19-Inch TFT Monitor

Instructions for Use

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Information about these instructions

Read through these instructions carefully and follow all the information given under all circumstances. You will guarantee reliable operation and a long useful life of your TFT monitor in this way. Always keep these instructions ready to hand, close to your TFT monitor. Keep the instructions safe, in order for you to be able to pass them on to a new owner, in the case of you selling the monitor.

We have structured these instructions so that you will be able to read the information needed subject-related at any time. Keep the instructions safe, in order for you to be able to pass them on to a new owner, in the case of you selling the monitor.

Target group

These instructions are intended for both first times users and those with previous experience.

Quality

We have selected the components that make up this product with an attention to functionality, ease of operation, safety and reliability. We are proud to have produced a TFT monitor that will provide pleasure when used in a business or pleasure application.

We would like to thank you for your purchase and look forward to welcoming you again as a Medion customer.

Service

We are here to support you in your daily use of this monitor.

Please contact us if you have questions or require assistance in operation. You will find a special chapter on the subject of Customer Service, starting on page 13 of these Operating Instructions.

Use in accordance with regulations

- This device is only suitable for use in dry internal rooms.
- This device has only been conceived for private use. The device is not designed for operation in a heavy industry business. Use subject to extreme environmental conditions can result in damage to your device.

Scope of supply

Please check the items received in the box and inform us within 14 days from purchase if anything is missing. You should receive the following items:

- TFT monitor
- Mains connection cable
- 15-pin D-Sub data cable
- DVI-D cable
- Audio cable
- Monitor stand
- Guarantee card
- These Operating Instructions
Safety information

Safety in operation

- Do not allow children to play with electrical devices without supervision. Children can not always recognise possible dangers correctly.
- Keep the packaging materials, such as plastic film, away from children. The danger of suffocation could arise in the case of misuse.
- Never open the casing of the TFT monitor (electric shock, short circuit and the danger of fire)
- Do not introduce any objects into the inside of the TFT monitor through the slots and openings (electric shock, short circuit and the danger of fire)
- The slits and opening of the TFT monitor serve ventilation. Do not cover these openings (overheating, danger of fire).
- Do not exert any pressure on the display unit. There will be the danger of the monitor breaking.
- Attention! There will be the danger of injury if the display unit has been broken. Pack up the broken parts with protective gloves and send them to your service centre for specialist recycling. Then wash your hands with soap, because it cannot be excluded that chemicals can escape.
- Do not touch the display unit with your fingers or with sharp objects, in order to avoid damage.

Contact Customer Service if:
- The mains cable has been contaminated or damaged
- Liquid has penetrated the monitor
- The TFT monitor is not functioning correctly
- The TFT monitor has been dropped or the casing is damaged

Set-up location

- New devices can emit a typical, unavoidable but completely harmless smell, which reduces increasingly in the course of time, in the initial hours of operation. We recommend that you ventilate the room regularly, in order to counter the formation of the smell. We have taken care that the applicable limits are clearly fallen below during the development of this product.
- Keep your TFT monitor and all the connected devices away from moisture and avoid dust, heat and direct solar radiation. Failure to comply with this information can lead to faults or damage to the TFT monitor.
- Do not operate your device in the open air, because external influences, such as rain, snow, etc. could damage the device.
- Do not subject the device to drops of water or spray and do not put any containers filled with liquid (vases or similar) on the device. Liquids penetrating can impair the electrical safety of the device.
- Do not put any open sources of fire (candles or similar) on the device.
- Pay attention to sufficiently large clearances in the wall unit. Maintain a minimum clearance of 10 cm around the device for sufficient ventilation.
- Place and operate all components on a stable, level and vibration-free base, in order to avoid the TFT monitor falling.
- Avoid fading effects, mirror effects and too strong contrasts between light and dark, to save your eyes and to guarantee comfortable workstation ergonomics.
- Take regular breaks when working at your TFT monitor, to prevent tension and tiredness.
Repair

- Leave the repair of your TFT monitor exclusively to qualified specialist personnel.
- Please contact our authorised Service Partners exclusively in the case of a necessary repair.

Intended environment

- The TFT monitor can be operated at a surrounding temperature from 0° C to +40° C and at a relative ambient moisture level of < 80% (non-condensing).
- The TFT monitor can be stored at -20° C to +60° C when it has been turned off.
- Wait to bring the device into operation until it has reached the surrounding temperature, after the TFT monitor has been transported.
  Moisture, which can cause an electrical short-circuit, can form within the TFT monitor in the case of wide variations in temperature or moisture.

Power supply

Please pay attention: Parts of the device will be subject to voltage, even if the mains switch has been switched off. Pull the mains plug from the socket, to interrupt the power supply to your TFT monitor or to release the device from voltage completely.

- Only operate the TFT monitor at an earthed socket with 100-240V~, 50/60 Hz. Ask your energy supplier if you are not sure about the power supply at the set-up location.
- We recommend the use of protection against excess voltage for additional safety, in order to protect your TFT monitor against damage because of voltage peaks or electrical flashes on the mains network.
- Pull the mains plug from the socket, in order to interrupt the power supply to your monitor.
- The socket must be located close to the TFT monitor and be easily accessible.
- Make sure that an extension cable complies with the VDE Requirements, if you use one. Ask your electrician if necessary.
- Lay the cable so that no-one can tread on it or trip over it.
- Do not place any objects on the cable, because it could be damaged otherwise.
- Your device has an On/Off switch. The TFT monitor can be switched on and off by means of it. No power will be consumed if the switch is standing at OFF (0). Put the On/Off switch to OFF or use a master/slave power strip, in order to avoid power consumption when the device is switched off.
Norms / Electromagnetic compatibility

The TFT monitor fulfills the requirements for electromagnetic compatibility and electrical safety of the following regulations:

- **EN 55022** Information technology equipment, interference – Limiting values and measuring procedure
- **EN 55024** Information technology equipment – Characteristics resisting interference - Limiting values and test procedure
- **EN 60950** Safety of information technology equipment

- The **Guidelines for electromagnetic compatibility (EMV)** must be observed at the connection.
- Maintain at least one metre clearance from **high frequency** and **magnetic sources of interference** (television device, loudspeakers, mobile phone, cell phone, etc.), in order to avoid disruptions to function and data loss.
- The failure of individual or several scanning spots can arise in rare cases, in spite of the most modern manufacture, because of the highly complex technology.

Your device complies with the European Norm ISO 13406-2 Class II (Pixel error class) (see P. 16).
Bringing the device into operation

Information

Please read the “Safety information” chapter on page 2 under all circumstances before bringing the device into operation.

Setup

Attach the stand of the TFT monitor as illustrated. Carry out this step before connecting the monitor.

![Installation of the monitor stand](III.: Installation of the monitor stand)

Preparation of your PC

You will possibly have to make some preparations if you have operated a CRT monitor with your computer in the past. This will be necessary if your current monitor is operated with settings that are not supported by your new TFT monitor.

Supported monitor settings

This TFT monitor supports the following modes.

<table>
<thead>
<tr>
<th>Resolution</th>
<th>Horizontal Frequency</th>
<th>Vertical Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>720 x 400</td>
<td>31.47 KHz</td>
<td>70 Hz</td>
</tr>
<tr>
<td>640 x 480</td>
<td>31.47 KHz</td>
<td>60 Hz</td>
</tr>
<tr>
<td>640 x 480</td>
<td>37.86 KHz</td>
<td>72.8 Hz</td>
</tr>
<tr>
<td>640 x 480</td>
<td>37.5 KHz</td>
<td>75 Hz</td>
</tr>
<tr>
<td>800 x 600</td>
<td>37.88 KHz</td>
<td>60.3 Hz</td>
</tr>
<tr>
<td>800 x 600</td>
<td>48.08 KHz</td>
<td>72.2 Hz</td>
</tr>
<tr>
<td>800 x 600</td>
<td>46.87 KHz</td>
<td>75 Hz</td>
</tr>
<tr>
<td>1024 x 768</td>
<td>48.36 KHz</td>
<td>60 Hz</td>
</tr>
<tr>
<td>1024 x 768</td>
<td>56.48 KHz</td>
<td>70.1 Hz</td>
</tr>
<tr>
<td>1024 x 768</td>
<td>60.02 KHz</td>
<td>75 Hz</td>
</tr>
<tr>
<td>1280 x 1024</td>
<td>63.98 KHz</td>
<td>60.02 Hz</td>
</tr>
<tr>
<td>1280 x 1024</td>
<td>80.00 KHz</td>
<td>75 Hz</td>
</tr>
<tr>
<td>1440 x 900*</td>
<td>55.47 KHz</td>
<td>59.90 Hz</td>
</tr>
</tbody>
</table>

*Recommended resolution (physical)

Check the settings of your graphics card under “Display Characteristics” within Windows XP/Vista.
Windows XP: Display Characteristics

This Windows control panel interface offers the ability to adjust the setting of the desktop representation to your monitor and the graphics card.

The program can be started as follows:

- Right mouse-click on the Windows interface (Desktop) and left mouse-click on „Characteristics“.

or

- Double-click on the “Display” icon in “System Control”.

Set the resolution under “Screen resolution” (θ). Your TFT monitor can represent a maximum resolution of 1440 × 900 pixels scanning elements. Check whether an update of the driver of your graphics card can solve the problem, if your graphics card does not support this resolution.

This resolution corresponds to the physical resolution. TFT monitors reach complete image quality with the physical resolution.

You can set the depth of colour (number of the colours represented) under “Colour quality” (θ). Your TFT monitor will support a depth of colour of a maximum of 16 million colours, which corresponds to 32 bits or ‘Real Color’.

The image refresh frequency can be set under “Expanded” (θ).

A Window with the characteristics of your graphics card will appear, according to the configuration of your computer.

You will be able to set the required value in the “List all modes” field under “Graphics card“. The optimal value lies at 60 Hz in the case of a TFT monitor. 75 Hz can be set as a maximum.

Attention!

You will possibly not receive any images if your setting does not correspond to the values supported by your display unit.

In this case, reconnect your CRT monitor and set the applicable values in correspondence with the options specified above under “Display Characteristics”.

(III.: Display characteristics)

(III.: Detail of Display Characteristics)
Windows Vista: Display Settings

The installed monitor will represent up to **1440 x 900** pixels scanning elements. The display will possible not appear on the full surface of the screen if you have changed to a representation with differing settings in the *System Control ⇔ Adjustment ⇔ Display Settings* Windows Help program. Distortions in the display can arise because of enlargement, particularly in the case of lettering. However, you will be able to work with a higher resolution if you connect an external monitor with a higher resolution. Adjust the representation to the modes supported with the “*System Control ⇔ Adjustment*” Windows Help program.

Connecting the monitor

Please read the “Safety information” chapter (from page 2), in order to bring the TFT monitor into operation immediately. We recommend that you also read the other chapters, in order to receive detailed explanations and operating instructions for your TFT display unit.

1. Connect signal cable
   - Plug the signal cable into the appropriate VGA or DVI connections on the computer and the TFT monitor.

2. Connect audio cable
   - Plug the audio cable into the appropriate audio sockets on the computer and the TFT monitor.

3. Connect the power supply
   - Now connect one end of the mains cable supplied with the device to TFT power supply connection and then the other end to an appropriate socket. The mains socket must be in the vicinity of the TFT monitor and be easily accessible (use the same electricity circuit as for the PC).

4. Switch on the power supply
   - Your TFT monitor has a mains switch on the back, by means of which you will be able to switch it on and off. No power will be consumed if the switch is positioned at **O**. First, put the mains switch at **I** and then switch your monitor on at the On/Off switch on the front of the device. Finally, switch your computer on.
The video workstation

Please pay attention to the following: The monitor device should be set up so that mirror effects, fading and strong contrasts between light and dark are avoided (even if the view from the window is still so attractive!)

(III.: Setting up of the monitor)

Placement of the monitor

Some problems frequently result from incorrect placement of the monitor for use. For example, windows, lighting elements or even furnishings can be reflected in the monitor because of a poor siting choice. These mirror effects will lead to eye strain. Incorrect bodily positions are always taken, consciously or unconsciously, to counterbalance these mirror effects (compulsive physical behaviour). The correct setting up of the monitor device is the basic requirement for your freedom from problems for this reason.

The monitor device should never be positioned in the immediate vicinity of a window, because the working area is lit most brightly by daylight at this position.

This brightness makes it more difficult for the eyes to adjust to the darker monitor. The monitor device should always be set up with a viewing direction parallel to the window frontage.

Setting up with a viewing direction turned away from the window is incorrect, because the mirroring of the bright window in the monitor is unavoidable. Setting up with a viewing direction towards the window is also incorrect, because the contrast between the dark window and the bright daylight can lead to difficulties adjusting the eyes and to problems.

The parallel viewing direction should also be maintained in relation to artificial lighting devices.

This means that the same criteria and reasons mainly apply in the case of the illumination of the working area with artificial light. There are many possibilities of preventing fading effects, mirroring, too strong contrast between light and dark, etc, if the room does not permit the monitor to be set up as described: e.g. turn, lower or incline the monitor device.

An improvement can be achieved in many cases by slats or vertical net curtains at the windows, by partitions or by changing the lighting equipment.

The most recent scientific investigations show that 12,000 to 33,000 head and eye movements and 4,000 to 17,000 pupil reactions are performed per day, depending on the type of the video workstation and the work effort performed. Healthy eyes nevertheless do not receive any damage as a result of working at a monitor device, according to the present state of knowledge. However, the activity is an additional strain on the eyes. Slight restrictions to the visual performance already present can therefore provoke eye problems (e.g. eye twitching, flickering, swimming letters, burning eyes, a feeling of pressure in the area of the eyes or headaches), if they have not been corrected. An increased risk during work at the video workplace also exists for wearers of glasses and contact lenses.
• Surface supporting the hands: 5 - 10 cm
• Highest monitor line at eye level or somewhat below it
• Viewing distance: 40 to 70 cm
• Leg-room (vertical): At least 65 cm
• Leg-room (horizontal): At least 60 cm
## Operating elements

![Front operating elements](image)

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
</table>
| 1    | ![Button 1](image) | You will start the OSD (On Screen Display) with this button. Press this button again if you wish to leave the OSD.  
  1 + ▼  Power block, when the OSD is not activated  
  1 + ▲  OSD block, when the OSD is not activated |
| 2    | ![Button 2](image) | Select a parameter and reduce its value with this button, when the OSD is switched on.  
  If you are not in the OSD: Direct call-up of the Contrast/Brightness menu. |
| 3    | ![Button 3](image) | Select a parameter and increase its value with this button, when the OSD is switched on.  
  If you are not in the OSD: Direct call-up of the Aspect Ratio menu. |
| 4    | ![Button 4](image) | Confirm the selection of the parameter to be changed with this button.  
  If you are not in the OSD: Automatic adjustment of the image. |
| 5    | ![Button 5](image) | Operational display  
  Shows the operational state. |
| 6    | ![Button 6](image) | You can switch the TFT monitor on or to the Standby mode with this button. |
Changing the parameters of the TFT monitor

The **On Screen Display** (abbreviation: OSD) is a menu that is briefly faded in across the TFT monitor. You will be able to set certain parameters of the TFT monitor through the OSD menu.

**Operating the OSD menu**

1. Press the **button**, in order to activate the OSD.
2. Select the options from the Main Menu with the **function selection buttons**.
3. Confirm your selection with the **button**.
4. Press the **button**, in order to leave the OSD.

**Information**

The OSD will be faded out automatically if you have not operated any button on the TFT monitor for the pre-set time.

**The OSD menu**

The main functions or possible settings through the OSD are explained in the following.

---

The menus described here can differ from those on your monitor because of possible technical changes.
<table>
<thead>
<tr>
<th>Menu point</th>
<th>Function / sub-menu</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Automatic adjustment icon" /></td>
<td>Automatic adjustment (Auto Adjust): Sets the horizontal and vertical position, phase (fine tune) and clock cycle (H size) automatically.</td>
</tr>
<tr>
<td><img src="image" alt="Contrast icon" /></td>
<td>Contrast (Contrast): Sets the white value of the monitor foreground.</td>
</tr>
<tr>
<td><img src="image" alt="Brightness icon" /></td>
<td>Brightness (Brightness): To adjust the brightness of the video. DCR: You can switch the DCR function (dynamic contrast) on and off here.</td>
</tr>
<tr>
<td><img src="image" alt="Input select icon" /></td>
<td>Input select (Input Select): The signal input will be switched between analog and digital if you press “Input Select”.</td>
</tr>
<tr>
<td><img src="image" alt="Audio Adjustment icon" /></td>
<td>Audio Adjustment (Audio Adjust): For setting the audio function. Volume: Sets the sound output of the loudspeakers. Mute switch: Enables the selection between Mute On/Off.</td>
</tr>
<tr>
<td><img src="image" alt="Colour Adjust icon" /></td>
<td>Colour Adjust (Color Adjust): For the selection of the colours, in order to improve the brightness and the colour saturation. Selection can be made between: Cool, Normal, Warm and user-defined colours. Cool: Adds blue to the monitor, creating a cooler white. Normal: Adds red to the monitor, creating a warmer white and a brighter red. Warm: Adds green to the monitor, creating a darker colour tone. User colour (User Color): Individual settings for red(R), green(G) and blue(B).</td>
</tr>
<tr>
<td><img src="image" alt="Information icon" /></td>
<td>Information (Information): Displays information about the current input signal of the graphics card of your computer.</td>
</tr>
<tr>
<td><img src="image" alt="Setup menu icon" /></td>
<td>Setup menu (Setup Menu): Set the language, OSD position and OSD time out. Language (Language Select): Enables the user to select between the available languages. OSD position (OSD Position): Horizontal and vertical setting of the OSD position. H. position: For the horizontal setting of the OSD position. V. position: For the vertical setting of the OSD position. OSD time out (OSD Time Out): For switching off the On Screen Display (OSD) automatically after the expiry of a preset period of time. OSD background (OSD Background): Enables the OSD background to be switched on and off.</td>
</tr>
<tr>
<td><img src="image" alt="Memory recall icon" /></td>
<td>Memory recall (Memory Recall): To recreate the factory settings for controlling video and audio.</td>
</tr>
</tbody>
</table>
Energy-saving properties

This monitor will switch to various energy-saving statuses set in advance by the respective computer / operating system. This complies with the current requirements to reduce energy consumption.

The monitor supports the following types of energy-saving mode:

<table>
<thead>
<tr>
<th>Status</th>
<th>Power (nominal value)</th>
<th>Colour of the LED</th>
<th>Readiness (approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>&lt; 42 Watts</td>
<td>Blue</td>
<td>-</td>
</tr>
<tr>
<td>STAND-BY</td>
<td>&lt; 1 Watt</td>
<td>Orange</td>
<td>6 seconds</td>
</tr>
</tbody>
</table>

The monitor will remain in the energy-saving status until you press a key on the keyboard or move the mouse, depending on the operating system.

The monitor will need about 6 seconds to switch from the STAND-BY status to the ON operating mode.

Customer Service

Solving problems

Make sure that the TFT monitor has been installed correctly (read the “Bringing into operation” chapter from Page 4), if problems with your TFT monitor arise. Read the information in this chapter about possible solutions if the problems continue to exist.

Localisation of the cause

Problems with functionality sometimes have commonplace causes but can also arise from defective components. We cannot provide every solution possible in this manual but would be more than happy to help you by telephone. Please call us if you need support.

Check the connections and cables

Start with a careful visual check of all cable connections. Ensure that the TFT monitor and the computer are correctly supplied with electricity, if the indicator lights are not functioning.

Faults and possible causes

The monitor does not display any image:

Check:

- **Mains supply**: The power supply cord must be sitting firmly in the socket and the mains switch must be switched on.
- **Signal input**: Please check whether the signal input (computer or other device) is switched on and the connection cables are sitting firmly in the sockets.
- **Image refresh frequencies**: The current image refresh frequency must be suitable for the TFT monitor.
- **Energy-saving mode**: Press any button or move the mouse to deactivate the mode.
- **Screen saver**: Press a button on the keyboard or move the mouse if the screen saver of the computer is activated.
- **Signal plugs**: Please contact your respective customer service if pins are bent.
- **Set the applicable values for your TFT monitor (see “Preparations on your PC”, Page 5).”

The image slips or is erratic:

Check:

- **Signal plugs**: Please contact your respective customer service if pins are bent.
- **Signal plugs**: The plugs of the signal cable must be sitting firmly in the sockets.
- **Graphics card**: Check whether the settings are correct (see Page 6).
- **Image refresh frequencies**: Select the permissible values in your graphics settings.
• **Monitor output signal.** The monitor output signal of the computer must agree with the technical data of the monitor.
• Remove disruptive devices (mobile telephones, cell phones, loudspeakers, etc.) from the vicinity of your TFT monitor.
• Avoid the use of monitor extension cables.

**Symbols are displayed darkly, the image is too small or not centred, etc.:**
• Readjust the respective settings (Setting the TFT monitor, Page 11)

**Colours are not displayed cleanly:**
• Check the signal cable pins. Contact your respective customer service if pins are bent.
• Readjust the colour settings in the OSD menu.
• Avoid the use of monitor extension cables.

**The display is too light or too dark:**
• Check whether the video output level of the computer agrees with the technical data of the monitor.
• Select automatic control, to optimise the settings for brightness and contrast. The display unit should show a text page (e.g. Explorer, Word, etc.) for its optimisation.

**The image flutters:**
• Check whether the operational voltage agrees with the technical data of the monitor.
• Select automatic control, to optimise the settings for the synchronisation of pixels and phases. The display unit should show a text page (e.g. Explorer, Word, etc.) for its optimisation.

**Driver information**

No driver installation is necessary for the functioning of your monitor.
You will be able to download the driver program file from the internet website listed below if the operating system nevertheless requests the installation of a monitor driver.

The installation of a driver can differ according to the operating system. Follow the specific instructions for your operating system.

www.medion.com

**Do you need further support?**

Please contact us if the suggestions in the above sections have not solved your problem. It would help us very much if you make the following information available to us:
• What is your computer’s configuration?
• What peripheral devices are you using?
• What messages appear on the monitor?
• What software were you using when the fault arose?
• What steps have you already taken to solve the problem?
• Give us your customer number if you have already received one.

**Cleaning**

You will be able to extend the useful life of the TFT monitor by the following measures:

**Attention!**

No parts to be maintained or cleaned are located within the monitor casing.

• Always pull out the mains plug and all connecting cables before cleaning.
• Do not use any solvents, corrosive or gaseous cleaning substances.
• Clean the screen with a soft, fluff-free cloth.
• Pay attention that **no drops of water** remain on the TFT monitor. Water can cause long-lasting discolouring.
• Do not subject the screen to either dazzling sunlight or to ultra-violet radiation.
• Please keep the packaging material and use this exclusively to transport the TFT monitor.

**Disposal**

**Packaging**
Your device is in packaging for protection against transport damage. Packaging is made from materials that can be disposed off in an environmentally friendly way and taken to correct recycling.

**Device**
Do not throw the device into the normal domestic refuse after the end of its useful life under any circumstances. Obtain information about the possibilities of environmentally friendly and correct disposal.

**Technical data**

- Monitor size: 19” (48.2 cm), TFT
- Size ratio: 16:10
- Nominal voltage: AC 100-240 V ~ 50/60 Hz
  Nominal electricity: 1.8 A
- Resolution: 1440 x 900
- Brightness: 300 cd/m² (typical)
- Contrast: 1000:1 (typical)
- Reaction time: 5 ms (typical)
- Viewing angle h/v: 178°/178° (typical) CR>5
- RGB input, analog: 15-terminal D-SUB connection
- RGB input, digital: DVI-D with HDCP decoding
- User control: Power ON/OFF, OSD
- Temperatures
  - In operation: 0 °C ~ +40°C
  - Not in operation: -20°C ~ +60°C
- Moisture (Non-condensing)
  - In operation: < 80%
  - Not in operation: < 90%
- Weight (net/gross): 4.2 kg / 5.2 kg
- Dimensions (WxHxD): 448 x 357 x 195.5 mm
- Power consumption
  - (Stand-by): Less than 1 Watt
Pixel errors in the TFT monitor

A total of approximately 3.9 million control transistors are used in the case of Active Matrix TFTs with a resolution of 1440 x 900 pixels (WSXGA), each composed of three sub-pixels (red, green, blue). A failure or incorrect control of pixels or individual sub-pixels can arise occasionally, because of this very high number of transistors and the extremely complex manufacturing process associated with it.

There have been continuous approaches to define the number of permitted pixel errors in the past. However, these attempts have for the most part been very complicated and completely different from manufacturer to manufacturer. MEDION follows the strict and transparent requirement of the ISO 13406-2, Class II Norm, which are summarised in brief in the following, in the handling of guarantees for all TFT display products for this reason.

Among other matters, the 13406-2 ISO Standard defines generally applicable guidelines in relation to pixel errors. The pixel errors are categorised into four error classes and three types of error. Each individual pixel is composed in its turn of three sub-pixels each with a basic colour (red, green, blue).

Types of pixel error:

- **Type 1:** Pixels shining for a long time (bright, white point), although not activated. A white pixel arises because of the illumination of all three sub-pixels.
- **Type 2:** Pixels not shining (dark, black point), although activated
- **Type 3:** Abnormal or defective sub-pixels coloured red, green or blue (e.g. shining for a long time with half brightness, not lighting one colour, flashing or flickering, but not Type 1 or 2)

Addition: Cluster of Type 3 (= failure of two or more sub-pixels in a block of 5 x 5 pixels. A cluster is a field of 5 x 5 sub-pixels).

Classes of pixel error:

<table>
<thead>
<tr>
<th>Error Class</th>
<th>Type 1</th>
<th>Type 2</th>
<th>Type 3</th>
<th>Cluster of Type 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>II</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>III</td>
<td>5</td>
<td>15</td>
<td>50</td>
<td>5</td>
</tr>
<tr>
<td>IV</td>
<td>50</td>
<td>150</td>
<td>500</td>
<td>50</td>
</tr>
</tbody>
</table>

The permitted number of errors of the types specified above in each class of error relates to a million pixels and must be converted in accordance with the physical resolution of the display.

A maximum permitted number in **Error Class II** follows from this:

<table>
<thead>
<tr>
<th>For a resolution of</th>
<th>M. pixel</th>
<th>Sub-pixels</th>
<th>(Type, see above)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1024 x 768 (15&quot;)</td>
<td>0.786432</td>
<td>2.359296</td>
<td>2 2 4 - 2</td>
</tr>
<tr>
<td>1280 x 1024 (17,18, 19&quot;)</td>
<td>1.310720</td>
<td>3.932160</td>
<td>3 3 7 - 3</td>
</tr>
<tr>
<td>1600 x 1200 (19&quot;)</td>
<td>1.920000</td>
<td>5.760000</td>
<td>4 4 10 - 4</td>
</tr>
<tr>
<td>1440 x 900 (19&quot; wide)</td>
<td>1.296000</td>
<td>3.888000</td>
<td>3 3 7 - 3</td>
</tr>
<tr>
<td>1680 x 1050 (20&quot; wide, 22&quot; wide)</td>
<td>1.764000</td>
<td>5.292000</td>
<td>4 4 10 - 4</td>
</tr>
</tbody>
</table>
Error Class I is only used in the case of special applications, e.g. in the medical sector, and is associated with corresponding supplementary costs. Error Class II has become established as the standard for manufacturers conscious of quality and with very good display units.

**Example 1:**
A 15” XGA display unit consists of 1024 horizontal and 768 vertical scanning elements (pixels), that is 786,432 pixels in total. This gives a factor of about 0.8 in relation to one million pixels.
Error Class II therefore allows two errors of both Type 1 and Type II, four Type 3 errors and two Type 3 clusters.

**Example 2:**
A 17” SXGA display unit consists of 1280 horizontal and 1024 vertical scanning elements (pixels), that is 1.31 million pixels in total. This gives a factor of about 1.31 in relation to one million pixels.
Error Class II therefore allows three errors of each Type I and Type II, seven Type 3 errors and three Type 3 clusters. However, this does not usually concern a guarantee case.
A guarantee may possibly exist if the number of errors given above is exceeded in a category.

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