

# NEXCOBOT

# Intelligent Solutions for IoT Automation

# NexECM EtherCAT Master Configuration User Manual for INtime

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#### **NEKCOBOT**



## **Revision History**

Rev.	Description
1.0	First released.

### пексовот



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### 1. NexECM Installation

### **1.1. Hardware Requirements**

- 1. Standard 32-bit or 64- bit PC / IPC, and equipped more than one Ethernet communication port
- 2. At least 40MB of free RAM for INtime and your real-time applications
- 3. At least 250MB hard disk space

### **1.2. Software Requirements**

Make sure that the development platform meets the above hardware requirements, and check the following software:

- Windows 10, Windows 7, or Windows XP with Service Pack3 (Both 32- and64-bit versions of Windows are supported)
- 2. Visual Studio (2017, 2015, 2013, 2012, 2010 and 2008)
- 3. NexCOBOT NexECM installation file
- 4. INtime6.3 or later
- 5. Microsoft .Net framework 4.5.2 or later
- 6. Visual Basic Power Packs 10.0 or later
- INtime 6.3 official download: https://www.tenasys.com/products/intime-rtos/.
- Microsoft .Net framework 4.5.2 official free download: <u>https://www.microsoft.com/en-us/download/details.aspx?id=42642</u>
- Visual Basic Power Packs 10.0 official free download: <u>https://go.microsoft.com/fwlink/?LinkID=145727&clcid=0x804</u>

### **1.3. INtime Installation**

Make sure that the development platform meets the above both hardware and software requirements before install INtime. (Take Windows 10, 64-bit, as an example here.)

1. Execute INtime installation files

Unzipping INtime installation files		_		×
Extracting files to temporary folder				
Extracting dotnetfx64_2.0.exe				
tenAsys' Installation progress				
	Install		Cancel	



#### 2. Click "Next >" to next step



3. Select "I accept the license agreement", then click "Next >" to next step





🕼 INtime SDK v6 Setup	—	$\times$
Readme Information The following information describes this installation.	INtim	
INtime SDK v6 Rele	ase Notes	^
Update version 6.3.190 This update contains important fixes for the	)40.2 INtime SDK v6 product. It is existing installation based on	

 Pick the destination folder as C:\Program Files (x86)\INtime\ (Default Path), then click "Next >" to next step

🛃 INtime SDK v6 Setup		_	-		×
Destination Folder		TNI-	1-1		6
Select a folder where the application will be installed.		LIN	LI		
The Wise Installation Wizard will install the files for II folder.	Ntime SDK	v6 in the f	ollowin	g	
To install into a different folder, click the Browse but	ton, and s	elect anoth	er fold	er.	
You can choose not to install INtime SDK v6 by click Installation Wizard.	ing Cancel	to exit the	Wise		
Destination Folder					
C:\Program Files (x86)\INtime\			Brows	e	
< B	ack	Next >		Cano	el

 Select "Development Tools & INtime for Windows", then click "Next >" to next step.



7. Input "User Name", then click "Next >" to next step.

jį,	INtime SDK v6 Setup	)		_		×
I	Jser Information Enter the following inform	nation to personalize yo	our installation.	INt	in	
	Full N <u>a</u> me:	Intime			1	
	Organization:					
	In order to install the or FQDN of the licen	INtime network develop se server here.	oment kit, enter th	ne IP address		
				Skip		
			< Back	Next >	Can	cel



🛃 INtime SDK v6 Setup		_		×
Ready to Install the Application		TNI		6
Click Next to begin installation.		TINU		
Click the Back button to reenter the install the wizard. Press the Next button to begi	ation information n the installation.	or click Cancel to	exit	
System Configuration HAL class = 5				

9. INtime has been successfully installed, click "Finish" and restart your computer.



10. After restarting your computer, you can find the INtime (e icon) in the Windows Toolbar.



## 2. NexECM Network Interface Card Setting

### 2.1. INtime NIC Driver Installation

1. After finishing INtime installation, right click the hidden icon in the Windows Toolbar and then select "INtime Configuration"



2. Select "INtime Device Manager"

ا 🛞	Ntime Configurat	ion Panel - Wind	dows restart req	uired	×
	Select the INtime co	mponent that you	want to configure		
	Node Management	Development Tools	Miscellaneous	License Manager	
	INtime Device Manager				
		Export Setting	Import Se	ettings	1
		Exit	Hel	p	

# 3. Right click on NIC device that you want to install INtime NIC driver and select "Pass to INtime using MSI"



4. Click "Save configuration", and then restart your computer

🕈 INtime Device Manager						
File Action View Help						
! ととと着べる ?						
Save configuration <sup>5</sup> B- Configuration <sup>5</sup>	You have requested the following changes: Pass control to INtime:					
Intel(R) I210 Gigabit Network Connection #2 (MSI capable)     Intel(R) I211 Gigabit Network Connection (MSI capable)     Intel(R) I211 Gigabit Network Connection #2 (MSI capable)     Intel(R) I211 Gigabit Network Connection #2 (MSI capable)     Intel(R) I211 Gigabit Network Connection #2 (MSI capable)	Intel(R) I211 Gigabit Network Connection #2 Legacy interrupt usage:					
Ports (COM & LT)     Ports     Ports (Com & LT)     Ports     Po	3 (Windows) Communications Port (COM2) 4 (Windows) Communications Port (COM1)					
E-€ NodeA	7 (Windows) INtime RT Interface Driver 8 (Windows) System CMOS/real time clock 18 (Windows) TwinCAT-Intel PCI Ethernet Adapter (Gigabit) 54 (Windows)					
	Microsoft ACPI-Compliant System					

5. After restarting your computer, you could confirm the INtime driver is installed correctly in "INtime Device Manager" page

🖻 INtime Device Manager						
File Action View Help						
1. 2 2 2 2 2 3 5 8 9						
<ul> <li>Windows devices</li> <li>Jisplay adapters</li> <li>IDE ATA/ATAPI controllers</li> <li>Hetwork adapters</li> <li>Intel(R) 1210 Gigabit Network Connection #2 (MSI capable)</li> <li>Intel(R) 1211 Gigabit Network Connection (MSI capable)</li> <li>TwinCAT-Intel PCI Ethernet Adapter (Gigabit) (MSI capable)</li> <li>For the context of the contex</li></ul>	Legacy interrupt usage: 3 (Windows) Communications Port (COM2) 4 (Windows) Communications Port (COM1) 7 (Windows) INtime RT Interface Driver 8 (Windows) System CMOS/real time clock 18 (Windows) TwinCAT-Intel PCI Ethernet Adapter (Gigabit) 54 (Windows) Microsoft ACPI-Compliant System					

### 2.2. Configure the INI file "C:\NEXCOBOT\RtxEcNic.ini"

Open the INI file "C:\NEXCOBOT\RtxEcNic.ini" by text editor as follow:

```
■ RtxEcNic - 記事本
檔案(F) 編輯(E) 格式(O) 檢視(V) 說明(H)
[Info]
NumOfInterfaces = 1
[Nic0]
BusNum=
DevNum=
FunNum=
```

NumOfInterfaces: The total number of EtherCAT network interface card [Nic0] : The first network card information

The value of "BusNum", "DevNum" and "FunNum" – PCI location information can be check via following steps:

1. Open the "Device Manager" and right click the NIC device that is installed INtime NIC driver, then select "Properties"



2. Record the "Location" information and then fill in the INI file

INtime Intel(R) I211 Gigabit Network Connection #2 Properties								
General	Advanced	Driver	Details	Events	Resources			
	INtime Intel(R) I211 Gigabit Network Connection #2							
	Device type: Network adapters							
	Manufacturer: TenAsys Corporation							
	Location:		PCI bus 2	2, device	0, function 0			
Device status							< >	
					ОК	(	Cancel	



**Note:** This INI file must be placed in the following path "C:\NEXCOBOT\RtxEcNic.ini"

## 3. INtime Kernel Management

1. Right click the hidden icon in the Windows Toolbar and then select "INtime Configuration"



### 2. Select "Node Management"

ا	🟶 INtime Configuration Panel							
5	Select the INtime c	omponent that you want to configure						
	Node Management	Development Miscellaneous License Manager Tools						
	INtime Device Manager							
		Export Settings Import Settings						
		Exit Help						

 Select "NodeA" and then in "Kernel" Tab, change "Kernel memory" to 256MB (depends on your real-time application) and change "Kernel Clock Rate" to 50us. (as shown in Figure below)

INtime Nodes     Iocal: DESKTOP-AC4D5KI    ¥¥ NodeA	System Nernel Network Auto Load Adva	nced
	Start automatically	No
	Processor core	1
l.	Kernel memory (in MB)	256
	Kernel memory mode	Extended Virtual and Physical Memory
	Kernel Clock Rate (in us)	50
ill	OS extensions	0
	Round Robin Time Slice (in ms)	50
N	Round Robin Priority Threshold	140
	Spin Control Threshold in ms	3000
	<ul> <li>Debugger COM Port</li> </ul>	NONE
	Debugger Baud Rate	9600
New Node Rename Remove	···	
Close	Save	elp

System Kernel Network Auto Load Advance	ed					
E Kernel						
Start automatically	No					
Processor core	1					
Kernel memory (in MB)	256					
Kernel memory mode	Extended Virtual and Physical Memory					
Kemel Clock Rate (in us)	50 🗸					
OS extensions	0					
Round Robin Time Slice (in ms)	50					
Round Robin Priority Threshold	140					
Spin Control Threshold in ms	3000					
Debugger COM Port	NONE					
Debugger Baud Rate	9600					

## 4. Set up INtime Development Environment on Visual Studio

### 4.1. INtime Development Tools Configuration

1. Right click the hidden icon in the Windows Toolbar and then select "INtime Configuration"



2. Select "Development Tools"

Ð	INtime Configura	tion Panel			Х
	Select the INtime co	mponent that you	want to configure		
	Node Management	Development Tools	Miscellaneous	License Manager	
	INtime Device				
	Manager				
		Export Setting	js Import Se	ettings	
		Exit	Hel	p	

3. Install Visual Studio 2015 (Take Visual Studio 2015 as an example here)

INtime Development Environment Configuration						
Visual Studio 6	Install	Uninstall				
Visual Studio .NET 2003	Install	Uninstall				
Visual Studio 2005	Install	Uninstall				
Visual Studio 2008	Install	Uninstall				
Visual Studio 2010	Install	Uninstall				
Visual Studio 2012	Install	Uninstall				
Visual Studio 2013	Install	Uninstall				
Visual Studio 2015	Install	Uninstall				
Visual Studio 2017	Install	Uninstall				
Install platform filesdone Install wizard filesdone Install debugger filesdone Install INtime help filesdone Add registry keysdone Install INtime add-indone Unhide quick start projectsdone Unhide samplesdone Configure Visual Studiodone Finished						
OK	Help					

### 4.2. INtime Development Environment Setting up

The following steps describe how to set up the INtime development environment on Visual Studio. For examples, how to create an INtime project, how to set up the path of header and library. (Take Visual Studio 2015 as an example here)

1. Create a new project (File/New), select "Application Wizard", and then input a project name.



### 2. Setup INtime Application settings, as below

INtime Application Wizard - INtimeApp1	?	$\times$
ten-sys Real-time Virtualization Experts		
What kind of INtime application do you want to create	?	
An empty project		
O A "Hello World" application		
O A minimal Iwin32 application		
<ul> <li>A <u>full-featured application</u></li> </ul>		
$\boxed{\square}$ <u>Generate C++ source (using INtime classes where applicable)</u>		
	ancel <u>H</u> e	lp



Th	s page	is th	e same a	as D	<b>D</b> efault	value.	click	"OK"	to	next	ste	p
									•••		~ ~ ~	r

INtime Application Wizard - INtimeApp1							
Options that affect the whole process							
Maximum memory pool size in Kbytes (max 2,097,151	or 0x1FFFFF): þ×						
Best priority of threads in this process (Range: 0 - 253):							
Use Windows or C++ exception handling:	Use Windows or C++ exception handling:						
Use C++ <u>n</u> amespaces:	$\checkmark$						
Use eXtended Memory mode:	V						
Sponser names for this process:	This process depends on:						
Add		Add					
Remove		<u>R</u> emove					
	<u>O</u> K <u>C</u> ancel	Help					

### Click "OK" to open project

INtime Application Wizard - INtimeApp1	?	×
INtime Application Wizard will create a new skeleton project with the following specifications.		
Generated Features:		
An Empty Project - with appropriate settings for Debug & Release Configurations. No source code was generated for this project.		
You use C++ as your programming language. The class name is INtimeApp1 Modules can be added or extended as necessary.		
	~	
<u>O</u> K <u>C</u> ancel	Help	<u>,</u>

3. To set up the path of header and library, right click on the project and then select "Properties".





### (as shown in Figure below)

SampleNexECM Property Pages		? ×
Configuration: Active(Debug)	<ul> <li>Platform: Active(INtime</li> </ul>	)
▲ Configuration Properties	Additional Include Directories	es\NEXCOBOT\NexECM\Header;%(AdditionalIncludeDirectories) ~
General	Additional #using Directories	<edit></edit>
Debugging	Debug Information Format	<inherit defaults="" from="" or="" parent="" project=""></inherit>
VC++ Directories	Common Language Runnine Support	
▲ C/C++	Consume Windows Runtime Extension	
General	Suppress Startup Banner	Yes (/nologo)
Optimization	Warning Level	Level3 (/W3)
Preprocessor	Treat Warnings As Errors	No (/WX-)
Code Generation	Warning Version	
Drecompiled Headerr	SDL checks	
Output Files	Multi-processor Compilation	
Browse Information		
Advanced		
All Options		
Command Line		
⊳ Linker		
INtime Properties		
Manifest Tool		
XML Document Generate		
Browse Information		
Build Events		
Custom Build Step	Additional Include Directories	
Code Analysis	Specifies one or more directories to add to the	e include path; separate with semi-colons if more than one. (/I[path])
< >		
		確定 取消 套用(A)

Additional Include Directories		?	Х	-
	*	×	<b>†</b>	
\$(INTIME)rt\include\con11				1
\$(NexECMHeaderDir64)			. ^	
			5	
				1
Evaluated value:				
C\Program Files (x86)\INtime\tt\include\con11 C\Program Files\NexCOBOT\NexECM\Header			^	]
20/4 ditionalincial eDirectories)				
<			>	
Inherited values:				
\$(INtime)rt\include\network7 \$(INtime)rt\include			^	
			~	
☑ Inherit from parent or project defaults	N	Macro	s>>	
ОК		Cano	el	

### In Linker\General, set up the path of NexEcm\_INtime.lib : \$(NexECMRtLibDir64) (as shown in Figure below)

SampleNexECM	Property Pages		? ×
Configuration:	Active(Debug)	<ul> <li>Platform: Activ</li> </ul>	ve(INtime)  V Configuration Manager
▲ Configuratio	on Properties	Output File	<pre>\$(SolutionDir)\$(Configuration)\\SampleNexECM.rta</pre>
General		Show Progress	Not Set
Debugg	ing	Version	21076.20053
VC++ D	irectories	Enable Incremental Linking	No (/INCREMENTAL:NO)
N C/C++		Suppress Startup Banner	Yes (/NOLOGO)
<ul> <li>Linker</li> </ul>		Ignore Import Library	No
Gene	eral	Register Output	No
inpu		Per user Redirection	N <sub>2</sub>
Man	ifest File	Additional Library Directories	)T\NexECM\Lib\INtime Realtime;%(AdditionalLibraryDirectories)
Debu	ugging	Link Library Dependencies	<edit></edit>
Syste	m	Use Library Dependency Inputs	<inherit defaults="" from="" or="" parent="" project=""></inherit>
Opti	mization	LINK Status	
Emb	edded IDL	Prevent DII Binding	
VVInc	tows ivietadata	Treat Linker Warning As Errors	
Adva	ntions	Force File Output	
Com	mand Line	Create Hot Patchable Image	
INtime P	Properties	Specify Section Attributes	
▷ Manifest	t Tool		
▶ XML Do	cument Generate		
Browse I	nformation		
Build Even	ents		
Custom	Build Step	Additional Library Directories	
Code Ar	nalysis	Allows the user to override the enviror	nmental library path. (/LIBPATH:folder)
<	>		
			確定 取満

# пехсовот

Additional Library Directories	?	×
	🎽 🗙 🗸	Ť
[\$(NexECMRtLibDir64)]		^
	•	
<	1	, × .
Evaluated value:		
C:\Program Files\NexCOBOT\NexECM\Lib\NexECMRt		~
%(AdditionalLibraryUirectories)		~
<		>
Inherited values:		
\$(INtime)rt\lib		<
✓ Inherit from parent or project defaults	Macros	>>
	OK Cance	əl

In Linker\Input, set up the library "NexEcm\_INtime.lib" (as shown in Figure below)

SampleNexECM Property Pages		? ×
Configuration: Active(Debug)	<ul> <li>Platform: Active(INtime)</li> </ul>	✓ Configuration Manager
<ul> <li>✓ Configuration Properties General Debugging VC++ Directories</li> <li>► C/C++</li> <li>✓ Linker General</li> <li>Input</li> <li>Manifest File Debugging System Optimization Embedded IDL</li> <li>Windows Metadata Advanced All Options Command Line INtime Properties</li> <li>► Manifest Tool</li> <li>► XML Document Generato</li> <li>► Browse Information</li> <li>► Build Events</li> <li>► Custom Build Step</li> <li>► Code Analysis</li> </ul>	Additional Dependencies           Ignore All Default Libraries           Ignore Specific Default Libraries           Module Definition rile           Add Module to Assembly           Embed Managed Resource File           Force Symbol References           Delay Loaded DIIs           Assembly Link Resource	ibus.lib;netlib.lib;clib.lib;vshelper.lib;NexEcm_INtime.lib;iwin32.lib <edit> <inherit defaults="" from="" or="" parent="" project=""></inherit></edit>
		確定 取消 套用(A)



Additional Dependencies	? ×
cpplib11.lib rt.lib pcibus.lib netlib.lib cib.lib ushapaslib	^
NexEcm_INtime.lib iwin32.lib	~
Evaluated value:	3
rtpp11d.lib cpplib11.lib rt.lib pcibus.lib netlib.lib clib.lib vshelper.lib	^
NexEcm_INtime.lib	v >
Inherited values:	
rt.lib pcibus.lib netlib.lib clib.lib vshelper.lib rmxiff3m.lib	^
	~
Inherit from parent or project defaults	Macros>>
	OK Cancel

In Build Events\Post-Build Event, copy the file "NexEcm\_INtime.rsl" to the target position by inputting the command:

" xcopy "C: \NEXCOBOT\ NexEcm\_INtime.rsl" "\$(TargetDir)" /Y "

(as shown in Figure below)

SampleNexECM Property Pages							?	$\times$
Configuration: Active(Release)	~	Platform:	Active(INtir	ne)	~	Configuration	on Manage	er
<ul> <li>Configuration Properties General Debugging VC++ Directories</li> <li>C/C++</li> <li>Linker INtime Properties</li> <li>Manifest Tool</li> <li>XML Document Generato</li> <li>Browse Information</li> <li>Build Events Pre-Build Event</li> <li>Pre-Build Event</li> <li>Post-Build Event</li> <li>Custom Build Step</li> <li>Code Analysis</li> </ul>	Command Line			OT\NexECM\Lib\INtime_Re <edit> <inherit from="" or="" parent="" proje<="" td=""><td>ealtime\NexEcm_</td><td>INtime.rsl" "\$(Ti</td><td>argetDir)" .</td><td>₩~</td></inherit></edit>	ealtime\NexEcm_	INtime.rsl" "\$(Ti	argetDir)" .	₩~
< >>	Specifies a comma	ind line for t	he post-build	event tool to run.				
					確定	取消	套用(/	A)



mmand Line	? ×
opy "C: \NEXCOBOT\ NexEcm_INtime.rsl" "\$(TargetDir)" //	^
	>
ppy "C: \NEXCOBOT\ Nexecm_INtime.rsi ="C:\Program Files\NEXCOBOT\NexeCM\Samples\INtime_6.s\Sample	_Realtime\Sample_2Layer\C /
	>
	> Macros>>

### 4. Build and compile the INtime application

# **NEXCOBOT**

