



Instruction 0024-9415

Flue-Gas Sample Conditioning System

P/N 0024-7224

Rev. 8 – May 2010

Introduction

The Bacharach Flue-Gas Sample Conditioning System consists of the following components:

- Probe with Peltier Cooler
- Condensate Pump with Water Trap
- Power Supply

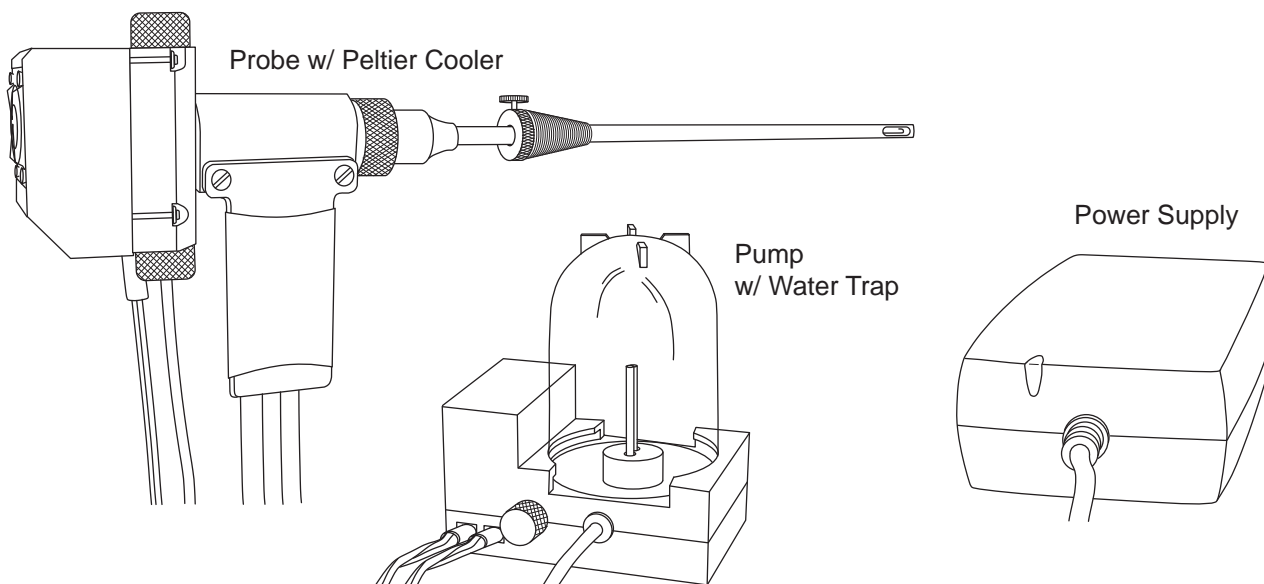
The function of this system is to remove water vapor from the flue-gas sample, thus preventing the formation of water droplets inside the probe hose. If water droplets were to form inside the hose, a portion of the gas sample could be absorbed by the water, thus resulting in lower-than-actual readings of NO_2 and SO_2 .

Water vapor is removed from the flue-gas sample by passing the sample through a Peltier Cooler where the sample is chilled, which in turn, causes the water vapor contained in the gas sample to be removed from the sample.

The water that was extracted from the gas sample is then pumped out of the Peltier Cooler and into a water trap.

The now dry, conditioned flue-gas sample is then sent to its associated combustion test equipment for analysis.

Figure 1. Flue-Gas Sample Conditioning System



Technical Data

Probe:

Standard Length.....	11.5 in (295 mm)
Optional Lengths	7 in (180 mm)
	19.5 in (500 mm)
	39 in (1000 mm)

Peltier Cooler:

Inlet Sample Dew Point.....	149 °F (65 °C) max.
Outlet Sample Dew Point.....	18 °F (10 °C) min. below ambient
Cooling Power	10 W
Environment Temperature	32 to 104 °F (0 to 40 °C)
Weight	8.5 oz (240 g)

Condensate Pump:

Sample Flow Rate.....	1.5 LPM @ STP
Length of Hose	6.6 ft (2 m)
Reservoir Storage.....	50 ml
Environment Temperature	32 to 104 °F (0 to 40 °C)
Weight	12.7 oz (360 g)

Power Supply:

Input.....	100 to 240 VAC, 50/60 Hz
Output	9 VDC, max. @ 4 A, max.

Equipment Setup

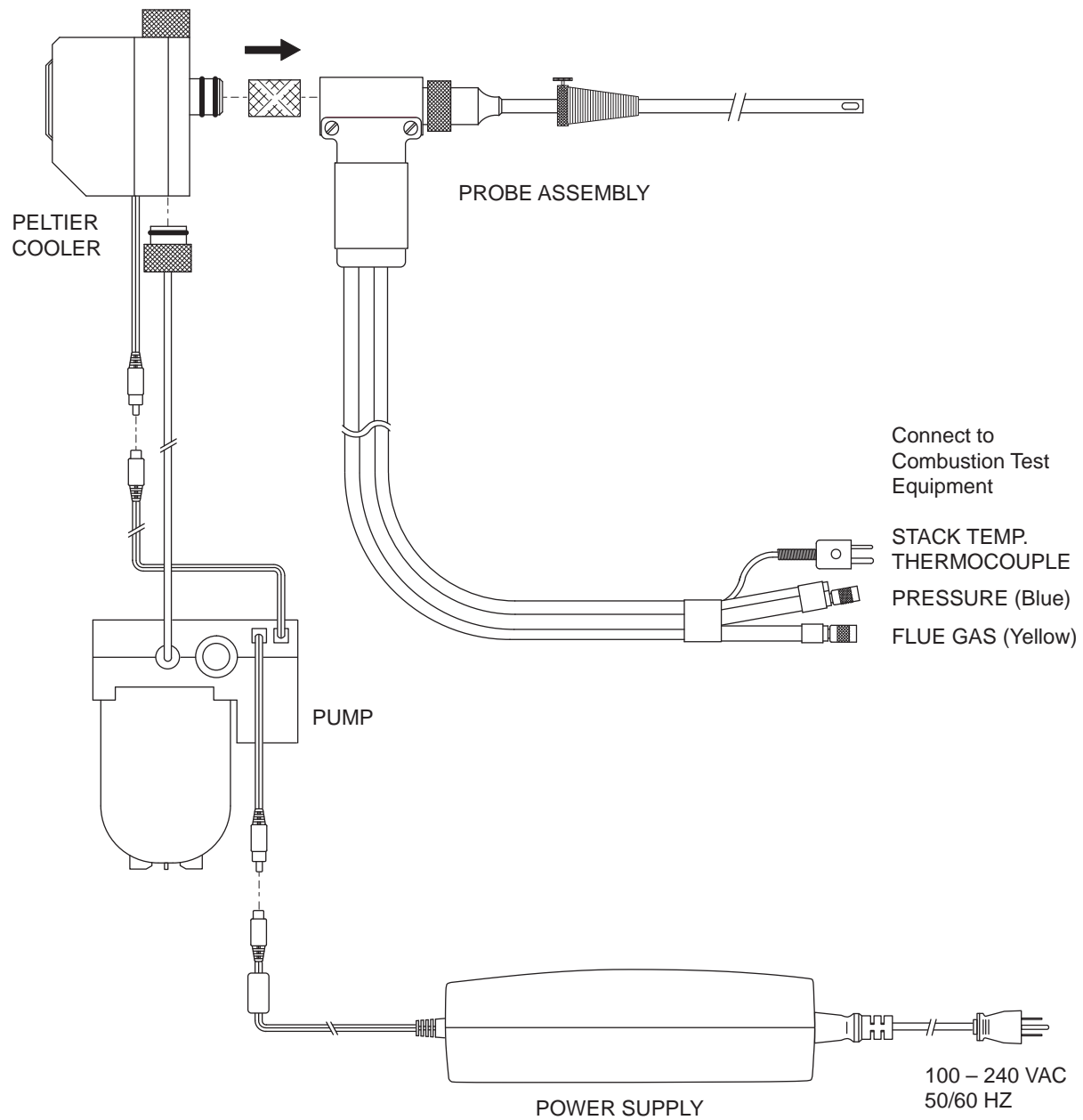
Refer to Figure 2. If not already done, attach the Peltier cooler to the probe assembly by first removing the plastic end cap from the rear of the probe, and then inserting the cooler's inlet connector, ensuring first that a filter is present between the cooler and probe.

Attach the pump's inlet hose to the bottom of the Peltier cooler. Water that is condensed from the flue-gas sample will be pumped into the condensate pump's reservoir through this hose. Note that the condensate pump can be placed in an upright, horizontal, or hanging position. A magnet mounted in the base of the pump allows the pump to be attached to overhead ductwork.

Connect the power supply's DC output connector to the condensate pump; then connect the condensate pump's DC output power connector to the Peltier cooler. The Peltier cooler and its associated condensate pump are started by plugging the power supply into a source of AC power that is between 100 and 240 VAC, 50/60 Hz.

Connect the probe assembly's stack-temperature thermocouple connector, pressure fitting, and flue-gas fitting to the combustion analyzer per the analyzer's instruction manual.

Figure 2. Equipment Setup



Operation

When ready to conduct a combustion efficiency test, plug in the power supply of the Flue-Gas Sample Conditioning System. You should hear the condensate pump start running and see the Peltier cooler's red LED turn on and off as the cooler is cycled. Note that the cooler's operating time changes according to its temperature.

Set up and configure the combustion analyzer as described in its instruction manual. Then insert the probe into the flue stack and begin testing.

During the combustion test, the condensed water vapor from the flue gas will accumulate inside the pump's reservoir. If the water level begins to approach the ends of the tubes inside the reservoir, then stop the test and empty the reservoir as described in the Maintenance Section of this manual.

WARNING! *The probe tube is hot! In the following step, be sure to allow the probe tube sufficient time to cool before handling.*

At the conclusion of the combustion test, remove the probe from the stack; then unplug the Peltier cooler's power supply.

Maintenance

Probe

The probe's sponge-type filter (Figure 3, Item 9) needs to be inspected at regular intervals for dirt contamination. Replace filter as necessary by first pulling out the Peltier cooler from the probe and then exchanging the filter with a new one.

Peltier Cooler

The cooler's wadding filter (Figure 3, Item 12) needs to be inspected at regular intervals for dirt contamination. Replace filter as necessary by first pulling off the filter chamber's top cap and then exchanging the filter with a new one.

Condensate Pump

WARNING! *The condensed water will be warm and slightly acidic. Take all necessary precautions to prevent the water from splashing into your eyes or contacting your skin.*

Empty the pump's reservoir (Figure 3, Item 15) by first holding the pump with its reservoir facing downwards. Then twist the reservoir 90 degrees (either clockwise or counterclockwise) to free it from the pump base. Empty the reservoir; then reattach it to the pump. Before reattaching the reservoir, however, make sure that the reservoir's o-ring (Figure 3, Item 20) is properly positioned inside its groove in the pump base.

The pump's wadding filter (Figure 3, Item 17) needs to be inspected at regular intervals for dirt contamination. Replace filter as necessary by first unscrewing the filter chamber cap and then exchanging the filter with a new one.

Replacement Parts

Item (Fig 3)	Description	Part No.
Probe:		
1	Complete Assembly (w/ 11.5 in. probe tube).....	0024-3038
2	Probe Tubes:	
	7 in. (180 mm)	0024-1183
	11.5 in. (295 mm)	0024-1184
	19.5 in. (500 mm)	0024-1185
	39 in. (1000 mm)	0024-1186
3	Gas Hose Fitting	0024-0877
4	Draft Hose Fitting.....	0024-0878
5	Probe Stop	0019-3037
6	Thumb Screw	0102-0875
7	Screw, M4 x 6mm.....	0501-3829
8	Retaining Nut.....	0102-3740
9	Filter (Qty. 5).....	0007-1646
Peltier Cooler & Power Supply:		
10	Complete Assembly, Peltier Cooler & Power Supply (AC Power Cord not included)	0024-1179
11	Plastic End Cap.....	0106-5454
12	Filter Wadding	0007-1647
13	Power Supply	0304-1713
14	AC Power Supply Cord, 3-Wire.....	4998-8986
Condensate Pump:		
15	Complete Assembly.....	0024-1180
16	Reservoir	0106-5453
17	Plastic Screw-On Cap	0106-5455
18	Filter Wadding (Qty. 1).....	0024-1205
19	Plastic Cap w/ Drain	0106-5456
O-Rings:		
20	9 x 2 mm	0105-5105
21	4 x 1.75 mm	0105-5106
22	50 x 3 mm	0105-5107
23	11 x 1 mm	0105-5108

Figure 3. Replacement Parts

