

W&T

www.WuT.de

Manual

Startup and application

Microwall

Valid for the following models:

#55411: Microwall Bridge

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Irrtum und Änderung vorbehalten:

Since we can make mistakes, none of our statements may be used unchecked. Please report any errors or misunderstandings you become aware of so that we can identify and correct them as quickly as possible.

Only carry out work on or with W&T products if you are described here and have read and understood the instructions completely. Unauthorized action can cause dangers. We are not liable for the consequences of arbitrary action. In case of doubt, please ask us or your dealer again!

This device contains software components that are licensed under one or more open source licenses. Copies of these licenses are included in the appendix of this document as well as the following website where the corresponding source code can also be downloaded free of charge.

<http://www.wut.de/e-5www-60-inus-000.php>

You can also obtain the source text from us in the form of a data carrier at cost price for a period of three years after the last delivery. Please contact us for this purpose at info@wut.de.

This offer applies to every recipient of this information.

Introduction

The Microwall Bridge is an industrial Ethernet bridge with two 1000BaseT network ports and integrated, whitelist-based firewall. Similar to router solutions, it connects a network island, e.g. with automation components, to a higher-level local network, whereby both network sides remain in the same IP network area. Nevertheless, suitable filter rules at the TCP/IP level protect the participants from unauthorized, unwanted and harmful communication.

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1 Legal information and safety

1.1 Legal notices

Warning concept

This manual contains notices that must be observed for your personal safety as well as to prevent damage to equipment. The notices are emphasized using a warning sign. Depending on the hazard level the warning notices are shown in decreasing severity as follows.

DANGER

Indicates a hazard which results in death or severe injury if no appropriate preventive actions are taken.

WARNING

Indicates a hazard which results in death or severe injury if no appropriate preventive actions are taken.

CAUTION

Indicates a hazard that can result in slight injury if no appropriate preventive actions are taken.

NOTE

Indicates a hazard which can result in equipment damage if no appropriate preventive actions are taken.

If more than one hazard level pertains, the highest level of warning is always used. If the warning sign is used in a warning notice to warn of personal injury, the same warning notice may have an additional warning of equipment damage appended.

Qualified personnel

The product described in this manual may be installed and placed in operation only by personnel who are qualified for the respective task.

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The documentation associated with the respective task must be followed, especially the safety and warning notices contained therein.



Qualified personnel are defined as those who are qualified by their training and experience to recognize risks when handling the described products and to avoid possible hazards.

Disposal

Electronic equipment may not be disposed of with normal waste, but rather must be brought to a proper electrical scrap processing facility.

The complete declarations of conformity for the devices described in the instructions can be found on the respective Internet data sheet page on the W&T homepage at <http://www.wut.de>.

Symbols on the product

Symbol	Explanation
	CE mark The product conforms to the requirements of the relevant EU Directives.
	WEEE mark The product may not be disposed of with normal waste, but rather in accordance with local disposal regulations for electrical scrap.

1.2 Safety notices

General notices

This manual is intended for the installer of the Microwall described in the manual and must be read and understood before starting work. The devices are to be installed and put in operation only by qualified personnel.

Intended use

DANGER

The Microwall Bridge is an industrial IPv4 bridge with two 1000BaseT network ports and integrated, whitelist-based firewall. It connects a network island to a superordinate local network. Suitable filter rules on TCP/IP level protect all networks from unauthorized, unwanted and harmful communication.

Any other use or modification of the described devices is not intended.

Electrical safety

WARNING

Before beginning any kind of work on the Microwall you must completely disconnect it from power. Be sure that the device cannot be inadvertently turned on again!

The Microwall may be used only in enclosed and dry rooms.

The device should not be subjected to high ambient temperatures or direct sunlight, and it should be kept away from heat sources. Please observe the limits with respect to maximum ambient temperature.

Ventilation openings must be clear of any obstacles. A distance of 10-15 cm between the Microwall and nearby heat sources must be maintained.

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Input voltage and output currents must not exceed the rated values in the specification.

When installing be sure that no stray wires stick out through the ventilation slit of the Microwall into the housing. Ensure that no individual wires stand off from leads, that the lead is fully contained in the clamp and that the screws are tightly fastened. Fully tighten screws on unused terminals.

The power supply used for the Microwall must absolutely ensure safe isolation of the low-voltage side from the supply mains according to EN62368-1 and must have "LPS" designation.

EMV

⚠NOTE

Only shielded network cables may be used for connecting the Microwall to the network.

In this case the Microwall meet the noise immunity limits for industrial applications and the stricter emissions limits for households and small businesses. Therefore there are no EMC-related limitations with respect to the usability of the devices in such environments.

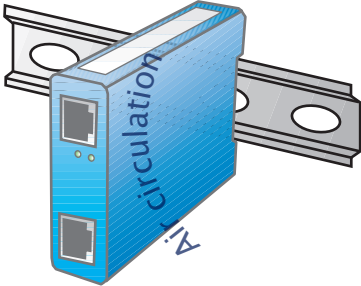
The complete Declarations of Conformity for the devices described in the manual can be found on the corresponding Internet page at the W&T homepage: <http://www.wut.de>.

2 Hardware, interfaces and displays

- Hardware installation
- Power supply
- Network interfaces
- Service button

2.1 Hardware installation

The Microwall is mechanically designed for mounting on a standard DIN rail. In this case, as well as with alternative mounting methods, the outlined air circulation must be guaranteed.



i *The installation site must be adapted to the security requirements of the respective system environment. Physical access to the Microwall enables a potential attacker to take the device out of operation or to replace the password via the service button.*

2.2 Power supply

The power supply of the Microwall is alternatively via PoE or an external power supply. Simultaneous connection of both power supplies is not permitted. The current consumption can be taken from the technical data.

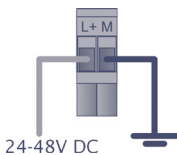
2.2.1 PoE- supply

The Microwall can be supplied via the interface *Network 1* (yellow) via PoE according to IEEE802.3af. It is a PoE power class 2 device (power consumption from 3.84W to 6.49W).

2.2.2 External power supply

As an alternative to the PoE supply, the Microwall can be supplied externally via the pluggable screw terminal located on the underside of the housing. The DC voltage used must be within the following range and the polarity must be observed:

- DC voltage: 24V (-10%) - 48V (+10%)



⚠WARNING

Only a floating power supply unit may be used for the external supply of the Microwall. Its reference ground for the output voltage must not have a direct connection to the protective conductor.

The power supply unit used to supply the Microwall must guarantee a safe separation of the low voltage side from the supply network according to EN62368-1 and must have „LPS“ characteristics.

2.3 Network Interfaces

The Microwall has two network interfaces: Network 1 (yellow) and Network 2 (green).



Network 1 (yellow) is used for connection to the higher-level network in which the island network is to be integrated at the *Network 2* (green) connection.

Commissioning with the factory settings and a possible supply via PoE is only possible via *Network 1* (yellow).

2.3.1 Gigabit Ethernet Features

Both Gigabit Ethernet connections have the following features:

RJ45 jack, shielded

Connections to the network infrastructure are via shielded patch cables with a maximum length of 100m

Autocrossing / Auto MDI-X

The transmit/receive lines of the connected device are automatically detected. Both 1:1 wired and crossed patch cables can be used.

Galvanic isolation

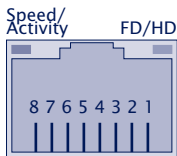
There is an electrical isolation of at least 500Vrms from the supply voltage

Auto-Negotiation

The transmission speed and duplex method are automatically negotiated with the connected device. To avoid problems such as duplex mismatch, we recommend that the connected devices are also operated in auto-negotiation mode.

2.3.2 Link state

The link status is indicated by LEDs integrated in the RJ45 sockets.



Speed/Activity (green/orange)

Green = 1000MBit/s Link

Green flashing = 1000MBit/s Link und Datenverkehr

Orange = 100MBit/s Link

Orange blinken = 100MBit/s Link and data traffic

FD/HD (yellow)

ON = Full duplex

OFF = Half duplex

2.4 System and Error LED



System LED

Service LED

2.4.1 System LED 🟢 (green)

ON: Signals normal operational readiness.

Flashing: The Microwall performs a reboot or receives a new firmware.

2.4.2 Service LED 🔴 (red)

The service LED is used to signal the *emergency access* and *factory default reset* functions that can be controlled via the service button.

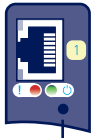
Slow flashing: The service button was pressed between 3.5s and 10s. The emergency access of the Microwall is activated.

Further information on emergency access can be found in the chapter on *emergency access*.

i *The emergency access opens a non-password-protected HTTPS access (TCP port 446) with the possibility to overwrite the current password. Therefore, only start the emergency access in an appropriately secure environment (e.g. direct connection to a configuration PC).*

Fast flashing: The service button was pressed for longer than 10s and the Microwall is preparing a reset to the factory settings. If the service button is still pressed, a reset to the factory settings is performed after a total of 20s.

2.5 Service button



Service button

The service button is accessible recessed on the front side of the Microwall to avoid operating errors. It is operated with a suitable, pointed object (e.g. paper clip).

The following actions are triggered via the service button:

Reset/Restart

Pressing the button briefly between 0.2 and 3.5s triggers a restart of the Microwall.

Starting the emergency access

After pressing the button for more than 3.5s, the error LED starts flashing slowly. If the button is released during this phase and before 10s have elapsed, the emergency access of the Microwall is activated on both network connections via TCP port 446. Pressing the button again briefly performs a reset and ends the emergency access.


Further information on emergency access can be found in the chapter *emergency access*.

i *The emergency access opens a non-password-protected HTTPS access (TCP port 446) with the possibility to overwrite the current password. Therefore, only start the emergency access in an appropriately secure environment (e.g. direct connection to a configuration PC).*

Reset to factory settings

If the service button is pressed for more than 10s, the service LED starts flashing rapidly and signals preparation for a factory default reset. If the button is held down further, the Microwall is reset to the factory default after 20s. Releasing the service button while the service LED is flashing rapidly (time window 10-20s) will cause the factory default reset to be

aborted. The Microwall continues with the standard operation of the current configuration.

 *A reset to the factory setting causes all settings (filter rules, IP parameters, log files, etc.) to be lost. Recommissioning must be carried out as described in the chapter Start-up.*

3 Start-up

The commissioning of the can only be done via the interface *Network 1* (yellow). In the first step, the IP address required for initial access is assigned. Subsequent browser access leads to the initial web page for configuration of the basic parameters required for operation, including the system password.


- IP assignment via DHCP
- Setting the IP address with the WuTility management tool
- Changing the IP parameters via Web-Based Management
- Initial access via browser

3.1 IP assignment via DHCP

In network environments with DHCP support and a dynamic address pool, the Microwall automatically receives the following basic IP parameters via the *Network 1* port.

- IP address
- Subnet mask
- Gateway address
- DNS server

The additional parameters required for the initial commissioning are set with the help of a browser after the IP assignment via the initial web page. For more information, refer to the chapter *Initial Web Page*.


 *When the interface Network 1 is connected to the network, the initial web page for assigning the system password is accessible via the default IP or the IP address assigned via WuTility or DHCP. Make sure that no unauthorized access to the Microwall occurs until the password is assigned on the initial web page (e.g. by commissioning with a direct connection to the respective PC).*

3.2 Initial assignment of IP parameters with WuTility

From version 4.52, the Windows tool *WuTility* supports the inventory and management of the basic network parameters of the Microwall

- IP address
- Subnet mask
- Gateway address
- DNS server

WuTility versions ≥ 4.52 must be used.

 *When the interface Network 1 is connected to the network, the initial web page for assigning the system password can be reached via the default IP or the IP address assigned via WuTility. Make sure that no unauthorized access to the Microwall occurs until the password is assigned on the initial web page (e.g. by commissioning with a direct connection to the respective PC).*

To assign the IP address with WuTility, the PC and the Interface *Network 1* of the Microwall must be located in the same physical network.

Installing WuTility

The download link for the Windows installation package of the latest version of *WuTility* can be found on our website

<https://www.wut.de/wutility>

After the installation the start takes place via

Start → *Programs* → *Wutility Version 4* → *WuTility*

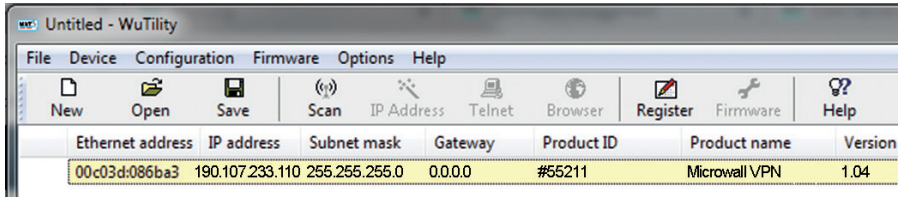
Start of the assignment dialog

Make sure that the Interface *Network 1* of the Microwall VPN and the computer used are connected to the same physical network. When starting *WuTility* automatically scans the local network for connected W&T network devices and creates an

inventory list. This search process can be repeated as often as required by pressing the Scan button:



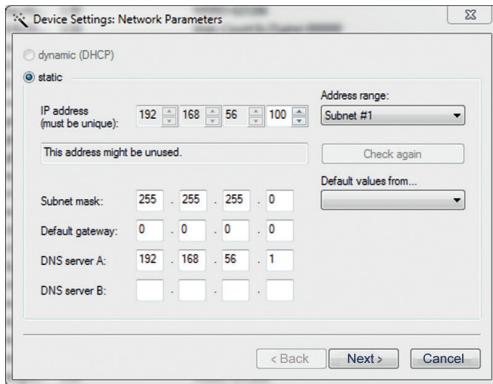
Within the inventory list, the desired Microwall can be identified via its MAC address. The default IP address is 190.107.233.110.



Select the desired Microwall and then press the *IP address* button:



Enter the desired values for IP address, subnet mask, gateway and DNS server.



When you click *Next*, the network parameters are saved by the Microwall.

The IP assignment with WuTility can be repeated until the Microwall has received a system password via the initial web page. Afterwards, the IP parameters can only be changed

using standard web-based management.

The additional parameters required for initial commissioning are set via an initial web page using a browser. For more information, refer to the chapter *Initial Web Page*.

3.3 Start-up via the default IP address

In the delivery state and after a reset to the factory settings, the default IP address of the interface *Network 1* is 190.107.233.110.

i *When the interface Network 1 is connected to the network, the initial web page for assigning the system password can be reached via the default IP or the IP address assigned by WuTility. Make sure that no unauthorized access to the Microwall occurs until the password is assigned on the initial web page (e.g. by commissioning with a direct connection to the respective PC).*

i *The commissioning of several Microwalls via their default IP must take place one after the other. Only after one Microwall has received a new IP address may the next Microwall be connected to the network.*

On the computer side, the following requirement must be met:


- The network connection of the computer used must have an IP address in the range 190.107.233.0/24. Changing the IP address of the computer requires administrator rights. Clarify IP changes in advance with the responsible network administrator.

All other parameters required for initial commissioning are then assigned via the initial web page using a browser. For more information, refer to the chapter *Initial Web Page*.

3.4 Initial web page

After the IP assignment, only the initial web page is available during the initial commissioning. Here, the password of the Microwall required for all further configuration accesses must be assigned.

Saving this initial web page does not involve any communication permissions. These must then be formulated in the form of explicit whitelist rules.

 *When the interface Network 1 is connected to the network, the initial web page for assigning the system password can be reached via the default IP or the IP address assigned by WuTility. Make sure that no unauthorized access to the Microwall occurs until the password is assigned on the initial web page (e.g. by commissioning with a direct connection to the respective PC).*

If the IP address was assigned using the *WuTility* tool, select the desired Microwall and click on the Browser button:



If access is to take place via the default IP address of the Microwall, start a browser on the PC prepared from an IP viewpoint. Enter the following URL in the address line:
https://190.107.233.110

The Microwall is equipped ex works with a self-signed certificate. Corresponding warnings of the browser must be ignored and/or acknowledged when the initial web page is called. After commissioning, the default certificate can optionally be replaced by an individual certificate.

All settings of the initial web page can also be changed later via the standard web-based management.

Initialization

Login password

Login password	<input type="password" value="Password *"/> <input type="password" value="Repeat password *"/>
----------------	---

Network settings

IP settings	<input type="radio"/> DHCP <input checked="" type="radio"/> static IP address * 10.10.10.192 Subnet mask * 255.255.0.0 Default gateway 10.10.10.40
Network names	Network interface 1 * Network 1 Network interface 2 * Network 2 (Island)

Management services

WuTility management Enable access from: <input checked="" type="checkbox"/> Network 1 <input type="checkbox"/> Network 2 (Island)	<input checked="" type="checkbox"/> enable (UDP/8513)
WuTility firmware update Enable access from: <input checked="" type="checkbox"/> Network 1 <input type="checkbox"/> Network 2 (Island)	<input checked="" type="checkbox"/> enable (TCP/5555)

Configuration backup

Configuration backup	<input type="text" value="UPLOAD CONFIGURATION"/>
----------------------	---

Login password (mandatory)

Assign the password for all configuration/control accesses of the Microwall. We recommend passwords with a minimum length of 15 characters, consisting of upper and lower case letters, numbers and special characters. The maximum length of the password is 51 characters.

i There is no default or master password. A lost password can only be reset to the factory settings via the emergency access that can be activated by means of the service button or a reset.

IP settings

Define whether the Microwall works with a static IP address or whether the IP parameters are obtained via DHCP.

For static operation, assign the desired IP parameters in the corresponding input fields.

Network names (optional)

Assign free names for the two network ports of the bridge.

The names are only used for better comprehensibility during the configuration of the Microwall via the web interface. They have no meaning for the actual bridge operation.

WuTility management


Determine whether and via which of the two network ports the W&T management tool WuTility can inventory the Microwall. The service is UDP-based and uses port 8513.

WuTility firmware update

Determine whether and via which of the two network ports the W&T management tool WuTility can perform a firmware update of the Microwall. The service is TCP-based and uses port 5555.

Configuration backup

Allows you to upload a configuration backup previously secured by another Microwall. After the file has been successfully checked, its content is accepted and the Microwall operates with the new parameters after an automatic restart.

 *Backup files also contain the new IP address of the Microwall. To avoid an IP conflict, make sure that the original or a previously programmed Microwall is no longer connected to the network before uploading.*

For details on configuration backups, see the chapter *Up-/Downloading Configuration Backups*

4 Web based management

The configuration of the Microwall is only possible encrypted via HTTPS. The WBM (Web based management) works session-oriented. Changes made on the respective pages are immediately saved and validated by pressing the *Save* button.

■ Navigation within WBM

4.1 Start and navigation concept of the WBM

To access the WBM of the Microwall, you need an up-to-date Internet browser. Session-Cookies, Javascript and Websockets must be supported and activated.

The configuration is only possible encrypted via HTTPS. The standard port 443 is preconfigured ex works.

Start your browser and enter the IP address of the Microwall VPN and, if necessary, the port number to be used.

https://[IP address]:[Port no.]

4.1.1 Navigation concept of the Microwall

The WBM of the Microwall works session-oriented via a password protected login. Operation without password is not possible.

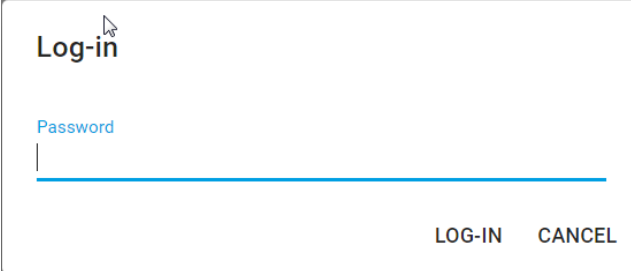
After login, any changes made are immediately applied by clicking the *Save* button on the respective page. If a restart of the Microwall is required to accept the parameters, a corresponding message is displayed after pressing *Save*.

To end a configuration session, click on the *Logout* button.

4.2 Login/Logout

The start page of the Microwall only offers the possibility to enter the password for login and to switch the interface language via the flag symbol.

4.2.1 Login

A screenshot of a login form. At the top left, the text "Log-in" is displayed in a bold, black font, with a mouse cursor hovering over it. Below this, the word "Password" is written in a light blue font above a horizontal blue input field. At the bottom right of the form, there are two buttons: "LOG-IN" and "CANCEL", both in a light blue font.

Enter the password and press the *Log in* button. After successful login the extended navigation tree with all configuration options is available.

i *To protect against brute force attacks, password entry is protected with an escalating timeout. After each incorrect password entry, the password can only be re-entered after a timeout that doubles with each attempt.*

4.2.2 Logout

To end a configuration session press the *Logout* button.

4.3 Help and description texts

If the individual configuration items are not self-explanatory, the assigned info symbols contain the necessary descriptions, explanations and notes.

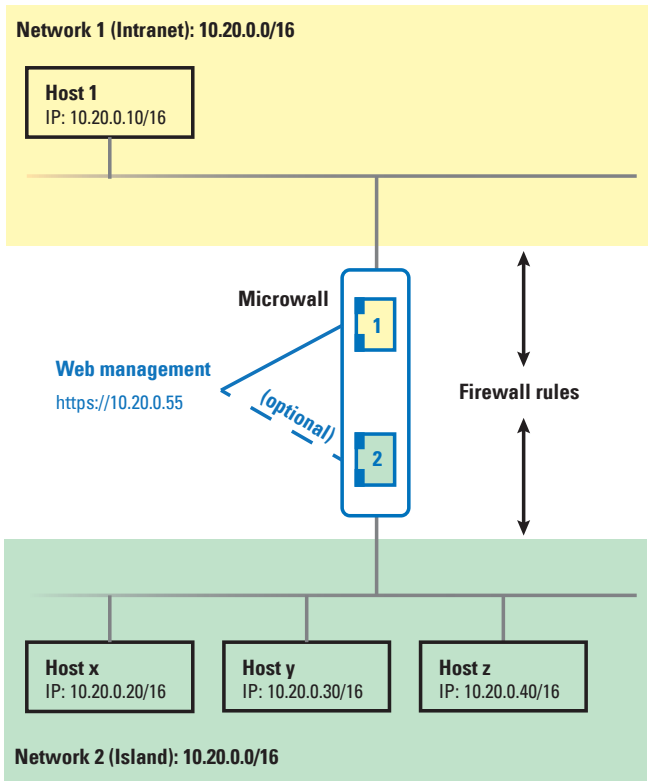
5 Bridge function and rule configuration

- Operation Mode Bridge
- Rule configuration and labels
- IP inventories

5.1 Mode Bridge

The Microwall Bridge separates a network island with one or more hosts at the Network 2 port from a surrounding or higher-level network at the Network 1 port. IP-based connections between hosts of the two network segments are only possible after explicit release by a corresponding rule of the integrated firewall.

All participants of the two network segments at the Microwall Bridge must be in the same subnet from an IP perspective. In contrast to routed solutions, this significantly simplifies subsequent segmentations in running networks. Time-consuming and error-prone changes to the connection settings in the applications or the devices and network components involved are not necessary.



After the initial startup via the initial web page, the Microwall is immediately in bridge mode and ready for the creation of sharing rules. No sharing rules are predefined at the factory, so initially no communication is possible across the Microwall.

ICMP behavior

To support commissioning and for diagnostic purposes, it is possible to release ICMP echo requests/replies (ping) depending on the direction in the menu branch *Basic settings* -> *Network*. The ICMP behavior of the management IP address of the Microwall is also configured here.

- Allow ICMP/ping to local interfaces
- Allow "Network 2 (Island)" -> "Network 1"
- Allow "Network 1" -> "Network 2 (Island)"

The Save button saves and activates the changes made.


Date and time







For a correct date/time indication in the log system the Microwall has an internal clock. In addition to the manual configuration, it is also possible to configure NTP time servers for synchronization in the menu branch *Basic settings* -> *Date and time*.







If the time servers are specified as host names, a DNS server must be configured in the IP settings of the microwall.

5.2 IP inventories

In the menu branch *Firewall Settings* -> *IP Address Inventory*, the Microwall provides a separate address inventory for each network. The configuration of the destination/source address(es) when creating firewall rules is always done from these address inventories.

LOG-OUT 

Network "Network 1" +				
<input type="checkbox"/>	IP address(es)	Name Description		In use
<input type="checkbox"/>	ANY	Any	1	 
<input type="checkbox"/>	192.168.10.1	DNS	1	 
<input type="checkbox"/>	192.168.10.254	Srv-1	0	 

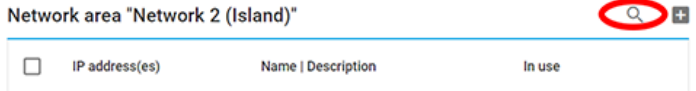
Network "Network 2 (Island)" 🔍 +				
<input type="checkbox"/>	IP address(es)	Name Description		In use
<input type="checkbox"/>	10.10.0.0/16	Subnet Island	3	 
<input type="checkbox"/>	10.10.0.78	SRV-2	3	 
<input type="checkbox"/>	10.10.0.200	hp switch	2	 

Inventory entries can consist of individual IP addresses, as well as areas or lists. The following entries are permitted:

- *any*
Keyword for any IP address
- *single IP address*
IP address in dot notation (e.g. 10.20.0.4)
- *Comma-separated IP address list*
List of IP addresses in dot notation (e.g. 10.10.10.1, 20.20.20.2)
- *IP range*
Continuous IP range in the form „from-to“ (e.g. 10.10.10.1 - 10.10.10.20)
- *IP- range CIDR notation*
CIDR listed IP range (e.g. 10.10.0.0/16)

5.2.1 Scan of Network 2

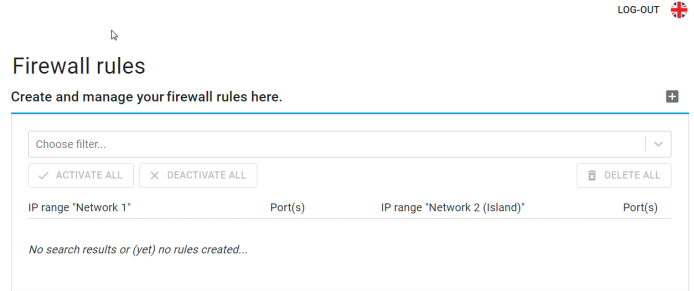
Using the magnifying glass in the area of *Network 2*, it is possible to search the island network for participants.



Newly found stations found during a scan can then be automatically added to the inventory list of *Network 2*.

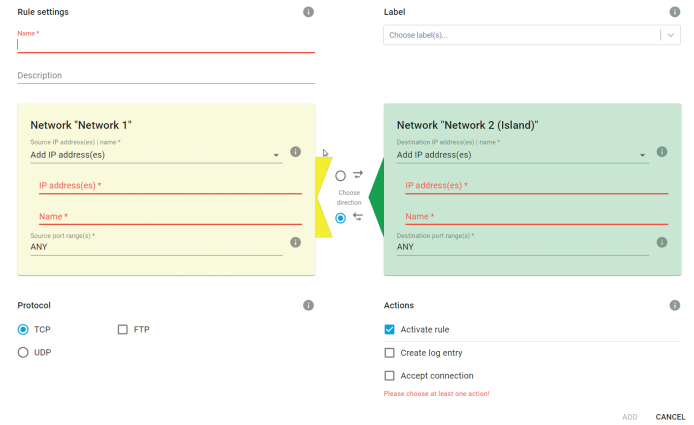
5.3 Creating firewall rules

Creating firewall rules is done on the page *Firewall settings* -> *Firewall rules*. The overview contains information about the existing rules with the possibility to activate and deactivate them using the respective slide switch.



The *Plus* button at the upper right edge of the table opens the dialog for creating new rules.

As soon as an input field is filled with a valid value, its frame color changes from red to blue. Saving the rule is only possible when all required fields are validly filled and blue.



Name

Freely assignable name of the rule.

Description

Optional additional description of the rule.

Label

For a more clearly arranged display or display filtering in the rule overview, one or more labels can be assigned to the rule. The labels Normal mode and Service are created ex works. The Label Inventory page can be used to create additional labels.

Direction

Clicking on the direction arrow sets the direction for the rule from the point of view of establishing a TCP connection. For UDP the direction is determined by the initial UDP datagram.

Network 1 (yellow) & Network 2 (green)

Configuration of the destination/source IP addresses and destination/source port numbers used for the rule. Which network the source or destination is on is determined dynamically by the selected direction of the rule.

The *destination IP address(es) | source IP addresses* can either be selected from the inventory lists via the select box or specified directly numerically. If specified numerically, the new host or address range is automatically transferred to the respective IP inventory for *Network1* or *Network2* with the name specified under *Name*.

Permissible entries and formats of addresses and address ranges:

- *any*
Keyword for any IP address
- *single IP address*
IP address in dot notation (e.g. 10.20.0.4)
- *Comma-separated IP address list*
List of IP addresses in dot notation (e.g. 10.10.10.1, 20.20.20.2)

- *IP range*
Continuous IP range in the form „from-to“ (e.g. 10.10.10.1 - 10.10.10.20)
- *IP- range CIDR notation*
CIDR listed IP range (e.g. 10.10.0.0/16)

Different input forms and concatenation of IP ranges within one input field are not possible. This means that „10.20.0.4, 10.20.0.10-10.20.0.20“ or „10.20.0.0/16, 10.10.0.0/16“ are invalid entries.

Permissible entries and formats of port numbers and port number ranges:

- *any*
Keyword for any port number
- *Single port number*
e.g. 8000
- *Comma-separated port number list*
e.g. 80,443,8000
- *Port number range*
e.g. 100-1000

Different input forms cannot be combined. This means, for example, „8000, 10-1000“ is an invalid input.

Protocol

Specifies whether the rule applies to TCP or UDP.

The TCP option *FTP* must be activated when the rule for FTP connections is formulated. Parallel TCP connections negotiated during the protocol process are automatically allowed and blocked.


UDP is a connectionless protocol which, however, often works on a request-reply principle (e.g. DNS). In these cases the option *Allow response in reverse direction* must be activated. The Microwall will automatically accept an incoming reply datagram within a timeout.

Actions

Activate rule activates the rule immediately after pressing the *Save* button. If the option is not set, the rule is created but not applied when you click *Save*. Data traffic according to the rule is not possible. The rule can also be activated later in the rule overview.

Create log entry creates an entry in the log file of the Microwall for each connection establishment according to the rule.

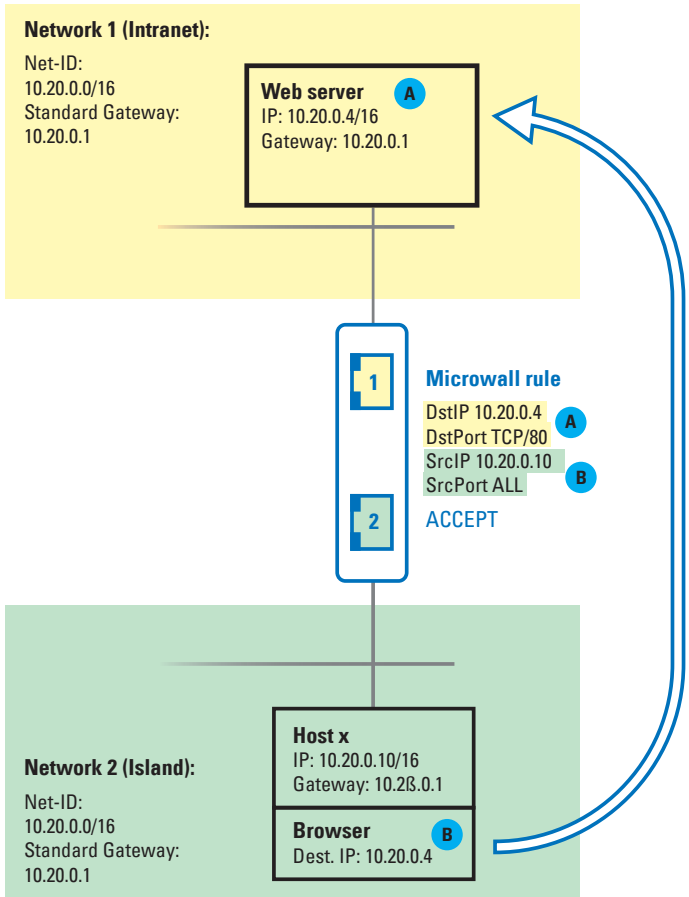
Accept connection allows the data traffic defined by the rule.

 *Rule examples for many standard applications can be found on our website at <https://www.wut.de/rule-examples>.*

5.6 Examples Firewall rule

5.6.1 Mode Standard router, Network 2 to Network 1

Island host **B** 10.20.0.10/16 at the *Network 2* port is to access the Intranet Web Server **A** 10.20.0.4/16, TCP/80 at the *Network 1* port via browser. For view filtering in the rule overview, the rule is marked with the label *Normal mode*.



The rule dialog to be filled out for this example:

The screenshot shows a rule configuration dialog with the following sections:

- Rule settings:**
 - Name: Example Web access
 - Description: (empty)
- Network "Network 1" (Source):**
 - Destination IP address(es) | name: Add IP address(es)
 - IP address(es): 10.20.0.4
 - Name: Intranet server
 - Destination port range(s): 80
- Network "Network 2 (Island)" (Destination):**
 - Source IP address(es) | name: Add IP address(es)
 - IP address(es): 10.20.0.10
 - Name: Island browser
 - Source port range(s): ANY
- Protocol:**
 - TCP
 - FTP
 - UDP
- Actions:**
 - Activate rule
 - Create log entry
 - Accept connection

Buttons: ADD, CANCEL

6 Security & Maintenance

- Security and operating notes
- Firmware updates
- Individual certificates
- Emergency access via service button
- Reset to factory defaults

6.1 Security notes

The following sections contain relevant notes and recommendations from an IT security perspective for commissioning, configuration, operation and maintenance of the Microwall.

6.1.1 Function

The Microwall Bridge is a small firewall designed as a bridge with two Ethernet ports. The typical application is to separate a network island from a higher-level intranet and only allow explicitly permitted connections via a whitelist-based firewall. The function of a network bridge means that both network sides are in the same IP subnet range.

6.1.2 Installation location

The installation location of the Microwall must ensure that no unauthorized physical access can occur (e.g. suitably secured room or network cabinet). Physical access to the Microwall entails the following risks, for example:

- Decommissioning of the device (removal of network cable, power supply ...) and loss of all connections to the participants of the island network
- Start emergency access of the Microwall via the service button and thus deactivate or change the password. An attacker gets full access to the management interface and is able to create or manipulate firewall rules.

6.1.3 Start-up

The start-up of a Microwall is divided into the assignment of an IP address with the WuTility tool and the subsequent call of the initial web page with the configuration of the password and the network-side basic parameters. Only after this step is access to the management interface of the Microwall protected by the password.

IP allocation and password assignment

During initial start-up, make sure that no unauthorized access to the Microwall occurs until the password is assigned on the initial web page. A suitable measure is, for example, to perform the commissioning steps via a point-to-point connection with the configuring computer. Only then is the Microwall connected to the target networks.

Password

The Microwall password is the central protection against unauthorized access to the configuration and management of the Microwall. We recommend the use of a secure password with a length of at least 15 characters consisting of upper and lower case letters, numbers and special characters.

Registration for security relevant information

Devices can be registered with W&T via the inventory tool. In case of security relevant updates and/or information you will be informed immediately by email. In addition to the personal data provided, device-specific data is also stored during registration.

6.1.4 Operation and configuration

Individual device certificate

Access to the Web-based management can only be encrypted via HTTPS. A self-signed default certificate is used ex works for this purpose, for which an exception must be set up in the browser used during commissioning. For access during operation, we recommend replacing the default certificate with an individual certificate of your own.

Deactivation of not needed services

With the factory settings, the Microwall provides the following incoming own services after commissioning:

Port/Socket number	Application	System-password?	Configurable/deactivatable?
443 (TCP)	HTTPS management	yes	yes/yes
8513 (UDP)	Inventory e.g. with WuTility	no	no/yes
5555 (TCP)	Firmware update with WuTility	yes	no/yes
446 (TCP)	HTTPS emergency access (only after manual activation via the service button)	no	no/yes
161 (UDP)	SNMPv2c/3 (only after activation via web management and read only)	yes (SNMPv3)	yes/yes

Configuration and activation/deactivation of these services is done in the menu tree under *Settings* -> *Network*. For each service it can be determined on which port it is available. For web-based management, the TCP port used can also be changed.

In environments with increased security requirements, it may make sense to deactivate some or all of these services after the communication rules have been set up during operation. For any changes that may become necessary at a later date, HTTPS access can be reactivated as required at any time via the emergency access accessible via the service button. (see chapter *Emergency access to the Microwall*).

Formulating the whitelist rules

The Microwall has no default rules for communication between the two network connections. When formulating rules,

we recommend that they be as concise as possible according to the need-to-know principle. For example, the use of a unicast address offers a higher level of security than an IP range.

Confidentiality of private keys

Asymmetric encryption with the corresponding public/private key pairs are used in the Microwall for the TLS protocol for web accesses. The private key of the Microwall cannot be read out.

6.1.5 Service and maintenance

Despite high quality standards, electronics can fail at any time, e.g. due to external events. Depending on the availability requirements of the respective application, we recommend taking appropriate precautions.

- Backup/storage of the device configuration
- Provision of a replacement unit if necessary
- Documentation of the procedure for exchanging devices


6.2 Up-/Download of configuration backups

On the *Maintenance* page, it is possible to save the current configuration of the Microwall or to write back a previously downloaded backup file.

Configuration or backup files contain not only the operative parameters (firewall rules, inventory lists, etc.) but also the data relevant for administrative access to the Microwall (IP parameters, system password, certificate, etc.). For this reason, backup files are encrypted and cannot be edited. For extended protection, we recommend that you also provide the file with an individual backup password. This password must then be known when uploading the file to a Microwall.

Download configuration

The *Download configuration* button starts the download of all current configuration parameters of the Microwall. If the file is to receive an individual backup password, this must be entered in the Backup Password field before the download.


 *Uploading a backup file with a password is only possible if you know this password. You should therefore save the password in a suitable form separately from the backup file.*

Upload configuration

Uploading a backup file is possible in two places:

- Standard WBM -> Maintenance
- Initial web page in the course of commissioning

If the backup file is protected with a password, this must be entered in the Backup Password field. The *Upload Configuration* button starts the file selection dialog and the transfer. After the file has been successfully checked, its contents are accepted and the Microwall operates with the new parameters after an automatic restart.

 *Backup files also contain the new IP address of the Microwall. To avoid an IP conflict, make sure that the original or a previously programmed Microwall is no longer connected to the network before uploading.*

6.3 Firmware updates

The firmware can be updated either using the WuTility management tool or via the web-based management of the Microwall.

6.3.1 Where is the latest firmware available?

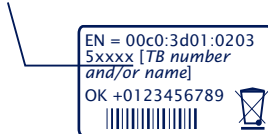
The latest firmware including the available update tools and a revision list is published on our website at the following address

<https://www.wut.de>

The easiest way to navigate from there is to use the search function on the page. First enter the type number of your device in the input field.

If you do not know the type number, you can find it on the sticker on the narrow side of the housing, which also contains the Ethernet address.

Type number




On the Microwall web data sheet, follow the *Firmware* link and start the download of the desired version. Before uploading to the Microwall, the actual firmware file must be unpacked from the zip archive.

6.3.2 Firmware update with WuTility

For the firmware update with WuTility, it must be installed on a Windows PC. Its IP settings must allow communication with the Microwall and its current IP parameters.

A prerequisite for firmware updates with WuTility is the activated update service to TCP/5555 in the Microwall. With the factory settings, the update with WuTility is only possible via the interface Network 1.

Web access

 enable

Enable access from:


Network 1

Network 2 (Island)

HTTPS port *

443

WuTility management


 enable (UDP/8513)

Enable access from:

Network 1

Network 2 (Island)


Firmware update

 enable (TCP/5555)

Enable access from:

Network 1

Network 2 (Island)

 *The network communication during the transmission of the system password and also the actual upload is encrypted and therefore confidential.*

To transfer the new firmware to the Microwall, select the desired Microwall in the WuTility inventory list and click on the *Firmware* button.



In the following dialog select the firmware file (*.uhd) to be transferred and click on the *Next* button. After the successful transfer, the Microwall decrypts the firmware file, checks the signature and writes the firmware to its internal flash. Finally, a restart is performed automatically and the Microwall is ready for operation again.

6.3.3 Firmware Update via Web-Based Management

In network environments that do not permit the use of WuTility or in which the update service in the Microwall has been deactivated for security reasons, the firmware update can be performed from the Web-based management.

Switch to the *Maintenance* page in the menu tree of the Microwall.

Maintenance

Trigger restarts and other maintenance tasks from here.

Restart	<input type="button" value="REBOOT DEVICE"/>
Restore	<input type="button" value="FACTORY DEFAULTS"/>
Service button features	<input checked="" type="checkbox"/> HTTPS emergency access <input checked="" type="checkbox"/> Reset to factory defaults
Firmware update	<input type="button" value="UPLOAD FILE"/> No file uploaded (yet)... Current firmware revision: 1.06 <input type="button" value="INSTALL UPDATE"/> <input type="button" value="DISCARD UPLOAD"/>
Configuration backup	Backup password <input type="button" value="UPLOAD CONFIGURATION"/> <input type="button" value="DOWNLOAD CONFIGURATION"/>

The *Upload File* button starts the selection dialog for the firmware file. Select here the previously downloaded and unzipped firmware file (*.uhd). After the upload, the *Install Update* button starts the actual installation of the new firmware.

6.4 Individual certificates

For security reasons, access to the web-based management of the Microwall is only possible in encrypted form using the HTTPS protocol.

The Microwall's self-signed certificate, which is pre-installed ex works, generates corresponding security warnings for current browsers. These must be acknowledged for WBM accesses and/or confirmed with suitable exception rules.

In network environments with increased security requirements, where these exceptions are not desired/allowed, the factory certificate can be replaced by an individual certificate.

Generation, signature and installation of an individual certificate are divided into the following rough steps:

- Generation of a CSR (Certificate Signing Request) with associated private key in the Microwall
- Download the CSR and external signature to a certificate by a trusted certificate authority.
- Upload and installation of the certificate into the Microwall

Navigate in the menu tree to the page *Basic settings* -> *Certificate*. In addition to information on the currently installed certificate, all functions for handling individual certificates are included here:

Create a Certificate Signing Request (CSR)

Fill in all the required information in the CSR form. The only mandatory field is the *Common Name*, under which the web pages of the Microwall VPN will later be called up in the browser. Additional names, IP addresses and also wildcard names can be entered under *Alternative Names*. The name entered in *Common Name* is automatically transferred to the *Alternative Names*.

By clicking on *Create*, the Microwall generates a pair of keys and creates a CSR from the information entered.

Installing a self-signed certificate

By clicking on *Install* under *Self-Signed Certificate*, the previously generated signing request can be provided with a self-signature. Browsers will display a corresponding security warning when the web pages are accessed.

Externally signed certificate

The generated signing request can be downloaded from the Microwall using the *Download* button for external signature. The download is in PEM format

After the signature by a trustworthy certification authority (CA), the certificate and any certificate chain that may be required can be loaded into the Microwall using the corresponding upload buttons. All files must be in PEM format.

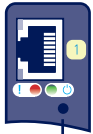
After a formal check, the certificate is integrated into the system by clicking on *Install* under *Externally signed certificate* and used for all web accesses.

Information and expiry of certificates

Under *Current certificate* you will find the file information of the current certificate and the certificate chain as well as the validity date.

6.5 Emergencies access to the Microwall

In case of a forgotten password or if web-based management has been deactivated for security reasons, emergency access can be activated via the recessed mounted service button on the front panel.



Service button

Start emergency access

Press the button with a suitable pointed object (e.g. paper clip) and keep it pressed until the error LED flashes slowly after approx. 3.5s. If you release the button now, the emergency access is activated.

The router/firewall function is completely retained in this state.

i *The emergency access activates a non-password-protected web page on the Microwall with the possibility to overwrite the current password. You should therefore take appropriate measures against unauthorized access in advance.*

Calling and function of the emergency access

Emergency access is provided by browser with HTTPS via TCP port 446:

`https://[IP address/hostname]:446`

Without a password request you can access the website with the following options:

Overwriting the current password

By activating the *Change password* option, you have the possibility to change the current password for access to the web management.

We recommend passwords with a minimum length of 15 cha-

Subject to error and alteration

acters, consisting of upper and lower case letters, numbers and special characters. The maximum length of the password is 51 characters.

Activating standard Web-Based Management

Under Management, define on which connection and under which port the web management of the Microwall should subsequently be accessible.

Terminating the emergency access

Changes are applied with a click on *Apply* and the Microwall restarts the affected services. Afterwards, access to the password-protected standard web interface is possible via the previously configured TCP port.

A click on *Cancel* discards any changes made and the Microwall restarts the required services. The password protected standard web interface can then be accessed via the configured TCP port.

6.6 Reset to default settings

A reset to the factory settings of the Microwall can be performed using the recessed mounted service button on the front panel.



Service button

Press the service button with a suitable pointed object (e.g. paper clip) and keep it pressed for at least 20s. After 3.5s the error LED starts flashing slowly and after approx. 10s it starts flashing fast. After a total of approx. 20s, the device is reset to the factory settings. If the service button is released while the service LED is flashing quickly within a time window of 10-20s, the factory default reset is aborted and the Microwall continues with standard operation according to the current configuration.

The reset is completed as soon as the system LED is permanently lit again. The Microwall must now be put into operation again. For more information, please refer to the chapter *Start-up*.

Appendix

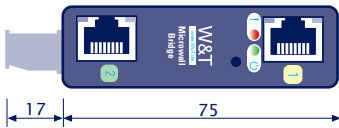
- Technical data and form factor
- Licenses

Technical data and form factor

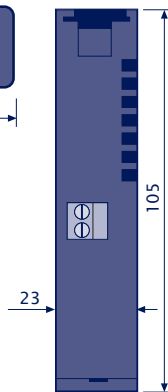
Microwall Bridge, #55411

Power supply ...	
Power-over-Ethernet:	37-57V DC from PSE
External power supply, screw terminal	DC 24-48V (+/-10%)
Current consumption ...	
Power-over-Ethernet:	PoE Class 2 (3,84 W - 6,49W)
Ext. supply	typ. 150mA@24V DC max. 200mA@24V DC
Galvanic isolation	Network interfaces: min 500V
LAN-Port Network 1	10/100/1000BaseT, RJ45, au- tosensing, autocrossing, PoE
LAN-Port Network 2	10/100/1000BaseT, RJ45, autosensing, autocrossing
Permissible ambient temperature ...	
... Storage	-40 ... +85°C
... Operation, non-cascaded	0 ... +50°C
Permissible rel. humidity	0 - 95% (non-condensing)
Dimensions	105 x 75 x 22mm
Weight	ca. 120g

Front view 55411



Bottom side 55411



Measure in mm. +/-1 mm

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END OF TERMS AND CONDITIONS

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