ENGINEERING PUBLICATION
MOTION CONTROL DIVISION

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PRODUCT: NSXXX VER 1.0   SUBJECT: SET UP OF NS300 / NS500 WITH STANDARD MOTOR (LINEAR MODE)

Summary: -This procedure is written to set up Standard servomotor with Sigma-2 Device Net Module – NS300 or Sigma-2 Profibus Module –NS500. In this note Standard servomotor has been configured in 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 Standard servomotor 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).

RS-232C (YS-16)

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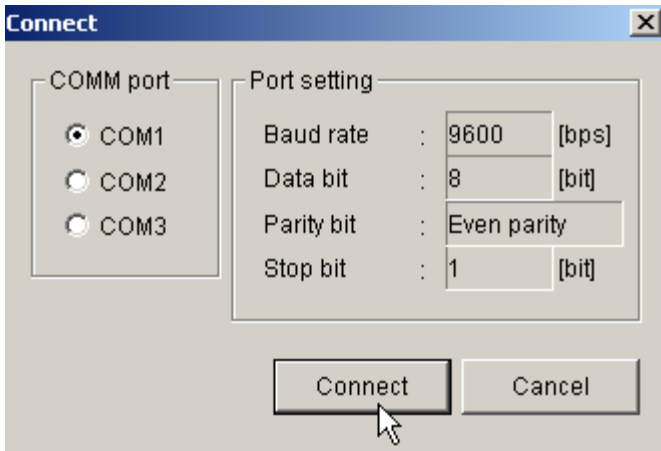
If the connection between your PC and NS300 /NS500 is not established, then close the set up tool software and try a different COM port. At the same time make sure a serial cable YS-16 is connected to the CN11 connector with correct orientation.
Press the Connect button to establish communication with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

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

Click File, then select Motor Type (D), and then choose Linear motor.
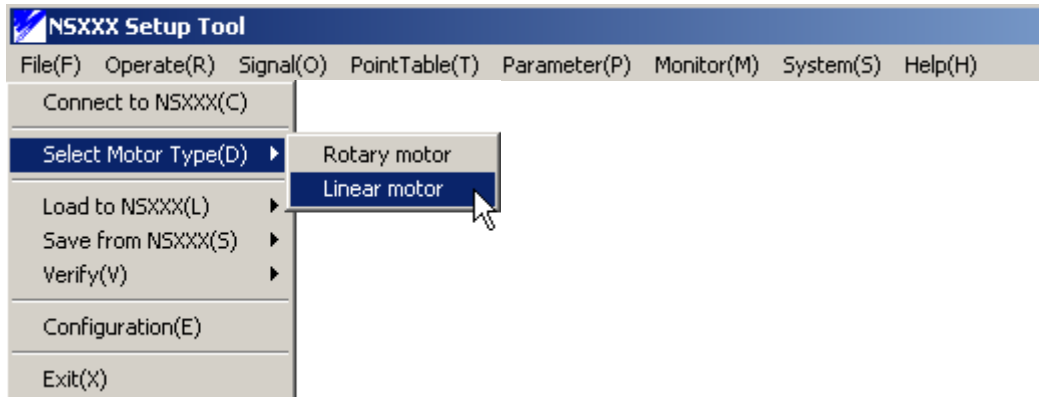
The status bar at the bottom of the screen should read "Ready", Servo OFF, and Main Power ON and Linear motor.
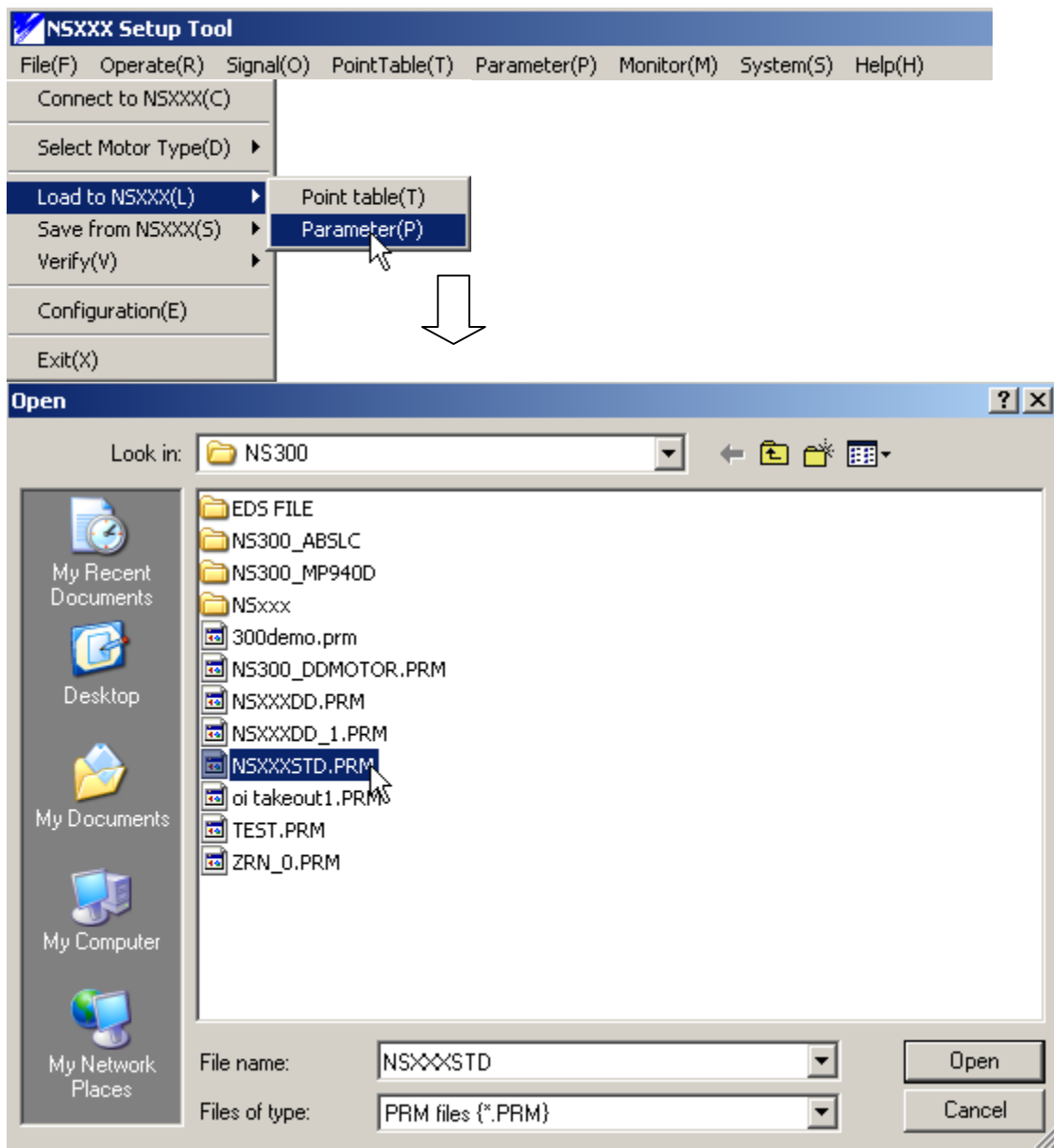
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Waukegan, IL, 60085   Date:06/04/2004
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3) Load the parameter file "NSXXXSTD.PRM and point table file NSXXXSTD.PNT

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 NSXXXSTD.PRM file.

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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.
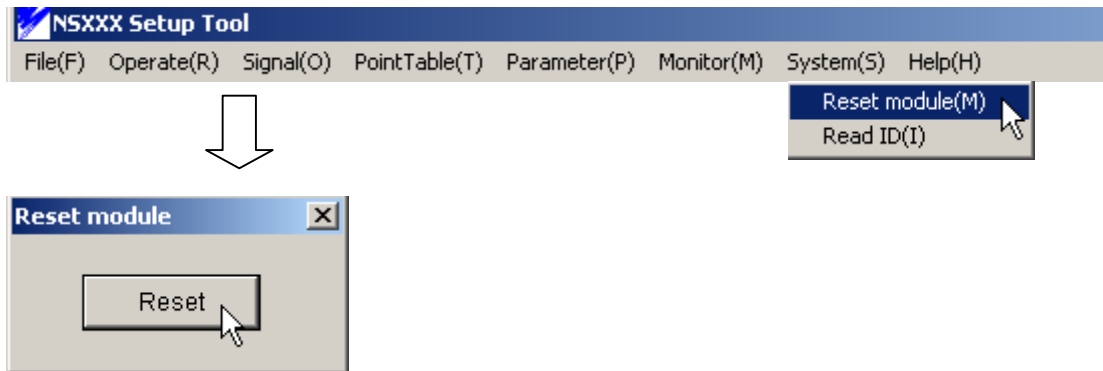
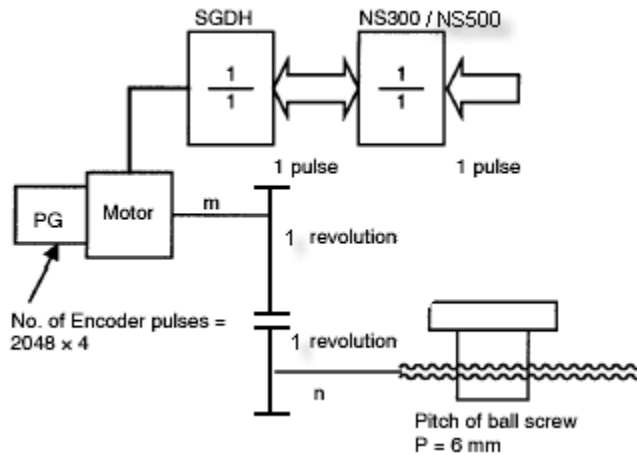## 4) Configure NSxxx to show the appropriate units
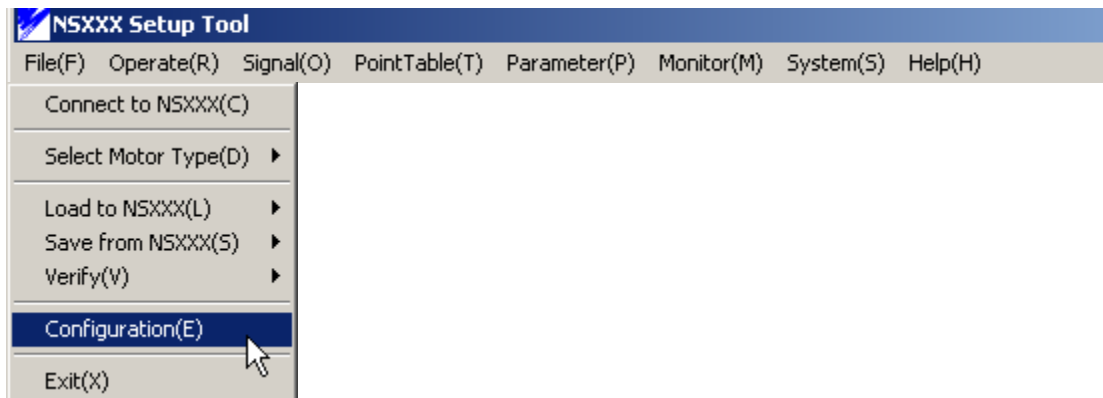
We assume that the set up is for mm. Change the display unit from "None" to "mm". Change the command unit from 0.01 to 0.001.
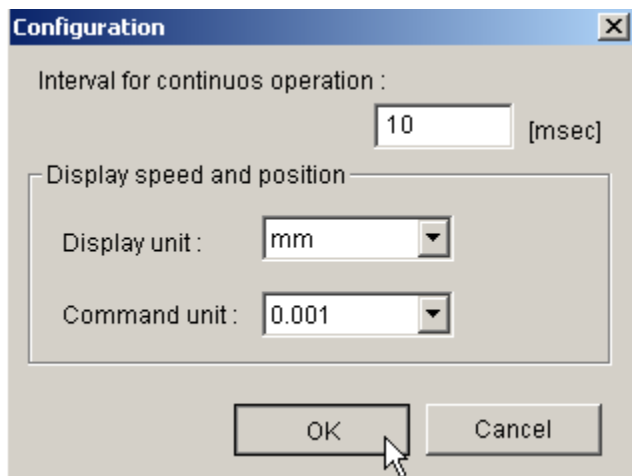
Our least input increment or resolution or the reference unit (R.U.) set to 0.001 mm

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= $\underline{\text{Travel distance of load per revolution (mm)}}$ = 6 / 0.001 = 6000
        Reference unit (mm)

A (Pn811) =REV * Gear Ratio = 6000 * 1 = 6000
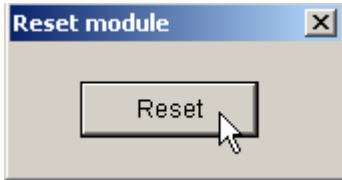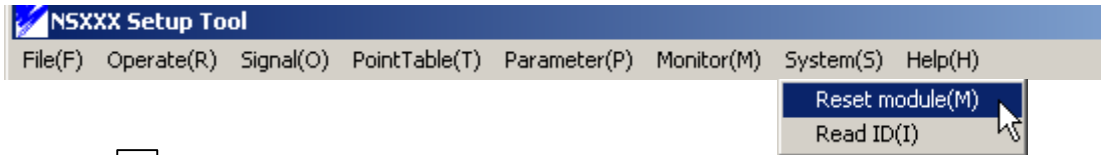
B (Pn810) =(Encoder PPR) * (Pulse Multiplier) * Gear Ratio = 2048 * 4 * 1 = 8192

We also need to set up Pn813 (Reference units per machine rotation) = 6000

Feed rate =

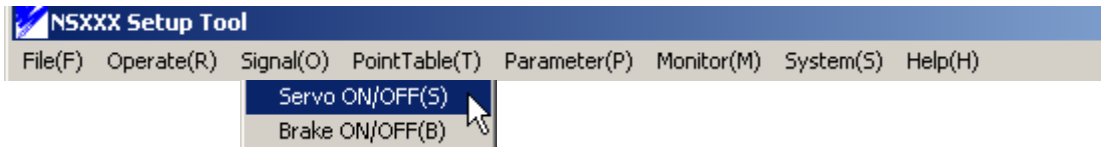$\dfrac{18000\ [1000\ R.U]}{[rev/min]\ Min}$ * $\dfrac{0.001\ R.U.}{0.001\ R.U.}$ * $\dfrac{8192\ (Pn810)}{6000\ (Pn811)}$ * $\dfrac{1\ REV}{8192\ Encoder\ counts}$ = 3000

NSXXX Setup Tool

File(F)　Operate(R)　Signal(O)　PointTable(T)　Parameter(P)　Monitor(M)　System(S)　Help(H)

Servo Parameter List(L)
Option Parameter List(O)

Option parameter list

Parameter No.	Name	Data	Units
Pn0803	Approach Speed for Zero Point Return	2000	[1000reference unit...
Pn0804	Creep Speed for Zero Point Return	500	[1000reference unit...
Pn0805	Final Travel Distance for Zero Point Return	0	[reference units]
Pn0806	Output Width for Zero Point Return	100	[reference units]
Pn0809	Zero Point Offset	0	[reference units]
Pn080A	Accel/Decel Time for Zero Point Return	100	[ms]
Pn0810	Electric Gear Ratio(Numerator)	8192	[-]
Pn0811	Electric Gear Ratio(Denominator)	6000	[-]
Pn0812	Coordinate Type	0001	
Pn0813	Reference units per Machine Rotation	6000	[reference units]
Pn0814	Backlash Compensation	0	[reference units]
Pn0815	Backlash Direction	0000	
Pn0816	Positive Software Limit	99999999	[reference units]

Pn086B parameter data reading from NSXXX

Edit　　Cancel

Edit parameter (Decimal)

Parameter No. :
Pn0810

Parameter name :
Electric Gear Ratio(Numerator)

8192　[-]

OK　　Cancel

Option parameter list

Parameter No.	Name	Data	Units
Pn0803	Approach Sp		nce unit...
Pn0804	Creep Spee		nce unit...
Pn0805	Final Travel		nits]
Pn0806	Output Width		nits]
Pn0809	Zero Point O		nits]
Pn080A	Accel/Decel		
Pn0810	Electric Gear		
Pn0811	Electric Gear		
Pn0812	Coordinate T		
Pn0813	Reference units per Machine Rotation	6000	[reference units]
Pn0814	Backlash Compensation	0	[reference units]
Pn0815	Backlash Direction	0000	
Pn0816	Positive Software Limit	99999999	[reference units]

Edit　　Cancel

NSXXX Setup Tool

File(F)   Operate(R)   Signal(O)   PointTable(T)   Parameter(P)   Monitor(M)   System(S)   Help(H)

Reset module(M)
Read ID(I)

Reset module ✕

Reset

6) Enable the SGDH + NS300/NS500

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

NSXXX Setup Tool

File(F)   Operate(R)   Signal(O)   PointTable(T)   Parameter(P)   Monitor(M)   System(S)   Help(H)

Servo ON/OFF(S)
Brake ON/OFF(B)

Servo ON/OFF ✕

Servo ON   Servo OFF

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.
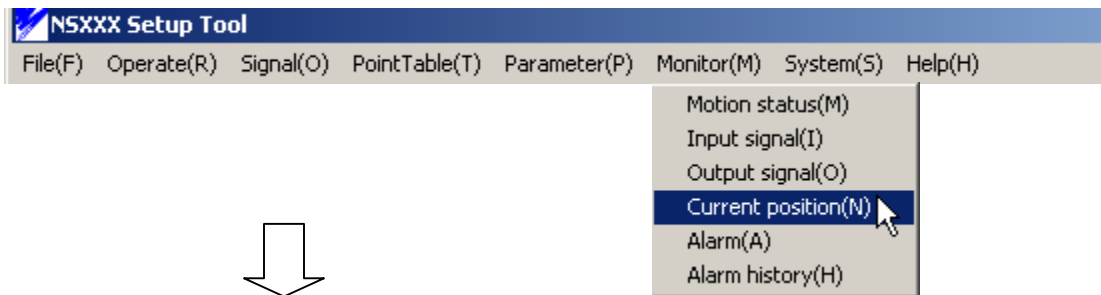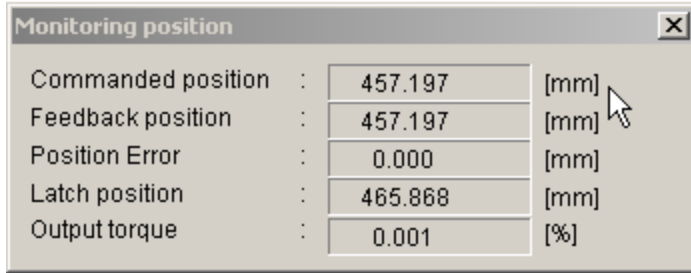
7) Jogging the Motor

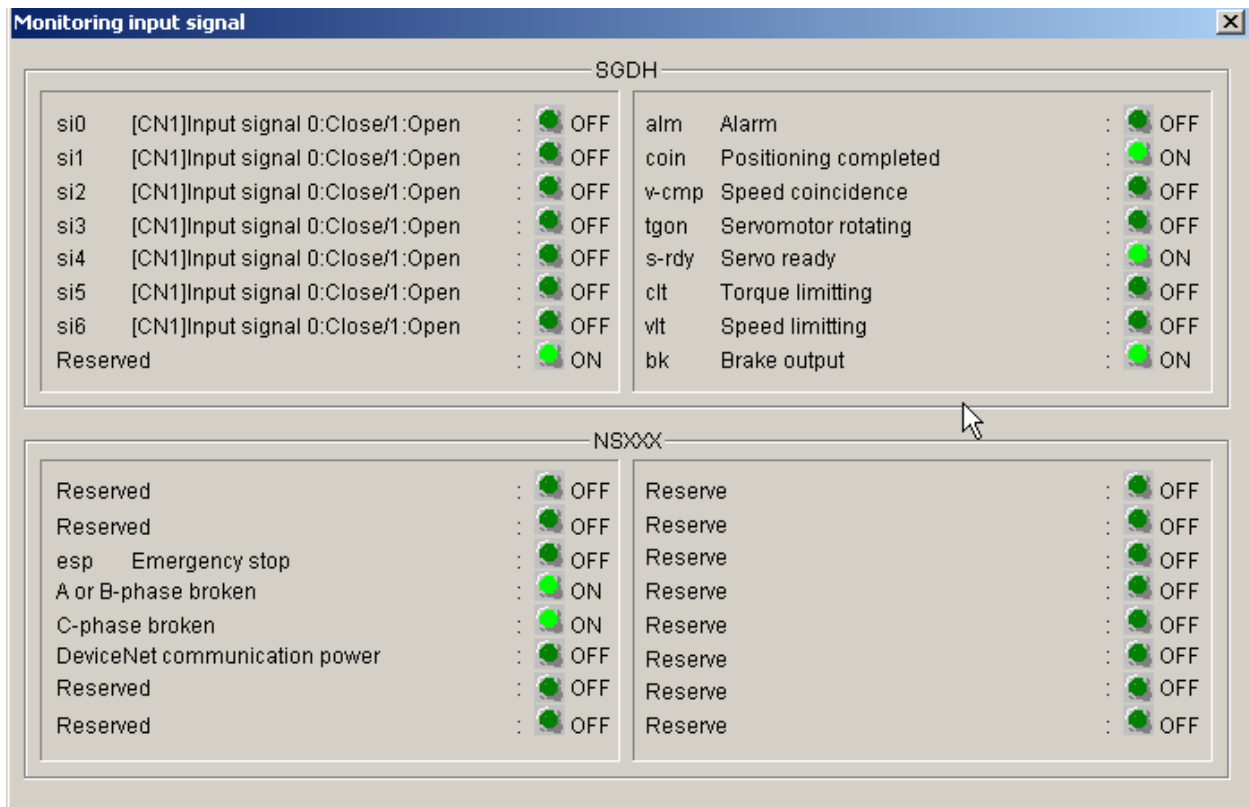Choose the JOG (J) function from the Operate(R) menu.
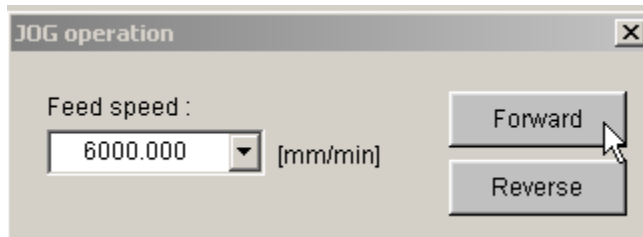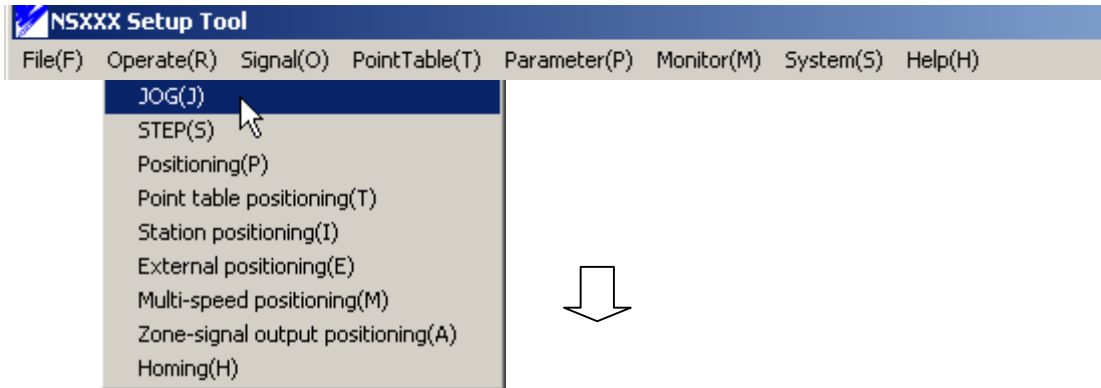
Select a speed in Reference units per minute (6000.00 mm/min) and select Forward or Reverse. The servomotor should rotate at the speed set in the Feed speed box. As per the calculation above, the motor will run at a speed of 1000 rpm.

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.

Monitoring position

Commanded position	:	457.197	[mm]
Feedback position	:	457.197	[mm]
Position Error	:	0.000	[mm]
Latch position	:	465.868	[mm]
Output torque	:	0.001	[%]

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

Monitoring input signal

SGDH

si0	[CN1]Input signal 0:Close/1:Open	: OFF	alm	Alarm	: OFF
si1	[CN1]Input signal 0:Close/1:Open	: OFF	coin	Positioning completed	: ON
si2	[CN1]Input signal 0:Close/1:Open	: OFF	v-cmp	Speed coincidence	: OFF
si3	[CN1]Input signal 0:Close/1:Open	: OFF	tgon	Servomotor rotating	: OFF
si4	[CN1]Input signal 0:Close/1:Open	: OFF	s-rdy	Servo ready	: ON
si5	[CN1]Input signal 0:Close/1:Open	: OFF	clt	Torque limitting	: OFF
si6	[CN1]Input signal 0:Close/1:Open	: OFF	vlt	Speed limitting	: OFF
Reserved		: ON	bk	Brake output	: ON

NSXXX

Reserved	: OFF	Reserve	: OFF
Reserved	: OFF	Reserve	: OFF
esp Emergency stop	: OFF	Reserve	: OFF
A or B-phase broken	: ON	Reserve	: OFF
C-phase broken	: ON	Reserve	: OFF
DeviceNet communication power	: OFF	Reserve	: OFF
Reserved	: OFF	Reserve	: OFF
Reserved	: OFF	Reserve	: OFF

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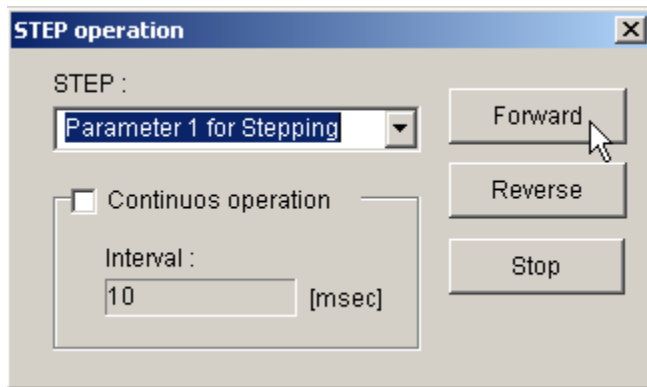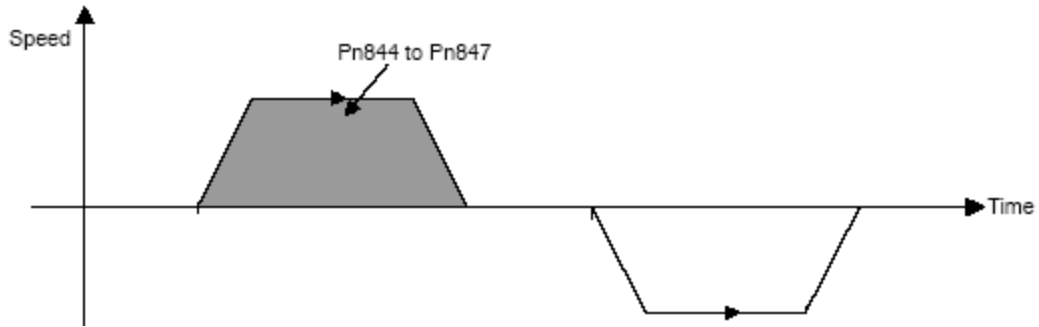
Select Forward or Reverse button. Do not select continuous operation while demonstrating the STEP operation. The motor should index to the stored value at the feed speed for positioning parameter Pn821. If there is no motion, then check that the servo is enabled, EMG STOP input, P-OT input and N-OT input.

9) Positioning the NS300/NS500

Choose positioning(P) from the operate(R) menu.
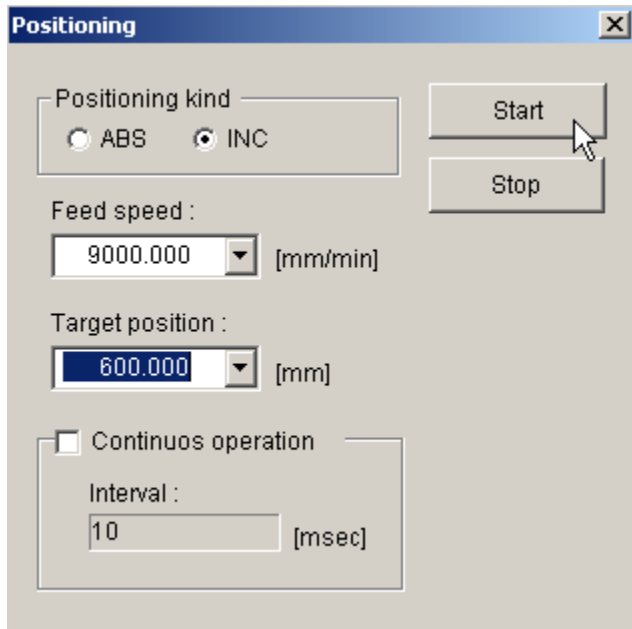
In the Positioning screen, select radio button INC. Set the value of 9000.00 in mm/minute (R.U. per minute). Set the target position of 600.000 mm. Press the start button. With current parameters of NSXXXDD.PRM, the motor should move close to 100 rev.

If the continuous operation box is checked, the servo will move to the target position with feed speed of 9000.00 mm/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
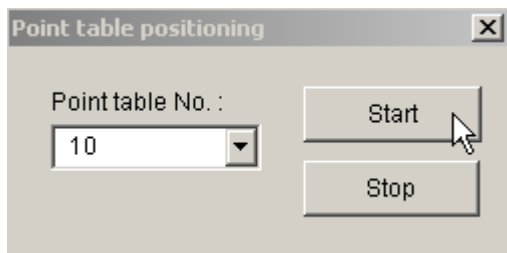
NSXXXSTD.PNT demo program loads the first ten point table cells. In order to edit the new table, select point table (T), then click on the Edit (S). Start entering new current

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).

Point table list

Point table No.	Feed speed	Target position
1	9000.000	6.000
2	9000.000	12.000
3	9000.000	18.000
4	9000.000	24.000
5	9000.000	30.000
6	9000.000	36.000
7	9000.000	42.000
8	9000.000	48.000
9	9000.000	54.000
10	9000.000	60.000
11	24000.000	0.000
12	24000.000	0.000

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.

Station positoning

Direction
- Forward
- Reverse

Feed speed : 1200.000 [mm/min]

Station No. : 2

Continuos operation
Interval : 10 [msec]

Start
Stop

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 NSXXXSTD.PRM has the following values.

Pn813→ 999999 reference units – Reference units per Machine rotation
Pn85A→ 8 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 8. 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.
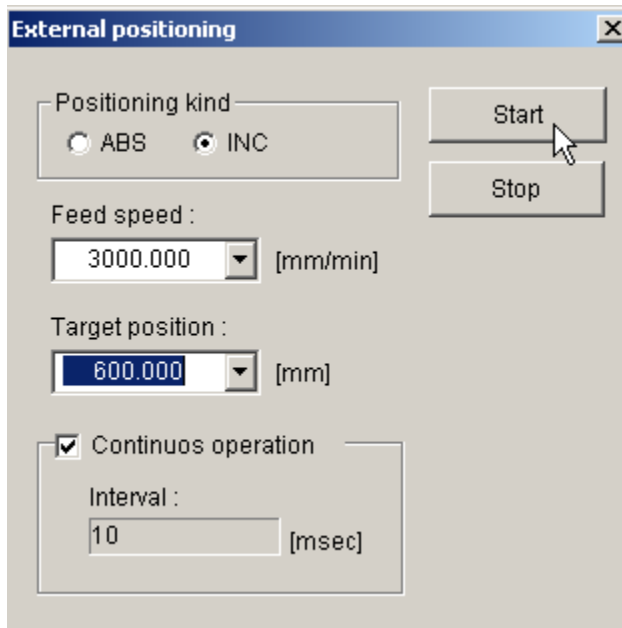
Enter the speed of 3000 mm/min in the Feed speed window. Enter the target position of 600.000 mm in the target position window. This speed and target position is the initial speed and position, before the EXTP (CN1-44) is turned ON.

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 NSXXXSTD.PRM sets the following values.

Pn854→ 9000 [1000R.U.]
Pn855→ 600 [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. NSXXXSTD.PRM sets the following positions and speeds.
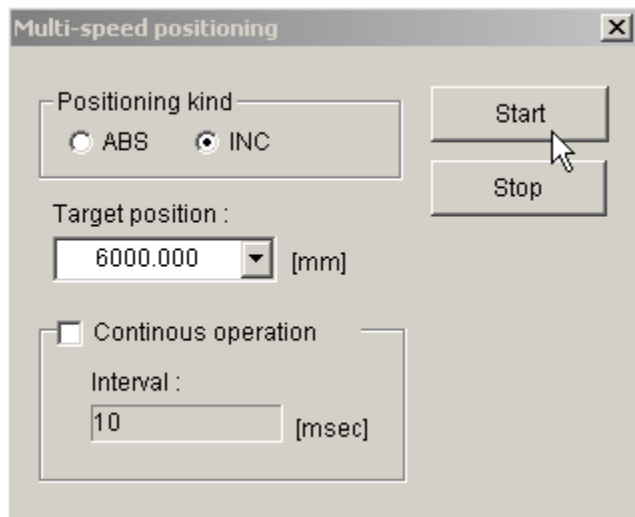

Pn861	number of points	4	
Pn862	First feed speed	10000	[1000 R.U.]
Pn863	speed switching position 1	6000	[1000 R.U]
Pn864	speed switching position 2	12000	[1000 R.U]
Pn865	speed switching position 3	18000	[1000 R.U]
Pn866	speed switching position 4	24000	[1000 R.U]
Pn867	speed switching position 5	30000	[1000 R.U]
Pn868	speed switching position 6	36000	[1000 R.U]
Pn869	speed switching position 7	42000	[1000 R.U]
Pn86A	speed switching position 8	48000	[1000 R.U]
Pn873	switch speed 1	2000	[1000 R.U./min]
Pn874	switch speed 2	4000	[1000 R.U./min]
Pn875	switch speed 3	6000	[1000 R.U./min]
Pn876	switch speed 4	8000	[1000 R.U./min]
Pn877	switch speed 5	10000	[1000 R.U./min]
Pn878	switch speed 6	12000	[1000 R.U./min]
Pn879	switch speed 7	14000	[1000 R.U./min]
Pn87A	switch speed 8	16000	[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.
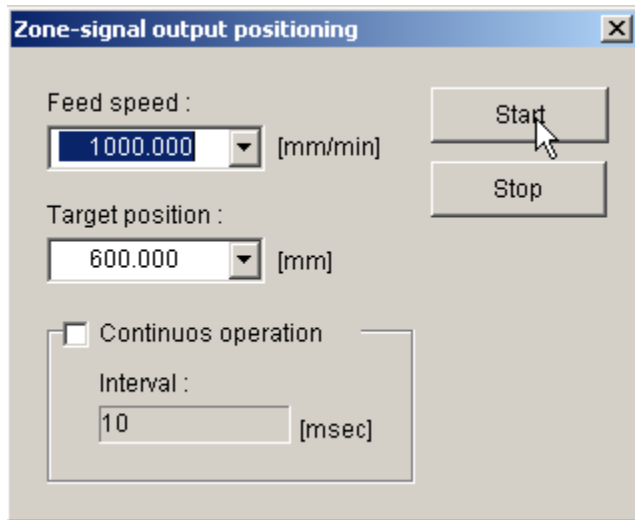

The Notch (zone signal) output mode allows two outputs CN4 (12), (10) to turn on and off at specified positions. NSXXXSTD.PRM sets the following parameters.
Enable Notch out put by using parameter Pn891

Pn892   Notch 1 output position lower limit   6000   [R.U]
Pn893   Notch 1 output position upper limit   12000   [R.U]
Pn894   Notch 2 output position lower limit   18000   [R.U]
Pn895   Notch 2 output position upper limit   24000 [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.
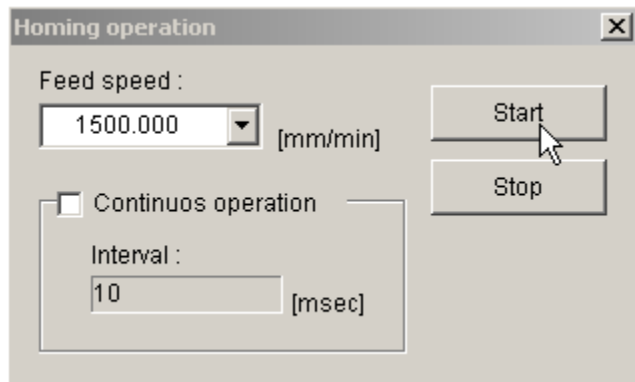
NSXXXDEMO.PRM sets the following important parameters.

Pn800	Home Type	3
Pn803	Approach speed	2000 [1000 R.U./min]
Pn804	Creep speed	5000 [1000 R.U./min]

Different home selection's type also can be tried.