

Topline

CO2 CONTROL UNIT MANUAL



General

This control equipment has been designed to add CO₂ (carbon dioxide) to a swimming pool to control the pH level downwards. The equipment consists of two first stage regulator's (part no: 11-010-756) each connected to a CO₂ cylinder, a change over valve (80-600-1111) to select between cylinders, a CO₂ controller and diffuser. If the CO₂ supply is from a bulk storage container and not bottles, then the first stage regulators and changeover valve are not required.

First stage regulator 11-010-756

The regulator is attached directly to the CO₂ cylinders. The cylinders for use with this equipment are painted black and have black hand wheels. They contain liquid CO₂ which is evaporated by ambient heat picked up by the cylinders, so as to supply the equipment with CO₂ vapour. Cylinders having a grey hand wheel and a white stripe down the side must not be used because they will inject liquid CO₂ into the equipment, which will then be permanently damaged.

The regulator will be factory adjusted to deliver 1.5 bar to the controller and this is indicated on the controller gauge (777-104). The gauge on the regulator indicates cylinder pressure.

Change over valve 80-600-1111

The change over valve is situated between the first stage regulator and the controller. The valve enables the user to have a main and standby cylinder permanently connected.

CO₂ controller

The controller turns the CO₂ on and off with a 240v solenoid valve controlled from the TEC control system. The indicator tube shows the flow rate of CO₂ to the diffuser. The flow rate is controlled by adjusting the black knob at the bottom of the flow indicator. The gauge on top of the controller indicates delivery pressure. There are no user serviceable parts in this unit. A cable gland is provided at the bottom of the unit.

Diffuser Assembly

The CO₂ diffuser consists of a non return valve attached to a 316L stainless steel tube with a series of 1mm holes drilled in the side. The tube is plugged at its open end so that the gas is dispersed into the water via the holes.

Interconnecting pipework

All pipe work after the first stage regulator is run in Topline part No.723-286 piping. Only this piping should be used.

Consumption

Consumption rates vary dependant on a number of operating conditions. Experience indicates that commercial pools will use between one and three 22.6kg CO2 cylinders per week.

Installation

This equipment should be installed by Topline Electronics Ltd or a suitably qualified and competent engineer. The equipment should be connected per drawing 9662.

Bottles

The bottles are to be secured to a solid wall and chained into position.

First stage regulator

The first stage regulator should be fixed to the wall so that the gauge is in the vertical position. The first stage regulator should be close to the bottles so that the high pressure hose easily reaches the bottles with no kinking.

Change over valve

The change over valve is to be positioned between the first stage regulators so that the user can see which cylinder is connected.

CO2 Controller

The controller is to be mounted vertically in a clearly visible position with easy access enabling the flow to be seen and adjusted.

Diffuser

The diffuser is to be placed in the circulation system per the instruction for the TEC chemical dosing systems.

Interconnecting pipe work & wiring

All dosing pipe should be run in Topline pipe 723-286 in 20mm plastic conduit. Wiring should be run in a suitable conduit with wiring capable of supplying not less than 1amp.

Commissioning instructions

Attach full cylinders to both regulators making sure that the high pressure hose is connected properly with the seal ring in position. Check that the pipe work runs are tidy with no kinking or pinching and corners are taken in smooth arcs. Fully open the valves on top of each cylinder. Force the TEC controller to dose CO2 by raising the pH setpoint. Adjust the flow of CO2 to a mid point on the flow indicator using the knob at the bottom of the flow indicator on the CO2 control unit. Check for leaks using a proprietary leak detection device. Restore the original setpoint setting on the TEC controller The TEC control system will now be able to control the pH level in the pool.

Safety

Only properly trained personnel should operate and/or maintain this equipment. Personnel must keep clear of the vapour cloud caused when liquid CO2 is discharged. All areas where CO2 is discharged must be adequately ventilated. If the CO2 equipment is installed in a below ground area or an area where ventilation is poor, CO2 detection equipment must be installed.

Maintenance Safety

Before working on the CO2 system, the system must be shut down.

THIS IS AN ESSENTIAL SAFETY PRECAUTION.

To shut down the system close the cylinder valves and de-pressurise the system and isolate the electrical supply by using the circuit breaker on the front of the TEC control system.

Relief Valves

Pressure relief valves should be examined every 2 years according to the H&SE.

Sodium / Calcium Hypochlorite Installations

Carbon dioxide and control equipment must not be kept in an enclosed room with Sodium / Calcium Hypochlorite. If the two chemicals are in the same room then the room must be adequately ventilated.

12 monthly Service

This equipment requires a routine service by engineers that are competent and understand the risks in operation.

Health and Safety Warning

You must have available safety clothing, when you are mixing or using any chemicals, Always wear protective clothing when handling chemicals, it is imperative that eye protection is employed at all times.

Details of which clothing must be worn is given on the COSHH health data sheets.

You must have the safety data sheets for the chemicals you use on site, these are provided by your chemical supplier. Topline Electronics Ltd can not be held responsible for any accidents. Trained personnel should be the only people allowed access to chemical dosing systems.

CE Certificate Declaration of conformance

Manufacturer's Name Topline Electronics Ltd
Manufacturer's Address Unit 7, Crown Close
 Hailsham, E.Sussex
 England, BN27 3JF

Declares that the above product conforms to the following product specifications:

Low Voltage Directive 72/73 EEC

Electromagnetic Compatibility Directive 2004/108/EC

**Restriction of Hazardous Substances (RoSH)
Directive 2002/96/EC**

**Waste Electrical and Electronic Equipment (WEEE)
Directive 2002/95/EC**

CE marking.

I the undersigned, declare that the equipment above conforms to the above directives and carries the CE marking.

Manufacturer Topline Electronics Ltd

Signature on behalf of Topline Electronics Ltd *A. Hunt*

Date Feb.10th 2007

Risk Assessment

If the equipment is not operated by persons who are proficient in the operation of swimming pool plant, then there is a risk of:

1. Overdosing CO₂ into the swimming pool. If this occurs then users of the swimming pool may experience skin irritation, burns and respiratory problems.
2. Direct mixing of chlorine donor and CO₂ in the plant, will liberate chlorine gas which can kill.
3. Not maintaining adequate disinfection of the pool. If this occurs then bacteriological counts could exceed recommended levels.
4. Not maintaining recommended pH levels in the pool. If this occurs then users may experience skin irritation, burns and respiratory problems.
5. Operation of the controller with covers removed may result in electrocution.
6. Installing the system in an area where there is not adequate ventilation or CO₂ detection equipment could result in a CO₂ build up in the area.

Regulator

Instructions

Apen 1

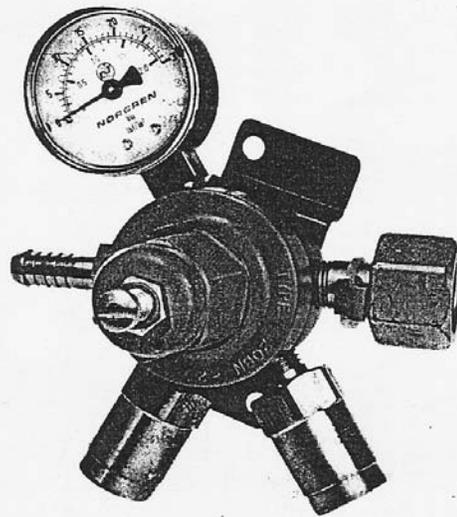
Form No. ENI CDPRVa 2/89

NORGREN Series 11-010 CARBON DIOXIDE PRIMARY REDUCING VALVES INSTALLATION AND OPERATIONAL NOTES

WARNING

Norgren CO₂ primary reducing valves are designed and tested for use on CO₂ gas at pressures up to 1 000 p.s.i.g. They are fitted with cylinder connectors that comply with BS 341, Part 1, connector number 8, and must not be used on other gases or with mixtures of gases at pressures in excess of 1 000 p.s.i.g. They should not be connected by adaptors, high pressure hoses or other means to cylinders with outlet connectors to BS 341, number 3.

Failure to comply with this instruction could result in making them unsuitable for dispense and in some circumstances could cause them to be dangerous.



GENERAL

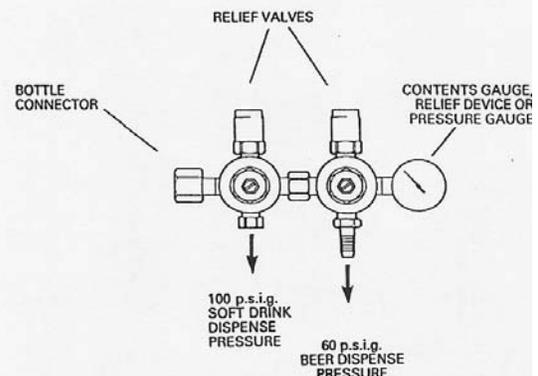
Norgren series 11-010 primary reducing valves meet the requirements of the codes of practice for the dispense of beers and soft drinks.

Specific configurations are available for either requirement.

The reducing valves are also available as Tandem Units (Fig 1) for supplying both beer and soft drink dispense systems from a single CO₂ source.

In this instance both reducing valves are supplied with gas at bottle pressure and either may be arranged to supply a particular service. Gas outlet pressures can be up to 60 or 100 p.s.i.g. The reducing valve set to 100 p.s.i.g. (soft drink) is always provided fitted with a white painted bonnet. A 'tamper-evident' sealing cover which must be fitted on installation is also supplied for use with this valve.

Fig 1 Suggested Tandem Configuration



Regulator

Open 1

INSTALLATION

Primary reducing valves may be connected directly to a gas cylinder or via a high pressure hose if they are to be wall mounted. Prior to connection it is recommended that the gas cylinders are 'snifted' by rapidly opening and closing the ON/OFF valve, to remove dust and moisture.

Once the downstream connection from a valve has been made the outlet pressure may be set. Ensure the adjusting screw is fully backed-off (turn anti-clockwise) before turning the gas supply ON. Pressure settings should be made under 'no flow' conditions by slowly increasing the outlet pressure to the desired level, (Visible on the outlet pressure gauge).

The outlet pressure is increased by turning the adjusting screw clockwise.

If it is not possible to isolate downstream systems, pressure should be increased to just below the desired level and should be slowly increased up to the final setting once the system flow has stopped. If by any chance the desired pressure level is exceeded, the adjusting screw should be backed off (anti-clockwise rotation) and the system pressure bled down. The reducing valve should then be reset.

Ideally pressure adjustment should be carried out on a cylinder that is less than half full, and the outlet pressure should never be set greater than 10 p.s.i.g. below the nominal setting of the relief devices.

Always install the gas cylinder and its associated reducing valve in an accessible location. Free access to the cylinder must be maintained at all times and detachable cylinder ON/OFF devices and connecting spanners stored where they are readily visible and accessible for instant use.

The reducing valve should be installed so that the pressure gauge is clearly visible and in a position where impact damage from kegs or crates cannot occur.

TANDEM UNITS

The outlet pressure on the 60 p.s.i.g. reducing valve is adjusted as given above.

Outlet pressures on the 100 p.s.i.g. (white bonnet) reducing valve may be set using a 1/8" socket wrench following the procedure given above. When set the 'tamper-evident' cap supplied with the valve should be fitted. To do this thread the wire through the hole in the top of the bonnet, pulling through until the lead seal is about 1/2" from the bonnet hole. Thread the wire through the hole in the cover (inside to out) and position the cover over the bonnet. Push the cover down onto the bonnet shoulder and thread the wire through the lead seal. Pull the wire tight and crimp the seal.

NOTE:

When setting outlet pressures the limited length of the adjusting screw will prevent the setting exceeding that laid down by the codes of practice or by individual breweries.

TECHNICAL SPECIFICATION

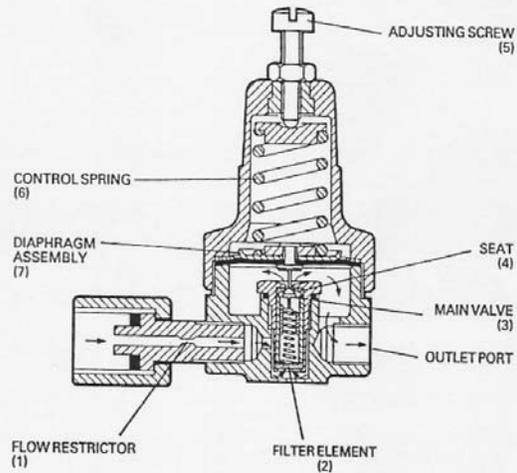
- a) Test Pressure: 3 300 p.s.i.g.
- b) Max. Inlet Pressure: 1 000 p.s.i.g.
- c) Max. Outlet Pressure: 60 and 120 p.s.i.g.
- d) Relief Valve Setting: 60 and 120 p.s.i.g. (or lower, specify when ordering)
- e) Secondary Pressure Gauge: 0-60 and 0-160 p.s.i.g.
- f) Outlet Connection: To customer specification
- g) Mounting: Wall or cylinder mounted
- h) High Pressure Hose: 1 metre (approx.) test pressure 7 500 p.s.i.g.
- i) Standards: Conforms to the recommendations of the brewery and soft drinks codes of practice.

OPERATION (Fig 2)

High pressure gas enters the valve via the cylinder connector. This incorporates a flow restrictor (1). The gas then passes through a 25µm filter element (2) and into the main valve (3). This is held on to the seat (4) making a gas tight seal. Rotation of the adjusting screw (5) exerts a load on the control spring (6) which causes the diaphragm assembly (7) to press on the main valve (4), moving it off its seat and permitting gas to flow and enter the plenum chamber beneath the diaphragm and out of the outlet port. As this pressure rises it creates a force on the diaphragm causing it to compress the control spring (6) until the pressure on the diaphragm equals the spring force. This permits the main valve (3) to re-seat and stops the gas flow.

Two relief devices are permanently connected to the valve body. Each is capable of exhausting a full gas cylinder without the downstream pressure exceeding ten percent of the relief device set pressure.

Fig 2



(Series 11-010)

Regulator

Instructions

Apenz

Form No. ENI 125 7/81

80 SERIES CO₂ PRESSURE REDUCING SYSTEM
 INSTALLATION AND MAINTENANCE

GENERAL

RING MAIN SYSTEMS

- (A) Primary Reducing Valves**
To reduce bottled gas pressure to the required level. Not in excess of 60 p.s.i.g.
- (B) Changeover Isolating Valve**
Allows the ring main to be supplied from two Primary Reducing Valves, one on service and the other on stand-by. It can, if required, isolate the ring main gas supply.
- (C) Secondary Reducing Valves**
Provide the correct dispense pressure on the keg from the ring main pressure.

DIRECT CONNECTION

- (A) Primary Reducing Valves**
To control bottled gas pressures directly to dispense pressures for 'under counter' type dispense requirements.

All pressure reducing equipment meets the requirements laid down in the code of practice for the dispense of beer by pressure systems in licensed premises (February 1974) and are colour coded to indicate date that inspection is required.

INSTALLATION

The installation and adjustment of pressure controlling equipment can only be undertaken by an authorized person (as detailed in code of practice G-5-2)

PRIMARY REDUCING MODULE

When despatched from the factory the Primary Reducing Module is a complete assembly ready for installation. For ring main installations the module should be screwed to the wall or other suitable fixture with the screws provided. Connection to the gas bottle should be made either with a suitable high pressure hose or directly to the gas bottle. The module can be fitted either vertically or horizontally.

To adjust the output pressure slacken off the locknut (1) and rotate the adjusting screw (2) anti-clockwise. Turn on the CO₂ and rotate the adjusting screw clockwise until the required output pressure is obtained. Lock this setting by means of the locknut.

Fit the tamperproof cover (3) and secure in position with wire (4) to the backing ring (5). Fit the lead seal (7).

Note: The Primary Reducing Module includes relief devices (6). These are factory set and require no attention.

The tamperproof cover must be correctly fitted and sealed in all instances. It must remain in place at all times.

SECONDARY REDUCING MODULE

When despatched from the factory the Secondary Reducing Module is a complete assembly ready for installation. It should be screwed to the wall or other suitable fixture with the screws provided and can be fitted either vertically or horizontally. Module design allows ring main pressure to pass through the unit, they can therefore be piped directly into the ring main in series by connections to the ports marked H.P. The outlet connection is made to the port marked L.P. Modules supplied with secondary pressure gauging facility should have the appropriate equipment fitted into the 1/8" B.S.P. port on the outlet leg of the module (Detail 'X').

The integral on/off slide valve (11) controls pressure supply to the actual secondary reducing valve, and from the reducing valve outlet, is stopped thus preventing the flow of gas when changing kegs.

To adjust the output pressure slacken off the locknut (9), rotate adjusting screw (8) anti-clockwise and slide on/off valve to the 'on' position. Rotate adjusting screw clockwise until required dispense pressure is obtained then lock this setting with the locknut. Fit the tamperproof cover (14) and secure in position with wire (13) through the tabs on the backing ring (12) and tabs on the cover. Fit the lead seal (10).

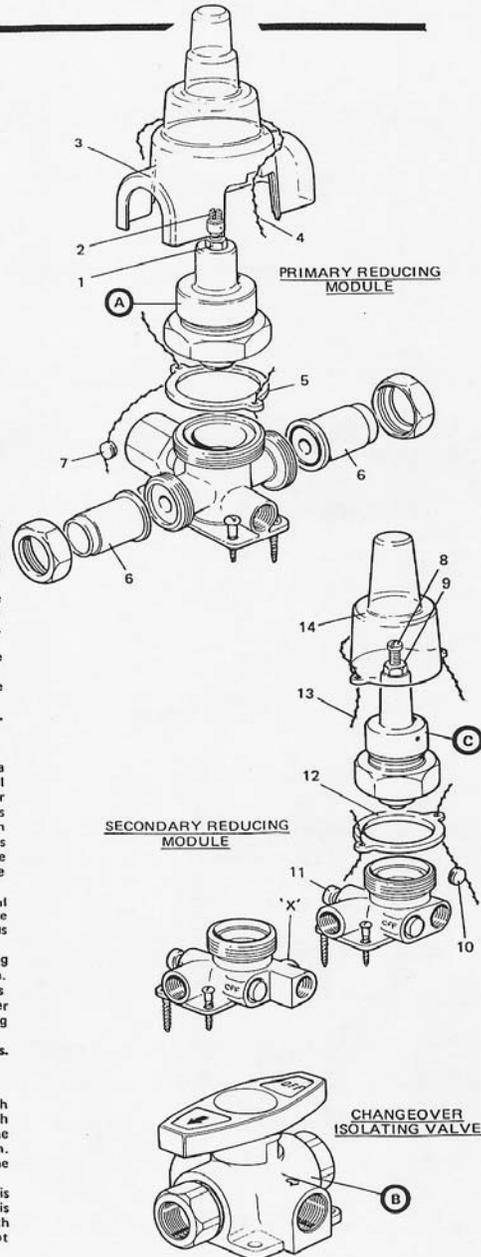
The tamperproof cover must be correctly fitted and sealed in all instances. It must remain in place at all times.

CHANGEOVER ISOLATING VALVE

The Changeover Isolating Valve is incorporated into installations which utilise the two gas cylinder system. The outlet from each of the two high pressure modules are connected to the two opposite ports on the unit. The port on the unit identified by an arrow is for connection to the ring main. The changeover valve is secured to a suitable fixture by means of the screws provided.

The arrow on the 'Tee' handle of the unit indicates which bottle supply is on service. A 180° turn of the handle will change the gas supply from this bottle to the stand-by bottle. A 90° turn of the handle will isolate both supplies and this position should be selected when gas supply is not required or for maintenance purposes on the ring main.

Note: Changeover Valves must not be connected directly to high pressure



Regulator

MAINTENANCE

Open

The 80 Range is specifically designed to eliminate any form of 'in trade' maintenance. All items requiring 5 yearly inspection as indicated in the code of practice are easily removed from their sub-base.

PRIMARY REDUCING VALVE

Removal

1. Shut off gas supply and disconnect module from gas cylinder.
2. If isolating valve is incorporated, isolate the Reducing Valve Module.
3. Remove plastic cover (3).
4. Slacken off locknut (1) and rotate adjusting screw (2) fully anti-clockwise.
5. Slacken off hexagonal clamp ring (15) at base of Reducing Valve (16) and withdraw unit from sub-base.

Replacement

1. Ensure that internal bores of module are clean.
2. Ensure that both 'O' rings are in position on base of Reducing Valve.
3. Insert Reducing Valve into sub-base (19).
4. Rotate clamp ring clockwise and tighten to 5-10 lbf ft.
5. Reconnect gas supply. Set regulator pressure. Check position of Isolating Valve.
6. Replace tamperproof cover.

RELIEF DEVICES

REMOVAL

1. Remove tamperproof cover (3)
2. If Isolating Valve is incorporated, isolate Reducing Valve Module.
3. Slacken off locknut (1) and rotate adjusting screw (2) fully anti-clockwise.
4. Slacken off clamp ring (17) at base of Relief Valve (6) and remove Relief Valve.

Replacement

1. Ensure that sealing face on Module is clean.
2. Ensure 'O' ring seal (18) is in position.
3. Secure Relief Valve by rotating clamp ring clockwise and tighten to 5-10 lbf ft.
4. Replace tamperproof cover.

SECONDARY REDUCING VALVE

Removal

1. Close integral on/off valve (11).
2. Remove tamperproof cover (14).
3. Loosen locknut (9) and rotate adjusting screw (8) anti-clockwise.
4. Slacken clamp ring (22) at base of Reducing Valve and withdraw unit.

Replacement

1. Ensure that internal bores of module are clean.
2. Ensure that both 'O' rings are in position on base of Reducing Valve.
3. Insert Reducing Valve into sub-base (21).
4. Rotate clamp ring clockwise and tighten to 5-10 lbf ft.
5. Slide on/off valve to 'on' position.
6. Set regulator pressure.
7. Replace tamperproof cover.

PARTS

PRIMARY MODULE ASSEMBLY	80-7XX-551
Comprising:	
3 Tamperproof Cover	6236-89
5 Backing Ring	6237-01
6 Relief Valve (incl. 'O' ring 18)	80-5XX-100
7 Locking Wire and Seal	18-999-196
16 Primary Reducing Valve*	80-100-000
19 Primary Sub-base Kit	80-302-001
SECONDARY MODULE ASSEMBLY	80-8XX-001
Comprising:	
10 Locking Wire and Seal	18-999-178
12 Backing Ring	1581-93
14 Tamperproof Cover	1581-94
21 Secondary Sub-base Assembly	80-401-001
23 Secondary Reducing Valve*	80-200-000
CHANGEOVER ISOLATING VALVE	80-600-001
*Reducing Valve complete with tamperproofing items	
16 Primary Reducing Valve	80-1XX-551
23 Secondary Reducing Valve	80-2XX-000

