INDUSTRIAL SCIENTIFIC

Quick-start Guide

Gas Detection Kit
for MSHA-approved Refuge Chambers

1 Enter Airlock.

2 Open case labeled WITHOUT PUMP.
Remove the instrument.
Close the case.

3 Locate pull tab on the back of the instrument. Pull to remove it and activate the battery. Wait 15 seconds.

4 Press and hold for three seconds to power on the instrument.

5 Monitor the gas readings.

6 Go to page 4, “Use Instructions”.

Revision 5

INDUSTRIAL SCIENTIFIC

Gas Detection Kit

for MSHA-approved Refuge Chambers

Use and Service Instruction

Part number: 17148420
Edition: 4
February 14, 2014

WITHOUT PUMP" instrument case (left); "WITH PUMP" instrument case (right); battery case (not shown); service containers (not shown).

Contents	Page

Application Description

The kit enables gas monitoring with a deployed MSHA-approved refuge chamber, and equipment service during periods of storage.

Refuge Chamber Kit

Chamber Supplies

The kit contains three cases. *All three* cases are to be stored in the refuge chamber's storage area and *all three* are to be used with a deployed chamber.

Two of the cases each contain a gas-monitoring instrument and supplies. One contains a without-pump instrument to monitor for gases in the "interior atmosphere", the livable space *inside* the chamber. The other contains a with-pump instrument. This unit is used – in the livable space – to periodically sample for gases in the "exterior atmosphere", the air *outside* the chamber.

The third case contains spare batteries.

Service Supplies

The kit also contains two accessory containers. The accessory containers are *not* used with a deployed chamber. They are used for equipment service during periods of storage (see "Service").

SUPPLIES

Instrument and battery case contents are listed below.

Note: ISC Part numbers are shown in parenthesis.

"WITHOUT PUMP" instrument case

MX6 Refuge Chamber multigas monitor[a] without pump; features a factory-installed pull tab for battery activation.

Note: A torx screw-head tool is tethered to the instrument.

83 alkaline batteries[a]; three installed and 80 spare items.

Not pictured.

This document (17148420).

[a] See "Warnings and Cautionary Statements" for details about installed sensor and battery-type requirements.

"WITH PUMP" instrument case

MX6 Refuge Chamber multigas monitor[a] with pump; features a factory-installed pull tab for battery activation.

Note: A torx screw-head tool is tethered to the instrument.

59 alkaline batteries[a]; three installed and 56 spare items.

Two 10' pieces of urethane tubing (17065970).

Three pump inlet filters (17058157); one installed and two spare items.

Two exhaust fittings (17067026).

Not pictured. This document (17148420)

[a] See "Warnings and Cautionary Statements" for details about installed sensor and battery-type requirements.

Battery case

Not pictured. 104 spare alkaline batteries.

USE INSTRUCTION

The following instructions guide the user through instrument setup and use.

See the refuge chamber manufacturer's instructions to correctly enter, exit, and use the chamber.

IN THE CHAMBER'S AIRLOCK COMPARTMENT

1. Open the case labeled "WITHOUT PUMP"

Remove the instrument.

Close the case.

2. Activate the battery pack

Locate the pull tab that is taped to the back of the instrument.

Pull the tab to release the tape, then pull the tab straight out to remove it. Discard the tab.

Wait approximately 15 seconds.

3. Power on the without-pump instrument

Press ⏻ for approximately 3 seconds then release.

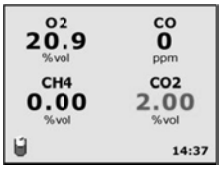
After a series of start-up display screens, the instrument will display gas readings.

IN THE LIVABLE SPACE

4. Monitor air quality

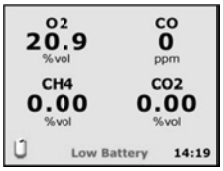
Except during battery replacement, run the without-pump unit continuously to monitor the interior atmosphere for gases.

Check the gas readings periodically.



In the event of a *gas* alarm, refer to the refuge chamber manufacturer's operating instructions for maintaining a breathable interior atmosphere.

The sensor that is producing the alarm condition will display its reading in red.



In the event of a *low battery* warning, replace the batteries. See “Part replacement”.

5. Open the case labeled “WITH PUMP”

Remove the instrument.

Close the case.

6. Activate the battery pack

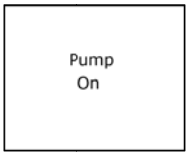
Locate the pull tab that is taped to the back of the instrument.

Pull the tab to release the tape; then pull the tab straight out to remove it. Discard the tab.

Wait approximately 15 seconds.

7. Power on the with-pump instrument

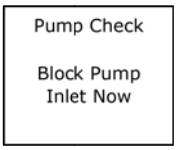
Press ⏻ for approximately 3 seconds then release.



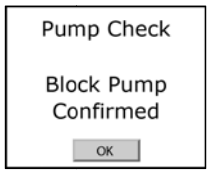
After a series of start-up display screens, the unit will display the message, “pump on”.

No action necessary.

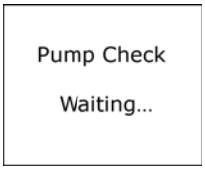
8. Complete pump check



Place a finger over the pump inlet to block the flow of air.



Remove the finger from the inlet, then press ⏻.



No action necessary.

After a brief waiting period, the gas readings will display.

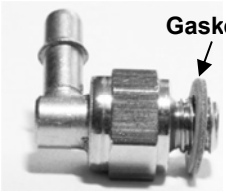
9. Set up the with-pump instrument

There are two pieces of tubing.

Attach one piece of tubing to the pump inlet nipple. This is called the “sample tubing”.

For port location and connection instruction, see the refuge chamber manufacturer’s instruction.

Attach the other end of the sample tubing to the sample port in the livable space.



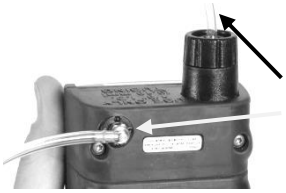
The exhaust fitting is a two-item part, the fitting and its gasket. To avoid the loss of either small item, *use caution* when working with these items.

Attach the exhaust fitting to the exhaust port located on the back of the instrument in the upper left corner. Use fingers to screw the item into the port. The fitting swivels; tighten it at the nut.

Attach the second piece of tubing to the exhaust fitting nipple, the fitting's nonthreaded arm. This is called the "exhaust tubing".

For port location and connection instruction, see the refuge chamber manufacturer's instruction.

Attach the other end of the exhaust tubing to the exhaust port in the livable space.



Ensure all noted-above connections are airtight.

Sample tubing

Exhaust fitting and tubing

10a. Monitor air quality *outside* the chamber

Operate the with-pump instrument in the livable space – when necessary – to sample the exterior atmosphere.

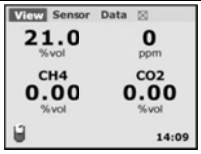
Power off the with-pump instrument after each use.

10b. Power off

Press and hold ⏻ until the shutdown confirmation screen displays (shown below).

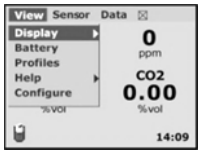
Press ⏻. The unit will power off.

11. Monitor battery power levels

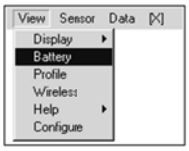


From the gas monitoring screen, press ⏻ once to activate the backlight.

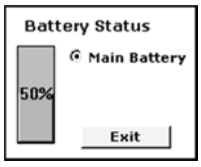
Press ⏻ again to activate the operation mode menu bar.



Press ⏻ to activate the drop-down menu, “View”.



Press ▼to highlight the menu item, “Battery”.



Press ⏻ to activate the display of remaining battery life.

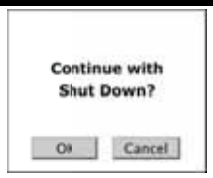
The number in the vertical bar indicates the percentage of power remaining.

Press ▼to highlight the exit bar.
Press ⏻ to “Exit”.

Note: Typical battery run time for each instrument is one to two hours. For battery replacement instructions, see “Part Replacement” below.
Note: Should the without-pump unit become inoperable, the interior atmosphere can be monitored for gases using the with-pump unit by removing the sample tubing from the instrument. To monitor the exterior atmosphere, simply reattach the sample tubing.

PART REPLACEMENT IN THE LIVABLE SPACE

1. Power off



Press and hold ⏻ until the shutdown confirmation screen displays.

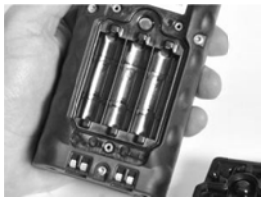
Press ⏻. The unit will power off.

Battery replacement

Power off the instrument.

Use the tool provided to loosen the three captive screws on the battery compartment cover.

Remove the cover and set it aside.



Remove *all three* batteries from the battery compartment.

Insert three *new* batteries using the positive (top) and negative (bottom) orientation shown here.

Note: Do not mix old and new batteries.

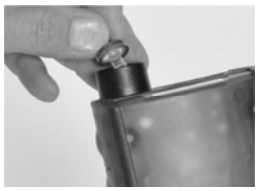
Replace the cover.

Use the tool provided to tighten the cover's three captive screws.

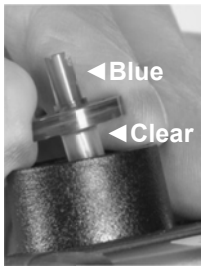
Filter replacement (with-pump instrument only)

Power off the instrument.

Turn the pump inlet cap counterclockwise to remove it. Set the cap aside.



Remove the filter from the inlet barrel. Discard the used filter.



Place the new filter inside the inlet barrel. One end of the filter is blue and one is clear. The blue end should face the instrument user.

Reattach the cap and turn it clockwise to tighten.

Service

The kit contains two accessory containers. They are to be stored and used above ground in an area known to be nonhazardous.

SUPPLIES

Accessory container contents are listed below.

Note: ISC Part numbers are shown in parenthesis.

Accessory container

Not pictured.

These documents:

- MX6 iBrid Product Manual (17130279-1)
- MX6 iBrid Quick Start Guide (17134552-1)

Calibration tubing (17044157) and calibration cup (17128489); use with without-pump instrument

SERVICE INSTRUCTION

Complete the following service procedures in an area known to be nonhazardous. Perform all tasks every 31 days for *each* instrument.

Preparation

At the service location, remove each instrument from its case (without pump shown).

Power off the instrument.

Use the tool provided to loosen the alkaline battery pack's three captive screws.

Remove the battery pack and set it aside.

Install a lithium-ion (17131038-4 or -5) or alkaline (17131046-6) battery pack. Use the tool provided to tighten its three captive screws.

Calibration and bump test

- ✓ Calibrate the unit. See "Warnings and Cautionary Statements" for calibration gas requirements. Use a compatible docking station or calibrate the unit manually (see the *Product Manual* for instruction).

  Note: If any sensor fails calibration, repeat the calibration. If the failure persists, see an onsite supervisor or contact ISC.

- ✓ Bump test the unit. See "Warnings and Cautionary Statements" for calibration gas requirements. Use a compatible docking station or calibrate the unit manually (see the *Product Manual* for instruction).
- ✓ Power off the units.
- ✓ Uninstall the lithium-ion or alkaline battery packs and set them aside for future use.

Alkaline battery pack inspection

Inspect the alkaline battery pack. If there is any sign of dust, water, corrosion, or discoloration, discard the battery pack*.

Inspect the pull tab near the edge of the battery pack. Ensure only one line on the tab is visible. If two lines are visible, discard the battery pack*.

Not pictured.

Check the battery pack *manufacture date*. This is located on the bar coded label that is affixed to the battery pack interior. The first four digits on the label are YYMM, where Y= year and M = month. For example, 1309 indicates the battery pack was manufactured September 2013. If the battery pack is five years old, discard it*.

*When the battery pack is discarded, also discard *all* spare alkaline batteries. This includes the spare batteries in the instrument cases and the battery case. Contact ISC for a replacement battery pack and replacement spare batteries.

Storage

- ✓ Place all kit contents into the approved cases.
- ✓ Close the cases and ensure they are properly sealed.
- ✓ Return the cases to the chamber.

Notes

Warning and Cautionary Statements

⚠ Use one with-pump instrument and one without-pump instrument together as instructed.

⚠ Both instruments must be equipped with these sensors: CO/H2-low, O2, CH4, and CO2.

⚠ Alarms must be set as follows:

Without pump

	Alarm settings			
Gas	*Low*	*High*	*TWA*	*STEL*
O2	18.5%	23.0%	N/A	N/A
CO	25 ppm			
CO2	1%			
CH4	1.0%		N/A	N/A

With pump

	Alarm settings			
Gas	*Low*	*High*	*TWA*	*STEL*
O2	18.5%	23.0%	N/A	N/A
CO	999 ppm			
CO2	1%			
CH4	1.0%		N/A	N/A

Note: Because the with-pump unit can be used to monitor the interior atmosphere for gases (should the without-pump unit become inoperable), instrument operators should be aware of the differences in alarm settings as shown above.

⚠ Service the instrument using the following gas concentrations:

	Gas concentration by task		
Sensor	*Zero*	*Calibration*	*Bump test*
O2	Zero Air	Zero Air	18%
CO	Zero Air	250 ppm	250 ppm
CO2	Zero Air	2.5%	2.5%
CH4	Zero Air	2.5%	2.5%

⚠ After the instrument leaves the factory, the MSHA approval is negated when any change is made to any of these settings, components, or requirements:

Alarm settings	Installed battery type
Sensor settings	Pull tab
Calibration gas concentrations	Instrument case contents
Calibration frequency	Faceplate or label

⚠ Use only these AA alkaline batteries: Duracell MN1500. The following apply to the alkaline battery replacement task:

- Replace all three batteries at the same time.
- The replacement task can be completed in a gassy area.
- Do not allow dust to enter the battery compartment.

⚠ The battery *pack* must be replaced in fresh air only.

⚠ Substitution of components may impair intrinsic safety and may cause an unsafe condition.

⚠ Always store and transport case contents in the supplied and approved dust-tight case.

⚠ The pull tab is factory installed. Do not reinstall a pull tab that has been removed from the instrument; contact ISC.

⚠ Remove the pull tab only for instrument use with a deployed refuge chamber.

⚠ The MX6 refuge chamber instruments do *not* meet IP64 or IP65 ratings.

⚠ Replace the instruments after they are used with a deployed chamber.

⚠ Specifications are subject to change without notice. Refer to the ISC website for the most current information.

INDUSTRIAL SCIENTIFIC

Contact Information

Industrial Scientific Corporation
1001 Oakdale Rd.
Oakdale, PA 15071-1500
USA
Phone: +1 412-788-4353
1-800-DETECTS (338-3287)
e-mail: info@indsci.com