ENGINEERING PUBLICATION
MOTION CONTROL DIVISION

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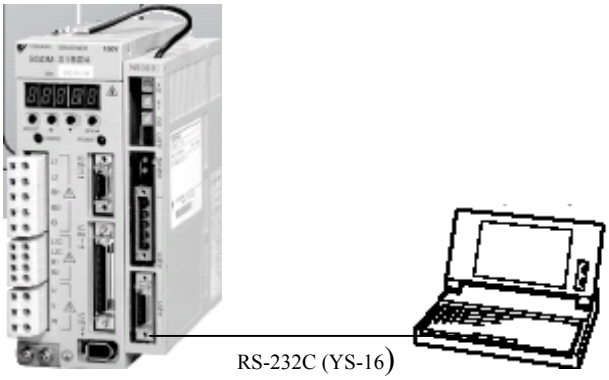
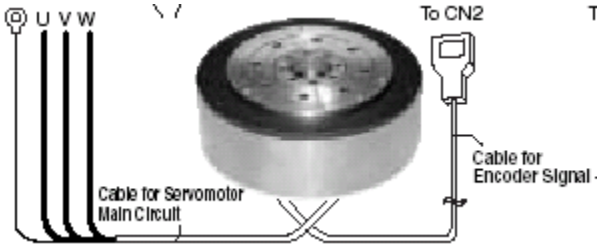
PRODUCT: NSXXX VER 1.0 SUBJECT: SET UP OF NS300 / NS500 WITH DD MOTOR

Summary: - This procedure is written to set up Direct-drive motor with Sigma-2 Device Net Module – NS300 or Sigma-2 Profibus Module –NS500. In this note Direct-drive motor has been configured in rotary linear mode. Sample demo program has been written to operate STEP, positioning, Point table Positioning, Station positioning, External positioning, Multi-speed positioning & Homing. The procedure helps an example to configure the Direct-drive motor with a reference unit (R.U.) of 0.001.

1) Establish communication with NS300 or NS500.

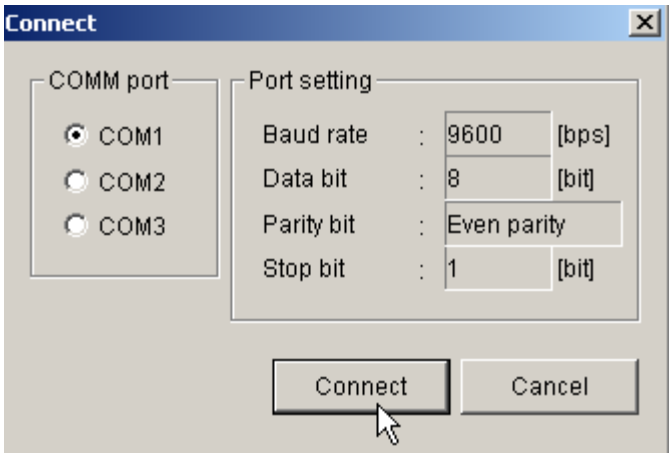
Attach YS-16 cable to the COM port of the PC and to CN11 on the NS300/500 module. Apply main power and control power to the SGDH+NS300 Module. Run the set up tool software "NS_MMI .exe" (Ver1.0).





The NSxxx set up tool screen will appear as below.

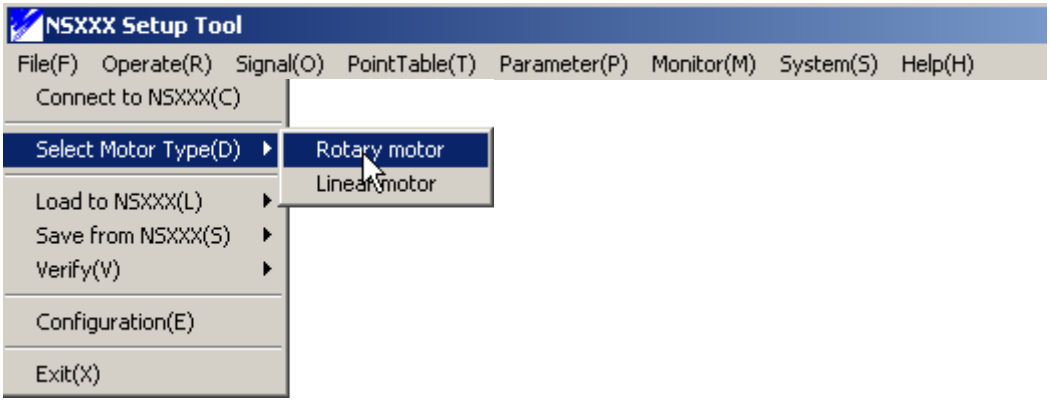
The status bar at the bottom of the screen should show as "Ready", "Servo OFF", and "Main Power ON" and on the side Rotary or Linear.



If the connection between your PC and NS300 /NS500 is not established, then close the set up tool software and try a different COM port. At the same time make sure a serial cable YS-16 is connected to the CN11 connector with correct orientation.
Press the Connect button to establish communication with your PC and NS300 /NS500.

2) Configure your NSXXX set up tool to either Rotary or Linear. This case chooses Rotary type.

Click File, then select Motor Type (D), and then choose Rotary motor.



The status bar at the bottom of the screen should read “Ready”, Servo OFF, and Main Power ON and Rotary Motor.

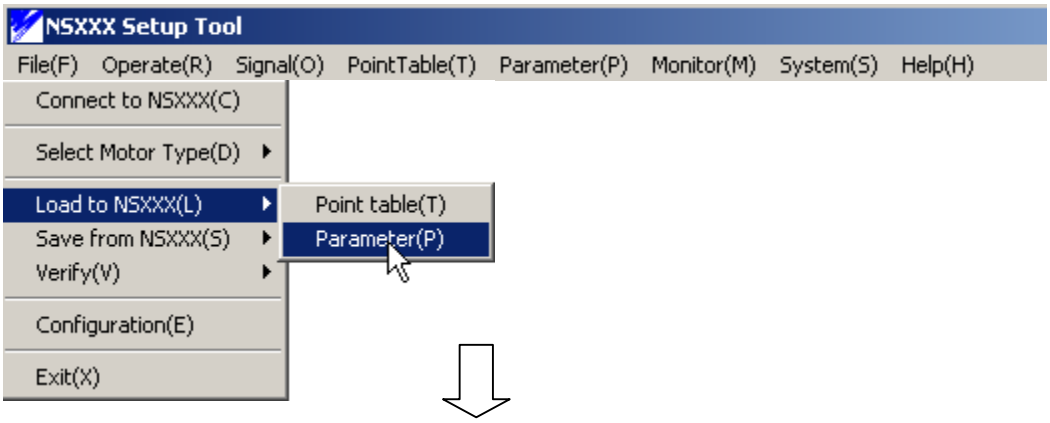
3) Load the parameter file "NSXXXDD.PRM and point table file NSXXXDD.PNT

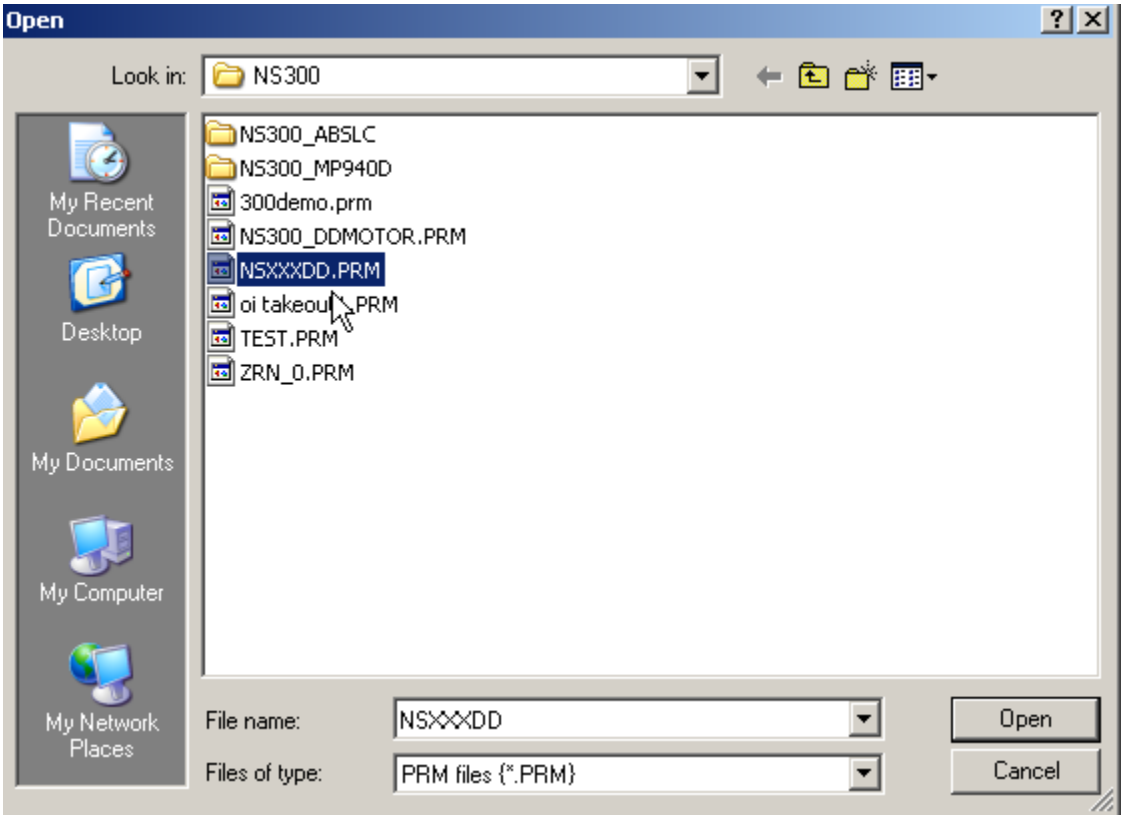
IMPORTANT NOTE: - A system reset is required every time whenever any parameter is changed to save the changed parameters to non-volatile memory. Press Reset module (M) from System(s) menu.

If you get ACC alarm, then change servo parameter Pn205 =0

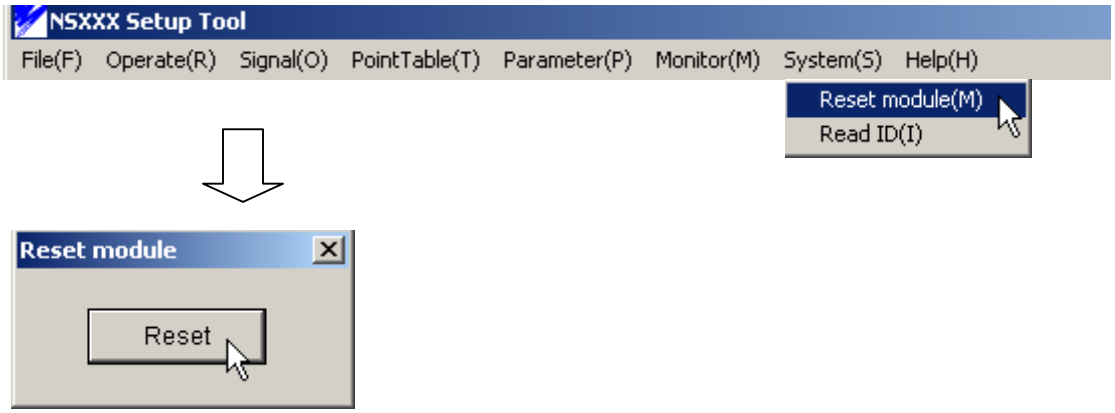
These parameter file and point table are the part of this NsxxxVer1.0

Click File, select Load to NSXXX (L), then parameter (P) and pick the NSXXXDD.PRM file.

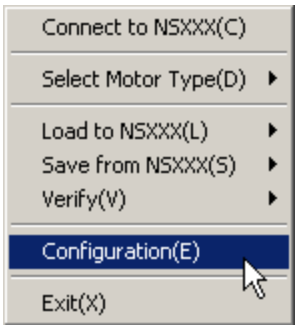




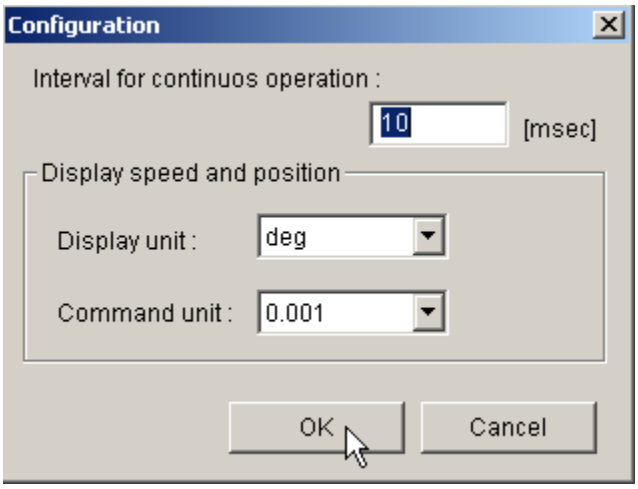
After editing any parameters or loading new parameters, carry out a system reset to save the parameters to non-volatile memory. Choose Reset module (M) from the System (S) Menu.



4) Configure NSxxx to show the appropriate units

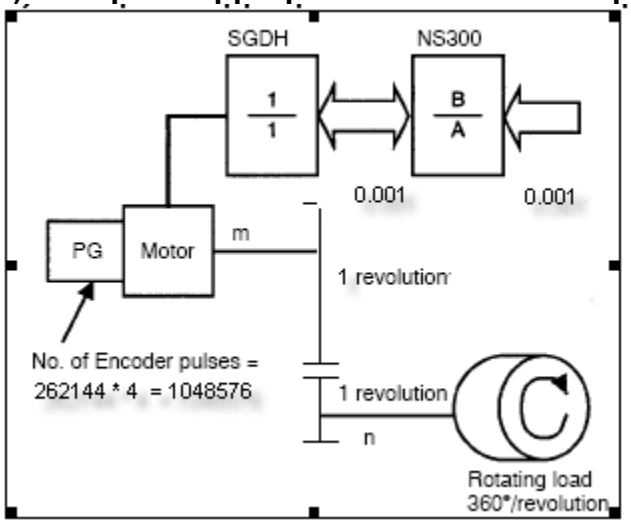


We assume that the set up is for deg. Change the display unit from “mm” to “deg”. Change the command unit from 0.01 to 0.001.



Our least input increment or resolution or the reference unit (R.U.) set to 0.001 deg.

5) Set up the appropriate Gear and Feed parameters



Let us set the Electronics gear ratio Pn810, Pn811, the maximum feed speed Pn843, feed speed for positioning and constant feed speed (for jogging) and (Pn 821,Pn831 and Pn831) are set to the **default 24000** [R.U./min].

REV=360/0.001 = 360000

A (Pn811) =REV * Gear Ratio = 360000 * 1 = 360000

B (Pn810) =(Encoder PPR) * (Pulse Multiplier) * Gear Ratio = 262144 * 4 * 1 = 1048576

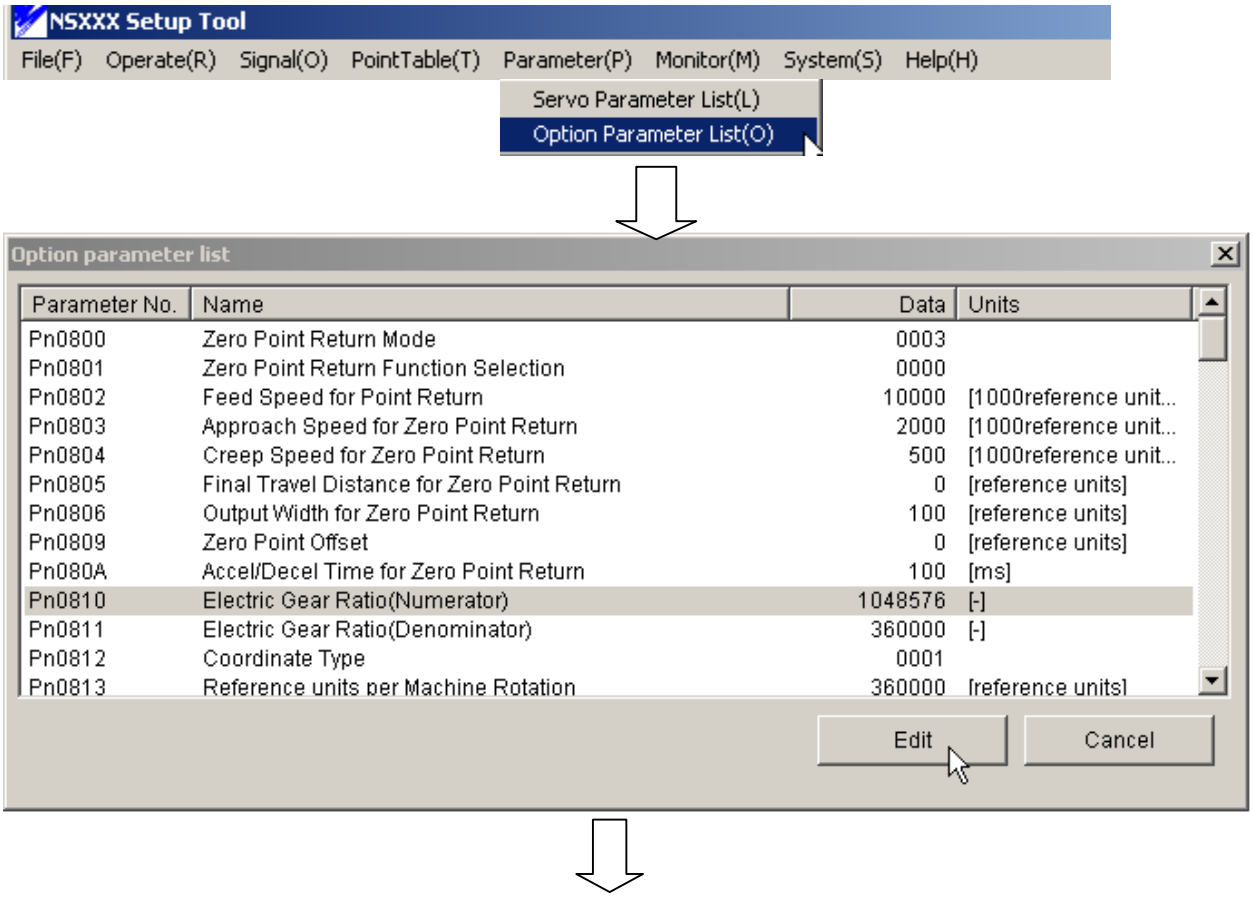
We also need to set up Pn813 (Reference units per machine rotation) = 360000

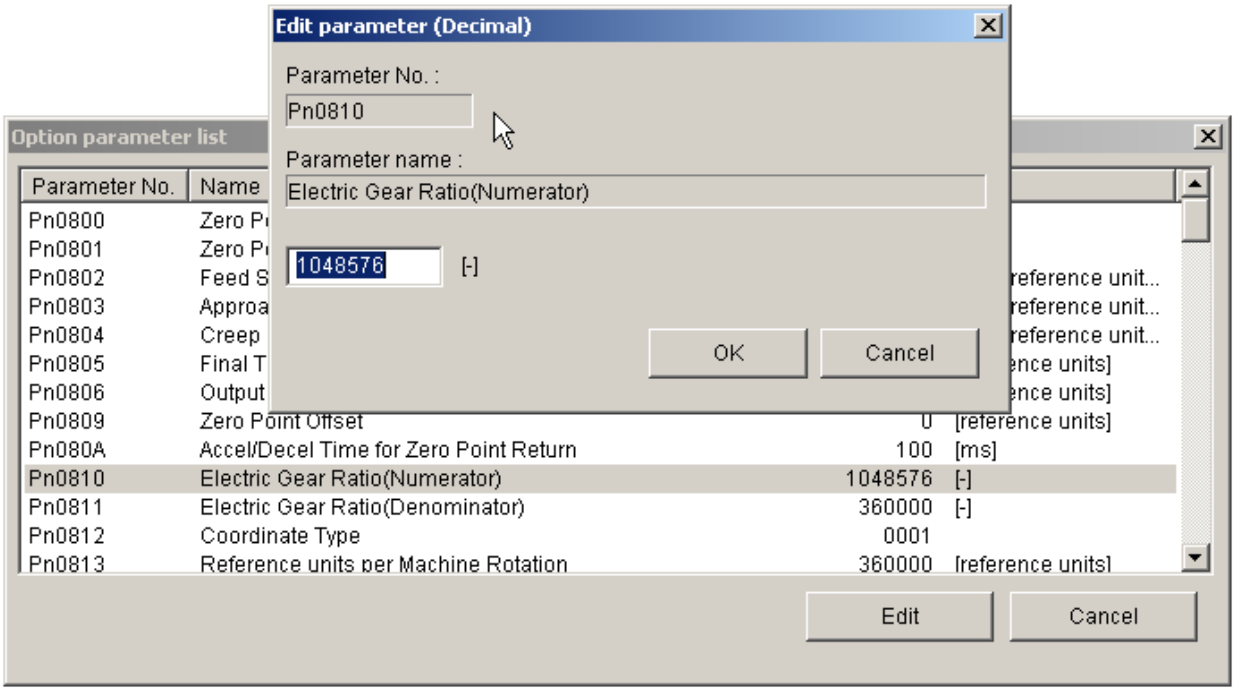
(With this parameter, whenever DD motor makes one rotation, it will start again from 0.001 deg~360.000 deg.)

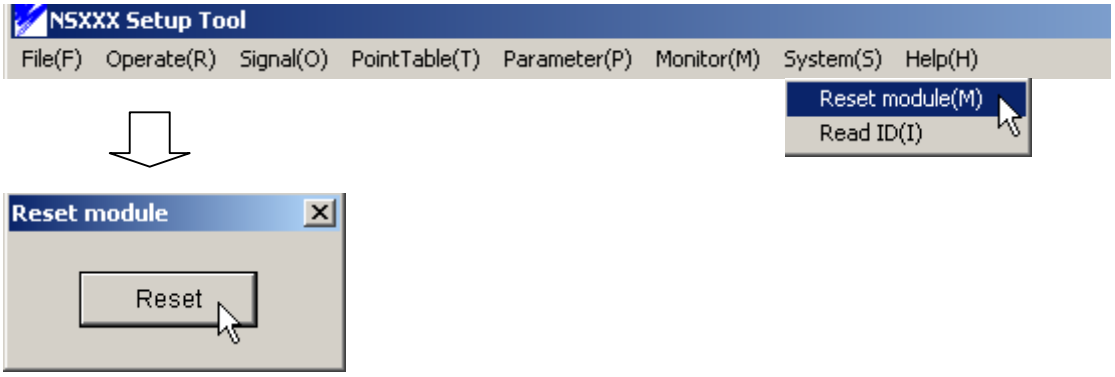
Feed rate =

$$\frac{180000\ [1000\ R.U]}{[rev/min]\ Min} * \frac{0.001\ R.U.}{0.001\ R.U.} * \frac{1048576(Pn810)}{360000(Pn811)} * \frac{1\ REV}{1048576\ Encoder\ counts} = 500$$

The Max feed rate is changed from 180000 --→ 90000, then the DD Motor Max RPM will change to 250 rev /min]

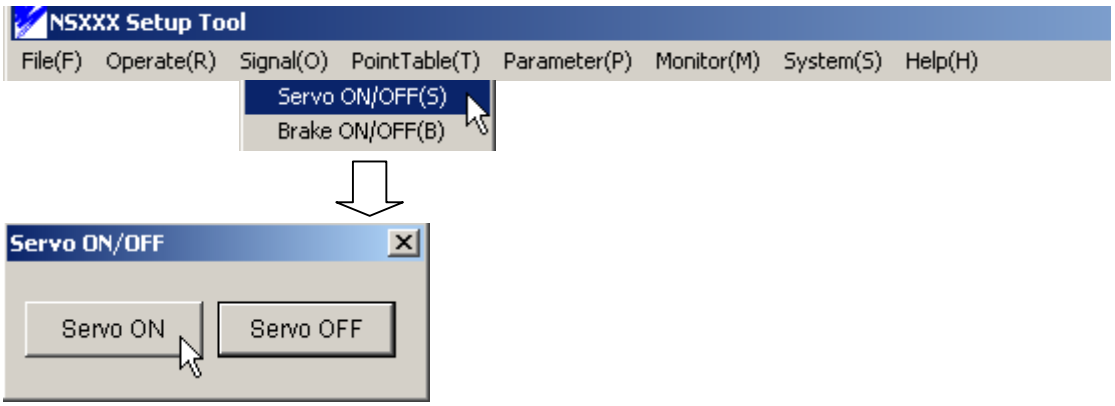






6) Enable the SGDH + NS300/NS500

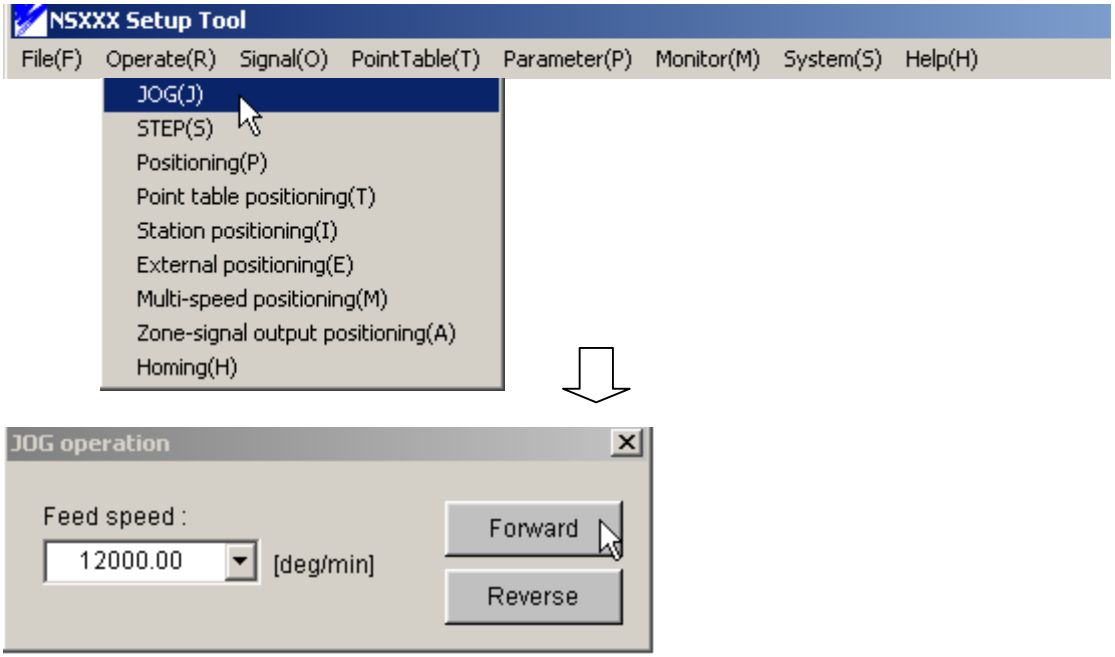
Click Signal (O), select Servo ON/OFF (S), Press “Servo ON” button to enable the servomotor.



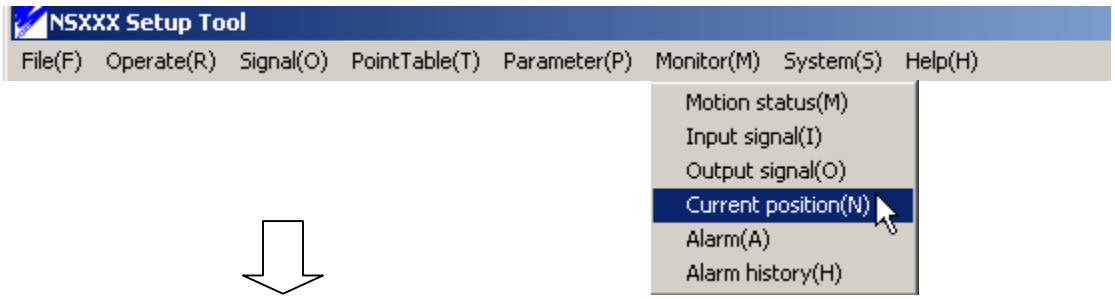
The SGDH display should read, “run”. If it reads “bb”, check that the EMG STOP circuit is wired correctly and has not disabled the drive, or disable the EMG STOP input by setting Pn081B to 0000.

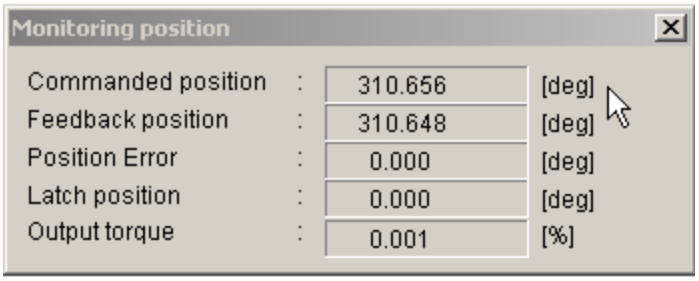
7) Jogging the Motor

Choose the JOG (J) function from the Operate(R) menu.

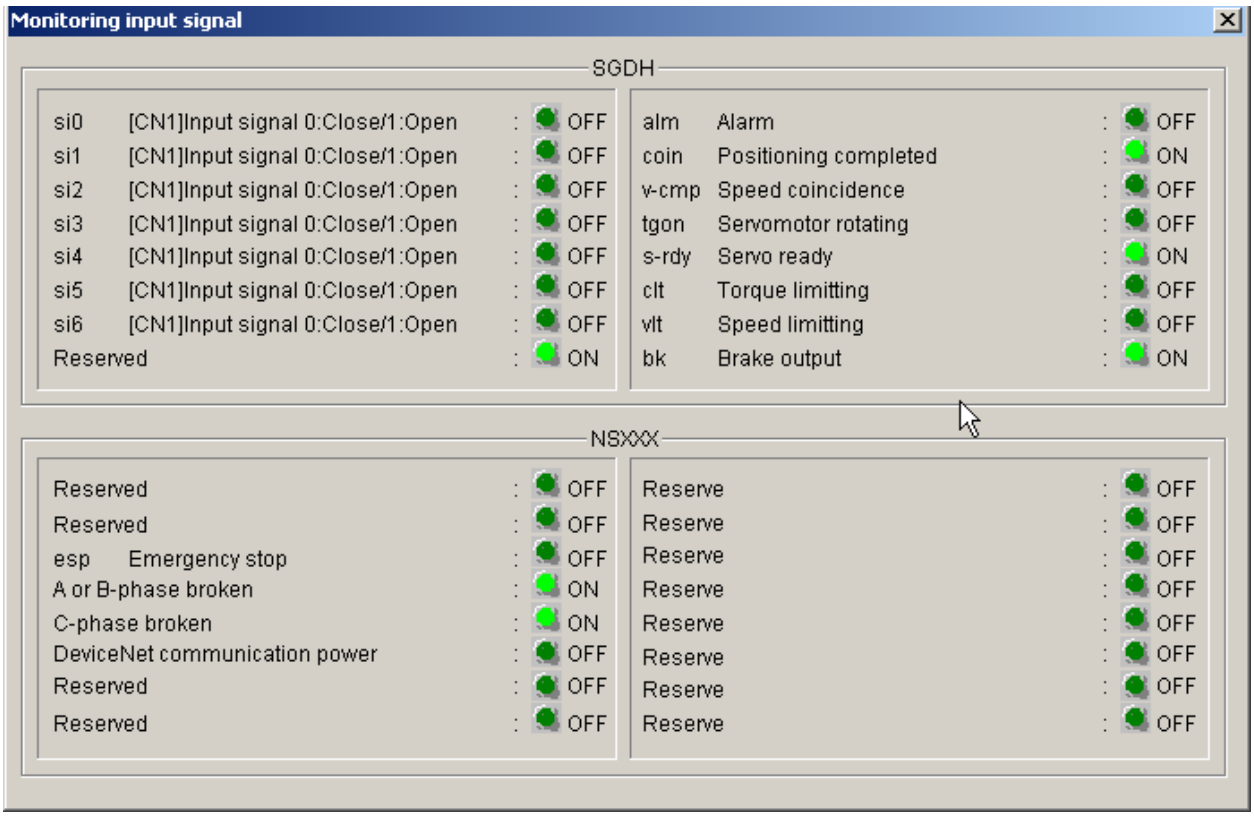


Select a speed in Reference units per minute (12000.00 deg/min) and select Forward or Reverse. The servomotor should rotate at the speed set in the Feed speed box. As per the calculation above, the motor will run at a speed of 33 rpm.
The current position can been seen from the Monitor (M) and selecting Current position (N). Leave this window open to observe the position changing. Also if the servo does not rotate, check the + OT and - OT switches. To verify these use the Monitoring input signal.





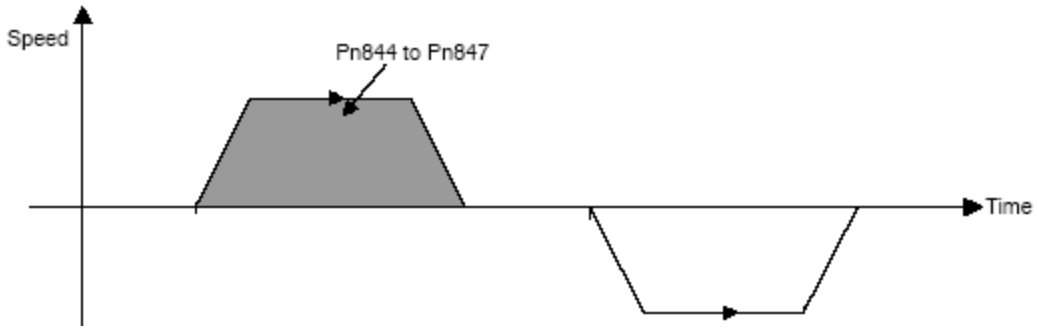
SGDH and NSXXX signal input and output status (SI2→P-OT, SI3→N-OT)

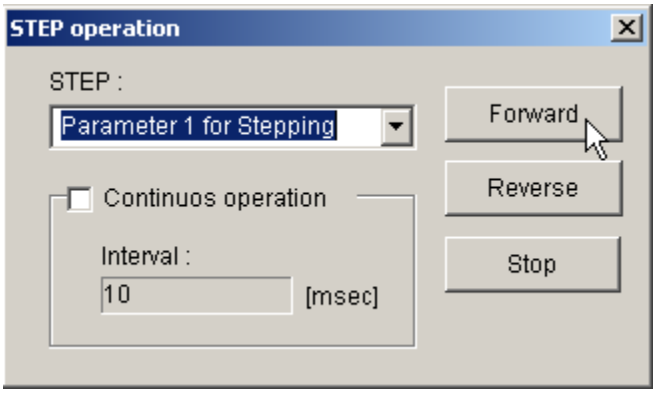


8) Stepping the NS300/NS500

The step operation from the Operate Menu, indexes the servo a distance stored in the NS300/NS500 parameters. This distance is in increment mode.

The parameter's for STEP mode uses the value in Pn844, 845,846 and 847 as the target position.

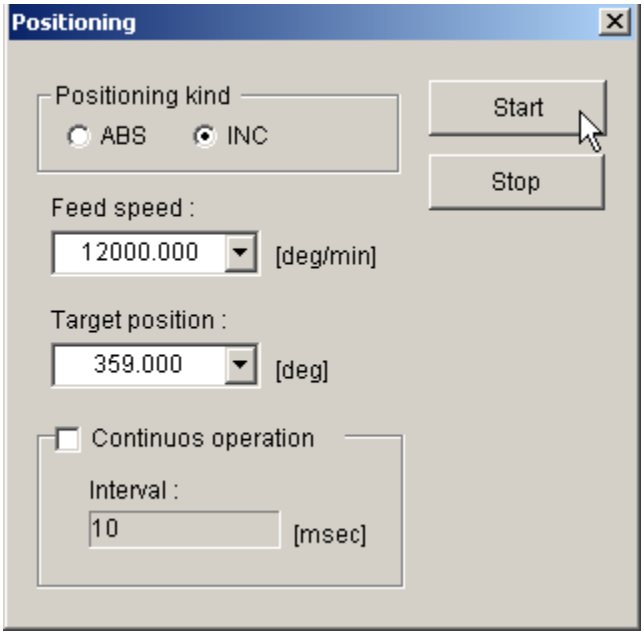




Select Forward or Reverse button. Do not select continuous operation while demonstrating the STEP operation. The motor should index to the stored value at the feed speed for positioning parameter Pn821. If there is no motion, then check that the servo is enabled, EMG STOP input, P-OT input and N-OT input.

9) Positioning the NS300/NS500

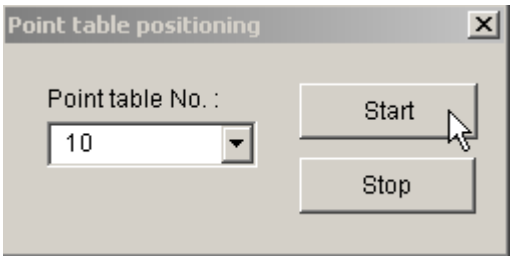
Choose positioning(P) from the operate(R) menu.



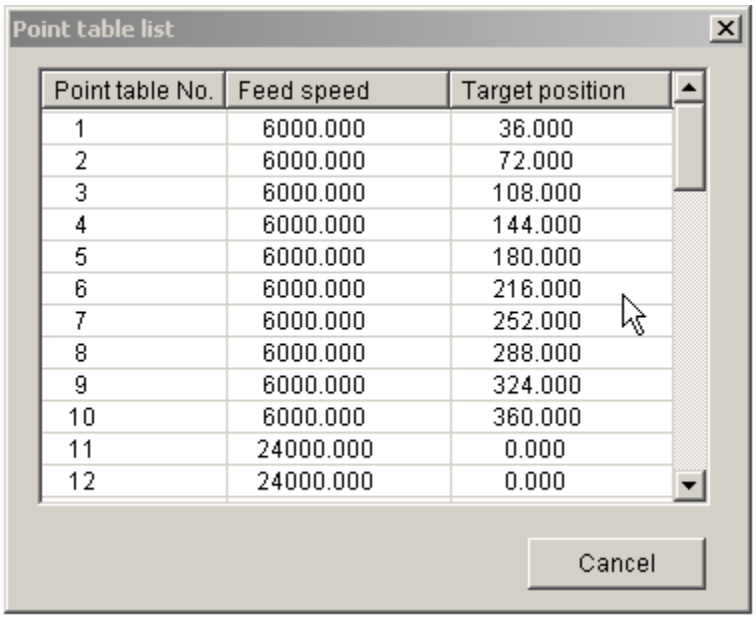
In the Positioning screen, select radio button INC. Set the value of 12000.00 in deg/minute (R.U. per minute). Set the target position of 359.999 deg. Press the start button. With current parameters of NSXXXDD.PRM, the motor should move close to 1 rev.

If the continuous operation box is checked, the servo will move to the target position with feed speed of 12000.00 deg/minute. It will back again with feed speed of parameter value set in Pn 843. The motor will move back and forth with two different feed speeds. If there is no motion, check that the servo is enabled, EMSTOP input, P-OT input and N-OT input.

10) Using the Point Table



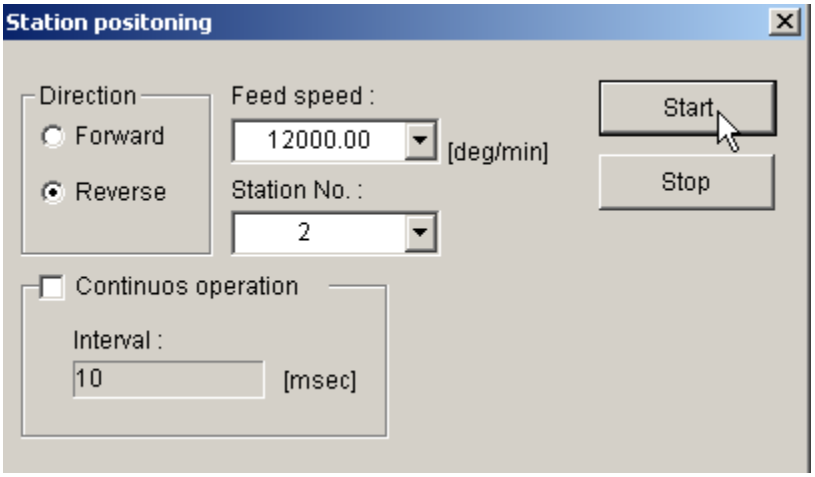
NSXXXDD.PNT demo program loads the first ten point table cells. In order to edit the new table, select point table (T), then click on the Edit (S). Start entering new current position's with different point table numbers. Every time when OK is pressed, the point table is built. The point table can be checked by selecting point table (T) and then click List (L).



The point table values are in absolute positions while using NSXXX. If the user tries to position to the same point table number more than once, no motion will occur.

11) Station positioning using the NS300/NS500

Choose the station positioning(I) from the operate(R) menu.



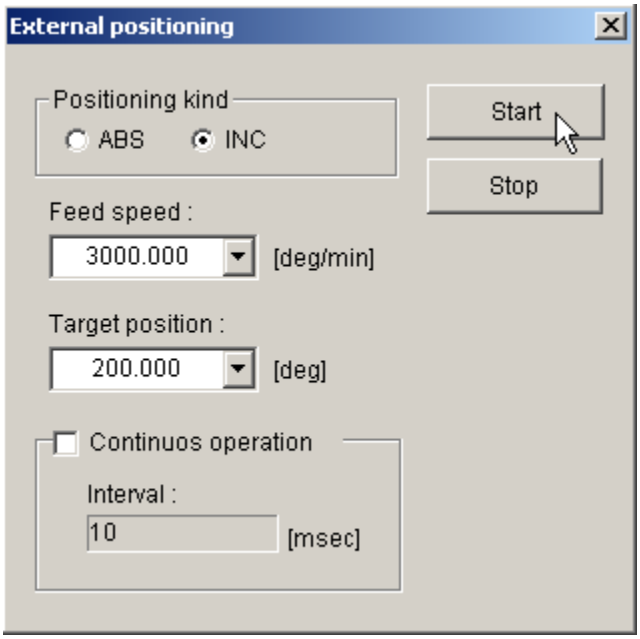
The NS300/NS500 has a station-positioning mode for rotary tables. The number of R.U per one machine rotation is defined in parameter Pn813. The number of station's used for the rotary table is defined in parameter Pn85A. The NSXXXDD.PRM has the following values.

Pn813→ 360000 reference units – one motor rotation
Pn85A→ 4 stations

Enter a speed in the Feed speed window. Select station 1,2, or 3 and select start. Currently, NSxxx will not allow positioning to the highest station number, in this case station number 4. Continuous operation will index between the current station and the last station continuously.

12) External Positioning using the NS300/NS500

Choose External positioning(E) from the operate (R) menu.



Enter the speed of 3000 deg/min in the Feed speed window. Enter the target position of 200.000 deg in the target position window. This speed and target position is the initial speed and position, before the EXTP (CN1-44) is turned ON.

Once the EXTP (CN1-44) is turned ON, the speed and feed will get changed as set by parameters. Approach speed for external positioning is set by Pn854. Travel distance for Pn855 sets external positioning. The NSXXXDD.PRM sets the following values.

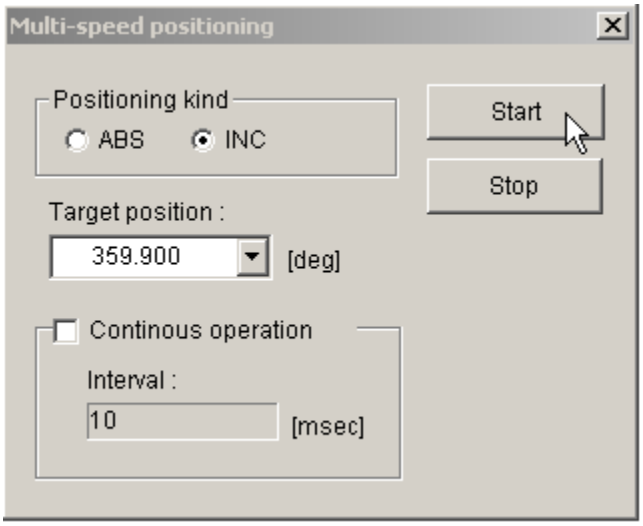
Pn854→ 180000[1000R.U.]
Pn855→ 359999[R.U]

For this demo purpose, the initial feed is set slower. Once the EXTP is turned ON, the feed will faster and it will be same as set in the parameters.

13) Multi-speed positioning using the NS300/NS500

Choose Multi-speed positioning(M) from the operate (R) menu.

The Multi-speed position mode allows one index move to have up to 16 speeds. NSXXXDD.PRM sets the following positions and speeds.



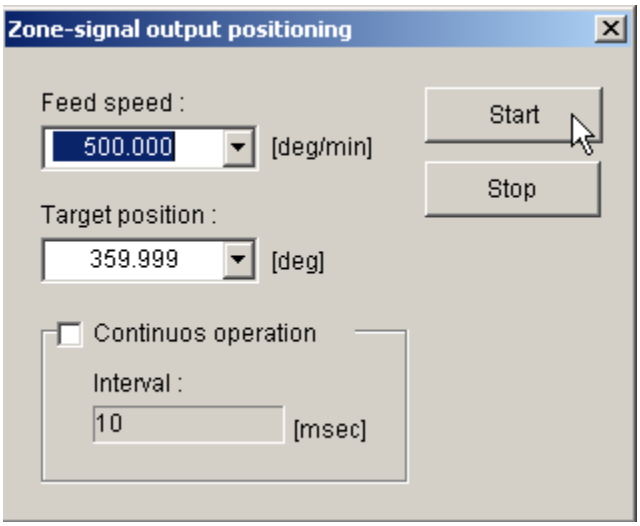
Pn861	number of points	4	
Pn862	First feed speed	10000	[1000 R.U.]
Pn863	speed switching position 1	72000	[1000 R.U]
Pn864	speed switching position 2	144000	[1000 R.U]
Pn865	speed switching position 3	244000	[1000 R.U]
Pn866	speed switching position 4	350000	[1000 R.U]
Pn867	speed switching position 5	900000	[1000 R.U]
Pn868	speed switching position 6	108000	[1000 R.U]
Pn869	speed switching position 7	126000	[1000 R.U]
Pn86A	speed switching position 8	144000	[1000 R.U]
Pn873	switch speed 1	20000	[1000 R.U./min]
Pn874	switch speed 2	40000	[1000 R.U./min]
Pn875	switch speed 3	60000	[1000 R.U./min]
Pn876	switch speed 4	80000	[1000 R.U./min]
Pn877	switch speed 5	100000	[1000 R.U./min]
Pn878	switch speed 6	120000	[1000 R.U./min]
Pn879	switch speed 7	140000	[1000 R.U./min]
Pn87A	switch speed 8	180000	[1000 R.U./min]

Enter a target in Reference Units in the target position window. Preferably, enter a target position larger than the speed switching position 8.

Select the INC radio button and select START.

14) Zone signal output positioning with the NS300/NS500

Choose Zone signal output positioning (A) from the operate (R) menu.



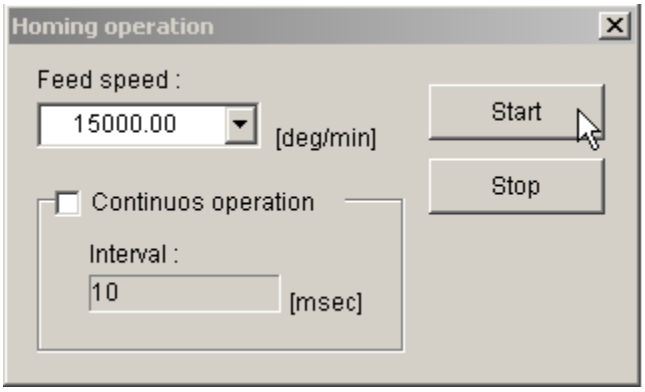
The Notch (zone signal) output mode allows two outputs CN4 (12), (10) to turn on and off at specified positions. NSXXXDD.PRM sets the following parameters.
Enable Notch out put by using parameter Pn891

Pn892	Notch 1 output position lower limit	9000	[R.U]
Pn893	Notch 1 output position upper limit	18000	[R.U]
Pn894	Notch 2 output position lower limit	18000	[R.U]
Pn895	Notch 2 output position upper limit	30000	[R.U]

Set the feed speed in the feed speed window in [R.U/min]. Set the target position in the target position window. Preferably, enter a target position larger than the Notch 2 output position upper limit.

15) Homing using the NS300/NS500

Choose Homing from the operate (R) menu.



NSXXXDEMO.PRM sets the following important parameters.

Pn800	Home Type	3
Pn803	Approach speed	20000 [1000 R.U./min]
Pn804	Creep speed	5000 [1000 R.U./min]

Different home selection's type also can be tried.