BECSys CO_2

Operation & Maintenance Manual

BECS TECHNOLOGY

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Unpacking

Your Shipping package should contain these items:

A. The BECSys CO_2 Feeder
B. Optional Diffuser Kit
C. Optional Eductor Kit
D. This manual (not shown)

A B C

General Guidelines

Proper installation and use of the BECSys controller depends on the specific needs of the application. Read the manual completely before starting the installation and ensure all guidelines and recommendations are followed. All components should be mounted and the controller plumbing installed and pressure tested before wiring the controller. Ensure compliance with all applicable plumbing and electrical codes during the installation as well.

Environmental Conditions

The BECSys CO_2 Feeder is housed in a NEMA 4X (IP65) enclosure. It should not be used in explosive environments. The BECSys CO_2 Feeder should be mounted so that adequate ventilation is provided around the enclosure, preventing general environmental specifications from being exceeded (see table below).

Environmental Specifications	
Specification	**Rating**
Storage Temperature	-30 to 60 Deg C
Ambient Operating Temperature	-20 to 50 Deg C
Ambient Humidity	95% non condensing maximum humidity

Electrical Specifications

The BECSys CO_2 Feeder may be ordered in either an 115VAC model or a 230VAC model. Following are the electrical specifications for each model:

115VAC Model:

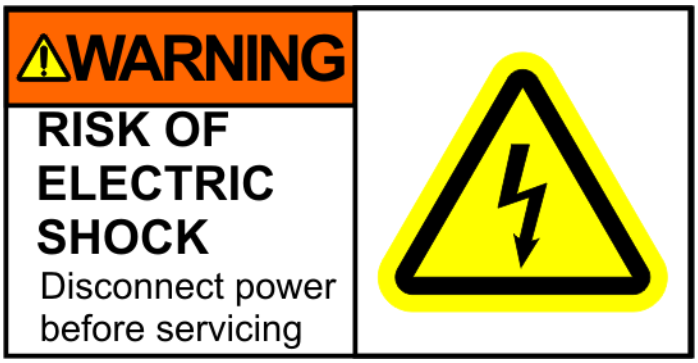
Voltage:	115VAC 50/60Hz
Phase:	Single
Current:	0.1 Amp Full Load

230VAC Model:

Voltage:	230VAC 50/60Hz
Phase:	Single
Current:	0.2 Amp Full Load

Warnings

Pay particular attention to the following warnings encountered in the pages of the BECSys CO_2 Feed System Installation and Technical Manual:



Warning: Various other warnings may be found throughout the manual text.

Section A: Installing the BECSys CO_2 Feeder

A – 1: BECSys CO_2 Feeder Location

The BECSys CO_2 Feed System and BECSys chemistry controller should be mounted in a location that is free from chemical fumes and excessive heat, isolated from electrical interference, and near a power source protected by a ground fault interrupter. The BECSys CO_2 Feed System requires a CO_2 cylinder and regulator. The CO_2 cylinder should be located within several feet of where the BECSys CO2 Feeder will be mounted. The BECSys CO_2 Feed System is equipped with a 6-foot power cord. The BECSys CO_2 Feeder should be mounted close enough to the BECSys chemistry controller so that its power cord may be plugged into the pH feed output. The BECSys CO_2 Feeder should also be mounted within 6-8 feet of the point of gas injection. A 10-foot length of tubing is supplied but several feet will be used to connect the CO_2 cylinder and regulator to the BECSys CO_2 Feeder.

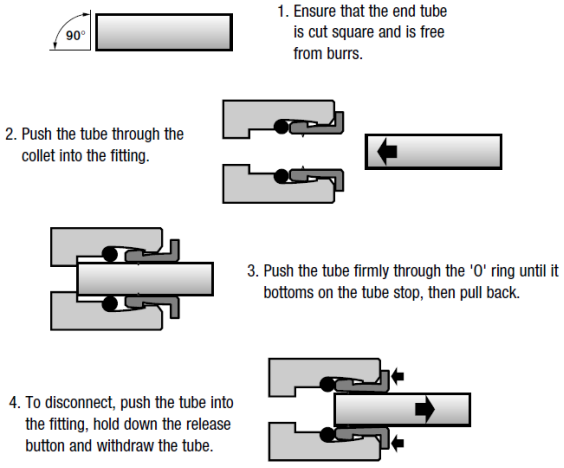
A – 2: Mounting the BECSys CO_2 Feeder

The BECSys CO_2 enclosure should be mounted to the wall with four anchor bolts, one installed in each corner of the enclosure base. To mount the BECSys CO_2 Feeder properly, please use the included mounting template and hardware. Drill the holes for the anchors using a 3/16" drill bit. Install the anchors in the wall. Remove the lid from the unit and place the included screws in the four corners of the box. Attach the screws into the anchors. The BECSys CO_2 Feeder and BECSys chemistry controller have NEMA4 weather resistant enclosures but should still be protected if mounted outdoors.

A – 3: BECSys CO_2 Feeder Connections

Plug the BECSys CO_2 Feeder power cord into the BECSys chemistry controller pH feed output. The BECSys chemistry controller pH feed output must be wired to a NEMA 5-15 receptacle. Connect a section of 3/8" polyethylene tubing from the CO_2 cylinder pressure regulator to the IN port of the BECSys CO_2 Feeder. The BECSys CO_2 Feeder is equipped with push to connect fittings, see the assembly instructions below.

Method of assembly



Section B: Eductor Installation

B – 1: Taping the Fittings

When assembling the eductor, first open the bag of eductor fittings and wrap each fitting three times around clockwise with Teflon tape. Do not use pipe joint compound on these threads.

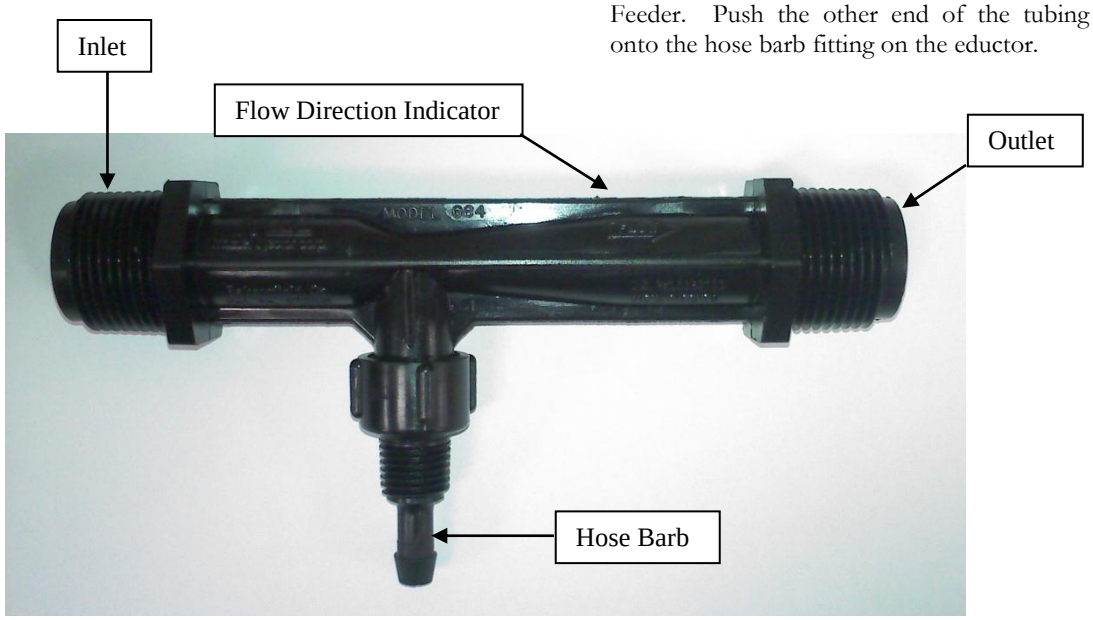
B – 2: Eductor Location

The following are considerations as to where and how the eductor should be installed:

1. The BECSys CO_2 Feeder and regulator should already be mounted and ready to use.
2. The BECSys CO_2 Feeder should be within 6 to 8 feet of the point of gas injection.
3. A side stream should be established with a consistent positive differential in pressure of at least 5 PSI. If this cannot be accomplished, a booster pump may be needed. (Booster pump should be able to deliver 30 PSI at 8.5 GPM.)
4. The output of the eductor side stream should be in the recirculation pipe at a point downstream of the pool heater.
5. The input of the eductor side stream should be installed just after the recirculation pump.

B – 3: Eductor Connections

1. Drill and tap a 3/4 NPT hole in the discharge pipe between the recirculation pump and filter. The water inlet side of the eductor should be installed here. It is recommended that a valve, no smaller than 1/2 NPT, should be installed before the eductor to allow the eductor to be cleaned or serviced. The eductor kit includes a reducer coupling and 1/2 NPT nipple.
2. Drill and tap a 1/2 NPT hole in the recirculation pipe downstream of the pool heater. The 5/8" tube fitting (included) should be installed here. If a valve was used before the eductor, another should be used here.
3. A reducer coupling and 5/8" tube fitting (included) should be attached to the water outlet side of the eductor.
4. Use all 15 feet of the 5/8" polyethylene tubing to connect the water outlet of the eductor to the tube fitting in the recirculation pipe. Using the whole length of tubing will allow the CO_2 more time to mix with the water and will result in a more efficient use of CO_2. Run the tubing as straight as possible to allow for more flow and less of a pressure drop (i.e. do not coil the excess tubing).
5. Connect one end of the 3/8" polyethylene tubing to the OUT port of the BECSys CO_2 Feeder. Push the other end of the tubing onto the hose barb fitting on the eductor.



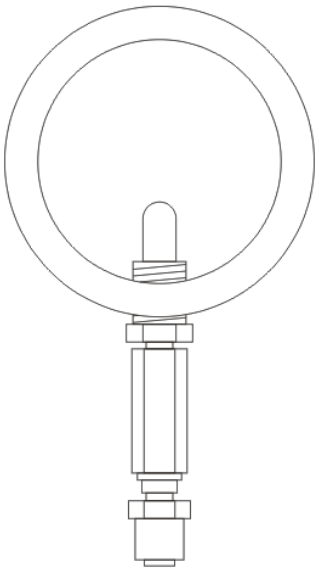
Section C: Diffuser Installation

C – 1: Taping the Fittings

Wrap the diffuser fitting three times around clockwise with Teflon tape. Do not use pipe joint compound on this thread.

C – 2: Diffuser Location

The diffuser assembly must be located in the recirculation pipe downstream of the pool heater. The BECSys CO_2 Feeder should be within 6 to 8 feet of the point of gas injection. The recommended method of mounting is from the bottom of a horizontal pipe as shown below.



C – 3: Diffuser Connections

1. Drill and tap a 1/2 NPT hole in the recirculation pipe downstream of the pool heater. The diffuser assembly should be installed here. The diffuser assembly contains a check valve to allow disconnecting the tubing without disrupting the flow of water in the recirculation pipe. A separate valve is not necessary. The diffuser must be in the flow of water.
2. Connect one end of the 3/8" polyethylene tubing to the OUT port of the BECSys CO_2 Feeder.
3. Connect the other end of the tubing to the push to connect fitting of the diffuser assembly.

Section D: Start-up

Warning: CO_2 pressures above 100 PSIG will damage the BECSys CO_2 Feed System and may result in injury to anyone nearby.

D – 1: Installation Check

Double check all connections making sure they are tight.

Warning: Eye protection should be worn during the following procedure.

D – 2: CO_2 Cylinder

1. Turn the adjustment knob on CO_2 cylinder pressure regulator counterclockwise until no tension is felt. This will set the regulator pressure output to zero.
2. Fully open the CO_2 cylinder shut off valve. The regulator input pressure gauge should show about 800 to 1000 PSI.
3. Adjust the regulator output to 40 to 60 PSI.

D – 3: BECSys CO_2 Setting

1. Turn the Rate of Flow adjustment knob on the BECSys CO_2 Feeder clockwise until it stops. This will set the rate of flow to zero.
2. Energize the valve of the BECSys CO_2 Feeder by switching the BECSys chemistry controller to manual or by lowering the setpoint.
3. Adjust the Rate of Flow knob on the BECSys CO_2 Feeder counterclockwise until the flowmeter shows a rate of approximately 15 SCFH (Standard Cubic Feet per Hour).
4. Reset the BECSys chemistry controller to automatic control, or return the setpoint to the normal setting.
5. Once the system is in automatic control, the rate of flow can adjusted to maintain the desired pH level.

Section E: Troubleshooting

E – 1: No CO_2 Feed

E – 1.1: BECSys CO_2 Feeder valve is not opening

1. Check the operation of the valve. The valve makes a noticeable click when it is energized. Depending on the sound level of the area, it may help to remove the BECSys CO_2 Feeder lid as the enclosure will muffle the sound.

E – 1.2: Controller malfunction

1. Check the BECSys chemistry controller. Make sure the relay is energized and supplying the proper voltage to the BECSys CO_2 Feeder (115VAC or 230VAC depending on model).

E – 1.3: CO_2 cylinder exhausted

1. Replace or refill the cylinder.

E – 1.4: Rate of Flow adjustment turned down

1. Make sure adjustment knob is not turned fully clockwise stopping CO_2 flow.

E – 2: Low CO_2 Flow Rate

E – 2.1: CO2 cylinder is nearly exhausted

1. Replace or refill CO_2 cylinder.

E – 2.2: Injector clogged

1. Clean or replace injector.

E – 3: Too much CO2 is going into pool

E – 3.1: BECSys CO_2 Feeder valve is not closing

1. Check the operation of the valve. Make sure it is not stuck open.

E – 3.2: Rate of Flow adjustment is too high

1. Turn the Rate of Flow adjustment knob clockwise to decrease the rate of flow.

E – 3.3: Pressure regulator is set too high

1. The CO_2 cylinder pressure should be set to 40 to 60 PSI.

E – 4: CO2 Use is Higher Than Normal

E – 4.1: CO_2 leak

1. Check for leaks around the CO_2 cylinder, pressure regulator, tubing, or tube fittings.

E – 5: BECSys Chemistry Controller Feed Alarm (Continuous CO_2 Feed)

E – 5.1: CO_2 flow rate set too low

1. Increase flow rate. Turn the Rate of Flow knob on the BECSys CO_2 Feeder counter-clockwise to increase flow.

E – 5.2: Maximum CO_2 flow rate is not sufficient to reach desired setpoint

1. Use muriatic acid to lower total alkalinity, bring calcium hardness up.

E – 5.3: BECSys chemistry controller is out of standardization

1. Standardize the BECSys chemistry controller.

E – 5.4: Defective pH Probe

1. Clean or replace the pH probe.

E – 5.5: Not enough flow through the eductor

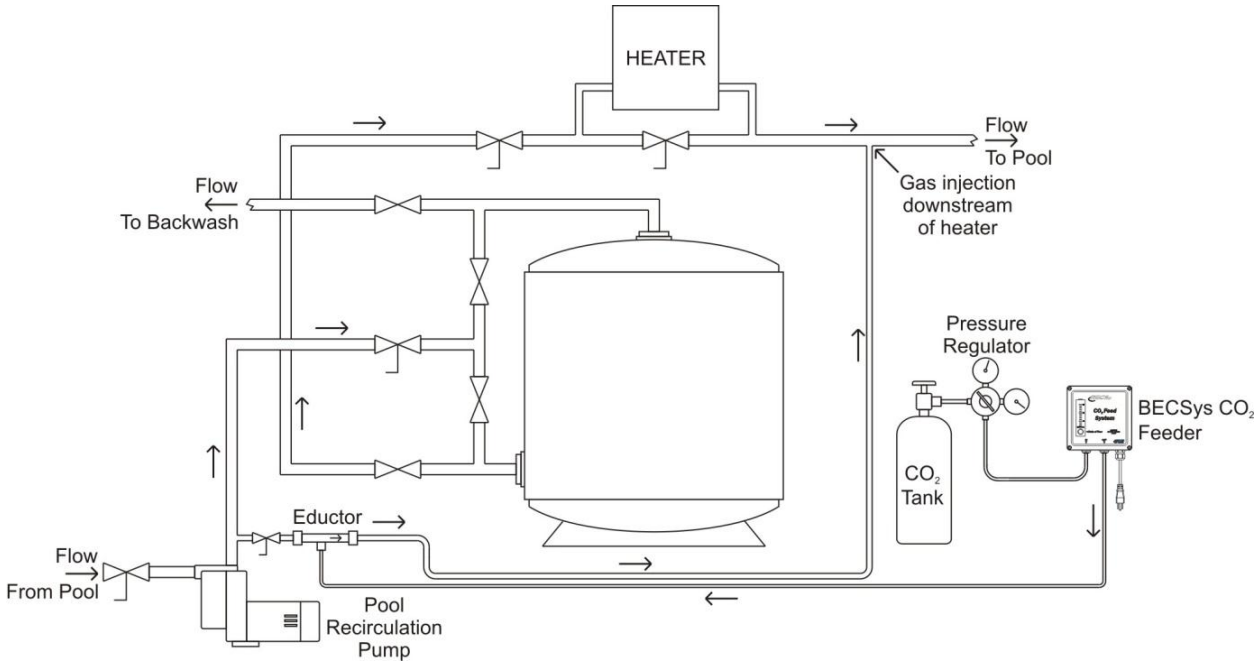
1. Check and if necessary increase the pressure differential across the eductor. The pressure differential should be at least 5 PSI.

Section F: Maintenance

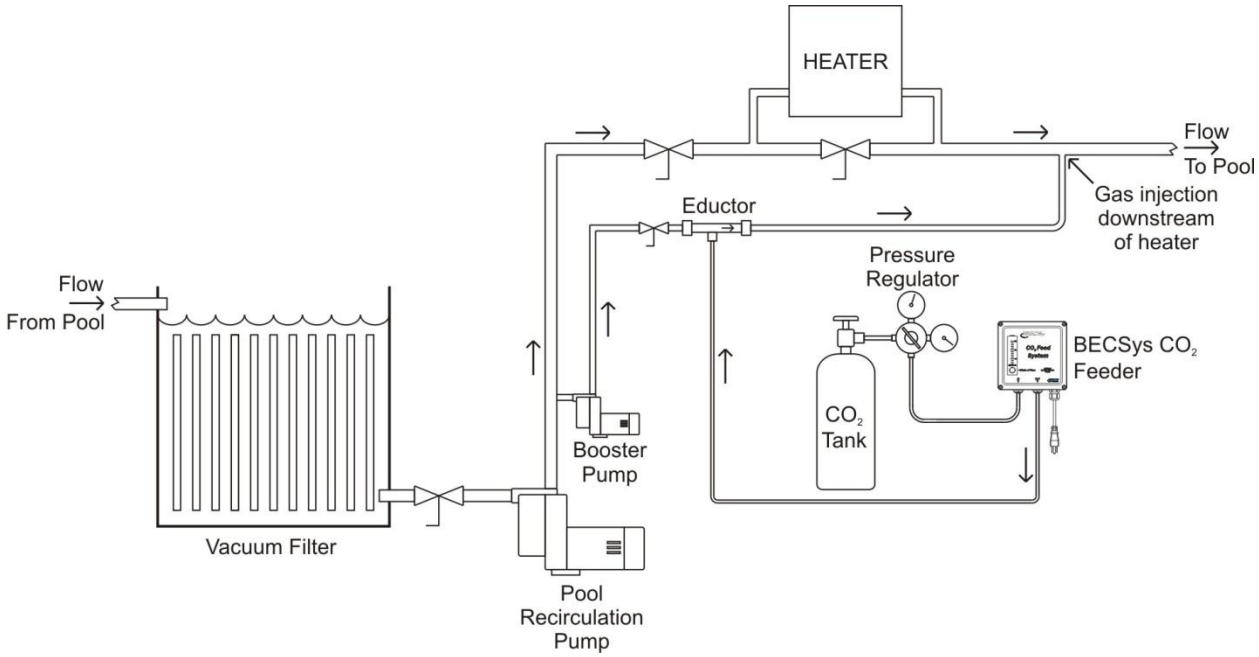
The BECSys CO_2 Feed System requires no maintenance other than a periodic rate of flow check and CO_2 cylinder refill.

Section G: Installation Diagrams

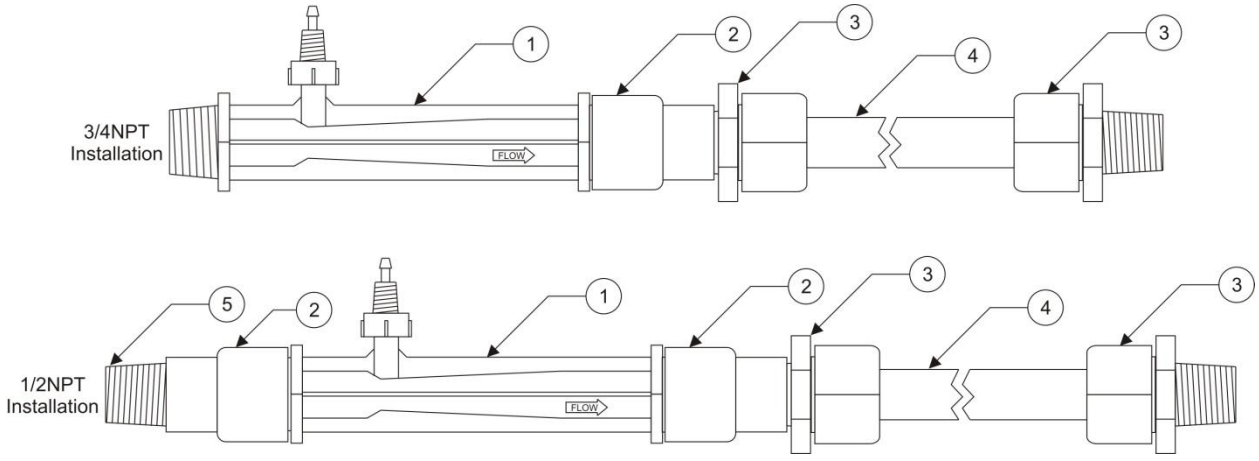
G – 1: Pressure Filter Installation



G – 2: Vacuum Filter Installation

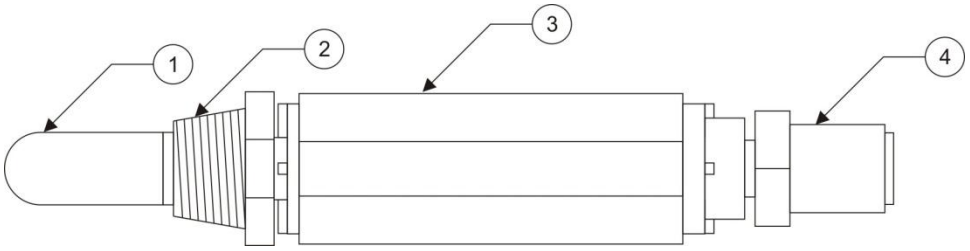


G – 3: Eductor Assembly



Eductor Assembly		
Item	Part Number	Description
1	8060795	Eductor
2	8060796	3/4NPT x 1/2NPT Reducer Coupling
3	8060797	Compression Fitting, 1/2NPT x 5/8 Tube
4	8060802	5/8 OD Tubing, 15ft,
5	8060541	Pipe Nipple, 1/2NPT x Close

G – 4: Diffuser Assembly



Diffuser Assembly		
Item	Part Number	Description
1	8060794	Diffuser
2	2220353	Diffuser Bushing
3	8060792	Check Valve, 1/4NPT
4	8060757	1/4NPT Straight Adapter, 3/8 Tube

Section H: Replacement Parts

BECSys CO_2 Feeder	
Valves	
2210306	Valve, 115VAC
2210309	Valve, 230VAC
Flowmeters	
8060752	Flowmeter, 4-30SCFH
8060753	Flowmeter, 20-200SCFH
Push to Connect Fittings	
8060788	Bulkhead Union, 3/8 Tube
8060789	Stem Adapter, 3/8 Tube
8060790	3/8NPT Elbow Adapter, 3/8 Tube
8060791	1/8NPT Straight Adapter, 3/8 Tube
Fasteners	
8060168	10-32x3/8 Machine Screw, Flowmeter
8060204	#10 Split Lock Washer, Flowmeter
8060787	10-24x3/8 SEMS Machine Screw, Valve
8060799	10-24 KEPS Nut, Valve mounting Panel

Injectors	
Diffuser	
2220353	Diffuser Bushing
8060757	1/4NPT Straight Adapter, 3/8 Tube
8060792	Check Valve, 1/4NPT
8060794	Diffuser
8060801	3/8 OD Tubing, 10ft.
Eductor	
8060541	Pipe Nipple, 1/2NPT x Close
8060795	Eductor
8060796	3/4NPT x 1/2NPT Reducer Coupling
8060797	Compression Fitting, 1/2NPT x 5/8 Tube
8060801	3/8 OD Tubing, 10ft.
8060802	5/8 OD Tubing, 15ft,

Documentation	
8620055	BECSys CO_2 Operation & Maintenance Manual

Section I: Warranty

LIMITED WARRANTY

BECS warrants this product against any defect in workmanship or materials for a period of one year from the date of shipment. In the event of a component failure due to any defect in workmanship or materials, BECS will repair, or if repair is not possible, replace the defective part or parts of the BECSys controller.

BECS will have the sole right to determine whether to repair or replace a product. BECS will not be responsible for any expense associated with installation of repaired or replacement parts.

LIMITATIONS AND EXCLUSIONS

This is a LIMITED WARRANTY. BECS makes NO WARRANTIES other than those contained herein. The LIMITED WARRANTY replaces and is in lieu of any WARRANTIES of MERCHANTABILITY or of FITNESS FOR A PARTICULAR PURPOSE which are expressly DISCLAIMED. All GENERAL, SPECIAL, INDIRECT, INCIDENTAL AND/OR CONSEQUENTIAL DAMAGES ARE EXCLUDED AND DISCLAIMED.

This Limited Warranty is governed by Missouri Law and all disputes related to or arising from this transaction or Limited Warranty shall be resolved in Circuit Court of St. Louis County, Missouri.

Any claims under this Limited Warranty must be brought within ONE YEAR after the cause of action accrued.

BECS TECHNOLOGY has been designing and manufacturing the industry's most reliable water chemistry controller for over 20 years. Our 24,000 ft^2 facility in Saint Louis, Missouri is home to an exceptional design team, and all manufacturing is performed onsite at this facility where we can personally assure the quality of our products. The BECS commitment to excellence drives the most innovative new products and unparalleled customer service.

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