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Information about these instructions

Read through these instructions carefully and under all circumstances follow the information given, by doing this you will guarantee reliable operation and a long useful life for your TFT monitor. Always keep these instructions safe and ready to hand. Should you pass the monitor to a new owner please ensure that these instructions go with it.

Target group

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

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 16 of these Operating Instructions.

The symbols and signal words used in these Instructions.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>🚨 Danger! 🚨</td>
<td>Observe the regulation to avoid an electric shock. There will be mortal danger.</td>
</tr>
<tr>
<td>⚠️ Warning! ⚠️</td>
<td>Observe the regulation to avoid physical injury.</td>
</tr>
<tr>
<td>⚠️ Caution! ⚠️</td>
<td>Observe the regulation to avoid damage to property and devices.</td>
</tr>
<tr>
<td>📘 Important! 📘</td>
<td>Further information about the use of the device.</td>
</tr>
</tbody>
</table>

Use in accordance with regulations

- The TFT monitor serves exclusively to reproduce the video signals of external devices where the connections and image resolutions match the technical data of the monitor i.e. computers. Any other use is not 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 industrial business. Use in extreme environmental conditions can result in damage to your device.
Contents

Please check the items received in the box and inform us within 14 days from purchase if anything is missing. Your statutory right are not affected.

You should receive the following items:

- Monitor
- DVI cable
- VGA cable
- Audio cable
- Power cord
- Monitor stand
- User manual
- Warranty card
Safety information

⚠️ Caution! Pay attention to operational safety.

- The device is not intended to be used by individuals with restricted physical, sensory or intellectual abilities (including children), or a lack of experience and/or knowledge, unless they are supervised by an individual responsible for their safety or have received instructions about how the device is to be used from such a person. Children should be supervised to ensure that they do not play with the device.
- 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 is a danger of the monitor breaking.
- **Attention!** There is a 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.
- In order to avoid damage, do not touch the screen with objects with points or sharp edges.
- Use a blunt entry stylus or a finger exclusively.

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

⚠️ Caution! Pay attention to the 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.

⚠️ Caution! Pay attention to the surrounding temperature!

- The TFT monitor can be operated at a surrounding temperature from 0° C to +35° 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.

Danger! Pay attention to the following:

After the TFT Monitor has been transported, wait until the device has reached the surrounding temperature before turning it on. Moisture, which can cause an electrical short-circuit, can form within the monitor when variations in temperature and moisture are experienced.

⚠️ Warning! Pay attention to safety during the connection!

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.
- 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.
- 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.

Information about conformity

The TFT monitor fulfils the requirements for electromagnetic compatibility and electrical safety.

Your device complies with the European Norm ISO 9241-307 Class II (Pixel error class) (see P. 18).

Your device complies with the basic requirements and the relevant guidelines of the 2004/108/EU EMV Guidelines [electromagnetic compatibility] and the 2006/95/EU Guideline for low voltage devices.

This device fulfils the basis requirements and the relevant regulation of the Ecodesign Guideline 2009/125/EG (Order 1275/2008).
Bringing the device into operation

Information

Please read the “Safety information” chapter on page 4 under all circumstances before bringing the device into operation.

Setting Up

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

Preparation of your PC

You may have to make some preparations if you have been operating a tubed monitor on your computer up to now. This will be necessary if your current monitor has been operated with settings that are not supported by your new TFT screen.

The screen will represent up to 1440 x 900 scanning elements. This resolution corresponds to the physical resolution. TFT screens achieve complete image quality with the physical resolution. The display will not appear on the whole area of the screen, under certain circumstances, if you change to a representation with deviating settings.

Distortions can also appear in the representation, particularly in the case of lettering.

Set a resolution and image frequency on the PC supported by both monitors, using the old monitor, before you connect the new monitor.

Shut down the PC and connect the new monitor.

You will be able to adjust the screen settings on the P53012 (MD 20249) as described after restarting.
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 768</td>
<td>47.6 KHz</td>
<td>59.6 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)
Monitor settings under Windows XP

You will make the screen setting in ‘Display Properties’ in the Windows program under Windows XP. 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” (1).

You can set the depth of colour (number of the colours represented) under “Colour quality” (2). 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” (3).

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.

Important!

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 properties”.

(III.: Detail of Display Characteristics)
Monitor settings under Windows Vista®

You will make the screen settings in ‘Personalize appearance and sounds’ Windows program under Windows Vista®. The program can be started as follows:

- Right mouse click on the Windows interface (Desktop) and left mouse click on ‘Personalize’.

  or

- Through Start ⇒ Control Panel ⇒ Personalize appearance and sounds by a double click with the left mouse button.

Monitor settings under Windows® 7

Make the screen settings in the ‘Appearance and Personalization’ Windows program under Windows® 7. The program can be started as follows:

- Right mouse click on the Windows interface (Desktop) and left mouse click on ‘Personalize’

  or

- Through Start ⇒ Control Panel ⇒ Appearance and Personalization by a double click with the left mouse button.

  (Ill.: Appearance and Personalization)

- Select the Display ⇒ Adjust screen resolution Menu, to adjust the resolution and the frequency.
Connections on the back

1. Power Switch
2. Power supply (POWER IN)
3. 3.5 mm stereo jack audio connection (AUDIO IN)
4. DVI-D 24-Pin connection (DVI)
5. Mini 15-pin D-sub connection (VGA)

Connecting the monitor

- Ensure that the TFT monitor has not yet been connected to the electricity supply (mains plug not yet plugged in) and that neither the TFT monitor nor the computer has been switched on.
- Prepare your computer for the TFT monitor if necessary, so that the correct settings for it will be present.

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 0. 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!)

- 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

The diagram illustrates the front operating elements of the device.

### Description of Buttons

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
</table>
| 1    | ![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  
   Hold the key combination until the bar displayed has moved from left to right completely, to activate/de-activate the block. A corresponding message will appear on the screen. |
| 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    | ![△](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    | ![2](image) | Confirm the selection of the parameter to be changed with this button.  
   If you are not in OSD: Automatic adjustment of the image. |
| 5    | Operational display | Shows the operational state. |
| 6    | ![Power](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.

Important!

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.

Important!

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></td>
<td><strong>Auto Image Adjust:</strong> Sets the horizontal and vertical position, phase (fine tune) and clock cycle (H size) automatically.</td>
</tr>
<tr>
<td></td>
<td><strong>Contrast:</strong> Sets the white value of the monitor foreground.</td>
</tr>
<tr>
<td></td>
<td><strong>Brightness:</strong> To adjust the brightness of the video.</td>
</tr>
<tr>
<td></td>
<td><strong>DCR:</strong> You can switch the DCR function (dynamic contrast) on and off here.</td>
</tr>
<tr>
<td></td>
<td><strong>Input Select:</strong> The signal input will be switched</td>
</tr>
<tr>
<td></td>
<td><strong>Audio Adjust:</strong> For setting the audio function.</td>
</tr>
<tr>
<td></td>
<td><strong>Volume:</strong> Sets the sound output of the loudspeakers.</td>
</tr>
<tr>
<td></td>
<td><strong>Mute switch:</strong> Enables the selection between Mute On/Off.</td>
</tr>
<tr>
<td></td>
<td><strong>Colour Adjust:</strong> 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.</td>
</tr>
<tr>
<td></td>
<td><strong>Cool:</strong> Adds blue to the monitor, creating a cooler white.</td>
</tr>
<tr>
<td></td>
<td><strong>Normal:</strong> Adds red to the monitor, creating a warmer white and a brighter red.</td>
</tr>
<tr>
<td></td>
<td><strong>Warm:</strong> Adds green to the monitor, creating a darker colour tone.</td>
</tr>
<tr>
<td></td>
<td><strong>User colour:</strong> Individual settings for red(R), green(G) and blue(B).</td>
</tr>
<tr>
<td></td>
<td><strong>Information:</strong> Displays information about the current input signal of the graphics card of your computer.</td>
</tr>
<tr>
<td></td>
<td><strong>Manual Image Adjust:</strong></td>
</tr>
<tr>
<td></td>
<td><strong>H. Size:</strong> Sets the width of the monitor.</td>
</tr>
<tr>
<td></td>
<td><strong>H./V. Position:</strong> Sets the horizontal and vertical position of the video image.</td>
</tr>
<tr>
<td></td>
<td><strong>Fine Tune:</strong> Fine tune to improve the display of the TFT monitor.</td>
</tr>
<tr>
<td></td>
<td><strong>Sharpness:</strong> For the adjustment of the clarity in the case of a signal that does not correspond to the physical resolution of the screen.</td>
</tr>
<tr>
<td></td>
<td><strong>Aspect Ratio:</strong> Select an image size from options 4:3 and 16:10.</td>
</tr>
<tr>
<td></td>
<td><strong>Setup Menu:</strong> Set the language, OSD position and OSD time out.</td>
</tr>
<tr>
<td></td>
<td><strong>Language:</strong> Enables the user to select between the available languages.</td>
</tr>
<tr>
<td></td>
<td><strong>OSD Position:</strong> Horizontal and vertical setting of the OSD position.</td>
</tr>
<tr>
<td></td>
<td><strong>H. Position:</strong> For the horizontal setting of the OSD position.</td>
</tr>
<tr>
<td></td>
<td><strong>V. Position:</strong> For the vertical setting of the OSD position.</td>
</tr>
<tr>
<td></td>
<td><strong>OSD time out:</strong> For switching off the On Screen Display (OSD) automatically after the expiry of a preset period of time.</td>
</tr>
<tr>
<td></td>
<td><strong>OSD background:</strong> Enables the OSD background to be switched on and off.</td>
</tr>
<tr>
<td></td>
<td><strong>Memory Recall:</strong> 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>2 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 2 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 5), 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 6).

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 7).
- 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 centered, etc.:

- Readjust the respective settings (Setting the TFT monitor, Page 12)

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:

**Important!**

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.
- Only use suitable cleaning substances, such as glass cleaner or screen cleaner (available in specialist shops), to clean the screen.
- 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.

Pixel errors in the TFT monitor

A total of approx. 3.9 m control transistors are used in the case of Active Matrix TFTs with a resolution of 1440 x 900 pixels, 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 9241-307, 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 9241-307 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 pixels (15 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>-</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>1600 x 900 (20&quot; wide)</td>
<td>1.440000</td>
<td>4.320000</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>
<tr>
<td>1920 x 1080 (23&quot; wide)</td>
<td>2.073600</td>
<td>6.220800</td>
<td>4 4 10 - 4</td>
</tr>
<tr>
<td>1920 x 1200 (25&quot; wide)</td>
<td>2.304000</td>
<td>6.912000</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:**

A 19" display unit consists of 1440 horizontal and 900 vertical scanning elements (pixels), that is 1,296,000 pixels in total. This gives a factor of about 1.3 in relation to one million pixels.

Error Class II therefore allows 3 errors of both Type 1 and Type 2, 7 Type 3 errors and 3 Type 3 clusters.

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Technical data

- Model: P53012 (MD 20249)
- Monitor size: 19” (approx. 48 cm), TFT
- Size ratio: 16:10
- Nominal voltage: AC 100-240 V ~ 50/60 Hz
- Nominal electricity: 1.5 A
- Resolution: 1440 x 900
- Brightness: 300 cd/m² (typical)
- Contrast: 1,000:1 (typical)
- Reaction time: 5 ms (typical)
- Viewing angle h/v: 170°/160° (typical) CR>10
- RGB input, analog: 15-terminal D-SUB connection
- RGB input, digital: DVI-D with HDCP decoding
- Audio Input: 1 Vrms max. 100Hz~20KHz
- Audio Output: 1 W (+/- 12%)
- User control: Power ON/OFF, OSD
- Temperatures:
  - In operation: 0° C ~ +35°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
- Power consumption (operation): Less than 42 Watt

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