Lab 2: Using SEL RTAC with SEL-849 Relay

1. Background information:

In the lab 2, students will develop a basic understanding of two types of IEDs. They will learn how to connect devices and how to use them. This lab will require manual wiring work, learning to use AcSELerator RTAC and AcSELerator QuickSet to complete the interconnection of devices, as well as changing device settings to measure voltage, current, and phase angle.

2. Learning outcomes

- ◆ Primary

  --Since they started with the SEL-849 in lab 1,this needs to be more specific to connect SEL 849 relay

  --How to work devices

- ◆ Secondary

  --Identify voltage and current tags

  --Use KoCoS ARTES 460 to set the voltage and current to the relay in the proper input range.

3. Equipment

- ● Hardware:

  --SEL-849

  --SEL RTAC

  --KoCoS ARTES 460

  --Desktop

  --Wiring appropriate for connections (Four insulate voltage cables and four insulated current cables.)

- ● Software:

  --AcSELerator RTAC

  --AcSELerator QuickSet

Lab Procedure

Initial Lab Set Up

1. Log into the computer:

   User name: ██████

   Password: ██████

2. Complete manual wiring job

A.Use a stripped male serial cable to connect the SEL 849 to the SEL RTAC.

Here is the table for SEL-849: (RTAC input):

Pin2- TXD	Red is 2
Pin3- RXD	Orange is 3
Pin5- GND	Blue is 4
Pin8- CTS	Brown is 5
	Black is 6

	White is 7
	Green is 8

When connecting, students will use a suitable wire strippers to fix the wire as shown in the figure below.

  B. Use voltage cables to connect to the KoCoS voltage outputs to the SEL 849 voltage inputs in a wye configuration as shown below (Figure 3).

  C.Use current cables to lead the KoCoS current outputs throught the SEL 849's CT in a wye configuration as shown below (Figure 2).
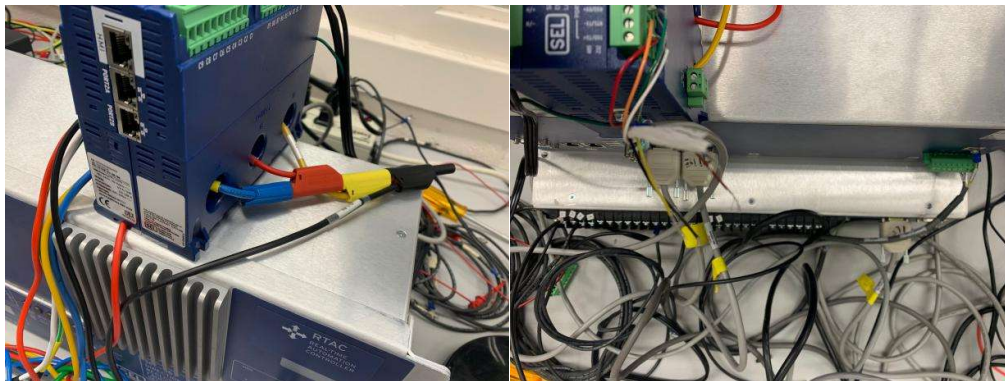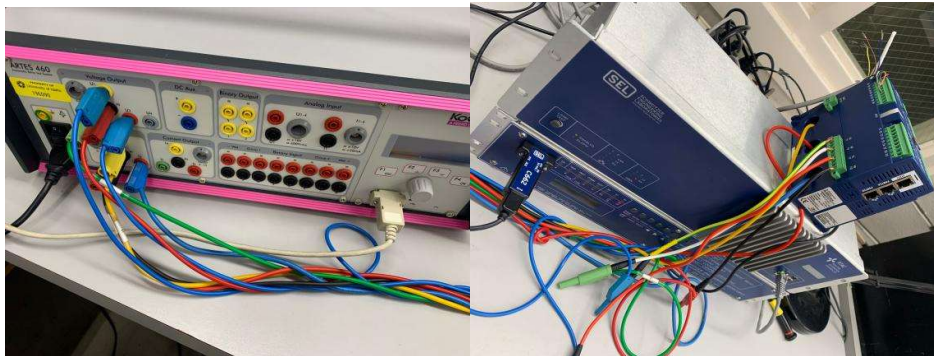
3. Open the software AcSELerator RTAC
4. Login to the AcSELerator RTAC Database
    User Name:
    Password:
5. Create a new project
    -- Click New SEL RTAC Project
    --Set the project name (The Student's First name or anything else they want)
6. Connect the SEL-849 to the RTAC
    -- Right click "devices"
    -- choose "Add SEL Device"-800 Series and find SEL-849
    -- For the Protocol, we use SEL Protocol
    -- Choose Client-Serial as our Connection type

Connect the SEL-849 to RTAC
1. Configure the baud rate to 9600
2. Save the setting

3. Click the button "go online" to check the connection
    * watch out which port you use and it can be changed in setting
    * on connector (the offline need be changed to FALSE)
    Password: ██████

Setting up SEL-849

1. Right click "Devices"
    --click "Add Other Device"
    --choose "SEL Protocol"
    --choose "Server - Ethernet Tunneled Serial"
2. Now you can find the "port number" we need use on the AcSELerator QuickSet
3. On Other_1_SEL (just the other device you have created)
    -- find setting and and "Allow Anonymous SEL IP..." from "FALSE" to "TRUE"
    -- Go online to save the changes.
4. Open AcSELerator QuickSet
5. Click Communication button
    --click network (Active Connection Type)
    -- change the port number to the determined in step 2.
    -- the IP address varies with the port you use on RTAC
    Here is the table:
RTAC IP:

██████		Port
		Port
		Port

6. Open the terminal window
7. Login to the SEL 849
    --type acc
    --password ██████
    --type 2ac
    --password ██████
    --type who
    --type port 2
    --password ██████
    display the current setting
    --type sho
    Change the setting of the range (sheet from SEL website)
    --type 2ac
    --password ██████

Connect KOCOS to the whole system

1. Connect the KOKOS ARTES 460 to the SEL-849 relay (as picture shown above)

2. Set the voltage、current、phase angle by the device itself (60 V Line-Nuetral, 2A Line-Nuetral, and 60 Hz is what we use on our lab), students should make sure that they will not make damages to the device).

Lab procedure

1. open the software AcSELerator RTAC
2. Choose "Devices" - "SEL_849_1_SEL" find Meter
3. Find the "IA" "IB" "IC" "VAB" "VBC" "VCA" inputs and change the setting from False to True
4. Check the voltage current phase angle whether it is true as we set

   -- go online

   --Find "Tags" and check that

$$_* \underline{\left| V_{\text{Line-Line}} \right| = \sqrt{3} \left| V_{\text{Line-neutral}} \right|}$$
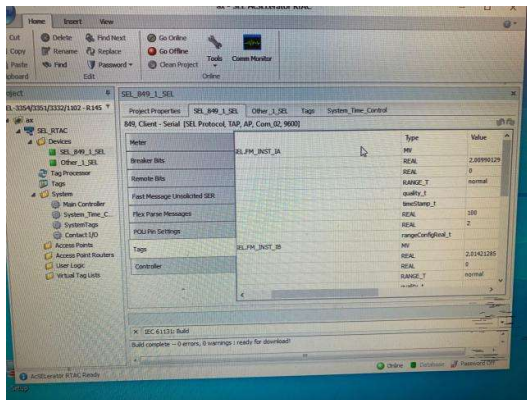
(Later it is good for us to perfect this by using the snipping tool)

Problems students may meet

1. Lack of cables (Use wire strippers to cut the wiring)
2. Connection-- After adding the device on the AcSELerator, the device doesn't connect (Check whether the Project is on-line. if it still doesn't work, check the IP address and the wiring)

3. The device's setting can not be changed (The AcSELerator should be off-line when they need change some settings)

4. Can't log into the device using AcSELQuickSet (They should change the port number which can be found on the AcSELerator-Metor. Also when they need change the setting the device need go on-line)

5. The voltage tested by the SEL-849 is not true.

$$\left|V_{\text{Line-Line}}\right| = \sqrt{3}\left|V_{\text{Line-neutral}}\right|$$