# Interfacing a nanoAcquity with a Thermo Mass Spec

# **Overview**

This document is intended to help you connect a nanoAcquity to a Thermo mass spectrometer. If you get lucky you may have nice service engineers from both companies that can help you.

In this document we used an Orbitrap XL and a nanoAcquity with the software versions in the figure below. Your software version may be different but the Thermo engineer should be able to get you the latest software and also tell you compatibility with the nanoAcquity. As of spring 2013 only 1D systems are supported.

### Software version

Ideally software is already loaded on the mass spec computer, but you may have to install the HPLC software. You should have software from Thermo called LC\_Devices. Load software (LC\_Devices2.7 or whatever version you currently have), it will ask you what devices you want to install, select Waters.

This is a screen shot of the software version we used (our pc is win7 32 bit):

Version Info
Installed Software
<ul> <li>Foundation         <ul> <li>Product Version: 1.0.2.65 SP2</li> <li>Release Date: Thursday, March 31, 2011</li> <li>Install Date: August 29, 2012</li> </ul> </li> <li>Applications         <ul> <li>FT Programs 2.1 0.40</li> <li>Xcalibur 2.1.0 SP1 build 1160</li> <li>Configured Instruments</li> <li>LTQ Orbitrap XL MS 2.5.5 SP2</li> <li>Waters nanoACQUITY 2.7.0</li> <li>Pater 2.7.0</li> <li>Release Date: July 25, 2012</li> <li>Install Date: September 21, 2012</li> <li>Description: LC Devices Waters nanoACQUITY 2.7.0 Build 574</li> </ul> </li> </ul>
Save Print Exit

#### Connecting the nanoAcquity to the mass spec PC

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Install a dedicated third ethernet card and configure port to connect to nanoAcquity (IP address).

There are two Ethernet cards in the computer that comes with your mass spec, one is to connect to the mass spec and the other one to connect to the internet. We install a third card to connect to the nanoAcquity to the pc using the Ethernet cable you get with the nanoAcquity. The screen shots below should help you configure the card.

Control Danel & Network and Internet & L	Network Connections	- 4 Search Network Connections	
Organize	is connection Rename this connection View status of this connec	tion »	
Internet Unidentified network Broadcom NetXtreme Gigabit Eth	rnet work 2 ((R) 82579LM Gigabit Network	CI	
nanoAquity Status	nanoAquity Properties           Networking         Sharing           Connect using:         Connect using:	Internet Protocol Version 4 (TCP/IPv4) General You can get IP settings assigned autor	Properties
IPv4 Connectivity: No Internet access IPv6 Connectivity: No network access Media State: Enabled	Reatek RTL8163/8110 Family PCI Gigabit Ethemet NIC (     Configure  This connection uses the following items:	this capability. Otherwise, you need to for the appropriate IP settings.	) ask your network administrator ly
Duration: 1 day 23:52:59 Speed: 100.0 Mbps Details		Jge the following IP address: IP address: Sybnet mask: Default gateway:	192.168.0.1         255.0.0.0.0
Activity		<ul> <li>Obtain DNS server address auton</li> <li>Obtain DNS server add</li> <li>Preferred DNS server:</li> </ul>	natically Iresses: 128 , 95 , 120 , 1
Bytes:         438,044,542         608,605,285           Properties         Image: Diagnose         Diagnose	Description Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks.	Alternate DNS server:	128 . 95 . 112 . 1 Ad <u>v</u> anced
Glose	OK Cancel		OK Cance

#### Configure instrument:

Next you need to configure the nanoAcquity in Xcalibur.

Close all mass spec related software (the Tune window can stay open) and open instrument configuration, be patient as this may take a minute to open:



Select all Device Types, select nanoAcquity, hit Add>>, hit done



Now that when you open Xcalibur or the method editor you should see the nanoAcquity module.



# To directly control the nanoAcquity you need the nanoAcquity console: Do a right mouse click, send to, desktop (create shortcut)

Organize 🔻 💼 Open 🛛 Burn New	folder					(
Favorites	Name	Date modified	Туре	Size	 	_
Desktop	🞴 en	8/29/2012 2:54 PM	File folder			
Collaborators	en-US	8/29/2012 2:54 PM	File folder			
Downloads	ia a	8/29/2012 2:54 PM	File folder			
E Recent Places	ko	8/29/2012 2:54 PM	File folder			
_	k-CHS	8/29/2012 2:54 PM	File folder			
Desktop	AcquityAAO	3/15/2009 9:07 PM	Application	52 KB		
🚡 Libraries	AcquityASMEditMgr.ocx	12/1/2010 2:33 PM	ActiveX control	184 KB		
Documents	AcquityASMInstr.dll	12/1/2010 2:33 PM	Application extens	412 KB		
👌 Music	AcquityASMServer	12/1/2010 2:33 PM	Application	116 KB		
E Pictures	AcquityASMXML.dll	12/1/2010 2:33 PM	Application extens	59 KB		
📑 Videos	AcquityComponents	3/21/2013 9:44 AM	XML Document	7 KB		
🧸 LTQOrbitrap	A ACQUITYConsole	7/5/2011 11:35 AM	Application	288 KB		
🖳 Computer	ACQUITYConsole.exe	5/3/2007 9:48 PM	XML Configuratio	1 KB		
🚢 Local Disk (C:)	🚳 AcquityIcsCommon.dll	12/1/2010 2:31 PM	Application extens	652 KB		
🔮 DVD RW Drive (D:)	ACQUITYLog	3/17/2009 11:54 AM	Application	24 KB		
辑 Network	🚳 ACQUITYLogCommon.dll	3/17/2009 11:54 AM	Application extens	48 KB		
😕 Control Panel	AcquityMethodEditor	3/15/2009 9:07 PM	Application	36 KB		
🧾 Recycle Bin	AcquityPlotViewer	7/5/2011 11:35 AM	Application	44 KB		
ColumnHeater	ACQUITYServer	7/5/2011 11:35 AM	Application	108 KB		
nanoAcquity_Service_and_Maintenance	ACQUITYServer.exe	5/3/2007 9:48 PM	XML Configuratio	1 KB		
OT1_Service and maintenance	AcquityTUVEditMgr.ocx	12/15/2008 6:58 AM	ActiveX control	248 KB		
🔰 software	🚳 AcquityTUVInstr.dll	12/15/2008 6:57 AM	Application extens	364 KB		
	AcquityTUVServer	12/15/2008 6:58 AM	Application	96 KB		
	🚳 AcquityTUVXML.dll	12/15/2008 6:57 AM	Application extens	59 KB		
	🚳 atl70.dll	1/5/2002 1:18 AM	Application extens	83 KB		
	🚳 atl71.dll	3/18/2003 6:05 PM	Application extens	87 KB		
	AutoLoader	2/7/2011 2:21 PM	Application	160 KB		
	🕋 AutoLoader	8/29/2012 2:55 PM	XML Document	4 KB		
	FirmwareLoader.dll	5/24/2010 10:00 AM	Application extens	592 KB		
	FluidicConfig	11/9/2010 9:37 AM	Application	36 KB		
	🚳 ILoader.dll	1/3/2008 10:20 AM	Application extens	16 KB		
	🚳 InstrIDL.dll	4/29/2011 1:36 PM	Application extens	186 KB		
	InstrumentEditorControlEditMgr.ocx	7/5/2011 11:39 AM	ActiveX control	359 KB		
	🚳 Interop.AAOBatchLib.dll	11/2/2006 4:31 PM	Application extens	28 KB		
	Interop.AAOLib.dll	11/2/2006 4:31 PM	Application extens	56 KB		

If you open the console you should be able to control the nanoAcquity, if your firmware version is correct. If not you may have to change the firmware.



#### nanoAqcuity firmware change

Firmware upgrade (if your system is under warranty or under service contract, let the waters engineer do it!): Otherwise find the loader:

🖉 🗸 🕨 Compu	ıter → OS (C:) → Program Files → Waters Instrum	ents 🕨 Firmware		•	Search Firmware		) 🗆	2
Organize 👻 Include	in library ▼ Share with ▼ Burn New f	folder				100 -		(
🔆 Favorites	Name	Date modified	Туре	Size				
Desktop	ACQUITY 2996 Detector.sft	11/1/2005 3:01 PM	SFT File	754 KB				
🐌 Downloads	ACQUITY Sample Organizer.sft	11/12/2010 10:39	SFT File	680 KB				
🔢 Recent Places	ACQUITY TUV Detector.sft	12/12/2008 3:24 PM	SFT File	1,133 KB				
	AutoLoader	6/27/2012 11:33 AM	Shortcut	1 KB				
词 Libraries	🖌 Loader	5/24/2010 3:19 PM	Application	736 KB				
Documents	nanoACQUITY Binary Solvent Manager.sft	11/15/2010 1:28 PM	SFT File	1,269 KB				
J Music	nanoACQUITY Sample Manager.sft	3/9/2011 7:46 AM	SFT File	1,266 KB				
Pictures								

#### Click on loader

Welcome!	
Welcome to the Waters Ferruran	lander
welcome to the waters miniware t	Loduer.
This program will upgrade the firmw	vare for your instrument.
Click "Next >" to continue.	
Scan for instruments	
	(Deals Nexts )
	Cancel

Check Scan for instruments and hit next; You should see the modules attached to the pc (you'll likely only have the SM and BSM, not the ASM)

instrument rype	Serial Number	Version	Address
nanoACQUITY Sample Manager nanoACQUITY Binary Solvent Manager	E07NPS279M E07NPB291N	1.42 1.42	192.168. 192.168.
ACQUITY Auxiliary Solvent Manager	M06NPA229N	1.42	192.168.
			_

Highlight the first module and hit ok, I think it'll ask you if you want to load firm ware, click yes....

Then be patient (this takes several minutes) it will unload the old firmware, then load the new one (it'll show you some progress bar) and finally tell you to cycle power, turn the module power off and on again, then wait again... it'll start up and the lights will keep flashing for about 10 mins (seems like forever... so be patient or go get coffee...) Sometimes if you open the nanoAcquity console it will tell you in the status message that it is installing firmware...

Then repeat for the second module... I always like to do one module at the time, but I think you can start them both in parallel.. I'm just not so comfortable with that kinda stuff so one at the time seems better for me... ©

Sometimes after it is all done you may have to restart the pc.. and/or cycle the power on the nanoAcquity again.

One thing I noticed there is no longer a trapping function with this particular firmware, but that's ok, we'll simply put a plug instead of the wasteline and "trap" at a low flow rate ... so no big deal.

And if you inject more than  $9\mu$ , with a  $10\mu$  loop it does some strange double trapping, so I always inject  $\leq 9\mu$ .

#### Contact Closure

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We always got a contact closure cable with our mass spec, but you may have to make one yourself.

On the nanoAcquity SM backside plug use the top two slots "Inject start Out" and connect the red wire to the top (1) and the black wire to the second one (2)



On the mass spec side use the peripheral control start in, connect the red wire to the first position on the left and the black wire to the second position.



The nanoAcquity automatically triggers the contact closure (i.e. starts the mass spec acquisition) after the trapping is complete. Setup a new method and start a run out of xcalibur, hit the start sequence button, then hit change instruments and confirm that both instruments (hplc and mass spec) are in use and that the hplc is selected to start the instrument.



After hitting ok the nano will go through the injection and trapping. During that time the status of the mass spec should say waiting for contact closure. After the trapping is finished it will start acquiring data.

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