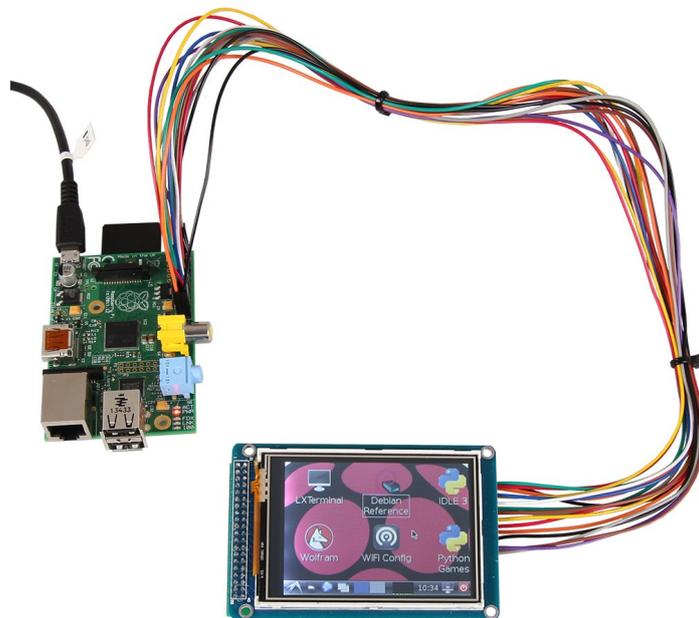


JOY-IT

3.2 / 3.5 TOUCH-DISPLAY



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Dear customer
Thank you for purchasing our product.
Please note the following instructions:

1. Connecting to a Raspberry Pi

Plug the 3.2"/3.5" TFT-Display on the Raspberry Pi so that the display is plugged onto the first 26 PINs of the GPIO connector strip.
The backlight should light up now.

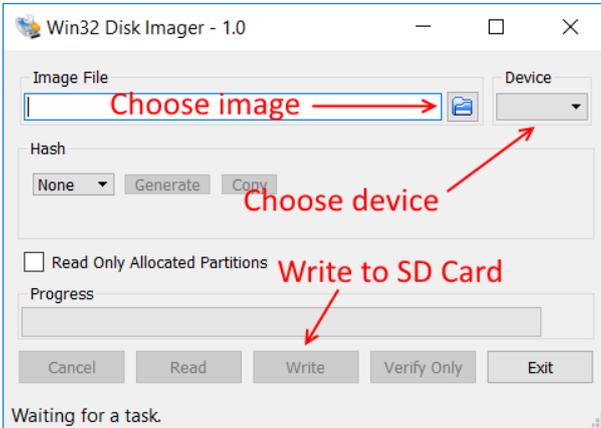


2. Softwareinstallation

Writing a prepared Image-File to a SD-Card

Install, on your SD-Card, the FBTFT Image with the „[Win32 Disk Imager](#)“-Program. You can download the image files here:

- [3,2“ LCD Image-Download](#)
- [3,5“ LCD Image-Download](#)



[Expert section]

Manual installation of the FBTFT-Modules

If you are already using a Raspbian Jessie Image and want to upgrade this with the 3.2“/3.5“ Touchscreen-TFT, then you can also install the needed FBTFT modules.

First, the „config.txt“-File needs to be edited.

Therefore, the following lines needs to be appended:

For the 3.2“ TFT:

```
dtparam=spi=on
dtoverlay=waveshare32b:rotate=270,swapxy=1
```

For the 3.5“ TFT:

```
dtparam=spi=on
dtoverlay=waveshare35a:rotate=270,swapxy=1
```

You can edit the file directly on your Raspberry Pi with the following command:

```
sudo nano /boot/config.txt
```

You can save your changes by pressing Ctrl+X and by confirming with „Y“ and „Enter“.

You also need to edit the „/boot/cmdline.txt“-File. Enter the following command:

```
sudo nano /boot/cmdline.txt
```

Append to the already existing first line the following command:

```
fbcon=map:10
```

This file can also be saved by pressing „Ctrl+X“.

Next, the „/usr/share/X11/xorg.conf.d/99-calibration.conf“-File needs to be reconfigured.

Enter the command:

```
sudo nano /usr/share/X11/xorg.conf.d/99-calibration.conf
```

The following lines needs to be appended:

```
Section "InputClass"
    Identifier      "calibration"
    MatchProduct   "ADS7846 Touchscreen"
    Option "Calibration" "160 3723 3896 181"
    Option "SwapAxes" "1"
    Option "TransformationMatrix" "1 0 0 0 -1 1 0 0 1"
EndSection
```

This file can also be saved by pressing „Ctrl+X“.

The „/usr/share/X11/xorg.conf.d/99-fbturbo.conf“-File also needs some changes.

Enter the command:

```
sudo nano /usr/share/X11/xorg.conf.d/99-fbturbo.conf
```

And change the line...

```
Option          "fbdev" "/dev/fb0"
```

..., so that „fb0“ changes to „fb1“. The line should look like:

```
Option          "fbdev" "/dev/fb1"
```

This file can also be saved by pressing „Ctrl+X“.

The required drivers are now needed to be installed.

Therefore, the Raspberry Pi needs to be connected to the internet.

Enter every three of the following commands and confirm with enter.

Choose your display size and enter the three commands.

Commands for the 3.2" LCD

```
cd /tmp
wget http://www.joy-it.net/anleitungen/rpi/tft32b/waveshare32b-overlay.dtb
sudo cp waveshare32b-overlay.dtb /boot/overlays/waveshare32b.dtbo
```

Commands for the 3.5" LCD

```
cd /tmp
wget http://www.joy-it.net/anleitungen/rpi/tft35a/waveshare35a-overlay.dtb
sudo cp waveshare35a-overlay.dtb /boot/overlays/waveshare35a.dtbo
```

3. Using the buttons on the 3.2" TFT

There are three buttons mounted to the side of the display. These buttons are assigned to the following GPIO connections of the Raspberry Pi:

[Key1] - > GPIO12
[Key2] - > GPIO16
[Key3] - > GPIO18

By pressing the button, the associated signal is pulled to GND (Active_LOW).

4. Calibrating the touchscreen

If necessary, you can calibrate the touchscreen with the following steps:

At first, download and install the calibration-tool with the following command:

```
sudo apt-get install -y xinput-calibrator
```

By using the command...

```
DISPLAY=:0.0 xinput_calibrator
```

...you can start the tool.

You will now see 4 points, one after another, on the display.

These points need to be pressed.

Afterwards, you will see 4 values which needs to be entered as new calibration-data to the „99-calibration.conf“ at:

```
"Option "Calibration" "160 3723 3896 181"
```

The first value is assigned to „MinX“, the second to „MaxX“, the third to „MinY“ and the fourth to „MaxY“. Restart your Raspberry Pi, after saving your changes, to load your new calibration-profile.

5. Simultaneously using the LCD and the HDMI output

To simultaneously use the LCD display aswell as the HDMI output, some additional configuration is needed.

At first, the „Framebuffer-Copy“-program needs to be compiled and installed with the following steps:

```
cd /tmp
wget http://www.joy-it.net/anleitungen/rpi/tft35a/waveshare35a-overlay.dtb
sudo apt-get install -y cmake
git clone https://github.com/tasanakorn/rpi-fbcp
mkdir -p rpi-fbcp/build
cd rpi-fbcp/build
cmake ..
make
sudo install fbcp /usr/local/bin/fbcp
```

To automatically start this programm, while booting the Raspberry Pi, you need to edit the following file...

```
sudo nano /etc/rc.local
```

... and append the following line right before toe line with the „exit 0“.

```
fbcp &
```

Now you need to edit the „/boot/config.txt“-File.

Here you can configure the resolution of HDMI-output and LCD-Display by commenting the needed block of „hmdi_group“, „hmdi_mode“ and „hmdi_cvt“.

The following example is configured for a resolution of 800x600.

For 4:3 resolutions:

```
hdmi_ignore_edid=0xa5000080
hdmi_force_hotplug=1

#####

#### Resolution-configuration - needed group needs to be uncommented ####
##### 4:3 #####

## Configuration for 320x240 (native resolution of the 3.2" TFT-Display)##
#hdmi_group=2
#hdmi_mode=87
#hdmi_cvt=320 240 60 1 0 0 0

## Configuration for 640x480 ##
#hdmi_group=2
#hdmi_mode=87
#hdmi_cvt=640 480 60 1 0 0 0

## Configuration for 720x540 ##
#hdmi_group=2
#hdmi_mode=87
#hdmi_cvt=720 540 60 1 0 0 0

## Configuration for 800x600 ##
hdmi_group=2
hdmi_mode=87
hdmi_cvt=800 600 60 1 0 0 0

## Configuration for 1024x768 ##
#hdmi_group=2
#hdmi_mode=87
#hdmi_cvt=1024 768 60 1 0 0 0

#####
```

For 16:9 resolutions:

```
hdmi_ignore_edid=0xa5000080
hdmi_force_hotplug=1

#####
#### Resolution-configuration - needed group needs to be uncommented ####
##### 16:9 #####

## Configuration for 1280x720 ##
#hdmi_group=2
#hdmi_mode=87
#hdmi_cvt=1280 720 60 3 0 0 0

## Configuration for 1600x900 ##
#hdmi_group=2
#hdmi_mode=87
#hdmi_cvt=1600 900 60 3 0 0 0

## Configuration for 1920x1080 ##
#hdmi_group=2
#hdmi_mode=87
#hdmi_cvt=1920 1080 60 3 0 0 0

#####
```

At last, the „/usr/share/X11/xorg.conf.d/99-calibration.conf“ needs to be configured again.

Enter the following command:

```
sudo nano /usr/share/X11/xorg.conf.d/99-fbturbo.conf
```

And change the following line...

```
Option          "fbdev" "/dev/fb1"
```

..., so that „fb1“ is changed to its original value „fb0“ (this is needed to use the Framebuffer-Copy):

```
Option          "fbdev" "/dev/fb0"
```

This file can also be saved by pressing „Ctrl+X“.