



**CS-425-01 Controlled Dissolved Gas assembly
with optional CS-603-01 Air Aspirator assembly**

Installation and Operation information

Serial # CS-XXX

Date of shipment: _____, 2005

Purchase order #: xxxxxxxx

Shipped to: _____

Attention: _____

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General, but important information (CS-425-01 with optional CS-603-01)

First, it is very important that all of the following instructions and support documentation is read and understood prior to installation and use. Failure to follow the System Commissioning instructions will affect performance, shorten the life of the de-gasification cells and void OEM warranties. If there are any questions regarding operation or use, contact Custom Fab Solutions prior to taking action.

The CS-425-01 / CS-603-01 Controlled Dissolved Gas assembly does not include a dissolved oxygen meter to measure the dissolved oxygen in DI water. See page 4 for ordering information.

Important information. Prior to installing the two (2) DI water filter elements and the two (2) de-gasification cells on the CS-425-01 assembly it is very important that the system is flushed with DI water as outlined in the System Commissioning section of this document. Failure to follow these instructions will dramatically decrease the life of the de-gasification cells, with pre-mature failure very likely, and void the manufacturers' warranty.

Consumables may be ordered directly from Custom Fab Solutions or from the original manufacturer. OEM documentation on the components used to manufacture the CS-425-01 and the CS-603-01 products is included in section 5 of the manual. This is important information and should be read, understood and followed before use.

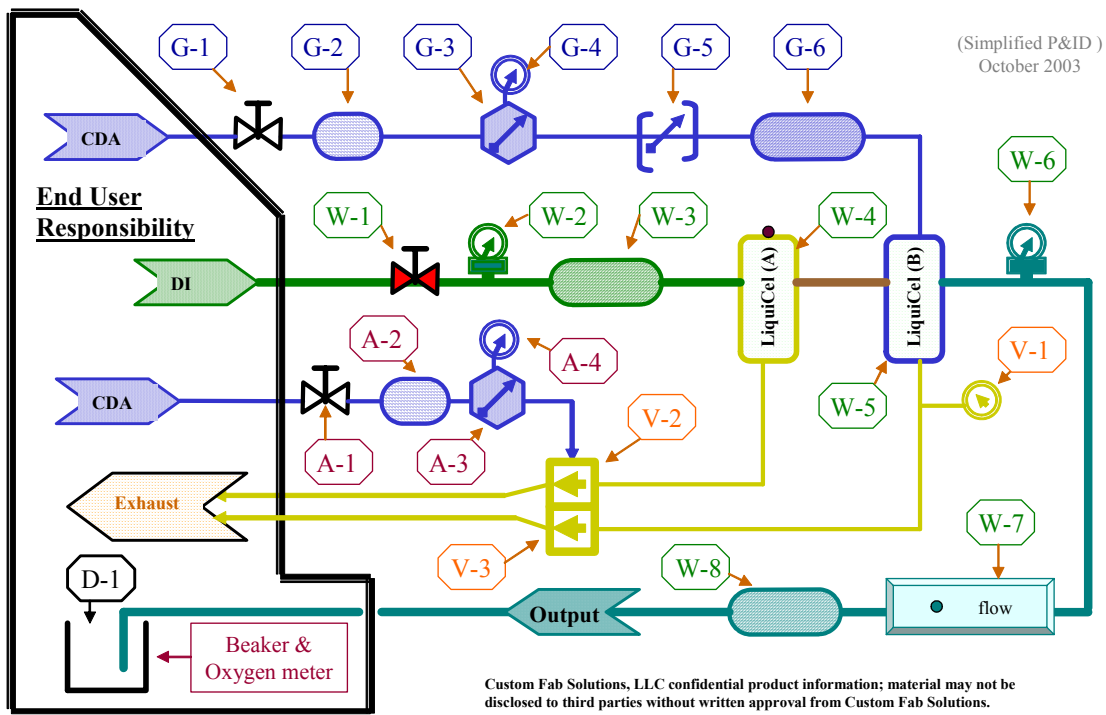
Thank you for selecting the CS-425-01/CS-603-01 products and your interest in Custom Fab Solutions. Feel free to contact us if we can be of any further service to you. The company web site is located at www.customfabsolutions.com.

System Configuration check list:

Model CS-425-01 Controlled dissolved gas assembly including:			
Label	Qty.	Description	Ordered
	1 ea.	304 Stainless Steel Component mounting frame; electro-polished	√
	1 ea.	8 feet of ½” PFA tubing for DI water source connection	√
W-1	1 ea.	PFA On/Off valve; ¼ turn	√
W-2	1 ea.	Gauge isolator with pressure gauge for DI water	√
W-3	1 ea.	Polypropylene (5”) filter housing; 0.1 element included	● √
	1 ea.	Polypropylene filter housing wrench	√
W-4	1 ea.	Liqui-Cel® model G420 (includes ready to install plumbing package)	● √
W-5	1 ea.	Liqui-Cel® model G420 (includes ready to install plumbing package)	● √
W-6	1 ea.	Gauge isolator with pressure gauge for DI water	√
W-7	1 ea.	DI water flow meter	√
W-8	1 ea.	PFA (5”) filter housing; 0.05 element included	● √
	1 ea.	16 feet of ¼” outlet tubing; PFA	√
G-1	1 ea.	Gas On/Off valve; ¼ turn	√
G-2	1 ea.	Gas filter housing; 0.3 filter element included	√
G-3	1 ea.	Gas regulator	√
G-4	1 ea.	15 psi gauge	√
G-5	1 ea.	Gas flow meter	√
G-6	1 ea.	0.003 disposable (in-line) gas filter	√
V-1	1 ea.	0 – 30” Hg vacuum gauge	√
	1 ea.	Vacuum interface with 3/8” ID vinyl tubing	√
	●	Liqui-Cel(s) and the DI water filter elements are supplied un-installed; as received from the OEM supplier.	√
Model CS-603-01 Air Aspirator assembly including:			
	1 ea.	304 Stainless Steel Component mounting frame; electro-polished	√
A-1	1 ea.	Gas On/Off valve; ¼ turn	√
A-2	1 ea.	Gas filter housing; 5 micron filter element included	√
A-3	1 ea.	Gas regulator	√
A-4	1 ea.	100 psi gauge	√
V-2	1 ea.	PIAB air aspirator with vacuum gauge and muffler	√
V-3	1 ea.	PIAB air aspirator with vacuum gauge and muffler	√
	1 ea.	12 feet of 2” flexible, wire re-enforced PVC tubing	√

Consumables & Accessories				
W-3	1 ea.	0.1 micron DI water (5") filter element	(Pall; P/N VFSG100-04M3V)	
W-8	1 ea.	0.05 micron DI water (5") filter element	(Pall; P/N VFSG050-04M3F)	
G-2	1 ea.	0.3 CDA pre filter element	(SMC; P/N 630611)	
G-6	1 ea.	0.003 disposable gas filter	(Pall; P/N GDF6406E5)	
W-4	1 ea.	Liqui-Cel	(Liqui-Cel; P/N G420)	
W-5	1 ea.	Liqui-Cel	(Liqui-Cel; P/N G420)	
	1 ea.	PFA filter housing wrench		√
Dissolved oxygen meter information				
Label	Qty.	Description	Manufacturer	Part #
D-1	1 ea.	OxyGuard® Handy Alpha (ppm / % saturation)	OxyGuard	Alpha
		Or		
D-1	1 ea.	OxyGuard® Handy Beta (ppm / % saturation / temp / display)	OxyGuard	Beta

Model CS-425-01 Controlled Dissolved Gas assembly with optional CS-603-01 Air Aspirator assembly



Installation information

- Mount the CS-603-01 aspirator assembly to the CS-425-01 frame using the three (3) ¼ -20 screws supplied with the air aspirator assembly. See the CS-425 / CS-603 installation drawing and **CS-603-01 ref. photos 1, 4 and 5 of 9** for further detail.
- Installation note. Each installation is unique and different and the CS-425-01 assembly should only be installed by a qualified technician. Installation further assumes the technician installing the system is competent in general plumbing practices and procedures.
- Mount the CS-425-01 frame to a wall or a surface capable of supporting the weight (approximately 50 lbs.) of the assembly utilizing the pre-drilled 3/8” mounting holes on the top and the bottom of the frame. It is recommended that a minimum of four (4) bolts and/or lag bolts, two (2) on the top and two (2) on the bottom, are used to secure the system. See CS-425 with optional CS-603 Installation Drawing (Section 1 in this manual) for dimensional detail. Custom Fab Solutions suggests the CS-425-01/CS-603-01 assembly be located in close proximity (12 feet or less) from the “sink” (use) area.
- Mount the assembly in a suitable area where controls and gauges are accessible, **visible** and protected. **(Note, clear visibility of V1 is critical to operation/controlling dissolved oxygen.)**

After Mounting:

- Remove the ½” PFA Nut and the PFA cap from valve W-1. Discard the sealing cap and slide the nut on to the ½” PFA tubing. Hand tighten the nut to the fitting on W-1. Cut excess tubing to length and connect to the DI water source.
 - See ½” DI inlet capped and ½” DI inlet connection photos, **photo’s 7 and 8 of 16** for further detail.
- Remove the ¼” PFA Nut and the PFA cap from filter W-8. Discard the sealing cap and slide the nut on to the ¼” PFA tubing. Hand tighten the nut to the fitting on W-8. Direct the outlet tubing to the designated sink; secure tubing as necessary.
 - See ¼” DI outlet connection **photo 9 of 16** for further detail.
- Remove and discard the ¼” plastic pipe plug from G-1. Connect to CDA.
 - See Gas Input **photo 12 of 16** for further detail.
- Remove and discard the ¼” plastic pipe plug from A-1. Connect to CDA; **90 psig min.**
 - See **CS-603-01 ref. photo 7 of 9** for further detail.
- Attach PVC flanges and mufflers to the air aspirators V2 and V3.
 - See **CS-603-01 ref. photos 2 and 3 of 9** for further detail.

System commissioning

SYSTEM FLUSHING --- The DI water plumbing must be thoroughly flushed with DI water before use! Failure to flush the system will result in pre-mature failure of the LiquiCel contactors and void the manufacturers' warranty.

Do not install the filter elements or the LiquiCel's at this time.

The following instructions assume:

- a) the CS-603-01 is attached to the CS-425-01 frame.
- b) the DI water input is plumbed and valve W-1 is closed.
- c) CDA is plumbed to G-1 and the valve is closed.
- d) CDA is plumbed to valve A-1 (90 psig minimum pressure) and valve is closed.
- e) the DI water output from W-8 (1/4" PFA tubing) has been plumbed to the designated sink (use) area and the tubing has been secured.
- f) both filter housings, W-3 & W-8 are installed and hand tightened.
- g) the "Flushing tubing" is connected between the W-3 filter housing and the W-6 DI water pressure gauge. See the Flushing tube [photo 10 of 16](#) for details.

Assuming the above is satisfied proceed with the following steps:

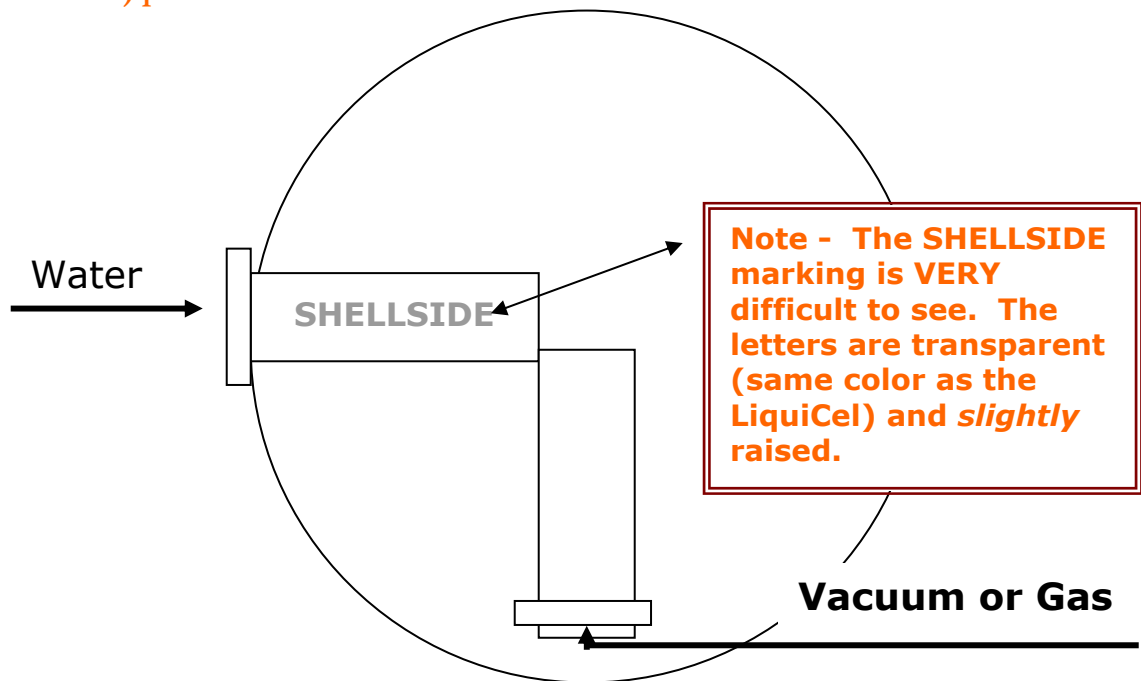
1. Slowly open valve W-1 and adjust the DI water flow rate (W-7) to the maximum (3000+) adjustment on the flow meter. Flush the system for approximately 10 minutes. During the flushing period, check for leaks and correct as necessary. After 10 minutes turn valve W-1 off.
2. Take appropriate action to drain and remove the two filter housings and install the two (2) DI water filter elements **per the manufacturers' instructions in the box.**
 - o The DI water filter housings are filled with DI water; take the necessary steps to prevent spilling when removing the housing from the head assembly.
 - o Be sure the 0.1 micron filter element (p/n VFSG100-04M3V) is installed in filter W-3 and the 0.05 element (p/n VFSG050-04M3F) is installed in the W-8 filter housing.
3. With the filter elements installed in W-3 & W-6 housings, open valve W-1 and flush for 5 minutes at the maximum flow of the flow meter. Check for leaks and correct as necessary.
 - o During this step it is necessary to bleed "trapped gas" from the W-3 DI water filter. This is accomplished by losing the filter vent fitting. See CS-425-01 DI water filter vent [photo; 16 of 16](#).
4. After flushing, take the appropriate steps to remove the flushing tube. See [photo 10 of 16](#).

5. Remove the LiquiCel(s) from the manufacturers' package and install per the manufacturers (LiquiCel) instructions. **The water ports are labeled SHELLSIDE.**

The vacuum/gas ports are unlabeled!

SHELLSIDE ports may or may not be oriented as shown in the following illustration or as in the photos attached to this document. Check and then re-check Shellside identification prior to installation.

- o Prior to installation it is necessary to remove the 1/4" MNPT shipping plugs; (2 each) per cell.



6. Installing the LiquiCel(s) is performed by the following steps. Prior to installation refer to the LiquiCel Connections and the Overview photos. [Reference photos 2, 13, 14 & 15 of 16](#)
- a) Vacuum fitting connection -- **W-4** [Reference photo 14 of 16](#)
 - Install the 1/4" NPT plug as shown in the attached photo.
 - Install the barbed fitting as shown in the photo.
 - b) Vacuum gauge and fitting connection -- **W-5** [Reference photo 15 of 16](#)
 - a. Install the vacuum gauge assembly as shown.
 - c) DI water in -- **W-4** [Reference photo 14 of 16](#)
 - 1/4" NPT x 1/2" tubing connection. (DI water filter connection)

- d) LiquiCel to LiquiCel connection -- **W-4 & W-5** [Reference photo 14 & 15 of 16](#)
 - Install the two (2) 1/4" NPT x 3/8" tubing fittings.
 - Install the 3/8" PFA connection tube.
 - e) DI water W5 to W6 connection -- **W-5** [Reference photo 15 of 16](#)
 - 1/4" NPT x 3/8" tubing connection. (LiquiCel to DI pressure gauge connection)
 - f) Secure LiquiCel(s) using mounting brackets as shown in LiquiCel Connection photo. [Reference photo 13 of 16](#)
 - g) Gas input -- **W-5**
 - Open valve G-1 and adjust the pressure on G-3/4 to 15 psig.
 - Open the gas flow meter valve G-5 set to 10.
 - Purge the line for two (2) minutes
 - Install the 1/4" NPT x 3/8" tube fitting on the Liqui-Cel and attach the tubing from G-6 to W-5 as shown in photo. [Reference photo 15 of 16](#)
- The CDA regulator supplied with the CS-425-01 and the CS-603-01 is a locking style regulator. Unlocking the regulator is accomplished by pulling "down" (out) on the adjustment knob; push up or "in" to lock.

CS-603-01 Connections

- I. Vacuum source connections
 - a. Connect the vacuum source from V2 to LiquiCel W-4 using the 3/8" supplied (vinyl) tubing.
 - b. Connect the vacuum source from V3 to LiquiCel W-5 using the 3/8" supplied (vinyl) tubing.
 - ❖ See [CS-603-01 ref. photo 6 of 9](#) for further detail.
- II. CDA (air aspirator control) connection
 - a. Connect the 3/8" tubing from regulator A-3 to V-3; fitting supplied on tubing.
 - ❖ See [CS-603-01 ref. photo 6 of 9](#) for further detail.
- III. Air Aspirator (CDA) discharge (Exhaust) 2" PVC connection(s)
 - a. Cut 2" flexible tubing to size and connect tubing to the PVC muffler bushing; 2 connections – V2 and V3. See [CS-603-01 ref. photos 8 & 9 of 9](#) for further detail.
 - ❖ Plumb CDA (air aspirator) discharge to an exhaust or a suitable area.
 - ❖ Note: 2" tubing should be adequately supported to avoid stress on the PVC flange.

The system is now ready for use. To operate:

- ✚ Turn on the DI water, valve W-1 and set the W-7 flow meter to a flow rate of 2000cc (2 liters) per minute. [Reference photos 7 of 16 & 11 of 16](#)
- ✚ Turn on valve A1, set regulator A3 **to a minimum of 90 psig**, and wait for V1 to reach approximately 29 Hg. Reference [CS-603-01 ref. photo 7 of 9](#) and [CS-425-01 photo 15 of 16](#) -- [Vacuum gauge V1](#).
- ✚ Use the gas flow meter G-5 and oxygen meter to achieve desired settings.
[Reference photo 12 of 16](#)
G-5 setting notation. In many cases (incoming water quality dependent) it may be necessary to adjust flow-meter G-5 to a +10 setting to achieve desired results.
- ✚ Use V1 as reference to quickly set the percentage (%) of dissolved oxygen in the DI water output. The reference is made by comparing the measurement of V1 with the readings from the dissolved oxygen (OxyGuard) meter. [Reference photo 2 of 16 -- V1 gauge](#).
- Dissolved oxygen in the DI Water output can be easily changed by one or more or a combination of the following:
 - Increasing or decreasing the flow of CDA into the DI water flow stream; adjusting G5.
 - Increasing or decreasing the air pressure to the air aspirators; adjusting A-3 -- 40 -> 90 psig.

See “End user (customer) notes” for additional details on dissolved oxygen and particle testing.

Warranty

- I. Custom Fab Solutions warrants that at the time the goods are shipped to the purchaser, they will be free from defects in material and workmanship, under normal use and service, with proper maintenance, for a period of one (1) year. Said warranty is limited, at the option of Custom Fab Solutions, to repair or replacement of the defective item provided that such item is returned to Custom Fab Solutions, transportation prepaid, for inspection and approval.
- II. Components which are not manufactured by CFS, purchased items, are per the manufacturers' warranty. Warranty claims for component items must be filed with the original manufacturer.

End user (customer) notes

Dissolved oxygen test:

- Calibrate the meter according to manufacturer's instructions.
- Immerse the probe into a designated/**clean** 500ml beaker.
- Immerse DI water output from the CS-425-01 into the beaker.

Observing change (time sensitive) in dissolved oxygen meter readings.

- Note: It will take several minutes for the system to reach an equilibrium of dissolved oxygen level after G-5 is changed.
- Adjusting the flow of G-5 will produce the desired dissolved oxygen level.
- Set the flow rate (W-7) to 2 L/min and check particle count using a clean beaker.
- The particle count >0.6 $\mu\text{m}/\text{ml}$ should be less than 0.5 particle/ml.
- If the count exceeds this limit, check the connections, continue flushing and retest with a clean beaker.

Packing List

Items ordered:

Customer _____

Included in this shipment:

PO # _____

- ↓
- ↓
- | | | |
|-------------------------------------|-------------------------------------|--|
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | The CS-425-01 assembly. |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Two (2) Liqui-Cel* membrane contactor cells. Liqui-Cel Part # G420. |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | A 0.1 micron DI water filter element. Pall filter element, Part # VFSG100-04M3V. |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | A 0.05 micron DI water filter element. Pall filter element, Part # VFSG050-04M3F. |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Necessary fittings to interface the Liqui-Cel contactors to the CS-425-01 assembly. |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Optional CS-603-01 Air aspirator assembly. |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 12 feet of 2" wire re-enforced PVC tubing for Air Aspirator discharge/exhaust. |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 8 feet of 1/2" PFA tubing (flared connection on one end) for the incoming DI water connection. |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 16 feet of 1/4" PFA tubing (flared connection on one end) for the DI water output connection. |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | One (1) Manual including electronic (PDF) files on a CD-ROM disk. |

by _____ date _____