CompDACS Controls Guide

For

The City of Phoenix

27th Avenue Compost Facility

Prepared by:
Michael Bryan-Brown
Jeff Gage
Green Mountain Technologies, Inc

Version 2.5 December 10, 2017

Contact:
Tel 802.368.7291
Fax 802.368.7313
sales@compostingtechnology.com

Green Mountain Technologies
5350 McDonald Ave NE
Bainbridge Island, WA 98110

Summary of Permit Requirements for Process Controls from ADEQ and MC Fire Dept.

The requirements outlined by The Maricopa County Fire Department and ADEQ for the dust, water and solid waste permits should be considered by facility operators as a minimum performance standard as non-compliance will put this facility in jeopardy of losing its permits. With that in mind, the operators shall strive to meet or surpass these requirements daily. The process designers also believe there are optimum composting procedures that surpass the permit requirements and strongly urge the operations contractor to also maintain a clean facility which manufactures quality products with minimal impacts. The following procedures are considered ideal conditions and actual operations may differ from these if they prove to be improvements in the overall operation or improve the compliance with regulatory requirements or improve product quality.

General Operating Procedures

Processing Received Materials to Meet Initial Aeration System Requirements

- Any food waste material received should be ground, loaded into the aeration zone and covered with a biocover within 2 hours to minimize odors and prevent vector attraction.
- Food waste should be ground with yard waste to evenly mix the food waste into the yard debris at a maximum ratio of 1 part food to 3 parts yard waste by volume
- Make a homogenous mix of all incoming material including the commercial and residential streams so the bulk density and moisture content are consistent. Add water just as the material is leaving the grinder as needed (target 50%-60% moisture and about 750 to 900 lbs/yd^3 wet weight.)
- Grind all the available fresh delivered yard waste and food waste material before the end of each work day.
- Assure that all paved surfaces are scraped clean every night and swept clean with power broom along the main traffic areas. The use of a rubber cutting edged bucket is the most efficient scraping method and will reduce the wearing down of concrete. Use water to rinse the receiving area surface daily to remove slime.

Brief Description of the GMT Aeration Floor Design

The floor of each 175’ by 180’ concrete aeration pad is divided into 8 zones, each zone with its own set of dampers to regulate air flow and a wireless temperature probe for feedback to the control system. Each zone has a below grade manifold with nozzles every 4’-6” across the concrete floor to distribute pressurized air as shown below. Each zone is 22.5’ x 175’ and designed for an average depth of 7’-6” of ground and watered feedstocks, giving an estimated 1050 cubic yards (803 cubic meters) of capacity per zone.

There are two blowers that provide pressure or suction to the 8 aeration zone manifolds. The aeration system is reversing, allowing either pressure (upward) or suction (downward) airflow into any aeration zone. The reversing damper system can be controlled automatically by the CompDACS Controller allowing an operator to define set points for the average temperature of the top and bottom sensors on each wireless probe, or based on a timer or manually controlled in either pressure or suction aeration. Temperature is controlled based on the average of the top and bottom temperature sensors to the control setpoint chosen by the operator.

Reversing the air flows provides a more even temperature and moisture level in the pile. It also improves the movement of oxygen into composting particles and the removal of carbon dioxide from the composting particles with a range of up to 1 psi difference in internal pressures. Pressure is the most effective direction for cooling or drying the pile and for preventing clogging of the nozzles while turning or loading the pad. Suction aeration conserves moisture, reduces visible steam from the pile and allows for greater odor control.

Figure 1 Overview of GMT Aeration System, Biofilter to left and Control Container to the right, aeration pad in the distance

Figure 2 Side View of Aeration System Positive Aeration Manifold and Dampers on the Right

The temperature probe reading from the top sensor (near the handles) and the tip sensor (deepest in the pile) is averaged by the CompDACS controller and helps the controller define the damper position for that zone and thus the volume of air flowing to each zone. The hotter the zone, the more the damper opens and the more air the damper provides for cooling to that zone. The controller will regulate the average of the two temperature sensors in pile to the set point the operator determines in the control software. If the piles are too cool, the controller will reduce the opening of the dampers to a set minimum that is designed to provide adequate oxygen without removing too much heat from the pile. The minimum setting is crucial to assuring enough air enters the piles to maintain aerobic conditions of > 13% Oxygen. This will tend to heat up the piles, allowing the automated opening of the dampers to cool the pile as needed and the minimum allowing the piles to heat up effectively.

Settings are available that allow for reversing in a timed manner, or using a PID control logic loop to automatically determine when to go from pressure to suction. The longer the time between switching directions, the more heat is removed from the pile. To heat cooler piles, the “reversing timed” setting is used to build up heat within the piles. PID Reversing Criteria settings exist in the Utility Screen. There is s switch that allows the sign of the PID to be

switched from negative feedback to positive feedback. During reversing PID this sign should be negative and during positive PID operation only this sign should be switched to positive. (this has not been verified to date due to suction blower vibration issues)

The primary adjustment for the operator is to set the blower pressure that provides adequate cooling for hot piles, without wasting power, or adding too much air to the cooler piles. The expected pressure settings are between 10" and 16" w.c. on the pressure blower manifold sensor and -10" and -18" w.c. on the suction blower manifold sensor. The turning controls automatically turn the zone to full open pressure damper while moving the piles to reduce nozzle clogging. The manifold pressure setting for the pressure blower should be set as high as practical during turning events. The system can be controlled from any computer over the internet with the current Team Viewer password, including tablets and smartphones. There is a second system of GoToMyPC loaded on the host computer which is accessible to those given the current passcode. Alarms and alerts can be set to notify an operator by email and/or text when a problem occurs with the system or piles.

Turning must occur at least once a week but operates best if turned twice a week. The more frequent handling improves moisture control and porosity, and makes it easier to go through the pile with the compost turner. Turning should not be more frequent than once every 2 days as the materials will be immature as they leave the aeration pad.

On the following page is a schematic of the below grade aeration pipes and the air flow calculations used to design the facility. This provides a wealth of information including pipe diameters, nozzle diameters, and pressure losses for the aeration floor. During start up the aeration system, the pipe system losses measured close to the calculated losses with an empty pad. Pile losses were estimated at 2" w.c. +/-1" w.c.. Biofilter losses measured at the biofilter manifold were estimated at 2" initially, growing to over 6" w.c. at the end of the biofilters functional life, during startup, measured losses after initial construction were less than 0.5" w.c. for the biofilter.

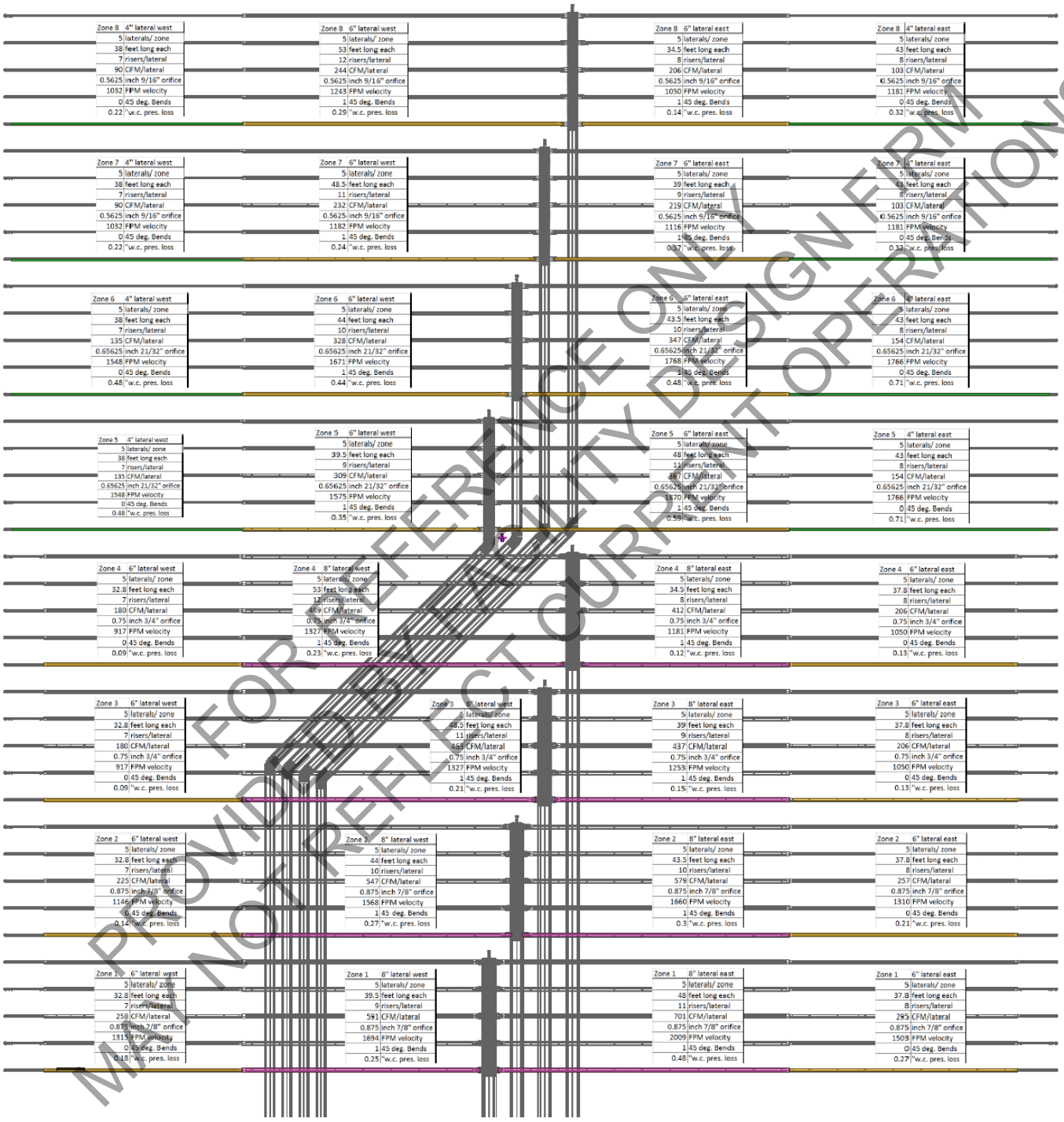
Figure 3 Zones One and Two the Shiny Area With All Piping Below Grade

The north to south pipes shown in the following graphic, are the zone distribution manifolds for the east to west pipes which are the lateral manifolds for each of the spargers or nozzles that deliver or remove air under the pile at the concrete surface. There are 5 laterals per aeration zone. Each one of the nozzles or spargers are a certain hole diameter to reduce overall airflow through the zone as materials get more mature, and to allow the velocity of the exiting air to still exceed 70 mph at 7 inches water column pressure or greater. This velocity and pressure allow the nozzles or spargers to tend to be self-cleaning unless a loader tire presses the compost into the hole. Therefore loaders should NEVER drive on spilled compost that covers the aeration floor. Keep the aeration pad scraped clean before covering with compost and visually check that the each nozzle is blowing air readily.

The blowing air, creates a temporary pocket around the nozzle as materials are placed on top of it. Removing much of the fine grained material near the hole, leaving small sticks or other structural materials to provide access to the hole during suction. The pocket collapses over time and excessive drying occurs near the nozzle, so it is important to turn at least once per week to reestablish both air nozzle clearance, moisture control and pile porosity.

City of Phoenix Aeration Pad Design

	Blower Set 1			Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8
Piles to be controlled	164 feet long			164 feet long	164 feet long	164 feet long	164 feet long	164 feet long	164 feet long	164 feet long	164 feet long
	183 feet wide			25.833 feet wide	22.5 feet wide	22.5 feet wide	22.5 feet wide	22.5 feet wide	22.5 feet wide	22.5 feet wide	22.5 feet wide
	8 feet high			8 feet high	8 feet high	8 feet high	8 feet high	8 feet high	8 feet high	8 feet high	8 feet high
Volume	8,909 cubic yards		Total/set	1,255 cubic yards	1,093 cubic yards	1,093 cubic yards	1,093 cubic yards	1,093 cubic yards	1,093 cubic yards	1,093 cubic yards	1,093 cubic yards
Total aeratation volume	31,769 cfm/blower			6,276 cfm/zone	5,467 cfm/zone	4,373 cfm/zone	4,373 cfm/zone	3,280 cfm/zone	3,280 cfm/zone	2,187 cfm/zone	2,187 cfm/zone
Aeration rate	3.57 cfm/cy		(average)	5 cfm/cy	5 cfm/cy	4 cfm/cy	4 cfm/cy	3 cfm/cy	3 cfm/cy	2 cfm/cy	2 cfm/cy
Orifice spacing on lateral	4.6428 feet			6.2 cy/orifice	6.2 cy/orifice	6.2 cy/orifice	6.2 cy/orifice	6.2 cy/orifice	6.2 cy/orifice	6.2 cy/orifice	6.2 cy/orifice
Spacing between laterals	4.5 feet			36.9 cfm/orifice	32.2 cfm/orifice	25.7 cfm/orifice	25.7 cfm/orifice	19.3 cfm/orifice	19.3 cfm/orifice	12.9 cfm/orifice	12.9 cfm/orifice
Orifice diameter	170 orifices/zone			0.875 inches 7/8"	0.875 inches 7/8"	0.75 inches 3/4"	0.75 inches 3/4"	0.65625 inch 21/32"	0.65625 inch 21/32"	0.5625 inch 9/16"	0.5625 inch 9/16"
Velocity at orifice	7040 fpm		target	8865 fpm	7188 fpm	7827 fpm	7827 fpm	7667 fpm	7667 fpm	6957 fpm	6957 fpm
orifice press loss				0.06 " w.c. loss	0.04 " w.c. loss	0.05 " w.c. loss	0.05 " w.c. loss	0.06 " w.c. loss	0.06 " w.c. loss	0.06 " w.c. loss	0.06 " w.c. loss
Velocity at riser	1.5 inch dia.		for all risers	3008 fpm	2625 fpm	2095 fpm	2095 fpm	1574 fpm	1574 fpm	1052 fpm	1052 fpm
# 90 deg bends	1			1	1	1	1	1	1	1	1
Riser pressure loss	2 feet long			1.99 " w.c. loss	1.51 " w.c. loss	0.96 " w.c. loss	0.96 " w.c. loss	0.54 " w.c. loss	0.54 " w.c. loss	0.24 " w.c. loss	0.24 " w.c. loss



Temperature Probes

Each zone has a dedicated temperature probe that connects wirelessly to the Receiver on the mast above the controls container, from there it is wired to the Eco-Probe Receiver box in the controls room, it is the stainless-steel box in the Southeast corner. The receiver is wired to the CompDACS process controller with both data and power to allow the controller to restart the receiver as needed. The temperature probes are made of a high temperature tolerant PVC, for excellent corrosion protection, and are 60" long and have two sensors for recording temperature at different depths. There is an upper sensor located at 18 inches from the handles and a bottom sensor located at the tip of the probe.

Place the probes near the center of the aeration zones keeping the correct probe number in the same numbered zone. **The probes must be inserted at full depth within the pile to within 6 inches of the handles to assure proper temperature sensor location.** It is easiest to insert the probe right after a pile is turned before it consolidates. Do not bend the probe, always push straight down on the handles towards the tip of the probe. If something gets in the way of full insertion, stop and try another location nearby. The top temperature sensor controls the air flow in negative and bottom sensor in positive.

Flags are mounted to the top of each probe to be able to scan a pile before turning and remove the probes if still in the pile. The operator should use landscaping flags or wooden stakes to identify and travel through the process with each pile. Indicating the name of that batch, and placed on the west side of the pile. These should also be removed and replaced during turning following the pile they identify with.

1. **Zonal air volume control** - Each zone has its own set of 2 butterfly dampers which control how much air is delivered into the pile. One is on the suction manifold (negative) located in the below ground concrete vault and one on the pressure manifold (positive)located above the concrete vault made of stainless steel. The air flow is adjusted in either pressure or suction mode by the amount of air allowed into the pile by the percentage of open that the damper is automatically placed at, based on the temperature feedback given to the computer for that zone. Air is delivered at all times in varying amounts, there is no on/off cycle. This assures that oxygen is always available within the compost pile. Less airflow heats up the pile and more airflow cools down the pile. The air flow amounts are controlled by the computer automatically by changing the damper position to modify the air flow needed to cool the pile in that zone. It takes approximately 2 minutes to change the damper from fully open to fully closed and vice-versa. It takes a compost pile several hours to gain or lose heat. The temperature range for each temperature condition listed below can be configured by the operator from the computer during set up and to adjust for changing temperature control requirements.

    a. **System Pressure –** total airflow for the entire aeration pad is controlled by the system pressure setting. If the piles do not cool down, and the dampers are always at 100% open, the operator must adjust the system pressure setting upwards by one or two inches water column. If the system in general is too cold, the system pressure settings need to be adjusted downwards one or two inches water column. **The normal operating range for pressure is between 5 and 16 inches water column.** Pressure changes will be needed to accommodate for; settling biofilter media, changing pile height or compost mix density or moisture. During start-up and during any significant seasonal changes the adequacy of the pressure settings should be evaluated and adjusted accordingly. For both the pressure manifold and the suction manifold. We suggest making changes in increments of 0.5" w.c. and allowing several hours to pass before making another adjustment so that you do not overshoot the right pressure setting.

b. **Air Flow Direction** – Air flow is either pushed through the pile from the floor (positive), or pulled from the pile through the floor (negative). This is done by changing the 2 large manifold dampers, fresh air damper on the left and exhaust damper on right as shown on the photo below.

The reason to change air flow direction is to ensure that the pile is uniformly cooled and dried. If air flow is just from one direction, the side that receives the fresh air will be the coolest and the side that the air exits from is the hottest. This temperature differential can exceed 25 degrees C in a deep pile.

i. The minimum duty cycle time between reversing cycles is 20 minutes which will tend to warm up a pile.
ii. During reversing PID the watchdog change of direction can be set under the utility setting, expected time is around 90 minutes to keep an active pile cooling.
iii. If more cooling and drying is required, increase the length of time between watchdog cycles
iv. If less drying and higher temperatures are required, shorten the time between cycles.
v. If there is fresh odorous material on the pad, set the system for Zones 1 and 2 into PID Negative Only for 12-24 h, until the aeration begins to control the odorous conditions.

Compost Aeration Floor Operating Guidelines

The Aeration floor is sized to manage up to 24 days of incoming fresh material in the 8 aeration zones at peak capacity. Turning can be accomplished with either a loader or a CT1010 side discharge turner. Using a loader, the material will be rewetted and moved once every 7 days of composting. Using a compost turner the system is designed to be turned once every 2 to 4 days. The two turning operations are described below.

Unloading a Zone

Identify the zone you want to unload and remove the temperature probe and place it on the probe rack on the back of the turner. The aeration control is managed by the tablet turning screen in the cab of the compost turner. Line up the edge of the zones using the 2 post zone indicators. As you dig out the zone, scrape the pad surface clean as you approach the pile so no compost is packed under the loader wheels. Try to avoid driving over compost and compacting compost into the nozzle. Keep loading out compost until you have reached the end of the row.

Loading a Zone

Using the control tablet, click the turn button on the zone you are filling and it will turn the dampers to 100% open pressure to keep the nozzles clear during loading and unloading. All compost material moving onto the aeration floor should have a moisture content of 55-65% and a bulk density of less than 900#/yds. Before loading, check the nozzles in the concrete to make sure they are unclogged. Start moving material into the empty zone and try to keep the face as steep as possible to prevent driving on compost when you bring in your next bucket load. Do not drive on the compost or on the compost pile. Try to keep the pile depth to 7'-6" with a flat top. Maximum height is 10' for both effective aeration and operation of the turner. Use the 10' depth only during peak events as it will slow processing time. Once the zone is full, hit the control tablet move button and complete the water documentation instructions. This allow the pile just turned to go to automatic control, and then reinsert the temperature probe into the proper zone.

Turning the Aeration Floor Using a Loader

If the turning equipment is not able to be used, a loader can be used to move the materials out of the oldest zone and then move each pile in sequence from the south to the north by one zone. It is important to make sure water is added just before or while the pile is being moved. This is also a good time to consolidate piles that have shrunk, and doubling up the number of piles in a zone.

Positive aeration is important to use during turning and when loading a zone to keep nozzles clear!

Turning the Aeration Floor Using the Compost Turner

The Vermeer CT1010 side discharge turner is capable of moving 1,500 cu.yd. per hour of compost across the aeration zones. The aeration floor was laid out to allow the turner to turn the material sideways and return down the same alley way it just made to reset back at the west side of the pile. The surface of the compost piles should be wetted with the hose reel using the water cannons prior to turning to reduce dust. The hose reel should then be connected to the back of the turner to add water during each pass as the material is flying off of the discharge conveyor. Watering is the most important part of turning. Moisture losses can exceed 2%/day and keeping the piles moist enough to compost is a challenge for most facilities, and becomes easier with frequent moderate applications.

Prior to turning, remove the probes from the piles and place them on the racks in the back of the turner. The compost turner requires a 25 foot wide gap to be removed from the mass bed at the north end and packed out to the curing piles. After removing those zones, turn the aeration system to 100% positive, and check the exposed floor for plugged nozzles. The compost turner then drives into the pile next to the gap and turns and throws the compost towards the open zone. Keeping the compost turner wiper level usually keeps the compost away from the tracks and keeps the nozzles clear. The nozzles should be visually checked as the operator passes the zone to make sure they have not gotten clogged during turning. Poking clogged holes with a stick ora toe kick is usually sufficient.

Moisture Addition System

Water is added to the mass bed using irrigation cannons located on hose carts. Just before a turning event, water should be added to the compost piles using the water cannons this will reduce dust generated for a dry top layer. Each zone has 1,000 cubic yards at a depth of 7'-6". Assuming that the material will lose 6-8% moisure over 4 days it will require about 6000 gallons per zone to rewet. The water cannons are capable of XX gallons per minute and will cover 4 zones. Each cannon will require XX hours of watering time to apply approximately 24,000 gallons of water prior to turning. Each cannon will saturate the top of the pile with water and the turner will blend into the mass as it turns. In addition, the spray bar can be used for the side discharge conveyor to more effectively wet all the material as it turns the pile.

Biofilter Maintenance

Biofilter Theory

The biofilter is a large bed of ground wood waste placed over a series of pipes that distribute odourous air for odor removal. A biofilter uses a thin film of water on all the wood chip's surfaces to adsorb odor compounds, and then the bacteria within the water film digest the odors as a food or energy source. The temperature of the biofilter should be kept below 105°F to condense the process air and encourage the growth of mesophilic bacteria. The airflow tends to dry out the biofilter except during cool winter days when the moisture in the air condenses within the biofilter. So watering the biofilter regularly during dry weather is essential to its performance. Allowing a biofilter to dry out makes it very difficult to remoisten. The biofilter should operate with 1-3" w.c. back pressure on

the duct. If the pressure increases, then it indicates that the media is clogging or degrading and may need replacing. The blowers were designed with a maximum static pressure of 7" w.c. for the biofilter. At that point the media must be replaced

Biofilter Maintenance

Check the biofilter daily and make sure the material below the surface glistens with visible moisture during dry weather. If it does not, water the biofilter for about 20 to 30 minutes twice a day. Installing an automatic sprinkler system can reduce the costs of maintaining biofilter moisture and make sure the watering occurs on a regular schedule. Even and consistent watering patterns are also essential for biofilter performance and reducing short circuiting. The 8" HDPE perforated pipe underneath the media also have fernco removable caps for cleanouts which allow for periodic cleaning by jetter if the back pressure increases. Over time the wood chips degrade and lose their porosity and will require replacement.

Biofilter Media Replacement

After 1.5 to 2 years, the biofilter is usually ready to be replaced. The pipes are pulled out using a loader and chain under the bucket edge, keeping the pipe level to the ground while being removed. After the pipes are removed, The wood chips can be dug up, ground, dried and sold as a nutrient rich wood mulch, or just added as a daily cover to the compost system to make finished compost. Clean the area around the distribution manifold, and relocate the pipes into the manifold, keeping the holes on either side of the pipe level. Cover the pipes with fresh ground wood and 10% compost overs which have been blended with a windrow turner and watered. Build the media to a depth of 5' over the HDPE piping trying to keep the 8" pipe on 4' centers. Add water as needed while layering in the new media. The back manifold is designed to be buried by media to keep the manifold from the direct sun and reduce the expansion and contraction of the pipe.

Two temperature probes are placed in the biofilter media to monitor the bed temperatures. The probes are 4 foot long and sample temperatures at the tip of the probe, they should be inserted about 2 to 3 feet from the surface.

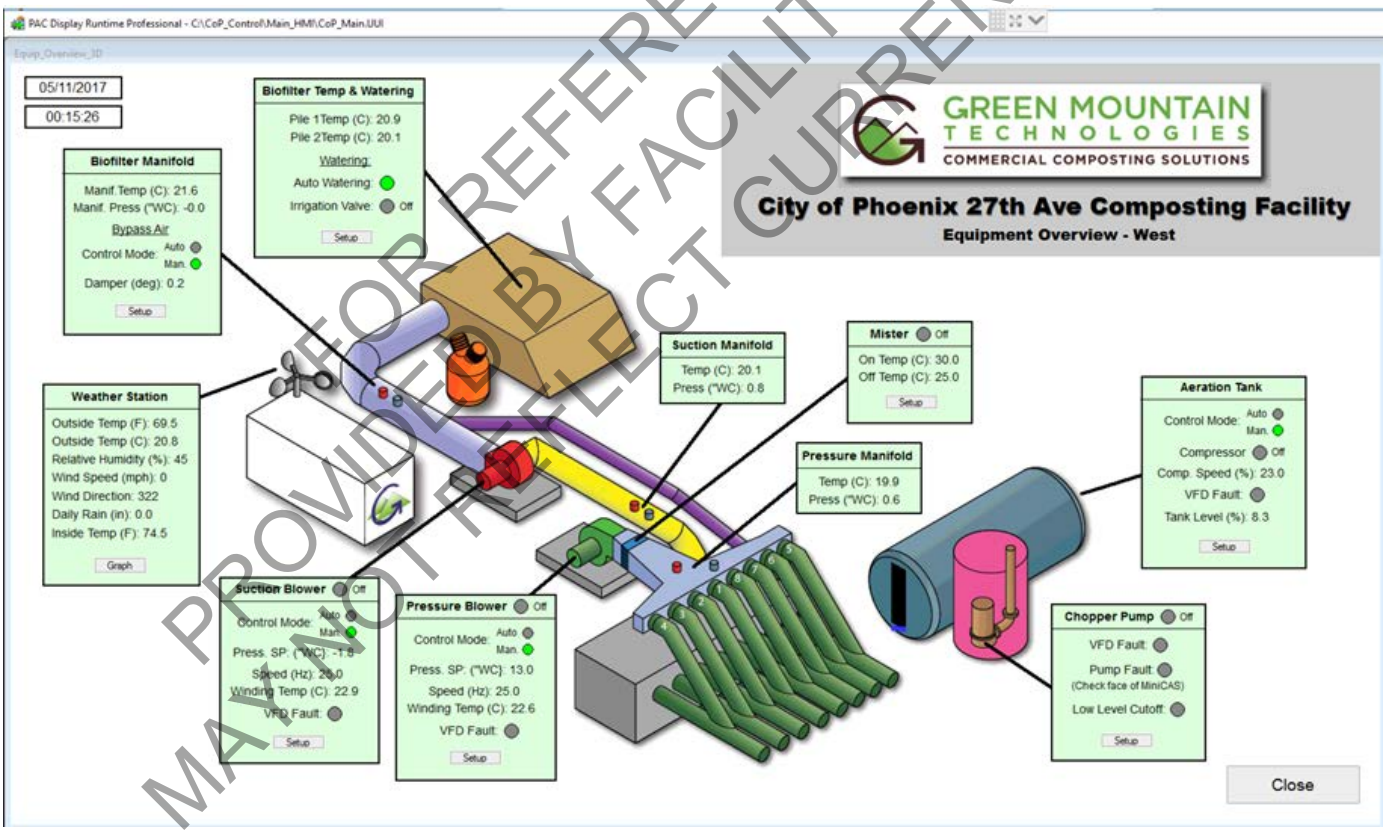
Sprinklers are intended to cover the whole biofilter evenly including the sides of the biofilter. Watering in the evening and early morning allows for calmer wind conditions and reduces the likelihood of the spray missing the pile. A irrigation timer is provided in the controls to determine the duration and frequency of the irrigation. It is best to set it according to an even number of minutes within a full day to keep the irrigation times dependable.

Quick Reference Guide to the CompDACS Control System

The 27th Ave. Compost Facility control system for 110,000 tons per year uses four blowers. Two blowers provide pressure and two blowers provide suction. As shown in the control screen shot below, these are put into two pairs of blowers, with one pressure (green) and one suction (red) blower together. The blowers provide airflow into or out of two distribution manifolds, one metal manifold for pressure that is seen above ground (blue), and one concrete for suction which is directly below ground (shown in gray) from the pressure manifold.

The blowers each have a Variable Frequency Drive (VFD) in the GMT Controls Container (white) to allow the controller to adjust the speed of the blowers in relation to the measured pressure (red dots) in each distribution manifold and the operator defined pressure set-point for each manifold. Manifold temperatures (green dots) are also monitored and used to manage the suction air temperature to stay below 104 degrees F as it enters the biofilter (brown). The controller uses the bypass damper (purple) to feed cooler ambient air into the biofilter manifold (lavender). If ambient air conditions are too hot and dry, a set of mister nozzles (bright blue band) are used to cool the ambient air exiting the pressure blower.

There are 8 butterfly dampers for the zone manifolds (dark green). Each aeration zone has 2 of these dampers one suction and one pressure damper. The dampers for each zone are controlled independently of the other zones, so either the pressure or suction dampers may be open at any time, changing the pressure in each distribution manifold at any time. However these changes are slow. It takes about 2 minutes for each damper to go from fully closed to fully open. The automation system closes one damper before opening the other in each zone. The controller will then increase or decrease the blower speed to maintain the pressure set-point in the distribution manifold as dampers open and close as needed.

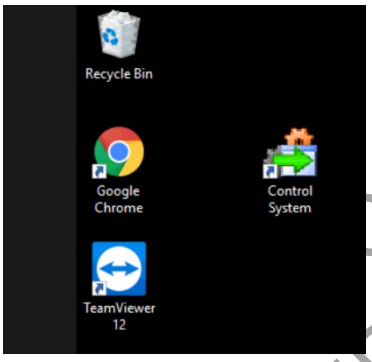


Each aeration zone has at least one wireless temperature probe with a bottom sensor at the tip of the probe and a top sensor located 18" below the probe handle. It is essential that the number on the probe matches the zone number so that the dampers can control the heat. Heat moves in the direction of airflow, and as the airflow cools the sensor nearest the source of airflow, it indicates that it has met the temperature set-point, and the airflow is reversed to cool the other sensor. The temperature feedback helps keep pile temperatures in control. Proper probe placement is thus very important. The probe should be roughly in the center of the aeration zone with the pile surface being within 6 inches of the handle.

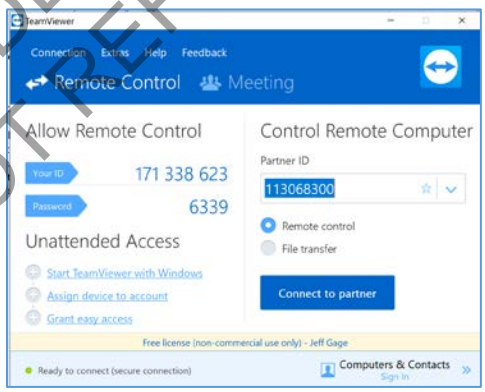
The CompDACS controller uses an OPTO22 PAC Display Runtime Professional program to be the Human Machine Interface (HMI) on the computer to allow the operator to see and control what the CompDACS controller is reading and doing. The CompDACS controller is the grey box on the wall behind the computer operator's chair. This controller is a Programmable Logic Controller or PLC which uses the set-points and sensor inputs and then sends instructions for blowers and dampers to respond to the controller determined setting, waiting a bit and then readjusting constantly to meet the temperature and pressure targets. Each blower group is managed by the same CompDACS control panel. One word of advice, this system is designed to respond slowly and methodically to keep the system stable, do not expect immediate response to your commands Captain! Wait and watch, it should begin within a few minutes to do what you asked.

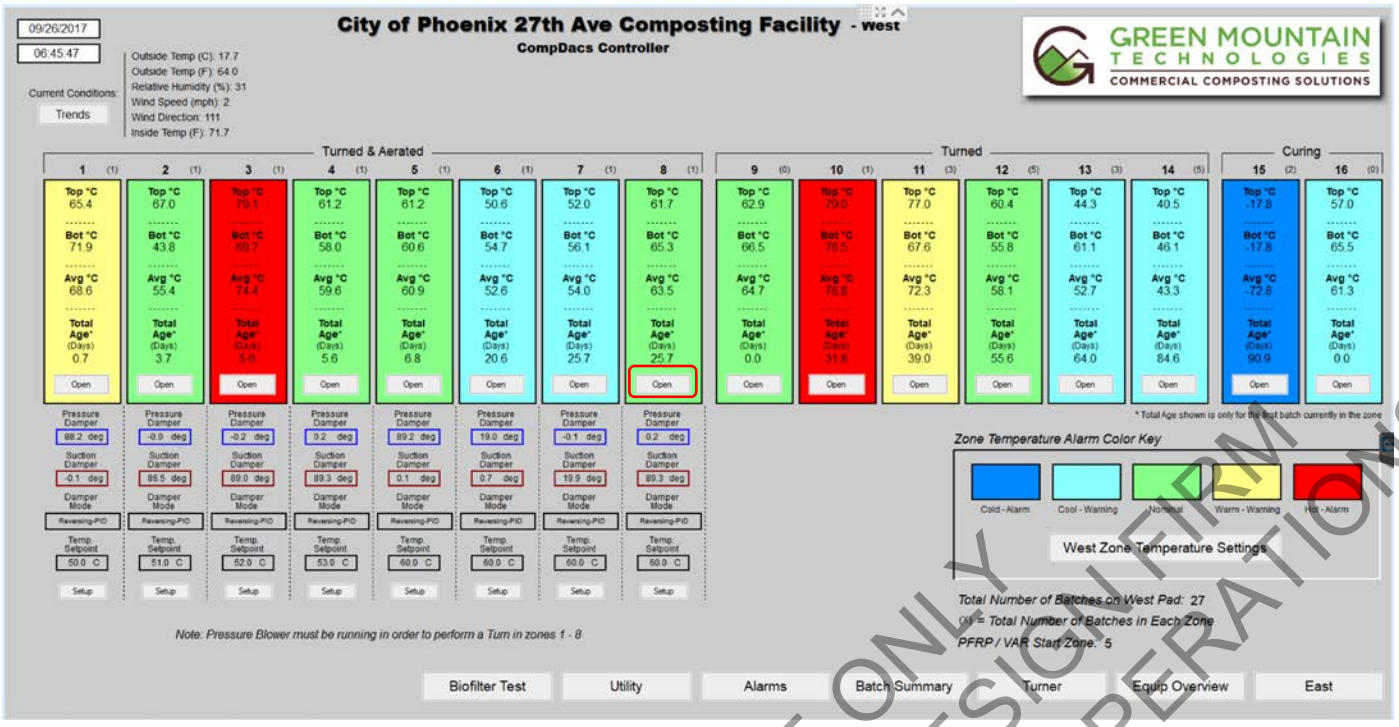
Start-up

To manage the CompDACS Controller after a power outage, or inadvertent shut down, turn on or wake up the computer. The Windows log in is JP login, and the Password is $GMT7102rot* Keep the computer on always to allow remote access to the controller. The program Team Viewer is used to communicate over the internet with the controller from your own computer, so that should be left running also. There is a 4-digit connection coded needed for any computer you want to grant access to. This 4-digit password is changed every time the team viewer program is rebooted, so do not shut down Team Viewer. If you happen to, you will need to resend the new 4 digit password to everyone you want to grant access to.



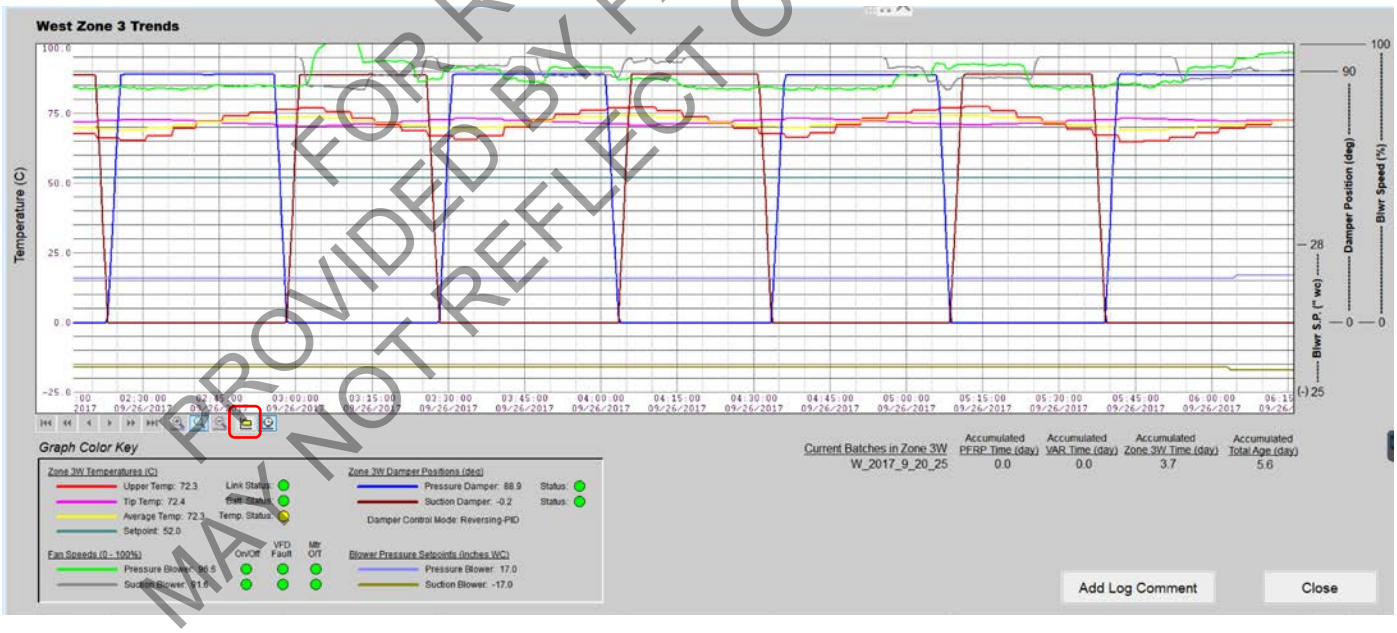
On the Desktop, Open the Control System Icon which will start PACS Display Runtime Professional program on the computer. Open the Team Viewer program icon from the desktop if it is not already on. Note the 4 digit password on the left of the Team viewer panel. Log this number in the Google Sheets controller log and jot it down to pass along to each of the people who you want to have access to the computer. You can access the whole computer system remotely, from your office or home as needed with this information. For each new machine you want to sign in from, you will need the Partner ID # which is currently 113068300. Then enter the 4 digit password when prompted in the pop-up screen.





This is the first screen you will see. It is of the Main Pad West Aeration Zones Information Screen. This shows an overview of all the zones connected to the CompDACS™ system. Each zone with a temperature probe has an associated image color that lets you know at a glance if the batch is currently active and operating within specified temperature parameters by using blue for cold alarm, light blue for cool warning, green for nominal or within set point, yellow for warm warning and finally to red as too bloody hot.

Any compost zone can be selected by using the Open button to view current batch information. This most recent batch information day is shown in a graph as shown below. The zone history for previous days can be seen by clicking the folder icon directly under the graph shown circled in red and selecting the day you want to review from the log files.



The status of that zone is shown below the graph as well including:

- Zone sensor communication status, including battery level, and communication
- Top & bottom compost temperatures, average temperatures, and temperature set point
- Damper positions and operating mode, including actuator communication status
- Blower pressure set points and current fan speeds
- PFRP & VAR time accumulated in days
- Batch start date/time and age
- If you click on the Add Log Comment on the lower right you can see the batch notes of feedstocks and water added information

When done looking at the batch controls and data information, you can hit the close button in the bottom right hand corner.

How to start a batch

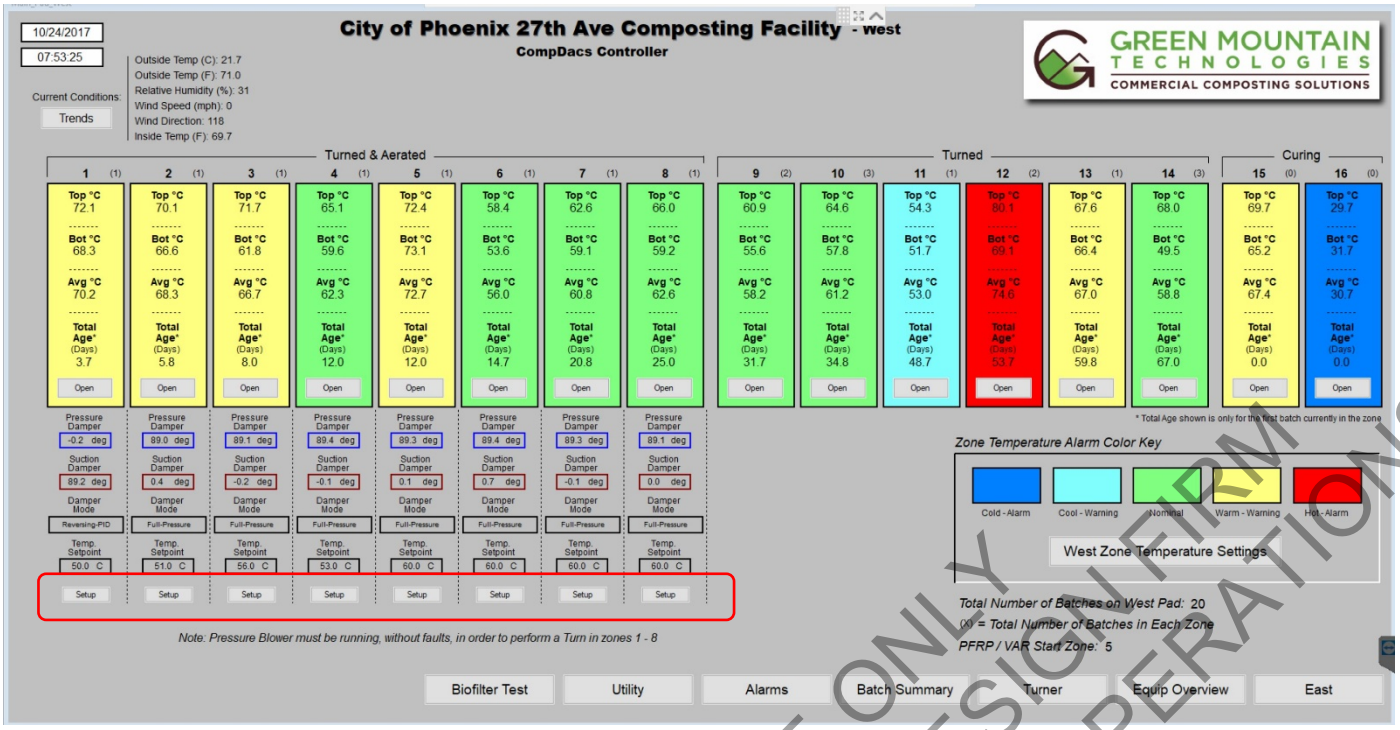
Located to the bottom left of the Zone One information screen is the Add Material button. When you start filling Zone 1W with fresh ground and mixed material, click on the Add Material button. Enter detailed information on what is being put in at the end of each day (or the next morning) this allows information to be as detailed as the info on each scale ticket, and eventually it may be automatically uploaded from the scale house information system. So this is where you should be adding as much information as you want regarding what is going into the initial pile, the material type and other pertinent data which will help you track the contents and mix in each batch, as you fill zone one. There must be at least one entry made in the Add Material window before you can start a batch.

This data is kept with the batch as it moves through each zone, and temperatures and water additions and all the control data is kept within this batch record. It asks for what you believe the starting moisture levels are, use the hand squeeze moisture estimation or do a drying of a sample to get the actual amount of starting moisture.

When zone 1 is filled, push the Start Batch button to initiate the data recording for that batch, after this you can no longer use the add materials button. It will prompt you to name the file adding to the preset naming conditions like date and place, and adding what you consider pertinent information like Green waste or Food waste - wood waste - green waste regarding what is in the batch. Use abbreviations like GW or FW-WW-GW that are meaningful to the operator. For example, a batch that is 10% food waste could look like this: W_2017_09_20_25_FW10_GW90. Reporting this batch number with samples sent to the laboratory

Once a batch is started and waiting to be moved off Zone 1, you can no longer add more material to the batch. So be sure to estimate and add the number of scoops of biocover you will add after the first turn. Once the turn of zone one is completed, the computer closes that batch and allows a new batch to be started in Zone 1W. Use the Add Material button and repeat until zone 1W is full again. Zone 1E is a separate batch with its own data set and its own batch information. The temperature probe should be placed in the accumulating ground and covered material as soon as possible to provide automated temperature and aeration control.

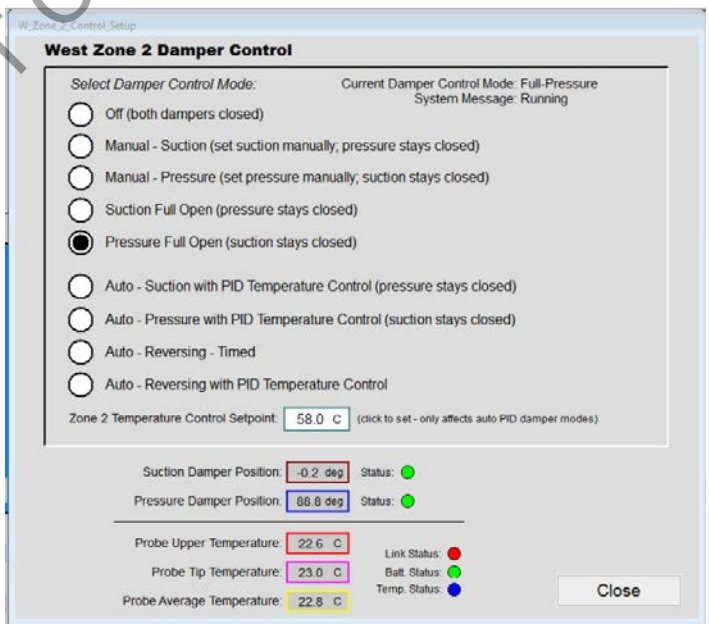
It is possible to have 2 batches in one zone as the pile shrink over time. You do this by turning the pile a second time into the next zone on top of the first pile in th ezone. Once combined, the zones temperature data is shared in both file datasets. Since the piles are intermingled during turning, the batches are no longer separable.



Zone settings

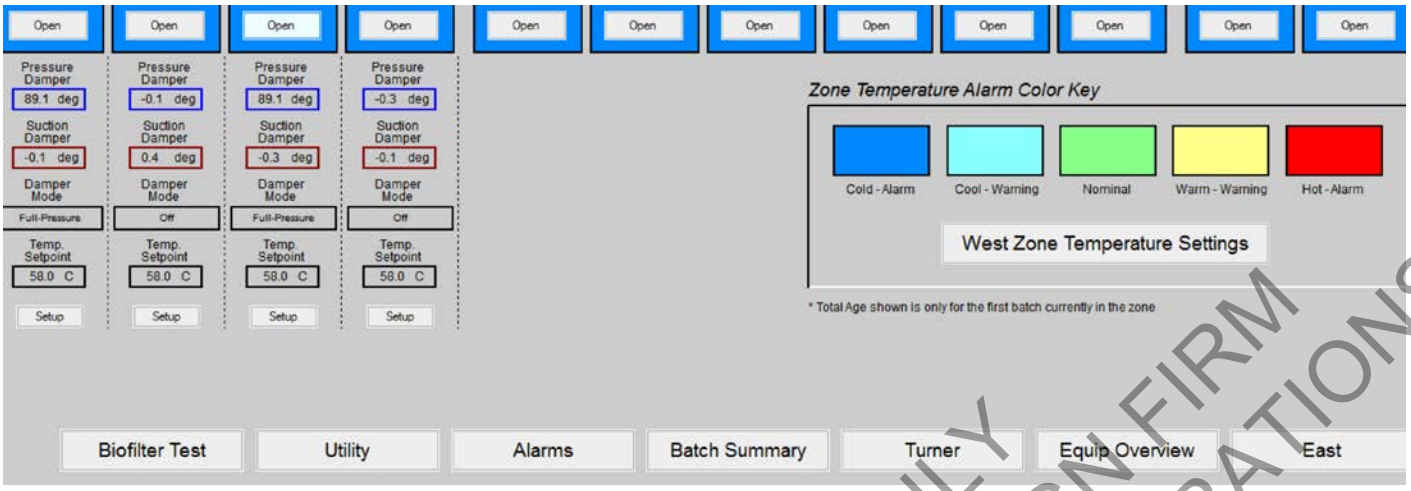
Located in the grey area below zones 1 through 8 are the aeration controls information and a Setup button for each zone as shown in the red circle. This is where all the options are for running an individual zone. You can set them to run either positive or negative, in automatic or manual, or close that zone. Typically, each zone will be managed in Auto – Reversing with PID control, this means the controller will look at the top and bottom temperature sensors and keep the right amount of airflow and the right direction of airflow to keep the piles close to the set point temperature you choose for that zone.

Under the temperature bars of the opening screen, provides you with an overview of each aeration zones damper position with zero degrees being closed, and 90 degrees being fully open. In the example above the pressure dampers for zones 2, 4 and 7 are fully open, the rest are closed. There is also a damper command report showing what the controller is telling the damper to do. Sometimes during changes, you will see the dampers in odd positions, if you watch the movement you will see it moving towards the command position. Finally, you see the temperature set-point for the zone which is determined by the operator using the Setup button just below the temperature set-point.



When you click the Setup button, the pertinent Damper Control screen opens. This is where the operator can choose how to control the zone. It is recommended that this only be adjusted by or with the knowledge of the assigned systems operator. Here you can select one of 9 presets so you can manage a zone any way you like. You can also put in the target temperature control set-point. This is always in degrees C, so use a temperature conversion chart if you are not familiar with degrees C.

At the bottom and to the right of the zone information screen you will see the following buttons that allow you to see or adjust other control parameters.

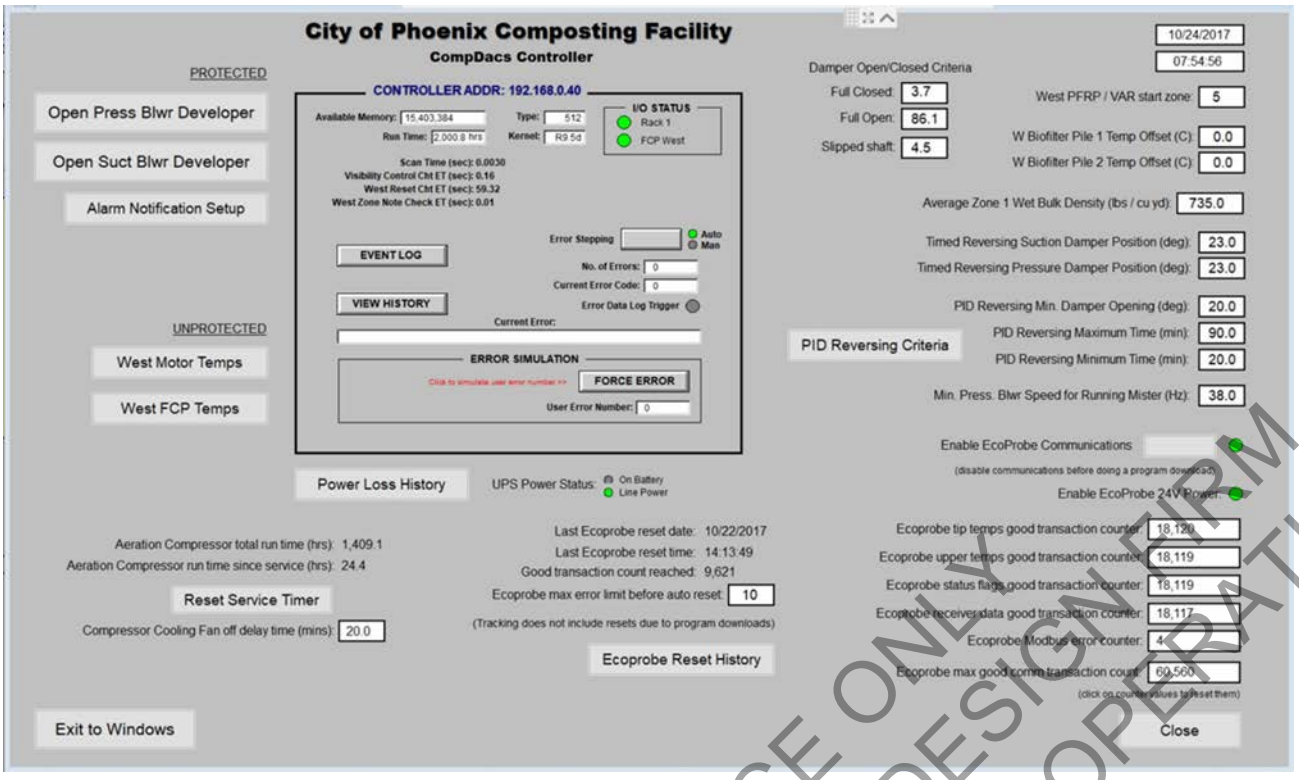


Biofilter Test

The Biofilter Test button sets up the blowers and the dampers to a preset test run condition to be run once a month or more often, that allows the operator to go out and measure the airflow in the biofilter manifold and to record the back pressure readings of the biofilter to see if they are getting too high and whether the biofilter requires replacement. An upper limit of 9" water column back pressure must not be exceeded during this test. Once the Biofilter Test shows a back pressure exceeding 7" water column, the change out of the biofilter media should be scheduled. The biofilter test cannot be run while the compost piles are being turned. Since all zones will be set to suction full open during the test.

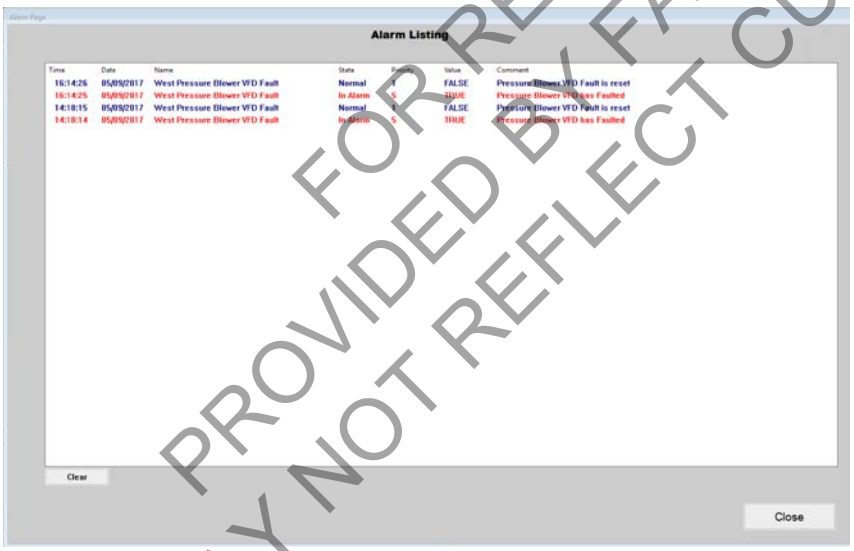
Utility

The Utility Button has a variety of things on it that allow the operator to look at the controller to see what issues have been coming up, What the blower motor winding temperature have been to define where on the aeration pad you want to start logging PFRP and VAR. as well as an offset for the biofilter temperature probes that can be added to keep the calibrated. And finally what the average bulk density of the ground and watered materials entering zone one are so that the volume can be estimated from the reported tonnage. This can be entered by doing a simple bucket drop test with a scale from random locations in zone 1. The Eco-Probe communication buttons are there If you need to reset the communication between the receiver and the controller, simple turn off the communication button here and then unscrew the power inlet to the probe receiver and wait about 10 seconds while the screen is blank, and then screw it back in, and click the grey button to turn the ecoprobe communication back on. The Reversing Criteria for the PID is also here and allows the temperature offsets to be changed to improve fine control of reheating and cooling responses. The power loss history tracks the number of times the system had a power interruption and for how long.



Alarms

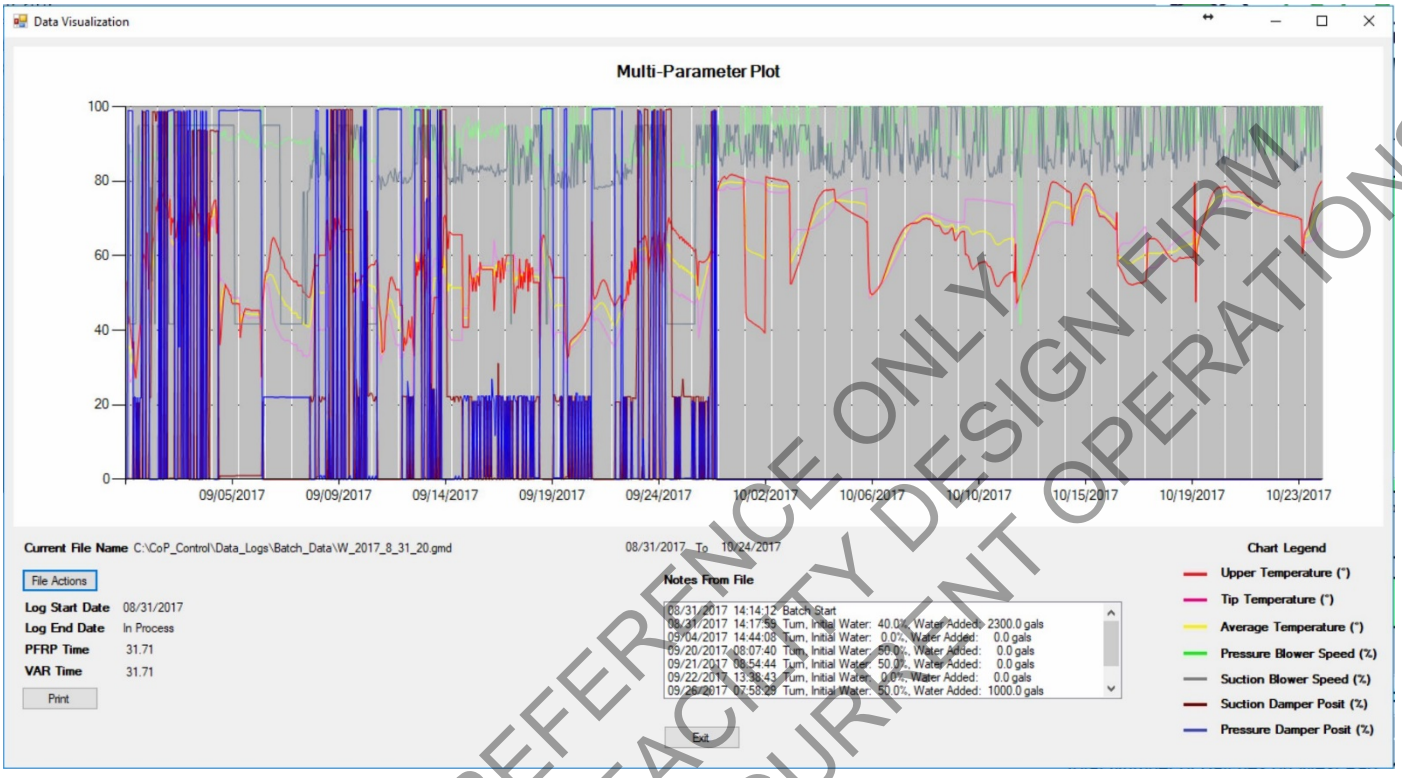
The Alarms button allows you to see what alarms have been logged and when they returned to normal, whether it is the blowers faulting, or a zone hitting the hot alarm temperatures or other conditions you want to have logged based on your settings. When you click on the Alarms button, this is the reporting screen you will see:



You can acknowledge the alarms to clear them but be sure to log what happened on the google sheets log if it needs attention. Read each of the errors and check the unit it is reporting on to make sure each of those alarmed items is functioning again. You can set up how alarms are managed from the Utility page from the Alarm Notification Setup button.

Batch Summary

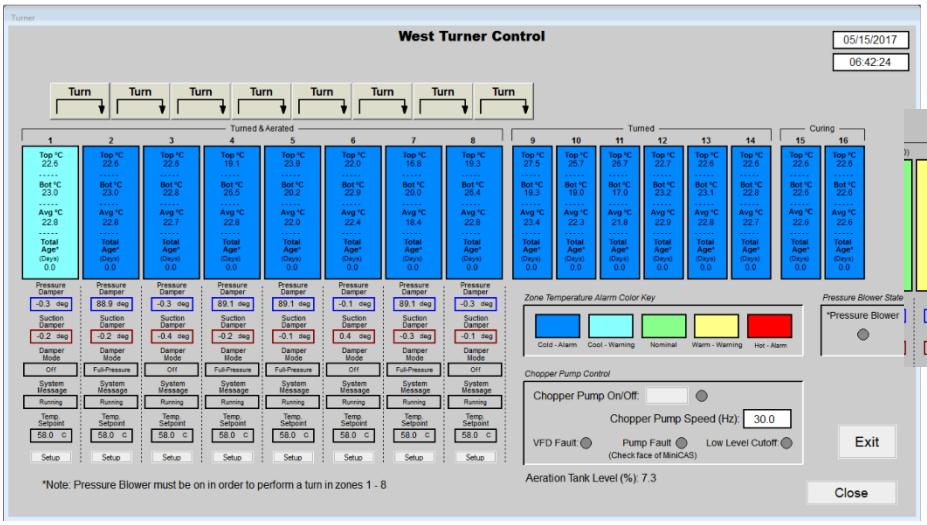
The Batch Summary button allows you to go into the history of any batch file on record and print out a report on the data collected for that batch. You will see here why it is useful to add comments about the batch as it progresses through the system. Keeping this data available when analyzing product quality and performance information, can assist in making better informed decisions about your processing choices. Keep track of your batches as they move through the composting yard by using a placard or flag with the batch name on it, and train the operators to keep the flags in the same batch and to check that they are moving the batches into the zones they think they are.

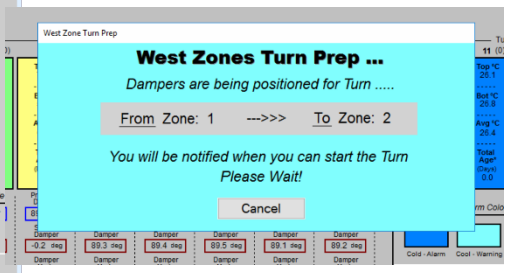


Turner

The Turner button brings up the control screen that is used by the wireless tablet in the compost turner. From here the piles can be moved, the amount of water added can be documented and the chopper pump that empties the 50,000 gallon storage and treatment tank can be turned off and on as needed by the turner operator to do their job. The Turner screen makes the operator remove temperature probes and document water added per turner pass.

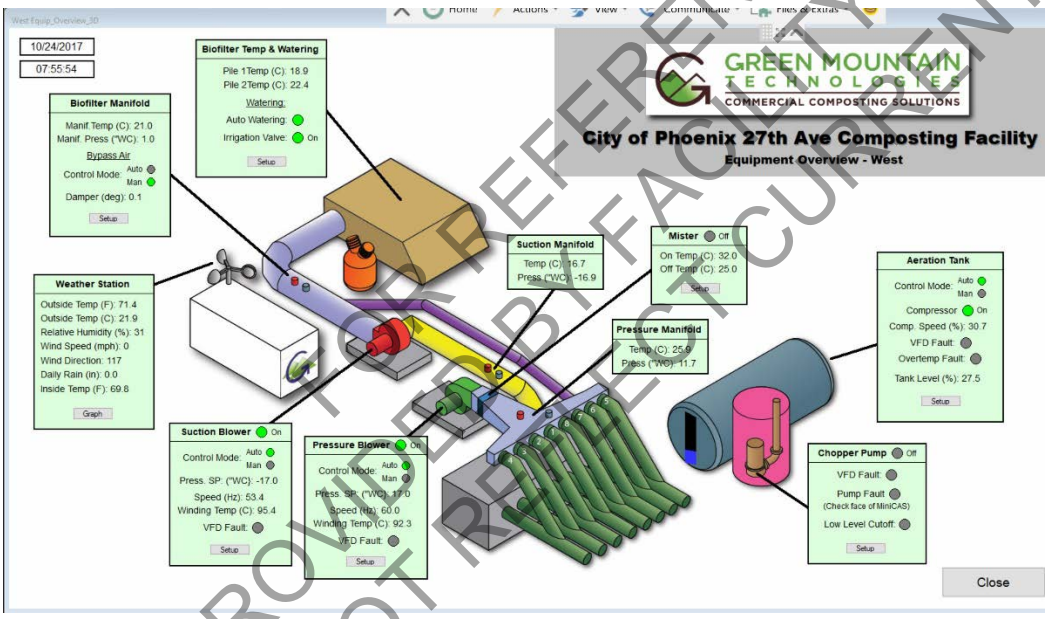
Remember, the probe must stay in the zone it is numbered for, and placed at the correct depth, otherwise the zone dampers will not be getting the proper feedback for what pile it is aerating. If a pile is getting too low, you can angle the probe so that the tip stays at least one foot off of the concrete aeration floor.

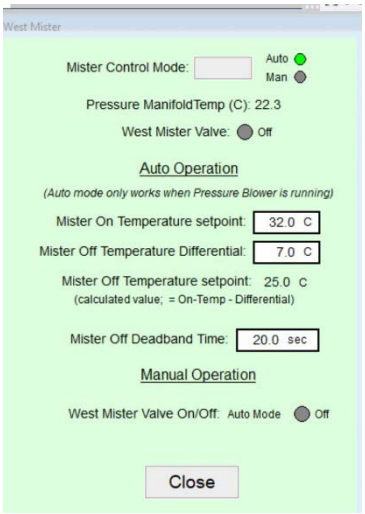


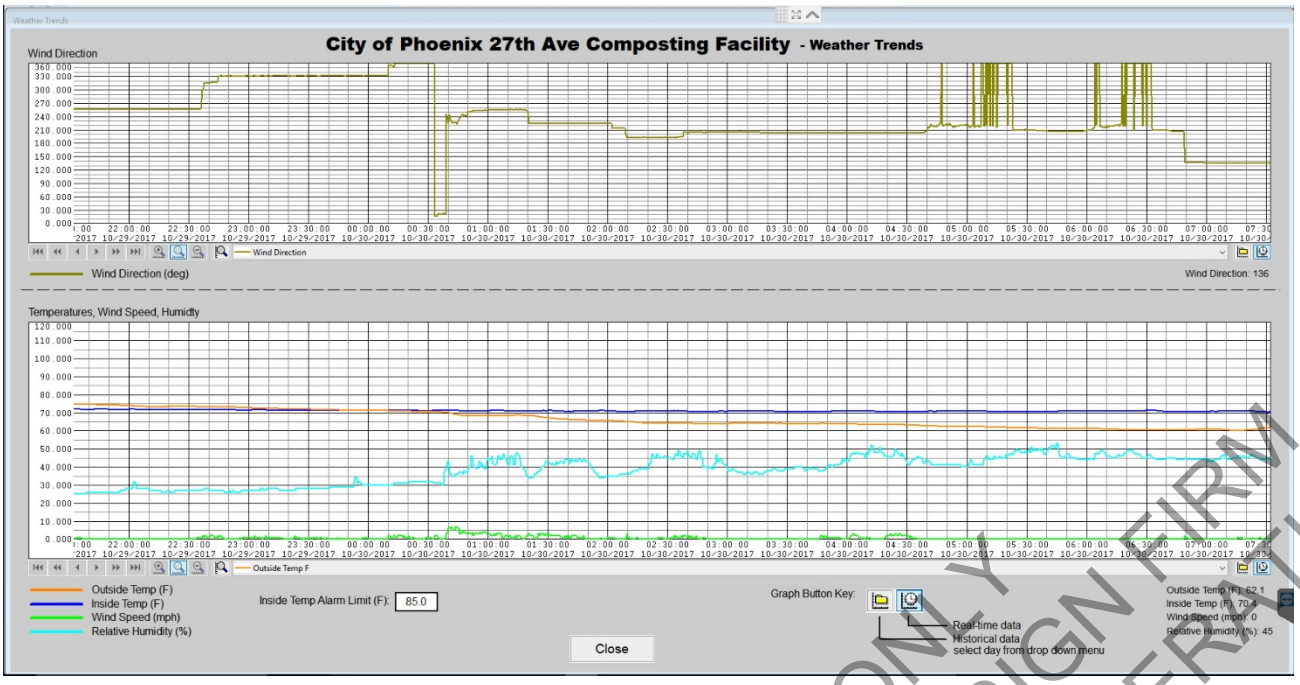


Equipment Overview

This is my favorite screen, from here you can look at the status of, and control, the blowers, the pump, the compressor, the bypass damper for cooling the biofilter duct, the biofilter irrigation system and the duct misters. It shows you the status for the duct temperatures and the tank fill level. It also allows you to use the setup button for each one and set the parameters you desire for each one to operate or alarm. The grey rectangles are switches to turn each system component from auto to manual and off.





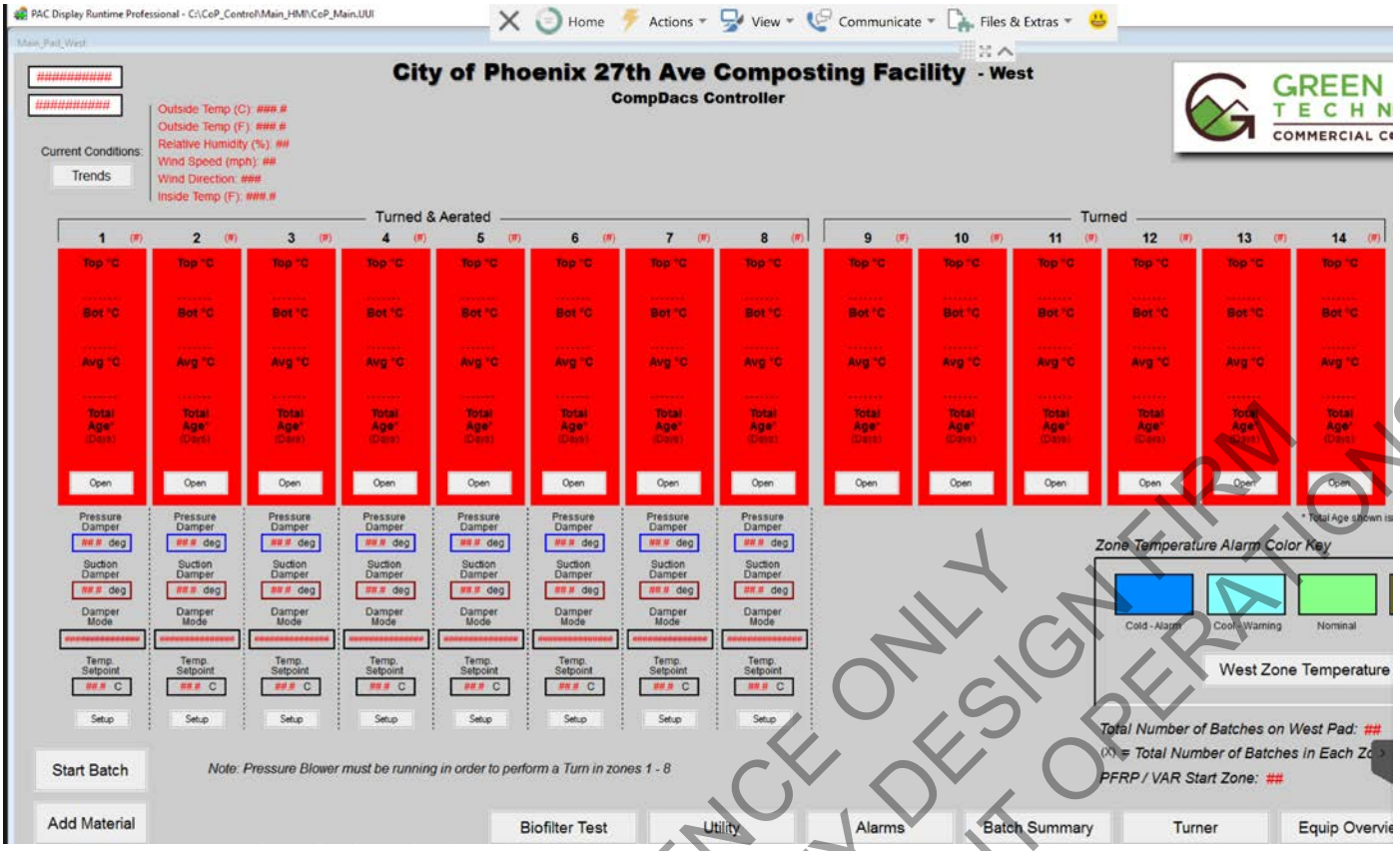


East

The East button takes you to the control system for the Eastern blower system and zone controls.

Incommunicado

If you see the screen below with all the data and readouts in red, that tells you that the CompDACS controller (in the grey panel) is not communicating with those red items and the communications have been timed out. Check the white breaker switch inside the lower left side of the CompDACS controller to be sure it is on. You should see green lights on some of the modules. This means there is power to the unit. Next, if the screen is still red all over, try turning the power switch off, wait about 10 seconds and then turn it back on. If the red does not clear there is a communication problem between the controller and all the things it controls. Call GMT for resolution to this problem.



Blower Maintenance

Greasing

There are grease fittings for each pillow block bearing on the main shaft and also grease fittings on the motor bearings. All fittings should be greased monthly. DO NOT OVERGREASE AND BLOW OUT SEALS ON BEARINGS!

Belt Tensioning

Under tensioned belts can slip, generating heat that results in cracking and eventual belt failure. Over tensioned belts stretch excessively, which reduces belt and bearing life, as bearing loads increase. While checking belt tension, one also should inspect for cracks or fraying, as these indicate belt wear.

The proper tension of a V-belt drive is the lowest tension at which the belt will not slip at peak-load conditions. For applications without a variable-frequency drive (VFD) or starter, a belt must be tensioned to handle increased motor torque during startup. For slow-start VFD applications, a belt must be tensioned to handle the actual brake horsepower of the fan at the fan shaft. The typical deflection of a properly tensioned belt is 1/64" per inch of spacing between the two sheaves as shown below.

1. Turn off power to the motor and follow lockout and tagout procedures.

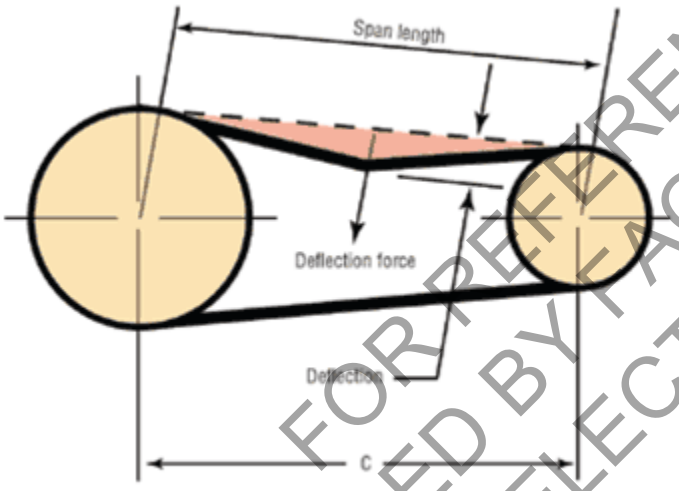


FIGURE 1 . Belt-span length and deflection force.

2. Measure the span length of the belt (**Figure 1**). Span length is the distance between the sheaves. The desired belt deflection is 1/64 in. for every 1 in. of belt span. For example, if the span length is 32 in., the desired belt deflection is ½ in.

After initial installation tensioning, retensioning of a V-belt is recommended after one to two days. After that, belt tension should be checked periodically—about every three to six months or more frequently, if noise or vibration occur.

Aeration Floor and Vault and Tank Maintenance.

Once a quarter initially and then as needed based on amount of sediment removed, clean the aeration pipes underground all the way to the aeration tank of accumulated sediments.

- Open the lateral cleanouts on one zone. Put the aeration zone in suction at full open and flush each lateral cleanout with water from water truck using a 1.5" diameter hose or greater under pressure from the water tank pump. A high pressure jetter can be used to break up any clogged laterals if needed.
- Open the Zone Lateral Manifold cleanout on the same zone. Flush with water from water truck. Close all cleanout lids for that zone.
- Repeat on each Zone. Follow the sequence of turning from zone 8 to 1 to get access to the zone lateral manifold cleanouts which are near the middle North of each Zone.
- Turn off the suction blower, turn off the vault aeration compressor line, and let the tank settle.
- Open the vault lids, barricade the openings from entry, start the suction blower manually at 35 Hz or less.
- Open the vault drain line to the tank, and let the water level drop until all the liquid has moved to the tank.
- Have a vactor truck suction out the remaining solids from the bottom of the vault using extensions without entering the vault at any time. DO NOT ENTER THE VAULT WITHOUT COMPLETE SCUBA, VENTILATION AND HOIST EQUIPMENT. USE ONLY TRAINED AND QUALIFIED CONFINED SPACE CONTRACTORS.
- Place a large bed of ground wood or screened biocover down in a 2 foot thick bed with 3 foot side walls to unload the vactor truck solids into for reuse in the composting process.
- Close the vault drain line, and refill with raw water to the overflow level. Close and reseal the vault lids.
- Open the aeration tank access lid and the pump station lid. Pump all the liquid from the tank and apply it to the active compost piles. You will have to use the pump VFD controller to override the automatic level switch to get all the liquid pumped out. Keep the suction blower at 35 HZ or less to maintain good suction flow from the open lids.
- Add water to the aeration tank through the access lid to flush the fine sediment towards the Chopper pump and lift station, continue to run the pump and discharge onto the active compost piles, until most of the fine sediment has been flushed out. DO NOT ENTER THE AERATION TANK OR LIFT STATION WITHOUT COMPLETE SCUBA, VENTILATION AND HOIST EQUIPMENT. USE ONLY TRAINED AND QUALIFIED CONFINED SPACE CONTRACTORS.
- Close and reseal the lids. Put all pumps and blowers back into automatic operation

Damper Maintenance

Overview

There are 34 dampers that regulate volume and direction of air flow, two for each zone and one for each bypass duct. The primary dampers pictured below regulate the air direction to each blower group. By closing the intake damper pictured on the left and opening the exhaust damper the blower group will switch to negative aeration and exhaust process air to the biofilter. In addition, each 18" duct going to the zone manifold has two butterfly dampers that regulate the volume of air going to each zone. One damper for the pressure manifold and one for the suction manifold.

Belimo Damper Motor Adjustment-

The computer controlled damper Belimo brand actuators move the 18” and 24” diameter butterfly dampers. There are two for each zone, one on the pressure manifold and one on the suction manifold. The actuators use a friction clamp to lock onto the damper shaft and keep in the correct position in relation to the blade of the butterfly damper. At the end of each damper shaft is a mark that indicates the position of the butterfly damper blade. The Belimo has a reversing switch as shown as the black dial in the upper corner of the orange housing. The black button on the lower left is the manual release button which allows the shaft to rotate to realign the damper blade to the Belimo motor.

Check the scored mark cut into the damper shaft indicating the blade position. Most of the blades are in the same position as the score mark. Push in the manual release button and rotate the damper clamp. It should move 90 degrees so that the blade shaft marking is parallel to the pipe. This is the open position. Close it and the blade marking should be 90 degrees from that showing the blade across the direction of flow through the pipe. There is a stop in the pipe at this position, and you should hear it hit the stops. Check that the Belimo is in the zero position at the stop. If not, loosen the clamp bolts, move the shaft to the correct position and retighten the clamps. Dampers should be checked every 3 months to make sure that the dampers are operating as designed.

With two people, one using the computer, and one checking the Belimos, cycle the manifold dampers to 90 degrees open and then to zero degrees closed, make sure they all move at the right time, and into the correct positions. One damper of the pair should fully close before the other one opens to prevent short circuiting of air. If one or two do not, check the blade position manually again, if that is correct, there may be a setting problem not a position problem. If a Belimo actuator motor is non responsive, check the wiring connections in the terminal box. If the wires are connected then check for 24V DC at the terminals. If 24V is present then the Belimo motor may have failed. There should be two damper motors in the spare parts kit. Call GMT for assistance.

GMB24-SR-T N4

NEMA 4, Proportional Control, Non-Spring Return, Direct Coupled, 24V, for 2 to 10 VDC and 4 to 20 mA

BELIMO

Torque min. 360 in-lb for control of damper surfaces up to 90 sq ft.

Application

For proportional modulation of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications.

The actuator is mounted directly to a damper shaft up to 1.05" in diameter by means of its universal clamp.

The actuator operates in response to a 2 to 10 VDC, or with the addition of a 500 Ω resistor, a 4 to 20 mA control input from an electronic controller or positioner. A 2 to 10 VDC feedback signal is provided for position indication or master-slave applications.

Operation

The actuator is not provided with and does not require any limit switches, but is electronically protected against overload. The anti-rotation strap supplied with the actuator will prevent lateral movement.

The GMB24-SR-T N4 provides 95° of rotation and a visual indicator indicates position of the actuator. When reaching the damper or actuator end position, the actuator automatically stops. The gears can be manually disengaged with a button on the actuator after the cover is removed.

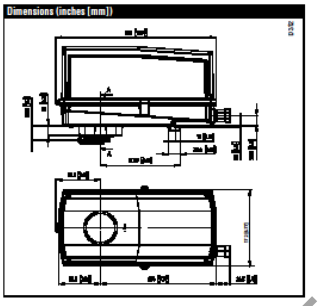
The GMB24-SR-T N4 actuator uses a sensorless brushless DC motor, which is controlled by an Application Specific Integrated Circuit (ASIC). The ASIC monitors and controls the actuator's rotation and provides a digital rotation sensing (DRS) function to prevent damage to the actuator in a stall condition. Power consumption is reduced in holding mode.

Add-on auxiliary switches or feedback potentiometers are easily fastened directly onto the actuator body for signaling and switching functions.

Technical Data	GMB24-SR-T N4
Power supply	24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	4.5 W (2.0 W)
Transformer Sizing	6.5 VA (Class 2 power source)
Electrical connection	screw terminal (for 26 to 14 GA wire) ½" conduit connector
Overload protection	electronic throughout 0 to 95° rotation
Operating range Y	2 to 10 VDC, 4 to 20 mA
Input impedance	100 kΩ (0.1 mA), 500 Ω
Angle of rotation	max. 95°, adjustable with mechanical stop
Torque	360 in-lb [40 Nm]
Direction of rotation	reversible with switch
Position indication	dial
Running time	150 seconds constant independent of load
Humidity	5 to 100% RH (UL Type 4)
Ambient temperature	-22°F to 122°F [-30°C to 50°C]
Storage temperature	-40°F to 176°F [-40°C to 80°C]
Housing	UL Type 4X, NEMA 4X, IP66
Housing material	polycarbonate
Agency listings†	cULus acc. to UL 60730-1A/-2-14, CAN/CSA E60730-1, CSA C22.2 No. 24-93, CE acc. to 89/336/EEC
Noise level	<45dB(A)
Servicing	maintenance free
Quality standard	ISO 9001
Weight	9.8 lbs [4.45 kg]

†Rated Impulse Voltage 800V, Type of action 1, Control Pollution Degree 3.

Dimensions (inches [mm])



M4GB24-1 0510 - Subject to change. © Belimo Aircontrols (USA), Inc.

BELIMO

GMB24-SR-T N4

NEMA 4, Proportional Control, Non-Spring Return, Direct Coupled, 24V, for 2 to 10 VDC and 4 to 20 mA

Accessories	
S1A, S2A	Auxiliary Switch (es)
P...A	Feedback Potentiometers
SGA24	Min positioners for surface mounting
SGF24	Min positioners for flush panel mounting
PTA-250	Pulse Width Modulation Interface
IRM-100	Input Rescaling Module
ADS-100	Analog to Digital Switch
ZG-R01	Resistor for 4 to 20 mA Conversion
NSV24 US	Battery Back-Up Module
ZG-X40	Transformer
43442-00001	Gland*
11097-00001	Gasket for Gland*

NOTE: When using GMB24-SR-T N4 actuators, only use accessories listed on this page.
* Both parts are needed when using an auxiliary switch or potentiometer with GMB24-SR-T N4

Typical Specification

Proportional control damper actuators shall be electronic direct-coupled type, which require no crank arm and linkage and be capable of direct mounting to a shaft up to 1.05" diameter. Actuators must provide proportional damper control in response to a 2 to 10 VDC or, with the addition of a 500 Ω resistor, a 4 to 20 mA control input from an electronic controller or positioner. Actuators shall have brushless DC motor technology and be protected from overload at all angles of rotation. Actuators shall have reversing switch and manual override on the cover of the actuator. Run time shall be constant and independent of torque. A 2 to 10 VDC feedback signal shall be provided for position indication. Actuators shall be cULus listed, NEMA 4X, have a 5-year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

Wiring Diagrams

INSTALLATION NOTES

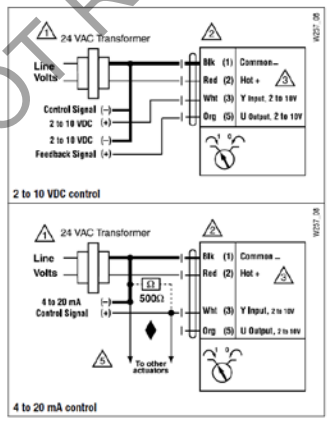
1. Provide overload protection and disconnect as required.
2. **CAUTION** *Equipment Damage!* Actuators may be connected in parallel. Power consumption and input impedance must be observed.
3. Actuators may also be powered by 24 VDC.
5. Only connect common to neg. (-) leg of control circuits.

APPLICATION NOTES

The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

WARNING *Live Electrical Components!*

During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



2 to 10 VDC control

4 to 20 mA control

800-543-9038 USA | 866-805-7089 CANADA | 203-791-8396 LATIN AMERICA

Introduction

Thank you for purchasing an EcoProbe System! You have invested in a high quality Wireless Compost Monitoring System, made right here in the USA. REOTEMP has been manufacturing temperature probes for the compost industry for over 20 years. Our reputation is built on high quality products, quick standard lead times, and exceptional customer support. We're dedicated to providing our customers with complete satisfaction, from the first phone call to the design and quality of the instrument they receive. If you have any questions or concern, don't hesitate to call or email.

REOTEMP Instruments
Ph: 800-648-7737
Email: compost@reotemp.com

Instructions

The EcoProbe System is built to last. With proper care, it will last for years to come. Here are some basic maintenance and handling instructions:

Turning Probes On:

All probes are shipped in the OFF position. You'll need to turn each probe ON.

1) To turn the EcoProbe ON, you'll need to remove the green lid (take the probe to a clean dry area before removing lid).

2) Once lid is open, flip the switch to the ON position.

3) Check the O-Ring on the underside of the lid to ensure it is **properly lubricated**. It should appear wet all the way along the o-ring. If it's not, apply a coat of silicone o-ring lubricant (PolySi Technologies PST-841 or equivalent) all the way around the o-ring.

4) **Make sure the top of the enclosure and o-ring are clean before re-attaching the lid.** Screw down lid hand tight. Do not over tighten.

5) You should receive a transmission within 10 seconds of turning on the probe. After the initial transmission, the probes will transmit every 15 minutes.

Changing Batteries:

1) To change the batteries, you'll need to remove the green lid (take the probe to a clean dry area before removing lid).

2) Once lid is open, remove both C batteries.

3) Replace with new batteries. **NOTE: Must use model below because of specific battery characteristics. Other batteries will drastically reduce battery life.**

a. BATTERY DESCRIPTION: LITHIUM, 3.6V, size C (Tadiran manuf. part # TL-5920/S). Can be purchased from DigiKey with P/N: 439-1018-ND

4) Check the O-Ring on the underside of the lid to ensure it is **properly lubricated**. It should appear wet all the way along the o-ring. If it's not, apply a coat of silicone o-ring lubricant (PolySi Technologies PST-841 or equivalent) all the way around the o-ring.

5) **Make sure the top of the enclosure and o-ring are clean before re-attaching the**

lid. Screw down lid hand tight. Do not over tighten.

KPSI 28

- Non-Submersible Pressure Transducer
- ±0.50% FSO Static Accuracy
- Multiple Pressure Connections
- Two Year Warranty

The KPSI 28 is a non-submersible pressure transducer specifically designed for demanding industrial applications where the primary criteria are reliability and economy. These units provide repeatable, precision measurements under the most hostile conditions. Capable of measuring vacuum to pressure as high as 2000 psi (13,790 kPa), these transducers can meet most any industrial pressure measurement requirement and are available with an overmolded cable exit option for splash down applications (IP 67).

All KPSI Transducers utilize a highly accurate pressure sensor assembly specifically designed for hostile fluids and gases. The assembly is integrated with supporting electronics in a durable housing constructed of 316SS or Titanium. A wide variety of electrical and pressure connections are available to accommodate most any system interface.

Features

- Custom Cable Lengths
- Welded 316SS or Titanium Body
- Custom Pressure Ranges up to 2000 psi
- Analog Outputs of 4-20 mA or VDC
- Optional Lifetime Lightning Protection

Applications

- Tank Level
- Pump Control
- Bubbler Systems
- Compressors

Specifications

PARAMETER		COMMENT
PRESSURE RANGES		
Full Scale Pressure Ranges (Intermediate pressure ranges are available)	1 thru 300 psi (7 thru 2070 kPa)	Vented Gage Reference
	5 thru 2000 psi (34 thru 13790 kPa)	Sealed Gage Reference
	15 thru 2000 psi (103 thru 13790 kPa)	Absolute Gage Reference
Proof Pressure	1.5 x FS	
Burst Pressure	2.0 x FS	
STATIC PERFORMANCE		
Static Accuracy (combined effects of non-linearity, hysteresis and repeatability, best fit straight line method)	±0.50% FSO	BFSL method
Resolution	±0.0001% FS	

SYSTEM TROUBLE SHOOTING

This section is intended to help the operator diagnose and rectify problems which could arise in the operation of the aeration building. The operator is requested to make a photocopy of the appropriate trouble-shooting page, go through the steps described therein, and make notes of his/her observations. If at the end of this effort the problem persists, contact GMT at (800) 610-7291 or (802) 368-7291.

Problem: No communication between PC and CompDAC's Panel (flashing OFFLINE)

Possible Cause	Remedy	Observations
Ethernet port scanner has stopped	Select "Restart Port Scanner" from the Tools menu	
RTU real-time controller in Main Panel has stopped.	Make sure status light on Main Panel is flashing (indicates normal operation). Cycle Main Panel power off – on if necessary. Status light should begin flashing within 2 minutes of power-up.	
Ethernet connection lost or broken.	Check all Ethernet cables for correct connections. Check the hubs or routers are powered up and operating and the green light is illuminated on the connector. Verify correct network configuration of PC computer.	

No connections with Controls computer? Check the following:
Is the ethernet switch in the controls panel powered up?
Same question for the Opto 22 controller?

The container PC should be on the 192.168.0.X subnet.

To check this, right click on the Windows menu (lower left button)
and select Run, then type in cmd.exe

After this type ipconfig /all
and look at what it says the wired ethernet card is set to - what IP address.
If it is on the correct subnet above, then do the following

See if you can ping the router - type:
ping 192.168.0.1

See if you can ping the Opto 22 controller
ping 192.168.0.40

If you cannot ping the router, then there is a connection problem to it,
if you cannot ping the controller, then there is a problem with the cable
to the switch, or the switch itself.

Problem: Faulty Temperature Readings (including readings of -50 or 150 degrees Celsius)

Possible Cause	Remedy	Observations
Failed Transmitter	Replace transmitter: Open probe head and disconnect all wires from transmitter (Make note of where wires are terminated on the old transmitter). Install new transmitter and reconnect wires.	
Failed Probe Sensor	Replace sensor: remove ss sensor tip and disconnect all wires making note of the color pairings. Remove the RTD capsule from the tip, install the replacement and reconnect wires.	
Power Loss or Equipment Failure in Field Panel	Check fuse in field panel and replace if necessary. Also check the shunt resisters located behind the I/O module and replace if necessary.	

Problem: Blower VFD Overloading

Possible Cause	Remedy	Observations
Exhaust Damper not operational	Check Damper actuator and see if damper is moving. If damper is not closing, blower will not have sufficient back pressure and overload. Open access hatch on manifold and damper positions.	
Belts out of adjustment	Check for squealing noises when the blower is running at full speed. Check tension of belts per maintenance schedule. Adjust as required.	

VFD overload adjustment not correct	The VFD is set to trip when the amperage exceeds a multiple of the nameplate amp rating on the motor. See the VFD manual for correct settings of the VFD.	

Problem: Reversing Aeration System

Possible Cause	Remedy	Observations
System running too hot	Increase the duty cycle between positive and negative aeration time. Increase the positive aeration on time as it provides more cooling.	
Zone Damper blade is not shutting off air flow	Remove the belimo damper motor weather cover and push clutch release button on damper motor. If the shaft does not rotate easily, then use vise grips to grab the shaft and rotate with the clutch button pushed in. (Refer to damper center adjustment.)	
Damper Belimo motor or cable failure	Verify damper operation by using the damper override feature in the PC interface. Select the override option box and set the position you want; then check the damper to see if it moves to the selected position.	
By pass Damper Check	To check the operation of the bypass dampers, go to the biofilter manifold settings and change it to be below ambient air temperatures and force the system to change direction. You should see the bypass air damper change position fully close or open. Check rotation on the damper shaft. Once the blower cycles on you should see the corresponding duct pressure go up.	

Problem: Zone Temperatures too high

Possible Cause	Remedy	Observations
Aeration plenum is blocked or flooded	Check air flow at floor nozzles to see if there is adequate pressure and flow. If not, check to make sure that the sump pump is operational and that tank levels are at the overflow pipe level. If the tank is full, call in Vac Truck and have the tank sediment cleaned out.	

Aeration floor nozzles plugged	When each zone is unloaded, check nozzles to make sure high pressure air is flowing. If not, use stick to clean nozzle and open air flow.	
Reversing duty cycle too short	Increase the amount of time the aeration system is in positive to increase cooling.	
Blower or VFD fault	Check VFD panel. Switch to manual to see if blower will start.	
Not enough pressure in ducts	Increase duct pressure setting in blower settings of CompDACS configuration dialog	

Problem: Temperatures too low

Possible Cause	Remedy	Observations
Compost mixture too wet and/or too low a level of volatile solids	Use dryer bulking agent and/or improve dewatering. Find additional ingredient to increase energy available	
Insufficient nutrients	Add nitrogen or fertilizer during mixing	
Process air temperature low	Decrease fresh air intake	
Damper allowing blow-by in off position	Adjust the damper off position to reduce the negative aeration blow-by used to keep a steady flow of Oxygen. Refer to damper adjustment.	
pH is low	Check pH of compost media, Add 100 # of lime/ton of compost if pH is below 6.5	
Duct pressure too high	Lower setting in blower settings on CompDACS configuration dialog.	
Run did not meet PFRP	Empty and remix container or use additional testing to determine compliance with pathogen reduction	

Problem: Compost is wet at end of run

Possible Cause	Remedy	Observations
Insufficient or wet bulk material	Adjust recipe or source of bulk material	
Aeration floor plugged	Check floor next time the aeration floor is empty. Poke each airhole clear.	
Invert temperature setting too small	Maintaining a tight invert temp can limit the ability of the aeration system to remove moisture. Increase setting	
Not enough aeration in the older zones	Lower set points or increase minimum duty cycle to 100% to aerate continuously	
total solids content is low adding too much moisture compared to available energy	Improve dewatering or increase ratio of active bulking agents like green waste or dry bedding	

Problem: Persistent Odors near Aeration Floor

Possible Cause	Remedy	Observations
Compost temperatures too high	Refer to above section on high temperatures	
Air Leaks in aeration system	Check the biofilter manifold for leaks on the main ducts, to see if there are leaks.	
Biofilter too dry	Refer to biofilter maintenance section	
Leachate leaks near ducting	Determine where leachate is dripping and clean and caulk. Make sure gaskets are clean and tight	
Incorrect compost recipe	Review compost mix specifications and sample to make sure parameters are in line with assumptions.	