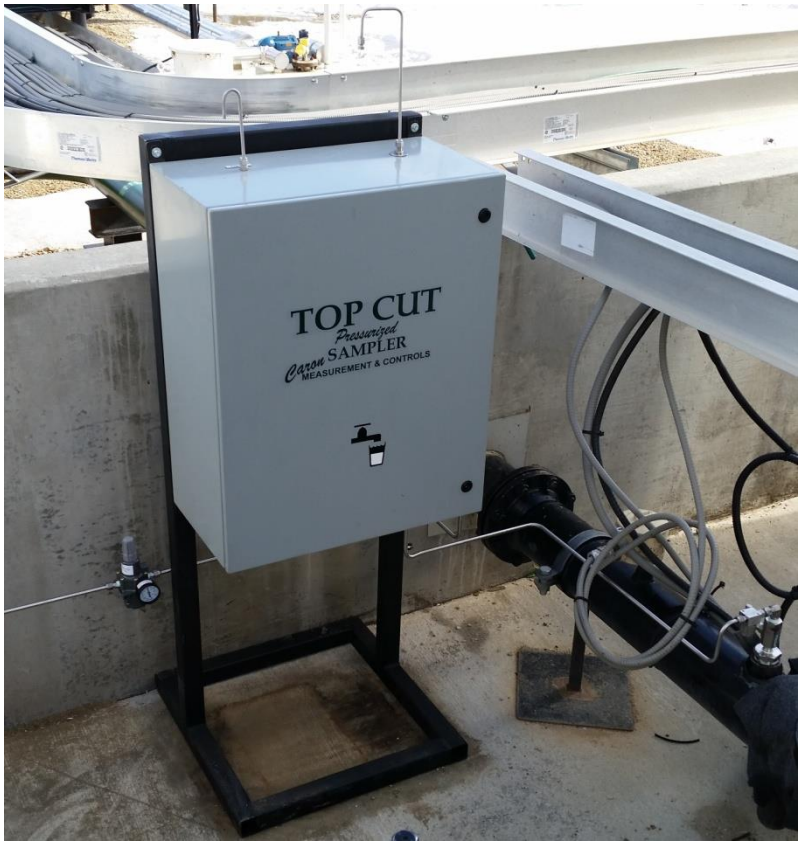
TOP CUT SAMPLER

TC-200 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.

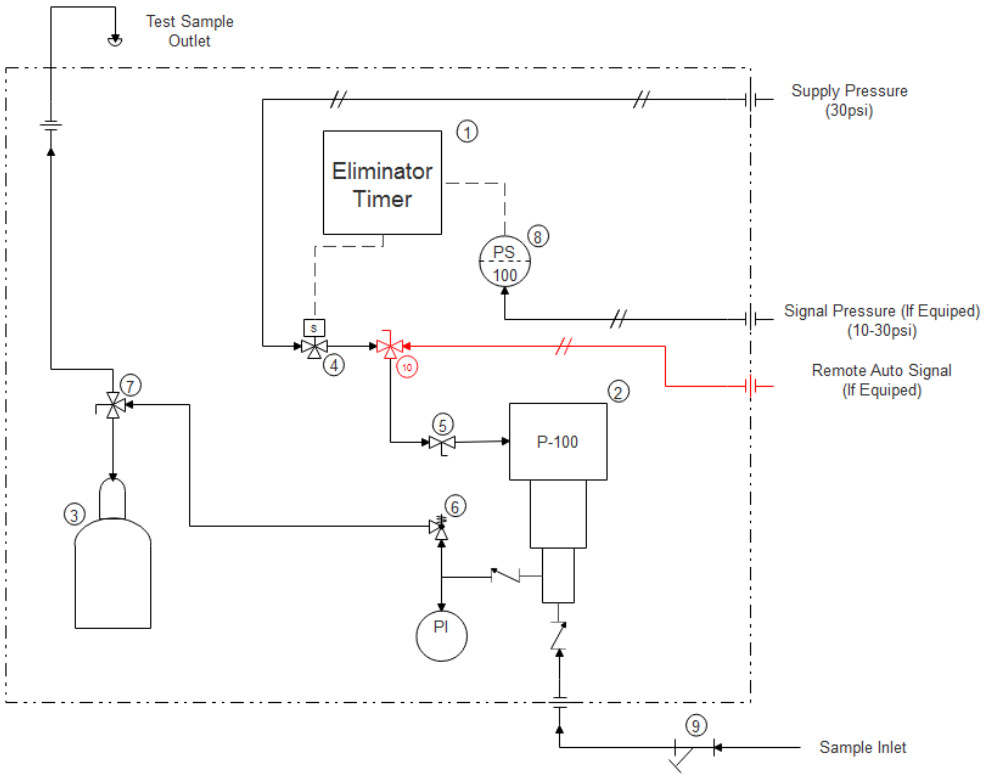
THE SAMPLER OPERATES ON A TIME BASED INTERVAL. THE BUILT IN TIMER IS TRIGGERED WHEN THE LOOP IS CLOSED ACROSS FLOW SIGNAL INPUT TERMINALS (FLOW SIGNAL OPTIONS LISTED IN SECTION 2.2). THE TIMER IS RETENTIVE IN-BETWEEN CYCLES OF THE FLOW SIGNAL INPUT. THIS MEANS THAT IF THE SIGNAL INPUT IS OPENED BEFORE 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 CONTAINER. 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 MARKED 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 CONTAINER WITH 7.2L OF FLUID AT THE END OF THE CHOSEN SAMPLE PERIOD. A SAFETY SHUTOFF VALVE IS USED TO DISABLE THE SAMPLE PUMP WHEN THE SAMPLE CYLINDER REACHES 7.2L. BECAUSE THE SAFETY SHUTOFF USES WEIGHT OF THE SAMPLE CONTAINER TO GAUGE ITS CONTENTS, IT NEEDS TO BE CALIBRATED TO ACTUAL SAMPLE DENSITY (SEE SECTION 3.3.1).

SECTION 3.1 SCHEMATIC DRAWINGS



ITEM	DESCRIPTION
1	**PROGRAMMABLE SAMPLER TIMER**
2	**SAMPLE PUMP**
3	**7.2L SAMPLE CONTAINER**
4	**SAMPLE PUMP CONTROL SOLENOID**
5	**SAFETY SHUTOFF VALVE. DISABLES SAMPLE PUMP WHEN SAMPLE CONTAINER REACHES A CERTAIN WEIGHT.**
6	**BACKPRESSURE REGULATING VALVE. PREVENTS SAMPLE FROM FREE FLOWING THROUGH PUMP.**
7	**SAMPLE DIVERT VALVE. SELECT SAMPLE TO OPERATING OR TEST CONTAINER.**
8	**FLOW SIGNAL INPUT DEVICE (STANDARD PNEUMATIC SHOWN. SEE SECTION 2.2 FOR MORE OPTIONS)**
9	**SAMPLE INLET FILTER**
10	**OPTIONAL DIRECT EXTERNAL CONTROL 3-WAY VALVE**

FIGURE 3.1.1

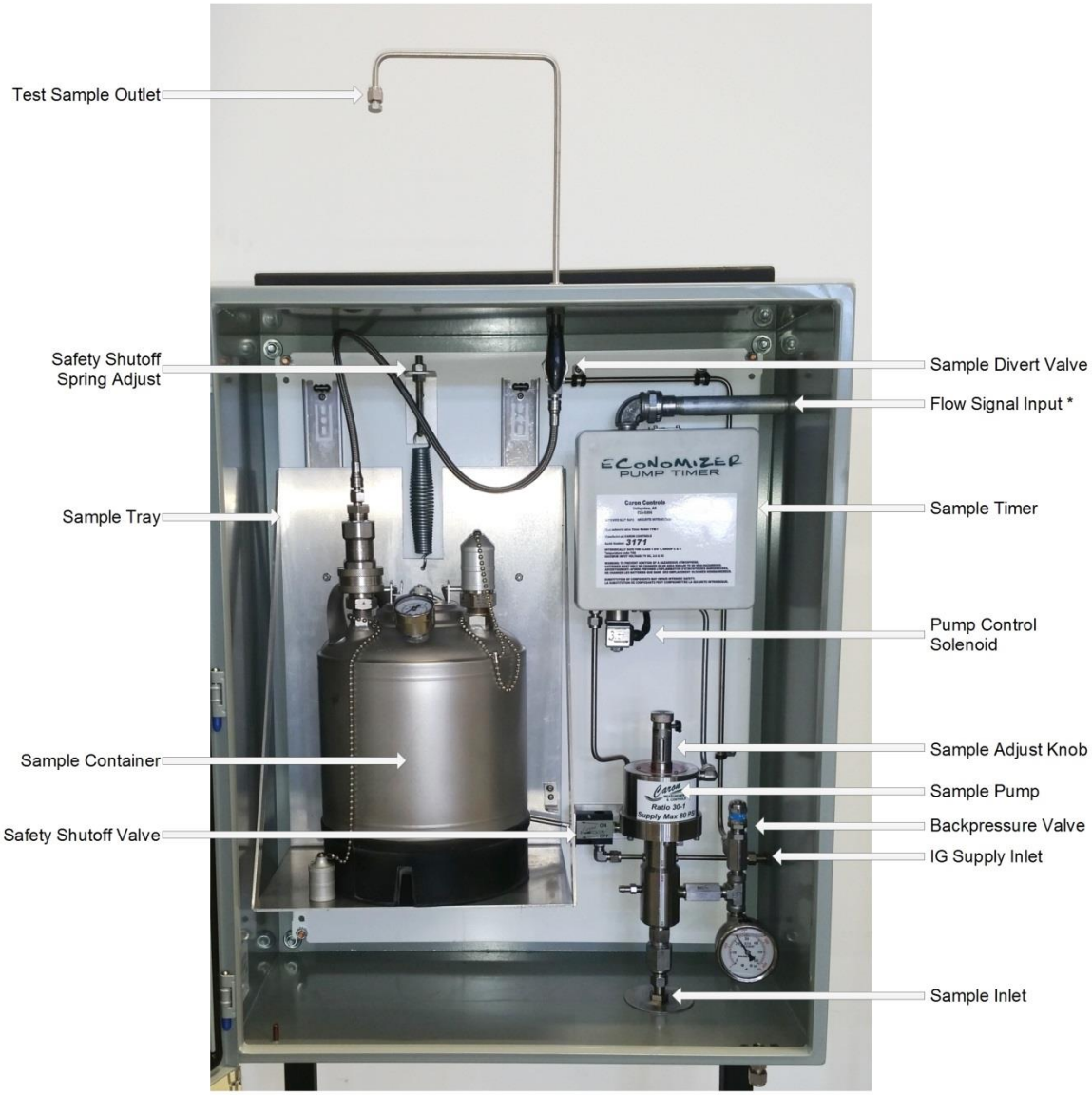

Test Sample Outlet
Safety Shutoff Spring Adjust
Sample Tray
Sample Container
Safety Shutoff Valve
Sample Divert Valve
Flow Signal Input *
Sample Timer
Pump Control Solenoid
Sample Adjust Knob
Sample Pump
Backpressure Valve
IG Supply Inlet
Sample Inlet
ECONOMIZER
PUMP TIMER

FIGURE 3.1.2

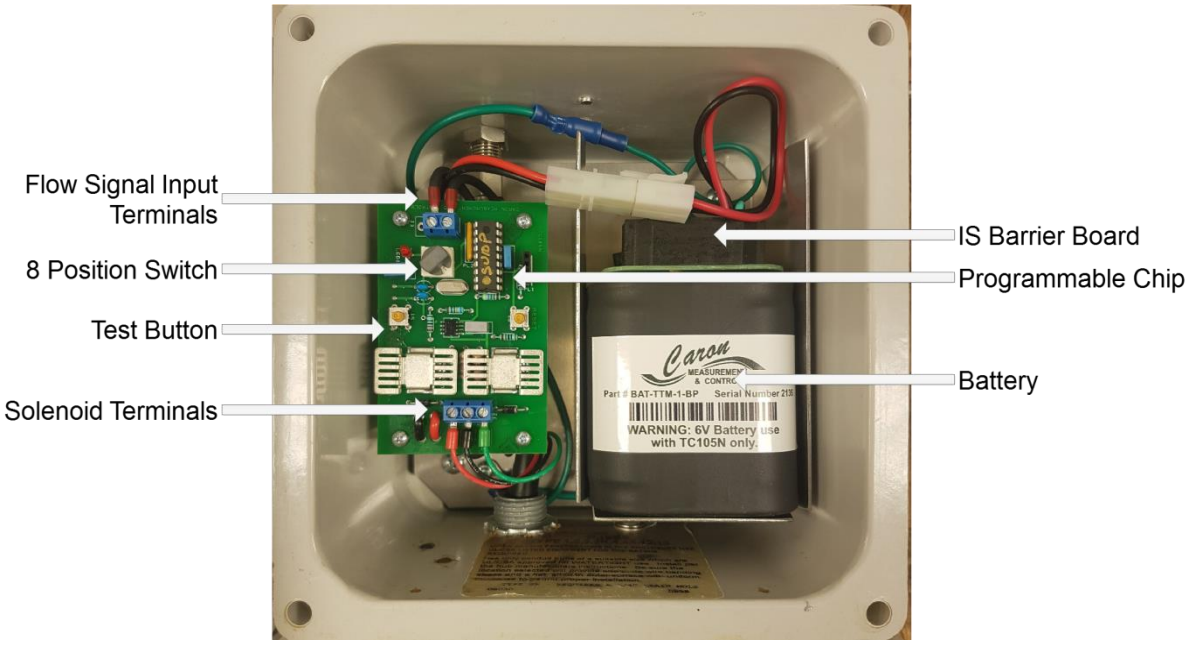

Flow Signal Input Terminals
8 Position Switch
Test Button
Solenoid Terminals
IS Barrier Board
Programmable Chip
Battery
Caron
MEASUREMENT & CONTRO
Part # BAT-TTM-1-BP
Serial Number 213
WARNING: 6V Battery use with TC105N only.

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.

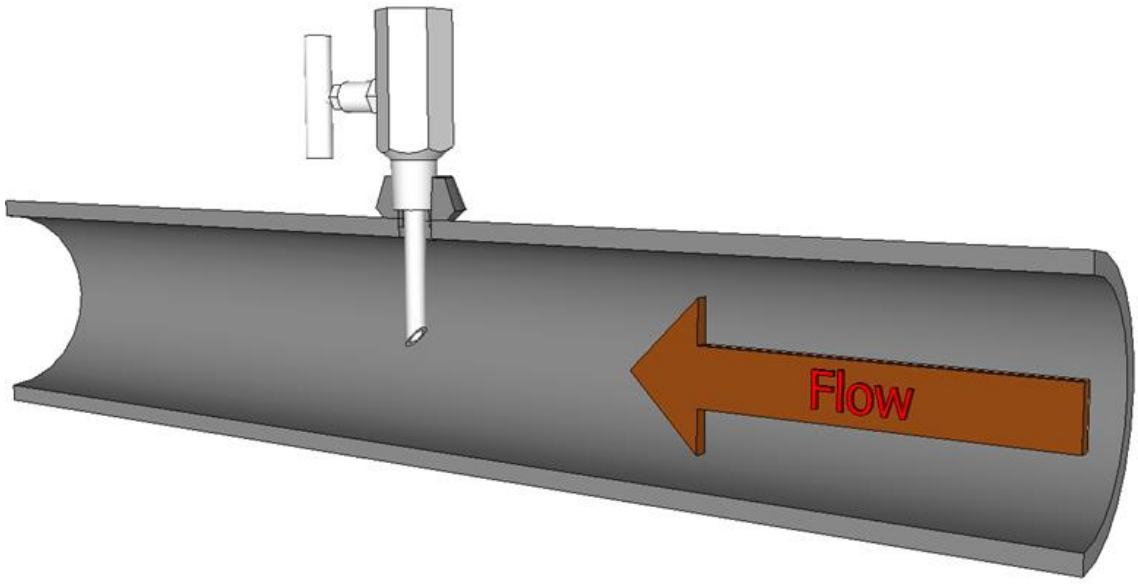


FIGURE 3.2.1

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 **30PSI** 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 PROCEDURE IN SECTION 3.4 STEP 4 FOR PURGING UNIT. 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) Remove the cap from the sample test port and place a 100ml graduated cylinder (or similar) underneath the opening.
3) Move the divert valve to send the sample to the test port.
4) turn the 8 position switch on the timer to position 7 (test).
5) 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.
6) Fill the container with 10 samples and move the switch back to the 0 position.
7) the sample should have increased 1mL every stroke, ending at 10mL more than the initial position. If this is not the case, adjust the SAMPLE ADJUST KNOB on the sample pump slightly. Empty the test cylinder and repeat from step 4.

Subsection 3.3.2 Safety Shutoff

The safety shutoff valve is designed to disable the sample pump when the sample container is full. Improper setup can result in low sample volume or a spill caused by overfill. The valve typically comes preset, but should be set to actual process fluid density. Follow these steps to set up the valve.

1) Place the empty container and connect the sample hose to the container. **Important:** Make sure anything that would be on the container or tray during operating conditions is present during calibration. Anything that would affect the weight needs to be considered.
2) open the lid of the container, making sure to leave it hanging somewhere on the container or tray.

3) Gather 7.2L of actual process fluid of the density the sample would see during operation.
4) Make sure the safety shutoff switch is in the ON position.
5) While keeping an eye on the safety shutoff, begin pouring the process fluid into the sample container, slowing down when the sample container gets close to 7.2L.
6) They safety shut off valve should snap to the off position just as the container reaches 7.2L. If this is true, calibration is complete. If it tripped early proceed to step 7, if it did not trip at all, proceed to step 8.
7) With the full 7.2L in the container, lift the tray slightly and reset the safety switch. Loosen the locknut on the spring adjust bolt and back the adjustment nut off loosening the spring until you are able to lower the tray and the SSV does not trip.
8) With the tray fully supported by the spring loosen the locknut on the spring adjust bolt (if you haven't already done so) and begin to tighten the adjustment nut, tightening the spring. Continue slowly tightening the nut, watching the SSV, until it trips. Stop tightening and secure the locking nut. The spring should now be close the 7.2L setting, but calibration is not yet complete.
9) Remove and collect a small portion of the sample from the container and reset the safety shut off.
10) Repeat step 5, then move to step 11
11) If the safety shut off did not snap just as the container reached 7.2L continue to step 12. If it did, calibration is complete
12) Loosen the adjustment locknut and make a small adjustment to the adjustment nut. If the SSV tripped

EARLY, TIGHTEN THE NUT. IF IT DID NOT TRIP, LOOSEN THE NET.

13) SECURE THE LOCKNUT AND GO BACK TO STEP 9 AND CONTINUE.

SUBSECTION 3.3.3 BACKPRESSURE REGULATOR

THE BACKPRESSURE REGULATING VALVE IS DESIGNED TO PREVENT FREE FLOW OF THE PROCESS FLUID THROUGH THE PUMP. NORMALLY IT IS SET TO THE MOP OF THE PROCESS. THE PUMP AND TUBING SHOULD BE PROPERLY PURGED (SECTION 3.4, STEP 4) PRIOR TO PERFORMING THIS STEP.

NOTE: THIS VALVE SHOULD COME PRESET FROM FACTORY AND SHOULD NOT REQUIRE ADJUSTMENT UNDER NORMAL CONDITIONS. THIS SECTION ALSO ASSUMES PRIOR KNOWLEDGE OF SAMPLER OPERATION.

1) SWITCH TIMER TO 0 POSITION
2) DIVERT THE SAMPLE TO A TEST CONTAINER USING THE TEST SAMPLE OUTLET LINE.
3) LOOSEN LOCKNUT ON BACKPRESSURE VALVE.
4) SWITCH TIMER TO TEST MODE AND MONITOR GAUGE.
5) ADJUST BACKPRESSURE VALVE IN TO RAISE PRESSURE AND OUT TO LOWER. THE VALVE SHOULD MAINTAIN THE DESIRED SET POINT IN BETWEEN PUMP CYCLES. DURING A PUMP STROKE, IT SHOULD READ SLIGHTLY HIGHER.
6) RETURN TIMER TO 0 POSITION
7) TIGHTEN LOCKNUT AND TAG SWITCH.
8) DIVERT SAMPLE BACK TO CONTAINER AND RETURN TIMER TO OPERATING SET POINT.

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.

1) CHECK AND ENSURE ALL FITTINGS AND CONNECTIONS ARE TIGHT. CLOSE ALL VALVES AND SET THE SAMPLE DIVERT VALVE TO THE SAMPLE CONTAINER.
2) SET THE 8 POSITION SWITCH TO THE "**0**" POSITION.
3) OPEN THE SAMPLE POINT VALVE.
4) **PURGE SYSTEM**: TO PURGE SYSTEM, PLACE A CONTAINER UNDERNEATH THE PUMP BLEED VALVE AND SLOWLY OPEN ½ TO 1 TURN. ALLOW FLUID TO FLOW OUT INTO THE CONTAINER UNTIL A CONSTANT AIR FREE STREAM IS OBSERVED. PROCEED TO TIGHTEN THE BLEED VALVE.
5) CAREFULLY REMOVE THE CAP ON THE TEST SAMPLE OUTLET LINE AND PLACE A JUG UNDERNEATH. SLOWLY MOVE THE DIVERT VALVE TO THE TEST OUTLET POSITION.
6) OPEN THE AIR SUPPLY TO THE SAMPLER AND VERIFY THE SET PRESSURE OF 30PSI. SWITCH SAFETY SHUTOFF SWITCH TO THE ON POSITION.
7) 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.
8) VERIFY **1**ML PER SAMPLE. FOR HELP ON THIS STEP SEE "SAMPLE VOLUME" CALIBRATION IN SECTION 3.3.1. ONCE COMPLETE, RETURN THE 8 POSITION SWITCH TO THE **0** POSITION AND REPLACE THE CAP ON THE TEST SAMPLE OUTLET LINE.
9) INSTALL EMPTY SAMPLE CONTAINER AND CONNECT QUICK CONNECT IF NOT ALREADY INSTALLED.
10) MOVE DIVERT VALVE TO THE SAMPLE CONTAINER POSITION.
11) SET 8 POSITION SWITCH TO THE DESIRED SET POINT. MONITOR SAMPLER TO VERIFY PUMP OPERATION WHILE RUNNING.

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) CHECK TO MAKE SURE SAMPLE TRAY MOVES FREELY.
4) CHECK SAFETY SHUTOFF CALIBRATION.

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 container overfills	Something effecting sample tray from moving freely	Make sure nothing is placed underneath sample tray. Check for smooth tray movement and safety shutoff operation.
	Safety Shutoff valve out of calibration	See section 3.3.2 for calibration