Carbon Dioxide Diffuser

Product Description

and

Standard Operating Procedure

https://www.boltac.co.nz/co2-diffuser/

BOLTAC CO_2 Diffuser

Document Version #8, (Released July 2018)

Specifications.

Supplied with or without dual-gauge regulators.
Wall mounted enclosure with hinged front panel.

Rotameter flow rate	0-50cc/min.
Gas inlet size	6mm push-fit fitting.
Sample inlet size	8mm push-fit fitting.

Diffuser Installation

Note- To open cabinet, completely undo the two screws on the right side of the lid, and partially on the LEFT SIDE. This allows the left side screws to act as "hinges".

Mount the diffuser chassis on wall, using suitable screws/fixings. If necessary, temporarily move the diffuser element from its' mount to place the mounting screw should the screw slot be covered. Ensure adequate room for hinging! There are 4 round headed plastic screws in the hinged panel front. To open the panel, simply remove the upper and lower screws on the right-hand side of the front panel. Then undo the left pair 4 full turns only, this will allow the front panel to be opened without removal. Turning the screws 6 turns allows complete removal of the screws and front panel. (There is tubing connecting the front panel to the diffuser).

Regulator

The regulator has contents, and operating pressure gauges. They also have two safety valves, one for high pressure and one for operating pressures.
A spare gas bottle/regulator sealing washer is temporarily located between the 8 and 6mm pneumatic fitting on the regulator outlet.
Ensure that you have read the instruction leaflet supplied by the regulator manufacturer.

To connect.
Place the regulator up to the carbon dioxide bottle valve, place the seal washer between the two sealing faces and wind on the nut. (Because carbon dioxide is a non-fuel gas, the thread on the nut is right-handed; i.e. same as a nut and bolt arrangement). It would also pay to note, that on later versions of the regulator, the sealing gasket provided is of a neoprene/copper composition. A spare seal is located on the push lock outlet fitting.

Do not over tighten nut. Check with soapy water for leaks. With some seals, it is advisable to recheck for leaks the next day, this is because the washer being compressed for the first time may lose its' integrity but is usually not required with the copper/neoprene seals.

Bottle Pressure. Depending on temperature, the bottle contents are pressurised to approximately 600 to 1200 psi- the warmer the temperature the higher the pressure.

Note 1
Boltac Industries is now committed to using metric tube fittings where possible.
6mm pushlock fittings are fitted to the gas regulator and gas inlet to the diffuser cabinet.

Connect the Carbon Dioxide regulator to 6mm pushlock fitting bottom left of cabinet using 6mm dia hose (not supplied by Boltac Industries).

8mm pushlock fitting is provided for sample water connection.

Note 2
After mounting the unit in the desired position, apart from inspection and maintenance, there is no further need to open the door.

Connect top of diffuser unit (8mm pushlock fitting) to Depolox unit using fittings to suit tube used to adapt/connect to Depolox hose connection.

Ensure that all prerequisites have been met, i.e. adequate sample flow/pressure, adequate gas pressure etc. Do not over pressure either the Diffuser or the Depolox.

Setup and Start procedure
Turn Rotameter control knob gently clockwise until slight resistance is met, (do not over-tighten), this will ensure that the diffuser will not pass CO_2 in the initial start-up.

Open the regulator pressure control knob anti-clockwise to reduce the chance of overpressure on start-up. The knob will feel free when spring pressure is non-existent.

Open gas supply slowly. Bottle contents should start to register as valve is opened, but the control pressure gauge should stay on zero.

Slowly turn the regulator control knob clockwise to increase pressure on the control side of the regulator. Opening the valve too quickly can cause the gas non-return valve in the diffuser to malfunction, possibly allowing moisture to reverse into the rotameter later.

The pressure you are looking for is approx 20 to 25 psi higher than the sample pressure. (If using the auto change over system, this 20-25 psi difference allows for the use of a pressure switch in the system to detect when a bottle is approaching empty and needs to be replaced, see set-up procedure later in the document).
Higher differential may be used if desired to overcome fluctuating water supply pressures.

By running a higher gas pressure, you will not necessarily use more gas, remember it is the rotameter setting that controls the gas flow, the higher pressure just gives you the margin to operate the pressure switch (when supplied). The correct gas flow is one where the pH of the sample exiting the Depolox is where you intended it to be. If your Depolox unit has the pH module installed, it is a simple matter to determine the correct gas flow.

Gently turn Diffuser control knob anticlockwise to introduce the gas to the diffuser. (Doing this will assist in preventing a backflow of water into the rotameter).
To prevent backflow on shutdown or gas stoppage, your Diffuser has been fitted with a Non-Return Valve, it is inside the diffuser element.
(See section on "Flooding" for remedy should your unit experience a backflow).

Once the gas flow has been established (rotameter ball hovering at required set point in tube), carefully introduce the sample supply. Watch the pressure gauges on the supply side of the gas regulator and the sample supply, the gas pressure should stay above that of the water sample supply.

Adjust the control knob on the Diffuser to obtain the required pH on the sample coming out of the Depolox unit.

Experience will dictate where the float will be on your Diffuser unit. (One water treatment plant has one unit set on 30 on the scale, another unit at the same plant runs at 20).

Shut down of your gas unit should be done in a manner to prevent water from ever flowing back into the rotameter tube, i.e. get the water supply off before the gas.
If necessary, make a sample supply disconnection prior to gas shut down. This procedure is probably an overkill, but would be necessary should an NRV fail.

NOTE
<u>Check with your local gas supplier as changes may have occurred.</u>

The gas cylinders commonly available are as follows :-
"G" cylinder contains 33kgs of gas (liquid weight)
"F" " " 17 " " " " "
"FL" " " 22.6 " " " " "

Per BOC Gas Ltd., the "F" cylinders will be gradually phased out. In fact, they're not available in Hamilton now, they have introduced the slightly larger "FL" cylinder in its place. Air Liquid offer cylinders of comparable size to those offered by BOC Gas Ltd.

Maintenance

Panel

To keep clean, use a soft, damp cloth with mild soap. Wipe off with damp cloth.

Do not over-tighten plastic screws when closing front panel.

Tubing

Avoid using nicked or damaged tubing.

When checking for leaks use a bowl of soapy water and apply to joints or suspect areas with small paintbrush or cloth, leaks will show up by appearing as soapy bubbles.

Rotameter

Unless absolutely necessary, do not dismantle rotameter assembly. (Great care is required when reassembling).
Contact your supplier if in doubt.

Flooding

Should there be an NRV failure and water makes its way back into the rotameter, the float inside the rotameter will become stuck at one end, (usually the top), or will become erratic in its action, depending on the amount of moisture in the unit, there are various ways of overcoming the problem.

Simple Method

If gas flow is still operating but the float is sticky or erratic there is a possibility that the flow of gas through the unit will clear the moisture by itself. This is entirely dependant on your pressure/flow setup and only your experience can dictate the option you may wish to take.

More involved method

1 Shut the entire unit down, water first, then gas.
2 Disconnect from the gas and water
3 Apply approx. 30 psi of air or CO2 to the rotameter and blow through until all water has gone.
4 There is a distinct probability that you will need to reverse the flow of gas/air through the rotameter during the drying operation.

NOTE. Should you experience a backflow more than once, you may need to look at your operating regime. But more importantly, there may be an NRV malfunction. If you are operating a unit, and are experiencing problems with backflow, please contact your supplier for assistance.

Optional equipment.

Carbon Dioxide Diffuser units with pressure switch for alarm/notification.

An automatic bottle changeover system that incorporates a switch indication to an alarm/PLC. The changeover is done automatically, and the operator is notified either by alarm, computer printout, or by LED indicator when in the immediate vicinity.

The setup for a system with pressure switch should be as follows: -

Gas pressure is 25 psi higher than sample water pressure.

Pressure switch set to operate at 10 psi below normal gas pressure, this will provide a 15-psi differential (gas over water), for continued operation until bottle is replaced.

Experience will dictate your actions when you receive notification of a switch action. One system may allow several days' operation until the bottle needs replacing, another system may only allow a few hours.