

Main Terminals
 CU7 Copper Conductors Only
 10-14 AWG 35 IN. LBS.
 8 AWG 40 IN. LBS.,
 4-6 AWG 45 IN. LBS.
 2-3 AWG 50 IN. LBS.

Auxiliary Terminals
 CU7 Copper Conductors Only
 12-16 AWG 20 IN. LBS.

Warning!
 Do not apply external voltage to the dry contact input terminals. This will damage the SAK-60 and void the warranty.

Installation Instructions

1. Device should be installed on DIN rail.
2. Device must be installed in an enclosure suitable for the application and environment for which it is being used. Connected Load shall not exceed 60 amps.
3. Confirm power is off prior to performing the installation.
4. Use the appropriate wire size and type based on the connected load and torque to the specified ratings.
5. Connect input and output connections and replace finger guard covers and restore power.
6. Confirm power LED is illuminated and proceed to programming functions.

To enter Programming Mode: Push "Mode" button one time. There may be a delay up to one minute while the program finishes the active cycle. Setup will begin by displaying setting "A 0000". Each time the mode button is pressed, the device advances to the next menu setting. Adjustments to the settings are made using the UP & DOWN buttons. The mode and settings are displayed on the LCD screen. The program mode exits and saves settings after 7 seconds of inactivity.

Quick Start Charts are provided to assist in setting up basic functions. The complete menu is available on the last pages of this document to assist with advanced functions and provide a better understanding of the program flow.

Load Lock-Out on Generator Settings Quick Start Chart

Set To:	MODE	Adjustment Range	Adjustment Details
<u>0000</u>	A 0000	A 0000 To A 0003	Set Mode "A" to 0000 to disable dry contact control of relay
<u>0000</u>	b 0000	b 0000 To b 0001	Set Mode "b" to 0000 to enable load lockout mode on Generator.
<u> </u>	d 0000	d 000.1 To d 999.9	Set Mode "d" to a minimum of 000.2 to provide 12 second delay after power up

Load Management (Under Frequency) on Generator Menu Settings

Quick Start Chart

Set To:	MODE	Adjustment	Adjustment Details
0000	A 0000	A 0000 To A 0003	Set Mode "A" to 0000 to disable dry contact control of relay
000 1	b 0000	b 0000 To b 000 1	Set Mode "b" to 0001 to enable load management on Generator.
	c 0000 <small>Note: Upper Case C</small>	c 0000 To c 000 1	Set Mode "C" to 0001 to enable Pre-Set Under Frequency Cut Off Points or set to 0000 to enable User Adjustable Under Frequency Cut Off Settings. See Advanced Settings For Adjustable Settings
	d 000.0	d 000.0 To d 999.9	Set Mode "d" to a minimum of 000.2 to provide 12 second (2/10 Min) delay after power up to allow power to stabilize. Increase time as need.
	g 000.0	g 000.1 To g 999.9	Set Mode "g" for the delay in minutes before load is restored after generator is detected. For multiple loads stagger restore times based on priority of loads connected.
	o 0000	o 000.1 To o 999.9	Set Mode "O" for the delay in minutes before load is restored after an under frequency over load event has occurred. This setting generally mirrors Mode "g" above, however the delay can be customized based on the devices under control and priority of the load.

Dry Contact Input Relay Control

Quick Start Chart

Set To:	MODE	Adjustment	Adjustment Details
	A 0000	A 0000 To A 0003	A = 0 Dry contact input disabled A = 1 Dry contact closed relay closed A = 2 Same as A0001 with 5 min delay A = 3 Dry contact open relay closed
	A d000	A d00 1 To A d999	Ad = Delay for turning on relay with dry contact input when modes A 0001 or A 0003 are selected. Delay from 1 to 999 seconds. Set to 000 for no delay

User Adjustable Under Frequency and Load Shed Delay Settings

Quick Start Chart

When Mode "C" is set to C 0000, the user adjustable under frequency set points and delay time settings are active, and can be adjusted using the Mode Settings below.

Set To:	MODE	Adjustment	Adjustment Details
_____	F 100.0	F 150.0 To F 160.0	Under Frequency 1: Set from 50.00 to 60.00 Hz. Default setting 58.00 Hz follows delay d1
_____	F 200.0	F 250.0 To F 260.0	Under Frequency 2: Set from 50.00 to 60.00 Hz Default setting 54.00Hz follows delay d2
_____	F 300.0	F 350.0 To F 360.0	Under Frequency 3: Set from 50.00 to 60.00 Hz Default setting 53.00Hz follows delay d3
_____	d 100.0	d 100.1 To d 110.0	Time Delay 1: Set delay from 00.1 to 10.0 seconds for Under Frequency 1 Under Frequency Load Shed. Default 3 Seconds
_____	d 200.0	d 200.1 To d 210.0	Time Delay 2: Set delay time from 00.1 to 10.0 seconds for Under Frequency 2 Under Frequency Load Shed. Default 1.5 Seconds
_____	d 300.0	d 300.1 To d 310.0	Time Delay 3: Set delay time from 00.1 to 10.0 seconds for Under Frequency 3 Under Frequency Load Shed. Default 0.5 Seconds

Under Frequency On Restore Extended Delay Setting

_____	P 0000	P 000.1 To P 001.0	Under Frequency During Load Restoration Set delay time from 0001 to 0010 seconds for detection of over-load when load is restored. An extended delay will be executed as set up in "U"
_____	U 0000	U 000.1 To U 999.9	Under Frequency on Restore Extended Lockout Upon load restoration, if under frequency event occurs within "P" seconds after restoration, this extended delay "U" is activated and added to setting "O" normal restore delay

Over-Under Voltage and Brown Out Protection

Quick Start Program Chart

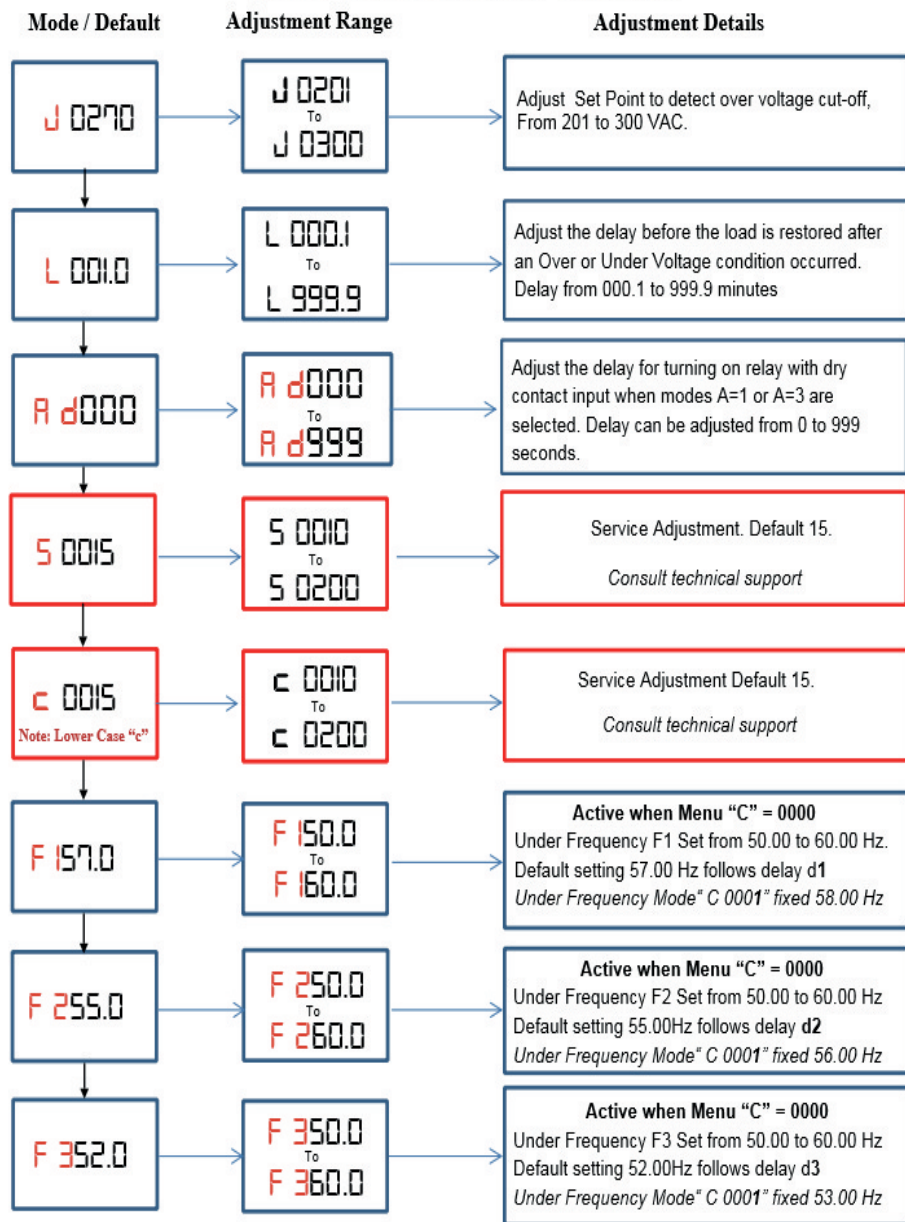
Set To:	MODE	Adjustment	Adjustment Details
0000	A 0000	A 0000 To A 0003	Set Mode "A" to 0000 to disable dry contact control of relay
0000	b 0000	b 0000 To b 0001	Set Mode "b" to 0000
	d 0000	d 000.1 To d 999.9	Set Mode "d" Start Up Delay on power restoration between 000.1 and 999.9 Minutes to prevent short cycling of connected load
000	H 0000	H 0000 To H 0001	Set Mode "H" to 0001 to activate over/under voltage protection mode. Note: over/under protection does not work with other functions.
	I 0000	I 0000 To I 0200	Set Mode "I" to Adjust the Set Point for Under Voltage cut-off, From 0 to 200 VAC.
	J 0000	J 0201 To J 0300	Set Mode "J" to Adjust the Set Point for Over Voltage cut-off From 201 to 300 VAC.
	L 0000	L 000.1 To L 999.9	Set Mode "L" to Adjust the delay before the load is restored after an Over or Under Voltage event has occurred. Delay from 0.1 to 999.9 minutes

SAK-60 Flow Chart Menu

Mode / Default	Adjustment Range	Adjustment Details
A 0000	A 0000 To A 0003	A = 0000 Dry contact input disabled A = 0001 Dry contact closed relay closed A = 0002 Same as A0001 with 5 min delay A = 0003 Dry contact open relay closed
b 000 1	b 0000 To b 000 1	b = 0000 Load drop when generator is detected b = 0001 Load management/under frequency drop of loads when generator detected.
C 0000 <i>Note: Upper Case C</i>	C 0000 To C 000 1	C = 0000 to enable user adjustable under frequency cut off settings C = 0001 to enable pre-set under frequency cut off settings
d 000.2	d 000.1 To d 999.9	Adjust relay program start up delay at Power-Up from 000.1 to 999.9 minutes to allow power to stabilize after power up.
E 0020	E 0001 To E 0099	Adjust the <i>Sine Wave Distortion Index™</i> to set generator detect threshold. Default setting: 0020 <i>Consult technical support</i>
9 003.0	9 000.1 To 9 999.9	Active in mode "b0001" only. Adjust the delay time in minutes before restoring load after generator sine wave has been detected
H 0000	H 0000 To H 000 1	H = 0, under/over voltage DISABLED. H = 1, under/over ENABLED. Stand alone function, does not work with other functions.
I 0190	I 0000 To I 0200	Adjust the Set Point to detect Under Voltage cut-off, From 0 to 200 VAC.

Note: Adjustments outlined in red are factory settings. These values should only be changed under advisement from PSP Technical Support Department.

SAK-60 Menu Flow Chart - Continued



SAK-60 Menu Flow Chart - Continued

Mode / Default	Adjustment Range	Adjustment Details
d 103.0	d 1 00.0 To d 1 10.0	Active when Menu Upper Case "C" = 0 Set delay time from 00.01 to 10.00 seconds for F1 Under Frequency Load Shed. Default 3 Seconds <i>Under Frequency Mode "C 0001" fixed at 3 sec</i>
d 202.0	d 2 00.0 To d 2 10.0	Active when Menu Upper Case "C" = 0 Set delay time from 00.01 to 10.00 seconds for F2 Under Frequency Load Shed. Default 1.5 Seconds <i>Under Frequency Mode "C 0001" fixed at 1.5 sec</i>
d 300.5	d 3 00.0 To d 3 10.0	Active when Menu Upper Case "C" = 0 Set delay time from 00.01 to 10.00 seconds for F3 Under Frequency Load Shed. Default 0.5 Seconds <i>Under Frequency Mode "C 0001" fixed at 0.5 sec</i>
0 0050	0 000.1 To 0 999.9	Normal Under Frequency Restore Delay Set restore time delay from 000.1 to 999.9 minutes to restore load after Under Frequency Load Drop event has occurred. Normally mirrors Delay G 0000
P 0004	P 0001 To P 0010	Under Frequency During Load Restoration Set delay time from 0001 to 0010 seconds for detection of Over-Load when load is restored. An extended delay will be executed as set up in "U"
U 00 15	U 000.1 To U 999.9	Under Frequency on Restore Extended Lockout Upon load restoration, if under frequency event occurs within "P" seconds after restoration, this extended delay "U" is activated and added to setting "O" normal restore delay

UL Testing Standards and Product Certifications

Construction of control: Independently mounted

Action: Type 1

Over voltage category: OVC III

Pollution degree: PD2

Rated Impulse Voltage: 2500 V

Maximum phase to ground voltage of the supply source: 150 V

Protection against electric shock class: Insulation-encased Class II Equipment

Environmental: IP00

Purpose of control: operating control



The SAK-60 is a 60 amp microprocessor controlled two-pole latching relay with built in functionality to lock out or manage loads on generator power, protect from over-voltage / under-voltage and brownouts. The SAK-60 can also work as conventional relay with dry contact inputs with adjustable on-time delay. 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 for reliability and maximum life expectancy of the contacts. The SAK-60 is self-powered by the 120 VAC or 120/240 VAC line input voltage eliminating the need for a secondary power source normally required to power the coil of a conventional device. Additionally, the SAK-60 comes with a two year product warranty from the date of install.

Generator Detection & Load Lock-Out

The SAK-60 uses a proprietary *Sine Wave-Distortion Index®* with user adjustable sampling rates to adapt to most utility and generator sine-waves. When Load-Drop is selected from the main menu Mode "B 0000", at power the device will turn the relay off at power up. The system analyzes 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-60, The Gen-Utility LED will turn green, the Load On LED illuminates yellow and the device enters sleep mode.

Generator Detection & Load Management With Under Frequency Control

In addition to Load-Lockout, the SAK-60 can Load-Manage using Under Frequency detection for air cooled generators. There are two modes for under frequency load management. The first Mode "C 0001" is fixed and the pre-set under frequency and delay times cannot be adjusted. These values should be suitable for most air-cooled applications. The second Mode "C 0000" 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-60 to adapt to the majority of load management applications.

Load Management Under Frequency Control

When power is restored after a power outage, and load management Mode "B 0001" is selected, the SAK-60 disconnects the load. 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-60 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 "C 0001" or "C 0000", 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.

Conventional Relay with Dry-Contact Control Input

The SAK-60 can work as a stand alone 60 amp relay, controlled by a normally open or normally closed logic dry contact control input. **Do not apply voltage to the dry contact terminals. This will damage the SAK-60 and void the warranty.** The loads controlled by the relay can be either 120/240 VAC double pole or 120 VAC single pole. Relay control can be adjusted for instant closure of the contacts, or for delayed closure for up to 10 minutes in one second increments. This device is also designed to be used as a standalone over-voltage / under-voltage protection cut off device with adjustable High/Low set points and restore delay adjustments.

Instructional Videos available at: www.sak60.com

Technical Support Call 800-648-6802