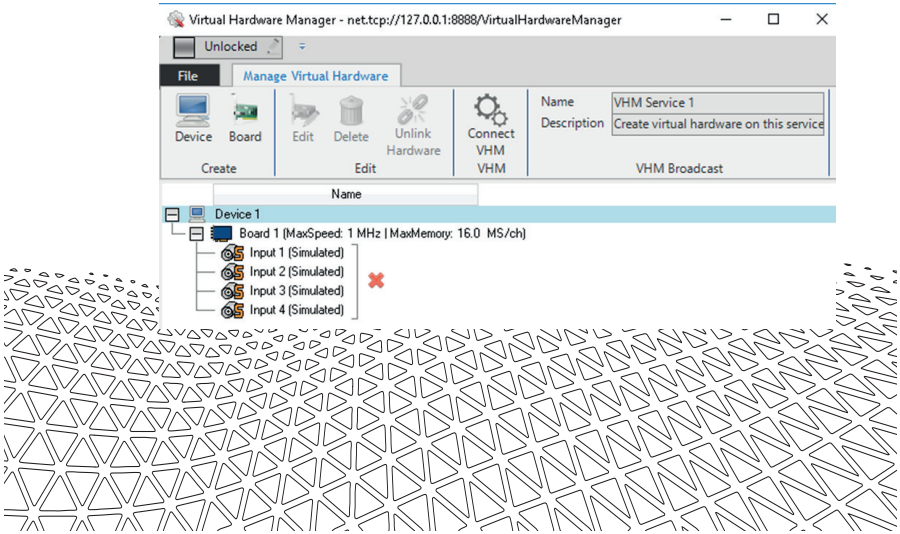
VHM

Virtual Hardware Manager



Elsys

User Manual

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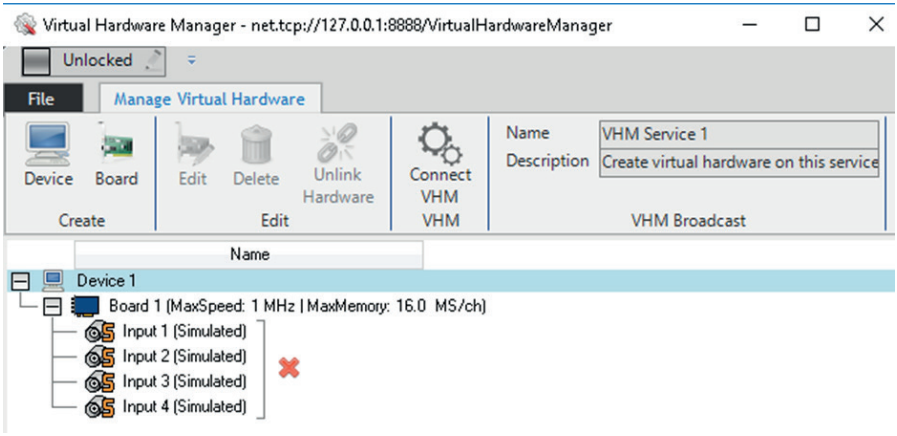
Content

1. Introduction

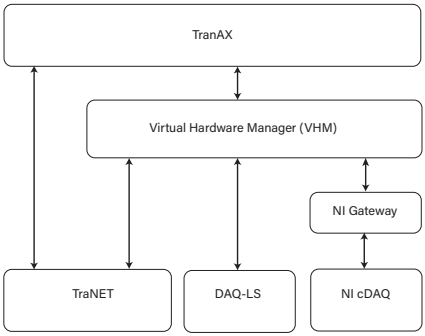
1.1 Preamble

The Virtual Hardware Manager (VHM) is a background service that can be used to create virtual measuring devices. The virtual device can be an image of any Elsys TraNET or TPCE DAQ card. The VHM is also constantly being expanded to make further devices accessible for TranAX. The DAQ-LS data loggers from Elsys and a range of NI cDAQ devices are currently supported.



1.2 Architecture

The VHM is installed as a service on a computer. This can be either the TraNET EPC or PPC, where the measurement cards are installed, the computer running TranAX, or a completely separate PC.
The VHM Client Tool is used to configure the VHM. During configuration, new measuring devices that are to be available in TranAX are created first. If no real measuring device is currently available for connection, the VHM simulates the corresponding measurement curves. If hardware is available, it can be connected, and the virtual hardware must be assigned to the real hardware.



While TraNET devices can be integrated into TranAX either directly or via the VHM, devices such as DAQ-LS or NI cDAQ only work via the VHM.

Advantages of the VHM:

- Hardware settings can also be prepared without hardware
- Hardware settings can be made regardless of whether 4 or 8 channel cards are installed in the device.
- NI cDAQ Integration
- DAQ-LS Integration

1.3 System requirement

For using Virtual Hardware Manager Software and its benefits and features, the following software versions are minimum required:

Software / Hardware	**Requirement**
TranAX	4.1.0.1795 or newer (4.2.x.x for NI cDAQ Integration)
Hardware	Locally installed TPCX, TPCE or TPCE-LE modules TraNET EPC, PPC or FE device NI cDAQ: ask Elsys for the actual supported measurement devices.

2. Installation

Please contact your local distributor or call Elsys directly to get the latest Version of the Virtual Hardware Manager installation setup.

Double-click the executable file and follow the installation dialog. In general, you do not need to change any settings during the installation.

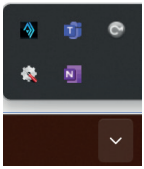
2.1 What will be installed?

The VHM setup installs two parts of the application:

- VHM Server, will be started as a Windows service
- VHM Client, this will be needed to configure the VHM server settings.
- TranAX NI Gateway service (optional, will be downloaded during the installation, Internet connection is necessary)

Please note, the VHM **Server** can be accessed from any VHM **Client** in the same network range.

After installation, the VHM Client can be opened via the tray icon.



Default installation path

VHM Server:
C:\Program Files\Elsys\VHM_1.0

VHM Client:
C:\Program Files\Elsys\VHM_1.0

Settings:
C:\ProgramData\Elsys\VHM_1.0

2.2 Configuration files

These files are used for the configuration of the VHM Server:

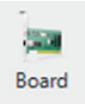
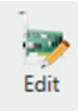
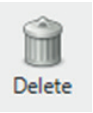
VirtualHardwareSettings.xml:
Name, description and password settings of the VHM Server

LastConfig.vhm:
VHM settings can be saved and loaded manually to the VHM Server. Different configuration can be prepared and used depending on its application.

3. Components

3.1 Menu and Ribbon Bar

Quick access to the main elements of the Virtual Hardware Manager Client.

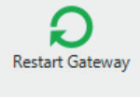
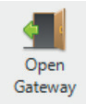
	Locks the Virtual Hardware manager server with the specified password. Prevents the unwanted modification of settings and configuration.
	Creates a new virtual device to which virtual measurement cards can be assigned. A virtual device can be compared with a physical TraNET device.
	Adds a new virtual board to a virtual device. Later, existing hardware can be assigned to the virtual measuring cards.
	Edit the virtual board configuration. In case a physical device is disconnected or offline, the virtual configuration will be still visible in TranAX.
	Remove the selected virtual board or a virtual device form the actual configuration.
	Remove the connection between the virtual board and the physical device. This can be undone be simple Drag & Drop the module back to this device.
	Select the Virtual Hardware Manager **Server** for configuration.

Name Description	Text box, enter name and description of the Virtual Hardware Manager Server. This will be shown in the Connect VHM dialog, and in the TPC Finder in TranAX

3.2 National Instrument

The connection to Nation Instruments cDAQ devices is done via “TranAX NI Gateway” service.

The NI Gateway is a further level in the connection architecture which enables the cDAQ devices to be controlled without installing NI software. Further information can be found later in this document.

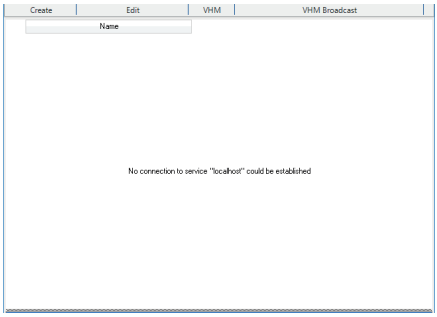
	Restarts the gateway service if no devices are found (this can happen if the hardware has already been reserved by NI software).
	Opens the gateway dialog to get additional status and error messages.

4. Configuration

This section explains all the necessary configuration to get VHM successfully running.

4.1 Start-up

After the first Start up, the VHM Client looks empty like in the picture below. As it is just a client application you first must connect to a VHM Server.



VHM Client

4.2 Connect to a VHM Server

Click the Icon Connect VHM and select the VHM Server which you would like to configure.

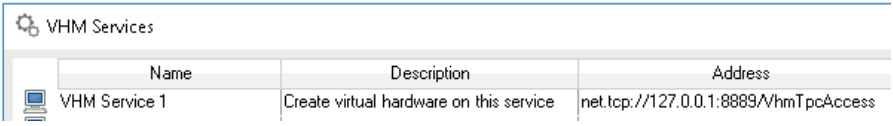
Your local installation is listed on top of the list, in this example, we use this local VHM Server. Any other VHM Servers can be configured exactly the same way.

Click and select this "VHM Service 1" and click the "OK" button. Now you are connected to the local VHM Server.

Change the Name and Description of these VHM Server. Use a name according your company standards or a name which identifies this VHM Server, location and usage as clear as possible.

Name	VHM Test Station 1
Description	Test Station 1 Production Lane A

Server Name Identification



List of VHM Server Services Available in the Network

4.3 Create the Virtual Hardware

There are two ways to generate and configure a virtual device.

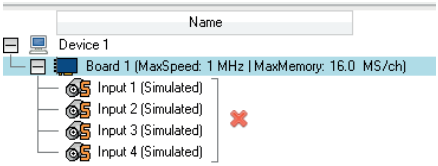
- If your hardware is currently available in the network, it will be listed in the Device list in the lower part of the software. Using Drag&Drop, the desired device can be dragged into the list of virtual devices and the corresponding virtual device with the same properties will be created based on the existing device.

  For NI cDAQ devices, this is the only way to generate a virtual device.

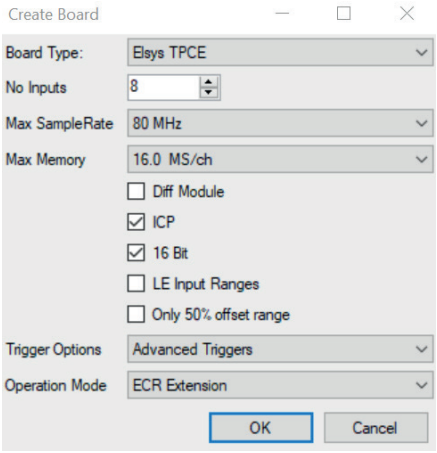
- Clicking the device or board icon in the Ribbon Bar creates a new device or board and opens the configuration dialog.

Example: We use a TraNET FE 404 with 4x 4 channels and map it to a virtual system with 2x 8 channels.

Select the Board and click the button “Edit” in the Ribbon bar or if no board is generated so far, click on the Board icon in the Ribbon bar.

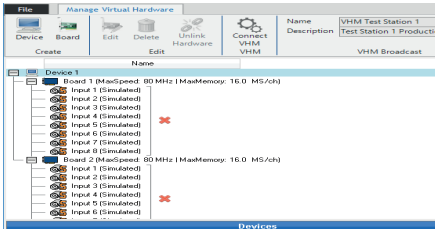


The hardware properties set here are those that will be displayed later in the TranAX Control Panel. We set it to 8 channel board, 80 MS/s, ICP and 16 Bit option enabled:



Virtual Device Configuration

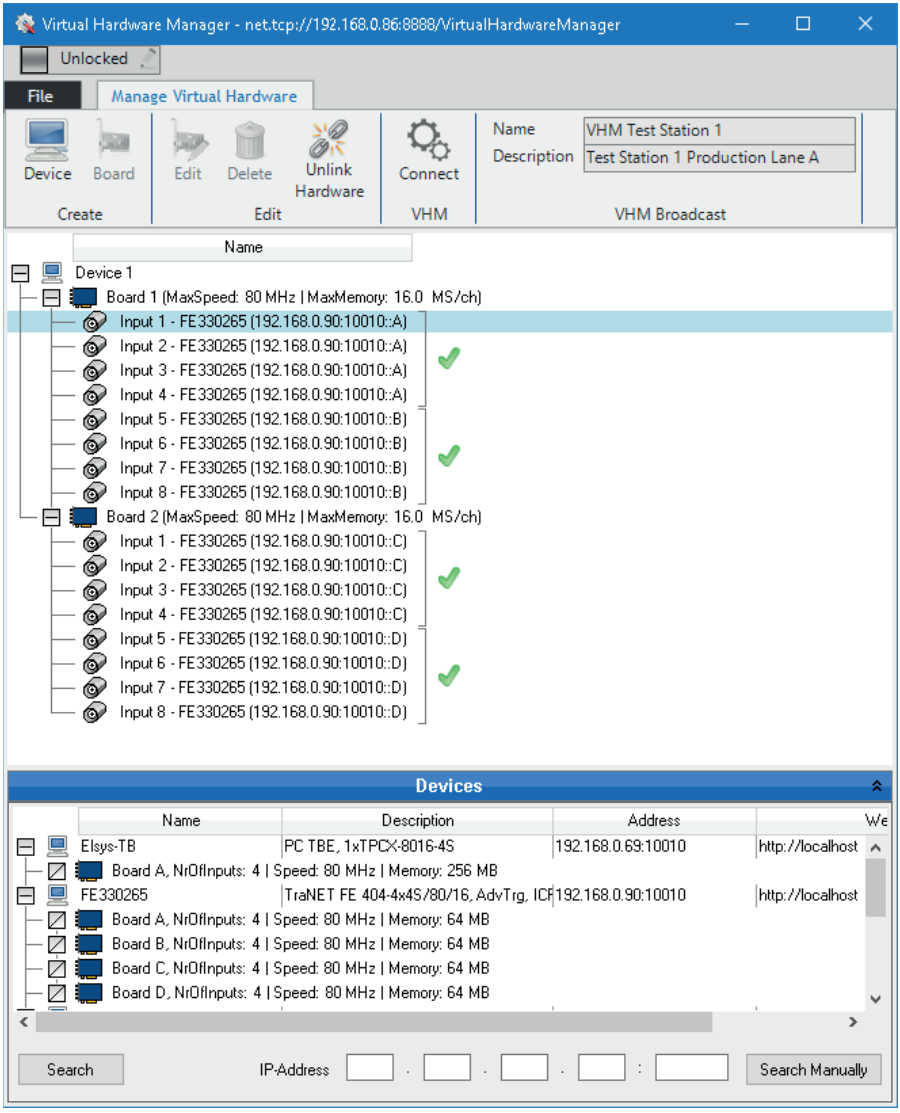
To add the second module, click on the Icon “Board” and add a second module with the same settings as the first one, “Board 1”



Now there are two 8 channel modules in the list. Please note the “S” on the BNC icon. As written in the description of the channel, this is a simulated channel. To measure with this VHM configuration, existing hardware devices has to be connected.

To connect the physical device to the virtual one, select the corresponding board in the device list below and drag and drop it to the corresponding virtual board.

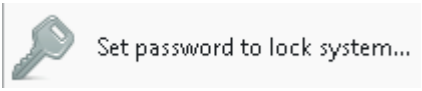
Afterwards, channel from modules A and B are now merged to module A, modules C and D are merged to modules B in the virtual system.



Virtual Device Connected to the Hardware

4.3.1 Password Protection

To prevent any changes in your VHM Client, click File -> “Set password to lock system...”

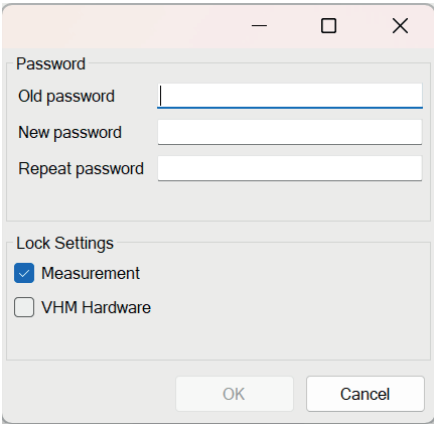


There are two options for password protection:

Measurement: If this is activated, the measurement settings cannot be changed and measurements cannot be started or stopped.

VHM Hardware: If this is activated, the measurement settings can be changed and measurements can be started or stopped. However, it is not possible to change the hardware configuration (number of devices and boards, etc.).

Enter a password, click OK, afterwards, click the slider on top to lock this configuration.



To remove the password, enter your current password in the text field “Old password” and leave both text fields “New password” and “Repeat password” empty.

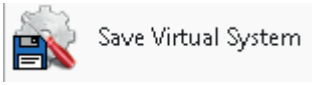
Please note this password is meant to prevent unwanted changes and modifications. This can be removed by editing the file VirtualHardwareSettings.xml in the directory C:\ProgramData\Elsys\VHM_1.0

In case of a forgotten password, clear the section between <Password> and </Password>. To remove the password protection from the Virtual Hardware Manager Server. You will need to restart the Server application or reboot the computer afterwards

4.4 Save Configuration

Close the VHM Client, the settings will be saved automatically to the file lastConfig.vhm in your documents\VHM_4.1 directory.

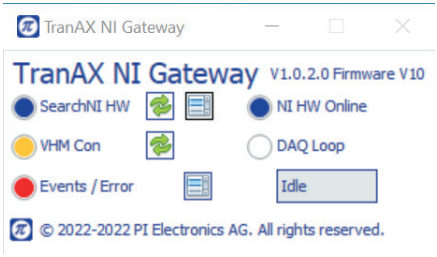
Click File -> “Save Virtual System” to save this configuration to a specific file. This can be used to handle different configurations. Connect to another running VHM Server to load the same settings on a different system.



5. NI cDAQ Integration

Basically, no software from National Instrument is required for the integration of cDAQ. Only for the configuration of the network settings NI MAX has to be installed. NI MAX is supplied with the NI-DAQmx package and can be downloaded from https://www.ni.com/de-ch/support/downloads/drivers/download.ni-daqmx.html.

For additional information how to configure cDAQ with NI MAX, consult the corresponding NI documentation.



TranAX NI Gateway Status Dialog

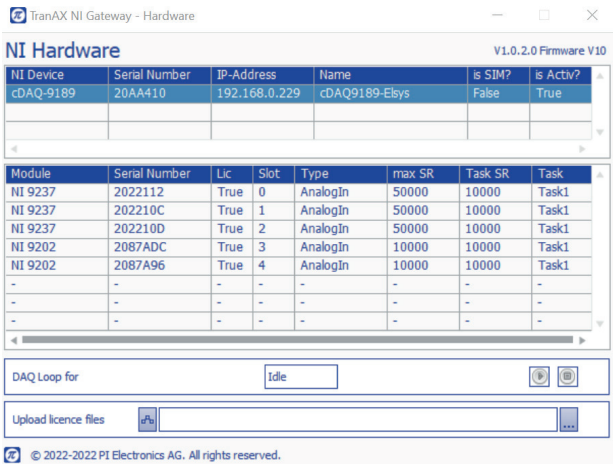
The found hardware is listed in the dialog, which is called by clicking on the symbol at "SearchNI HW".

To be able to use cDAQ hardware, a corresponding license per module is necessary. The license files can be loaded under "Upload license files". The license is bind to the serial number of the cDAQ device.

If the connection is successful and the licenses are loaded, the NI cDAQ hardware appears in the device list, analogous to the Elsys hardware. As described above, the hardware must be dragged and dropped into the list of virtual devices. After that the hardware is usable in TranAX.

> It should be noted that the NI hardware cannot be used in parallel with NI measurement software, as the latter reserves the hardware for itself and blocks access by the TranAX-NI gateway.

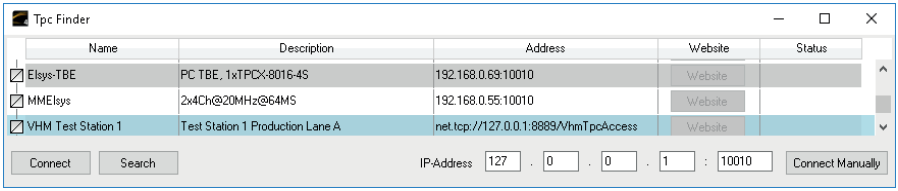
The communication between the cDAQ hardware and the VHM is done by means of the TranAX NI Gateway. The gateway searches for available hardware in the network.



6. Connecting with TranAX

The connection with the VHM is established in the same way as with a TraNET device direct.

Start TranAX, click “Redefine Device Connection...”, in the list of available devices in TPC Finder, the VHM Server will be listed as a new device. Please note that the TraNET device used in the VHM configuration will be listed too.

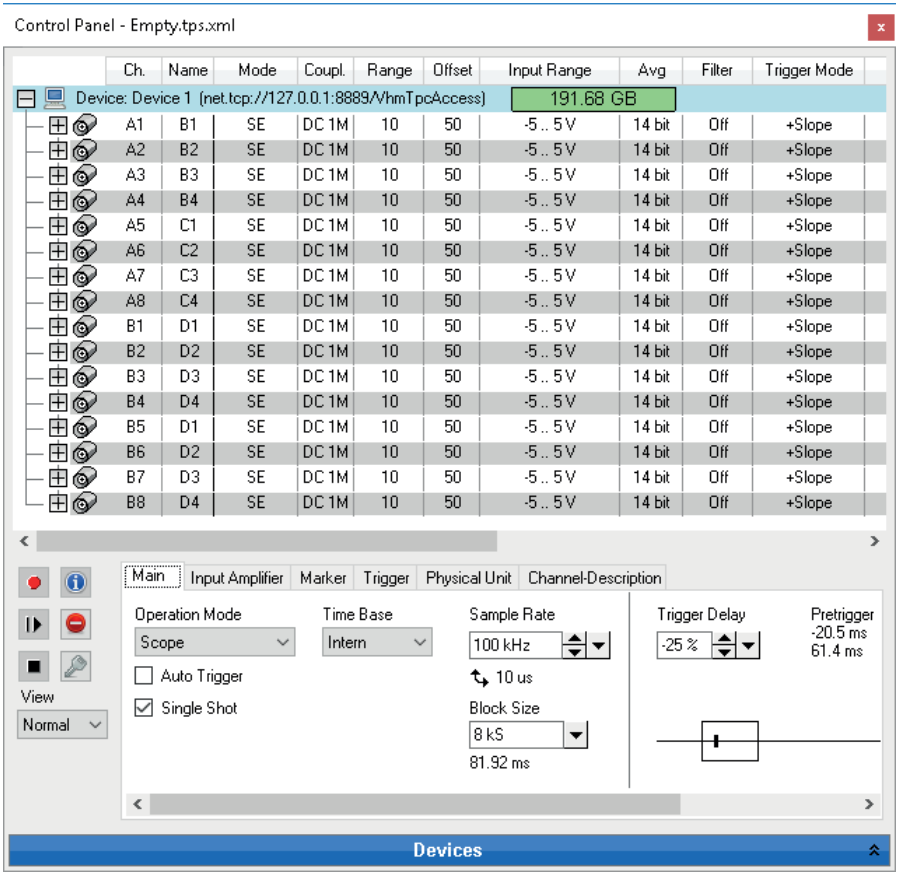


Connected to the “VHM Test Station 1”.

If the password protection for the measurement has been activated, it must be unlocked in the Control Panel in order to change the measurement settings or to start or stop a measurement.

Please click the locked icon, enter the password as set in the VHM client before.

	Configuration locked, read only operation
	Configuration enabled



6.1 Firewall and Port Settings

TranAX communicates over TCP/IP with the TPCServer. This is running on Windows based like EPC/PPC, as also on external devices like TraNET FE.

- Device Finder of TranAX uses Port 10020 UDP for searching for devices
- TranAX uses Port 10010 TCP for communication and data Transfer with devices
- 10025 UDP VHM search
- 8889 TCP communication

Make sure that these ports are activated for TranAX software in **both directions**. Windows standard firewall will be configured automatically.