TOPCUT SAMPLER

Pressurized TC-300 User Manual

CARON MEASUREMENT & CONTROLS

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CHAPTER 1…….SAFETY

SECTION 1.1 SAFETY PRECAUTIONS

- THE INTERNAL TIMER BATTERY SHOULD ONLY BE CHANGED IN A SAFE ENVIRONMENT. VERIFY THAT AN EXPLOSIVE ATMOSPHERE IS NOT PRESENT.
- WHEN SAMPLE IS NOT IN USE ENSURE THAT ALL SWITCHES ARE SET TO OFF WHEN SAMPLER IS NOT IN USE. THE INTERNAL TIMER SWITCH SETTING "0" AND THE MASS SAFETY SHUTOFF IN THE "OFF" POSITION.
- THE SAMPLER ENCLOSURE SHOULD BE VENTED INDEPENDENTLY TO A SAFE LOCATION AND A MINIMUM OF 1.5M FROM ANY ELECTRICAL ENCLOSURE.

CHAPTER 2……..…..OPTIONAL ACCESSORIES

SECTION 2.1 MOUNTING

THE TOP CUT SAMPLER CAN BE MOUNTED IN VARIOUS CONFIGURATIONS. WALL MOUNTING TABS ARE SHIPPED WITH THE STANDARD SAMPLER PACKAGE. OPTIONALLY AVAILABLE IS A UNIVERSAL STAND, ALLOWING THE SAMPLER TO BE LOCATED ON ANY LEVEL SURFACE. CUSTOM BUILT STANDS ARE AVAILABLE UPON REQUEST.

SECTION 2.2 FLOW SIGNAL

IN ORDER FOR THE SAMPLER TO ACCURATELY SAMPLE IN PROPORTION TO FLOW, A BOOLEAN (TRUE OF FALSE) FLOW CONDITION SIGNAL CAN BE SUPPLIED TO THE SAMPLER. THE INTRINSICALLY SAFE ELECTRONICS CAN TAKE SIGNAL FROM ANY ISOLATED DRY CONTACT. ANY EXTERNAL WIRING SHOULD BE DONE USING BLUE CABLE TO INDICATE INTRINSIC WIRING, AS WELL AS MAINTAINING ISOLATION FROM ANY NON-INTRINSIC WIRING. A CLOSED LOOP CONDITION INDICATES FLOWING, WHILE OPEN INDICATES NOT FLOWING.

SUBSECTION 2.2.1 PNEUMATIC

OUR STANDARD SAMPLER IS EQUIPPED WITH A PNEUMATIC PRESSURE SWITCH WHICH ACCEPTS A **30**PSI SIGNAL TO INDICATE A FLOWING CONDITION. THE SIGNAL CAN COME DIRECTLY FROM A LEVEL CONTROLLER OUTPUT, OR VIA SOLENOID VALVE CONTROLLED BY A PLC FOR FLOW PROPORTIONAL SAMPLING.

Subsection 2.2.2 Flow Switch

A Stainless Steel flow switch can be wired to the sampler timer to indicate a flowing condition. This allows for a completely self contained electrical flow signal system. No need for external power or logic. The flow switch requires a **1-1/2**"NPT connection on the top of a horizontal section of pipe.

Subsection 2.2.3 Dry Contact

The Top Cut Sampler can also utilize any isolated dry contact to indicate flow. Care must be taken to follow CEC guidelines to maintain intrinsic safety. Please contact a member of our team for more information on this configuration.

Subsection 2.2.4 Direct External Pneumatic

A direct external pneumatic control signal can also be used to actuate the pump. With this option, the unit will be equipped with a selection valve to alternate from internal timer control, to external control, bypassing the electronic timer completely. See Schematics in section 3.1 for more information.

Section 2.3 Insulated and Heated Enclosure

For outdoor operation the Top Cut Sampler is available with an insulated and heated enclosure. The thermostat controlled heater will maintain above freezing temperatures inside the sampler. The heater requires a 120-240VAC power source. Please contact the Sales department for more detailed heater specifications.

CHAPTER 3……TOP CUT OPERATION

THE TOP CUT SAMPLER ELECTRONICS OPERATE ON ONE 6 VOLT PC915 ALKALINE BATTERY. OPERATING LIFE OF THE BATTERY VARIES WITH SAMPLING FREQUENCY, BUT WILL GENERALLY LAST 6 TO 18 MONTHS.

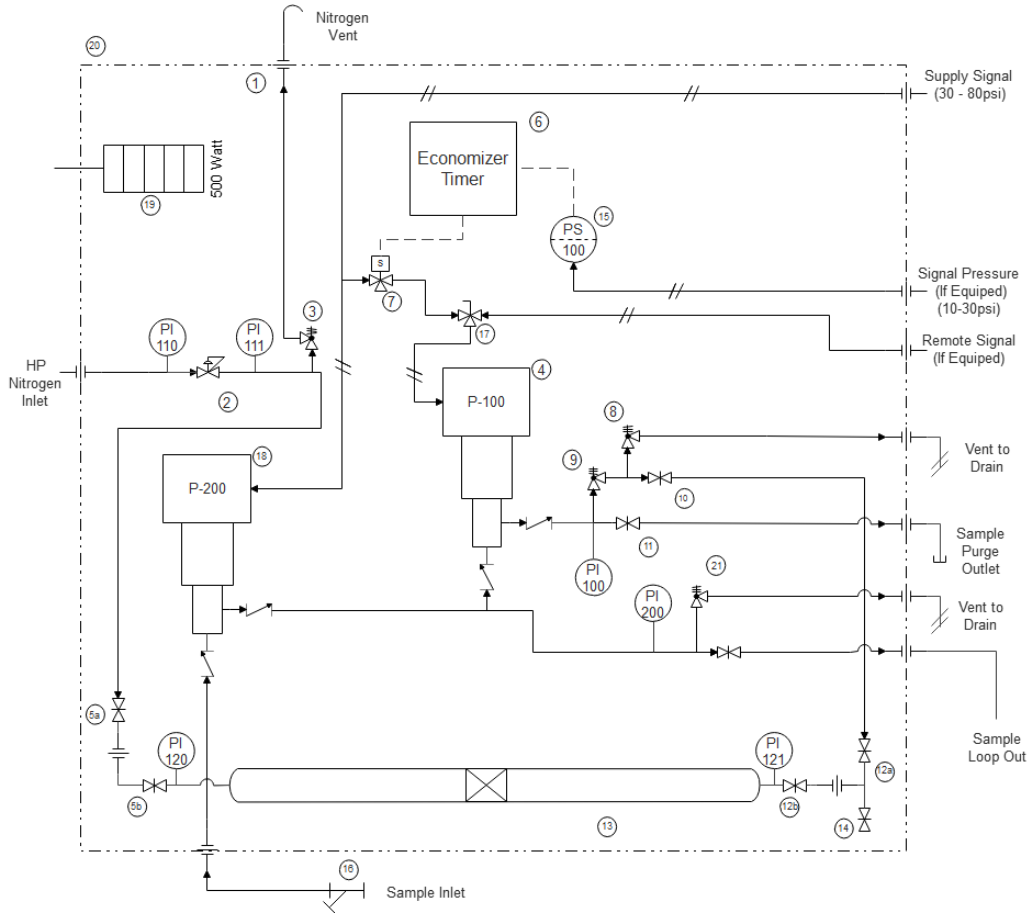
THE SAMPLER OPERATES ON A TIME BASED INTERVAL. THE BUILT IN TIMER IS TRIGGERED WHEN THE LOOP IS CLOSED ACROSS FLOW SIGNAL INPUT TERMINALS (FLOW SIGNAL OPTIONS LISTED IN SECTION 2.2). THE TIMER IS RETENTIVE IN-BETWEEN CYCLES OF THE FLOW SIGNAL INPUT. THIS MEANS THAT IF THE SIGNAL INPUT IS OPENED BEFORE THE TIMER RUNS OUT, THE TIMER WILL PAUSE, AND RESUME FROM THE REMAINING TIME THE NEXT TIME THE INPUT IS CLOSED.

WHEN THE FLOW CONDITION INPUT IS CLOSED, THE TIMER BEGINS TO COUNT. WHEN THE TIME SETTING IS REACHED, THE PULSE VALVE WILL SWITCH ON FOR 2 SECONDS, THEN OFF AGAIN FOR 2 SECONDS, AT WHICH POINT THE TIMER WILL RESET AND START COUNTING UNTIL THE INPUT GOES OPEN. IN THE ON POSITION, THE PULSE VALVE STROKES THE SAMPLE PUMP AND PUSHES THE SAMPLE FLUID THROUGH THE BACKPRESSURE VALVE AND INTO THE SAMPLE CYLINDER. WHEN OFF, THE PUMP RETURNS TO ITS RESTING POSITION, DRAWING ANOTHER SAMPLE FROM THE PROCESS.

THE INTERVAL TIME SETTING IS SELECTABLE FROM THE 8 POSITION SWITCH INSIDE THE SAMPLER TIMER BOX. SETTING 0 IS RESERVED FOR THE OFF POSITION, WHILE 1 THROUGH 7 ARE PROGRAMMABLE SET POINTS. THE SET POINTS ARE SET UP CUSTOM FOR EACH UNIQUE INSTALLATION AND ARE MARKET IN SHIPPING HOURS PER DAY. THE TIMER CHIPS ARE FIELD REPLACEABLE TO ACCOMMODATE CHANGES IN PROCESS CONDITIONS. FOR MORE INFORMATION PLEASE CONTACT OUR SUPPORT TEAM.

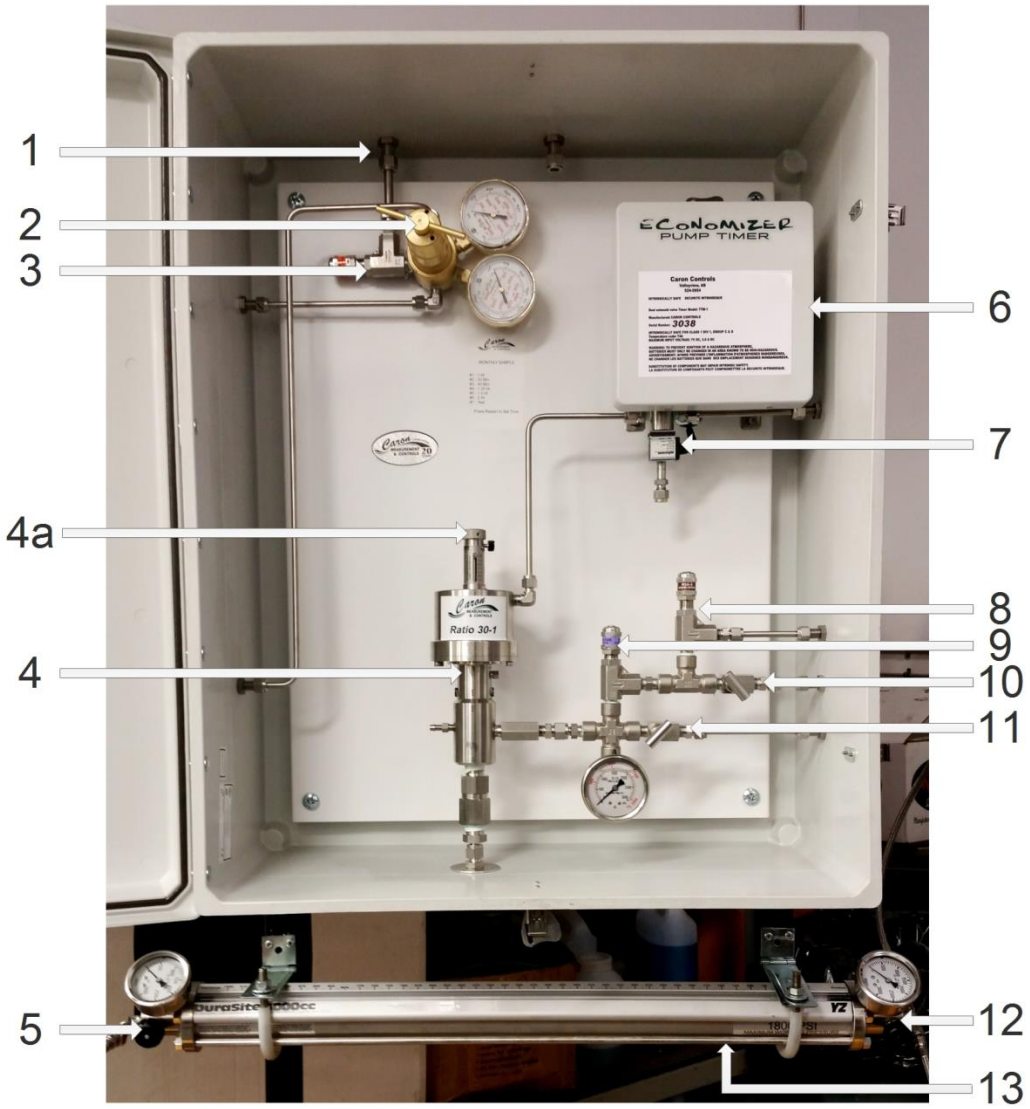
TIME SETTING SHOULD BE SET TO FILL THE SAMPLE CYLINDER TO 80% AT THE END OF THE CHOSEN SAMPLE PERIOD.

SECTION 3.1 SCHEMATIC DRAWINGS



1	NITROGEN PSV OUTLET	**12A**	SAMPLE ISOLATION VALVE
2	NITROGEN REGULATOR	**12B**	SAMPLE CYLINDER VALVE
3	NITROGEN PSV	**13**	SAMPLE CYLINDER
4	SAMPLE PUMP	**14**	SAMPLE CYLINDER PURGE
5A	NITROGEN ISOLATION VALVE	**15**	FLOW SIGNAL INPUT DEVICE (IF EQUIPPED)
5B	NITROGEN CYLINDER VALVE	**16**	SAMPLE INLET FILTER
6	LOCAL PUMP TIMER	**17**	OPTIONAL LOCAL/REMOTE CONTROL
7	PUMP CONTROL SOLENOID	**18**	OPTIONAL SPEED LOOP PUMP
8	SAFETY PSV	**19**	OPTIONAL HEATER, 500WATT
9	SAMPLE BACKPRESSURE PSV	**20**	OPTIONAL INSULATED CABINET
10	SAMPLE OUT ISOLATION VALVE	**21**	OPTIONAL SPEED LOOP PUMP PSV
11	PURGE VALVE		

FIGURE 3.1.1



1	NITROGEN PSV OUTLET	**7**	PUMP CONTROL SOLENOID
2	NITROGEN REGULATOR	8	SAFETY PSV
3	NITROGEN PSV	**9**	SAMPLE BACKPRESSURE PSV
4	SAMPLE PUMP	**10**	SAMPLE OUT ISOLATION VALVE
4A	SAMPLE ADJUST KNOB	**11**	PURGE VALVE
5	NITROGEN SIDE OF SAMPLE CYLINDER	**12**	SAMPLE SIDE OF CYLINDER
6	PUMP TIMER	**13**	SAMPLE CYLINDER

FIGURE 3.1.2

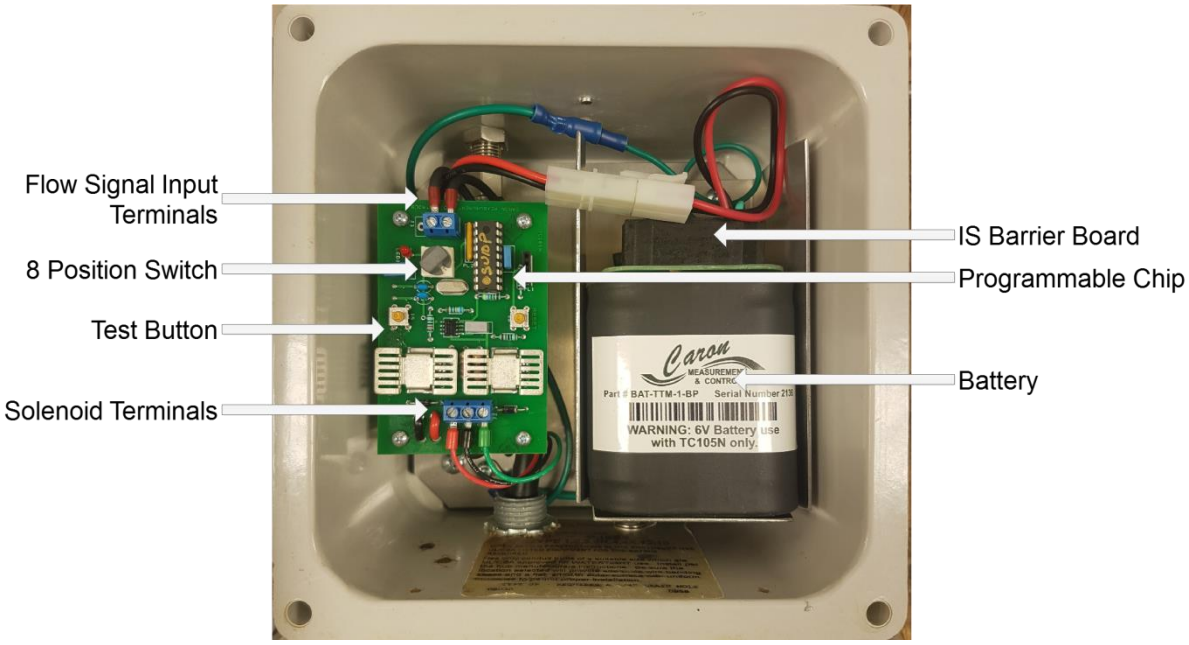

Flow Signal Input Terminals
8 Position Switch
Test Button
Solenoid Terminals
IS Barrier Board
Programmable Chip
Battery
Caron
MEASUREMENT & CONTROL
Part # BAT-TTM-1-BP
Serial Number 213
WARNING: 6V Battery use with TC105N only.

FIGURE 3.1.3

SECTION 3.2 INSTALLATION

PROPER INSTALLATION IS INTEGRAL TO RELIABLE AND ACCURATE OPERATION OF YOUR TOPCUT SAMPLER. THE FOLLOWING INFORMATION IS MEANT TO ASSIST YOU IN SETTING UP THE SAMPLER FOR OPTIMAL OPERATION.

FIRST STEP IS TO FIND AN APPROPRIATE LOCATION FOR THE SAMPLE POINT. IT IS IMPORTANT TO SELECT A SAMPLE POINT WHERE THE PRODUCT WILL BE WELL MIXED. WE RECOMMEND THE USE OF A STATIC MIXER UPSTREAM OF THE SAMPLE POINT FOR MOST APPLICATIONS. VARIOUS SIZES AND STYLES OF MIXER ARE AVAILABLE; CONTACT OUR SALES DEPARTMENT FOR MIXER AND SAMPLE QUILL OPTIONS. WHEN INSTALLING THE SAMPLE QUILL, THE BEVELED EDGE SHOULD FACE UPSTREAM, AGAINST FLOW. IDEALLY THE QUILL SHOULD BE MOUNTED OFF THE TOP OF THE PIPE. SEE FIGURE 3.2.1 BELOW.

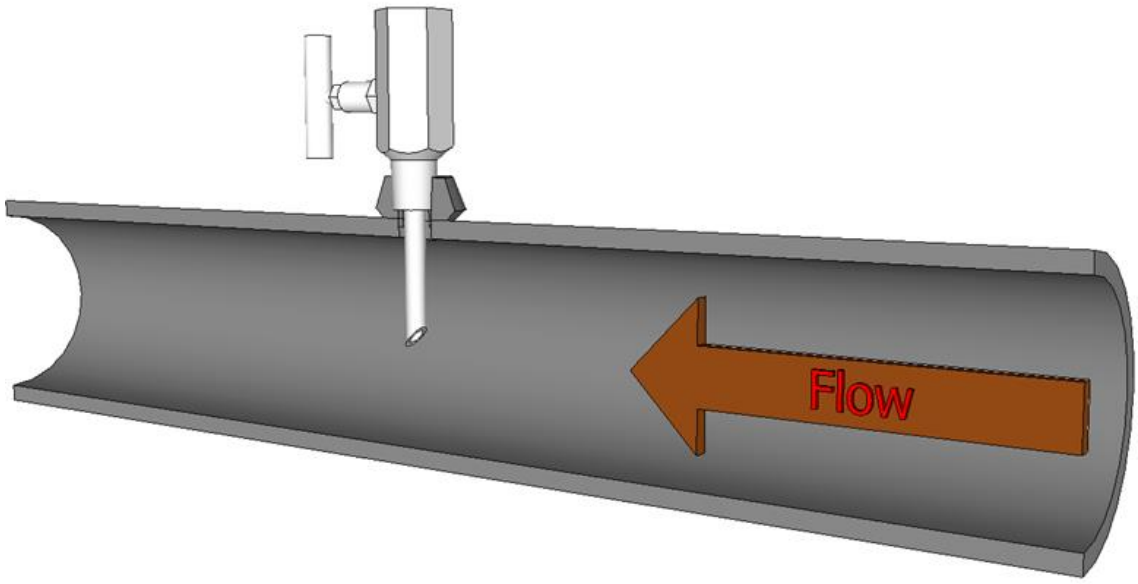


FIGURE 3.2.1

ANOTHER POINT TO CONSIDER WHEN SELECTING A SAMPLE POINT LOCATION IS THE SAMPLER ITSELF. FIND A SECURE MOUNTING LOCATION FOR THE SAMPLER AS CLOSE TO THE SAMPLE POINT AS POSSIBLE.

Connect the sample prober the fitting on the sampler marked **SAMPLE** using 1/4" or 3/8" tubing.

Connect a clean, dry **30 - 100psi** supply to the fitting marked **SUPPLY.**

Connect the flow indication signal to the sampler. This will vary depending on the sampler configuration.

- If configured with Pneumatic signal, tube the 10-30psi signal to the fitting marked **SIGNAL** on the sampler
- If configured with electronic signal, connect the signal wires from the dry contact switch to the input terminals using the conduit connection on the sampler. Ensure a watertight cable connector is used.

Section 3.3 Calibration

Before initial use, and periodically there are 3 key points on the sampler that should be calibrated to ensure accurate and reliable operation.

IMPORTANT: Before performing a calibration, follow the startup procedure in the next section. The system needs to be purged with fluid for a successful calibration.

Subsection 3.3.1 Sample Volume

The sample pump should accurately take a **1mL** sample every stroke (unless otherwise configured). For accurate results, the pump and the sample tubing **MUST** be properly purged of all trapped air. Follow the startup procedure (Section 3.4) to properly purge and set up a new sample cylinder. To calibrate the sample volume follow these steps:

1) Turn the 8 position switch on the timer to the 0 position, turning the sampler off.

2) Direct the sample to an empty cylinder.
3) turn the 8 position switch on the timer to position 7 (test).
4) If the flow signal input is indicating flow, the unit will start sampling and proceed to step 6. If not press the TEST button for two seconds, and release for 2 seconds to take a sample.
5) Monitor the magnetic indicator on the sample cylinder.
6) the sample should have increased 1mL every stroke. If this is not the case, adjust the SAMPLE ADJUST KNOB on the sample pump slightly inward for less sample and out for more sample until 1mL per stroke is reached.

Subsection 3.3.2 Relief Valves

NOTE: The 3 relief valves should come preset from factory and should not require adjustment under normal conditions. Calibration should be performed by qualified personnel only.

Safety PSV – This relief valve protects the sample tubing as well as the sample cylinder from overpressure. It should be set to the maximum operating pressure of the cylinder.

Sample Backpressure PSV – This relief valve prevents free flow of the process through the pump. It should be set to the maximum operating pressure of the process system of which the sample is being taken from.

Nitrogen PSV – This relief valve protects the nitrogen side of the sample cylinder from over pressure. It should be set to process system maximum operating pressure.

SECTION 3.4 STARTUP PROCEDURE

THE FOLLOWING PROCEDURE SHOULD BE PERFORMED PRIOR TO FIRST USE AND WHENEVER ANYTHING THAT COULD AFFECT THE SAMPLER OPERATION IS CHANGED. FOR EXAMPLE, ANYTHING THAT WOULD INTRODUCE AIR TO THE PROCESS UPSTREAM OF THE SAMPLE POINT CAN CAUSE THE SAMPLER TO BECOME AIR LOCKED.

IF SAMPLER IS ALREADY IN OPERATION AND ONLY A CYLINDER CHANGE IS REQUIRED, SEE THE "QUICK START GUIDE" AT THE END OF THIS MANUAL.

1) CLOSE ALL VALVES AND CHECK TO ENSURE ALL FITTINGS AND CONNECTIONS ARE TIGHT.
2) SET THE 8 POSITION SWITCH TO THE "**0**" POSITION.
3) INSTALL AN EMPTY SAMPLE CYLINDER AND CONNECT THE LINES. DOUBLE CHECK BOTH CYLINDER VALVES ARE CLOSED.
4) OPEN THE NITROGEN SUPPLY AND **VERY SLOWLY** OPEN THE VALVE ON THE NITROGEN SIDE OF THE CYLINDER. BE CAREFUL NOT TO SLAM THE INTERNAL PISTON AGAINST THE END OF THE CYLINDER.
5) OPEN THE SAMPLE POINT VALVE.
6) **PURGE SYSTEM**: TO PURGE SYSTEM, PLACE A CONTAINER UNDERNEATH SAMPLE PURGE OUTLET AND CAREFULLY REMOVE THE CAP. OPEN THE PURGE VALVE (#11) AND ALLOW FLUID TO FLOW OUT INTO THE CONTAINER UNTIL A CONSTANT AIR FREE STREAM IS OBSERVED. PROCEED TO CLOSE THE PURGE VALVE AND REPLACE THE CAP
7) OPEN THE AIR SUPPLY TO THE SAMPLER AND VERIFY THE SET PRESSURE.
8) PLACE A CONTAINER UNDER THE SAMPLE CYLINDER PURGE POINT. SLOWLY OPEN THE SAMPLE OUT ISOLATION VALVE (#10).CAREFULLY REMOVE THE CAP AND OPEN THE CYLINDER PURGE VALVE (#14).
9) SET THE 8 POSITION SWITCH TO POSITION 7. IF THE FLOW SIGNAL DEVICE IS INDICATING FLOW, THE PUMP WILL BEGIN TO STROKE. IF NOT, PRESS THE TEST BUTTON FOR 2 SECONDS AND RELEASE FOR A MINIMUM OF 2 SECONDS TO MANUALLY STROKE THE SAMPLE PUMP. CONTINUE TO SAMPLE UNTIL CONTINUOUS AIR FREE SAMPLES ARE OBSERVED FROM THE TEST SAMPLE OUTLET. **THE SYSTEM IS NOW PURGED.**

10) Open the sample cylinder valve (#12B) and close the sample cylinder purge valve (#14).
11) Fill the sample cylinder with 10 – 20mL of sample while Verifying **1**mL per sample. For help on this step see "Sample Volume" calibration in section 3.3.1. When complete turn timer to 0. Once complete, return the 8 position switch to the **0** position.
12) Open the cylinder purge valve (#14) and bleed off cylinder.
13) Close cylinder purge valve (#14) on cylinder and replace cap.
14) Set 8 position switch to the desired set point. Monitor sampler to verify pump operation while running.

*During operation valves **5A, 5B, 10, 12A,** and **12B** should be OPEN. Valves **11** and **14** should be CLOSED.

SECTION 3.4 PREVENTATIVE MAINTENANCE

THE FOLLOWING STEPS SHOULD BE PERFORMED PERIODICALLY TO MAINTAIN RELIABLE SAMPLER OPERATION. OVER THE FIRST FEW WEEKS, CHECK MORE FREQUENTLY AND TAKE THE TIME DO DEVELOP A MAINTENANCE SCHEDULE.

1) CHECK SAMPLE FILTER ELEMENT (IF INSTALLED). REMEMBER TO PROPERLY PURGE PUMP AFTER ANYTIME THE SAMPLE LINE IS OPENED.
2) VERIFY SAMPLE VOLUME CALIBRATION.
3) CALIBRATE RELIEF VALVES.
4) CHECK FOR ADEQUATE NITROGEN SUPPLY

CHAPTER 3……..…TROUBLESHOOTING

SYMPTOM	POSSIBLE CAUSE	SOLUTION
NO SAMPLE FLOW, BUT PUMP IS STROKING	PUMP IS AIR LOCKED	PURGE SAMPLE PUMP. SEE SECTION 3.4 STEP 4. CHECK SAMPLE FILTER IF INSTALLED.
	SAMPLE LINE OR FILTER IS PLUGGED	CLEAN SAMPLE FILTER AND PURGE PUMP.
	A VALVE IS CLOSED	CHECK VALVING
SAMPLE PUMP IS NOT STROKING, BUT PUMP CONTROL SOLENOID IS MAKING CLICKING SOUND	INADEQUATE SUPPLY PRESSURE	CHECK TO ENSURE 30PSI SUPPLY TO SAMPLER
	PLUGGED SIGNAL LINE	CHECK TO SEE IF IA SUPPLY IS PRESENT RIGHT AT SAMPLE PUMP DURING A STROKE. TRACE PRESSURE TO FIND BLOCKAGE.
SAMPLE PUMP IS NOT STROKING, SOLENOID IS NOT CLICKING	NO FLOW SIGNAL	TO TEST, SET TIMER TO SETTING 7, AND JUMPER THE FLOW SIGNAL INPUT TERMINALS. IF PUMP STROKES, CHECK FLOW SIGNAL DEVICE
	LOW BATTERY VOLTAGE	CHECK BATTERY VOLTAGE, REPLACE IF NECESSARY
	FAILED SOLENOID VALVE	CONTACT SALES DEPARTMENT FOR REPLACEMENT PARTS

	Failed electronics	To test, set timer to setting 7, and jumper the flow signal input terminals. If pump strokes, electronics are operational. Contact sales department for replacement parts
Too little sample volume	shipping less hours per day then set point	Modify timer setting to less hours per day
	Sample pump partially air locked	Purge sample pump. See section 3.4 Step 4. Check sample filter if installed.
	Sample volume calibration out	Check sample volume and calibrate if necessary. See section 3.3.1 (check for air locked pump first)
Too much sample volume	Shipping more hours per day then set point	Modify timer setting to more hours per day
	Sample volume calibration out	Check sample volume and calibrate if necessary. See section 3.3.1
Sample cylinder fills immediately when valve is opened.	Backpressure relief valve has failed or is not properly calibrated, and N2 pressure is inadequate.	Have Relief valve calibrated and set N2 at proper pressure.

TOP CUT QUICK START GUIDE

NOTE: SEE SECTION 3.4 FOR DETAILED STARTUP PROCEDURE

SEE FIGURES 3.1.1 AND 3.1.2 FOR HELP WITH ITEM LOCATION.

1) CLOSE ALL VALVES
2) INSTALL NEW 1000CC CYLINDER AND CONNECT LINES
3) SET N2 REGULATOR (**#2**) TO SLIGHTLY HIGHER THAN LINE PRESSURE.
4) SLOWLY OPEN N2 TO SAMPLE CYLINDER (**#5A**) AND (**#5B**).
5) PURGE PUMP THROUGH PURGE VALVE (**#11**), THEN CLOSE VALVE
6) OPEN VALVES (**#12A**) AND (**#10**). PURGE PUMP THROUGH PURGE VALVE (**#14**) BY OPENING VALVE AND TURN TIMER ON TO SETTING **7.**
7) OPEN CYLINDER VALVE (**#12B**) AND CLOSE (**#14**). FILL CYLINDER WITH 10 – 20ML, WHILE VERIFYING 1ML PER STROKE. THEN TURN TIMER TO SETTING **0**
8) OPEN VALVE (**#14**) AND BLEED OFF SAMPLE CYLINDER, THEN CLOSE VALVE
9) SET TIMER TO DESIRED SET POINT.

*DURING OPERATION VALVES **5A, 5B, 10, 12A,** AND **12B** SHOULD BE OPEN. VALVES **11** AND **14** SHOULD BE CLOSED.