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Environmental Systems

Leaders in Environmental Compliance Products

PCC

Pump Cycle Counter

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Document No. 600473-05

The equipment in this manual is protected under U.S. and foreign patents issued and pending:

U.S. Patents:

Selective Oil Skimmer (SOS)	4,497,370
Specific Gravity Skimmer (SPG)	4,663,037
AutoPump (AP)	5,004,405
Specific Gravity Skimmer (SPG) Product Sensing	5,474,685
Vacuum/Pressure Hydrocarbon Recovery System	4,761,225
SPG PSR technology	5,474,685
AP-2	5,641,272
Genie System	5,704,772

Canada Patent:

Specific Gravity Skimmer (SPG)	1,239,868
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"AutoPump" is a Registered Trademark of "QED Environmental Systems"

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Introduction

QED Environmental Systems (QED) Pump Cycle Counters (PCC) are air pulse detecting units that are placed in-line between a pump and its air supply. They require no external power source. A digital readout displays the number of times a pump cycles. PCCs consist of a magnet housing, an internally located magnet shuttle, and a digital display.

The position of the digital display is adjustable, allowing the counter to be used on many different kinds of pumps and at various distances from the well. (See Figure 1)

The PCC can be used on at least 150 feet (45.7 m) of 3/8 inch (9.5mm) or 1/4 inch (6.4mm) air hose with air pressure supply 30% higher than the total developed head.

Performance of the PCC is dependent upon the air hose size and the length, the type of pump and the system pressure. Air flow control valves can affect counter performance. Please contact QED for application assistance.

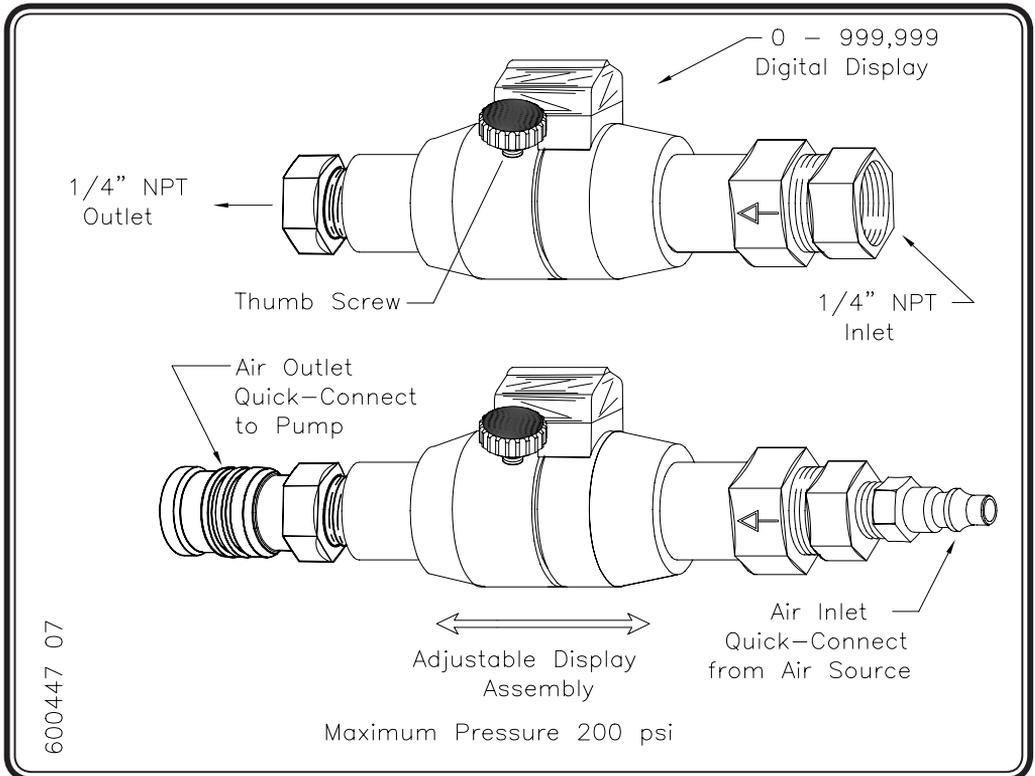


Figure 1 - Pump Cycle Counter

Pump Cycle Counter Operation/Installation

When a pneumatically operated pump such as the *QED AutoPump®* has filled, it triggers itself “On”. This allows air to flow to the pump until a certain volume of fluid has discharged. The air stops; the pump fills; then the cycle continues to repeat.

A PCC mounted between a filter/regulator and a pump senses air flow to the pump. In a piston-like action, the internally located magnet shuttle moves forward (in the direction of air flow) during the “On” pulse and returns to a seated position in the “Off” period. (See Figure 2)

The digital display senses the completion of this “to-and-from” movement and records the cycle, increasing the number one digit that is shown in the clear plastic display.

This process repeats itself for each pump cycle.

Note:

The PCC will not function properly beyond certain distance limits from the pump, or, above or below optimum air line diameters. Safe limits are as follows:

AP-4: 250 ft. maximum with 1/4 inch or 3/8 inch ID air hose.

AP-3: 150 ft. maximum with 1/4 inch or 3/8 inch ID air hose.

AP-2: 75 ft. maximum with 1/4 inch or 3/8 inch ID air hose.

Contact *QED* for advice.

Digital Display

The digital display has the following features:

- A six digit counter that counts from 0 - 999,999 before resetting itself.
- A clear viewing lens that is water-and-impact resistant.
- **Optional:** Switch for remote electronic readout available upon request.

Magnet Housing

The magnet housing has the following features:

- A clear mark on the outside that indicates the correct direction of air flow.
- It is made of anodized aluminum.
- It has a 1/4-inch FNPT inlet and a 3/8-inch or 1/4-inch FNPT outlet.
- It handles air pressures from 40 - 200 psi.

Hardware Options

Inlet and outlet openings can be fit with no-mix quick-connects or barb connections depending on site requirements.

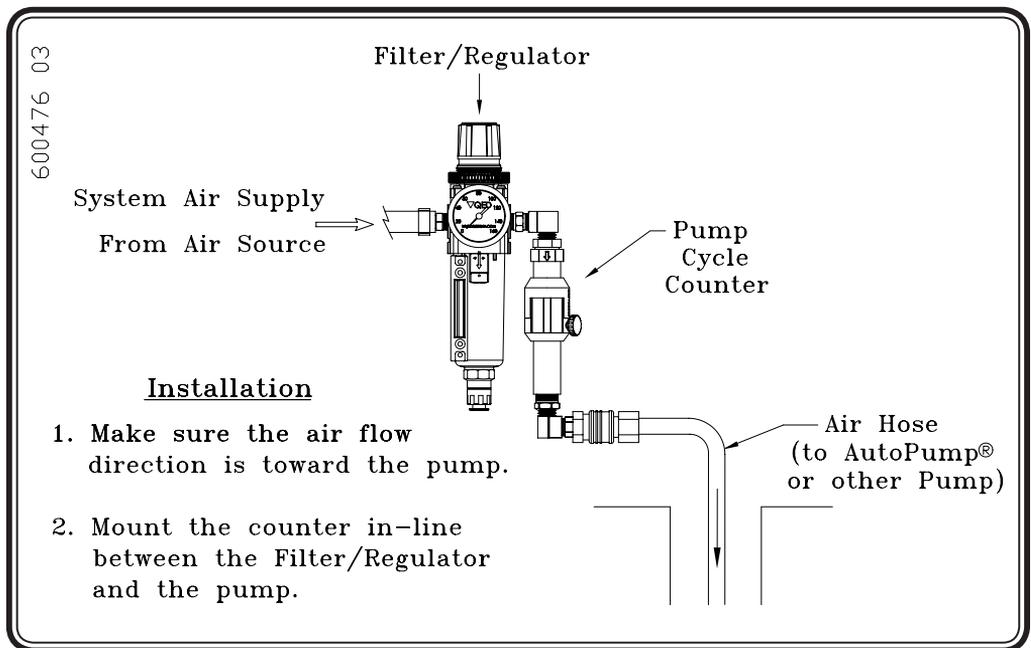


Figure 2 - Pump Cycle Counter Installation

Materials of Construction

QED PCCs are made of the following:

- Anodized Aluminum
- Stainless Steel
- Engineering Plastics
- Brass
- Viton

Pump Cycle Counter Weight - 0.4 lbs (0.2 kg)

Adjusting the Pump Cycle Counter

Note:

To get the most reliable performance, adjust the counter after it is installed and the pump is running. Typically, the Display Assembly that holds the digital readout is set 1/2-inch (13mm) from the upstream hex. Before adjusting the PCC be sure there is no air leak downstream of the counter. A leak could influence the travel **of the magnet shuttle** when the pump cycles.

- STEP 1 - Loosen, but do not remove, the thumb screw (item #3) that **locks the Display Assembly**. (See Figure 3)
- STEP 2 - Slide the Display Assembly on the magnet housing (item #6) (back and forth or up and down as the case may be) while the pump is cycling until the digital display (**item #4**) advances once per pump cycle.
- STEP 3 - Slowly slide the Display Assembly upstream towards the air source until the digital display (item #4) stops counting. Using a pencil, mark **this point** on the magnet housing (item #6).
- STEP 4 - Slowly slide the Display Assembly in the opposite direction, towards the pump, past where the counting occurs until the digital display (item #4) stops counting. Using a pencil, mark **this point** on the magnet housing (item #6).
- STEP 5 - Position the Display Assembly between the two extremes where counting did not occur. Lock the Display Assembly in place with the thumb screw. (item #3)
-

Cleaning the Pump Cycle Counter

Sometimes the PCC does not count due to either the magnet shuttle or the spring hanging up inside the magnet housing. The counter components can be cleaned by *gently* washing the unit in warm water. A soft brush may be used to remove debris. To clean the inside, follow these instructions: (See Figure 3)

Note:

As a precaution, mark and/or measure with a pencil, the set distance (See Figure 3) so that it can be reset in the same position should movement occur. Do not loosen the thumb screw (item #3) since movement of the Display Assembly is unnecessary for cleaning.

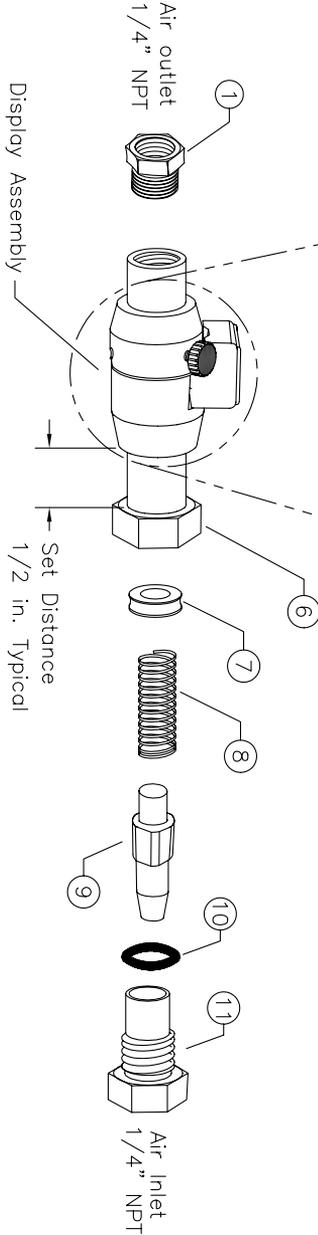
- STEP 1 -** Remove the inlet fitting (item #11), not the thumb screw (item #3) as noted above.
- STEP 2 -** Remove the magnet shuttle assembly (item #9) and the spring (item #8) from inside the magnet housing (item #6).
- STEP 3 -** Inspect the magnet shuttle assembly (item #9), the spring (item #8), and the inside of the magnet housing (item #6) for burrs which may restrict the magnet shuttle assembly (item #9) movement.
- STEP 4 -** If burrs are present, remove the burrs and smooth the part. Replace the PCC if necessary.
- STEP 5 -** Use a soft bottle brush and warm water to clean the inside of the magnet housing.

Caution:

Be careful not to scratch the pieces.

- STEP 6 -** Let the parts dry.
- STEP 7 -** Reassemble the PCC.

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- NOTE:**
- 1 - All threaded joints are Teflon sealed.
 - 2 - Loosen Thumb screw (3) to adjust position of display assembly.

Display Assembly

Parts List			
No.	Part No.	Description	Qty.
1	200064	Outlet fitting	1
2	200065	Cycle counter sleeve	1
3	205744	Thumb screw	1
4	205048	Digital display	1
5	205031	Display seat	1
6	200069	Magnet housing	1
7	200324	Counter slide stop	1
8	200070	Spring	1
9	300534	Magnet shuttle	1
10	200073	O-Ring	1
11	200074	Inlet fitting	1

Figure 3 - Pump Cycle Counter Cleaning and Adjustment

Assembly of the Digital Display (Figure 3)

Should the digital display be removed and disassembled for any reason, the procedure for assembling is as follows:

- STEP 1 -** Seat the digital display (item #4) on the flat of the display seat (item #5). (See Figure 3)

 - STEP 2 -** Slide the cycle counter sleeve (item #2) over the display seat (item #5) and the bottom lip portion of the digital display (item #4). Both pieces (the display seat #5 and the digital display #4) should be held in place by the cycle counter sleeve (item #2).

 - STEP 3 -** Align the thumb screw holes.

 - STEP 4 -** Screw in the thumb screw (item #3) to hold the Display Assembly together.
-

AutoPump Volumes Pumped Per Cycle

The volume of fluid pumped per cycle from an AutoPump® varies depending upon the inlet air pressure and the total developed head (TDH) (static plus dynamic head). The closer the pressures are to each other, (the TDH is almost the same as the inlet air pressure), the closer the volume pumped per cycle will be to the lower end of the gallon range in the table below. The TDH depends upon back pressure in the surface lines, hose size, fittings, vertical and horizontal pumping distance, the number of pumps feeding the hose system, air pressure to the pump, and the type of pump. The effects of some of these variables may cause the volume pumped per cycle to vary from pump to pump on a single site.

AP4 AutoPump Models

Pump	Volume per Cycle: Range	Volume per Cycle: Typical
Long AP4	0.58 - 0.78 gal (2.2 - 3.0 L)	0.65 gal (2.46 L)
Short AP4	0.22 - 0.36 gal (0.87 - 1.36 L)	0.25 gal (0.95 L)
Low Drawdown AP4	0.11- 0.16 gal (0.42 - 0.61 L)	0.13 gal (0.51 L)

AP3 AutoPump Models

Pump	Volume per Cycle: Range	Volume per Cycle: Typical
Long AP3	0.23 - 0.32 gal (0.87 - 1.21 L)	0.25 gal (0.95 L)
Short AP3	0.08 - 0.15 gal (0.30 - 0.57 L)	0.11 gal (0.42 L)

AP2 AutoPump Models

Pump	Volume per Cycle: Range	Volume per Cycle: Typical
Long AP2	0.14 - 0.17 gal (0.53 - 0.64 L)	0.155 gal (0.59 L)
Short AP2	0.05 - 0.08 gal (0.19 - 0.30 L)	0.065 gal (0.25 L)

Terms, Conditions, and Warranty

1. Warranty Claims Procedure —Purchaser Responsibility —

The original purchaser's sole responsibility in the instance of a warranty claim shall be to notify QED or its appointed agent, of the defect, malfunction, or other manner in which the terms of this warranty are believed to be violated. The purchaser may secure performance of obligations hereunder by contacting the Customer Service Department of QED or its appointed agent, and:

- a. Identifying the product involved by model or serial number, or other sufficient description, that will allow QED, or its appointed agent, to determine which product is defective.
- b. Specifying where, when, and from whom the product was purchased.
- c. Describing the nature of the defect or malfunction covered by this warranty.
- d. Sending the malfunctioning component, after obtaining authorization from QED, via a RMA# (Return Material Authorization number) to:

**QED Environmental Systems
1133 Seventh Street
Oakland, CA 94607
USA**

(510) 891-0880 • (800) 537-1767 • FAX (510) 444-6789

or to its appointed agent.

If any product covered hereby is actually defective within the terms of this warranty, purchaser must contact QED, or its appointed agent, for determination of warranty coverage. If the return of a component is determined to be necessary, QED, or its appointed agent, will authorize the return of the component at Purchaser's expense. If the product proves not to be defective within the terms of this warranty, then all costs and expenses in connection with the processing of the Purchaser's claim and all costs for repair, parts, labor, and shipping and handling, as authorized by owner hereunder, shall be borne by the Purchaser. In no event shall such allegedly defective products be returned to QED, or its appointed agent, without its consent, and QED's, or its appointed agent's, obligations of repair, replacement or refund are conditional upon the buyer's return of the defective product to QED, or its appointed agent.

2. **Limited Warranty:** This express limited warranty is in lieu of and excludes all other representations made by advertisements or by agents and all other warranties, both express and implied. **THERE ARE NO IMPLIED WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE FOR GOODS COVERED HEREUNDER.**

QED Environmental Systems warrants to the purchaser of its products that, subject to the limitations and conditions provided within the Terms & Conditions of Sale, products, materials and/or workmanship shall reasonably conform to descriptions of the products and shall be free of defects in material and workmanship.

All warranty durations are calculated from the original date of purchase. This warranty shall be limited to the duration and conditions set forth below.

- a. Pneumatic Logic Control Panels — All components, material and workmanship are warranted for one (1) year.
- b. Pumps, hose, tubing, fittings, heater, condensers and air filtration housings are warranted for one (1) year, material and workmanship. THERE WILL BE NO WARRANTY FOR APPLICATION OR MATERIAL COMPATIBILITY.
- c. Parts and Repairs — Repairs performed by QED, or its appointed agent, are warranted for ninety (90) days from date of repair or for the full term of the original warranty, whichever is longer. Separately sold parts are warranted for ninety (90) days.

This warranty will be void in the event of unauthorized disassembly of component assemblies. Defects in any equipment that result from abuse, operation in any manner outside the recommended procedures, use and applications other than for intended use or exposure to chemical or physical environments beyond the designated limits of materials and construction, will also void the warranty.

Chemical attack by liquids contacting equipment and accessories shall not be covered by this warranty. A range of materials of construction is available from QED and it is the Buyer's responsibility to select materials of construction to fit the Buyer's application. QED will only warrant that the supplied site liquid contacting materials will conform to published QED specifications and generally accepted standards for that particular material.

QED Environmental Systems shall be released from all obligations under all warranties if any product covered hereby is repaired or modified by persons other than QED service personnel unless such repair by others is made with the written consent of QED.

It is understood and agreed that QED Environmental Systems shall in no event be liable for incidental or consequential damages resulting from its breach of any of the terms of this agreement, nor for special damages, nor for improper selection of any product described or referred to for a particular application. Liability under this warranty is limited to repair or replacement F.O.B. QED's factory, or its appointed agent's shop, of any parts which prove to be defective within the duration and conditions set forth herein, or repayment of the purchase price at the option of QED, provided the products have been returned in accordance with the duration and conditions set forth herein.

3. **Subassemblies and Other Equipment Manufactured by Others**

The foregoing warranty does not apply to major subassemblies and other equipment, accessories, and other parts manufactured by others, and such other parts, accessories, and equipment are subject only to the warranties, if any, supplied by their respective manufacturers. QED makes no warranty concerning products or accessories not manufactured by QED. In the event of failure of any such product or accessory, QED will give reasonable assistance to Buyer in obtaining from the respective manufacturer whatever adjustment is reasonable in light of the manufacturer's own warranty.

4. **Illustrations and Drawings**

Every effort has been made to have all illustrations and drawings accurately represent the product(s) as it actually was at the time of doing the illustrations and drawings.

Obviously, however, to effectively continue to meet the requirements of users, changes in some items may be made during the life of this manual - which on occasion, may be made without notice.

5. **Buyer's Remedies:** The buyer's exclusive and sole remedy on account of or in respect to the furnishing of defective material or workmanship shall be to secure replacement thereof as aforesaid. QED shall not in any event be liable for the cost of any labor expended on any such product or material or for any special, direct, indirect or consequential damages to any one by reason of the fact that it shall have been deemed defective or a breach of said warranty.

6. **Prices and Specifications** are subject to change without notice.

7. **Shipping Dates** are approximate and are subject to delays beyond our control.

8. **Terms:** net 30 days; 1.5% per month past due.

9. **F.O.B. Point and Title:** All material is sold F.O.B. factory. Title to all material sold shall pass to buyer upon delivery by seller to carrier at shipping point. All freight insurance and freight claims are the responsibilities of the Buyer.

10. **State and Local Taxes:** Any taxes, duties or fees which the seller may be required to pay or collect upon or with respect to the sale, purchase, delivery, use or consumption of any of the material covered hereby shall be for the account of the Buyer and shall be added to the purchase price.

11. **Acceptance:** All orders shall be subject to the terms and conditions contained or referred to in the Seller's quotation, acknowledgments, and to those listed here and to no others whatsoever. No waiver, alteration or modification of these terms and conditions shall be binding unless in writing and signed by an executive officer of the Seller. All orders subject to written acceptance by QED Environmental Systems, Ann Arbor, MI, U.S.A.

Please direct your questions and comments to:

Service Department
QED Environmental Systems
www.qedenv.com

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