

Application Note

1 The Sensit Smart's Connections

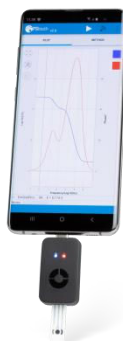


Figure 1.1 Sensit Smart with ItalSens IS-1 SPE and a Samsung Galaxy Tab

The Sensit Smart was designed with a focus on a small footprint suitable for measurements using smart phones and tablets as controlling units. Keeping this in mind we chose an USB C plug for the Sensit Smart. The USB C plug is suitable for most Android phones and tablets, because USB C ports are the standard for these devices.

A slit with contacts for Screen Printed Electrodes (SPE) is the interface for the electrochemical cell. This connection was chosen as SPEs are common for electrochemical point-of-care applications. SPEs can be operated by non-lab educated users and afterwards be disposed due to the low production costs for large volumes.

However, maybe your application for the Sensit Smart requires other connection options. These are supported by the included accessories.

2 Connection Accessories

As USB C has recently become the standard for smart phones not all phones and tablets have it yet. Old devices have micro USB ports. Your Sensit Smart comes with an adaptor to convert the USB C into a micro USB plug.

Laptops without a USB C port have usually an USB A port, which is the big USB port found in most desktop computers. For this reason your Sensit Smart package includes a cable that converts an USB A port into a USB C port. This way you can connect the Sensit Smart to USB A ports and you could position the Sensit Smart above liquids or in similar places, where you don't want to place your Android device.

If you want to connect other electrodes than SPEs, you can utilize the screw-terminal convertor.



Figure 2.1 The Sensit Smart and all included accessories

2.1 Screw Terminal for SPE Connector

For managing a broad spectrum of cables with the Sensit Smart, but keeping the design of the Sensit Smart itself simple and elegant, a screw terminal with 3 connections is included. The Screw terminal has three ports for cables and three contact pads on the other side. These contact pads can be shoved into the slit of the Sensit Smart just like an SPE and thus a contact is created between the Sensit Smart leads and the screw terminal. Different cables sizes can be inserted and fixed in the screw terminals. We recommend covering open cables with ferrules to prevent single copper strings from breaking and making it easy to insert the cable end into the screw terminals ports. In this application note we will demonstrate how to connect the cables and perform a Cyclic Voltammogram.

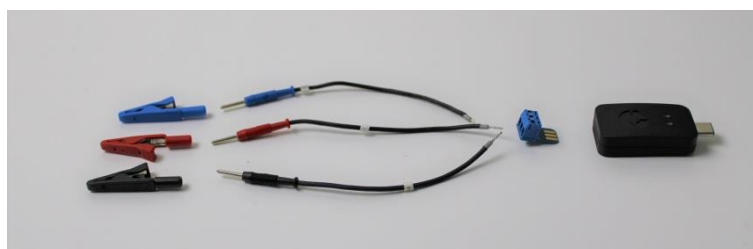


Figure 2.2 Sensit Smart with screw terminal, cables and croc clips

3 Setting up the Cable connection

Prepare first your cables. For this demonstration we have taken one of our [regular sensor cables](#) and cut the front part including the banana plugs off. We took the cables pieces and removed a bit the insulating layer to place a ferrule and fix it by crimping. A cable is inserted in each screw terminal port and fixed by turning the screw of that port. On the screw terminal adaptor you will find labels indicating which screw terminal port connects to the reference electrode (RE), working electrode (WE) and counter electrode (CE).



Figure 3.1 Screw terminal with marks for the electrode connections

When the cables are fixed shove the adaptor into the Sensit Smart and you are good to go.



Figure 3.2 Sensit Smart and screw terminal assembled

4 Measuring a Cyclic Voltammogram

A solution of 2.5 mM $\text{K}_3[\text{Fe}(\text{CN})_6]$, 2.5 mM $\text{K}_4[\text{Fe}(\text{CN})_6]$ and 0.1 M KCl in water was filled into our [simple cell set](#). A [platinum working electrode](#), a [platinum counter electrode](#) and an [Ag/AgCl reference electrode](#) were placed in the cell. The 2 mm banana plugs were equipped with crocodile clips and fixed to the corresponding electrodes. A laptop with USB A port was used for this measurement, so the Sensit Smart was connected via the USB C to USB A cable to the laptop. The screw terminal was shoved into the Sensit Smarts sensor connector.

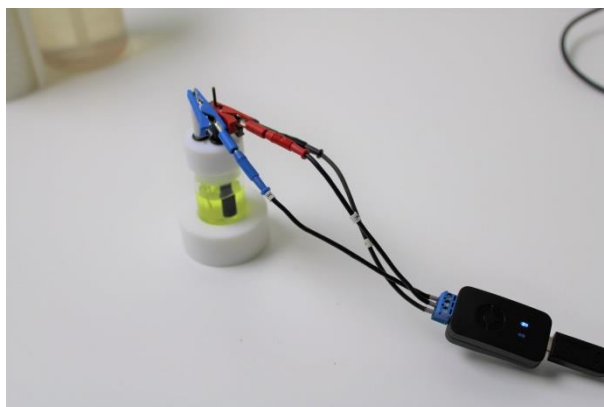


Figure 4.1 Sensit Smart connected to classical electrodes

PSTrace was started, the Sensit Smart was connected by pressing the *Connect*-button. From the techniques list Cyclic Voltammetry (CV) was chosen and the following parameters were set:

Parameter	Value
Technique	Cyclic Voltammetry
Current Range	10nA-100μA
E cond	0
t cond	0
E dep	0
t dep	0
t eq	5
E begin	-0.2
E vertex1	0.5
E vertex2	-0.2
E step	0.005
Scan rate	0.1
Number of Scans	3

The Run-button is pressed and the measurement starts.
The results are shown in Figure 4.2.

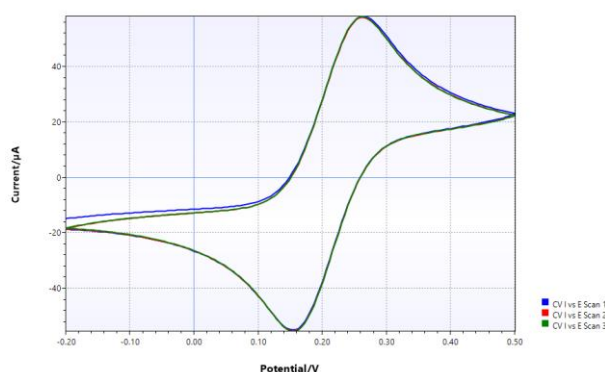


Figure 4.2 CV performed as described in chapter 4

4.1 Results

The CV shows the expected shape with two peaks. One peak occurs at around 260 mV during the anodic sweep and the second one around 150 mV during the cathodic sweep. The formal potential is around 205 mV accordingly. It is known that the diffusion coefficient is the same for the oxidized and reduced form of the iron complex, so the formal potential is the average of the peak potentials.

5 Conclusions

We demonstrated in this application note that the Sensit Smart can be easily connected to non-SPE electrodes by the means of the included screw terminal adaptor. This enables you to connect any type of cell to the Sensit Smart. The screw terminal adaptor is suitable for all kind of cables, which can be inserted into the screw ports.