Manual

W&T Web Thermometer

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1. Connection and displays

The Web Thermometer should be located so that the network-side maximum allowed cable length of 100 meters is not exceeded.

Please note that all connections must be made with the terminal devices powered down.

1.1 Ethernet connection

An IEEE-802.3 compatible connection on a shielded RJ45 male connector is provided on the front panel. Through here you can connect the Web Thermometer to a hub or switch. Pin/lead assignments comply with a standard MDI interface (AT&T258), so that you can use here a 1:1 cable having a length of max. 100 meters.

10BaseT, 10MBit/s and autosensing 100BaseTx/10BaseT, 100/10MBit/s are supported:


```
1 = Tx+                    8 = nc
2 = Tx−                    7 = nc
3 = Rx+                 6 = Rx−
      4 = nc   5 = nc
```
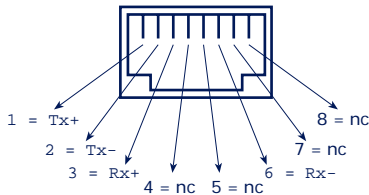
RJ45 female (per AT&T256)

Tip: Incorporation into a 100BaseTx-network is also possible with the 10BaseT-version by using an autosensing hub or switch. Such an autosensing component automatically sets itself to the transmission speed supported by the terminal device.

The Error LED on the front panel indicates the current link status: If it flashes at 1-2 second intervals, there is a fault in the connection to the hub or the connection is interrupted.

1.2 Connection for the thermocouple

The thermocouple is connected using a DB9 plug. Details concerning pin assignments can be seen in the following illustrations:

3 = TxD
2 = RxD
1 = NC
4 = NC
5 = PT100 GND (white)

6 = DSR
7 = PT100 (white)
9 = PT100 (red)
8 = PT100 (red)
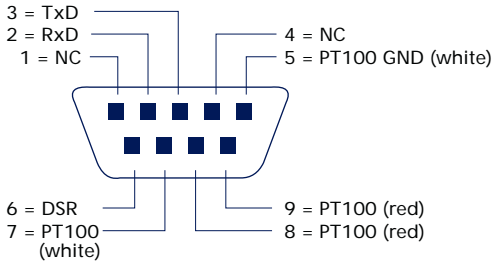
Pin assignment for RS232, DB9 plug

Pin	Factory Default
1	NTC thermocouple reference voltage
2	Data (RxD) *see 2.1.2*
3	Data (TxD)
4	NTC input 10K
5	PT 100 (white, GND)
6	internal use
7	PT 100 (white)
8	PT 100 (red)
9	PT 100 (red) *reference voltage for PT100 thermocouple*

The thermocouple is simply connected to the Web Thermometer through this interface. Position the thermocouple where you wish to monitor the temperature. The length of the cable on the NTC thermocouple is one meter and can be extended to ten meters if needed. The Web Thermometer is configured for the NTC supplied. If you use a different NTC, a firmware update may be necessary.

The cable to the PT100-4-wire thermocouple may be made as long as needed.

1.3 Supply voltage

5V versions
The supply voltage of 5V +/-5% is brought to the plug-in power supply provided through the socket located on the bottom of the housing. Please use *only* the regulated power supply provided!

24V versions
The supply voltage of 12-24 AC/DC is brought in through the screw terminal on the bottom of the housing.

1.4 LED indicators

Power-LED
Indicates the presence of supply voltage. If the LED is not on, please check for correct wiring of the power supply.

Status-LED
Flashes whenever there is network activity from the Web Thermometer. Periodic flashing indicates that the port has a connection to another station.

Error-LED
The Error LED uses various flash codes to indicate error conditions on the device or serial port.

`1x flashing of the Error LED`: Check network connection The Web Thermometer is not receiving a link pulse from a hub. Check the cable or the hub port.
`2x or 3x flashing of the Error LED`: Perform a reset by momentarily cycling the power. If the error is not resolved, set the device back to its factory defaults. Since all the network settings are reset, you should first write down these settings. You can check the settings with the menu option *SETUP System –> Factory Defaults.* Confirm with „y". After a reset the device is returned to the factory defaults. Reconfigure for your own network settings.
`All LEDs on`: Self-test error. The self-test that is performed after each start or reset of the Web Thermometer may – for

example due to an incomplete firmware update – not have been correctly finished. The Web Thermometer is in this state no longer operational. Please return the unit to us.

2 TCP/IP configuration

After you have set up the hardware as described above, you must assign the necessary IP address for use in a TCP/IP network. Please obtain the correct value for this parameter from your system administrator.

Caution: *This IP address must be unique throughout the network!*

2.1 Assigning the IP address

There are four ways to assign the IP address of the Web Thermometer for the first time:

Using DHCP-/BOOTP protocol
Many networks use for centralized and dynamic assigning of IP addresses DHCP (*D*ynamic *H*ost *C*onfiguration *P*rotocol) or BOOTP. Which of the two you use makes no difference to the Web Thermometer, since DHCP is simply an upward-compatible expansion of BOOTP. DHCP servers thus also use requests from BOOTP clients. The following parameters can be assigned to the Web Thermometer using these protocols:

- IP address
- Subnet mask
- Gateway address

It is not possible to transfer other parameters or a lease time option.

Function
To obtain an IP address, the Web Thermometer sends a corresponding BOOTP request as a network broadcast after each new start. The reply generated by the DHCP/BOOTP server contains the IP address as well as the subnet mask and gateway address. The Web Thermometer immediately adds this information to its non-volatile memory. Refer to your system administrator for startup of the Web Thermometer in DHCP/BOOTP networks. If using DHCP to as-

sign the address, you must note that a reserved IP address is required. To add to the respective address database the administrator will need the Ethernet address of the Web Thermometer, which can be found on the sticker on the housing:

```
58xxx      [Model]

EN=00c03d004a05              ——  Ethernet addres

OK xxxxxx
```

Once the administrator has made the necessary entries, the Web Thermometer automatically obtains the desired IP address after each reset. To ensure availability of the Web Thermometer even should the DHCP/BOOTP server fail, the previous IP address is kept if there is no reply.

Caution: *In DHCP environments the IP address to be assigned must be reserved by a fixed link to the Ethernet address of the Web Thermometer. Under Windows NT this is done in the DHCP Manager under menu item* Reservations*. Linux provides the file* .dhcpd.conf *for making the corresponding entry.*

Using ARP command
The requirements is a PC that is located in the same network segment as the Web Thermometer and which has TCP/IP protocol installed. Read off the MAC address of the Web Thermometer from the device (e.g. EN= 00C03D0012FF). Under Windows you will first ping another network station and then make a static entry in the ARP table of the computer using the command line *arp -s [IP address] [MAC address].*

e.g. under Windows: *arp -s 172.16.231.10 00-C0-3D-00-12-FF*
e.g. under SCO UNIX: *arp -s 172.16.231.10 00:C0:3D:00:12:FF*

Now ping the Web Thermometer again (in our example that would be ping 172.16.231.10). The IP address is now stored in non-volatile memory.

Caution: *This method can only be used if no IP address has been assigned yet to the Web Thermometer, i.e. the entry is 0.0.0.0. To change an already existing IP address you must invoke the internal configuration menu through TELNET or use the serial method (2.1.3).*

Through the serial port
As opposed to the procedure described above you can use the serial interface to change an already existing IP address for the Web Thermometer.

Connect the RS232 port of the Web Thermometer to a PC and start Hyperterminal. Once in the program, establish a direct connection through your COM port and set the serial parameters to *9600 baud*, *no parity*, *8 bits*, *1 stop bit*, *no protocol*. Make sure that Hyperterminal is in offline mode by clicking on the *Disconnect* button in the tool bar. Do a reset of the Web Thermometer by cycling the power. If the green status LED comes on, enter the letter "x" at least three times on the terminal until the reply "IPno.+<Enter>" appears. Now use normal dot notation (xxx.xxx.xxx.xxx) to enter the IP address and finish by pressing <Enter>. If the entry was correct, the system acknowledges with the assigned IP address, otherwise "FAIL" appears on the monitor along with the current IP address. This procedure may be repeated as often as needed.

If you wish to use a different terminal program, you will need a cable on which only pins 2, 3 and 5 are used.

Using an RARP Server (UNIX only)
Working with an RARP server activated under UNIX is based on entries in the configuration files *val/etc/ethers* and *val/etc/hosts.* First expand *val/etc/ethers* with a line assigning the Ethernet address of the Web thermometer to the desired IP address. In *val/etc/hosts* the link is then specified with an alias name. Once you have connected the Web Thermometer in the network segment of the RARP server, you can use the network to assign the desired IP address to the device.

`Example:` Your Web Thermometer has MAC address *EN= 00 CO 3D 00 12 FF* (from the sticker on the unit). You want to assign it IP address *172.16.231.10* and alias *WT_1*.
Entry in the file */etc/hosts: 172.16.231.10 WT_1*
Entry in the file */etc/ethers: 00:C0:3D:00:12:FF WT_1*

If the RARP daemon is not yet activated, you must now start it using the command "rarpd -a".

2.2 Setting the subnet mask and gateway

When working in routed environments the Web Thermometer must also be told which subnet mask and router is valid and responsible respectively for the network segment in question. Valid values for both parameters can be obtained from your network administrator. The Web Thermometer provides a Telnet configuration menu for entering this data under port number 1111.

Under Windows 95/98/NT start the Telnet client using *Start -> Run...* and the command line *telnet [IP-Address Web-Thermometer] 1111*
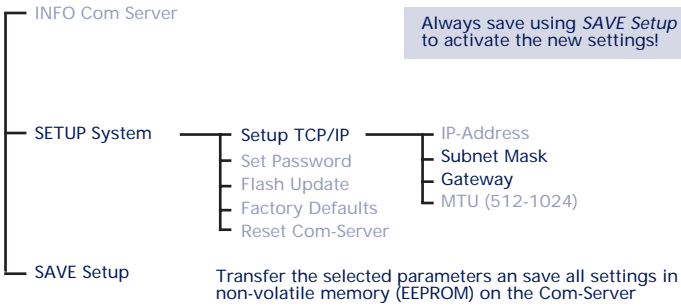
*I*f the Telnet client is already active, you can open a connection using *Connect-> Remote-System...*; for *Host-Name* enter the IP address, and for *Connection (Port)* port number *1111*.
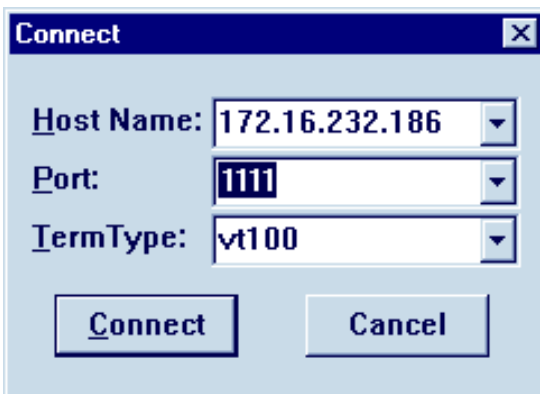
If the connection could be established, the Web Thermometer displays the following menu on the monitor:

```
*********************************
*          Mini Com-Server        *
*********************************
1. INFO  System
2. SETUP System
3. SETUP Port 0 (Serial)
4. SAVE Setup
```

You can get to the input fields for the subnet mask and gateway address through the following menu path:

INFO Com Server

Always save using *SAVE Setup* to activate the new settings!

SETUP System ─── Setup TCP/IP ─── IP-Address
              ├─ Set Password   ├─ Subnet Mask
              ├─ Flash Update   ├─ Gateway
              ├─ Factory Defaults └─ MTU (512-1024)
              └─ Reset Com-Server

SAVE Setup   Transfer the selected parameters an save all settings in non-volatile memory (EEPROM) on the Com-Server

Once you have made your settings, you must save them in the non-volatile memory of the Web Thermometer by selecting *4. SAVE Setup*. Then you may close the Telnet connection.

The network side configuration of the Web Thermometer is now finished. To check whether all the settings were correctly make, ping the device again. In routed environments the Web Thermometers must also be accessible from other IP networks embedded in the infrastructure.

A method of configuring these settings from the browser is also in development.

2.3 Connecting the Web Thermometer

In an Intranet

Once all the network settings have been made the Web Ther-mometer can be accessed from any Web browser. Enter the IP address as the address or (if you have specified a corre-sponding DNS entry) the host name of the Web Thermom-eter. The unit will then sent its information back to the browser.

In the Internet

To make the Web Thermometer accessible from the Internet, you need a free external and static IP address at which your router is accessible from the Internet. Have your Internet Service Provider make a DNS entry for you so that the Web Thermometer can be accessed through a URL. Then all you need to is redirect the HTTP port 80 in your router to the IP address of the Web Thermometer. This is done by means of an entry in the NAT table (e.g. *http 172.16.231.10*).

2.4 Manual retrieval of temperatures

As a special function it is possible to manually retrieve the current temperature values in CSV format (comma delimited) through a socket connection. For this send the device the following string to port 80 or 8000: *"GET /Thermo.csv?D1=1& " +CRLF +CRLF +CRLF*. To retrieve the individual current tem-perature value, send *"GET /Single" +CRLF +CRLF +CRLF*.

3 Configuration of the HTML page

Open the standard HTML page by entering the IP address or host name in any Web browser. The "Configuration" link at the bottom of the table brings you to the configuration page of the Web Thermometer:

Here you can now freely change the given texts as well as the links and path names for the graphics. To test the settings temporarily, click after making your changes on *Set* on the lower edge of the page. The settings you have made are now displayed but not yet stored in the Web Thermometer. When you next go to the address of the Web Thermometer, the original page will still appear.

To make you changes permanent in the Web thermometer, you must enter the password on the configuration page. Now the changes will be saved in the Web Thermometer. You can of course change the password itself from this page.

The unit is shipped with no passport entered. To make permanent changes you will first have to assign a password. Following is the standard configuration as shipped:

Password

Item	Factory Default	Function/Comment
Password		None
New Password		Assign new password

Texts

Item	Factory Default	Function/Comment
Title	W&T WEB Thermometer	Heading for the Web Thermometer
Description	Sensor location	Where the sensor is installed

Links

Item	Factory Default	Function/Comment
Link 1		
Name	Configuration	Link to configuration page on the left side of the screen
Symbol	www.wut.de/kpics/webtherm /config2.gif	
Link	config.htm	
Link 2		
Name	Time of day/day	Link to time/date entry on left side of screen
Symbol	www.wut.de/kpics/webtherm /blatt2.gif	
Link	config2.htm	
Link 3		
Name	Data sheet	Link to data sheet on left side of screen
Symbol	www.wut.de/kpics/webtherm /home2.gif	
Link	www.wut.de/index.html	

Links (ctnd.)

Item	Factory Default	Function/Comment
Ad banner		
Graphic	www.wut.de/kpics/webtherm /banner_dummy.gif	Ad banner at top and link to W&B Homepage
Link	www.wut.de/57101.html	
Photo in Frame		
Graphic	www.wut.de/kpics/webtherm /f_geb.jpg	Small photo at upper right in frame and link to enlarged image
Link	www.wut.de/kpics/firma.jpg	
Image left		
Graphic	www.wut.de/kpics/webtherm /inwork.gif	Graphic left and link to data sheet
Link		
Image right		
Graphic	www.wut.de/kpics/webtherm /thermo.jpg	Graphic right and link to W&T Homepage
Link		

Links to graphic elements

Item	Factory Default	Function/Comment
Transparent placeholder	www.wut.de/kpics/webtherm/ trans.gif	Graphic element for creating borders in tables
Border corner left	www.wut.de/kpics/webtherm/ e_l.gif	Rounded corner of the border left
Border corner right	www.wut.de/kpics/webtherm/ e_r.gif	Rounded corner of the border right

4 Mail Function

Open the standard HTML page by entering the IP address or host name in any desired Web browser. Use the "Mailer" link at the bottom of the table to go to the configuration page of the Web Thermometer mail function.

Be sure when making any changes that you enter your password in the first line. Otherwise your changes will not be saved!

In the line *Name of Web Thermometer* enter then name you want to appear as sender for the mail recipient. In addition you can enter a reply address the recipient can use to reply to an e-mail. This address could be for example the e-mail address of the system administrator. The default is address *mailto:-@no.reply*, i.e. no reply address specified. In the line *IP address mailserver* enter the IP address of the appropriate mail server using dot notation (xxx.xxx.xxx.xxx). When using an external mail server be sure that you indicate the gateway in the Web Thermometer configuration menu *(see 2.2)*.

Information Mail
This function instructs the Web Thermometer to send mails containing the current temperature to the specified recipient(s) at a certain interval. Enter the send interval in minutes (max. 9999). If you do not wish mail to be sent, enter a "0" here. If you want to send the e-mail to multiple recipients, separate the individual addresses with a semicolon ";". Fill in the *Subject* line and the desired mail text. The first line of the text generally contains the current temperature in the format "Current temperature: 22.5°C", followed by the text body you have specified.

Alarm Mail 1
In this variant the Web Thermometer sends a mail to the recipient(s) whenever a certain minimum or maximum temperature is reached. The send interval can be specified as "E" indicating one time only, i.e. when the limit value is reached the mail is sent only once. If you enter a numeric interval,

the mail is sent repeatedly at the same interval until the temperature returns to the specified range. Here again enter the recipient address, subject line and mail text.

Alarm Mail 2
Like Alarm Mail 1. Here you can enter an additional limit value, so that a total of two limits are monitored.

Use the "Set" button to activate your settings.

5 SNMP

In development (projected availability May 2001).

6 Emergency access in case of lost password

If you have forgotten your password, you may connect the RS232 port of the Web Thermometer to a terminal or PC. The configuration settings of the terminal should correspond to the parameters described under *2.1.3* (9600,N,8,1,No Handshake). Reset the Web Thermometer by cycling the power. When the green status LED comes on, enter the letter "p" at least three times on the terminal. This deletes the password in the Web Thermometer, and you must then enter a new one from the configuration page in the Web browser.

7 Firmware Update

7.1 Update HTTP-Server

Example using Telnet client under Windows 95/98/NT:

1 Open the file *update.txt* and enter your password follow-
   ing "LPW= ". If there is no password, you may use any de-
   sired string. Now copy the entire contents of the file to
   the clipboard:
   Edit –> Select all
   Edit –> Copy

2 By entering *Start –> Run –> telnet [IP address] 8000* on a
   computer equipped with a TCP/IP stack you open the net-
   work connection to the Web Thermometer. Now insert
   the contents of the clipboard into the Telnet window
   (*Edit –> Paste*). Update mode is started with the follow-
   ing message:
   MB90F562 bootloader v1.3 W&T 01/2000
   Invoked by software, ESC to cancel
   Waiting (Port 1) …

3 Open the mhx file with the Web Thermometer firmware
   in Notepad (ASCII editor) and copy the entire contents to
   the clipboard:
   Edit -> Select all
   Edit -> Copy

4 Now go to *Edit –> Paste* to copy the firmware from the
   clipboard to the Web Thermometer. This action may be
   performed after no sooner than 0.5 sec. and no later
   than 30 sec., since otherwise the Web Thermometer will
   return to normal run mode. Following a successful up-
   date a number will be output and the message "Done!"
   will appear. If there were any transmission errors a mes-
   sage will appear along with a checksum error.

7.2 Update TCP/IP-Stack

Requirement is a PC running under Windows 98x/NT with a network connection and an installed TCP/IP stack. You need two files for the update process:

- The program *Cs_util.exe* (32-bit application for Windows 9x/NT), used to execute the update, and
- the file with the extension *.bin* (e.g. *C4r1_0.bin*), which contains the new operating software for the Web Thermometer. This file is sent to the Web Thermometer.

The update process is described step-by-step below. Please follow this sequence exactly. Following an incomplete update the unit will no longer be operational!

1 Close *all* connections which may be still active on the Web Thermometer. Before the update process all buffers and therefore all the data contained in them will be deleted!

2 Start the remote configuration tool via Telnet:
   telnet [IP address] 1111.
   Go to *SETUP: System –> Flash Update –> Net Update* and confirm with "y". The Web Thermometer closes the Telnet session and the green status LED indicates that you are in update mode.

3 Run *Cs_util.exe* . In the *CS programmieren* select *Flash*. At *Com-Server Firmware (*.bin)* enter the file name of the update file (e.g. C4r1_1.bin) and under *Default Configuration (*.cfg)* enter the corresponding configuration file. For models 57101, 57102 and 57502 this is *C4_Therm.cfg*; for models 57202 and 57602 *C5_Therm.cfg*. You must of course also enter the IP address of the Web Thermometer you are programming.

4 Click on *Start*. The update will take several seconds. It is not finished until the message window indicates the end of the update process.

5 Check in the configuration menu of the Web Thermom-
   eter to see whether it took the new operating software.
   The menu *INFO System –> SOFTW Date/Rev* must contain
   the new version number of the software that is also in-
   cluded in the file name (Example: file *C41_2.bin* indicates
   Version 1.2).

*If the old version is still displayed, the file with the new oper-
ating software is corrupt. Please contact us over the W&T
Hotline.*

W&T

Technical Data

Article Number	#57101 Standard 10BT, 5V	#57102 Professional 10BT, 5V	#57202 Professional 100BT, 5V	#57502 Professional 10BT, 24V	#57602 Professional 100BT, 24V
Thermocouple	NTC	NTC and PT100 connection; mail when limit values are exceeded			
Network	10BaseT	10BaseT	10/100BaseT	10BaseT	10/100BaseT
Supply voltage	regulated 5V DC +/-5% Plug in AC adapter (included) Input: 110V/50Hz; Output: regulated 5V			12–24V AC/DC +20%/-10% Power supply through screw terminal	
Current draw	typ. 270mA, max. 330mA		typ. 540mA, max.680mA	typ. 80mA, max. 110mA @24V DC	typ. 175mA, max. 225mA @24V DC
Measuring unit					
Thermocouple	NTC 10k	NTC 10k, PT100 connection, 2-,3- or 4-wire			
Measuring range	-45°C/+75°C				
Resolution	1/10°C				
Measuring error	±0.3°C, ±5% (NTC); ±0.3°C, ±2% (PT100)				
Update frequency	5 min				
Memory depth	2 weeks	7 weeks			
Ambient					
Storage	-40°C/+70°C				
Operating	0°C/+60°C		strung: 0°C/+50°C not strung: 0°C/+60°C	0°C/+60°C	strung: 0°C/+50°C not strung: 0°C/+60°C
Other data					
Galvanic isolation	Measuring inputs to network: min. 500V				
SNMP	—	in development			
Configuration interface	Serial port RS232, 9600 baud, 8 data bits, 1 stop bit, no parity				
Housing	Plastic compact housing, 105x75x22mm				
Weight	ca. 200g				
Included	1x Web Thermometer for hat rail mount 1x NTC thermocouple 1x AC adapter			1x Web Thermometer for hat rail mount 1x NTC thermocouple	

Glossary

DNS (Domain Name Service)

Function: Domain Name –> IP number

Location: Internet Service Provider or Internet DNS server

The DNS is a service which runs on a server. It contains a list containing the IP addresses in the network or the domains and the corresponding host names. When a network station is invoked by its host name, the DNS server converts the name into the IP address. This means the DNS server must know the network station it is communicating with. A DNS table might look as follows:

172.16.232.10 Webtherm.company.de

172.16.232.11 Ntsrv.company.de

172.16.232.12 Novellsrv.company.de

...

Now if an application or a user requests communication with "Ntsrv", the request is first sent to the DNS server, which then returns the IP address 172.16.232.11 for the host name.

It works exactly the same way in the Internet. The Internet DNS servers however contain Web addresses, e.g. *www.klima.de*. If the DNS server does not have a requested host name in the table, the request is forwarded to the neighboring DNS server. If after a certain time there is no reply from a DNS server, the connection is closed and an error message appears in the Web browser indicating the page could not be found.

NAT (Network Address Translation)

Function: IP number, Port No. of Network A —> IP number, Port No. of Network B

Location: Router at network interface (between Internet and Intranet)

The NAT service is responsible for passing along an IP address and a port number to another IP address and port number. This procedure is used for example to redirect external IP addresses to internal ones.

For example, the NAT entry *http 172.16.232.10* indicates that an incoming request to Port 80 (standard HTTP port) is

diverted to IP address *172.16.232.10*. The port is not changed. The NAT entry must be done on the device at which the external IP request arrives, such as an ISDN router. This procedure also permits direct external access to an internal network device, meaning the network device does not have to be directly configured to the external IP address.

`Example:`

The address *www.klima.de* is initiated by the DNS server of a provider and the request is sent to the associated IP address. This request arrives at the ISDN router, which in turn uses NAT to redirect this IP address to the internal address of the Web Thermometer, thus enabling access to the device.