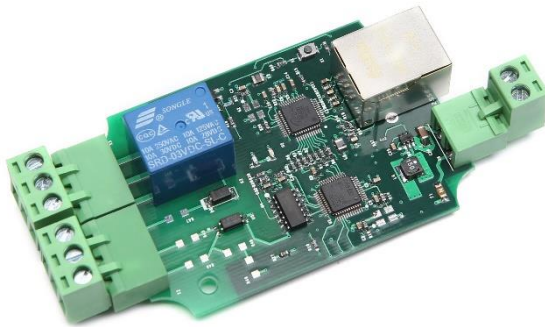


BrickElectric Ethernet Relay

BEM107

Excellent network building block



Features

- WEB control
- X-Connect
- Modbus-TCP
- Hardware Reset
- 5 - 24 VDC power supply
- EasyBus - simple solution
- Android App
- LAN mode
- DHCP - Plug and play
- Internet Control
- Password Protection

Introduction

BEM107 is an Wide Supply Input, Ethernet Remote I/O Module, with 1 output channel and 1 input channel, and provide with both enclosed and open type housing. Its Ethernet connector provides 10/100baseT interface.

It supports EasyBus-TCP, HTTP control, and Internet control protocols, suitable for being used with servers, computers, mobiles, routers, etc., to provide remote control and monitor.

With DHCP functions, it doesn't need to make any settings anymore in field. So *just plug and play*, power it on and then enjoy your remote control.

BEM107 is a new generation product with more functions and higher stability. Control mode "toggle" and "automatic cycle operation" are provided additionally.



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1. Device Overview

1.1 General Ratings

Power Consumption	3W max.
Operation Temperature	-30°C to +85°C
Module Size	75mmx50mmx20mm
Weight	-

1.2 Connection Diagram

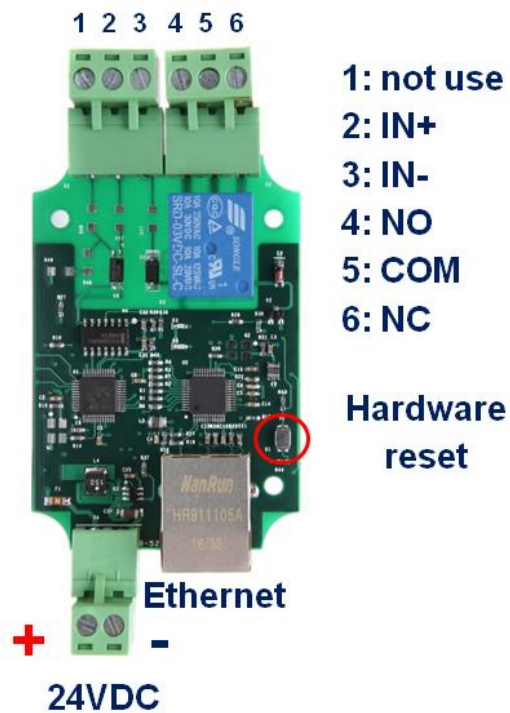


Fig. 1.1

2. Specifications

2.1 Recommended Operating Conditions

Parameters	Symbol	Values			Unit
		Min.	Typ.	Max.	
At T = 25°C, V _{supply} = 5V unless otherwise specified.					
Operating voltage	V _s	5	-	24	V
Output Relay Rating	-	250VAC/10A			-
		125VAC/10A			
		24VDC/10A			
		12VDC/10A			

2.2 Default Software Settings

Default Settings

- **IP Setting:**
IP address: 192.168.1.105
Subnet Mask: 255.255.255.0
Gateway: 192.168.1.1
DHCP: disable
- **HTTP function**
State: Enable
Port: 80
- **Latest Firmware Version**
V107.0-00
You can download latest firmware for free.
- **Internet Control**
State: Enable
Platform with App: Android
/ iOS(in prepare) / Windows(in prepare)
Cross-Platform (Web Browser) in prepare

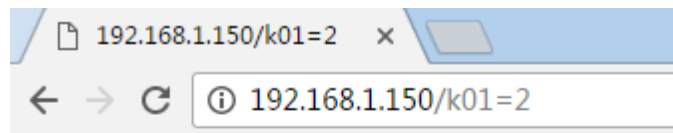
3. Easy Start

A Practical step-by-step operation guide for starters

This part is a step-by-step tutorial explaining how to start with BEM104. We'll not discuss too much details here. The only idea here is to make it work by minimum steps. For more information, please refer to later chapters.

3.1 HTTP Mode

1. Connect BEM104 with your routers or computer via a standard Ethernet cable. And then power it on with 5 - 24VDC power supply. (see **fig.1.1 at page 2**)
2. Open any Browser, for example Chrome is used here as demonstration. Please enter URL: `http://192.168.1.105/k01=2`. Relay channel 1 will be toggled, and a message will be returned to your browser. Congratulations!



`K01 = 2;`

3.2 LAN Mode

1. Connect BEM module with your routers or computer by Ethernet cable, and then power it on with 5 - 24VDC power supply. (see **fig.1.1 at page 2**)
2. Open any TCP test tool (if you don't have any, or you don't know what a TCP test tool is, you can use **BE-Manager**, it is within our software package). Open it and see the following **Fig.1.2**:

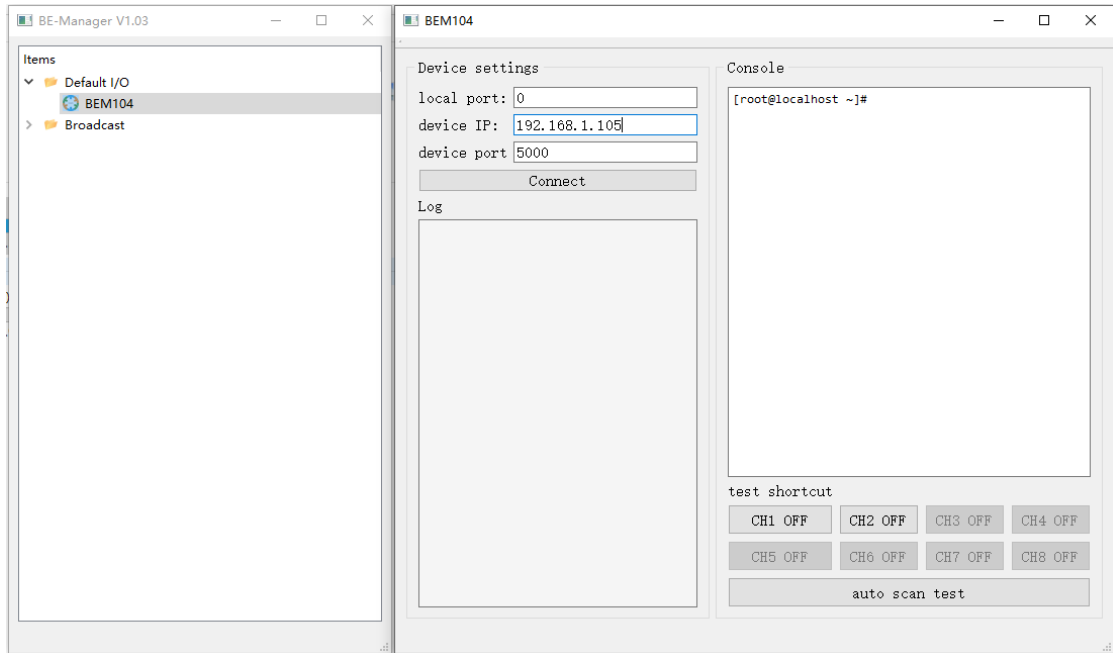


Fig.1.2

3. Click "**Connect**" button, and wait for module connected. Then, it is able control the relay module. Click "**CH1 OFF**" button, and the relay channel 1 will be switched on. See **Fig.1.3**

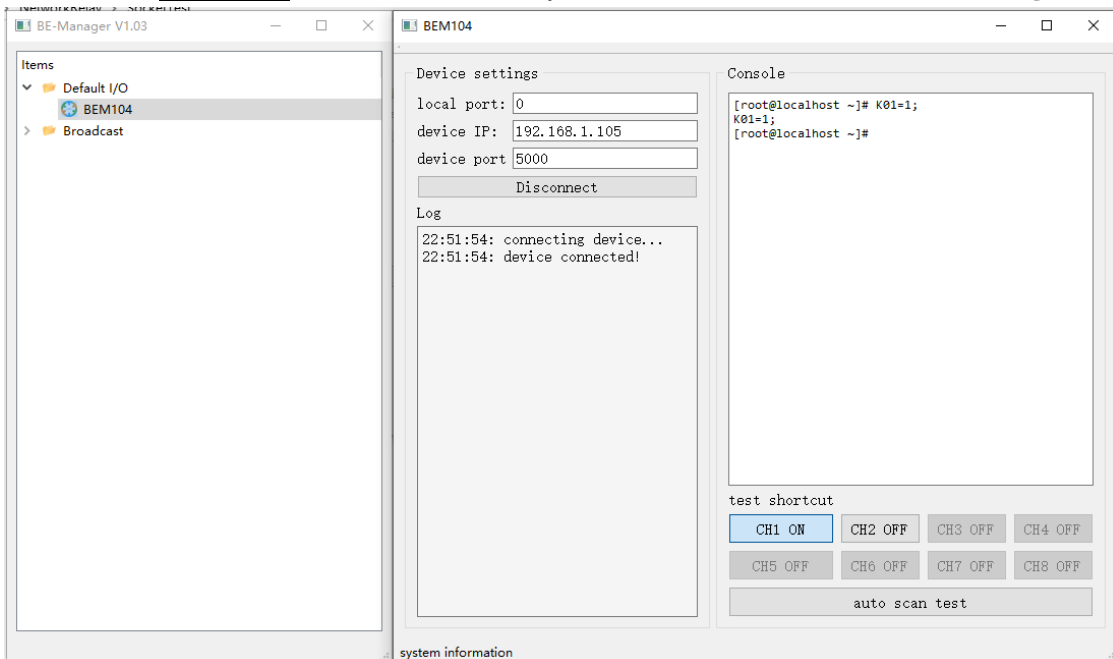


Fig.1.3

3.3 Internet Mode:

BEM series network controller module features an innovative Internet connectivity function: **Virtual LAN.**

Relatively speaking, it is very easy to visit/control a device or to communicate with a PC within your LAN, which means they are directly connected to your local network via one or several routers. In LAN it is very common to share a folder, create ERP service, use OA system or to visit/control some devices like BEM modules by their local IP address.

You can setup your own static IP address in LAN which is not limited by network service provider, and you can also trust the communication in LAN because without permission from firewall rules(or sometimes there is no Internet connection) there is no possibility to send information to devices within LAN unless you can directly access the router.

But LAN is also highly limited exactly by this feature, that means you have to connect everything by a physical Ethernet wire or wireless router. When the device is in a different building or even at a different city or country this is almost impossible to achieve. If this is the case, Internet is the only option left. But Internet also have its own weakness, like no static IP address (ISP have their own local networks and firewall, and mostly your device is not directly accessible by other device/PC), safety issues(well, we believe everyone agrees that there is no need to argue this point), server deployment and management.

Virtual LAN is created exactly to solve all these problems in Internet while keeping the advantages of LAN. Virtual LAN can be installed in PC and also is integrated in BEM series modules. With virtual LAN, you can add a virtual network adapter into your device/PC, and the device/PC will be connected to a virtual local network via this adapter.

For example, you have two PC and several BEM devices which is connected Internet at different locations, and they have dynamic local network IP address and thus can't visit each other. But with virtual LAN software activated, each PC and BEM devices will have a second IP address which is build upon their Internet connection and independent on their local IP, so you can directly visit each other once in this virtual LAN. PC A1 will have a virtual IP like 10.8.0.2, and PC A2 will have a virtual IP like 10.8.0.3. If you are PC A1, you can directly connected to PC A2 by visiting 10.8.0.3, no matter where you and PC A2 is connected as long as they both have Internet connection.

It is same way to use BEM devices with virtual LAN. No matter where they're installed, you can always connect to them use their virtual IP address as long as they have Internet connection. Only a simple click and you will have your own LAN in Internet.

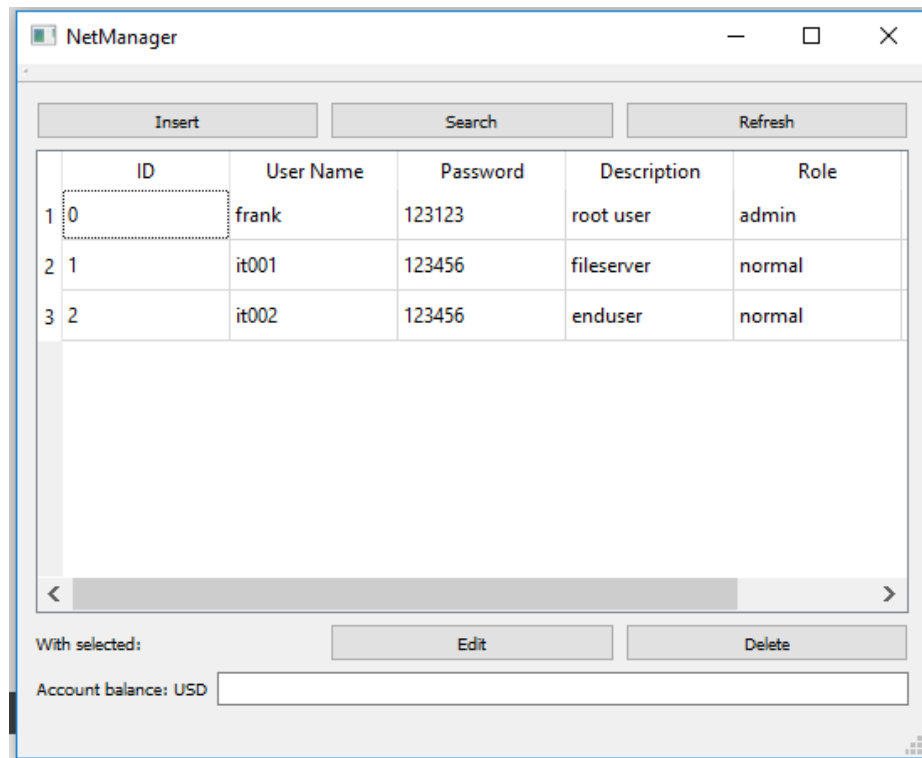
Not only a simple connection can be established by virtual LAN, but also it can be used in all network applications, like share folder, file server, ERP system, OA system, web server and so on... It is easy to use and it is also safe because it is transmitting data in highly encrypted way.

1. Virtual LAN software product kit introduction and purchase page:
<https://www.brickelectric.com/software-c-8/virtual-lan-service-099month-p-52.html>

2. Download NetManager at:
https://www.brickelectric.com//downloads_and_updates.html

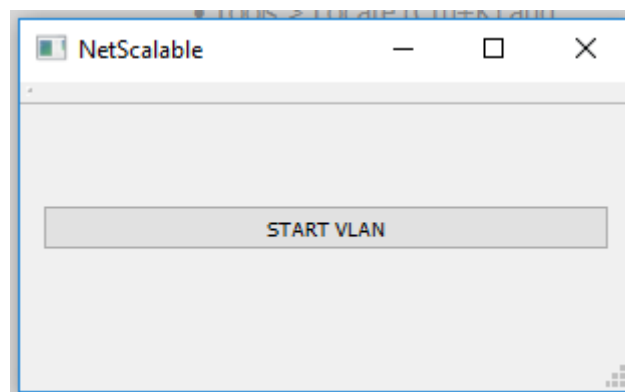
2. Open "**NetManager**" app for windows, register a new group and then you can add users or devices into group. Users are used for PC and devices are used for BEM modules.

3. You can manage users/devices with NetManager as you need. NetManager is only a user management software, it does not contain virtual LAN soft adapter.



4. After you have created your own group and its users by NetManager, you can download virtual LAN soft adapter **NetScalable** at:
https://www.brickelectric.com//downloads_and_updates.html

5. Login into NetScalable and click button "Start VLAN", enjoy your virtual LAN connection.



4. General Functionality

4.1 Basic Network Communications

The main method of communication to BEM107 is a standard Ethernet communication. This communication protocol makes use of Network Sockets or HTTP protocol to create point to point tunnels that data can flow through bi-directionally. In this way, the computer that is controlling the relay can send commands and shortly thereafter receive the response through the same Socket/Web Page.

Communications

In most programming languages, all you need to do to open a socket is to import the appropriate plug-in, build the socket object, and connect the socket using the IP Address and Port Number of the target device.

MAC Address

You can find the MAC Address of the module at the simple start manual delivered together with module package.

4.2 Save Parameters

After power cycle, BEM107 will lose its parameter modifications if you don't actively require it to save modified parameters into internal nonvolatile memory. For examples, IP Address, Gateway address and Net mask.

Assuming module current IP Address is 192.168.1.105 for all the following commands.

Save parameters

To save parameters:

Web access URL:

<http://192.168.1.105/save=1>

Socket command text:

save=1;

4.3 Reboot

Send the module a restart signal so it will restart itself. **Some parameters modifications are only effective after a reboot or power cycle.** Relay contact outputs are still in control during reboot process, under default setting, module will be keep the contact status unchanged during this reboot process. Parameters modifications will be lost if you don't save them before reboot or power cycle operation.

Assuming module current IP Address is 192.168.1.105 for all the following commands.

Reboot

To reboot device:

Web access URL:

<http://192.168.1.105/reboot=1>

Socket command text:

[reboot=1;](#)

4.3 DHCP Function

BEM107 supports both DHCP and static IP Addressing. For communication reliability, we recommend using a Static IP Address when you feel comfortable doing so. This will ensure that the device will always be where you expect it to be, when you try to connect to it.

DHCP stands for Dynamic Host Configuration Protocol and basically means that your router will assign the first available IP Address in the list of IP Addresses Range to your device. This technology makes network devices very easy to use, but it is not as reliable because in certain circumstances it will cause the IP Address it assigns to change. DHCP mode is recommended when you only use Internet control, or your local software is able to detect module IP changes.

Assuming module current IP Address is 192.168.1.105 for all the following commands.

Enable/Disable DHCP

Note: modification only effective after parameter saving and module reboot.

To Enable DHCP:

Web access URL:

<http://192.168.1.105/dhcp=1>

Socket command text:

[dhcp=1;](#)

To Disable DHCP:

Web access URL:

<http://192.168.1.105/dhcp=0>

Socket command text:

[dhcp=0;](#)

4.4 Static IP Address

This technology is the antithesis of DHCP in that it is manually set IP address and does not dynamically change without direct action. The disadvantage of this method is that, if done incorrectly, can make the module unreachable through any standard means. This usually happens when an IP Address is statically set to an IP Address outside of the range of the router, or another device on the network obtains this IP address via DHCP. If this happens, see the section of this guide titled "Reset Function". This method is the preferred and more reliable way to handle network IP Address allocation. For improved reliability, the IP Address assigned to this Module should be reserved on your router.

To work correctly in static IP address mode, you need to set correct IP address, gateway address and subnet mask. The following content describes how to modify each of them.

If module is currently in DHCP mode, to set a new static IP address you need to disable DHCP mode at first. After settings are done, please save parameters and reboot the device to make it effective.

Assuming module current IP Address is 192.168.1.105 for all the following commands.

Set static IP Address

Note: modification only effective after parameter saving and module reboot.

To set static IP Address to 192.168.1.100:

Web access URL:

<http://192.168.1.105/ipaddr=192.168.1.100>

Socket command text:

[ipaddr=192.168.1.100;](#)

Set static Gateway Address

Note: modification only effective after parameter saving and module reboot.

To set static Gateway Address to 192.168.2.1:

Web access URL:

<http://192.168.1.105/gateway=192.168.2.1>

Socket command text:

[gateway=192.168.2.1;](#)

Set static Net Mask

Note: modification only effective after parameter saving and module reboot.

To set static net mask to 255.255.0.0

Web access URL:

<http://192.168.1.105/netmask=255.255.0.0>

Socket command text:

[netmask=255.255.0.0;](#)

4.5 Relay outputs control

Eight basic different control modes are introduced into this Ethernet relay module to make more applications easier to work with. From the most basic simple contact switch operation to cycled operation with customized timing, you may use different commands to make your work easier.

In the following contents, assuming current IP Address is 192.168.1.105. If you need to switch different channels please replace "k0x" to the value you need. For example, if you want control ch2, you may replace "k01" with "k02".

Normal ON/OFF/TOGGLE

Normal on/off/toggle operation changes the relay output status immediately after receiving commands. No timing features included.

Switches

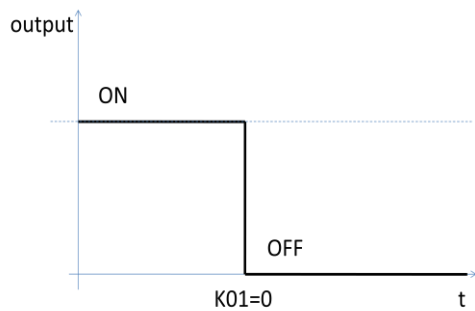
To **switch off** ch1 output:

Web access URL:

<http://192.168.1.105/k01=0>

Socket command text:

k01=0;



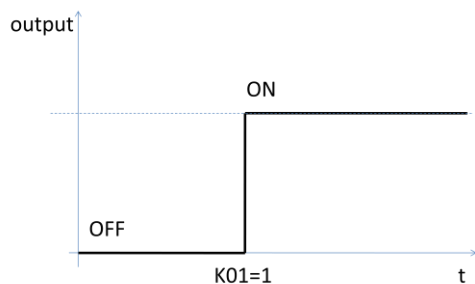
To **switch on** ch1 output:

Web access URL:

<http://192.168.1.105/k01=1>

Socket command text:

k01=1;



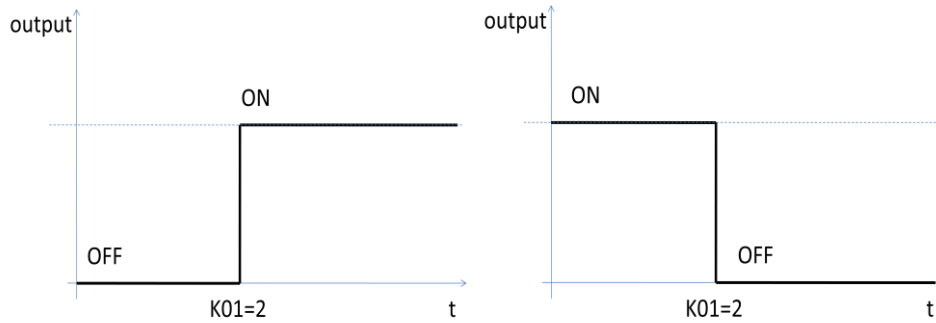
To **toggle** (opposite to previous status) ch1 output:

Web access URL:

<http://192.168.1.105/k01=2>

Socket command text:

k01=2;



Timing Feature

NONE

Pulse ON/OFF/TOGGLE

Pulse on/off/toggle operation changes the relay output status immediately after receiving commands, and wait for a predefined time period, then automatically switches to opposite status.

Switches

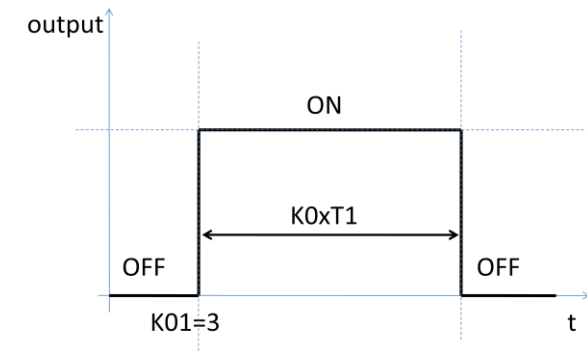
To **pulse on** ch1 output, you can input by require web access:

Web access URL:

<http://192.168.1.105/k01=3>

Socket command text:

k01=3;



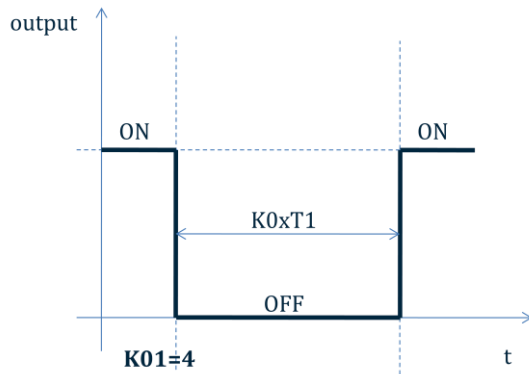
To **pulse off** ch1 output, you can input by require web access:

Web access URL:

<http://192.168.1.105/k01=4>

Socket command text:

k01=4;



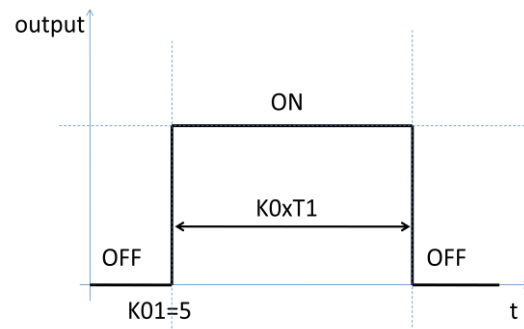
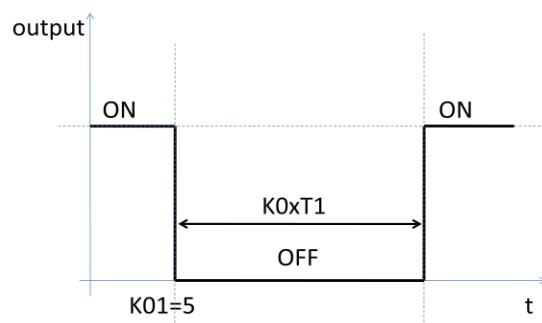
To **pulse toggle** (opposite to previous status) ch1 output:

Web access URL:

<http://192.168.1.105/k01=5>

Socket command text:

[k01=5;](#)



Timing Features

To set up customized timer for relay pulse outputs, timer T1 is used and need to be set. Each relay channel has an independent timer $K0 \times T1$, timer supports from 1ms to 4294967295 second. $K0 \times T1$ needs to be set for time value, and $K0 \times U1$ needs to be set for timer value unit. Default value for $K0 \times T1$ is 1000, and default unit for $K0 \times U1$ is ms.

To set timer T1 value to 5000:

Web access URL:

[http://192.168.1.105/setpara\[65\]=5000](http://192.168.1.105/setpara[65]=5000)

Socket command text:

[setpara\[65\]=5000;](#)

To set timer T1 value unit to ms:

Web access URL:

[http://192.168.1.105/setpara\[29\]=0](http://192.168.1.105/setpara[29]=0)

Socket command text:

[setpara\[29\]=0;](#)

To set timer T1 value unit to second:

Web access URL:

www.BrickElectric.com

[http://192.168.1.105/ setpara\[29\]=1](http://192.168.1.105/ setpara[29]=1)

Socket command text:

[setpara\[29\]=1;](#)

Cycle Switch Mode

Cycle switch mode changes the relay output status automatically on and off in customized time period. After receiving cycle commands, relay output will always cycle until you give it a new command.

Switches

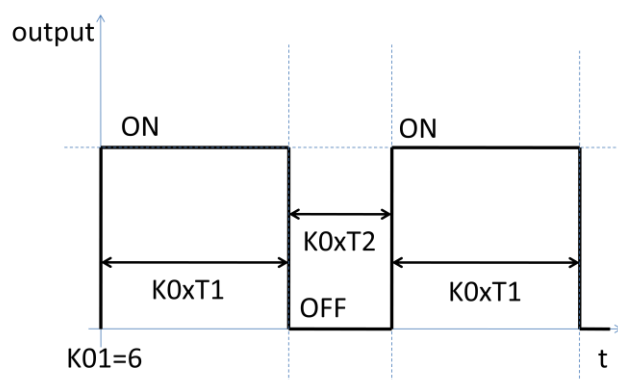
To **pulse off** ch1 output, you can input by require web access:

Web access URL:

<http://192.168.1.105/k01=6>

Socket command text:

[k01=6;](#)



Timing Features

To set up customized timer for relay cycle outputs, timer T1 and T2 are used and need to be set. Each relay channel has two independent timers K0xT1 and K0xT2, time period supports from 1ms to 4294967295 second. K0xT1/K0xT2 is needed to be set for time value, and K0xU1/K0xU2 is need to be set for timer value unit. Default value for K0xT1/K0xT2 is 1000, and default unit for K0xU1/K0xU2 is ms.

To set timer T1 value to 5000:

Web access URL:

[http://192.168.1.105/ setpara\[65\]=5000](http://192.168.1.105/ setpara[65]=5000)

Socket command text:

[setpara\[65\]=5000;](#)

To set timer T1 value unit to ms:

Web access URL:

[http://192.168.1.105/ setpara\[29\]=0](http://192.168.1.105/ setpara[29]=0)

Socket command text:

[setpara\[29\]=0;](#)

To set timer T1 value unit to second:

Web access URL:

[http://192.168.1.105/setpara\[29\]=1](http://192.168.1.105/setpara[29]=1)

Socket command text:

[setpara\[29\]=1;](#)

To set timer T2 value to 5000:

Web access URL:

[http://192.168.1.105/setpara\[66\]=5000](http://192.168.1.105/setpara[66]=5000)

Socket command text:

[setpara\[66\]=5000;](#)

To set timer T2 value unit to ms:

Web access URL:

[http://192.168.1.105/setpara\[30\]=0](http://192.168.1.105/setpara[30]=0)

Socket command text:

[setpara\[30\]=0;](#)

To set timer T2 value unit to second:

Web access URL:

[http://192.168.1.105/setpara\[30\]=1](http://192.168.1.105/setpara[30]=1)

Socket command text:

[setpara\[30\]=1;](#)

Read Switch Mode

Read current relay output status for feedback control. Module will return the current status in web content or socket text, depending on how do you send the command.

To read relay ch1 current status:

Web access URL:

<http://192.168.1.105/k01=7>

Socket command text:

[k01=7;](#)

4.6 Password protection

Password protection function is used for protecting the device from un-authorized access. Once enabled, user can only send effective command when they're able to provide correct 6-bit length access password.

In the following contents, assuming current IP Address is 192.168.1.105. And device password is "123456", which is also the default password.

Enable/Disable Password Protection

To Enable password protection:

Web access URL:

<http://192.168.1.105/pwenable=1>

Socket command text:

[pwenable =1;](#)

To Disable password protection, you need also firstly input correct password:

Web access URL:

<http://192.168.1.105/pw=123456&pwenable=0>

Socket command text:

[pw=123456&pwenable=0;](#)

Change Password

To change password to "abcdef", you need also firstly input previous correct password:

Web access URL:

<http://192.168.1.105/pw=123456&newpw=abcdef>

Socket command text:

[pw=123456&newpw=abcdef;](#)

4.7 Http port setting

In default conditions, HTTP port is always 80 if you enter directly in web browser a URL without any additional parameters. But in some applications different port number is needed for port forwarding or any other reasons. For example, you can force your web browser to access http content at port 8080, to do so you need to enter <http://url:8080>.

This module is able to customize http access port to realize such functions. In the following contents, assuming current IP Address is 192.168.1.105.

Change Http Port

To change http port to 8080:

Web access URL:

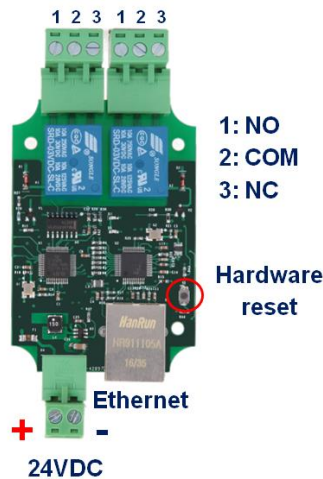
<http://192.168.1.105/webport=8080>

Socket command text:

[webport=8080;](#)

4.8 Hardware reset button

Hardware reset button is used for situations when you want to reset the device to factory settings. For example, if you set incorrect IP Address and the device is no longer detectable in your network. Two different level of reset are provided in this module. Level-1 only reset parameters, i.e. network settings, time settings and so on, while Level-2 will reset on-chip app, i.e. for firmware updating/reload.



Hardware reset Level-1 (Parameter reset)

To reset parameters, press the hardware reset button in above pictures until green and red LEDs are both on, then release the button. Module will set all parameters to their default values.

Hardware reset Level-2 (Firmware update/reload)

To update firmware, press the hardware reset button in above pictures until green and red LEDs are both on, then continue to press the button for another 10 seconds. Module will erase its firmware and try to download latest firmware from Internet. Please connect to internet when you do this operation.

4.9 Identification & customized information

When more than one modules are installed in the field, it is necessary to be able to read the identification information from module, for example serial number. Except for several pre-defined parameters in system, additionally a device name which can be set by user is supported.

Read serial number

You can read serial number by reading the sticker on the device, but you can also read device serial number by communication.

To read device serial number:

Web access URL:

[http://192.168.1.105/getpara\[100\]=1;](http://192.168.1.105/getpara[100]=1;)

Socket command text:

[getpara\[100\]=1;](#)

Customized device name

In some applications, customer may want to set up their own name for better identification of the device. For this purpose, device name can be customized, with a maximum length of 15 letters.

To read device name:

Web access URL:

[http://192.168.1.105/getpara\[97\]=1;](http://192.168.1.105/getpara[97]=1;)

Socket command text:

[getpara\[97\]=1;](#)

To change device name to "my_device":

Web access URL:

[http://192.168.1.105/setpara\[97\]=my_device](http://192.168.1.105/setpara[97]=my_device)

Socket command text:

[setpara\[97\]=my_device;](#)

Read device type

you can read device type by communication, for the purpose of better identification the device.

To read device type:

Web access URL:

[http://192.168.1.105/getpara\[99\]=1;](http://192.168.1.105/getpara[99]=1;)

Socket command text:

[getpara\[99\]=1;](#)

Read device firmware version

you can read device firmware version by communication, for the purpose of better identification the device, or diagnosis.

To read device firmware version:

Web access URL:

[http://192.168.1.105/getpara\[98\]=1;](http://192.168.1.105/getpara[98]=1;)

Socket command text:

[getpara\[98\]=1;](#)

4.10 Read Inputs

BEM107 has one input channel, which can detect external contact condition. It is not allowed to apply any external voltage to those input channels. You can read the input parameters to check if the external contact is closed or opened.

Read input condition

You can read input channel 1 by:

Web access URL:

[http://192.168.1.105/getpara\[189\]=1;](http://192.168.1.105/getpara[189]=1;)

Socket command text:

[getpara\[189\]=1;](#)

5. X-Connect

With X-Connect functionality, multiple BEM Series modules can be logically connected to each other without using a central controller (for example, a PC or a server). You can directly map any input channel of BEM Series I/O module to another output channel BEM Series I/O module.

For example, if you have one BEM108 which have 8 inputs and four BEM104 which each have 2 outputs and in total 8 outputs. In such a case you can map each input of BEM108 to the eight outputs of 4 BEM104 without central controller. Also, if you have 8 BEM107 which each have one input and in total 8 inputs, you can also map each of the input bit to one or more output modules. This mapping is totally free, you can map the same one input channel to 1 ~ 10 output channels at one output module or multiple output module.

When one input is mapped to one or more outputs, then if this input is triggered, all the outputs that it mapped will also be triggered immediately.

5.1 X-Connect Map Setting

Each BEM Series module can support at max 10 I/O mapping. Each I/O mapping is independent with each other. Each I/O mapping channel need to setup:

- (1) Which input channel you want to map;
- (2) Which module you want to map, that means IP address of the target module;
- (3) Which output channel of target module you want to map;

For example, to setup BEM108 (IP: 192.168.1.105) input channel 1 to BEM104(IP: 192.168.1.106) output channel 1, all setting needed to be done at BEM108:

- (1) Select input channel one in BEM108 by:

Web access URL:

[http://192.168.1.105/ setpara\[102\]=1;](http://192.168.1.105/ setpara[102]=1;)

Or Socket command text:

[setpara\[102\]=1;](#)

- (2) Select the module you want to map at 192.168.1.106 by:

Web access URL:

[http://192.168.1.105/ setpara\[133\]=192;](http://192.168.1.105/ setpara[133]=192;)

Or Socket command text:

[setpara\[133\]=192;](#)

Web access URL:

[http://192.168.1.105/ setpara\[134\]=168;](http://192.168.1.105/ setpara[134]=168;)

Or Socket command text:

[setpara\[134\]=168;](#)

Web access URL:

[http://192.168.1.105/ setpara\[135\]=1;](http://192.168.1.105/ setpara[135]=1;)

Or Socket command text:

[setpara\[135\]=1;](#)

Web access URL:

[http://192.168.1.105/ setpara\[136\]=106;](http://192.168.1.105/ setpara[136]=106;)

Or Socket command text:

[setpara\[136\]=106;](#)

(3) Select output channel one of target BEM104 by:

Web access URL:

[http://192.168.1.105/ setpara\[173\]=1;](http://192.168.1.105/ setpara[173]=1;)

Or Socket command text:

[setpara\[173\]=1;](#)

5.2 X-Connect Map Parameter List

All eight X-Connect channels can be setup by the following parameter list:

Parameter Nr.	X-Connect Channel	Para Name	Description	Range
102	1	VWSL1	X-Connect CH1 input select	1 ~ 8
103	2	VWSL2	X-Connect CH2 input select	1 ~ 8
104	3	VWSL3	X-Connect CH3 input select	1 ~ 8
105	4	VWSL4	X-Connect CH4 input select	1 ~ 8
106	5	VWSL5	X-Connect CH5 input select	1 ~ 8
107	6	VWSL6	X-Connect CH6 input select	1 ~ 8
108	7	VWSL7	X-Connect CH7 input select	1 ~ 8
109	8	VWSL8	X-Connect CH8 input select	1 ~ 8
110	9	VWSL9	X-Connect CH9 input select	1 ~ 8
111	10	VWSL10	X-Connect CH10 input select	1 ~ 8
133	1	VWSIP11	X-Connect CH1 target IP 1	0 ~ 255
134	1	VWSIP12	X-Connect CH1 target IP 2	0 ~ 255
135	1	VWSIP13	X-Connect CH1 target IP 3	0 ~ 255
136	1	VWSIP14	X-Connect CH1 target IP 4	0 ~ 255
137	2	VWSIP21	X-Connect CH2 target IP 1	0 ~ 255
138	2	VWSIP22	X-Connect CH2 target IP 2	0 ~ 255
139	2	VWSIP23	X-Connect CH2 target IP 3	0 ~ 255
140	2	VWSIP24	X-Connect CH2 target IP 4	0 ~ 255
141	3	VWSIP31	X-Connect CH3 target IP 1	0 ~ 255
142	3	VWSIP32	X-Connect CH3 target IP 2	0 ~ 255
143	3	VWSIP33	X-Connect CH3 target IP 3	0 ~ 255

144	3	VWSIP34	X-Connect CH3 target IP 4	0 ~ 255
145	4	VWSIP41	X-Connect CH4 target IP 1	0 ~ 255
146	4	VWSIP42	X-Connect CH4 target IP 2	0 ~ 255
147	4	VWSIP43	X-Connect CH4 target IP 3	0 ~ 255
148	4	VWSIP44	X-Connect CH4 target IP 4	0 ~ 255
149	5	VWSIP51	X-Connect CH5 target IP 1	0 ~ 255
150	5	VWSIP52	X-Connect CH5 target IP 2	0 ~ 255
151	5	VWSIP53	X-Connect CH5 target IP 3	0 ~ 255
152	5	VWSIP54	X-Connect CH5 target IP 4	0 ~ 255
153	6	VWSIP61	X-Connect CH6 target IP 1	0 ~ 255
154	6	VWSIP62	X-Connect CH6 target IP 2	0 ~ 255
155	6	VWSIP63	X-Connect CH6 target IP 3	0 ~ 255
156	6	VWSIP64	X-Connect CH6 target IP 4	0 ~ 255
157	7	VWSIP71	X-Connect CH7 target IP 1	0 ~ 255
158	7	VWSIP72	X-Connect CH7 target IP 2	0 ~ 255
159	7	VWSIP73	X-Connect CH7 target IP 3	0 ~ 255
160	7	VWSIP74	X-Connect CH7 target IP 4	0 ~ 255
161	8	VWSIP81	X-Connect CH8 target IP 1	0 ~ 255
162	8	VWSIP82	X-Connect CH8 target IP 2	0 ~ 255
163	8	VWSIP83	X-Connect CH8 target IP 3	0 ~ 255
164	8	VWSIP84	X-Connect CH8 target IP 4	0 ~ 255
165	9	VWSIP91	X-Connect CH9 target IP 1	0 ~ 255
166	9	VWSIP92	X-Connect CH9 target IP 2	0 ~ 255
167	9	VWSIP93	X-Connect CH9 target IP 3	0 ~ 255
168	9	VWSIP94	X-Connect CH9 target IP 4	0 ~ 255
169	10	VWSIP101	X-Connect CH10 target IP 1	0 ~ 255
170	10	VWSIP102	X-Connect CH10 target IP 2	0 ~ 255
171	10	VWSIP103	X-Connect CH10 target IP 3	0 ~ 255
172	10	VWSIP104	X-Connect CH10 target IP 4	0 ~ 255
173	1	VWSR1	X-Connect CH1 output select	1 ~ 8
174	2	VWSR2	X-Connect CH2 output select	1 ~ 8
175	3	VWSR3	X-Connect CH3 output select	1 ~ 8
176	4	VWSR4	X-Connect CH4 output select	1 ~ 8
177	5	VWSR5	X-Connect CH5 output select	1 ~ 8
178	6	VWSR6	X-Connect CH6 output select	1 ~ 8
179	7	VWSR7	X-Connect CH7 output select	1 ~ 8
180	8	VWSR8	X-Connect CH8 output select	1 ~ 8
181	9	VWSR9	X-Connect CH9 output select	1 ~ 8
182	10	VWSR10	X-Connect CH10 output select	1 ~ 8

6. Modbus-TCP

Modbus-TCP is supported by relay module. Standard Modbus-TCP is implemented at port number 502. The Modbus-TCP address table is as following:

Address	Ch	Function Code	Description	Access
00000	1	05	Relay 1 output control	Write/Read
00000	1	02	Input 1 status read	Read

To look into Modbus-TCP frame structure or create your own Modbus-TCP program, here are the detailed message frame for each command:

To switch on relay channel 1 output

Ethernet frame: 0x05 0x00 0x00 0xFF 0x00

To switch off relay channel 1 output

Ethernet frame: 0x05 0x00 0x00 0x00 0x00

To read input channel 1 status

Ethernet frame: 0x02 0x00 0x00 0x00 0x01

7. Fast Program Reference

7.1 Easybus Specifications

EasyBus use more friendly language to control the relay module. With "easy to understand" grammar and similarity to OS command lines, it's extremely easy to work with it. Read the following materials and you will be ready to go with every detail in 10 minutes.

Not like any other field bus, you don't need to be an expert of automation or learn programming to use it. This saves time for many people who wants to focus on more creative works, and they can start to create application with BEM105 immediately, rather than spend lots of time on learning the old-fashioned and very detailed industry automation communication protocol before they can really start to do anything.

How to send a correct switch command?

Example - switch on relay channel 1:

K01 = 1;

Example – set parameter 65, to value 1000:

setpara[65] = 1000;

Example – read parameter 65 (value will be returned in module reply):

getpara[65] = 1;

Parameter list

In BEM105, there are many parameters for controlling the behavior of module. The following table is the general description of all parameters available and their functionality:

No.	Name	Functionality
000	-	Reserved parameter default value: - range: -
001	-	Reserved parameter default value: - range: -
002	GW1	module gate way address 1 default value: 192 range: 0 – 255
003	GW2	module gate way address 2 default value: 168 range: 0 – 255
004	GW3	module gate way address 3 default value: 1 range: 0 – 255

005	GW4	module gate way address 4 default value: 1 range: 0 – 255
006	SN1	module subnet mask 1 default value: 255 range: 0 – 255
007	SN2	module subnet mask 2 default value: 255 range: 0 – 255
008	SN3	module subnet mask 3 default value: 255 range: 0 – 255
009	SN4	module subnet mask 3 default value: 0 range: 0 – 255
010	SIP1	module IP address 1 default value: 192 range: 0 – 255
011	SIP2	module IP address 2 default value: 168 range: 0 – 255
012	SIP3	module IP address 3 default value: 1 range: 0 – 255
013	SIP4	module IP address 4 default value: 105 range: 0 – 255
014	-	Reserved parameter default value: - range: -
015	-	Reserved parameter default value: - range: -
016	-	Reserved parameter default value: - range: -
017	Reboot	reboot module, 0 = none reboot, 1 = reboot start default value: 0 range: 0 – 1
018	DHCP	DHCP functionality, 0 = static IP mode, 1 = DHCP mode default value: 0 range: 0 – 1
019	PWEN	Password enable, 0 = password disable, 1 = password disable default value: 0

		range: 0 – 1
020	WEBPORT	http port default value:80 range: 0 – 65535
021	-	Reserved parameter default value: - range: -
022	-	Reserved parameter default value: - range: -
023	-	Reserved parameter default value: - range: -
024	-	Reserved parameter default value: - range: -
025	-	Reserved parameter default value: - range: -
026	-	Reserved parameter default value: - range: -
027	-	Reserved parameter default value: - range: -
028	-	Reserved parameter default value: - range: -
029	K1U1	Relay K1 timer T1 unit selector, 0 = ms, 1 = second default value: 0 range: 0 – 1
030	K1U2	Relay K1 timer T2 unit selector, 0 = ms, 1 = second default value: 0 range: 0 – 1
031	K2U1	Relay K2 timer T1 unit selector, 0 = ms, 1 = second default value: 0 range: 0 – 1
032	K2U2	Relay K2 timer T2 unit selector, 0 = ms, 1 = second default value: 0 range: 0 – 1
033	-	Reserved parameter default value: - range: -
034	-	Reserved parameter

		default value: - range: -
035	-	Reserved parameter default value: - range: -
036	-	Reserved parameter default value: - range: -
037	-	Reserved parameter default value: - range: -
038	-	Reserved parameter default value: - range: -
039	-	Reserved parameter default value: - range: -
040	-	Reserved parameter default value: - range: -
041	-	Reserved parameter default value: - range: -
042	-	Reserved parameter default value: - range: -
043	-	Reserved parameter default value: - range: -
044	-	Reserved parameter default value: - range: -
045	-	Reserved parameter default value: - range: -
046	-	Reserved parameter default value: - range: -
047	-	Reserved parameter default value: - range: -
048	-	Reserved parameter default value: - range: -

049	-	Reserved parameter default value: - range: -
050	-	Reserved parameter default value: - range: -
051	-	Reserved parameter default value: - range: -
052	-	Reserved parameter default value: - range: -
053	-	Reserved parameter default value: - range: -
054	-	Reserved parameter default value: - range: -
055	-	Reserved parameter default value: - range: -
056	-	Reserved parameter default value: - range: -
057	-	Reserved parameter default value: - range: -
058	-	Reserved parameter default value: - range: -
059	-	Reserved parameter default value: - range: -
060	-	Reserved parameter default value: - range: -
061	-	Reserved parameter default value: - range: -
062	-	Reserved parameter default value: - range: -
063	-	Reserved parameter default value: -

		range: -
064	-	Reserved parameter default value: - range: -
065	K1T1	Relay K1 timer T1 value default value: 1000 range: 0 - 65535
066	K1T2	Relay K1 timer T2 value default value: 1000 range: 0 - 65535
067	K2T1	Relay K2 timer T1 value default value: 1000 range: 0 - 65535
068	K2T2	Relay K2 timer T2 value default value: 1000 range: 0 - 65535
069	-	Reserved parameter default value: - range: -
070	-	Reserved parameter default value: - range: -
071	-	Reserved parameter default value: - range: -
072	-	Reserved parameter default value: - range: -
073	-	Reserved parameter default value: - range: -
074	-	Reserved parameter default value: - range: -
075	-	Reserved parameter default value: - range: -
076	-	Reserved parameter default value: - range: -
077	-	Reserved parameter default value: - range: -
078	-	Reserved parameter

		default value: - range: -
079	-	Reserved parameter default value: - range: -
080	-	Reserved parameter default value: - range: -
081	-	Reserved parameter default value: - range: -
082	-	Reserved parameter default value: - range: -
083	-	Reserved parameter default value: - range: -
084	-	Reserved parameter default value: - range: -
085	-	Reserved parameter default value: - range: -
086	-	Reserved parameter default value: - range: -
087	-	Reserved parameter default value: - range: -
088	-	Reserved parameter default value: - range: -
089	-	Reserved parameter default value: - range: -
090	-	Reserved parameter default value: - range: -
091	-	Reserved parameter default value: - range: -
092	-	Reserved parameter default value: - range: -

093	-	Reserved parameter default value: - range: -
094	-	Reserved parameter default value: - range: -
095	WANEN	Internet function enable, 0 = disable, 1 = enable default value: 1 range:0 – 1
096	-	Reserved parameter default value: - range: -
097	NAME	Device name, max 18 characters default value: BEM105 range: -
098	FMVER	Device firmware version default value: - range: -
099	DEVTYP	Device model type default value: 107 range: -
100	DEVSN	Device serial number default value: - range: -
101	PIP1-1	Ping monitor 1 IP address 1 default value: 192 range: 0 – 255
102	PIP1-2	Ping monitor 1 IP address 2 default value: 168 range: 0 – 255
103	PIP1-3	Ping monitor 1 IP address 3 default value: 1 range: 0 – 255
104	PIP1-4	Ping monitor 1 IP address 4 default value: 1 range: 0 – 255
105	PIP2-1	Ping monitor 2 IP address 1 default value: 192 range: 0 – 255
106	PIP2-2	Ping monitor 2 IP address 2 default value: 168 range: 0 – 255
107	PIP2-3	Ping monitor 2 IP address 3 default value: 1

		range: 0 – 255
108	PIP2-4	Ping monitor 2 IP address 4 default value: 1 range: 0 – 255
109	-	Reserved parameter default value: - range: -
110	-	Reserved parameter default value: - range: -
111	-	Reserved parameter default value: - range: -
112	-	Reserved parameter default value: - range: -
113	-	Reserved parameter default value: - range: -
114	-	Reserved parameter default value: - range: -
116	-	Reserved parameter default value: - range: -
117	-	Reserved parameter default value: - range: -
118	-	Reserved parameter default value: - range: -
119	-	Reserved parameter default value: - range: -
120	-	Reserved parameter default value: - range: -
121	-	Reserved parameter default value: - range: -
122	-	Reserved parameter default value: - range: -
123	-	Reserved parameter

		default value: - range: -
124	-	Reserved parameter default value: - range: -
125	-	Reserved parameter default value: - range: -
126	-	Reserved parameter default value: - range: -
127	-	Reserved parameter default value: - range: -
128	-	Reserved parameter default value: - range: -
129	-	Reserved parameter default value: - range: -
130	-	Reserved parameter default value: - range: -
131	-	Reserved parameter default value: - range: -
132	-	Reserved parameter default value: - range: -
133	PNAME1	Ping monitor 1 domain name, max 55 characters default value: www.example1.com range: -
134	PNAME2	Ping monitor 2 domain name, max 55 characters default value: www.example2.com range: -
135	-	Reserved parameter default value: - range: -
136	-	Reserved parameter default value: - range: -
137	-	Reserved parameter default value: - range: -

138	-	Reserved parameter default value: - range: -
139	-	Reserved parameter default value: - range: -
140	-	Reserved parameter default value: - range: -
141	PCODE1	Ping monitor 1 reboot program code, max 55 characters default value: K01=1;WAIT=5;K01=0; range: -
142	PCODE2	Ping monitor 2 reboot program code, max 55 characters default value: K02=1;WAIT=5;K02=0; range: -
143	-	Reserved parameter default value: - range: -
144	-	Reserved parameter default value: - range: -
145	-	Reserved parameter default value: - range: -
146	-	Reserved parameter default value: - range: -
147	-	Reserved parameter default value: - range: -
148	-	Reserved parameter default value: - range: -
149	PSEL1	Ping monitor 1 mode selector, 0 = fixed IP mode, 1 = DNS mode default value: 0 range: 0 – 1
150	PSEL2	Ping monitor 2 mode selector, 0 = fixed IP mode, 1 = DNS mode default value: 0 range: 0 – 1
151	-	Reserved parameter default value: - range: -
152	-	Reserved parameter default value: -

		range: -
153	-	Reserved parameter default value: - range: -
154	-	Reserved parameter default value: - range: -
155	-	Reserved parameter default value: - range: -
156	-	Reserved parameter default value: - range: -
157	PFTRY1	Ping monitor 1 max allowed no response failure times before reboot default value: 3 range: 0 – 65535
158	PFTRY2	Ping monitor 2 max allowed no response failure times before reboot default value: 3 range: 0 – 65535
159	-	Reserved parameter default value: - range: -
160	-	Reserved parameter default value: - range: -
161	-	Reserved parameter default value: - range: -
162	-	Reserved parameter default value: - range: -
163	-	Reserved parameter default value: - range: -
164	-	Reserved parameter default value: - range: -
165	PDT1	Ping monitor 1 delay timer after reboot default value: 1000 range: 0 – 65536
166	PDT2	Ping monitor 2 delay timer after reboot default value: 1000 range: 0 – 65536
167	-	Reserved parameter

		default value: - range: -
168	-	Reserved parameter default value: - range: -
169	-	Reserved parameter default value: - range: -
170	-	Reserved parameter default value: - range: -
171	-	Reserved parameter default value: - range: -
172	-	Reserved parameter default value: - range: -
173	PDU1	Ping monitor 1 delay timer unit selector after reboot, 0 = ms, 1 = second default value: 0 range: 0 – 1
174	PDU2	Ping monitor 2 delay timer unit selector after reboot, 0 = ms, 1 = second default value: 0 range: 0 – 1
175	-	Reserved parameter default value: - range: -
176	-	Reserved parameter default value: - range: -
177	-	Reserved parameter default value: - range: -
178	-	Reserved parameter default value: - range: -
179	-	Reserved parameter default value: - range: -
180	-	Reserved parameter default value: - range: -
181	PCTRL1	Ping monitor 1 control word, 0 = stop, 1 = start default value: 0 range: 0 – 1

182	PCTRL2	Ping monitor 2 control word, 0 = stop, 1 = start default value: 0 range: 0 – 1
183	-	Reserved parameter default value: - range: -
184	-	Reserved parameter default value: - range: -
185	-	Reserved parameter default value: - range: -
186	-	Reserved parameter default value: - range: -
187	-	Reserved parameter default value: - range: -
188	-	Reserved parameter default value: - range: -

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