
SCAL-400

CALIBRATION AND CHARGING STATION



INSTRUCTION MANUAL

READ AND UNDERSTAND INSTRUCTIONS BEFORE USE

FOR USE IN AREAS KNOWN TO BE FREE OF COMBUSTIBLE GAS HAZARDS

FOR USE IN AREAS THAT ARE CLEAN AND DRY



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CONTENTS

SPECIFICATIONS	4
FEATURES	4
DESCRIPTION	5
LED STATUS	5
MAIN SCREEN	6
DETAIL STATUS SCREEN.....	7
MAIN MENU SCREEN	8
CALIBRATION GAS INFORMATION SCREEN.....	8
LOG REVIEW SCREEN.....	9
PASSWORD SCREEN	9
SUPERVISOR MENU SCREEN	10
OPERATION – SETUP	13
OPERATION – SYSTEM ACTIVATION	13
OPERATION – P400 TESTING	13
WARRANTY	13

SPECIFICATIONS

POWER: 100-240 VAC INPUT

SIZE: 24" x 7" x 3" (61cm x 17.8cm x 7.6cm)

WEIGHT: 5.75 lbs. (2.6kg)

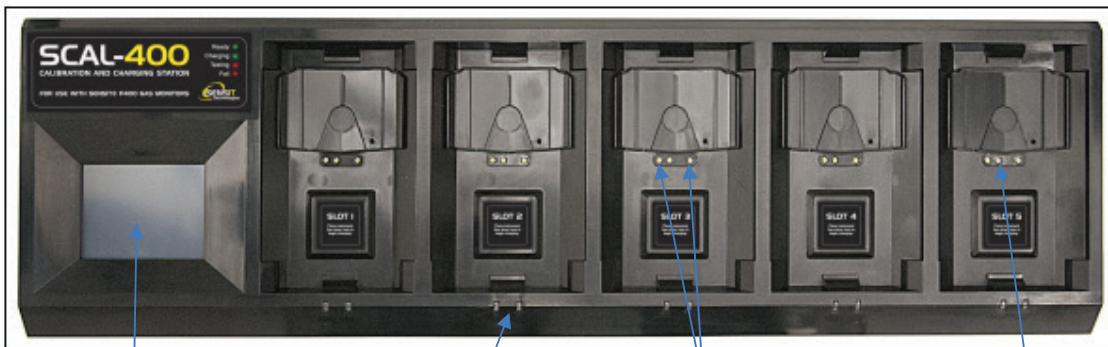
OPERATIONAL TEMPERATURE: 40-122°F (5-50°C)

MAXIMUM INLET PRESSURE: 20psi

WHAT'S INCLUDED

- SCAL-400
- Power Cord (120 VAC)
- Instruction Manual
- USB Cable

FEATURES



Touch screen display

LED status indicators

Charging pins

Communication pin

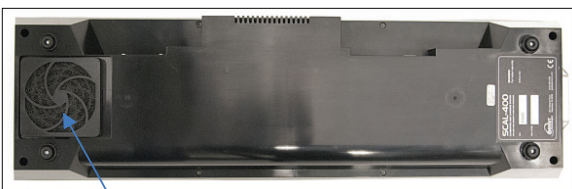


Power connection

RJ45

Serial

Connections



Cooling fan intake



Gas inlets/connections

DESCRIPTION

The **SCAL-400** is a multi-unit charging and calibration station for **SENSIT P400** gas detection instruments. It can bump test and/or calibrate up to five **P400** units consecutively while simultaneously recharging the battery packs. The **SCAL-400** also detects if a **P400** requires calibration or a bump test when connected and automatically performs the required test. During connection any manually performed calibration and bump tests in the instruments memory log will automatically transfer from **P400** to **SCAL-400**. Data management for the **SCAL-400** requires software packages, either **SCAL 360** (Desktop/Network)

The location to place any instruments is referred to as a “slot”. For each slot there are charger and communication connections as well as LEDs to indicate the status. All testing functions require no user interaction.

The display is a touchscreen. Instrument and station information can be accessed by using your finger or the included stylus.

The **SCAL-400** scans each slot, updates the LED status, and refreshes the display screen for each slot every three seconds. During communication, the **SCAL-400** completes any log transfer before scanning another slot.

LED STATUS

Each slot has two LEDs indicating the status for the docked instrument. The following table describes the various LED states:

SCAL-400 INDIVIDUAL SLOT LED STATUS:			
	GREEN LED	RED LED	DESCRIPTION
1	OFF	OFF	Nothing on slot
2	ON	OFF	Ready (all test done, fully charged/ alkaline OK)
3	OFF	ON	Fail calibration/bump test/alkaline low battery
4	BLINK	ON/OFF/BLINK	Charging
5	ON/BLINK	BLINK	Test in progress/pending

MAIN SCREEN

When the **SCAL-400** is powered on by connecting it to a 100-240 VAC supply, the display will show the Main Screen (refer to the sample shown below). This screen is divided in six cells. Five of the cells are for the five instrument slots and one cell is for showing **SCAL-400** information. The background color of a slot indicates the status of the **P400** in the corresponding slot (See Table 1). Tapping the slot that has a unit docked will activate the Detail Status Screen. Tapping the blue section will take you to the Main Screen only if no unit test is pending or in progress.

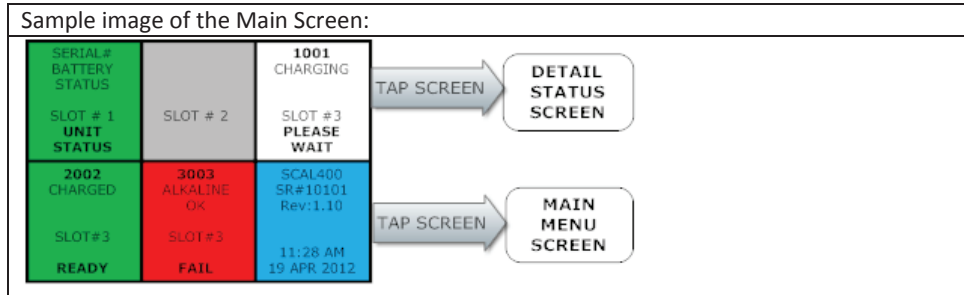


TABLE 1: MAIN SCREEN BACKGROUND COLORS AND DESCRIPTIONS	
SLOT SCREEN BACKGROUND COLOR	STATUS DESCRIPTION
Gray	Empty slot (Instrument is not docked)
White	One of the following TasksIn Progress <ul style="list-style-type: none"> • Detected unit and acquiring more information • Waking up unit • DATA TRANSFER – Update P400 RTC, transfer BUMP/CAL Log from Instrument to SCAL-400 • Calibration in progress • Bump test in progress • Waiting in queue • Charging
Red	One of the following failures occurred <ul style="list-style-type: none"> • Calibration failed • Bump test failed • Alkaline low battery is detected
Green	Unit is ready for use.
Blue	Tapping this section will open the Main Menu Screen only if no unit test is pending or in progress

DETAIL STATUS SCREEN

The Detail Status Screen provides additional details about the P400 in the selected slot. This provides real time progress of data transfer, calibration and bump test. From here you can manually perform a calibration or bump test by tapping the appropriate icon.

Table 2 references the displayed example.

Sample image of the Detail Status Screen:

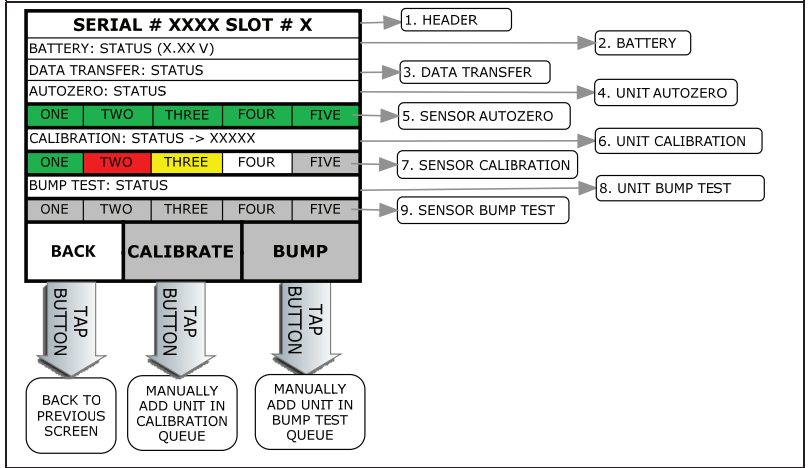


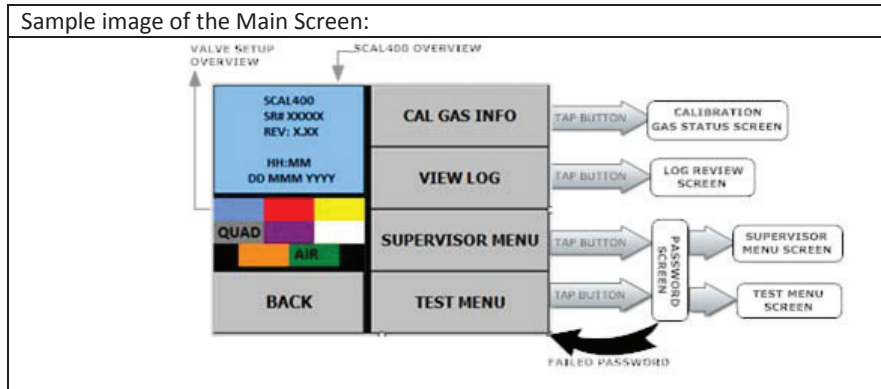
TABLE 2: DETAIL STATUS SCREEN DESCRIPTION

LABEL TYPE	BACKGROUND COLOR	STATUS DESCRIPTION
1. Header	White	Waking Up/Data Transferred/Test Pending/Waiting In Queue/In Progress
	Red	Failed Bump Test Or Calibration
	Green	All Test Successfully Completed
2. Battery	White	Charging
	Red	Alkaline: Low Battery
	Green	Charged/Alkaline: Ok
3. Data Transfer	Gray	Pending
	White	Updating Rtc/Downloading Calibration Log/Downloading Bump Test Log
	Green	Completed Data Transfer
4. Unit Autozero	Gray	Not Required
	White	Pending/Purging/In Progress
	Red	Failed
5. Sensor Autozero	Green	Passed
	Gray	Pending
	Red	Failed
6. Unit Calibration	Green	Passed
	Gray	Not Required
	White	Pending/Purging/In Progress – Displays Adc Counts Of Sensor Being Calibrated
7. Sensor Calibration	Red	Failed
	Green	Passed
	Gray	Pending
	White	In Progress
	Yellow	Calibration Gas Supply Test Failed
8. Unit Bump Test	Red	Failed
	Green	Passed
	Gray	Not Required
	White	Pending/Purging/In Progress
9. Sensor Bump Test	Red	Failed
	Green	Passed
	Gray	Pending
	White	In Progress
	Yellow	Calibration Gas Supply Test Failed

MAIN MENU SCREEN

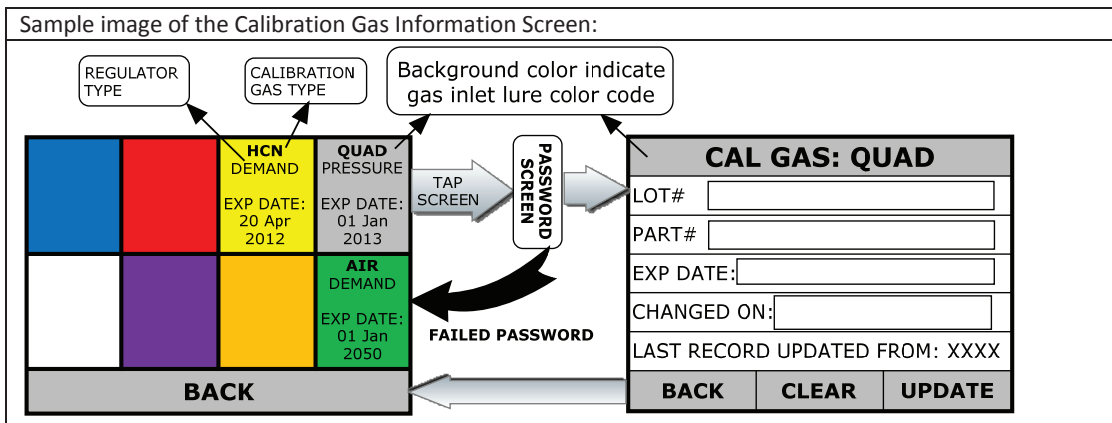
The Main Menu Screen provides an overview of the system (Serial #, Software Rev#, Date and Time, Valve Configuration). It also provides access to view calibration gas information, view logs, update settings through the Supervisor Menu, and a Test Menu.

- The Valve Setup Overview provides information about which gas inlets (valves) are configured for each calibration gas. Each lure inlet on the manifold is color coded with label around it.
- The Supervisor and Test Menu screens are password protected.



CALIBRATION GAS INFORMATION SCREEN

This screen is divided in eight cells. Each cell represents a single gas inlet (valve). The background colors and gas inlets are color coded and matched for easy identification. The colors on the manifold label correspond to the colors shown on this screen. It also provides the information about type of regulator required for the gas bottle and the expiration date of the calibration gas. A blank/empty cell indicates that particular gas inlet (valve) is not configured and will not be used. "N/A" in a cell indicates that the valve is not installed. Tapping on a configured cell (i.e. - not blank/empty) will take you the password screen. Upon providing the correct password, the calibration gas information will be displayed.



LOG REVIEW SCREEN

This screen lets you review all the logs available in the **SCAL-400s** local database. It will display the most recent log first, but other logs can be viewed by using the “PREV” and “NEXT” buttons. **NOTE:** you cannot see logs from other stations or **SCAL 360** databases.

Table 3 references the displayed example.

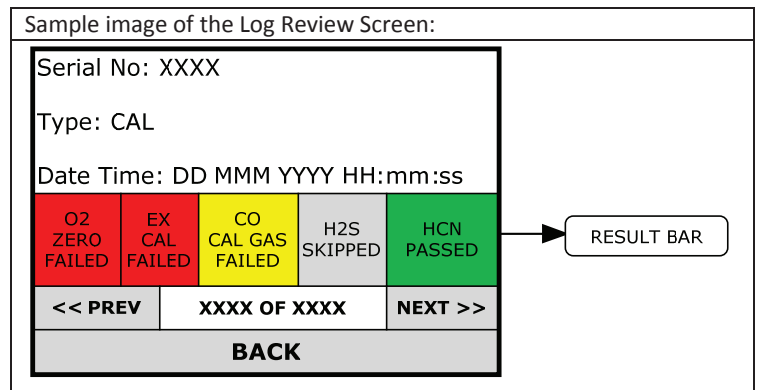
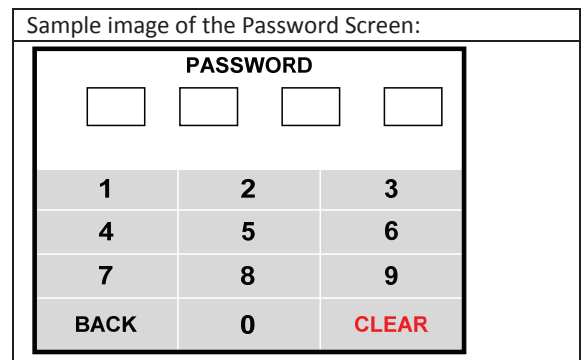


TABLE 3: LOG REVIEW SCREEN BACKGROUND COLORS AND DESCRIPTIONS

TYPE	BACKGROUND COLOR	DESCRIPTION
Result Bar	N/A	Displays the serial number of the P400 unit
	N/A	Displays the type of log: BUMP/CAL
		Result bar is divided in 5 cells. Each cell represents sensor calibration/bump result.
	Red	FAILED: BUMP FAILED CAL FAILED: CALIBRATION FAILED ZERO FAILED
	Yellow	CAL GAS FAILED: Calibration gas supply check failed
	Gray	Sensor Test (calibration/bump) is skipped by user
	Green	PASSED

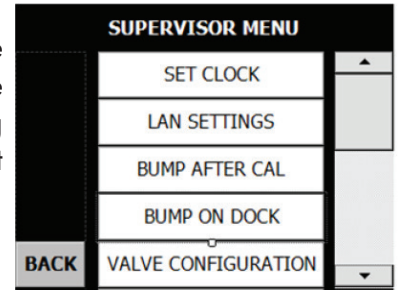
PASSWORD SCREEN

The Password Screen provides a supervisor level of protection to access the Supervisor and Test Menus and the menu to update the calibration gas information. The password is four numbers long. Tapping the “CLEAR” button will reset the boxes, allowing you to try again. After you enter four numbers, the password will automatically be checked. Upon providing the correct password, the next screen will be displayed. Entering an incorrect password will change the screen title to be displayed as “WRONG PASSWORD” in red. After three unsuccessful attempts, the password screen will close and you will return to the previous screen.



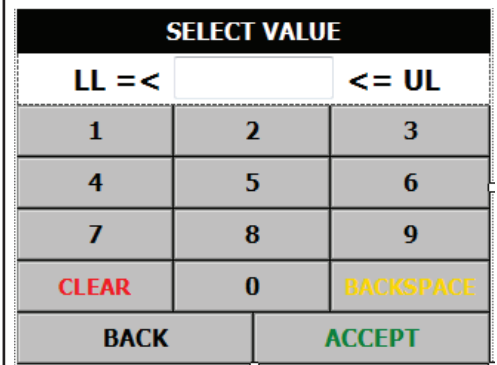
SUPERVISOR MENU SCREEN

The settings of the **SCAL-400** can be changed from within the Supervisor Menu. Please see Table 4 for a list of all the configurable items that can be modified. You can use the vertical scroll bar to view all available options. Scroll to and tap the button for the setting you would like to change. Another screen will appear that will allow you to view/adjust the current setting.



SELECT VALUE SCREEN:

The header of this screen will display the name of the setting you are changing. "LL" and "UL" in the sample image will be replaced by the lower limit and upper limit numbers for the selected setting. Click the "ACCEPT" button to update the value.



ENABLE/DISABLE SCREEN:

The header of this screen will display the name of the setting you are changing. This screen allows you to enable or disable the selected feature. Click the "ACCEPT" button to update the value.

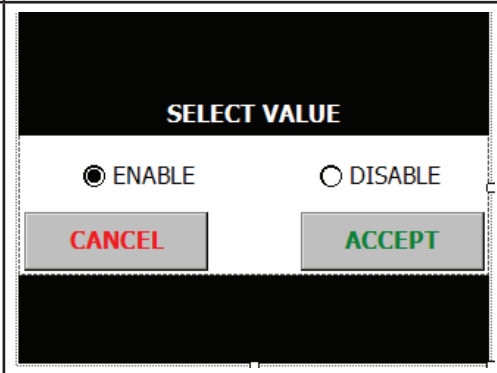
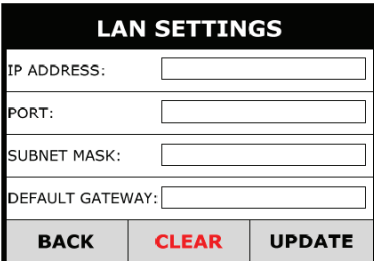
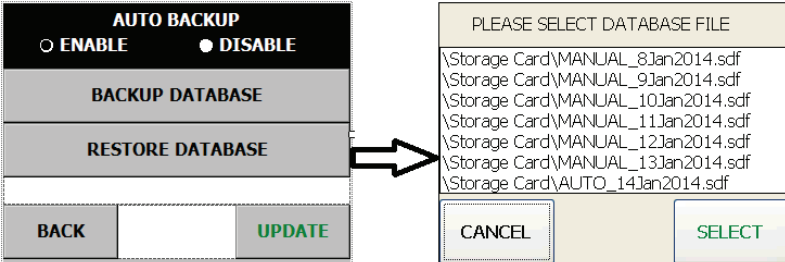
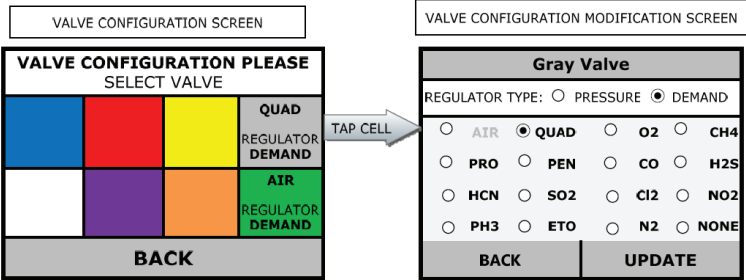


TABLE 4: SUPERVISOR MENU ITEMS

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1	Set Time Zone	<p>This allows you to set the time zone of the clock. Updating this setting will restart the SCAL-400 application. All available time zones will be listed. Select the appropriate time zone and click "UPDATE". A message box will be displayed to indicate system will restart. Click "OK" to continue.</p>															
2	Set Clock	<p>This allows you to change the date and time of the clock.</p>															
3	Set Charging Offset	<p>PLEASE REMOVE P400 FROM ALL SLOTS</p> <table border="1"> <tr> <td>SLOT#1</td> <td>XXXX mA</td> <td>OFFSET SAVED: XXXX mA</td> </tr> <tr> <td>SLOT#2</td> <td>XXXX mA</td> <td>OFFSET SAVED: XXXX mA</td> </tr> <tr> <td>SLOT#3</td> <td>XXXX mA</td> <td>OFFSET SAVED: XXXX mA</td> </tr> <tr> <td>SLOT#4</td> <td>XXXX mA</td> <td>OFFSET SAVED: XXXX mA</td> </tr> <tr> <td>SLOT#5</td> <td>XXXX mA</td> <td>OFFSET SAVED: XXXX mA</td> </tr> </table> <p>This option allows the factory to adjust the offset for recharging. It will display the current ADC reading for each slot and also the currently saved offset. Click "UPDATE" to save a new offset reading. Before updating this setting, please remove all P400 units from all slots and wait few seconds for the readings to stabilize. Please contact factory before changing this setting.</p>	SLOT#1	XXXX mA	OFFSET SAVED: XXXX mA	SLOT#2	XXXX mA	OFFSET SAVED: XXXX mA	SLOT#3	XXXX mA	OFFSET SAVED: XXXX mA	SLOT#4	XXXX mA	OFFSET SAVED: XXXX mA	SLOT#5	XXXX mA	OFFSET SAVED: XXXX mA
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4	SCAL/LAN Settings		This will allow you to set the necessary network information to enable this device to communicate with SCAL 360 (Network).
5	Backup/Restore Db	<p>a. AUTO BACKUP: This option allows a supervisor to setup automatic backups of the database to an internal memory card. Enabling this option will require a memory card to be present. A copy of the database will be saved to the memory card every day. The automatically saved backup files are named AUTO_DDMMYYYY.sdf.</p> <p>b. BACKUP DATABASE: This option will create a manual backup on the memory card. These backup databases are named MANUAL_DDMMYYYY.sdf.</p> <p>c. RESTORE DATABASE: This will allow the user to restore a database back from the memory card. It will display a list of all available backup databases (both manual and automatic) that exist on the memory card. You can choose one database and click "SELECT" to restore it.</p>	
6	Bump After Cal	Turning this option on will make the unit to go through the bump test after calibration is performed successfully.	
7	Bump On Dock	Turning this option on will make the unit to go through the bump test every time you dock the unit.	
8	Valve Configuration	<p>This allows you to select type of calibration gas connected to the selected gas inlet (valve) along with regulator type.</p> <p>VALVE CONFIGURATION SCREEN: The middle section of this screen is divided in eight cells. Each cell represents a single gas inlet (valve). The background colors and gas inlets are color coded and matched for easy identification. The colors on the manifold label correspond to the colors shown on this screen. It also provides the information about the type of regulator required for the gas bottle and the expiration date of the calibration gas. A blank/empty cell indicates that particular gas inlet is not configured and will not be used. "N/A" in a cell indicates that the valve is not installed. Tapping on any of the cells will take you to Valve Configuration Modification Screen.</p> <p>VALVE CONFIGURATION MODIFICATION SCREEN: This screen provides you with an option to configure the calibration gas for the selected gas inlet (valve). You can also choose which regulator type to use. If a demand regulator is used, the internal pump will turn on while using that particular gas inlet (valve). If you want to disable the selected gas inlet (valve), then select "NONE" as the gas type. All of the calibration gases that are configured for the other inlets (valves) will be disabled in this screen. If you want to switch a gas to a different inlet (valve), you need to disable that particular calibration gas from the inlet (valve) before enabling it on the desired inlet (valve).</p> 	

9	Reset Valve Config	Reset the valve configuration to the factory default as per following: GREEN – AIR – DEMAND REGULATOR GRAY – QUAD – DEMAND REGULATOR
10	Erase Log	This will erase the entire log saved in the local database.
11	Purge Time Before	Amount of time (in seconds) the unit will purge the line with air before starting any calibration/bump test.
12	Purge Time After	Amount of time (in seconds) the unit will purge the line with air after it completes a calibration/bump test.
13	Speciality Gas Purge	Amount of time (in seconds) the unit will purge the line with air before starting any calibration/bump test for a specialty gas sensor (other than O ₂ , EX, CO, H ₂ S).
14	Cal Gas Check Time	Amount of time (in seconds) the SCAL-400 will wait after opening the calibration gas valve and before checking for an empty cylinder. Please contact factory before changing this setting.
15	Pressure Threshold	Minimum difference of the pressure sensor response (in ADC counts) required to verify the calibration gas bottle is not empty. This setting is only valid when the valve is configured to use a pressure regulator. Please contact factory before changing this setting.
16	Vacuum Threshold	Maximum difference of the pressure sensor response (in ADC counts) required to verify the calibration gas bottle is not empty. This setting is only valid when the valve is configured to use a demand regulator. Please contact factory before changing this setting.
17	Set Password	This option will allow a supervisor to choose their own password other than the default password.
18	Flip Screen	This will flip the screen 180°.
19	Reset Settings	This option will reset all settings back to the factory defaults (except for the serial number).
20	Close Application	This will close the application and exit to Windows.
21	Set Serial Number	This will let you modify the serial number of the unit. This is password protected and can only be modified at the factory.
22	Do Not Save	Enabling this option will not save any bump or calibration logs to the SCAL-400 database. This option is specially designed for factory use to verify the SCAL-400 is working properly without creating any logs. This is password protected and should only be modified at the factory.

OPERATION – SETUP

1. Locate the **SCAL-400** in an area that is clean, dry, and in an area known to be free of combustible gases.
2. Lay the **SCAL-400** flat. Positioning the housing at an angle interferes with proper gas flow to the instruments.
3. Attach the power cord to the instrument (do not plug in to the power source yet).
4. Attach the proper gas bottles to the inlets on the left side. The gray location is preset for quad-gas mixtures of LEL, CO, H₂S and O₂.
5. Attach a hose to the green inlet to bring fresh air for zeroing. Keep the other end of the hose in clean air and away from the station.
6. Attach the cable (Ethernet or USB-to-RS232) for serial data connection (not required for operation). For operation of **SCAL 360** data management software, please review their respective instruction manuals.
7. Turn on the gas if a pressure regulator is used. Demand regulators do not require this action.

OPERATION – SYSTEM ACTIVATION

1. Plug the **SCAL-400** into a power source.
2. The screen will illuminate with Sensit logo.
3. The internal fan will start to spin. This is to cool the power supply components.
4. The **SCAL** application will automatically initiate and then be ready to use.

OPERATION – P400 TESTING

1. Remove the pump assembly if attached.
2. Be sure the instrument filter is clean and dry.
3. Lay the instrument face down into any slot.
4. If the instrument is off, it will turn on automatically.
5. The instrument will be bump tested and/or calibrated as determined by the instrument setup.
6. The instrument will recharge if needed. Alkaline powered instruments will not recharge. The station will indicate if the battery is low in an alkaline powered instrument.
7. Battery charging status indicators will function.
8. Full recharge requires approximately 5.5 hours.
9. The display will update the status at the end of each process. Red backgrounds indicate failures. Tap the corresponding screen location for more information.

WARRANTY

Your **SENSIT SCAL-400** is warranted to be free from defects in materials and workmanship for a period of two years after purchase. If within the warranty period the instrument should become inoperative from such defects the instrument will be repaired or replaced at our option. This warranty covers normal use and does not cover damage which occurs in shipment or failure which results from alteration, tampering, accident, misuse, abuse, neglect or improper maintenance. Proof of purchase may be required before warranty is rendered. Units out of warranty will be repaired for a service charge. Internal repair or maintenance must be performed by a Sensit Technologies authorized technician. Violation will void the warranty. Units must be returned postpaid, insured and to the attention of the service department for warranty or repair. This warranty gives you specific legal rights and you may have other rights which vary from state to state.

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This warranty gives you specific legal rights and you may have other rights which vary from state to state.

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MADE IN THE USA
WITH GLOBALLY SOURCED COMPONENTS

SCAL-400 INSTRUCTION MANUAL
Part # 750-00057

Revision 8-17-2021