Manual
Web-IO Analog-In/Out PoE

Typ	10/100BaseT
Modell	57661, 57662 FW 1.70
Release	1.70, March 2011

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Introduction

The W&T Web-IO Analog-In/Out models include all the functions in a single box for capturing your analog measurements (0..20mA/4..20mA or 0..10V), tunneling them through the network, saving and displaying them. A variety of alarm and report functions are also available which can be custom added to your own applications or into existing systems (Modbus-TCP, OPC, SNMP).

This manual contains all the information you need for installation, configuration and operation of the Web-IO Analog-In/Out devices.

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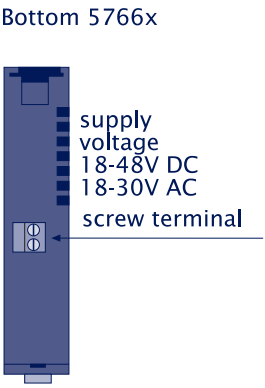
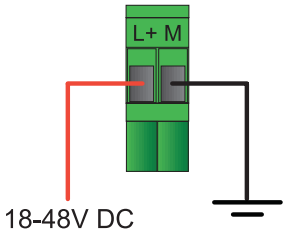
1 Quick-start, Commissioning

To start up the W&T Web-IO Analog-In/Out and make it visible in your network only a few steps are necessary.

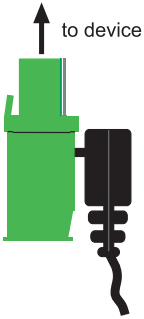
1.1 Connect to power



If you want to use a power supply, connect 18-48V DC or 18-30V AC to the screw terminal provided. Polarity is uncritical when connecting AC power supplies. When connecting DC power supplies please note the polarity as indicated on the screw terminal adapter:



To use the W&T model 11020 power supply, screw the power supply plug into the screw terminal adapter:



PoE supply

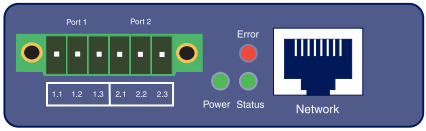
The Web-IO Analog-In/Out can be used in PoE (Power-over-Ethernet) environments in accordance with IEEE802.3af. The supply voltage is provided then by the network infrastructure through the RJ45 terminal. The device supports both phantom power using data pairs 1/2 and 3/6 as well as power on the unused wire pairs 4/5 and 7/8.

To enable power management for the supplying components, the W&T Web-IO Analog-In/Out is identified as a Power Class 1 device with a power consumption of 0.44 to 3.8W.

As an alternative to PoE the device can also be powered externally using the screw terminal located on the underside of the device.

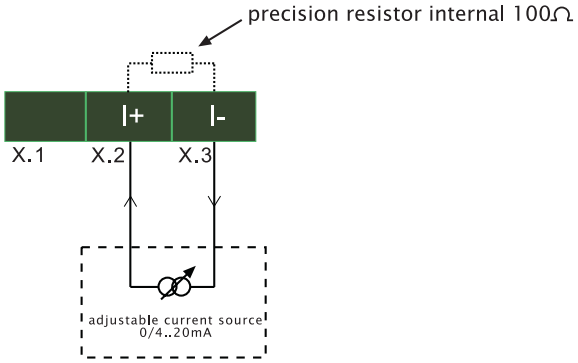
Use of the W&T Web-IO Analog-In/Out is also possible in networks wihtout PoE. In this case simply use an external power supply with the screw terminals as described above. No additional configurations or settings are necessary.

1.2 Wiring the in- and outputs

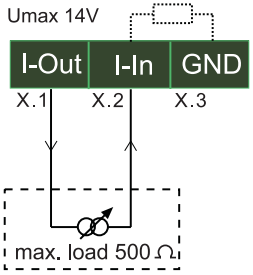


Depending on the configuration the W&T Web-IO Analog-In/Out can be wired as follows, whereby Ports 1 and 2 are indicated by an „X“. The configuration is identical for both ports:

1.2.1 Current input 0..20mA, passive (#57661)

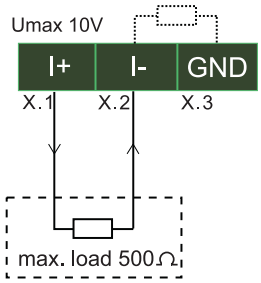


1.2.2 Current input 0..20mA, active (#57661)



Note: If you need to connect two passive sensors, 1.1 and 2.1 may be jumpered in order to save wires. 1.2 and 2.2 may not be jumpered however, since otherwise cross-currents will flow which falsify the input values.

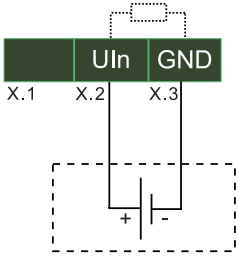
1.2.3 Current output 0..20mA (#57661)



Note: Current outputs cannot be connected directly to active inputs. Please use isolation amplifiers.

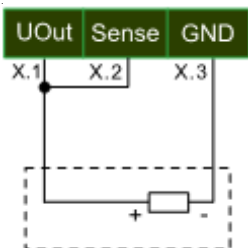
If you need to connect two passive sensors, 1.1 and 2.1 may be jumpered in order to save wires. 1.2 and 2.2 may not be jumpered however, since otherwise cross-currents will flow which falsify the input values.

1.2.4 Voltage input 0..10V (#57662)



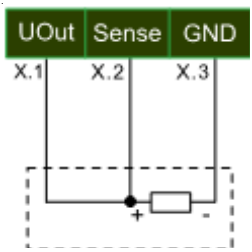
1.2.5 Voltage output (#57662)

The voltage output must be jumpered to the Sense input, which can be used to measure and regulate the output voltage. This jumper can be made either directly on the device or at the remote end. Imax in both cases 15mA at sense line.



Jumper directly on the device

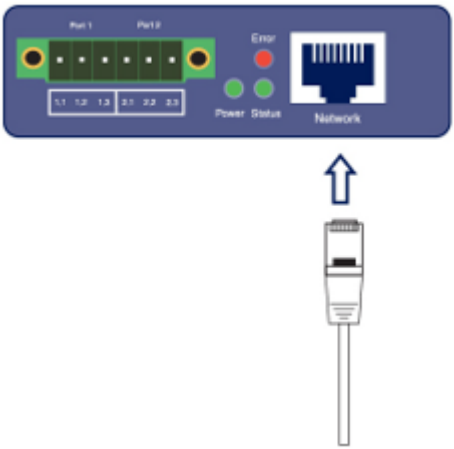
For longer cable distances the jumper should be made on the remote end so that fluctuations are automatically compensated:



Jumper on the remote end

1.3 Network connection

The W&T Web-IO Analog-In/Out has an IEEE 802.3 compatible network connection on a shielded RJ45 connector. The pin configuration corresponds to an MDI interface, so that the connection is made to the hub or swtich using a 1:1 shielded patch cable.



Power-over-Ethernet

The W&T Web-IO Analog-In/Out can obtain its supply voltage through the network interface in accordance with IEEE802.3af / Power-over-Internet. The feed comes in over the data pairs or on the wire pairs not used for 10/100BaseT (*see PoE section*).

1.4 Assigning the IP address using „WuTility“

Once the hardware has been connected to the power supply as described above, the IP address needed for operating in a TCP/IP network must be assigned. You should obtrain the correct value for this parameter from your systems administrator.

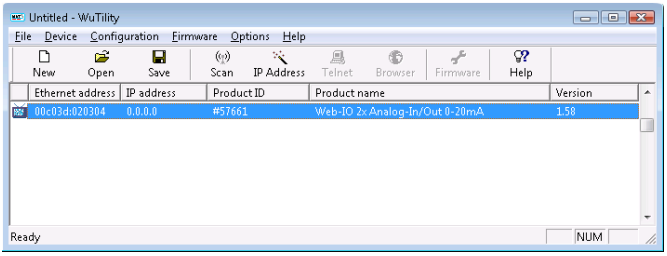
The IP address must be unique in the network.

There are various ways of assigning the IP address. To make the procedure as convenient as possible, we have developed the „WuTility“ tool, which you can download from the WuT homepage at *http://www.wut.de*. This procedure is described in the following. A summary of the options for assigning the IP address can be found in the Appendix of this manual.

Be sure that the PC you are using to assign the IP address is located in the same subnet as the W&T unit and that both the PC and the unit are connected to the network.

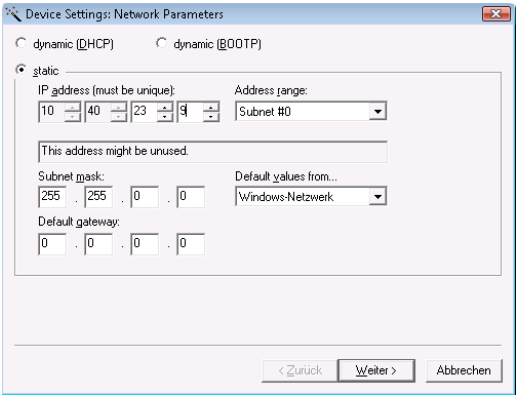
When first started, *WuTility* automatically searches the local network for all connected W&T network devices and generates an inventory list. This search process can be repeated as often as desired by clicking on the *Scan* button:

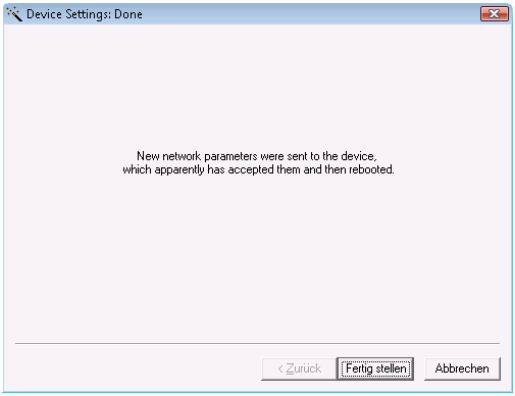
Select your Web-IO from the displayed list based on its MAC address:



Click on the „IP address“ icon:

In the resulting window enter the desired network parameters for the device. Clicking on the *Next* button assigns the network parameters to the device.





All the columns in the WuTility device list are filled with information. After clicking on the globe in the WuTIlity menu bar your standard browser is opened and you see the start page of the device.

1.5 Assigning the IP address using DHCP protocol

Many networks use DHCP (**D**ynamic **H**ost **C**onfiguration **P**rotocol) or the predecessor protocol BOOTP (described in the following section) for centralized and dynamic assignment of the network parameters. DHCP protocol is enabled by factory

default setting, so that in network environments wtih dynamic IP assignment you need only to connect the W&T Web-IO Analog-In/Out to the network. The following parameters can be set using DHCP:

· IP address
· Subnet mask
· Gateway address
· DNS server
· Lease time

To prevent unintended address assignments or address changes, we recommend disabling DHCP, BOOTP and RARP protocols unless they are expressly used in the respective network environment. W&T Web-IO Analog-In/Out units with incorrectly assigned IP addresses can be conveniently located and reconfigured using the scan function of WuTility management tool.

1.5.1 Enabling/Disabling DHCP

The factory default setting is for DHCP protocol enabled. To disable or enable it again later any of the following methods may be used.

- **WuTility management tool**
  From the device list select the desired W&T Web-IO Analog-In/Out and click on the *IP Address* button. In the dialog box enter the new network parameters you want to assign. Disable the options *BOOTP* and *DHCP*. Click on *Next* to send the new configuration data to the W&T Web-IO Analog-In/Out.

- **Web Based Management**
  In the menu path *Config >> Device >> Basic Settings >> Network* Network the protocols can be alternatingly enabled or disabled. For detailed information see the section *Assigning basic network parameters.*

1.5.2 System Name

To suypport any automatic updating of the DNS system by the DHCP server the W&T Web-IO Analog-In/Out identifies itself within the DHCP protocol by its system name. The factory default setting is *WEBIO-* followed by the last three places of the Ethernet address. For example, the factory set system name of a W&T Web-IO Analog-In/Out with Ethernet address 00:c0:3d:01.02.03 is *WEBIO-010203*. The system name of the W&T Web-IO Analog-In/Out can be changed using Web Based Management.

1.5.3 Lease Time

The lease time determined and sent by the DHCP server specifies the term of the assigned IP address. After half the lease time has expired the W&T Web-IO Analog-In/Out attempts to extend or update the address. If this is not possible before the lease time expires, for example because the DHCP server can no longer be reached, the W&T Web-IO Analog-In/Out deletes the IP address and begins a cyclical search for alternate DHCP servers for assigning a new IP address.

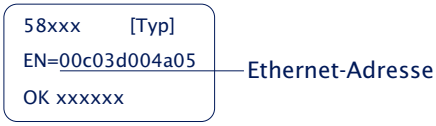
The lease time associated with the current IP address is no longer available after a reset. After restarting, therefore, a corresponding update request is made by the original DHCP server. If the server cannot be reached at this time the W&T Web-IO Analog-In/Out deletes the IP address and begins a cyclical search for alternate DHCP servers.

If DHCP is enabled, the remaining lease time together with the current IP address is displaced in seconds in the menu path *Home >> Doc >> Property*.

If the DHCP server is no longer accessible after expiration of the lease time, the W&T Web-IO Analog-In/Out deletes its IP address. All existing TCP/UDP connections between the W&T Web-IO Analog-In/Out and other network clients are thereby closed. To prevent such situations, we recommend configuring the assigned lease time in the DHCP server to infinite whenever possible.

1.5.4 Reserved IP addresses

The W&T Web-IO Analog-In/Out provides services which can make use of the other clients in the network as needed. Of course the current IP address of the W&T Web-IO Analog-In/Out is needed by these clients in order to open a connection, so that in these cases it makes sense to reserve a particular IP address for the W&T Web-IO Analog-In/Out. This is generally done by linking the IP address to the unique Ethernet address of the unit, which can be found on the sticker on the housing.



1.5.5 Dynamic IP addresses

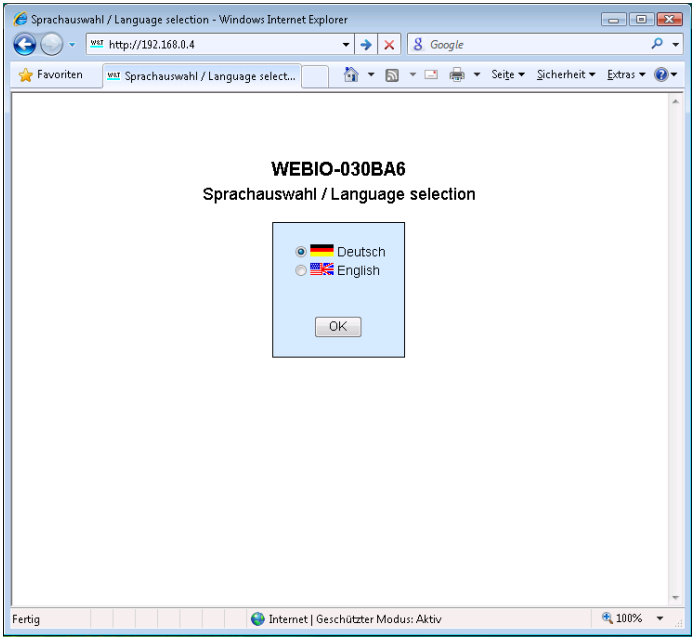
Fully dynamic address assignment, whereby the Web-IO Analog-In/Out is given a different IP address after each restartor after the lease time expires, is only practical in network environments with automatic cross-linking between the DHCP and DNS services. This means when assigning a new IP address to the Web-IO Analog-In/Out, the DHCP server automatically updates the DNS system as well. The new address is assigned to the respective domain name. For detailed information about your network environment, consult your systems administrator when in doubt.

For time server requests, sending e-mails or other client applications where the device itself actively seraches for server

services located in the network, dynamic changing IP addresses can also be used.

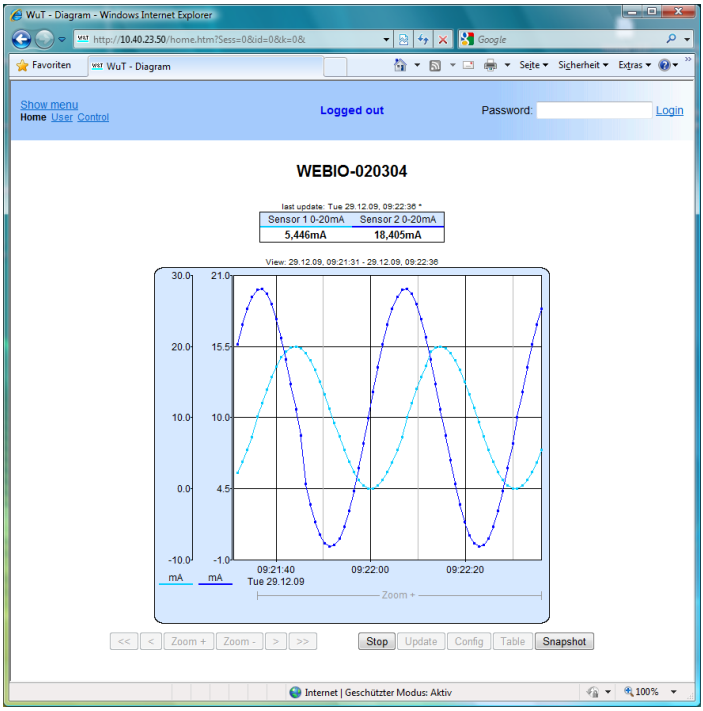
1.6 Start page

As soon as an IP address is assigned, the start page of the device can be opened in the Web browser:



When first opened you must select the device language. Once this is done, you are taken to the actual start page of the device.

To get to the configuration menu, click above on the page on the „Show menu“ link. If you assign a password later in the configuration, you can login here.

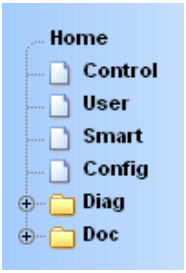


Also on this page you can switch to the User page to directly read out the data logger of the unit.

Display the menu to go to the Smartphone page or to proceed with the rest of the configuration.

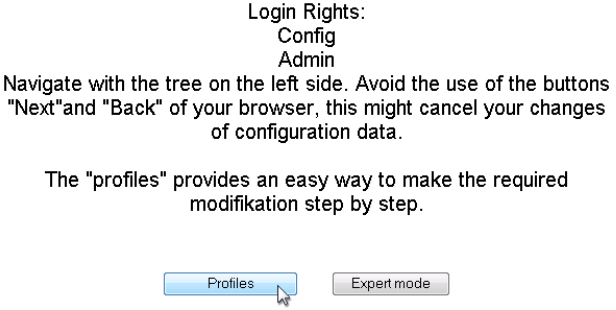
1.7 Assigning the basic network parameters

At left in the configuration tree click on **„Config“**.

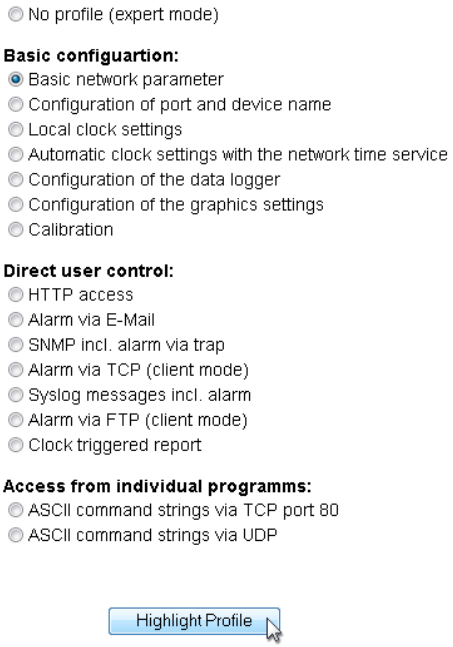


You are now prompted to enter a password. The factory default setting is for no password, so that you can simply click on the Login button without entering a password (or with entering any password) .

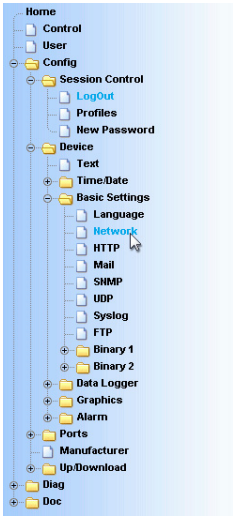
On the next page select the configuration path using the profiles.



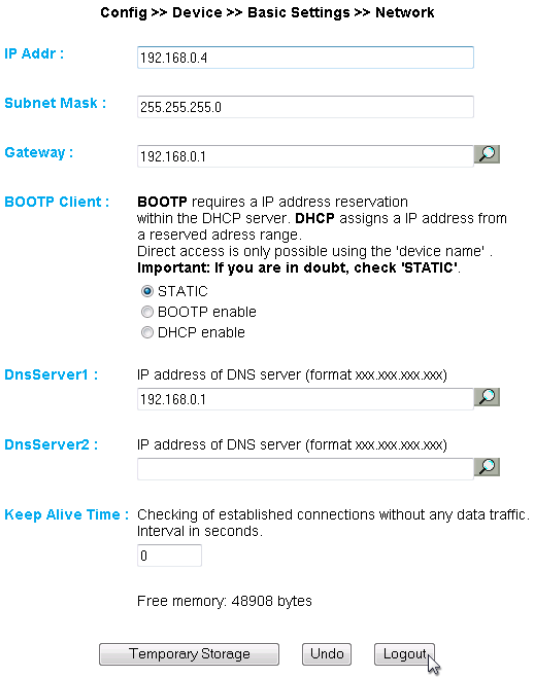
Select the profile „Network basic parameters“ and click on the „Show profile“ button“.



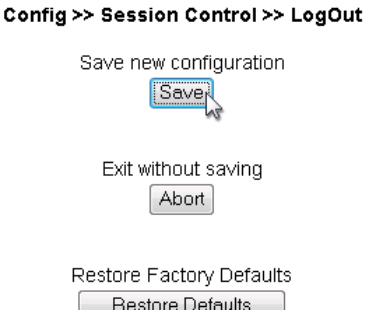
The device now automatically displays the necessary menu points for this profile. In the configuration menu click on the entry **„Network“**.



On the following page enter all the necessary network parameters and then click on the „*Logout*“ button.



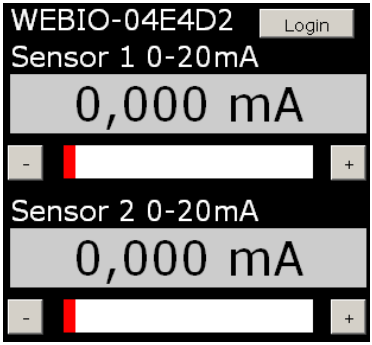
Clicking on the „*Save*“ button stores the settings in the device and closes your configuration session. After the network parameters are changed the device automatically performs a restart.



The device is now ready to use in your network. For ease of handling use the additional profiles for adapting the device to your needs.

1.8 Smartphone Page

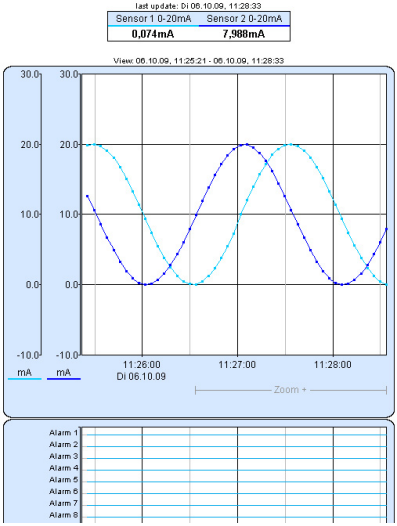
In addition to the start page, users of smartphones (such as the iPhone) can make use of a special Web page. This is tailored to the resolution of most phones. Here you can read the 2 analog measurement values and adjust them as necessary if the corresponding device terminal is configured as an output.



You can also access this page directly as a URL: http://ip-adresse/smart. A corresponding notification disappears after pressing the *OK* button.

2 Graphical Representation of the Measurements

2.1 Basic functions

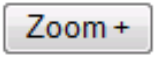


The device provides a table of the current values and a chart of the stored values on the home.htm page.

The navigation buttons on the bottom provide the following control functions.

Scrolls the chart to the right or left by the size of the display interval.

Scrolls the chart right or left by one unit of the x-axis.



Zooms in to the area of the chart indicated by „Zoom +“ on the lower right edge.

Zoom -	Zooms out to the previous zoom level.
Auto	Activates automatic updating of the chart.
Update	Updates the display.
Config	Opens the configuration menu beneath the chart.
Table	Displays the values current displayed in the chart in table format.
Snapshot	Opens a new page with a snapshot of the chart display.

Measured value representation:

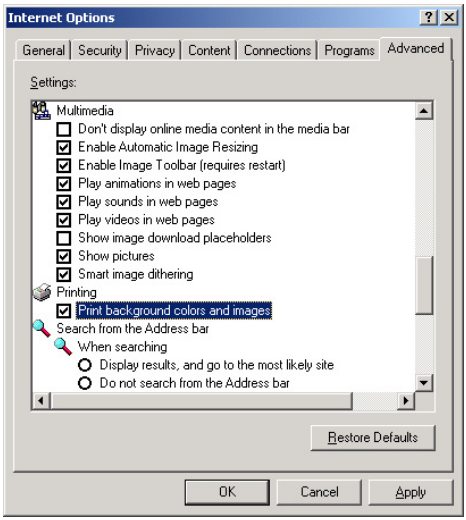
Large point: This value is stored in the data logger of the device.

Small point: This value is a volatile one which is used only for display and is not stored in the data logger.

When exiting the zoom level these values are lost. The connecting lines are only displayed in the zoom level which represents the memory.

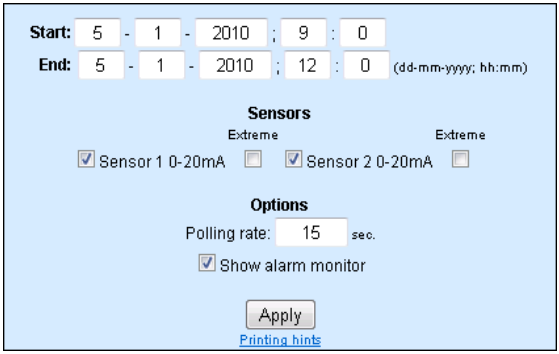
To print out the page containing the graphical display, you must enable printing of background colors and images in the Internet options. In Microsoft Internet Explorer this setting is found in

Tools -> Internet options -> Advanced



The design and configuration of the graphical display can be varied. For additional information, see the section *Configuring the graphical display.*

2.2 Config Menue



The following functions are available from the configuration menu below the graphical display:

Start: Specify the starting time point for the x-axis

End: Specify the end time point for the x-axis.

Sensors: Turn individual sensors for the display on and off.

Polling Rate: Enter here the desired polling rate for the graphical display. The device makes a new value available no sooner than 0.5 seconds. Entering a value of less than 0,.5 has no effect.

Extreme: If in the graphical display a zoom level is selected in which a display point represents a measurement interval and not an individual measuring point, this function is used to display the maximum and miminum measured during this interval. If the zoom level is selected so that every measurement is displayed, this function has no effect. If the function is turned off, the average of the displayed interval is displayed.

Show alarm monitor: Uses a bar graph to show whether the alarm monitor is active or inactive for the respective alarm.

Apply: The changes made are immediately applied to the graphical display.

2.3 Table

Report: Mo 05.10.09, 10:04:38 - Mo 05.10.09, 10:19:38

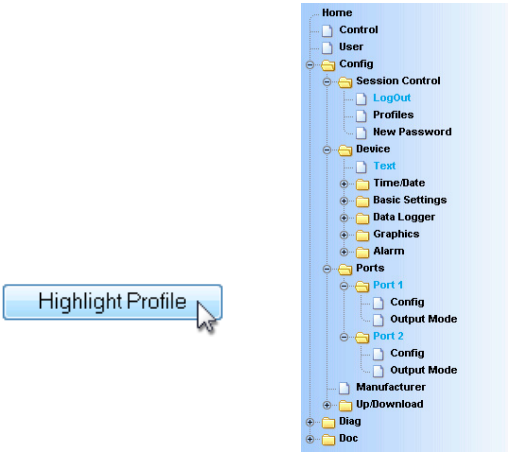
Date, Time		Sensor 1 0-20mA mA	Sensor 2 0-20mA mA
Mo 05.10.09, 10:04:57	Max	13.994	17.951
	Min	13.994	17.951
	ø	13.994	17.951
10:05:16	Max	19.362	12.639
	Min	19.362	12.639
	ø	19.362	12.639
10:05:34	Max	19.076	6.682
	Min	19.076	6.682
	ø	19.076	6.682
10:05:53	Max	13.323	0.924
	Min	7.360	0.666
	ø	10.341	0.795
10:06:12	Max	1.238	6.086
	Min	1.238	6.086
	ø	1.238	6.086
10:06:31	Max	0.448	11.961
	Min	0.448	11.961
	ø	0.448	11.961
10:06:49	Max	5.467	18.089
	Min	5.467	18.089
	ø	5.467	18.089

This function is used to show the currently displayed values in table format. As soon as not all the stored values can be displayed, the following values for the sensor are shown in the table:

Max: The maximum value in the displayed interval
Min: The minimum value in the displayed interval
Ø: The average value of the displayed interval

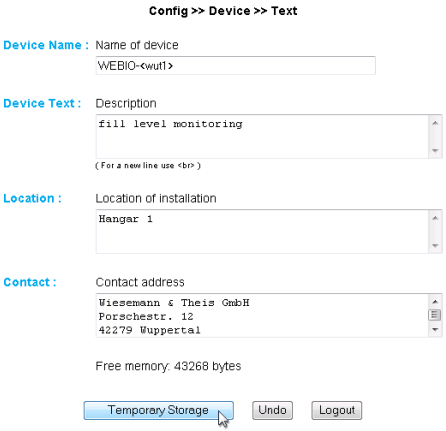
3 Other Basic Settings

3.1 Configuring the port and device name



3.1.1 Text

Enter your personal descriptions in the fields and then click on *Temporary Storage*.



3.1.2 Ports

Port 1..2:

First enter a name and a descriptive text for the port and select the measuring range for adapting the input wiring for your measuring point (For model 57661 only: Measuring range 0..20mA or 4..20mA). To disable the port, select „Disconnect.“

Configuring the current input and output (Model 57661):

Config >> Ports >> Port 1

Name : Sensor 1 0-20mA

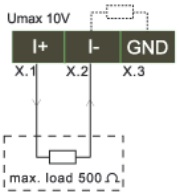
Text : Sensor description 1

(For a new line use
)

Select Sensor :
- (•) 0 - 20mA
- ( ) 4 - 20mA
- ( ) Disconnect

Mode :
- ( ) I-Input, passive
- ( ) I-Input, active
- (•) I-Output

Wiring:



Configuring the voltage input and output (Model 57662):

Config >> Ports >> Port 2

Name : Sensor 2 0-10V

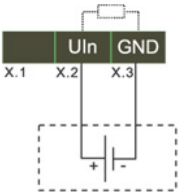
Text : Sensorbeschreibung 2

(Für einen Zeilenumbruch <br> einfügen)

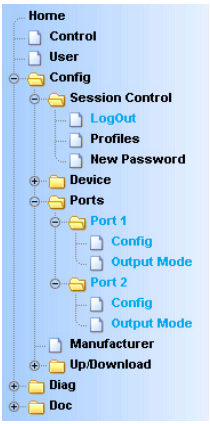
Select Sensor :
- (•) 0 - 10V
- ( ) Disconnect

Mode :
- (•) U-Input, passive
- ( ) U-Input, active
- ( ) U-Output

Verdrahtung:



3.2 Calibration

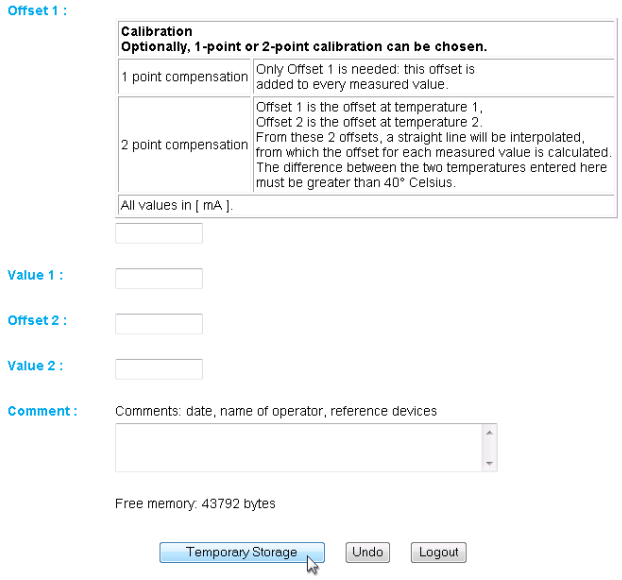


The sensor can be calibrated using single-point and two-point reference measurements and corresponding entries for offset values.

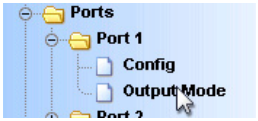
In single-point compensation the entered offset value is added to the measured value, whereas in two-point compensation a straight line is calculated for compensating the entire measuring range. The offset is allowed to be max. 20% of the total range. The offset may be negative, but the full scale values may not fall below the 0% mark.

For offset you enter the value to be added to the measured value in order to reach the desired value.

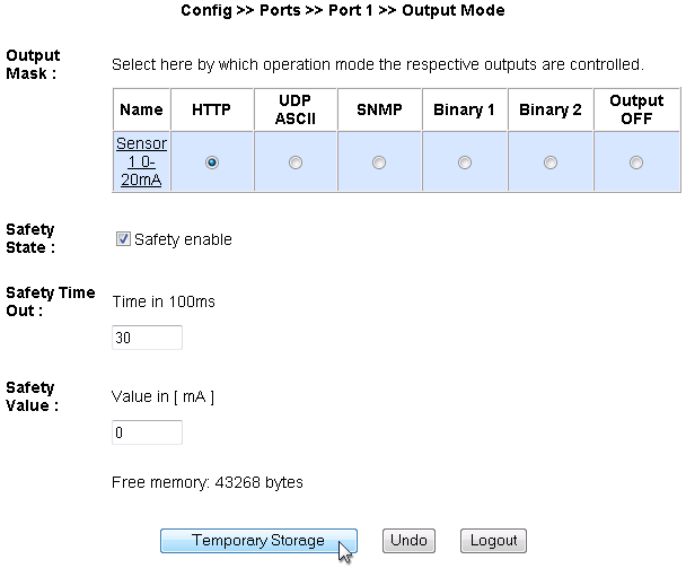
To retain calibration setting, the user can store a comment text.



3.3 Specifying Output Mode



You must specify which mode you want each individual output to operate in. The corresponding configuration can be made under *Config >> Ports >> PortX >> Output Mode*.



Output Mask:
Here you specify which operating mode is used for each output. The factory default setting for all ports is HTTP.

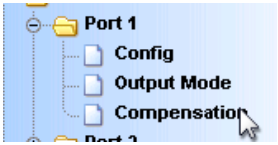
Please note that for most of the modes you must make a few other settings in addition to output mode, such as enabling the operating mode. Additional information can be found in the description for the respective operating mode.

Please note when using the active input that in Output Mode "Output OFF" causes passive Input Mode to be set for Config >> Ports >> Port x. This protects the hardware from inadvertent damage. The active input must then be selected again and saved.

Safety State / Timeout / Value
If no network activity is detected for the timeout time set here, the Web-IO Analog-In/Out sets the outputs to a configurable value (Safety Value).

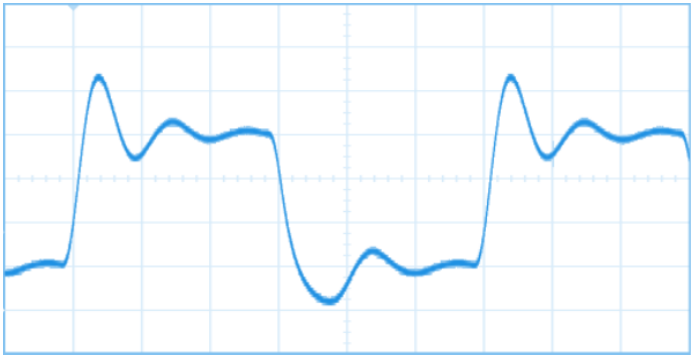
After selecting the output modes click on *Temporary Storage* to sent the settings to the device. Use the *Logout* button to activate the settings and then click on *Save*.

3.4 Compensation of the output controller (57662 only)



During the use of applications, which have a high entrance capacity, it is necessary to compensate the voltage regulator to prevent an overshooting of the output value.

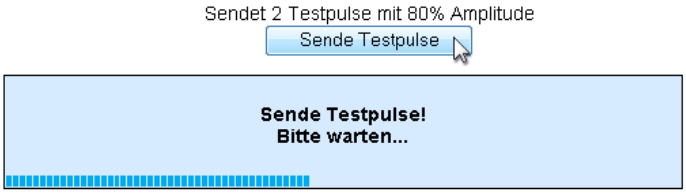
Example: Output regulation with entrance capacity of 100µF, without compensation:



This overshooting can be avoided with a compensation value between 0 and 1000. This value can be configured manually, or determined automatically. The device adjusts two test pulses with 80% amplitude at the output.

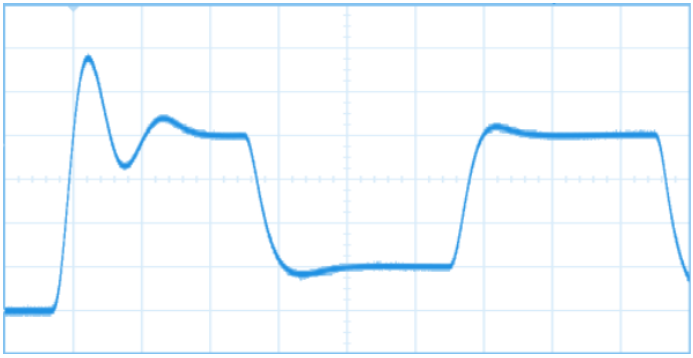
To start the automatic determination of the compensation click on the button *„send test pulses“*.

Please make sure that no sensitive devices are attached to the output to avoid inadvertent output levels.



„Send Testpulses, please wait ...“

After clicking the button the device begins with the automatic compensation. The test pulses with a capacity of 100µF appear as follows:



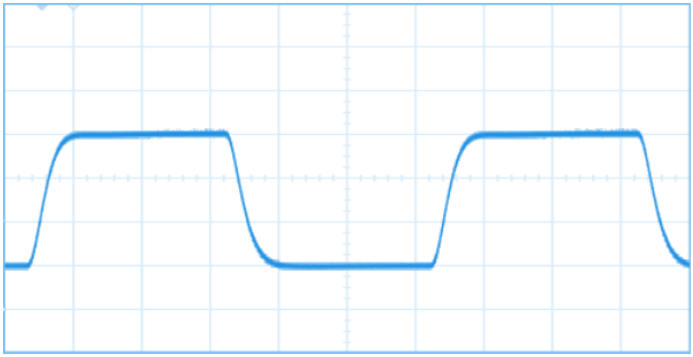
Value: The device enters the determined compensation value automatically. This value is valid immediately. The value can also be set manually. Subsequently, the desired value which was present before the determination will be adjusted again.

Mode:

Auto adaptive enable: The device determines the compensation at run-time. Here no compensation value must be registered. The disadvantage here is in the fact that constantly changing capacities must be measured first, until the initial value fits again correctly.

Use saved value at power on: If this function is activated, the adjusted compensation value is used immediately after starting the device.

Example: Output regulation with entrance capacity of ·n 100µF, with compensation:

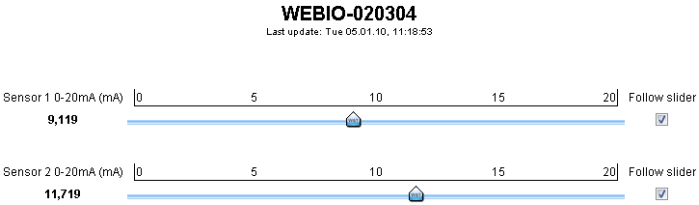


3.5 HTTP - Controlling outputs in the browser (Control)

Access from the browser is probably the simplest way of working with the Web-IO Analog-In/Out.

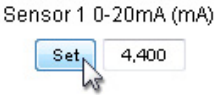
To operate the outputs from the browser it is necessary to log in as Administrator or with Config rights.

After successfuly logging in the control elements for the output are enabled using the *Control* menu point.



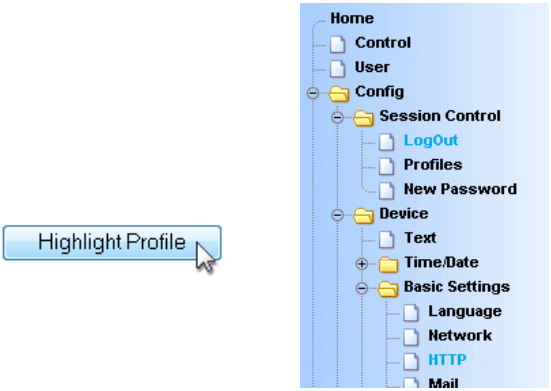
The *Follow slider* checkbox causes the selected output value to be set as soon as the slide controller is released at a certain point. At the same time the slide controller automatically changes its position when the device changes its output value, for example using TCP commands.

If the *Follow slider* checkbox is not selected, an input field and a button appear which can be used to manually set the output. The value in the input field can also be set using the slide controller. The entered output value is set as soon as the *Set* button is clicked.



Please note that control scaling has only limited function: 0..10 (#57662) or 0..20 (#57661) in configured scaling.

3.6 Basic Settings HTTP



Properties of device regarding HTTP have to be configurated on *Config >> Devices >> Basic Settings >> HTTP*.

Startup: Specify here which HTML page you want displayed when the device starts up.

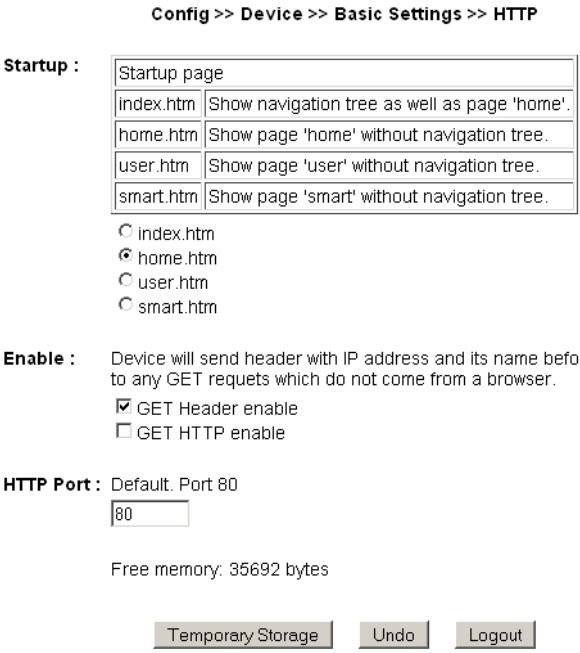
Enable: The device can, when polled using an HTTP-Get command, also send along with the measured value a header with the IP address and name of the device. Check the corresponding box to enable this. If this function is disabled only the actual measurement is sent.

The function *GET HTTP enable* is a special SAP application. If enabled the connection is closed automatically after device reply.

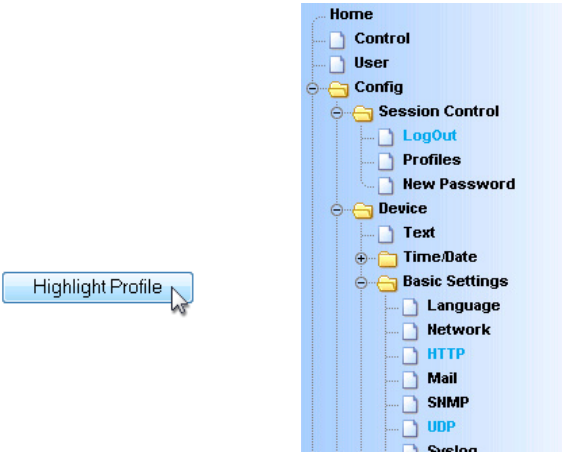
HTTP Port: You can use this port to access the device. The factory default setting is the standard HTTP port 80. If you want to use a different port, this may need to be explicitly names when opening the page:

http://<ip address>:<PortNr>

For the usage of HTTP commands „GET /...“ please refer chapter 4 „Individual Measurement Polling“.



3.7 Basic Settings UDP

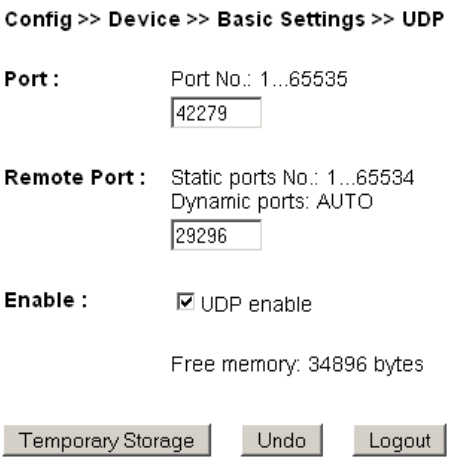


In addition to TCP/IP commands the device can also reply to UDP datagrams. Here you need to set the local **Port** you want

the device to listen to. The factory default setting is 42279. The **Remote Port** default is AUTO for answering to Source Port.

In special cases Web-IO have to answer to defined port that is not equal 0.

The Enable function turns on UDP.



The setting for the header which can be appended to the measurement value also applies here.

3.8 BINARY - Socket programs with binary structures

The Web-IO Analog-In/Out provides two independent socket accesses, *Binary 1* and *Binary 2*, for binary data exchange. Both can be used and configured independently of each other.

Whether the device should use the respective BINARY socket as a TCP server, TCP client or UDP peer depends on the desired application

Here is an overview of applications and operating modes for the Web-IO:

- Customer socket application (binary with password protection)
  - TCP-Server
  - TCP-Client
  - UDP-Peer

- Customer socket application which uses the same structure as the W&T Digital- EA-Com-Server 50xxx.
  - TCP-Server
  - TCP-Client
  - UDP-Peer

- Box-to-Box Master (with password)
  - TCP-Client

- Box-to-Box Slave (with password)
  - TCP-Server

- OPC-Device together with the W&T OPC-Server (with password)
  - TCP-Server

Binary socket access
In this section you will learn how the Web-IO Analog-In/Out can be accessed from your own professional applications using sockets with binary structures.

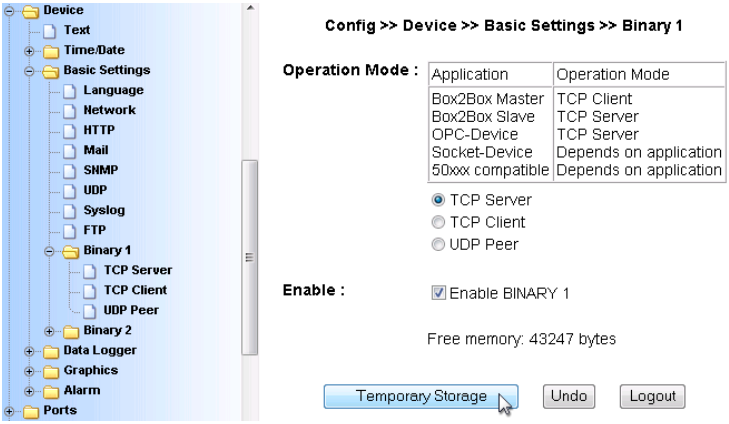
Box-to-Box and OPC device modes are covered in greater detail in the next sections.

3.8.1 Specifying the operating mode

First you must specify whether the Web-IO Analog-In/Out will be be used in your application as a TCP client, TCP server or UDP peer.

In the navigation tree select *Config >> Device >> Basic Settings >> Binary 1* if you want to configure the operation mode for access through *Binary 1*.

Necessary access rights: *Administrator*



After selecting the desired mode and setting *Enable Binary* send the setting to the Web-IO Analog-In/Out by clicking on the *Temporary Storage* button.

For access from your own application programs the developer is provided with two levels of the socket programming.

1. Socket Device (password protected access)
2. Compatible 50xxx (This mode is compatible with the binary structure which was alrelady used by the older W&T Digital I/O Com-Servers.)

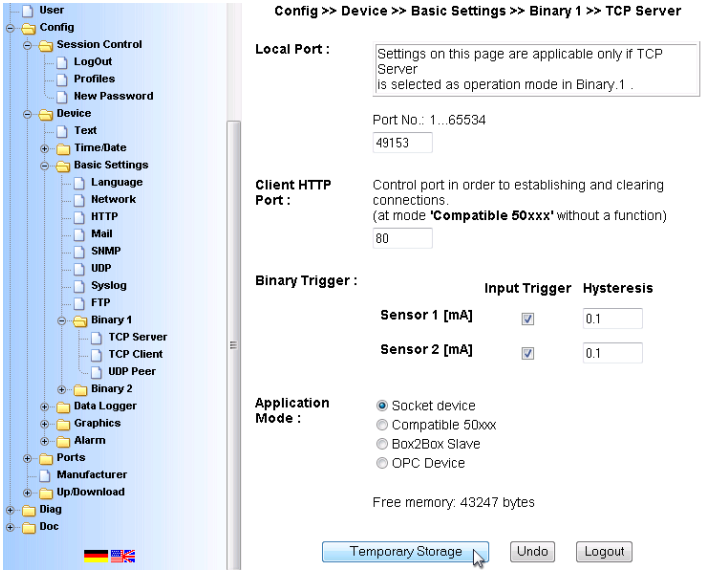
Both access options use the same binary structures and differ only in the absence of password protection in Compatible 50xxx mode.

3.8.2 The Web-IO Analog-In/Out as Socket-Server

To operate the Web-IO Analog-In/Out as a socket server, a few additional settings must be made.

In the navigation tree select *Config >> Device >> Basic Settings >> Binary 1>> TCP Server.*

Necessary access rights: *Administrator*



Local Port

The local port on the device is factory set to 49153. If your application requires a different local port for the Web-IO, enter the desired port number in the *Local Port* field.

Client HTTP Port

Is only relevant for OPC and Box2Box modes and specifies the HTTP port on which a control line should open a connection to the OPC server or slave box.

Unless otherwise specified, Port 80 should always be used here.

Binary Trigger

Enter here a hysteresis value for both ports which, when it is reached or exceeded, should trigger sending of data to the client application (important for event-triggered applications).

Application Mode
Select here:

- *Socket Device* - If you want access to the Web-IO password protected.
- *Compatible 50xxx* - If you want access to the Web-IO using applications which were programmed for the older Digital I/O Com-Servers. You can also use this mode for new applications that do not require password protection.

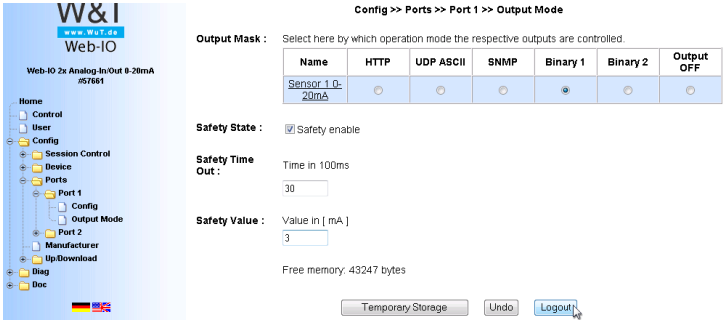
A more detailed discussion of *Box2Box Slave* and *OPC Device* modes can be found in the corresponding sections.

After all your settings have been made, send them to the Web-IO by clicking on the *Temporary Storage* button.

In addition, the ports used must be enabled for Binary Mode.

In the navigation tree select *Config >> Ports >> Port X >> Output Mode* and highlight the desired binary access.

Necessary access rights: *Administrator*



After all the entries have been made, send the setting by clicking on the *Logout* button. Click on the *Save* button to activate the settings.

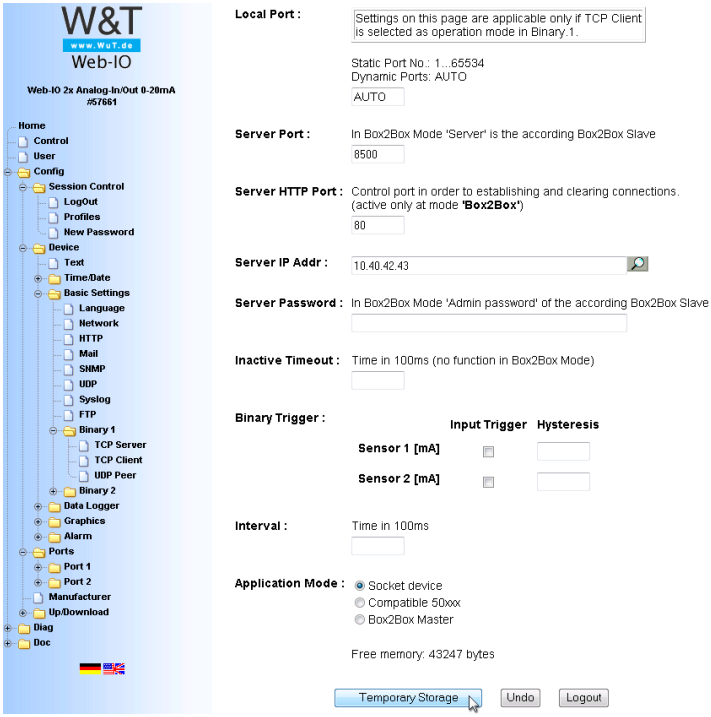
All configuration possibilities shown for Binary 1 may also be used for Binary 2.

3.8.3 The Web-IO as Socket-Client

To operate the Web-IO as a socket client, a few additional settings must be made.

In the navigation tree select *Config >> Device >> Basic Settings >> Binary 1>> TCP Client*

Necessary access rights: *Administrator*



Local Port
The local port of the Web-IO is factory set to AUTO. If your application requires a special local port for the Web-IO, enter the desired port number in the *Local Port* field.

Server Port
Enter here the port number the server application should use to receive the connection.

Server HTTP Port
Is only relevant for Box2Box mode and specifies the HTTP port on which a control line should open a connection to the slave box.

Unless otherwise specified, always use Port 80 here.

Server IP Addr
Enter here the IP address of the server.

Server Password
A server password only needs to be entered if the Web-IO is used as a Box-to-Box Master or needs to access a different Web-IO as a TCP client in Server mode. More about this in the Box-to-Box section.

Inactive Timeout
Here a timer is configured. After the time expires, the Web-IO closes the TCP connection. The value is entered in decimal and in 100ms increments. The timer is reset during an active connection when data are exchanged.

Example: The value 10 corresponds to one second. If no data transfer is detected for one second, the Web-IO closes the connection.

If no value is entered, automatic connection closing is disabled..

Binary Trigger
Here you select the ports whose status change should act as a trigger for opening the TCP connection and sending data to the server (important for event-triggered applications).

Interval
If you want the status of the inputs to be sent cyclically to the server application, you can enter here the interval in 100ms increments.

Example: A value of 300 corresponds to 30 seconds.

Please note that for connections using fee-based dial-up connections too small an interval may result in the connection not being closed, in turn resulting in permanent fees!

Mode
Select here:

- *Socket device* - If you want access to the Web-IO password protected.
- *Compatible 50xxx* - If you want access to the Web-IO using applications which were programmed fo the older Digital IO Com-Servers. You can also use this mode for new applications that do not require password protection.

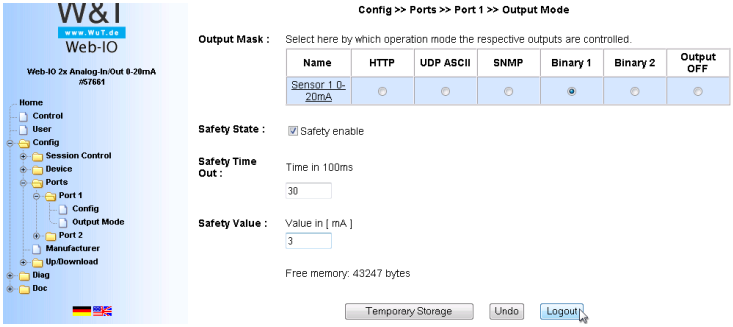
More detailed information about *Box2Box Master* mode can be found in the *Box-to-Box* section.

After all your settings have been made, send them to the Web-IO by clicking on the *Temporary Storage* button.

In addition you must enable the used outputs for Binary mode.

Now in the navigation tree select *Config >> Ports >> Port X >> Output Mode* and highlight the desired Binary access.

Necessary access rights: *Administrator*



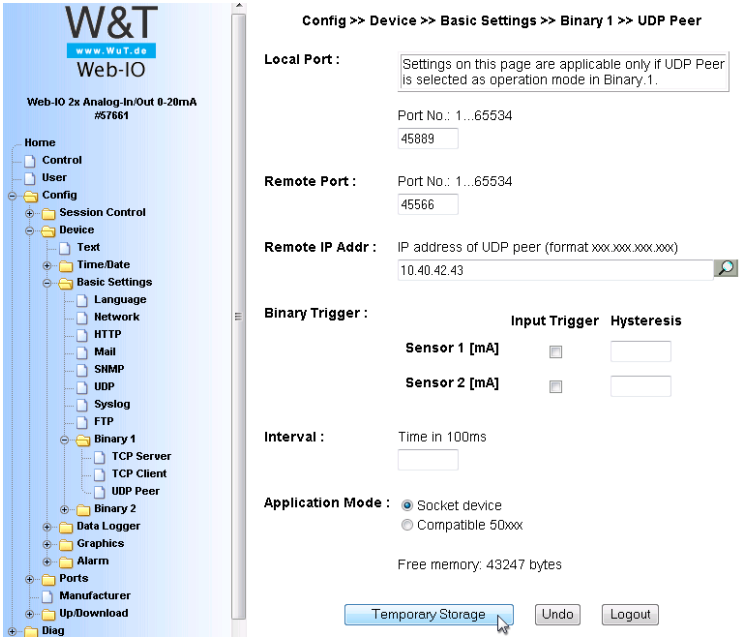
After you have made all your settings, send them by clicking on the *Logout* button. Clicking on the *Save* button activates the settings.

3.8.4 The Web-IO as UDP-Peer

To use the Web-IO as a UDP peer a few additional settings must be made.

In the navigation tree select *Config >> Device >> Basic Settings >> Binary 1 >> UDP Peer*

Necessary access rights: *Administrator*



Local Port
The local port on the device is factory set to 45889. If your application requires a different local port for the Web-IO, enter the desired port number in the *Local Port* field.

Remote Port
Enter here the port number you want the UDP application to use for receiving data when communicating with the Web-IO.

Remote IP Addr
Enter here the IP address of the communication partner.

Binary Trigger
Enter here the inputs whose change of state should be used as the trigger for sending a UDP datagram (important for event-triggered applications).

Interval
If you want the status of the inputs to be sent cyclically to the communication partner, enter here the interval in 100ms increments.

Example: A value of 300 corresponds to 30 seconds.

Please note that for connections using fee-based dial-up connections too small an interval may result in the connection not being closed, in turn resulting in permanent fees!

Application Mode
In the configuration as UDP peer there is no difference between *Socket Device* and *Compatible 50xxx* modes.

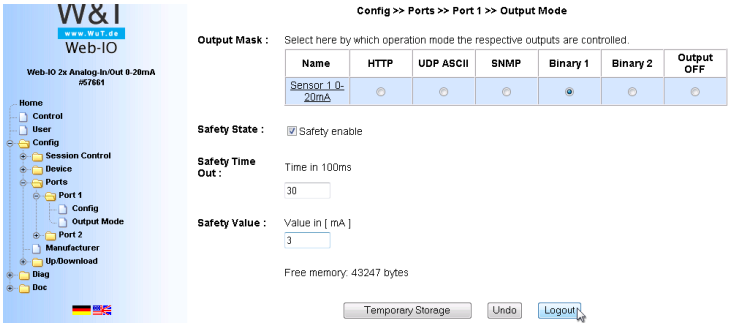
After all your settings have been made, send them to the Web-IO by clicking on the *Temporary Storage* button.

In addition you must enable the used outputs for Binary mode.

Now in the navigation tree select *Config >> Ports >> Port X >> Output Mode* and highlight the desired Binary access.

Necessary access rights: *Administrator*

After you have made all your settings, send them by clicking on the Logout button. Clicking on the Save button activates settings.



3.8.5 Password protection

As already mentioned earlier, the Web-IO enables you in TCP server mode to protect access through the application using a password.

Before the actual connection to the Web-IO is opened, the *BinInfo* structure defined here must be sent over a separate TCP connection to the HTTP port (factory set to Port 80) on the Web-IO.

For the reply the Web-IO also uses the structure *BinInfo*.

BinInfo (PC <-> Web-IO	BYTE[n]0	HTTPlogin	n = 14 Byte + Passwort
	WORD	dummy	immer 0
	BYTE	type	Typ der Anfrage
	BYTE	subtype	Zusatzinformation
	LONG	srcip	IP-Adresse des Absenders
	WORD	srcport	Source Port
	WORD	destport	Destination Port

The individual variables of the structure are filled in as follows:

HTTPLogin[n]
A byte field or string consisting of a login string and the Administrator password.

```
GET /bin?LPW=<Administator Passwort>&
```

n stands for the number of bytes used and corresponds to 14 + the length of the password. The length of the password is limited to 31 characters.

In the reply from the Web-IO HTTPLogin is always 8 characters in length and contains the following string:

```
GET /bin
```

Dummy
Slash between the ASCII and the binary section of the structure.

Is always = 0x00

Type
Determines the type in which Binary mode is used.

The application must enter 0x04 here in order to open a TCP connection.

In its reply the Web-IO enters

0x02 if the connection request was accepted

0x03 if the connection request was denied.

SubType
Provides more details about the status of the connection request.

The application always sends 0x00.

The Web-IO replies with

```
0x01    BINSUBTYPE_OK,          // wenn die Verbindungsanforderung akzeptiert wurde.
0x02    BINSUBTYPE_NO_ACCESS,   // wenn bereits eine Verbindung besteht
0x04    BINSUBTYPE_WAIT,        // wenn die Verbindung erst nach einem
                                // Timeout hergestellt werden darf
0x07    BINSUBTYPE_PW_MISMATCH,         // bei falschem Passwort
0x08    BINSUBTYPE_DEST_PORT_MISMATCH, // bei falschem Destination Port
0x09    BINSUBTYPE_MODUS_MISMATCH,      // bei falschem Modus
```

If 0x01 or 0x04 was received, the actual data connection can be opened.

SrcPort
The client application alwlays enters a 0 here.

The Web-IO returns here the opened server port (e.g. 49153 for Binary 1). If the login attempt has failed, the Web-IO enters 80.

DestPort
The client application enters here which port will be used for the connection (e.g. 49153 for Binary 1 or 49154 for Binary 2).

The Web-IO always returns 0.

The connection through which the BinInfo structure was transmitted is automatically closed by the Web-IO.

3.8.6 BINARY - The IO structures

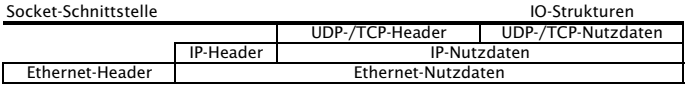
To enable simple communication between the user program on the computer and the Web-IO, there are a limited number of structures (variable fields) which define the format and content of the data exchanged between the user program and the Web-IO.

IO structures are provided for the following functions:

- Reading the inputs
- Setting the outputs
- Parameterizing the cyclical and automatic messaging when there is a status change

The user program uses the easy to use socket4 interface (Windows: WinSock, UNIX, Linux: Berkley Sockets) for exchanging data in the form of these IO structures with the Web-IO over the network via TCP/IP.

The IO structures do not depend on the network protocol used (TCP or UDP).



Which of the two protocols are used, UDP or TCP, depends on the type of application. Both protocols offer advantages and disadvantages which must be considered depending on the application you want to create.

Help with socket programming including the basics of TCP/IP can be found in a short and clear form in our manual „Ready in 1 day for TCP/IP Sockets“. Program examples for client/server applications under TCP/IP are located on our homepage at http://www.wut.de.

3.8.7 Definition of the IO structures

To be able to unambiguously identify and process the contents of a packet, in BINARY mode all the data must be sent to the Web-IO in the form of these IO structures regardless of whether *50xxx-compatible* or *Socket Client* mode is used..

All structures begin with the same header which consists of the following 4 WORDS (16bit_Integer):

Struktur-Header	WORD	send_sequence	immer 0
	WORD	rec_sequence	immer 0
	WORD	struct_type	identifiziert die Struktur
	WORD	length	Länge der Struktur in Bytes

send_sequence, rec_sequence
For compatibilty reasons with respect to older Digital I/O Com-Servers *send_sequence* and *rec_sequence* are provided but not used. Both values are always 0.

struct_type
The value *struct_type* identifies which structure is being used. Both the PC application and the Web-IO decide when the data are received how the structure should be processed based on the value *struct_type*.

length

length indicates the total length of the structure in bytes, i.e. including the first 4 WORDs.

The result is the following packet structure:

Struktur-Aufbau	WORD	send_sequence	immer 0
	WORD	rec_sequence	immer 0
	WORD	struct_type	identifiziert die Struktur
	WORD	length	Länge der Struktur in Bytes
	Variable	.....	je nach Funktion
	.....	.....	weitere Variablen

Note: The following applies for all IO structures.

A **WORD** corresponds to 16bit_integer (unsigned)
A **BYTE** corresponds to one byte (8 bits)
A **LONG** corresponds to a 232bit_integer (unsigned)

Hexadecimal format: **0x** in front of the value

When sending and receiving, the following applies for all structure variables: **Low-Byte first**.

The following structure

Beispiel	WORD	send_sequence	0x0000
	WORD	rec_sequence	0x0000
	WORD	struct_type	0x0001
	WORD	length	0x0008

would look as follows when sent on the network:

send_sequence		rec_sequence		struct_type		length	
low byte	high byte	low byte	high byte	low byte	high byte	low byte	high byte
00	00	00	00	01	00	08	00

3.8.8 Working with the IO structures

In the next section we will explain the individual structures and the corresponding values of the variables send_sequence, rec_sequence, struct_type and length, which are used to begin each packet.

IO-Structure ReadRegister

Sending this structure to the Web-IO causes it to send the status of the port to the user program. The packet consists only of these four WORDs. This structure is used only by the user program, and the Web-IO always responds by sending the structure *AnalogRegisterState*.

ReadRegister (PC -> Web-IO)	WORD	send_sequence	immer 0
	WORD	rec_sequence	immer 0
	WORD	struct_type	0x0001
	WORD	length	0x0008

IO-Structure AnalogRegisterState

The Web-IO Analog-In/Out uses this structure to lsend the state of both ports. This structure is sent when the user program has sent the structure *ReadRegister* to the Web-IO, or when this structure was used to set an output value.

AnalogRegisterState (Web-IO <-> PC)	WORD	send_sequence	immer 0
	WORD	rec_sequence	immer 0
	WORD	struct_type	0x01B8
	WORD	length	0x0014
	LONG	word_anz	2
	LONG	Port 1	Port1 State (in 1/1000 %)
	LONG	Port 2	Port2 State (in 1/1000 %)

This structure is also used for sending the output value of the port for the Web-IO Analog-In/Out. When the user program sends this structure to the Web-IO, the Web-IO sets the outputs according to the value sent on *Port 1* and *Port 2*. Here the value is not transmitted in the configured units, but rather always in 1/1000 % of the current or voltage present. An output value of 15.4mA must be sent as 77000 x 1/1000 %, or 0x012CC8.

When the Web-IO sends this structure to the user program, *Port 1* and *Port 2* have the value correspolnding to the input state.

IO structure Send Mode

This structure determines the trigger conditions the Web-IO Analog-In/Out uses to send the state of the ports to the user program. The trigger can be configured for state changes on both ports. The respective hysteresis for the trigger must be set in the Web configuration.

SendMode (PC -> Web-IO)	WORD	send_sequence	immer 0
	WORD	rec_sequence	immer 0
	WORD	struct_type	0x0010
	WORD	length	0x000C
	WORD	input_trigger	0x0000 - 0x0003
	WORD	interval	Intervall für Datenpakete in 100ms

The following combinations can be configured as input_trigger variables:

	Port 1	Port 2
0x0000	aus	aus
0x0001	an	aus
0x0002	aus	an
0x0003	an	an

IO structure ReadDiagnosis

If the Web-IO detects a communications or system error, the error is listed on the HTML page *diag* and can be read from the browser. Since error management via browser is not always available for program-controlled applications, the error status of the Web-IO can be polled using the structure *ReadDiagnosis*.

ReadDiagnosis (PC -> Web-IO)	WORD	send_sequence	immer 0
	WORD	rec_sequence	immer 0
	WORD	struct_type	0x00D1
	WORD	length	0x0008

In reply the Web-IO sends a *Diagnosis* type structure.

IO structure Diagnosis

The Web-IO sends the Diagnosis structure in reply to the *ReadDiagnosis* structure.

Diagnosis (Web-IO -> PC)	WORD	send_sequence	immer 0
	WORD	rec_sequence	immer 0
	WORD	struct_type	0x00D0
	WORD	length	0x001C
	LONG	word_anz	in dieser Version 4
	LONG	diag_error_count	Anzahl der anliegenden Fehler
	LONG	diag_errorbits0	binäre Codierung der Fehler
	LONG	diag_errorbits1	
	LONG	diag_errorbits2	

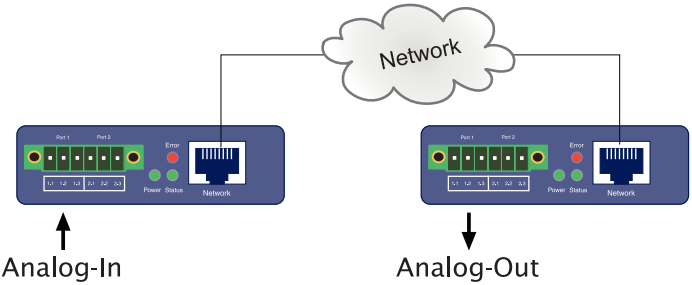
The variable *diag_error_count* returns how many different errors are currently in the error log. The Web-IO differentiates a variety of different error states, whereby each set bit in the variables *diag_errorbits0*, *diag_errorbits1* and *diag_errorbits2* stands for an error type.

The exact text description can be opened using TCP Port 80.

3.9 Box-to-Box (tunneling measurement network)

In this mode the inputs of a Web-IO Analog are transferred to the outputs of a second Web-IO. In this way you can for example send signals from one location to another over a WAN connection.

The values are sent as a percentage. This means a model #57662 can send ("convert") voltage values of 0...10V to a model #57661 with current values of 0...20mA and vice-versa.



Feature: It is also possible to tunnel an analog value to a receiving Web-IO from two different locations.

With Box-to-Box connections a Web-IO assumes the function of the Master. The second Web-IO operates as a Slave. The Slave (Server) waits for the Master (Client) to open the connection.

The device which physically reads the analog values can be configured as a slave or a master. The same applies to the device which then outputs the analog values.

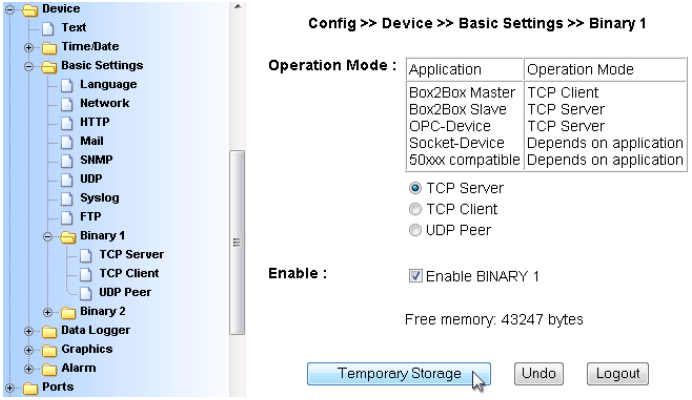
Note for safety-critical applications: Alarms can be defined in both devices in case the Box-to-Box connection is interrupted. It should then be possible for at least one of the devices to send a message.

Both the Master and the Slave Web-IO need to be correspondingly configured.

3.9.1 Configuring the Slave Web-IO (Server)

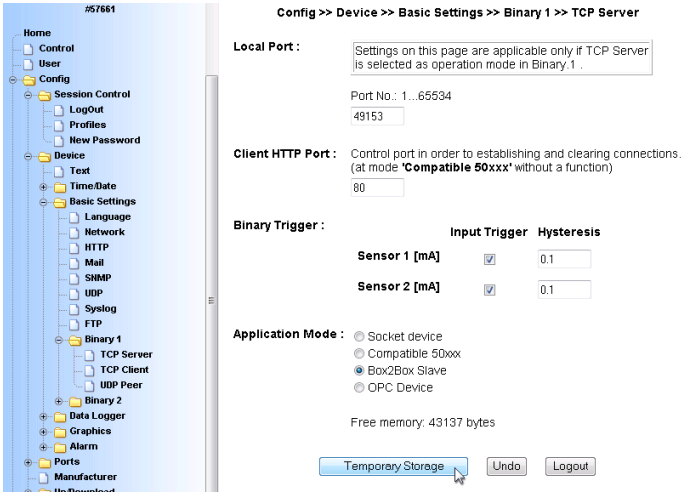
Necessary access rights: *Administrator*

In the navigation tree of the Slave Web-IO select *Config >> Device >> Basic Settings >> Binary 1*



For *Operation Mode* set TCP-Server mode and activate *Enable Binary 1*.

Then click on the *Temporary Storage* button to send the changes to the Web-IO.



Now in the navigation tree select: *Config >> Device >> Basic Settings >> Binary1 >> TCP-Server*

Local Port
Unless your network administrator has informed you otherwise, the factory default set Port 49153 may be used.

One reason for changing the factory default set local port may be for example a fireweall which permits access only to a particular port.

In any case the set local port on the Slave must be identical to the Server Port entry for the Master.

Client HTTP Port
Specifies which HTTP port to be used for opening the control connection to the Master box.

Unless otherwise specified, always use Port 80 here.

Binary Trigger
Here you activate the inputs which are to set the corresponding outputs on the Master.

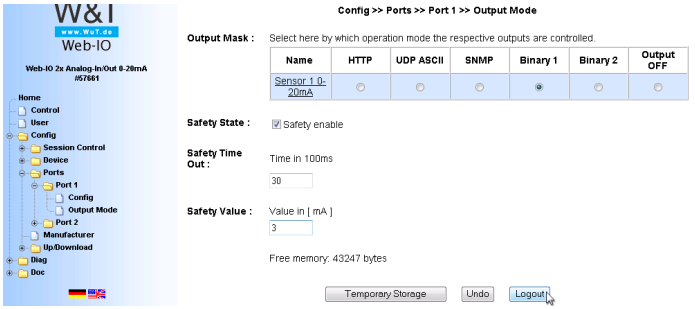
The Web-IO Analog-In/Out allows simultaneous access to the input from various modes.

This means for example that the inputs which control the outputs on the Master Web-IO can at the same time be read out over HTTP.

Application Mode
Select *Box2Box Slave*

After all the parameters have been entered, confirm by clicking on the *Temporary Storage* button.

Now in navigation tree: *Config >> Ports >> Port 1 >> Output Mode*



Activate the outputs to be set by the corresponding inputs on the Slave for Binary 1 and confirm by clicking on the *Temporary Storage* button.

The outputs activated for Box-to-Box are no longer accessible for other modes.

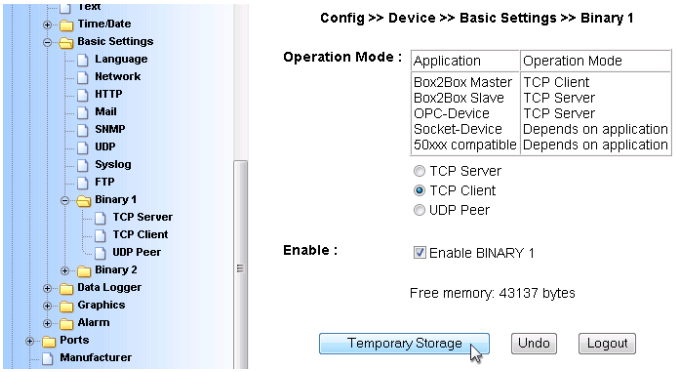
Next the new settings still need to be activated. Use the *Logout* button or select *Config >> Session Control >> LogOut*.

3.9.2 Configuring the Master (Client)

Necessary access rights: *Administrator*

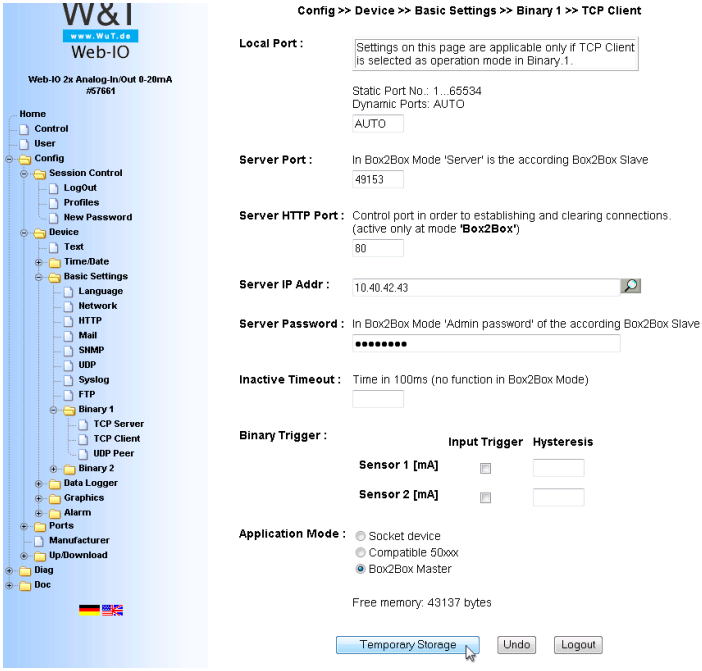
In the navigation tree select: *Config >> Device >> Basic Settings >> Binary1*

For *Operation Mode* select *TCP-Client* mode.



Then click on the *Temporary Storage* button to the Web-IO.

Now in the navigation tree select: *Config >> Device >> Basic Settings >> Binary1 >> TCP-Client.*



The following parameters must be entered:

Local Port
Unless otherwise specified by your network administrator, the factory default setting AUTO can be used.

ServerPort
Here the *Local Port* for the Slave must be entered. Here again the basic setting 491 53 can be used unless otherwise specified by the network administrator.

Local Port and Slave Port do not necessarily have to be set the same as the factory default settings.

One reason for changing the factory default settings for *Local* and *Slave Port* may be for example a fireweall which permits access only to a particular port.

Server HTTP Port
Specifies the HTTP port on which the control connection is to be opened to the Slave box.

Unless otherwise specified, always use Port 80 here.

Server IP Addr
Enter here the IP address of the Web-IO to be used as a Slave.

Server Password
Here the administrator password of the Slave-IO is entered. If no password has been assigned for the Slave, this field remains blank.

Inactive Timeout
This parameter has no function in Box-to-Box mode, since a permanent connection is desired.

Binary Trigger
Activate here the inputs which the corresponding outputs should set for the Slave.

The Web-IO Anaog-In/Out allows simultaneous access to the inputs from various modes...

This means for example that the inputs which control the outputs on the Master Web-IO can at the same time be read out over HTTP.

"Input Trigger" allows sending based on an input change. Use “Hysteresis” to specify how great the change should be in order for a new value to be sent.

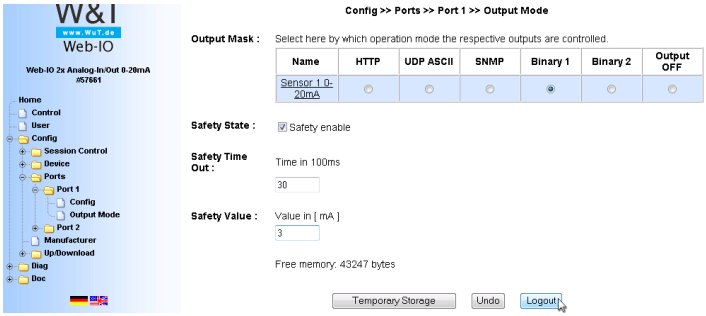
Interval:
If no interval is entered, the state of the inputs is sent to the outputs of the other respective Box-to-Box partner whenever there is a change. By entering an interval the state is also sent cyclically even when there is no change.

If two locations are connected to each other over a fee-based ISDN line, use of an interval is discouraged since the ISDN connection may either be never disconnected or often reopened depending on the timeout and interval.

Recommendation for fast response to changes with the least possible network load: Set interval to 2s and enable Input Trigger with a hysteresis value which allows relevant signal changes to be detected.

Application Mode
Select *Box2Box Master*
After all the parameters have been entered confirm by clicking on the *Temporary Storage* button.

Now in the navigation tree select: *Config >> Ports >> Port 1 >> Output Mode*



Activate here the outputs which are to be set by the corresponding inputs on the Slave for Binary 1 and confirm by clicking on the *Temporary Storage* button.

In contrast to the inputs, the outputs activated for Box-to-Box mode are no longer accessible for other modes.

Now the new settings still need to be activated. Use the *Logout* button or select *Config >> Session Control >> LogOut.*

After clicking on the *Save* button all the settings are updated in the Web-IO and the start page is reopened in the default user mode. The Master Web-IO attempts then to open a connection to the Slaqve Web-IO. All functions described here for Binary 1 can of course also be used under Binary 2. For example a Web-IO A in the Binary 1 area can be configured so that Input 1 operates Box to Box with a Web-IO B. In the Binary 2 area Input 2 can then be configured so that it works together Box-to-Box with another Web-IO.

3.9.3 Determining Box-to-Box connection status

Necessary access rights: *Administrator*

The connection status of a Box-to-Box connection can be queried using the navigation tree under *Diag >> Test >> Output Config*.

Here you are shown in which mode the individual inputs are currently working. In addition the current status of a Box-to-Box connection is displayed in the footer of the Web page.

3.9.4 Quitting Box-to-Box mode

Box-to-Box mode only for the Master

Necessary access rights: *Administrator*

Quitting Box-to-Box mode should always be done by configuring the Master correspondingly. Master and Slave Web-IO must be connected in the network. In the navigation tree select des Masters: *Config >> Device >> Basic Settings >> Binary1 >> TCP Client* and delete the entry for *Server IP Addr*. Also set *Application Mode* to *Socket Client*.

Confirm by clicking on the *Temporary Storage* button.

Then set under *Config >> Device >> Basic Settings >> Binary1* the Operation Mode to *TCP Server*.

Confirm by clicking on the *Temporary Storage* button.

Now in the navigation tree for the Master select: *Config >> Ports >> Port X >> Output Mode* and set the outputs you want to operate Box-to-Box to HTTP.

Confirm by clicking on the *Temporary Storage* button. Now the changed settings still need to be activated. Use the *Logout* button or select *Config >> Session Control >> LogOut*.

After clicking on the *Save* button all the settings are updated in the Web-IO and the start page is reopened in the default user mode.

Quitting Box-to-Box mode for the Slave Web-IO

Necessary access rights: *Administrator*

In the navigation tree select des Slave: *Config >> Device >> Basic Settings >> Binary1 >> TCP Server* and set *Application Mode* to *Socket Device*.

Confirm by clicking on the *Temporary Storage* button.

In the navigation tree select *Config >> Ports >> Port X >> Output Mode* and set the outputs which are no longer to operate Box-to-Box to HTTP.

Confirm by clicking on the *Temporary Storage* button. Now the changed settings still need to be activated. Use the *Logout* button or select *Config >> Session Control >> LogOut*.

After clicking on the *Save* button all the settings are updated in the Web-IO and the start page is reopened in the default user mode.

3.9.5 Quitting Box-to-Box mode only for the Slave Web-IO

If the Master is no longer available, for example because there is no network connection but you still want to deactivate Box-to-Box mode for the Slave, in the navigation tree select *Config >> Session Control >> LogOut*.

The configuration frame contains an addition button called *Stop Box2Box Slave*.

If this button is not displayed, first click on the *Reset* button. The Web-IO is restarted.

After logging in again and opening *Config >> Session Control >> LogOut* the *Stopp Box2Box Slave* button will be shown. Clicking on the button resets the Slave to Box-to-Box mode.

3.9.6 Preconfiguring Box-to-Box for another network

You can configure Box-to-Box mode from your desk. Then carry out the following steps (Master = Client, Slave = Server):

Master: Use Binary disable to close the connection, then save. Now the slave is ready to accept a new connection.

Slave: Set network address to the destination network, then save. Now the device is no longer accessible to you after a reset.

Master: Binary enable, TCP-Client enter new slave IP address. Set network address to the destination network, then save. Now the device is no longer accessible to you after a reset.

When changing the IP address please be sure you are also using the correct subnet mask and gateway address.

Now both devices will automatically connect to each other in the new network.

3.10 Modbus TCP

Modbus TCP is a software interface for address-based access to process data. The W&T Web-IOs work as Modbus servers (slaves) which can be controlled by a variety of Modbus TCP controllers (clients).

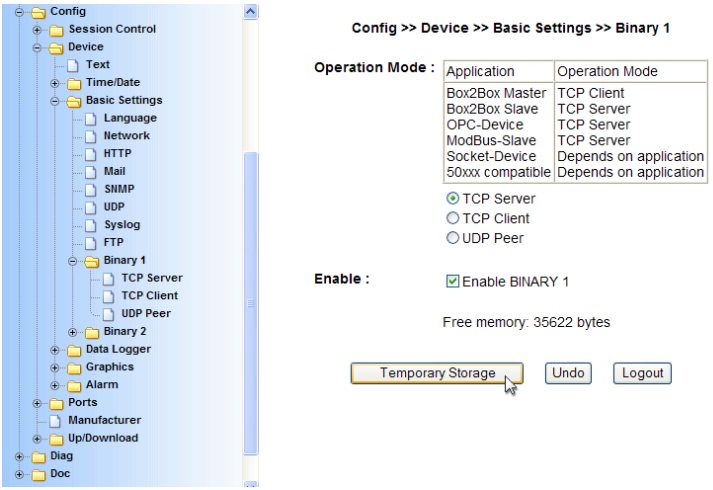
Modbus TCP access allows you to read the analog in- and outputs. You can also set outputs.

The Web-IOs are not intended to be configured using Modbus. This is done from the Web browser.

3.10.1 Configuration for Modbus TCP access

Required access rights: *Administrator*

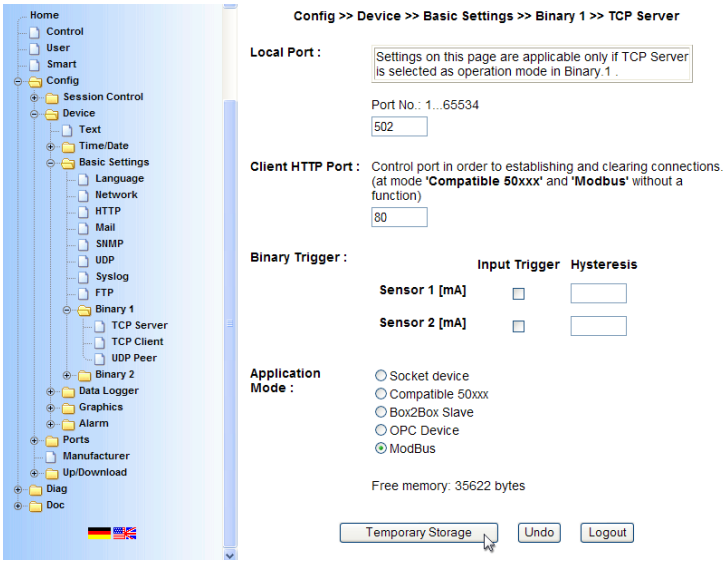
From the Web-IO navigation tree select *Config >> Device >> Basic Settings >> Binary 1*.



For *Operation Mode* set *TCP-Server* mode and check *Enable Binary*.

Then click on the *Apply* button to send the changes to the Web-IO.

In the navigation tree select: *Config >> Device >> Basic Settings >> Binary 1 >> TCP-Server*.



Local Port: For use in the normal Modbus TCP environment the local port on the Web-IO should be set to 502. This can be selected only in a binary channel. If you need to access the device with 2 clients, you must select a different port for Binary 2.

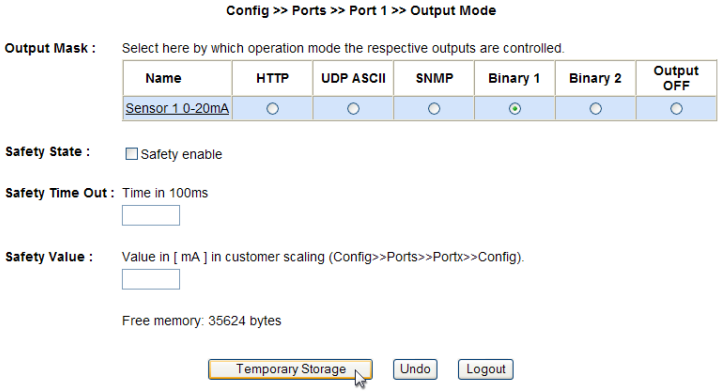
Client HTTP Port: With Modbus TCP access this port is not used and can remain set to the default value.

Input Trigger: The input triggers must not be activated for Modbus TCP mode, and are turned off when selecting Modbus as the Application Mode.

Application Mode: Select Modbus.

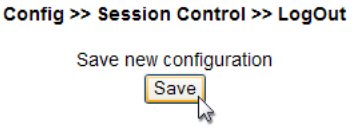
After you have entered all the parameters, confirm by clicking on the *Temporary Storage* button.

From the navigation tree select: *Config >> Ports >> Port 1 >> Output Mode*.



Here you select the analog output as Binary 1 which you want to be controlled by Modbus. Confirm by clicking on the *Temporary Storage* button.

Now you must still enable the new settings. Use the *Logout* button or menu sequence *Config >> Session Control >> LogOut*.



After clicking on the *Save* button all the settings are updated in the Web-IO and the start page is reconstructed. The Web-IO can now be accessed by the Modbus client.

3.10.2 Modbus variables for Web-IO Analog In/Out

All address information is in hex format.

There are various Modbus memory ranges for the Web-IO:

- Bit range (starting at Address 1000 or 1800)
- 16-bit range (starting at Address 2000),
- 32-bit range (starting at Address 5000, 6000 or 7000),
- 8-bit range (Exception Status, no address).

Addressing is done in the bit-range, i.e. 1 bit requires an address. In the 16-bit and 32-bit range addressing is by the word (2 bytes).

The **analog inputs** are located in the 32-bit range starting at Address 5036 (example for 5766x: 5036 and 5038). The values are in percent with 3 places following the decimal point and are considered relative..

Value	dec.	hex.	4-20mA	0-10V
0%	0	0x0000 0000	4	0
1%	10	0x0000 000A	4,0016	0.001
1%	1,000.	0x0000 03E8	4.16	0,1
10%	10,000	0x0000 2710	5,6	1
65.5%	65,535	0x0000 FFFF	14.4856	6.55
65.5%	65,536	0x0001 0000	14.4857	6.55
100%	100,000	0x0001 86A0	20	10
120%	120,000	0x0001 D4C0	23.2	12

The **analog outputs** are located in the 32-bit range starting at Address 5046 (example for 5766x: 5046 and 5047). The values (see above) are in percent with 3 places following the decimal point.

The **alarms** are located in the bit range starting at Address 1040 (example for 5766x: 1040 bis 1048), in the 16-bit range at 2004 and in the 32-bit range at Address 5004. The alarm trigger bits lie in the bit range starting at Address 1800.

The **Exception-Status** is located in the bit range starting at address 1060, in the 16-bit range at 200D (Low Byte). Alternately the Exception Status is read out using the function code 0x07.

The **Configuration-Status** is located in the bit range at Address 1068, in the 16-bit range at 200D (High Byte).

The **Diagnostics-Status** (number of errors) is located in the 16-bit range at 2006, in the 32-bit range at 504A.

The **Diagnostics Status Bits** lie in the 16-bit range starting at 2007, in the 32-bit range starting at 504C. #5766x allows 64 error messages.

The **Device Identification** is by serial number (starting at 6000) and Mac address (starting at 6004).

Available memory range, which the device provides for any Modbus client, lies in the 32-bit range starting at Address 7000.

3.10.3 Modbus-TCP device behavior

When reading data (memory ranges) which were not defined for the device, the device returns „0“.

When writing inputs the device responds with an error message.

The analog output values are double words (4 bytes). These should be written in one pass, i.e. preferably use function code 0x10 for writing. When accessing the values with function code 0x06 bear in mind that two words need to be written.

If the two words are written individually, there may be jumps in on the analog output.

Note also: For analog values which are **impermissibly** high (> 120%) or low (<0%), the value is accepted without an error message and the permissible limit (see values table) is set.

Diagnostics status writing of the Master: Reset (corresponds to „Delete Report“) - regardless of the written value.

At present the configuration byte is 0, i.e. only Modbus and Big Endian are supported. Others (JBUS, LIttle Endian) are available on request.

3.10.4 Modbus - Alarm triggering incl. special memory

An alarm trigger bit in the bit memory range can be used to trigger individual device alarms with the rising edge. The bits are located starting at Address 1800 (Alarm 1). While the bit is set the alarm is active. Resetting the corresponding bit also clears the alarm. The Modbus alarm can be ORed with the other triggers in the alarm.

The device provides memory (starting at register 7000) for free use to report and visualize states in the Modbus TCP using the Web-IO network services. This allows the Modbus client to save any values (e.g. calculation results, states, measurement values from other Modbus clients) to this memory. The client determines when these values are passed along via alarm. One alarm trigger bit (starting at register 1800) is available per alarm. As long as the bit is set the alarm is active.

The time window function in the alarms can be combined with the Modbus alarm trigger bit. For more information about this, see the description under „Alarms - CRON services“. The output functions can also be used for example for sensor alarms, and are described after the alarms in this manual.

Memory which is made available lies in the 32-bit range starting at Address 7000. These are 32 long values and double words (128 bytes). This memory range can be written and read as desired. Special so-called embedded tags can be used for read access to this memory for sending data when alarms are issued (mail, FTP, SNMP).

Embedded Tags allow byte, word and long access to the address base. Access is in 2-character hex format. The output values are send decimal or hex in ASCII format.

Tag	Description	Value range
<rbsHH>	Register Byte signed decimal number	(0 .. 7F)
<rwxHH>	Register Word hexadecimal number	(0 .. 3F)
<rluHH>	Register Long/Double Word unsigned decimal number	(0 .. 1F)

Register	Contents
7000	0x8182
7001	0x8384
7002	0x8586
7003	0x8788

No.	Byte	Word	Double word
00	0x81	0x8182	0x81828384
01	0x82	0x8384	0x85868788
02	0x83	0x8586	...
03	0x84	0x8788	...
04	0x85	...	...
05	0x86	...	...
06	0x87	...	...
07	0x88	...	...

Free texts and embedded tags can be mixed as desired in the mail or FTP texts.

3.10.5 Displaying Modbus variables on the user page

The data in the freely usable memory range starting at Address 7000 can be displayed on the user page of the Web-IO Analog In/Out. The procedure is similar to the familiar one for

displaying an analog measurement value: <w&t_tags=m1>. Likewise the tags are applicable to e-mail etc.

Using the above tags you can access the free memory as follows: <w&t_tags=modbus:rbxHH>, whereby the syntax after the colon corresponds to the syntax for embedded tags. This means each byte can be read by the byte. The memory can be read out by the word or in double words. Big Endian format is used:

In addition, by using GET /modbusreg?PW=& you can read out the **entire data contents** (128 bytes) at one time. Here the device constructs an ASCII string which starts with „modbus“, followed by „;“ and the data as ASCII characters (1 byte is shown with 2 ASCII characters.), also separated by „;“.

Example: „modbus;00;00;00;...“

If „modbus“ is read, but then after the „;“ an „OFF“ follows, this indicates that the device is not configured for Modbus. This criterion can be used on the user page.

The user page can be adapted for the browser so that the stored data can be displayed as desired. By adapting the function CommandLoop() and updateDisplay(ReceiveStr) you can refresh the Modbus values cyclically.

3.10.6 Modbus memory distribution

In the following tables you can see the memory ranges (1-, 16-, 32-bit) for the Web-IO Analog In/Out which can be accessed using Modbus TCP. The **green** columns indicate which function codes can be used to read the addresses. The **red** columns show the function codes used for writing to the registers. The **yellow** column shows which and how many elements are supported by the device.

Memory-region	Definition	MB-Start-address [hex]	Read m. FC / Port access	Read m. FC / Block access	Write m. FC / Port access	Write m. FC / Block access	5766x
Bit	Alarm- / Report-Status (1-8)	1040	1,2	-	-	-	1-8
Bit	Alarm- / Report-Status (9-16)	1048	1,2	-	-	-	9
Bit	Exception-Status	1060	1,2	-	-	-	Exc. 0-7
Bit	Conf.-Status	1068	1,2	-	-	-	Conf-St. 0-7
Bit	Alarm-Trigger 1	1800	1,2	-	5	15	1
Bit	Alarm-Trigger 2	1801	1,2	-	5	15	2
Bit	Alarm-Trigger 3	1802	1,2	-	5	15	3
Bit	Alarm-Trigger 4	1803	1,2	-	5	15	4
Bit	Alarm-Trigger 5	1804	1,2	-	5	15	5
Bit	Alarm-Trigger 6	1805	1,2	-	5	15	6
Bit	Alarm-Trigger 7	1806	1,2	-	5	15	7
Bit	Alarm-Trigger 8	1807	1,2	-	5	15	8
8Bit	Exception-Status	-	-	7	-	-	x
16Bit	Alarm- / Report-Status (1-16)	2004	-	3, 4	-	-	1-9
16Bit	Diagnose-Status (Anzahl Fehler)	2006	-	3, 4	-	6, 16	0-x
16Bit	Diagnose-Status (0-15)	2007	-	3, 4	-	-	0-15
16Bit	Diagnose-Status (16-31)	2008	-	3, 4	-	-	16-31
16Bit	Diagnose-Status (32-47)	2009	-	3, 4	-	-	32-47
16Bit	Diagnose-Status (48-63)	200A	-	3, 4	-	-	48-63
16Bit	Diagnose-Status (64-79)	200B	-	3, 4	-	-	64
16Bit	Exception-Status (low byte) + Conf.-Status (high byte)	200D	-	3,4	-	-	0-7, 8-15

Memory-region	Definition	MB-Start-address [hex]	Read m. FC / Port access	Read m. FC / Block access	Write m. FC / Port access	Write m. FC / Block access	5766x
32Bit	Alarm-/Report-St.(1-32)	5004	-	3, 4	-	-	1-9
32Bit	AI 1	5036	-	3, 4	-	-	1
32Bit	AI 2	5038	-	3, 4	-	-	2
32Bit	AO 1	5046	-	3, 4	-	6,16	1
32Bit	AO 2	5048	-	3, 4	-	6,16	2
32Bit	Diagnose-Status (Error quantity)	504A	-	3, 4	-	6, 16	0-x
32Bit	Diagnose-Status (0-31)	504C	-	3, 4	-	-	0-31
32Bit	Diagnose-Status (32-63)	504E	-	3, 4	-	-	32-63
32Bit	Diagnose-Status (64-95)	5050	-	3, 4	-	-	64
32Bit	Serial number	6000	-	3, 4	-	-	OK-Nr.
32Bit	Mac-address	6004	-	3, 4	-	-	Eth-Nr.
32Bit	Memory 0	7000	-	3, 4	-	6, 16	0
32Bit	Memory 1	7002	-	3, 4	-	6, 16	1
32Bit	Memory 2	7004	-	3, 4	-	6, 16	2
32Bit	Memory 3	7006	-	3, 4	-	6, 16	3
32Bit	Memory 4	7008	-	3, 4	-	6, 16	4
32Bit	Memory 5	700A	-	3, 4	-	6, 16	5
32Bit	Memory 6	700C	-	3, 4	-	6, 16	6
32Bit	Memory 7	700E	-	3, 4	-	6, 16	7
32Bit	Memory 8	7010	-	3, 4	-	6, 16	8
32Bit	Memory 9	7012	-	3, 4	-	6, 16	9
32Bit	Memory 10	7014	-	3, 4	-	6, 16	10
32Bit	Memory 11	7016	-	3, 4	-	6, 16	11
32Bit	Memory 12	7018	-	3, 4	-	6, 16	12
32Bit	Memory 13	701A	-	3, 4	-	6, 16	13
32Bit	Memory 14	701C	-	3, 4	-	6, 16	14
32Bit	Memory 15	701E	-	3, 4	-	6, 16	15
32Bit	Memory 16 .. 31	7020	-	3, 4	-	6, 16	16-31

3.11 OPC - Standardized access

OPC (OLE for Process Control) is a software interface for accessing process data based on OLE technology from Microsoft.

Application programs such as visualization systems which use this interface are called OPC clients. On the opposite side of the interface are OPC servers. These are device drivers which represent certain hardware in abstract form as a set of OPC variables.

The OPC server used here implements the specifications OPC Data Access 2.0 and Alarms & Events. The server controls devices in the W&T Web-IO product families, but also serial Com-Servers and the older Digital I/O Server.

In terms of the architecture this is a system service running in the background and a monolithic application which contains the operating elements for configuration and diagnostics.

3.11.1 Installing the OPC-Server

The OPC server can be found on the product CD / DVD or on included with the Web-IO, in the Web-IO Digital section.

On our Web site www.WuT.de you will find at left the „Article number search" function. Enter here for example article number 57661, select „Tools" from the field below and click on „Go". On the page that then opens select the link „OPC-Server".

For ease of downloading the required files are compressed in a Zip file. Save the extracted file in any desired directory on your hard drive (e.g. C:/Temp). Start the setup program by for example selecting Run from the Start menu and then entering: „C\Temp\opc_en.msi" (choose the version for your language). This installs and registers the OPC server on your computer.

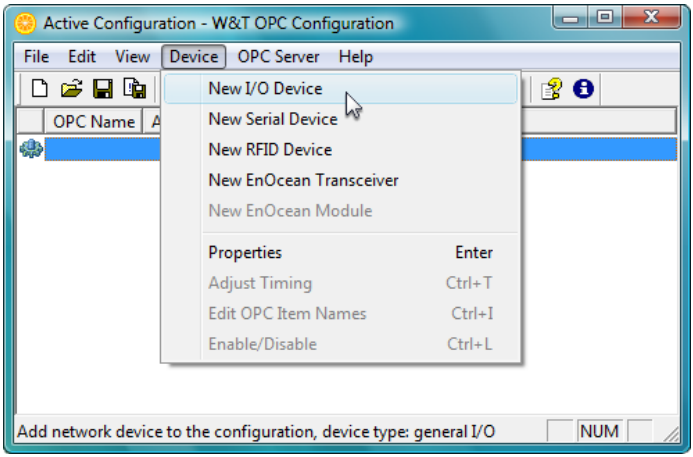
The OLE server name which OPC clients will need to specify later in order to connect to the server is: *Wiesemann-Theis.Network-IO*. The OPC server starts automatically upon such requests. To configure the server you can also run it manually. A corresponding entry *W&T OPC-Server Version 4* can be found in the Start menu under „Programs."

3.11.2 Uninstalling

You can remove the OPC server using the control panel component „Software." It is listed there under *OPC-Server for network-I/O devices Version 4*.

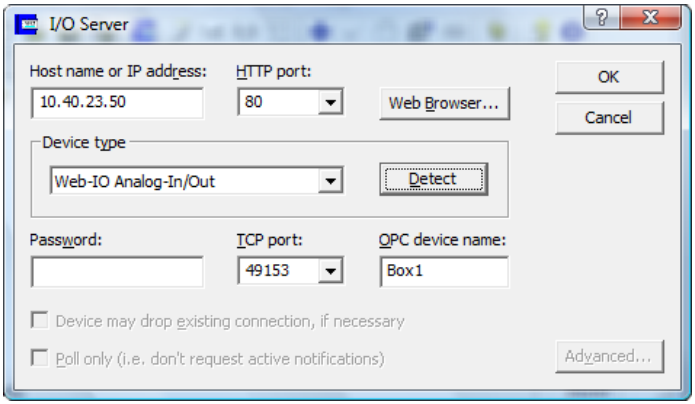
3.11.3 Configuring

First start the OPC server. For normal installations you will find the corresponding start icon on your Windows interface under *Start >> Programs >> W&T OPC-Server Version 4*.



Click on the Web-IO icon or in the menu on *Device >> New I/O device*.

The following window opens:



Host name or IP address: Must agree with the IP address which was assigned to the unit. If there is also a DNS name for the address, you can also use this instead of a number combination.

HTTP port: Should normally be 80. The port number entered here is also used for opening the external browser („Web-Browser“ button“).

Device type: In case of doubt the „Identify“ function can help to select the proper type here. Some input fields with unneeded parameters may be deactivated after a selection is made.

Passwort: Here you can enter the Config or the Administrator password which was specified for the unit.

TCP Port: The factory preset for Port is 49153. For the Web-IO Analog In/Out check the corresponding setting in the Web menu of the unit.

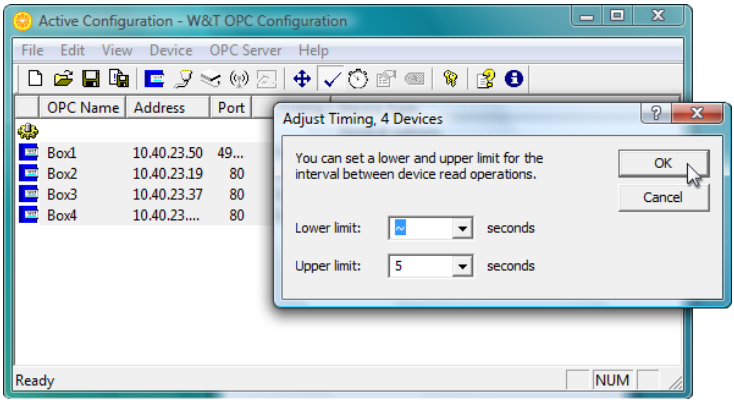
OPC Device name: All OPC variables for a device begin with a common (and unique) name component which you can specify here.

Adjust timing: The amount of network traffic between the OPC server and devices depends essentially on the behavior of the OPC client: The more frequently a client requests updating of DA items, the more data must be sent over the network.

If there is a need to eliminate an undesirably high network load, the OPC client would be the first place to start. There you could select any unnecessarily high update rate and choose not to subscribe to any OPC items which are not really essential. If this does not help (or if the behavior of the OPC client cannot be modified in these ways), a lower limit for the time between read accesses can be specified in the OPC server. The default is 100ms, but depending on the device type a significantly greater lower limit can be chosen. For example would be the typically change of measurements of temperature very slowly.

For some types of OPC items (Example: the inputs on the Web-IO Analog) the device itself reports all changes, so that the OPC server does not need to perform any explicit read operations. But it does exactly that from time to time, namely in order to obtain a life sign from the device, since otherwise connection dropouts would not be reliably detected. The upper limit for the time interval between read accesses determines how often (at minimum) this occurs.

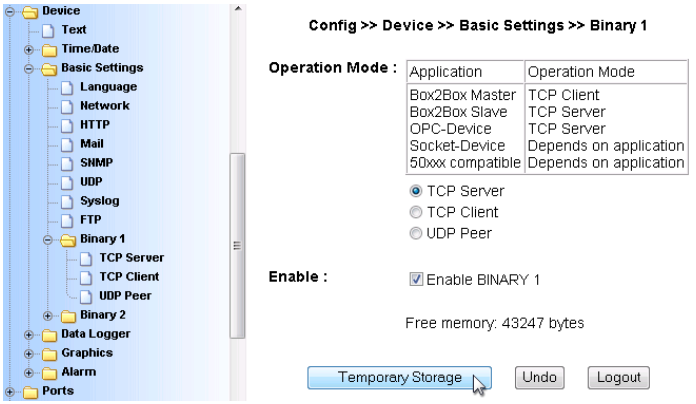
Processing multiple devices: You can also edit the timing parameters for multiple devices at the same time. In dialog fields whose content is not the same for all selected devices, a tilde („~“) is displayed. Fields in which the tilde remains even when closing the dialog field retain their various contents.



3.11.4 Configuring the Web-IO as an OPC device

Necessary access rights: *Administrator*

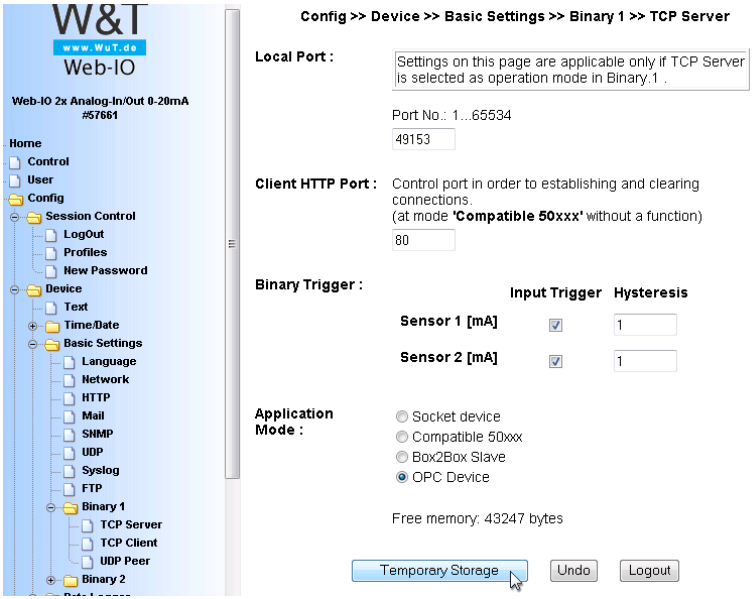
In the navigation tree of the Web-IO select *Config >> Device >> Basic Settings >> Binary 1.*



As *Operation Mode* set *TCP-Server*.

Then click on the *Temporary Storage* button to send the changes to the Web-IO.

Now in the navigation tree select: *Config >> Device >> Basic Settings >> Binary1 >> TCP-Server*.



Local Port

Unless otherwise specified by your network administrator, the factory default setting Port 491 53 can be used.

One reason for changing the factory default local part setting may be for example a firewall which only allows certain port accesses.

In any case the set local port on the Web-IO must be identical with the corresponding settings in the OPC server.

Client HTTP Port

Specifies the HTTP port on which the control connection to the OPC server should be opened.

Unless otherwise specified, always use Port 80 here.

Binary Trigger

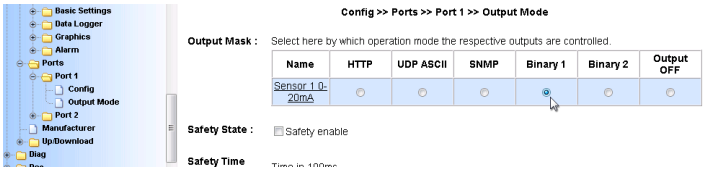
Here you activate the inputs which should trigger a message to the OPC server when there is a state change. The hysteresis

describes by how much the state must change in order for a message to be triggered.

Application Mode
Select *OPC Device.*

After all the parameters have been entered confirm by clicking on the *Temporary Storage* button.

Now in the navigation tree select: *Config >> Ports >> Port X >> Output Mode*



Activate here the output mask *Binary 1* for the respective output and confirm by clicking on the *Temporary Storage* button.

Now the new settings still need to be activated. Use the *Logout* button or select *Config >> Session Control >> LogOut*.

After clicking on the *Save* button all the settings are updated in the Web-IO and the start page is reopened in the default user mode. The Web-IO can now be accessed by the OPC server.

3.11.5 Program options

After clicking on *General options* you can specify some details about the behavior of the OPC server.

Release I/O devices: In this context „release“ means disconnecting the network connections to the devices so that other applications can again have access to them.

Watchdog (VT_R8, R/W) is a global OPC variable, i.e. not associated with any particular I/O device. It contains a seconds value which is continually counted down if this option is enabled. As soon as a value of 0 is reached, the I/O devices are released. Please note: Even if obviously only an OPC-DA client can prevent the watchdog from being turned off (by writing over and over a watchdog value other than zero, e.g. sending the value 15 every 10 seconds), both DA and A&E clients are also affected.

If no OPC clients are still connected: Depending on the device type it may take a while (even several seconds!) until a closed connection can be opened again and the OPC server resumes providing valid values.

Limit update rate: An attempt to read values from a device at a faster rate than it can actually provide those values results in the OPC interface always finding itself in timeout situations. The affected DA variables then continually swing back and forth between OPC_QUALITY_GOOD and OPC_QUALITY_BAD, which makes them effectively useless. To avoid such a situation OPC clients are prevented by this parameter from setting too fast an update rate.

We consider the standard default value of 800ms to be a practical compromise between reliability and speed. Enter a higher value if the problems described still occur, or a lower value if you want to try out the highest possible update rate (for your special application case). The latter depends mainly on the device types used: Web-IO Analog-In/Out and any devices to which a permanent network connection is opened can be polled much faster than for example a Web-Thermometer.

3.11.6 Data model for OPC Data Access

From the view of the OPC client an OPC-DA server provides a collection of named variables which can be read or written. Each variable is associated which a value, a time stamp and a signal quality, all of which are continually refreshed. In addition, variables can have other attributes written to them, item properties which for example may contain physical units or a general comment text.

Naming OPC variables

The names of the OPC variables generally consist of several components, separated by decimal points, whereby each of these name components stands for a hierarchy level within a logical tree structure. A typical name would be for example „Box1.Analog.2“: „Box1“ is the device associated with the variable, „Analog“ refers to the ports on the device, and „2“ represents the second of the (numbered from 1 to 2) ports.

The device names are freely selectable, and if needed the other name components can also be adapted to your own desires using the menu point „Change OPC item name“. In addition to the variables for OPC-DA the dialog window „Edit OPC item names“ also shows for most devices the names of the event sources for OPC-A&E.

Abbreviations

The variable names on the following reference pages are shown abbreviated: The leading name component „Device name“, which varies in any case and therefore serves at best as an example, is always omitted. A variable shown as „Analog.1“ would in fact be accessed, depending on what kind of a device it is located on, as for example „Box1.Analog.1“.

In addition, the following abbreviations are used for access rights and OLE data types:

R/W: Read and wrote

VT_BOOL: Binary value

VT_I2, VT_I4: Whole number (16bit/32bit)

R: Read-only

VT_R8: Floating point number

W: Write-only

VT_BSTR: Character string

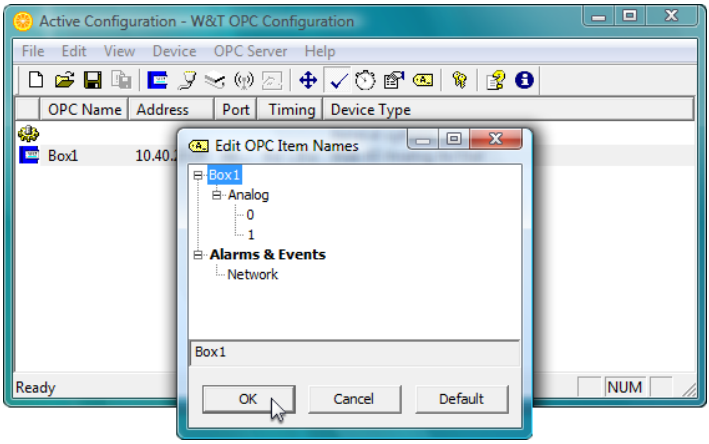
3.11.7 OPC variables for Web-IO Analog

Each Web-IO Analog has two ports for current and/or voltage depending on the model. Configuration settings can also be used to scale a connected sensor, and instead of current or voltage the device then provides the measurement values of this sensor in any other physical unit. The OPC server does not determine which unit this is from the device until it is running, and correspondingly little can be said ahead of time about the associated variables:

Analog.0 - 1 (VT_R8, R): Sensor measurement values. The unit is user-definable. The OPC client can read it out during run time as a text (e.g. „mA“) from the Item Properties.

Web-IO Analog-In/Out provides two sensor values.

Please note also the general notes for describing the OPC variables.



3.11.8 OPC Alarms & Events

Various device types (described individually below) provide not only variables for OPC Data Access, but can also provide events for OPC Alarms & Events. Common to all of them are the following events which refer to the network connection between OPC server and the device:

Event Category	Message	Event Type	Severity	Event Source
1	no network connection to the device	Simple Event	200	Network
2	network connection established		180	

Remarks

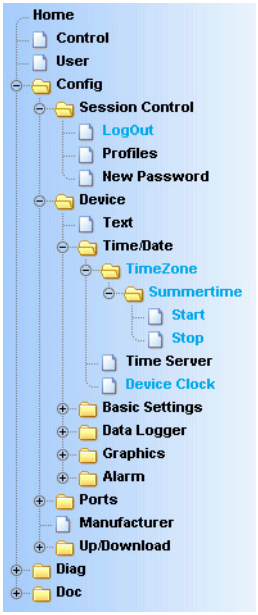
- The same applies to the names of the Event Sources as to the data items of the OPC-DA server: Listed in the table are abbreviated names where the leading name component „Device Name“ is always omitted.

- Message texts vary in the German and English version of the OPC server and should therefore not be used as a filter criterion.

- Whether the network connection to a particular device has a fault can be determined by an A&E client only after it has

first received an event from this device, and you cannot know in adavance when this will happen, or whether it will happen at all.(It is not the case for example that newly connected clients are automatically greeted with an event from Category 1 or 2 for each device.). If this information needs to be reliably made available, it can be determined instead from the signal quality of the OPC-DA item of the affected device.

3.12 Local time setting

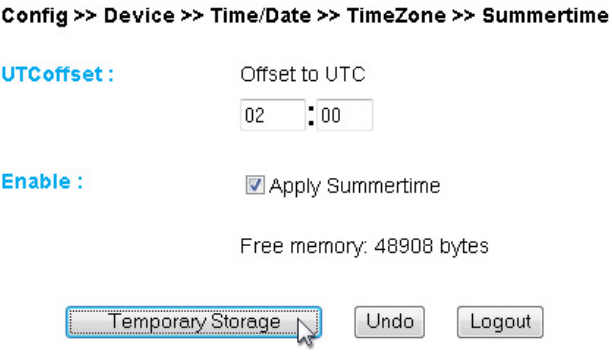


3.12.1 Time zone

Define here the time zone where the device is located. The settings refer to UTC (Universal Time Coordinated). Then click on *Temporary Storage*.

3.12.2 Summertime

If you want your device to automatically take daylight savings time into account, first enter the offset to UTC. The standard value (e.g. for Germany) is two hours. Enable this function using „Apply Summertime“ and apply the settings.



Start/Stop

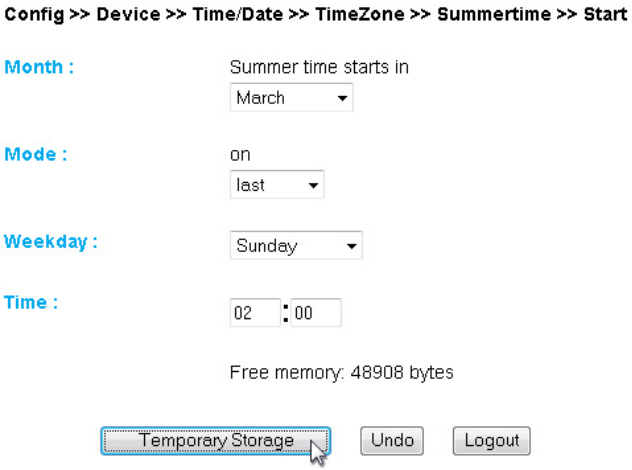
Define when summer time begins and ends. The parameters are already preconfigured:

Start:

Last Sunday in **March** at **02:00**

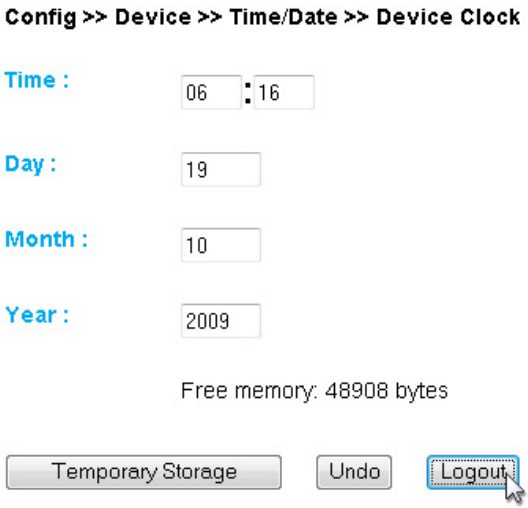
Stop:

Last Sunday in **October** at **03:00**



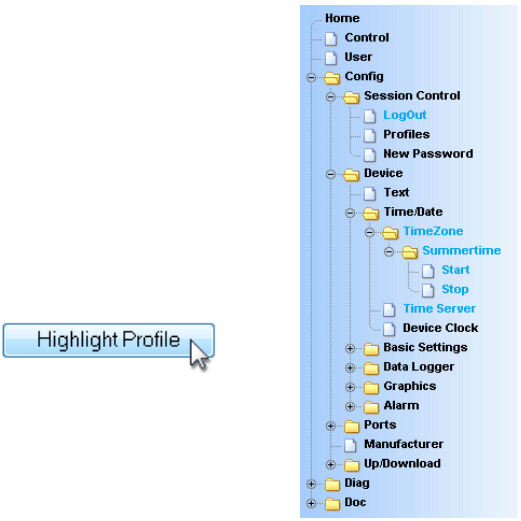
3.12.3 Device Clock

If you do not wish to use a time server, you can set the clock manually here. Then click on „*Logout*“ and save your settings.



The device has an internal, battery-buffered clock, so that the time remains stored even after a device is turned off.

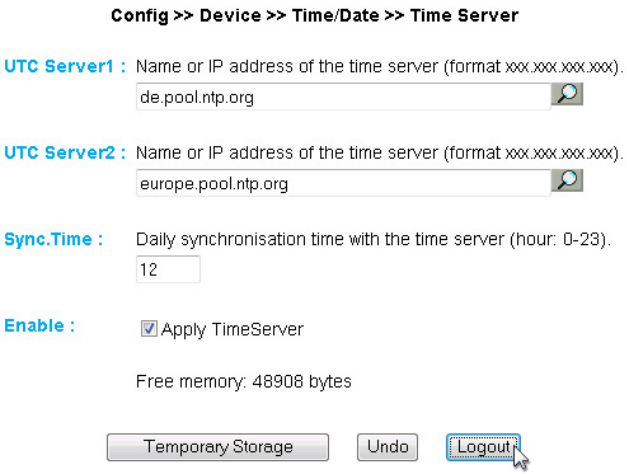
3.13 Automatic time setting using a network time service



3.13.1 Time server

If you want to use a time server to adjust the time, enter the necessary information here.

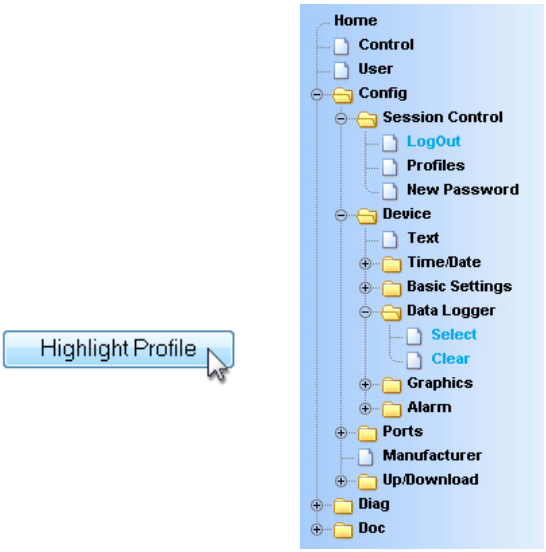
The preset addresses are only an example and do not necessarily have to be used.



If you enter an address for a name, be sure that you have first configured the gateway and DNS server so that the device can resolve the addresses.

Click on the „*Logout*“ button and save your settings.

3.14 Configuring the data logger



3.14.1 Select

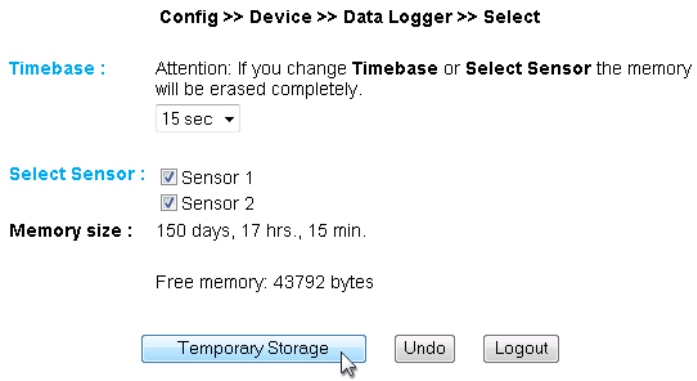
Select Sensor: Der hier ausgewählte Sensor wird für das Abspeichern der Werte im Datenlogger berücksichtigt.

Make the following settings:

Timebase: Defines at what time intervales (min. 15s) the measurement data are stored in the data logger. The device will in any case measure two values per second.

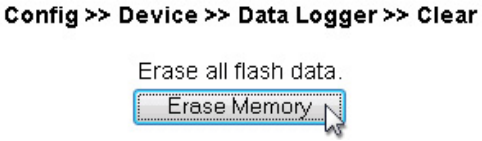
*Note: If **Timebase** or **Select Sensor** are changed all the data in memory will be lost!*

Select Sensor: The sensor selected here is used for storing the values in the data logger.

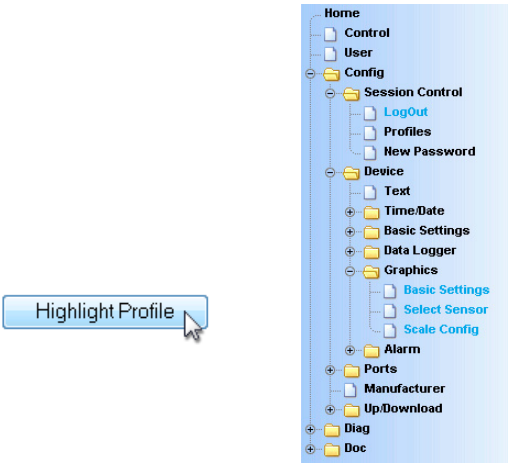


3.14.2 Clear

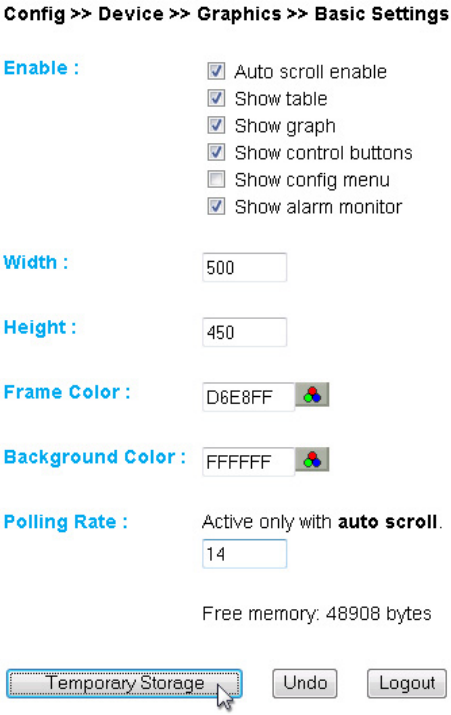
Clicking on the „*Clear memory*“ button clears the entire contents of the data logger.



3.15 Configuring the graphics output



3.15.1 Basic Settings



Enable:

Auto scroll enable: After opening the graphics display the measurements are automatically refreshed. The navigation buttons are not available for the Auto Scroll function.

Show table: Shows the current values in table form as well.

Show graph: Enables graph display of the measurements.

Show control buttons: Shows the navigation buttons.

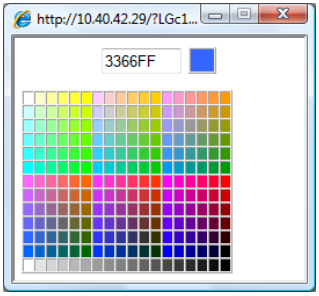
Show config menu: Shows the configuration menu for the graph display below the navigation buttons.

Show alarm monitor: Uses a bar graph to show whether the alarm monitor for each alarm is active or inactive.

Width: Enter here the desired width of the graph display.

Height: Enter here the desired height of the graph display.

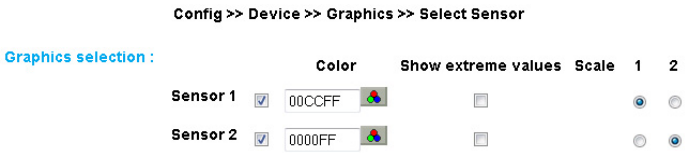
Frame Color: Enter here the desired color for the frame of the graph display, or select a color using the adjacent color selector:



Background Color: Here you select the color of the background of the graph. This color is also used for the table display.

Polling Rate: Enter here the desired polling rate of the graph display. The device provides a new value no sooner than every 0.5 seconds. Entering a value of less than 0.5 therefore has no effect.

3.15.2 Select Sensor



Graphics Selection:

The following parameters can be set for each sensor:

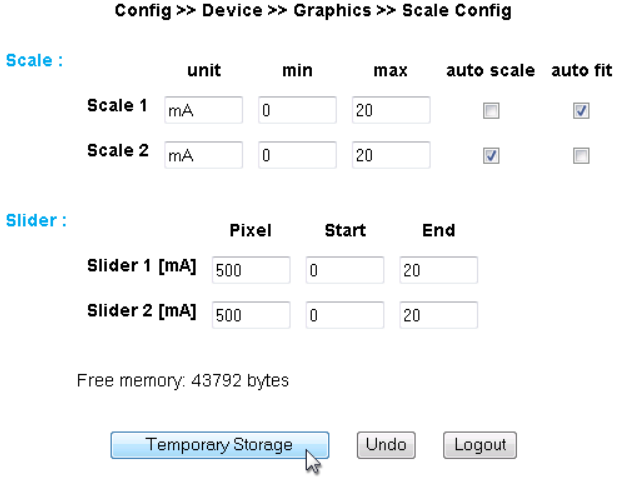
*Sensor **X** enable/disable:* (Checkbox blank/filled in)

Sensor Color: Enter the desired sensor color, or use the color selector to choose.

Show extreme values: If a zoom level is selected in the graph display where a display point represents a measurement interval and not an individual measuring point, this function is used to show the maximum and minimum measured in this interval. If the zoom level is selected so that every measurement is shown, this function has no effect. If the function is disabled, the average of the displayed interval is represented.

Scale 1 2: For multi-channel devices you can show multiple y-axes at the same time in the graph. These may represent for example different measurands. Specify here which scale you want to assign to the respective sensor.

3.15.3 Scale Config



Scale:

The following parameters can be associated with the scale:

unit: The unit to be shown for this scale.

min: The lower value shown for this scale

max: The upper value shown for this scale

auto scale: The lower and upper values for this scale are automatically selected based on the measurement values, so that an optimal, dynamic representation can be achieved. If this function is enabled, the „min“ and „max“ parameters are ignored.

auto fit: If this function is enabled the scale is corrected so that only whole-number values are shown on the display grid. Auto fit automatically enables the auto scale function.

Slider:

The following parameters can be applied to the sliders for direct access using the *Control* page:

Pixel: Length of the slider in pixels

Start: Lowest value that can be set using the slider.

End: Highest value that can be set using the slider.

3.16 Alarms

The device provides 8 alarms and a report (see separate section).

Valid outputs are mail, SNMP trap, Syslog and TCP and FTP client.

An alarm is triggered by the following inputs / events: Sensor 1 or 2 exceeds or falls below configurable threshold values, cold or warm start, the Box-to-Box connection is interrupted. Activation of the alarm can be made dependent on a time window.

Here the desired alarm conditions are configured.

Config >> Device >> Alarm >> Alarm 1

Trigger :

- [x] Sensor 1: Sensor 1 0-10V
- [ ] Sensor 2: Sensor 2 0-10V
- [ ] Timer
- [ ] Cold Start
- [ ] Warm Start
- [ ] Binary 1 B2B connection lost
- [ ] Binary 2 B2B connection lost
- [ ] Select all

Sensor 1 0-10V

Min : Limit in [V].

2

Max : Limit in [V].

8

Hysteresis : Hysteresis in [V].

1

Sensor 2 0-10V

Min : Limit in [V].

Max : Limit in [V].

Hysteresis : Hysteresis in [V].

Delay Time : The alarm will be send after the alarm condition stay stable during this periode of time (time in minutes).

Interval : Sending interval in minutes

E

Trigger: Define here the triggers for the alarm. Multiple selections are possible.

Min./Max.: Specifies the lower and upper limit. The range within these limits is considered to be „valid“.

Hysteresis: You can also specify a hysteresis value used to reset the alarm status.

Example:

min. 2V / max. 8V / Hysteresis 1V

When a limit is violated the alarm status is reset when 7V (8-1) or 3V (2+1) is reached.

This function prevents the limit value from ‚flickering‘.

Delay Time: Triggering of the alarm is delayed by this time (in minutes) to compensate for momentary limit violations.

Interval: Enter here the send interval (in minutes) at which a message should be sent when there is an active alarm. If you want to send only a single message, enter here „E“.

Timer: Here you configure when the alarm monitor should be turned on and off. The interval set here is based on the CRON service as used in Linux/Unix systems.

3.16.1 CRON service

Valid characters are:

* : Stands for all valid values in the respective entry field (e.g. all minutes or all hours)

- : Indicates a range of from..to. For example weekday „2-4“ stands for Tuesday to Thursday, whereas an entry of „*“ triggers the timer on all weekdays.

/ : Interval within the entered range, e.g. minute „0-45/2“ triggers the timer in a range between the 0th and 45th minute every two minutes (0, 2, 4, 6 ,8, 10, ... , 44).

, : Indicates an absolute value. For example: Minute 0. 15, 30 triggers the timer at each full hour, at the 15th minute and at the 30th minute.

Note: All fields must be filled in for the times to be accepted. When the device detects invalid character combinations, it outputs a question mark and rejects the time. If the entries exceed the allowed numerical range, the time is also rejected. An action does not then take place.

If the alarm conditions are met, an alarm is generated when the start time is reached. If the trigger conditions are yet met when the stop time is reached, the alarm is reset.

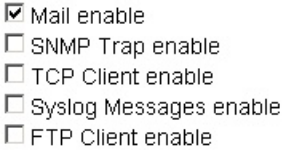
Alarm monitoring can be shown in the graphic on the Home page: Stop – Config – Enable alarm monitoring display.

Example:

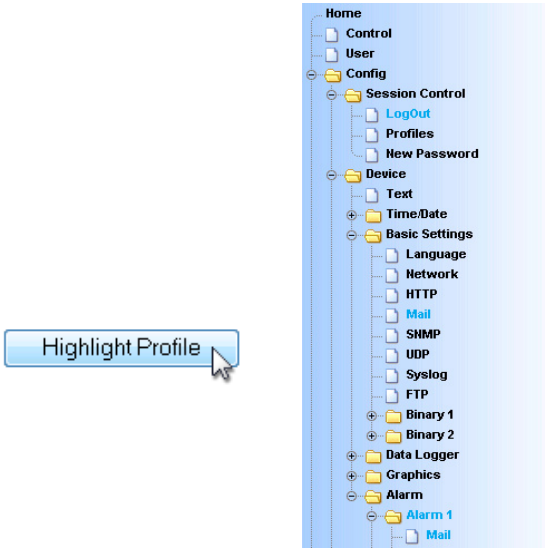
In the following example the alarm monitor is enabled from Monday through Friday at 08:00 and disabled from Monday through Friday at 17:00. Outside of these times no alarm is shown or triggered.

Input [Number * , - /]			
Field	Start	Stop	Range of values
Minute	0,15,30,45	8-17	0-59
Hour	*	*	0-23 (0 is midnight)
Day_of_month	*	*	1-31
Month	*	*	1-12
Weekday	*	*	0-6 (0 is sunday)

Enable: Select the type of message. For an e-mail alarm activate the „Mail enable“ checkbox“.

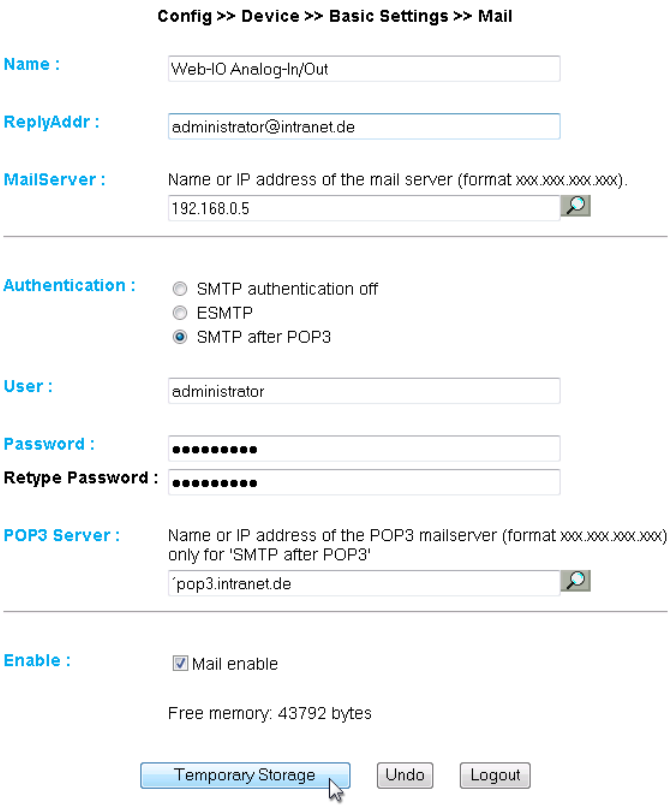


3.17 Sending alarms via e-mail



3.17.1 Basic Settings -> Mail

Here the basic settings for e-mail sending are made.



The e-mail function allows you to sent an information of alarm mail to one or more e-mail or SMS recipients.

Name: Enter the name you want to appear for the e-mail recipient.

ReplyAddr: The reply address the device uses to identify itself.

MailServer: In the next step enter the IP address of your mail server or its host name (for configured DNS servers) you want the device to use. If the e-mail port is not the same as the standard port 25, append the actual port to the address using a colon:

```
mail.provider.de:476
```

Authentication: If authentication is required on the mail server, enter here the corresponding procedure for user identification:

SMTP authentication off: No authentication

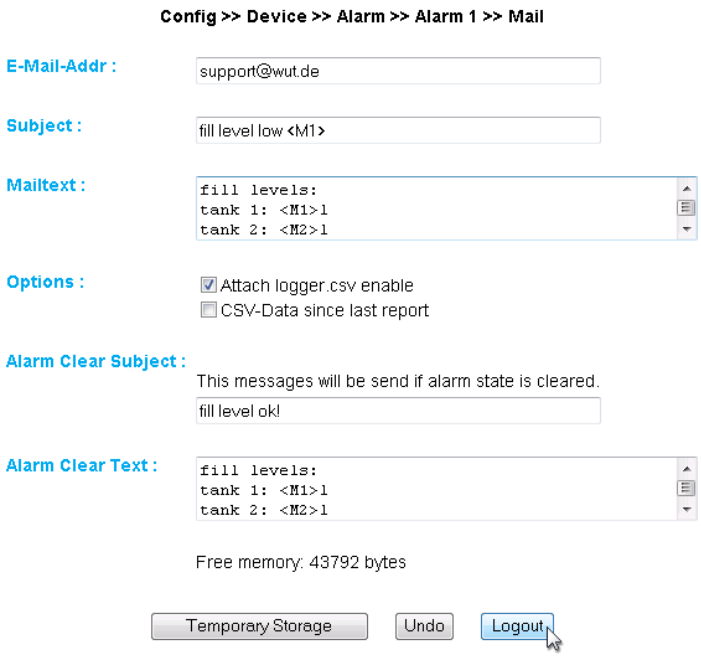
ESMTP: A user name and password are required in order to log in on the mail server.

SMTP after POP3: For an SMTP access it is necessary first to access through POP3, so that the user can be identified. For this setting you also enter an associated POP3 server.

Enable: Be sure that the „Mail enable“ checkbox is checked for e-mail sending.

3.17.2 Alarm X -> Mail

Under this menu item the actual contents of the e-mail is determined.



E-Mail-Addr: Enter here the recipient's e-mail address. To send the e-mail to multiple recipients, separate the addresses with a semicolon.

Subject & Mailtext: Specifies the subject line and mail text for the e-mail.

Please note: No mail (neither for alarm nor for clear alarm) is sent without a mail text!

In these text boxes the following tags are also accepted. The device replaces these tags with the respective values:

W&T tag value		Function
comma spelling (##,####)	dot spelling (##.####)	
<M1>	<m1>	*Measurand 1:* Displays the value for channel 1.
<M2>	<m2>	*Measurand 2:* Displays the value for channel 2.
<AA>		*Alarm active:* Shows all alarms (numbers, komma separatet) which are currently active.
<AN>		*Alarm sensor number:*Shows all sensors (numbers, komma separated) which match with the configured alarm values per alarm.
<AS>		*Alarm sensor name:* see above, but with sensor names (komma separated)

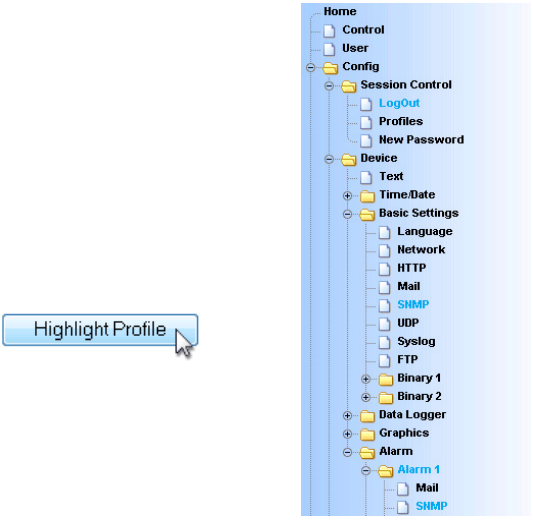
W&T tag date + time	
<Z>	Displays the actual time and date as a string.
<$y>	*Year (####):* Displays the year.
<$m>	*Month (##):* Displays the month.
<$d>	*Day (##):* Displays the day.
<$h>	*Hour (##):* Displays the hour.
<$i>	*Minute (##):* Displays the minute.
<$s>	*Second (##):* Displays the second.

Attach logger.csv enable: Using the „Attach logger.csv enable“ option you can append the complete contents of the data logger as a mail attachment in semicolon delimited CSV format. The time basis for the output corresponds to the data logger settings.

The file is dynamically generated in the device, so that when the logger contents is large it may take up to 30 seconds to create the CSV file. No other mail may be sent during this time. Pending alarms are executed as soon as the mail with its attachment is sent.

CSV-Data since last report: This option causes only the data which arrived since the last send interval to be written to the CSV file.

3.18 SNMP incl. alarm sending per Trap



Send alarm messages as SNMP trap.

3.18.1 Basic Settings -> SNMP

Define here the basic settings needed for SNMP operation.

Community String: Read: Using this string you can have read access to measurements in your SNMP manager.

Community String: Write: Using this string you can have both read and write access to measurements in your SNMP manager. If you want to fill a field without no information, please write „public“ instead of „“.

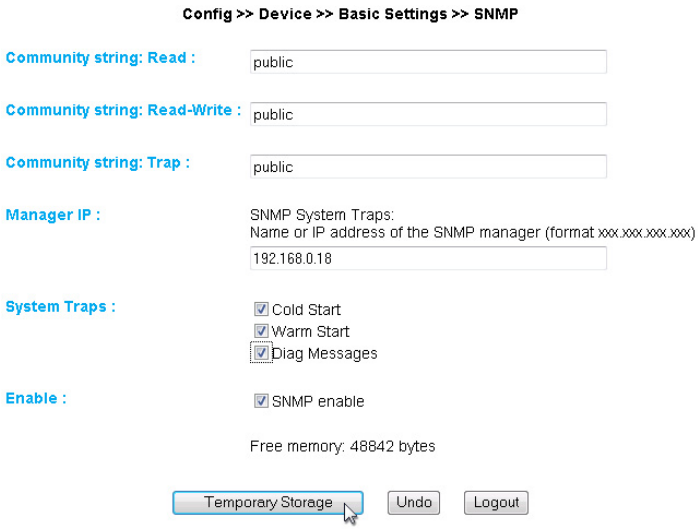
Manager IP: Contains the IP address of your SNMP manager. The device sends the SNMP messages to this address.

System Traps: Two system traps can be generated.

Cold Start: After power is disconnected (intentionally or unintentionally)

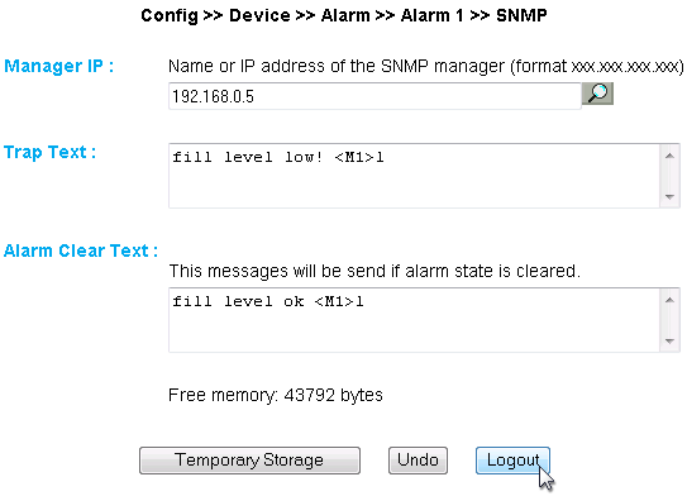
Warm Start: For device reset

SNMP Enable: To use the SNMP functionality, enable this check-box.



3.18.2 Alarm X -> SNMP

Under this menu item the actual contents of the SNMP is specified.



Manager IP: Contains the IP address of your SNMP manager. The device sends SNMP messages to this address.

Trap Text: Specifies the text for the trap. The following tags are also accepted in these text boxes. The device replaces these tags with the respective values:

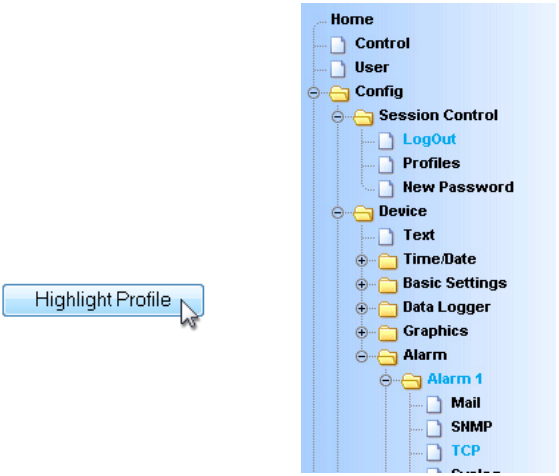
W&T tag value		Function
comma spelling (##,####)	dot spelling (##.####)	
<M1>	<m1>	*Measurand 1:* Displays the value for channel 1.
<M2>	<m2>	*Measurand 2:* Displays the value for channel 2.
<AA>		*Alarm active:* Shows all alarms (numbers, komma separatet) which are currently active.
<AN>		*Alarm sensor number:*Shows all sensors (numbers, komma separated) which match with the configured alarm values per alarm.
<AS>		*Alarm sensor name:* see above, but with sensor names (komma separated)

W&T tag date + time	
<Z>	Displays the actual time and date as a string.
<$y>	*Year (####):* Displays the year.
<$m>	*Month (##):* Displays the month.
<$d>	*Day (##):* Displays the day.
<$h>	*Hour (##):* Displays the hour.
<$i>	*Minute (##):* Displays the minute.
<$s>	*Second (##):* Displays the second.

Alarm Clear Text: In addition an Alarm Clear message is sent when the mesasurement value again runs within the valid range (observing hysteresis). Here you can use the same tags as are used for the alarm message.

Note: The MIB for the device can be retrieved directly at http://IP-Adresse/mib.zip. In addition, the MIBs for the device are available from WuT on the Web-Server (www.wut.de // Downloads / Web-IO Analog / SNMP MIB Revision list / MIB for Web-IO Analog-In/Out).

3.19 Sending alarms per TCP (Client Mode)



Send the alarm messages as a TCP datagram.

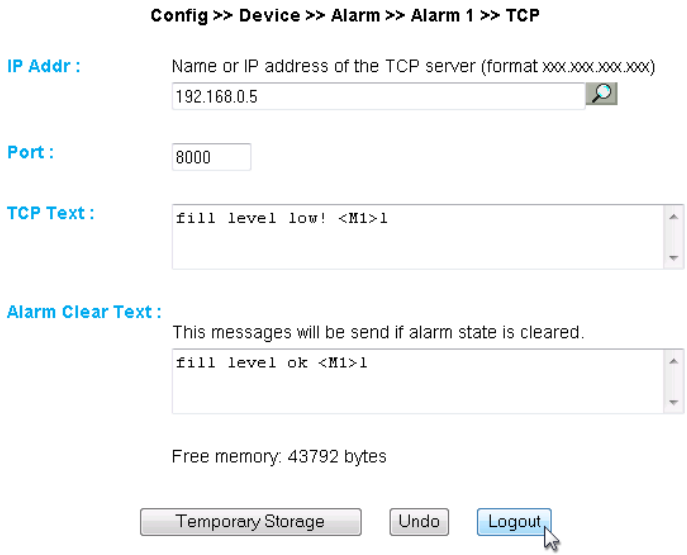
3.19.1 Alarm X -> TCP

IP Addr: The IP address you want the message sent to.

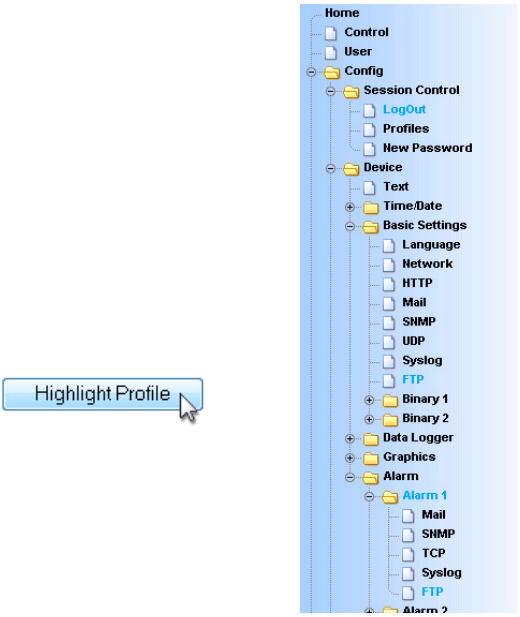
Port: At the receiver end there must be a TCP server service on this port which can accept incoming connections.

TCP Text: The text corresponds to the same specifications as apply to the other message types.

Alarm Clear Text: see above



3.20 Sending alarms per FTP (Client Mode)



Write the analog values directly to an FTP server.

3.20.1 Basic Settings -> FTP

Here you find the basic settings needed for FTP mode.

FTP Server IP: Enter here the IP address or host name of the FTP server you want the data to be sent to.

FTP Control Port: This is the port needed for the connection. The standard port for FTP access is 21. This port is already preset and should work fine on most systems. If you require a different port, please check with your network administrator.

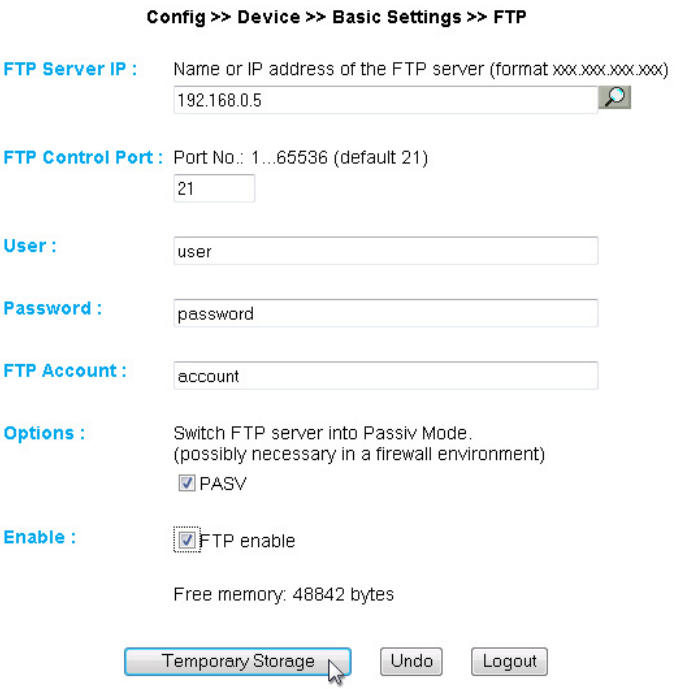
User: Enter here the user name required for FTP access.

Password: This is the password assigned to the user.

FTP Account: Some FTP servers require a special Account entry for login. If this is the case with your server, enter the account name here.

Options / PASV: If this option is enabled the server is instructed to operate in passive mode. This means the Web-IO opens the data connection. If this option is disabled, the FTP server handles opening of the data connection. If the server is protected by a firewall, you should enable the PASV option, since otherwise connection attempts could be blocked under some circumstances.

Enable: To use the FTP functionality check this box.



3.20.2 Alarm X -> FTP

FTP Local Data Port: This is the local data port on the Web-IO. Valid are entries between 1 and 65536. Entering „AUTO“ causes the device to select the port dynamically.

File Name: Enter here the path to the file you want the device to access.

FTP Alarm Text: Specify the text for the FTP contents. The following tags are accepted in these text boxes. The device replaces these tags with the respective values:

W&T tag value		Function
comma spelling (##,####)	dot spelling (##.####)	
<M1>	<m1>	*Measurand 1:* Displays the value for channel 1.
<M2>	<m2>	*Measurand 2:* Displays the value for channel 2.
<AA>		*Alarm active:* Shows all alarms (numbers, komma separatet) which are currently active.
<AN>		*Alarm sensor number:*Shows all sensors (numbers, komma separated) which match with the configured alarm values per alarm.
<AS>		*Alarm sensor name:* see above, but with sensor names (komma separated)

W&T tag date + time	
<Z>	Displays the actual time and date as a string.
<$y>	*Year (####):* Displays the year.
<$m>	*Month (##):* Displays the month.
<$d>	*Day (##):* Displays the day.
<$h>	*Hour (##):* Displays the hour.
<$i>	*Minute (##):* Displays the minute.
<$s>	*Second (##):* Displays the second.

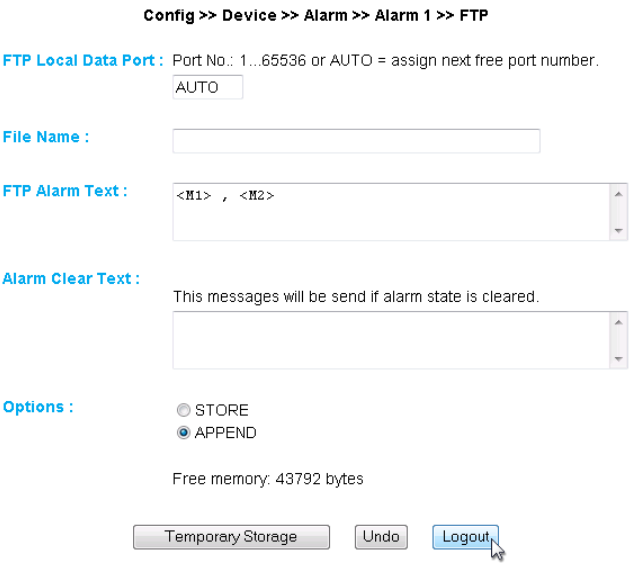
If you want a line feed after each data transmission, enter a CRLF by pressing the RETURN key at the end of each line.

Alarm Clear Text: This message is sent at the end of the alarm state. The above listed tags apply here as well.

Options:

STORE: Stores a file and writes the data to it. If this file already exists it is overwritten.

APPEND: Appends the data to an existing file. If the file does not exist, it is created.



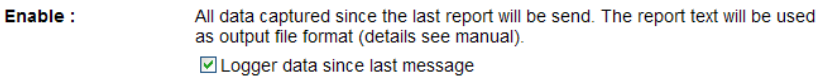
3.20.3 Special case: Report -> FTP

If the values should be sent through FTP cyclically, then the report function can be used. Here there is an additional option

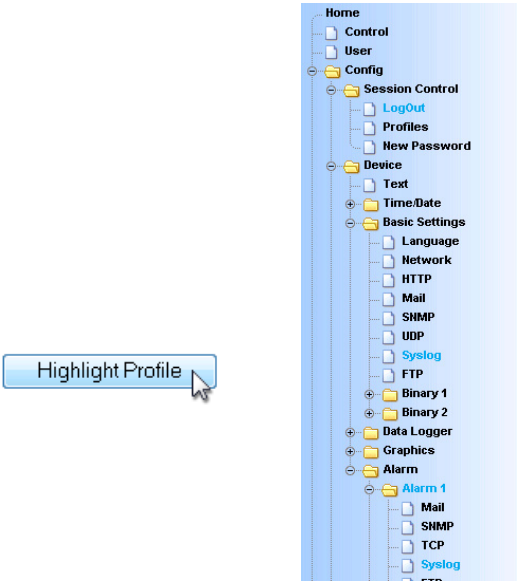
Logger Data since last message

This option ensures that after a power or network failure or if the FTP server cannot be reached all saved values which have been stored since the last transmission will be sent.

This ensures the completeness of the transmitted values.



3.21 Syslog messages incl. alarm sending



Send alarm messages as a Syslog message.

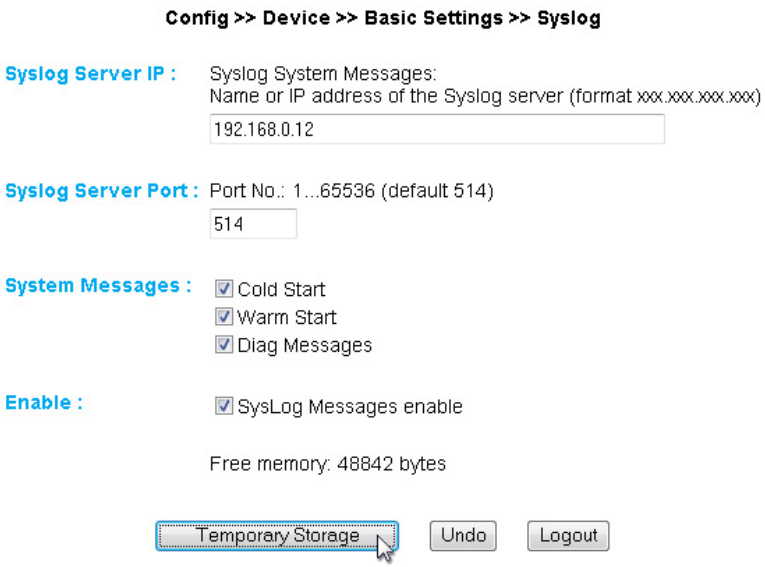
3.21.1 Basic Settings -> Syslog

Server Server IP: The IP address you want the device to send status messages to.

Syslog Server Port: A Syslog server service must be located on this port at the recipient end. This port must be able to receive incoming connections (Standard: 514).

System Messages: Select which status messages you want the device to send.

Enable: Enables/disables the Syslog function.



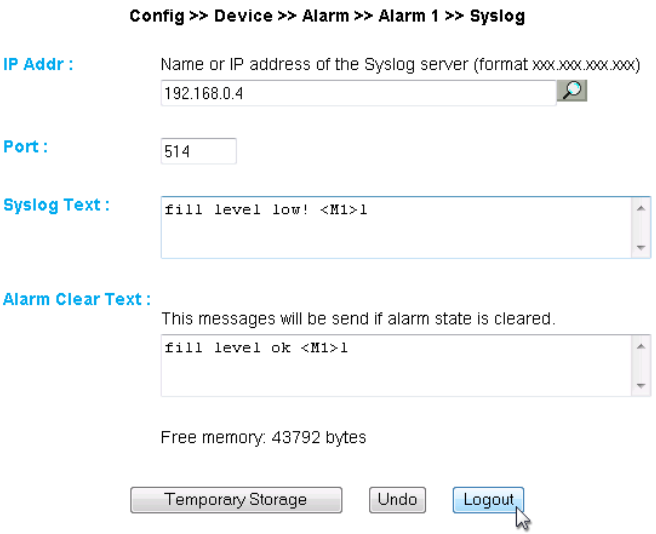
3.21.2 Alarm X -> Syslog

IP Addr: The IP address you want the message sent to.

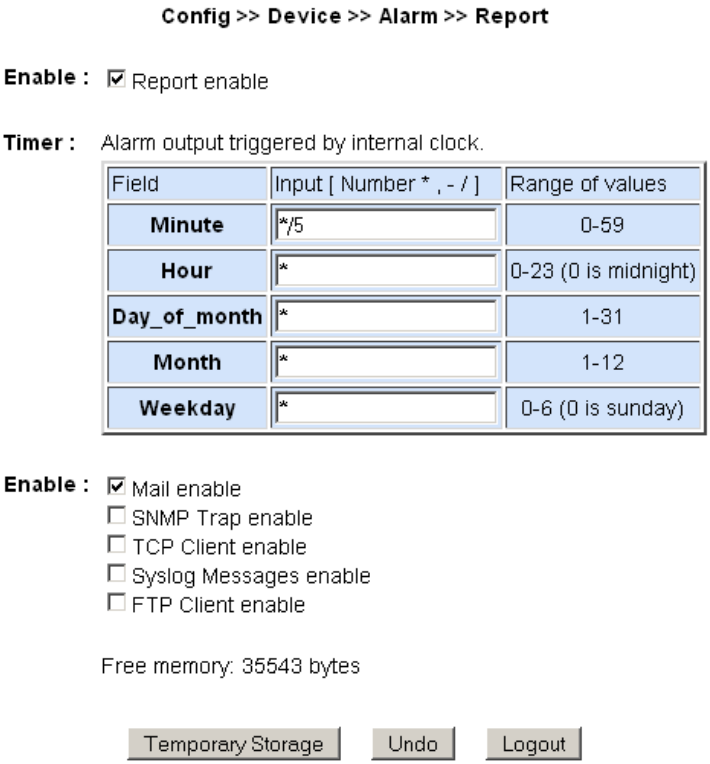
Port: A Syslog server service must be located on this port at the recipient end. This port must be able to receive incoming connections (Standard: 514).

Syslog Text: This text has the same specifications as apply to the other message types.

Alarm Clear Text: s.o.


Config >> Device >> Alarm >> Alarm 1 >> Syslog
IP Addr :
Name or IP address of the Syslog server (format xxx.xxx.xxx.xxx)
192.168.0.4
Port :
514
Syslog Text :
fill level low! <M1>l
Alarm Clear Text :
This messages will be send if alarm state is cleared.
fill level ok <M1>l
Free memory: 43792 bytes
Temporary Storage
Undo
Logout

3.22 Time-based report

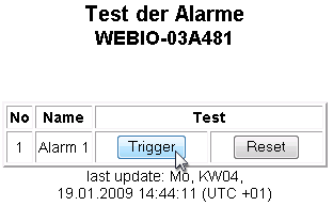


Timer: The timer interval set here is based on the CRON service as used in Linux.Unix systems. Valid characters can be found in chapter „alrms - CRON service“.

The „Report enable“ box must be checked for this function.

3.23 Check Alarm

On the configuration page *Diag >> Test >> Check Alarm* you can test the alarms (Alarm 9 represents time based report) you set. Clicking on the „Trigger“ button for the respective alarm simulates the corresponding alarm status, so that the configured actions can be run accordingly. Clicking on the „Reset“ button returns the alarm state to its normal state (only alarm 1-8).



3.24 UP-/Download

In the Download area you can download the XML configurations as well as the three user pages (home.htm, user.htm, log.htm) for further processing.

With **XML** Download you can read out the settings of the Web-IO, make any needed changes, and upload them back to the device using XML Upload.

With some Web browsers the correct code is not output until „View -> (Frame-) Show source text" is selected after clicking the „XML Download" button.

For an XML upload create or modify a text file with the corresponding parameters and load this file into the device. The configuration of the Web-IO must begin with the expression

```
<io-AOUTCC2.3> (#57661) resp. <io-AOUTVV2.3> (#57662)
```

and end with the expression

```
</io-AOUTCC2.3> (#57661) resp. </io-AOUTVV2.3> (#57662).
```

The sequence of the parameters you set corresponds to the sequence of the configuration menu starting at „Device".

The syntax for configuring via XML is as follows:

```
<Option>
    <Parameter1> VALUE </Parameter1>
    <Parameter2> VALUE </Parameter2>
</Option>
```

The individual options and parameters correspond to the configuration points in the browser menu.

Please note, especially for mass updates/configurations, that the IP address stored in the XML file is also sent and must then be changed accordingly.

Please note when using the active input that in Output Mode "Output OFF" causes passive input mode to be set. This must then be manually reset to active input mode after the upload. This protects the hardware from inadvertent damage.

In addition, the user pages (user.htm, home.htm, log.htm) can also be replaced in the **Upload** area.

An example can be found in the Appendix (example for creating your own Web pages).

Use the menu item „**Upload -> GIF**" to replace the logo shown in the menu and store it directly in the device.

4 Individual Measurement Polling

4.1 Polling via TCP/IP

4.1.1 HTTP - Controlling outputs of device

You can also use a TCP client in HTTP mode to set the outputs using HTTP-GET commands. Here you use the expression:

GET /outputaccess***X***?PW=***<password>***&State=***<value>***&

X: Number of the output: 1=Port 1, 2= Port 2

password: If an Admin password is assigned, it must be entered here in order to be able to set the output value. If no password is assigned, leave this place blank (...?PW=&...)

value: Here you enter the value you want to set on the respective output. The unit of the value corresponds to the scale settings you configured under *Config >> Ports >> Port X >> Config*.

To set a value of 50 on Channel 2 without an assigned password, use for example the expression:

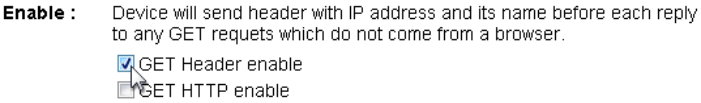
GET /outputaccess2?PW=&State=50&

Response: <Header>;<Sensor-Name>;output2;<value> <unit>

example:
„http://<IP address>/outputaccess1?PW=&State=10.5&“
Response:
„<IP address>;WEBIO-xxxxxx;Sensor 1 4-20mA;output1;10,5 Unit“

4.1.2 HTTP - Polling inputs using a ASCII command string

Similar to setting the output, both input channels can also be polled using command strings. What is sent out depends on the setting *GET Header enable* under *Config >> Device >> Basic Settings >> HTTP*.



If this box is checked the device sends its IP address in front in the reply along with the system name and sensor name. If the box is unchecked only the actual measurement values are sent.

The expression for polling the respective port is:

GET /Single***X***

X: Number of the Inputs: 1=Port 1, 2= Port 2

Example, Display with option *GET Header enable*:

10.40.42.44;WEBIO-046EE9;Sensor 1 0-20mA;14,300 mA

Example, Display without option *GET Header enable*:

14,300 mA

When entering the command string

GET /Single

without a port number the device outputs the values for both ports separated by semicolons:

10.40.42.44;WEBIO-046EE9;12,000 mA;5,000 mA

bzw.

12,000 mA;5,000 mA

4.1.3 HTTP - Reading logger infos from device

It is possible to poll the current analog values manually in CSV format (comma delineated data) through a socket connection. This function is also used to poll the individual data without the Web interface.

To do this, send the following string to Port 80 on the device:

```
GET /logger.csv
```

4.1.4 HTTP - Reading diagnostics infos from device

For diagnostics and the error memory the following applies:

```
GET /diagnosis
```

Requests the status of the diagnostics memory. The Web-IO returns:

```
diagnosis;0000;00000000;00000000;00000000
```

The 4-place value indicates the number of stored messages. For the three 8-place hexadecimal values each set bit represents one of the possible messages.

```
GET /diagnosisx
```

“x” specifies the index for the currently stored message. The Web-IO returns the corresponding message text. “x” may not be greater than the number of currently present messages.

```
GET /diaglistx
```

Returns the messages for the individual message bits (max. 64).

Deletes the message memory:

```
GET /diagclear
```

Example with Browser:

```
http://<IP address>/diagnosis
```

4.2 Polling via UDP

Open a UDP connection to the IP address of your device or to the Net-ID as a broadcase to Port 42279 (preset, can be changed).

Send one of the above expressions to the device and the latter will return the measured value on the port you are using.

When using multiple devices it may be practical when broadcasing messages to have the name and IP address of the device included. To do this, enable „GET Header enable“ under „Config >> Device >> Basic Settings >> HTTP“.

4.3 Polling via SNMP

The input/output can be directly polled or set using SNMP Get instructions. Reach the respective port using the following paths:

<IP-Adresse> 1.3.6.1.4.1.5040.1.2.**28**.1.3.1.1.**1** = Output value 1 as Octet String (Read/Write).

<IP-Adresse> 1.3.6.1.4.1.5040.1.2.**28**.1.4.1.1.**1** = Output value as integer value in thousandths, not comma delineated (Read/Write).

<IP-Adresse> 1.3.6.1.4.1.5040.1.2.**28**.1.3.1.1.**2** = Output value 2 as Octet String (Read/Write).

<IP-Adresse> 1.3.6.1.4.1.5040.1.2.**28**.1.4.1.1.**2** = Output value 2 as integer value in thousandths, not comma delineated.(Read/Write).

The IDs for the various device versions are as follows:

#57661: 1.3.6.1.4.1.5040.1.2.**28**...

#57662: 1.3.6.1.4.1.5040.1.2.**29**...

Specify the configured SNMP Read or Read/Write Community for polling.

An MIB for incorporation into management applications can be found on the datasheet page for the device at the WuT homepage http://www.wut.de (download). You can also find the MIB file in the device itself. It can be downloaded from the following address:

http://<ip address>/mib.zip

If you want to change settings (IP address, subnet mask, etc.) or output values in the device via SNMP, you must first use your SNMP manager to start a session on the device.

Entering the Administrator password into the variable

`wtWebGraphAnalog57661SessCntrlPassword`

or

`wtWebGraphAnalog57662SessCntrlPassword`

opens a session. Reading out the variable

`wtWebGraphAnalog57661SessCntrlConfigMode`

allows you to check whether the session was successfully opened.

1 = Session open, device in configuration mode.
0 = Session opening failed. Check whether the password may have been incorrectly entered.

After successfully opening the session you can use the variables defined in the private MIB to make any desired configuration changes. In addition you can use the aforementioned variables to set the output values for the ports.

After configuration is finished, write the variable

`wtWebGraphAnalog57661SessCntrlLogout`

to close the session

```
wtWebGraphAnalog57661SessCntrlLogout =
```

1 all changes are saved
2 quit without saving

If while a session is open there is no SNMP communication over a period of 5 minutes, the device itself closes the session and all changes are cancelled.

Opening an SNMP session takes priority over an HTTP login. This means: A user with Config or Administrator rights loses his browser access as soon as an SNMP session is opened.

The description for the individual SNMP variables, OIDs etc. can be found in the private MIB.

5 Including Measurements in your own Web Page

It is possible to use an implemented Java applet to integrate the measured values on your own Web page. The applet is refreshed every 60s. An example for this applet can be found here in the device itself:

```
http://172.0.0.10/app.htm
```

To incorporate the applet for the analog value monitoring in the HTMP page, the following HTML tag must be inserted at the point where the applet is located:

```
<Applet Archive="A.jar" Code="A.class" Codebase="Http://web-io/"
Width="breite" Height="Höhe">
```

Now the following parameters can be optionally specified:

Background color:

```
<Param Name="BGColor" Value="#RGB-Wert">
```

Font color:

```
<Param Name="FGColor" Value="#RGB-Wert">
```

The RGB value is given as 24Bit hex value.
For example: Value="#2F3C09". No distinction of capital and small letters.

Text orientation:

```
<Param Name="Align" Value="const">
```

const must be one of the following constants:

- Left
- Center
- Right

Capitalization is ignored.

If a parameter is omitted or incorrectly set, the following standard values are used:

BGColor	#FFFFFF (weiß)
FGColor	#000000 (schwarz)
Align	Right

The sensor is selected using the parameter

```
<Param Name="Sensor" VALUE="1">
```

The analog value is specified using Value 1, and the output status using Value 2.

Units are specified using the parameter

```
<Param Name="unit" VALUE="Liter">
```

The parameter is of the string type. If not specified, it is automatically set to „C“.

If you want to use Java functions for access by multiple device applets, you can use the parameter

```
<Param Name="device" VALUE="0">
```

to number the applets for each device beginning at 0.

Polling of the devices is turned on and off using the parameter

```
<Param Name="sensorpolling" VALUE="on">
```

The standard value is „on“.

To use a polling rate other than the factory default setting of 60 seconds, use the parameter

```
<Param Name="pollingrate" VALUE="60000">
```

with ms as the units. Note that a new value will in any case only be made available every 0.5 ms.

To output an error message when there are problems opening a connection, do this by turning the parameter

```
<Param Name="showerrors" VALUE="on">
```

resp. „off“ on and off. The standard value is „off“.

Once all parameters have been entered, the HTML tag must be closed using </Applet> geschlossen werden.

Example:

```
<Applet Archive="A.jar" CODE="A.class"
Codebase="http://192.168.0.10" Width="300" Height="100">
<Param Name="unit" VALUE="Liter">
<Param Name="device" VALUE="0">
<Param Name="BGColor" Value="#0000FF">
<Param Name="FGColor" Value="#FF0000">
<Param Name="Align" Value="Center">
<Param Name="Sensor" Value="1">
</Applet>
```

The font size is automatically calculated from the size of the applet.

5.1 Controlling the Java-Applet with Java Script

To use Java Script to control the Java applet, the addition „mayscript“ must be specified when opening the applet

```
<Applet Archive="A.jar" CODE="A.class"
Codebase="http://192.168.0.10" Width="300" Height="100"
mayscript>
```

To be able to work with the applet, the corresponding JavaScript function must be declared in the Web page header.

The following read functions are used for this:

```
function sensorChanged( iDevice, iSensor, iVal )
  { Program code which is running at change of an Input }
```

The preceding function is invoked by the applet when a analog value change is detected at the sensors. *iDevice* specifies for

which Web-IO Analog a value has changed. *iSensor* is sued to indicate which sensor has changed. The variable *iVal* sends the current analog value.

Please note that no distinction is made between capital and small letters when naming the functions.

The following source text shows a small example for dynamic display of Sensor 1.

```
<html>
<head>
<script language="JavaScript" type="text/javascript">

            function Current (iVal, iSensor)
            {
             document.getElementById('currenttab').firstChild.data = iVal+'mA';
             }

            function sensorChanged( iDevice, iSensor, iVal )
            {if (iSensor==0){
            Current (iVal);}
            }
</script>
</head>
<body style="background-color: #79ACDF;
font-family: Arial, Helvetica, sans-serif;">
<div align="center"><noscript> JavaScript ist nicht aktiviert
oder wird nicht unterst&uuml;tzt </noscript>
  <p><applet name="Analog" archive="A.jar" code="A.class"
    codebase="http://10.40.23.19" height="0" width="0" mayscript>
      <param name="device" value="0">
      <param name="showerrors" value="off">
      <param name="sensorpolling" value="on">
      <param name="pollingrate" value="1000">
           Java ist nicht aktiviert oder wird nicht unterst&uuml;tzt
    </applet></p>
    <table width="200" cellspacing="0" cellpadding="0" bordercolor="#FFFFFF"
    align="center">
    <tr bgcolor="#CCCCCC">
```

```
      <td id="currenttab" align="center">0</td>
    </tr>
    <tr bgcolor="#999999">
      <td>
        <div align="center"><font size="2" color="#FFFFFF">Sensor 1</font></div>
      </td>
    </tr>
  </table>
</div>
</body>
</html>
```

The following function can be used for writing analog values to the output.

```
function outputaccess( iSensor, iVal )
  { Program code which is used for writing an analog value to one of the both Outputs. }
Example:
Analog.outputaccess(1, document.getElementById('channel1').value);
```

Therefore you need an additional function for entering password and login at device.

```
function setPassword( String )
  { Program code sends password to Web-IO and handles login. }
Example:
<input id="pass" type="password" /><input type="button" value="set password"
onclick="Analog.setPassword(document.getElementById('pass').value); />
```

A detailed example for using the Java applet is found on the Web page app.htm, which can be opened in the Web-IO.

Opening: http://<ip-adresse>/app.htm

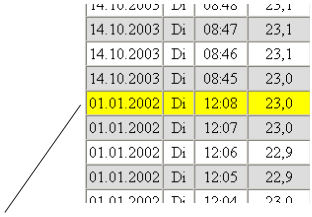
6 Data Logger

The Web-IO saves all measured values in a fixed ring memory, so that they are retained even after disconnecting power or pressing the Reset button.

The measuring data in the data logger are opened from the user page of the device (Home -> User or http://xxx.xxx.xxx.xxx/user.htm).

From *Config -> Device -> Data Logger -> Memory* you can clear the memory.

An interruption of the time line, for example from a reset or subsequent time server synchronization, is represented on the data logger page as a yellow line.



14.10.2003	Di	08:47	23,1
14.10.2003	Di	08:46	23,1
14.10.2003	Di	08:45	23,0
01.01.2002	Di	12:08	23,0
01.01.2002	Di	12:07	23,0
01.01.2002	Di	12:06	22,9
01.01.2002	Di	12:05	22,9

time line interruption:
yellow marked line

In the case of set alarm limits, measurement values which are not within a valid range are highlighted in red.

7 Appendix

7.1 Alternative IP address assigning

7.1.1 ... using DHCP-/BOOTP protocol

Many networks use DHCP (Dynamic Host Configuration Protocol) or BOOTP for centralized and dynamic assignment of the IP addresses. Which of the two protocols is used in any individual situation makes no difference with respect to Web-IO devices, since DHCP is simply a downward compatible expansion of BOOTP. DHCP servers thus use the same requests as BOOTP clients.

The following parameters can be assigned to the Web-IO Analog using these protocols:

- IP address
- Subnet mask
- Gateway address

Function

To obtain an IP address the device sends a corresponding BOOTP request as a broadcast to the network after each restart. The resulting reply generated by the DHCP/BOOTP server contains along with the IP address the subnet mask and gateway address. The Web-IO immediately copies this information to its non-volatile memory.

When starting up the device in DHCP/BOOTP networks, contact the responsible system administrator. If using DHCP for address assignment, you must also make it clear that a reserved IP address is required. To incorporate this into the respective address database, the administrator needs the Ethernet address of the Web-Graph Thermometer, which can be found on the housing sticker.

After the necessary entries have been made, the device automatically obtains the desired IP address after each reset.

To ensure that the Web-IO can be accessed even if the DHCP/ BOOTP server goes down, the previous IP address is retained when there is no response.

In DHCP environments the IP address to be assigned must be reserved by means of a fixed connection to the Ethernet address of the Web-IO. Under Windows NT this is done in the DHCP manager under „Reservations". Linux provides the file „dhcpd.conf" for this purpose; where you need to make a corresponding entry.

If you change this option in the Web configuration, the change to the checkbox is not updated until after a device reset.

7.1.2 ... using ARP command

The prerequisite is a PC which is located in the same network segment as the Web-IO and on which TCP/IP protocol is installed. Read the MAC address for the device from the label (e.g. EN=00C03D0012FF). Under Windows you first ping another network client and then use the command line described below to insert a static entry into the computer's ARP table:

```
arp -s <IP-Adresse> <MAC-Adresse>
```

e.g. under Windows:

```
arp -s 172.0.0.10 00-C0-3D-00-12-FF
```

e.g. under SCO UNIX:

```
arp -s 172.0.0.10 00:C0:3D:00:12:FF
```

Now ping the device again (in our example you would ping 172.0.0.10). The IP address is not stored in the non-volatile memory.

This method is only usable if no IP address has yet been assigned to the Web-IO, i.e. the entry ius 0.0.0.0. To change an already existing IP address you must use the configuration menu from your browser or use WuTility.

7.1.3 ... using RARP-Server (UNIX only)

Working with an RARP server enabled under UNIX is based on entries in the configuration files */etc/ethers* and */etc.hosts*. First add a line to */etc/ethers* with the assignment of Ethernet address of the Web-IO to the desired IP address. In */etc/hosts* the link is made with an alias name. After you connect the device in the network segment of the RARP server you can assign the desired IP address to the device over the network.

Beispiel:
Ihr Web-IO hat die MAC-Adresse EN=00C03D0012FF (Aufkleber auf dem Gerät). Es soll die IP-Adresse 172.0.0.10 und den Aliasnamen WT_1 erhalten.

Eintrag in der Datei */etc/hosts:* 172.0.0.10 WT_1

Eintrag in der Datei */etc/ethers:* 00:C0:3D:00:12:FF WT_1

Falls der RARP-Daemon noch nicht aktiviert ist, müssen Sie ihn nun mit dem Befehl *„rarpd -a“* starten.

Example:

Your Web-IO has MAC address EN=00C03D0012FF (sticker on the device). You want to give it IP address 172.0.0.10 and the alias WT_1.

Entry in the file */etc/hosts:* 172.0.0.10 WT_1

Entry in the file */etc/ethers:* 00:C0:3D:00:12:FF WT_1

If the RARP daemon is not yet enabled, start it using the command *„rarpd -a“*.

7.2 Example for creating your own Web pages

You can freely configure the standard display pages of the device (user.htm, home.htm, log.htm). Special control elements

can be inserted into the page using „tags“. In the following you will find an example for creating the page „user.htm“.

Create an HTMP file which must begin with the expression

```
<user.htm>          (resp. log.htm or home.htm)
```

Then enter the HTML code.

You have the ability to show the following parameters on your pages:

```
<w&t_tags=m1>
```

shows the current measured value of the first port.

```
<w&t_tags=m2>
```

shows the current measured value of the second port.

```
<w&t_tags=time>
```

inserts the current time.

```
<w&t_tags=steps>
```

inserts a list box for selecting the time steps you want to display.

```
<w&t_tags=ok_button>
```

inserts an „OK“ button which sends the selected parameters to the device.

```
<w&t_tags=session>
```

inserts an invisible session control so that the user can leave the page without being logged out by the device. The expression is only needed if you want to design your own button for sending. Insert this expression then between *<form action>* and *</form>*.

Background color:

You can assign different background colors to values shown in tables depending on the sensor state:

```
<w&t_tag=bc1>
```

describes a background color (BGColor) which depends on the alarm status of the first port. If there is a limit violation, this color is red. Otherwise the tag does not describe an explicit color. This tag is required for example to show limit violations in the log table in red.

```
<w&t_tag=bc2>
```

Background color for the second port.

```
<w&t_tags=sensorx>
<w&t_tags=outputx>
```

inserts the name of the sensor or output into the page and contains a link to the complete sensor description.

```
<w&t_tags=device_name>
```

inserts the assigned device name.

```
<w&t_tags=device_text>
```

inserts a freely configurable, descriptive text for the device.

```
<w&t_tags=location>
<w&t_tags=contact>
```

inserts the respective text modules which are configured under *Config >> Device >> Text*.

```
<w&t_tags=reload_button>
```

insers a „Reload“ button for refreshing the current page.

```
<w&t_tags=previous_button>
<w&t_tags=next_button>
```

inserts a button for paging ahead or back through the table.

The „Previous“ button and the „Next“ button only have any function in the „Log.htm“ file.

```
<w&t_tags=logtable>
```

inserts a table with the current measurement values. On the „log-page“ you can only navigate forward and backward in this table using the „Next“ and „Previous“ buttons (see above). On

both of the other pages (user.htm and home.htm) only the current measurement values can be displayed.

Example for setting a background color in a table:

```
<tr>
    <td colspan="3" align="center">
    <table border="2">
        <tr>
            <th><w&t_tags=sensor1></th>
        </tr>
        <tr>
            <td <w&t_tags=bct>><w&t_tags=m1> mA</td>
        </tr>
    </table></td>
</tr>
```

If there is a limit violation, the measurment value is shown in red.

To specify the output format of the data, insert the following line into your document:

```
<form action="log.htm" method="POST" >
....
</form>
```

The CSV output can be specified using the expression

```
<form action="logger.csv" method="POST" >
....
</form>
```

Resetting the device to its factory default settings restores the original HTMP pages.

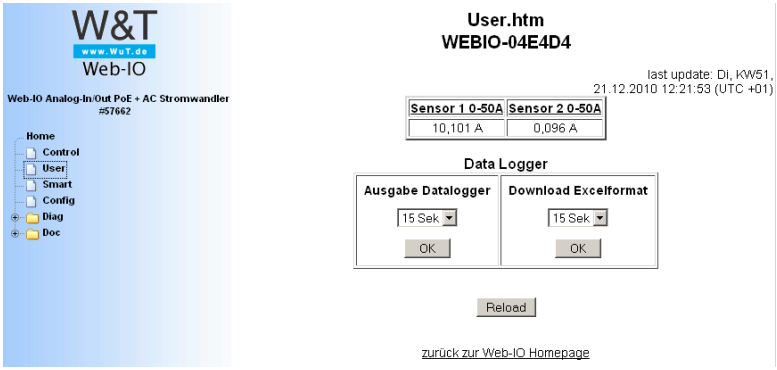
Sample user.htm:

```
<user.htm>
<!DOCTYPE html PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN">
<html>
```

```
<head>
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1">
<link rel="stylesheet" href="style.css" type="text/css">
<title>USERUP</title>
</head>
<body>
<table border="0" cellpadding="0" cellspacing="0" width="600" align="center">
<tr><td colspan="3" align="center" class="size5"><b>User.htm</b></td></tr>
<tr><td colspan="3" align="center" class="size5"><b><w&t_tags=device_name></b></td></tr>
<tr><td colspan="3" align="center" class="size4"><w&t_tags=device_text></td></tr>
<tr><td colspan="3"> </td></tr>
<tr><td colspan="3" align="right"><p>last update: <w&t_tags=time></p></td></tr>
<tr>
    <td colspan="3" align="center">
    <table border="2">
        <tr>
            <th align="center"><w&t_tags=sensor1></th>
            <th align="center"><w&t_tags=sensor2></th>
        </tr>
        <tr>
            <td align="center" <w&t_tags=bc1>><w&t_tags=m1></td>
            <td align="center" <w&t_tags=bc2>><w&t_tags=m2></td>
        </tr>
    </table></td>
</tr>
<tr>
    <td align="center" colspan="3"> </td>
</tr>
<tr>
<td colspan="3" align="center" class="size3"><b>Data Logger</b></td>
</tr>
<tr>
    <td colspan="3" align="center">
    <table border="1">
        <tr><td>
        <form action="log.htm" method="POST" >
        <table border="0" cellpadding="5%">
            <tr>
                <td align="center"><b>Ausgabe Datalogger</b></td>
            </tr>
            <tr>
```

```
            <w&t_tags=steps>
        </tr>
        <tr>
            <td align="center">
            <w&t_tags=ok_button>
            </td>
        </tr>
    </table></form>
    </td>
    <td>
    <form action="logger.csv" method="POST" >
    <table border="0" cellpadding="5%">
        <tr>
            <td align="center"><b>Download Excelformat</b></td>
        </tr>
        <tr>
            <w&t_tags=steps>
        </tr>
        <tr>
            <td align="center">
            <w&t_tags=ok_button>
            </td>
        </tr>
    </table></form>
    </td></tr>
</table>
</td>
</tr>
<tr><td align="center" colspan="3"><br><br><form action="user.htm" method="GET"
><w&t_tags=reload_button></form></td></tr>
<tr><td align="center" colspan="3"><br><br><a href="index.htm<w&t_tags=session>"
target="_top">zur&uuml;ck zur Web-IO Homepage</a></td></tr>
</table>
</body>
</html>
```

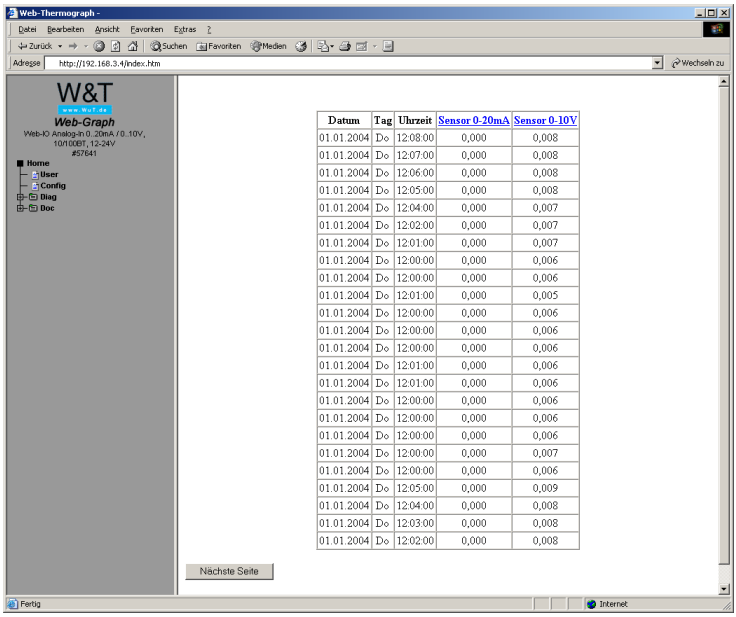
The Web-IO displays this page in the Web browser as follows:



Sample log.htm:

```
<log.htm>
<html>
<head>
<title>Untitled Document</title>
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1">
</head>

<body bgcolor="#FFFFFF" text="#000000">

<form action="log.htm" method="POST">
    <w&t_tags=previous_button>
</form>

<w&t_tags=logtable>

<form action="log.htm" method="POST">
    <w&t_tags=next_button>
</form>
</body>
</html>
```

The Web-IO displays this page in the Web browser as follows:



Datum	Tag	Uhrzeit	Sensor 0-20mA	Sensor 0-10V
01.01.2004	Do	12:08:00	0,000	0,008
01.01.2004	Do	12:07:00	0,000	0,008
01.01.2004	Do	12:06:00	0,000	0,008
01.01.2004	Do	12:05:00	0,000	0,008
01.01.2004	Do	12:04:00	0,000	0,007
01.01.2004	Do	12:02:00	0,000	0,007
01.01.2004	Do	12:01:00	0,000	0,007
01.01.2004	Do	12:00:00	0,000	0,006
01.01.2004	Do	12:00:00	0,000	0,006
01.01.2004	Do	12:01:00	0,000	0,005
01.01.2004	Do	12:00:00	0,000	0,006
01.01.2004	Do	12:00:00	0,000	0,006
01.01.2004	Do	12:00:00	0,000	0,006
01.01.2004	Do	12:01:00	0,000	0,006
01.01.2004	Do	12:01:00	0,000	0,006
01.01.2004	Do	12:00:00	0,000	0,006
01.01.2004	Do	12:00:00	0,000	0,006
01.01.2004	Do	12:00:00	0,000	0,006
01.01.2004	Do	12:00:00	0,000	0,007
01.01.2004	Do	12:00:00	0,000	0,006
01.01.2004	Do	12:05:00	0,000	0,009
01.01.2004	Do	12:04:00	0,000	0,008
01.01.2004	Do	12:03:00	0,000	0,008
01.01.2004	Do	12:02:00	0,000	0,008

The pages home.htm, user.htm and logger.htm are replaced by the factory integrated pages after the device language is changed.

7.3 Firmware update

The operating software of the Web-IO is being constantly improved. The following section describes how to upload new firmware when necessary. It is a goog idea to store the device configuration before. Firewalls should not be active so that update can be performed without problems.Especially ports 8002 (TCP) and 69 (UDP).

- Where is the current firmware available?

- Firmware update over the network under Windows

7.3.1 Where is the current firmware available?

The latest firmware including the available update tools and a revision history is published on our Web site at the following address: *http://www.wut.de*

Before downloading please write down the 5-character model number found on the Web-IO. From the homepage you now reach the product overview sorted by article number, from where you can go directly to the datasheet for the device. Follow the link to the current version of the firmware.

7.3.2 Firmware update over the network under Windows

The prerequisite is a PC running WIndows 9x/NT/2000/XP/Vista/7 with a network connection and enabled TCP/IP stack. For the update process you need two files,which as already described are downloadable from the homepage *http://www.wut.de.*

- The executable update tool for sending the firmware to the Web-IO
- The file with the new firmware to be sent to the Web-IO Analog In/Out

No special preparation of the Web-IO for a firmware update is necessary.

WuTility (you find the latest version also on our Web site), which is needed for the update, detects all WuT devices located in your network and is for the most part self-explanatory. If you do have questions or anything is unclear, please refer to the associated documentation or our online help.

! *Never intentionally interrupt the update process by disconnecting power or pressing the Reset button. After an incomplete update the Web-IO Analog will be unusable.*

Never mix files with different version numbers in file names. This results in rendering the device unusable.

The Web-IO automatically detects when uploading of the new firmware is complete and then automatically performs a reset.

7.3.3 LED indicators

- **Power LED:** Indicates that power is present. If the LED is not on, please check for correct connection of the power supply.
- **Status LED:** Flashes whenever there is network activity with the Web-Analog. Periodic flashing indicates a ready state.
- **Error LED:** The Error LED uses various flash codes to indicate error states on the device or network port.

  1x flashing of theError-LED = Check network connection. The Web-Thermograph is not receiving a link pulse from a hub/switch. Check the cable or the hub/switch.

  2x or 3x flashing of the Error-LED = Interrupt the power to perform a reset. If this does not eliminate the error, return the device to its factory default settings. Since all the network setting will also be resete, you should write down your current network settings.

  ```
  Config >> Session Control >> LogOut >> Restore Defaults
  ```

  After a reset the device is restored to its factory default settings. Reconfigure the network settings.

Power LED + Status LED + Error LED on = Self test error

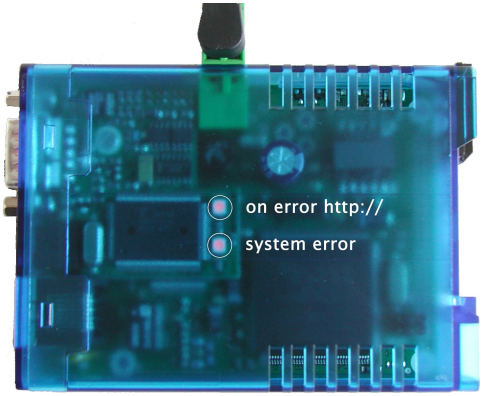
The self-test performed by the Web-IO each time it is started or reset may - for example due to an incomplete firmware update - not be correctly executed. In this state the device is no longer functional. Please return the device.

Additional LEDs (internal)

- **on error http://xxx.xxx.xxx.xxx/diag -LED:** Indicates an internal configuration error. For troubleshooting open page http://xxx.xxx.xxx.xxx/diag in the device. For remedied errors delete under Diag Report.

- **system error:** Major hardware error. Try to restart the device by cycling power. If the fault is not cleared, please return the device for service.

If the Web-Thermograph does not have an IP address or the address is 0.0.0.0, the LEDs on error and system error will remain on after a reset or new start! The system error LED will flash 3x after a short time. Only when an IP address has been assigned will the LEDs go out.



7.4 Emergency access

The device can be reset to its factory default settings in the following manner:

1. Open the housing

The DIN rail mount housing is opened by plugging in the 6-pin connector. After tightening both the fastening screws the board can be removed from the housing by pulling on the connector.

2. Insert module jumper

An open jumper location is located on the separate module. Insert this jumper and ensure that a network cable with a link to a hub or switch is connected to the device.

3. Reset

Turn on the device with the jumper in. The device flashes the „System-Error“ and „On-Error http://“ several times. After approximately 30 seconds the device is restored to its factory default settings.

Resetting is done only using the jumper on the module board. Please always leave the two other jumpers on the motherboard out!

7.5 Technical data

Prod. No.:	**#57661**
Product:	Web-IO Analog-In/Out 2x 0..20mA PoE
Current input passive:	0..20mA / 4..20mA , apparent ohmic resistance 100 Ohm
Current input active:	0..20mA, apparent ohmic resistance max 500 Ohm, power supply Umax 13V / 40mA
Current output:	0..20mA, apparent ohmic resistance max. 500 Ohm, power supply 10V guaranteed
Current loop monitoring:	short-circuit-proof and open loop detection
Network:	10/100BaseT autosensing
Power Supply:	Power-over-Ethernet (PoE) or via terminal screw DC 18V .. 48V (+/-10%) or AC 18Veff .. 30Veff (+/-10%)
Measurement unit:	
Measuring range:	0..20mA (+2%)
Resolution:	1 µA
Measuring error:	±0,5% FSR, Ta=0-60 °C
Measuring frequence:	2 Hz
Saving frequence:	15, 30 sec, 1, 5, 15, 60 min
Memory (832kB):	min. 150 days, max. 99 years
Additional infos:	
Galvanic isolation:	Inputs vs. Network: min. 500 Volt
Mail function:	Mail for sending alarm or reports
Power supply:	DC 12V (-5%) - 34V (+5%) AC 9Veff (-5%) - 24Veff (+5%)
Current consumption:	AVG: 80mA @24VDC, 110mA @18VAC Max: 90mA @24VDC, 50mA @48VDC PoE Class 1 (0,44 - 3,84W)
Housing:	Plastic housing, 105 x 75 x 22 (l x b x h)
Weight:	approx. 200g
Storage temperature:	-40..+70°C
Operating ambient temperature:	non-cascaded: 0 .. +60°C cascaded: 0 .. 50°C

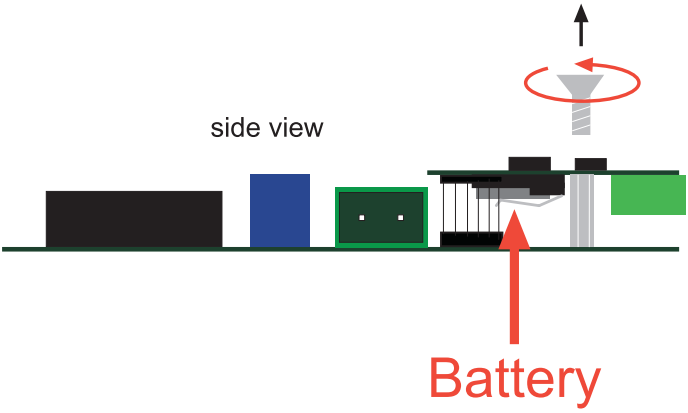
Prod. No.:	#57662
Product:	Web-IO 2x Analog-In/Out 0-10V
Voltage Input:	0..10V, 1MOhm
Voltage Output:	0..10V, Imax 15mA, sense terminal
Network:	10/100BaseT autosensing
Power Supply:	Power-over-Ethernet (PoE) or via terminal screw DC 18V .. 48V (+/-10%) bzw. AC 18Veff .. 30Veff (+/-10%)
Measurement unit:	
Measuring range:	0..10V (+2%)
Resolution:	1 mV
Measuring error:	±0,5% FSR, Ta=0-60 °C
Measuring frequence:	2 Hz
Saving frequence:	15, 30 sec, 1, 5, 15, 60 min
Memory (832kB):	min. 150 days, max. 99 years
Additional infos:	
Galvanic isolation:	Inputs vs. Network: min. 500 Volt
Mail function:	Mail for sending alarm or reports
Power supply:	DC 12V (-5%) - 34V (+5%) AC 9Veff (-5%) - 24Veff (+5%)
Current consumption:	AVG: 80mA @24VDC, 110mA @18VAC Max: 90mA @24VDC, 50mA @48VDC PoE Class 1 (0,44 - 3,84W)
Housing:	Plastic housing, 105 x 75 x 22 (l x b x h)
Weight:	approx. 200g
Storage temperature:	-40..+70°C
Operating ambient temperature:	non-cascaded: 0 .. +60°C cascaded: 0 .. 50°C

7.6 Disposal

This device contains a non-rechargeable lithium button battery type BR (lithium carbon monofluoride cell) for retaining the time even when the device is turned off. This battery must be disposed of after its useful life has expired. Take it to an official collection site for recycling.

First disconnect all cables and sensors from the device.

Screw the 6-pin screw terminal strip on and open the housing by gently pulling on the terminal.

Remove the screw joining the two circuit boards and remove the upper circuit board.

The button battery is located at the rear of the circuit board.
Remove it from its holder and have it properly recycled.