

waukesha®



Single Column Dehydrating Breather Manual

SCB-MANUAL – 1.7

Read and understand this manual prior to operating or servicing the products.



Patented Single Column Auto Recharging Dehydrating Breathers are manufactured by Prolec-GE Waukesha, Inc., Service & Components Division
U.S. Patent Nos. 5,902,381; 6,797,037; 7,285,150; 7,332,015 & Patent Pending



CONTENTS

Description	3–4
General Description	3
Principle of Operation	4
Construction	4
Intelligent Controls	4
Operational Diagram	5
Safety Warnings and Cautions	6
Specifications	7
Standard SCB vs. Arctic SCB	8
Standard Installation	9–10
Electrical Connections & Warnings	11
Start-Up	12
DIP Switch Settings	12
Fast Mode	12
Alarms Indications	13
Periodic Recommended Inspections	14
Appendix A:	15
Flange Mount Installation	15
Contact Information	16



GENERAL DESCRIPTION

The Single Column Breather (SCB) has been designed to remove moisture from the air entering a load tap changer tank, conservator or other sealed tank. Heaters controlled by an adjustable timer to provide automatic recharging of the silica gel desiccant, eliminating the need for manual intervention. By adjusting the column regeneration cycle time, the system can be configured for various tank (air volume) sizes, up to 8,000 gallons.

System Principle of Operation:

See Figure 1 on page 5. During normal operation, air enters the breather through slots in the upper housing and passes through desiccant to the center of the assembly. The center tube contains several holes along its entire length, forcing air to disperse through the maximum surface area of desiccant. Air then travels through the center tube, along a path to the isolation solenoid, vacuum sensor and eventually through the top port to the conditioned air space.

During regeneration, a temperature regulating PTC heater within the center tube in the silica gel bead column energizes to heat desiccant to a specified temperature. Any moisture present in the desiccant is driven outward to the cooler borosilicate glass globe where it turns into condensate. The condensate runs to the bottom of the breather assembly, where it is discharged through the water drain filter. During regeneration, the solenoid valve located at the top of the breather assembly isolates the column to prevent moisture from the regeneration from entering the tank. The tank may exhale during the regeneration process via the exhale check valve and vent. If the tank needs to inhale during the regenerating process, the vacuum sensor will detect the pressure drop, put the regeneration process on hold and unseal the silica gel column to allow the tank to breathe. Regeneration will resume when the system detects a “quiet” time. Once regeneration is complete (3 hours plus 60 minute cool down), the silica gel column is again unsealed for service.

Construction:

The Single Column Breather (SCB) system is shipped as a single, integrated assembly along with accessories necessary for installation. The breather is constructed with a machined aluminum top, bottom and cast controls housing. Other components include PTC heater, heat conductive fins, screen, condenser media, filter vent system and non-indicating silica gel (installed at the factory before shipment). Electrical and signal wiring is via conduit connections on the bottom of the control housing. An adapter is available for customers that prefer cable connections.

The outer tube is optically clear borosilicate high strength glass. Sealed, Super Bright LED lamps on the control cover provide easy visual indication of breather status (reference table 3 on page 13).

Intelligent Controls:

SCB systems feature an integrated PCB microcontroller that constantly monitors the condition of airflow through the breather. User adjustable, time-based controls regenerate the desiccant regardless of condition. The firmware “learns” the best “quiet” time to perform the regeneration of the silica gel column.

Internal diagnostics constantly monitor, evaluate and adjust the performance of components to ensure breather operation will always provide optimum protection for the air space. All controls and components default to a standard desiccant breather in the event of power loss.

SCB systems include an alarm relay that monitors the heating, solenoid function and line power. This alarm relay may be monitored remotely via a SCADA system.

OPERATIONAL DIAGRAM FOR STANDARD SINGLE COLUMN BREATHER

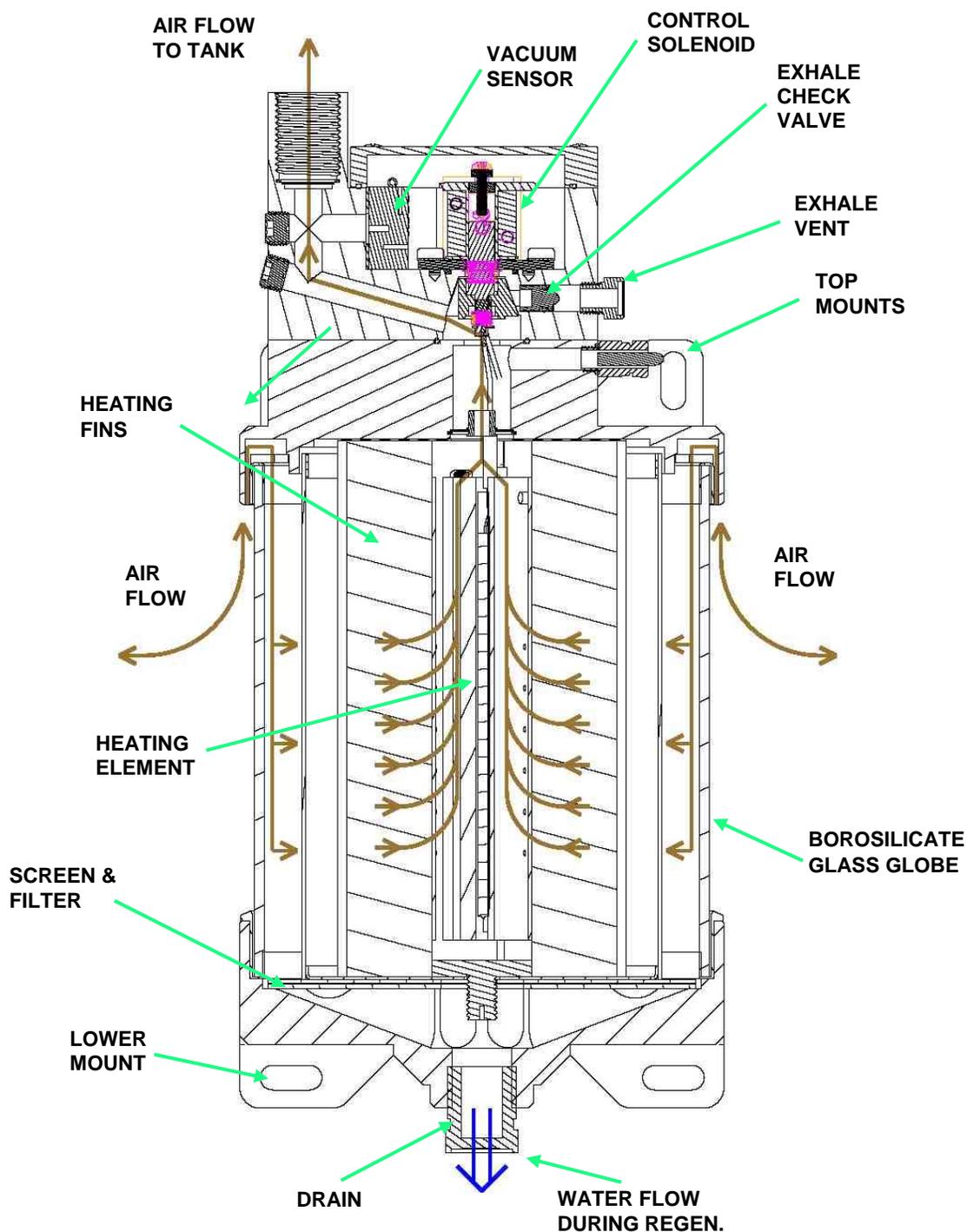


Figure 1 – Standard Single Column Breather (SCB) Functional Operation and Component Identification.

SAFETY INFORMATION

Correct use of this equipment is important for your personal safety and for trouble-free functioning of the unit. Incorrect control or attempts to perform adjustments could cause damage or lead to incorrect operation. Be sure to read and understand all the instructions before attempting to operate the unit.

The unit is designed to produce dry air. Do not operate the unit beyond its limits (see Specifications Table 1 on page 7).

In addition to the warnings and cautions in this manual, use the following safety guidelines for safe operation of the unit.

- ⚠ WARNING** This unit is an electrical appliance. Verify the main power supply is disconnected before you perform installation, maintenance or repair work.
- ⚠ WARNING** If you must work on the equipment with the main power supply on, be aware of electrical hazards.
- ⚠ WARNING** The PTC heater, glass tube and metal housing become hot when operating. Be careful when you touch the system if the yellow LED light is on (PTC heater energized).
- ⚠ CAUTION** Do not block ventilation inlets and outlets as this could cause damage to the unit.
- ⚠ WARNING** In order to prevent injury or damage, caused by the sudden release of compressed air, confirm the unit and connected systems are fully de-pressurized before you start uncoupling parts of the system.

IMPORTANT: The following words and symbols appear throughout this manual and designate important safety instructions:

- ⚠ DANGER** **DANGER:** Indicates information important to the proper operation of the equipment. Failure to observe will result in damage to the equipment and/or severe bodily injury or death.
- ⚠ WARNING** **WARNING:** Indicates information important to the proper operation of the equipment. Failure to observe may result in damage to the equipment and/or severe bodily injury or death.
- ⚠ CAUTION** **CAUTION:** Indicates information important to the proper operation of the equipment. Failure to observe may result in damage to the equipment.

Read all safety instructions to avoid personal injury or death and to avoid damage to the unit or property.

SPECIFICATIONS

COMPONENTS		ELECTRICAL	
Airflow Solenoid	24 VDC Latching	Voltage/Frequency	100–240 VAC, 50/60 Hz
Vacuum Sensor	Vac.: 0 to .54 psi	Regenerating	Inrush 4.0 A max. Steady 1.2 A
Timer Control	DIP switch on PCB	Non-Regenerating	Steady 0.2 A
Indicator Lights	Super Bright LEDs	Alarm Relay (Connect to N.C. Connection)	Normally CLOSED, Held OPEN with Power (Res: 10A 120 VAC, 8A 30 VDC)
OPERATION		AMBIENT CONDITIONS	
Time-Based Settings	5, 10, 20 & 40 day cycle	Temperature Range: Standard SCB	0° to 80°C
Heating	3 hour, full power	Temperature Range: Arctic Zone SCB	–50° to 80°C
Cooling Time	60 minutes before Standby Mode	Air Quality	Normally clean ambient air
Failure Detection	Heater, solenoid valve, vacuum sensor & power failure	Relative Humidity	>95%
		ENVIRONMENT	
		Location	Indoor/Outdoors, wall, rack or pipe mounted

Table 1 – SCB Specifications

OPERATIONAL DIFFERENCES BETWEEN STANDARD AND ARCTIC WEATHER SCBs

Standard SCB

- Fully functional between 0°C and 80°C
- Below 0°C operation:
 - Still **FULLY** functional as a regenerating dry air breather, except, in lower temperatures, water from the automatic regeneration process will freeze in the filter vent.
 - Some light frost may form on the inside of the glass globe but will in no way affect the operation of the SCB auto-recharging breather.
 - Does not affect the unit's ability to reliably provide dry air to the protected space, as the temperature rises above 0°C, any frozen water in the filter vent and/or frost will quickly melt, clearing the filter vent.

NOTE: At temperatures below 0°C, the air only contains a minimum amount of moisture content, which should minimize the occurrence of the non-heated filter vent freezing.

Arctic Weather SCB

- Fully functional between –50°C and 80°C.
- Below 0°C operation:
 - From 0°C to –50°C, the heated filter vent prevents freezing of the water generated from the regeneration process, allowing complete drainage.
 - Some light frost may form on the inside of the glass globe but will not affect operation of the Arctic Weather SCB.
 - Below –50°C, water from the automatic regeneration process may begin to freeze in the heated filter vent; however, this will not affect operation of the Arctic SCB in servicing the protected space.

NOTE: At temperatures below –50°C, air only contains an absolute minimum amount of moisture content, which should minimize the occurrence of the heated filter vent freezing.

INSTALLATION *(using included hose and hose barbs)*

⚠ CAUTION The unit must be mounted in a vertical position. Do not mount the unit on its side or back.

⚠ CAUTION Do not block ventilation inlets and outlets as this could cause damage to the unit and provide inadequate protection for the airspace.

- Unit must be mounted level and vertical.
- All piping and fittings **MUST** be non-corrosive (polymer, brass, copper, stainless steel or equivalent).
- Unit and piping must be installed such that transformer oil cannot enter the breather.
- Install unit away from heat sources.
- Do not install in an enclosed cabinet; **PROPER VENTILATION IS REQUIRED.**

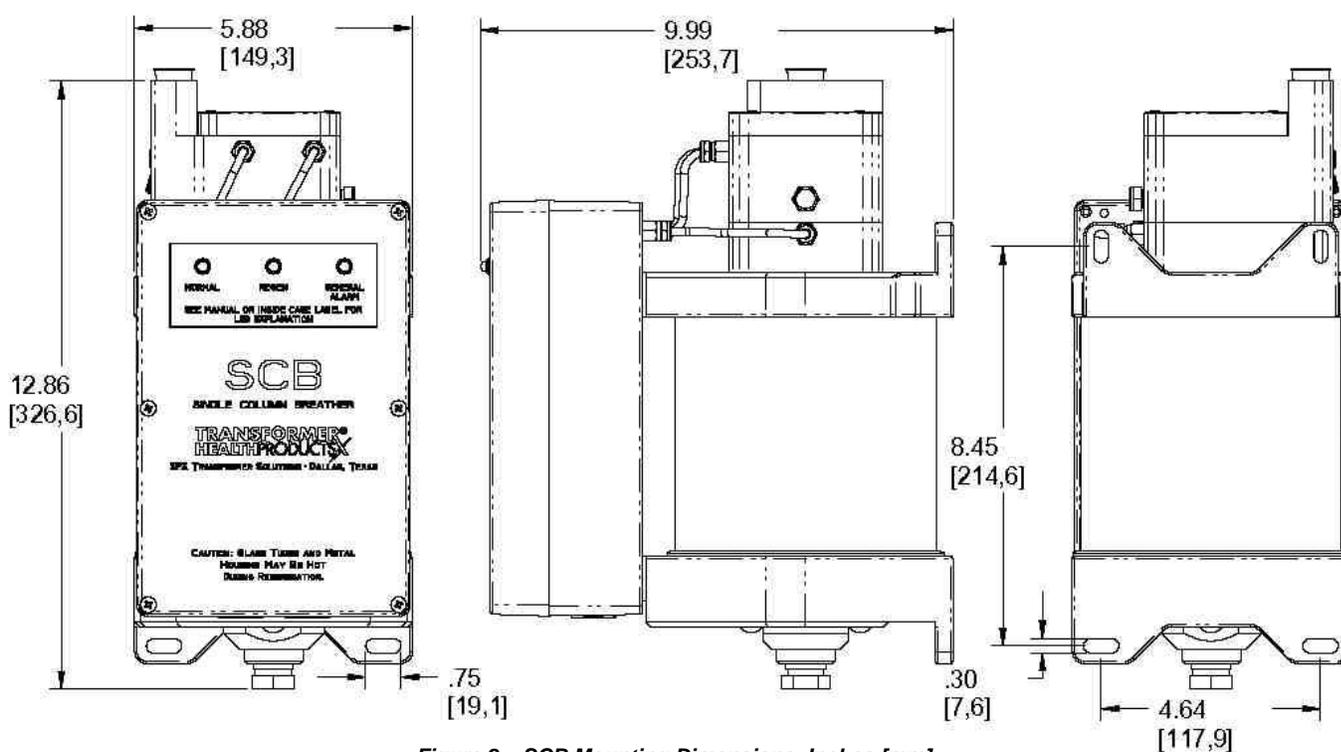


Figure 2 – SCB Mounting Dimensions, Inches [mm]

1. Measure and mark mounting holes or studs as shown by the center-to-center distances in Figure 2 above.
2. Place the unit into position and install with 1/4" hardware into top of breather casting (hardware not included).
3. Install included hose barb securely (see Figure 3 on page 10). Use of thread sealant or thread tape (if hose barb is not already pre-Teflon taped) is required to prevent water from flooding the silica gel chamber.

—CONTINUED ON NEXT PAGE—

INSTALLATION (continued)

4. Install included hose barb from outlet to tank piping or port; use of **thread sealant or thread tape is required to prevent leaks.**
5. Install included hose between hose barbs; ensure the absence of any loops or low spots in the output hose to the conditioned air space.
6. Install power conduit to the right access hole on the bottom of the control cabinet.
7. Install remote alarm conduit (if monitored) to left access hole on bottom of control cabinet.
8. Run the appropriate electrical alarm wiring (if monitored) and connect per Figure 4 on page 11.

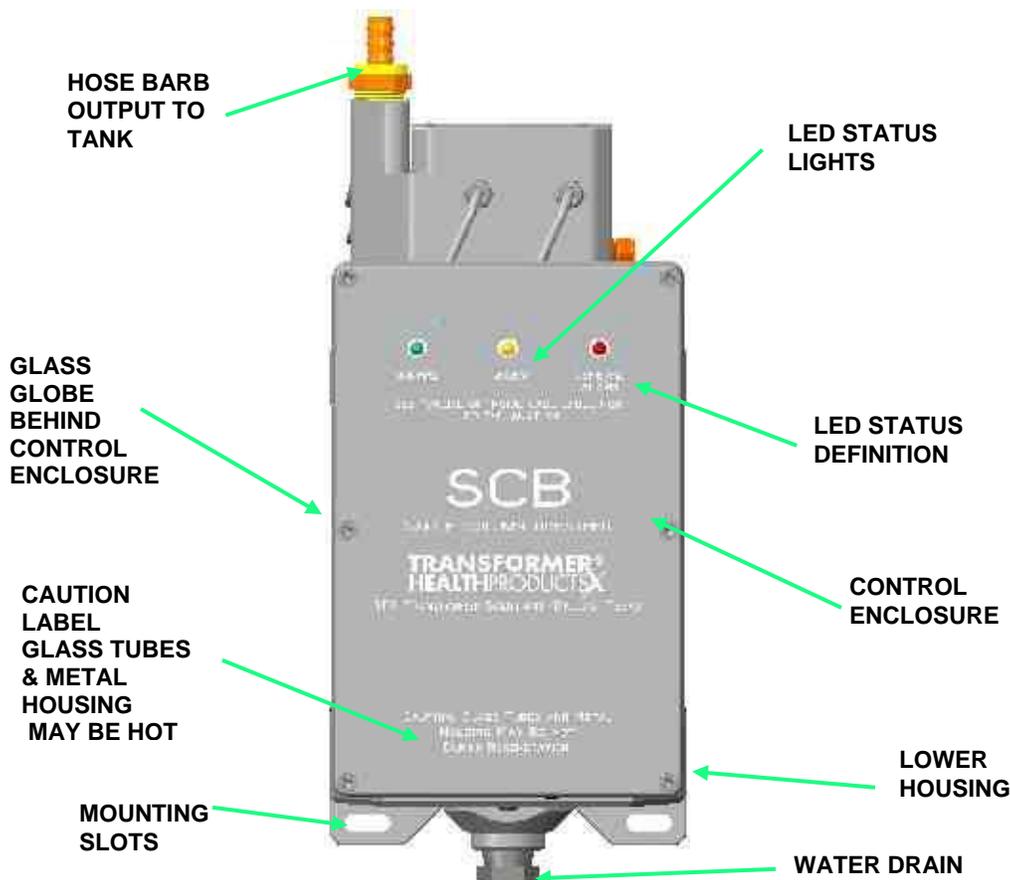


Figure 3 – SCB Major Components

CAUTION Connection to tank port is critical to ensure that no oil can enter the breather. **IF the oil-filled tank connected to the breather is MOVED OR RE-Filled, the breather MUST be ISOLATED from the tank. Oil in the breather OR breather HOSE will result in VOIDING the Warranty.**

CAUTION Piping between the unit and the tank **MUST** be dry, free of oil residue and debris.

CAUTION Unit ships with clear, non-indicating silica gel installed.

ELECTRICAL CONNECTIONS



Electrical shock hazard. Failure to follow these instructions could result in serious injury or death.



Disconnect the lid LED cable from keyed LED connector whenever the lid is removed during installation OR service to prevent DAMAGE to the lid mounted LEDs.

- Electrical ground is required on this appliance.
- Unit should be grounded according to local electrical codes to prevent the possibility of electrical shock. It requires a grounded receptacle with separate electrical lines, protected by fuses or circuit breaker of the proper rating; *check with a qualified electrician if you are in doubt as to whether the appliance is properly grounded.*
- Do not use an extension cord with this appliance.
- Remove temporary hole plugs from bottom of the control cabinet and make appropriate conduit connections to these openings. Power should use the LEFT access hole and remote alarm monitoring should use the RIGHT access hole.
 - Power Connector rated for up to **12 AWG bare round wire, stranded wire preferred.**
 - Alarm Connector rated for up to **12 AWG bare round wire, stranded wire preferred.**
 - If a contact closure is expected for an alarm condition, connect to the N.C. and Com terminals, as the alarm relay is N.C. held open with power.
- Plug-in cable adapters and mounting adapter plates are available for replacement compatibility with previous generation units (ARDB2-0000 and ARDB2-1000)
- For USA 120 VAC, 60 Hz. operation: Connect L1 to L1, Neut. to N & E-Gnd. To E-Gnd.
- For USA 240 VAC, 60 Hz. operation: Connect L1 to L1, L2 to N & E-Gnd. to E-Gnd.
- For Europe 230 VAC, 50 Hz operation: Connect L1 to L1, Neut. to N & E-Gnd. To E-Gnd.

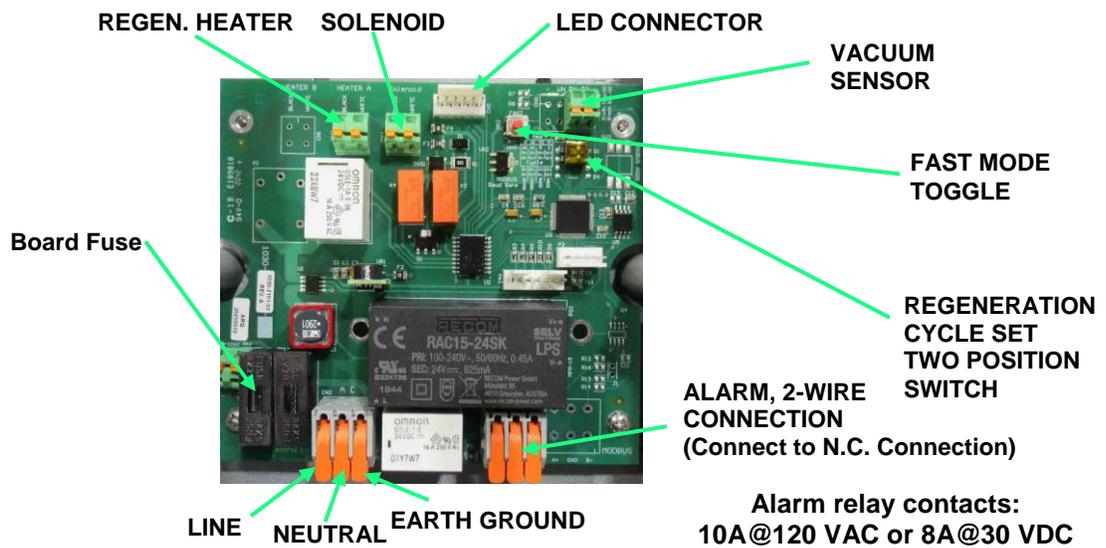


Figure 4 – SCB Alarm and Power Connections



When reinstalling the control box cover, the MAXIMUM torque for the lid screws is 10.8 in-lbs. DO NOT OVERTIGHTEN

START-UP, DIP SWITCH SETTINGS AND FAST MODE

IMPORTANT: Verify the unit has been properly installed according to the installation instructions included in this manual.

CAUTION When the unit is energized, controls will proceed with a regeneration cycle. The glass tube and metal housing will become hot to the touch.

1. Verify all electrical connections are secured and the breather is securely mounted in a vertical position.
2. Energize breather, Self-check verifies solenoid, column heaters and vacuum sensor operation.
3. When power is applied, all three LEDs will blink to verify operation. **The Self-Check procedure will run. After exercising the insolation solenoid, the GREEN LED & the YELLOW LED will light up to signal the start of a regeneration cycle.**
4. Verify heating occurs within 10 minutes; the glass tube should be warm to touch.
5. Unit is ready for operation.

Regeneration Frequency – DIP Switch Settings

The SCB system is factory set for optimum performance and adjustments are limited to the preferred timer-based regeneration frequency. Timer-based regeneration cycle is factory set for a frequency of 5 days; however, the system can be set for 5, 10, 20 or 40 day cycles.

Changing Regeneration Frequency:

1. Ensure the unit is de-energized from the power source.
2. Remove the six screws from front access cover and store to the side. *Be careful with the wires connecting the LED to the PCB.*
3. Locate the DIP switch controls and move both DIP switches to the OFF position.
4. Factory default setting is for 5-day operation: S1-OFF, S2-OFF.
5. See Table 2 and Figure 5 below for combinations of S1 and S2 positions for desired cycle frequencies. (Switch pictured set for 5-day cycle: S1-OFF, S2-OFF).

DIP Switch		Timer Cycle Time (days)
S1	S2	
OFF	OFF	5
OFF	ON	10
ON	OFF	20
ON	ON	40

Table 2 – S1 & S2 Switch Combinations

FAST MODE TOGGLE (HOLD FOR 3 SECONDS TO ACTIVATE)

REGENERATION CYCLE SET TWO POSITION SWITCH (5 DAY)

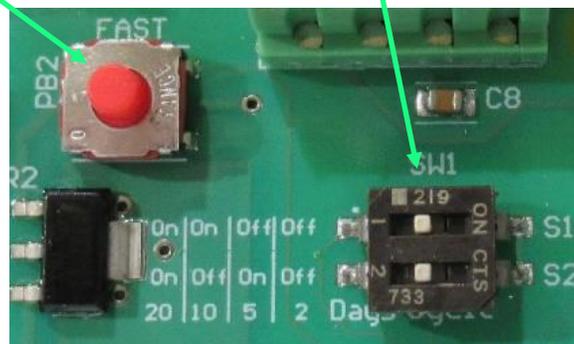


Figure 5 – Cycle DIP Switch & Fast Mode

6. Re-install front cover and tighten the six screws.
NOTE: Maximum torque on cover screws is 40 in-lbs.

Fast Mode: 1 minute of programmed time = 1 second
NOTE: This mode should only be used for debug.

- **Must ALWAYS be returned to normal operation.**
- **Must HOLD Toggle for 3 seconds to activate or deactivate:** Ex.: 3 hour Regen + 60 Minute Cool = 240 seconds

ALARMS INDICATIONS

The SCB system features local LED indicators and alarm contacts that can be used to monitor the condition of the system remotely. The following table lists each alarm, corresponding condition and recommended action for the system.

LED INDICATOR	CONDITION	FEEDBACK CONDITION	ACTION
Local Alarm Indications			
Green	Breather is in normal standby mode and tank is breathing normally through the desiccant	Local indication	None
Blinking Green	Fast mode (debug only)	Local indication	Return to NORMAL mode by toggling the FAST mode button (Must HOLD for 3 Sec.)
Yellow	Regeneration	Local indication	None
Blinking Yellow	Vacuum sensor error	Local indication	Cycle power, if alarm returns, contact factory
Remote Alarm Contacts			
Blinking Red	Regeneration PTC heater failure	Alarm relay contacts CLOSED	Cycle power; if alarm returns, contact factory
Red	Solenoid valve failure	Alarm relay contacts CLOSED	Cycle power; if alarm returns, contact factory
None	Power failure	Alarm relay contacts CLOSED	Investigate power failure

Remotely Monitored Alarm Indications (see Figure 4 on page 11 for wiring)

Table 3 – Local and Remote Alarm Indications

INSPECTIONS

SCB is a self-monitoring system that requires minimal attention. Periodic inspection is recommended to ensure the system is operating at optimum efficiency.

Annual Inspection

1. Visually check the vent drain and inspect for restrictions, such as dust or other contaminants.
2. Clean or replace bottom drain vent, as necessary (SPX Transformer Solutions P/N 1030-1661).
3. Visually inspect desiccant for contamination, particularly oil that will show up as a dark or blackened desiccant color. Desiccant should be clear. If desiccant is saturated, timer regeneration frequency should be decreased (see START-UP section on page 12).
4. If desiccant is oil-contaminated, return the unit to the factory to be reconditioned or replace with a new unit.
5. Clean breather glass tube using a soap/water mixture, if necessary.
6. If control cover is removed, maximum torque on the cover screws is 40 in-lbs.

▲ CAUTION

Glass cleaner or soap and water may be used to clean the glass tubes. Solvents must not be used for any reason as they may contact and degrade the rubber seals. ***Use of solvents on the unit immediately voids warranty.***

APPENDIX A: Flange Mount Installation

1. If transformer has breather piping which ends in DIN 42462-5 flange with integral gasket, order the SCB as follows:
 - If your breather pipe has a DIN 42462-5 flange, order SCB with connection option **-X1X**.
 - Connection option **-X1X** includes a flat flange, flat gasket and down pipe to connect to breather and securing hardware; flat gasket may be used as needed for the installation.
2. Installation with either of the connection options above is straightforward:
 - a. Verify the existing breather piping is clean, clear of debris and/or transformer oil contamination and strong enough to support the 17-pound breather. If debris or contamination is introduced to the SCB, the SCB could fail and warranty is void.
 - b. Install the flange down pipe to the SCB top port; use of thread sealant is required to prevent leaks.
 - c. Install SCB using the flange plate and included hardware; SCB must be installed in the vertical position for proper operation.
3. See Figure 6 below for a typical flange installation.

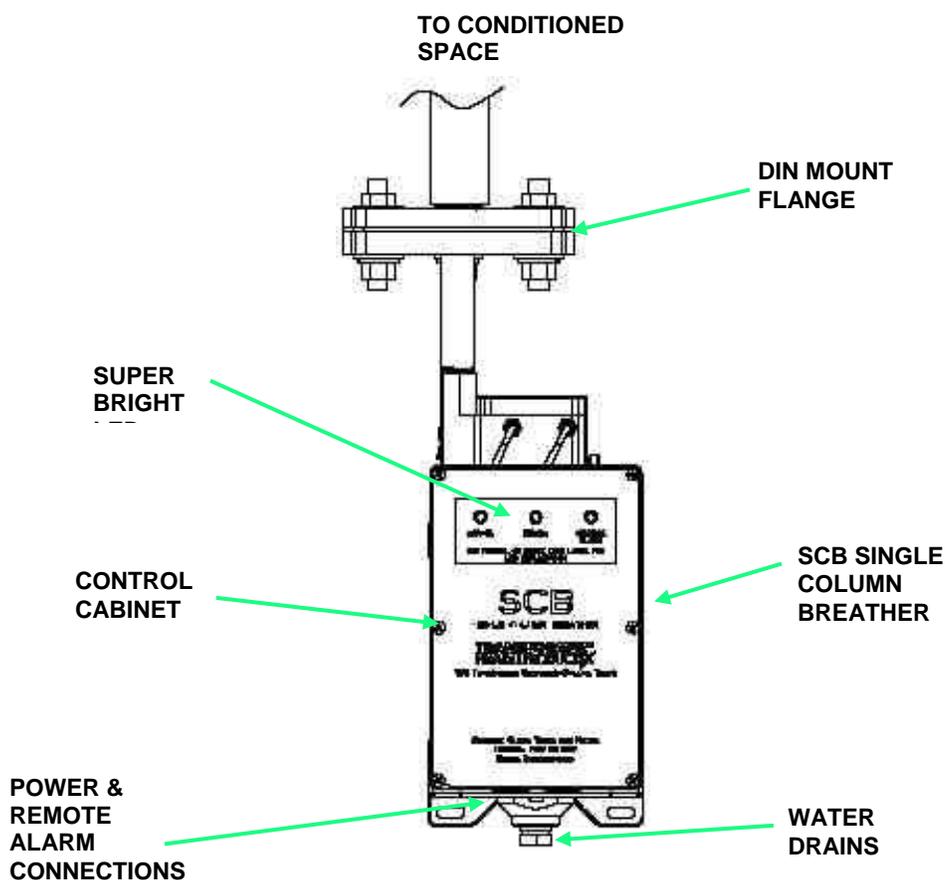


Figure 6 – Typical SCB Flange Installation

REPLACEMENT PARTS AND SERVICE:

Please contact your local sales representative or authorized distributor for replacement parts and/or service, or visit us online at www.waukeshacomponents.com.

For technical support, call us at 800-338-5526.