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Static Var Generator (SVG) Installation Guide

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Static Var Generator (SVG) – installation guide

Revision B

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1.0 System Overview

Automatic power factor correction equipment is broadly applied in NZ industry to ensure the electrical network is utilised to its best capacity. The usual form of such power factor correction is an automatic controller that monitors one incoming phase to a plant and switches banks of capacitors to try and maintain a target power factor.

The problems with capacitor based automatic power factor correction are vast and varied. It is slow to react to load changes so the system is constantly in a state of over compensation or under compensation. In today's harmonic rich environments the capacitors suffer with overload.

System resonance is a risk and the life expectancy of the system is reduced. Contactors regularly fail and overloaded capacitors leak, presenting a real fire risk.

Sinexcel's SVG is an entirely new approach to power factor correction. The SVG utilises a high speed three level inverter that reacts to changes in reactive power, exchanging corrective reactive power into the system. Full correction is made in 3/4 of a cycle. This rapid response provides stable accurate real-time power factor correction without the drawbacks of traditional capacitor based systems. The SVG can continuously adjust reactive power dynamically and bi-directionally (leading or lagging). There is no chance of system resonance and even under low voltage conditions SVG will provide full reactive power compensation. The Sinexcel SVG is 100% inverter based so there are no AC capacitors to fail

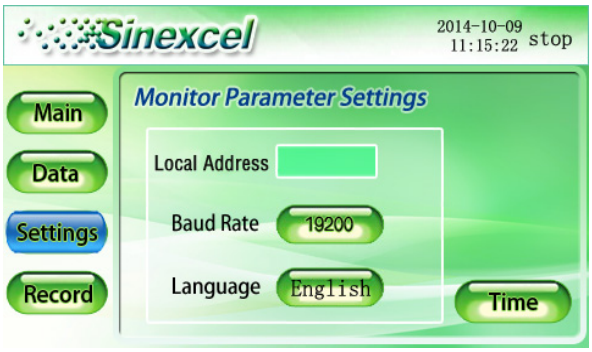
2.0 SVG Plain English Touchscreen 4.3” (Wallmount Only)

2.1 What If The SVG 4.3” Touchscreen Comes Up In The Wrong Language

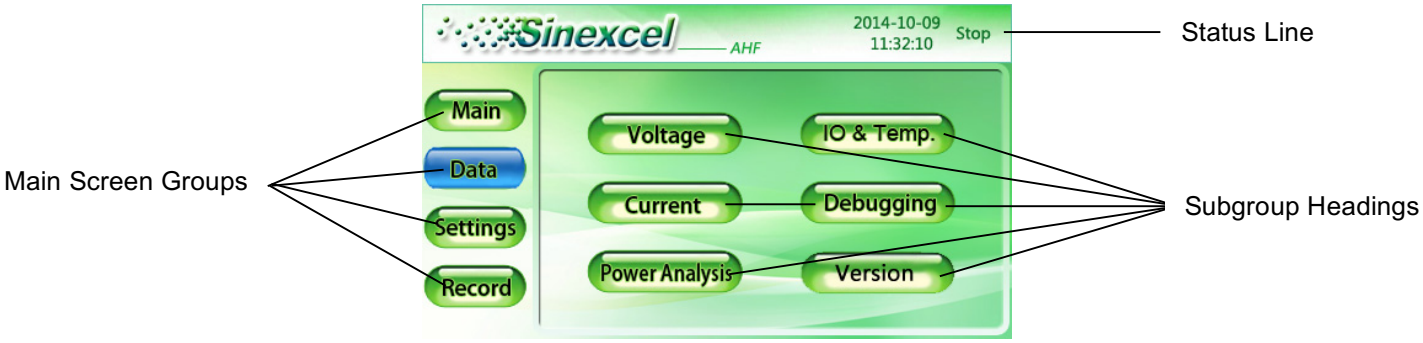
On rare occasions the 4.3” colour touchscreen may not have been configured for the English language prior to dispatch from the factory (example below). This can be easily remedied.

Press 3rd button on left, then select the bottom left of the four options that appear.

Press the bottom user field and select “English” and the following display will appear.



2.2 SVG 4.3" Touchscreen Layout



The 4.3" colour touchscreen is available on all wallmount variants of the SVG and ASVG. Commissioning is undertaken via this display with the password to access all user settings set at default to **"080808".**

Navigation through the screen groups is achieved by touching one of the four main screen groupings as listed on the left hand side of the display. Touching the appropriate group will bring all the appropriate subgroups or settings for that group to the screen. Adjustment of the groups is achieved by touching the screen group that is required to be adjusted. A drop down box or number keypad will appear to allow the user to amend the setting. Exiting the setting ensures all changed parameters are saved.

Please note the 4.3" Touchscreen and 7.0" Touchscreen cannot be used together.

3.0 SVG Plain English Touchscreen 7.0" (Cabinet or Rackmount Only)

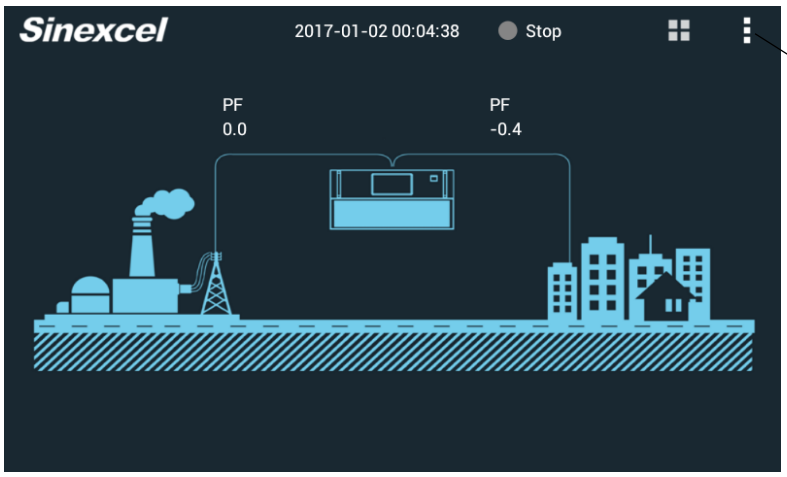
3.1 Powering Up The SVG 7.0" Touchscreen For The First Time

The 7.0" colour touchscreen is available on all variants of the SVG, ASVG, and AHF (ZAPF) not fitted with a 4.3" Touchscreen. It is supplied as standard on all Sinexcel Plug In or Flexi cabinets but is also available as a loose item for custom built systems.

On initial power up the touchscreen should be configured to ensure that it is set to suit the device that it is connected to. This is a simple process.

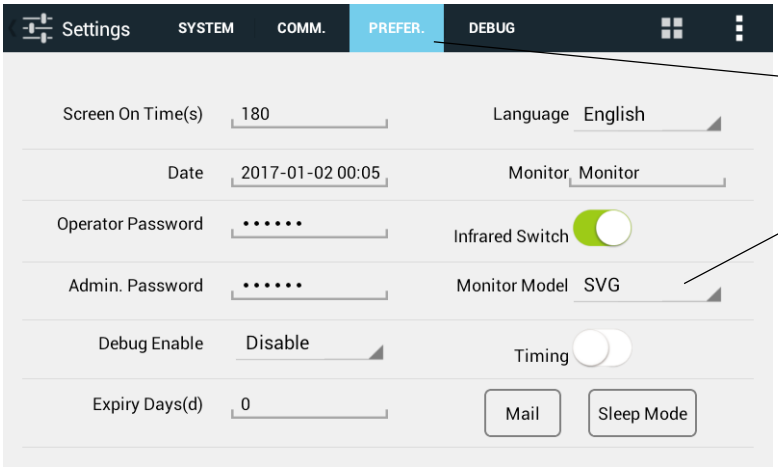
Pressing this icon will unfold the 'settings' option. Pressing the settings option will bring up the password screen.

The screen above will be shown on power up if the touchscreen has come pre-configured as an AHF display. If the touchscreen has come pre-configured as an SVG or ASVG then the screen below will be shown.



Pressing this icon will unfold the 'settings' option. Pressing the settings option will bring up the password screen.

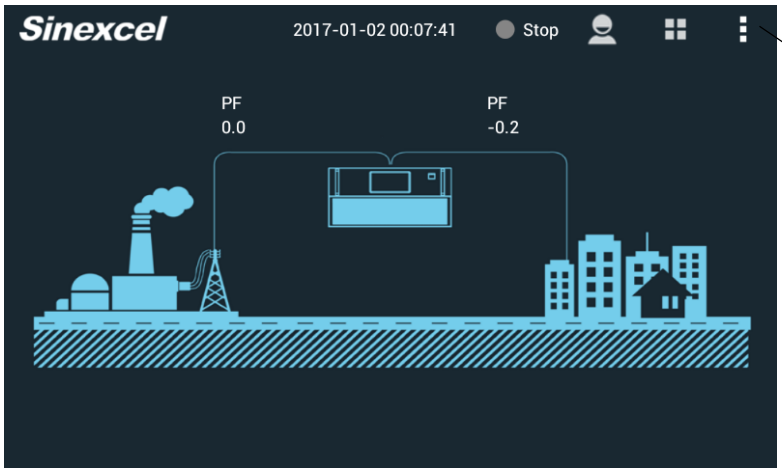
In either case select the vertical three dotted icon (top right). Select 'settings' and enter the super password "**654321".**



Select the ‘Prefer’ tab

Monitor Model setting must be configured to SVG

Select ‘Prefer’ and ensure monitor model is set to SVG. The HMI will now reboot if the configuration is changed.

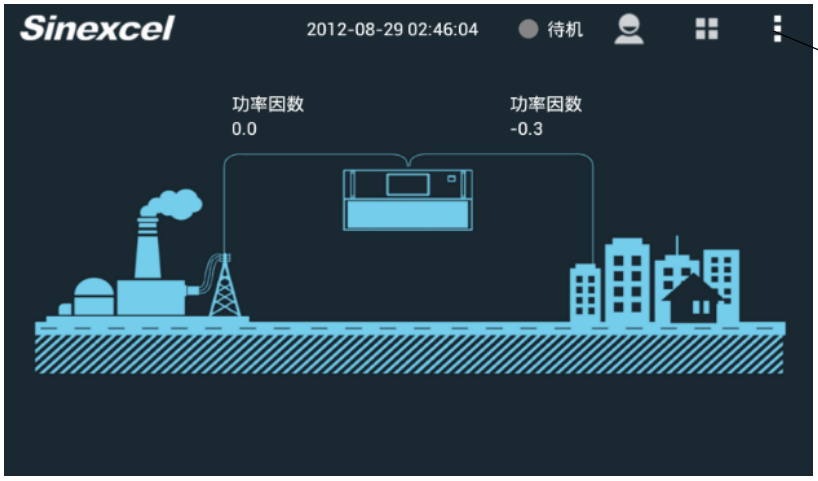


To continue normal commissioning select this icon again, then settings, then open the systems tab

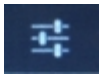
Select the vertical three dotted icon again and select ‘Settings’, then ‘System’. Unit commissioning can now be commenced.

3.2 What If The SVG 7.0" Touchscreen Comes Up In The Wrong Language?

On rare occasions the 7.0" colour touchscreen may not have been configured for the English language prior to dispatch from the factory (example below). This can be easily remedied.

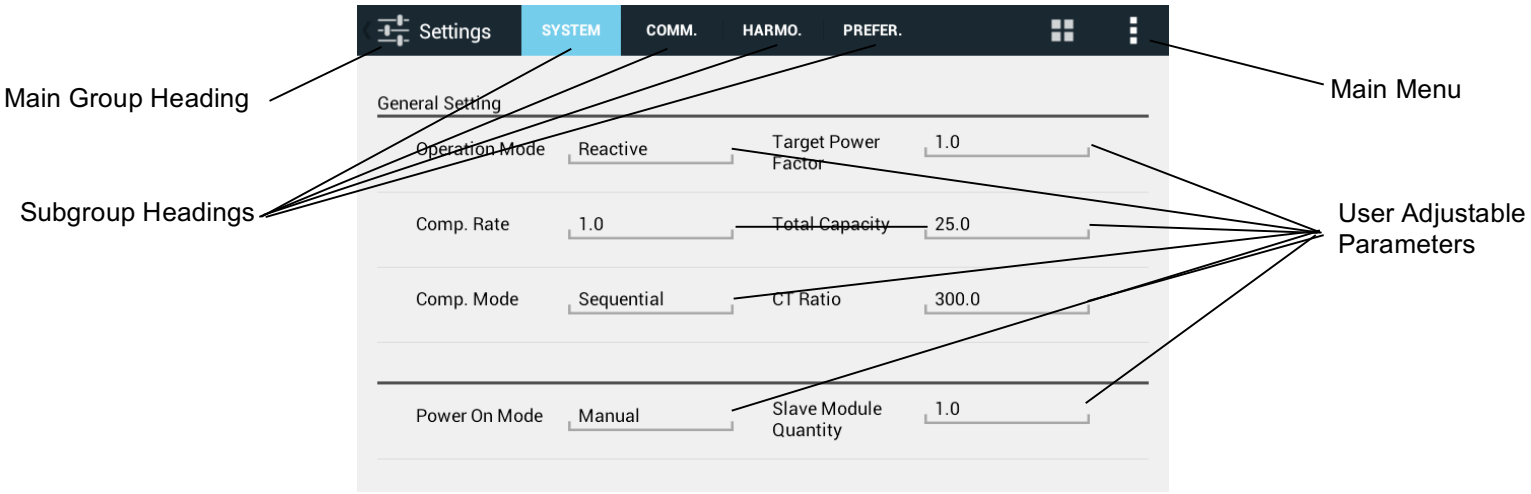


After clicking on the three dotted icon a drop down box will appear containing the character shown below

Select the vertical three dotted icon (top right) then click on the option  (with Chinese text next to it) that appears in the drop down box and the display below will appear.

Press the tab shown highlighted in blue, and the screen will show as above. Opening the top right user field will allow you to change the language to English. The display will reconfigure to the main screen and the displayed text should now be in English. Check the monitor model is set to SVG as described in section 3.1 – Powering Up The SVG 7.0" Touchscreen For The First Time.

3.3 SVG 7.0" Touchscreen Layout



Commissioning is undertaken via this display with the password to access all user settings set at default to **"080808".**

Navigation through the screen groups is achieved by touching one of the six main screen groupings across the top of the display. Touching the appropriate group will bring all the appropriate subgroups and settings for that group to the screen. Adjustment of the groups is achieved by touching the screen group that is required to be adjusted. A drop down box or number keypad will appear to allow the user to amend the setting. Exiting the setting ensures all changed parameters are saved.

Please note the 4.3" Touchscreen and 7.0" Touchscreen cannot be used together.

4.0 Modes Of Operation

The principal purpose of the SVG is to provide reactive power in order to improve power factor. The SVG can also be configured to use its capacity to provide current balancing, voltage regulation (on request only), and in the case of the ASVG harmonic correction.

This installation guide has been prepared to assist with the installation and configuration for operation in reactive power mode. For applications requiring the SVG or ASVG to use the additional functionality described above please contact your local Power Electronics office for assistance.

5.0 MCCB Sizing

SVG Model (KVAR)	MCCB Size (Amps)
50	100
100	200
Cabinet or Custom Systems	System Current Rating x 1.25 (1KVAR = 1.5Amp)

6.0 Heat Dissipation And Airflow

SVG Model (KVAR)	Heat Losses Max (W)	Airflow (l/s)
50	1384	220
100	2786	405

PLEASE NOTE ALL SINEXCEL PROPRIETARY CABINETS MUST BE INSTALLED WITH 300MM CLEARANCE AT THE REAR OF THE CABINET FOR CORRECT AIRFLOW

7.0 CT Sizing

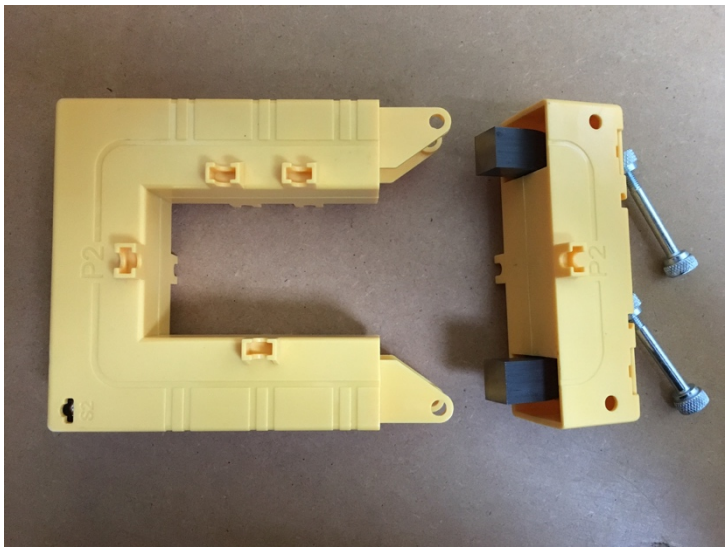
Traditional power factor correction has monitored power factor in one phase only and has connected reactive power on the basis that the two unmonitored phases will have exactly the same power factor as the monitored phase. In reality this condition very rarely exists. It is typical of the power factor on all three phases to be completely different.

The SVG will monitor and provide reactive power for all three phases individually. Thus a minimum of three CTs (one per phase) are required to be installed for the SVG to operate correctly. The CTs should be of 0.5 accuracy class or better.

The ratio of CT to be fitted is 1.75 x, to 4 x, the rated full load current supply to the switchboard. For example – a 100A supply requiring power factor correction would require a CT ratio of between 175/5 to 400/5. The secondary of the CT must always be rated 5A.

Positioning of the CTs is critical. Separate detail is available in this document showing CT positioning for various installations. Some applications may require multiple CTs. If multiple CTs per phase are required – the CT ratio for all CTs must be the same.

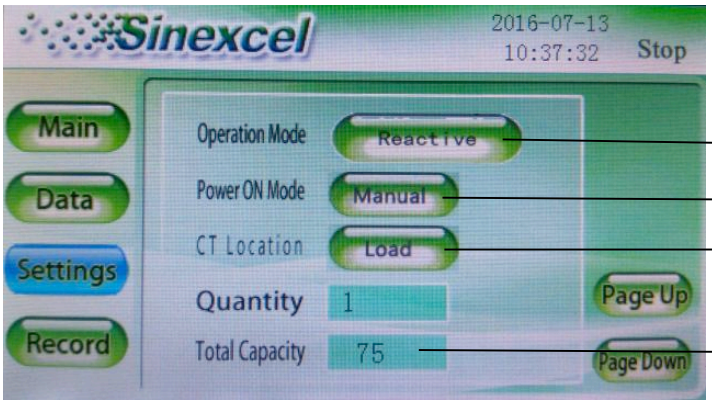
Sinexcel CT List		
CT Ratio	**Outer Diameter (mm)**	**Inner Diameter (mm)**
150/5	110*90	30*20
200/5	145*114	80*50
300/5	145*114	80*50
500/5	145*114	80*50
600/5	145*114	80*50
1000/5	185*144	120*80
1500/5	185*144	120*80
2000/5	185*144	120*80
2500/5	193*144	125*55
3000/5	193*144	125*55
4000/5	185*144	120*80
5000/5	245*174	160*80
6000/5	245*175	160*80



8.0 Basic Commissioning Settings For Plain English 4.3" Touchscreen

Select Settings Group

Enter Password 080808

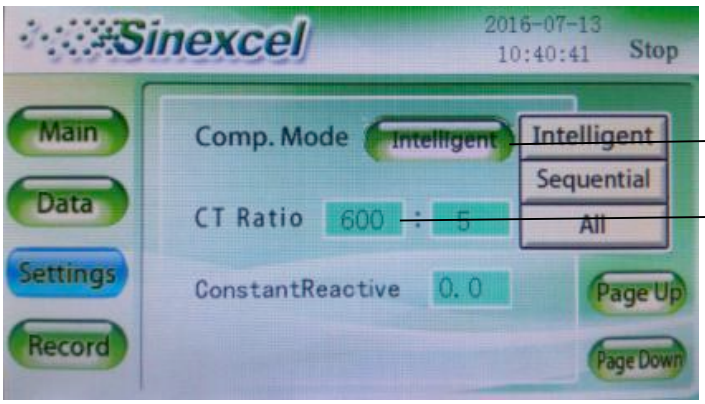


Ensure set to Reactive mode

Power On mode to Automatic

Set to Line or Load as per CT location shown in config drawings

Set to total current rating of all SVG modules combined. Setting is in Amps. Use 100KVAR = 150Amps



Set to Intelligent mode

Set correct CT ratio

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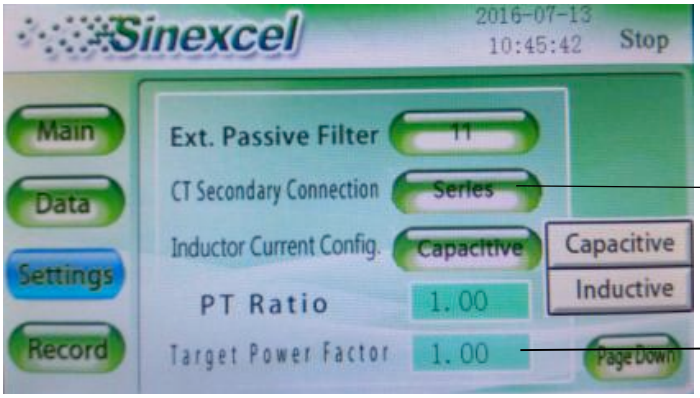
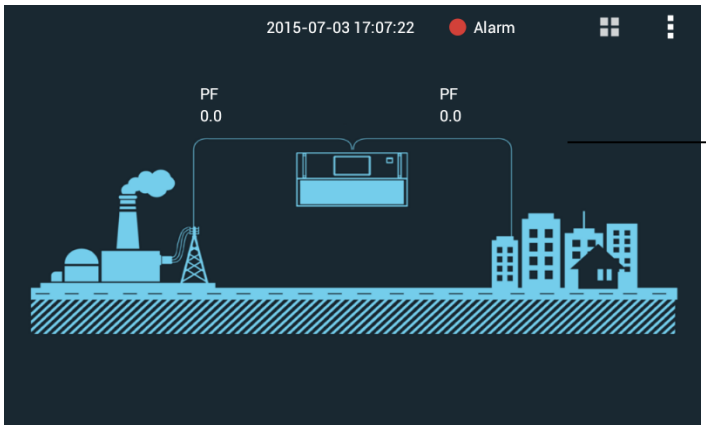


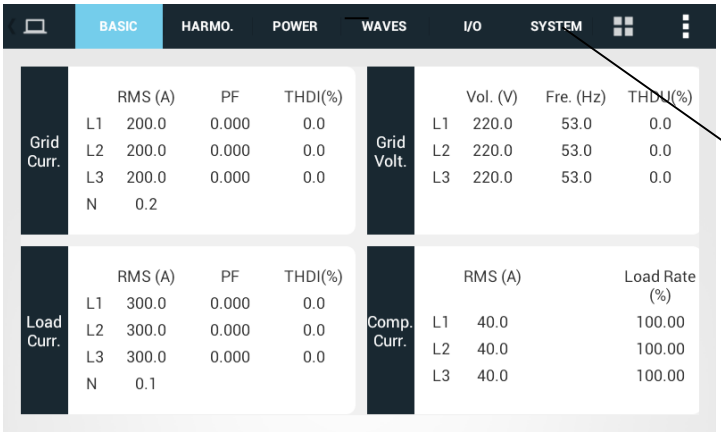
Leave set to series. This relates to internal CTs within the SVG cabinet only

Set required power factor

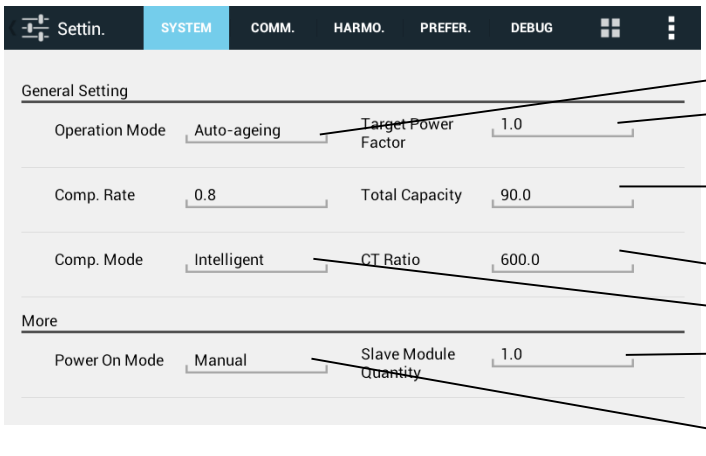
9.0 Basic Commissioning Settings For Plain English 7" Touchscreen



Touch anywhere on default screen to bring up main menus.



Select System Menu. When prompted enter 080808 as the password



Ensure set to Reactive mode

Set required power factor

Set to total current rating of all SVG modules combined. Setting is in Amps. Use 100KVAR = 150Amps

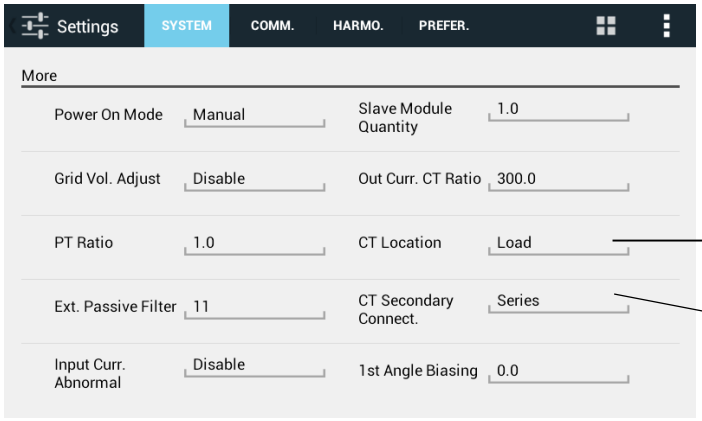
Set correct CT ratio

Set to Intelligent mode

Set to total number of modules connected to display

Power On mode to Automatic

SCROLL DOWN THE SCREEN

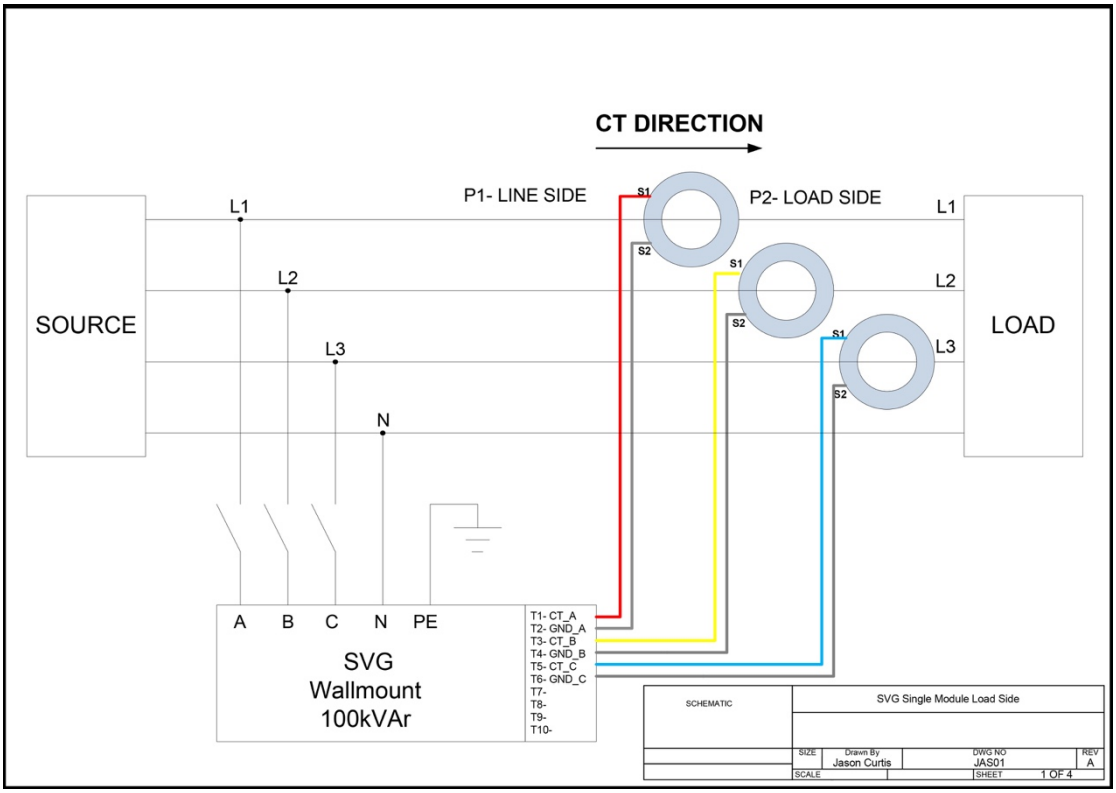


Set to Line or Load as per CT location shown in config drawings

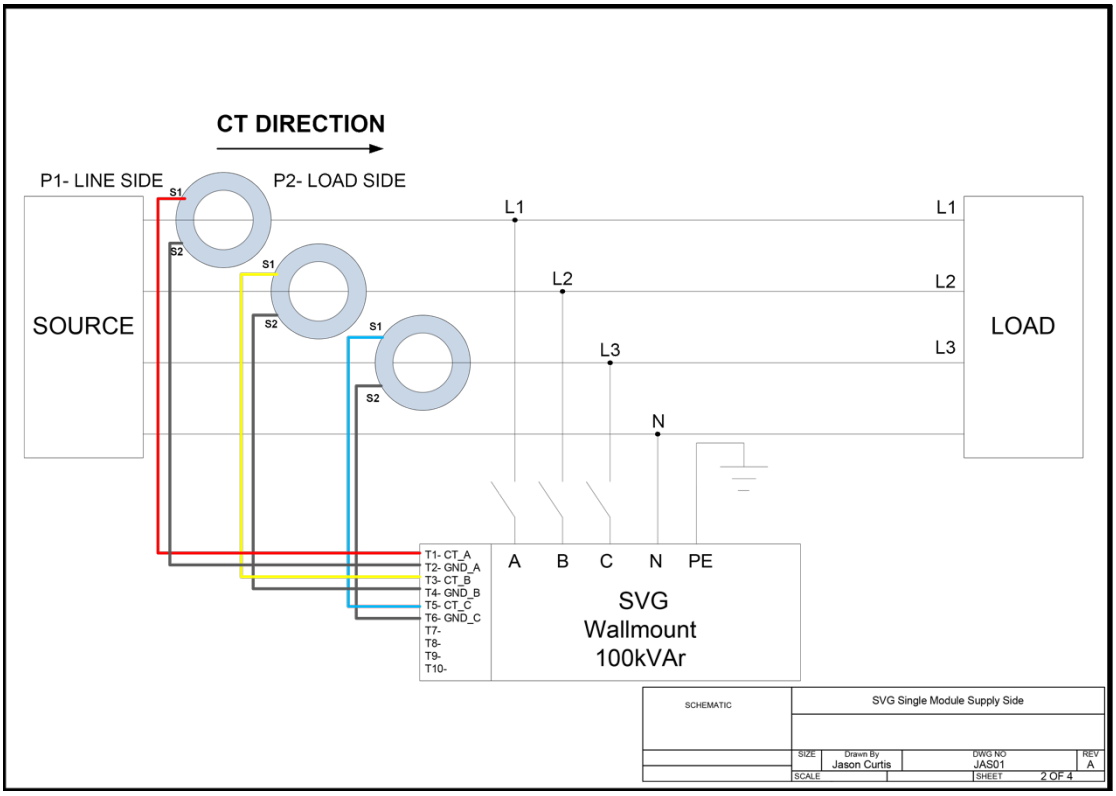
Leave set to series. This relates to internal CTs within the SVG cabinet only

10.0 Wiring Connections And Terminal Layout For Wallmount Modules

PLEASE NOTE THE SVG PROVIDES OPTIMAL PERFORMANCE WHEN A NEUTRAL CONNECTION IS PROVIDED TO THE UNIT. POWER ELECTRONICS WOULD RECOMMEND THE CONNECTION OF A NEUTRAL CONDUCTOR THE SAME CROSS SECTIONAL AREA AS THE PHASE CONDUCTORS



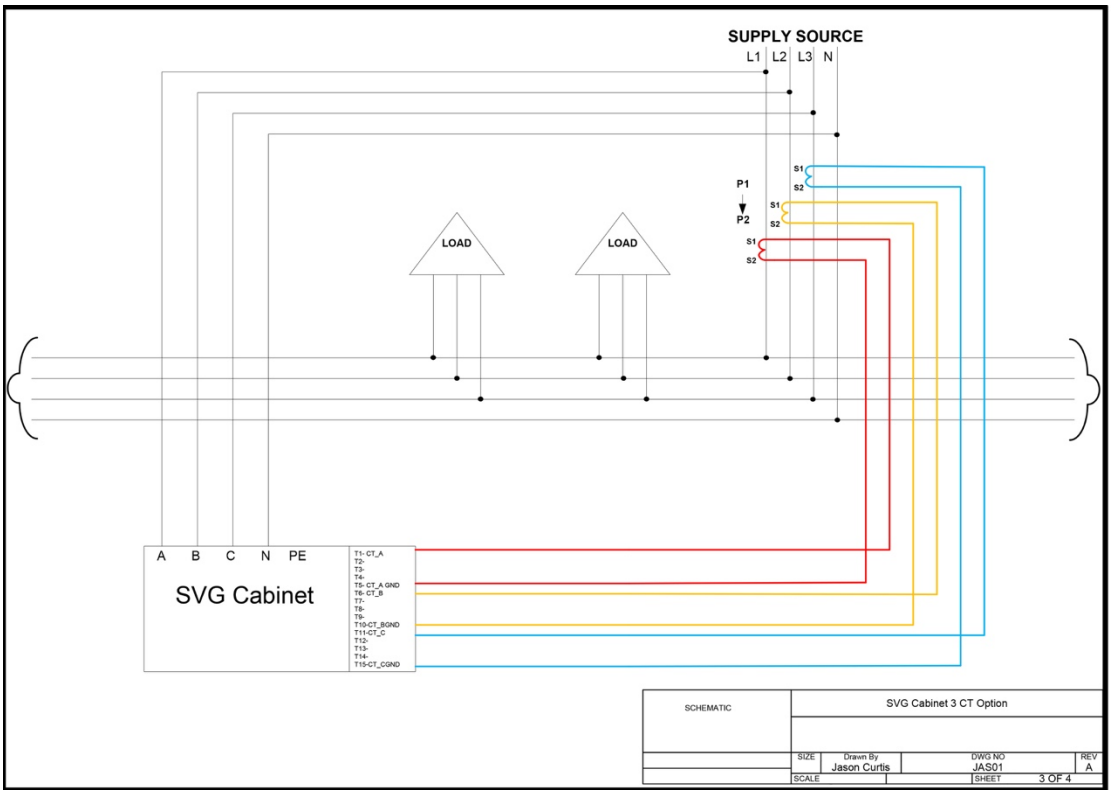
SVG single module load side



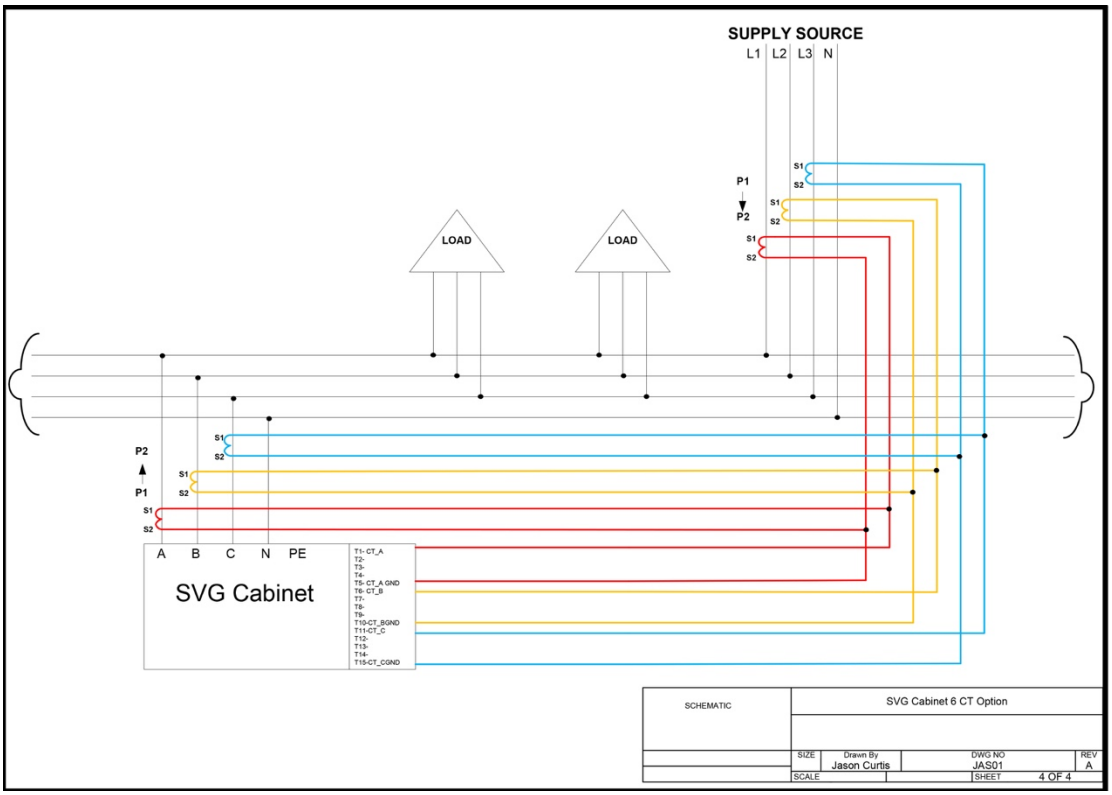
SVG single module supply side

11.0 Wiring Connections And Terminal Layout For Pluggable Cabinets

PLEASE NOTE THE SVG PROVIDES OPTIMAL PERFORMANCE WHEN A NEUTRAL CONNECTION IS PROVIDED TO THE UNIT. POWER ELECTRONICS WOULD RECOMMEND THE CONNECTION OF A NEUTRAL CONDUCTOR THE SAME CROSS SECTIONAL AREA AS THE PHASE CONDUCTORS



SVG Cabinet 3 CT Option



SVG Cabinet 6 CT Option

12.0 Tips for the Sinexcel Plug In Cabinets

12.1 Enabling The Plug In Module Before Insertion Into The Cabinet

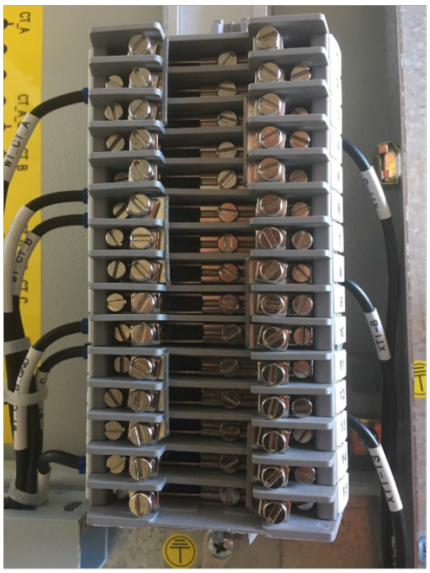
On the backplane within the Sinexcel plug in cabinet the jumper plug must be shifted from the right position to the left position to enable the SVG module. Should the jumper plug remain in the right position then that slot will be ignored.

J13-module in place LEFT

J12-no module in place RIGHT

12.2 CT Shorting Blocks

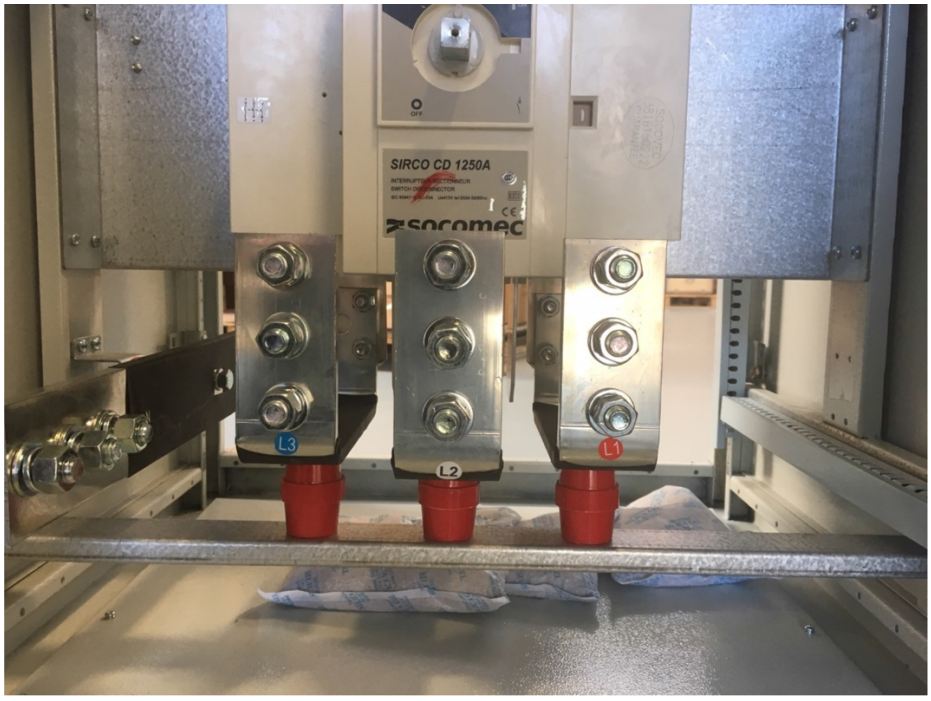
At any time the CTs are be connected, removed, or their associated circuits are being worked on the CTs should be shorted out. This can be done at the CT shorting block by changing the positions of links 3, 8, and 13.



CT terminal block with CTs shorted out.

CT terminal block with the links on 3, 8, and 13 open. This is the correct operating position.

12.3 Incoming Phase Orientation



Please note the input bars at the bottom of the 1000Amp isolator are L3 (Blue), L2 (White), Line1 (Red) from left to right. This makes the orientation on the modules L1, L2, L3 from the rear which is correct for operation.

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