BARIX

BARIONET 1000

Quick Install Guide
Version V2.3 (FW B1000-2.3.0.1)

IP & Wi-Fi Automation Controller

Package contents

a Barionet 1000
b 3 Female Terminal Blocks
c Sticker with Wi-Fi and LAN MAC Address

Mounting on a DIN Rail

Slide the device upwards onto the DIN rail. Push it up and towards the rail until it snaps onto the upper rail edge. Before powering the device please read this quick install guide and mind the polarity of the power supply (see picture on page 2).

Firmware

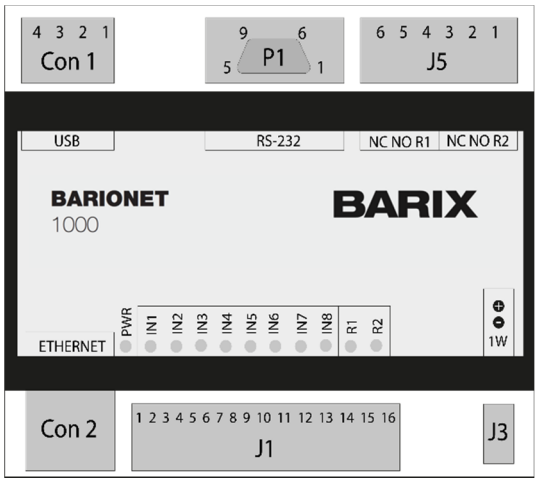
This devices comes preloaded with a default OpenWrt image with drivers for the Barionet Hardware. A Python and Lua Interpreter are pre-installed.

Newer or alternative Firmware can be downloaded from www.barix.com/downloads

Support

For support please contact your local dealer or visit www.barix.com

Top View



Con1 2x USB Host

Pin	Description
1	VCC (+5V)
2	D $^{-}$ (Data -)
3	D $^{+}$ (Data +)
4	GND

J5 Relay Outputs (250VAC, 5A)

Pin	Description
1	Relay 2 common
2	Relay 2 normally open
3	Relay 2 normally closed
4	Relay 1 common
5	Relay 1 normally open
6	Relay 1 normally closed

J1 I/O and Supply Inputs

Pin	Description
1..4	Input 1..4 Analog 0..15VDC or Digital
5..8	Input 5..8 Digital
9	Common Inputs Ground
10..13	Output 1..4 Digital (Open Collector 0..24VDC, 100mA)
14	Common Outputs Ground
15	Power In +9..30VDC
16	Power In -

P1 RS-232 serial port

Pin	Description
2	RxD (Receive data)
3	TxD (Transmit data)
5	GND (Ground)
7	RTS (Ready to send)
8	CTS (Clear to send)
1,4,6,9	not connected

CON2 Ethernet (RJ45)

Pin	Description
1	TX + (Transmit data)
2	TX - (Transmit data)
3	RX + (Receive data)
4	NC
5	NC
6	RX – (Receive data)
7	NC
8	NC
Left LED Yellow - Activity	
Left LED Green - Link / Speed (Blinking)	

J3 Dallas 1-wire® bus

Pin	Description
1	(DO NOT CONNECT)
2	Ground (GND)
3	1-wire data

1. Connecting to power and initialization

Power Supply

The Barionet 1000 needs a DC supply voltage of 9V to 30V, 4W max. Please mind the polarity. When powered up, the Status LED of the CPU will start blinking, indicating that the device is starting up.

Blue CPU LED: Main CPU

When the device is initialized, the PWR Status LED turns solid, all other LEDs will turn off (assuming no active IO is connected).

2. Connecting via Ethernet

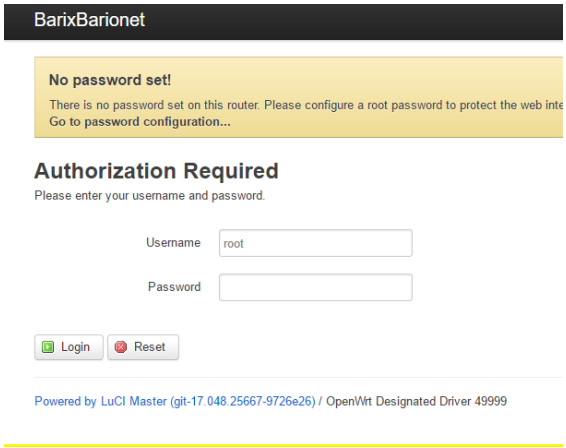
Plug an Ethernet cable from the Barionet 1000 to an Ethernet network.

The Barionet 1000 is configured to be a DHCP Client by default. Use a Network Scanning Program in order to determine the IP Address according to the given MAC Address.

3. Changing Settings via Luci Web Interface

Opening the LuCi Interface

To use the LuCI web interface please type the IP address of the Device of into your web browser: e.g. 192.168.1.123



The default username and password is:
Username: root
Password: (blank)

The root user has NO password set, so make sure you set one !

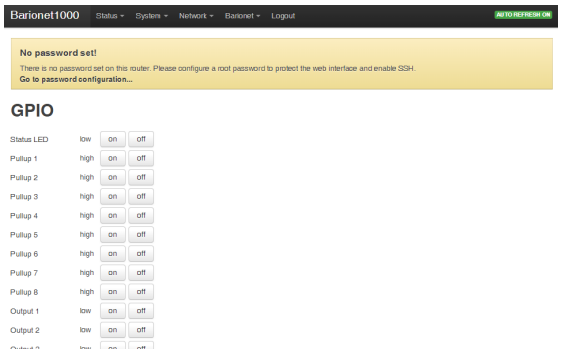
Changing Network Settings

In the LuCI web interface -> <Network> you will find all relevant settings, so you can set other IP addresses, enable/disable DHCP for each network port (Wi-Fi or Ethernet), and also enable the Wi-Fi interface.

Make sure you don't lock yourself out if you change the settings !

Control IOs

In the LuCI web interface -> <Barionet> you will find a Control Interface to control and monitor the GPIOs of the Barionet.



Simply click on the Control Buttons to change the state of Relays and IOs.

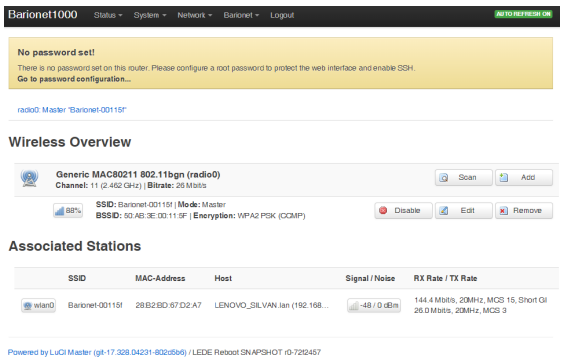
4. Connecting via Wi-Fi and SSH

Connecting via Wi-Fi

The Wi-Fi Interface is turned on by default offering an SSID which is called “Barionet_” and the four last digits of its MAC address (for example, Barionet_0024B5). The security key/passphrase “barionet” is used to protect the WLAN.

Connect your PC to this Wi-Fi network. For this network, the Barionet works as a DHCP server and uses the IP Address 192.168.166.1 itself. For your PC, an IP address in the 192.168.166.x range will be assigned.

For security reason, we recommend to turn off the WLAN interface if it is not needed in the Application. Use the LuCI Webinterface -> <Network> -> <Wireless> in order to turn the Interface off.



Establishing an SSH Connection

Use ssh or a similar client (for example, PuTTY, port 22, SSH option) and establish a connection as user “root” to the IP address of the Barionet (given DHCP Address if connecting via Ethernet or 192.168.166.1 if connected via Wi-Fi).

The root user has NO password set, so make sure you set one !

5. Installing OpenWRT Packages

OpenWRT Packages can be installed by the standard OpenWRT/Lede Package installer by using “opkg” command

“opkg list” -> lists all the available packages

“opkg list-installed” -> lists the installed packages

“opkg update” -> updates the installed packages

“opkg install <file>” -> installes a specific package

6. IO Access from Scripts or programs

The IO ports are accessible through the standard OpenWrt IO device files.

The Device Files can be found in the folder /dev/gpio.

Relay Outputs

Relay Outputs: bio1 – bio2
Use the following shell command in order to control the relay outputs:
“echo 1 > bio1/value” -> set Relay 1
“echo 0 > bio1/value” -> reset Relay 1

Digital Outputs

Digital Outputs: bio101 – bio104
Use the following shell command in order to control the digital outputs:
“echo 1 > bio101/value” -> set Output 1
“echo 0 > bio101/value” -> reset Output 1

Digital Inputs

Digital Inputs: bio201 – bio208
Use the following shell command in order to read the digital input values:
“cat bio201/value” -> reads Input 1

Analog Inputs

Analog Inputs: bio501 – bio504
Use the following shell command in order to read the analog input values:
“cat bio501” -> reads Analog Input 1

Make sure that Pull-Up Resistors on the Analog Inputs are turned off for reading analog values

7. Use of Serial Ports from Scripts or programs

The Serial Ports (RS232 and RS485) are accessible through the standard OpenWrt USB device files.

The Device Files can be found in the folder /dev.

RS232 Interface: ttyS1

Use the following shell command in order to write to the Serial Port:

“echo hello world > ttyS1” -> writes to RS232

Use the following shell command in order to read from the Serial Port:

“cat ttyS1” -> reads from RS232

8. Use of 1-wire ® Temperature Sensors from Scripts

The 1-wire interface can be accessed using an OpenWrt device driver.

The Device Driver maps the 1-wire devices into the folder /sys/bus/w1/devices/.

Use the following shell command in order to read data from the 1-wire devices:

cat /sys/bus/w1/devices/yy-yyyy/w1_slave

yy-yyyy represents the corresponding 1-wire device address.

The read data are represented in hex using ASCII character, the read temperature is shown as a string t=xxyyy (°C with 3 decimal places).

9. Mounting a USB Stick

In order to mount a USB stick to the OpenWRT File System, the following packages need to be installed:

-> kmod-usb-storage (Kernel support for USB Mass Storage devices)

-> kmod-fs-vfat (support of the right file system, vfat for fat32)

The USB Stick can now be plugged in and mounted with mount command as following:

“mount -t vfat /dev/sda1 /mnt/usb” -> mounts the sda1 (first USB stick)

Note that “sda1” is eventually replaced by another interface. Use dmesg in order to determine the right interface.

Note that the /mnt/usb directory needs to be created before mounting.

10. Use of Modbus

The Barionet 1000 is supporting Modbus TCP Protocol in order to be controlled.

Modbus Interface: TCP Port 502

All IOs as well as a lot of more functions are accessible via Modbus IO Registers according to Appendix 1) IO Mapping.

11. Lua Programming

The Barionet 1000 can easily be custom programmed in Lua. For more information about Lua Programming see www.lua.org.

A limited set of Lua Packages are pre-installed on the Barionet 1000 already. Most of the common Packages can easily be installed using OPKG packet installer (see above).

Lua Programs can be loaded onto the device using ssh and scp. The Lua program will be started using the following command:

“lua helloworld.lua” -> starts helloworld.lua

If a Lua Program needs to be started automatically after startup of the device, the program has to be named as “default.lua” and copied to the following directory:

-> /usr/bin/default.lua

12. Reboot the Device

With LuCI Web Interface

On the LuCI web interface go to the System -> <Reboot>

Select “Perform Reboot”.

13. Reset to factory defaults

With LuCI Web Interface

On the LuCI web interface go to <System> -> <Backup/Flash Firmware>

Under Backup/Restore select “Reset to defaults” and perform the factory reset.

At this point, the device will reboot and apply default settings.

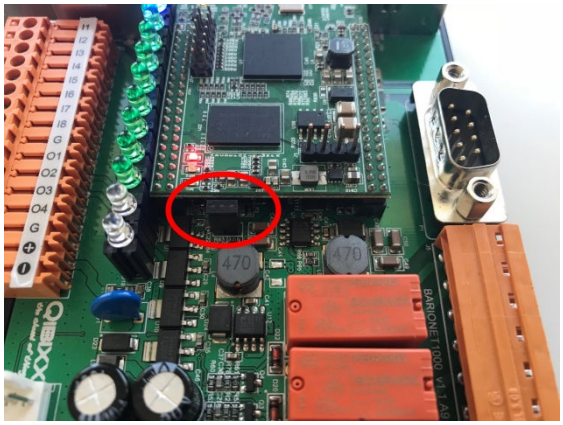
With Hardware Jumper

Remove the top part of the B1000 case.

Power the Device and wait until it has started up -> Blue CPU LED turns solid.

Place the Factory Defaults Jumper and wait at least 10s.

Remove the Factory Defaults Jumper.



14. Upload Firmware Image

For Software updates a complete OpenWRT/LEDE Image is provided by Barix. For new updates see www.barix.com/downloads.

The easiest way is to update the Firmware using the LuCI Webinterface: <System> -> <Backup / Flash Firmware>.

Make sure the “Keep Settings” option is not selected, this ensures that the Device is correctly set back to Factory Defaults after the Firmware Update.

Please note that all Settings, user programs etc. are deleted after a Firmware Update.

Be patient during the Software update and do not disconnect the Power Supply. The Software Update can Take up to 5 Minutes.

Appendix 1) IO Mapping

The following Table shows the IO Mapping for the Barionet 1000 with its associated IO addresses and functions:

IO Addr	Read/Write	Size	Description	Driver Alias	Driver Link
1	R / W	1 bit	Relay 1	rel1	bio1
2	R / W	1 bit	Relay 2	rel2	bio2
10..100	R / W	1 bit	Virtual IO Bits		
101	R / W	1 bit	Digital Output 1	out1	bio101
102	R / W	1 bit	Digital Output 1	out2	bio102
103	R / W	1 bit	Digital Output 1	out3	bio103
104	R / W	1 bit	Digital Output 1	out4	bio104
105..200	R / W	1 bit	Virtual IO Bits		
201	R only	1 bit	Digital Input 1	in1	bio201
202	R only	1 bit	Digital Input 2	in2	bio202
203	R only	1 bit	Digital Input 3	in3	bio203
204	R only	1 bit	Digital Input 4	in4	bio204
205	R only	1 bit	Digital Input 5	in5	bio205
206	R only	1 bit	Digital Input 6	in6	bio206
207	R only	1 bit	Digital Input 7	in7	bio207
208	R only	1 bit	Digital Input 8	in8	bio208
209..400	R / W	1 bit	Virtual IO Bits		
501	R only	16 bits	Analog Input 1 Value	analog1	bio501
502	R only	16 bits	Analog Input 2 Value	analog2	bio502
503	R only	16 bits	Analog Input 3 Value	analog3	bio503
504	R only	16 bits	Analog Input 4 Value	analog4	bio504
505..600	R / W	16 bits	Virtual IO Registers		
701..1000	R / W	16 bits	Virtual IO Registers		
60101	R / W	1 bit	Pull-Up Digital Input 1	pullup1	bio60101
60102	R / W	1 bit	Pull-Up Digital Input 2	pullup2	bio60102
60103	R / W	1 bit	Pull-Up Digital Input 3	pullup3	bio60103
60104	R / W	1 bit	Pull-Up Digital Input 4	pullup4	bio60104
60105	R / W	1 bit	Pull-Up Digital Input 5	pullup5	bio60105
60106	R / W	1 bit	Pull-Up Digital Input 6	pullup6	bio60106
60107	R / W	1 bit	Pull-Up Digital Input 7	pullup7	bio60107
60108	R / W	1 bit	Pull-Up Digital Input 8	pullup8	bio60108