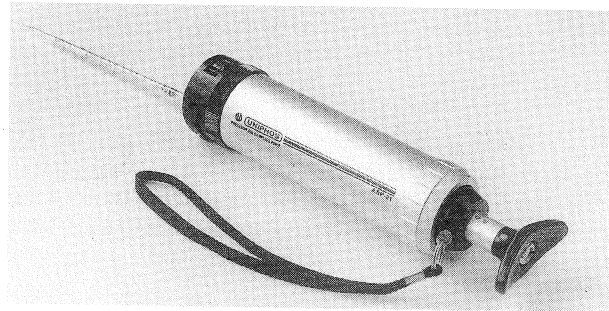


# **UNIPHOS PRECISION AIR SAMPLING PUMP**

**MODEL : ASP - 21**



**INSTRUCTION MANUAL**



**United Phosphorus Limited**

# INSTRUCTION MANUAL FOR UNIPHOS PRECISION AIR SAMPLING PUMP MODEL : ASP-21

The UNIPHOS precision gas detector consists of two parts viz. i) the gas detector tubes and ii) air sampling pump (ASP-21). Together they form the UNIPHOS gas detection system. The air sampling pump is used to draw a precisely defined volume of sample air through the detector tube for determining the impurity gas concentration in the air sample. This manual describes the air sampling pump and its operation for impurity gas measurement using detector tubes.

## 1. DESCRIPTION

ASP-21 is a piston and barrel air sampling pump (Fig.-1). For measurement a detector tube with both ends cut is connected to the rubber tube connector at the end of the barrel. When the piston is withdrawn by pulling the handle, sample air is drawn into the barrel through the detector tube.

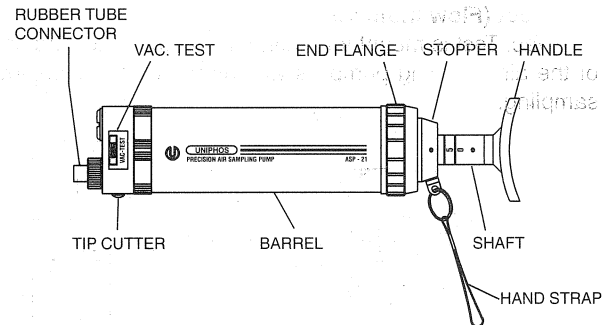


Fig. - 1 : Uniphos Precision Air Sampling Pump (ASP-21)

Fig. – 1 shows the different parts of the air sampling pump which are described in the following section.

### 1.1 Tip cutter :

The tip cutter is provided on the pump to break off both ends of the detector tube before it is inserted into the rubber tube connector for drawing the air sample. The broken tips are collected into a storage space which when filled is to be emptied by pulling off the rubber cap on the opposite side.

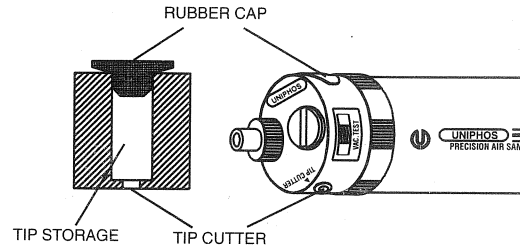


Fig. – 2 : Tip Cutter

### 1.2 Vac. Test (Flow indicator) :

The Vac. Test is meant for testing the vacuum holding capacity of the air sampling pump as well as to see the completion of sampling.

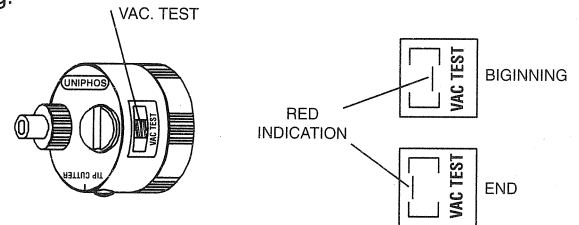
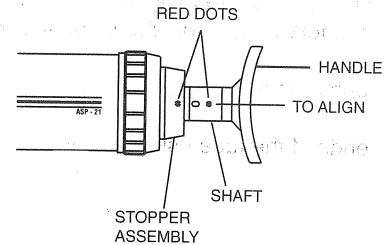


Fig. – 3 : Vacuum Testing

### 1.3 Stopper :

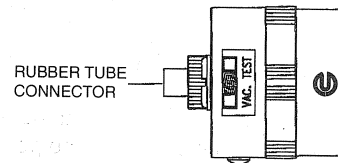
The air sampling pump has facility to lock the shaft after pulling and reaching 50 cc (1/2 stroke) or 100 cc (full stroke) mark. For locking, the red dots on the stopper and shaft have to be aligned. In this position when the shaft is pulled it gets locked at 50 or 100 cc mark. By turning the handle right or left by 90 degree when in the locked position, the shaft is freed.



**Fig. – 4 : Stopper Assembly**

### 1.4 Rubber tube connector :

The rubber tube connector is meant for securely holding the detector tube for drawing the sample air.

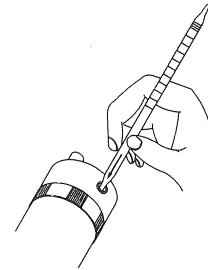


**Fig. – 5 : Rubber Tube Connector**

## 2. OPERATION

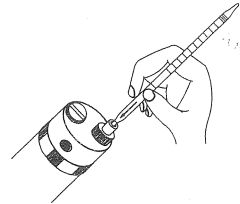
The detector tube system is based on the following working principle. A precisely defined volume of sample air is drawn through the detector tube. The detector tube contains the sensing chemical which reacts with the impurity gas in the sample air and produces a coloured stain in the sensing chemical. The length of the coloured stain measures the impurity gas concentration in ppm on the tube scale. For getting accurate reading, using the UNIPHOS detector tube system, the following steps should be followed

- 2.1 Inspect the pump as described in section 3.
- 2.2 Break both ends of the tube using tip cutter.



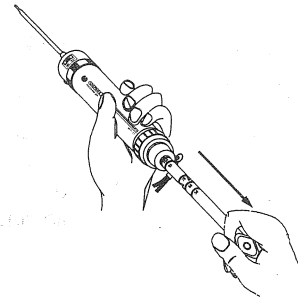
**Fig. – 6 : Tip cutting**

- 2.3 Insert one end of the tube securely in the rubber tube connector ensuring that the arrow on the detector tube points towards the pump.



**Fig. - 7 : Tube Inserting**

- 2.4 Align the red dots on the stopper and shaft and pull the pump handle to the 50 cc or 100 cc mark.



**Fig. - 8 : Sample Drawing**

- 2.5 For drawing more than 100 cc, (one stroke) push back the pump shaft to its original position after freeing it, and without removing the detector tube, pull the pump handle again, for the second stroke. These steps can be repeated to get the desired number of strokes.
- 2.6 Pull out the detector tube from the pump inlet after the sampling is

completed (approximately 1 or 2 minutes). The sampling is considered to be completed when the red line on 'Vac. Test' which is at the bottom, at the beginning of the sampling goes back to its original position at the top.

2.7 The impurity gas concentration is directly obtained on the detector tube scale.

### **3. INSPECTION OF THE PUMP**

Before use, the pump should be checked for air leak. The following steps are recommended.

3.1 Insert a new detector tube without breaking its ends into the rubber tube connector.

3.2 Align the red dots and pull the pump handle a full stroke.

3.3 Wait for three minutes, and release the pump handle by turning 90 degrees on left or right and slowly allowing the piston to come back by holding the handle.

3.4 If it does not come back completely to its original position it means that there is a leak in the pump, the cause for which, could be one of those described in section 4 under maintenance.

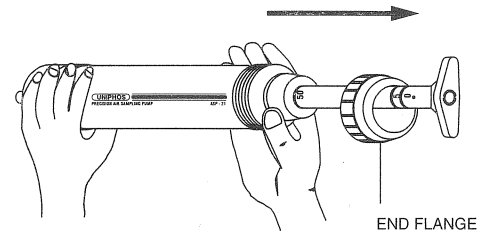
### **4. MAINTENANCE**

The pump needs occasional maintenance.

#### **4.1 Greasing the barrel :**

Greasing of the barrel, can be done by following the steps described below.

- i. Take off the hand strap attached on the stopper.
- ii. Pull out the pump handle a little and unscrew the end flange fully.



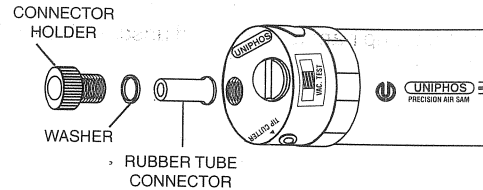
**Fig. – 9 : Pulling out the Piston**

- iii. Pull out completely the piston in the barrel along with the stopper.
- iv. Mop up the piston and the inside surface of the barrel. Smear a thin layer of fresh grease on the rubber packing of the piston.
- v. Put back the piston in the barrel and tighten the flange.



#### 4.2 Replacement of rubber tube connector :

If the rubber tube connector is worn out, take off the connector holder and replace it with a new one.



**Fig. - 10 : Rubber Tube Connector Assembly**

#### 4.3 Correcting leaking pump :

In case of a leaking pump the following should be checked and if necessary replaced or corrected.

- i. Rubber tube holder getting loose.
- ii. Insufficient grease in the piston.
- iii. Ageing of rubber tube connector.
- iv. One way valves on the pump leaking.

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