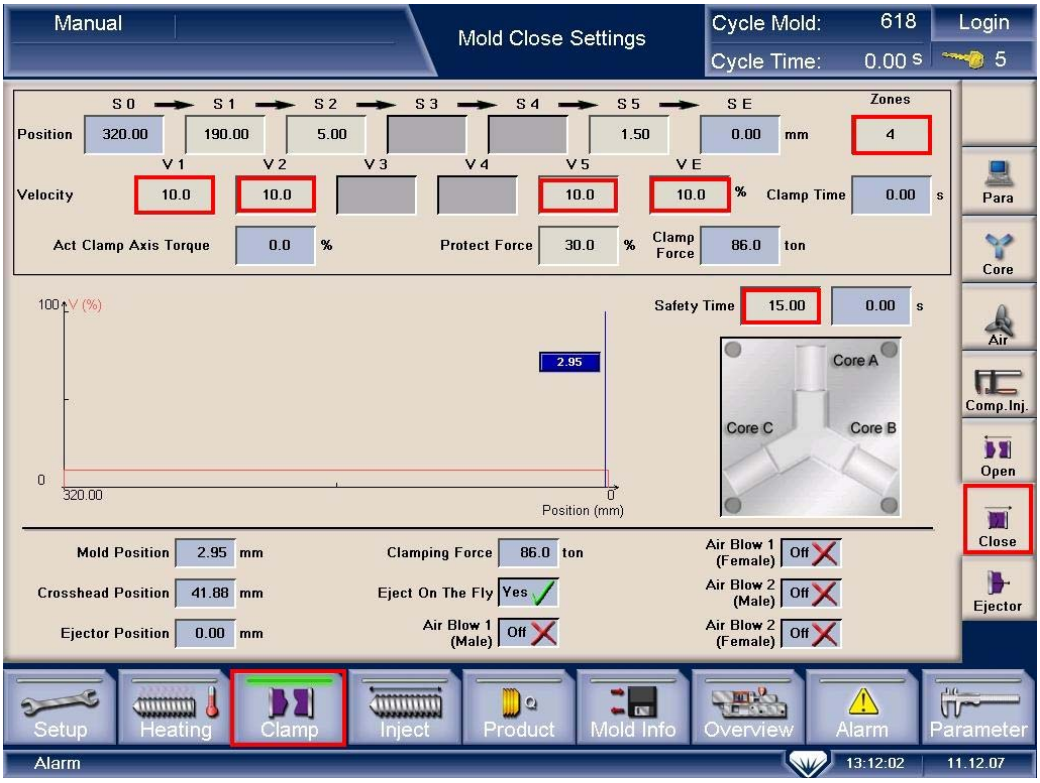


Fig 5.2.6(35)

(3) Observe running status

Turn on ‘Motor On’ and click ‘Mold Open’ and ‘Mold Close’ on the keyboard to rotate the motor. Enter into the menu ‘Mold KEB Parameter’ to observe the running status.

If actual parameters correspond with those in table 5.2.6(36) and there is no vibration or noise, then the motor and the inverter both work well.

Parameter	Content of parameter	Parameter state display
ru00	inverter state	66
ru01	Setpoint value display	±1600
ru09	encoder 1 speed	close to±1600
ru15	apparent current	less than 1 A

Table 5.2.6(36)

(4) Set the direction of motor’s rotation

Observe the motor’s rotation from the axis direction.

Motor	Direction of the axis			
	40T——410T			
Mold Servo Motor	Mold Open	Clockwise	Mold clamp	Anticlockwise

Table 5.2.6(37)

If the direction is the same as in fig 5.2.6(37), then it is correct. If not, we have to adjust it. Methods refer to injection motor.

3、Test running at middle speed

Turn on ‘Motor Off’ and set mold close ‘Velocity’ to 50%.

Turn on ‘Motor On’ and click ‘Mold Open’ and ‘Mold Close’ on the keyboard to rotate the motor. Enter into the menu ‘Mold KEB Parameter’ to observe the running status.

If actual parameters correspond with those in table 5.2.6(38) and there is no vibration or noise, then the motor and the inverter both work well.

Parameter	Content of parameter	Parameter state display
ru00	inverter state	66
ru01	Setpoint value display	±8000
ru09	encoder 1 speed	close to±8000
ru15	apparent current	less than 1 A

Table 5.2.6(38)

4、Test running at high speed

Turn on ‘Motor Off’ and set mold close ‘Velocity’ to 100%.

Turn on ‘Motor On’ and click ‘Mold Open’ and ‘Mold Close’ on the keyboard to rotate the motor. Enter into the menu ‘Mold KEB Parameter’ to observe the running status.

If actual parameters correspond with those in table 5.2.6(39) and there is no vibration or noise, then the motor and the inverter both work well.

Parameter	Content of parameter	Parameter state display
ru00	inverter state	66
ru01	Setpoint value display	±16000
ru09	encoder 1 speed	close to±16000
ru15	apparent current	less than 1 A

Table 5.2.6(39)

Now, test running of servo motor has been finished have finished. Next is to install the synchronous belt on servo motor.

(4)、Test running of ejector motor

Steps:

1、 Return to mechanical reference

2、Test running at low speed

3、Test running at middle speed

4、Test running at high speed

1、Return to mechanical reference

Please refer to injection servo motor.

2、Test running of low speed

(1) Ejector Settings

Set ‘Zones’ of Eject forward to 1, ‘Position’ to the maximum, which is 80mm in this example, and set ‘Velocity’ to 10%.

Set ‘Zones’ of Eject Backward to 1, ‘position’ ‘SE’ to 0, ‘Velocity’ to 10%. Set ‘Eject Mode’ to ‘Semi Eject’, Eject Counter’ to 1, ‘Safty time’ to 12s. See fig 5.2.6(40).

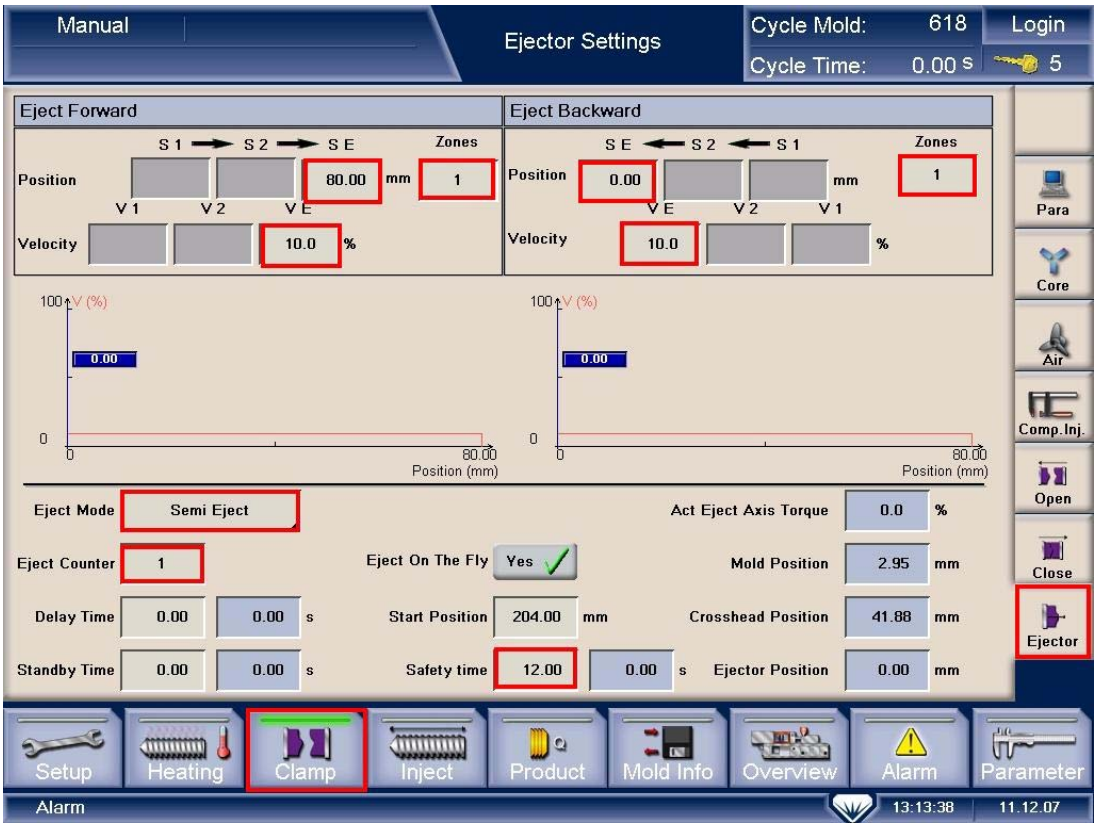


Fig 5.2.6(40)

(2) Observe running status

Turn on ‘Motor On’ on the keyboard and click ‘Eject Forward’ and ‘Eject Backward’ to rotate the motor. Enter into the menu ‘Eject KEB Parameter’.

If actual parameters correspond with those in table 5.2.6(41) and there is no vibration or noise, then the motor and the inverter both work well.

Parameter	Content of parameter	Parameter state display
ru00	inverter state	66
ru01	Setpoint value display	±1600
ru09	encoder 1 speed	close to±1600
ru15	apparent current	less than 1 A

Table 5.2.6(41)

(3) Set the direction of the motor's rotation.

Observe the motor's rotation from the axis direction.

Motor	Direction of the axis			
	40T——410T			
Ejector Servo Motor	Ejector Forward	Anticlockwise	Ejector Backward	Clockwise

Table 5.2.6(42)

If the direction is the same as in table 5.2.6(42), then it is correct. If not, we have to adjust it. Methods refer to injection motor.

3、Test running at middle speed

Turn on 'Motor Off' and set 'Velocity' of eject forward and eject backward to 50%.

Turn on 'Motor On' and click 'Eject Forward' and 'Eject Backward' on the keyboard to rotate the motor. Enter into the menu 'Eject KEB Parameter' to observe the running status.

If actual parameters correspond with those in table 5.2.6(43) and there is no vibration or noise, then the motor and the inverter both work well.

Parameter	Content of parameter	Parameter state display
ru00	inverter state	66
ru01	setpoint value display	±8000
ru09	encoder 1 speed	close to±8000
ru15	apparent current	less than 1 A

Table 5.2.6(43)

4、Test running at high speed

Turn on ‘Motor Off’ and set ‘Velocity’ of eject forward and eject backward to 100%.

Turn on ‘Motor On’ and click ‘Eject Forward’ and ‘Eject Backward’ on the keyboard to rotate the motor. Enter into the menu ‘Eject KEB Parameter’ to observe the running status.

If actual parameters correspond with those in table 5.2.6(44) and there is no vibration or noise, then the motor and the inverter both work well.

Parameter	Content of parameter	Parameter state display
ru00	inverter state	66
ru01	Setpoint value display	±16000
ru09	encoder 1 speed	close to±16000
ru15	apparent current	less than 1 A

Table 5.2.6(44)

Now, test running of servo motor has been finished have finished. Next is to install the synchronous belt on servo motor.

Remarks: ‘ru01’ and ‘ru09’ display values are on the basis of the motor’s ‘rated speed’, which is 2000/rpm in this example, so we calculate like this:

For test running at low speed, |ru01|=2000×10%×8=1600rpm, |ru09| is around 1600rpm.

For test running at middle speed, |ru01|=2000×50%×8=8000rpm, |ru09| is around 8000rpm.

For test running at middle speed, |ru01|=2000×100%×8=16000rpm, |ru09| is around 16000rpm.

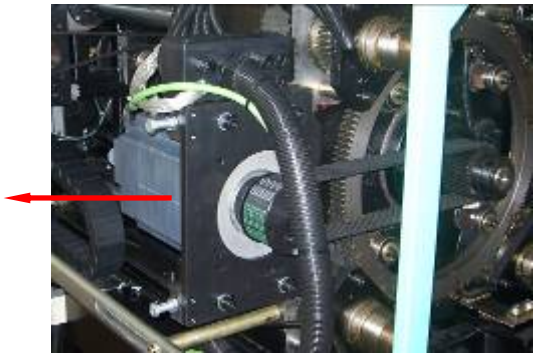
It is the same to calculate values of other rated speed motors.

5.2.7 Install synchronous-belt and test the tension

1、Clamping unit (Codes of components, see Fig 5.2.7(1) clamping unit.)
(1) Install synchronous-belt for clamping unit

① Put a belt on one gear, then tighten the belt and put the belt on the other gear.

②Install bolts (3 pieces) and gear cover



③ Strain the synchronous-belt by moving the motor outward(as the arrow shows).

④Tighten flange installation bolt (4 bolts must be tightened simultaneous)

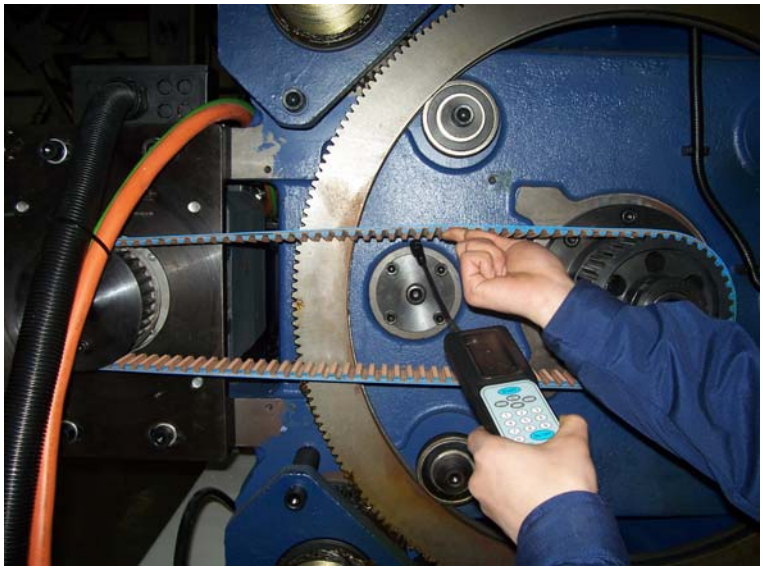


Fig 5.2.7(1) Test method of tensiometer

(2) Test on clamping synchronous-belt tension
⑤ Put the professional tensiometer (fig 5.2.7(1)) (Tensiometer directions refer to appendix II) away from the synchronous-belt about 10mm, and the best

position is in the middle of tow gears, then tension the belt by hands. The tensiometer displays tension values by measuring air vibration. Then compare to synchronous-belt tension-form (appendix I), to check if the belt tension is right or not.

⑥ If actual value is bigger, then it means the belt is too tight. First, loosen flange installation bolts; second, loosen tension adjusting bolts, at last do remember to tighten flange installation bolts before testing again. If the value is smaller, then it means the belt is to loose. First, loosen flange installation bolts; second, screw down the tension adjusting bolts; at last do remember to tighten flange installation bolts before testing again. Adjust the tension until its value is equal to the standard.

⑦ If the value is right, then tighten nuts first, and then screw down flange installation bolts.

Notice

Two tension adjusting bolts should be screwed down synchronously, to avoid imbalance and damage to the synchronous-belt while working.

2、Plastification unit

(1) Install synchronous-belt for plastification unit. (Codes of components see fig 2.2.1(3) plastification unit)

① Put the belt on one gear, then tighten the belt and put the belt on the other gear.

② Install bolts (3 pieces) and gear cover.

③ Strain the synchronous-belt by moving the motor outward.

④Tighten flange installation bolts (4 bolts must be tightened synchronously).

(2) Plastification synchronous-belt tension testing.

⑤ Put the professional tensiometer (fig 5.2.7(1)) (Tensiometer directions refer to appendix II) away from the synchronous-belt about 10mm, and the best position is in the middle of tow gears, then tension the belt by hands. The tensiometer displays tension values by measuring air vibration. Then compare to synchronous-belt tension-form (appendix I), to check if the belt tension is right or not.

⑥ If actual value is bigger, then it means the belt is too tight. First, loosen flange installation bolts; second, loosen tension adjusting bolts, at last do remember to tighten flange installation bolts before testing again. If the value is smaller, then it means the belt is to loose. First, loosen flange installation bolts; second, screw down the tension adjusting bolts; at last do remember to tighten

flange installation bolts before testing again. Adjust the tension until its value is equal to the standard.

⑦ If the value is right, then tighten nuts first, and then screw down flange installation bolts.

3、Ejector unit

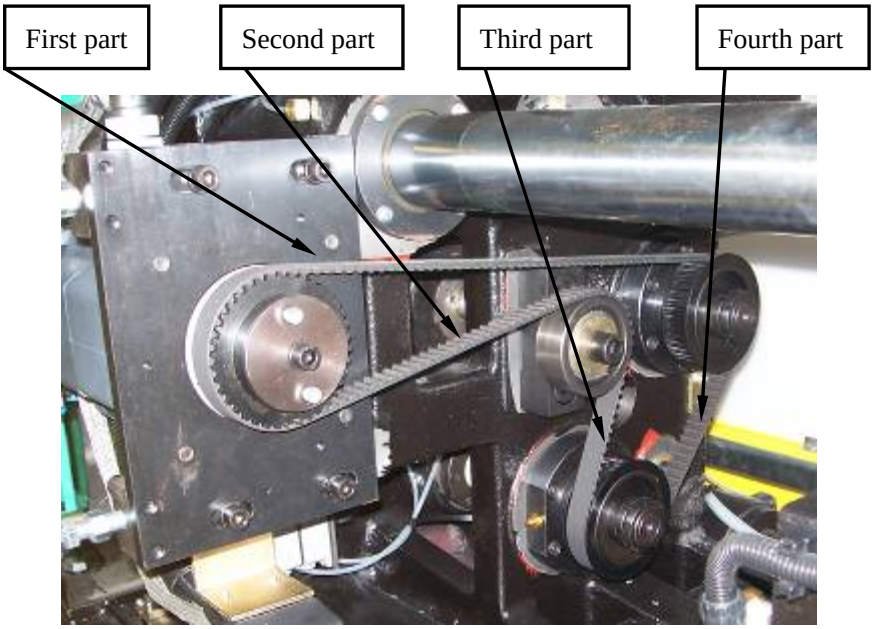


Fig 5.2.7(2) Ejector unit and the four parts of the belt

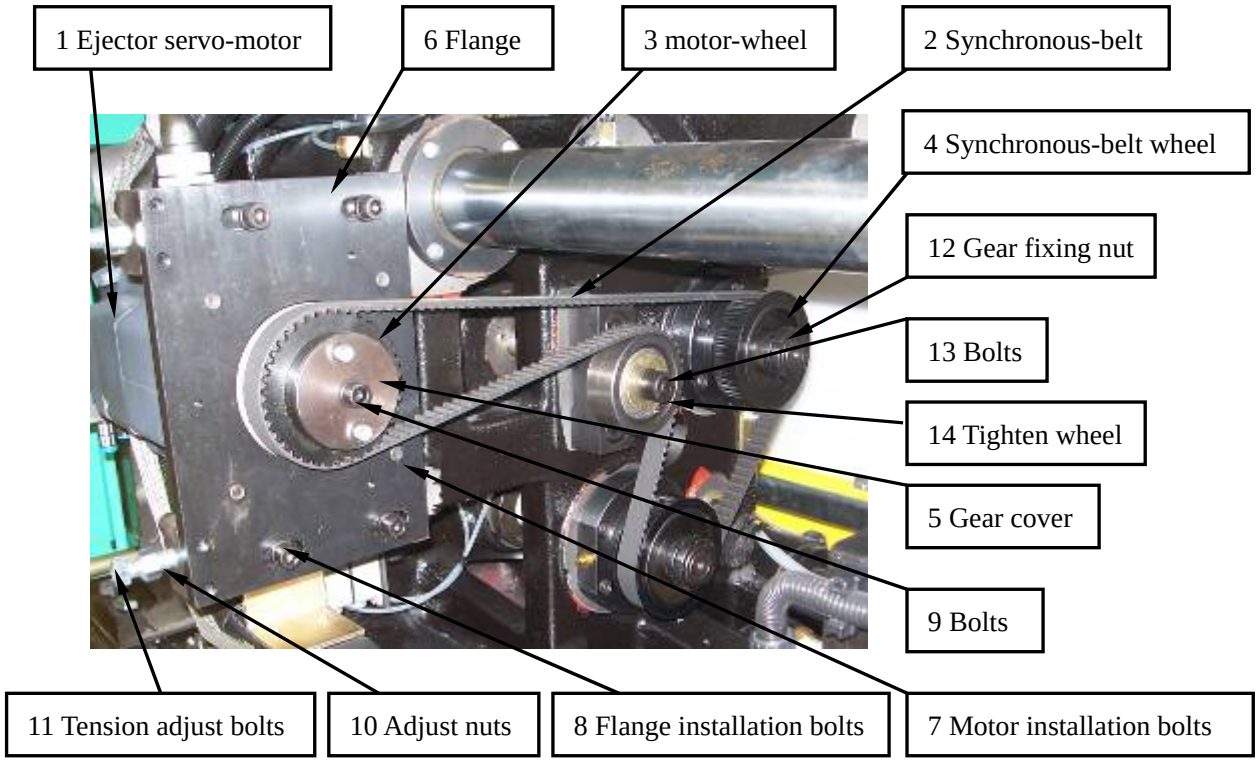


Fig5.2.7(3) Ejector unit and the four parts of the belt

(1) Install synchronous-belt.

①Rotate the synchronous-belt wheels4 (2 pieces) by hands. Let the ejector guide-panel on limit position (front-end or back-end).

②Put the belt on synchronous-belt wheels. Notice: tighten the first and third part of belt to keep the belt tension. Then the belt goes around tighten wheels, at the same time tighten the first and second part of belt to keep the belt tension. Finally put the belt on motor-wheel3 and keep the belt tension.

(2) Test on ejector synchronous-belt tension.

Divide the ejector synchronous-belt into fours parts, as Fig5.2.7(1). If the belt is well installed, according to the theory, when the belt is zero-distortion, the tension of each part should be same. So it is ok to test the first part which is longest part.

Testing approaches:

Tighten flange installation bolts (the four bolts must be tightened simultaneously).

⑤Put the professional tensiometer (Tensiometer directions refer to appendix II) away from the synchronous-belt about 10mm, and the best position is in the middle of tow gears, then tension the belt by hands. The tensiometer displays tension values by measuring air vibration. Then compare to synchronous-belt tension-form (appendix I), to check if the belt tension is right or not.

⑥ If actual value is bigger, then it means the belt is too tight. First, loosen flange installation bolts4; second, loosen tension adjusting bolts, at last do remember to tighten flange installation bolts before testing again. If the value is smaller, then it means the belt is to loose. First, loosen flange installation bolts; second, screw down the tension adjusting bolts; at last do remember to tighten flange installation bolts before testing again. Adjust the tension until its value is equal to the standard.

Notice: Two tension adjusting bolts should be screwed down synchronously, to avoid imbalance and damage to the synchronous-belt while working.

⑦ If the value is right, then tighten nuts first, and then screw down flange installation bolts. Installation and adjustment are finished.

4、Injection unit.

(1) Install synchronous-belt for injection unit. (Codes of components see Fig 2.2.1(7) injection unit.)

① Put the belt on one gear, then tighten the belt and put the belt on the other gear.

② Install the bolts (3 pieces) and gear cover.

③ Strain the synchronous-belt by moving the motor outward.

④ Tighten flange installation bolts. (Four bolts must be tightened synchronously)

(2) Injection synchronous-belt tension testing.

⑤ Put the professional tensiometer (Tensiometer directions refer to appendix II) away from the synchronous-belt about 10mm, and the best position is in the middle of tow gears, then tension the belt by hands. The tensiometer displays tension values by measuring air vibration. Then compare to synchronous-belt tension-form (appendix I), to check if the belt tension is right or not.

⑥ If actual value is bigger, then it means the belt is too tight. First, loosen flange installation bolts4; second, loosen tension adjusting bolts, at last do remember to tighten flange installation bolts before testing again. If the value is smaller, then it means the belt is to loose. First, loosen flange installation bolts; second, screw down the tension adjusting bolts; at last do remember to tighten flange installation bolts before testing again. Adjust the tension until its value is equal to the standard.
Notice: Two tension adjusting bolts should be screwed down synchronously, to avoid imbalance and damage to the synchronous-belt while working.
⑦ If the value is right, then tighten nuts first, and then screw down flange installation bolts. Installation and adjustment are finished.
5、

⚠ Notice

1. While testing the synchronous belt, do not knock with a rubber hammer or other similar thing.
2. Please double check the synchronous-belt after installation to avoid unnecessary errors.

5.2.8 Search for the mechanical reference

Searching Steps:
1、Login the dialog box of zero set;
2、After choosing zero set function, move related mechanical components to the reference;
3、Set the reference and adjust the proximity switch;
4、Test the machine to check the actual stroke;
5、Finish..
Detail explanations:
1、Login the fourth level
(1)、Turn on the main power supply (Do not turn on the button ‘Motor on’);
(2)、Click ‘login’ on the screen;
(3)、Type login passwords ‘020808’ to the dialog box;
(4)、Click ‘Enter’.
See fig 5.2.8(1)

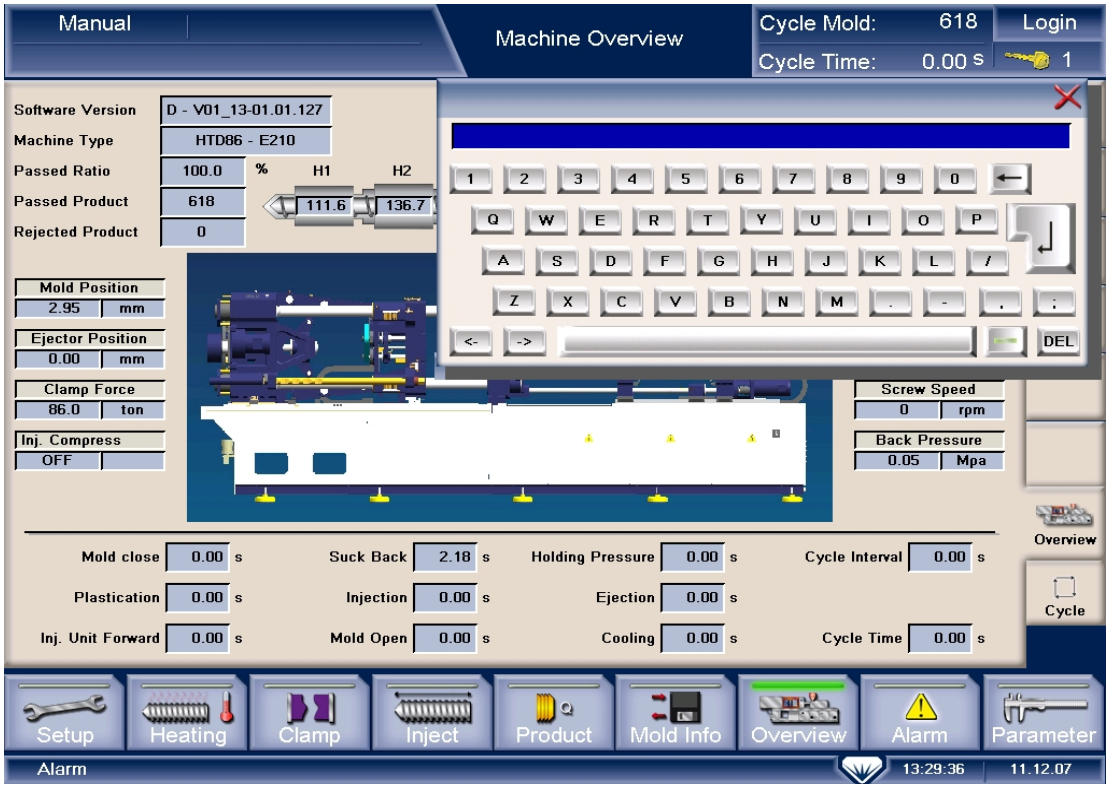


Fig 5.2.8(1) login the fourth level

2、Login the menu of system's zero setting

(1)、Click 'parameter' on the right of the screen;

(2)、Click 'zero set' on the right of parameter menu

(See fig5.2.8(2))

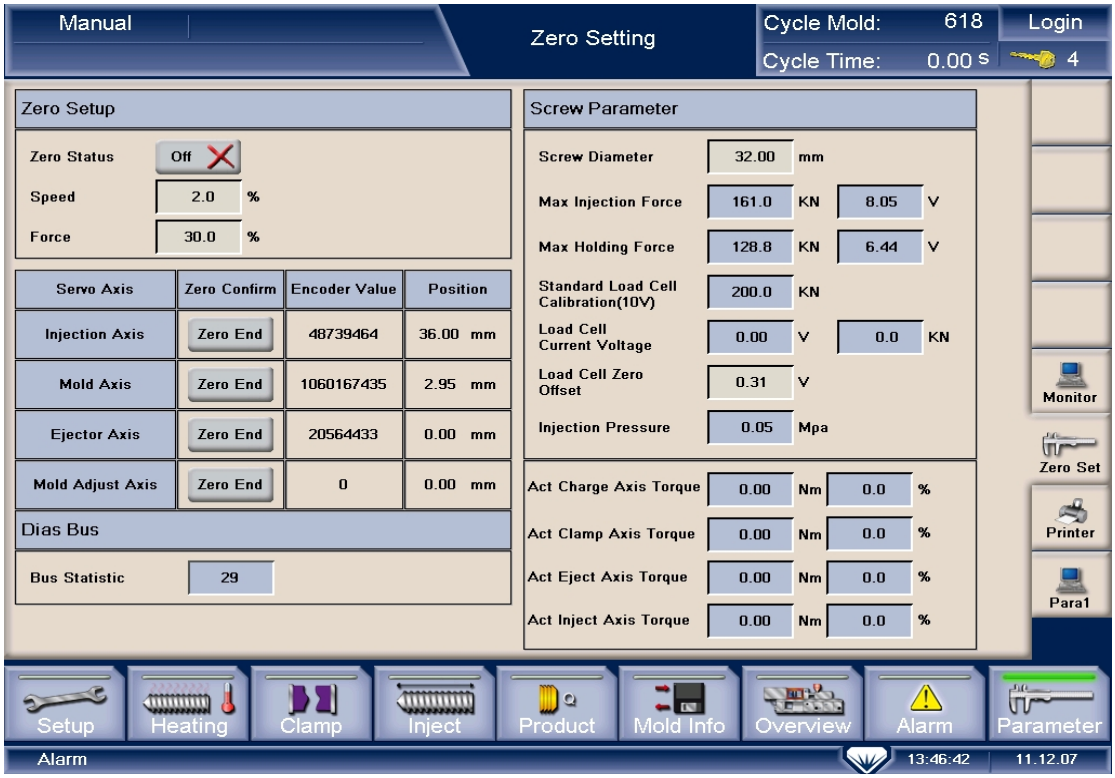


Fig 5.2.8(2) zero setting menu

3、Set up speed and pressure of zero set

(1)、Click dialog box of speed;
(2)、Click '2' in the dialog box;
(3)、Click green hook;
(4)、Set up the pressure to 30.
(See fig5.2.8(3))

Fig 5.2.8(3) set up speed and pressure

4、Click 'on' and move to the reference

(1)、Click 'motor on';
(2)、Click 'zero setting', and then click 'on';
(3)、Select the axis which need be setted to zero. Operations as following:

axis needs to set	Set zero	motion
Injection axis	Inject	Suck back
Mold axis	Mold chose	Mold open
Ejection axis	Eject back	Eject forward

Table 5.2.8(4) operational keys

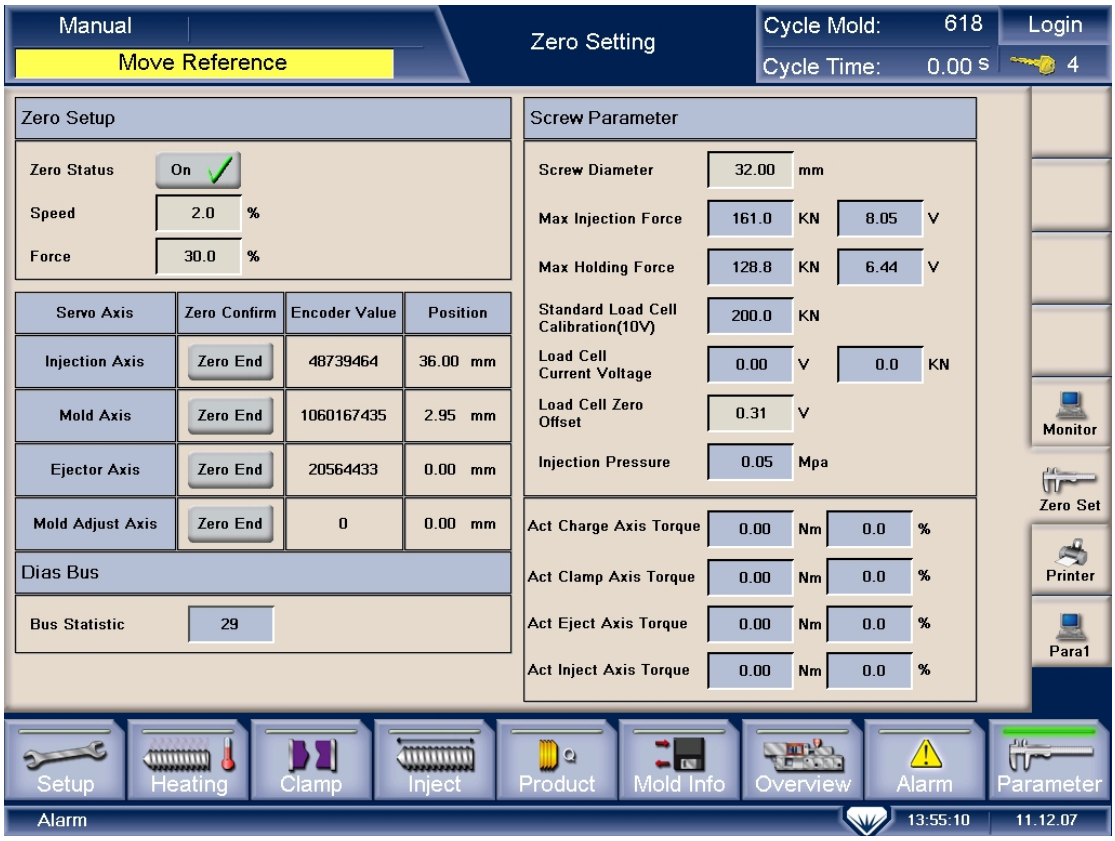


Fig 5.2.8(4) zero setting menu

5、Click operational keys of zero setting and move the axis to the reference

(1)、Dismantle the two proximity switches corresponding to axis loosely. Make sure it does not affect zero set.

(2)、According to table 5.2.8(4), press the key until the axis move to the reference, and then press 'Zero End'. Then "actual reference" shows 'zero', which means sto moving. (3)、According to table 5.2.8(4), press the key of clamping. When the numeric value of actual reference is between 2mm and 3mm, press the key of 'zero set' again. It's the actual mechanical reference.

(4)、Turn on the proximity switch of zero set to. Then fix them up.

(5)、Move the model axis. When the numeric value of the actual reference is between 5mm and 10mm, press the key of zero set. Observe the proximity switch when actual reference is zero. If the light is not on, trim the sensor till all lights on.

(6)、Move the model axis. Observe actual reference, and wait until it reaches to the maximum stroke. The system will stop.

(7)、If actual reference doesn't reach maximum, adjust it as step 3.

(8)、Adjust the proximity switch to make them on at stroke end.

(9)、Click 'off' to quit.

6、Test the machine to check the actual stroke

(1)、Set the axis stroke from zero to maximum stroke.

(2)、Observe the maximum stroke to check whether it is the same as actual stroke.

(3)、Observe the zero stroke to check whether it is the same as actual stroke.

7、Finish

> ⚠ **Notice**
>
> During zero setting, operated speed must be below 3% of speed and operated pressure below 30% of pressure. Otherwise, the machine will be broken.

5.2.9 Test running of full-electrical injection moulding machine

(1)、At the manual model, test the machine at low speed and pressure and with full stroke. In the test, set speed about 10% and pressure about 30%.
(2)、At the manual model, test the machine at middle speed and pressure and with full stroke. In the test, set speed about 30%, pressure about 50%.
(3)、At the manual model, test the machine at high s speed and pressure and with full stroke. In the test, set speed about 99%, pressure about 100%.
(4)、Finish.

> ⚠ **Notice**
>
> During tests, please press ‘stop’ button immediately if any abnormal happens. Find out the reason, and then do tests again.

5.2.10 Finish

1、Clean up the machine; tighten all wires;
2、Close the back cover of the button chest, and fasten setscrews.

Chapter 6 C-IPC Malfunctions

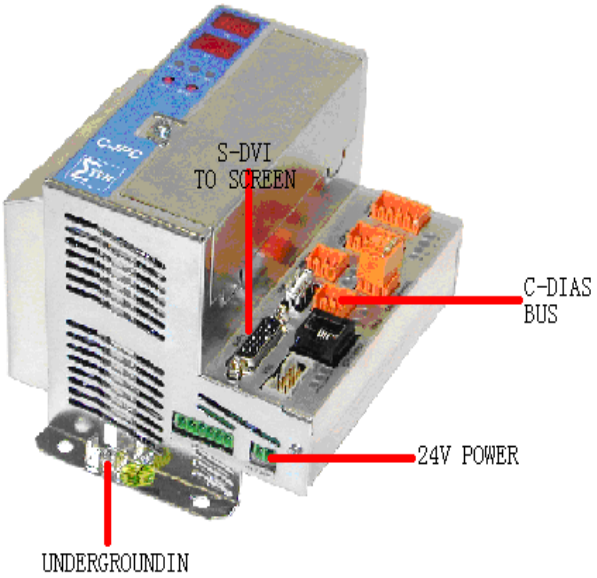


Fig6 C-IPC interfaces

6.1 Steps of changing C-IPC

1、Demount the broken C-IPC;
2、Install a good C-IPC;
3、Upload the main program to C-IPC;
4、Upload configuration files and system files to C-IPC;
5、Search for the mechanical reference of the injection machine;
6、Test running of the machine;
7、Finish.

6.2 Changing C-IPC in detail

6.2.1 Demount the broken C-IPC

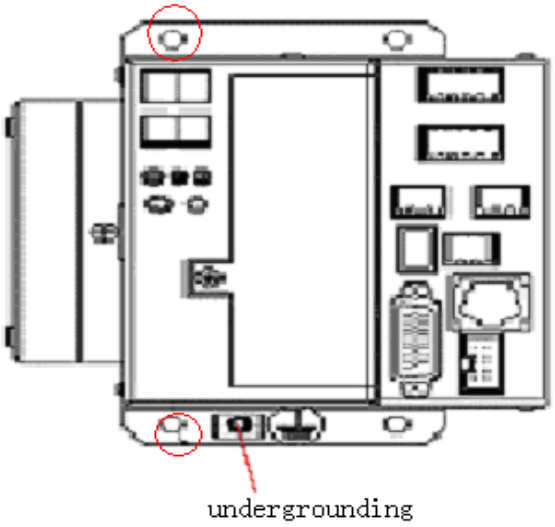


Fig 6.2.1(1) C-IPC fixing

Shown as fig 6.2.1(1), we should remove the C-IPC bus shielding grounding wire and main grounding wire at first, then pull out 24V power wire、C-DIAS bus and S-DVI data wire, at last pull out the whole C-IPC.

Notice

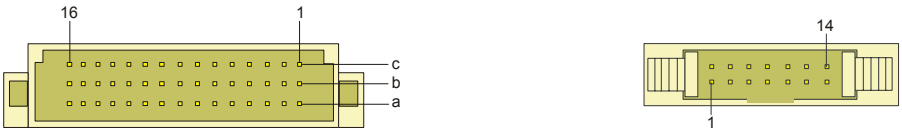
Be careful when pull out the C-IPC.

6.2.2 Install a good C-IPC

Notice

Don't electrify C-IPC before find out the broken reason; otherwise, C-IPC will be easily broken again.

1、There are two bus terminals on the base of C-IPC. Insert C-DIAS bus terminals to relevant position. Then tighten two screws. Insert C-DIAS bus and S-DVI data wire，and connect grounding wire and C-DIAS bus shielding grounding wire to C-IPC PE. See fig 6.2.1(1).



C-DIAS ports DIAS ports

Fig 6.2.2(1) C-IPC bottom ports

2、Check the circuitry from 24v electrical source and recover malfunctions which make the C-IPC broken before electrification.

> ⚠ Attention
>
> Be sure there is not any scrap iron when fixing C-IPC.

6.2.3 Upload the main program to C-IPC

1、Open USB plastic covers, and then insert a U-disc (including program files) and USB keyboard to any two USB connectors.

Fig 6.2.3(1) three USB connectors on the display

2、Electrify the injection machine and update system files.

As fig 6.2.3(2), there are five options on the screen:

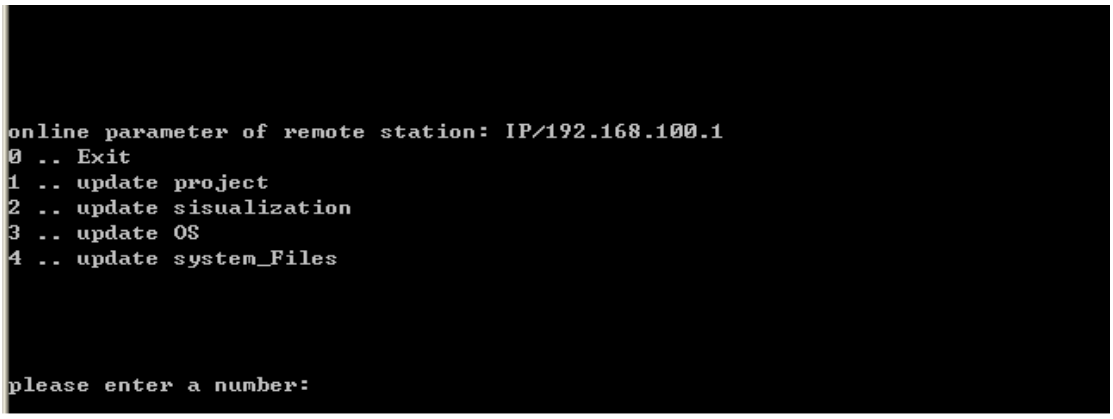


Fig 6.2.3(2) after starting

(1)、Input 4 and click ‘Enter’;

(2)、After finishing copying files, there will be prompts as following fig6.2.3(3). Press ‘Enter’ to return to the main menu.

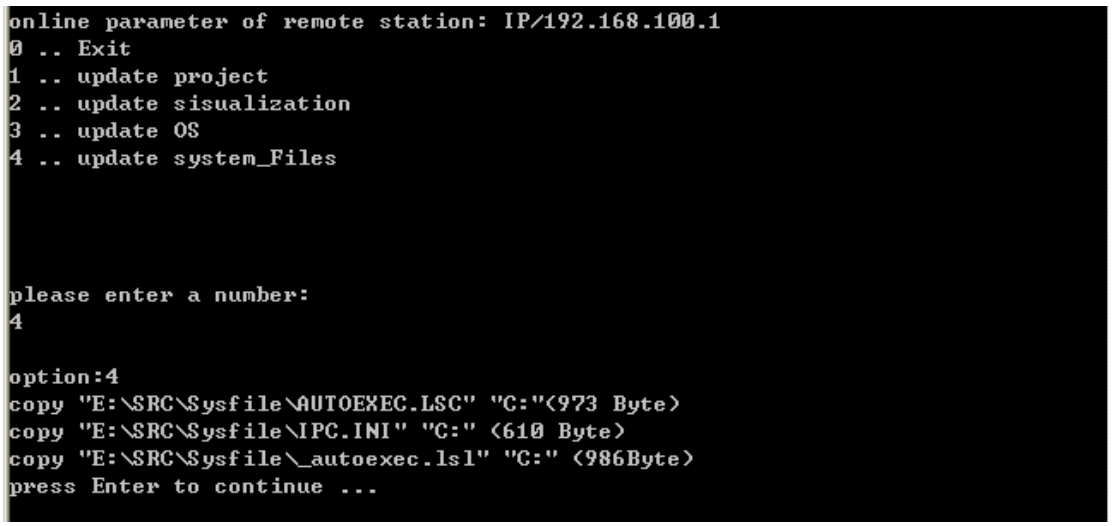


Fig 6.2.3(3) copy over

(3)、Pull out U-disc, and input 0 to quit. Then press ‘Enter’ to see fig6.2.3(4))

Fig 6.2.3(4) enter ‘0’ to quit

(4)、Press ‘Enter’ to reset the system and update is over.

3、Checkout the touch screen

After reboot, go to C root and input command ‘CALIB’. See fig 6.2.3(5)

Fig 6.2.3(5) enter 'calib' after rebooting

(1)、Click the cross cursor on top left corner;
(2)、Click the cross cursor on the right
(3)、Click the cross cursor at he bottom;
(4)、Then the program will save files automatically and restart. See 6.2.3(5). Touch screen starts working now.
If you do any step wrong during the course, please input command 'CALIB' under C root, and follow above steps again.

> ⚠ Warning
>
> Only command 'CALIB' can be inputted after reboot. Any other command is not allowed.

4、Upload main programs
Close electrical source and insert U-disc again. Electrify after one minute.

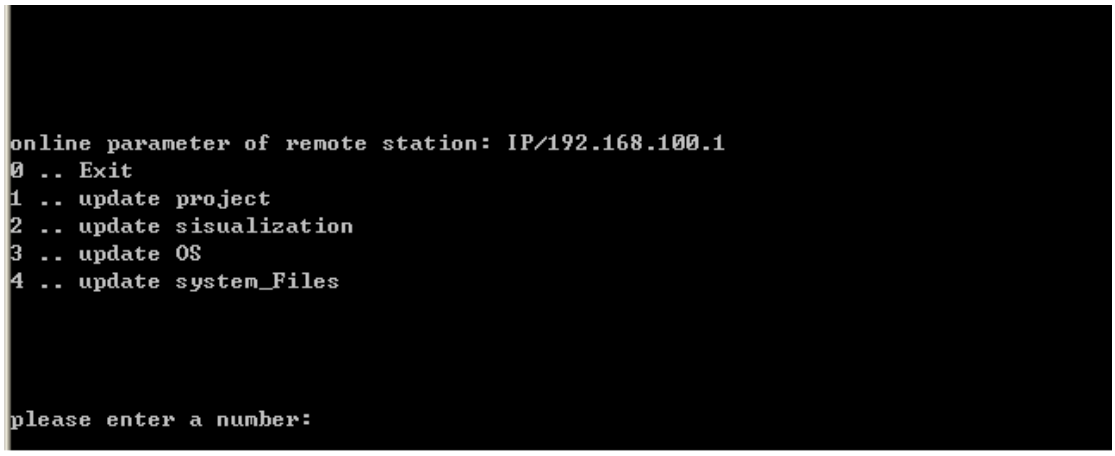


Fig 6.2.3(6) main menu after reboot

(1)、Input 1 to update main programs.
(2)、Wait a moment, the system enters into a new menu as fig 6.2.3(7). Press 'Enter', to return to main menu. (as fig 6.2.3(6))

Fig 6.2.3(7) Uploading finished

5、Reboot system

(1)、Pull out U-disc and keyboard, plug plastic covers on USB.

(2)、Select '0' on the main menu and click 'Enter'. The system restarts and enters into injection machine menu automatically.

Notice

Please use a special U-disc from Zhafir, or it may cause data losing and damages to the machine.

Notice

Please make sure there is no scrap iron or other foreign matters on U-disc and keyboard. Plug plastic covers in time.

6.2.4 Upload configuration files and system files to C-IPC

Steps:

(1)、Upload mold configuration files;

(2)、Upload injection configuration files;

(3)、Upload ballscrews conversion table;

(4)、Upload system files.

Types of configuration files are listed in below table.

Type of uploading files	extension	example
mold configuration files	CFG	VE600.CFG
injection configuration files	HTD	210.HTD
ballscrew conversion table	CSV	VE600.CSV
system files	SYS	VE600.SYS

Table 6.2.4(1) types of configuration files

1、Upload mold configuration files

(1)、Insert U-disc;

(2)、Login in forth level consumer purview.

Click the login in level→ input '020808' in blank → click 'Enter' (See fig 6.2.4(1))

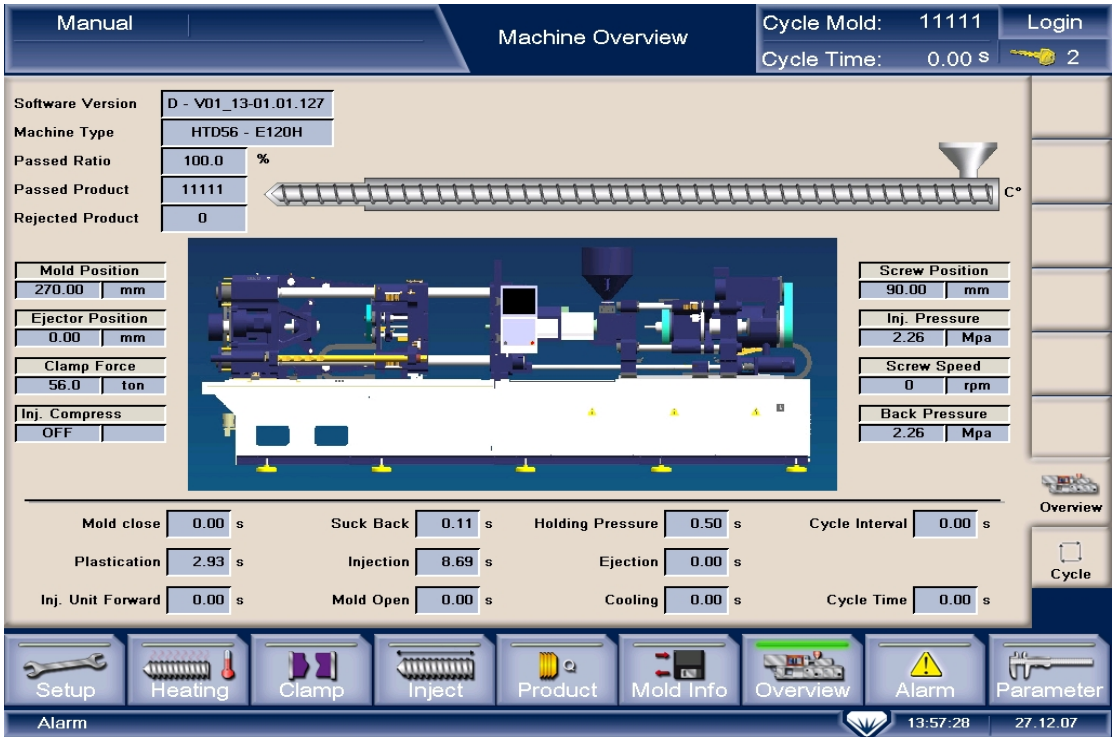


Fig 6.2.4(1) login in forth level consumer purview

(3)、Click 'molding' to enter into the menu of mold data. See fig 6.2.4(2)

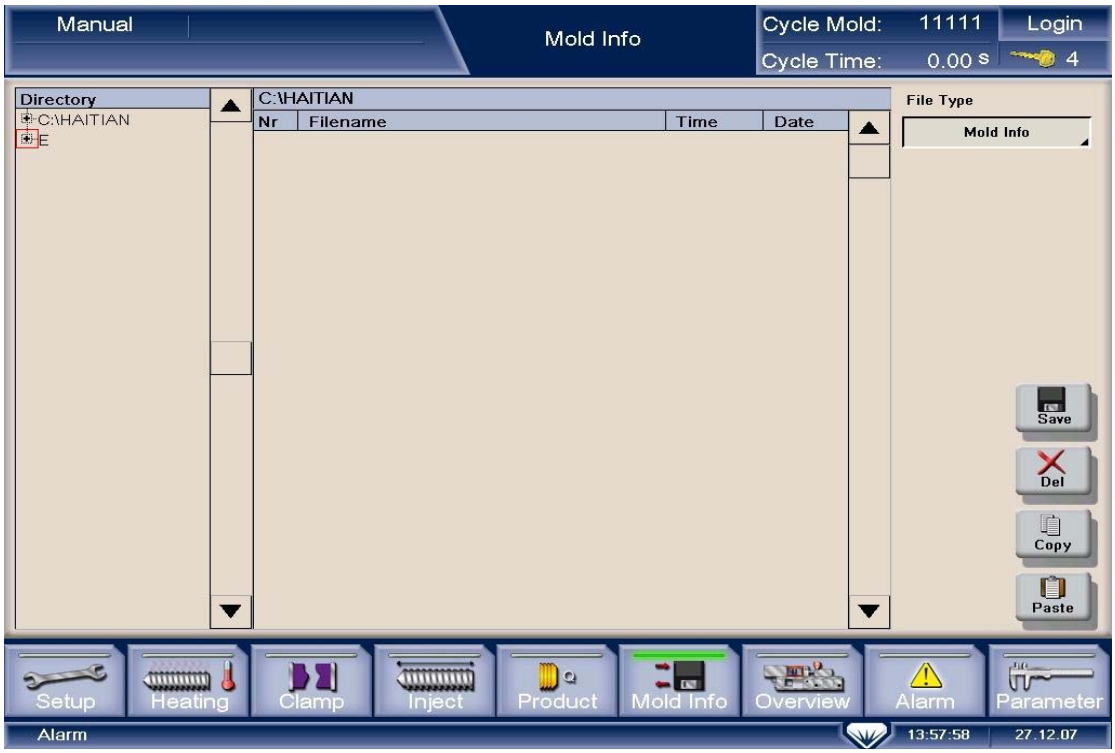


Fig 6.2.4(2) molding menu

(4)、Click ‘E’ to check content of the U-disc. Select a folder to save these configuration files. For example, select a folder named ‘moldconfig’ as in fig 6.2.4(3).

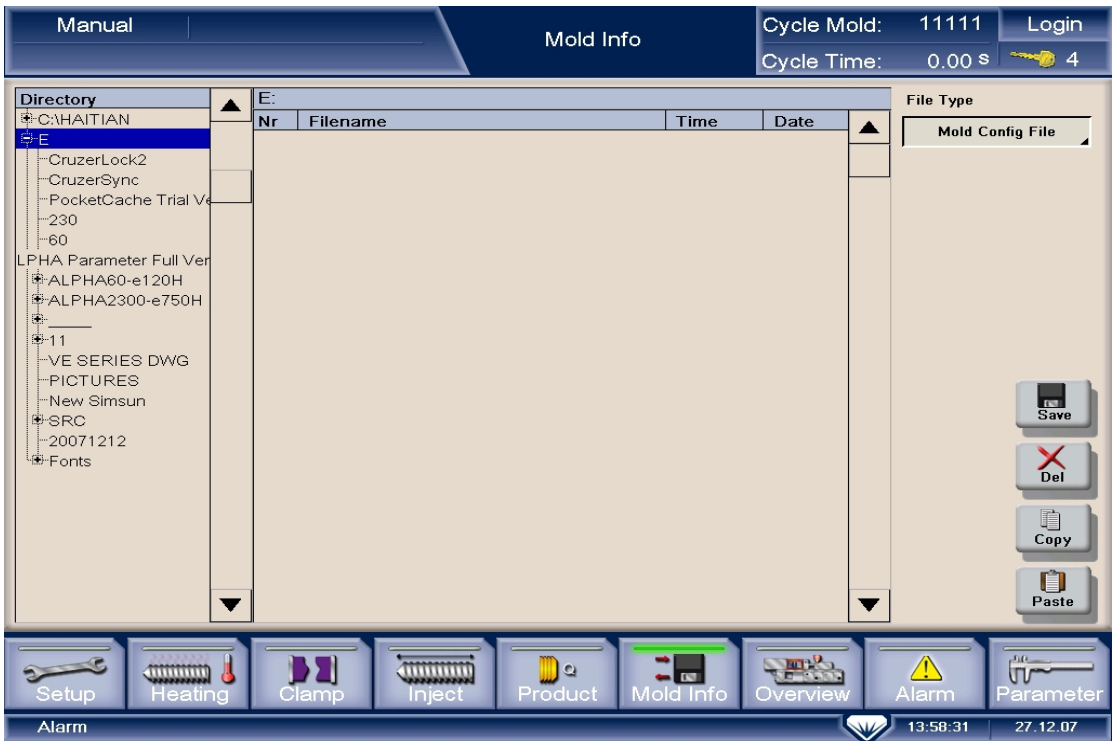


Fig 6.2.4(3) contents of U-disc

(5)、Select mold configuration files in ‘mold info’ in yellow. See fig 6.2.4(4).

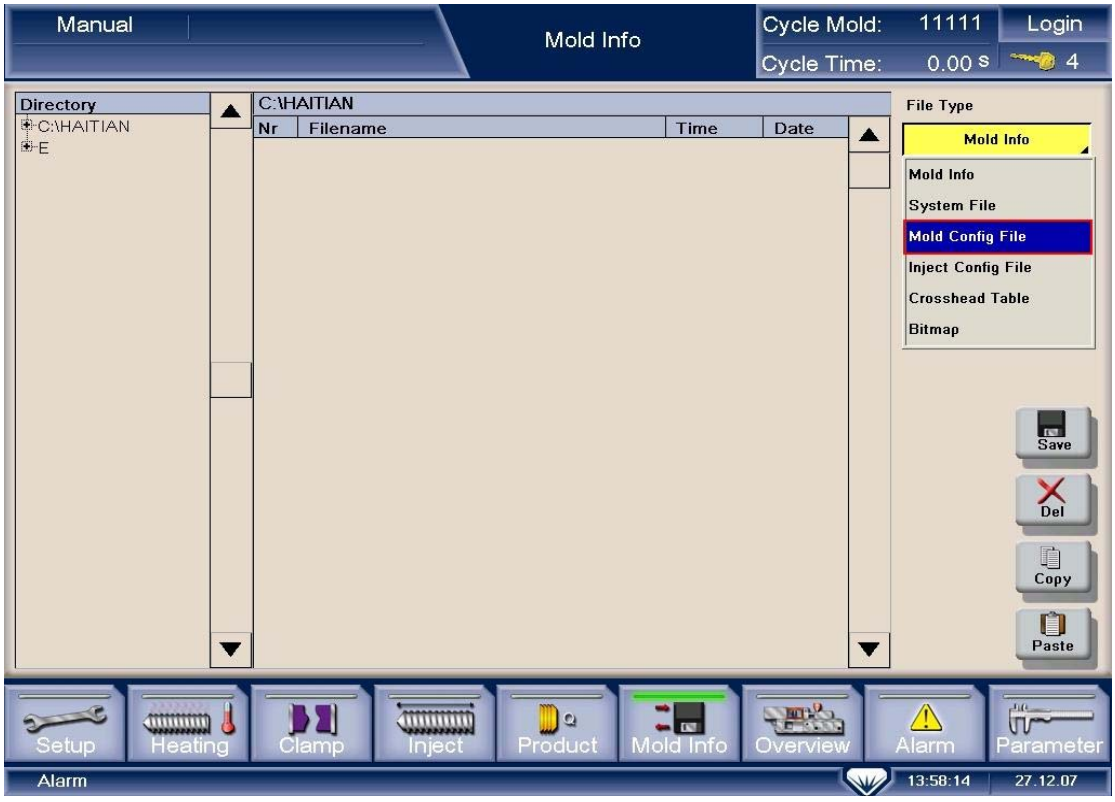


Fig 6.2.4(4) choose the type of files

(6)、There are four files in ‘ moldconfig’ folder. See fig 6.2.4(5)

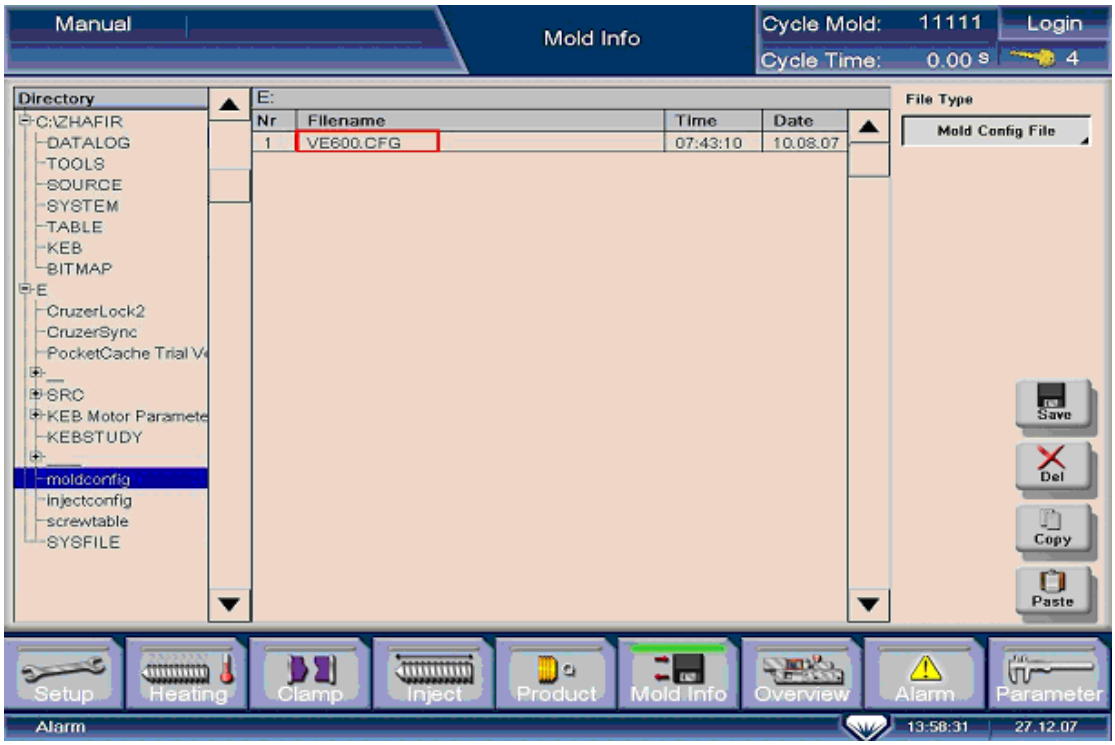


Fig 6.2.4(5) mold configuration files

(7)、Double click the mold configuration file which is fit for the machine, then select ‘yes’ in the block. Configuration files will copy automatically. See fig 6.2.4(6) (the extension is ‘.CFG’).

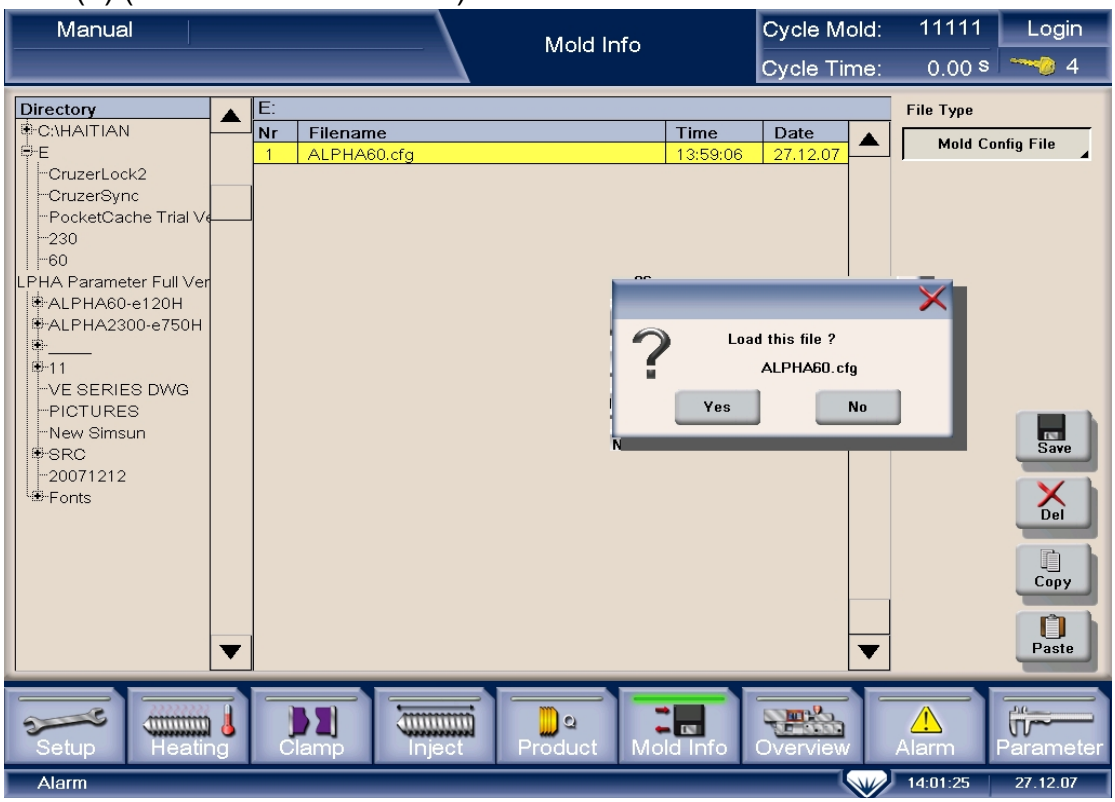


Fig 6.2.4(6) upload mold configuration files

(8)、After copying mold configuration files, there will appear a block. Click ‘OK’ to confirm. See fig6.2.4(7)

Fig 6.2.4(7) finish uploading

2、Upload injection configuration files

(1)Use the same method of uploading mold configuration files to select a folder to copy injection configuration files. Then select injection configuration in the yellow block on the top right. See fig 6.2.4(8). (The extension is ‘.HTD’)

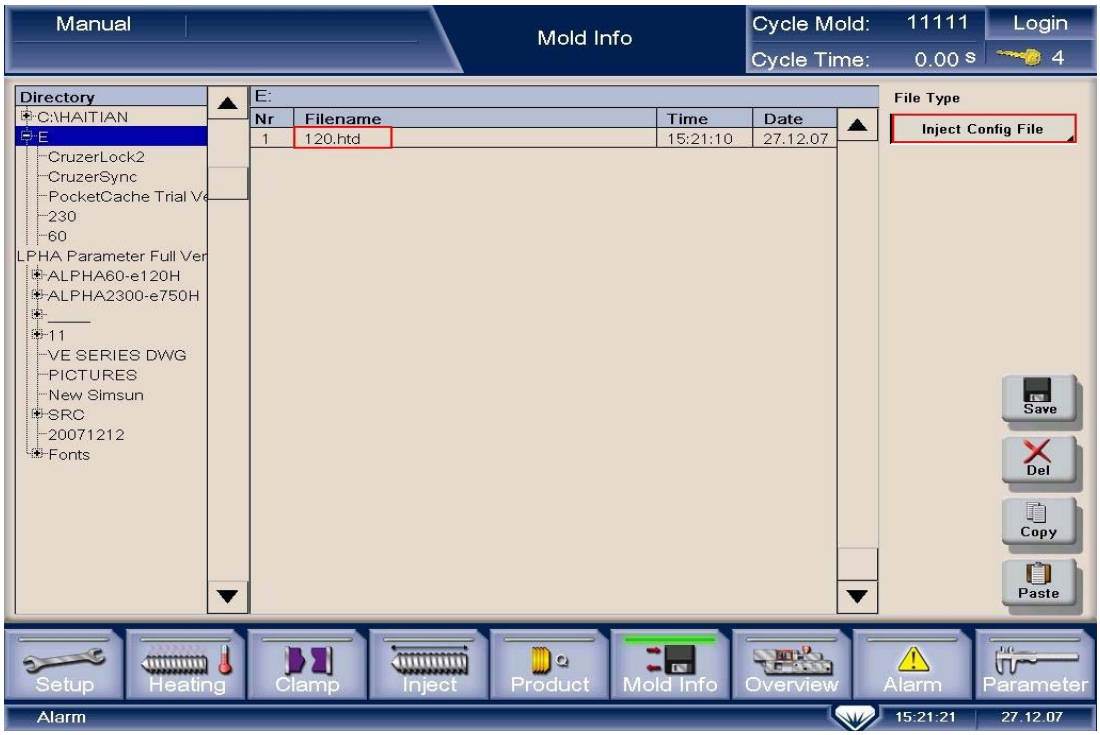
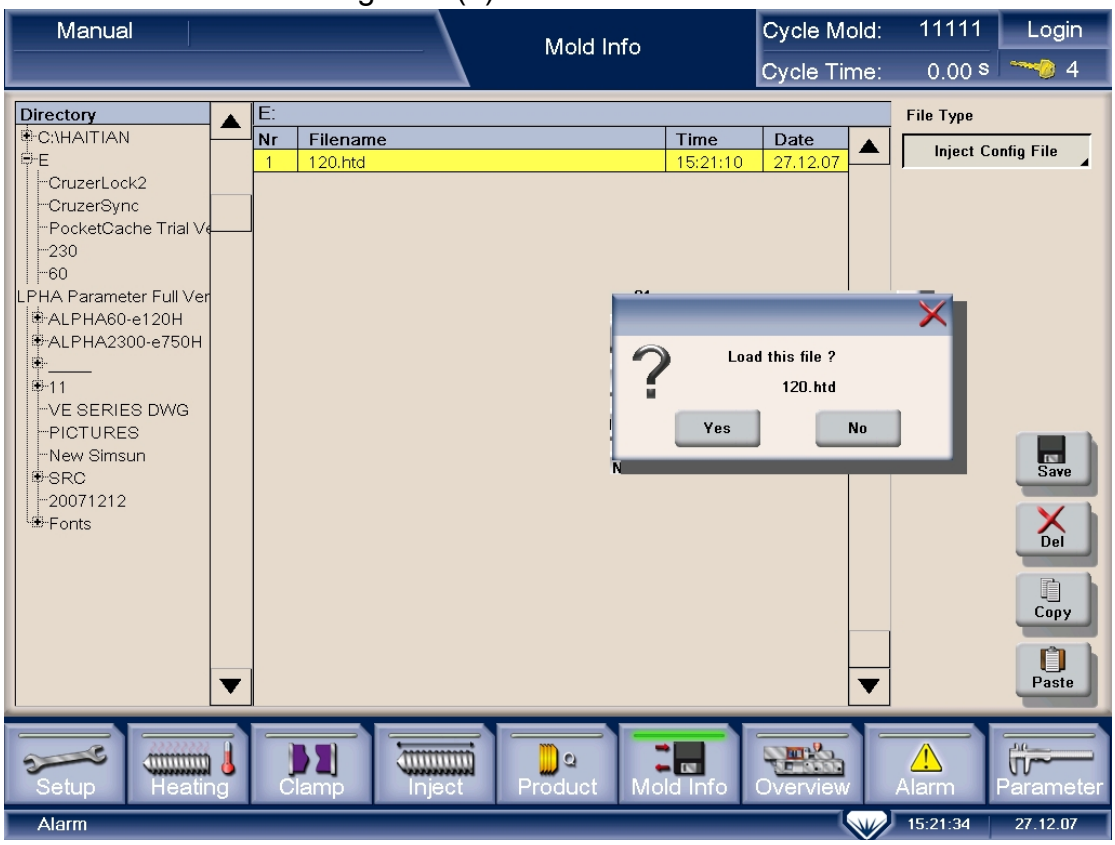


Fig 6.2.4(8) injection configuration files

(2)See the center screen. Double click the injection configuration file which is fit for the machine. See fig 6.2.4(9)



Figs 6.2.4(9) upload injection configuration files

(3)、The injection configuration file will copy automatically after clicking ‘yes’. It will show ‘over’, and then click ‘ok’. See fig 6.2.4(10)

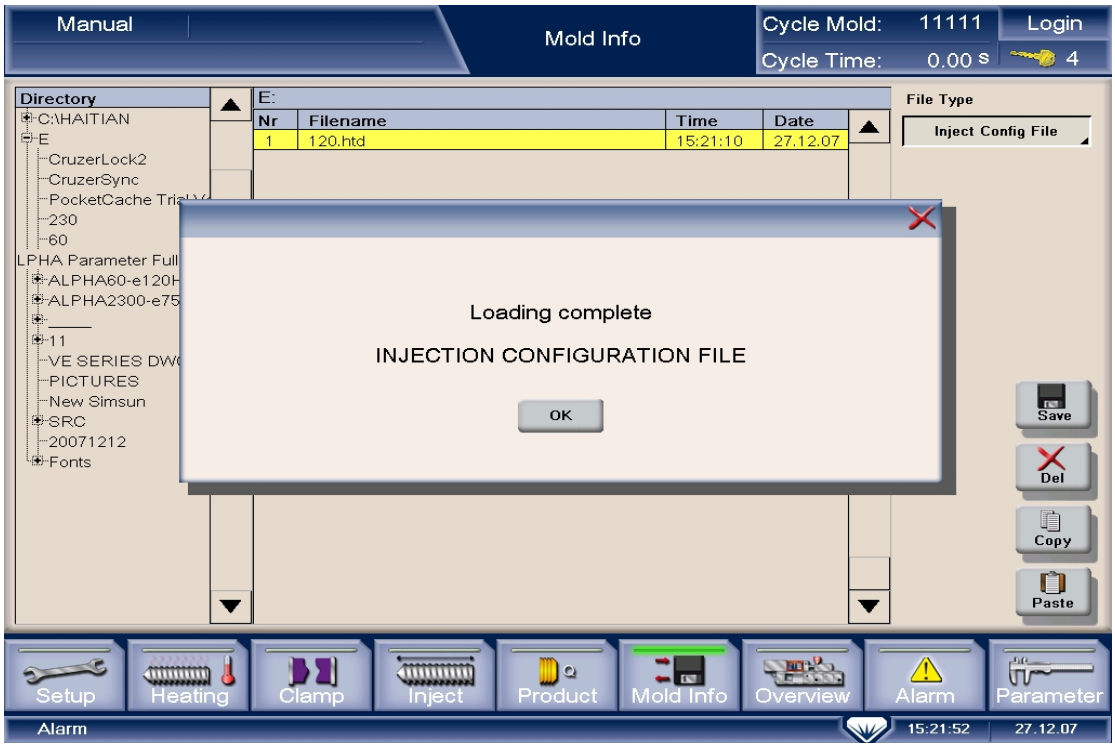


Fig 6.2.4(10) uploading over

3、Upload ballscrew conversion table

(1)、Select a folder to copy files, and at the top right corner, select ballscrew conversion table in the yellow block, and select ‘,’ as the delimiter, then double click the file in the center of screen to copy it. (The extension is ‘.CSV’) See fig 6.2.4(11).

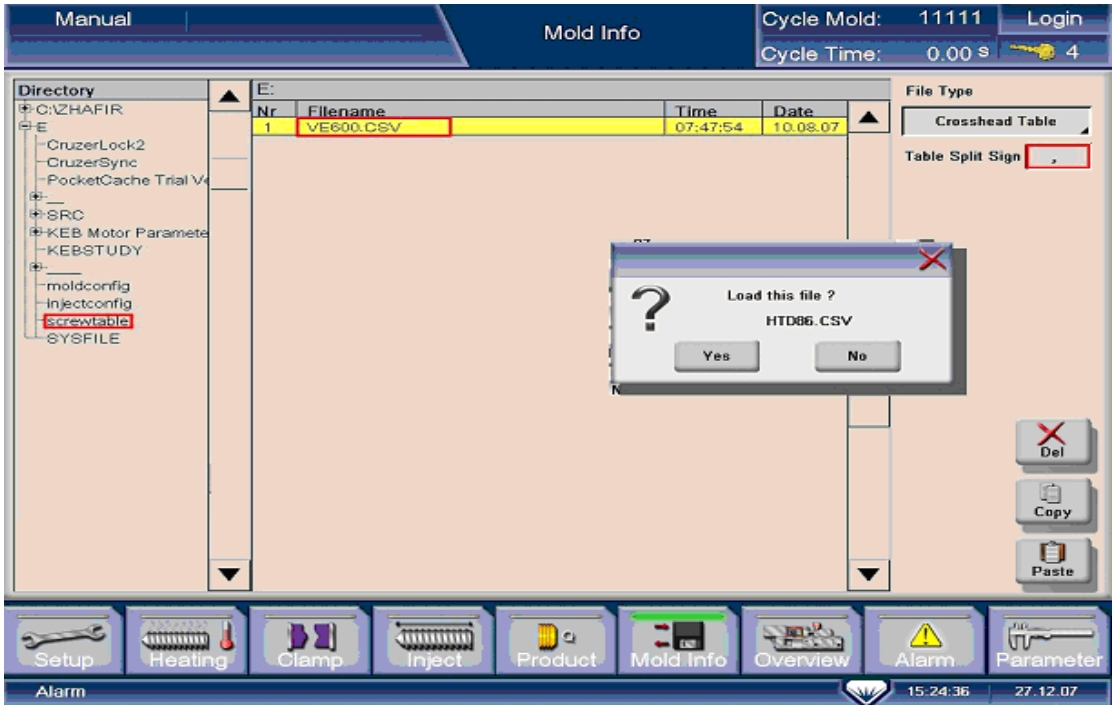


Fig 6.2.4(11) upload ballscrew conversion table

(2)The system automatically copies the conversion table after click ‘yes’, and then click ‘ok’ after finishing. See fig (6.2.4(12))

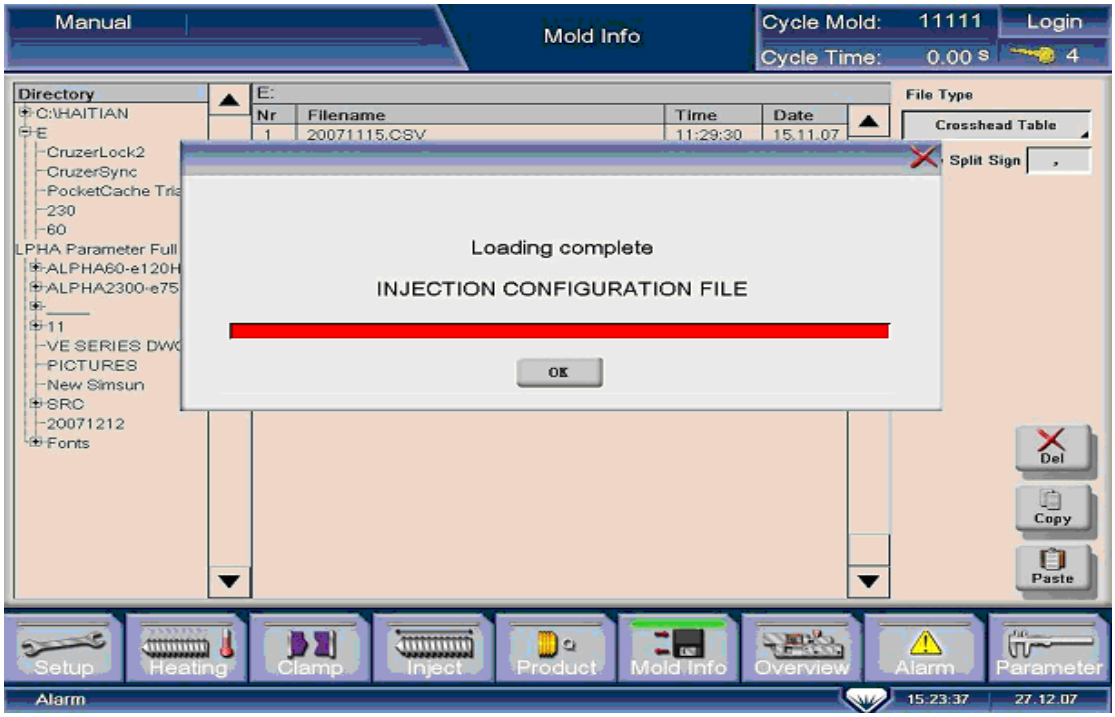


Fig 6.2.4(12) uploading over

4、Upload system files

(1)、Select a folder to copy files, and at the top right corner, select system files in the yellow block. (The extension is '.SYS') See fig 6.2.4(13)

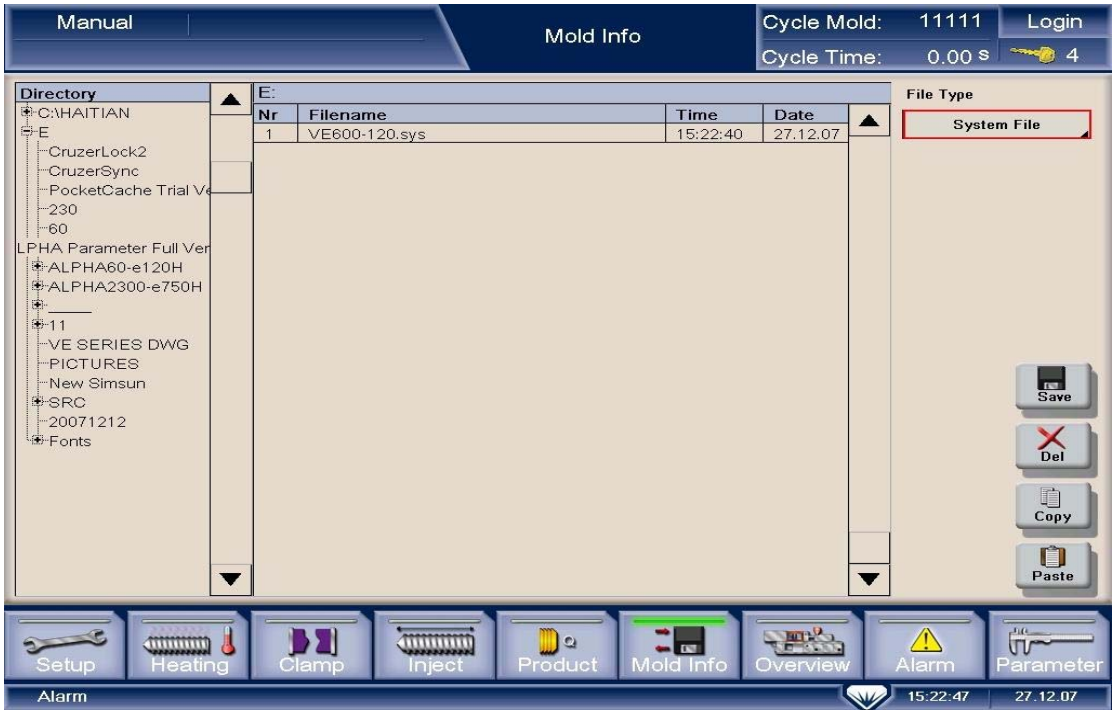


Fig 6.2.4(13) system files

(2)、See the center screen. Double click the injection configuration file which is fit for the machine. See fig 6.2.4(14)

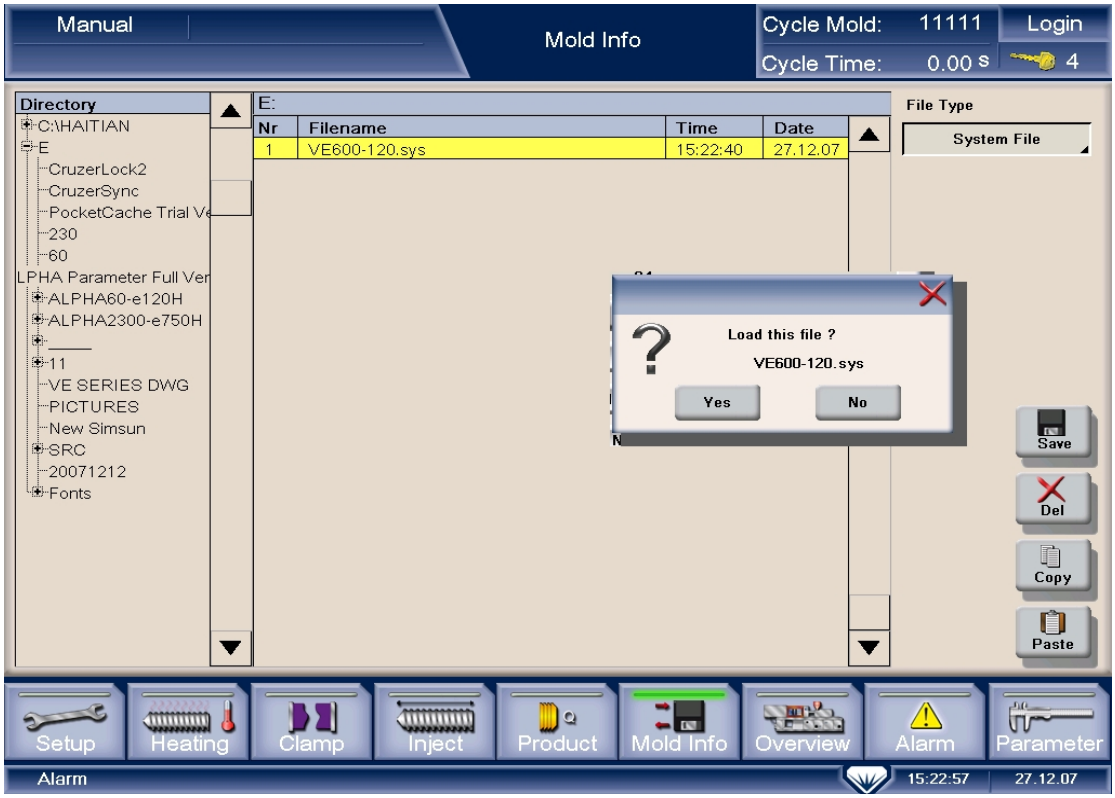


Fig 6.2.4(14) uploading system file

(3)、The system automatically copies the conversion table after click ‘yes’, and then click ‘ok’ after finishing. See fig (6.2.4(15))

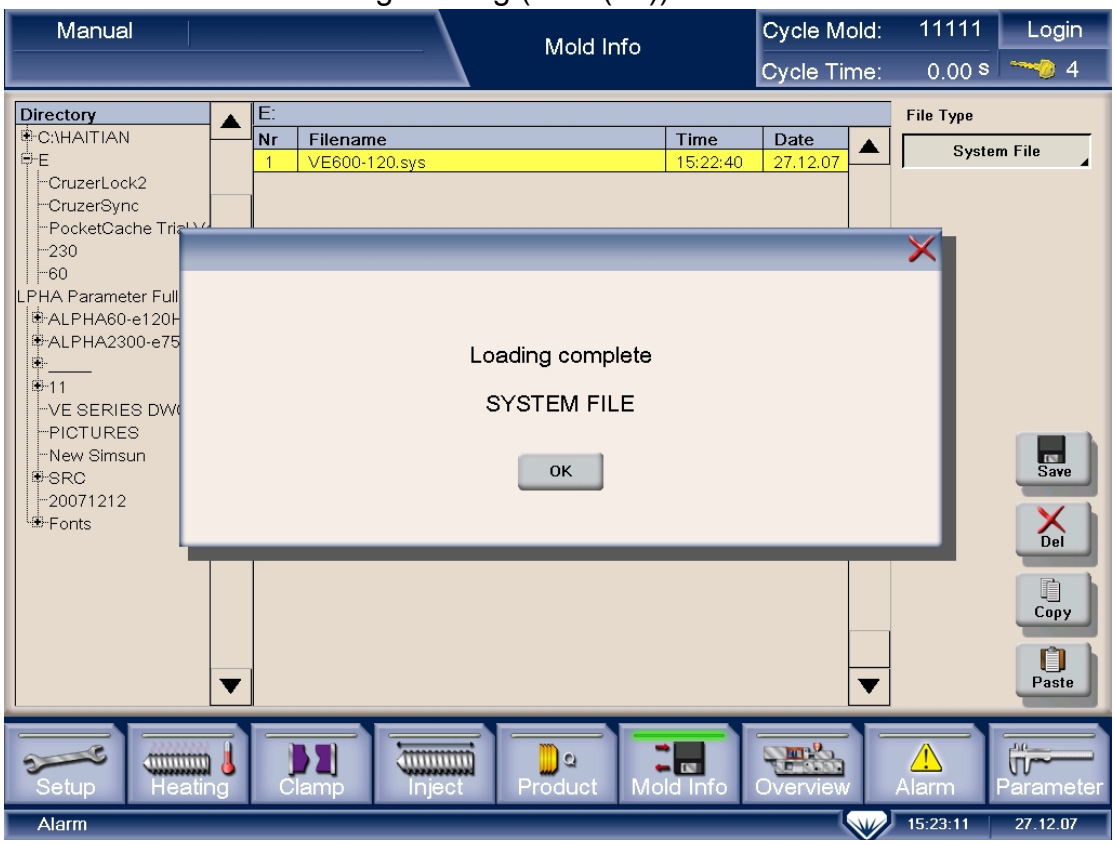


Fig 6.2.4(15) uploading over

6.2.5 Search for the mechanical reference

Steps of searching for the mechanical reference:
1、Login the dialog box of zero setting;
2、After selecting the zero setting function, move the mechanical component which need be setted to the reference;
3、Set up the reference and adjust the photo sensor;
4、Test the machine to check whether the actual stroke reaches the rated stroke or not;
5、Finish searching.
Detail explanations:
1、Login the fourth level
(1)、Turn on the main power supply. (Don’t turn on the button ‘Motor on’ on the keyboard.)
(2)、Click ‘login’ on the screen;
(3)、Input login passwords ‘020808’ to the dialog box;
(4)、Click ‘Enter’.
(See fig6.2.5(1))

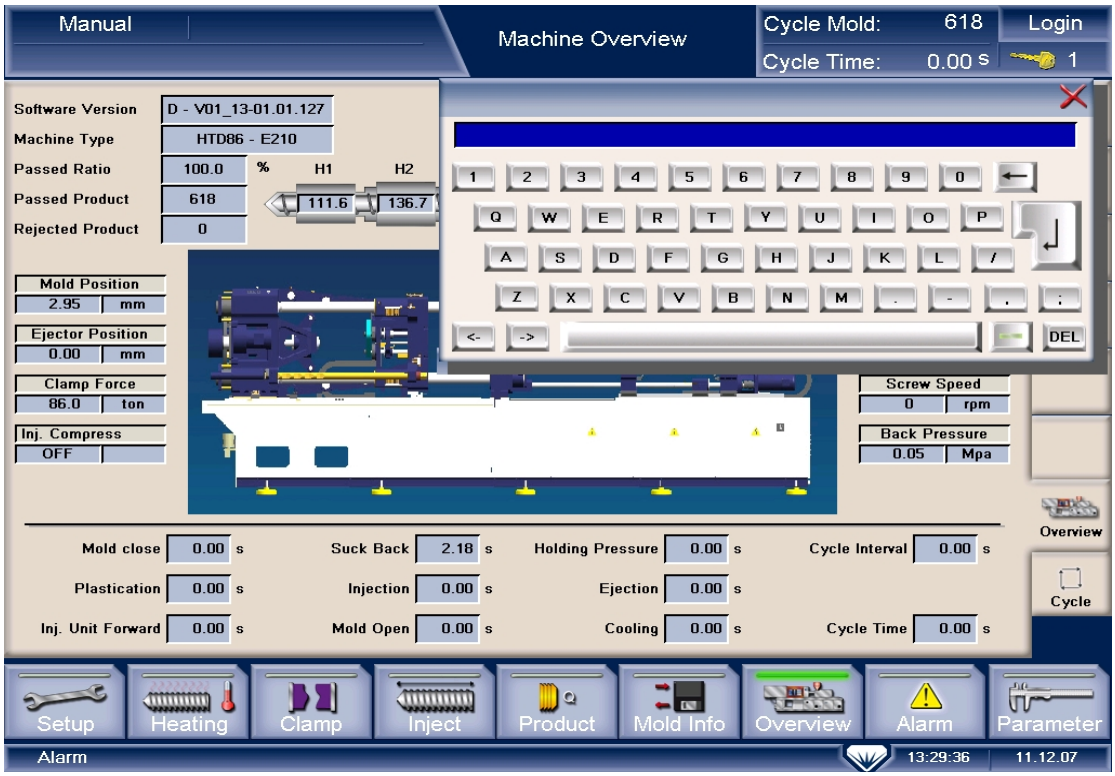


Fig 6.2.5(1) login the fourth level

2、Login the menu of system's zero setting

(1)、Click 'parameter' on the right of the screen;

(2)、Click 'zero setting' on the right of parameter menu.

(See fig6.2.5(2))

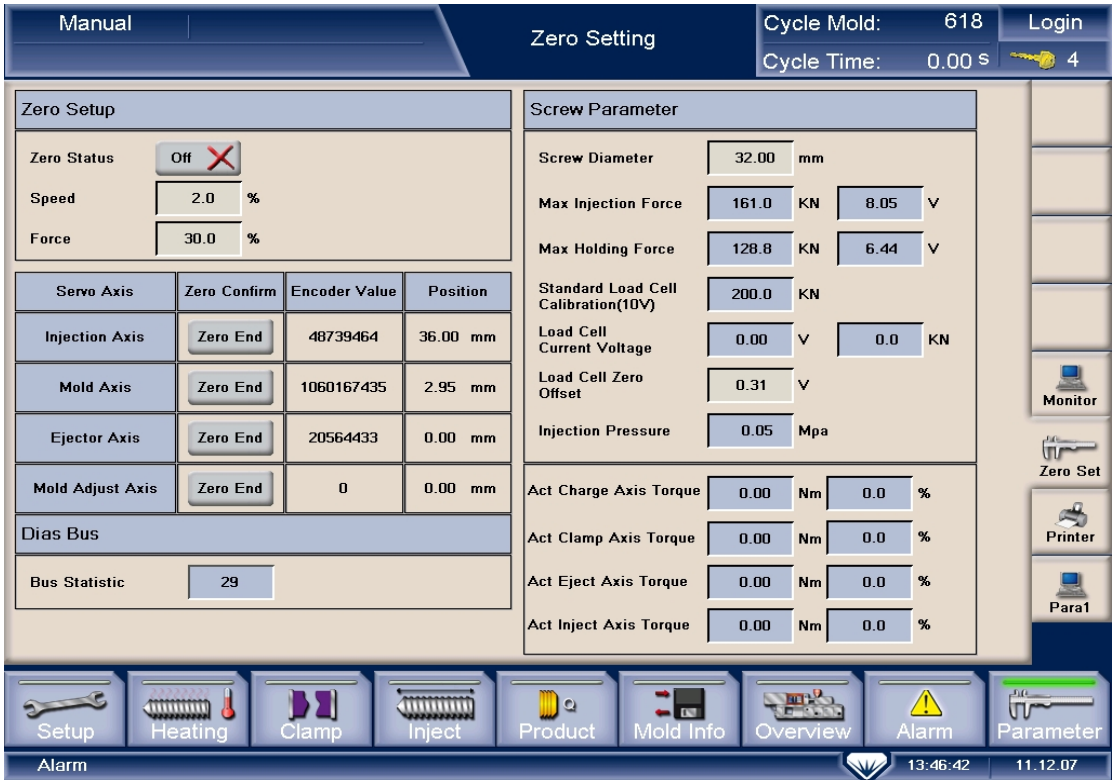


Fig 6.2.5(2) zero setting menu

3、Set up speed and pressure

(1)、Click the dialog box of speed;

(2)、Click '2' in the dialog box;

(3)、Click green hook;

(4)、Set up the pressure to '30' in the same way.

(See fig6.2.5(3))

Fig 6.2.5(3) set up speed and pressure

4、Click 'on' and move to the reference

(1)、Click 'motor on';

(2)、Click 'zero set', then click 'on' ;

(3)、Select the axis which need be setted. Operations as following:

axis needs to set	Set zero	motion
Injection axis	Inject	Suck back
Mold axis	Mold chose	Mold open
Ejection axis	Eject back	Eject forward

Table 6.2.5(4) operational keys to the the axis need to set zero

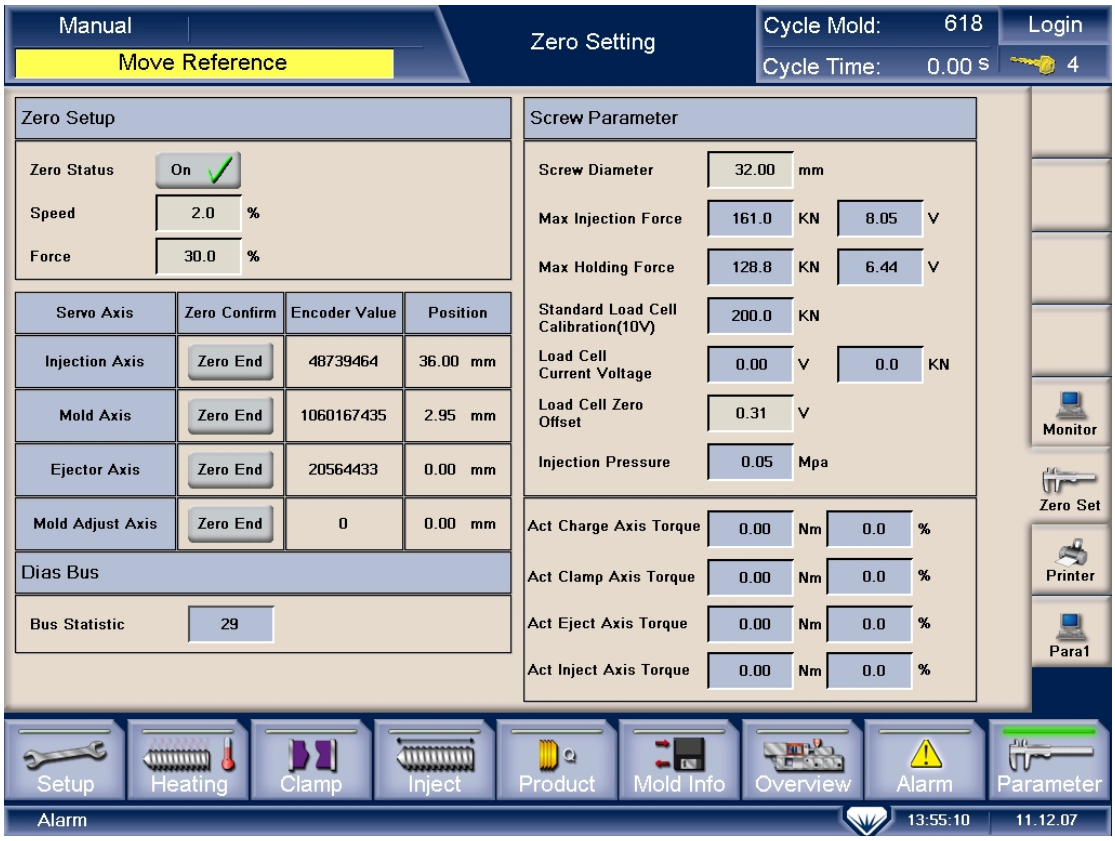


Fig 6.2.5(5) the menu of zero setting

5、Click the operational keys of zero setting and move the axis to the reference

(1)、Dismantle two photo sensors which correspond to the axis loosely. Make sure it does not affect the zero setting.

(2)、See table 6.2.5(4). Press the key until the axis moves to the reference. Then select 'Zero End'. Actual reference shows 'zero', which means stop moving.

(3)、See table 6.2.5(4). Press the key for clamping. When the numeric value of the actual reference is between 2mm and 3mm, click 'Zero Setting' again. It's the actual mechanical reference.

(4)、Adjust photo sensors of zero setting. Then fix them up.

(5)、Move the model axis. When the numeric value of the actual reference is between 5mm and 10mm, click 'zero setting'. Observe when actual reference is zero, whether the photo sensor is on or not. If not, trim the sensor.

(6)、Move the model axis. Observe actual reference. When it reaches the maximum stroke, the system will stop.

(7)、If actual reference doesn't reach the maximum stroke, adjust it as step 3.

(8)、Adjust the photo sensors to make them on at stroke end.

(9)、Click 'off' to quit.

6、Check whether actual stroke reaches the rated stroke or not

(1)、Set up the stroke of the axis from zero to maximum stroke.

(2)、Observe the actual stroke.

(3)、Observe the zero stroke.

7、Finish zero setting

> **⚠ Warning**
>
> During zero setting, the speed must be under 3% of the max speed and 30% of the max pressure, or the machine will be broken.

6.2.6 Test the full-electrical injection moulding machine

(1)、At the manual model, test the machine at low speed and pressure and test with full stroke. Set up the speed about 10% and the pressure about 30%.
(2)、At the manual model, test the machine at middle speed and pressure and test with full stroke. Set up the speed about 30% and the pressure about 50%.
(3)、At the manual model, test the machine at high speed and pressure and test with full stroke. Set up the speed about 100% and the pressure about 100%.
(4)、Finish testing.

> **⚠ Notice**
>
> If any abnormal during texting, please press ‘stop’ immediately. Find out the reason and then do tests again.

6.2.7 Finish

1、Take off the sundries, and make up the wires together.
2、Close the back cover of the button chest, and fasten setscrews.

Chapter 7 Touch Display Malfunctions

Fig 7 touch display

7.1 Steps of changing the touch display

1、Remove the broken touch display;
2、Install a new touch display;
3、Set up the interface of the touch display;
4、Connect electrical apparatus with the touch display;
5、Finish.

7.2 Changing the touch display in detail

7.2.1 Remove the broken touch display from the fully electrical injection molding machine

Warning

Do not insert or demount any connector with electricity, or it will be broken.

1、Open the back cover of the button chest.
2、Remove three wires connecting with back of the touch display.
3、Remove the touch display setscrews.
4、Remove the touch display.

7.2.2 Install a new touch display

Warning

Don't electrify the touch display before find out the broken reason; otherwise, the touch display will be easily broken again.

1、Install a new touch display to button chest.
2、Fasten setscrews at the back of the touch display.

7.2.3 Set up the interface of the touch display

1、Introduction of the interface

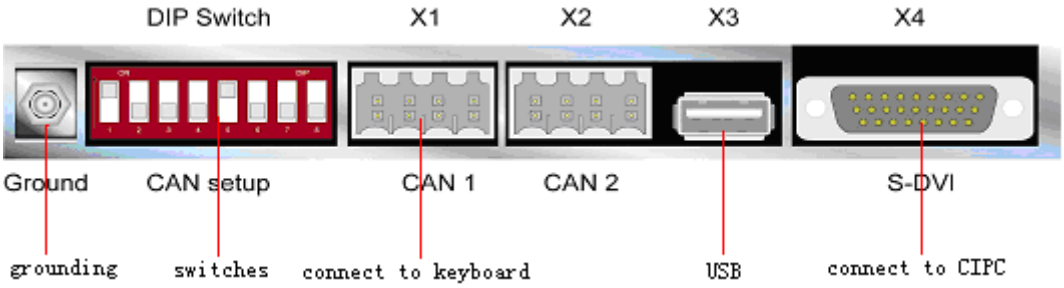
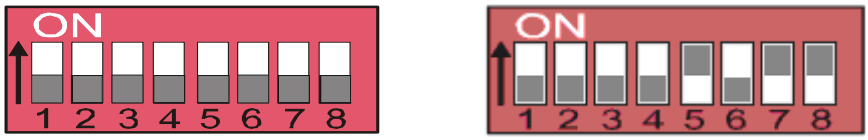


Fig 7.2.3(1) the interface at the back of the touch display

2、Set up switches (8 bit)

Turn switch '1' 'on', and the sequence of switches is 00001011.



initialization ultimate

Fig 7.2.3(2) set up the interface

7.2.4 Connect electrical apparatus of the touch display

1、Connect the grounding wire of the touch display to PE (at the back of the touch display).
2、Connect the wire of keyboard and the touch display with CAN1 (at the back of the touch display).
3、Connect the S-DVI wire to S-DVI, and fasten setscrews.

7.2.5 Finish

1、Take off the sundries, and make up the wires together.
2、Close the back cover of the button chest, and fasten setscrews.

Chapter 8 Operation Keyboard Malfunctions

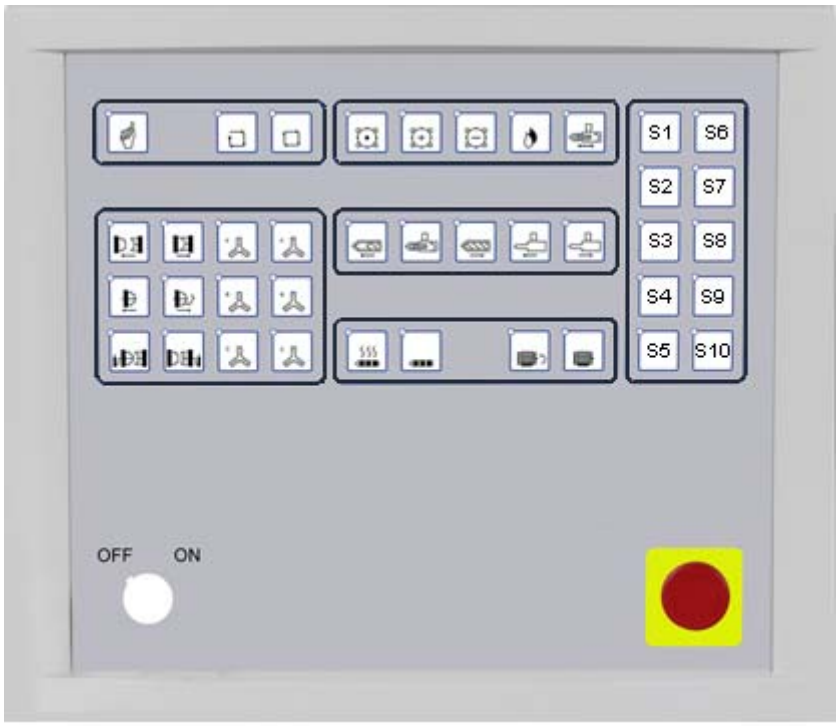


Fig 8 the operation keyboard

8.1 Steps of changing the operation keyboard

1、Remove the broken operation keyboard;
2、Install a new operation keyboard;
3、Set up the interface of the operation keyboard;
4、Connect electrical apparatus with the operation keyboard;
5、Finish.

8.2 Changing the operation keyboard in detail

8.2.1 Remove the broken operation keyboard from the fully electrical injection molding machine

Warning

Do not insert or demount any connector with electricity, or it will be broken.

1、Open the back cover of the button chest.
2、Remove the three wires which is connected with the back of operation keyboard.
3、Remove the operation keyboard setscrew.
4、Remove the operation keyboard.

8.2.2 Install a new operation keyboard

> ⚠ **Warning**
>
> Don't electrify the operation keyboard before find out the broken reason; otherwise, the operation keyboard will be easily broken again.

1、Install a new operation keyboard to the button chest.
2、Fasten setscrews at the back of the operation keyboard.

8.2.3 Set up the interface of the operation keyboard

1、Introduction of the interface

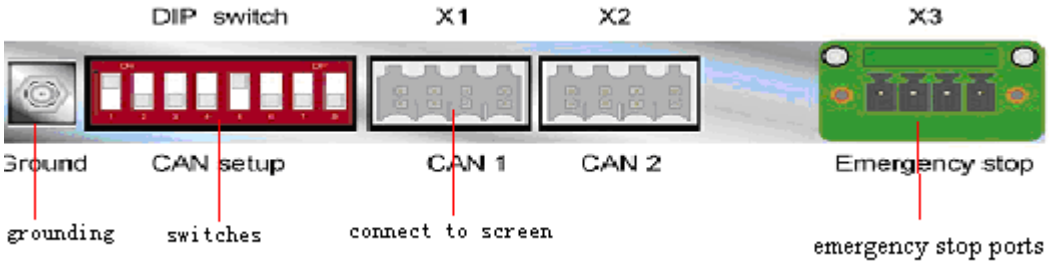
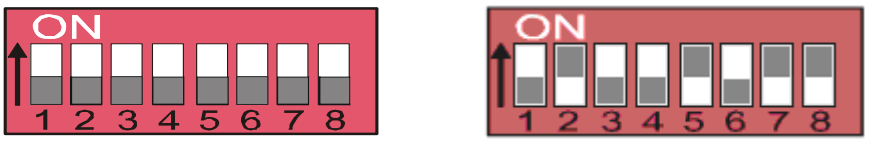


Fig 8.2.3(1) the interface at the back of the operation keyboard

2、Set up switches (8 bit)

Turn switch '1' 'on', and the sequence of the switches is 01001011



Initialization ultimate

Fig 8.2.3(2) set up the interface

8.2.4 Connect electrical apparatus with the operation keyboard

1、Connect the grounding wire of the operation keyboard to PE (at the back of the operation keyboard).
2、Connect the wire of the operation keyboard with CAN1 (at the back of the operation keyboard).
3、Connect the emergence stop interface with the emergence stop terminal (at the back of the operation keyboard). There are four pins on the emergence stop terminal. From left to right, each two pins are as a part of NC.

8.2.5 Finish

1、Take off the sundries, and tighten all wires.
2、Close the back cover, and fasten setscrews.

Chapter 9 DKI Module Malfunctions

Fig 9 DKI module

9.1 Steps of changing DKI module

1、Remove the broken DKI module;
2、Install a new DKI module;
3、Running tests;
4、Finish.

9.2 Changing the DKI module in detail

9.2.1 Remove the broken DKI module from KEB inverter

⚠ Warning

Do not insert or demount any connector with electricity, or it will be broken.

1、Open the back cabinet;
2、Remove DIAS bus which is connected with DKI module;
3、Remove DKI module from KEB inverter.

9.2.2 Install a new DKI module

> **Warning**
>
> Don't electrify the operation keyboard before find out the broken reason; otherwise, the operation keyboard will be easily broken again.

1、Introduce the interfaces of DKI module

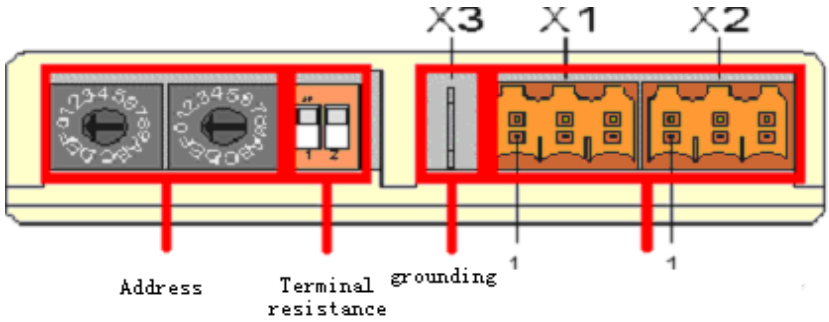


Fig 9.2.2(1) the interface of DKI module

2、DKI address

Inverter	Inject	Molding	charge	eject
DKI address	11	12	13	14

Table 9.2.2(1) DKI module

(1)、Set up DKI address. See table 9.2.2(1);

(2)、Turn on two terminal resistance switches which are at the DKI of injection KEB inverter.

3、Install DKI module to relevant KEB inverters.

4、Insert DIAS bus to DIAS terminal, and insert shielding grounding wires to PE.

9.2.3 Running test

1、Check up the state of DKI module

(1)、Electrify the fully electrical injection molding machine;

(2)、Login in the forth level;

(3)、Select menu 'state', and menu 'inverter', then it will show the connection state of DKI. See fig 9.2.3(1).

2、Check up DKI communication

(1)、Select menu 'parameter', and menu 'reference', then it will show the bus statistics.

(2)、If the bus statistics is less than ten, it is satisfied. If not stable, please make sure the DIAS bus pin is inserted well, and also check up bus shielding

grounding wires. If the bus statistics is still not stable, please contact with technicians.

Fig 9.2.3(1) DKI connection state(normal)

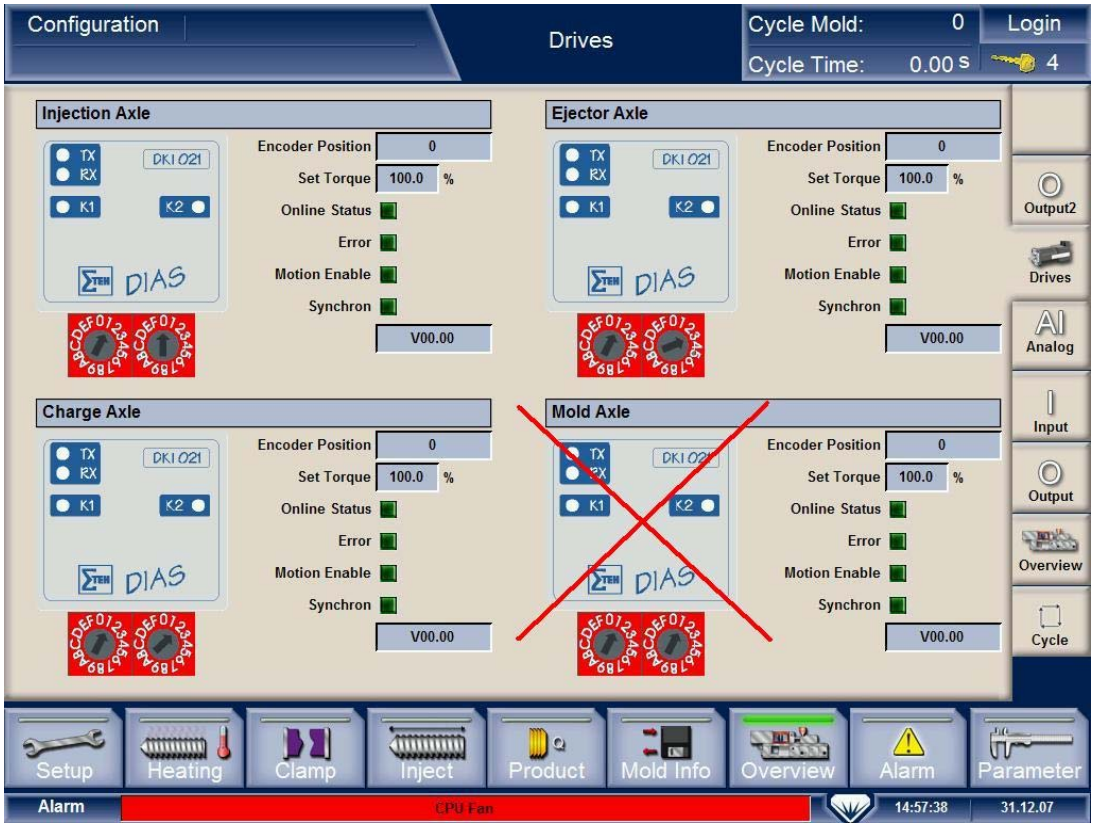


Fig 9.2.3(2) DKI connection(molding DKI disconnection)

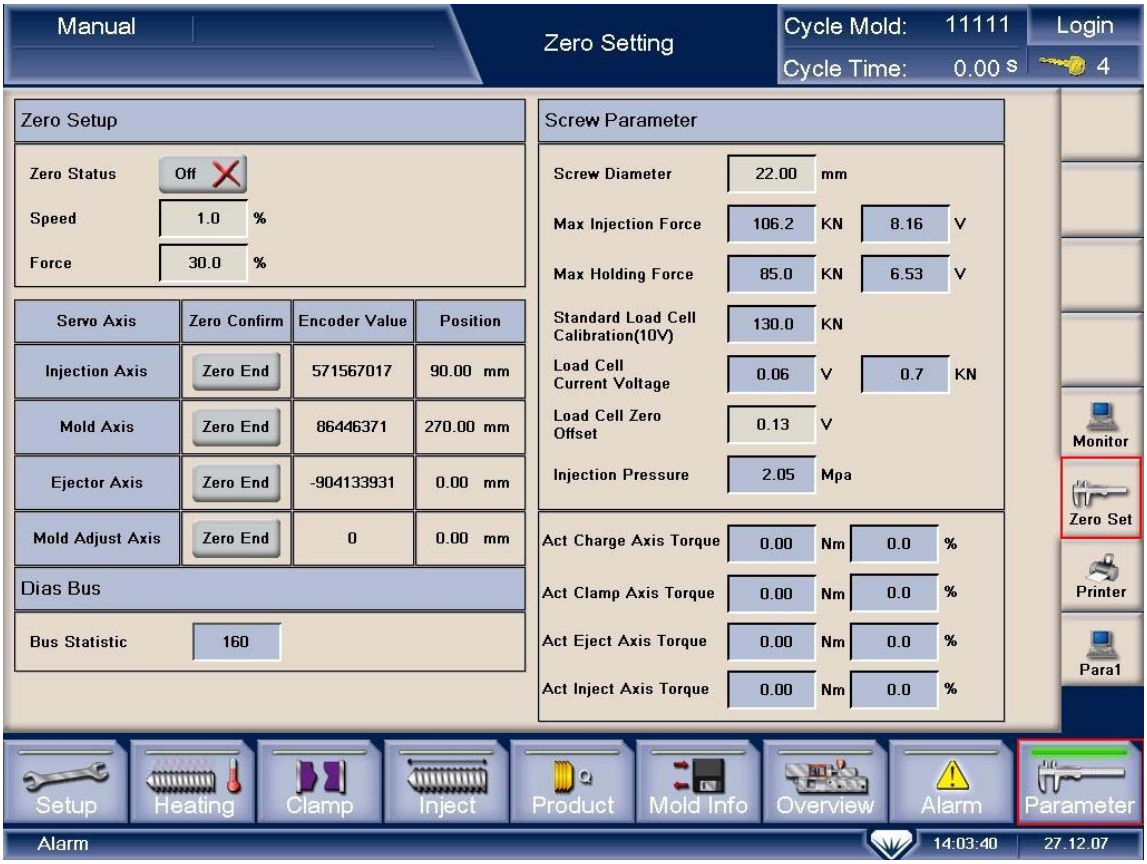


Fig 9.2.3(3) DKI bus state

9.2.4 Finish

1、Take off the sundries, and make up wires together.
2、Close the back cover of the back cabinet, and fasten setscrews.

Chapter 10 Other Components Malfunctions

10.1 Change the battery of C-IPC

The battery is used for saving RAM's programs and data when there is no power. The battery is already installed.

10.1.1 Notice

Attention

Use a special battery Zhafir provided, or it will cause data losing and apparatus broken.

Notice

The battery must change every year or it may cause data losing.

Notice

Do not change the battery with electricity. A new battery must be installed on within 15 minutes after discharging the old one, or it may cause data losing.

10.1.2 Steps of changing C-IPC battery

1、Unscrew setscrews on the top of C-IPC, then remove the shuck.

Fig 10.1.2(1) removing the shuck

2、Install a new battery, then screw setscrews to fasten the shuck.

Fig 10.1.2(2) exchanging C-IPC battery

> ⚠ **Notice**
>
> Pay attention to the battery polarity while changing.

> ⚠ **Notice**
>
> Keep the C-IPC clean.

10.2 Change C-IPC memorizer—CF card

CF card is used for saving programs and data, and it has been already installed.

10.2.1 Steps of changing CF card

1、Unscrew setscrews on the top of C-IPC, then remove the shuck. See fig 10.2.1(1)

Fig 10.2.1(1) remove the shuck

Notice

Keep the C-IPC clean.

2、Install a new CF card, then screw setscrews to fasten the shuck

Fig 10.2.1(2) change CF card

10.3 Install the dish spring

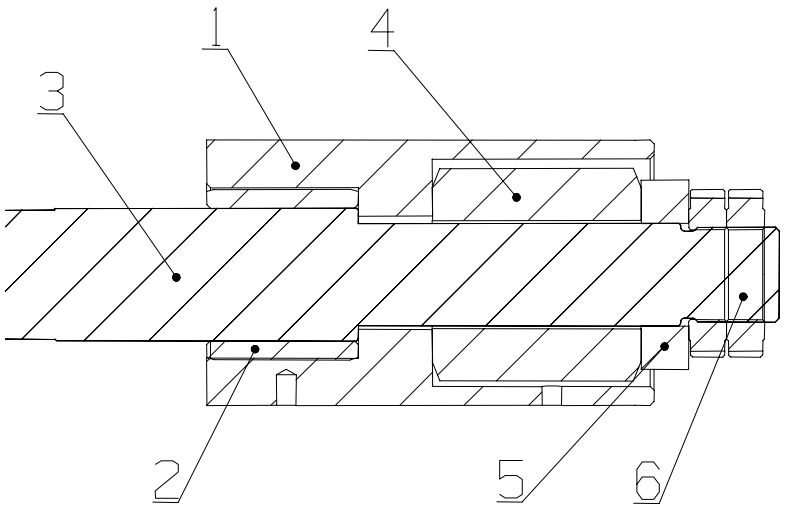


Fig 10.3(1) Dish spring fixed position

1	Cylinder for dish spring
2	Plumbago bush
3	Carriage leader
4	Dish spring
5	Washer
6	Nuts

Table 10.3(1) codes of each part

1．Installation methods

a. Clean up the plumbago bush (code 2) and cool in the icebox. Take them out some time later and put them into the cylinder for dish spring (code 1) quickly, keeping the end surface close to another part.

b. Take off the carriage leader (code 3) through the base hole, then fix the cylinder (code 1) on the carriage leader (code 3). See fig 10.3(1). Keep the end surface close to another part.

c. Assemble the dish spring (code 4) and carriage leader (code 3). (Notice: Quantity of dish springs on other machines is different.)

d. Assemble the washer (code 5) and nuts (code 6) together with carriage leader and screw down. (Before testing the machine, the force of nozzle touch should be adjusted already.)

e. At last, fix the assemble part with bolts.

f. Clean up the workshop and tools.

2、Adjust dish springs

① Screw the first nut down with hand, and then use a spanner rotate the nut for “n” loop (value of “n” as following)

② Screw the second nut (a locknut) down

Type	N(loop)	Remarks
VE600	0.5	
VE900	0.5	
VE1200	0.5	
VE1500	0.5	
VE2300	0.5	

Table 10.3(2)

3、Disk springs of VENUS series

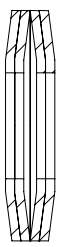
Type	Quantity	Free length	Distortion	Max. load	Specification
VE600	20 pieces (at one side)	56mm	9.2mm	1.8T	56x28.5x2
VE900	36 pieces (at one side)	91.2mm	9.24mm	2.4T	6x28.5x2
VE1200	20 pieces (at one side)	67.5mm	10.7mm	2.7T	63x31x2.5
VE2300	24 pieces (at one side)	90.4mm	9.68mm	5T	80x41x3

Table 10.3(2) parameters of dish springs

4、Installation methods:

VE600, VE1200 (Apposition)

VE900, VE2300 (Combination)



Appendix I

Set the limit current in protection switches of ejection unit motor and mold adjusting motor

Type	Protection switches of injection unit motor	Protection switches of mold adjust motor
VE600	0.8A	0.8A
VE900	1.2A	1.2A
VE1200	1.2A	1.2A
VE1500	1.2A	2A
VE1900	2A	3.5A
VE2300	2A	3.5A
VE3000	3.5A	4.7A
VE4100	3.5A	4.7A