



CO₂ Scrubber

User Manual

280499-ENG R00

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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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 1-1 Hazard Identification Symbols



Symbol	Description
	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.
	The “ IMPORTANT INFORMATION ” symbol is used to identify operating procedures that must be followed to ensure smooth and efficient equipment operation.
	The “ ELECTRICAL SHOCK/ELECTROCUTION ” symbol is used to identify a source of potentially dangerous electrical current.
	The “ ELECTROSTATIC DISCHARGE ” symbol is used to identify equipment that is sensitive to electrostatic discharge.
	The “ SLIPPERY SURFACE ” symbol is used to identify a potential hazard caused by a slippery surface.
	The “ PROTECTIVE EARTH-GROUND-MANDATORY ACTION ” symbol is used to identify the protective earth connection.
	The “ PROTECTIVE EARTH-GROUND ” symbol is used to identify the protective earth connection.

Symbol	Description
	<p>The “WEAR EYE PROTECTION-MANDATORY ACTION” symbol is used to identify areas where eye protection is mandatory.</p>
	<p>The “READ THE OPERATOR MANUAL” label is intended to remind the user to have a thorough understanding of the equipment <i>before</i> use.</p>


1.2 Precautions

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

1.2.1 Installation

	<p>Only qualified trades-people, e.g., electricians, plumbers, refrigeration mechanics, etc. should perform installation work as required, according to local codes and regulations.</p> <p>Do <i>not</i> attempt to install or maintain this equipment without the appropriate knowledge and expertise.</p> <p>Inspect all connections in the top compartment <i>before</i> connecting the equipment to the building utilities.</p> <p>Shipping vibration can cause electrical and plumbing connections to loosen. Inspect all connections <i>before</i> connecting to main building services.</p>
	<p>Ensure that power to the chamber line is off, locked out, and tagged out, <i>before</i> making any electrical connections at the chamber.</p> <p>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 <i>before</i> powering up.</p>

1.2.2 Operation

	<p>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 <i>before</i> operating the cabinet.</p> <p>Operate your Conviron equipment for a minimum of five days <i>before</i> introducing any research material to ensure proper and stable operation.</p> <p>Follow all applicable local environmental regulations and guidelines for disposal of hazardous material. If in doubt, contact local authorities for proper disposal procedures.</p>
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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.

Convion 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.



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.

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.

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.



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).

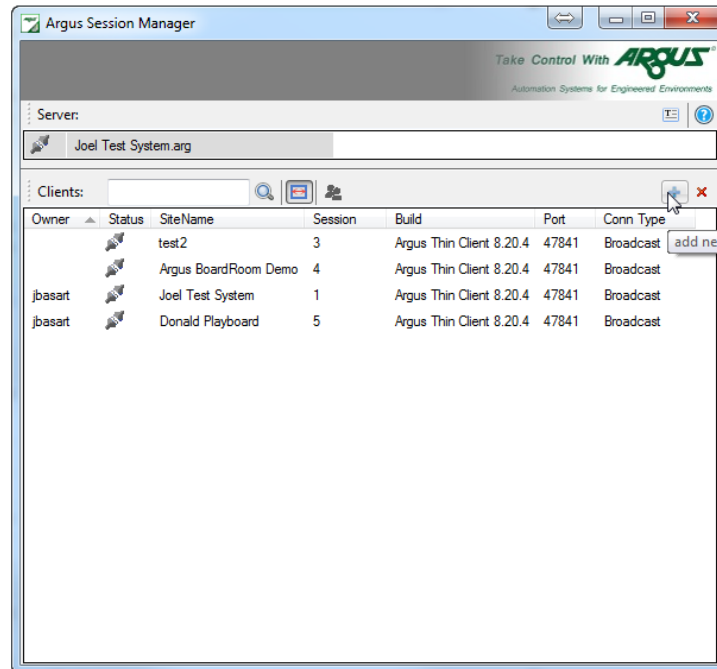


Figure 2-1 Argus Session Manager

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 Homescreen** appears.

- On the **Argus Homescreen**, select the chamber where the CO₂ Scrubber is installed.
The **Chamber Settings** page appears (Figure 2-2).

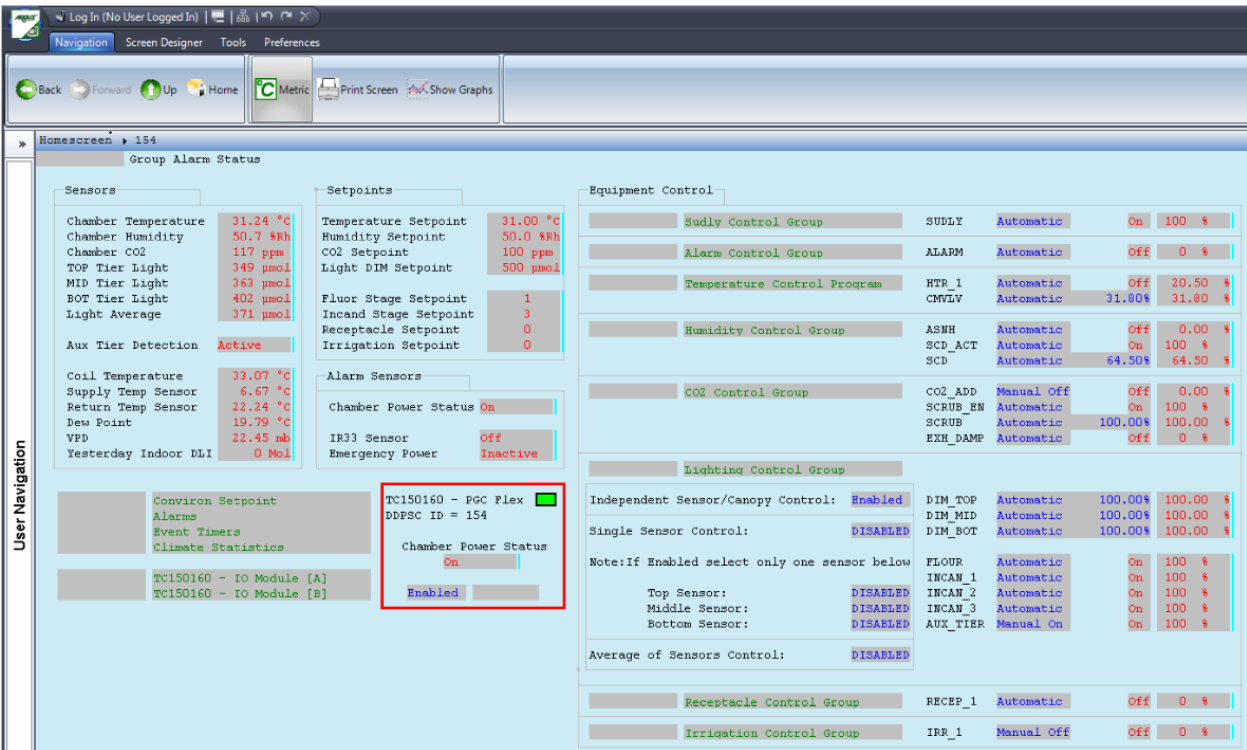


Figure 2-2 Chamber Settings Page

- 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**.
- 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**.

7. Click **OK**.
8. Select **Convicon Setpoint** (Figure 2-3).

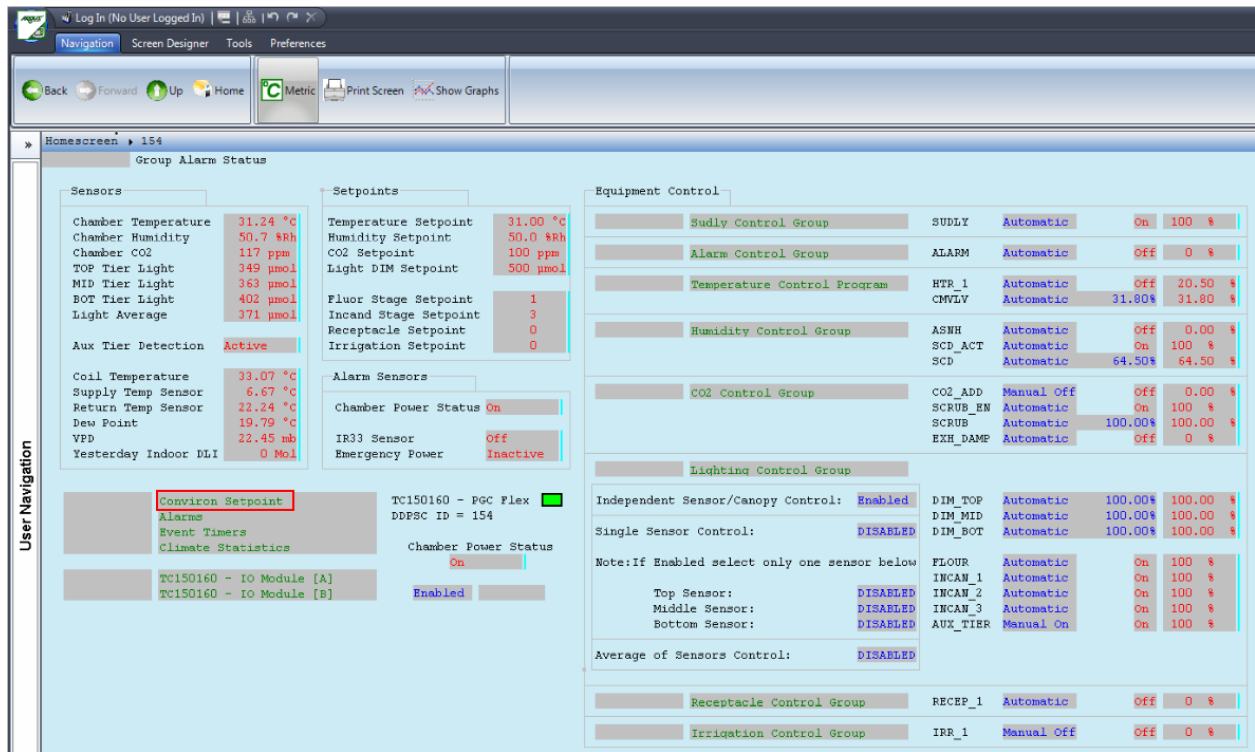


Figure 2-3 Convicon Setpoint

- In the **CONVIRON PROGRAM MANAGEMENT** section > **Selected Program** column, select a program (Figure 2-4).

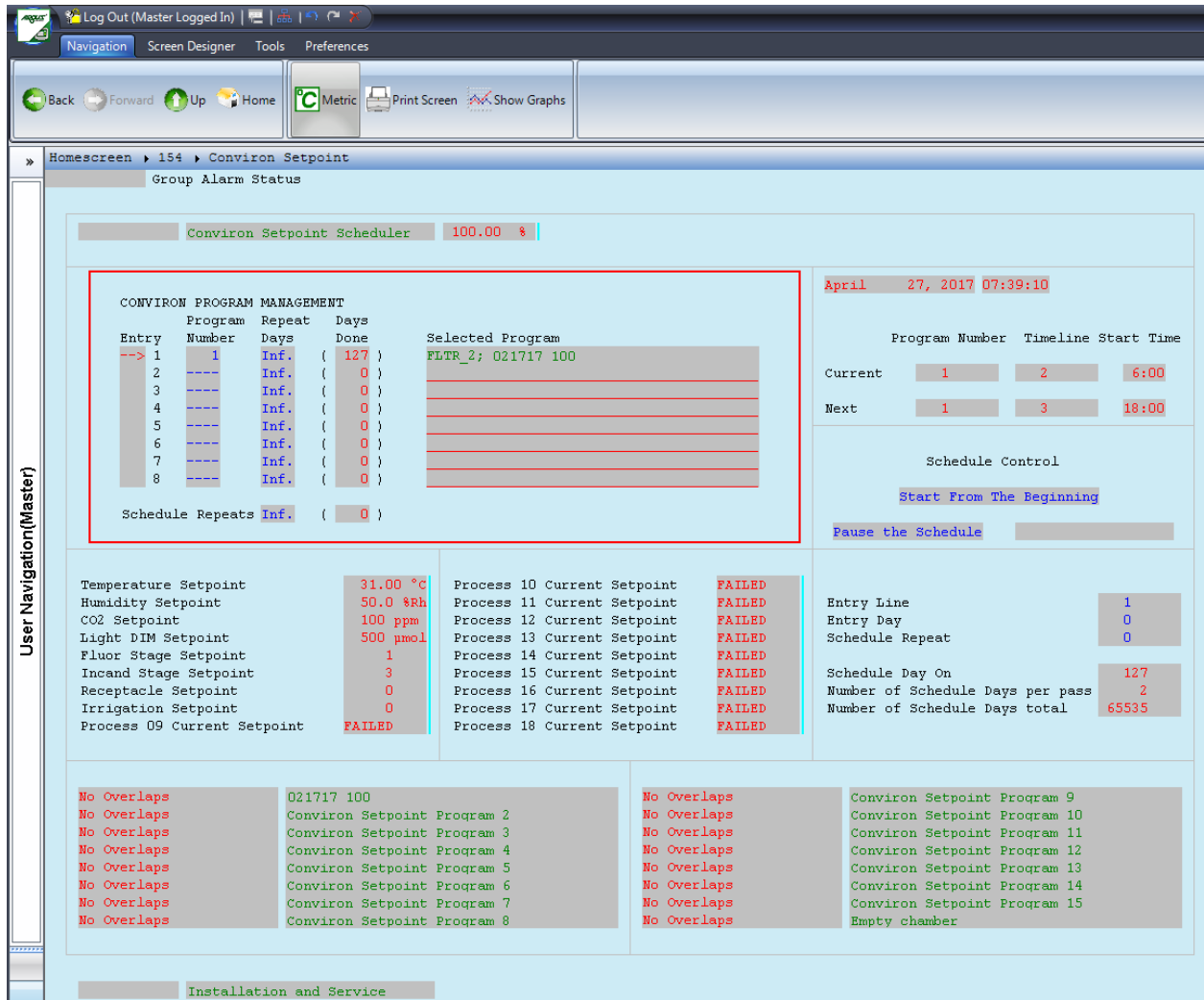


Figure 2-4 Setpoint Scheduler Screen – Convicon Program Management Section

10. In the **CO₂** column, enter the preferred setpoint, which should be lower than the CO₂ level inside the chamber (Figure 2-5).

Log Out (Master Logged In) | 600 |

Navigation | Screen Designer | Tools | Preferences

Back | Forward | Up | Home | Metric | Print Screen | Show Graphs

Homescreen ▶ 154 ▶ Conviron Setpoint ▶ 021717 100

Program Type: Conviron Program ?

Alarms No Overlaps | Installation & Service | Selective Display

Program Screen

Conviron Setpoint Editor

Times	Process 1	Process 2	Process 3	Process 4	Process 5	Process 6
1	0:00 Temperature 22.00 °C	Humidity 50.0 %Rh	CO2 100 ppm	Light Dir 0 µmol	Fluorescent 0	Incandescent 0
2	6:00 31.00 °C			500 µmol	1	3
3	18:00 22.00 °C			0 µmol	0	0
4	:					
5	:					
6	:					
7	:					
8	:					
9	:					
10	:					
11	:					
12	:					
13	:					
14	:					
15	:					
16	:					
17	:					
18	:					
19	:					
20	:					
21	:					
22	:					
23	:					
24	:					

User Navigation(Master)

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).

The screenshot shows the 'Convicon Setpoint Scheduler' interface. The 'Schedule Control' section is highlighted, showing the 'Start From The Beginning' option selected. The interface includes a navigation bar, a status bar, and various data tables and controls.

CONVIRON PROGRAM MANAGEMENT

Entry	Program Number	Repeat Days	Days Done	Selected Program
--> 1	1	Inf.	(127)	FLTR_2; 021717 100
2	---	Inf.	(0)	
3	---	Inf.	(0)	
4	---	Inf.	(0)	
5	---	Inf.	(0)	
6	---	Inf.	(0)	
7	---	Inf.	(0)	
8	---	Inf.	(0)	

Schedule Repeats: Inf. (0)

Schedule Control

Start From The Beginning

Pause the Schedule

Temperature Setpoint 31.00 °C
Humidity Setpoint 50.0 %Rh
CO2 Setpoint 100 ppm
Light DIM Setpoint 500 pmol
Fluor Stage Setpoint 1
Incand Stage Setpoint 3
Receptacle Setpoint 0
Irrigation Setpoint 0
Process 09 Current Setpoint FAILED

Process 10 Current Setpoint FAILED
Process 11 Current Setpoint FAILED
Process 12 Current Setpoint FAILED
Process 13 Current Setpoint FAILED
Process 14 Current Setpoint FAILED
Process 15 Current Setpoint FAILED
Process 16 Current Setpoint FAILED
Process 17 Current Setpoint FAILED
Process 18 Current Setpoint FAILED

Entry Line 1
Entry Day 0
Schedule Repeat 0

Schedule Day On 127
Number of Schedule Days per pass 2
Number of Schedule Days total 65535

No Overlaps 021717 100
No Overlaps Convicon Setpoint Program 2
No Overlaps Convicon Setpoint Program 3
No Overlaps Convicon Setpoint Program 4
No Overlaps Convicon Setpoint Program 5
No Overlaps Convicon Setpoint Program 6
No Overlaps Convicon Setpoint Program 7
No Overlaps Convicon Setpoint Program 8

No Overlaps Convicon Setpoint Program 9
No Overlaps Convicon Setpoint Program 10
No Overlaps Convicon Setpoint Program 11
No Overlaps Convicon Setpoint Program 12
No Overlaps Convicon Setpoint Program 13
No Overlaps Convicon Setpoint Program 14
No Overlaps Convicon Setpoint Program 15
No Overlaps Empty chamber

Installation and Service

Figure 2-6 Setpoint Scheduler Screen – Schedule Control Section

13. Click **Back** again.
14. If you want to *manually* modulate the Process damper, then do the following:
- In the **CO2 Control Group** section, select the **SCRUB** field.
 - On the **Proportional Properties** dialog, select **User Override**.
 - 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).

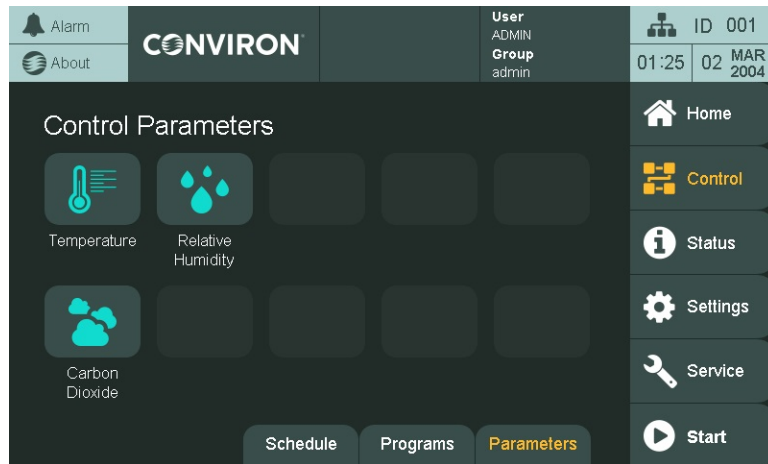


Figure 2-7 Control Parameters Screen

3. To access the Carbon Dioxide parameters, tap the **Carbon Dioxide** icon. The **Carbon Dioxide** screen appears (Figure 2-8).

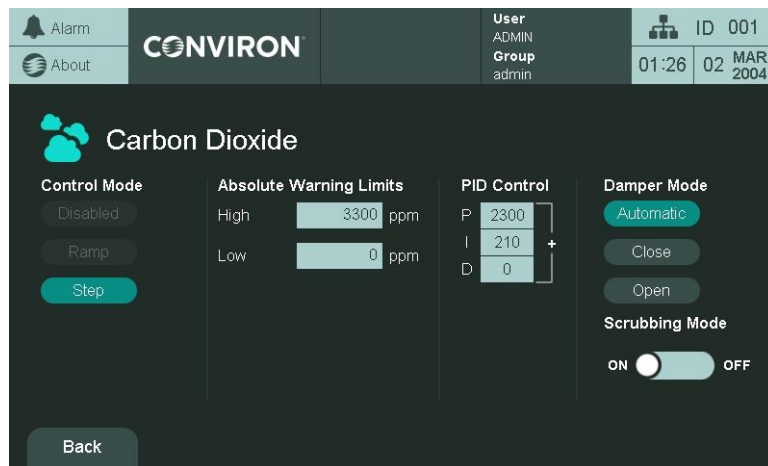


Figure 2-8 Carbon Dioxide Screen

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 CO₂ 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 CO₂ Scrubber from reaching the intended CO₂ setpoint.

To change the CO₂ 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



Conviron Technical Support is available to all users at no charge, either to assist with troubleshooting or to order parts, for the life of the equipment.

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.

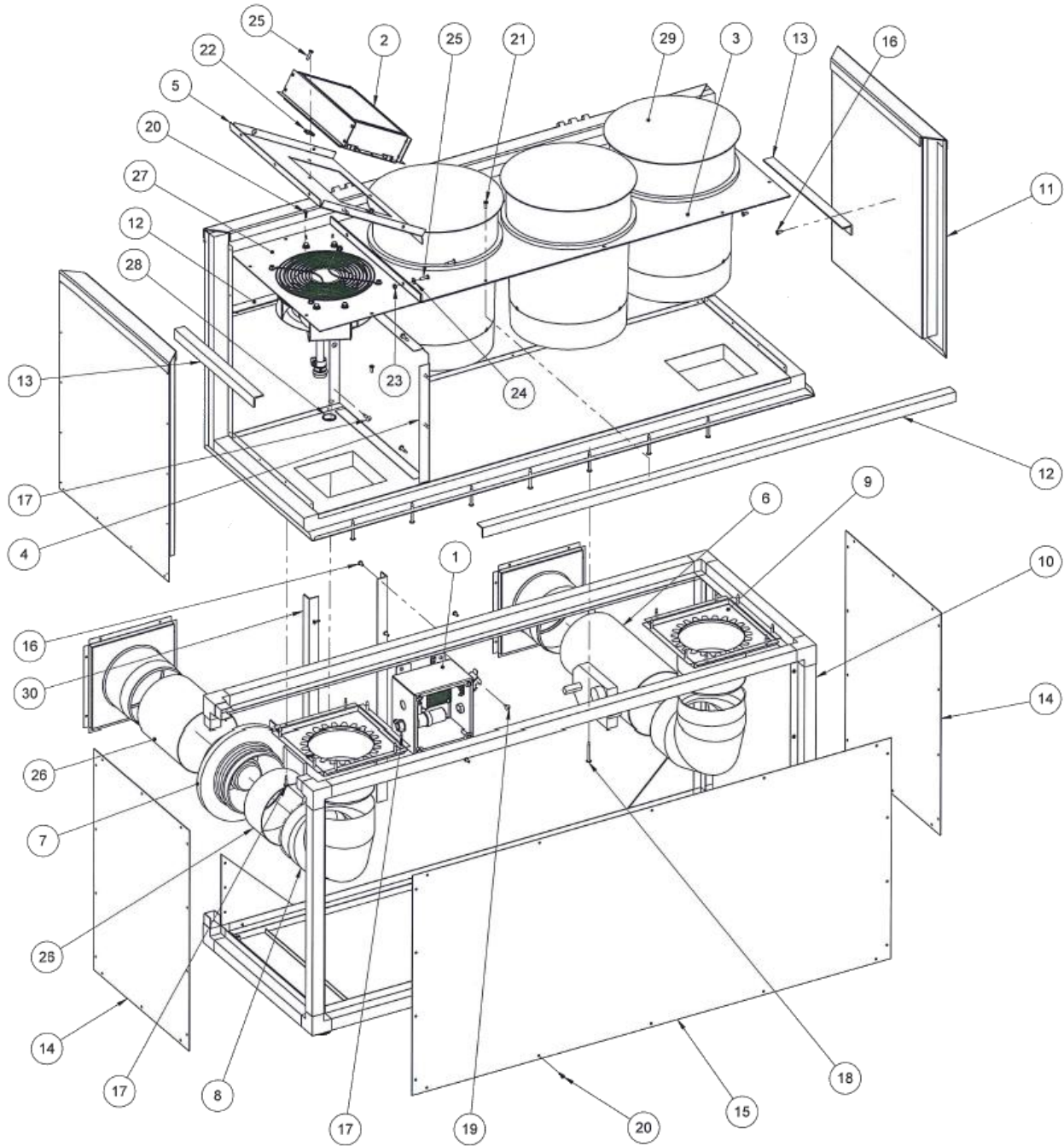


Figure 4-1 Parts List of the CO₂ Scrubber, Drawing

NOTES:

1. SEAL ALL DUCT WORK JOINTS WITH FOIL TAPE.
2. INSULATE ALL DUCT WORK WITH FIBERGLASS FOIL 79399.
3. SEAL ALL INSULATION JOINTS WITH 2" ALUMINUM FOIL TAPE 78400.
4. ASSEMBLE AIR DUCT TRANSITIONS, ELBOWS, DAMPERS, AND ACTUATOR, SHIP LOOSE WITH ASSY
5. SILICONE SEAL ALL INTERIOR JOINTS BEFORE INSTALLING INTERIOR SHEET METAL PARTS.

35	244902	SODASORB-ABSORBENT CO2 # 688-008880,5-GAL PAIL (NOT SHOWN)	3	EA
34	248575	LABEL-CO2 SCRUBBER, MEDIA CANISTER,PG40 (NOT SHOWN)	1	EA
33	76171	TAPE-SEAL,GASKET,SPONGE,RECT-SHAPE,1/2INW X 1/4INH,BLACK(NOT SHOWN)	2	FT
32	79399	INSULATION,1-1/2x48x100'FOIL (NOT SHOWN)	6	FT
31	78400	TAPE-2IN ALUM FOIL (NOT SHOWN)	1	EA
30	274882	ALUM-ANGLE SUPPORT, 22 9/16IN	2	EA
29	215957	ASSY-CO2 SCRUBBER PAIL	3	EA
28	76872	BUSHING-SNAP 1-1/8, #SB1093-15	2	EA
27	278887	ASSY-CO2 SCRUBBER FAN, 60Hz	1	EA
26	78721	PIPE-GALV, 26ga 6IN X 36IN	2	FT
25	76222	SCREW,MCH PH PNHD 10/32X3/4 SS	6	EA
24	76238	WASHER-FLAT #10 18.8 SS	2	EA
23	247864	HEX NUT 10-32 18-8 SST W/LOCK WASHER	2	EA
22	742355	NUT, U #10 STEEL PHOSPHATE	4	EA
21	76221	SCREW-MCH PH PNHD 10/32X1/2 SS	14	EA
20	77034	SCREW-TAPTITE 70, 8/32 X 1/2	47	EA
19	79903	SCREW-#10x1/2 MCH TH PH S.S. TYPE B	4	EA
18	76237	SCREW-TPG #10 X 2 PH TRUSS SS	28	EA
17	76236	SCREW-TPG #10 X 1 PH TRUSS SS	29	EA
16	79968	POP RIVET-3/16,AL-ST,OPEN,DOME HD (AD64BS)	20	EA
15	252899	PANEL-FRONT COVER,SCRUBBER FRAME,FLR MTG,PG40D	1	EA
14	252898	PANEL-SIDE COVER,SCRUBBER FRAME,FLR MTG,PG40	2	EA
13	215932	SUPPORT-SHORT,	2	EA
12	215931	SUPPORT-LONG,	2	EA
11	244375	ASSY-DOOR TO SCRUBBER TUB, WHITE EXTERIOR	1	EA
10	252871	ASSY-FRAME,MC,PG40	1	EA
9	90738	DUCT-AIR, TRANSITION 8" TO 6"	4	EA
8	78720	ELBOW-GALV. 6" ADJ. 30GA	2	EA
7	274827	DAMPER-6",IRIS W/MOTOR,POSITIVE SEAL,24V,0-10VDC,M-PS-06	1	EA
6	79032	DAMPER-6" ROUND AVD-6 W/ MOTOR	1	EA
5	252900	PLATE-MGT,HEPA FILTER,SCRUBBER, FLR MTG,PG40	1	EA
4	215930	BAFFLE-FAN ZONE,	1	EA
3	215928	BAFFLE-MEDIA PAIL,	1	EA
2	238549	ASSY-HEPA FILTER	1	EA
1	278888	B&B-ASSY,JUNCTION BOX,CO2 SCRUBBER,60HZ	1	EA
FIND NO.	PART NO.	DESCRIPTION	QTY	UM

Figure 4-2 Parts List of the CO₂ Scrubber, Table

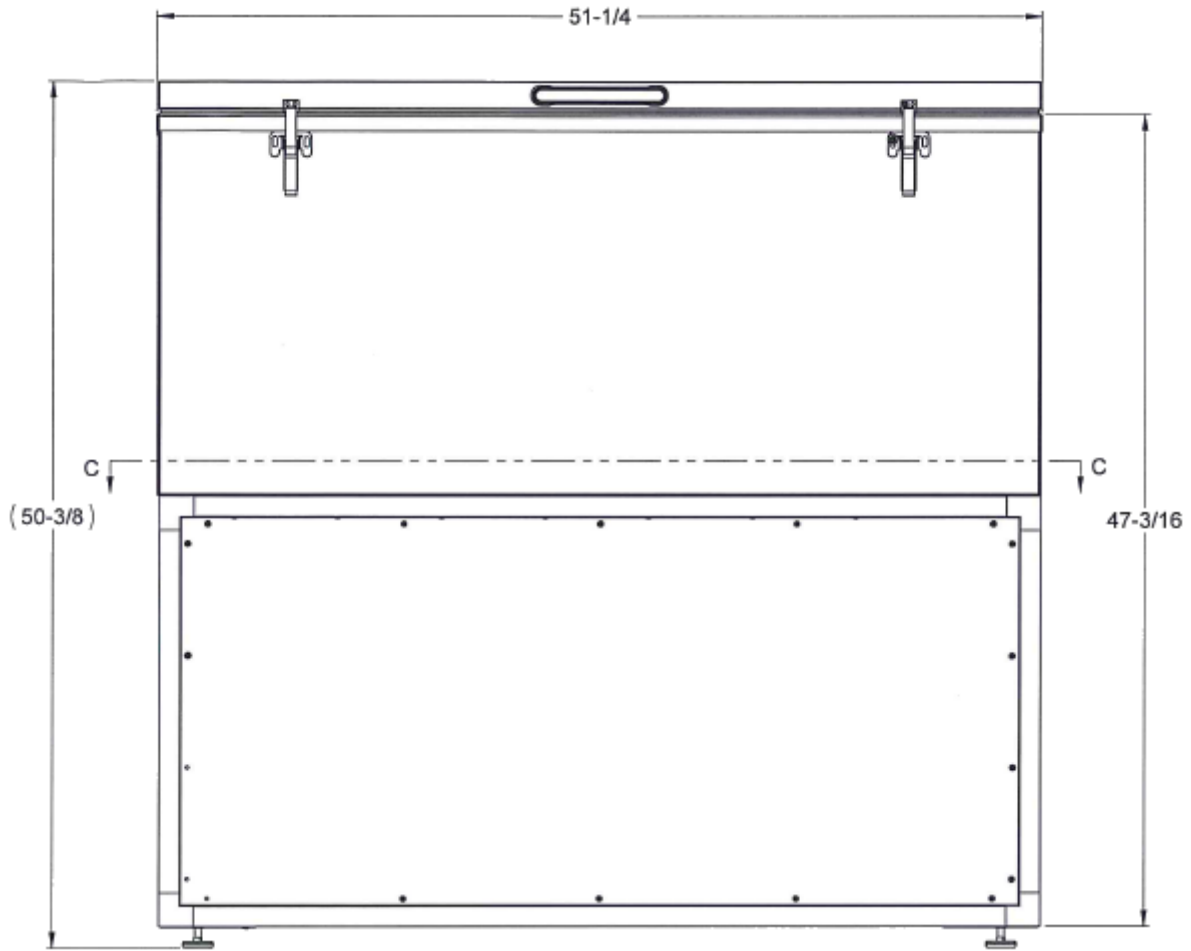


Figure 4-3 Dimensions, Front View

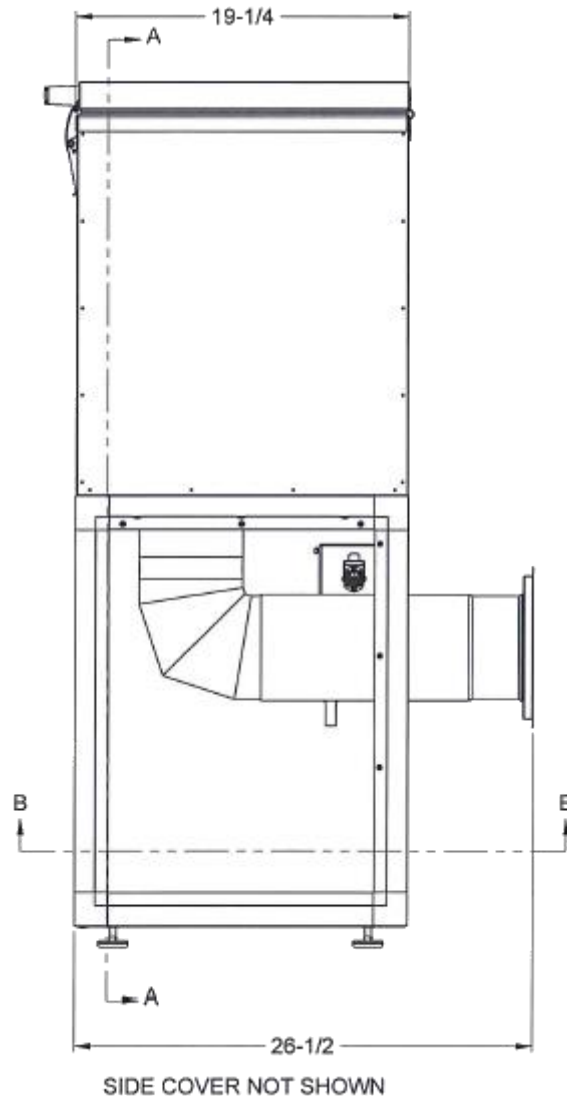


Figure 4-4 **Dimensions, Side View**

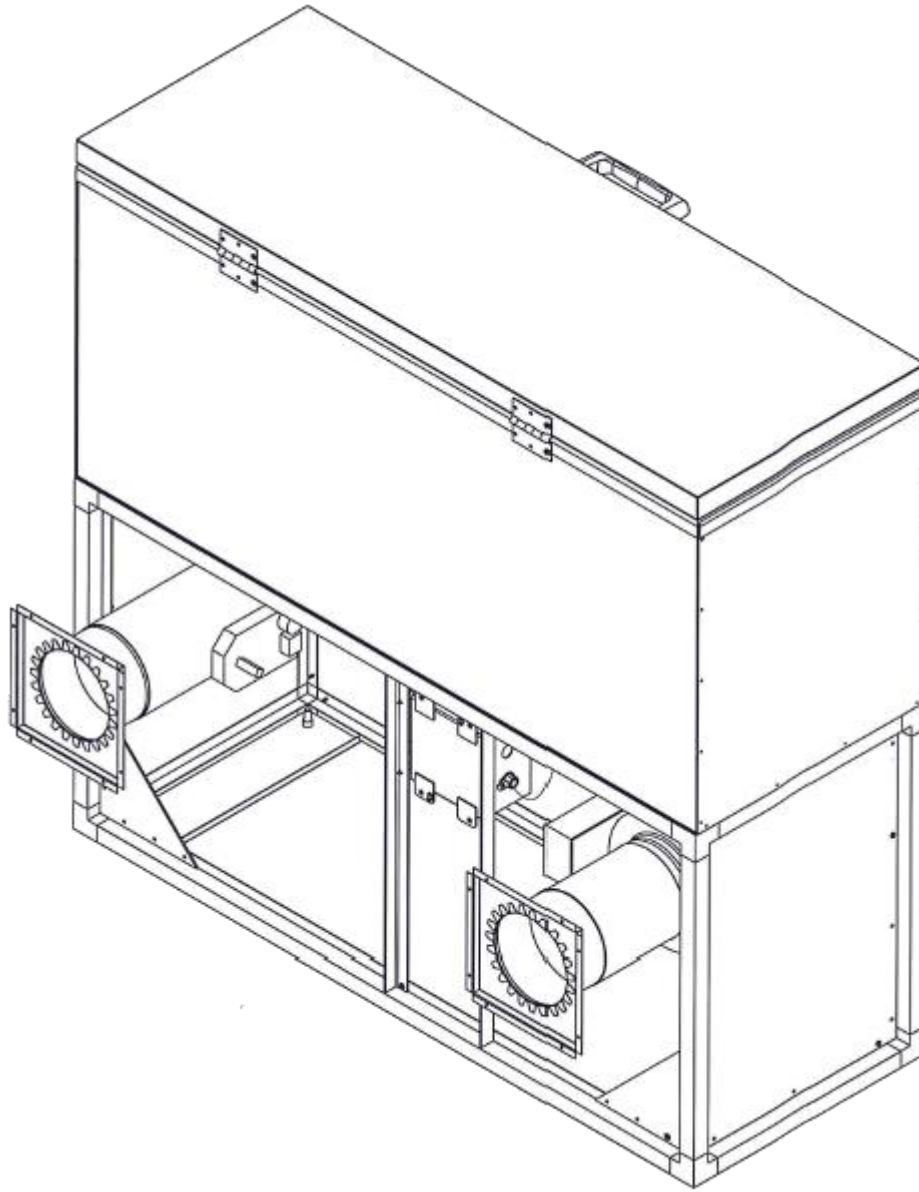
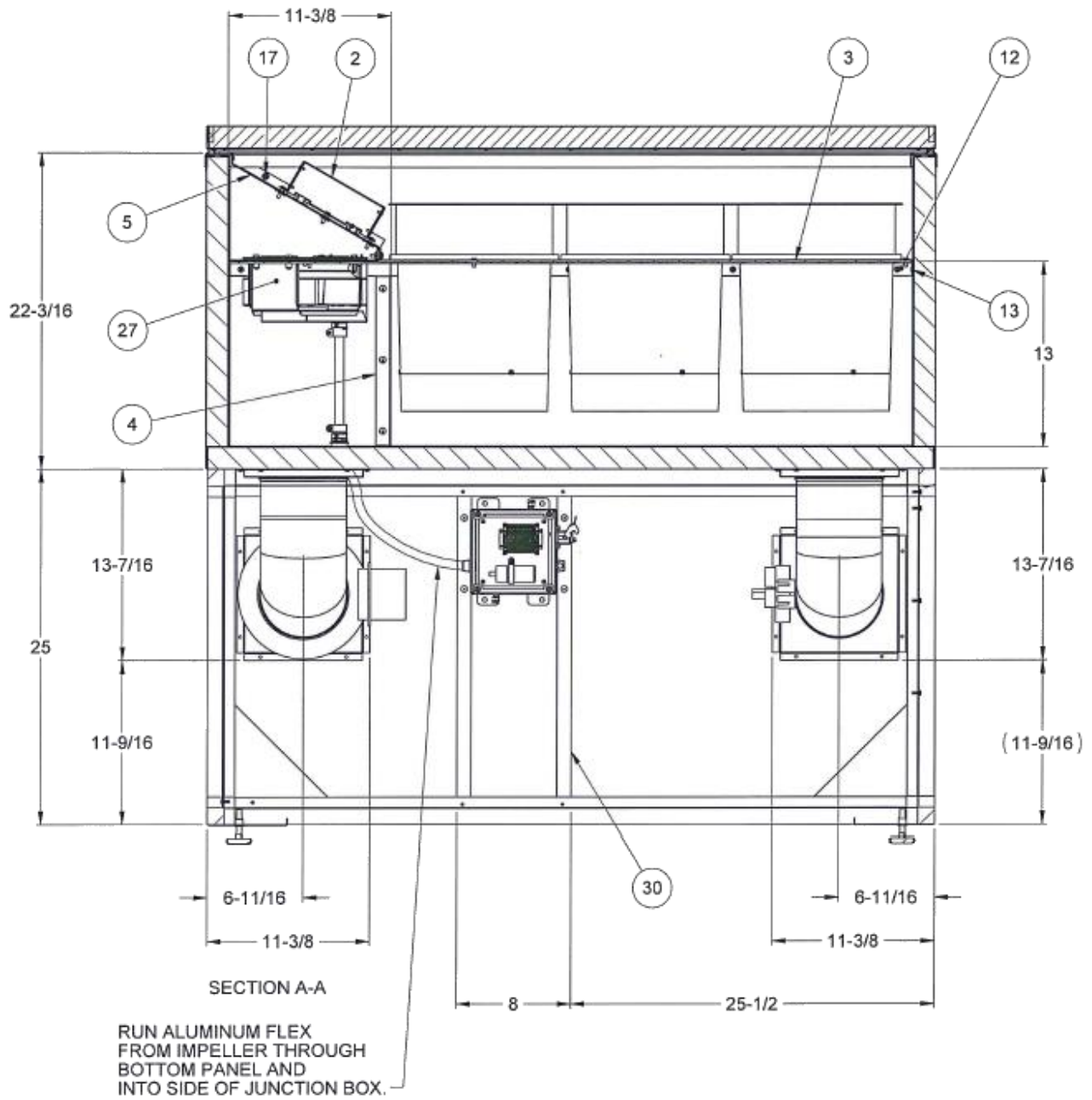


Figure 4-5 Back View



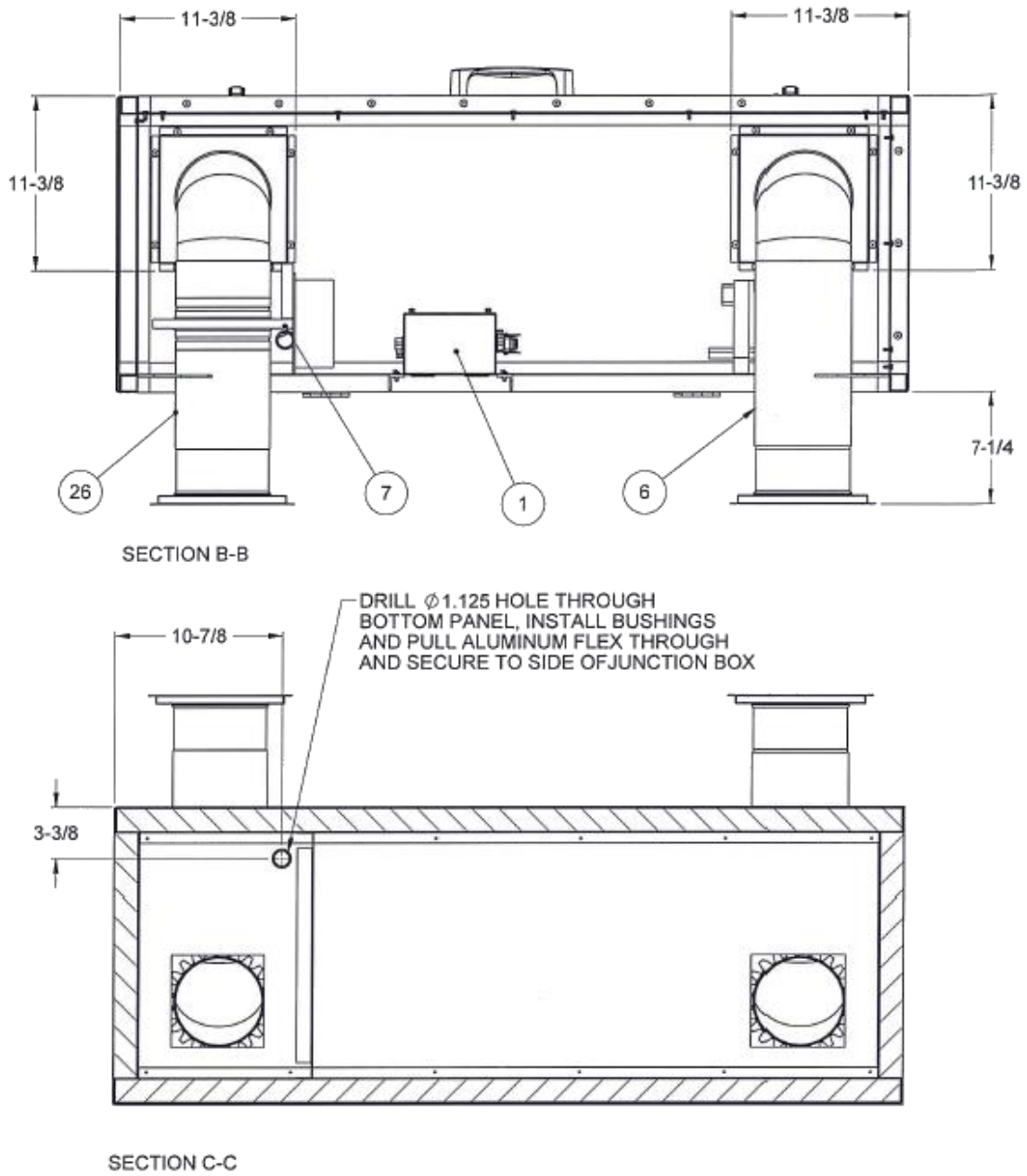


Figure 4-7 Top View, Dimensions



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280499-ENG R00, August 2017



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