



# INSTRUCTION MANUAL OXYGEN DETECTOR TUBE

No.159SC

★ READ CAREFULLY THIS INSTRUCTION MANUAL AND THE INSTRUCTIONS OF THE ASPIRATING PUMP PRIOR TO USING THIS PRODUCT.  
★ DO NOT DISCARD THIS INSTRUCTION MANUAL UNTIL ALL THE TUBES IN THIS BOX ARE USED UP.

## 1. PERFORMANCE

Measuring Range	: 3 - 24 % (*)	1.5 - 3 %
and Sampling time	: 1 minute	1.5 minutes
Pump Strokes	: 1/2 (50mL)	1 (100mL)
(*) Graduations on the detector tube are based on 1/2 pump strokes.		
Colour Change	: Black → White When the concentration is less than 10%, 3mm length of original colour (Black) of the detector tube remains as it is. But, if the top of the discoloured layer is clear, read its point. Remained original colour does not affect the readings.	
Detectable Limit	: 1% (1 pump stroke)	
Operating Temperature	: 0 - 45 °C (32-113°F) (No correction is necessary.)	
Aspirating Pump	: Model AP-20, AP-20S, 400B, AP-1, AP-1S, or 400A	

### CAUTION

1. THE DETECTOR TUBE AND POST-TREAT TUBE CONTAINS CHEMICAL REAGENTS.
2. DO NOT TOUCH THESE REAGENTS DIRECTLY ONCE TUBES WERE BROKEN.  
WHEN THE DETECTOR TUBE IS BROKEN AND CHEMICAL REAGENTS CONTACT TO OXYGEN, HYDROGEN CHLORIDE OCCURS.
3. KEEP THE TUBES OUT OF THE REACH OF CHILDREN.

### NOTICE

1. USE ONLY WITH PUMP MODELS AP-20, AP-20S, 400B, AP-1, AP-1S, or 400A. OTHERWISE, CONSIDERABLE ERROR IN INDICATION MAY OCCUR.
2. BEFORE TESTING, CHECK THE ASPIRATING PUMP FOR LEAKS (REFER TO ITEM 8. INSPECTION OF ASPIRATING PUMP). ANY PUMPS SHOWING SIGNS OF LEAKAGE SHOULD BE CORRECTED BEFORE USE.
3. DO NOT USE THIS TUBE OUTSIDE THE STATED OPERATING TEMPERATURE RANGE.
4. STORE TUBES IN A COOL AND DARK PLACE (0-25 °C/32-77°F), AND USE BEFORE EXPIRATION DATE PRINTED ON THE TOP OF THE BOX.
5. PRIOR TO USE, READ CAREFULLY ITEM 9. USER RESPONSIBILITY.
6. READ THE CONCENTRATION IMMEDIATELY AFTER MEASUREMENT.

## 2. SAMPLING AND MEASUREMENT

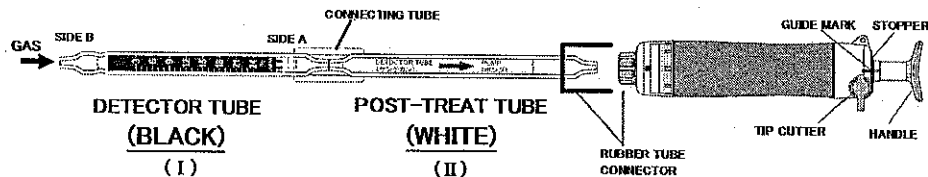


Fig.1

- ① Break both ends of the post-treat tube (II) and an end of the side A of the detector tube (I), and connect each end of the detector tube (I) and post-treat tube (II) with connecting tube as shown in Fig.1. (Arrow mark on the detector tube and post-treat tube shall point to the pump.)

▲ CAUTION SAFETY GLASSES AND GLOVES SHOULD BE WORN TO PREVENT INJURY FROM SPLINTERING GLASS.

▲ WARNING (1) THE POST-TREAT TUBE MUST BE NEAREST TO THE ASPIRATING PUMP. IF CONNECTING METHOD AND DIRECTION OF TUBES ARE INCORRECT, OBTAINED MEASUREMENT RESULTS WILL NOT BE CORRECT, AND HYDROGEN CHLORIDE WILL BE EXHAUSTED FROM DETECTOR TUBE AND DAMAGE TO THE PUMP WILL OCCUR.

- ② Break an end of the side B of the detector tube (I), and insert the post-treat tube (II) into the aspirating

- ③ pump securely as shown in Fig.1. (Arrow mark shall point to the pump.)
- ③ Align the guide marks on the handle and stopper of the aspirating pump.
- ④ Pull the pump handle at 1/2 pump strokes (to 50mL line) until it locks and wait for 1 minute or until the completion of sampling is confirmed with the flow indicator of the pump. (See descriptions about the flow indicator in the instruction manual of the pump.)

NOTE : CARRY OUT THE STEP OF ②~④ MENTIONED ABOVE QUICKLY.

▲ WARNING (2) THIS TUBE RUNS HOT BECAUSE OF CHEMICAL REACTION AFTER MEASUREMENT. TO AVOID POSSIBLE INJURY, ALLOW ADEQUATE COOLING TIME OR WEAR SAFETY GLOVES WHEN HANDLING THE RECENTLY USED TUBE.

- ⑤ On completion of sampling, read the scale at the maximum point of the stained layer.
- ⑥ When the concentration is below the scale range, 1 pump stroke can be used to determine concentrations of 1.5 to 3%.  
1) Remove the detector tube from the pump.  
2) Repeat the above step ① to ③ by using the new tubes.  
3) Pull the pump handle at a full stroke until it locks and wait for 1.5 minutes or until the completion of sampling is confirmed with the flow indicator of the pump. (See descriptions about the flow indicator in the instruction manual of the pump.)  
4) On completion of sampling, read the scale at the maximum point of the stained layer.  
In case of 1 pump stroke, the following equation is available for true concentration.  
True concentration = Reading value × 1/2

SPECIAL NOTE: I. The scale is calibrated at 20 °C (68°F), 50%R.H. and 1013hPa. Readings obtained in other circumstances should be corrected (REFER TO ITEM 3. CORRECTION FOR AMBIENT CONDITIONS).

II. When the maximum point of the stained layer is unclear or oblique, read the scale at the centre between the longest and shortest points.

## 3. CORRECTION FOR AMBIENT CONDITIONS

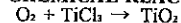
- ① Temperature; No correction is necessary.
- ② Humidity; No correction is necessary.
- ③ Atmospheric Pressure;

$$\text{True concentration} = \text{Tube Reading} \times \frac{1013}{\text{Atmospheric pressure (in hPa)}}$$

## 4. INTERFERENCE:

Sulphur dioxide, Carbon dioxide, Nitrogen dioxide or hydrogen sulphide does not affect the readings.

## 5. CHEMICAL REACTION IN THE DETECTOR TUBE:



## 6. DISPOSAL OF TUBES:

USED TUBES SHOULD BE DISPOSED CAREFULLY ACCORDING TO RELEVANT REGULATIONS, IF ANY.

## 7. OXYGEN DEFICIENCY: Less than 18%

## 8. INSPECTION OF ASPIRATING PUMP:

Checking for leaks;

- ① Insert a sealed, unbroken detector tube into the pump.
- ② Align the guide marks on the shaft and stopper of the pump.
- ③ Pull the handle to a full stroke and wait for 1 minute.
- ④ Unlock the handle and allow it to return slowly into the pump by holding the cylinder and handle securely.

▲ CAUTION HANDLE WILL TEND TO SNAP BACK INTO THE PUMP QUICKLY.

- ⑤ If the handle returns completely to the original position, the performance is satisfactory. Otherwise, refer to maintenance procedures shown in the pump instruction manual of the pump to correct the leakage.

## 9. USER RESPONSIBILITY:

It is the sole responsibility of the user of this equipment to ensure that the equipment is operated, maintained, and repaired in strict accordance with these instructions and the instructions provided with each Model AP-20, AP-20S, 400B, AP-1, AP-1S or 400A aspirating pump, and that detector tubes are not used which are either beyond their expiration date or have a colour change different to that stated in the Performance specifications.

The Manufacturer and Manufacturer's Distributor shall not be otherwise liable for any incorrect measurement or any damages, whether damages result from negligence or otherwise.