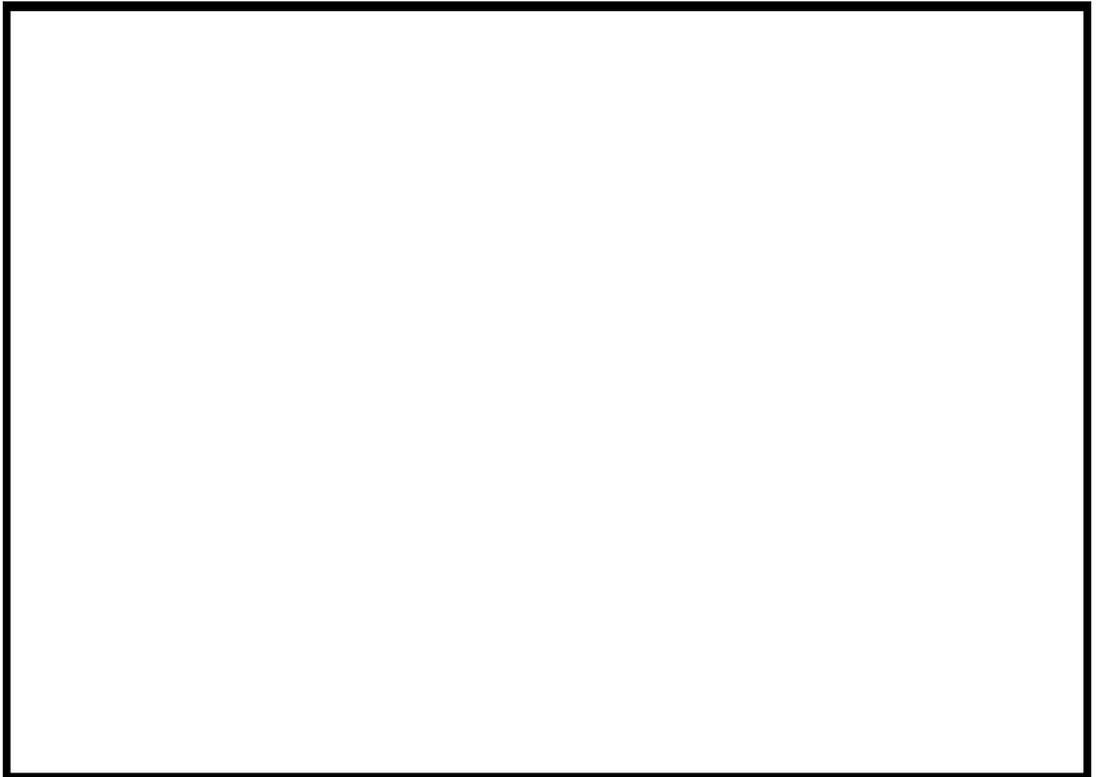

User's Handbook

Homer Hot Measurement and Tuning System

S-TEAM Lab



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Contents

| | |
|---|-----------|
| Introduction | 1 |
| Welcome to <i>HomCon</i> ! | 1 |
| What Is <i>HomCon</i> ?..... | 1 |
| <i>HomCon</i> Composition | 1 |
| <i>HomCon</i> Configuration..... | 2 |
| Output Range (common to all channels)..... | 2 |
| Output Quantity (individual) | 2 |
| Min Value (individual) | 2 |
| Max Value (individual)..... | 2 |
| Ovrange Handling (common to all channels) | 2 |
| No Data Handling (common to all channels)..... | 3 |
| Default Configuration..... | 3 |
| Configuring Methods..... | 3 |
| Example of HomCon.ini configuration file | 3 |
| | |
| <i>HomCon</i> Installation | 5 |
| Note on Power-Up Sequence | 5 |
| USER1 LED | 6 |
| | |
| Establishing Connection with <i>HomCon</i> | 9 |
| Establishing Connection for the First Time | 9 |
| <i>HomCon</i> Network Settings..... | 9 |
| Installing LabVIEW Run-Time Engine Add-On..... | 11 |
| Establishing Connection Later..... | 11 |
| | |
| Configuring <i>HomCon</i> | 13 |
| | |
| Index | 17 |

Introduction

Welcome to *HomCon*!

This Help/Handbook is the first quick introduction to S-TEAM's *HomCon* Homer Data Converter. The document briefly describes:

- *HomCon* hardware (Controller), based on National Instrument's CompactRIO computer mainframe
- *HomCon* software (Server), a program running in Controller which
 - Determines how *HomCon* behaves
 - Can also be used for *HomCon* Controller configuring

Note that for communication with *HomCon*, Homer Autotuner must be equipped with *LabVIEW* option.

What Is *HomCon*?

HomCon is a device that:

- Intercepts data transmitted by Homer via RS232 serial interface (while Homer is at the same time independently controlled e.g. by a *HomSofit* Homer Windows Visualization and Control Software)
- Converts selected data to analog output voltages.

By means of the *HomCon* software, the user can decide, among others, which quantities are to be converted and what their scaling should be. *HomCon* Server runs as a *web server* in Controller, hence it appears as an interactive web page on a web browser. To display the page, some [preliminary actions](#) are to be performed (but only once).

HomCon Composition

HomCon hardware consists of:

- National Instrument CompactRIO computer mainframe NI cRIO9075
- National Instrument 4-channel $\pm 10V$ Analog Output Module NI 9263
 - Accessory: NI 9932 Backshell with 10-position connector block
- S-TEAM RS232 T-Box
- Set of two standard RS232 DB9 null-modem cables (not part of delivery)
- 24 V/1 A DC power supply (not part of delivery)
- Ethernet cable (optional, not part of delivery)

HomCon CompactRIO computer mainframe with installed Analog Output Module is shown in [Figure 1](#).

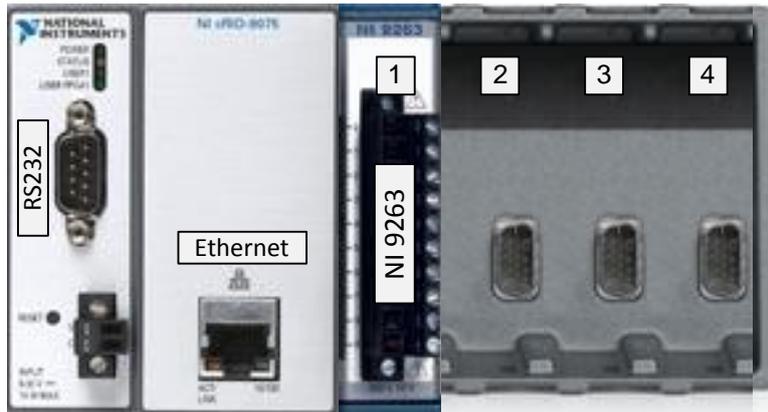


Figure 1. CompactRIO computer mainframe with NI 9263 Analog Output Module installed in Position 1.

HomCon Configuration

HomCon provides up to four analog outputs (AO 0 to AO 3), which can be configured as follows:

Output Range (common to all channels)

- 0 to +5 V
- 0 to +10 V
- -5 V to +5 V
- -10 V to +10 V

Output Quantity (individual)

- Frequency (MHz)
- Incident Power (W)
- Reflected Power (W)
- Absorbed Power (W)
- Reflection Coefficient Magnitude
- Homer Internal Temperature (Celsius)
- Homer Internal Temperature (Fahrenheit)

Min Value (individual)

Value of output quantity yielding minimum analog output (e.g. 0 V for Output Range 0 to +10 V). Can be freely chosen from within a permitted interval.

Max Value (individual)

Value of output quantity yielding maximum analog output (e.g. 10 V for Output Range 0 to +10 V). Can be freely chosen from within a permitted interval. Must be higher than Min Value, otherwise the AO voltage will always be zero.

Overrange Handling (common to all channels)

Controls what the AO voltages should be if the Output Quantity exceeds Max Value.

- Clip to Max. AO is kept at maximum Output Range value (e.g. at 10 V for Output Range 0 to +10 V).

- Clip to Value. AO is kept at a fixed value determined by software which is higher than Output Range (e.g. at 10.1 V for 10 V Output Ranges or 5.5 V for 5 V Output Ranges). The increased value can be used as an indication of overrange.
- Custom Clip. AO is kept at a user-defined value from within a permitted interval.

Note: Underrange is not handled; the AO value for Output Quantity below Min Value is set to the minimum of the given range (i.e. 0, -5 V or -10 V).

No Data Handling (common to all channels)

Controls what the AO voltages should be in case of absent data from Homer (timeout).

- Keep Last Valid. This prevents temporary AO voltage dropouts (indicator pointer twitching) e.g. during the tuning stubs movements.
- Set to Zero. This indicates problems in communication with Homer.

Default Configuration

| | | |
|--------------------|-----------------|------------------|
| Output range | 0 to +10 V | |
| Analog Output 0 | Incident power | 0 to 20000 W |
| Analog Output 1 | Reflected power | 0 to 5000 W |
| Analog Output 2 | Temperature | 0 to 100 C |
| Analog Output 3 | Frequency | 2425 to 2475 MHz |
| Overrange Handling | Clip to Max | |
| No Data Handling | Keep Last Valid | |

Configuring Methods

There are two configuring methods:

- Creating or editing [HomCon.ini configuration file](#) and uploading it, using FTP connection, to HomCon, i.e. to the folder `c:/ni-rt/startup/data`.
- Using [HomCon Server](#).

Example of HomCon.ini configuration file

You can copy the blue-printed text below as the master for editing.

```
[Analog Outputs]

;Output Range: 0=+10V, 1=+5V, 2=+/-10V, 3=+/-5V
Range = 0

;Output Quantity: 0=Freq 1=Pinc 2=Prefl 3=Mag 4=TempC 5=TempF
SelectAO0 = 1
SelectAO1 = 2
SelectAO2 = 5
SelectAO3 = 0

Min Value
MinAO0 = 0
MinAO1 = 0
MinAO2 = 0
MinAO3 = 2425

;Max Value
MaxAO0 = 20000
MaxAO1 = 5000
MaxAO2 = 100
MaxAO3 = 2475
```

```
;Overrange Handling: 0=Clip to Max, 1=Clip to Value, 2=Custom
  OverageType = 0
;Value for OverageType = 1
  OverageValue = 10.25

;No Data Handling: TRUE=Keep Last Valid, FALSE=Set to Zero
  LastValid = TRUE
```

HomCon Installation

1. Unpack the NI cRIO9075 Controller, NI 9263 Analog Output module, and the RS232 T-Box.
2. Fasten the Controller at a chosen position in your plant.
3. Insert the Analog Output Module into Position 1 of the Controller chassis.
4. Connect the wires, coming from your indicators or PLC, to the appropriate screw terminals of the NI 9932 Backshell (the part is accessory to the Analog Output Module).
5. Push the Backshell to the Analog Output Module socket.
6. Plug *HomCon* connector of the T-Box into the counterpart connector in CompactRIO. Secure the T-Box with screws.
7. Interconnect Homer Autotuner and *Homer* connector of the T-Box with a RS232 null-modem cable.
8. If you intend to control Homer by *HomSoft* Homer Windows Visualization and Control Software running in your PC, use another RS232 null-modem cable to interconnect the PC with *HomSoft* connector of the T-Box. Note that *HomSoft* Version 4.0.6.1 or higher should be best installed in the PC.
9. Power on Homer Autotuner.
10. Power on *HomCon* (CompactRIO Controller).
11. Start *HomSoft* in your PC. Using *HomSoft*, start measurement.

After Homer starts measurement, your analog indicators should display the chosen quantities.

Note that Homer can be configured to start measurement automatically after power-up, hence *HomSoft* is in principle not necessary for proper *HomCon* operation.

Detail of the installed RS232 T-Box and cables is shown in [Figure 2](#). The installation global view is shown in [Figure 3](#).

Note on Power-Up Sequence

If your *HomSoft* is Version 4.0.6.1 or higher, the order of powering on the devices may be arbitrary.

You can use *HomCon* also with lower *HomSoft* versions: in that case powering-up sequence should be as stated above (Homer – HomCon – HomSoft). The reason is that the T-Box is powered from DTR and RTS connector lines and older *HomSoft* versions do not treat these signals suitably for *HomCon*.

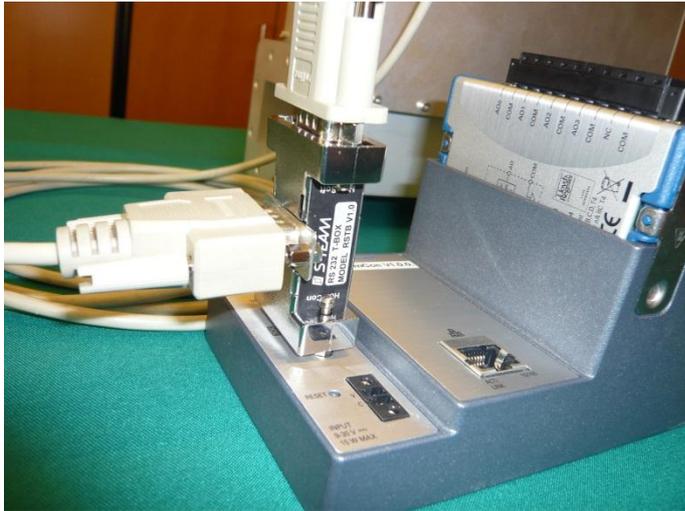


Figure 2. Detail of installed RS232 T-Box and cables.

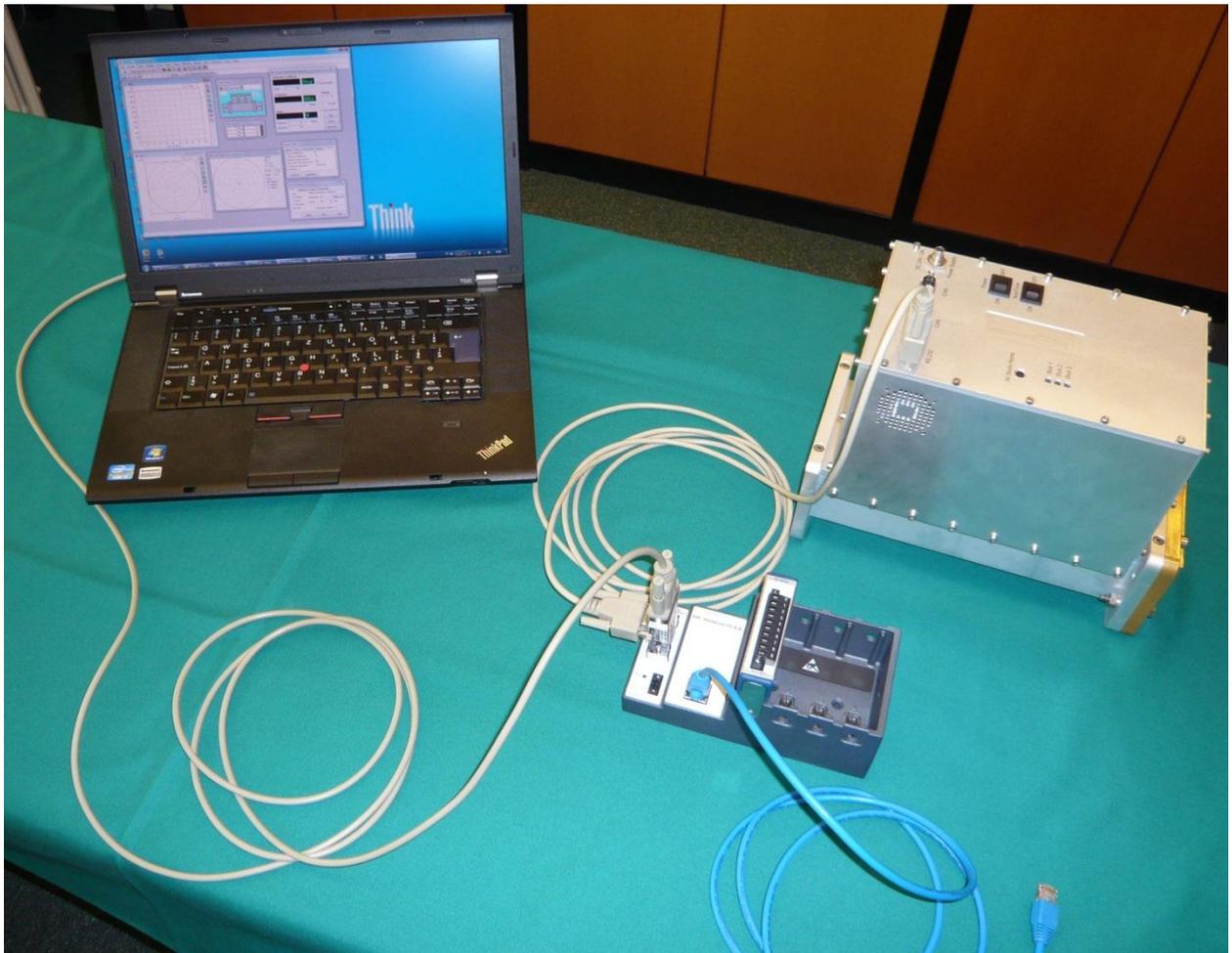


Figure 3. Global view of HomCon installation. See also the Ethernet cable (green, bottom right).

USER1 LED

The USER1 LED on the CompactRIO (copied also in the [HomCon software window](#)) indicates the following states:

No light

CompactRIO is in the process of booting (*HomCon* Server program has not started yet).

Flashing fast (about 5 times/s)

There are two possible reasons.

- *HomCon* Server program is in the process of startup (temporary).
- Homer is not connected, not running, or not equipped with LabVIEW option. In these cases the fast flashing continues until the conditions cease to exist.

Flashing slowly (about 1 time/s)

HomCon Server program is up and running. This is the normal situation.

Establishing Connection with *HomCon*

HomCon Server program runs in CompactRIO controller in the form of a *web server*. This means that the user can see the *HomCon* program window as a web page after typing an appropriate IP address. Once on the screen, the web page then enables [interactively configuring HomCon](#).

For all this, the *HomCon* unit must be connected to the user's local area network (LAN) via common Ethernet cable in the first place.

Establishing Connection for the First Time

To obtain an appropriate IP address and to establish the connection for the first time, two actions are needed:

- Changing *HomCon* Network Settings (task for your network administrator)
- Installing LabVIEW Run-Time Engine add-on into your web browser

HomCon Network Settings

Default *HomCon* Network Settings are:

| | |
|---------|---------------|
| Address | 192.168.1.250 |
| Mask | 255.255.255.0 |
| Gateway | 192.168.1.1 |

If, after typing the default Address (and provided the Run-Time Engine add-on has been installed in the browser), the web page remains empty, you need to change the network settings. This action requires web administrator skills. The following are just brief hints for such a person.

Procedure

- Connect the *HomCon* unit with your local area network by Ethernet cable.
- Go to the NI-cRIO9075-HomCon system settings page, which is at the address <http://192.168.1.250:80>. System Settings window ([Figure 4](#)) pops up.
- Click Network Settings button (the second from top in the left-hand column). The window content changes to [Figure 5](#).
- Configure network settings by editing the individual fields, then confirm by Save.

Alternatively, a configuration, ensuring a fixed IP address, can also be made dynamically using DHCP server.

As a result of the above procedures, the required IP address has been obtained.

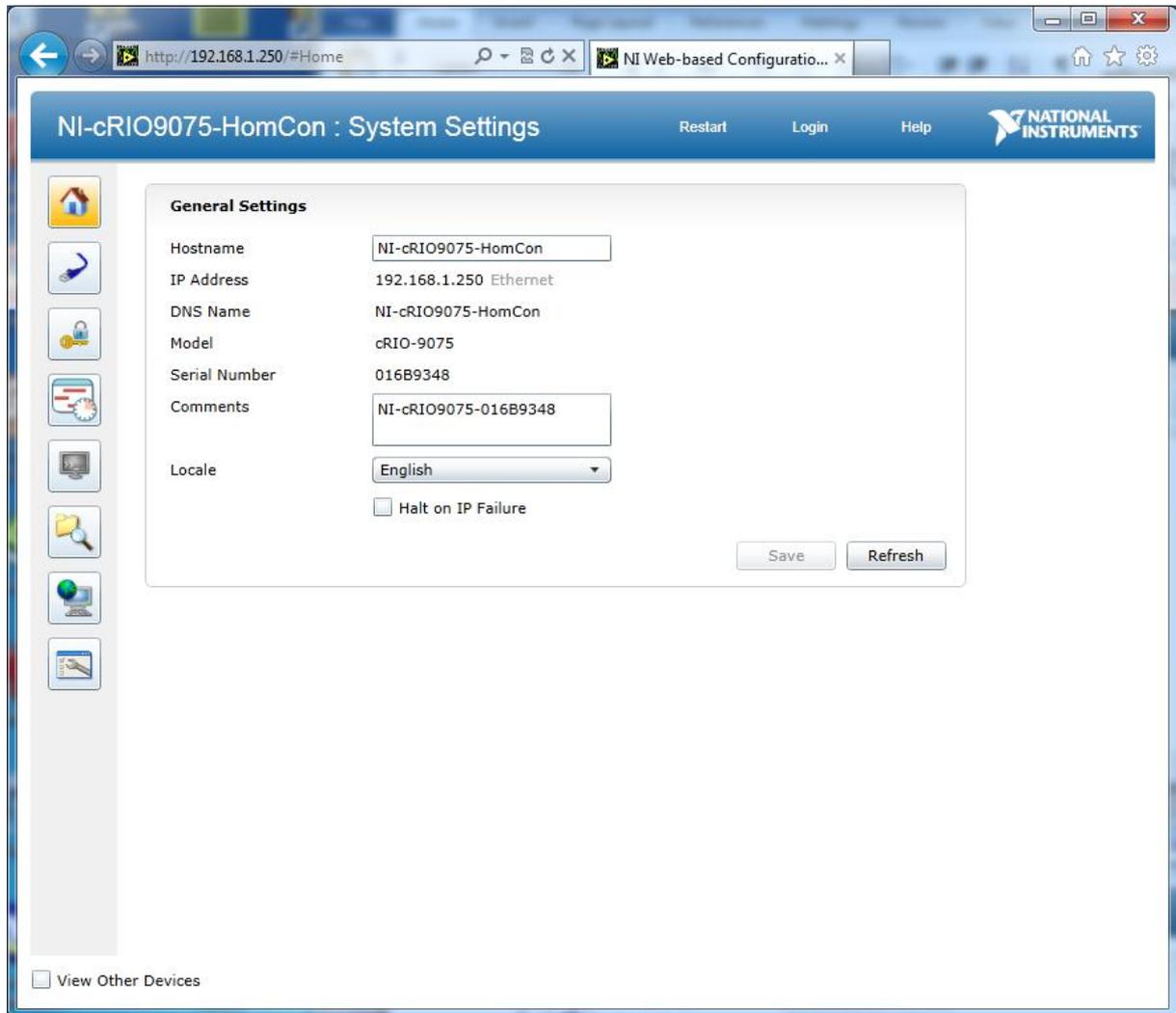


Figure 4. HomCon General Settings page.

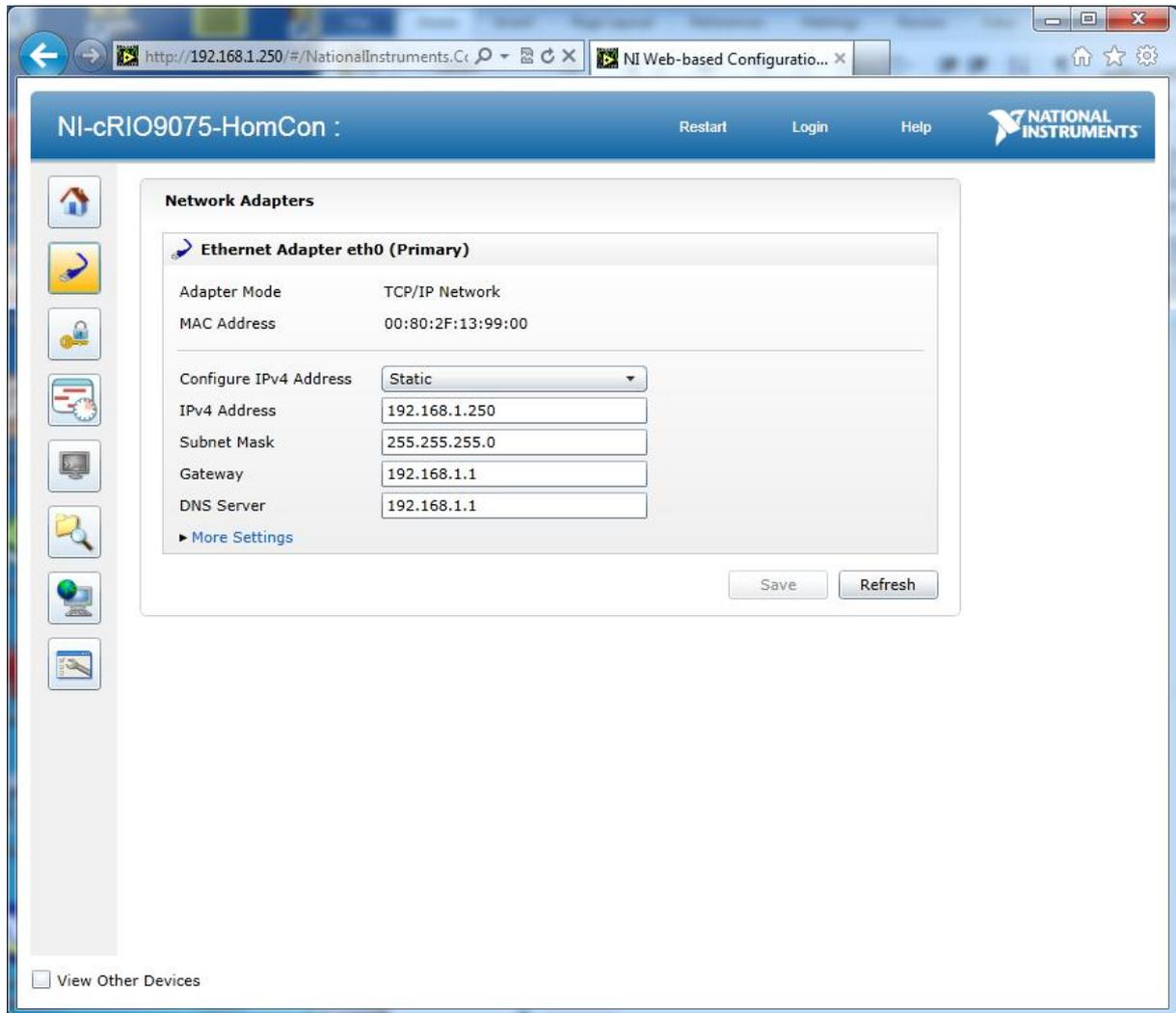


Figure 5. HomCon Network Settings page.

Installing LabVIEW Run-Time Engine Add-On

Using your Internet browser, go to the address

http://xxx.xxx.xxx.xxx:8000/RT_HomCon.html

where xxx.xxx.xxx.xxx stands for the **HomCon** IP address obtained in the previous step. (“:8000” is the port number of the HomCon web page.)

If you have previously installed the LabVIEW Run-Time Engine add-on, **HomCon** program window appears. If the add-on is not installed, an empty **HomCon** web control page will open and, with some browser, the add-on will start downloading and installing automatically (please observe the messages and allow time for the installation).

If the automatic download does not start, you have to install the add-on manually. You can do that by browsing the HomCon Utility CD. The installation suite is located in

.../LabVIEW 2011 32-bit/ RTEmin

folder. Alternatively, it can be downloaded from

<http://joule.ni.com/nidu/cds/view/p/id/2531/lang/en>

Start the installation by running setup.exe and follow the instructions.

Establishing Connection Later

To establish connection anytime later, the user only has to type the IP address in the browser address field.

Configuring *HomCon*

After the connection with *HomCon* has been established, the program window appears on the page, as shown in [Figure 6](#). The procedure is then fairly straightforward.

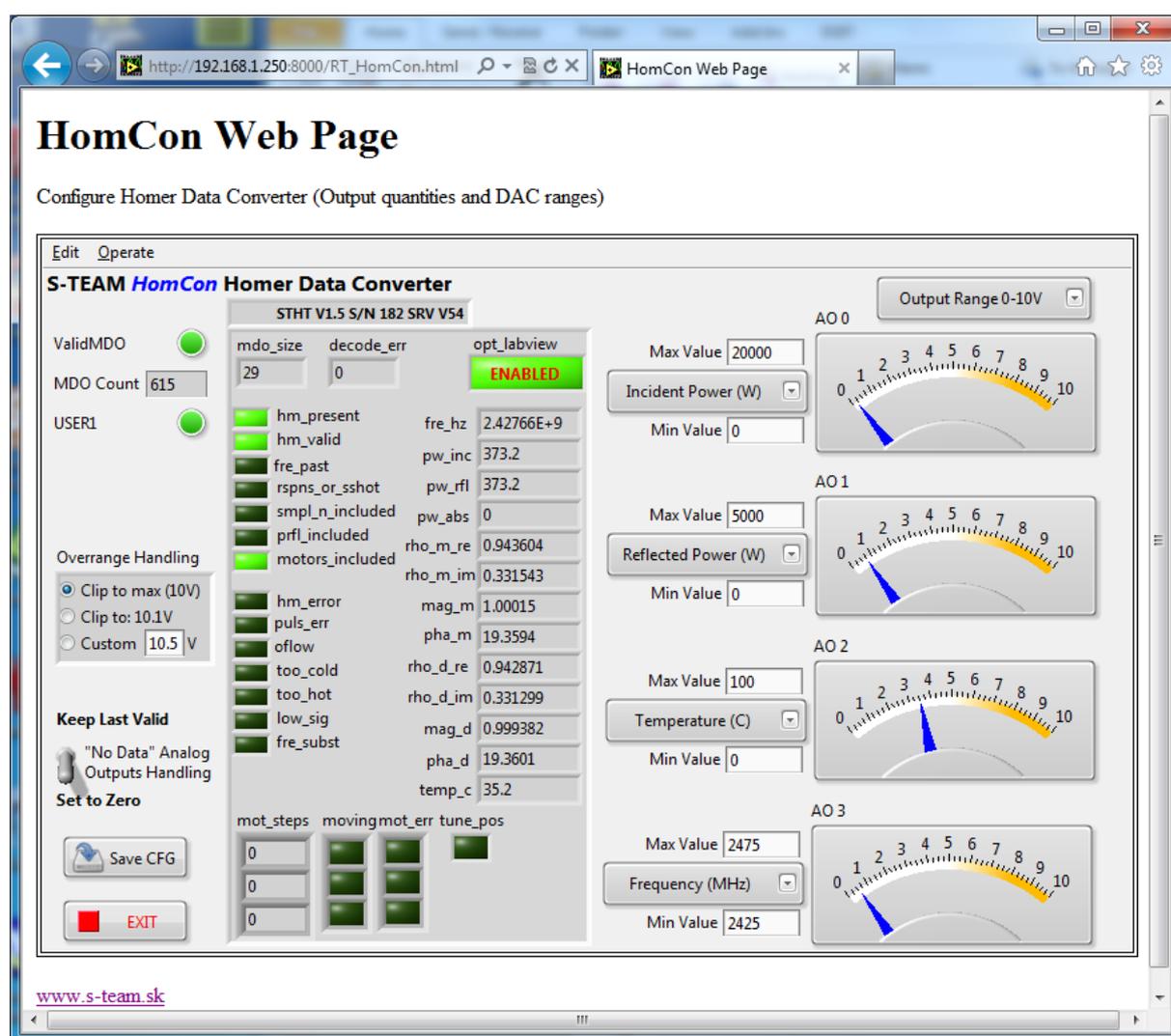


Figure 6. *HomCon* program window.

- Click **Output Range** drop-down button to select the range of the analog outputs (common to all channels).
- For each of the four channels (AO 0 to AO 3):
 - Click the drop-down button on the left of the indicators to select Output Quantity.
 - Edit **Min Value** and **Max Value** fields to change the corresponding limits.

- Click the appropriate radio button in the **Overrange Handling** group to select the desired Overrange Handling method. For **Custom**, edit the corresponding field (the value may be limited).
- Toggle the “**No Data**” **Analog Outputs Handling** switch to select No Data Handling method.

When you are satisfied with the settings, confirm them by clicking **Save CFG** button.

The remaining indicators serve for information and development purposes only. The large panel in the middle essentially decodes and displays the data received from Homer (MDO stands for Measurement Data Object – a lump of information Homer sends).

[USER1](#) lamp copies the behavior of the equally named CompactRIO LED.

The indicators on the right reflect the analog outputs. *Note*: Do not be misled by seeing that the indicators are updated at slow rate (twice a second). The actual analog outputs update much faster: as fast as the data from Homer are coming.

Index

C

Configuring HomCon 13

Configuring Methods 3

D

Default Configuration 3

E

Establishing Connection for the First Time 9

Establishing Connection Later 11

Establishing Connection with HomCon 9

Example of HomCon.ini configuration file 3

H

HomCon Composition 1

HomCon Configuration 2

HomCon Installation 5

HomCon Network Settings 9

I

Installing LabVIEW Run-Time Engine Add-On 11

Introduction 1

U

USER1 LED 6

W

What Is HomCon? 1