Tri-Gas Generator Series

Models LCMS-5000, LCMS-5001T, LCMS-5001NT

Installation, Operation, and Maintenance Manual

Parker Balston

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Explanation of Warning Symbols

Symbol	Description
	Caution, refer to accompanying documents for explanation.
	Refer to the caution note indicated for explanation.
	Caution, risk of electric shock.
	Refer to the warning note indicated for explanation.

Tri-Gas Generator Series
Models LCMS-5000, LCMS-5001T, LCMS-5001NT

Installation, Operation, and Maintenance Manual

These instructions must be thoroughly read and understood before installing and operating this product. Any modification of the product will void the warranty. Failure to operate this product in accordance with the instructions set forth in this manual and other safety governing bodies could jeopardize the safety of the operator and void the safety certification of this product. Retain these instructions for future reference. If you have any questions, please call the Technical services department at 1-800-343-4048, 8AM to 5PM Eastern Time or e-mail at balstontechsupport@parker.com. For other locations, please contact your local representative.

Please refer to page 2 for an explanation of the caution/warning symbols used throughout this manual.

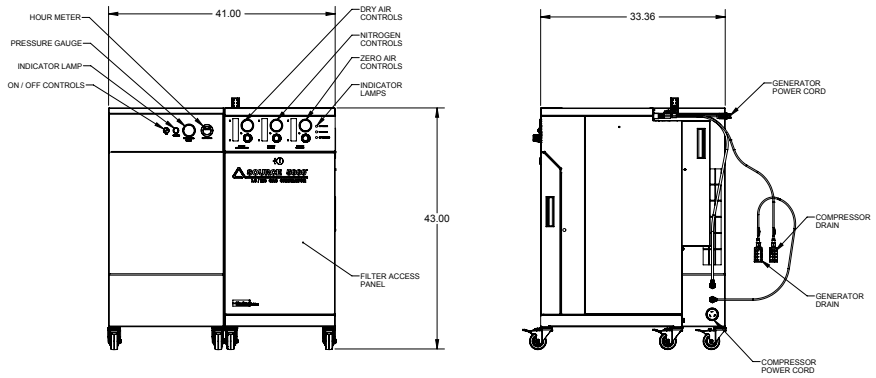

Figure 1a Model LCMS-5000 Generator/Compressor

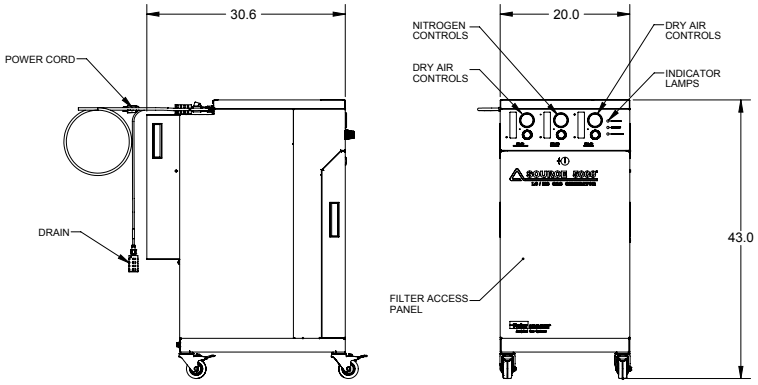

Figure 1b Model LC/MS-5001T Generator/Receiver Tank

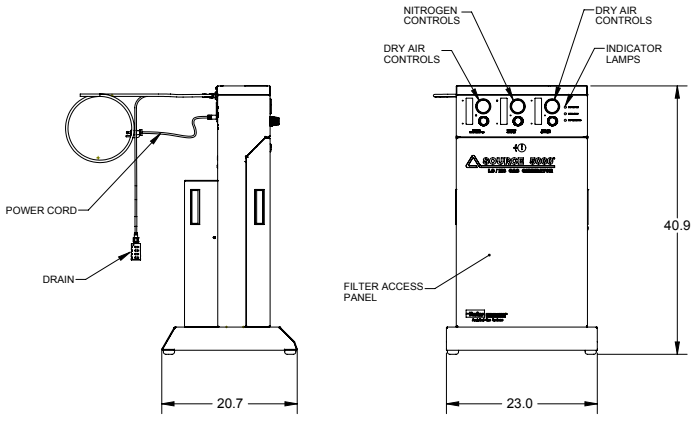

Figure 1c Model LC/MS-5001NT Generator (Dimensions in inches)

General Description

The Source LC/MS Tri-Gas 5000 Generator Series are available in three models (figures 1a,b,c):

(1) LCMS-5000, Tri-Gas Generator, Compressor and Receiver Tank (visually integrated model)
(2) LCMS-5001T, Tri-Gas Generator and Receiver Tank
(3) LCMS-5001NT, Tri-Gas Generator

The visually integrated system is engineered to produce pure nitrogen for curtain gas; zero grade air for gas-1/gas-2 source gases; and clean, dry, -40°F dew point air for source exhaust gas from compressed air delivered by a carefully matched scroll compressor. The system is housed in two mobile, sheet metal cabinets: one cabinet produces the compressed air using an oil-less rotary scroll compressor. The second cabinet removes contaminants and separates the compressed air into the three gases.

Regulatory Compliance

The generator is certified to the electrical safety requirements as specified by the IEC, UL, and CSA standards. These units bear the CSA marking on the product. Product supplied internationally also carries the CE mark. The product meets EMC compliance. Internal pressure receivers are CRN and ASTM Certified or CE certified.

Integrated System

The LCMS Source 5000 contains the necessary components to produce reliable, oil-free compressed air and the three gases required to operate the LC/MS instruments. The system consists of six functional technologies: (1) compressed air, (2) liquid water removal (3) prefiltration (4) oxygen/carbon dioxide/water vapor removal, (5) hydrocarbon removal and (6) final filtration. The compressed air schematic (figure 2) shows the air flow through the intake filter, compressor pump, aftercooler, receiver tank, and check valve. The gas separation schematic (figures 3 and 4) shows the compressed air flow through the receiver tank and prefiltration where additional water (liquid and vapor) is removed. After filtration, the compressed air flow passes through an activated carbon prefilter, nitrogen membrane, post carbon filters, pressure regulator, and flow meter, providing the nitrogen curtain gas. The second flow passes through a dryer membrane, then further divides into two paths. One path goes to a pressure regulator, flow meter as dry air or the source exhaust gas. The second path flows into the hydrocarbon removal module, an aftercooler, filter, pressure regulator, flow meter resulting in zero air gas or gas 1/gas 2 as output. To protect from environmental contaminants, all three gas lines pass through final activated carbon filters before entering the instrument.

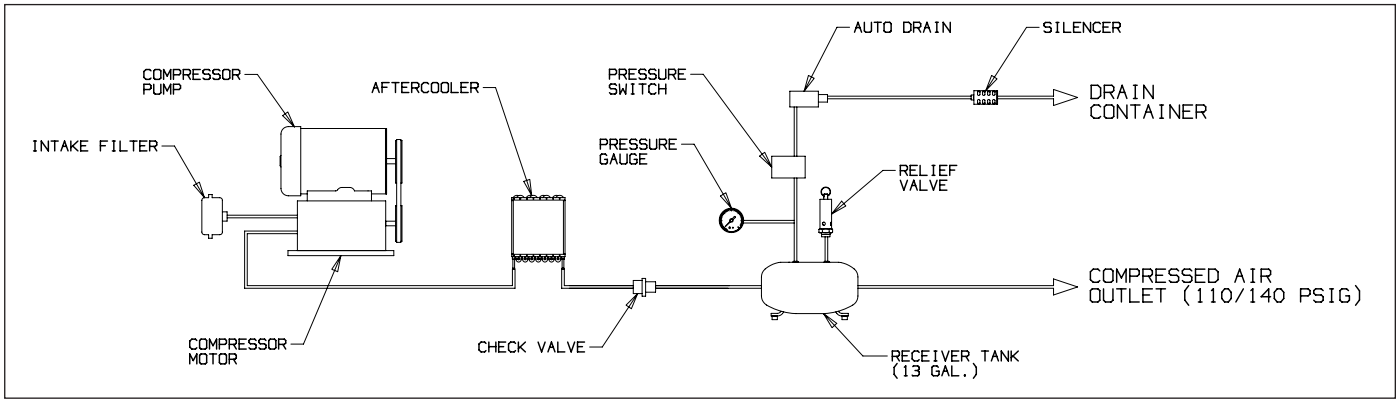

Figure 2: Compressor Flow Schematic LCMS-5000

Compressor Pump

The oil-less rotary scroll compressor is based on the theory of scroll compression. It offers high reliability and quiet operation. The scroll set consists of two identical spirals, offset 180° with respect to the other so the scrolls mesh. One scroll is orbited around the fixed scroll, trapping and compressing gas pockets as the pockets move to the center of the fixed scroll. The compressed gas is discharged from the pump through the center outlet.

Compressor After Cooler

The air cooled aftercooler on the scroll compressor is a series of cooling fins and a high output fan. The cooling features allow the scroll compressor to operate at lower temperatures and extend bearing, tip seal and grease life. The aftercooler cools the temperature of the discharge air. The temperature of the discharge air is lowered, producing trapped water in the tank. The water is then discharged through the automatic electric drain valve and collected in a disposal container.

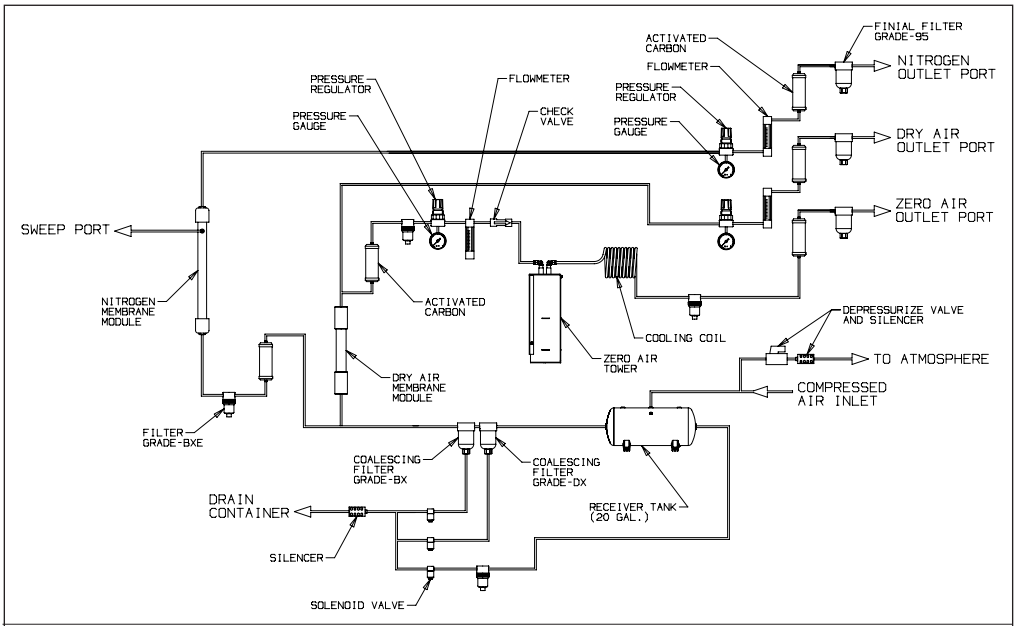

Figure 3: Tri-Gas Generator Flow for LCMS-5000 and LCMS-5001T

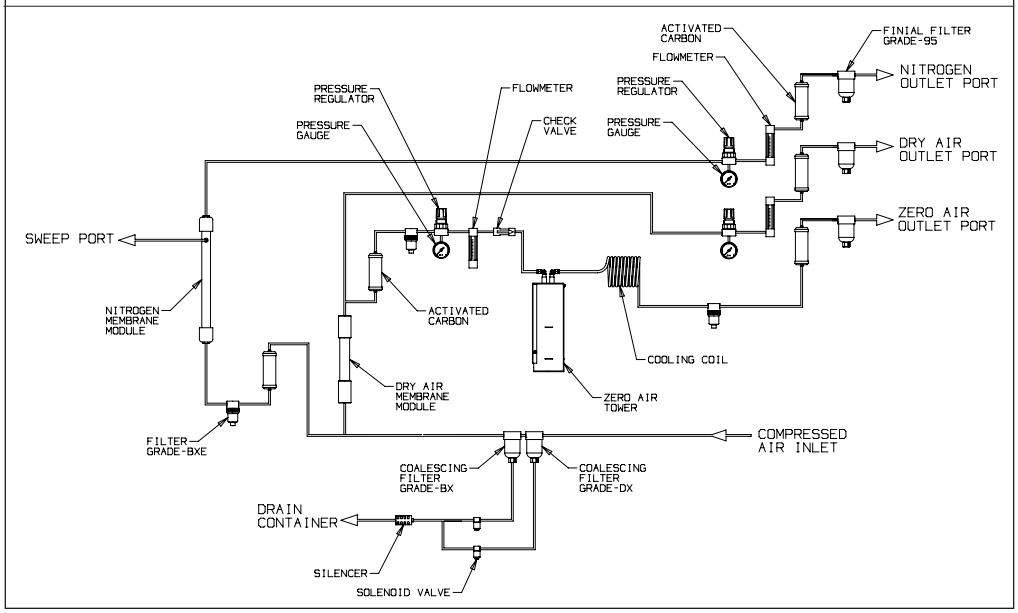

Figure 4: Tri-Gas Generator Flow for LCMS-5001NT

Prefilters

Two stages of high efficiency coalescing prefiltration are incorporated into the design of the Source 5000 to remove water and particulate contamination to 0.01 micron. The generator is equipped with electronically timed drain valves to automatically discharge any liquids which have accumulated in the filter bowls. The liquids are collected in the supplied disposal container. These filters protect the membrane and associated components from contamination which may foul the operation.

Carbon Module and Filter

An activated carbon module is located before the zero air module to remove any chlorinated hydrocarbon contaminates that may exist in the room air. A filter is located after the carbon module to remove any carbon contaminates.

Nitrogen Membrane

The Source 5000 Gas Generator has a hollow fiber membrane module which converts compressed air into high purity nitrogen, suitable for use as the curtain gas. The membrane module has no moving parts assuring years of maintenance-free operation.

Dryer Membrane

The water vapor in the compressed air passes through the hollow fibers of the membrane for removal, resulting in dry air. A small portion of the dry air is redirected along the fibers to sweep out additional water vapor laden air and vented to atmosphere in the cabinet. A dewpoint of -40°F is achieved at a pressure of 100 psig and flow rate of 28 slpm.

Hydrocarbon Removal

The tower module is a stainless steel vessel filled with catalyst, equipped with a cartridge heater. During operation, hydrocarbons are oxidized into carbon dioxide and water vapor. The catalyst bed is maintained at the required temperature for optimal oxidation by the heater's temperature controller. A coiled nickel-copper aftercooler and fan cool the hot outlet air from the hydrocarbon removal module, resulting in zero grade air.

Outlet Carbon Scrubbers & Filters

There are three final activated carbon modules and filters located at the outlet gases that protect the gas purity from environmental contaminants to assure medical/research grade is entering the instrument.

Diagnostics

There are three diagnostic indicator lights on the LCMS Source 5000 Tri-Gas Separation Cabinet:

Low Pressure LED (yellow): The "Low Pressure" LED illuminates with an audible beep to indicate the inlet pressure is less than 105 psig (7.2 barg). The alarms are activated at start-up until the receiver tank pressure reaches the 105 psig set point. Models LCMS-5001T, LCMS-5001NT, the set point is 85 psig (5.8 barg).

System Ready LED (green): The "System Ready" LED indicator has two functions: If the green "System Ready" LED is blinking (once per 12 seconds), the generator is in start-up mode. The "System Ready" LED indicator will illuminate when the generator has completed its warm-up phase and is ready to deliver gases to the instrument.

Low Temperature LED (yellow): The "Low Temperature" LED indicator has three functions. The LED is lit solid when the zero air module is heating up during the start-up phase. If the LED is solid for longer than 20 minutes, there may be a possible fault with the hydrocarbon catalyst heater or the electrical connections to it. If the LED is blinking, it is time to replace the hydrocarbon catalyst module as part of the routine maintenance of the generator.

There are two diagnostic indicator lights on LCMS Source 5000 compressor cabinet.

High Temperature LED (red): The "High Temperature" LED indicator illuminates when the compressor pump has reached its maximum temperature. The compressor will shut down.

Power On LED (green): This indicates the compressor is operating.

Installation

Unpacking

All installation, operation, and maintenance activities for the Tri-Gas Generator Series should be performed by trained personnel using reasonable care to avoid injury or damage.

The LCMS-5000 Generator has casters and is packed in a wooden shipping container. The Installation Kit, consisting of plastic tubing, silencers, and a plastic disposal container, is packed inside the container. Remove the wire L-shaped fasteners from the top and one end of the container (see figure 5). **Do not attempt to lift the generator from the container.** Remove and locate the plywood ramp (see figure 6). Check the locking casters are unlocked. Move the two cabinets down the ramp. Move the generator and installation kit to its installation location. Model LCMS-5001NT is not equipped with casters and requires a mobile cart to move to its location.

Figure 5

Figure 6

Location

Location of the generator with proper ventilation is critical. Install the generator in a clean, well ventilated area. To provide adequate ventilation and servicing for the generator, a minimum clearance distance of 30 inches in front and in the rear is required. **For the LCMS-5000** Installation, the Tri-Gas generator cabinet should be located on the right side of the compressor cabinet (see figure 7). Fresh intake ventilation for the compressor cabinet enters from the bottom and sides, while warm exhaust air exits from the right, rear side. A minimum of 3 inches clearance is required on the left side of the compressor cabinet (see figure 8). **For the LCMS-5000 or LCMS-5001**, ventilation for the Tri-Gas generator cabinet is from the bottom. No clearance distance is required from either the left or right sides. **For the LCMS-5001NT**, the intake ventilation enters from the bottom, while the warm exhaust air exits out the rear. No clearance distance is required from either side.

Figure 7 Compressor and Tri-Gas Generator Location

Figure 8 Compressor Left Side Intake

The generator is for indoor use only. Do not install outdoors. The ambient temperature of the air surrounding the generator should not exceed 90°F (32°C). If the compressor is located in a totally enclosed room without ventilation, an exhaust fan with access to outside air must be installed. Do not locate the compressor where hot exhaust air from other heat generating units may be drawn into the compressor. The area should be free of excessive dust, toxic or flammable gases, solvent fumes, and moisture.

Chlorinated hydrocarbon compounds and chlorofluorocarbons (or freons) will permanently contaminate the hydrocarbon catalyst module in the generator. Extreme care should be taken to ensure that these compounds are not present in the air supplying the compressor.

The hydrocarbon catalyst module can also be contaminated by high concentrations of lead, sulfur, or phosphorous compounds, heavy metals, and long chain polymers. Care should be taken to avoid introducing these compounds into the Generator. Specifically, assure that none of these compounds are stored near the inlet to the compressor supplying the system with compressed air. If these compounds are present, the intake for the compressor should be vented to the outdoors.

If any potentially damaging hydrocarbons, chlorofluorocarbons, chlorinated solvents or other similar components are used in close proximity to the compressor, an auxiliary hydrocarbon scrubber (P/N 76080) should be installed directly upstream from the generator (see Recommended Accessories on page 10).

The LCMS-5000 creates minimal noise during operation. The noise generated is about 49 dB at one meter. Periodically there is an air discharge noise from the drain port eliminating accumulated fluids in the prefilters and receiver tank. The noise and heat generated by the unit should be considered when selecting an installation location. A silencer kit is included for the drain discharge noise. There is also a pump “burp” noise lasting a few seconds each time the compressor shuts-off depressurizing the pump during the off cycle.

Utilities

For the NA Model: The LCMS-5000 generator requires two electrical power outlets: The compressor cabinet requires a dedicated grounded 208 to 254VAC, 60 Hz, single phase, minimum 20 Amp. circuit breaker with a NEMA L6-20R receptacle (see figure 9). **Parker requires purchasing a step-down transformer if your facility voltage is 255 or higher, or a step-up transformer if your voltage decreases below 208.** See the accessory section on page 27. The Tri-Gas generator cabinet requires a 120VAC, 60Hz, single phase, 15Amp circuit with a NEMA 5-15R receptacle. The provided cordset rating is 15A / 125VAC. The cordset should not be replaced with an inadequately rated cordset. Main supply voltage fluctuations must be within ±10% of the nominal main supply voltage.

For UK, EU Models: The compressor, rated at 230V, 50 Hz, single phase, 13A fully loaded installation requires the following electrical setup:
1 The supply line should be dedicated to the compressor. No other equipment should operate using the same line.
2 The service should be capable of carrying 20 amperes. The wire gauge should be sized accordingly.
3 The service should be protected by up to a minimum 20 amperes circuit breaker. The value is based on the application/equipment requirements as well as the electrical components’ tolerance and uncontrollable external variables.

The Tri-Gas Generator, rated at 220 VAC, 230 VAC or 240 VAC, 50/60 Hz, single phase, 2A installation requires the following electrical setup:
1 The supply line does not need to be dedicated to the generator.
2 The service is of adequate ampere rating.
3 The voltage selector is set to match the local power supply (220V, 230V or 240V).
4 The provided cordset rating is 10A / 250VAC. The cordset should not be replaced with an inadequately rated cordset.

The electrical schematics for the compressor are shown in Figures 54, and 55 on pages 35 and 36 (Back Cover).

For compressors shipped after 10/1/2010 which look like Figure 15, use Electrical Schematic 3 on the back cover (page 36) of this manual.

Figure 9 Compressor 20 Amp, 250 V Receptacle for NA model

Figure 10 Tri-Gas Generator Voltage Selection

The Tri-gas generator is shipped with a tag at the power receptacle which specifies the factory setting of the voltage selector. For optimal performance of the **EU Model** generator, the customer should set the voltage selector to match the local power supply. To change the setting on the voltage selector, simply remove the selector/fuse drawer from the receptacle using a small screwdriver, turn the selector so the desired voltage (220, 230 or 240) shows in the window, and reassemble (see figure 10). To connect the generator to the power supply, simply plug the female end of the electrical cord into the receptacle of the generator, and the opposite end into the appropriate earthed grounded power receptacle.

Before plugging the power cord into the Tri-gas generator power receptacle, check the voltage selector setting. The voltage setting must match the local power supply voltage. **Note: "NA" models of the generator are designed for 120VAC operation only.**

Piping

There are six plastic tubing connections for the LCMS-5000 Model: (1) inter-connection; (2) drain connections; and (3) outlet gas connections. The inter-connection tube requires a length of PFA plastic 3/8" tubing connecting the outlet of the compressor cabinet to the inlet of the Tri-Gas generator (figure 11). Press the tubing into the quick-connect fittings. Assure tubing is full inserted (about 1/2"). See Recommended Accessories for installation kits on page 10. For remote locations additional length tubing is provided.

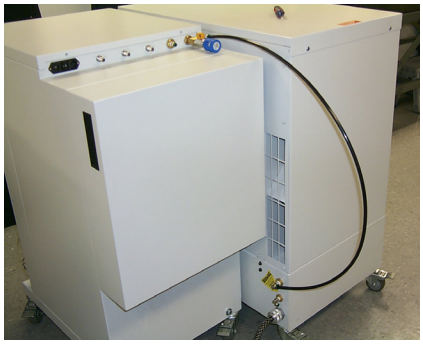

Figure 11 Compressor and Tri-Gas 3/8" Connection

Figure 12 Compressor Drain to Disposal Container

Drains

The compressor drain tube is a black nylon 1/4” tubing connecting the drain outlet to the provided disposal container (see figure 12). A blue silencer is provided to reduce the discharge noise.

The Tri-Gas generator drain tube is also a black nylon 1/4” tubing connecting the drain outlet to the same provided disposal container (see figure 13).

Outlet Gases

The three outlet gas fittings are 1/4” stainless steel compression type (see figure 14) . Piping to the instrument should be PFA plastic, clean stainless steel or pre-cleaned refrigeration grade copper with a minimum pressure rating of 125 psig (8.6 bar). Do not use any liquid, thread sealing compounds which could contaminate the gases. Use only PTFE sealant tape. Check all piping connections for leaks using a bubble-type leak detecting solution. Europe/UK models include tube end converters to adapt to 6mm tubing.

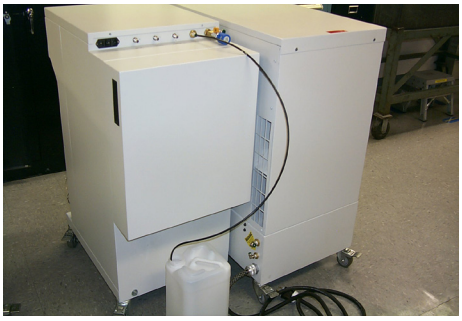

Figure 13 Tri-Gas Drain to Disposal Container

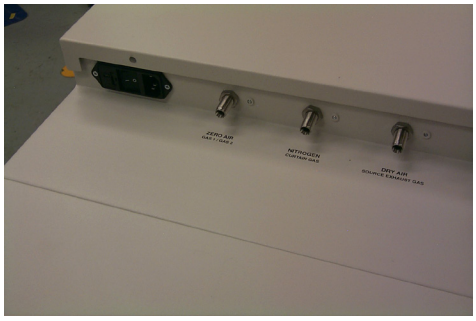

Figure 14 Three Outlet Gas Fittings

Recommended Accessories

A03-0286 voltage step-down transformer - If your facility supply voltage is 255V or higher, then the use of this transformer is required.

A03-0281 Voltage Step-up Transformer - If the supply voltage is 195V or lower, then the use of this transformer is required.

Model 76080 halogenated hydrocarbon scrubber for model LCMS-5001 NT: If the compressed air supply to the generator is subject to contamination from halogenated hydrocarbons, install a halogenated hydrocarbon scrubber directly upstream from the generator. **Exposure of the generator to halogenated hydrocarbons will damage the catalyst module and void the warranty.** For additional information, request the Analytical Gas Supplies Product Catalog from your local representative.

IKLCMS-5000: Installation kit includes PFA tubing, tube cutter, PTFE sealant tape.

IKLCMS-5000UK: Installation kit for Europe includes same items as above with the addition of 6mm tubing and 6mm tube end adapters.

LCMS-EZLINK: Gas back-up panel for cylinder reserve: If there is a loss of electrical power or pressure, the gas back-up panel will automatically switch over to a single or bank of nitrogen gas cylinders (see Figure 52 and Bulletin TI-B06-0092 for details).

Operation

Start-up

Check that the power cords of both the compressor and the Tri-Gas generator are connected to their proper power supply outlets. Check that the Tri-gas generator is not powered on (all LEDs are not lit). Check that the depressurize valve is closed (see fig. 21). Valve lever is positioned 90° to the valve body when closed.

Figure 15 Compressor Power On Switch

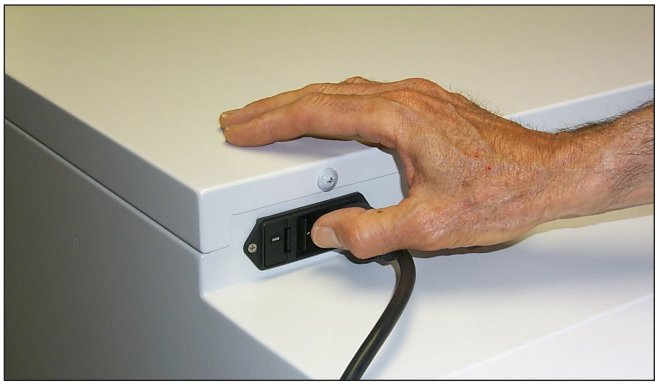

Figure 16 Tri-Gas Power On

Compressor

Rotate the Power Switch to On (I) (see figure 15) on the front panel of the compressor cabinet. The compressor will start and the green LED will illuminate. The pressure gauge indicates system pressure slowly increasing to a maximum set pressure of 140 psig (9.6 barg). Full pressurization will occur within 10 minutes. The compressor is ON for about 2 minutes and OFF for about 5 minutes when the generator is operating at the maximum rated capacity.

Tri-Gas Generator

Press the power switch on the top rear side of the Tri-Gas generator to turn it on (I) (see figure 16). There is a 45 minute warm-up period. The LEDs on the front panel indicate the following:
The yellow “Low Pressure” LED temporarily illuminates until the system pressure reaches 105 psig (7.2 barg) for model LCMS-5000 (for models LCMS-5001T and LCMS-5001NT, 85 psig or 5.8 barg). The yellow “Low Temperature” LED illuminates up to 10 minutes, then goes out. The green “System Ready” LED blinks for 45 minutes until the zero-air generator reaches the specified temperature for hydrocarbon removal level. The green “System Ready” LED then will remain illuminated. The three pressure gauges should indicate 0 psig. The three flow meters should indicate zero flow.

Operation

The LCMS-5000 Generator requires 45 minutes of warm-up time to achieve rated gas purities.

During normal operation, the compressor cabinet has one display LED illuminated: green “ON” power switch. The compressor pressure gauge indicates a pressure between 110 to 140 psig (7.5 to 9.6 barg). The Tri-gas generator cabinet has one display LED illuminated “System Ready” (green). After the generator has completed the 45 minute warm-up period, the generator is ready for setting outlet pressures.

To set the pressure regulators, pull the regulator knob to unlock. Turn the knob clockwise to increase pressure, and counter clockwise to decrease pressure. Push knob in to lock the setting. Set the three regulators to the specified values required by the instrument. The flow rate is displayed by a flow meter for each of the three gases. The flow meter has a dimensionless gauge. Refer to either the flow chart in the Specifications section of this manual or the outlet flow label on the top of the Tri-Gas generator cabinet for the correct flow reading. The flow rates are normally set at the instrument.

The compressor operates on a 30% duty cycle (pump on about 2 minutes, off 5 minutes) for maximum service life at the rated maximum flow/pressure specifications. A pressure switch shuts off the compressor at about 140 psig (9.6 barg) and starts the compressor at about 110 psig (7.5 barg). There is a “burping” sound lasting about 2 seconds each time the compressor shuts off. The sound is the air pressure being released from the compressor pump.

Each cabinet has its own automatic water drain system. The compressor drain operates every 40 minutes, opens for 2 seconds. In the Tri-gas generator, the two filter bowls drain every 5 minutes and the receiver tank drains every 30 minutes for less than one second.

Diagnostics

The LCMS 5000 has built-in system diagnostics to monitor the operation of the generator and to alert the operator both visually and audibly in case service is required.

Compressor

The compressor cabinet has two LED indicators (see figure 17): Power ON, and Temperature High. The green LED remains illuminated during normal operation. The other LED indicator, "Temperature High" remains unlit if the compressor is functioning properly. Red illumination of the Temperature High LED signals a faulty condition and warns the operator that the unit requires servicing.

The compressor has an hour meter to record the **accumulated operating time** of the compressor for preventative maintenance scheduling of the serviceable components. The meter indicates 00000.0 hours. The hour meter is not re-setable.

The compressor output pressure gauge indicates the range of system pressure during operation, normally between 110 psig and 140 psig.

See the troubleshooting section of this manual on pages 30-32 to resolve any abnormal or faulty conditions.

Tri-Gas Generator

The Tri-gas generator cabinet is equipped with three LED indicators: Low Pressure, System Ready, and Low Temperature (see figure 18). There is also an audible alarm located on the PCB assembly inside the cabinet.

Figure 17 Compressor Cabinet LED Indicators

Figure 18 Gas Generator LED Indicators

Pressure Interruption

For **Model LCMS-5000**, If the compressed air pressure decreases less than 105 psig (7.2 barg), the yellow "Low Pressure" LED will illuminate and an audible alarm will sound (beeping every 2 seconds). Once pressure is restored, the LED will go out and the audible alarm will stop. For **Models LCMS-5001T and LCMS-5001NT** the set-point is 85 psig (5.8 barg).

Power Interruption

If the electrical power is interrupted for less than 30 minutes, the system will continue to deliver the gases at the rated flow and purity. If the power is interrupted for more than 30 minutes, the system will require the normal 45 minute warm-up cycle in order to deliver the rated gas purities. **The compressor will start automatically when power returns.**

Low Temperature

If the "Low Temperature" LED is illuminated and solid, the tower module heater may be faulty or the electrical connections leading to it may be faulty.

If the "Low Temperature" LED is blinking, it is time to replace the tower module. See the maintenance section.

Shutdown

For normal or emergency shutdown, two switches must be activated. Rotate the power switch counter clock-wise to the OFF (O) position on the front panel of the compressor cabinet and press the power off switch on the top, rear side of the Tri-gas generator (see figures 19 and 20)

1. If the system is being relocated or being serviced, depressurize the system. Depressurize the system by opening the shutoff valve located on the top, rear of the Tri-Gas generator (see figure 21). Rotate the lever in-line with the blue silencer. Full depressurization takes 1 minute. Full cool down is 2 hours.

Figure 19 Compressor Power OFF Switch

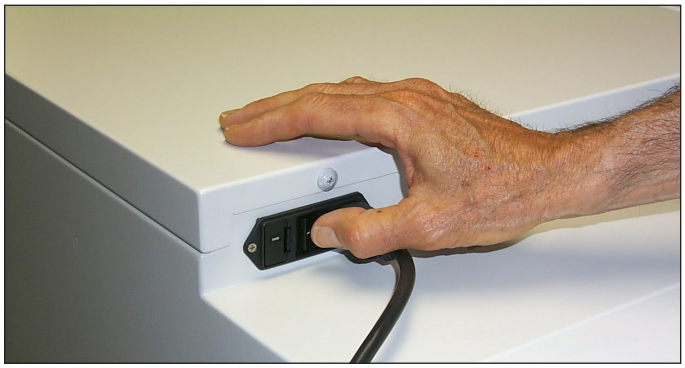

Figure 20 Tri-Gas Power OFF

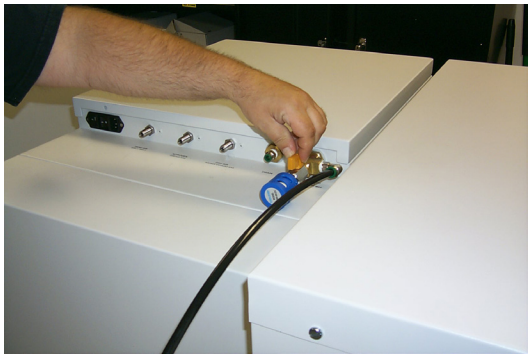

Figure 21 Tri-Gas Generator Depressurizing - Open Valve

Maintenance

Maintenance tasks for the Tri-Gas Generator should be performed by trained personnel familiar with the service and safety precautions of electromechanical devices to avoid injury or damage.

Parker highly recommends service be performed by a Parker trained technician only. Call the factory about PMP, the Preventative Maintenance Program.

Prior to servicing the Tri-Gas Generator, turn off the compressor (or compressed air supply) and power supplies. Allow the system a minimum of 2 hours to depressurize and cool down. See shutdown section on page 13.

To ensure product performance and reliability, periodic preventative maintenance **must** be performed according to the following schedules (refer to the replacement parts section for the part numbers when ordering).

Model	Schedule	Frequency [1,2]
LCMS-5000	1 and (2 or 3) [5]	1 year or 5,000 hours
LCMS-5001T	2 or 3 [5]	1 year
LCMS-5001 NT	2 or 3 [5]	1 year

Schedule 1 Compressor

Schedule 1 (refer to figures 22 and 23)

Replace	Quantity	Hours [1]
Intake Filter	1	1 year or 5,000 hours
Belts	2	1 year or 5,000 hours
Tip Seal Set	1	1 year or 5,000 hours
Grease	1	1 year or 5,000 hours
Pump	1	20,000 hours

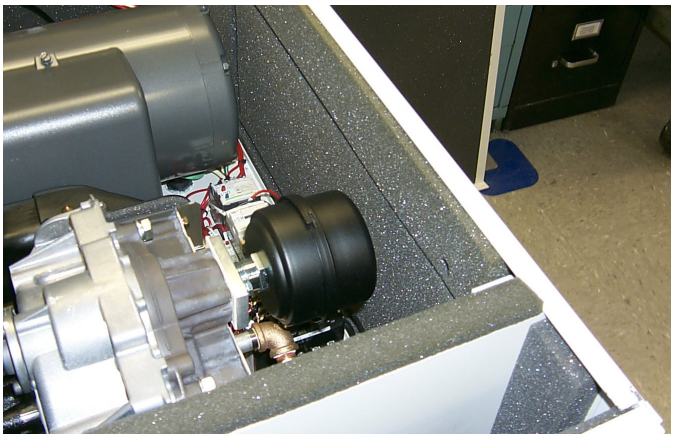

Figure 22 Compressor Intake Filter

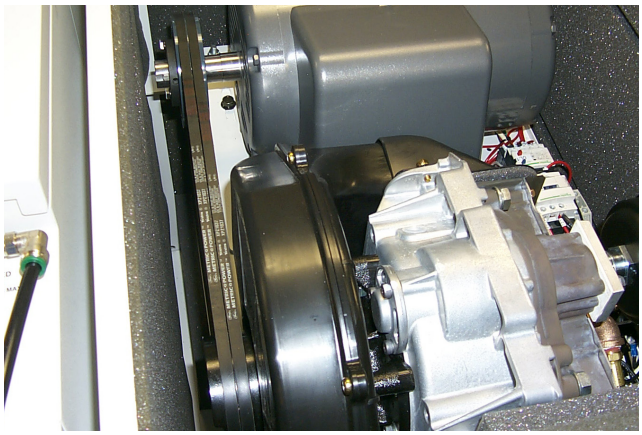

Figure 23 Compressor Belts

Schedule 2 Tri-Gas Generator

For Serial Numbers
LCMS-5000NA: 1001 to 1191
LCMS-5001NT: 1001 to 1065
LCMS-5001T: 1001 to 1017

Schedule 2 (refer to figure 24A)

Replace	Quantity	Hours [1]	Frequency[2]
Filter Element (P/N 100-09-DX)	1	5,000	1 year
Filter Element (P/N 100-09-BX)	1	5,000	1 year
Filter Element (P/N 050-05-BX)	4 [3]	5,000	1 year
Carbon Module (P/N B06-0051)	2	5,000	1 year
Tri-Carbon Scrubber[4] (P/N B03-0262)	1	5,000	1 year
Tower Module (P/N 76811)	1	15,000	3 years

[1] Frequency hours for **Model LCMS-5000** is recorded by an hour meter. The hour meter is located on the compressor control panel.
Note: The meter indicates 00000.0 hours. The hour meter does not reset.
[2] Frequency for **Models LCMS-5001T and LCMS-5001NT** is by calendar time (No Hour Meter).
[3] 3 elements only for **Model LCMS-5001NT**.
[4] If optional scrubber is installed on outlet gas lines.
[5] Schedule 2 or 3 based on generator Serial Number. S/N ending with revision A, B, or C, go to Schedule 3. S/N ending with no letter, go to Schedule 2.

Schedule 3
Tri-Gas Generator

For Serial Numbers
LCMS-5000NA: 1192A and above
LCMS-5001NT: 1066A and above
LCMS-5001T: 1018A and above
(includes all S/Ns ending in letters A, B, or C) [4]

Schedule 3 (refer to figures 24A & 24B)

Replace	Quantity	Hours [1]	Frequency[2]
Filter Element (P/N 100-09-DX)	1	5,000	1 year
Filter Element (P/N 100-09-BX)	1	5,000	1 year
Filter Element (P/N 050-05-BX)	4 [3]	5,000	1 year
Carbon Module (P/N B06-0051)	2	5,000	1 year
Carbon Module (P/N B06-0194)	3	5,000	1 year
Tube Assembly (BNGS100-120-95	3	5,000	1 year
Tower Module (P/N 76811)	1	15,000	3 years
Silencer (P/N BN75117)	3	15,000	3 years

[1] Frequency hours for **Model LCMS-5000** is recorded by an hour meter. The hour meter is located on the compressor control panel.
Note: The meter indicates 00000.0 hours. The hour meter does not reset.
[2] Frequency for **Models LCMS-5001T and LCMS-5001NT** is by calendar time (No Hour Meter).
[3] 3 elements only for **Model LCMS-5001NT**.
[4] A - Environmental Pack
B - Horizontal Compressor
C - 2-Belt Drive on Vertical Compressor

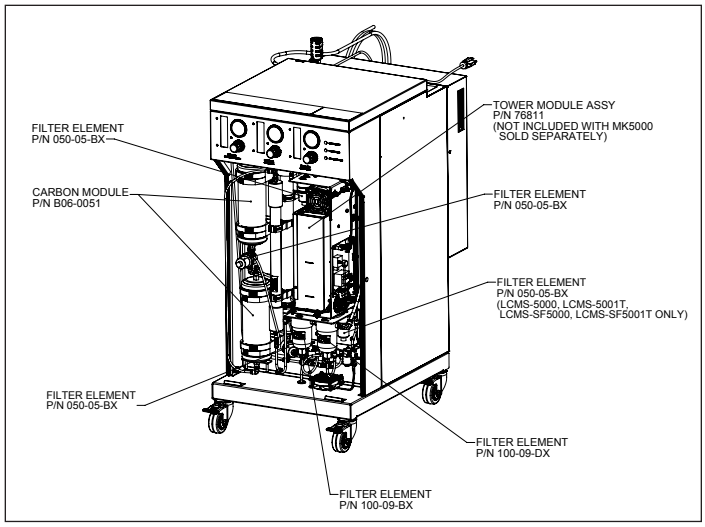

Figure 24A Tri-Gas Maintenance Items: Front View

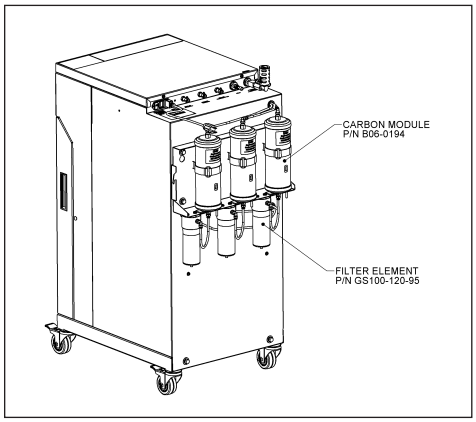

Figure 24B Tri-Gas Maintenance Items: Back View

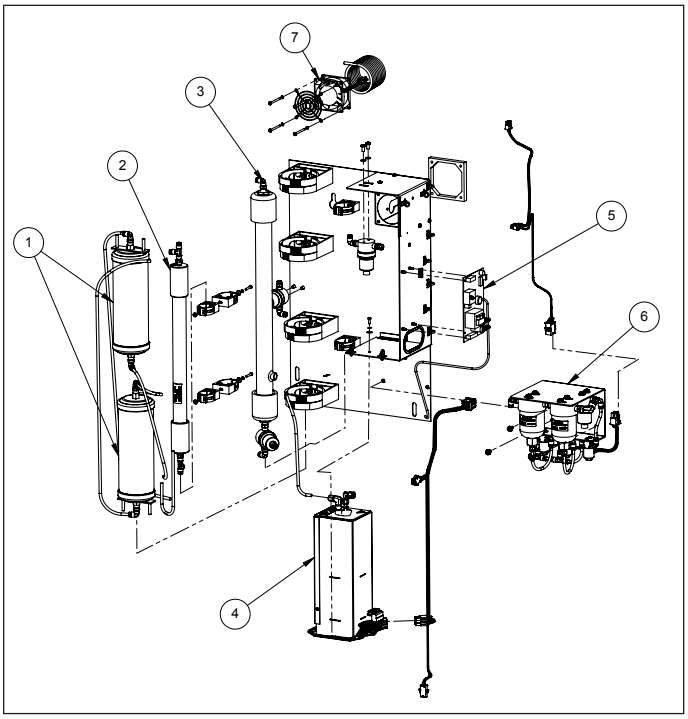

Figure 25 Tri-Gas Expanded View Replacement Parts (Refer to Page 27 for list of parts): Front View

Cleaning

If necessary, wipe the compressor or generator with a clean, dry cloth on an as-needed basis. Do not use water, aerosols or other cleaning agents on the units. Use of any liquid detergent to clean the units could pose an electrical hazard.

Schedule 1 Instructions

View the video, Scroll Compressor Service Maintenance, prior to performing the following tasks. The detail steps are shown in the video instructions.

Intake Filter

1. Remove the top panel on the unit by removing two screws with a flat head screwdriver.
2. By hand, push-in and rotate the intake filter cap counter clockwise to remove (figure 26).
3. Replace the old filter element with a new one, reverse steps to reassemble.

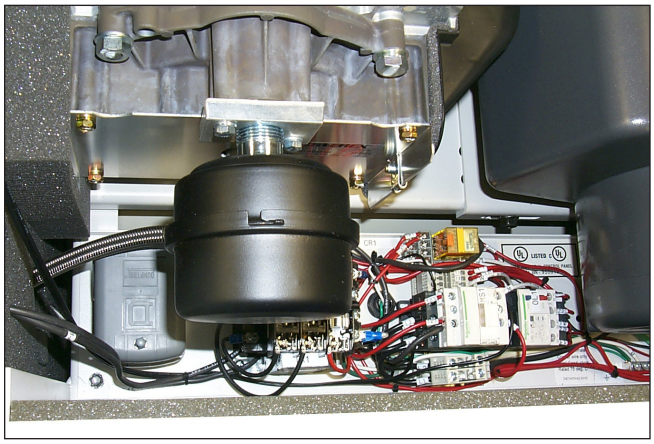

Figure 26 Filter Element

Belts

1. Check belt tension using belt tension gauge (see figure 23). Tension gauge should indicate minimum 45 lbs.
2. Adjust tension if required by adjusting motor bracket. Replace belts if needed.

Grease Orbit Scroll Compressor Bearings

1. Remove the plastic dust cap from the pump (see figure 27).
2. Rotate the compressor pulley until the grease fitting is visible in the dust cap hole.
3. Using a grease gun extension adapter to engage the grease fitting, supply the proper amount of grease according to the grease delivery Table 1, figure 27.

Note: Pump grease gun before feeding to eliminate air from the needle adapter. Each pump equals 0.65 grams of grease. The volume of grease is less after the 2nd pump since some grease remains in the extension adapter.

4. Replace the plastic dust cap.

Table 1 - Grease Delivery SLAE03E

Bearing	1st Pump	2nd Pump
Orbit Scroll Bearing	5 times	4 times
Pin Crank Bearing (Orbit Scroll side)	4 times	4 times

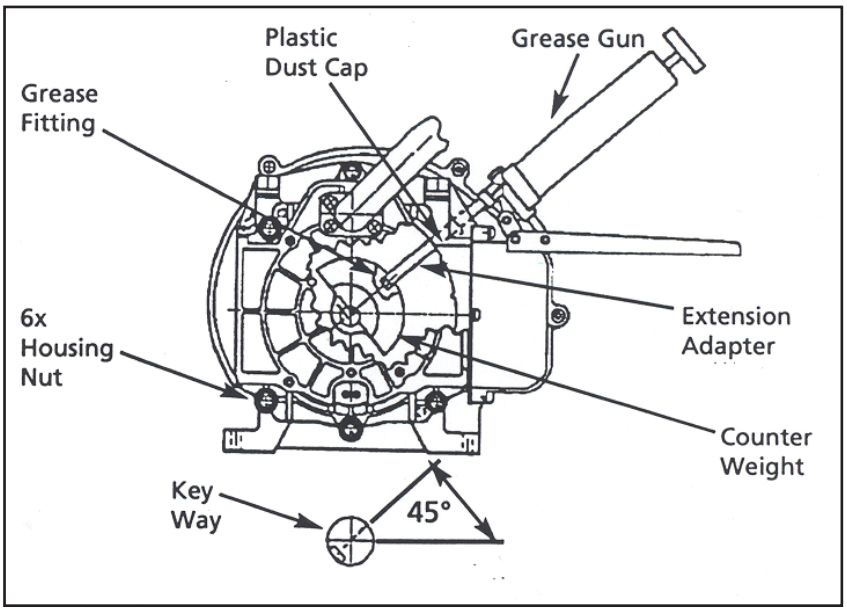

Figure 27 Grease and Orbit Scroll Bearing

Grease Pin Crank Bearing

1. Remove top and side service panels (see figure 8).
2. Remove the fan duct.
3. Remove the nuts, bolts, and then the fixed scroll.
4. Grease three pin crank bearings according to Table 1 and figure 28.
5. Replace fixed scroll and fan duct. Torque bolts, initially 17 inch-lbs., then final 175 inch-lbs.

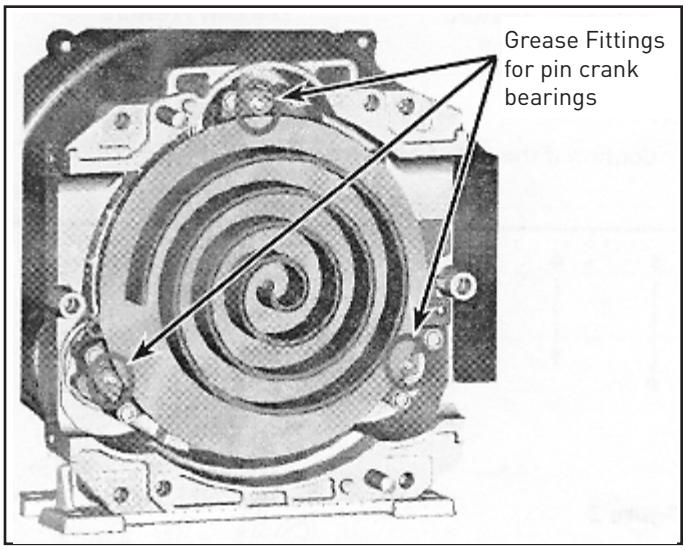

Figure 28 Grease Fittings for Pin Crank Bearings

Note: The grease fitting located in the center of the pin crank bearing feeds only the orbit scroll side bearing. Use a needle adapter to supply grease to the housing side bearing. Pump grease gun to eliminate any air in the needle adapter. Hold grease gun for 5 to 10 seconds after feeding grease to prevent grease blowback from the grease fitting.

Replace Tip Seal

1 Remove the side and top panels (see figure 8).

2 Remove the six housing nuts (see figure 27).

3 Remove the stationary scroll housing.

4 Remove the old tip seals from both the orbiting and stationary scroll housings.

5 Remove the old dust seals from both housings.

6 Blow off any dust from both housings.

7 Install the new high pressure (shorter one) tip seal starting from the center of the scroll, outward inside the seal channel.

Note: The side and bottom lip notches of the tip seal face INWARD and DOWNWARD in the channel.

8 Install the new low pressure (longer one) tip seal in the same way.

Note: Make sure there is no gap between the high and low pressure seals.

Caution! Do not attempt to remove the orbit scroll from the housing.

9 After installing half of the low pressure seal, **carefully** remove the seal from the channel to make sure the seal is properly locking onto the channel indentations located just past the high pressure seal.

Note: The indentations are machined into the seal channel to prevent the low pressure seal from moving.

10 Blow off any dust caused by removing the seal from the channel.

11 Install the low pressure seal completely.

Note: Make sure the side and bottom lip notches are facing INWARD and DOWN into the seal channel.

Note: The lip notches must not be distorted in the seal or torn off.

12 Install backup tube in the dust seal channel.

13 Place dust seal over the backup tube.

Caution! The backup tube must meet at the bottom of the housing in the six o'clock position. The dust seal must meet on the right side of the housing at the three o'clock position.

14 Install the stationary scroll housing onto the orbiting scroll housing and reassemble the unit.

15 Tighten the pulley bolt (M8) to 265 in -lbs, using a torque wrench.

16 Tighten the six housing nuts to 265 in-lbs, using torque wrench.

Fuse Replacement Compressor

There are three fuses located in the compressor cabinet (see figure 29). Before servicing the fuses, turn the compressor off and disconnect the power cord from the power supply.

To access the fuses, remove the service panel and locate the fuse blocks. Both lines 1 and 2 are fused separately. Remove both line fuses with a small screwdriver. Replace either one or both fuses as required. **To maintain safety, use only fuses of the size and type specified in the Specifications section of this manual.**

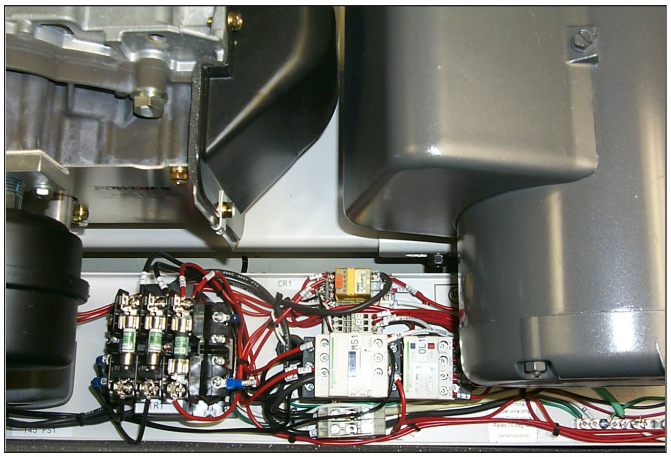

Figure 29 Location of Fuses

Figure 30 BX Filter on the Left, DX Filter on the Right

Schedule 2 and 3 Instructions

These instructions describe the replacing of the two coalescing pre-filters, the four in-line filters, the two carbon modules, and the zero air tower module in the Tri-Gas generator.

Coalescing Prefilters

1 Remove the front panel from the Tri-Gas generator by rotating the latch a quarter turn counter clockwise with a screwdriver.

2 The replacement elements are 100-09-DX (first stage) and 100-09-BX (second stage). It is very important to install the proper grade filter into the proper housing. Take extra care to install in the proper sequence (see figure 30).

3 Using a 1" wrench, remove the tie nut at the base of the bowl (see figure 31).

4 Twist the bowl loose from the head of the assembly and remove carefully so as not to damage or lose the o-ring (see figure 32).

5 Unscrew the element retainer at the base of the element, and replace the spent element with a new one (see figure 33).

6 Reverse the steps to re-assemble. Make sure the o-ring is sealed in the groove before re-installing the bowl. Hand tighten.

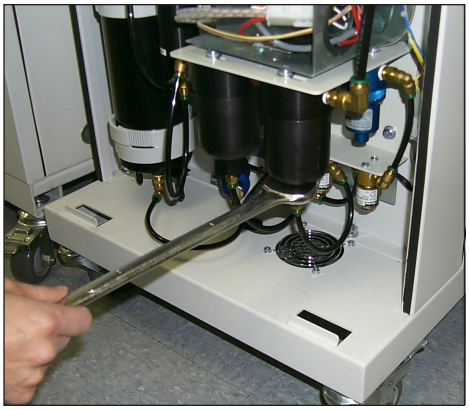

Figure 31 Tie Nut

Figure 32 Remove Bowl

Figure 33 Remove Element

Figure 34 Filter Bowl

Figure 35 New Element

In-Line Filters

There are four in-line filters requiring replacement (for model LCMS-5001NT three in-line filters). The replacement element (050-05-BX) is the same for all in-line filters (see figure 24A).

By hand (or with wide-grip pliers, if necessary), rotate the bowl counter clockwise, remove and replace the filter element with a new one, return bowl, and hand tighten (see figures 34 & 35).

Carbon Modules

There are two carbon modules that require changing. Note the flow direction arrow prior to removing the spent modules (see figure 36).

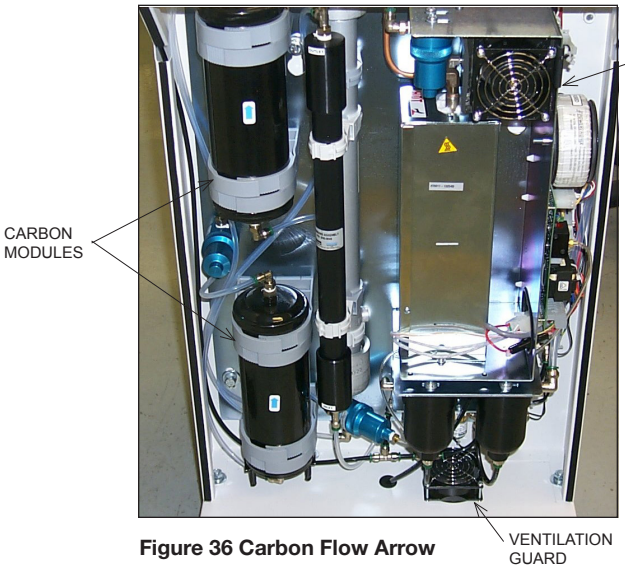

Figure 36 Carbon Flow Arrow

Figure 37 Tri-Gas Changing In-Line Filter

1. Disconnect the plastic tubing from the press fittings on the inlet and outlet ports of the module. To remove the tubing from the press fitting, push the tubing into the fitting, hold the collar of the fitting back, and pull the tubing out of the fitting.
2. Release the ratcheting bands that clamp the module to the unit using two screw drivers (see figure 37).
3. Replace with a new carbon module, with the flow arrow pointing in the proper direction (see figure 36).
4. Push the module firmly for the ratcheting bands to clamp the module.
5. Re-insert inlet and outlet tubing. Use a soap or a leak detecting solution to check for leaks when pressurizing (re-starting) the unit.

Fan Guard

Inspect and clean the fan guard (see figure 36).

Ventillation Guard

Inspect and clean the ventillation guard on the bottom of the cabinet (see figure 36).

For generators that apply to schedule 3, these instructions describe replacing the three outlet carbon modules and three outlet filter elements.

Outlet Carbon Modules

1. Remove the back panel cover by removing two phillips head screws (see figure 38).
2. Lift back panel cover up about 1 inch and back. Put cover aside (see figure 39).
   Note: Replace one carbon module at a time. Be careful tubing does not slide back into the generator cover.

3 Remove black velcro strap from one carbon module (see figure 40).

4 Remove tubing from top of module (see figure 41). Remove tubing from bottom of module.

5 Pull out module and replace new. Insert tubing, top and bottom.

6 Perform steps 3 through 5 for the other two carbon modules.

Outlet Filters

1 With both hands, rotate the filter bowl counter clockwise (looking from the bottom), remove and set aside (see figure 42).

2 Rotate the filter element retainer counter clockwise (see figure 43), remove and set aside.

3 Pull out element and replace with new. Snug up retainer.

4 Re-assemble the bowl and tighten to hand-tight.

5 Perform steps 1 through 3 for the other two outlet filters.

6 Before putting on the back panel cover (see figure 44), use a soap or a leak detecting solution to check for leaks when re-starting the generator.

Figure 38

Figure 39

Figure 40

Figure 41

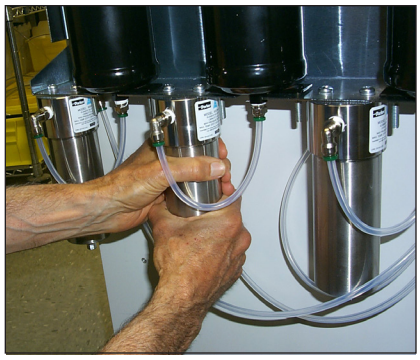
Figure 42

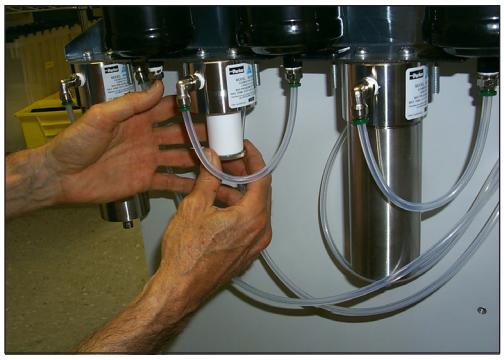
Figure 43

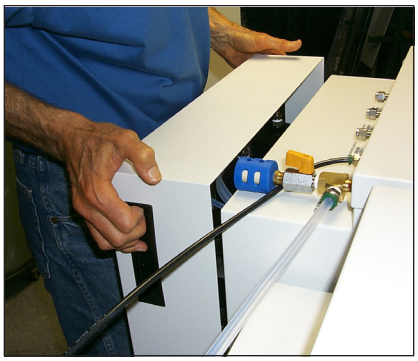
Figure 44

Tower Module

The tower module in the generator should be changed (when the “Low Temperature” LED is illuminated or blinking) to maintain the hydrocarbon removal specification for the unit. Contact the local representative for ordering information and pricing for a replacement tower module.

To prevent electric shock, disconnect the Tri-Gas generator from the power supply prior to servicing the catalyst tower module.

Allow unit to cool for at least 2 hours before removing the front panel to service the tower module.

The tools required to change the tower module are: a Phillips head screwdriver, and 11/32 nut driver, one 9/16”, 1/2” open end wrenches. The steps for replacing the tower module are as follows:

1 Switch off the power to the unit, unplug from the power receptacle, close the (customer installed) inlet air valve, and allow the unit to cool (2 hours, minimum) and depressurize.

2 Remove the front panel from the generator.

3 Using a 9/16” wrench, disconnect the module inlet fitting at the elbow (see figure 45).

4 Remove the black air dryer membrane to access the outlet fitting (see figure 46).

5 Using 2 wrenches (one as an anchor), loosen the bottom nut of the compression outlet elbow.

6 Use a flathead screw driver to get leverage when releasing the elbow fitting free from the tower.

7 Remove the kep nut (11/32) at the base of the module (see figure 47).

8 Disconnect the electrical power connector and the PCB connector (see figures 48 and 49).

9 Remove the spent module and place the replacement in position.

10 Re-connect the replacement tower module by reversing the removal steps. Hand tighten nuts on to ferrules and finish tightening with a wrench 1-1/2 turns for a tight seal.

11 Re-install the black air dryer membrane.

12 Prior to turning the generator on, check for leaks by opening the compressed air supply to the unit. Use a soap or leak detecting solution to check the integrity of the piping and fittings.

13 Replace front panel.

14 Restart generator as detailed in the start-up section of this manual. The “Low Temperature” indicator light on the front of the generator will flash for 2 to 3 minutes after start-up, until the circuit board and the tower module have been initialized. After the initialization period, the generator will commence operation from the warm-up stage. **Note: if the “Low Temperature” indicator light continues to blink after 5 to 10 minutes, please contact the factory at 1-800-343-4048. Send email to: balstontechsupport@parker.com.**

Figure 45 Inlet / Outlet

Figure 46 Dryer Membrane

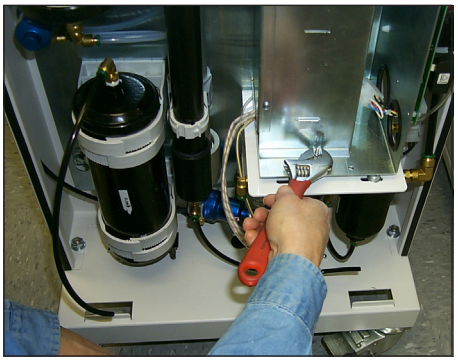

Figure 47 Nut

Figure 48 Disconnect Electrical

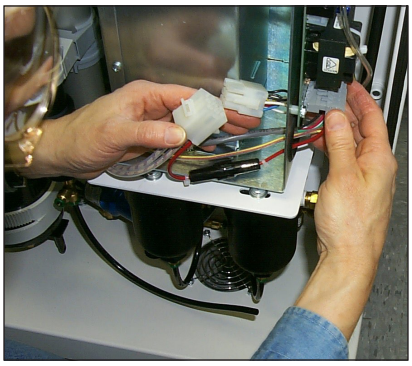

Figure 49 Disconnect Electrical at PCB

Fuse Replacement

The Tri-Gas Generator fuses are located in the power receptacle on the top, rear side of the generator. **Before servicing the fuses, turn the generator off and disconnect the power cord from both the power supply and the generator power receptacle.**

To access the fuses, use a small screwdriver to remove the fuse holder located in the power receptacle of the generator (see figure 50). Insert screwdriver blade in holder tab and push in and draw out. In the generator, both the phase and neutral are fused separately. As a result of this configuration, both fuses should be checked any time fuse replacement is warranted. Replace either one or both fuses as necessary and re-assemble. **To maintain the safety and performance integrity of the product, use only fuses of the size and type detailed in the Specifications section of this manual.**

Figure 50 Tri-Gas Fuse

System Specifications

System Specifications	LCMS-5000	LCMS-5001T, LCMS-5001NT
CSA Certification Standard	CAN/CSA C22.2 No. 61010-1	same
IEC Standard	IEC 61010-1: 2001	same
CENELEC Standard	EN 61010-1: 2001	same
UL Standard	UL 61010A-1: 2002	same
IEC 61010 Installation	Category II	same
IEC 61010 Pollution	Degree 2	same
EMC Compliance	EN61326-1: 1997/CISPR 11: 1990/IEC 1000	same
Curtain Gas (N2) Purity	99.999% Organics, 99% Oxygen	See Note 2
Curtain Gas Max. Flow/Pressure	6 SLPM/80 PSIG (5.5 Barg)	same
Max. Inlet Hydrocarbon Content	100 PPM	same
Source Gas (UHP Zero Grade Air) Purity	<0.1 PPM Total Hydrocarbons	See Note 2
Source Gas Max. Flow/Pressure	20 SLPM/110 PSIg (7.6 Barg)	See Note 2
Exhaust Gas (Dry Air) Purity	-40°F (-40°C) ATM Dew Point	See Note 2
Exhaust Gas Max. Flow/Pressure	8 SLPM/60 PSIG (4.1 Barg)	same
Suspended Liquids	None	same
Particles > 0.01 Micron	None	same
Phthalates	None	same
Sound Level	< 49 dB(A)	< 30dB(A)
Min./Max. Operating Pressure	110/140 PSIG (7.6/9.6 Barg)[3]	85/140 psig (5.8/6.9 barg)[2, 3]
Flow Capacity	See Pressure/Flow Charts page 28	same
Inlet Air Consumption	90 SLPM (3.2 scfm)	same
Inlet Air Temp. Range	60°F-95°F (15°C-35°C)	same
Min./Max. Ambient Temp.	60°F/90°F (16°C/32°C)	same
Max. Ambient Relative Humidity	80%	same
Altitude	2000M	same
Heat Dissipation - Compressor	10246 BTU/Hour	-------
Heat Dissipation - Tri-Gas Generator	1229 BTU/Hour	same
Electrical Requirements[1] - Compressor 60Hz	195-254VAC, 60Hz, 1 Phase, 14A[4]	-------
Electrical Requirements[1] - Compressor 50Hz	230VAC, 50Hz, 1 Phase, 13A	-------
Electrical Requirements[1] - Gas Generator	100-120/200-240VAC, 60/50Hz, 1 Phase, 4A/2A	-------
Power Consumption - Compressor	13A@230VAC, 3000 Watts	-------
Power Consumption - Tri-Gas Generator	3A@120VAC, 360 Watts	same
	1.5A@230Vac, 360 Watts	same
Start-Up Time	45 Minutes	same
Compressor Outlet - Compressed Air	3/8” Tube	-------
Compressor Outlet - Tank Drain	1/4” Tube	-------
Tri-Gas Generator Ports - Comp Air Inlet	3/8” Tube / 3/8” BSPT Adapter	same
Tri-Gas Generator Ports - Drain	1/4” Tube	same
Tri-Gas Generator Ports - Gas Outlets (3)	1/4” SS Compression / 6 mm adapters	same
Compressor Fuses - Primary FU1, FU2	10.3 x 38.1mm, Type T, 600V, 1.25A	-------
Compressor Fuses - Secondary FU3	6.3 x 31.7mm, Type T, 250V, 1.25A	-------
Tri-Gas Fuses - 120V	5 x 22mm, Type T, 250V, 4A	same
Tri-Gas Fuses - 230V	5 x 22mm, Type T, 250V, 2A	same
Dimensions LCMS-5000	35”L x 41”W x 43”H	
	(89cm x 104cm 109cm)	-------
Dimensions LCMS-5001T	-------	31”L x 20”W x 43”H
		(80cm x 51cm x 109cm)
Dimensions LCMS-5001NT	-------	21”L x 23”W x 41”H
		(53cm x 58cm x 104cm)
Product Weight LCMS-5000	611 lbs (277 kgs)	-------
Product Weight LCMS-5001T	-------	271 lbs (123 kgs)
Product Weight LCMS-5001NT	-------	157 lbs (71 kgs)
Shipping Weight LCMS-5000	864 lbs (392 kgs)	-------
Shipping Weight LCMS-5001T	-------	396 lbs (180 kgs)
Shipping Weight LCMS-5001NT	-------	272 lbs (123 kgs)

Notes:

1. Main supply voltage fluctuations not to exceed ± 10% of nominal voltage.
2. Optimum minimum inlet pressure is 110 psig (7.6 barg) to achieve published gas specifications of instrument manufacturers.
3. Consult factory for performance specifications at lower inlet pressures, or high elevation installations.
4. PCS motors installed after 11/3/09, starting with Serial Number LCMS-5000NA-1196A.

Cautions

1. The flow meter reading is dimensionless. Read flowmeter at the middle of the ball. The actual flow at various operating pressures is converted into SLPM (standard liters per minute) in the flow chart label on the unit, or in the flow charts section of this manual.

2. All data shown in the flow chart is based on an operating temperature of 68°F (20°C).

3. The generator should be installed in an area with adequate ventilation to reduce the flammability of the oxygen-rich permeate stream. The system should not be located in an area where the permeate stream poses the risk of explosion or combustion.

4. **Nitrogen is nontoxic and largely inert. It can act as a simple asphyxiant by displacing oxygen in air. Inhalation of nitrogen in excessive concentrations can result in unconsciousness without any warning symptoms such as dizziness and fatigue.**

5. The **maximum** operating pressure of the system is 145 psig (10 barg). Operating the nitrogen generator at pressures above 145 psig (10 barg) will result in damage to the membrane.

6. The **recommended** operating inlet air temperature for the Tri-Gas generator is 60°-90°F (16°-32°C). If the inlet air temperature will be higher than the ambient temperature, the compressed air should be cooled and filtered, to remove water and oil, prior to introduction to the gas generator. **Do not use high temperature compressed air directly from the compressor, this will permanently damage the membranes.**

7. The **maximum** operating inlet air temperature of the Tri-Gas Generator is 95°F(35°C). If the inlet air temperature is above 95°F (35°C), the longevity of the membrane will be reduced and the warranty will be void.

8. The drain lines should be piped away to the provided collection container (open to atmospheric pressure) to avoid any possible re-entrainment of liquid in the air which feeds the generator.

9. Changes in inlet pressure or outlet flow demand will alter the gas purity.

10. **Use of any valve other than a gate valve (or other slow-opening valve) on the inlet air supply will cause damage to the membrane module.**

Figure 51 Tri-Carbon Scrubber

Figure 52 Back-up Cylinder Switchover Panel

Replacement Parts

System Serial Number ending in no letter, "A", or "C" (14) LCMS-5000 Compressor Replacement Parts (SF120)	Models NA Part Number	 Part Number	VERTICAL
Pump Number (7)	SLAE03HP	SLAE03E	SLAE03E
5,000 Hour Maintenance Kit 1 (1)	MK5002	MK5006	MK5006-220
10,000/15,000 Hour Maintenance Kit 2 (2)	MK5003	MK5007	MK5007-220
15,000 Hour Drain Kit 7 (6)	MK5005	MK5005	MK5005
20,000 Hour Maintenance Kit 3 (3)	MK5004	MK5008	MK5008-220
V-Belts Kit 8 (8)	MK5026	MK5026	—
V-Belts Kit 9 (15), 50 Hz Model	—	—	MK5038
Primary Fuses	A03-0199 (Figure 29)		
Secondary Fuse	A03-0198 (Figure 29)		

System Serial Number ending in "B" (14) LCMS-5000 Compressor Replacement Parts (SF130)	Models NA Part Number	Models UK, EU, JA, AU Part Number	HORIZONTAL
Pump Number (7)	SLAE03EB	SLAE03EB	
5,000 Hour Maintenance Kit 1 (1)	MKSF5034	MKSF5030	
10,000/15,000 Hour Maintenance Kit 2 (2)	MKSF5035	MKSF5031	
15,000 Hour Drain Kit 7 (6)	MK5005	MK5005	
20,000 Hour Maintenance Kit 3 (3)	MKSF5036	MKSF5032	
V-Belts Kit 12 (11)	MKSF5037	MKSF5033	
Primary Fuses	A03-0324 (Figure 29)		
Secondary Fuse	A03-0323 (Figure 29)		

LCMS-5000, LCMS-5001T, LCMS-5001NT Tri-Gas Maintenance Parts	System S/N Serial Number (12)	Refer to Figure 24A & B	Part Number P/N
Maintenance Kit 4 - LCMS-5000 (4)	1001 to 1192	—	MK5000
Maintenance Kit 5 - LCMS-5001T (4)	1001 to1017	—	MK5000
Maintenance Kit 6 - LCMS-5001NT (5)	1001 to 1065	—	MK5001
Maintenance Kit 9 - LCMS-5000 (9)	1193A and above	—	MK5028
Maintenance Kit 10 - LCMS-5001T(9)	1018A and above	—	MK5028
Maintenance Kit 11 - LCMS-5001NT (10)	1066A and above	—	MK5029
Maintenance Tri-Carbon Scrubber (floor assembly)	—	—	B03-0262
Tower Module	—	25, Item 4	76811

LCMS-5000, LCMS-5001T, LCMS-5001NT Tri-Gas Replacement Parts	Refer to Figure	Part Number P/N
Filter/Solenoid Assembly - LCMS-5000, LCMS-5001T	25, Item 6	B06-0054
Filter/Solenoid Assembly - LCMS-5001NT	25, Item 6	B06-0060
Fan Assembly	25, Item 7	B06-0062
Printed Circuit Board Assembly LCMS-5000	25, Item 5	B06-0052
Printed Circuit Board Assembly LCMS-5001	25, Item 5	B06-0199
Nitrogen Module	25, Item 3	B06-0053
Dryer Membrane Assembly 1 (13)	25, Item 2	B06-0055
Dryer Membrane Assembly 2 (13)	25, Item 2	B06-0209
Pressure Regulator Assembly	18	B06-0200
Primary Fuses 120V/230V	55/55	13215/13192

Notes:

1. Kit 1 includes Intake Filter, V-Belt, Tip Seal Set, Grease, and Grease Gun.
2. Kit 2 includes Intake Filter, V-Belt, Tip Seal Set, and Grease.
3. Kit 3 includes Compressor Pump, Intake Filter, and V-Belt.
4. Kit 4 or 5 includes (2) Carbon Modules, (6) Filter Elements.
5. Kit 6 includes (2) Carbon Modules, (5) Filter Elements.
6. Kit 7 includes Auto Drain Valve only.
7. Identify the style of pump your compressor has: C-Style (Pump No.SLAE03HP), E-Style (Pump No. SLAE03E), or E-Style Two Belt (Pump No. SLAE03EB). Pump number is located on the product label on the right side of the compressor.
8. Kit 8 includes (2) Belts: One for original mount and one for pivot base (S/N units after 11/12/2008 4164106-97)
9. Kit 9 or 10 includes (5) Carbon Modules, (10) Filter Elements.
10. Kit 11 includes (5) Carbon Modules, (9) Filter Elements.
11. Kit 12 includes (2) Identical Belts.
12. Last four digits of Serial Number.
13. Use dryer B06-0055 for serial numbers before LCMS-5001NT-1088A, LCMS-5001TNA-1017A, LCMS-5000NA-1223A. Use dryer B06-0209 for Serial Numbers after.
14. Serial Number revision letters described on Page 15.
15. Kit 9 includes (2) Belts: For Serial Numbers LCMS-5000-1012 to -1015.

Accessory Parts	Part Number
Voltage Step-Down Transformer	A03-0286
Hydrocarbon Scrubber	76080
NA Installation Kit	IKLCMS-5000
UK Installation Kit	IKLCMS-5000UK
3/8" Plastic Tubing (Remote Compressor)	11400-1 (Specify Length)
Tri-Carbon Scrubber (see figure 51)	B03-0262
Voltage Booster Step-Up Transformer	A03-0281
Back-up Cylinder Switchover Panel (Figure 52)	LCMS-EZLINK

Nominal conditions for the charts are Temperature 68°F (20°C) and Ambient Pressure 14.7 psi [1013 mbar(a)]. The maximum pressure specification for the **DRY AIR** is 60 psig. Flow meter accuracy +/- 0.2 (Dewpoint -40°F). The number in the charts is from the ball on the flow meter scale. The number has no unit of measure.

Flow Rate	Pressure (PSIG)				
(LPM)	20	30	40	50	60
2	1.20	1.10	1.00	.85	.70
3	1.75	1.40	1.40	1.20	1.02
4	2.30	1.90	1.85	1.60	1.42
5	2.90	2.60	2.36	2.05	1.84
6	3.45	2.90	2.85	2.50	2.27
7	4.00	3.40	3.30	2.90	2.66
8		3.90	3.80	3.37	3.10
9				3.80	3.50
10					3.90

The maximum pressure specification for the **NITROGEN** is 80 psig. Flow meter accuracy +/-0.5 (99% purity).

Flow Rate	Pressure (PSIG)						
(LPM)	20	30	40	50	60	70	80
2	1.28	-------	-------	-------	-------	-------	-------
3	1.75	1.75	1.40	-------	-------	-------	-------
4	2.30	2.25	1.85	1.75	1.42	-------	-------
5	2.90	2.75	2.36	2.25	1.84	2.00	1.42
6	3.45	3.25	2.85	2.75	2.27	2.25	1.80
7	4.00	3.75	3.30	3.25	2.66	2.75	2.16
8	5.00	4.25	3.80	3.60	3.10	3.25	2.55
9	5.75	4.75	4.25	4.00	3.50	3.50	2.92
10	6.50	5.50	4.75	4.25	3.90	3.75	3.30
11	7.00	6.25	5.25	5.00	4.75	4.25	3.70
12	7.75	6.75	6.00	5.50	5.00	4.75	4.50
13	8.50	7.50	6.50	6.00	5.75	5.00	5.00
14	9.00	8.00	7.00	6.50	6.00	5.50	5.25
15	9.75	8.50	7.75	7.00	6.50	6.00	5.75
16		9.25	8.00	7.50	7.00	6.50	6.25
17		9.75	8.50	8.00	7.50	6.75	6.50
18			8.50	8.50	8.00	7.25	7.00
19			9.50	9.25	8.50	7.75	7.50
20				9.75	9.00	8.50	7.75
21					9.50	8.25	8.00
22					10.00	8.75	8.25
23						9.00	8.75
24						9.25	9.00
25						9.75	9.25
26						10.00	9.75

The maximum pressure specification for the **ZERO AIR** is 110 psig. Flow meter accuracy +/-0.5 (<.1 ppm Hydrocarbons measured as Methane).

Flow Rate (LPM)	Pressure (PSIG)								
	30	40	50	60	70	80	90	100	110
3	1.75	1.25	------	------	------	------	------	------	------
4	2.25	1.75	1.65	1.55	------	------	------	------	------
5	2.75	2.50	2.25	2.00	1.85	1.75	------	------	------
6	3.25	3.00	2.65	2.50	2.25	2.15	2.00	1.90	------
7	3.75	3.50	3.25	2.75	2.65	2.50	2.45	2.25	2.15
8	4.30	3.75	3.55	3.25	3.00	3.00	2.75	2.50	3.35
9	4.75	4.25	4.00	3.75	3.50	3.35	3.25	3.00	2.75
10	5.50	4.75	4.50	4.15	3.85	3.50	3.40	3.25	3.00
11	6.25	5.25	5.00	4.75	4.25	4.00	3.75	3.65	3.50
12	6.75	6.00	5.50	5.00	4.70	4.50	4.25	4.00	3.70
13	7.50	6.50	6.00	5.75	5.00	4.75	4.50	4.25	4.00
14	8.00	7.00	6.50	6.00	5.63	5.25	5.00	4.75	4.40
15	8.50	7.75	7.00	6.25	6.00	5.75	5.25	5.00	4.75
16	9.25	8.25	7.50	6.75	6.50	6.25	5.75	5.35	5.11
17	9.75	8.50	8.00	7.50	6.75	6.50	6.25	5.75	5.50
18	------	9.00	8.50	8.00	7.34	7.00	6.50	6.25	5.90
19	------	9.50	9.25	8.50	7.75	7.50	7.00	6.50	6.25
20			9.75	9.00	8.25	7.75	7.50	7.00	6.75

Troubleshooting

Disconnect the electrical power and depressurize the generator before attempting any troubleshooting activities according to the shut down steps in the operation section. Only trained personnel using reasonable care should perform any troubleshooting activities.

Determine whether the trouble is with the compressed air source or the Tri-Gas Generator. First, check that the compressed air source is delivering. If you have an integrated compressor (Model LCMS-5000), refer to the compressor troubleshooting section, otherwise check that the compressed air source is delivering a minimum, continuous flow of 90 SLPM (3.2 SCFM) at a pressure between 110 - 140 PSIG (7.6 - 9.6 barg).

If the compressor air supply is confirmed, then go to the Tri-Gas Generator troubleshooting section, and begin troubleshooting the Tri-Gas Generator.

Compressor Troubleshooting

Symptom	Probable Cause	Corrective Action
POWER ON light (green) does not appear	• Power not plugged in supply outlet.	• Plug in power cord.
	• Main disconnect is not ON.	• Switch disconnect to ON.
	• Blown fuse or tripped OFF circuit breaker at customer provided power supply.	• Replace fuse or switch disconnect to ON.
	• Blown fuse at primary side of transformer.	• Replace fuse on primary side. Be sure to use the same type and size.
	• LED power switch has failed.	• Replace switch.
POWER ON light is on but motor will not start	• Motor overload has tripped	• Determine fault and reset overload (Blue button)
	• Wrong or low voltage	• Check incoming power supply and unit power rating
	• Motor failed	• Replace motor
Compressor is running but will not make pressure	• Depressurize Valve on TriGas Generator is OPEN	• Close Valve
	• Auto Drain Valve is open continuously	• Replace Auto Drain Valve
	• Drive belts broke or are too loose	• Replace drive belts and (or) tighten to specification
	• Clogged intake filter element	• Replace intake filter element per instructions
	• Pressure relief valve has opened	• Pressure switch needs replacing or motor contacts welded shut
	• Excessive tip seal wear	• Replace tip seals per instructions every 5,000 hrs
	• Motor running wrong direction	• Correct power connections

Compressor Troubleshooting

Symptom	Probable Cause	Corrective Action
Excessive noise or vibration	• Drive belts are loose	• Tighten belts to specification
	• Drive belt has separated or flat spot	• Replace drive belt
	• Cooling fan touching guard	• Adjust guard
	• Motor bearing has failed	• Replace motor
	• Re-greasing procedure not performed at 5,000 hr intervals	• Removal of stationary scroll is required for pump inspection
	• Pump damaged	• Repair or replace pump
TEMPERATURE HIGH light is on, Compressor shuts down	• Room temp is above 104°F	• Add ventilation or air conditioning to room
	• Inlet air duct is obstructed	• Remove obstruction or reposition unit to allow for cooling air
	• Cooling air fan not running	• Check electrical connection at fan • Replace cooling air fan
	• Re-greasing procedure not performed at 5,000 hr intervals	• Re-grease
	• Aftercooler fins dirty, clogged	• Clean aftercooler
	• Excessive tip seal wear	• Replace tip seals per instructions every 5,000 hrs
	• Intake filter damaged	• Check, replace filter
	• Compressor is dirty	• Clean unit
Compressor shuts down on temperature malfunction	• Temperature switch has unplugged	• Plug in temperature switch
	• Temperature switch has failed	• Replace temperature switch
Compressor turns on/off rapidly	• Receiver tank has high level of water	• Replace electric tank drain
	• Compressor check valve has failed	• Replace check valve
	• Defective pressure switch	• Replace pressure switch
Safety valve blows off	• Pressure switch has failed to open	• Replace pressure switch
	• Motor starter contacts welded shut	• Replace motor starter
Motor overload has tripped	• Motor has failed	• Replace motor
	• Improper wiring	• Check wiring
	• Wrong overload setting	• Check overload setting
	• Low voltage	• Check incoming power supply
	• Pump has failed	• Fix or replace pump

Tri-Gas Generator Troubleshooting

Symptom	Probable Cause	Corrective Action
No Power	• Power cord not plugged in at outlet and/or wall unit	• Plug in cord both ends
SYSTEM READY light not ON (blinking or solid)	• No power at outlet	• Push circuit breaker at electrical panel to ON position
	• Power switch not ON	• Press switch to ON position
	• Switch not at proper voltage selection	• Remove and select proper voltage
	• Blown fuse	• Replace fuse
No pressure	• Compressor source is not ON	• Turn on compressor or supply
	• Depressurize shut-off valve is open	• Close valve (see Figure 21)
	• Regulators are closed	• Open pressure regulators
	• System leaks at fitting connections	• Check for leaks at connections
Low pressure (light ON and audible alarm every 2 seconds) LCMS-5000 only	• Compressed air supply is lower than 105 psig (7.2 barg)	• Adjust pressure switch on compressor by rotating spring nut clockwise until shut-off set point is minimum 110 psig (7.6 barg)
Low pressure (light ON and audible alarm every 2 seconds) LCMS-5001 only	• Factory compressed air supply is less than 85 psig (5.8 barg)	• Adjust factory air supply greater than 90 psig (6.2 barg)
Low temperature light is ON (Solid)	• Tower module heater faulty or electrical connections to heater faulty	• Check electrical connections. If good, replace tower module
Low temperature light is ON (blinking)	• Time to replace tower module	• Replace tower module

Don't Forget To:

1. Complete and mail or fax in your Warranty Registration Card.
2. Keep your product certification in a safe place.
3. Call the Technical Services Department at 800-343-4048, 8AM to 5PM Eastern Time (North America only) or email at balstontechsupport@parker.com with any questions. For other locations, please contact your local representative.

The serial number for the unit is attached to the back panel. For your own records, and in case service is required, please record the following:

DATE IN SERVICE_____ SERIAL NO._____

Please have the serial number available when calling for assistance.

WARRANTY (NORTH AMERICA ONLY)
FOR INFORMATION CONTACT YOUR LOCAL REPRESENTATIVE

Parker Hannifin guarantees to the original purchaser of this product, that if the product fails or is defective within 12 months from the date of purchase, when this product is operated and maintained according to the instructions provided with the product, then Parker guarantees, at Parker's option, to replace the product, repair the product, or refund the original price for the product. This warranty applies only to defects in material or workmanship and does not cover: wear components on compressors, routine maintenance recommended by the instructions provided with this product, or filter cartridges. Any modification of the product without written approval from Parker will result in voiding this warranty. Complete details of the warranty are available on request. This warranty applies to units purchased in North America.

COMPRESSOR LIMITED WARRANTY

COMPRESSOR 3 YEAR / 10,000 HOUR EXTENDED PARTS LIMITED WARRANTY - Compressor Manufacturer warrants each Compressor Pump or Scroll Air-End against defects in material or workmanship from the date of purchase for a period of **Three years or 10,000 hours**, whichever may occur first. This warranty applies to the exchange of part(s) of the compressor pump or air-end found to be defective by an Authorized Service Center.

COMPRESSOR 1 YEAR / 5,000 HOUR INLET TO OUTLET LIMITED WARRANTY - Compressor Manufacturer warrants each Compressor Unit, System, Pump, or Air-End against defects in material or workmanship from the date of purchase for a period of **One Year or 5,000 Hours,** whichever may occur first. This warranty applies to the exchange of defective component part(s) and labor performed by an Authorized Service Center.

Complete details of the Warranty are available on request.

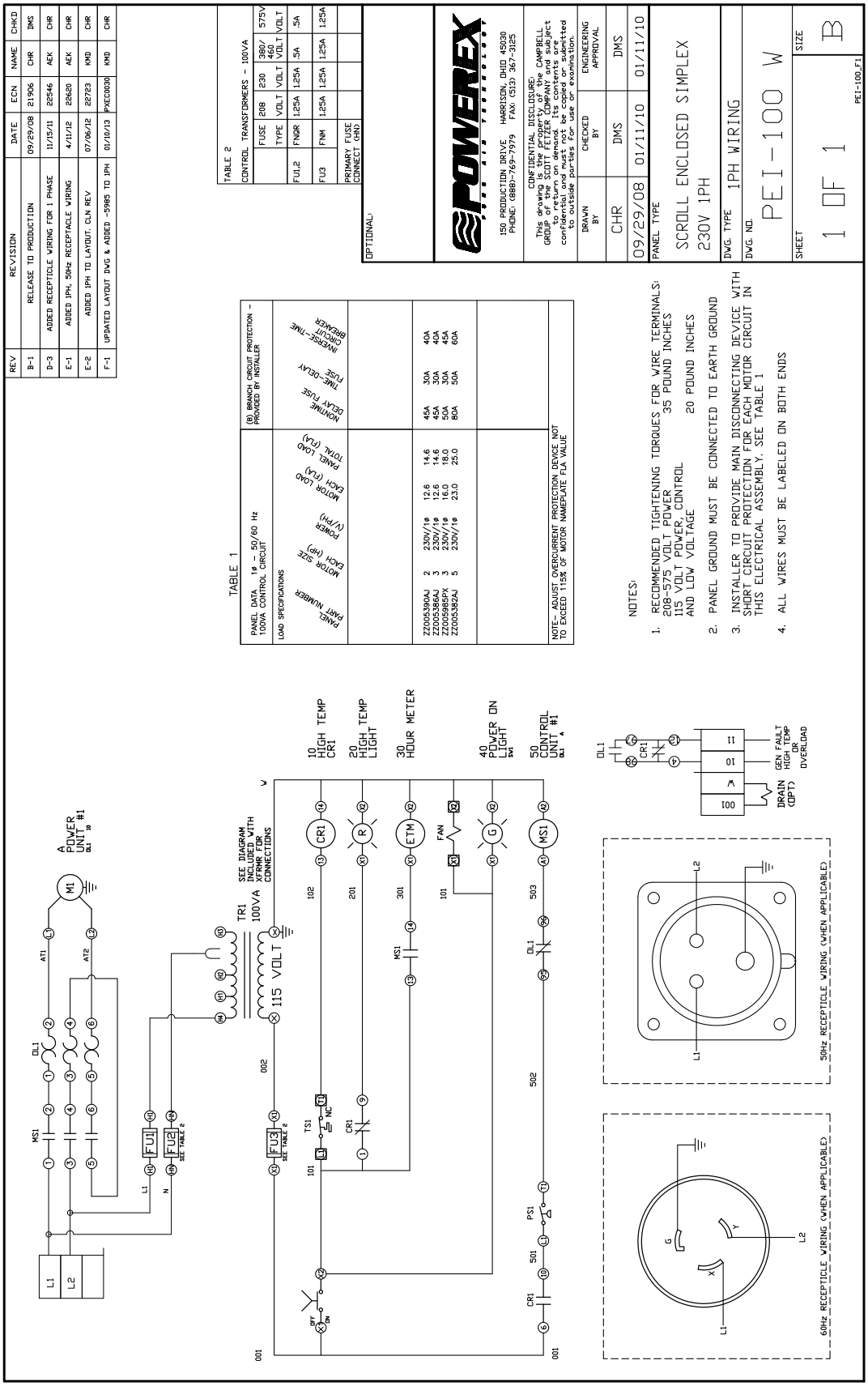

Figure 53 Vertical Compressor Electrical Schematic 1, 60 Hz Unit

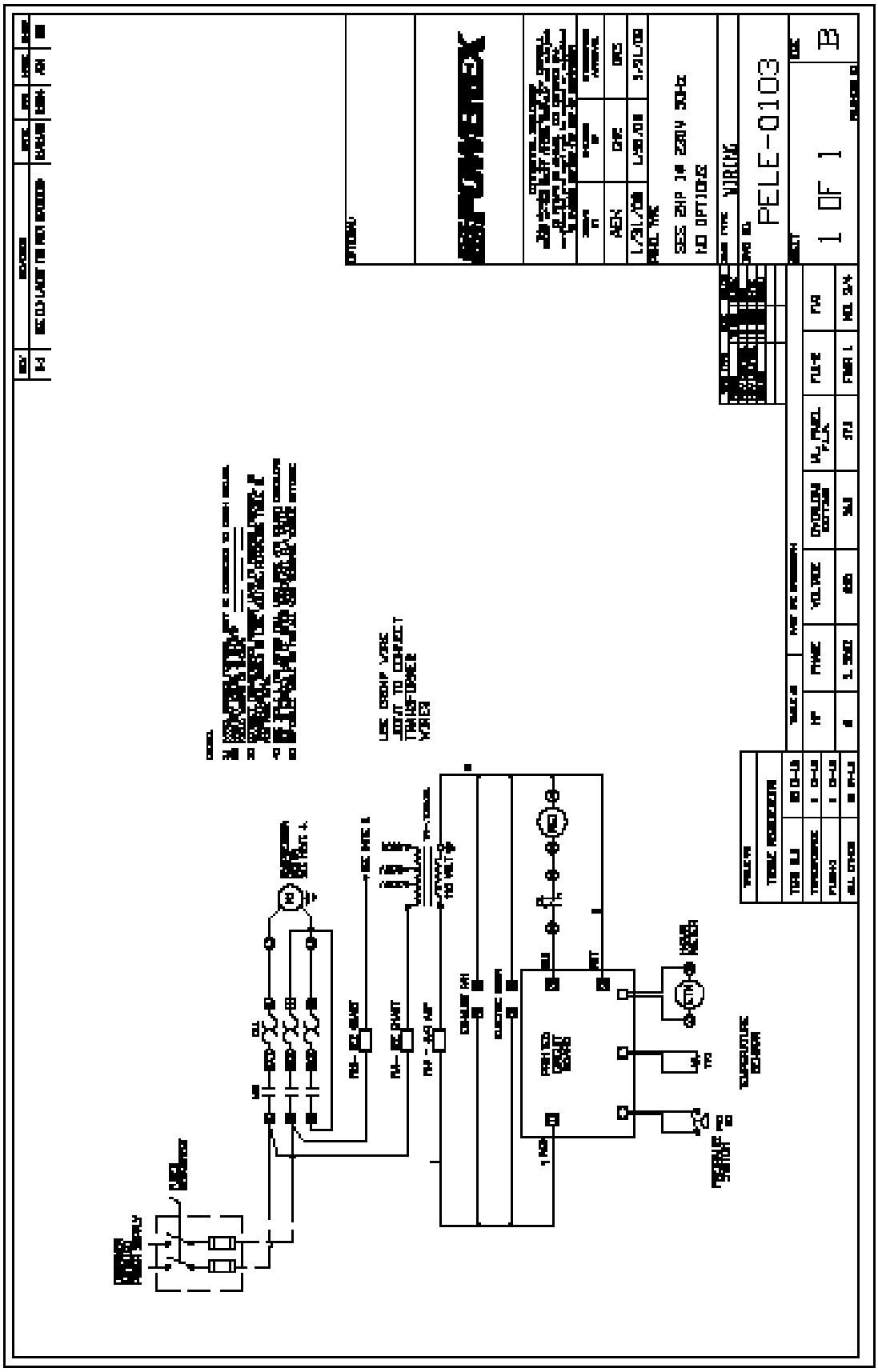

Figure 54 Vertical Compressor Electrical Schematic 2, 50 Hz Unit

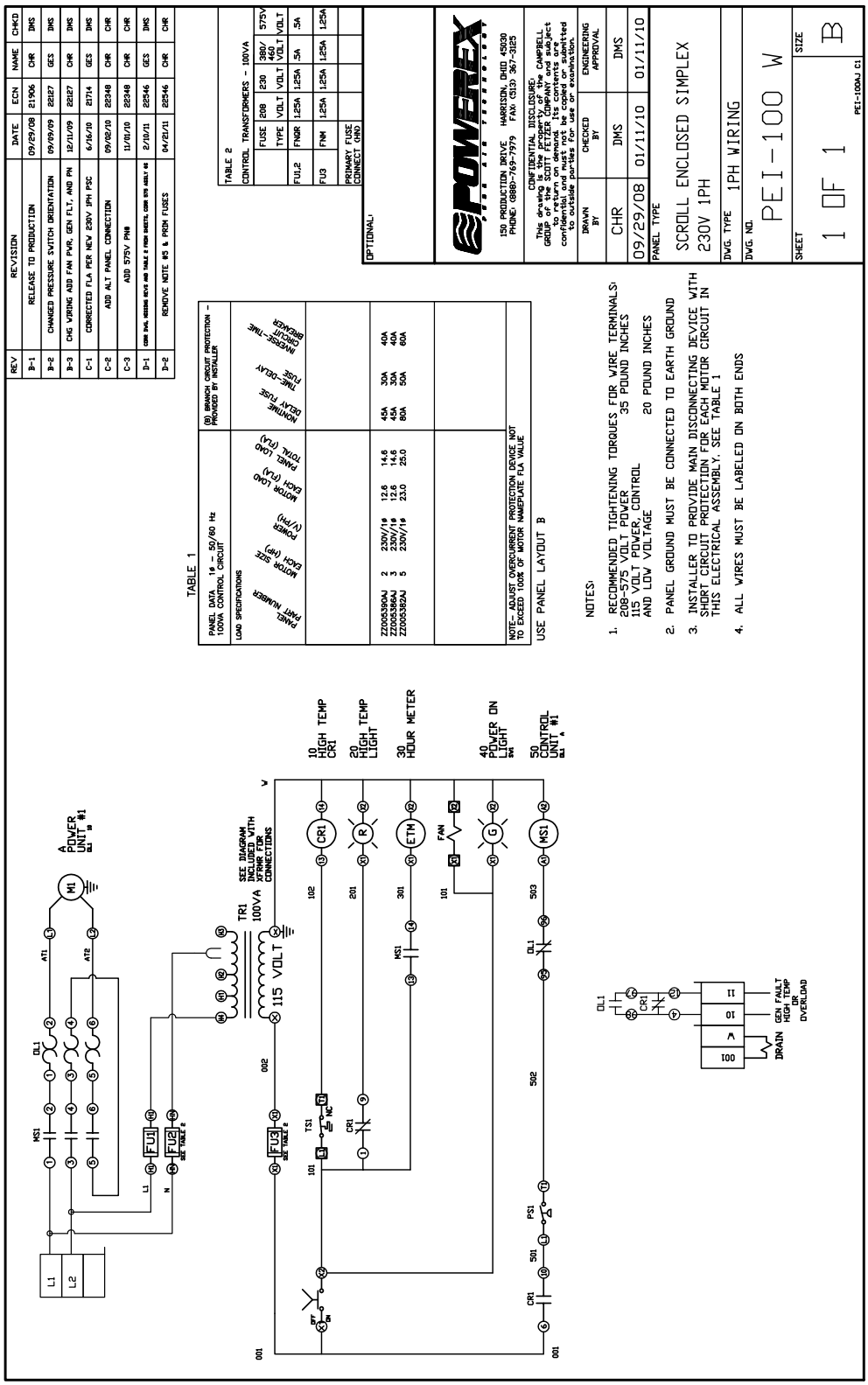

Figure 55 Horizontal Compressor Electrical Schematic 3, 50 and 60 Hz Units

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