3.2" / 3.5" TOUCH-DISPLAY

For the pinning onto the Raspberry Pi

1. GENERAL INFORMATION

Dear customer,

Thank you for purchasing our product. In the following, we will show you which things should be noted during the use.
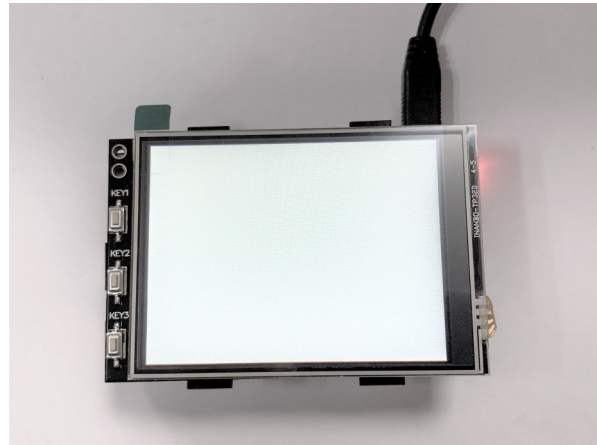
Should you encounter any unexpected problems, do not hesitate to contact us.

2. OVERVIEW

	3.2" Display	3.5" Display
Controller	XPT2046	
Resolution	320 x 240	480 x 320
Colors	65.536	

3. CONNECTION

Put the 3.2" / 3.5" TFT- Display on the Raspberry Pi so that the first 26 pins of the GPIO pin header are plugged in. After that, the backgroundlight of the display is turned on.
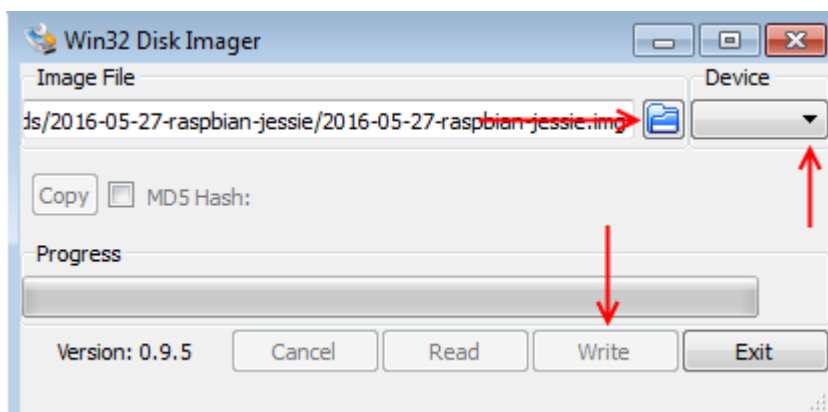

4. INSTALLATION OF THE SOFTWARE

Install the TFT-image on your SD-card with a program like the **Win32-Disk-Imager**. You can download the images via the following links:

For the 3.2" display, you find the downloads **here**.

For the 3.5" display, you find the downloads **here**.

Manual Installation

If you already use another Raspbian image and you want to expand it with the 3.2" / 3.5" touchscreen-TFT, you can install the modules on your system subsequently.Therefore, you must edit the file *config.txt* .

You have to open the terminal on your Raspberry Pi and enter following command:

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

Add here, depending on the display, the following lines at the beginning of the opened file:

For the 3.2" TFT-Display:

```
dtparam=spi=on
dtoverlay=joy-IT-Display-Driver-32b-overlay:rotate=270,swapxy=1
dtparam=audio=on
max_usb_current=1
hdmi_force_hotplug=1
config_hdmi_boost=7
hdmi_drive=1
hdmi_ignore_edid=0xa5000080
```

For the 3.5" TFT-Display:

```
dtparam=spi=on
dtoverlay=joy-IT-Display-Driver-35a-overlay:rotate=270,swapxy=1
dtparam=audio=on
max_usb_current=1
hdmi_force_hotplug=1
config_hdmi_boost=7
hdmi_drive=1
hdmi_ignore_edid=0xa5000080
```

With the **Raspberry Pi 4** ,you have to make some additional settings. For that, you have to comment out in the file config.txt beneath point *[pi4]* the command *dtoverlay=vc4-fkms-v3d* so it looks like the following:

```
[pi4]
# Enable DRM VC4 V3D driver on top of the dispmanx display stack
#
#dtoverlay=vc4-fkms-v3d <---- This setting must be commented out with a #.
max_framebuffers=2
```

You can change the orientation of the display by changing the number behind "rotate=".
To rotate the display by 180°, the line must be adjusted as follows:

```
dtoverlay=joy-IT-Display-Driver-35a-overlay:rotate=90,swapxy=1
```

Now safe the file with the key combination **CTRL + O**, confirm with **Enter** and leave the file with **CTRL + X**.

Now the file *cmdline.txt* must be edited:

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

Therefore, you have to add in the <u>first line</u> the following command:

```
fbcon=map:10
```

Save the file, leave the editor and create the file *99-calibration.conf* :

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

The following lines must be added in the file:

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

Safe the file with the key combination **CTRL + O**, confirm with **Enter** and leave the file with **CTRL + X**.

Now restart your Raspberry Pi with the following command:

```
sudo reboot
```

Last but not least, the file /usr/share/X11/xorg.conf.d/99fbturbo.conf. To do this, enter the following command:

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

And change the following line ...

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

... so you change fb0 to fb1 and the line looks like this

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

This file is also ended and saved with **CTRL + O** followed by **Enter** and **CTRL + X**.

Now the required drivers are downloaded and installed. The Raspberry Pi must be connected to the Internet. Enter each of the following four commands into the console and confirm each of them with Enter.

Commands for the 3.2" TFT-Display:

```
cd /tmp
```

```
wget http://joy-it.net/files/files/Produkte/RB-TFT3.2-V2/joy-IT-Display-Driver-32b-overlay.zip
```

```
unzip joy-IT-Display-Driver-32b-overlay.zip
```

```
sudo cp joy-IT-Display-Driver-32b-overlay.dtbo /boot/overlays/joy-IT-Display-Driver-32b-overlay.dtbo
```

Commands for the 3.5" TFT-Display:

```
cd /tmp
```

```
wget http://joy-it.net/files/files/Produkte/RB-TFT3.5/joy-IT-Display-Driver-35a-overlay.zip
```

```
unzip joy-IT-Display-Driver-35a-overlay.zip
```

```
sudo cp joy-IT-Display-Driver-35a-overlay.dtbo /boot/overlays/joy-IT-Display-Driver-35a-overlay.dtbo
```

Now a package for the touch function must be installed and a file copied:

```
sudo apt-get install xserver-xorg-input-evdev
```

```
sudo cp -rf /usr/share/X11/xorg.conf.d/10-evdev.conf /usr/share/X11/xorg.conf.d/45-evdev.conf
```

Now restart your Raspberry Pi:

```
sudo reboot
```

To change the desktop resolution, open the Start menu and click **Prefe-rences**-> **Appearance Setting** -> **Defaults** and select **Set Defaults For smaller screens**.

5. USAGE OF THE BUTTONS OF THE 3.2"TFT

On the side of the 3.2" display are three buttons.

These can be controlled and used via the GPIOs.
If the button is pressed, the signal is pulled to ground (Active_LOW).

The buttons are connected like that:

TFT	Raspberry Pi
Key 1	GPIO 12
Key 2	GPIO 16
Key 3	GPIO 18

6. CALIBRATION OF THE TOUCH SCREEN

If a calibration of the touch screen is necessary, it can be done with the following steps. First of all download and install the calibration tool. To do this, open a terminal window and enter the following command:

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

Restart your Raspberry Pi so that the touch display is correctly recognized:

```
sudo reboot
```

The calibration can be started with the following command

```
DISPLAY=:0.0 xinput_calibrator
```

Now four dots light up one after the other, which must be pressed to calibrate the display. Four calibration values are then output in the terminal. In order for the calibration to remain stored, the setting must be saved in a file.
Create a new folder:

```
sudo mkdir /etc/X11/xorg.conf.d
```

Now create the file in which the settings are to be saved:

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

The entry should look like the following example (the values behind Calibration may differ from your values)

```
Section  "InputClass"
        Identifier        "calibration"
        MatchProduct      "ADS7846 Touchscreen"
        Option        "Calibration"    "171 3720 3899 196"
        Option        "SwapAxes"       "0"
EndSection
```

MinX corresponds to the first value, MaxX to the second value, MinY to the third value and MaxY to the fourth value. After saving the file and restarting, the new calibration data are accepted.

7. SIMULTANEOUS USE OF LCD AND HDMI

To be able to output the picture signal on the TFT display and on the HDMI output simultaneously, additional steps have to be taken. In the first step, the program Framebuffer-Copy must be compiled and installed using the following commands.

```
cd /tmp
```

```
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
```

In order for the program to start when the Raspberry Pi boots, it must be added to the /etc/rc.local file.

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

Here, before the exit 0 statement, add a new line with the following content

```
fbcp &
```

Now the following text block must be added to /boot/config.txt under the previously added settings.
Here you can set the resolution output from HDMI and display by commenting out the respective block of three of **hdmi_group**, **hdmi_mode** and **hdmi_cvt**: (In the following example the resolution 800 x 600 is preset)

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

For 4 : 3 Resolution:

```
hdmi_ignore_edid=0xa5000080
hdmi_force_hotplug=1

##############################################################################
#### Resolution settings - relevant group must be commented out ####
##### 4:3 ######

## Settings 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

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

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

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

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

<u>For 16 : 9 Resolution:</u>

```
hdmi_ignore_edid=0xa5000080
hdmi_force_hotplug=1

##############################################################################
#### Resolution settings - relevant group must be commented out ####
##### 16:9 #####

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

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

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

###############################
```

The last step is to edit the file /usr/share/X11/xorg.conf.d/99-calibration.conf again. Open the file with the following command:

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

Change the following line ...

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

... so that you change fb1 back to fb0 as in the original state (this is absolutely necessary in framebuffer copy mode):

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

The settings are applied after a restart

```
sudo reboot
```

8. OTHER INFORMATION

Our Information and Take-back Obligations according to the Electrical and Electronic Equipment Act (ElektroG)

Symbol on Electrial and Electronic Products:
This crossed-out bin means that electrical and electronic products do **not** belong into the household waste. You must hand over your old appliance to a registration place. Before you can hand over the old appliance, you must remove used batteries and replacement batteries which are not enclosed by the device.

Return Options:
As the end user, you can hand over your old appliance (which has essentially the same functions as the new one bought with us) free of charge for disposal with the purchase of a new device.
Small devices, which do not have outer dimensions bigger than 25 cm can be handed in for disposal independently of the purchase of a new product in normal household quantities.

1. Possibility of return at our company location during our opening hours
SIMAC Electronics GmbH, Pascalstr. 8, D-47506 Neukirchen-Vluyn

2. Possibility of return nearby
We will send you a parcel stamp with which you can send us your old appliance free of charge. For this possibility, please contact us via e-mail at service@joy-it.net or via telephone.

9. SUPPORT

If any questions remained open or problems may arise after your purchase,we are available by e-mail, telephone and ticket support system to answer these.

E-Mail: service@joy-it.net
Ticket-system: http://support.joy-it.net
Telephone: +49 (0)2845 98469 – 66 (10 - 17 o'clock)

For further information visit our website:
www.joy-it.net