AIR CARE

AIR PURITY TEST KIT

USER INSTRUCTION MANUAL

Undersea Centre Ltd

SERVING THE DIVING INDUSTRY SINCE 1974

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Air-Care Operating Manual

Kitigawa compressed air detector tubes are supplied with a set of operating instructions which are not applicable to the **Air-Care**. The **Kitigawa** instructions are for use with their P-41R compressed air test kit. **This is not available from us.**

By carefully following these instructions, **Air-Care** and **Kitigawa** gas detection tubes will enable you to accurately measure the concentration of impurities in compressed air. Please read carefully and follow the instructions properly.

The **Air-Care** system comprises the following components

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Kitagawa compressed breathing air test tubes					
Substances to be measured	Tube code number	Measuring range	Colour change	Shelf life (years)	Tubes in each box
Carbon monoxide (CO)	600 SP	5-100 PPM	Yellow/dark brown	2	10
Carbon dioxide (C02)	601 SP	100-3000 PPM	Purplish blue/ pale pink	2	10
Oil mist	602 SP	0.3-5 mg/m3	Yellow/ pale blue	2	10
Water vapour	603 SP	20-160 mg/m3	Yellow/yellowish green or blue*	3	10

*This tube becomes yellowish green if less than 60 mg/m3 and blue if more than 60mg/m3.

Performance specifications			
Substance	Tube code number	Actual flow rate (ml/min.)	Sampling time (mins)
CO	600 SP	150	2.0
C02	601 SP	150	2.0
Oil mist	602 SP	400	25.0
Water vapour	603 SP	550	1.0

Measurement conditions

Special notes

1. 602 SP Orange colour stain may be produced by water vapour in the sample gas but the discolouration by oil mist is not affected. The top of pale-blue discolouration should be read irrespective to the orange colour stain.
2. 603 SP Diaphragm in the pressure regulator (1) should be stainless steel or Teflon coated rubber. A normal rubber diaphragm is previous to ambient humidity and a reading of the water vapour tubes will be affected by the ambient humidity.

CAUTION! Keep tubes away from children and dispose of them with care according to current regulations.

User responsibility

It is the sole responsibility of the user of this equipment to ensure that it is operated, maintained, and repaired in strict accordance with these instructions. Detector tubes must not be used beyond their expiry date nor have a colour different from the **Performance specifications** at the top of this page. The manufacturer and distributor shall not be otherwise liable for any incorrect measurement or any damages, whether damage is a result from negligence or otherwise.

Operating procedure

1. Ensure that the flow selector control (1) is in the OFF position.
2. Connect the **Air-Care** regulator assembly to the cylinder of air to be tested. This is designed for **Din** valves. For use with International valves screw the international adapter supplied to convert the regulator to suit.
3. Now open the cylinder valve and ensure that there is a minimum pressure of 50 bar registering on the contents gauge (3). At no time during the test should the pressure be allowed to fall below 4 bar. **NB. The minimum testing pressure is 9 Bar and the maximum is 232 Bar.**
4. Open the flow selector to the PURGE (P) position as shown in the selector window (5) and allow to flow for a minimum time of 30 seconds. **It is important to note that you must purge for 20 seconds between each tube type to ensure any remaining contents are removed from the previous test.**
5. Select the appropriate **Kitigawa** gas tube and break off the ends using the tip breaker provided (2.3).
6. Now insert the tube into the clamping collet (4) to its full depth. This should fit in firmly and you may have to loosen or tighten collet to suit tube you are using. You must ensure that the arrow on the tube is facing away from the collet in the direction of the air flow and be suspended in a downward position as shown in the picture overleaf.
7. Set the timer alarm for the appropriate test (See notes on **Operating conditions**) shown on the next page.
   Setting the alarm
   i Set the time by pressing the minute button to the desired time.
   ii To start timing press the **Start/reset** once. Display will stop flashing.
   iii To stop alarm signal press **Start/reset** once. Display will now show 0:00 flashing and will automatically switch off after 1 minute.

Start the alarm timer and at the same time turn the flow selector (1) to the required test selector as shown in the selector window (5):
P = Purge
H2O = Water
OIL = Oil
CO2 /CO = Carbon monoxide/Carbon dioxide

8. At the end of the sampling period turn the flow selector to the OFF position and remove the **Kitigawa** tube from the collet.
9. If a colour change has taken place read the concentration of impurity directly from the tube scale at the end of the colour stain.

If you are doing a full test you should always do the water first to prevent a false reading.

Do not follow instructions supplied with the tubes as they do not apply with our system.

To keep test tubes in optimum condition store in a normal household refrigerator.

Operating conditions

Test duration times		
Tube type	Tube code number	Sampling time (mins)
CO	600 SP	2.0
C02	601 SP	2.0
Oil mist	602 SP	25.0
Water vapour	603 SP	1.0

Test result criteria

The current *Health and Safety Executive* standards for breathing air used by sport divers are BS EN12021. Generally, it is accepted that is the most relevant, however various standards currently being used are detailed below:

	BS EN 12021:2014	BS 4001 PT 1	BS 4001 PT 2	DIN 3188	JTM BS 4667	Komyo tube (range and part number)
CO	5 PPM 1.5 ml/m3	10 PPM 11 ml/m3	10 PPM 11 ml/m3	30 PPM	5PPM	5-100 PPM 600 SP
CO2	500 PPM 500 ml/m3	500 PPM 900 mg/m3	500 PPM 900 mg/m3	1000 PPM	500 PPM	100-3000 PPM 601 SP
Oil	0.5 mg/m3	1.0 mg/m3	1.0 mg/m3	Tasteless & odourless oil will be below 0.3 mg/m3	0.5 mg/m3	0.3-5.0 mg/m3 602 SP
Water	See note below	500 mg/m3 If risk of freezing, air should be dried	Dry as poss. No condensation at max W.P. and at 40°C	50 mg/m3 at 200 BAR 35 mg/m3 at 300 BAR	Dew point minus 50°C 38 mg/m3	20-160 mg/m3 603 SP
Humidity	Not to exceed 80%		RH (10880-19550 mg/m3)			
Temperature	15-25°C	15-25°C	15-25°C			
Odour	Odourless & tasteless	Odourless	Odourless	Odourless & tasteless		
Cleanliness	No dust	No dirt	No metallic particles	No toxic or irritating ingredients		

More information regarding this table overleaf.

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For user comfort breathing air for divers should be free of odour (smell). It is considered that air having a total oil content, mist, and vapour below 0.3 mg/m3 is odour free. There are several considerations with regard to **water** content. Exposure to very low humidity levels is not recommended and is even considered to be hazardous. Also, high levels could lead to regulators freezing up in very low temperature situations and the risk of corrosion in steel cylinders.

Taking all the relevant factors into consideration it is considered that water levels should be kept below the following:

50mg/m3 at 200 Bar
below 35mg/m3 at 300 Bar

These amounts should ensure there is no free water.

What is “oxygen compatible air”?

The current *Health and Safety Executive* standards for sport divers breathing air are BS 4001 and BS 4275. However, BS 4275 has now been super ceded by BS EN 12021:2014 which is generally taken as the accepted standard as this is to a higher specification.

These are the standards covering the use of compressed air (21% oxygen). The various contaminant types and their respective limits that affect divers/operators are listed below:

Water vapour	Better than 50mg/m3 with no significant taste or odour
Oil mist	0.5mg/m3
Gaseous hydrocarbons	Not specified under this standard
	American standards quote 25 PPM
	UK Specification for 100% oxygen is 15 PPM
Carbon monoxide	15 PPM/0.5 mg/m3
Carbon dioxide	500 ml/m3

These limits can only be achieved and maintained by careful and regular compressor maintenance plus regular air purity testing and analysis.

It must be understood that the above information is quoted from the current standards for air and gas mixes.

The more oxygen used will require even more cleanliness. Where compressed air comes into contact with 100% oxygen it is recommended that the following specification is applied as a minimum requirement. This is a practical specification based on experience and **British oxygen company** standards for 100% oxygen. It is not a specification.

Oxygen compatible air standard

Water vapour	Better than 150mg/m3
Oil mist	Less than 0.1mg/m3
Gaseous hydrocarbons	15 PPM
Carbon monoxide	2 PPM
Carbon dioxide	500 PPM

All other impurities should meet BS EN12021:2014.

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Gas detector tube

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Detector tube with colour stain

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Tip breaker

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Air Care Test Record

It is strongly recommended that the air purity should be checked on a monthly basis or at any time when there are symptoms of increased oil consumption or a change in water discharge from the filter system becomes apparent.

Date	Carbon monoxide (CO)	Carbon dioxide (CO_2)	Oil mist	Water vapour (H_2O)

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