CO₂ Scrubber
User Manual

Please read these instructions carefully and completely before operating the unit.

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SERVICE & TECHNICAL SUPPORT

Before contacting Conviron, please check the following:

- Read this document, CO₂ Scrubber User Manual, and the other accompanying manuals in their entirety.
- If you are having a problem using your CO₂ Scrubber device, pay particular attention to the relevant section and the pertinent information in this manual, and use the information to diagnose and correct the problem.
- If the problem persists and/or you require additional assistance, please collect the following information prior to contacting Conviron:
  - The serial number of the chamber, located on the rating plate
  - The software version of the control system. Instructions for obtaining the software version of your control system are provided in the control system operator manual.
  - A description of the problem
  - A description of what you were doing before the problem occurred

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Please visit www.conviron.com for global service contact information.
TABLE OF CONTENTS

1 PRECAUTIONS .................................................................................................................. 1
  1.1 Hazard Identification Symbols ..................................................................................... 1
  1.2 Precautions ................................................................................................................. 2
    1.2.1 Installation ............................................................................................................. 2
    1.2.2 Operation ............................................................................................................. 2
    1.2.3 Maintenance ......................................................................................................... 3

2 WORKING WITH THE CO₂ SCRUBBER ........................................................................ 4
  2.1 Overview .................................................................................................................... 4
  2.2 Setting up the CO₂ Scrubber ....................................................................................... 4
  2.3 Understanding the Absorptive Capacity of the CO₂ Scrubber ....................................... 5
  2.4 Activating the CO₂ Scrubber ....................................................................................... 6
    2.4.1 Using the Argus Control System .......................................................................... 6
    2.4.2 Using the CMP Control System ......................................................................... 12

3 TROUBLESHOOTING .................................................................................................... 14
  3.1 The Scrubbing Mode toggle does not switch to ON ................................................... 14
  3.2 CO₂ levels do not reach the intended setpoint ............................................................ 15

4 APPENDIX ...................................................................................................................... 16
  4.1 Assembly Drawings of the CO₂ Scrubber ................................................................. 16
LIST OF FIGURES

Figure 2-1 Argus Session Manager .................................................................................. 6
Figure 2-2 Chamber Settings Page ..................................................................................... 7
Figure 2-3 Conviron Setpoint ........................................................................................... 8
Figure 2-4 Setpoint Scheduler Screen – Conviron Program Management Section ......... 9
Figure 2-5 Setpoint Editor Screen ..................................................................................... 10
Figure 2-6 Setpoint Scheduler Screen – Schedule Control Section ................................. 11
Figure 2-7 Control Parameters Screen ............................................................................. 12
Figure 2-8 Carbon Dioxide Screen ................................................................................. 12
Figure 3-1 Controller Screen from Service Mode .............................................................. 14
Figure 4-1 Parts List of the CO₂ Scrubber, Drawing .......................................................... 16
Figure 4-2 Parts List of the CO₂ Scrubber, Table ............................................................... 17
Figure 4-3 Dimensions, Front View .................................................................................. 18
Figure 4-4 Dimensions, Side View ................................................................................... 19
Figure 4-5 Back View ........................................................................................................ 20
Figure 4-6 Front View with the Front Covers Removed ...................................................... 21
Figure 4-7 Top View, Dimensions ..................................................................................... 22
1 PRECAUTIONS

The equipment is intended to be installed, operated, maintained, and serviced only by trained personnel, according to the instructions and precautions described in the manuals provided by Conviron.

The following precautions are intended to help guide users in the safe operation of Conviron chambers.

1.1 Hazard Identification Symbols

The following symbols in Table 1-1 are used throughout this manual, on the equipment, or both to draw your attention to important warnings, guidelines, and product information.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>![ ]</td>
<td>The “HAZARD WARNING” symbol is used whenever a hazard exists which could cause personal injury or potential equipment damage, and requires correct procedures/practices for prevention.</td>
</tr>
<tr>
<td>![ ]</td>
<td>The “IMPORTANT INFORMATION” symbol is used to identify operating procedures that must be followed to ensure smooth and efficient equipment operation.</td>
</tr>
<tr>
<td>![ ]</td>
<td>The “ELECTRICAL SHOCK/ELECTROCUTION” symbol is used to identify a source of potentially dangerous electrical current.</td>
</tr>
<tr>
<td>![ ]</td>
<td>The “ELECTROSTATIC DISCHARGE” symbol is used to identify equipment that is sensitive to electrostatic discharge.</td>
</tr>
<tr>
<td>![ ]</td>
<td>The “SLIPPERY SURFACE” symbol is used to identify a potential hazard caused by a slippery surface.</td>
</tr>
<tr>
<td>![ ]</td>
<td>The “PROTECTIVE EARTH-GROUND-MANDATORY ACTION” symbol is used to identify the protective earth connection.</td>
</tr>
<tr>
<td>![ ]</td>
<td>The “PROTECTIVE EARTH-GROUND” symbol is used to identify the protective earth connection.</td>
</tr>
</tbody>
</table>
The “WEAR EYE PROTECTION-MANDATORY ACTION” symbol is used to identify areas where eye protection is mandatory.

The “READ THE OPERATOR MANUAL” label is intended to remind the user to have a thorough understanding of the equipment before use.

1.2 Precautions
These precautions should be read and understood before proceeding with installation, operation, and maintenance.

1.2.1 Installation
Only qualified trades-people, e.g., electricians, plumbers, refrigeration mechanics, etc. should perform installation work as required, according to local codes and regulations.

Do not attempt to install or maintain this equipment without the appropriate knowledge and expertise.

Inspect all connections in the top compartment before connecting the equipment to the building utilities.

Shipping vibration can cause electrical and plumbing connections to loosen.
Inspect all connections before connecting to main building services.

Ensure that power to the chamber line is off, locked out, and tagged out, before making any electrical connections at the chamber.

Ensure that the control panel and top-cover lids are properly closed and screwed shut, and that no one is in contact with the equipment before powering up.

1.2.2 Operation
Conduct a visual inspection of the equipment and surrounding area by walking around the unit to ensure no debris or obstacles are present that could pose a safety hazard before operating the cabinet.

Operate your Conviron equipment for a minimum of five days before introducing any research material to ensure proper and stable operation.

Follow all applicable local environmental regulations and guidelines for disposal of hazardous material. If in doubt, contact local authorities for proper disposal procedures.
Do not allow water to come into contact with electrical components while watering. Water contacting live circuits will damage both high and low voltage circuits.

Alert service personnel immediately if a slip hazard is detected.

### 1.2.3 Maintenance

Disconnect and lock out the main power before servicing the equipment.

Take all appropriate safety precautions when using and maintaining this equipment – including wearing appropriate safety apparel, and using appropriate tools and fall protection equipment if working on elevated areas.

Use only original replacement parts when maintaining and servicing the equipment.

Conviron recommends waiting at least 10 minutes after powering off the equipment before servicing the heater elements or related components.

Do not service the control panel without using proper ESD procedures, including the use of a grounding strap and/or anti-static mat.
2 WORKING WITH THE CO₂ SCRUBBER

2.1 Overview
The CO₂ Scrubber option is available on a Conviron chamber to control the carbon dioxide (CO₂) concentration levels by removing, or scrubbing, the respired or excess CO₂ gases inside the chamber.

The CO₂ Scrubber is a standalone device that can be attached to the chamber, either on the floor beside the chamber or mounted on its roof. The scrubber system includes an external cabinet with up to three canisters for the Sodasorb® CO₂ absorbent, process air fan, inlet and outlet ductwork, and may include an iris damper. For detailed information on the parts of the CO₂ Scrubber, refer to the drawings in section 4.1, Assembly Drawings of the CO₂ Scrubber, on page 16.

2.2 Setting up the CO₂ Scrubber
It is recommended that the CO₂ Scrubber device be placed on the floor beside the chamber. However, space restriction may allow for the device to be mounted on the roof.

1. Refer to the drawings in section 4.1, Assembly Drawings of the CO₂ Scrubber, on page 16 for dimensions, parts list, and installation notes of the CO₂ Scrubber device.

2. Once the device is installed, remove the lids from the CO₂ Scrubber pails.

3. Gently shake the Sodasorb pail to ensure that the pellets are not clumped together.

4. Open the Sodasorb pail, and then slowly pour the Sodasorb pellets into one of the CO₂ Scrubber pails.

5. Fill the pail to about two-thirds in volume.
   Use the fill line inside the pail as the marker.

6. To ensure even distribution of the Sodasorb pellets, gently shake the CO₂ Scrubber pail so that the pellets do not clump together.

7. If your CO₂ Scrubber system has more than one CO₂ Scrubber pail, then repeat steps 3 through to 6 for the second or the second and third CO₂ Scrubber pails.

Before proceeding with the next steps, ensure that you are wearing appropriate safety equipment. Refer to the recommendations outlined on the Sodasorb pail for more information.
2.3 Understanding the Absorptive Capacity of the CO₂ Scrubber

To prolong the absorptive capacity of the Sodasorb pellets used in the CO₂ Scrubber pails, if the CO₂ Scrubber system is not in use, then cover the CO₂ Scrubber pails with their lids.

However, if the CO₂ Scrubber system is in use, then open the top cover of the CO₂ Scrubber and ensure that the CO₂ Scrubber pails are open and uncovered.

![Warning]

If the Scrubber pails are covered, then the CO₂ Scrubber will not be able to remove the CO₂ gases from the chamber.

In addition, using covered Scrubber pails while the CO₂ Scrubber is functioning may cause the Scrubber fan to overheat and become damaged.

To ensure that the Sodasorb pellets are still potent, regularly check their color. At first use, the color of the pellets is white. After multiple uses, the color gradually becomes purple.

When the absorptive capacity of the Sodasorb pellets is depleted, their color turns deep purple. This color indicates that the Sodasorb pellets need to be changed.

For proper disposal of the expended Sodasorb pellets, follow all applicable local environmental regulations and guidelines. If in doubt, contact your local authorities.
2.4 Activating the CO₂ Scrubber

2.4.1 Using the Argus Control System

1. On your computer, double-click the Argus Titan icon from the desktop.

   The Argus Session Manager dialog box appears (Figure 2-1).

![Figure 2-1 Argus Session Manager](image)

2. In the Server field, verify that the server is online.

   If the Argus Session Manager dialog does not contain any server information, then you
   need to configure the settings. For more information, click the Help icon on the Argus
   Session Manager dialog, and then navigate to Getting Started > Connecting to an
   Argus System > Argus Session Manager.

3. In the SiteName column, double-click a session to launch the Argus client software.

   The Argus Homescreeen appears.
4. On the **Argus Homescreen**, select the chamber where the CO₂ Scrubber is installed. 

The **Chamber Settings** page appears (Figure 2-2).

![Figure 2-2 Chamber Settings Page](image)

5. In the highlighted section on Figure 2-2, check that the following information is correct:
   - Chamber Type
   - Chamber Number
   - Chamber Power Status is set to **On** and **Enabled**.

6. In the **CO₂ Control Group** section, select the **SCRUB_EN** field, and then do one of the following:
   - To customize all the settings for the CO₂ Scrubber, select **Manual On**. Selecting this option also activates the inlet damper and fan.
   - To allow the control system to automatically adjust the settings based on the preferred setpoint, select **Automatic**.

---

4. **CO₂ Scrubber** User Manual  
Working with the CO₂ Scrubber  
August 2017 | 280499-ENG R00
7. Click OK.

8. Select **Conviron Setpoint** (Figure 2-3).
9. In the **CONVIRON PROGRAM MANAGEMENT** section > **Selected Program** column, select a program (Figure 2-4).

Figure 2-4  Setpoint Scheduler Screen – Conviron Program Management Section
10. In the CO2 column, enter the preferred setpoint, which should be lower than the CO2 level inside the chamber (Figure 2-5).

![Figure 2-5 Setpoint Editor Screen]

If the entered setpoint value is not lower than the CO2 level inside the chamber, then the Scrubbing control will not turn on.

11. On the upper left corner of the screen, click Back.
12. In the **Schedule Control** section, ensure that the value is **Start From The Beginning** (Figure 2-6).

![Setpoint Scheduler Screen – Schedule Control Section](image)

13. Click **Back** again.

14. If you want to *manually* modulate the Process damper, then do the following:
   
   a. In the **CO2 Control Group** section, select the **SCRUB** field.
   
   b. On the **Proportional Properties** dialog, select **User Override**.
   
   c. In the **User Override** field, enter a percentage value, and then click **OK**.

15. Select the **EXH_DAMP** field.

16. Select **Manual Off**, and then click **OK**.
2.4.2 Using the CMP Control System

1. Log in as Admin in the CMP control system.

2. On the control system display, tap **Control**, and then tap **Parameters**.

   The **Control Parameters** screen appears (Figure 2-7).

3. To access the Carbon Dioxide parameters, tap the **Carbon Dioxide** icon.

   The **Carbon Dioxide** screen appears (Figure 2-8).

To learn more about **Control Mode**, **Absolute Warning Limits**, and **PID Control**, refer to the “Control Parameters” section of the **CMP6060 Operator's Manual**.
4. In the **Damper Mode** section, select **Automatic** to allow the control system to automatically open or close the exhaust damper, depending on the CO$_2$ setpoint of the program.

If you select **Close** or **Open**, then the exhaust damper remains closed or open at all times. This setup may prevent the CO$_2$ Scrubber from reaching the intended CO$_2$ setpoint.

To change the CO$_2$ setpoint of a program, refer to the “Create, Edit, or Delete a Program” section of the *CMP6060 Operator’s Manual*.

5. In the **Scrubbing Mode** section, verify that the toggle button is set to **ON**, and then tap **Back** repeatedly to navigate to the **Home** screen.
3 TROUBLESHOOTING

Even if Service is close by, a few troubleshooting steps significantly reduce the time to diagnose and correct a fault. Make careful notes of the faulty symptoms and the chamber and ambient conditions. This could help to determine the cause of the problem.

3.1 The Scrubbing Mode toggle does not switch to ON

If you are using the CMP6060 control system and the Scrubbing Mode toggle seems to be locked to the OFF position, then force-start the CO₂ Scrubbing option.

1. Check that the CO₂ Scrubber is properly installed.
   For detailed installation information, refer to the drawings in section 4.1, Assembly Drawings of the CO₂ Scrubber, on page 16.
2. Log in as Admin in the CMP control system.
3. On the control system display, tap Service, and then tap Digital Outputs.
4. If necessary, tap Controller.
   The Controller screen appears (Figure 3-1).

   Figure 3-1   Controller Screen from Service Mode

5. Tap SCRUBBING CO₂, and then verify that its corresponding icon is lit and not grayed-out.
6. Follow the steps in section 2.4.2, Using the CMP Control System, on page 12 to switch the Scrubbing Mode toggle to ON.

If the Scrubbing Mode toggle still does not switch to ON, then contact Conviron Service.

3.2 CO₂ levels do not reach the intended setpoint

Example scenario: The entered setpoint is 200ppm, but when the control system is checked, the display shows the CO₂ levels do not go lower than 600ppm.

If the CO₂ levels do not reach the intended setpoint, then do the following:

- Ensure that the chamber is sealed correctly, so that outside air cannot enter the chamber. Check that the chamber doors and fresh air dampers are properly closed.

- Ensure that the Sodasorb pellets are still potent.
  For more information, refer to section 2.3, Understanding the Absorptive Capacity of the CO₂ Scrubber, on page 5.

- Ensure that the Damper mode is set to Automatic and the Scrubbing Mode is set to On.
  If the chamber is using the Argus control system, then refer to section 2.4.1, Using the Argus Control System, on page 6.
  If the chamber is using the CMP control system, then refer to section 2.4.2, Using the CMP Control System, on page 12.

If the CO₂ levels still do not reach the intended setpoint, then contact Conviron Service.
4 APPENDIX

4.1 Assembly Drawings of the CO₂ Scrubber
The following drawings portray a CO₂ Scrubber for a walk-in chamber. Your CO₂ Scrubber may not look exactly like the drawings shown in this section.

Figure 4-1 Parts List of the CO₂ Scrubber, Drawing
### Parts List of the CO₂ Scrubber, Table

<table>
<thead>
<tr>
<th>FIND NO.</th>
<th>PART NO.</th>
<th>DESCRIPTION</th>
<th>QTY</th>
<th>UM</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td>244902</td>
<td>SODASORB-ABSORBENT CO₂ # 688-008880, 5-GAL PAIL (NOT SHOWN)</td>
<td>3</td>
<td>EA</td>
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<tr>
<td>34</td>
<td>248575</td>
<td>LABEL-CO₂ SCRUBBER, MEDIA CANISTER, PG40 (NOT SHOWN)</td>
<td>1</td>
<td>EA</td>
</tr>
<tr>
<td>33</td>
<td>76171</td>
<td>TAPE-SEAL, GASKET, SPONGE, RECT-SHAPE, 1/2INW x 1/4INH, BLACK (NOT SHOWN)</td>
<td>2</td>
<td>FT</td>
</tr>
<tr>
<td>32</td>
<td>79399</td>
<td>INSULATION, 1-1/2x4x100 FOIL (NOT SHOWN)</td>
<td>6</td>
<td>FT</td>
</tr>
<tr>
<td>31</td>
<td>78400</td>
<td>TAPE-2IN ALUM FOIL (NOT SHOWN)</td>
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<tr>
<td>30</td>
<td>274882</td>
<td>ALUM-ANGLE SUPPORT, 22 9/16IN</td>
<td>2</td>
<td>EA</td>
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<tr>
<td>29</td>
<td>215957</td>
<td>ASSY-CO₂ SCRUBBER PAIL</td>
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<td>EA</td>
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<tr>
<td>28</td>
<td>76872</td>
<td>BUSHING- SNAP 1-1/8, #SB1093-15</td>
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<td>27</td>
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<td>ASSY-CO₂ SCRUBBER FAN, 60Hz</td>
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<td>PIPE-GALV, 26ga 6IN x 36IN</td>
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<td>25</td>
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<td>SCREW, MCH PH PNHD 10/32X3/4 SS</td>
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<td>24</td>
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<td>WASHER-FLAT #10 18.8 SS</td>
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<td>23</td>
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<td>NUT, U #10 STEEL PHOSPHATE</td>
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<td>76237</td>
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<td>SCREW-TPG #10 X 1 PH TRUSS SS</td>
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<td>EA</td>
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<td>16</td>
<td>79688</td>
<td>POP RIVET-3/16, AL-ST, OPEN, DOME HD (AD64BS)</td>
<td>20</td>
<td>EA</td>
</tr>
<tr>
<td>15</td>
<td>252899</td>
<td>PANEL-FRONT COVER, SCRUBBER FRAME, FLR MTG, PG40D</td>
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<td>13</td>
<td>215932</td>
<td>SUPPORT-SHORT</td>
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<td>215931</td>
<td>SUPPORT-LONG</td>
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<td>11</td>
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<td>ASSY-DOOR TO SCRUBBER TUB, WHITE EXTERIOR</td>
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<td>9</td>
<td>90738</td>
<td>DUCT-AIR, TRANSITION 8&quot; TO 6&quot;</td>
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<td>8</td>
<td>78720</td>
<td>ELBOW-GALV 6&quot; ADJ. 30GA</td>
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<td>EA</td>
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<td>DAMPER-6&quot;, IRIS WIMOTOR, POSITIVE SEAL, 24V, 0-10VDC, MP-06</td>
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<td>ASSY-HEPA FILTER</td>
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<td>278886</td>
<td>B&amp;B-ASSY, JUNCTION BOX, CO₂ SCRUBBER, 60HZ</td>
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<td>EA</td>
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**Figure 4-2**

Parts List of the CO₂ Scrubber, Table
Figure 4-3 Dimensions, Front View
Figure 4-4 Dimensions, Side View
Figure 4-6      Front View with the Front Covers Removed
Figure 4-7  Top View, Dimensions