

### Theory of Operation

The SAK-24 is a low-voltage microprocessor controlled dual latching relay with built in functionality to lock out or manage loads on generator power. The device is built around latching relays that are toggled on and off by a short pulse of energy to open and close the contacts. The relay incorporates SRT® (Smart Relay Technology) to control switching at the zero cross over point of the sine-wave.

### Mode LD - Generator Detection & Load Lock-Out

The SAK-24 uses a proprietary *Sine Wave-Distortion Index*® with user adjustable sampling rates to adapt to most utility and generator sine-waves. When Load-Drop (Mode **LD**) is selected from the main menu, at power the device will turn the relay off, execute power up delay **d**. The SAK-24 will analyze the sine-wave to determine if the power source is utility or generator. When utility is detected, the Gen-Util LED will turn green, the Load On relay LED will illuminate yellow, closing the relay contacts and restoring the connected load. When generator is detected, the Gen-Util LED will illuminate red, and the load will remain off until stable utility power is restored. The Sine Wave Distortion Index® reading will be displayed on the LCD digital display. After utility power returns and is detected by the SAK-24, The Gen-Utility LED will turn green, the Load On LED illuminates yellow and the device enters sleep mode.

### Mode UP & UA - Under Frequency Load Management Functions

The SAK-24 can Load-Manage using Under Frequency detection for air cooled generators. The **UP mode** has preset under frequency and delay times that cannot be adjusted. These values should be suitable for most air-cooled applications. The **UA mode** provides field adjustments for frequency and delay time to allow the installer to adjust up to three levels of under frequency detection. The option to adjust these parameters allows the SAK-24 to adapt to the majority of load management applications.

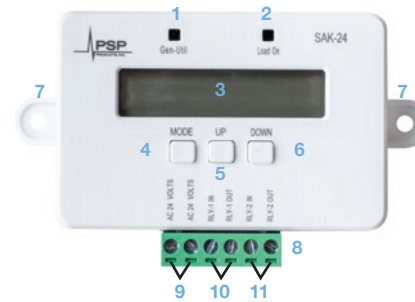
When power is restored after a power outage, and load management Mode UP or UA are selected, the SAK-24 opens relay one and two. The system analyzes the sine-wave to determine if the power source is utility or generator. When a utility sine wave is detected, the Gen-Util LED turns green, the Load On LED illuminates closing the relay contacts to restore the connected load. The SAK-24 will now enter sleep mode. When generator sine-wave is detected, the Gen-Util LED illuminates Red indicating generator power is detected. After the adjustable delay “g 000.0”, the load is restored and the Gen-Util LED flashes red, indicating load management mode is active, and the yellow LED illuminates indicating the load is restored. The AC frequency is displayed on the front panel LCD. In the event of an under frequency condition meeting the trigger points of either **Mode UP** or **Mode UA**, the load is disconnected for the delay time set in Mode “O 000.0”. When utility power is restored, the Gen-Util LED will illuminate green and device enters sleep mode. Please note when the SAK-24 is in sleep mode, a power outage of at least 2-3 seconds is required to restart program. The SAK-24 will **not** recognize a Hot Swap transfer event so load shedding will not be activated.

### Additional Modes of Operation

**Scroll Compressor Saver Mode:** The “Y” Mode was developed to help prevent HVAC Scroll compressors from over heating as a result of reverse rotation after a transfer from generator voltage back to utility. When “Y” Mode is adjusted to 000.0 the mode is inactive. Any setting greater than 000.0 will activate the mode. When “Y” mode is active the load connected will be turned off in approximately 45 seconds after a transfer from Generator to utility has occurred. The connected device will then remain off for the time in minutes set in the “Y” mode adjustment.

**Factory Test Mode:** The factory test mode is programmed to test the push buttons, LEDs and accuracy of the AC frequency reading during quality control testing. This feature can also be used in the field as a real time AC Line frequency meter. To enter test mode adjust the value of to 0001. To exit mode remove and restore power.

### Installation Instructions



1. Gen-Util LED: Illuminates solid green when utility voltage is detected, solid red when generator voltage is detected. Flashes red when load is restored under generator power modes UP & UA.
2. Load On LED: Illuminates yellow when relays are closed.
3. LCD Display: Displays status and adjustment values
4. Mode Button: Used to enter main menu and toggle
5. Up Button: Adjust value up
6. Down Button: Adjust value down
7. Mounting Ears
8. Detachable wiring terminal block connector
9. 24 Volt AC Input terminals
10. Relay one dry contact terminals
11. Relay two dry contact terminals

### Programming Instructions

**To enter Programming Mode:** Push “Mode” button (4) for three seconds and release. The present master mode will be displayed. Pressing the mode button for one second increments will scroll through the four available master modes as shown below. Once the desired master mode is displayed, press the mode button for 3 seconds to select that master mode. After releasing the mode button the SAK-24 will now be in the adjustment mode of the selected master mode. The menu mode will be exited after 7 seconds of inactivity.

### Adjust Settings In Master Modes

**Adjust settings within a Master Mode:** After a Master Mode has been selected the adjustments within the Master Mode can be selected by pushing the Mode Button for 1 second increments to scroll through the adjustments. Use the Up Button and the Down Button to adjust the values to the desired setting.

### Master Modes

**Master Mode LD:** Load drop mode. When this mode is selected the load controlled by the SAK-24 will be locked out when ever generator power is detected and will not be restored until stable utility power has returned. Adjustment “D” set the delay time before load is restored after any power outage event occurs.

**Master Mode UP:** Load Manage Preset Under Frequency Settings. When this mode is selected the load controlled by the SAK-24 will be connected under generator power after delay “G” when ever generator power is detected. The load will be disconnected should an under frequency event occur. After an under frequency event the load will be restores after delay “O”.

**Master Mode UA:** Load Manage Adjustable Under Frequency Settings. When this mode is selected the load controlled by the SAK-24 will be connected under generator power after delay “G” when generator power is detected. The load will be disconnected should an under frequency event occur. After an under frequency event the load will be restores after delay “O”. There are three sets of under frequency adjustment set points to customize the delay and intensity levels at which an under frequency event is detected.

**Master Mode FA:** Factory Adjustment Mode. When this mode is selected you have the option to adjust global settings that can effect all modes of operation. Please consult technical support prior to making any changes to these settings.

# Menu Flow Chart with Default Settings

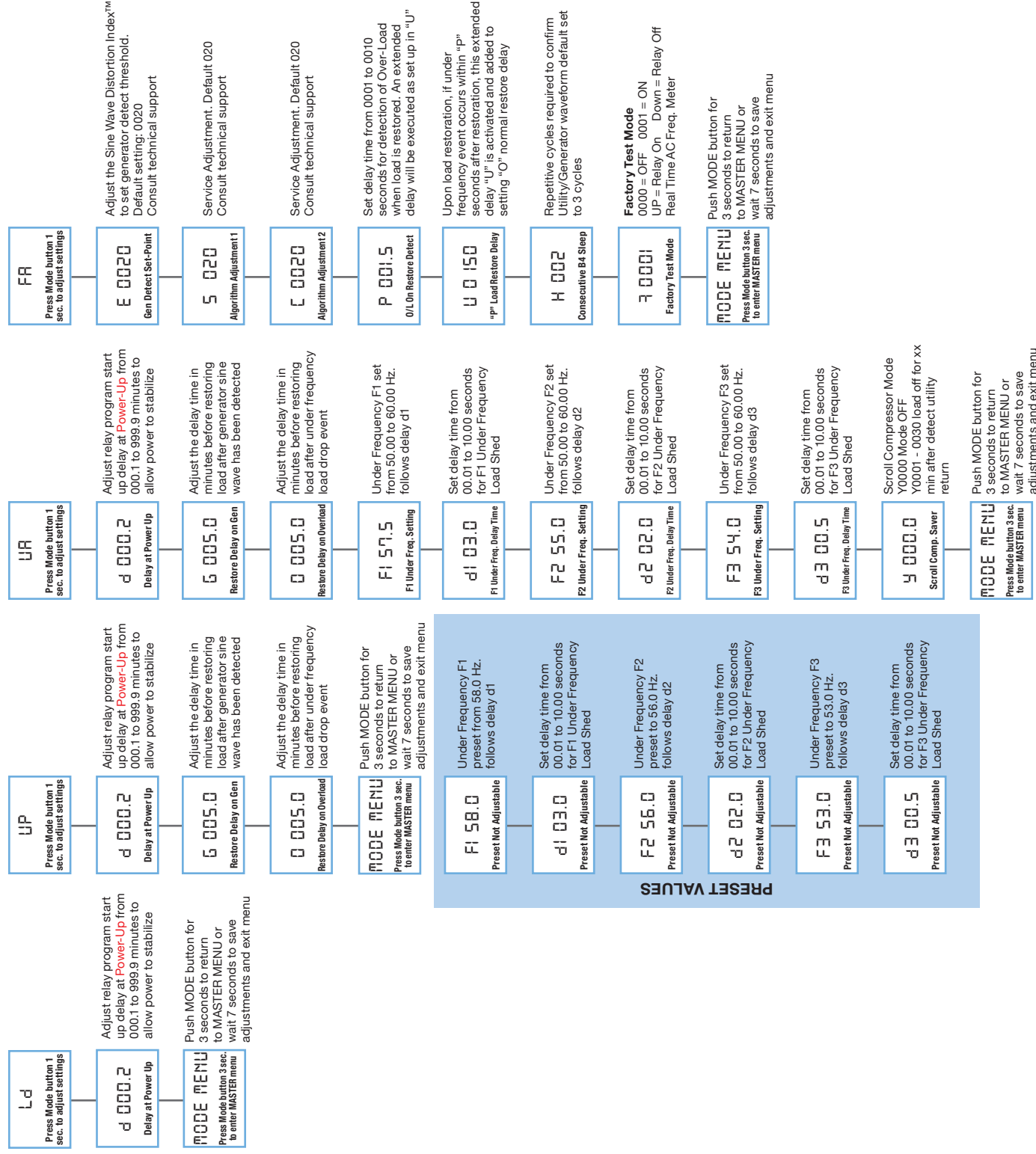
## To Enter Master Menu

Press and hold mode button for three seconds and release. Press mode button for 1 second intervals to scroll to desired mode, then press mode button again for three seconds to store selected mode.



## To Adjust Settings Within a Mode

After selecting the desired Master Menu, Press mode button for one second to scroll to desired adjustment, then press up and down keys to desired settings. Repeat for each setting you need to adjust. Value will be stored after 7 seconds of inactivity.



PRESET VALUES