

- ★ READ THIS INSTRUCTION MANUAL AND THE INSTRUCTIONS OF THE COMPRESSED BREATHING AIR SAMPLING SYSTEM (P-41R) PRIOR TO USING THIS PRODUCT.
- ★ DO NOT DISCARD THIS INSTRUCTION MANUAL UNTIL ALL THE TUBES IN THIS BOX ARE USED UP.

## 1. PERFORMANCE:

Substance to be measured Tube No.	Carbon monoxide 600SP		Carbon dioxide 601SP	Oil mist 602SP	Water vapour 603SPA      603SP2	
	Measuring Range	2.5 - 5ppm	5 - 100ppm	100 - 3000ppm	0.3 - 5mg/m <sup>3</sup>	20 - 160mg/m <sup>3</sup>
Sampling Time	4 minutes	2 minutes	2 minutes	25 minutes	1 minute	20 seconds
Flow Rate (L/min.)	2		1	3	2	3
Detectable Limit	1ppm (4 minutes sampling)		20ppm	0.1mg/m <sup>3</sup>	15mg/m <sup>3</sup>	30ppm
2nd Pressure	0.6Kgf/cm <sup>2</sup> (0.059MPa)		1.0Kgf/cm <sup>2</sup> (0.098MPa)	1.0Kgf/cm <sup>2</sup> (0.098MPa)	1.0Kgf/cm <sup>2</sup> (0.098MPa)	1.0Kgf/cm <sup>2</sup> (0.098MPa)
Operating Temperature	0 - 40 °C (32-104°F) (No correction is necessary.)					
Colour Change	Yellow → Dark brown		Purplish blue → Pale pink	Yellow → Pale blue	Yellow → Yellowish green or Blue	Yellow → Greenish blue

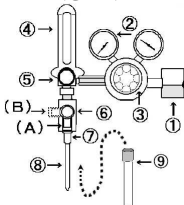
### ▲ CAUTION

1. THE DETECTOR TUBE CONTAINS CHEMICAL REAGENTS.
2. DO NOT TOUCH THESE REAGENTS DIRECTLY ONCE TUBES WERE BROKEN.
3. KEEP THE TUBES OUT OF THE REACH OF CHILDREN.

#### NOTICE

1. USE ONLY WITH THE COMPRESSED BREATHING AIR SAMPLING SYSTEM (P-41R). OTHERWISE, CONSIDERABLE ERROR IN INDICATION MAY OCCUR.
2. DO NOT USE THIS TUBE OUTSIDE THE STATED OPERATING TEMPERATURE RANGE.
3. 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.
4. PRIOR TO USE, READ CAREFULLY ITEM 6. USER RESPONSIBILITY.
5. READ THE CONCENTRATION IMMEDIATELY AFTER MEASUREMENT.
6. UPON USE OF NO. 602SP OIL MIST TUBES, ORANGE COLOUR STAIN WILL BE PRODUCED BY WATER VAPOUR IN THE SAMPLE GAS BUT DISCOLOURATION BY OIL MIST IS NOT INTERFERED. THE TOP OF PALE BLUE DISCOLOURATION SHALL BE READ IRRESPECTIVE OF THE ORANGE COLOUR STAIN.
7. UPON USE OF NO. 603SPA AND 603SP2 WATER VAPOUR TUBES, MEASURE THE CONCENTRATOIN IMMEDIATELY AFTER BREAK BOTH ENDS OF THE DETECTOR TUBE TO AVOID THE COLOUR CHANGING BY WATER VAPOUR IN AIR.
8. THE COLOUR STAIN OF NO. 603SPA WATER VAPOUR TUBE IS YELLOWISH GREEN AT LESS THAN APPROX. 60mg/m<sup>3</sup> OF WATER VAPOUR, AND BLUE OVER 60mg/m<sup>3</sup> OF WATERVAPOUR.

## 2. SAMPLING AND MEASUREMENT:



- ① Part to connect gas cylinder
- ② 2nd pressure gauge
- ③ Handle of pressure regulator
- ④ Flow meter
- ⑤ Needle valve
- ⑥ Open/Shutoff valve
- ⑦ Inlet to gas detector tube
- ⑧ Gas detector tube
- ⑨ Tube protector

Fig.1

- 1) Without connecting detector tube, make the position of Open/Shutoff valve ⑥ to (A) and open the Needle valve ⑤ fully. Adjust the 2nd pressure to a preset condition with looking at the 2nd pressure gauge ② through the pressure regulator ③.
- 2) Adjust the flow rate to the preset condition with looking at the Flow meter ④ though the Needle valve ⑤ and purge the air flow circuit for 1 minute as it is.  
 ※ In case of No.603SPA and 603SP2, the purge time of air flow circuits are 10 and 3 minutes respectively.
- 3) Break both ends of the detector tube.

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

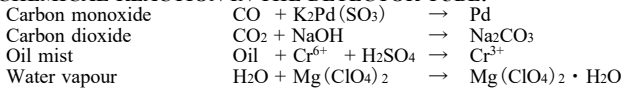
- 4) Insert the detector tube into the Inlet to gas detector tube securely as shown in Fig.1.  
 (Arrow mark shall point to the opposite side of the Inlet.)  
 At that time, the indication value of the Flow meter is decreased on a large scale, but leave it as it is, and continue putting the compressed breathing air through the gas detector tube.  
 ※ Take the sampling time accuracy which is listed in **ITEM 1. PERFORMANCE.**
- 5) Install the Tube protector.
- 6) After putting the compressed breathing air through the detector tube for a regulated time, make the position of Open/Shutoff valve ⑥ to (B), put off the detector tube and read the scale at the maximum point of a stained layer.

**※ In case of No.600SP of 4 minutes sampling, multiply the reading value by 0.5.**

4 minutes sampling of No.600SP is for 2.5-5ppm. When the concentration of Carbon monoxide is more than 5ppm, 2 minutes sampling must be use.

**SPECIAL NOTE:** I. 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. CHEMICAL REACTION IN THE DETECTOR TUBE:**



**4. DISPOSAL OF TUBES:**

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

**5. HAZARDOUS AND DANGEROUS PROPERTIES OF :**

Carbon monoxide	TLV-TWA ◆:	25ppm	Explosion range in air:	12.5 -74%
Carbon dioxide	TLV-TWA ◆:	5000ppm	Explosion range in air:	-
Oil mist	TLV-TWA ◆:	-	Explosion range in air:	-
Water vapour	TLV-TWA ◆:	-	Explosion range in air:	-

◆ Threshold Limit Value established by the American Conference of Governmental Industrial Hygienists, 2019.

**6. 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 Model P-41R, 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 Distributors shall not be otherwise liable for any incorrect measurement or any damages, whether damages result from negligence or otherwise.**

※ Product specifications are subject to change without any prior notice.

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