



Application Note

Starting up a Nanotec Controller/Drive with OMRON NX1P2

Version 1.1.0

www.nanotec.com





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1 Prerequisites

The slave drive (Nanotec Controller) must be configured beforehand. Proper operation of the motor and slave drive must be ensured before the example can be used. Make sure that the controller/drive operation is not hindered, e.g. by a stand-alone program running on the slave.

To ensure correct operation with the OMRON PLC make sure that the interpolation time period in our controller is set to 2ms. This is needed because the minimum cycle time for the OMRON PLC is 2ms whereas our default value is 1ms.

0x60C2:01 = 2

2 Hardware

OMRON NX1P2-1040DT, Version 1.40 N5-1-1, Firmware version FIR-v1650-B527540

3 Software

Sysmac Studio, Version 1.30.1.0

4 Creating a new project and adding the drive

1 Prepare the ESI file, so that Distributed Clock Mode can be enabled later. Open the ESI file with an editor, scroll to the very bottom, and adjust the setting for DC. Remove the "-" sign for CycleTimeSync1 Factor. It should look like this:





- 2 Create a new project in Sysmac Studio.
- 3 Go to **Configurations and Setup -> EtherCAT** in the **Multiview Explorer**.
- 4 Right-click on the **Master** and go to **Display ESI Library** to include the ESI file in your software.



5 To add ESI files, click on **Install (File)**, then choose the ESI file you want to install. After successful installation the drive should be added.





6 Now you should see the added drives in the **Toolbox**. From there you can drag & drop the drive to the **Master**.

Application Note Nanotec - new_C	📓 Application Note Nanotec - new Controller O - Sysmac Studio				
File Edit View Insert Project	Controller Simulation Tools Help				
X 🖲 🕼 🖄 つぐ 🕯					
Multiview Explorer • #	Akschnitti - Programm0 DefeteOXT x Vode Address Network configuration I	Toolbox • 4 All vendors •			
Configurations and Setup Beher(AT Structure) GrUU/Expansion Racks # UO Map Controller Setup & Motion Control Setup & Motio	Item name Value Device name Master Model name Master Product name Master Product name Master Product name Master Product name Master Number of Slaves 0 POD Communications Cycle 1 2000 use POD Communications Cycle 2 Value Fail-of Operation Setting Pail-of Operation Setting Fail-of Operation Setting POD communications Interna Setting < Value Setting Value Setting POD communications Interna Setting Value Setting Value Value	Messurement Sensor Vision Sensor Orginal Type Sensor Orginal Type Sensor Orginal Type Sensor Orginal Type Sensor Ormenication Unit Drives Drives Drives Show all versione NS-2.1 Rev0x06720000 NS-2.1 Rev0x06720000			

7 Click on Edit PDO Map Settings and select the Receive PDO 1 Mapping Parameter. Right-click on 0x3202:00 and Delete PDO Entry. This prevents unwanted deactivation of Closed Loop.

rm EulerCAT X			•
Node Address Network configuration		1	
Master			
Mastar		Itom name	Value
Edit PDO Map Settings	S	- 1 >	<)1 <u>^</u>
000 M			-1-1
РОО мар		PDO entries included in Receive PDO 1 Mapping Parameter	EtherCAT Drive (CoE)
Pro	ocess Data Size : Input 56 [bit] / 11472 [bit]	Index Size Data type PDO entry name Com	mer 6/2000
	Output 88 [bit] / 11472 [bit]	0x6040:00 16 [bit] UINT Controlword	5 Communications Cyci
SelectionIInput/Output	Name Flag	0x607A:00 32 [bit] DINT Target Position	And a second second second
O N	No option	0x3202-00 32 [bit] LIDINT Motor drive submode select	loled V
Output R	Receive PDO 1 Mapping Parameter Editable	Qv6 Add PDO Entry Modes of operation	040:00 Paceive PDO 1
Output R	Receive PDO 2 Mapping Parameter Editable	Delete PDO Entry	07A:00 Receive PDO 1
	lo ontion	Edit DOO Entry	202:00 Receive PDO 1
Output R	Receive DDO 3 Manning Parameter Editable	Luc PDO Liny	060:00 Receive PDO 1
	Deceive PDO 4 Mapping Parameter Editable	Move Up	041:00 Transmit PDO 1
- Output R	Receive FDO 4 Mapping Farameter Editable	Move Down	064:00 transmit PDO 1
N	No option		061:00 Transmit PDO 1
S Input T	ransmit PDO 1 Mapping Parameter Editable		Edit PDO Map Settings
🕘 Input T	ransmit PDO 2 Mapping Parameter Editable		ibled (DC with SYNC0)
• N	No option		abled
Input T	ransmit PDO 3 Manning Parameter Editable		,t
	tanonie roo o mopping romineter catable		× .
	No option		
Input T	ransmit PDO 4 Mapping Parameter Editable		by the process data
	15		
Build		Move Up Move Down Align	+ ª ×
		Edit PDO Entry Add PDO Entry Delete PDO Entr	y I
Descri		OK Cancel Apply	

8 Go Online with the **Master** to set the Node Address for the drives you need.





9 When online, right-click on the Master and go to Write Slave Node Address.

10 Set the desired value and click Write. Follow the instructions on the screen and restart the drive.

🚔 Abschnitt0 - Prog	rramm0 🐘 EtherCAT 🗙
Node Address Netwo	rk configuration
	Master Romonome
	Master Aten name
1	Slave Node Address Writing
	Present value/Set value/Actual network configuration
	Master
	NS-1-1 Rev:0x06720000
	-
	a a construction of the second se
	1 10
	1
	1 11
	Update With Latest Actual Network Configuration
	Node addresses are set for slaves.
Output	when any value other than 0 is set to a slave whose hode address can be set from hardware, the setting has priority. In other cases, the addresses set here applicable.
	- Write Correct



11 Verify the correct setup by right-clicking on **Compare and Merge with Actual Network Configuration**.

🚔 Abschnitt0 - Programm0	EtherCAT X
Node Address Network config	uration I
	Master
	Cat
1	Lopy .
	Paste
	Undo
	Redo
	Expand All
	Collapse All
	Calculate Transmission Delay Time of the Master
	Import Slave Settinos and Insert New Slave
	Export Slave Settings
	Write St Tioue Audress
	Compare and Merge with Actual Network Configuration
	Uet Cit Corial Numbers
	Clear All Settings
	Display Diagnosis/Statistics Information
	Display Production Information
	Display Packet Monitor
	Display ESI Library
Output	Evenue Configuration Information
	Output to ENS File
	Export All Couplers' I/O Allocations
	Assign Drives to Axes

12 If they do not match, click on **Apply actual network configuration.**

Compare and Merge with Actual Network Configuration				
Node Address Network configuration on Sysmac Studio	Node address Actual network configuration	Netw Comparison result	Actua Lower Configuration	
Master Master	Master	Mast Matched	Mast	
1 6001 N5-1-1 Rev:0x06720	1 N5-1-1 Rev:0x06720000	1 : N Matched	1 : N	
K				
Apply actual network configuration				
Some saves such as Power Supply onits are not included in the actual network conliguration.				
-				

13 If everything was set up correctly, you should now be able to communicate with the drive.



5 Example file for Velocity Mode with SDO commands

The example "Application Note - Nanotec - OMRON NX1P2 - Example Project_V1.1.0" shows you how to drive the motor in the Operation Mode Velocity.

5.1 Description of the example project

Import the example file in the Sysmac Studio.

Sysmac Studio			
Offline	Projects		
Import	Import file Application Note_OMRON > OMRON_Example		OMRON_Example durchsuchen
Online	Organisieren Veuer Ordner	Änderungsdatum	8≡ ▼ 🗔 🔞
4 Connect to Device	Fav Fav Application Note - Nanotec - OMRON NXIP2 - Example Project.smc2 B	19.09.2018 17:04	SMC2-Datei
R Version Control Explorer	Search 2 E		

The project contains a setup of a master and slave ready for communication via SDO. Please note that PDO communication is disabled here.

OMRON_Example_1 - new_Controller_0 - Sysmac Studio					
File Edit View Insert Project Controller Simulation Tools Help					
	1 Q 12				
Multiview Explorer 🔹 🕴 🔛 EtherCAT 🗙		-			
new_Controller 0 Image: Controller 0 Configurations and Setup Master Image: Controller 0 Master Image: Controler 0 Master <td>Item name Device name Model name Product name Revision PDO Communications Cyster Productions Enable/Disable Settings Crisial Number PDO Map Settings</td> <td>Value E001 NS-1-1 NS-1-1 NS-1-1 NS-therCAT Drive (CoE) 0x06720000 nthO Communications C 1 Distabilid 0x0000000 0x000000 0x000000 0x302000 Receive PDO 0x6070.00 Receive PDO 0x6070.00 Receive PDO 0x606000 Receive PDO 0x607000 Receive PDO 0x60700 Receive PDO 0x6070 Receive PDO 0x607</td>	Item name Device name Model name Product name Revision PDO Communications Cyster Productions Enable/Disable Settings Crisial Number PDO Map Settings	Value E001 NS-1-1 NS-1-1 NS-1-1 NS-therCAT Drive (CoE) 0x06720000 nthO Communications C 1 Distabilid 0x0000000 0x000000 0x000000 0x302000 Receive PDO 0x6070.00 Receive PDO 0x6070.00 Receive PDO 0x606000 Receive PDO 0x607000 Receive PDO 0x60700 Receive PDO 0x6070 Receive PDO 0x607			
Programming V Programming V Programming V POUs V C Pous V	Fach Data de la	0x6064:00 Transmit PDO 0x6061:00 Transmit PDO Edit PDO Map Settings			

The program consists of three function blocks that can be executed manually by activating the respective input.

FB_ModeOfOperation:	This function block sets the Mode of Operation for a specific slave. The Mode of Operation is set to the value "2" which is Velocity Mode. To write the Mode of Operation to the drive, set the input to "True".
FB_VLTargetVelocity:	This function block sets the target velocity for Velocity Mode. You can adjust the value of the variable <i>VLTargetVelocity</i> . To write the target velocity to the drive, set the input to "True".
FB_EnableOperation:	This function block puts the drive into the Operation Enabled state. As soon as this state is reached, the motor will be powered and started. To start the motor, set the input to "True". To stop the motor, set the input to "False".



5.2 How to start the motor

Using the example project

1 Build the controller and check for error messages.

MRON_Example_1 - new_Controller_0 - Sysmac Studio			
File Edit View Insert Project Controller Simula	tion Tools Help		
X 🕘 🗟 🖶 🕤 Check All Programs F		8 8 * * 0 9 9 9 0 4	Q "Q
Multiview Explorer European Build Controller Fi	Example_VelocityMode - P 🗙 편 F	8_EnableOperation III FB_ModeOfOperation	He F8_VLTargetVelocity
new_Controller_0 Abort Build Si	hift+F8	SatModeOfOnerstion	
Configurations and Setu Memory Usage	1odeOfOperation	FB_ModeOfOperation	write_ModeOfOperati
T T EtherCAT Opling Edit		Execute Done	O
L - Node1 : N5-	NodelD-	NodeID ModeOfOperationDisplay ModeOf	OperationDisp
CPU/Expansion Library	ModeOfOperation-	ModeOfOperation	
↓* I/O Map			
Controller Setup	write VI TargetVelocity	SetVLTargetVelocity	write VLTargetVelocity
Gran Data Settings		Execute Done	Ô
Cam Data Settings	NodelD-	NodeID	
Task Settings	W TargetValacity	W Target Volgeity	
전 Data Trace Settings	verargetvelocity-	Veraigetvelocity	
V Programming 2		SetEnable	to Provide a
V 🖪 POUs	Enable	F8_EnableOperation Execute Done	
🔰 🔻 🗊 Programs	I I NodelD	NedelD	<u> </u>
🗰 🗸 🖂 Program0	NODELD-	NUCLED	
Example_VelocityMode	10		1.7/5-
L 📰 Functions			
V 🕮 Function Blocks			
FB_EnableOperation			
E FB_ModeOfOperation			
L PB_vcrargetvelocity			

2 Go online and transfer the project to the controller.

MRON_Example_1 - new_Controller_0 - Sysmac Studio				
File Edit View Insert Project	Controller Simulation Tools Help	<u> </u>		
	Communications Setup Change Device	▲▲ & # * * C P P II @ Q N		
Multiview Explorer	Online Ctrl+W	P X 💀 FB_EnableOperationgra 💀 FB_ModeOfOperation 💀 FB_VLTargetVelocityLTar		
new Controller 0 💌	Offline Ctrl+Shift+			
	Sunda Ctrl+M	SetModeOfOperation		
Configurations and Setup	Transfer	To Controller Ctrl+T ModeOfOperation write_ModeOfOperati		
▼ 础 EtherCA1	Mode	Frank Generation CUT+Shift+T		
► IS CPU/Expansion Racks I I/O Map	Monitor Stop Monitoring	ModeOfOperation - ModeOfOperation		
► 國 Controller Setup ► ۞ Motion Control Setup	Set/Reset Forced Refreshing	SetVLTargetVelocity F8_VLTargetVelocity Free/ite Dope		
 ✔ Cam Data Settings ▶ Event Settings ➡ Task Settings 	MC Test Run MC Monitor Table CNC Coordinate System Monitor Table	NodeID-NodeID VLTargetVelocity-VLTargetVelocity		
	SD Memory Card Controller Clock Release Access Right Update CPU Unit Name	SetEnable FB_EnableOperation Execute Done NodeID NodeID		
Example Veloc	Security	•		
L 💓 Functions ▼ 🕱 Function Blocks	Clear All Memory Reset Controller			

- 3 Once you enter RUN mode you should see that the program is active.
- 4 You can manipulate the inputs by double-clicking on the respective input.



Using Function Block FB_ModeOfOperation

1 Set the input *write_ModeOfOperation* to "True" to set the Mode of Operation to Velocity Mode in the drive. The Node ID is set to "1" by default.

Multiview Explorer 👻 🖡	🧱 EtherCAT 🚜 Example, VelocityMode - P 🗙 💀 F8_EnableOperationgra 🐼 F8_ModeOfOperation 🐼 F8_VLTargetVelocityLTar
new_Controller_0	Variables
✓ Configurations and Setup ✓ ಔ EtherCAT · L □ Node1 : N5-1-1 (E001) ⑤ CPU/Expansion Racks ✓ I/O Map	SetModeOfOperation write_ModeOfOperation write_ModeOfOperation write_ModeOfOperation True (1) NodeID ModeOfOperationDisplay ModeOfOperation ModeOfOperation ModeOfOperationDisplay
I Controller Setup I Motion Control Setup I Andian Control Setup I Cam Data Settings I Task Settings Task Settings Data Trace Settings	1 vrite_VLTargetVelocity FB_VLTargetVelocity write_VLTargetVelocity (1) NodeID NodeID NodeID (0) VLTargetVelocity ULTargetVelocity
	2 Enable Enable Is_Enable Is_Enable Is_Enable Is_Enabled Is_Enable

2 You can see which Operation Mode is set by looking at the variable *ModeOfOperationDisplay*. It should be set to the same value as the variable *ModeOfOperation*. Velocity Mode is active if it shows the value "2".

Using Function Block FB_VLTargetVelocity

1 To set the desired target velocity right-click on the variable and then click **Edit Variable Value**. By default, our controllers are set to rpm. For example, enter the value "60" to set the target velocity to 60rpm.

0	10 000000 00000 VD			Se	etModeOfOperation			
1997	write_ModeOfOperation			FB	_ModeOfOperation	Dono		write_ModeOfOperati
		(1)	NodeID	NodeID	ModeOfOperati	onDisplay	ModeOfOperationDisp.,, (2)	
		(2)	ModeOfOperation	ModeOfOpera	ation			
1	write_VLTargetVelocity			SetVLTarget FB_VLTarget Execute	tVelocity tVelocity Done		write_VLTargetVelocity	
		(1)	NodeID-	NodeID				
		(0)	VLTargetVelocity-	VLTargetVeloo	city			
2	Enable		Edit I Go Ti	Data Type o Variable Tat	ple		Is_Enabled	
		(1)	Edit	/ariable Value				
			Dele	E.				
			Copy	20 20				
			Go To	0	•			
			Force Set/F	d Refreshing leset				
			Fixed	Target Cross	Ret.			

- 2 Set the input *write_VLTargetVelocity* to "True" to write the target velocity to the drive.
- 3 To adjust the velocity, simply enter a new value for *VLTargetVelocity* and toggle the input *write_VLTargetVelocity* to "False" and back to "True". This can also be done while the motor is running.



Using function Block FB_EnableOperation

- 1 The Mode of Operation and the Target Velocity need to be set before starting the motor.
- 2 You can start the motor by setting the input *Enable* to "True". The State Machine should be switched up to the state Operation Enabled. When this is done, the output *Is_Enabled* will be set. This will start the motor movement.
- 3 To stop the motor, set the input *Enable* to "False". This will switch the State Machine down, thus stopping the motor movement.

0		SetModeOfOperation	
	write_ModeOfOperation	FB_ModeOfOperation	write_ModeOfOperati
		Execute Done	
	(1) NodeID	NodeID ModeOfOperationDisplay ModeOfOperationDisp.,, (2)	
	(2) ModeOfOperation	ModeOfOperation	
1		SetVLTargetVelocity	
2004	write_VLTargetVelocity	FB_VLTargetVelocity write_VLTargetVelocity	
		Execute Done	
	(1) NodelD	NodeID	
	(60) VLTargetVelocity	VLTargetVelocity	
2	\sim	SetEnable	
	Enable	FB_EnableOperation Is_Enabled	
1		Execute Done	
	True 🕶 (1) NodelDa	NodeID	
	True False		



6 Example for positioning with Motion Control function blocks

With this example you will be able to use the Motion Control function blocks to start positioning. The motor will oscillate between two positions.

The project with the complete setup and program is also included as example file "Application Note - Nanotec - OMRON NX1P2 - Example Project - MC Function Blocks_V1.1.0".

6.1 Setting up the axis

 Set up communication with the drive as described in chapter 4 Creating a new project and adding the drive. Please also make sure the prerequisites are met, see chapter 1 Prerequisites. Make sure that the drive PDO communication is enabled. Additionally, make sure that Distributed Clock is enabled.



2 Create a new Motion Control axis by right-clicking on **Motion Control Setup** → **Axis Setting** and go to **Add** → **Motion Control Axis**.





3 Go to **Axis Basic Settings** and set the axis type to **Servo axis**. Assign the connected drive as **Output device 1**.

Application Note - Nanotec - OMRON NX1P2 - MC Function Blocks - new_Controller_0 - Sysmac Studio							
File Edit View Insert Project Controller	Simulation Tools Help						
X 🖲 🖬 🖄 ៦ ៤ 🕮 🛃	▲ 銘 蒔 蒔 幕 幕 図 載 ▲ ≫ & ⊗ ∲ № ∥ Ο 및 22 其 Q Q ₪						
Multiview Explorer 🗸 🕂 👯 EtherCA	AT 🔄 Section 0 - Program 0 🖉 MC_Axis000 (0,MC1) 🗙						
new_Controller_0 Configurations and Setup	🕂 Axis Basic Settings						
EtherCAT L - Node1 : N5-1-1 (E00 CPU/Expansion Racks I/O Map	Axis number 0 MCL Discontinentalic lask Axis use Used axis Servo axis Servo axis						
	Control function All ▼ Feedback control No control on T Input device 1 ≪Not assigned ▼ Input device 2 <not assigned="" ▼<br="">Channel ▼</not>						
L & And Sections & Cam Data Settings Fevent Settings	Output device 3 <t< td=""></t<>						
Task Settings	▼ Detailed Settings Reset to Default						
Programming POUs V II Programs V II Program0	Cortput (controller to Device) Controller) Controller) Digital inputs Digital inputs The combinations of MC Function Module functions and process data are changed.						
L Section0 L Functions	When changing the combinations, please confirm that they behave as intended. Invalid combinations may cause unexpected operations of the equipment and machines.						

4 Open **Detailed Settings** and configure the Output-PDOs for **Controlword**, **Target position** and **Modes of operation** as well as the Input-PDOs for **Statusword**, **Position actual value** and **Modes of operation display**.

When done, it should look as shown in the picture below.

藏	🕵 Axis Ba	sic Settings			
	Axis number	0			
1000	Motion control	MC1: Primary periodic task			
**		Used avis			
HHH	Avic type	Secure axis			
	Control function				
	Control function				
(to)	Feedback control	No control loop			
	Input device 1	<not assigned=""></not>			
	Input device 2	<not assigned=""></not>			
-	Output device 3	<not +="" 1<="" assigned="" td=""><td></td><td></td><td></td></not>			
	Output device 1	(Node : 1 NJ-1-1(E001)			
	Output denice 2	(Not assigned)			
	Output device 5	<not assigned=""></not>			
5	Detailed Setting	s			
6.7	Reset to Default				
\sim		Function Name	Device		Process Data
	- Output (C	ontroller to Device)			
rd-s	+ 1. Control	word	Node : 1 N5-1-1(E001)	-	6040h-00.0(Receive PC
-	🛨 3. Target p	osition	Node : 1 N5-1-1(E001)		607Ah-00.0(Receive P[
	5. larget v	elocity	<not assigned=""></not>		<not assigned=""></not>
	7. Target t	orque	<not assigned=""></not>	1	<not assigned=""></not>
100	Q May pro	file Velocity	<not accigned=""></not>	10.01	ZNIAL Sectored N 1991
	11. Modes	of operation	Node : 1 N5-1-1(E001)		6060h-00.0(Receive PC 🔻
R	LD. POSIUV	e torque innit value	<nvot assigned=""></nvot>		snorasigneu> Leij
<u> </u>	16. Negati	ve torque limit value	<not assigned=""></not>		<not assigned=""></not>
Ā	21. Touch	probe function	<not assigned=""></not>	1	<not assigned=""></not>
\odot	44. Softwa	re Switch of Encoder's Input	<not assigned=""></not>	6.6	<not assigned=""></not>
	- Input (De	vice to Controller)			
	★ 22. Status	vord	Node : 1 N5-1-1(E001)	10.6	6041h-00.0(Transmit P 💌
	* 23. Positio	n actual value	Node : 1 N5-1-1(E001)		6064h-00.0(Transmit P 💌
	24. Velocit	y actual value	<not assigned=""></not>		<not assigned=""></not>
	25. Lorque	actual value	<not assigned=""></not>		<not assumed=""></not>
	27. Modes	of operation display	Node : 1 N5-1-1(E001)		6061h-00.0(Transmit P
	40. Touch	probe status	<not assigned=""></not>	0.6	< NOT assigned >
	41. Touch	probe post pos value	<not assigned=""></not>	8.6	<not assigned=""></not>
	42. Touch	probe pos2 pos value	<nvot assigned=""></nvot>		<inot assigned=""></inot>
	43. Error C	ode of Encodor's Input Claus	<not assigned=""></not>		<not assigned=""></not>
	45. Status	or Encoder's input slave	<not assigned=""></not>		<not assigned=""></not>
	40. Kefere	nce Position for csp	<not assigned=""></not>		<not assigned=""></not>
		Juis			k



5 Go to **Unit Conversion Settings** and set the values according to the drive settings. For the N5 drive the value is set to "2000" (2000 increments per revolution) by default.

Please note:

The value depends on your drive setup. It may be necessary to set a different value than the suggested "2000". Please set the values accordingly.

Multiview Explorer 🔹 🕂	EtherCAT	🚔 Section0 - Program0 MC_Axis000 (0,MC1) 🗙 🐻 Task Settings
new_Controller_0 Configurations and Setup	¢.	Unit Conversion Settings
▼		▼ Unit
L III Nodel : ND-1-1 (EU)	**	Unit of display 🔘 pulse 🕘 mm 🕘 um 🕘 nm 🔘 degree 🎯 inch
I/O Man	HHH	▼ Travel Cistomce
Controller Setup		Command pulse count per motor rotation 2000 pulse/rev (1)
▼ ⊕ Motion Control Setup	1	Do not use gearbox Work travel distance per motor rotation 2000 pulse/rev (2)
L MC_Axis000 (0,N		Reference, U. * conversion formula Number of subart forders. (1) Commany puse count per motor rotation [UDINT] * Taxad distance [Unit of discloyed
L 🖏 Axes Group Settings		Number of pulses [pulse] = (2) Work travel distance per motor rotation [LREAL]
🖉 💞 Cam Data Settings		
Event Settings		Use gearbox
Task Settings Data Trace Settings	\bigcirc	Work travel distance per work rotation <u>10000</u> pulse/rev (3) (Calculated from the Modulo maximum/minimum positions in Position Count Settings if the count mode is Rotary mode)

6 Important note:

Go to **Servo Drive Settings** and change **Main circuit power supply OFF detection** to **Do not detect.** If you do not adjust this setting, you may get an error when you try to enable the drive.



Now the axis should be set up correctly.



6.2 Programming an oscillating movement with MC Function blocks

You can now proceed with programming a short example for a positioning movement.

Rung 0 will be used to enable the motor.

- 1 In Rung 0 you will need one input and the **Motion Control** function block **MC_Power**. You can simply drag & drop the function block from the toolbox to the rung.
- 2 In the example the input variable is called *ServoLock* and the function block is called **Enable**.
- 3 Use the axis you set up before. In the example this is "MC_Axis000".
- 4 The complete Rung 0 should look as shown in the picture below.

Section0 - P	rogram0 ×	Toolbox 🝷 🖡
Variables		<search></search>
0	ServoLock MC_Axis000 Axis MC_Power Enable Status Busy Enter Variable Error E	R MC_MoveRelative R MC_MoveVelocity R MC_MoveZeroPosition R MC_Phasing R MC_Power R MC_Power R MC_ReadAxisParameter

Rung 1 will be used for a repeating series of two relative movements.

- 1 In Rung 1 you need to include two inputs: One called *StartMovement* and an inverted one called *Complete*.
- 2 Additionally, you will need function block **MC_MoveRelative** twice. They will simply be called **Move1** and **Move2**.
- 3 Use the desired axis, in the example it is "MC_Axis000".
- 4 Now create variables for the two movement function blocks. When you have created the variables, assign initial values to them.

In the example the distances are set to "2000" and "-2000". With the axis setup shown in chapter **6.1 Setting up the axis,** this will result in one revolution back and forth. The velocity is set to "2000" respectively "1000" pulses/second, Acceleration and Deceleration are set to "20000" pulses/second².

5 To complete Rung 1, add one Output called *Complete*.

With the Input and Output called *Complete* you will get a repeating functionality. This way the motor will constantly move back and forth until it is stopped.



ction	0 - Program0 🗙									
riable	5									
ames	pace - Using									
als	Name	Data Type	Initial Value	I AT	l Retain	Constant	Comment	i		
als	Move1	MC_MoveRelative								
	Distance1	LREAL	2000							
	Velocity1	LREAL	2000							
	Acc1	LREAL	20000							
	Dec1	LREAL	20000							
	Move2	MC_MoveRelative								
	Distance2	LREAL	-2000							
	Velocity2	LREAL	1000							
	Acc2	LREAL	20000							
	Dec2	LREAL	20000	1						
	StartMovement Complete	MC_Axis000—A	Move1 MC_MoveRelation xis	ve Axis Done	— MC_Axis000		MC_Axis	Move s000—Axis — — — — — — — — — — — — — — — — — — —	2 elative - Axis MC_Axis000 Done	Complete
		Distance1-D	istance	Busy	—Enter Variable		Distar	nce2—Distance	Busy - Enter Variable	Ŭ
		Velocity1-V	elocity	Active	-Enter Variable		Veloc	city2—Velocity	Active - Enter Variable	
		Acc1-A	cceleration Comman	dAborted	-Enter Variable		¢	Acc2-Acceleration Com	mandAborted - Enter Variable	
		Dec1-D	eceleration	Error	-Enter Variable		C	Dec2-Deceleration	Error Enter Variable	
- 1 I I		Enter Variable-	rk	ErrorID	-Enter Variable		Enter Vari	able-Jerk	ErrorID -Enter Variable	

6 The complete Rung 1 and variables should look like this.

- 7 To transfer the program to the PLC and operate the program, please follow the instructions given in chapter **5.2 How to start the motor.** After successfully transferring and starting the program, you are now able to operate the drive and motor.
- 8 To power up the motor go to Rung 0 and set the input ServoLock to "True".

Ether	CAT 🛛 💐 Section0 - Program0 🗙 🐼 MC_A	cis000 (0,MC1)					
Varia	bles			11.2			
•	Serval.cock	MC_Axis000- Axis Enal	Enable MC_Power Aris Status Busy Error Error Error Criter Variable				
1			Move MC_MoveR	1 elative		Move2 MC_MoveR	2 elative
	StartMovement Complete		MC_Axis000-Axis	- Axis - MC_Axis000		MC_Axis000-Axis	Axis MC_Axis000
			Execute	Done		Execute	Done
		(2000)	Distance1—Distance	Busy Enter Variable	(-2000)	Distance2—Distance	Busy Enter Variable
		(2000)	Velocity1-Velocity	Active - Eriter Vorlable	(1000)	Velocity2- Velocity	Active Enter Variable
		(20000)	Acc1-Acceleration Com	mandAborted — Enter Variable	(20000)	Acc2—Acceleration Com	nandAbortedEnter Variable
		(20000)	Dec1-Deceleration	Error Enter Variable	(20000)	Dec2-Deceleration	Error - Enter Variable
			Enter Variable— Jerk	ErrorID—Enter Variable		Enter Variable—Jerk	ErroriD - Enter Variable
			Enter Variable BufferMode			Enter Variable-BufferMode	
							12

9 To start a movement, set the input *StartMovement* to "True". The drive will then do two movements repeatedly.

Variables Enable 0 Enable Serval.ock MC_Avis000 Enable Status Bury Ender Variable Erroritio Ender Variable Image: Erroritio Erroritio Image: Erroritio Erroritio Erroritio Erroritio Erroritio Erroritio Erroritio Erroritio Erroritio Erroritio <th>🐺 EtherCAT 🚽 👘 Section0 - Program0 🗙 🐲</th> <th>MC_Axis000 (0,MC1)</th> <th></th> <th></th> <th></th> <th></th> <th></th>	🐺 EtherCAT 🚽 👘 Section0 - Program0 🗙 🐲	MC_Axis000 (0,MC1)					
0 ServoLock ServoLock MC_Akis000 ServoLock MC_Akis000 ServoLock MC_Akis000 ServoLock Enable Statu Busy Coter Variable Error Complete MC_Akis000 Axis MC_MoveReative Axis MC_MoveReative Axis MC_Akis000 Axis MC_Akis000 MC_Akis000 Axis MC_Akis000 MC_Akis0	Variables						
More:2 Complete More:2 Execute Done Complete Complete More:Asset for through to the top	0 ServoLock	MC_Axis000 Axis Enab	Enable MC_Power Avis MC_Avis000 Ie Status Busy Criter Variable Error Enter Variable	_			
1 StartMovement Complete MC_Axis000 Axis MC_Ax			ErrorID Enter Variable				
StartMovement Complete MC_ANS000 Axis MC_ANS000 Axis Axis	1		Move MC MoveP	1 elative		Move.	2 alathua
Execute Done Execute Done 1 (2000) Distance Busy Enter Variable (-2000) Velocity Active Enter Variable (-2000) Velocity Active Enter Variable (-2000) Acceleration Enter Variable (20000) Acceleration Enter Variable (-2000) Acceleration Enter Variable (20000) Decle Deceleration Enter Enter Variable (-2000) Decle- Deceleration Enter Variable	StartMovement Comple	te	MC_Axis000 Axis	- Axis MC_Axis000		MC_Axis000-Axis	Axis MC_Axis000
True ¥ (2000) Distance1 Distance Busy Enter Variable (-2000) Distance2 Distance Busy Enter Variable (2000) Velocity1 Velocity Active Enter Variable (1000) Velocity2 Velocity Active Enter Variable (2000) Accel Acceleration CommandAborted Enter Variable (2000) Accel Acceleration CommandAborted Enter Variable (2000) Decle Deceleration Enter Variable (2000) Decel Deceleration Enter Variable			Execute	Done		Execute	Done
(2000) Velocity I Velocity Active Enter Variable (1000) Velocity- Velocity Active Enter Variable (20000) Acci Acceleration CommandAborted Enter Variable (20000) Acci Acceleration CommandAborted Enter Variable (20000) Deci Deceleration Error Enter Variable (20000) Deci Deceleration Error Enter Variable	True 🐨	(2000)	Distance1 Distance	Busy Enter Variable	(-2000)	Distance2—Distance	Busy Enter Variable
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(2000) Deci=Deceleration Error=Enter Variable (2000) Dec2=Deceleration Error=Enter Variable		(20000)	Acc1 Acceleration Com	mandAborted Enter Variable	(20000)	Acc2-Acceleration Com	mandAborted - Enter Variable
		(20000)	Dec1 Deceleration	Error Einter Variable	(20000)	Dec2-Deceleration	Error Enter Variable
Enter Variable Jerk ErrortD Enter Variable : Enter Variable Jerk: ErrortD - Onter Variable			Enter Variable Jerk	ErrorID Enter Variable		Enter Variable— Jerk	ErrorID - Enter Variable
Enter Variable= BufferMode Enter Variable= BufferMode			Enter Variable BufferMode			Enter Variable-BufferMode	

10 To stop the movement after the last two movement commands are executed, set the input *StartMovement* to "False".



11 To stop the movement instantly, set the input *ServoLock* to "False".

These examples will help you to start up a Nanotec controller/drive with an OMRON PLC.



7 Liability

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