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## 7. SPLIT CASE PUMP MODULE

### 7.1 DESCRIPTION (Figure 7.1)

The Split Case Pump Module, hereafter referred to as Pump Module, is comprised of a ceramic piston and cylinder set, two castellated sleeves and a split case assembly. Certain components of the Pump Module are in the direct liquid path. The Pump Module has been designed to be easily disassembled and detached from the Motor/Base Module for ease of cleaning, decontamination and sterilization.

The Pump Module's piston/cylinder set provides positive liquid displacement. Table 7.1 describes the total volumetric output of this pump.

#### WARNING

*Never remove a safety cover while the motor is running. Moving parts are located under these covers. Physical harm to individuals is possible.*

### 7.2 OPERATION

When the Pump Module is mounted on the Motor/Base Module, the piston is driven by a spherical bearing mounted within a rotating spindle. This drive arrangement imparts both reciprocating and rotary motion to the piston. The magnitude of the piston's stroke is adjustable by varying the angle of the axis of the pump head relative to the axis of the motor drive shaft. This displacement range is infinitely adjustable within the pump specifications (refer to Table 7.1). The displacement adjustment is easily made and recorded as a setting taken from the Motor/Base Module's vernier scale. Repeatability of 0.1% is obtainable once the stroke length is established.

On each rotation of the piston, the ports are opened alternately and exclusively, first to the inlet and then to the outlet. During the rotation, the limited piston flat creates the void that allows the flow from only one port at a time, positively displacing the liquid. The piston flat acts as a rotary valve, completing one pressure stroke and one suction stroke per revolution as the pump rotates and reciprocates synchronously.

The end of the piston is never drawn back beyond the inlet and outlet ports in normal operation. The piston flat allows only one port to communicate with the interior chamber of the pump cylinder at any one time. The effect is positive mechanical valving, eliminating the need for check valves under normal operations.

The pump, which cannot be driven by either inlet or outlet pressure, essentially acts as a closed valve when the unit is not in operation.

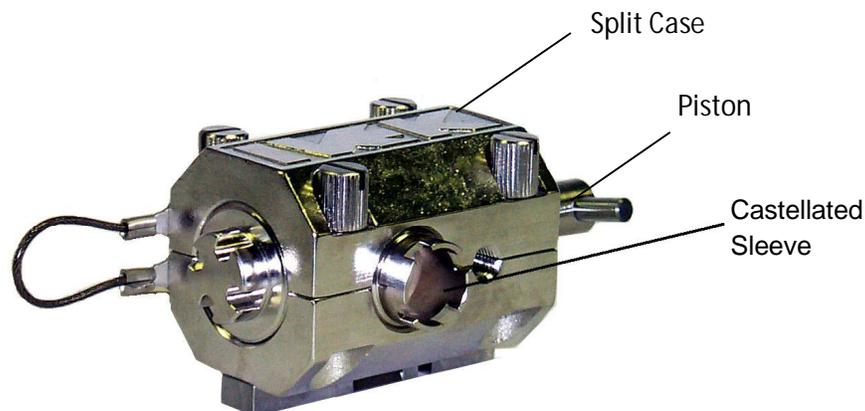


Figure 7.1 Split Case Pump Module

The Pump Module can easily and accurately be set over the full displacement range. By changing the stroke length through the angular adjustment of the metering head, displacement is changed from zero to the maximum. Once the displacement is set, Pump Module maintenance can be performed without affecting the displacement.

### **7.2.1    Piston/Cylinder Set**

The piston/cylinder set is constructed of high density alumina, magnesium stabilized zirconia, or Hexoloy® SA SiC ceramic. The ceramics are compatible with most acids and bases. The precision piston/cylinder set has a radial clearance between the piston and cylinder wall of approximately 1.3 micron (.00005") which minimizes fluid slip.

The ceramic piston operates within the ceramic cylinder with no lubrication other than the liquid being dispensed or metered. The natural crystalline structure of the ceramics display zero porosity ensuring zero retention and carryover of one liquid to the next.

The combination of the ceramic material's mechanical and thermal stability allows it to be machined and operated with a close running clearance. This means that no compliant dynamic seals are needed, eliminating parts requiring frequent replacement in traditional pump designs.

### **7.2.2    Split Case**

The stainless steel split case design provides ease of disassembly for cleaning and maintenance. The ceramics, end cap seal, and fitting sets are all serviceable parts. The ceramics are easily accessed by removing the upper half of the split case either while attached to the Motor/Base Module or after its removal.

#### **NOTE**

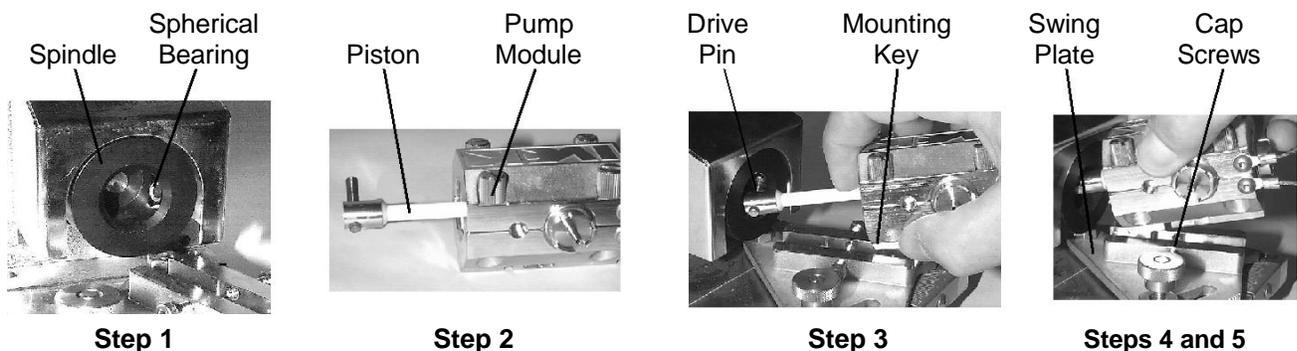
*The upper and lower halves of the case are matched parts and cannot be interchanged.*

## **7.3        INSTALLATION**

Installing the Pump Module into the Motor/Base Module involves the following: (refer to Figure 7.2) Refer to Section 7.5.5.1 for removal procedure.

#### **CAUTION**

*Make sure the power is off and all hazardous liquids have been flushed from the system prior to performing any disassembly or assembly procedures.*



**Figure 7.2 Split Case Pump Module Installation**

Lubricate the drive pin with IVEK Spindle Bearing Lubricant (IVEK part number 052046) prior to assembly. Failure to lubricate the drive pin may result in damage to the Pump Module and Motor/Base Module.

1. Rotate the spindle on the Motor/Base Module so the spherical bearing is at the 3 O'clock position.
2. Extend the piston, which is housed in the Pump Module, approximately 2/3 of the way out of the cylinder.
3. Slide the drive pin, which is pressed into the piston end cap, into the center bore of the spherical bearing.
4. Position the Pump Module on the swing plate with the locating pin of the swing plate inserted into the slot of the Pump Module mounting key.
5. Secure the Pump Module to the swing plate by tightening the two #10 socket head cap screws on the swing plate.

#### NOTE

Figure 7.3 shows the inlet orientation of the Pump Module on both the Single Ended and Double Ended Motor/Base Modules.

### 7.4 OPTIONS

IVEK Corporation offers a variety of options to best meet the customers' needs. Following is a list and description of available options for the Pump Module. Refer to the Title Section of this manual for the list of options provided with this system.

#### 7.4.1 Special Piston/Cylinder Bore Clearances or Modifications

For certain applications, special clearances are required for the piston/cylinder bore. IVEK Corporation determines these clearances by performing application tests using the application fluid. Contact IVEK Corporation for more information.

For certain applications, special machined modifications are required for the piston/cylinder. IVEK Corporation determines these modifications by performing application tests using the application fluid. Contact IVEK Corporation for more information.

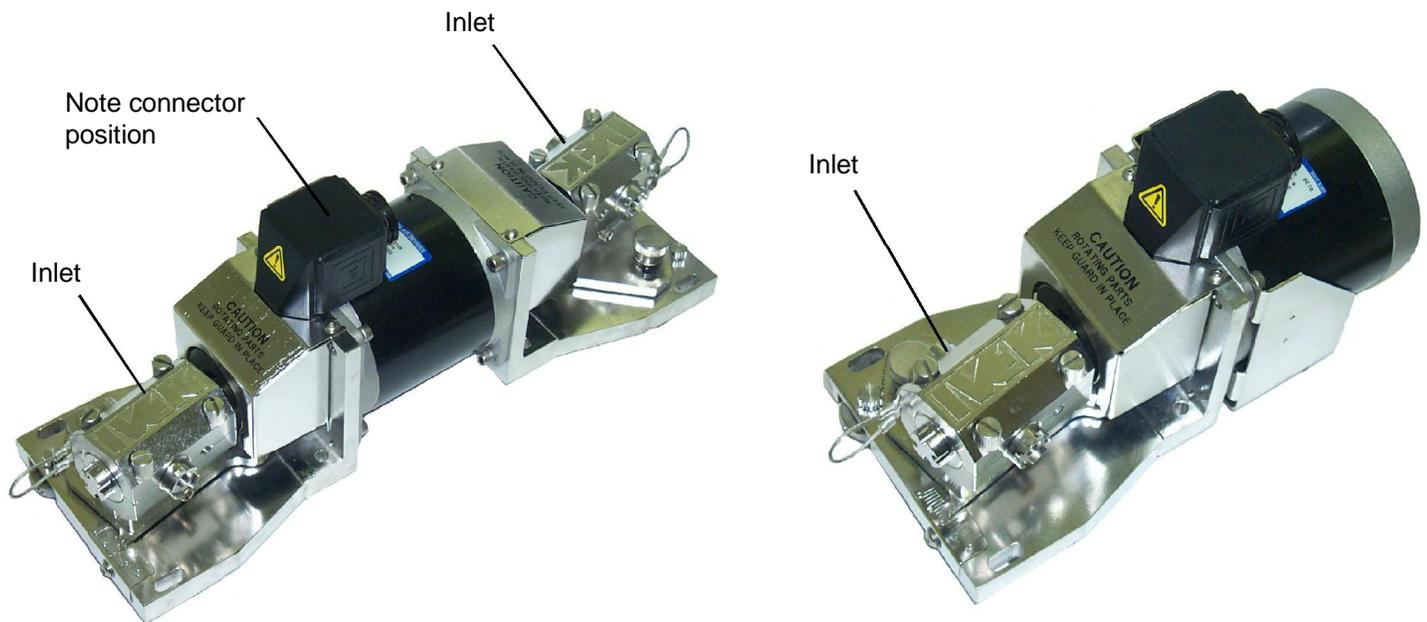


Figure 7.3 Split Case Pump Module Orientation

### **7.4.2 Rinse Gland**

This option provides for rinsing the rear portion of the piston with a liquid passing at a low flow rate through the annular gland. This precludes migration of the metered liquid beyond this groove, preventing it from reaching the rear of the pump. This also reduces the chance of the piston binding in the cylinder.

### **7.4.3 Cartridge Heater Ports/Cartridge Heaters**

Optional cartridge heater ports and cartridge heaters are available. IVEK Corporation will assist the user in determining the optimum heater specification. Pump head heating is used to maintain liquid temperature. Heating is not used to increase liquid temperature.

#### **7.4.3.1 Cartridge Heater Ports**

Optional cartridge heater ports can be provided in the pump case to keep the Pump Module at an elevated temperature. The 1/4" diameter ports are located in the pump case 180° apart.

#### **7.4.3.2 Cartridge Heaters**

Optional cartridge heaters can be mounted in the cartridge heater ports. A temperature controller and thermocouple may also be provided. If a controller is provided, instructions for the controller are provided in Chapter 11.

### **7.4.4 Fittings**

Fittings are available with the Pump Module. Chapter 9 lists the IVEK part numbers for the available fittings, associated seals and sleeves when required. Not all fittings shown are applicable to the Split Case Pump Module.

## **7.5 MAINTENANCE**

### **CAUTION**

*Never connect or disconnect the cable from the Controller or Motor/Base Module connector while power is on. Damage to the equipment may result.*

### **7.5.1 Preventative Maintenance**

The ceramic components for the Pump Module have been designed to last for millions of repetitions without wear.

Preventative maintenance should include careful handling of the piston and cylinder when they have been removed from the Pump Module. Always take great care when removing the piston from the cylinder and replacing the piston into the cylinder. Never clean ceramic parts in such a way that they can vibrate against each other. This could cause chipping.

The piston and cylinder are a matched set and should always be kept together. Each piston and cylinder are identified with a number which match the parts as a set.

### **CAUTION**

*Ceramic piston/cylinder sets are particularly sensitive to neglect and may "freeze" if allowed to dry out without adequate cleaning.*

#### **7.5.1.1 General Applications; Routine Cleaning Procedure.**

1. Disconnect inlet tubing from process liquid supply container.
2. Cycle pump in continuous mode until remaining process liquid has been purged from the Pump Module liquid path.

3. Connect the inlet tubing to an appropriate cleaning solution supply container.
4. Cycle pump in continuous mode at a high volume and rate to flush the cleaning solution through the entire liquid path.

#### NOTE

*Routine flushing with a compatible solution after shutdown may provide sufficient cleaning for many applications.*

### **7.5.2 Storage Options.**

Storage refers to any extended time that the system remains idle. The main concern is liquid drying in the piston/cylinder area, causing the piston to freeze in the cylinder. The duration of idle time requiring storage procedures is based on the liquid being pumped, the Pump Module configuration, and the operating environment. The system can either remain wetted with cleaning liquid, disassembled, or a liquid loop can be created.

#### **7.5.2.1 Wetting With Cleaning Liquid**

This option involves leaving the liquid circuit and Pump Module assembled in place. Load the liquid circuit with a compatible cleaning liquid and leave the system wet until the next use when the stored liquid can be purged during setup for operations.

#### **7.5.2.2 Disassembling**

If it is desired not to leave cleaning liquid in the system, after rinsing with cleaning liquid as described in Section 7.5.1.1, empty the system of cleaning liquid as described in Section 2.7.

Disassemble the liquid circuit and Pump Module, remove the piston from the cylinder and store the component parts disassembled until the pump is again required. The instructions for disassembling the Pump Module are found in Section 7.5.5 of this chapter.

#### NOTE

*If applicable, the disassembled liquid circuit and Pump Module components may be immersed and soaked or further cleaned in an ultrasonic cleaning device using a compatible cleaning solution.*

#### **7.5.2.3 Liquid Loop**

Fill a loop of flexible tubing with a compatible cleaning liquid or other chemical that will thin or neutralize the last liquid pumped. Connect one end of the tube to the pump inlet port and the other to the outlet port. Cycle the pump a few times in any operational mode to ensure the piston and cylinder are wetted by the cleaning liquid. With this loop positioned above the pump head, the ceramic surfaces and seal areas will stay moist and mobile for extended idle periods.

### **7.5.3 Extended Storage**

If a pump is to be stored assembled for an extended period of time, it is recommended that after cleaning, the piston and cylinder be dried before reassembly or stored separately in protective packaging. Wet components will have a tendency to bind after materials have evaporated, leaving residue.

### **7.5.4 End Cap And Seal Assembly**

The end cap and seal at the front of the Pump Module serve to contain liquid within the pump.

When properly maintained in a clean condition, the original seal may be expected to last for extended periods. If removed for any reason, the seal should be carefully cleansed of all foreign particles prior to reassembly. The seal seating area must also be free of particles and scratches to prevent leaks when reassembled.

**7.5.5 Assembly/Disassembly Procedures (Refer to Figure 7.5)**

The Pump Module contains the following replaceable parts.

- End Cap, End Cap Seal and O-Ring (1, 9, 11)
- Key (6)
- Cylinder Locating Pin (5)
- Cylinder and Piston Fabrication (7,8)
- Slotted Ring (4)
- Castellated Sleeve (12)

**CAUTION**

*Make sure the power is off and all hazardous liquids have been flushed from the system prior to performing any disassembly or assembly procedures.*

**7.5.5.1 Pump Module Removal (Figure 7.4)**

Removing the Pump Module from the Motor/Base Module involves the following. Refer to Section 7.3 for the installation procedure.

1. Rotate the spindle on the Motor/Base Module so the spherical bearing is at the 3 O'clock position.
2. Loosen the two #10 socket head cap screws securing the Pump Module to the swing plate.
3. Lift the Pump Module and pull up and away from the swing plate until the piston fabrication is approximately 2/3 of the way out of the cylinder.
4. Move the Pump Module laterally until the pin in the piston fabrication slides out of the spherical bearing.

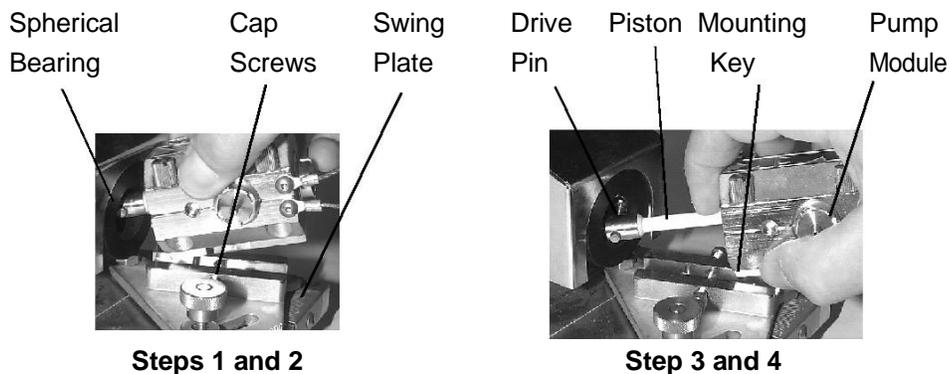
**7.5.5.2 End Cap, End Cap Seal and O-Ring (Figure 7.5 Items 1, 9, 11)**

Disassembly

1. Remove end cap, end cap seal, and O-ring (1, 9, 11) from split case pump fabrication (3) by placing the spanner wrench (IVEK part# 142017, provided with equipment) on end cap (1) and turning in a counterclockwise direction.

**NOTE**

*If installing the same end cap seal and/or O-ring, make sure it is clean and free of scratches before installing.*



**Figure 7.4 Split Case Pump Module Removal**

## Assembly

**For O-ring Seal**

1. Position O-ring (11) in end cap seal (9) and position in end cap (1) as shown in Figure 7.5.

**For PTFE (Polytetrafluoroethylene Seal**

1. Position O-ring (11) in end cap seal (9) and position in end cap (1) with O-ring against end cap (1).
2. Position end cap (1) on split case pump fabrication (3) and finger tighten by turning in a clockwise direction.
3. Finish tightening using spanner wrench supplied.

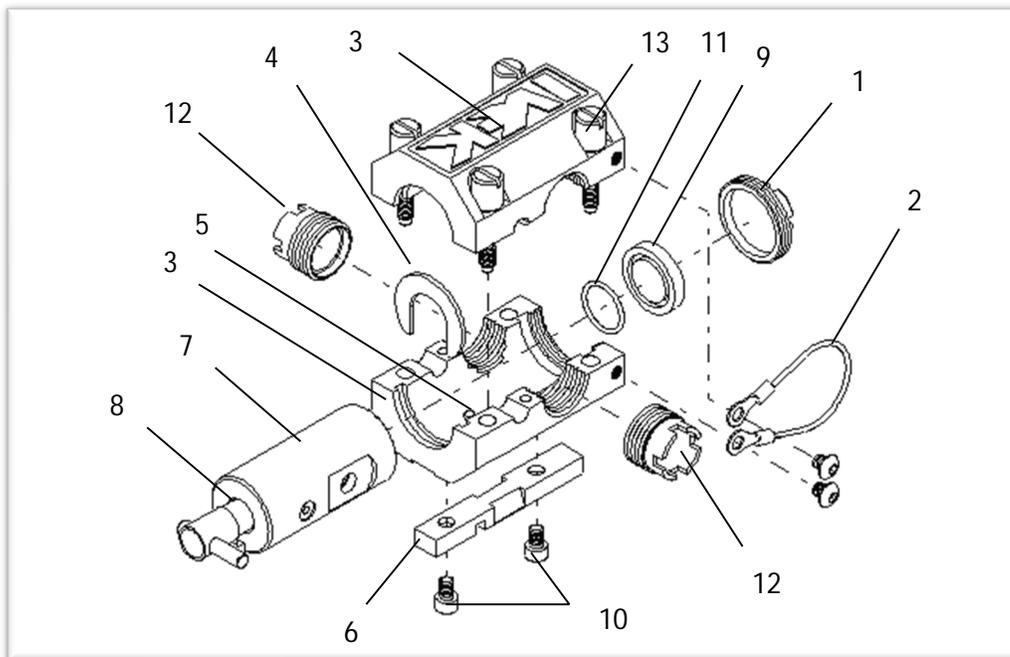
**7.5.5.3 Key (Figure 7.5 Item 6)**

## Disassembly

1. Remove the Pump Module from the Motor/Base Module as described in section 7.5.5.1.
2. Remove two 8 - 32 x .25" long socket head cap screws (10) securing key (6) to split case pump fabrication (3).
3. Remove key (6).

## Assembly

1. Position key (6) on split case pump fabrication (3) and secure with two 8 - 32 x .25" long socket head cap screws (10).
2. Install the Pump Module on the swing plate as described in section 7.4.



**Figure 7.5 Split Case Pump Module**

### 7.5.5.4 Cylinder Locating Pin (Figure 7.5 Item 5)

#### Disassembly

1. Remove the Pump Module from the Motor/Base Module as described in section 7.5.5.1.
2. Remove the fitting sets (12) from split case pump fabrication (3) by placing the spanner wrench (provided with equipment) on the fitting retainer and turning in a counterclockwise direction.
3. Remove end cap, end cap seal and O-ring (1, 9, 11) from split case pump fabrication (3) by placing the spanner wrench (provided with equipment) on end cap (1) and turning in a counterclockwise direction.
4. Loosen the four captive slotted screws (13) securing the two halves of split case pump fabrication (3) and remove the upper half of split case pump fabrication (3). Lanyard (2) will keep the two Pump Module halves together.
5. Remove slotted ring (4).
6. Remove piston fabrication (8) and cylinder (7) from split case pump fabrication (3).
7. Remove two socket head cap screws (10) securing key (6) to split case pump fabrication (3) and remove key (6).
8. Using a punch smaller than .125" (3.175mm), gently push cylinder locating pin (5) out of the lower half of split case pump fabrication (3).

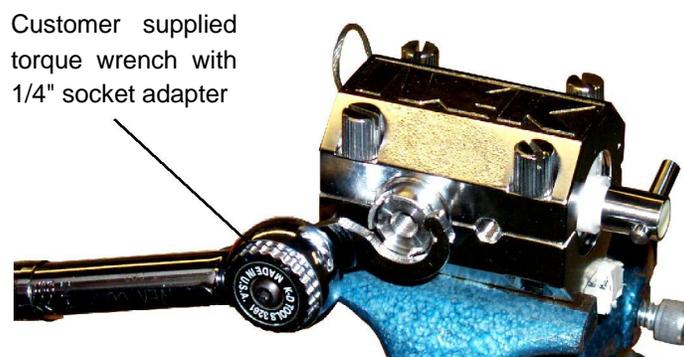
#### Assembly

1. Position key (6) on split case pump fabrication (3) and secure with two socket head cap screws (10).
2. Place cylinder locating pin (5) in position and gently press in until it contacts key (6).
3. Install the cylinder and piston fabrication, (7, 8) by aligning over the cylinder locating pin (5) in lower half of split case pump fabrication (3).
4. Install slotted ring (4) by sliding over piston fabrication (8).
5. Position the upper half of split case pump assembly (3) on the lower half and secure with the four slotted screws (13).
6. Place end cap, end cap seal and O-ring (1, 9, 11) over end of cylinder (7). Finger tighten only.
7. Position the two fitting sets (12) on split case pump fabrication (3). Finger tighten only.
8. Tighten end cap (1) on split case pump fabrication (3) using spanner wrench provided.
9. Tighten fitting sets (12) to a maximum of 1.4 N-M (12 in. lbs.) the two fitting sets (12) using spanner wrench provided. Refer to Figure 7.6.
10. Install the Pump Module on the swing plate as described in section 7.3.

### 7.5.5.5 Cylinder And Piston Fabrication (Figure 7.5 Items 7,8)

#### Disassembly

1. Remove the Pump Module from the Motor/Base Module as described in section 7.5.5.1.
2. Remove the fitting sets (12) from split case pump fabrication (3) by placing the spanner wrench (provided with equipment) on the fitting retainers and turning in a counterclockwise direction.



**Figure 7.6 Torque Setup for Fittings (12)**

3. Remove end cap, end cap seal and O-ring (1, 9, 11) from split case pump fabrication (3) by placing the spanner wrench (provided with equipment) on end cap (1) and turning in a counterclockwise direction.
4. Loosen the four captive slotted screws (13) securing the two halves of split case pump fabrication (3) and remove the upper half of split case pump fabrication (3). Lanyard (2) will keep the two Pump Module halves together.
5. Remove slotted ring (4).
6. Remove piston fabrication (8) and cylinder (7) from split case pump fabrication (3).

#### Assembly

1. Install the cylinder and piston fabrication, (7,8) by aligning over the cylinder locating pin, (5) in lower half of split case pump fabrication (3).
2. Install slotted ring (4) by sliding over piston fabrication (8).
3. Position the upper half of split case pump assembly (3) on the lower half and secure with the four captive slotted screws (13).
4. Place end cap, end cap seal and O-ring (1, 9, 11) over end of cylinder (7). Finger tighten only.
5. Position the two fitting sets (12) on split case pump fabrication (3). Finger tighten only.
6. Tighten end cap (1) on split case pump fabrication (3) using spanner wrench provided.
7. Tighten a maximum of 1.4 N-M (12 in. lbs.) the two fitting sets (12) using spanner wrench provided.
8. Install the Pump Module on the swing plate as described in section 7.3.

#### 7.5.5.6 Slotted Ring (Figure 7.5 Items 4)

#### Disassembly

1. Remove the Pump Module from the Motor/Base Module as described in section 7.5.5.1.
2. Remove the fitting sets (12) from split case pump fabrication (3) by placing the spanner wrench (provided with equipment) on the fitting retainers and turning in a counterclockwise direction.
3. Remove end cap, end cap seal and O-ring (1, 9, 11) from split case pump fabrication (3) by placing the spanner wrench (provided with equipment) on end cap (1) and turning in a counterclockwise direction.
4. Loosen the four captive slotted screws (13) securing the two halves of split case pump fabrication (3) and remove the upper half of split case pump fabrication (3). Lanyard (2) will keep the two Pump Module halves together.
5. Remove slotted ring (4).

#### Assembly

1. Install slotted ring (4) by sliding over piston fabrication (8).
2. Position the upper half of split case pump assembly (3) on the lower half and secure with the four captive slotted screws (13).
3. Place end cap, end cap seal and O-ring (1, 9, 11) over end of cylinder (7). Finger tighten only.
4. Position the two fitting sets (12) on split case pump fabrication (3). Finger tighten only.
5. Tighten end cap (1) on split case pump fabrication (3) using spanner wrench provided.
6. Tighten a maximum of 1.4 N-M (12 in. lbs.) the two fitting sets (12) using spanner wrench provided.
7. Install the Pump Module on the swing plate as described in section 7.3.

#### 7.5.5.7 Castellated Sleeve (Figure 7.5 Items 12)

#### Disassembly

1. Remove the fitting sets (12) from split case pump fabrication (3) by placing the spanner wrench (provided with equipment) on the fitting retainers and turning in a counterclockwise direction.

## Assembly

1. Tighten a maximum of 1.4 N-M (12 in. lbs.) the two fitting sets (12) using spanner wrench provided.

**7.6 PROBLEM GUIDE****7.6.1 Piston Frozen In The Cylinder**

If the piston gets frozen in the cylinder perform the following steps.

**CAUTION**

*DO NOT TRY TO FORCE THE PISTON FREE!*

*Damage to the piston/cylinder set may occur.*

1. Carefully remove the Pump Module from the Motor/Base Module. Remove the piston and cylinder from the split case then soak in a compatible solvent.
2. If the Pump Module is not conveniently removable, the tube loop described in section 7.5.2.3 of this chapter may permit solvent to dissolve the “frozen” residue in reasonable time.
3. If the aforementioned procedures fail, contact IVEK for technical help. It may be necessary to ship the Pump Module back to the factory. Provide a note describing, in detail, what conditions caused the seizure and what liquids are being pumped.

It may also be necessary to return the Controller and Motor/Base Modules along with the Pump Module should readjustment of the pump drive components be required to free the pump.

Table 7.2 contains a list of possible problems, causes and solutions for the Pump Module.

**7.7 SPECIFICATIONS****7.7.1 Volume**

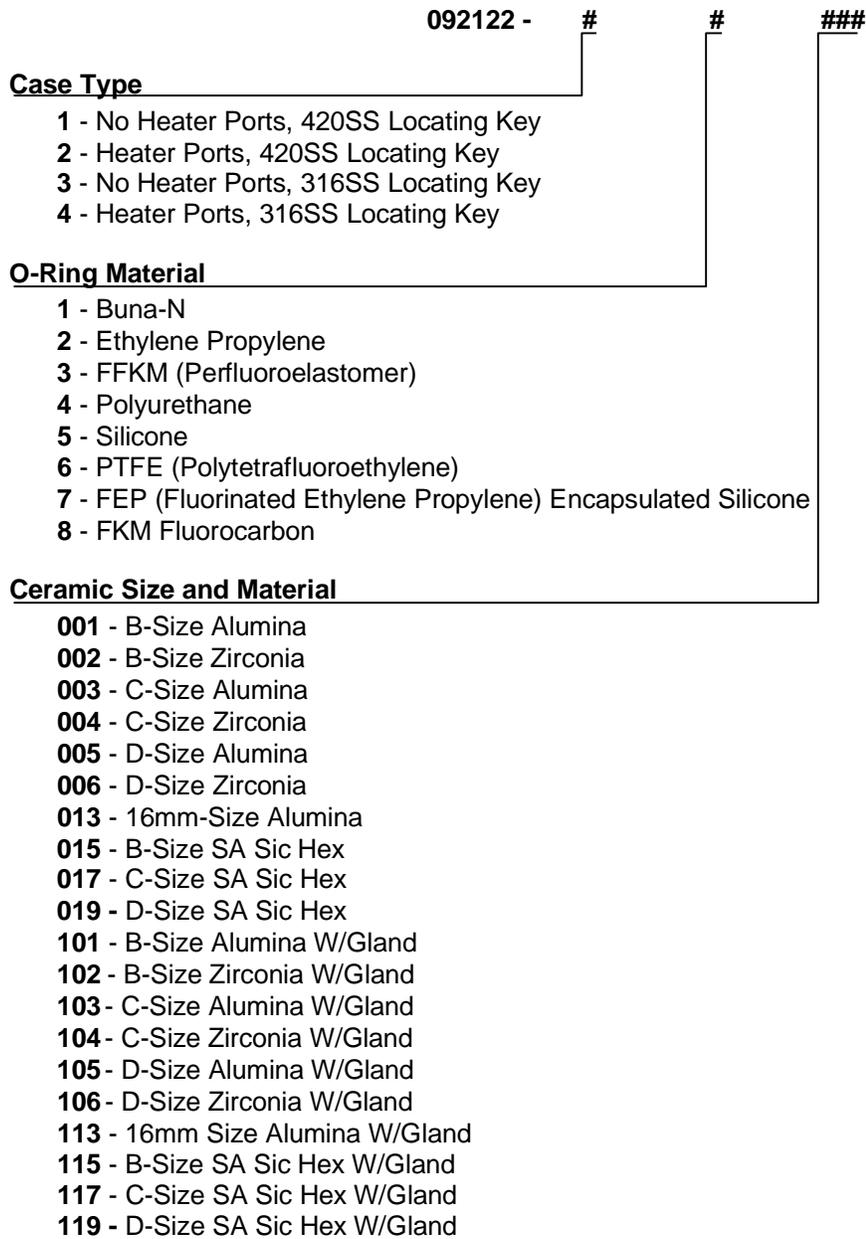
The volume represents the liquid displaced for a single revolution of the motor. If this system is used for dispensing, the dispenser’s VOLUME STROKES setting will determine the total volume for each dispense cycle. Table 7.1 list the recommended minimum and maximum displacement per stroke for the different size Pump Modules.

**Table 7.1 Pump Module Displacement Specifications**

Size	Max Displacement Per Stroke	Recommended Min Displacement Per Stroke
B	0.295 ml	0.015 ml
C	0.739 ml	0.037 ml
D	1.478 ml	0.074 ml
16mm	1.886 ml	0.094 ml

**7.8 MODEL NUMBER**

The model number provides important information about the specifics of your Pump Module. Refer to this number when calling IVEK Technical support. The model number for your Pump Module is located in the Title Page section of this manual.



An example of a Pump Module model number would be **092122-18004**. This would be a Split Case Pump Module without heater ports, 420SS Locating Key with a FKM O-ring and C-size Zirconia piston/cylinder set.

**7.9 ILLUSTRATED PARTS BREAKDOWN**

The illustrated parts breakdown (Figure 7.7) contains the information required for identifying and ordering parts for the Split Case Pump Module.

Table 7.2 Common Operational Problems And Solutions

PROBLEM	PROBABLE CAUSE	POSSIBLE SOLUTION
Power is on, Controller Module accepts trigger, motor spindle rotates, but Pump Module does not move any fluid.	Loose fittings or seals.	Check port seals and front cap seal.
	Broken piston or loose piston cap.	Remove and inspect piston/cylinder set.  If none of the above solves the problem, contact IVEK technical support for assistance.
Fluid is leaking from front of pump.	Leaky seals.	Inspect for scratches or grit (clean or replace if necessary).
End cap will not tighten smoothly.	Grit in threads.	Clean end cap and split case.
Ceramic cylinder will not seat in split case.	Misalignment	Make sure the slot on the ceramic cylinder aligns with the cylinder locating pin.
		Make sure the cylinder locating pin is not damaged.
Piston does not rotate or rotates slowly.	Piston seized	Clean by soaking.
	Port fittings are too tight	Loosen castellated sleeve and recheck piston.

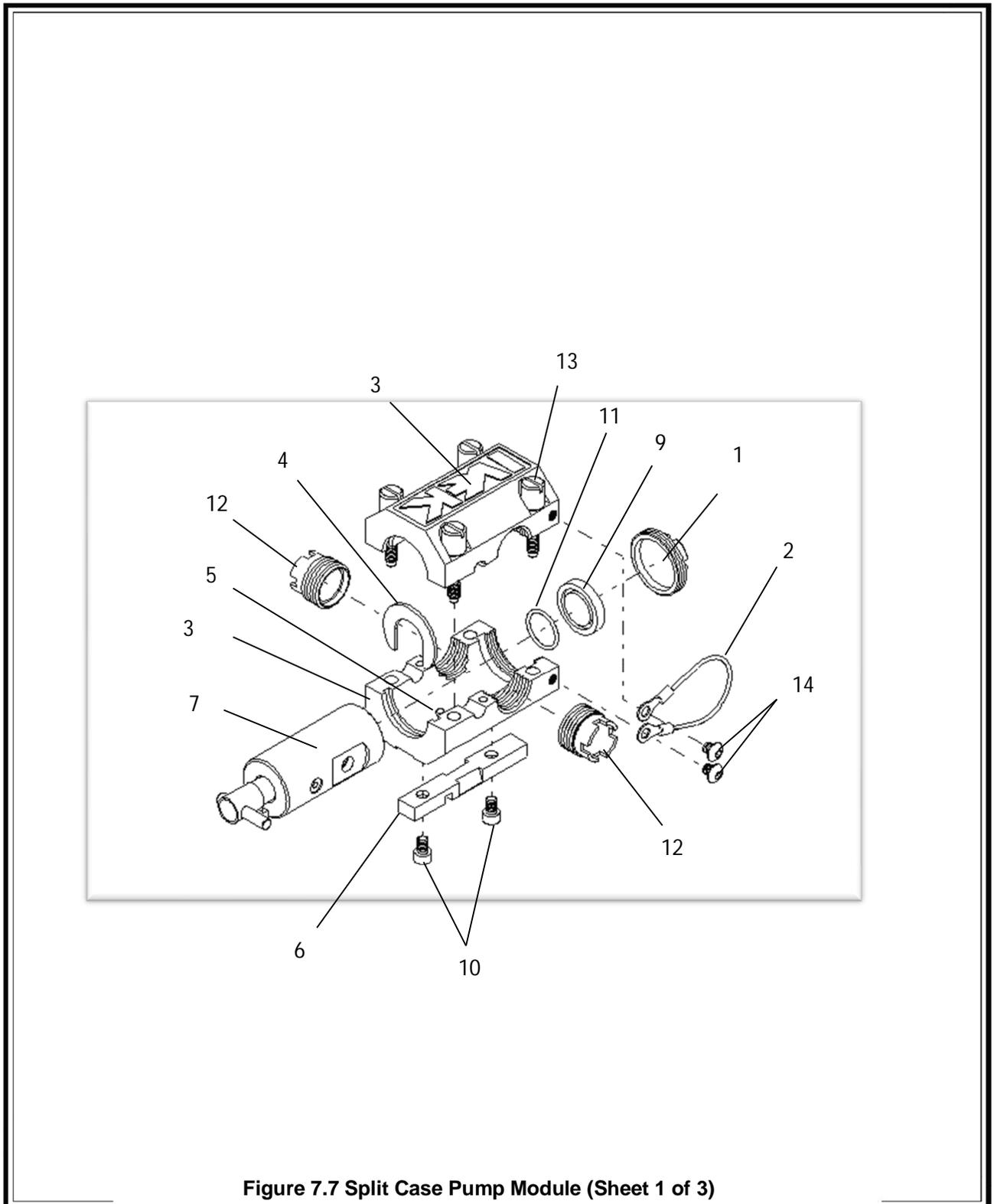


Figure 7.7 Split Case Pump Module (Sheet 1 of 3)

	PART NUMBER	DESCRIPTION	UNITS PER ASSY	
	092122-#####	Split Case Pump Module	1	
<b>Model Dwg</b>				
<b>#</b>	<b>Index</b>	<b>Part</b>		
<b>Tab</b>	<b>#</b>	<b>Description</b>	<b>Qty</b>	
	1	092250	End Cap, Pump Case, 1.063-20	1
	2	092090	Lanyard Fabrication	1
	4	092081	Ring, Slotted, Split Case Pump	1
	5	092068	Cylinder Locating Pin	1
	9	092285	Seal, End Cap, W/ -016 O-Ring Groove	1
	10	182011-C08025	Screw, Soc Hd Cap, 18-8; 8-32 X 0.25	2
	12	142084	Sleeve, Threaded, Castellated	2
	13	092064	Screw, Captive, #10-32X1" Dia 3/8X7/16 HD, SST	4
	14	182005-C08012	Screw, But Hd Soc Cap, 18-8 Inch, #8-32 X 1/8	2
<b>092122 - # ## CASE TYPE (Includes item 5) Contains 2 of the Following:</b>				
1	3	092065-1	Split Pump Case Fabrication; W/O Heater Ports	1
1	6	092074-01	Key, Locating, Split Case Pump, 420 SST	1
2	3	092065-2	Split Pump Case Fabrication; W/ Heater Ports	1
2	6	092074-01	Key, Locating, Split Case Pump, 420 SST	1
2		182005-C06019	Screw, But Hd Soc Cap, 1808 Inch, #6-32 x 3/16 (not shown)	3
3	3	092065-1	Split Pump Case Fabrication; W/O Heater Ports	1
3	6	092074-02	Key, Locating, Split Case Pump, 316 SST	1
4	3	092065-2	Split Pump Case Fabrication; W/ Heater Ports	1
4	6	092074-02	Key, Locating, Split Case Pump, 316 SST	1
4		182005-C06019	Screw, But Hd Soc Cap, 1808 Inch, #6-32 x 3/16 (not shown)	3
<b>092122 - # ## O-RING MATERIAL Contains 1 of the Following:</b>				
1	11	142294-01601	O-Ring ; -016 Buna-N	1
2	11	142294-01602	" ; -016 Ethylene Propylene	1
3	11	142294-01603	" ; -016 FFKM	1
4	11	142294-01604	" ; -016 Polyurethane	1
5	11	142294-01605	" ; -016 Silicone	1
6	11	142294-01607	" ; -016 PTFE	1
7	11	142294-01608	" ; -016 PTFE Encapsulated Silicon	1
8	11	142294-01609	" ; -016 FKM	1
<b>092122 - # ## CERAMIC SIZE AND MATERIAL Contains 1 of the Following:</b>				
001	7	022218-001	Ceramic Piston/Cylinder Set; B-Size Alum	1
002	7	022218-002	" ; B-Size Zirc	1
003	7	022218-003	" ; C-Size Alum	1
004	7	022218-004	" ; C-Size Zirc	1
005	7	022218-005	" ; D-Size Alum	1
006	7	022218-006	" ; D-Size Zirc	1
013	7	022218-013	" ; 16mm Alum	1
015	7	022218-015	" ; B-Size SA Sic Hex	1
017	7	022218-017	" ; C-Size SA Sic Hex	1
019	7	022218-019	" ; D-Size SA Sic Hex	1

Figure 7.7 Split Case Pump Module (Sheet 2 of 3)

Model # Tab	Dwg Index #	Part #	Description	Qty
101	7	022218-101	" ; B-Size Alum W/Gland	1
102	7	022218-102	" ; B-Size Alum W/Gland	1
103	7	022218-103	" ; C-Size Alum W/Gland	1
104	7	022218-104	" ; C-Size Zirc W/Gland	1
105	7	022218-105	" ; D-Size Alum W/Gland	1
106	7	022218-106	" ; D-Size Zirc W/Gland	1
113	7	022218-113	" ; 16mm Alum W/Gland	1
115	7	022218-115	" ; B-Size SA Sic Hex W/Gland	1
117	7	022218-117	" ; C-Size SA Sic Hex W/Gland	1
119	7	022218-119	" ; D-Size SA Sic Hex W/Gland	1

Figure 7.7 Split Case Pump Module (Sheet 3 of 3)