Liebert®

SGH Steam
Generating Humidifiers

Maintenance and Troubleshooting Guide

IMPORTANT: Read and save this guide for future reference. This guide to be left with equipment owner.

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MAINTENANCE

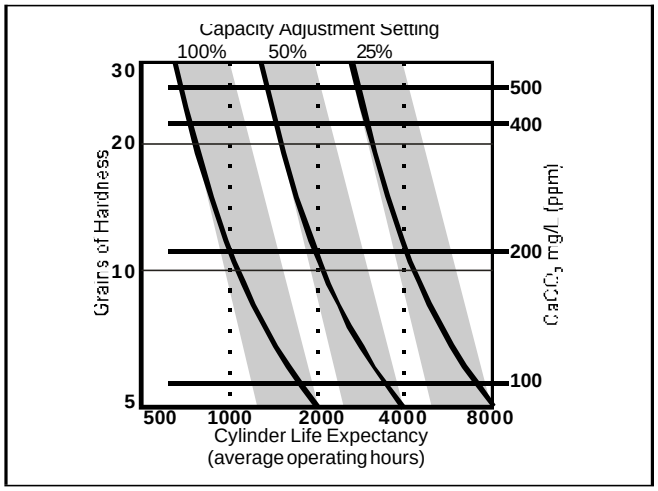
WARNING! The plumbing and electrical compartments contain high voltage components and wiring. The access door(s) is equipped with a lock. Access should be limited to authorized personnel only.

WHEN TO REPLACE THE STEAM CYLINDER

The steam cylinder is disposable and must be replaced at end of cylinder life. Cylinder life is dependent on water supply conditions and humidifier usage. Failure to replace the cylinder at the end of cylinder life may result in unit damage. Liebert is not responsible for any damages resulting from, or attributable to, the failure to replace a used cylinder (see Manufacturer's Warranty). There are many indications, each of which signifies the end of cylinder life.

1. After a period of operation (not on initial start-up), the water level will approach the top of the cylinder. (Life varies from 500 to 2000 operating hours, as illustrated in Figure #1.)

Figure #1
Water Conditions vs. Cylinder Life



2. Each SGH humidifier has a yellow status lamp, a green status lamp, and a relay for remote indication. Double units (models SGH 200) have two of each.

3. When the yellow status lamp is on, the water level is detected as being at the top of the cylinder. This is normal on start-up, but as the contained water concentrates, the water will stabilize at a lower water level and the yellow lamp will be off.

4. When the cylinder is fully used, the water level will have returned to the top of the cylinder. Since there is no longer any clean electrode surface available at end-of-cylinder-life, the required steam output rate can no longer be maintained.

5. At this stage, the yellow lamp flashes (4 times in sequence) and the green lamp is off, telling the user that the cylinder has reached the end of its life and will need to be replaced. The SGH will not operate at end of cylinder life fault.

HOW TO REMOVE THE STEAM CYLINDER

1. (It is advisable to keep a spare cylinder in stock throughout the humidification season.) When ordering a replacement steam cylinder, always quote the three or five digit model number on the label applied to the cylinder or quote the unit's serial number, model and voltage located on the spec label (nameplate).

2. Turn off water supply to unit.

3. Open plumbing door.

4. The used cylinder must be drained completely before removal. If the water has just been boiling, allow it to cool before draining. Push the ON/OFF/DRAIN switch to the MANUAL DRAIN position. Leave it in this position just long enough to drain the cylinder (usually less than 10 minutes).

5. When completely drained, push the main ON/OFF/DRAIN switch back to the OFF position.

6. Once drained, open the main electrical disconnect. The electrical disconnect is to remain open during the entire cylinder change operation.

7. Cylinder plugs are attached to the primary voltage cylinder wires. (The plugs remain attached to the wires unless they have to be replaced due to damage.) The plugs are press-fitted over the electrode pins protruding from the top of the cylinder. Remove cylinder plugs from cylinder by pulling vertically.

8. Using slot screwdriver, loosen the steam hose clamp(s) and pull steam hose off the cylinder vertically.

9. Using a small slotted screwdriver, depress tab on the re-usable tie wrap, if present, around the middle of the cylinder. This will allow you to remove the tie wrap so you can re-use it later on.

10. Cylinder is now ready to be lifted out of the unit. CAUTION: Cylinder and any undrained water might still be HOT.

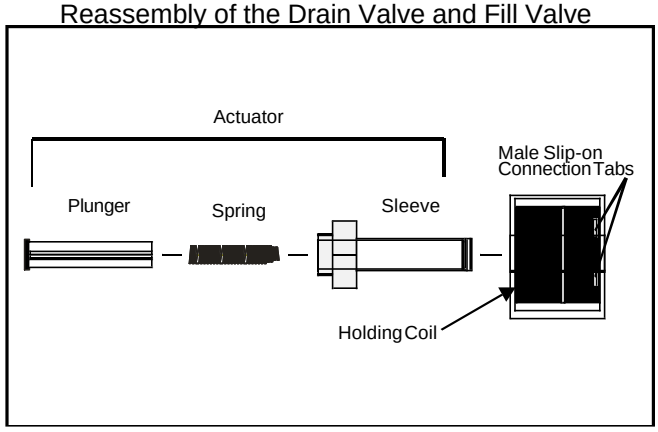
MANDATORY CLEANING OF THE DRAIN VALVE

Always clean the drain valve before installing a new cylinder since the valve port may be as dirty as the used cylinder.

1. Remove used cylinder as previously described.
2. Remove two screws securing drain valve body to drain pan. Disconnect the two slip-on terminals from the two tabs on the (24VAC) drain valve coil.
3. Remove hose clip and hose connection from drain valve body.
4. Drain valve assembly is now free to be taken to a sink for disassembly and cleaning.
5. Remove snap-fit red cap from coil assembly and slide coil off the actuator.
6. Loosen actuator with wrench and unscrew from plastic valve body.
7. Clean the exposed core and spring and plastic drain valve port.
8. Important: Tapered end of spring must be installed toward the solenoid. Reassemble, tighten actuator 1/4-turn past hand-tight. See Figure #4.

Figure #4

Reassembly of the Drain Valve and Fill Valve



9. Clean out the end of the hose, then reconnect it to the drain valve body with the clamp.
10. Fit mounting screws through drain valve body, one for the green ground wire.
11. WARNING: To prevent the possibility of electrical shock the green ground wire must be reinstalled before power is restored.
12. Push the two slip-on terminals back onto the two tabs on the coil. The terminals, although not identical, are reversible.

HOW TO INSTALL THE REPLACEMENT CYLINDER

Note: Liebert does not recommend the use of any acid solutions to clean the used cylinder. Always replace a used cylinder.

1. Reverse procedure in the section “How to remove steam cylinder” to install new cylinder. With the exception that the main disconnect is to be left open until cylinder is completely installed and reconnected.
2. Ensure that cylinder is secured properly by the re-usable tie wrap and mounting brackets within the unit. (Verify that it is the right cylinder type).
3. The cylinder plug wires are color-coded in accordance with colored dots beside the electrode pins on top of the cylinder.
4. This color-coding must be adhered to when replacing cylinder plugs on pins.
5. With cylinders having six primary voltage cylinder plugs, it should be noted that there are two of each color.
6. Care must be taken so that cylinder leads of the same color are always directly opposite each other as indicated by the dot formation on the top of the cylinder.
7. The crimped on blue plug on all units is for the sensor electrode which always goes on the single pin surrounded by a plastic shoulder.
8. Ensure that cylinder plugs fit snugly on the pins.
9. If cylinder plugs become loose, it is best to obtain a new replacement plug. Consult factory.

EXTENDED SHUTDOWN

Before disconnecting power to the humidifier for a period of extended shutdown, ALWAYS DRAIN the cylinder first. Otherwise, the electrodes are subject to harmful corrosion which drastically shortens cylinder life. Do NOT leave the switch in the DRAIN position indefinitely as the drain coil could burn out. Leave the switch in the OFF position and “open” the main external fused disconnect to stop power to the humidifier. Close the shut off valve in the water supply line feeding the humidifier. Lock the cabinet door(s) to prevent unauthorized tampering. All doors are factory supplied with keyed locks. DO NOT LEAVE KEY IN

Figure #3
Cylinder Plug Installation

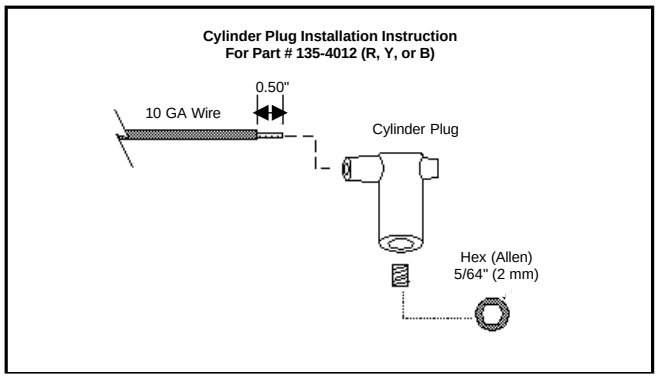
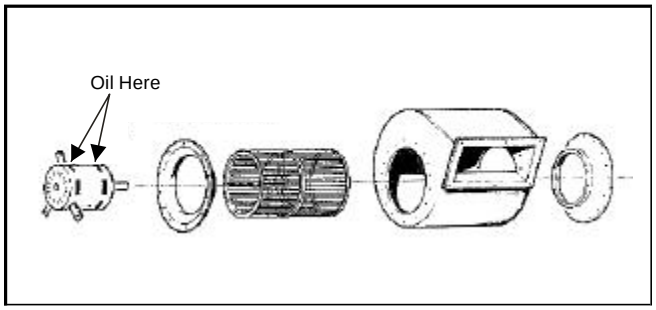


Figure #4
Where To Oil



LOCK. ACCESS SHOULD BE LIMITED TO AUTHORIZED PERSONNEL ONLY.

As long as the SGH is powered, it will automatically drain the cylinder when there has not been a call for humidity for a 72 hour period of time. The cylinder will remain empty until there is a call for humidity at which time the fill valve will open and refill the cylinder. The unit will go through its normal stabilization process for optimum operation.

This feature will reduce the possibility of corrosion of the electrodes and the possible accumulation of algae and bacteria growing in the cylinder.

BUILT ON AND REMOTE MOUNTED BLOWER PACKS

FAN MOTOR OILING: The blower pack fan motor requires occasional oiling of motor bearings. To do this, open up the blower pack top and oil the motor with ten drops of SAE-20 grade motor oil. Refer to Figure #4 for oiling slots. It is important to oil the fan motor every four months to preserve long life and to maintain the fan's warranty. It is not necessary to disassemble the fan/motor assembly. The exploded view is for visual purposes only. See Figure #4.

TROUBLESHOOTING

PLEASE READ THIS SECTION BEFORE REFERENCING SPECIFIC DIAGNOSTIC MESSAGES.

1. Ensure the installation detail conforms with the recommendations contained in the Installation Manual.

2. Understanding the Principle of Operation is an asset when troubleshooting. This information is readily available from your local representative.

3. When contacting your local representative or Liebert, for troubleshooting assistance, please ensure the serial number has been obtained for reference purposes.

4. Whenever the troubleshooting steps indicate a problem with the main PCB, first check all connections at the main PCB before ordering replacements.

PREREQUISITES

- on/off/drain switch must be switched on
- control circuit 8-10 must be made
- modulation humidistat, if present, must be calling
- control circuit 82-83 and 84-85 must be made
- door interlock switch must be made (interlock switch can be pulled out to operate unit)

NOTE: Most water does not contain enough conductivity for full boil on initial start-up. Units will need to concentrate the water over a time period (hours to days). During this process both lights are on. (Also see Troubleshooting Guide).

The SGH has built in diagnostic capabilities and will shutdown for the following reasons:

- Excess current
- Max fill time
- Change cylinder/end of life

See Figure #5 on page 4 for system messages and responses of the unit.

Figure #5
Sys tem Mes sages and Re sponses

SGH				
SYSTEM FAULTS*	UNIT OPERATION STATUS	UNIT STATUS LAMPS		REMOTEINDICATION (24 VAC TO:)
		YELLOW	GREEN	61-20
ExcessCurrent	OFF	Flashing (1 time in sequence)	OFF	ON
Max. Filling Time	OFF	Flashing (2 times in sequence)	OFF	ON
Cylinder Spent	OFF	Flashing (4 times in sequence)	OFF	ON
Maximum level	ON	ON	ON	OFF

BLOWER PACK OPERATION

An optional blower pack, if present, gets its primary voltage from inside the humidifier. This way, only one external power source has to be connected to the equipment.

Blower packs are equipped with a control thermostat mounted on the steam distributor. When the humidifier generates steam the thermostat is heated, the contact is closed, and the fan is started. When steam is no longer being generated, the fan cuts out with a delay.

If blower packs get overheated (malfunction of the air circulation), the manual reset safety thermostat interrupts the steam generation. To reset, switch off the humidifier and wait until the steam distributor cools down. Wait until the fan stops before throwing the disconnect switch. Failure to do so will trip the safety thermostat interrupts. Then remove left-hand side intake air filter and, using a screwdriver, press the reset button (marked with a red dot) inside the blower packs.

All units are equipped with speed select switch. The switch is located on the right-hand side of the blower, inside the blower pack. To access the switch remove the right-hand side intake air filter. For blower packs working with humidifier outputs of 50lbs/hr or higher use the high speed setting.

USING THE WIRING DIAGRAM

Fixed to the inside of each unit's door is a wiring diagram showing all of the internal (and most of the external) wiring details. Additional external wiring details can also be found with any electrical accessories purchased from Liebert.

The following is a detailed explanation of how the SGH humidifier (with and without options) operates. Direct reference is made to the wiring diagram. Reviewing the proper function in detail will make it easier to troubleshoot if something goes wrong.

The wiring diagram details a 24 Vac control circuit and a primary voltage circuit.

The contactor receives its "hot leg" from Relay #1 (RL1) on the control board. The fill receives its "hot leg" from terminal P4/2. The drain receives its "hot leg" from terminal P4/3.

PROCEDURES AND TERMS USED IN DIAGNOSING

PRINCIPLE OF OPERATION

The conductivity of the water within the cylinder must be controlled in order for the humidifier to function properly. The fill and drain rates must be maintained. Filling too quickly can cause over-amping and automatic shutdown or blown fuses. Filling too slowly can cause insufficient steam output and foaming. Water supply pressure should be between 30 and 150 psig. Draining too slowly can cause over-concentration and malfunction due to foaming. These are just some examples of what can go wrong if the fill and drain rates are not maintained.

FILL RATE

Fill rates of suspect units should be checked. Fill rates should measure nominally at 1" to 1-1/2" of vertical rise in water level in the cylinder in one minute.

A clogged fill valve will cause lower fill rate. The fill valve strainer is removable and can be cleaned.

DIAGNOSTIC PROCEDURES - TROUBLESHOOTING

The SGH controller provides a number of messages to simplify troubleshooting procedures. The following table presents fault messages displayed by the controller, their meaning and possible corrective actions. Refer to the preceding section for detailed information about terms used in the table.

Unit Status Lamp		Symptom	Possible Cause	Corrective Action
Yellow	Green			
1 flash in sequence	Off	Excess Current. Current drawn on monitored primary lead to cylinder has reached or exceeded 130% of its rated amps. The unit will have tried to self-correct prior to system shut down by draining water from the cylinder and de-energising the contactor momentarily while it drains. This self corrective action occurs between 115% and 130% of it's rated amps. When controller detects excess current it also drains water from cylinder.	1. Cylinder water is over-concentrated (too conductive) due to restricted drain, short-cycling by controls, supply water not within acceptable limits (too conductive), improper fill rate, incorrect cylinder being used. 2. Water level too high due to leaking fill valve, excess condensate return from steam line.	1. Turn unit back on and check the fill rate (1 - 1-1/2 inches per minute) 2. Manually drain cylinder while checking drain rates (See Figure #6). If too slow correct cause. 3. Once RH% set point is attained, monitor cycle time and check for water flow presence in overflow hose (symptom of backpressure).
2 flashes in sequence	Off	Maximum filling time. Neither Maximal Level (full cylinder) is detected, nor is there enough current drawn to meet capacity demand within a pre-programmed interval.(30 minutes)	1. Steam line restriction causing back pressure 2. Improper fill rate 3. Leaking drain valve 4. Full cylinder not detected.	1. Check for water leaking from drain. If present, correct the drain valve deficiency (check for debris holding drain coil plunges open) 2. Check steam line to the steam distributor (duct or blower pack) , for restrictions that could cause high back pressure. 3. Check water level in cylinder. - If full: Reset unit and ensure there is a demand for steam (the green LED on unit door will stay illuminated). Maximal Level should be indicated with both the green and yellow lights on the unit door illuminated. If Maximal Level is not indicated, a problem exists with the high water sensor circuitry since the unit does not sense the water level. - If not Full: Drain cylinder, reset unit and check the fill rate (1"-1 ½" per minute). If fill rate is correct, back pressure is the likely cause and should be rechecked.
4 flashes in sequence	Off	Cylinder spent. Water level stays high, cycling on and off Maximal Level (full cylinder), without an increase in output/amp draw or reaching demand for an extended period of time.	1 .Normal on start-up with a new cylinder or a cylinder that has been completely drained because of an extensive off period. This can last several hours until the water in the cylinder has concentrated. Or the electrodes can no longer provide rated capacity (or adjusted capacity). Water level automatically rises to seek out fresh electrode surface to meet the demand.	Replace the cylinder immediately or if the cylinder has been replaced recently, check for foaming.

DRAIN TIME

Manual drain time of a half full cylinder depends on cylinder size (see Figure #6).

If time measurements are longer, repeat with the external drain disconnected (and draining into a pail) to verify that the external drain is impeding flow. If it still does not drain, check for a clogged strainer or drain valve.

A clogged strainer or drain valve will cause shortened cylinder life. Determine what caused the strainer or drain valve to clog in the first place.

Do not assume that if a strainer and/or drain valve is clogged that it is to blame. If the external drain has been impeding flow then waste accumulates resulting in a clogged strainer or clogged drain.

Clean the drain valve and install a fresh cylinder. Then measure the manual drain time with and without the external drain connected. Is the external drain impeding flow? Liebert recommends an open external drain line.

Figure #6
Manual Drain Times

CYL. SIZE (SERIES)	PROPER TIME (sec) TO DRAIN MANUALLY FROM SEAM TO EMPTY BEIGE BODY DRAIN VALVE
600	2 min utes and 52 sec onds ± 10 sec.
300	43 seconds ± 2 sec.
200	25 seconds ± 1 sec.

RATED AMPS

This refers to amps listed on the humidifier specification label.

SHORT CYCLING

Occurs when the 'on time' of the humidifier is less than ten minutes upon a call for humidity. To correct short cycling, all humidifiers have a capacity adjustment which allows the output of the humidifier to be reduced as low as 25% of rated output, thus extending the 'on time' required to maintain output. Excessive short cycling may cause higher water conductivity (mineral content) than the unit is designed for.

FOAMING

A phenomenon which can occur in water when impurities, already in the water, reach an excess concentration as result of boiling away pure water and the continued boiling action agitating the contained water. The humidifier electronics are designed to prevent this occurrence although in extreme cases water will foam with little concentration, making it necessary to have the drain time of the water, contained in the cylinder, increased. Foaming is normally caused by short cycling, a restricted drain, or back pressure. The foam, generated in these instances, is conductive and may lead to a false full cylinder indication if the level of the foam approaches the top of the cylinder.

BACKPRESSURE

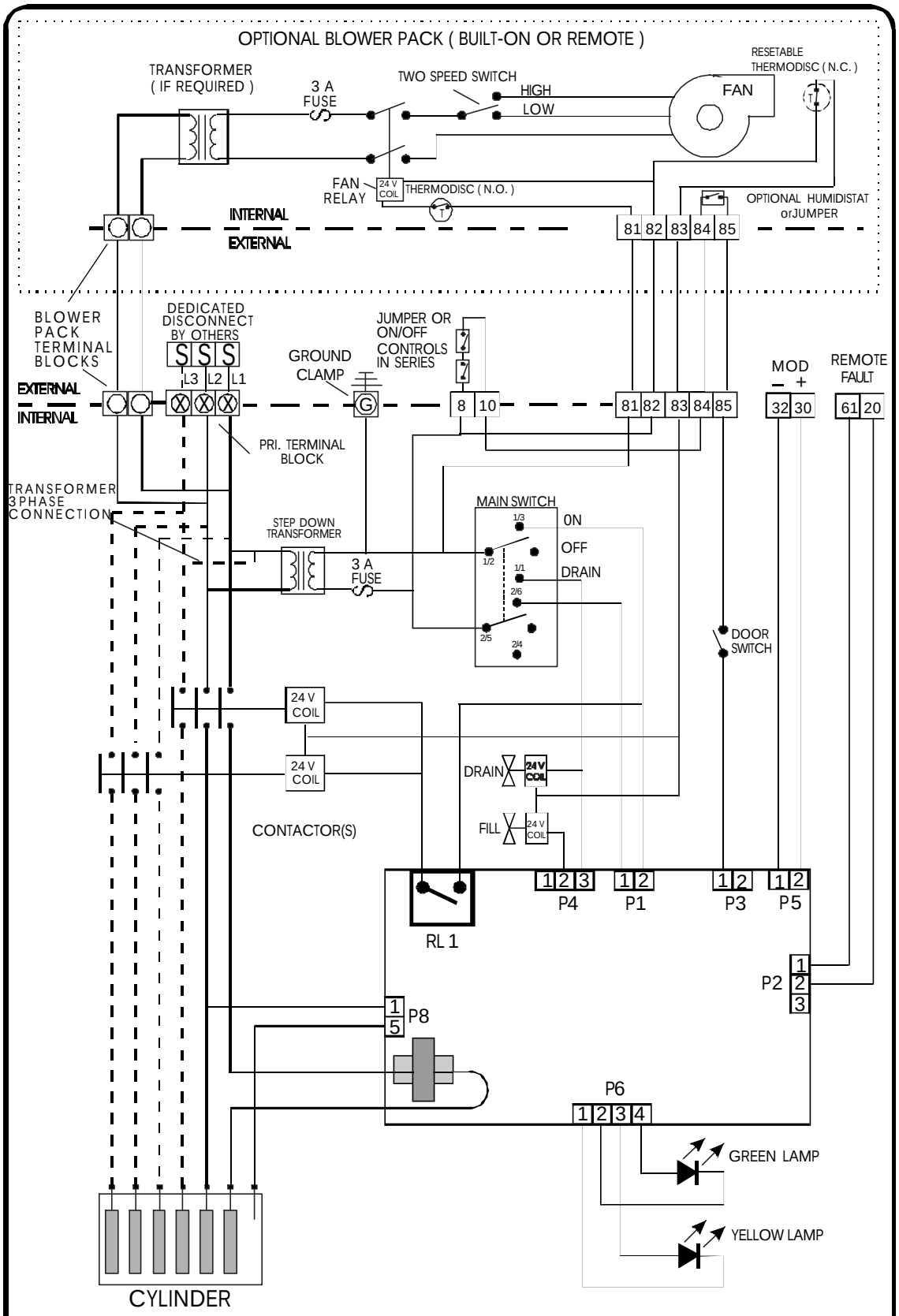
Restriction of steam flow caused by improperly sloped steam lines, elbows changing the direction of the steam flow from horizontal to vertical without a condensate drain leg, and any plumbing detail allowing the accumulation of condensate, undersized steam line, improper steam distributor, downward air flow onto the distributor creating excess static pressure at the steam outlets or high static pressure ducts (not probable). To overcome excess static pressure in the duct, a fill cup extension kit should be used. In downflow applications, a downflow distributor should be used but in some cases the fill cup extension will also be required.

MONITORED LEG

Refers to the primary wire, to the cylinder, which loops through the current sensing device on the main PCB. This wire is terminated at the red cylinder plug at the cylinder. Units with six primary wires to the cylinder will monitor only one of the two wires, terminating with red plugs.

RESET UNIT (HUMIDIFIERS)

To reset the humidifier, the on/off/drain switch at the front of the humidifier should be switched to the off position for a minimum of five seconds and then switched back to the on position.



Liebert®

SGH HUMIDIFIER

w OR w/o OPTIONAL BLOWER PACK (BUILT-ON OR REMOTE)

WIRING DIAGRAM NO. SGH0001 Rev. C

LIMITED WARRANTY

Liebert Corporation (hereinafter collectively referred to as THE COMPANY), warrant for a period of two years from date of shipment, that THE COMPANY's manufactured and assembled products, not otherwise expressly warranted (with the exception of the cylinder) are free from defects in material and workmanship. No warranty is made against corrosion, deterioration, or suitability of substituted materials used as a result of compliance with government regulations.

THE COMPANY's obligations and liabilities under this warranty are limited to furnishing replacement parts to the customer, F.O.B. THE COMPANY's factory, providing the defective part(s) is returned freight prepaid by the customer. Parts used for repairs are warranted for the balance of the term of the warranty on the original humidifier or 90 days, whichever is longer.

The warranties set forth herein are in lieu of all other warranties expressed or implied by law. No liability whatsoever shall be attached to THE COMPANY until said products have been paid for in full and then said liability shall be limited to the original purchase price for the product. Any further warranty must be in writing, signed by an officer of THE COMPANY.

THE COMPANY's limited warranty on accessories, not of Liebert's manufacture, such as controls, humidistats, pumps, etc. is limited to the warranty of the original equipment manufacturer from date of original shipment of humidifier.

THE COMPANY makes no warranty and assumes no liability unless the equipment is installed in strict accordance with a copy of the catalog and installation manual in effect at the date of purchase and by a contractor approved by THE COMPANY to install such equipment.

THE COMPANY makes no warranty and assumes no liability whatsoever for consequential damage or damage resulting directly from misapplication, incorrect sizing or lack of proper maintenance of the equipment.

THE COMPANY retains the right to change the design, specification and performance criteria of its products without notice or obligation.

Liebert®

Model #:_____

Serial #:_____

Cylinder #:_____

Cylinder Last Replaced:

_____
MTH/DAY/YR

_____
MTH/DAY/YR

_____
MTH/DAY/YR

LISTED
HUMIDIFIER
E65185

LR-35859

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