

# Tangible Object Recognition

Manual Version 1.4

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## 1. Description TOR

The TOR System enables high performance touch screens to detect objects placed on the sensor surface. The TOR-System consists of several components which will be described in the following:

### TOR Software

Software compatible with Windows 10 that is used to identify TOR Chips depending on individual touch point patterns. TOR Software receives touch data via USB. The data can be native Windows 10 touch commands, TUIO data or touch data via a proprietary 3M protocol. The TOR Software sends TUIO data to the application PC. The software requires an active license registration prior usage (internet connection necessary).

### TOR Chip

The TOR Chip is the tangible part of the system. The chips are small, therefore easy to integrate into different applications. As an example, they can be mounted on the bottom of objects (such as small model of a product) and used to change various elements on the display. From the outside, all TOR Chip appear identical. However, they each have a unique identity from the pattern of the touchpoints they create. With fluxTOUCH gen3 touch screens, 10 different TOR Chip can be identified.

### TOR Box

The TOR- Box is a mini PC based on Intel NUC and optimised for TOR. It comes equipped with preinstalled licensed TOR Software and preconfigured to be used as part of the TOR system.

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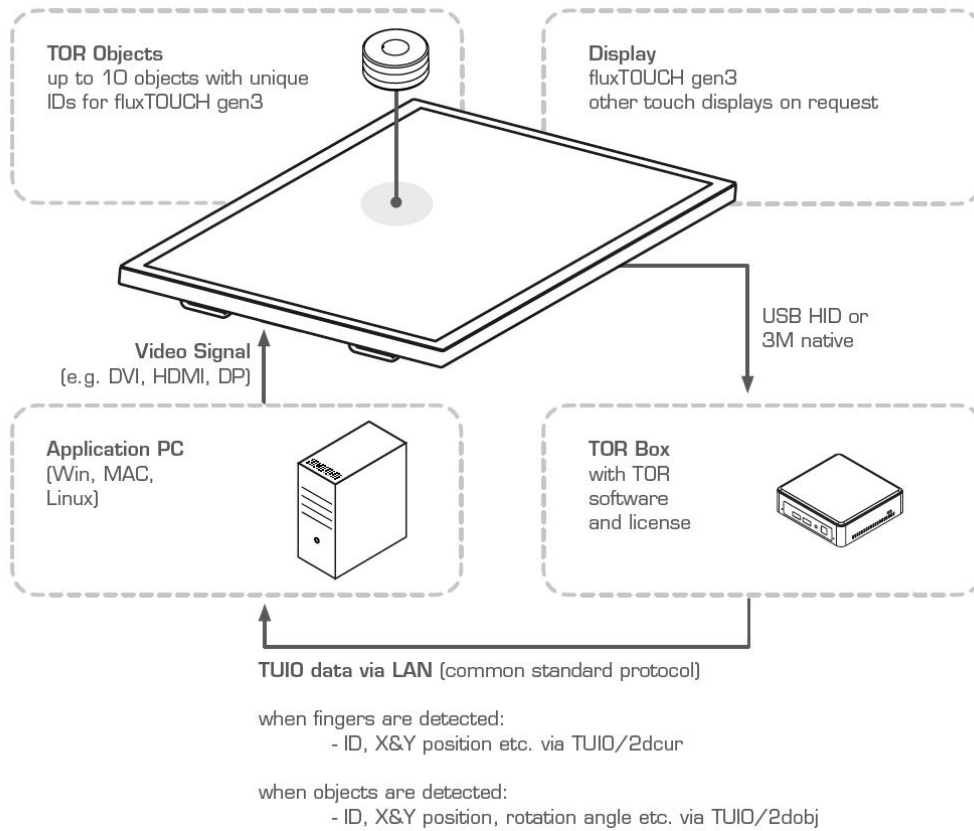


Figure 1 TOR working principle

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**Note: Make sure that objects are clean and without any particles that might cause scratches before placing them on the sensor surface.**

**Note: If using USB HID native Win10 Touch data, you need to use TOR Box. TOR Software running on the application PC needs to receive either TUIO or native 3M touch data.**

**Note: Make sure that unused TOR Chips are not placed on the screen for long periods of time. This can cause sensor malfunctions on the touch sensor side.**

## 2. TOR Software

The TOR software is typically installed in `C:\TOR`. In the following you will learn how to configure the behaviour according to your setup.

### 2.1 Batch file for start-up

The TOR executable file is called `TOR.exe` which will be usually started using a batch file. If you are using the TOR Box (see chapter 3. TOR BOX) this batch file is located in the Windows start-up folder and it's named `TOR-startup.bat`. It sets the screen resolution to 1920 x 1080 and deactivates the Windows explorer before starting the TOR Software. This prevents undesired events in Windows while using the TOR Software.

At start up, the TOR Software will run in full screen mode, has its GUI disabled and receives touch data via 3M proprietary protocol.

Depending on the setup, you will need to change the default configurations, please see Chapter 2.3 Graphical User Interface to understand the procedure.

### 2.2 Screen Resolution and TOR Software

There is a relation between the current display resolution and the touch data being sent from a touch sensor (with the exception of TUIO). Therefore, it is important that the screen resolution being displayed while teaching objects is the same resolution that will be displayed in the final set up and play out. By default, TOR Software running on the TOR Box will always start in FullHD

(1920 by 1080). This is specified as a part in the start-up batch file starting the TOR Software.

## 2.3 Graphical User Interface

By default, the TOR Software will automatically start in full screen with a minimalistic GUI showing a black background while displaying active touch points (Figure 2). Here are keyboard shortcuts which can be used:

- g: Show / hide full GUI
- e: Editor
- r: Show / hide additional information
- F2: Show / hide trails from touch points
- F3: Show / hide IDs
- F4: Show / hide Touchpoints
- F11: Fullscreen on / off

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To save system performance, it is recommended to hide the full GUI screen. Once a TOR Software or TOR Box is set up and configured, there is no need to work with the GUI or even connect a screen to the TOR Box.



Figure 2 Standard full screen with minimalistic GUI showing three touchpoints

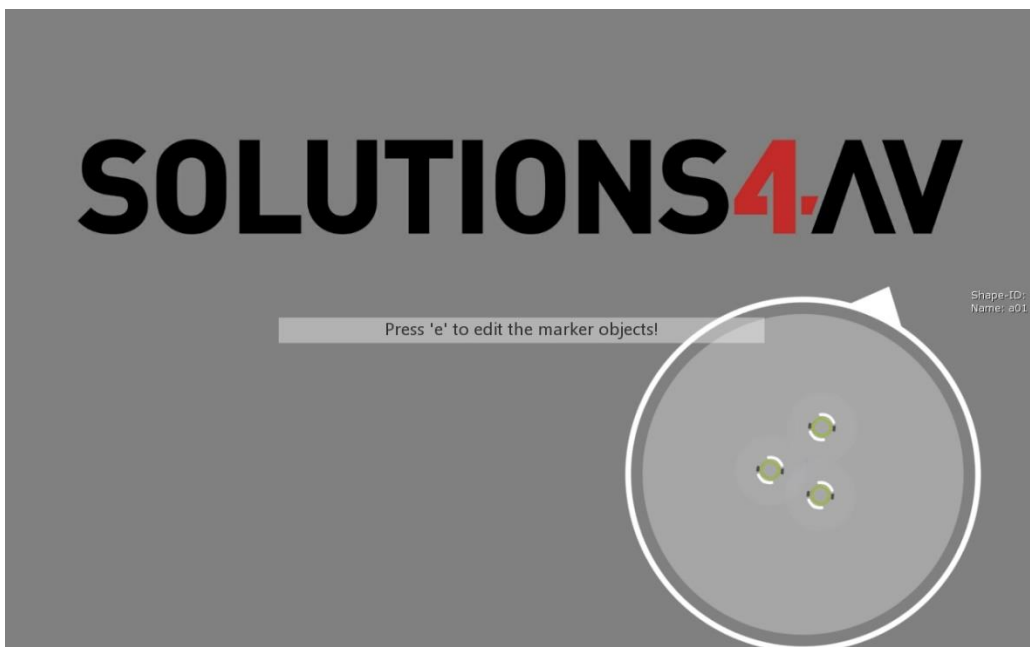


Figure 3 GUI after pressing "g" showing one active object

## 2.4 Configuration menu

After pressing “e” the configuration menu opens (Figure 4)

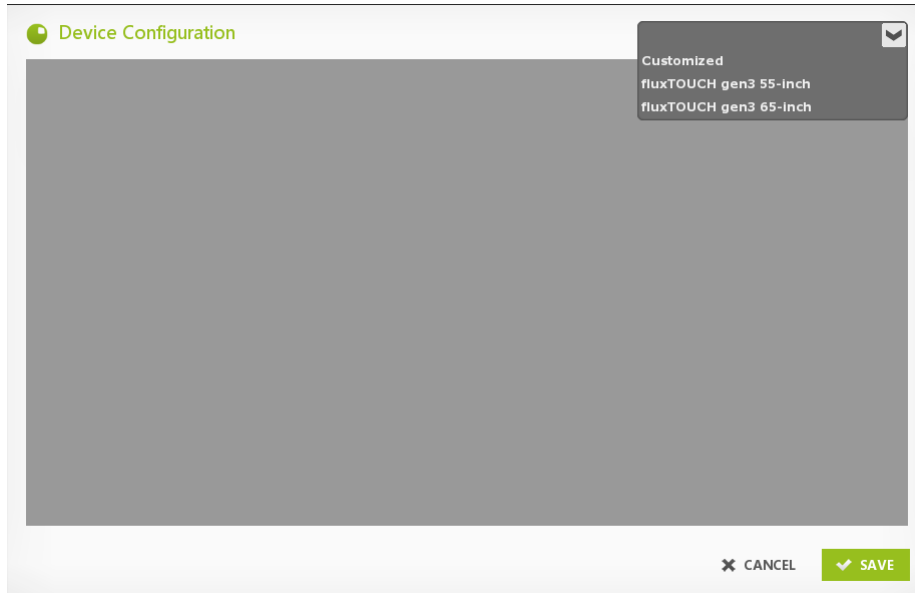


Figure 4 Configuration menu

By default, fluxTOUCH gen3 55" is selected, you can easily switch to fluxTOUCH gen3 65" by choosing it in the right upper corner (Figure 4).



Figure 5 Configuration menu - fluxTOUCH gen3 55" active

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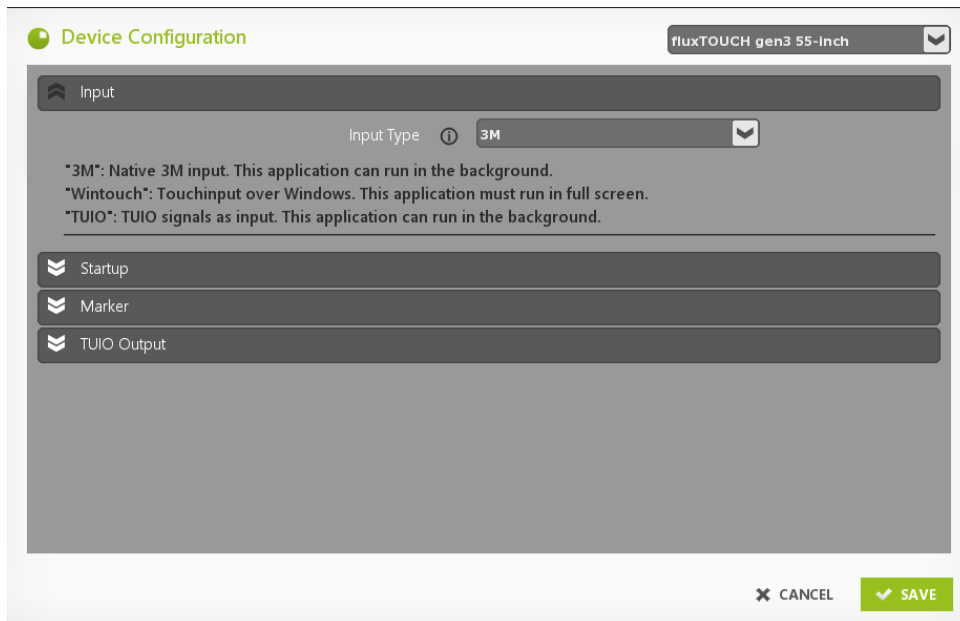


Figure 6 Configuration menu - Input

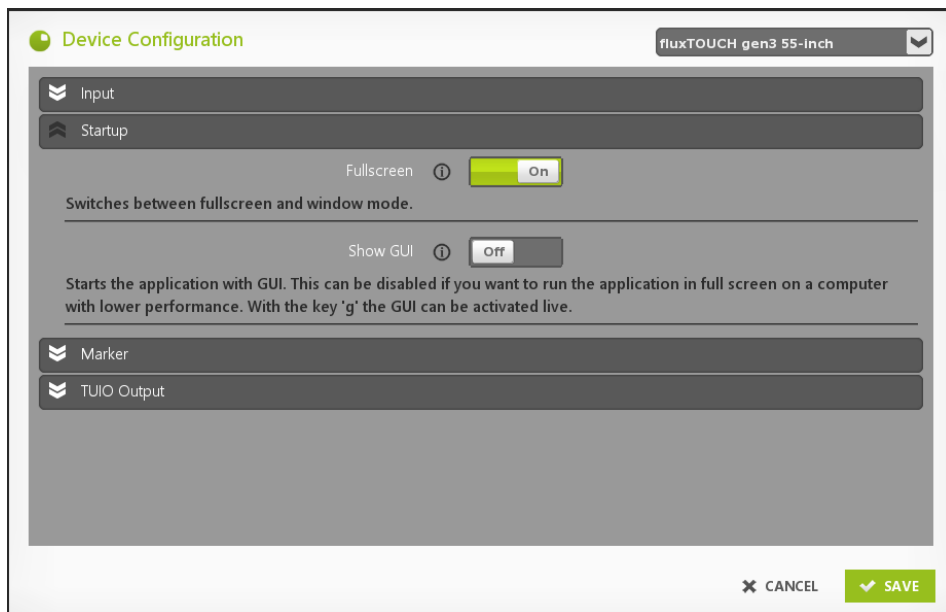


Figure 7 Configuration menu - Startup



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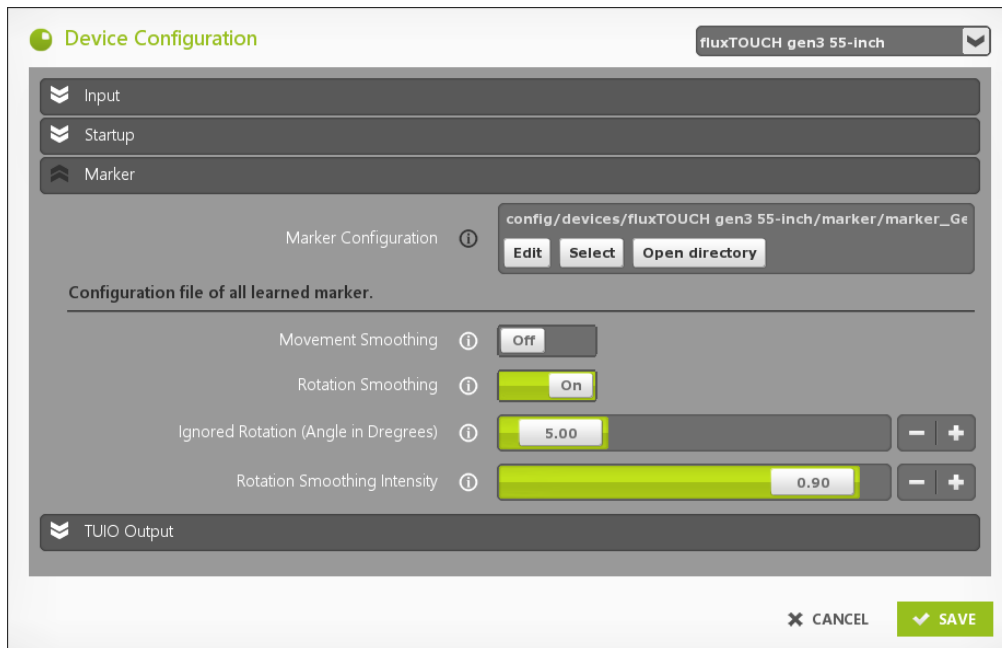


Figure 8 Configuration menu - Marker I

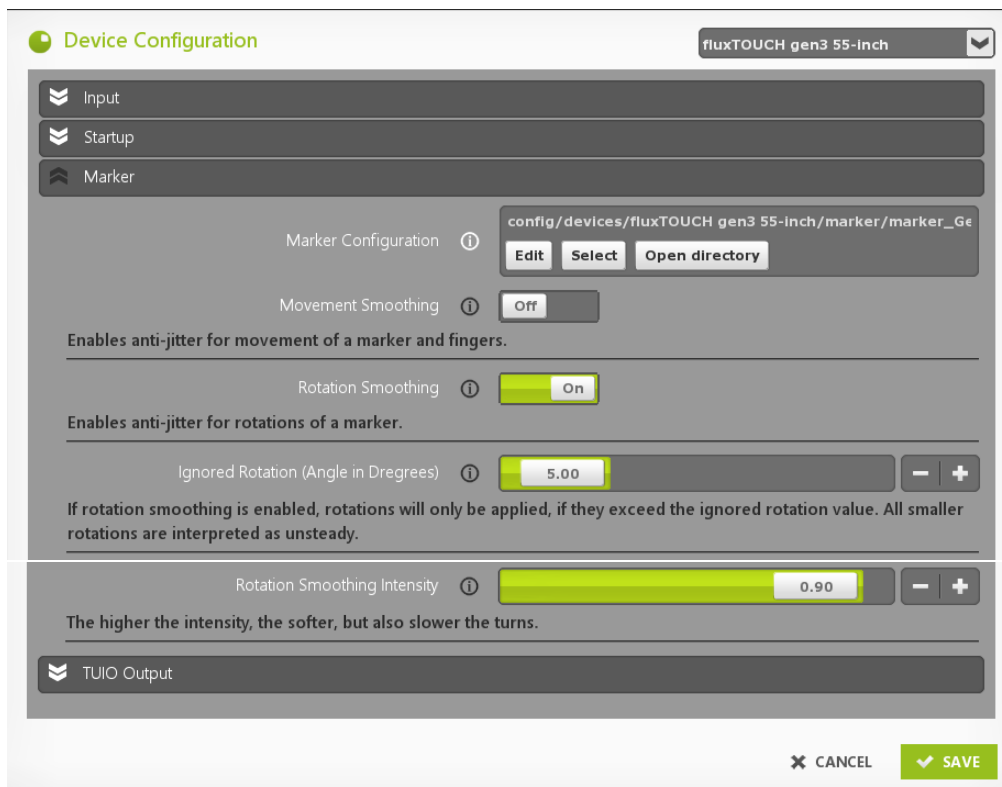


Figure 9 Configuration menu - Marker II

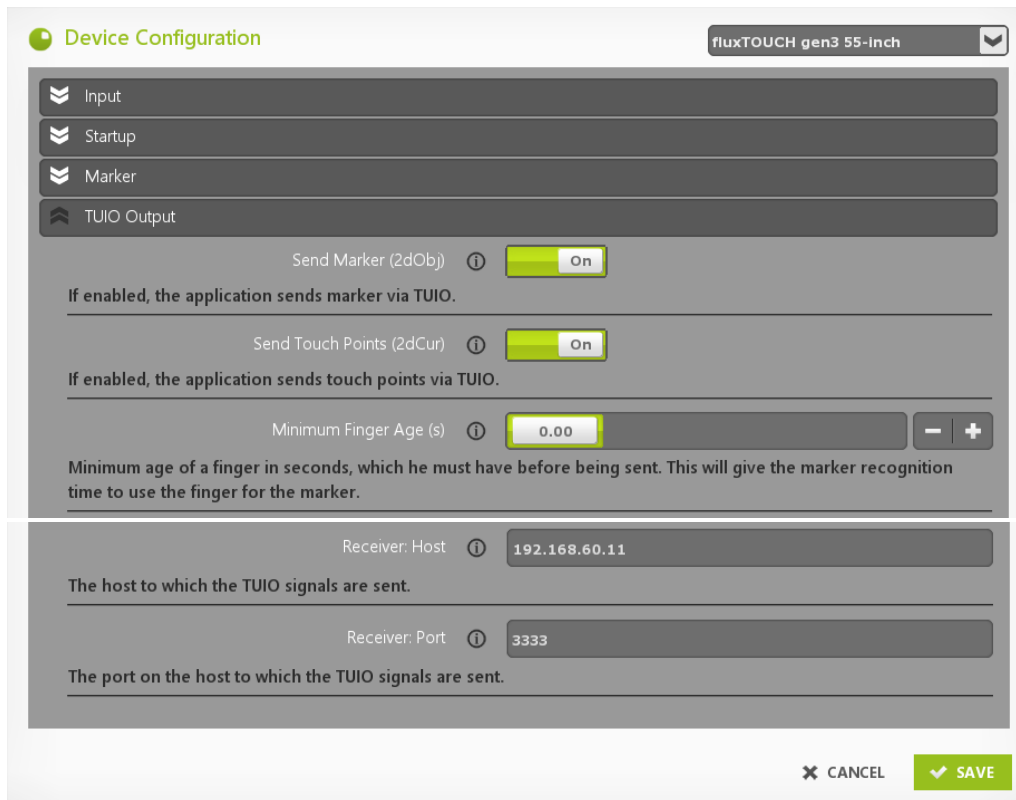


Figure 10 Configuration menu - TUIO Output

## 2.5 Teaching new objects

Please note chapter 2.2 Screen Resolution and TOR Software

In some cases, it may be necessary to teach new objects. This chapter describes how to do that with a few clicks.

After starting the TOR software press "g" to show the full GUI and afterwards press "e" to open the configuration menu and select Marker (Figure 8). Press "Edit" for teaching new objects. If you already have an xml-file just click on "select" and choose your file.

Figure 11 shows the GUI when a new potential object is detected, you can see its three touch points. It is recommended to activate check box for "Enable extra Learning" as this will improve the reliability but will take slightly more time. After activating this check box, press "Add Marker Object" to add a new Object.

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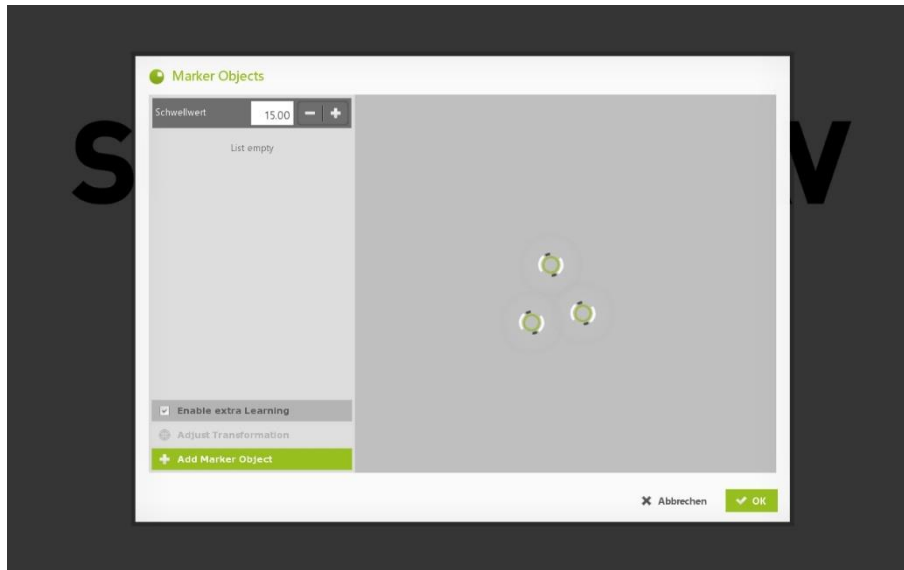


Figure 11 Potential object detected

Figure 12 shows the process of teaching the object. The TOR Software will ask you to rotate the objects slowly and keep you updated on the process.

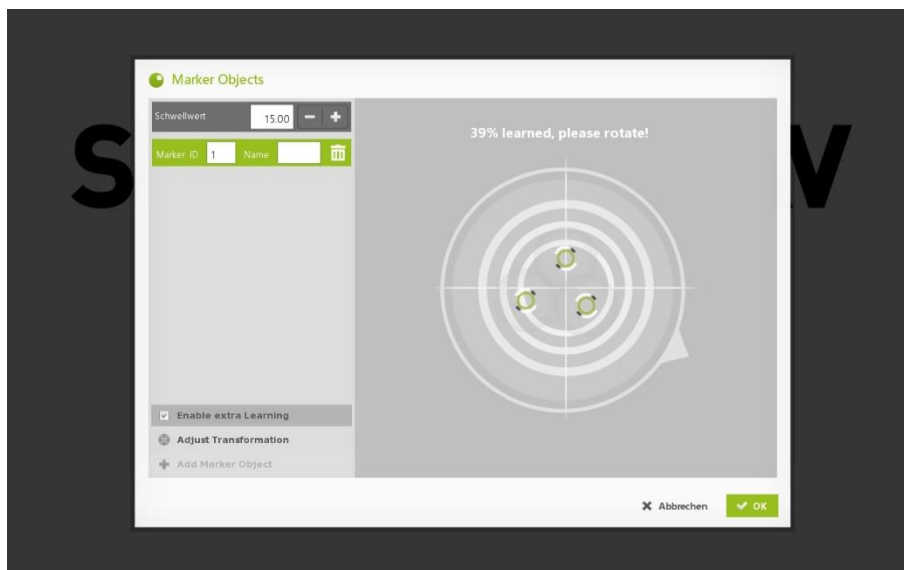


Figure 12 Learning process

Figure 13 shows the GUI after reaching 100%. Now the process is finished and you can remove the object. If necessary, the ID and name of the object can be edited. Furthermore, the "Adjust Transformation" button allows you to recalibrate the geometric centre and pivot point of each object.

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Place the next object on the screen and repeat the process or press “Save” to save and exit the window.

**Please note that by clicking on “Save” the original file will be overwritten.**

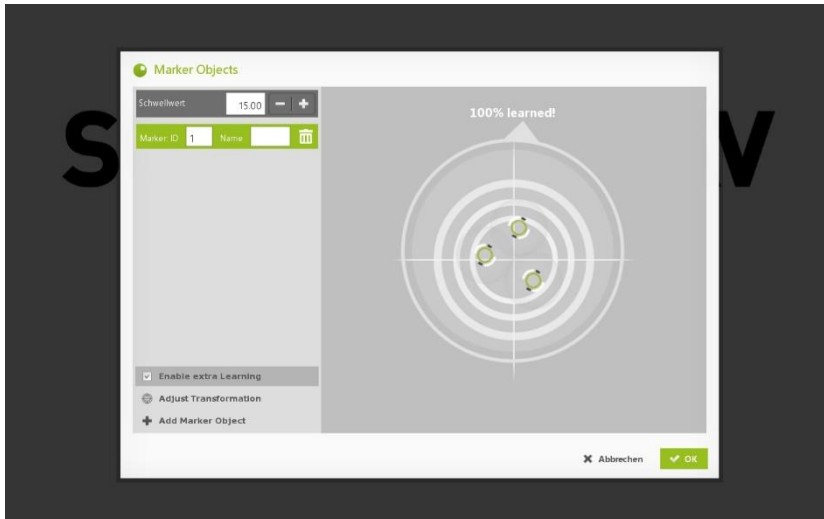


Figure 13 Learning process finished

## 3. TOR BOX

The TOR Box translates touch data sent from fluxTOUCH gen3 or other touch displays in TUIO/2dcur and TUIO/2dobj protocol. The benefit of the TOR Box is that it can capture native Windows 10 touch data as it works in full screen mode and always has the operating systems window focus. The TUIO data can be sent to any operating system. The TOR Box is optimised for TOR Software.

- The default IP of the TOR Box is 192.168.60.5
- The default TUIO host IP is 192.168.60.11 and port number is 3333

**Note:** The firewall of the Application PC has to be deactivated to receive TUIO

### 3.1 Set up TOR Box

1. Connect the TOR Box to the touch screen via USB cable (A male / A male)
2. Connect the TOR Box to Application PC via LAN cable
3. Connect the TOR Box to power supply

4. Starting
  - a. Start Application PC and let it boot completely
  - b. Start the TOR Box by pressing the power button and let it boot for approx. two minutes. After booting up it sends TUIO Data via LAN to the application PC
  - c. Make sure that there is no object, finger or anything else on the touch sensor during start up

## 3.2 Shut down TOR Box

Press the power button shortly and wait for complete shutdown (blue light behind button will disappear) before unplugging power supply

## 3.3 Trouble Shooting

- TOR Box is not working
  - Check Power supply
  - Reboot the TOR Box
- Application PC is not receiving TUIO data
  - Make sure the fire wall of the Application PC is deactivated
  - Make sure the host IP and port are configured correctly  
Default TUIO host: 192.168.60.11  
Default TUIO port: 3333
  - Reboot the TOR Box
- TOR Objects are not recognised correctly
  - Make sure that the correct screen type and/or the correct marker configuration file is chosen in the configuration menu.

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- Application PC shows false touch points
  - Make sure that nothing is placed at the screen while application PC and TOR Box are booting
  - Make sure that unused TOR Chips are not placed on the screen for a long period of time
  - Reboot the TOR Box

Contact us if the problem persists:

e-mail: [info@exactsolutions.de](mailto:info@exactsolutions.de)

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## 4. Appendix

### 4.1 Drawings

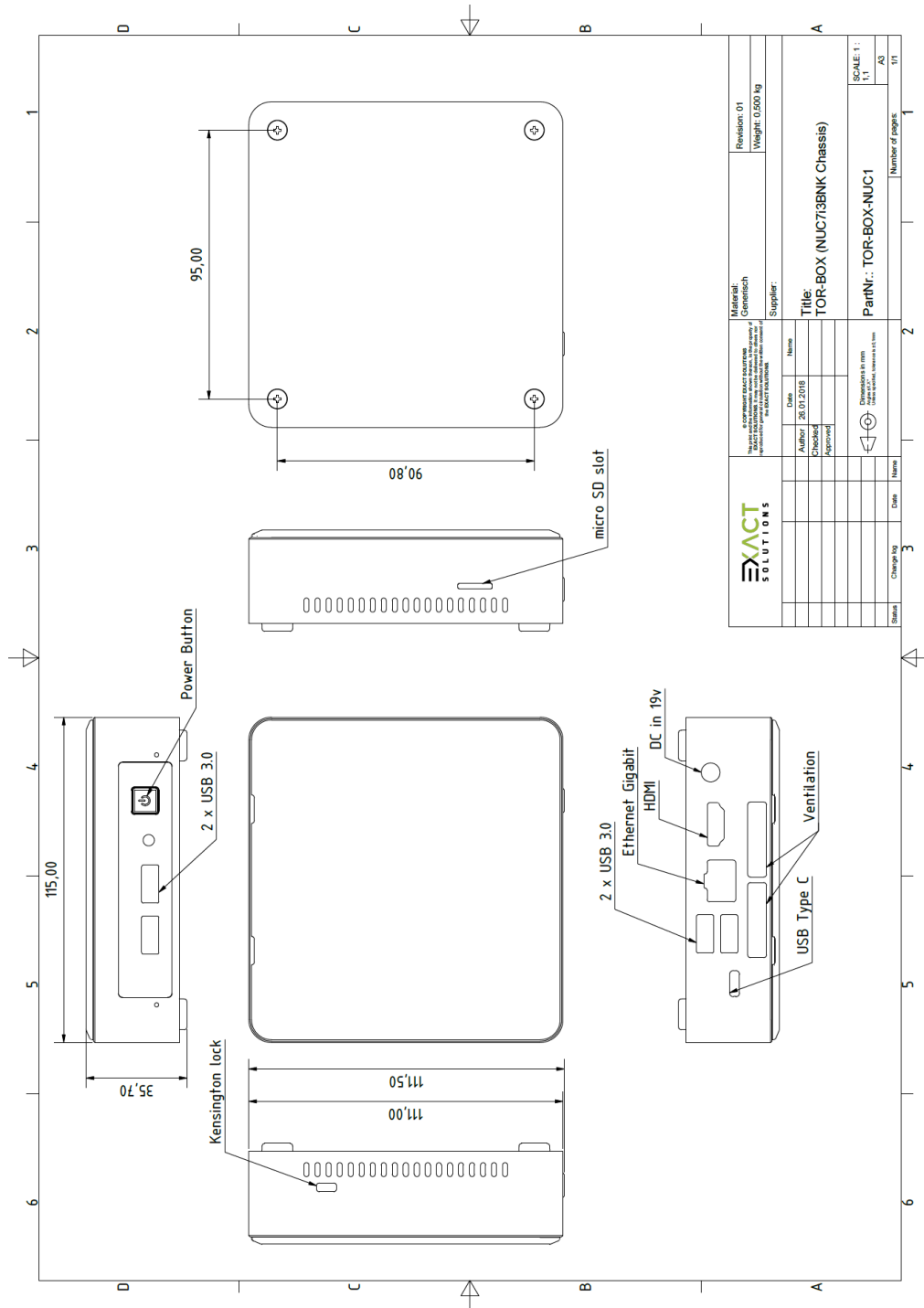


Figure 14 Drawing TOR BOX

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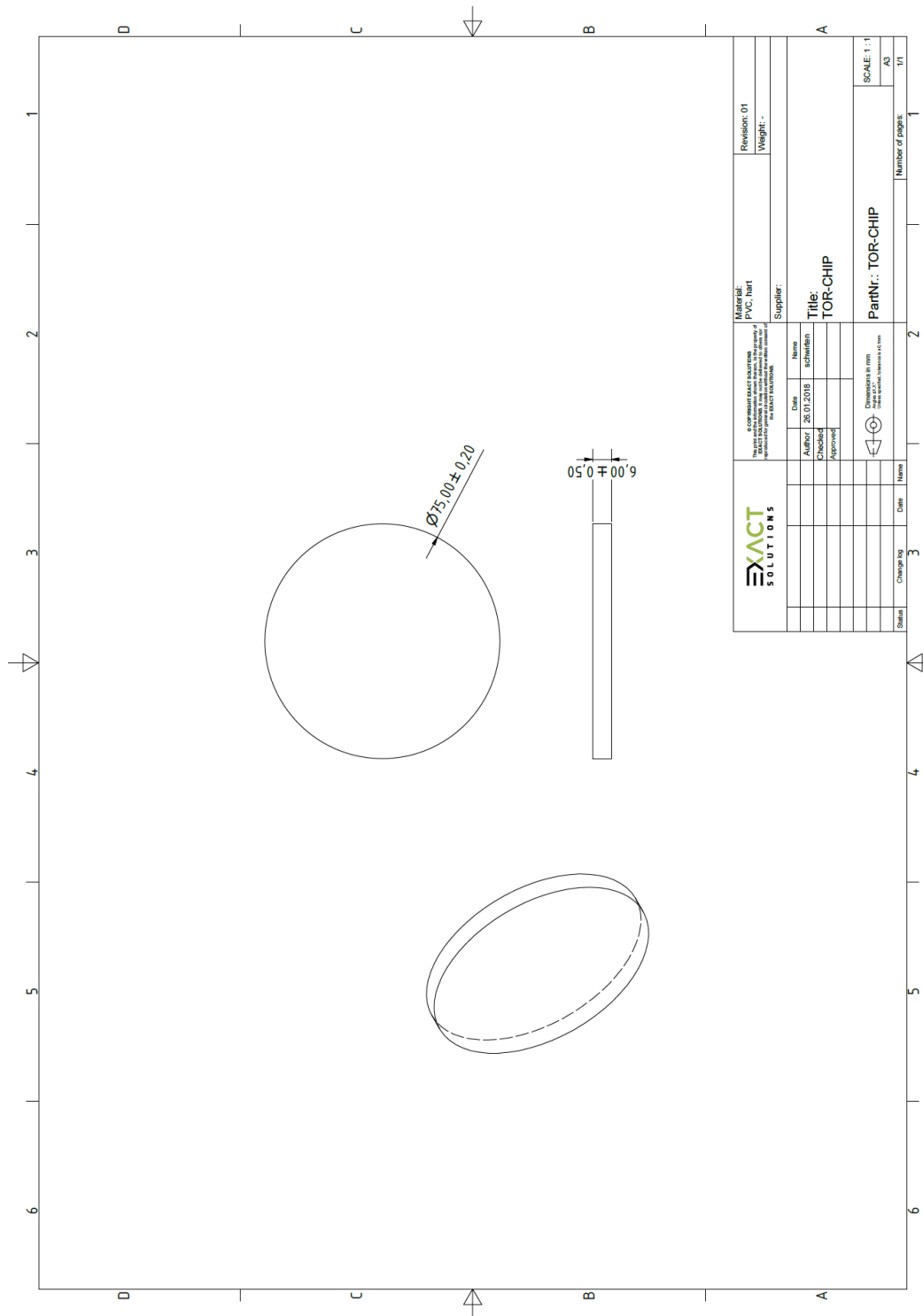


Figure 15 Drawing TOR CHIP



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## 4.2 Pictures



Figure 16 TOR BOX and external power supply



Figure 17 TOR CHIP

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Date	Revision No.	Author	Checked	Description
26.01.2018	0.0	TSN	DWN	First Draft
22.02.2018	1.0	DWN	BVT	V 1.0
21.03.2018	1.1	TSN	DWN	Small changes
20.06.2018	1.2	DWN	TSN	New Version
02.01.2020	1.4	TSN	DWN	Layout change

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