NHR INSTRUMENT SETUP GUIDE

FOR LAN INSTRUMENTS

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1 CONTENTS

2 UNDERSTANDING YOUR NEW INSTRUMENT

Many NHR instruments use an Ethernet-based Local Area Network (LAN) to communicate between an external computer and the instrument. In some cases, a front panel may be communicating with the instrument as well. See the diagrams below for typical configurations

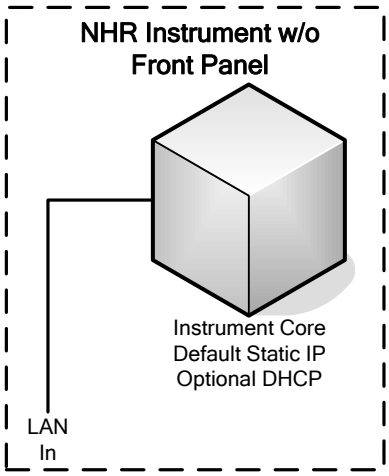


Figure 1 –Typical configuration without the front panel option

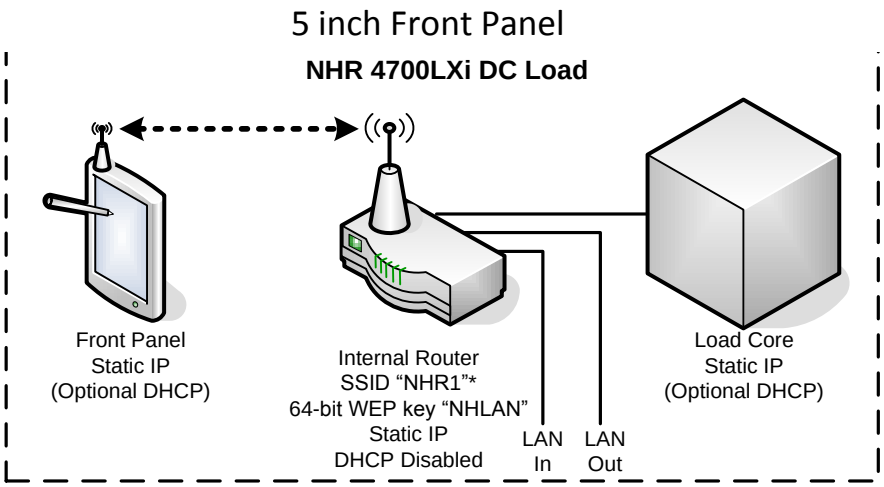


Figure 2 –Typical configuration with the 5" front panel option

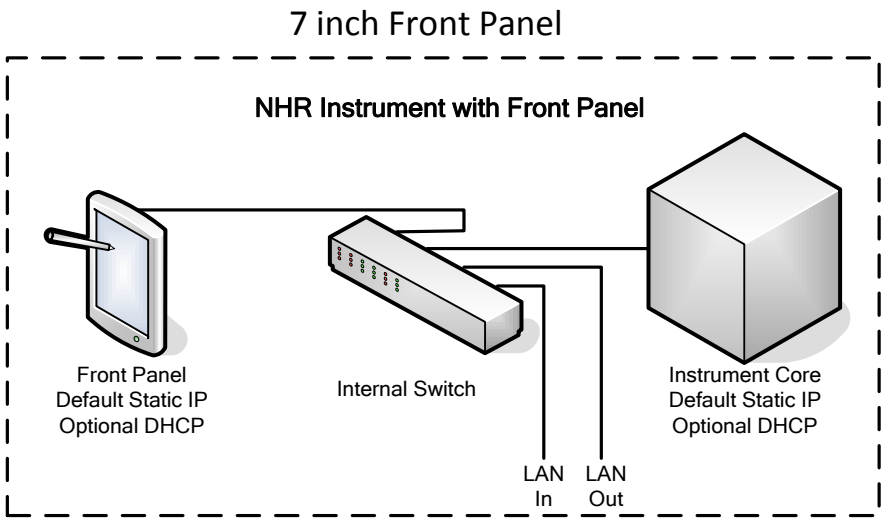


Figure 3 – Typical configuration with the 7" front panel option

3 UNDERSTANDING LAN

Every device on a LAN (local area network) must have a unique address (IP address or Internet Protocol address). The IP address is 32-bits (four bytes) and is written as four groups of one byte (0-255) each. For example "192.168.0.1" is the IP address of the computer in a typical test system. The first three bytes of the IP address identify the network and sub-network (subnet) that the device is on. So in this case, the computer subnet is 192.168.0. This is IMPORTANT; ALL devices that are going to communicate with each other MUST be on the same subnet.

You will notice in Figure 2 & 3 – Typical configuration with the 5" and 7" front panel options that the front panel and the instrument core are both shown as static IP. To work correctly, they must be assigned unique addresses on the same subnet. For example, the instrument core might be 192.168.0.10 and the front panel is 192.168.0.20. An alternative to static IPs is to set up the devices as DHCP. DHCP stands for Dynamic Host Configuration Protocol. Basically, what that means is that they ask for an IP address when they power up. So what IP address are they at? We don't know, at least until they are turned on. Once powered up, a DHCP device will send a broadcast message on the network asking for an address to be assigned by a DHCP Server. Usually, the DHCP Server is part of the corporate network and is administered by the IT department and will return an appropriate IP address to the requester. If, however, there is no DHCP Server (like if you connect a PC directly to the load), the request will go unanswered. If the device is configured for Auto-IP then the device will make up its own IP Address after about one minute. It will use an address 196.254.xxx.xxx where it fills in the "x"es.

The other aspect of all of this IP address stuff is that if the software running on the front panel wants to talk to the instrument core, or your computer software wants to talk to the instrument core, the software must know the IP address for the destination. When addresses are assigned dynamically (or self-assigned), we don't know them so how does that work? NHR software (whether front panel or PC) knows how to perform a type of network discovery that allows them to find the instrument core. That way, no matter what IP address is assigned, all of the NHR software will still work. HOWEVER, if you are writing your own software and not using the NHR driver (like controlling a load with SCPI on a Linux machine), you will need to know the IP address. In that case, you will set up the load core to a static IP address (fixed).

If you decide to hook up the load on a shared LAN port along with your corporate network note that the corporate network traffic may affect the reliable communication with the hardware. The recommended solution is to add a second LAN port to the computer. One port will remain the corporate LAN connection and the other will be dedicated to the instrument bus. IMPORTANT, if using a Windows 7 PC you must assign a routing table entry so when the NHR network discovery happens, the global broadcasts used to find the NHR hardware will be transmitted with the correct interface. Windows XP will do this without the route table being modified.

4 LAN SETUP

4.1 DEFAULT INTERNET PROTOCOL ADDRESSES

By default, NHR instruments are shipped configured to a static IP. When multiple units are shipped on the same purchase order, they will be configured with each instrument having a unique address in the series as outlined below. While these are the standard configurations, the user can reconfigure the IPs as desired or use DHCP. Note: systems with a DMS MUST be on the 192.168.0 subnet or DHCP.

Usage	First IP	Last IP	Notes
Reserved	192.168.0.0		Reserved
Reserved	192.168.0.1		Commonly used as default address of routers and PC's so avoid use.
NHR Maintenance IP Override	192.168.0.2		Used for hardware switch to override IP for maintenance.
System Control PC's and Routers	192.168.0.3	192.168.0.8	5X00's, and other test systems
DMS	192.168.0.9		DMS only supports DHCP or this IP. User selectable static IP is not available.
4700LXi Core	192.168.0.10	192.168.0.27	
4700LXi Front Panel	192.168.0.28	192.168.0.45	
4700LXi Router	192.168.0.46	192.168.0.51	Only used with 5" front panel units.
4300 Chassis	192.168.0.52	192.168.0.59	
4300 Front Panel	192.168.0.60	192.168.0.67	
5427	192.168.0.68	192.168.0.70	
9200 Touchpanel PC	192.168.0.71	192.168.0.82	
49XX Channel/4600	192.168.0.83	192.168.0.118	
Enerchron Systems	192.168.0.119	192.168.0.148	System control PC's, measurement HW, routers, etc.
4530 ACPM	192.168.0.149	192.168.0.160	
Additional NHR	192.168.0.161	192.168.0.200	Overflow or future use
Customer	192.168.0.200	192.168.0.254	Reserve for customer
Internal NHR	192.168.0.200	192.168.0.219	NHR Sales (in customer range)
Internal NHR	192.168.0.220	192.168.0.254	NHR Eng (in customer range)
Reserved	192.168.0.255		Broadcast

1 - Standard Static IP Addresses

4.2 PC TO INSTRUMENT LAN SETUP

Perform one of the following setups based on your desires:

4.2.1 WINDOWS PC WITH NO CORPORATE NETWORK

When using a Windows PC, the recommended configuration is a dedicated LAN port for communicating with all NHR equipment. If the PC has only one LAN port it should be dedicated to controlling the instruments. Connecting the PC LAN port to a network hub/switch/router is NOT the same as adding a LAN port.

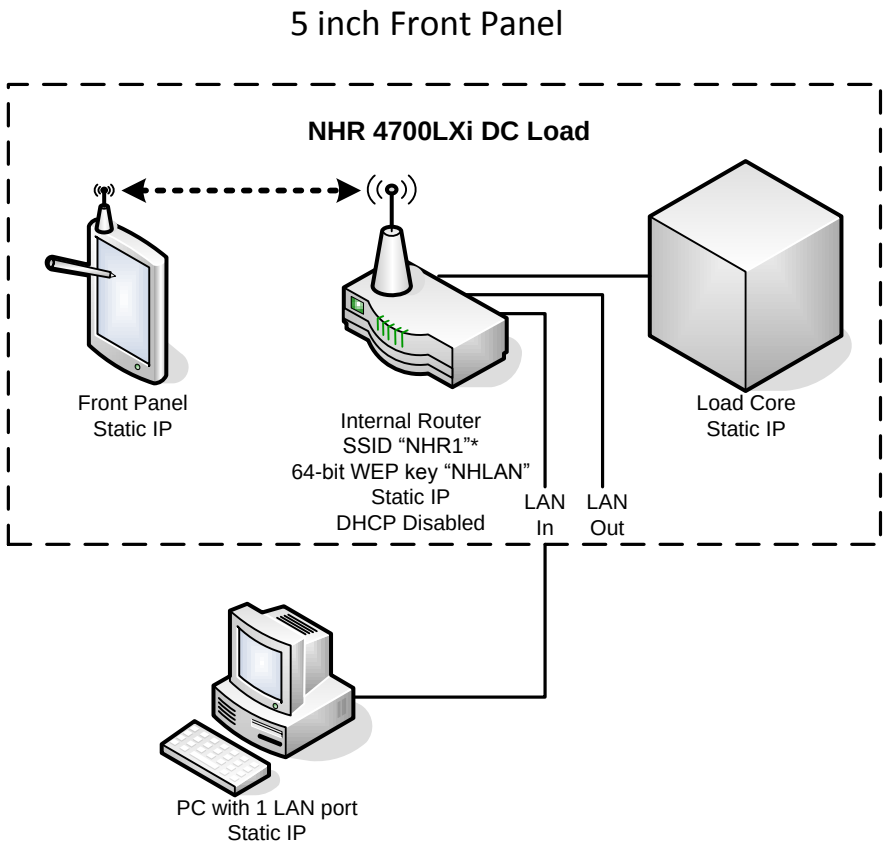


Figure 4 - Typical configuration with the 5" front panel option and no corporate network

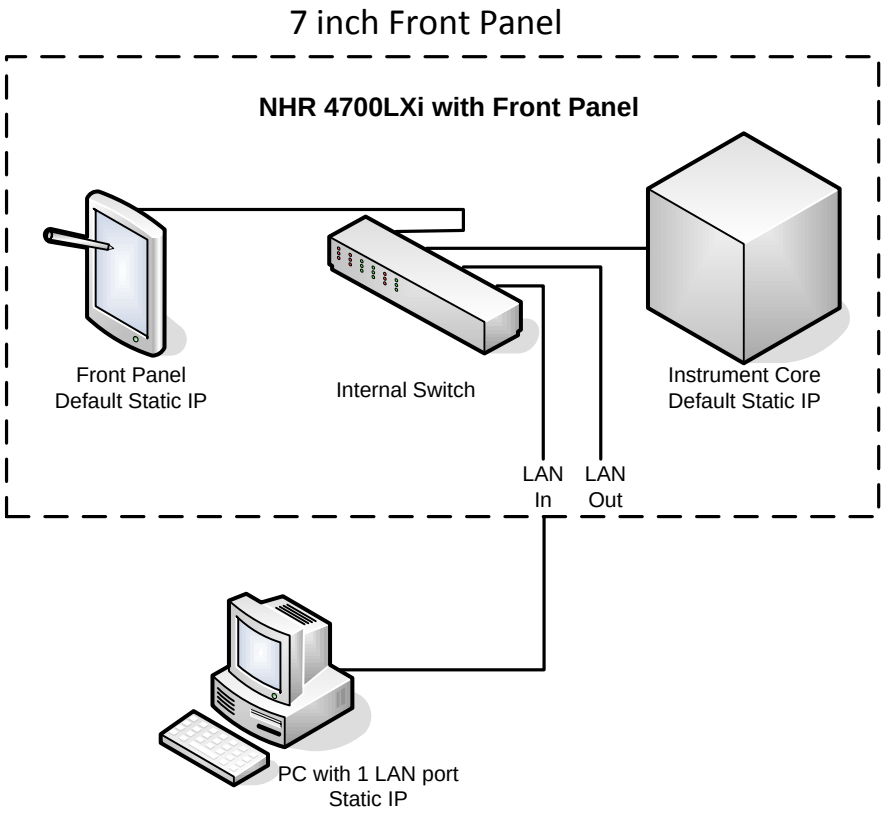


Figure 5 – Typical configuration with the 7" front panel option and no corporate network

Connect the PC LAN port to the instrument "LAN In" connector. IMPORTANT: If your instrument does NOT have the front panel option, you MUST use a "Crossover" or "Patch" type LAN cable. If you have the front panel option, a straight-through or crossover type cable will work.

Contact your IT department to setup the following on your PC:

- Control Panel
  - Network & Internet Connections
  - Network Connection
  - Local Area Network, Select, right click then Properties
  - Set 192.168.0.1
- LAN Connection: Set Internet Protocol Version 4 (TCP/IPv4) to use an appropriate static IP address (we recommend 192.168.0.1)
- Disable the firewall
- If Windows 7, disable UAC
- Change network port property "IPv4 Checksum Offload" to "None"

4.2.2 WINDOWS PC WITH CORPORATE NETWORK

4.2.2.1 WINDOWS PC USING TWO LAN PORTS (RECOMMENDED)

When using a Windows PC, the recommended configuration is a dedicated LAN port for communicating with all NHR equipment. If the PC has two LAN ports, one can be used for the corporate network while the second is dedicated to controlling the instruments. Connecting the PC LAN port to a network hub/switch/router is NOT the same as adding a LAN port.

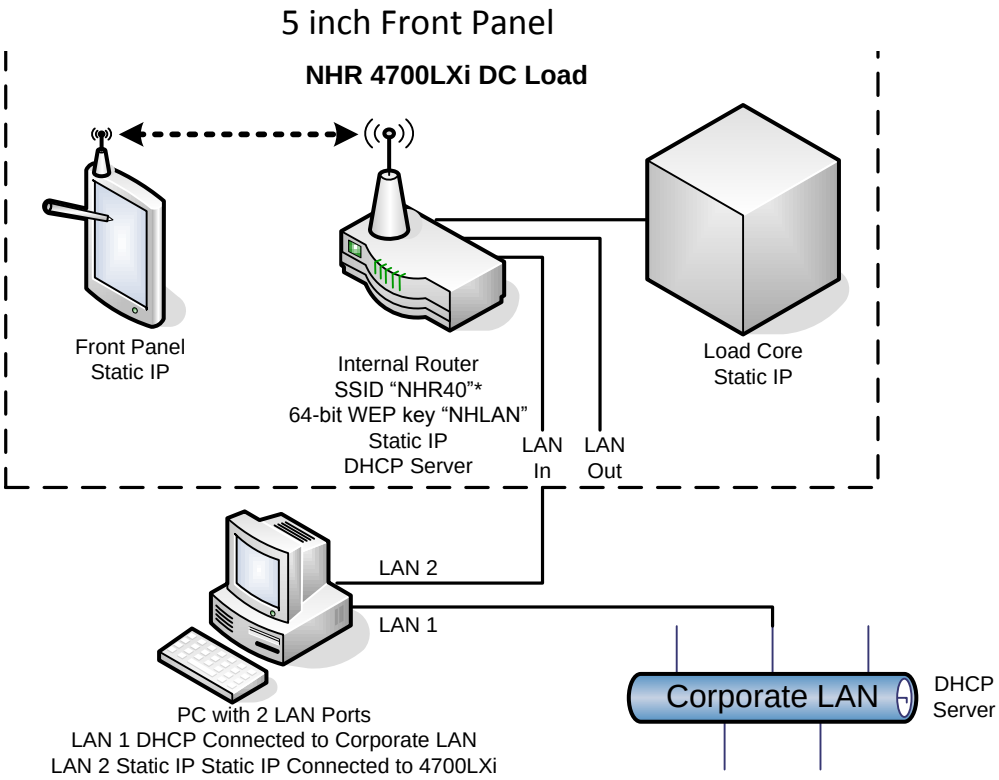


Figure 6 - Typical configuration with the 5" front panel option and two LAN ports

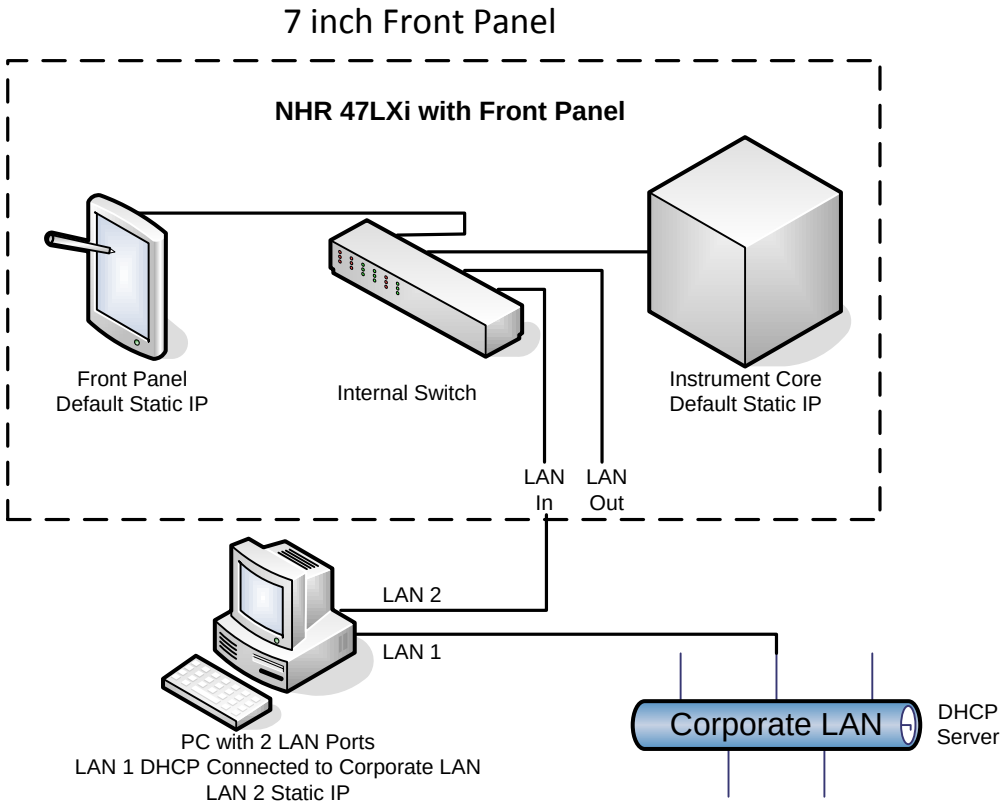


Figure 7 – Typical PC with two ports to load and corporate LAN

Connect the PC LAN port to the Load LAN In connector. IMPORTANT: If your load does NOT have the front panel option, you MUST use a "Crossover" or "Patch" type LAN cable. If you have the front panel option, a straight-through or crossover type cable will work.

Add a 2nd LAN port to the PC and get your IT department to configure the following:

- LAN 2 Connection: Set Internet Protocol Version 4 (TCP/IPv4) to use an appropriate static IP address (we recommend 192.168.0.1).
- LAN 2 Disable the firewall
- If Windows 7, disable UAC
- If Windows 7, set up route table. This will route global broadcast commands to the instrument port which is required to find the NHR hardware. The route table change requires a reboot of the PC
    - From a command prompt, type:
        - route -p ADD 255.255.255.255 <static ip of LAN 2 port> METRIC 1
    - Example:
        - route -p ADD 255.255.255.255 192.168.0.1 METRIC 1
- Change network port property "IPv4 Checksum Offload" to "None"

4.2.2.2 WINDOWS USING ONE LAN PORT (NOT-RECOMMENDED)

When using a Windows PC, the recommended configuration is a dedicated LAN port for communicating with all NHR equipment (see 4.2.2.1 Windows PC Using TWO LAN ports (recommended)). However, if you have a Windows PC that has only one LAN port and another cannot be added, you can still connect to the load. Remember, connecting the PC LAN port to a network hub/switch/router is NOT the same as adding a LAN port. The only problem with this configuration is that there is an increased likelihood that communications from the PC to the load could fail due to the high volume of traffic on the network. In that case, the PC will automatically retry as necessary but timely control may be compromised.

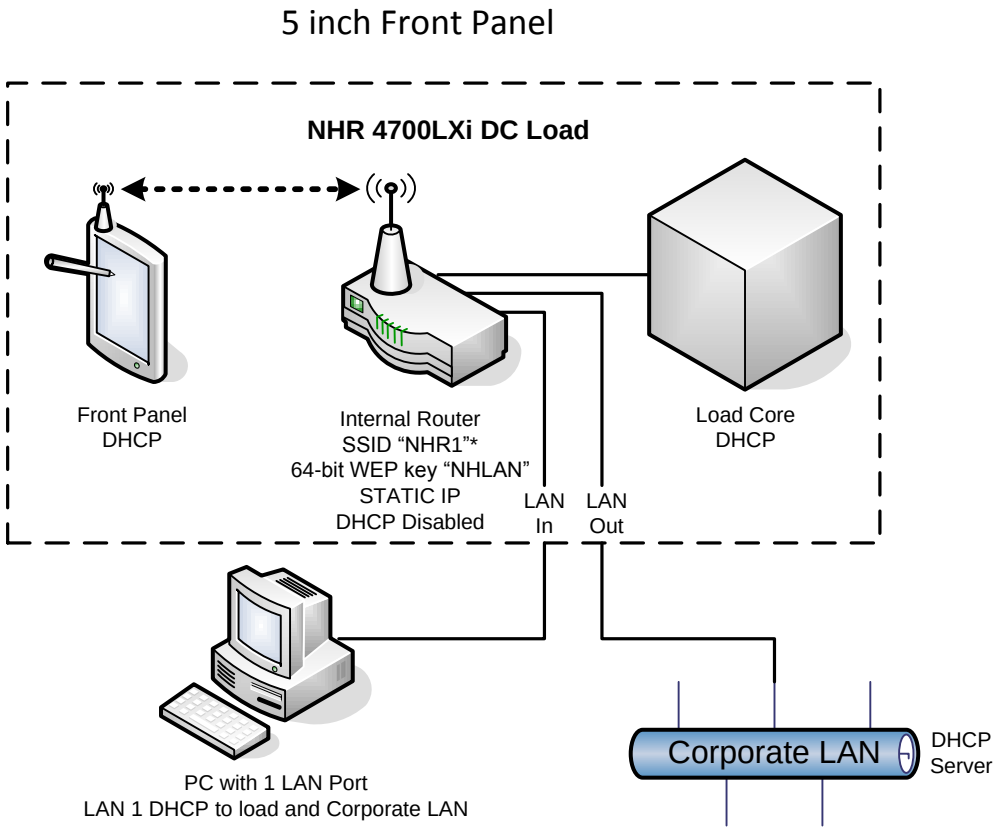


Figure 8 - Typical PC with one LAN port to load and corporate LAN

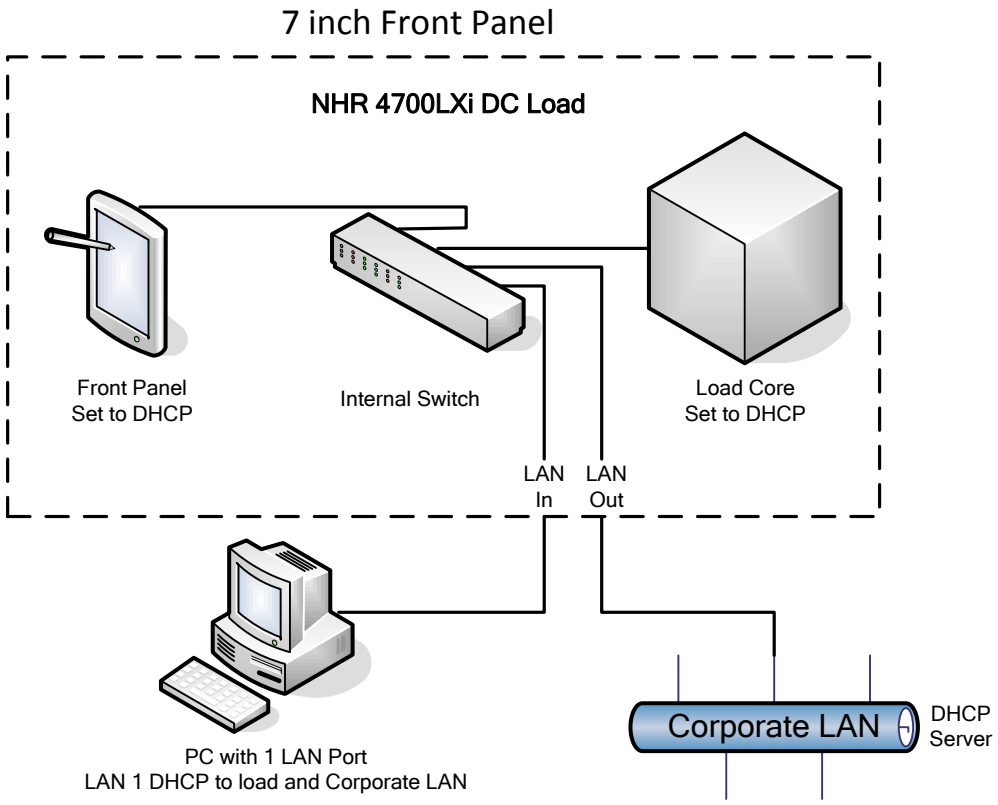


Figure 9 - PC with one port to the load and the corporate LAN

Note, if the load does not have the front panel option, you will need to provide your own network switch.

You will need to reconfigure your NHR hardware to use DHCP instead of a static IP address. In most cases, the default setup on the PC LAN will work. If needed, get your IT department to verify the following:

- LAN 1 Connection: Set Internet Protocol Version 4 (TCP/IPv4) to obtain an IP address automatically.
- LAN 1 Disable the firewall
- If Windows 7, disable UAC
- Change network port property "IPv4 Checksum Offload" to "None"

4.2.3 HOW TO SET IP ADDRESSES

4.2.3.1 SET THE PC FOR STATIC IP ADDRESS

1. Set PC LAN port to use static IP = 192.168.0.1, subnet mask = 255.255.255.0 (contact your IT department for assistance)
2. Connect PC LAN port to the instrument LAN In

4.2.3.2 SET THE INSTRUMENT CORE FOR STATIC IP ADDRESS

1. Turn-OFF the instrument
2. Set the instrument "Force Static IP" Dip Switch 7 to OPEN (logical 1). The switch lever should be towards the fans.
3. Turn-ON the instrument

4. The instrument will now be at static IP address 192.168.0.2.
    a. In Internet Explorer (IE) enter the address http://192.168.0.2
    b. On NH Research LAN Configuration Page
        i. Host Name: 192.168.0.x
        (same as the IP address or any other unique name)
        ii. Domain: NHdomain
        iii. Description: <instrument specific>
        iv. TCP/IP Mode: Uncheck DHCP, Uncheck Auto-IP, Check Manual
        v. IP Address: (see 1 – Standard Static IP Addresses) or an IP address assigned by your IT department) bring up the on-screen keyboard by clicking the keyboard icon in the lower-right corner of the scree).
        vi. Subnet Mask: 255.255.255.0
        vii. Default Gateway: 192.168.0.1
        viii. DNS Server: 0.0.0.0
        ix. Dynamic DNS: Disabled
        x. LAN Configuration Password: (blank)
        xi. Click Change Configuration
    c. Set the instrument “Force Static IP” Dip Switch to CLOSED (logical 0).
    d. Recycle power on the instrument

4.2.3.3 SET THE FRONT PANEL FOR STATIC IP ADDRESS

1. Exit the NHR panel software by going to the “More” tab and selecting “Quit”
2. Double click on APPS, Double click on IP, Double click on SDIO ##
3. Click specify IP address, select Keyboard.
4. Enter 192.168.0.XXX.
5. Enter 255.255.255.0 as the subnet mask
6. Click the “Ok” button in the dialog title bar

5 SOFTWARE INSTALLATION

You have three choices for installation.

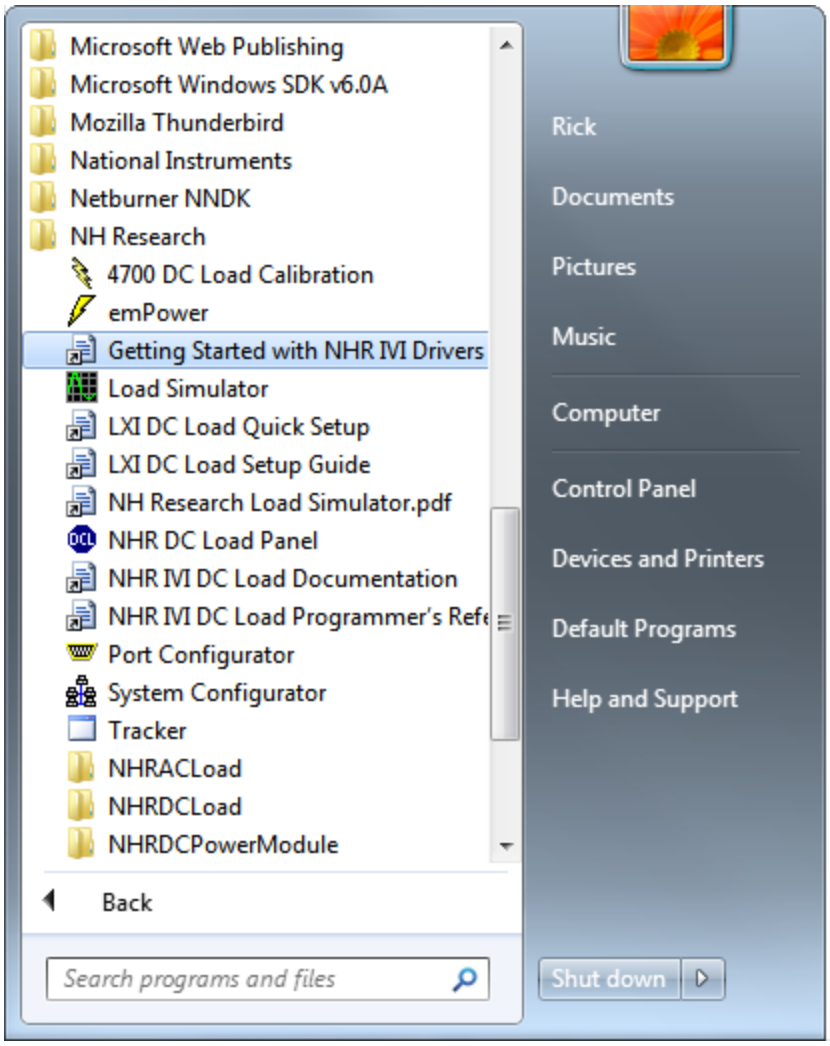
1. If you are going to use the instrument with its front panel only, no software installation is required.
2. If you will be controlling the instrument from a Windows PC, either with the NHR soft panel or from a programming language like LabVIEW, C#, VB, etc. you will need to install the NHR software. See section 5.1Windows PC NHR Software Installation.
3. If you want to control the instrument using SCPI, you do not need to install any software. You will, however, need access to the documentation located on the CD. You may install the software on a Windows PC to have the documentation installed for you or you may copy the contents of the following folder to a convenient location on your system:

   D:\NHR DC Load Core Components\Program Files Folder\NH Research\emPower\Help

5.1 WINDOWS PC NHR SOFTWARE INSTALLATION

Close all programs that are currently running in windows. Insert the CD into the drive. If your drive is configured for Autoplay the setup program should start. If Autoplay is not enabled, you will need to view the contents of the disk and double click on 'Setup' to start the installation. Follow the prompts on the screen to install. You may need to reboot during the process.

If you will be controlling your instrument from a programming language like LabView, C#, VB, et cetera, please refer to the document "Getting Started with NHR IVI Drivers" which should be a shortcut in the NH Research program group accessed through the start menu.


Microsoft Web Publishing
Microsoft Windows SDK v6.0A
Mozilla Thunderbird
National Instruments
Netburner NNDK
NH Research
4700 DC Load Calibration
emPower
Getting Started with NHR IVI Drivers
Load Simulator
LXI DC Load Quick Setup
LXI DC Load Setup Guide
NH Research Load Simulator.pdf
NHR DC Load Panel
NHR IVI DC Load Documentation
NHR IVI DC Load Programmer's Refe
Port Configurator
System Configurator
Tracker
NHRACLoad
NHRDCLoad
NHRDCPowerModule
Back
Search programs and files
Rick
Documents
Pictures
Music
Computer
Control Panel
Devices and Printers
Default Programs
Help and Support
Shut down

6 WHERE TO NEXT?

After installation of the NHR software, links to the following documentation will be found in the Start / All Programs / NH Research program group.

The following is an example based on installation of an NHR DC Load.

- "NHR IVI DC Load Documentation" – This will bring up an index to the various manuals which apply to the DC Load. It includes links to:
  - About NH Research (NH PN 08-0331)
  - Getting Support (NH PN 08-0332)
  - Software License Agreement (NH PN 08-0330)
  - NHR Networked Instrument Setup Guide (NH PN 08-0402)
  - Getting Started with NHR IVI Drivers (NH PN 09-0303)
  - LXI Load SCPI Commands Programmer's Reference (NH PN 09-0304)
  - NHR Model 4700 DC Load User's Manual (NH PN 09-0281)
  - NHR Model 4700 DC LXI DC Load User's Manual (NH PN 09-0299)
  - NHR Model S300 Module H/W Reference Manual (NH PN 09-0240)
  - NHR Model 4200 DC Load User's Manual (NH PN 09-0293)
- "Getting Started with NHR IVI Drivers" – This document describes how to use the included IVI drivers to interact with the load from a programming language such as LabVIEW, C#, VB, etc.
- "NHR IVI DC Load Programmer's Reference" – This is the online help with the reference for the application programming interface.