3.2" / 3.5" TOUCH-DISPLAY

For the pinning on 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.
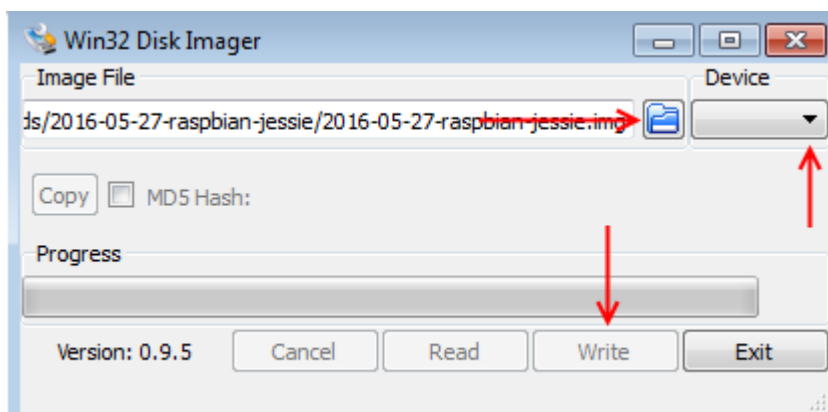

4. INSTALLATION OF THE SOFTWARE

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-Driver32b-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_Driver35a-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 <---- Diese Einstellung muss mit einer # auskommentiert werden
max_framebuffers=2
```

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/comdline.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
```

Also this file has to be saved and terminated with **CTRL + X** with a following **Y** and **Enter**. As the last step, the file */usr/share/X11/xorg.conf.d/99fbturbo.conf* has to be edited. Therefore, enter the following command:

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

Change this line …

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

… from ***fb0*** to ***fb1*** so that the line looks like the following:

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

Also this file has to be saved and terminated with **CTRL + X** with a following **Y** and **Enter**.
Now the necessary drivers will be downloaded and installed. Therefore,the Raspberry Pi must be connected with the internet. Enter the following three commands into the console and confirm them each one of the with **Enter**.

Commands for the 3.2" LCD:

```
cd /tmp
wget https://joyiteurope-my.sharepoint.com/:u:/g/personal/
onedrive_joyiteurope_onmicrosoft_com/EZRHk4EMVQZPrF_eEDAmeicBmmRBm7dIXvmvIj
-H5Pt98g?e=RJYLqC
sudo cp joy-IT-Display-Driver-32b-overlay.dtb /boot/overlays/joy-IT-
Display_Driver-32b-overlay.dtbo
```

Commands for the 3.5" LCD:

```
cd /tmp
wget https://joyiteurope-my.sharepoint.com/:u:/g/personal/
onedrive_joyiteurope_onmicrosoft_com/
EUe_jgASjBpHvhoJRUudCIQBh5gyRrnkLm_RQI34fYW1QA?e=mm6VCf
sudo cp joy-IT-Display-Driver-35a-overlay.dtb /boot/overlays/joy-IT-
Display_Driver-35a-overlay.dtbo
```

Then, install the package for the touch function as well as copy a file:

```
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
```

Restart the Raspberry Pi:

```
sudo reboot
```

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 TOUCHSCREEN

Calibration of the 3.2" displays:
If a calibration of the touchscreen should be necessary, it can be performed like in the following steps. First of all, you must download the calibration tool. Open the terminal and enter the following command:

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

Restart the Raspberry Pi, so that the display is identified correctly:

```
sudo reboot
```

Now you can start the calibration with the following command:

```
DISPLAY=:0.0 xinput_calibrator
```

Four points will light up after another which must be pressed to calibrate the display. Afterwards, the terminal shows four calibration values. To save the calibration, the adjustment must be saved in a file.

For that create a new folder:

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

Create now the file in which the setting will be saved in.

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

The listing should look like the following (The values after **Calibration** can be differ from yours):

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

Calibration of the 3.5" display:
If a calibration of the touchscreen should be necessary, it can be done with the following steps. First, you have to download the calibration tool. For that, open the terminal and enter the following command:

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

Restart the Raspberry Pi to identify the touch display properly:

```
sudo reboot
```

Then, you can start the calibration with the following command:

```
DISPLAY=:0.0 xinput_calibrator
```

Now, four points will light up after another which have to be pressed to calibrate the display. After that, the terminal will issue four values from the calibration which have to be written in the file **99-calibration.conf**.
Therefore, open the file:

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

Enter the values in the following line:

```
Option    "Calibration"      "215 3947 3901 244"
```

Thereby, the first value complies with **MinX**, the second value with **MaxX**, the third with **MinY** and the fourth with **MaxY**. After saving the file and restarting the device, the new calibration values will be set.

To output the image signal with the TFT display and with the HDMI output at the same time, you must perform additional steps. In the first step, the program **Framebuffer-Copy** must be compiled and installed with 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
```

So that the program can start during the ramp-up of the Raspberry Pi, you must add this in the file */etc/rc.local*.

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

Add a new line with the following content in front of the statement **exit 0**:

```
fbcp &
```

Now, you have to add the following text block in */boot/config.txt* beneath the recently added settings. In this file, you can edit the resolution of the HDMI and the display which is issued by both, by commenting out the respective threesome pad from **hdmi_group**, **hdmi_mode** and **hdmi_cvt**: (In the following example is the resolution 800 x 600 set by default)

For 4 : 3 resolution:

```
hdmi_ignore_edid=0xa5000080
hdmi_force_hotplug=1


################################################################################
#### Aufloesungseinstellungen - betreffende Gruppe muss aukommentiert werden ####
##### 4:3 ######

## Einstellungen für 320x240 (native Aufloesung des 3.2"TFT-Displays) ##
#hdmi_group=2
#hdmi_mode=87
#hdmi_cvt=320 240 60 1 0 0 0

## Einstellungen für 640x480 ##
#hdmi_group=2
#hdmi_mode=87
#hdmi_cvt=640 480 60 1 0 0 0

## Einstellungen für 720x540 ##
#hdmi_group=2
#hdmi_mode=87
#hdmi_cvt=720 540 60 1 0 0 0
```

```
## Einstellungen für 800x600 ##
hdmi_group=2
hdmi_mode=87
hdmi_cvt=800 600 60 1 0 0 0


## Einstellungen für 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

###############################################################################
#### Aufloesungseinstellungen - betreffende Gruppe muss aukommentiert werden ####
##### 16:9 #####

## Einstellungen für 1280x720 ##
#hdmi_group=2
#hdmi_mode=87
#hdmi_cvt=1280 720 60 3 0 0 0

## Einstellungen für 1600x900 ##
#hdmi_group=2
#hdmi_mode=87
#hdmi_cvt=1600 900 60 3 0 0 0

## Einstellungen für 1920x1080 ##
#hdmi_group=2
#hdmi_mode=87
#hdmi_cvt=1920 1080 60 3 0 0 0

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

As the last step, you must edit the file
/usr/share/X11/xorg.conf.d/99-calibration.conf again. For that, open the file
with the following command:

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

Change there the following line …

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

… , so that **fb1** is changed back to its original state **fb0**(this is mandatory
necessarily for the Framebuffer-Copy operation):

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

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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.

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