FutureNow FNIP-6x2AD
Installation Manual
rev 20.02.2015

6 Channel DIN Rail Mountable Smart Dimmer with Local Inputs

OVERVIEW

The FN485-6x2AD is used for switching and dimming up to six lighting loads that do not exceed the specifications. The outputs can be controlled via local inputs, TCP/IP or the module's built-in web interface.

Figure 1. The FNIP-6x2AD dimmer module

The devices attached to the FNIP-6X2AD can be operated and monitored from standard network capable devices such as computers, smart phones or tablets either locally or via the Internet.

The FNIP-6X2AD supports both trailing and leading edge dimming modes. It handles most any lighting load you're likely to need. A list of supported load types can be found in the **Output** section.

In addition to the outputs, the FNIP-6x2AD provides local inputs for each channel.

Using local inputs improves the overall reliability of the system. If network or programming errors should occur, the lights still remain controllable via the local inputs.

Further, the lights can be controlled via the local inputs once the FNIP-6x2AD modules are installed. The home owner can decide later on what controller or system to use.

The local inputs are usually connected to momentary wall switches and function similarly to traditional light switches.

The inputs can also be used as independent digital inputs for remote monitoring. The status of various sensors, such as water leakage sensor or door contacts, or even an output of a security system (armed/disarmed/in alarm) can be determined remotely.

Main features

Robust Operation

- All-in-one dimmer
- 6 outputs for switching and dimming 6 lighting circuits
- 6 galvanically isolated multi-purpose inputs for direct control or connecting digital sensors
- Temperature monitoring
- Overheat protection (both from software and hardware)
- Overcurrent protection

Ultimate Flexibility

- Switching any loads
- Both trailing and leading edge dimming (dimming of resistive, capacitive and inductive loads)
- Automatic load type detection

- Switching (On/Off) any loads
- Possibility to combine two outputs for more wattage
- Standard DIN rail mount
- Voltage, frequency, power consumption metering
- 100 dim levels (800 level hardware resolution)
- Preset dim level – outputs will go to that level when turned on
- Dim level memory (if preset dim level is set to zero) - Modules recall their last dim level when next turned on
- Adjustable minimum and maximum dim levels
- Adjustable ramp rates
- Monostable mode with adjustable timing

Enhanced Connectivity

- New TCP/IP interface offers remote control and advanced management
- Built-in web server for configuration, control and monitoring
- Remote control and monitoring from network enabled smartphones, tablets
- Multiple users with different user rights
- TCP communication with simple ASCII commands
- Automatic event reports about status changes of inputs and outputs
- Firmware upgrade via LAN

Industry-Wide Interoperability

- Full Integration with home controllers from most major vendors (Control4, AMX etc.)
- Interoperable with any momentary contact switches available on the market

INSTALLATION

WARNING! The module is connected to line voltage! The installation must be performed by a qualified electrician in accordance with the local electrical codes!

Turn off power (main circuit breaker) before installation!

Terminal connections

Each module has a wiring diagram on the front which can help the installer when connecting the modules at installation sites. See Figure 2.

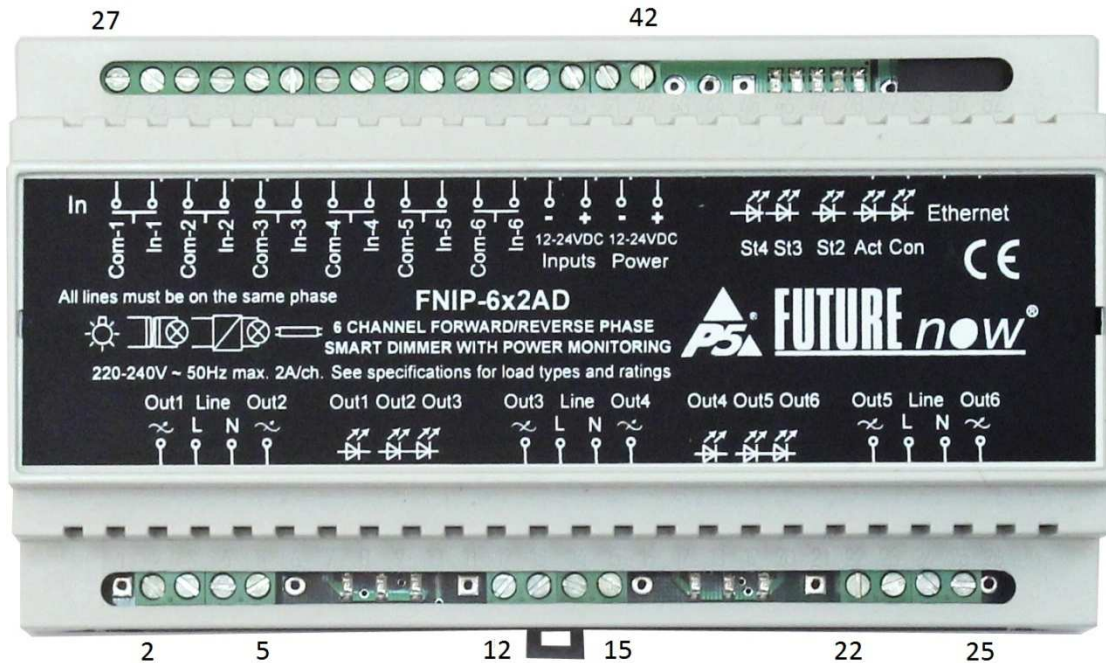The terminal connections of the FNIP-6x2AD are listed in Table 1.

Figure 2. FNIP-6x2AD front view with terminal connectors

No.	Description	No.	Description
1.	-	27.	Inputs Common
2.	Output 1 Live	28.	Input 1
3.	230V Line Input Live for ch1 and ch2	29.	Inputs Common
4.	Neutral	30.	Input 2
5.	Output 2 Live	31.	Inputs Common
6.	-	32.	Input 3
7.	-	33.	Inputs Common
8.	-	34.	Input 4
9.	-	35.	Inputs Common
10.	-	36.	Input 5
11.	-	37.	Inputs Common

12.	Output 3 Live	38.	Input 6
13.	230V Line input Live for ch3 and ch4	39.	Power for the Inputs GND
14.	Neutral	40.	Power for the Inputs +12V.. +24V DC
15.	Output 4 Live	41.	Power for the Main Circuitry GND
16.	-	42.	Power for the Main Circuitry +12 .. +24V DC
17.	-	43.	
18.	-	44.	
19.	-	45.	
20.	-	46.	
21.	-	47.	
22.	Output 5 Live	48.	
23.	230V Line input Live for ch5 and ch6	49.	
24.	Neutral	50.	
25.	Output 6 Live	51.	
26.	-	52.	

Table 1: FNIP-6x2AD terminal connectors

Wiring

A typical wiring diagram is shown in figure 3.
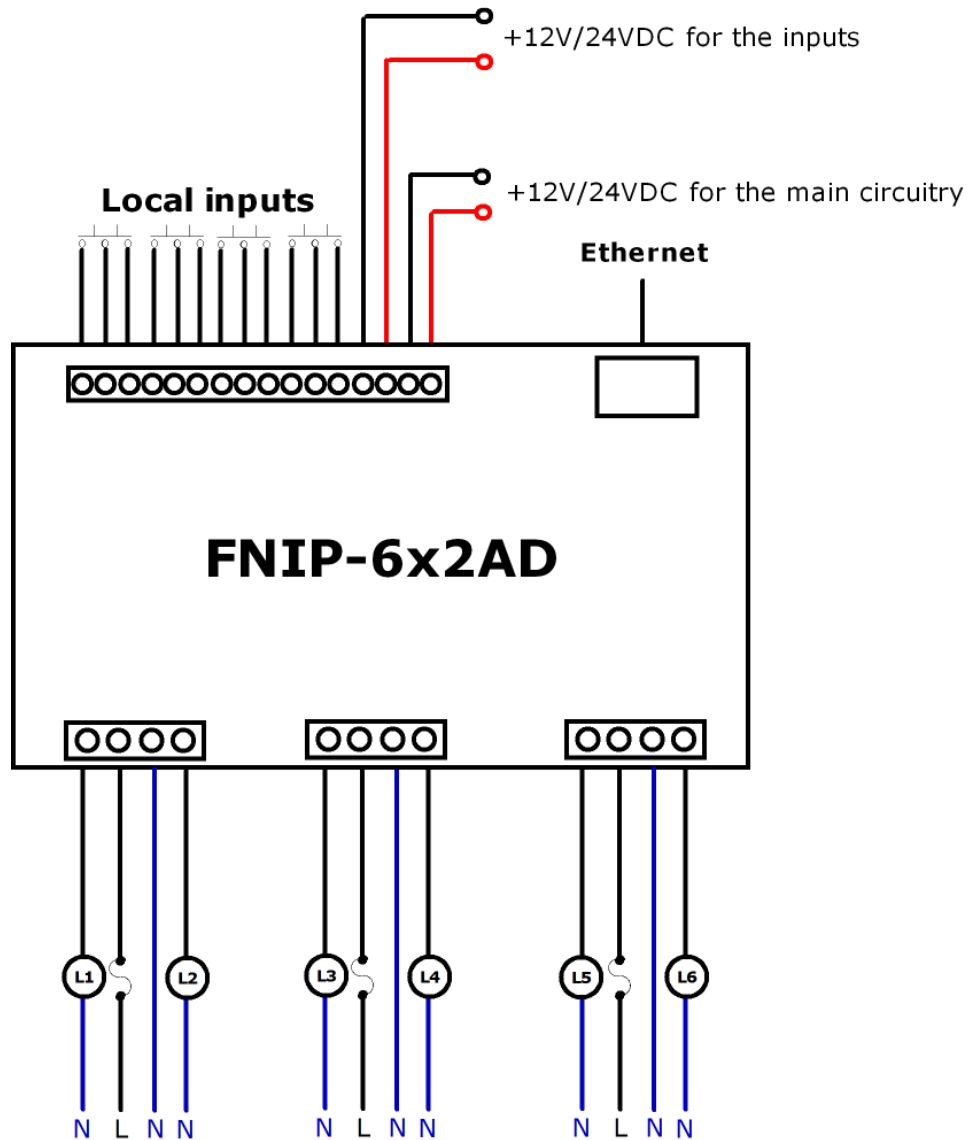
Figure 3. Wiring diagram
Please note that the neutrals are not connected to the module and that all line inputs must be on the same phase and on the same circuit breaker!

Recommended wire types

- Ethernet cable: Twisted pair, CAT5 or better.
- Outputs: According to the loads attached to the outputs (current and voltage).
- Inputs: A pair of low or high voltage cables. The inputs use low voltage signals.

All wires used and the way they are run must be in accordance with the local electrical codes.

Keep line voltage wiring physically separated from Ethernet and signal wiring.

Power requirements

The module requires 12VDC/24VDC through terminals 41 and 42.

If local inputs are to be used 12VDC/24VDC through terminals 39-40 will also be required.

Please pay attention to the correct polarity.

The galvanic isolation of the inputs is only effective when a separate power supply is used for powering the inputs. The FNIP-6x2AD has separate power input terminals (39 and 40) for this purpose. If you choose not to use the extra protection the isolated inputs offer, you can use the same power to supply both the main circuitry and the inputs. In that case, simply connect terminal 39 to terminal 41 and terminal 40 to terminal 42.

Apply 230V 50 Hz AC live on terminals 3, 13 and 23 and neutral on terminal 4 and/or 14 and/or 24. You don't need to connect three neutrals because they are connected internally in the module. It's enough to connect one neutral as shown in Figure 4.

Please make sure that all the three line inputs (terminal 3, 13 and 23) are on the same phase and on the same circuit breaker! They are connected internally within the module.

Live on terminal 3 powers output 1 and output 2, live on terminal 13 powers output 3 and output 4, while live on terminal 23 powers output 5 and output 6.

The loads should be connected between the module's outputs (terminal 2, 5, 12, 15, 22, 25) and a neutral point somewhere outside the module. Neutral legs of the loads don't have to be connected to the module. The same neutral must be used for all the loads.

Ethernet Connection

Connect the module to the LAN via the RJ45 Ethernet socket.

Outputs

The FNIP-6X2AD supports both trailing and leading edge dimming modes. It handles most any lighting load be it resistive, inductive or capacitive, such as incandescent, line voltage and low voltage halogens with both electronic and iron core transformers, phase-cut dimmable fluorescents and compact fluorescents, phase-cut dimmable line voltage LEDs.

Do not attach any other types of loads to the outputs if dimming of the outputs is enabled! Using an improper load can damage both the attached device and the FNIP-6x2AD, creating a potential fire hazard!

Apart from dimming, the FN-6x2AD can also be used to switch (on/off only) non-dimmable loads.

To avoid inadvertent dimming of non-dimmable loads, the dimming of the outputs is disabled by default.

If dimming of the outputs is disabled, non-dimmable lights and other types of loads that don't exceed the output ratings can be turned on/off.

Local Inputs

For each output there is a local input to allow for manual operation. If you do not wish to use local inputs, this section may be skipped.

Connect dry contacts (pushbuttons, momentary switches, relay contacts, etc.) or open collector transistor outputs across the appropriate input terminals and the input common terminal. Low voltage for the inputs is supplied by the module itself**.**

WARNING! Avoid supplying voltage on these terminals!

All input ports are galvanically isolated to protect the unit against unwanted effects of ground loops, overvoltage or misconnections.

It should be noted that the galvanic isolation is only effective when an independent power supply is used for powering the inputs. The FNIP6x2AD has separate power input terminals for this purpose. See section "Power Requirements" if you don't want to use two separate power supply units.

To assure an additional level of safe and reliable operation, the inputs are also software protected against the effects of noise spikes that usually occur when heavy inductive loads (motors, fans, etc.) are switched nearby. In most systems lacking this level of protection, these spikes may result in unwanted operation.

Three-way switches can be implemented by simply connecting multiple momentary switches in parallel.

Status LED Indicators

In order to make installation and debugging easier, communication and channel status are displayed via LEDs.

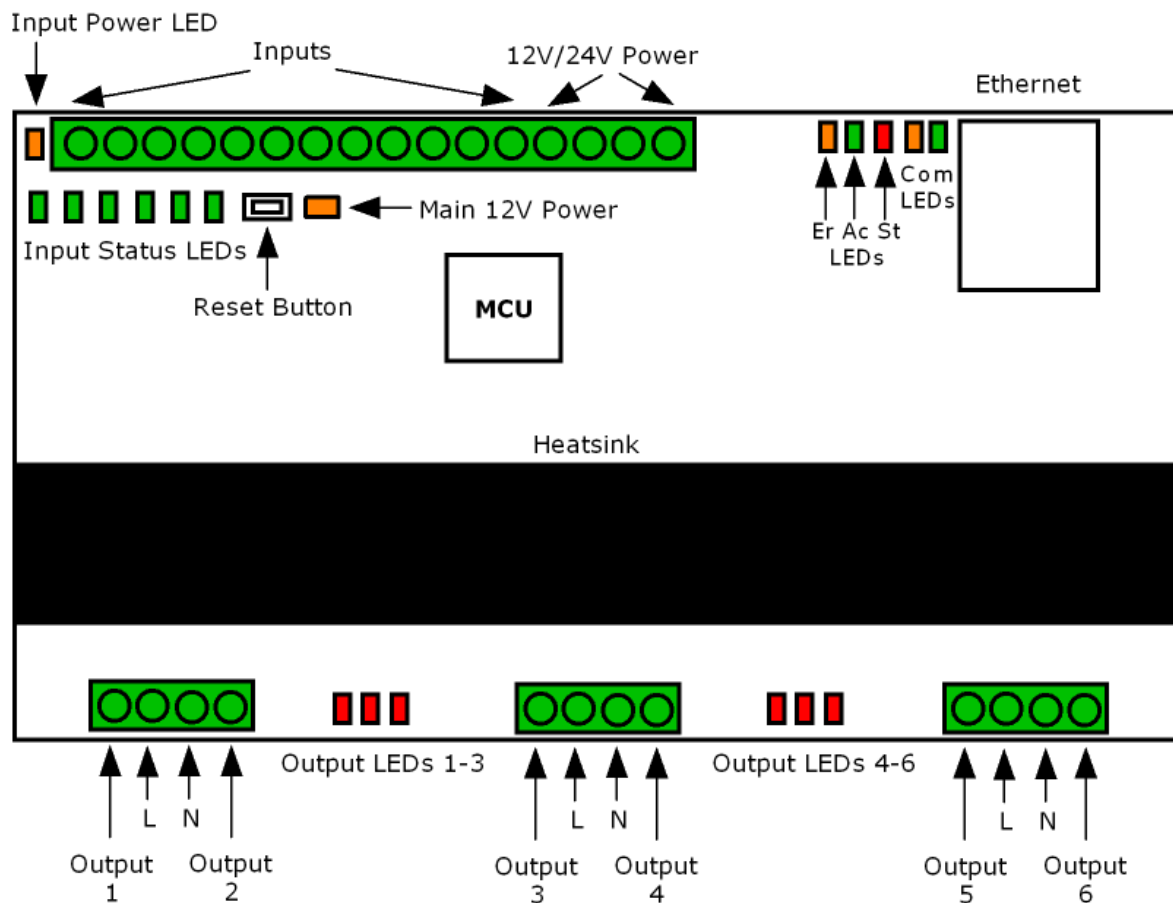Use the board layout drawing in Figure 4. to locate the status LEDs.

Figure 4. The board layout of the FNIP-6x2AD

Input status LEDs
Each input has a dedicated status LED that illuminates solid green when the corresponding input is activated.

Power LED
When on, indicates that the 12V DC power for the main circuitry is present.

Input power LED
When on, indicates that the input power is present.

Communication LEDs

Con LED
The Con LED is on when the module is connected to the Ethernet network.

Act LED
It indicates that communication via Ethernet is in progress.

Status LED

St LED
It is blinking while the boot loader of the module is active. This should only happen during hardware resets and in the second phase of firmware updates.

AC LED
This LED indicates the presence of the 50/60Hz line voltage.

Er LED
The Er LED turns on if the module gets overheated. This LED will not turn off until the module is power cycled or the temperature of the heat sink falls below 40°C.

Output status LEDs
Each output has a dedicated status LED that illuminates solid red when the corresponding output is activated. In case of overcurrent the corresponding LED starts flashing. The error condition resets when the output is turned on again.

CONFIGURATION

Configuration can be done either via the built-in website or via TCP/IP connection. In the latter case the configuration interface the controller provides is used.

Configuration via the web interface

Use the FNIP Network Discovery Utility software to find all FutureNow IP devices on your network.

Connecting to the module's web server

After the scan is over you can click on one of the modules found to open its website in a browser.

You can also access the module's internal web pages from an Internet browser by typing **FNIP6x2AD** (default hostname) or whatever the hostname has been changed to or the IP address in the URL window. See the list of supported browsers in the specifications below.

Each module automatically obtains an IP address from a DHCP server by default.

In the lack of DHCP server the default IP address of 192.168.1.25 will be assigned. The same IP address will be assigned when connecting the module directly to your computer using an Ethernet cross cable (no DHCP server).

Once you are connected to the module's website, you will be asked to identify yourself, as seen in figure 5.
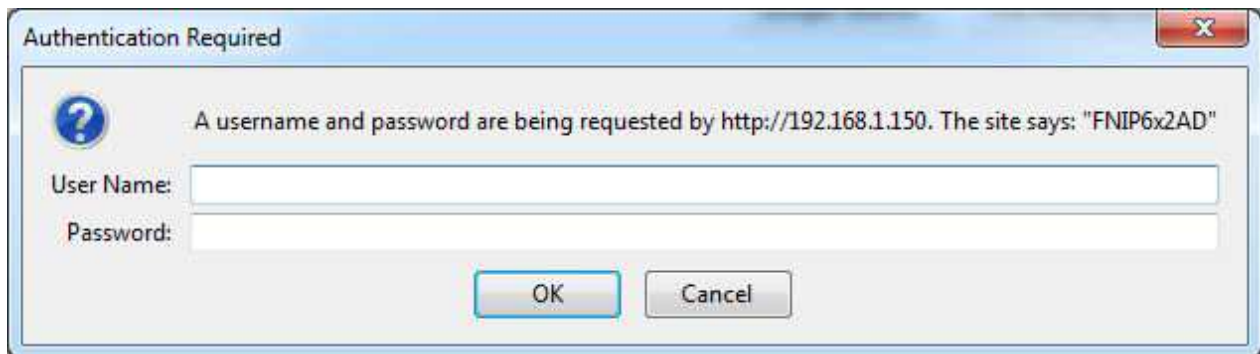
Figure 5. Authentication Window

The default user has administrator rights and can access all settings and functions.

The default user name is:**admin**
The default password is:**futurenow**
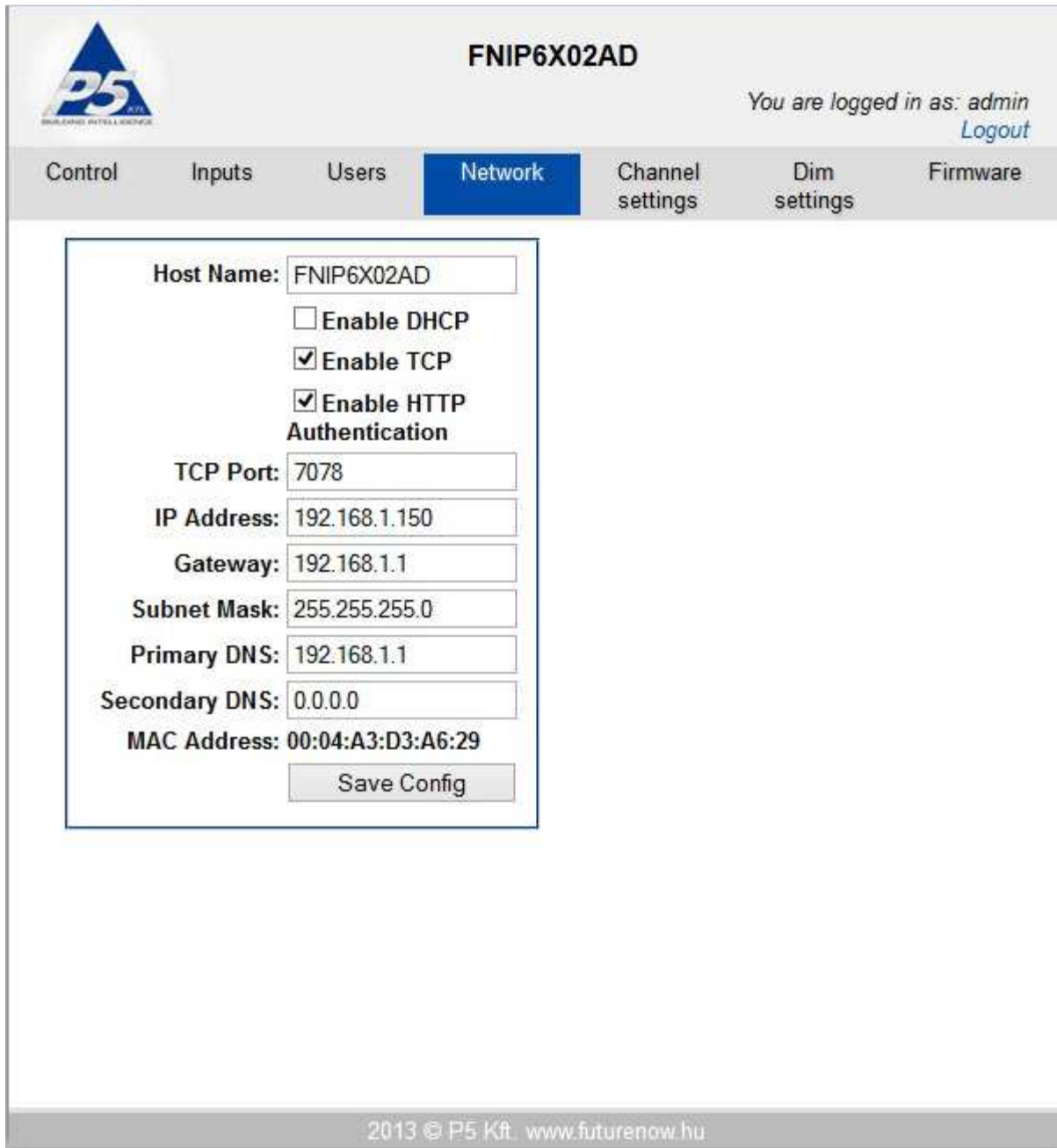
Once logged in, you will automatically be directed to the control page. There is a menu on the top of each web page to navigate between the different control and configuration pages.

Configuring network settings
To make basic network settings click **Network** in the top menu.
You can choose between using DHCP or static IP address and make all necessary network settings on this page as shown in Figure 6.

Figure 6. Network Configuration Page

Adding users and setting up user rights
Three different users can be defined each with three different user rights: **admin**, **actor** and **observer**.

Admins have access to all functionality, including control of the outputs, monitoring the status of the inputs and outputs and changing all the settings.

Actors are allowed to control the outputs and monitor the status of the inputs and the outputs, but are not allowed to change any settings.

Observers are allowed to monitor the status of inputs and outputs but not allowed to control the outputs, nor can they change any settings.

To modify user settings click on **User** in the top menu. The user configuration page is shown in Figure 7.

The name of the currently logged in user is displayed at the top right corner of the page.

Figure 7. User Configuration Page

Channel settings

On the **Channel Settings** page custom labels can be created and modified for each of the six outputs and inputs. The input modes can also be defined here. The input mode determines the logical connection between the input and the output of the same channel. For details on possible input modes and how they work, see "Operation via local inputs" part of this document.

You can also choose the dimming method on the Channel Setting page. As a generally rule, leading edge dimming can be used with resistive and inductive loads, while capacitive loads require trailing edge dimming. If you are not sure which mode to set, click on **detect** and the module will automatically test the connected load type and set the mode that suits best. For some loads you have to experiment to see which mode works best. For example some phase-cut dimmable fluorescents and LEDs work better with trailing edge dimming while others require leading edge dimming. The Channel Settings page is shown in Figure 8.

Figure 8. Channel Settings Page

Dim settings

They way the outputs dim can be configured via the Dim Settings page.
The meaning of each setting is detailed below:

Preset level: If other than zero, the output will go to that level when turned on. Zero means the output will go to the last used dim level.

Minimum level: Some load types can't be dimmed down all the way to zero. They cut off at some point and produce some strange behavior (flickering or pulsing) below that point. Light bulbs also need a minimum dim level to produce visible light. Setting the minimum level slightly above these cut-off points makes these loads dimmable all the way down more smoothly.

Maximum level: The module may not be dimmed past this level. One reason may be to extend the bulb's life or to limit the brightness to fit the environment.

Default ramp rate: This is the time it takes for the light to go from zero to 100% when turned on/off via the inputs, via the website, or TCP commands. Shorter ramps will take a proportionally shorter time. For example going from zero to 50% will take half of the time than what the ramp rate is set to.

Hold ramp rate: The time it takes for the light to go from zero to 100% when the corresponding input is held. Shorter ramps will take a proportionally shorter time. For example going from zero to 50% will take half of the time than what the ramp rate is set to.

Combining channels:
If dimming or switching a higher load than what a single channel can handle is required, it is possible to combine two outputs. Ch1 can be combined with ch2, ch3 with ch4 and ch5 with ch6. Outputs of a combined channel pair will always produce the same dim level. There are two ways how combining can be done.

Software only combination:
The above channel pairs can be combined from software only, by checking the respective checkboxes on the Dim Settings page. The combined pairs will be tied together, they will always be at the same dim level but hardware-wise they are separate outputs with different loads/lighting legs attached to them.

Hardware and software combination:

Besides being combined from software, the combined output pairs can also also be combined hardware-wise, i.e. they will drive the same load. For example output 1 and output 2 will be connected in parallel.

The rating of the combined output pairs will be slightly lower than double of a single channel.

Connecting outputs that are not combined in the software in parallel is dangerous. It can damage the module, possibly creating a fire hazard!

Dimming enabled: There are loads that are not dimmable. Examples are most fluorescents and most LEDs. These lights can only be turned on and off. Apart from non-dimmable lights the FNIP6x2AD is capable of switching (On/Off) any types of load that doesn't exceed the specifications. You can disable dimming by unchecking the corresponding dimming enabled checkbox. Please note that in order to prevent inadvertent dimming of non-dimmable loads, dimming of the outputs is disabled by factory default.

Never enable dimming of non dimmable loads. Doing so can damage the device connected to the output, possibly creating a fire hazard!

The Dim setting page is shown in Figure 9.

Figure 9. Dim Settings Page

Firmware Upgrade

Figure 10. Firmware Upgrade Page

Upgrading the firmware of the module is possible via LAN or WAN.

On the **Firmware** page of the module's internal website, navigate to the location on your PC where the new firmware file is saved. Then click **Upload**. The **St** LED turns on and stays on

during firmware update. After uploading the new firmware –which takes about a minute- the module will automatically restart.

The version of the current firmware and the time since the last reset is also displayed on this page.

Hardware reset
Holding the reset button briefly (less than 2 sec) while powering up the module will reset the module.

Resetting to factory defaults
Holding the reset button for more than 4 sec while powering up the module will set all the settings to factory defaults.

OPERATION

Operation via local inputs

The inputs can be activated by shorting the appropriate input terminal to the input common terminal.

Throughout this section it is assumed that momentary switches are connected to the local inputs.

In order to power the circuitry for the local inputs, an input power of 8-16V must be applied across terminals 39 and 40. In case local inputs are not needed, this power connection is not necessary.

Input Modes

There are different input modes. Setting the input mode is possible via bus commands.
The inputs are factory defaulted to toggle mode. The input modes work as follows:

1. Toggle mode (factory default)
Each short button press toggles the corresponding output. Holding the button for less than 0.5 s will dim up and down (always to the opposite of the last direction) the output until the button is let go of or min/max dim level is reached.

2. Independent inputs
Inputs can be disconnected from their corresponding outputs, in which case they will have no effect on them. However, the status changes of the digital inputs will still be reported via

the open TCP/IP sockets and on the **Control** page of the built-in website. This can be used for monitoring the status of digital sensors connected to the inputs or to activate lighting scenes or macros whenever the input gets triggered.

3. Input follow mode
The status of outputs will follow the state of the corresponding inputs, as in case of a regular maintained switch. (The output will be on while the momentary switch is pressed and off while it is released).

4. Toggle with no dimming mode
Each press of the button toggles the corresponding output. Holding the button has no function. No dimming is possible.

5. Monostable mode
The outputs can be programmed to switch on for an adjustable amount of time when the corresponding input is triggered (in case of a staircase lighting for example).

6. Switch mode
This mode makes it possible to use maintained (standard switches) instead of momentary switches on the inputs. Each transition of the switch (on or off) will toggle the outputs. Please note that the position of the switch –similarly to three-way switches- will not indicate the status of the output.

Operation via the built-in web server

Operation of the outputs is possible via the Control page. The outputs can be toggled by clicking their status icons. The status of the outputs are also displayed. A grey icon means that the corresponding output is inactive. An active output is indicated by a red icon. The current power usage is displayed for each channel. A common temperature for outputs 1, 2, 3 and outputs 4, 5, 6 is also displayed as well as the current power consumption for each output and the frequency of the line voltage. The Control page is shown in Figure 11.
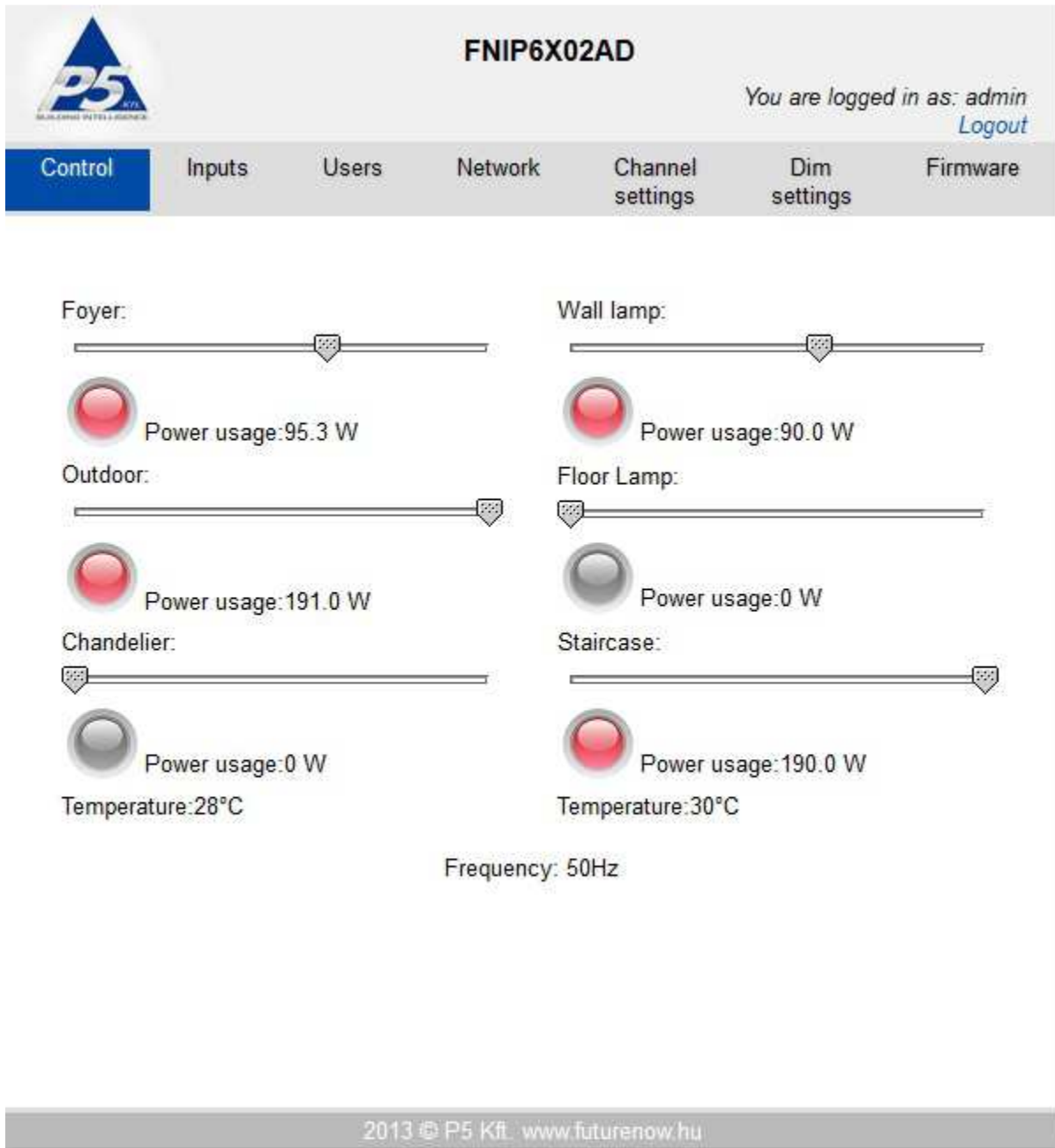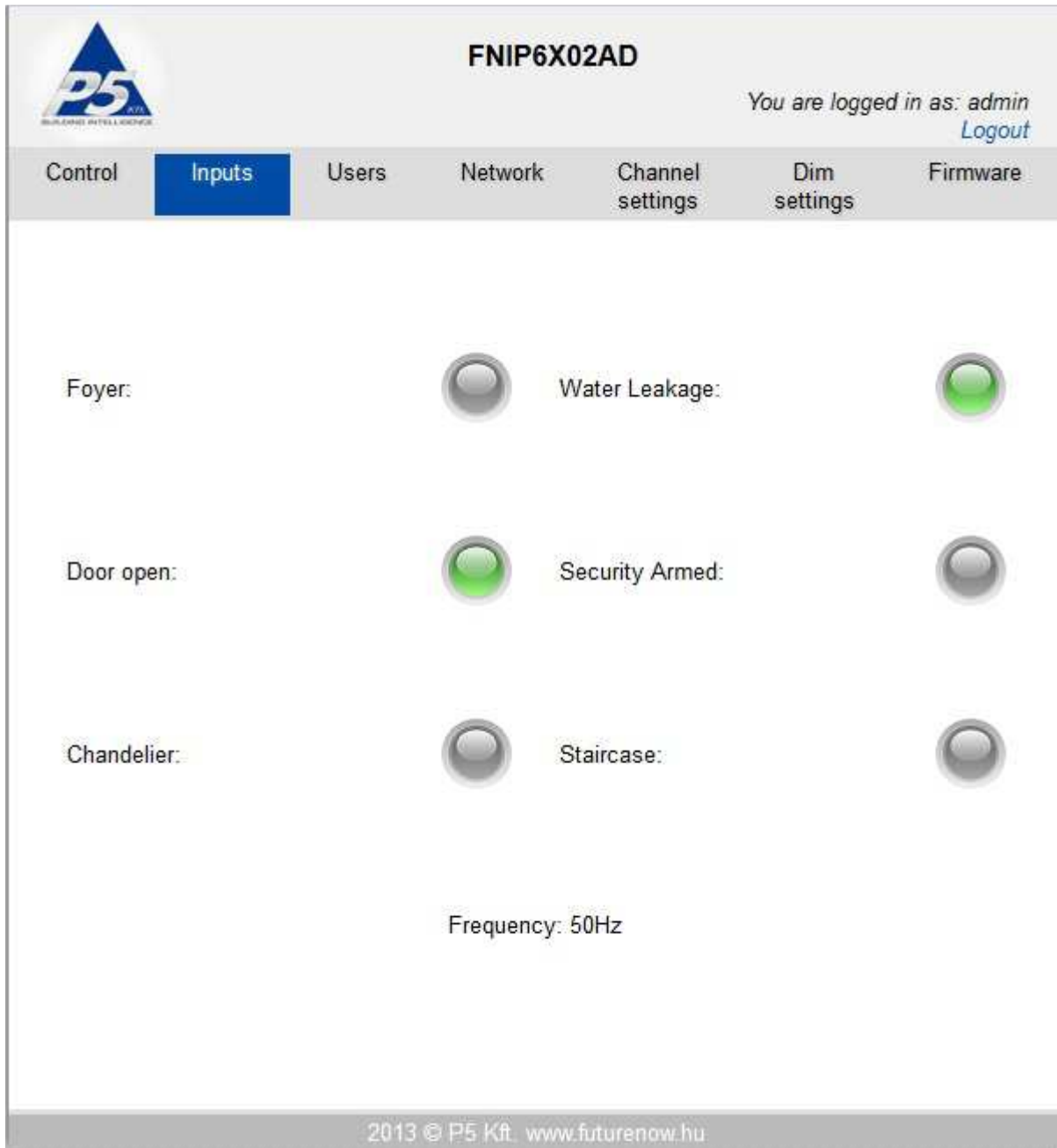
Figure 11. Control Page

Input Status Page

The status of the inputs are displayed on the Input Status page. A grey icon means that the corresponding input is inactive (input circuit opened). An active input (input circuit closed) is indicated by a green icon. The Input Status page is shown in figure 12.

Figure 12. Input Status Page

Operation via TCP

To achieve the easiest integration with most controllers used in home and commercial applications, the module can be controlled by raw TCP protocol using simple ASCII based commands.

The TCP Communication Protocol Description is available upon request.

Event notifications
There are automatic event notifications sent to clients via the open socket connections whenever the status of an input or output changes.

The TCP/IP communication can be enabled/disabled via the Network settings page.

Most any third party controller or software that can implement the FNIP-2x6AD's simple communication protocol can control the FutureNow FNIP-6x2AD. The following are the most widely used:

- AMX
- BitWise Controls
- Control4
- CommandFusion
- Crestron
- iRidium Mobile
- iRule
- RTI

Software modules/plug-ins for the above controllers and software are either already available or P5 will provide full assistance in creating them.

Besides these special-purpose controllers, many applications that support custom TCP IP commands on embedded industrial PC boards, PCs and smart phones running Linux, Windows, Mac OS, iOS, Android are available.

TECHNICAL SPECIFICATIONS

Power requirements
Main circuitry**:** 9-24V DC max. 80mA@12V
Inputs: 9-24V DC, max. 30mA@12V
Line: 220 - 240V AC +/-10%, 50/60Hz max. 15mA@230V AC

Outputs
Load**:** Incadescent, 230V halogens: max. 750W
Fluorescents and electronic low voltage transformers: max. 500W
Compact fluorescents: max. 400W
LEDs: max. 250W
All channels combined: max 3000W

The above ratings are for 25C ambient temperature.

Inputs

Type: 6 x galvanically isolated, noise protected common GND digital inputs for dry contacts or open collector transistor outputs
Functions: Assigned to the corresponding output (Toggle, Follow, Monostable) or Independent

Terminals

Type: Screw terminals for max. 2.5 mm^2 wires

Communication

10Mb/s Ethernet via RJ45 Ethernet connector
Simple ASCII based TCP commands via port 7078, number of socket connections that are allowed to be opened simultaneously: 4
HTTP via built-in web server
Supported web browsers
Mozilla Firefox, Google Chrome, Safari, Internet Explorer 7 or greater, Opera

Other parameters

Operating temperature: 0 °C – 40 °C (32-104 °F)
Dimensions: W x H x D = 157 mm x 86 mm x 57 mm (9 DIN unit width)
Weight: 0,48 kg
Color: Light grey with black cover plate

Standards

EN 60669-2-1
RoHS

Test methods

EN 55015:2013
EN 61547:2010

REFERENCES

FNIP Search Utility
FNIP-6x2AD TCP Communication Protocol Description

CONTACT DETAILS

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