# Smart Control and Monitoring Module

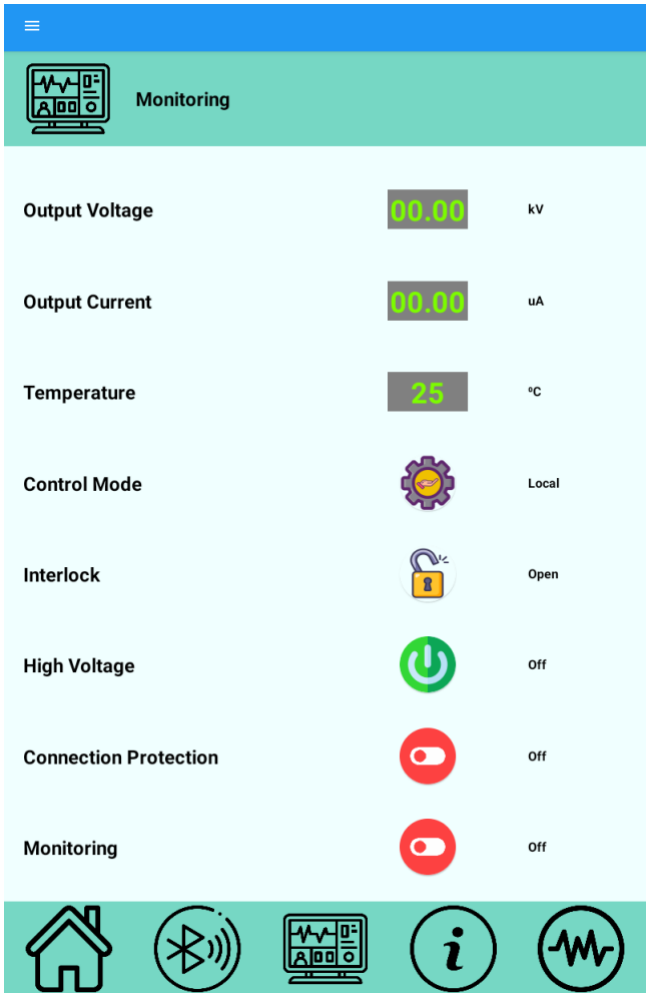

## Specification Summary

The SCM is a Smart Computer Programmable Control and Monitoring system that has a 4x20 Character LCD display, The SCM has a built-in RS485/USB communication interface that can be used with Genvolt GUI computer software and a built-in Bluetooth Interface that can be used with Genvolt Mobile Phone Application to create a fully automatic control and monitoring experience. The SCM is ideally suited for Genvolt High Voltage Power Supplies.

## Main features of the SCM

- RS485 serial communication for industrial use
- USB communication interface
- Bluetooth communication Interface

- Remote control and measurement on PC
- Remote control and measurement on Phone and Tablet (Android OS)
- Voltage and current monitoring via 0-10 V analog input with 2.5mV resolution
- Power supply temperature display
- Over voltage fault indicator
- Over current fault indicator
- Over temperature fault indicator
- Fault reset capability
- Power supply static operating mode indicator (Constant voltage or Constant current)
- Monitoring Speed Selection (0.01 to 100 Hz)
- Control method selection (Local or Remote)
- Interlock bypass switch
- High voltage power on control
- Saving monitored data to a .txt file
- Virtual Oscilloscope for output voltage and current waveform display
- Fully output waveform configuration as:
    - Step turn-on (with adjustable on-voltage, and current limit)
    - Ramp-Up turn on (with adjustable rise-time and on-voltage)
    - Rectangular shape repetitive output pulse (with adjustable on-time, off-time, on-voltage, off-voltage, and current limit)
    - Sawtooth shape repetitive output (with adjustable rise-time, on-voltage, off-voltage, and current limit)
    - Triangle shape repetitive output (with adjustable rise-time, fall-time, on-voltage, off-voltage, and current limit)
    - Arbitrary shape repetitive output (with adjustable rise-time, on-time, off-time, fall-time, on-voltage, off-voltage, and current limit)
- LCD display
- Local keypad control
- Output voltage, output current, temperature, control method, and faults can be displayed on the LCD and(or) Computer Software and(or) Phone or Tablet.
- Automatic Power Supply Configuration Recognition (e.g., Nominal Voltage, Nominal Current, Polarity, Available protections, etc.)




## Wired Serial Interface

The module supports USB/RS485 communication interfaces. Users can use this remote interface to control the power supply using a computer.

## Wireless Interface

The module supports Bluetooth communication interfaces. Users can use this interface to control and monitor the power supply using phone or tablet.

## Output Monitor

The SCM measures the output voltage, output current and device temperature. These values are shown in both the computer software and LCD display.

## Local/Remote Operation Mode

The SCM provides two operation modes: Local and remote. After you power on the power supply, it enters the local operation mode by default. In the local operation mode, all the keys on the front panel are available for you to use. However, in the remote operation mode, you can send programming commands from a controller (computer) via any one of the interfaces (RS485/USB or Bluetooth). In remote operation mode, all the keys (except the Power) will be disabled. This is known as “local lock out”. When locked, the Power Supply front panel is disabled, and the unit can only be controlled via programming commands.

## Interlock

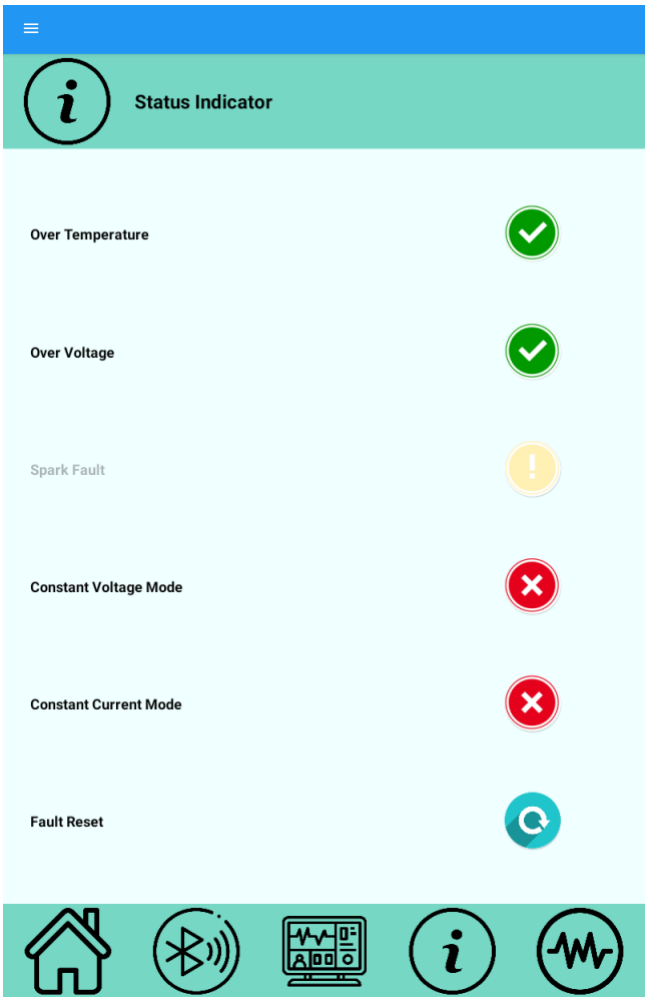
The SCM can close (bypass) the power supply interlock remotely by means of a solid-state relay.

## High Voltage Control

The SCM can remotely turn on and turn off the power supply high voltage by means of a wired serial communication or wireless Bluetooth interface.

## Connection Protection

The connection protection (if activated) will turn off the power supply in case of losing connection between power supply and the controller.

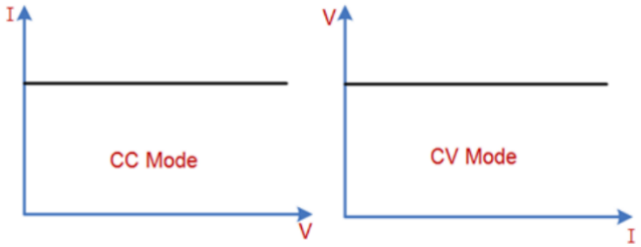



## Fault Indicator

The SCM shows the status of the power supply faults. Over Voltage fault, Over Temperature Fault, and Spark Fault (if applicable) will be shown in both the computer software and LCD display.

## Operation Mode Indicator

The static operation modes include the Constant Current (CC) Mode and Constant Voltage (CV) Mode. In CV mode, the power supply will fix the output voltage in accordance with the programmed value regardless of the output current. In CC mode, the power supply will control the voltage to maintain the output current at the setpoint current in accordance with the programmed value regardless of the output voltage. The constant current value and the setpoint voltage value can be selected in the computer software.

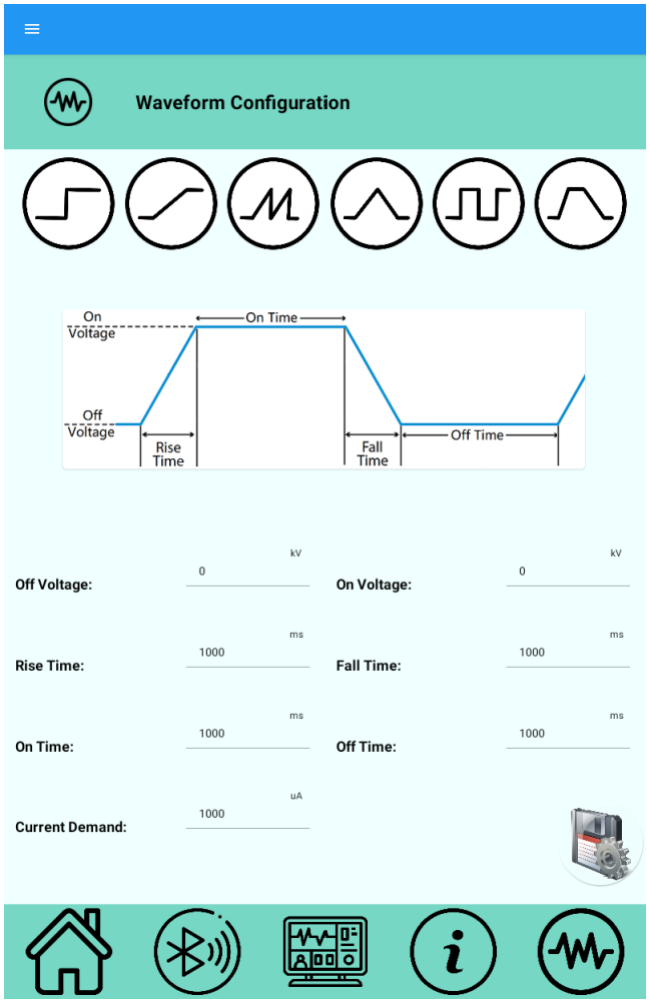



## Fault Reset

The SCM can reset the occurred faults in the power supply remotely and make it ready for turning on again.

## Data Recording

The SCM can save the data of the power supply output voltage, output current and temperature, which could be used for further analyses. It Also records the faults and status log of the power supply. The file is in .txt format which could be used for future analysis.




## Output Voltage Waveform Selection

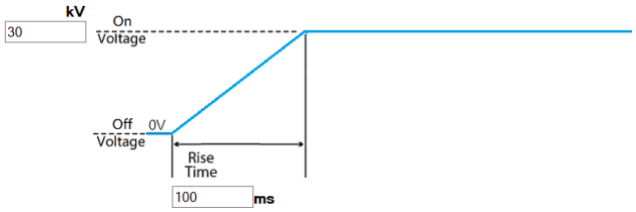
The most special and exclusive capability of the SCM is controlling the output voltage of the high voltage power supply based on the user selected waveform. The output voltage waveform can be selected among lots of different wave types in the SCM computer software. All waveforms are fully configurable to produce the user desired waveform.

### Step Voltage

The most common waveform of most power supplies is the step-up waveform.

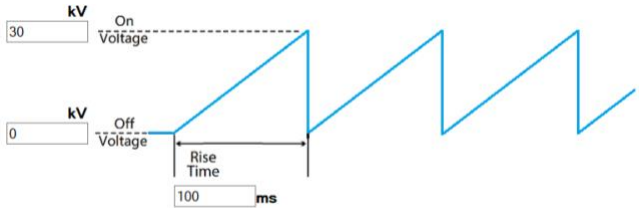

### Ramp-Up

The ramp-up turn on will smoothen the increase of the output voltage and decrease the high voltage pulse tension over the load and power supply. In this output waveform type the rise time of the ramp is configurable.



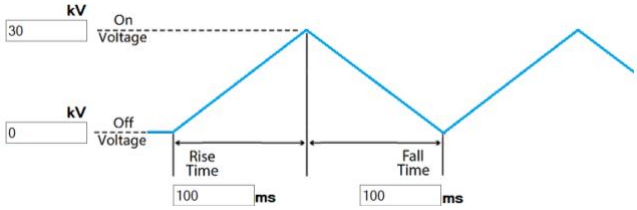

### Sawtooth

The sawtooth waveform is needed when you want to repeat the ramp-up waveform continuously. In this wave type, on voltage, off voltage, and rise-time are configurable.



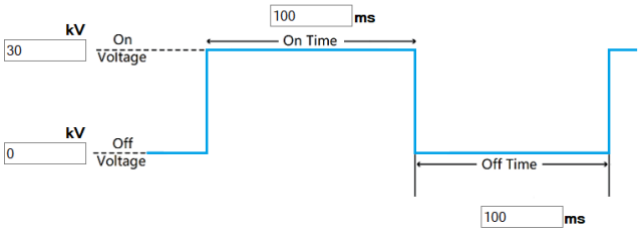

### Triangle

The triangle waveform provides soft increase and soft decrease of the output voltage. In this wave type, on voltage, off voltage, rise-time, and fall time are configurable.



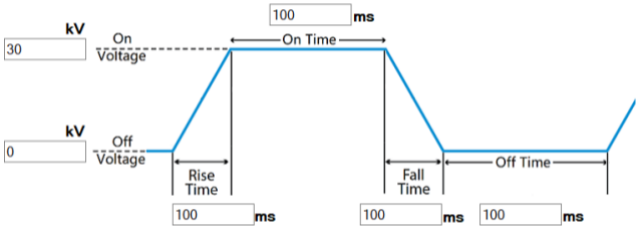

## Rectangular (Pulse)

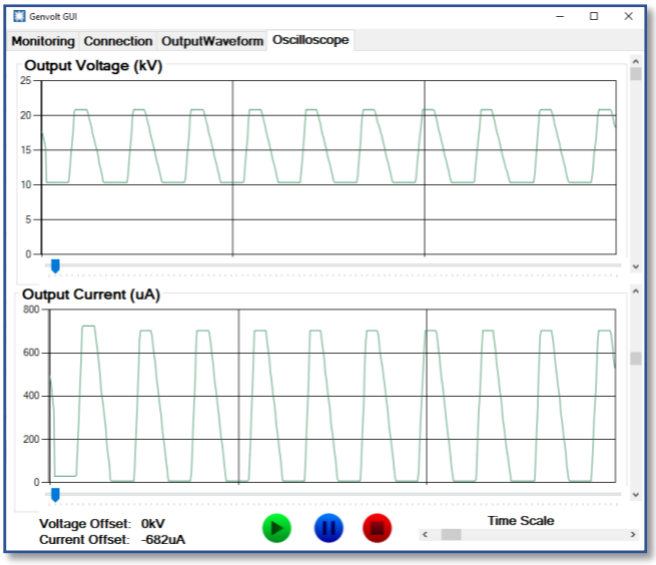
The rectangular or pulse waveform is needed when you want to repeat the step-up waveform continuously. In this wave type, on voltage, off voltage, on-time, and off-time are configurable.




## Arbitrary

Finally, an arbitrary waveform configuration is provided to produce user customized output voltage waveform. In this configuration, on voltage, off voltage, rise-time, fall-time, on-time, and off-time are configurable.




## Virtual Oscilloscope

One of the most important concerns when using a high voltage power supply is to know the exact waveform of the output voltage and current. The SCM provides a virtual oscilloscope inside its computer software to show the output waveforms of the power supply voltage and current.

### Auto Amplitude Scale

The virtual oscilloscope has an auto amplitude scale algorithm, which will adjust the amplitude axis scale of the output voltage and current automatically based on their value.

### Time Scale Adjustment

The virtual oscilloscope has a time scale adjustment option which could adjust the display window of the output waveforms.

### Voltage and Current Offset Adjustment

The virtual oscilloscope has the option to adjust the offset on output waveforms. This capability could be used to see the small changes of the output waveform over large DC value of the output (e.g., small overshoots or undershoots, output instability, and output ripple).

## General Specifications

- 8 Isolated Digital Input
  Fully configurable as an active low or active high or differential
- Two independent Direct Interrupt input
  Could be used for high priority faults
- 2 Common Emitter Digital Output
- 2 Common Collector Digital Output
- 2 Fully configurable Digital output
  Common Emitter or Common Collector or fully Isolated
- 1 Solid State Relay Output
  All digital outputs can be configured for 0-5V, 0-12V, 0-24V or User defined voltage.
- 4 Analog Input 0-10 V Range with 12-bit Resolution
- 2 Analog Output 0-10V Range with 13-bit Resolution
- 2 Analog Output 0-10V Range with 7-bit Resolution
  All Analog inputs and outputs can be configured to any value between 0-3.3V to 0-15V
- One internal temperature sensor
- Isolated RS485 Serial Communication
- Isolated USB Interface
- 4x20 Character LCD Display