



## Installation and operating instructions

Wireless LAN router

These operating instructions are part of the product.

- ▶ Read the instructions carefully before use,
- ▶ keep them over the entire lifetime of the product,
- ▶ and pass them on to any future owner or user of this product.



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## **Product information**

### **EC declaration of conformity**

"This product conforms to the applicable European directives with regard to its design and its operating behaviour. This conformity has been verified. Further information in this regard can be obtained from your specialist dealer."

# 1 Product description

## 1.1 Proper usage

The wireless LAN router is part of a digital remote display for the visualisation of a solar thermal system. Other components are an appropriate solar thermal controller which transmits its readings to an interface and a digital picture frame with a wireless LAN interface.

The current temperature readings of the selected solar energy system are visualised. In addition, the temperature curves are displayed in a daily diagram. When using a heat meter, instantaneous power, energy balances and CO<sub>2</sub> savings are displayed.

Prerequisite for the proper functioning of the remote display is a solar thermal controller for the US market with a software version 2.0 or higher and for the European market with a software version 2.1 or higher. To query the software version on the controller, consult the operating instructions for the controller.

To allow the controller to send the current system data to the router, the slide switch of the controller needs to be in the central position (automatic mode, see also instructions for the controller).

## 1.2 Components

The remote display consists of the following components:

- suitable solar thermal controller for US market with software version 2.0 or higher and European market with software version 2.1 or higher, a special interface, possibly already present,
- RS232 interface cable with 9-pin D-sub socket, 3-wire,
- RS232-USB converter with 9-pin D-sub connector, cable with USB connector,
- wireless LAN router (ASUS WL-500g Premium V2 with special firmware for remote displays),
- USB flash drive with firmware for remote displays,
- digital picture frame with wireless LAN interface, Kodak EasyShare W820.

### 1.2.1 ASUS router with firmware for remote displays

The most important component of the remote display is the wireless LAN router ASUS WL-500gP V2 with a special firmware for remote displays. Since the operating system and application software of the ASUS router have been replaced by firmware, the original manual for the ASUS router is rendered invalid. The technical data of the wireless LAN router as well as the approvals and certifications remain valid.

## 1.3 Functionality

The solar controller cyclically sends the current system data to the wireless LAN router. The data is embedded into the appropriate system image in the wireless LAN router and the daily diagram is generated. The system image and the daily diagram are sent via the wireless LAN interface from the wireless LAN router to the digital picture frame.

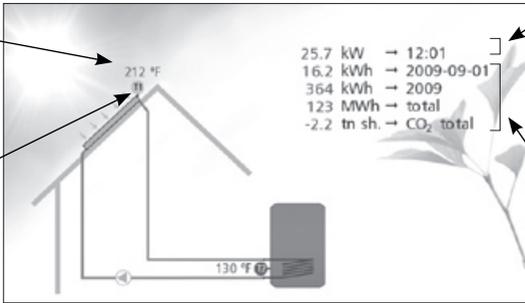


System image and daily diagram are shown on the digital picture frame as follows (sample images).

### 1.3.1 System image

Current temperature reading of sensor T1 [°C] or [°F]

T1: Sensor on clamp 1 of the solar controller



Current thermal output power [kW] or [Btu/h] -> current time

**For the heat meter:**

Daily energy balance [kWh] or [Btu] -> current date

Annual energy balance [kWh] or [Btu] -> current year

Total energy balance [MWh] or [Btu] -> total cumulative value of the heat meter

CO<sub>2</sub> reduction [t] or [tn sh.] -> calculation based on the total cumulative value of the heat meter \*

\* Sources: Renewable energy sources in figures - national and international development; German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, CO<sub>2</sub> savings factor 232g CO<sub>2</sub>/kWh<sub>therm</sub> Hawaiian Electric Co., Inc. HECO Residential Rebate Program, Solar water heating system information sheet (2007): 1,918 lbs CO<sub>2</sub>/kWh<sub>therm</sub>

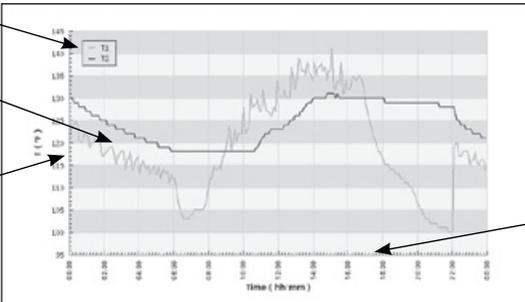
### 1.3.2 Daily diagram

Legend:

T1: Sensor on clamp 1 of the solar controller

Temperature curves

Y-axis: Temperature in °C or °F. The scaling is done automatically.



X-axis: Time of day in hh:mm. The scaling is done automatically.

## 2 Safety

### 2.1 Dangers during assembly/commissioning

The following risks exist during the commissioning of the router and the picture frame:

- Danger to life due to electric shock caused by a damaged mains adapter plug.
- During work on the solar thermal controller, the safety instructions for the controller instructions must also be followed.
- Ensure that the permissible ambient conditions at the installation site are observed.

### 2.2 Detecting faults

- ▶ If it becomes apparent that safe operation is no longer guaranteed (e.g. visible damage), ensure that the device is immediately disconnected from the mains.

### 2.3 Exclusion of liability

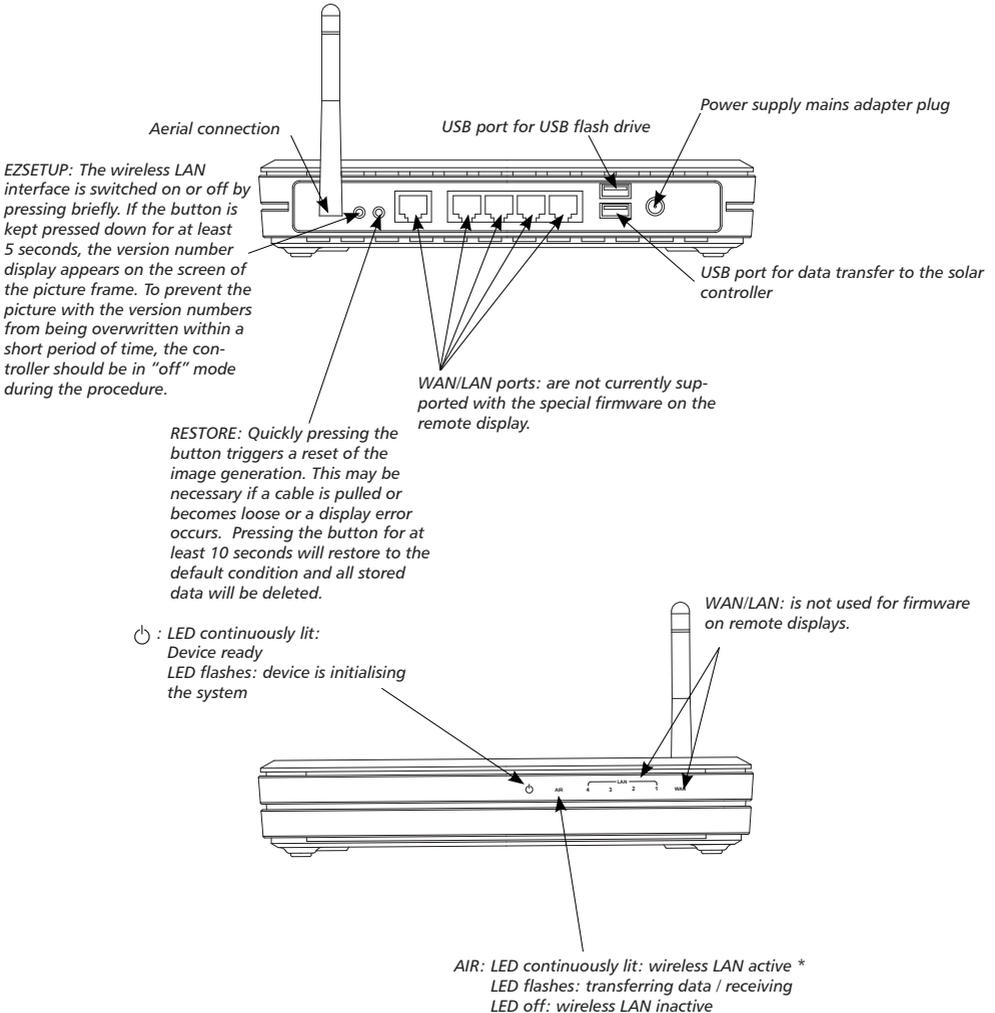
The manufacturer can neither monitor the compliance with this manual nor the conditions and methods during the installation, operation, and usage of the devices. Improper installation of the system may result in damage to property and, as a consequence, bodily injury.

Therefore, the manufacturer assumes no responsibility or liability for any loss, damage or costs arising from or in any way related to incorrect installation, faulty performance of the installation work, improper operation as well as wrong use.

Likewise, the manufacturer assumes no responsibility for infringement of patent rights or violations of other rights of third parties arising from the use of the devices.

The manufacturer reserves the right to make changes to the product, technical data or installation and operating instructions without prior notice.

### 3 Casing overview of the router



#### NOTE

- ▶ \*Applies only to WLAN operation: When using WPA/WPA2 encryption, the „AIR“ LED may be unlit after having booted the router if no connection to the picture frame has been established yet!

## 4 About these operating instructions

### 4.1 Applicability

This manual covers installation, commissioning and operation of the wireless LAN router for remote display of a solar thermal system. The relevant instructions from the respective manufacturers are to be followed for the remaining components, e.g. picture frame and solar control.

### 4.2 Users

The remote display and the wireless LAN router can be operated by the user by following these instructions.

Use the remote display and the wireless LAN router only after you have carefully read and understood the operating instructions and the safety instructions. Adhere to all safety instructions and consult professional personnel in the event of any ambiguities.

This device is not intended for persons (or children) with physical, sensory, or mental disabilities, or who have inadequate experience and knowledge, unless they were instructed in the proper use of the device and initially supervised by a person who is responsible for their safety. Children should not be left alone with the device, to ensure that they do not play with it.

### 4.3 Description of symbols

#### 4.3.1 Structure of the warning notices

#### SIGNAL WORD

Type, source and consequences of the danger!

- ▶ Measures for avoiding danger.

#### 4.3.2 Danger levels in warning notices

Danger level Niveau de risque	Likelihood of occurrence Éventualité de l'intervention	Consequences resulting from non-compliance Conséquences en cas de non-respect
 <b>DANGER</b> <b>RISQUE</b>	Imminent threat of danger Danger imminent	Death, serious bodily injury Mort, lésions corporelles graves
 <b>WARNING</b> <b>AVERTISSEMENT</b>	Possible threat of danger Danger éventuel	Death, serious bodily injury Mort, lésions corporelles graves
 <b>CAUTION</b> <b>ATTENTION</b>	Possible threat of danger Danger éventuel	Minor bodily injury Lésions corporelles simples
<b>CAUTION</b> <b>ATTENTION</b>	Possible threat of danger Danger éventuel	Property damage Dommages matériels

#### 4.3.3 Notes

#### NOTE

Note on easier and safer working habits.

- ▶ Measures for easier and safer working habits.

### 4.3.4 Other symbols and markings

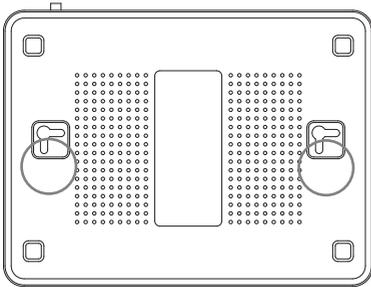
Symbol	Meaning
✓	Precondition for action
▶	Call to action
⇒	Result of action
•	List
<b>Emphasis</b>	Emphasis

## 5 Mounting and installation

### 5.1 Mounting the router

The device can be mounted on the wall or the ceiling.

1. Locate the mounting holes on the underside.
2. Mark the two upper holes on the wall or on a raised level surface.
3. Tighten the two screws on the wall far enough that only a residual length of 0.5 cm protrudes.
4. Hook the mounting holes of the ASUS WL-500gP V2 onto the screws.



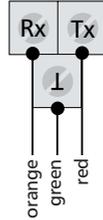
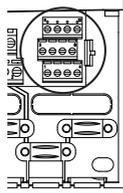
### NOTE

Re-align the screws if you are not able to mount the ASUS wireless LAN router, or if it is too loose.

## 5.2 Installation

In the following, the individual steps for setting up the remote display are described. Please follow the sequence.

1. Connect the RS232 interface cable to the solar controller. Please also see the instructions for the controller. Pay attention to the wire colours.



Terminal diagram of the RS232 interface



### DANGER

**Risk of fatal injury due to electric shock!**

- ▶ Prior to opening the controller casing, disconnect the controller from the mains.

2. Connect the RS232 interface cable to the RS232-USB converter.
3. Plug the USB connector of the RS232-USB converter into the USB port of the wireless LAN router for data transfer.
4. Plug the USB flash drive into the USB port of the wireless LAN router.
5. Attach the aerial to the wireless LAN router.
6. Connect the power supply of the wireless LAN router to the wireless LAN router and connect to the mains.

### NOTE

The wireless LAN router needs about 1 minute for system initialisation after switching it on. The wireless LAN router is ready for use when both the power LED and the "AIR" LED are permanently lit.

Exception: In the WPA or WPA2 mode, AIR will only light up after trying to establish a connection between the picture frame and the wireless LAN router.

7. Connect the solar thermal controller to the mains.



### DANGER

**Risk of fatal injury due to electric shock!**

- ▶ Make sure that the controller is closed.

8. Assemble the digital picture frame and put it into operation. Please see the user manual Kodak EasyShare W820 and section 6 "Initial commissioning W820".

## 6 Initial commissioning

### 6.1 Commissioning for the first time

When starting the digital picture frame for the first time, please see the Kodak EasyShare W820 user's guide "Getting started".

### 6.2 Language

See the user's guide for the Kodak EasyShare W820 "Getting started", setting the language. Once the language is selected, the digital picture frame will start looking for wireless networks.

### 6.3 Wireless network

⇒ *All available wireless networks will be displayed.*

Select the network "TK RW1 Net" and press "OK".

### 6.4 Safety check

The system performs a safety check. The picture frame indicates that the network is not secured since the delivery status of the remote display is without any preset encryption.

There is no factory preset encryption because no security-relevant information is being transmitted. The message box is closed by selecting "Finish". If you want to encrypt image data, see section 7.3.6 "Wireless LAN encryption".

### 6.5 Confirming the network connection

A successful connection to the wireless network "TK RW1 Net" is confirmed. The digital picture frame is now asking to install the EasyShare software on the wireless LAN router.

Prompt the installation with "Search now".

### 6.6 Detected devices

The detected devices are listed. Select "SolarShare" and complete the installation with "FINISHED".

### 6.7 Setup completed successfully

The successful installation is confirmed again.

The confirmation can be closed from the menu window "[Home]."

### 6.8 Home

You will see the home page of the setup. To enable the display of the solar thermal images, select "Images and videos".

### 6.9 Images and videos

Available images / videos are displayed. Select "SolarShare" and confirm with "OK".

### 6.10 SolarShare contents

The contents of "SolarShare" is displayed as a thumbnail. The contents consist of the system image with the current temperature values and the daily diagram.

Either a single image can be displayed or a slide show can be started.

## 6.11 Single image display

For the single image display, simply select the desired image and confirm with "OK".

This opens the selected image permanently, e.g. the "System image".

## 6.12 Slideshow

The slideshow is started from the menu window "[Start]". The system image and the daily diagram are displayed alternately in 5-second intervals.

In addition, separate images can be embedded in the slideshow (see section 9). The default duration of the image display is 5 seconds but it can be changed in the setup window of the picture frame.

# 7 Changing the wireless LAN settings

If another wireless network is run within range of the wireless LAN router, it may be necessary to change the channel or the network name of the wireless LAN network. In addition, the encryption of the wireless LAN network can be adjusted according to personal preference.

To do this, the configuration file "Config.wri" on the USB flash drive needs to be modified (see section 7.1 "Appendix: configuration file").

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## NOTE

Config.wri may only be opened with Microsoft® WordPad!

Please note that after changes have been made to the wireless LAN settings, the network settings of the picture frame need to be re-adjusted.

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## 7.1 Appendix: Configuration file

The configuration file "Config.wri" is on the USB flash drive and it contains all the settings that can be changed by the end user.

The file "Config.wri" is located in the directory: Share -> Config.

The file "Config.wri" must be opened with Microsoft® WordPad to be edited.

## 7.2 How to edit the configuration file

- ▶ Wireless LAN router and digital picture frame have to be disconnected from the mains.
- ▶ Remove USB flash drive from the wireless LAN router and plug it into a USB port of a PC.
- ▶ Open the config.wri file with Microsoft® WordPad, edit it and save with the same name.
- ▶ Remove the USB flash drive from the USB port of your PC and plug it into the wireless LAN router.
- ▶ Connect the wireless LAN router to the mains and wait until it is ready for operation.
- ▶ Connect the digital picture frame to the mains and make any necessary changes to the settings (see section 6, "Initial commissioning").

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## NOTE

Config.wri may only be opened with Microsoft® WordPad!

The USB flash drive may not be formatted!

## 7.3 Contents of the configuration file

```
#####
### Fernanzeige Konfiguration / Remote display configuration ###
#####
```

;1: Einstellungen bezueglich Fernanzeige / Remote display settings  
[REMOTEDISPLAY\_CONFIG]

;1.1: Anlagenbild (aktiv: 1 / inaktiv: 0) / System image (active: 1 / inactive: 0)

system\_active = 1

;1.2: Zeittagesdiagramm (aktiv: 1 / inaktiv: 0) / Time diagram (active: 1 / inactive: 0)

diagram\_active = 1

```
#####
### WLAN Konfiguration / WLAN Configuration ###
#####
```

;2: Einstellungen bezueglich Wireless LAN / Wireless LAN settings  
[WLAN\_CONFIG]

;2.1: WLAN nach Einschalten des Routers ausgeschaltet (ja: 1 / nein: 0) /  
Disable wireless LAN after power on (yes: 1 / no: 0)

wlan\_disabled = 0

;2.2: WLAN Netzwerkname / WLAN network name

ssid = „TK RW1 Net“

;2.3: WLAN Kanal (Wert zwischen 1 und 11) / WLAN channel (Value  
between 1 and 11)

channel = 6

;2.4: WLAN Verschlueselung / WLAN encryption („OPEN“, „WEP“,  
„WPA“, „WPA2“)

encryption = „OPEN“

;2.5: WLAN Passwort / WLAN password (OPEN: „“, WEP: 5 o. 13 Zeichen  
/ Chars, WPA/WPA2: 8 - 63 Zeichen / Chars)

passphrase = „“

### 7.3.1 System image

;1.1: System image active: 1, inactive: 0

system\_active = 1

System\_active is preset in the factory to 1, so the system image can be selected and displayed in the digital picture frame.

If system\_active is set to 0, the system image cannot be selected in the digital picture frame.

### 7.3.2 Time diagram

;1.2: Time diagram active: 1, inactive: 0

diagram\_active = 1

Diagram\_active is preset in the factory to 1, so the daily diagram can be selected and displayed in the digital picture frame.

If diagram\_active is set to 0, the daily diagram cannot be selected in the digital picture frame.

### 7.3.3 WLAN after turning on the wireless LAN router

;2.1: Wireless LAN disabled after switching off the router (yes: 1 / no: 0)

wlan\_disabled = 0

Wlan\_disabled is preset to 0, so the wireless LAN is automatically enabled after restarting the wireless LAN router.

If wlan\_disabled is set to 1, the wireless LAN of the router is inactive after restarting.

### 7.3.4 Wireless LAN name

;2.2: Wireless LAN name

ssid = „TK RW1 Net“

The ssid is preset to "TK RW1 Net", so the wireless network of the wireless LAN router appears on the picture frame under the name "TK RW1 Net". A change of name requires a new assignment of the network in the digital picture frame.

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## NOTE

The name must always be entered with quotation marks, e.g. "MySolarThermalSystem".

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### 7.3.5 Wireless LAN channel

;2.3: Wireless LAN channel (value between 1 and 11)

channel = 6

The factory preset value for channel is set to 6. The value can be changed between 1 and 11.

### 7.3.6 Wireless LAN encryption

By default, the wireless LAN router is supplied without network encryption because no security-relevant information is being transmitted. If desired, the network can be encrypted with WEP, WPA or WPA2.

To do this, the configuration file "Config.wri" on the USB flash drive needs to be modified (see section 7.1 "Appendix: configuration file").

The settings for the network encryption are made in "Config.wri", under "Wireless encryption". If a network encryption is selected, a password

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has to be set under "Wireless LAN password". This password is required for access authorisation for the digital picture frame.

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## NOTE

Config.wri may only be opened with Microsoft® WordPad!

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;2.4: Wireless LAN encryption ("OPEN", "WEP", "WPA", "WPA2")

encryption = "OPEN"

Factory preset value for encryption is "OPEN", so the network is not encrypted.

If the network is to be encrypted, you must set

- encryption = "WEP" for WEP encryption,
  - encryption = "WPA" for WPA encryption,
  - encryption = "WPA2" for WPA2 encryption
- .

### 7.3.7 Wireless LAN password

;2.5: Wireless LAN password (OPEN: " ", WEP: 5 or 13 characters, WPA/WPA2: 8 to 63 characters)

password = " "

The factory preset value for password is " " because the network is unencrypted by default.

If you chose WEP encryption, the password must be entered as a 5-digit or 13-digit password, for example

password = "12345"

If you chose WPA or WPA2 encryption, the password must be entered as an 8 to 63-digit password, for example

password = "12345678"

---

## NOTE

Only use numbers and letters for the password. A distinction is made between uppercase and lowercase letters.

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## 7.4 Restoring the configuration file

For safety's sake, a copy of the configuration file "Config.wri.backup" is saved in the config directory. If problems occur after editing the configuration file "Config.wri", delete the file "Config.wri" from the config directory and rename the "Config.wri.backup" file to "Config.wri".

## 8 Appendix: customised logo

A customised logo can be stored on the USB flash drive. The logo will be displayed on top right of the system image. The position of the logo is predetermined.

### 8.1 Requirements to the logo template

The maximum resolution of the customised logo is 200 x 40 pixels (l x w).

Larger pictures will be scaled so that they fit into the image and this is associated with a loss of quality! Therefore, please use the specified image resolution. The width-to-height ratio is maintained!

The only supported format is JPEG. The name of the logo file is: "logo.jpg".

### 8.2 How to apply the customised logo

If there is no logo image in the folder, applying the logo will be ignored.

- ▶ Wireless LAN router and digital picture frame have to be disconnected from the mains.
- ▶ Remove USB flash drive from the wireless LAN router and plug it into a USB port of a PC.
- ▶ Copy the logo file "logo.jpg" into the directory share -> logo.
- ▶ Remove the USB flash drive from the USB port of your PC and plug it into the wireless LAN router.
- ▶ Reconnect the wireless LAN router to the mains and wait until the wireless LAN router is ready for operation.
- ▶ Connect the digital picture frame to the mains and make any necessary setting changes.

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#### NOTE

The USB flash drive may not be formatted!

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## 9 Appendix: adding your own images to the slide show

You can add your own pictures to those in the remote display. They are then displayed alternatingly in the slide show.

### 9.1 Requirements to your own pictures

- Only images in the JPEG format can be used. The suffix for each of the images must be ".jpeg".
- The resolution of the picture frame is 800 x 450 pixels. Deviations from the image size can lead to loss of quality!
- The picture sizes should not exceed 100kB, otherwise it may lead to longer loading times.
- The names 1\_system.jpg and 2\_diagram.jpg are in use by the remote display and cannot be chosen for your own images, otherwise they will be overwritten.

## 9.2 Procedure for inserting your own images

- Wireless LAN router and digital picture frame have to be disconnected from the mains.
- Remove USB flash drive from the wireless LAN router and plug it into a USB port of a PC.
- Copy your own images into the folder "share\Bilder". Attention. Only JPEG images are supported!
- Remove the USB flash drive from the USB port of your PC and plug it into the wireless LAN router.
- Connect the wireless LAN router to the mains and wait until it is ready for operation.
- Connect the digital picture frame to the mains and make any necessary setting changes.

## 10 Fault finding

The wireless LAN router is a quality product and is designed for many years of continuous use. Should, however, a fault occur, the cause of the fault is often not the wireless LAN router itself but the peripheral system components. The following description of some causes of problems should help the installer and operator to isolate the problem so that the system can be repaired as quickly as possible and to avoid unnecessary costs. Of course, not all possible causes of problems can be listed here. However, here you will find the most common causes of problems that cover the majority of possible faults. Only return the wireless LAN router when you are absolutely sure that none of the problems listed below is responsible for the fault.

## 10.1 Causes of faults in the wireless LAN router

Problem	Cause / Remedy
The time display in the system image is not updated or the message "Note: wireless LAN router is waiting for data from the solar controller. Please check the cable connection between the solar controller and the wireless LAN router should there be no graphic display shown within 90 seconds!" is displayed.	Interruption of the serial connection between the controller and the wireless LAN router. Please check the cable connection! Try resetting with the restore button.
Message "Fault: No or wrong USB flash drive inserted!".	You may only use the supplied USB flash drive. After inserting the correct USB flash drive while the device is still switched on, you may have to do a "Reset".
Message "Fault: No USB-RS232 adapter found".	Please verify if the USB serial adapter is plugged into the wireless LAN router! After installing the adapter, you may need to do a "Reset".
Message "Fault: Incorrect software version. Please contact your specialist dealer."	The controller is sending data that is incompatible with the router version. Contact your distributor and state the two 3-digit identification numbers S: and A: (  ) on your USB flash drive and the specific firmware of the solar thermal controller (displayed in Off mode, see the solar controller operating instructions).
The logo is not displayed.	The logo must have the name "logo.jpg" and has to be created in the JPEG format. It has to be located on the USB flash drive in the "share\Logo" directory. By default, no logo is displayed!

## 10.2 Causes of faults in the picture frame

Problem	Cause / Remedy
Wireless network not found.	<ul style="list-style-type: none"> <li>Is the wireless LAN router switched on?</li> <li>Is the maximum distance to the WLAN router being exceeded?</li> </ul>
The network computer cannot be found.	Can occur if you try to reconnect an existing connection. <ol style="list-style-type: none"> <li>Restart the wireless LAN router and wait until the power LED is lit.</li> <li>Switch on the picture frame and restart the network if necessary.</li> </ol>
The wireless LAN connection is very slow, even though the picture frame is located within range of the WLAN.	The selected wireless LAN channel is already used by other devices. The wireless LAN channel can be changed with the USB flash drive of the router (see section 7, "Changing the wireless LAN settings").
When setting the wireless LAN connection, the warning message appears that the connection is not secured.	By default, the wireless LAN connection is not encrypted. This allows all persons who are within range of the wireless LAN network to log into the wireless LAN router and look at the pictures. To avoid this, encryption can be enabled (see section 7, "Changing the wireless LAN settings").

## 11 Legal guarantee

In accordance with European Union regulations, there is a 2-year legal guarantee on this product for the customer.

The seller will remove all manufacturing and material faults that occur in the product during the legal guarantee period and affect the correct functioning of the product. Natural wear and tear does not constitute a malfunction. No legal guarantee can be offered if the fault can be attributed to third parties, unprofessional installation or commissioning, incorrect or negligent handling, improper transport, excessive loading, use of improper equipment, faulty construction work, unsuitable construction location or improper operation or use. Legal guarantee claims shall only be accepted if notification of the fault is provided immediately after it is discovered. Guarantee claims are to be directed to the seller.

**The seller must be informed before guarantee claims are processed. For processing a guarantee claim an exact fault description and the invoice/delivery note must be provided.**

The seller can choose to fulfil the legal guarantee either by repair or replacement. If the product can neither be repaired nor replaced, or if this does not occur within a suitable period in spite of the specification of an extension period in writing by the customer, the reduction in value caused by the fault shall be replaced, or, if this is not sufficiently taking the interests of the end customer into consideration, the contract is cancelled.

Any further claims against the seller based on this legal guarantee obligation, in particular claims for damages due to lost profit, loss-of-use or indirect damages are excluded, unless liability is obligatory by German law.

## 12 Technical data

ASUS WL-500g Premium V2	
Power	AC input: 100V-240V~ (50-60Hz); DC output: +5 V, max. 2.5 A
Frequency	2.4 – 2.5 GHz
Data transfer rate	802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps
Range	40 m indoor, outdoor (line of sight) 600m at 11Mbps* 25m indoor, outdoor (line of sight) 150m at 54Mbps*
Output power	802.11g: 15-19 dBm**
Sensitivity	-72 to -74 dBm @ 54Mbps** -85 to -87 dBm @ 11Mbps** -94 to -96 dBm @ 1Mbps **

\* The range may vary depending on environmental conditions.

\*\* In a normal temperature range.





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