

### Lab 3: Basic HMI Lab

#### Background:

Human Machine Interface(HMI) provides ability to view data and tags from RTAC and also do controls from remote location through web interface. There are three characteristics of HMI. First, it is web-based, so we do not need special software on your PC or substation. You can view the HMI from anywhere you have a network connection to the RTAC. It is also very secure, so you don't have to worry somebody log in and view the data that they don't suppose to. All of the information you have configured in the RTAC applies the HMI account as well. Second thing is that diagrams are contained in RTAC itself. So you don't have to load the RTAC diagrams to one PC move them to another. Last but not least, diagram builder software is very important to our lab. It provides ability to build diagrams and load the in the RTAC.

HMI is widely applied in substation control. The purpose of this experiment is to familiarize students with the operating principle of HMI and how to design their own operating circuit. Send the circuit to RTAC and monitor the data you want.

#### Learning Outcomes:

1. Understand the equipment to be used in the experiment (almost same as lab 2)
2. We are going to use a new piece of software in this experiment (diagram builder software)

#### Equipment needed:

1. Hardware:
  - SEL 849
  - Laptop
  - KoCoS
  - SEL RTAC
  - Wires for connection
2. Software:
  - Diagram builder software
  - SEL AcSELerator RTAC

#### Procedure:

1. Connect the circuit and follow the circuit design in experiment 2 (both the communication connections, physical voltage-current connection with KoCoS)
2. Set the voltage and current provided by the power supply at the KoCos
3. Enter the tags you need to check at RTAC (currents IA, IB and IC, and voltages VA, VB and VC)

4. Design an HMI to display the tags from the SEL 849.
5. Upload the HMI to RTAC
6. Ensure HMI displays correct voltage and current measurements.

Use diagram builder software

- Open the diagram I sent you
- Connect the RTAC
- On the left side of the screen you'll see the options in tags
- Drop the required tags into the circuit diagram
- Upload the circuit diagram to RTAC

(Here's a video of the HMI experiment:

<https://selinc.com/products/3530/?vidId=122617#tab-literature%25253Ffallback>)

Detect real-time data with HMI

- Take the SELRTAC online
- Turn on the KoCoS
- Open the google chrome
- Input url: 192.168.3.2 (use name: admin; password:Asdf123\$)
- Then you click the HMI tab, you will see the diagram you built using the diagram builder software
- We can see the data we want in the interface (additional idea: we may see in the. Lab two. The voltage you measure is equal to the voltage you set times 1.732)

Suggestions:

Because this is a more autonomous experiment, students can carry out some of their own ideas when drawing circuit diagrams. We can measure voltage, current and frequency in groups of three.

<b>Check List For Students</b>	
<b>equipment connection</b>	<b>put tags into diagram</b>
<b>set alarm value of current and voltage</b>	<b>Upload the diagram to SEL RTAC</b>
<b>Open the HMI and measure the data</b>	<b>Repeat the experiment by modifying the voltage and current</b>