Installation Manual

Powder Booths

Class 4

>> Batch Powder Booths

>> Cartridge Batch Powder Booths

>> Pass Through Powder Booths

>> Lab Powder Booths

This Installation Manual reviews an introduction, safety, component description, installation, maintenance and warranties of RTT's powder booths.

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Contents

1. General Description 2

1.1 General Description 2

1.2 Compliance to Applicable Codes 2

1.3 Proper Grounding Procedures 3

2. Safety 4

2.1 Safety Alert Symbol and Signal Words 4

2.1.1 Assembly Hazards 5

2.1.2 Operational Hazards 6

2.1.3 Maintenance Hazards 7

2.1.4 Fire Hazard 7

2.2 Safety Decals 8

2.3 NFPA 33 9

3. Spray to Waste Powder Booth 12

3.1 Three-Stage Filter System 12

3.2 Manometer 12

3.3 Air Solenoid Valve 16

3.4 Exhaust Fans 17

3.5 Powder Exhaust Filter Proving Assembly 20

3.6 Optional Control Panel 20

4. Lab, Batch, and Pass Through Powder Booths 21

4.1 Control Panel with Variable Frequency Drive 22

4.2 Optimizing Your Collector's Performance 24

4.3 Understanding the Pulse Down System 26

4.4 Troubleshooting Pulse Problems 30

4.5 Exhaust Filter Installation 33

4.6 Intake Filter Installation 34

5. General Lighting Components 35

5.1 Light Fixtures 35

6. General Installation Procedures 36

6.1 Installation General 36

6.2 Booth Assembly 37

6.3 Motor Installation 39

6.4 Electrical 40

6.6 Tubeaxial Fan 42

7. General Maintenance Procedures 43

7.1 General Instructions 43

7.2 Fans and Motors 43

7.3 Routine Fan Maintenance 43

7.4 Excessive Fan Vibration 44

7.5 High Motor Temperature 44

7.6 High Bearing Temperature 44

7.7 Lubrication 44

7.8 Cautions 44

7.9 Environmental Limitations of Booth Components 44

7. Warranty 46

General Description

1.1 General Description

This section contains literature which describes your RTT powder spray booth in general terms. Subsequent chapters of this manual provide more detailed descriptions of the individual booths and their operating components, as well as maintenance procedures.

This description covers a family of RTT powder booths. The following booth types are covered herein:

- >> Batch Powder Booths (PB)
- >> Cartridge Batch Powder Booths (RPB)
- >> Pass Through Powder Booths (EPB)
- >> Lab Powder Booths

The powder booth itself consists of four major components: powder application area, collection/extraction chamber, exhaust fan and chamber, and in some cases product doors. A brief description is provided for these and other related items.

The parts to be powder coated are placed in the powder application area, through the booth opening or product doors (if so equipped). Air flows through the booth opening(s) to the exhaust filters. Exhaust filters will vary based on the style of booth purchased. The booth exhaust is routed the exhaust plenum(s) at the exit of the booth. The exhaust fan then routes the exhaust out through the Final Filters and discharges clean contaminate free air back into the powder coating room.

Exhaust Fan and Chambers

The Spray to Waste Industrial Batch Powder exhaust chamber is located as shown in the mechanical drawing package which is included in this manual. Powder laden air is drawn through a three stage filtration system (pre filter, primary filter and final filter) by a tubeaxial fan which is powered by an ODP motor. Filters clean the air of powder allowing it to return into the plant environment. The fan is made of spark resistant material and the motor is located out of the air stream. The exhaust chamber(s) operate(s) under a negative pressure to induce the required airflow through the exhaust filters.

The Recovery Powder Booth exhaust is located as shown in the mechanical drawing package which is included with this manual. Powder laden air is drawn through a two stage filtration system (primary cartridge filter and final HEPA filter) using a plug style fan with a TEFC type motor. Clean air is returned to the plant environment.

1.2 Compliance to Applicable Codes

Warning: *Your safety and the safety of others is a direct result of how you operate this powder booth. Make sure you understand all the controls and the operating instructions before beginning.*

Bypassing Safety Devices There are several safety devices provided to ensure safe operation of the powder booth. DO NOT make any attempt to override these devices.

Personal Safety Consult with your powder/material supplier for proper recommendations on respirator types required for applying the powder/material supplied. Operators should read and follow instructions from the powder companies Material Safety Data Sheets (MSDS).

All parts and components must be electrically bonded and properly grounded to prevent static buildup and discharge.

Compliance to Applicable Codes This Powder Booth is designed to be in strict accordance with the National Fire Protection Association Standard Number 33, "Spray Application Using Flammable Combustible Materials. The NFPA Standard Safety Code for the design, Construction and Ventilation of Spray Finishing Operations." This Powder Booth meets or exceeds the requirements of the Occupational Safety and Health Administration (OSHA).

Material Specifications The powder booth panels, filter racks and product doors (if required) are constructed of 18 gauge steel, conforming to ASTM A527 "Lock Forming Quality" and are hot dip galvanized per ASTM A525 with G90 coating.

All structural steel conforms to ASTM A36.

Safety Local fire codes prohibit smoking in the vicinity of powder coating operations. Consult your local fire marshal for posting of "No Smoking" signs.

Improperly maintained equipment could cause sparks which could ignite the powder cloud.

For Your Safety Beware of poor electrical wiring that could cause sparks. DO NOT store flammable liquids adjacent to or inside the powder booth. Read all refinishing product labels and instructions.

Fire Protection An approved fire detection/suppression system must be installed on the powder coating booth to comply with NFPA 33, Section 9 and all applicable state and local codes. NOTE: Fire detection/suppression system supplied by others.

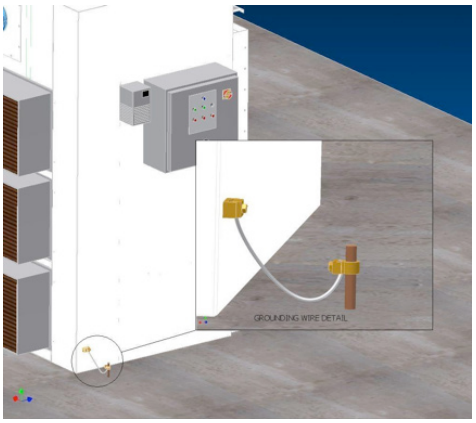
1.3 Proper Grounding Procedures

The powder booth must be properly grounded to a positive earth ground. Powder booth installation should include a 5/8" diameter rod by 8'-0" in length driven into the ground leaving 8" of protruding above the floor (see picture). The booth and all booth components MUST be grounded to this rod including all powder application equipment.

PROPER BOOTH GROUNDING:

- >> 5/8" diameter x 8'-0" long copper rod.
- >> Grounding rod installed through hole in the floor leaving at least 8" of rod above floor as close to booth as installation will allow.
- >> Booth, parts hangers, application equipment must be grounded to this rod.

Failure to properly ground all booth components could possibly cause static discharge which could result in a fire.



2. Safety

2.1 Safety Alert Symbol And Signal Words

Before assembling, operating or servicing the spray booth, you must read, understand and follow the instructions and safety warnings in this manual. Your spray booth may not be equipped with some of the optional equipment described in this manual.

NEVER ALLOW ANYONE TO OPERATE THIS EQUIPMENT WITHOUT PROPER TRAINING!

The safety information in this manual is denoted by the safety alert symbol: ⚠

The level of risk is indicated by the following signal words:

⚠ DANGER
DANGER - Indicates a hazardous situation, which, if not avoided, WILL result in death or serious injury.

⚠ WARNING
WARNING - Indicates a hazardous situation, which, if not avoided, could result in death or serious injury.

⚠ CAUTION
CAUTION - Indicates a hazardous situation, which, if not avoided, could result in minor or moderate injury.

NOTICE
NOTICE - Indicates a situation that could result in damage to the equipment or other property.

2.1.1 Assembly Hazards

⚠ WARNING

Prevent serious injury or death.

Overriding a safety system may result in unsafe equipment, which may result in serious injury or death.

Do not override safety devices.

⚠ WARNING

Blade hazard. Keep hands clear of rotating parts.

Follow lockout procedure before servicing.

⚠ WARNING

Prevent serious injury or death.

Use adequate lifting devices to raise, move and install booth components.

⚠ WARNING

Prevent serious injury or death.

Electrical installations must be performed by qualified electricians.

Installation must conform to all national, local, and provincial codes and standards.

2.1.2 Operational Hazards

⚠ WARNING

Prevent serious injury or death.

Do not operate machine with guards and/or covers open or removed.

⚠ WARNING

Prevent serious injury or death.

Only trained and qualified personnel may operate booth.

⚠ WARNING

Prevent serious injury or death.

Never operate spray booth while under the influence of drugs, alcohol or while feeling ill.

⚠ WARNING

Prevent serious injury or death.

Always wear personal protective equipment (PPE) appropriate for job.

Read Material Safety Data Sheet for products used in spray booth.

⚠ WARNING

Shock hazard.

Only a qualified electrician may open electrical control cabinet.

Disconnect and lockout / tagout all power sources before adjusting, repairing, or cleaning booth.

2.1.3 Maintenance Hazards

⚠ WARNING

Prevent serious injury or death.

Disconnect and lockout / tagout all power sources before adjusting, repairing, or cleaning booth.

⚠ WARNING

Prevent serious injury or death.

Service, maintenance and adjustments must be performed by trained and qualified personnel.

⚠ WARNING

Burn hazard. Do not touch hot parts.

Allow to cool before servicing.

⚠ WARNING

Prevent serious injury or death.

Always wear personal protective equipment (PPE) appropriate for job.

Read Material Safety Data Sheet for products used in spray booth.

2.1.4 Fire Hazard

No smoking or open flame in or near spray booth. Local fire codes prohibit smoking in the vicinity of spray painting operations.

⚠ WARNING

Explosion and fire hazard.

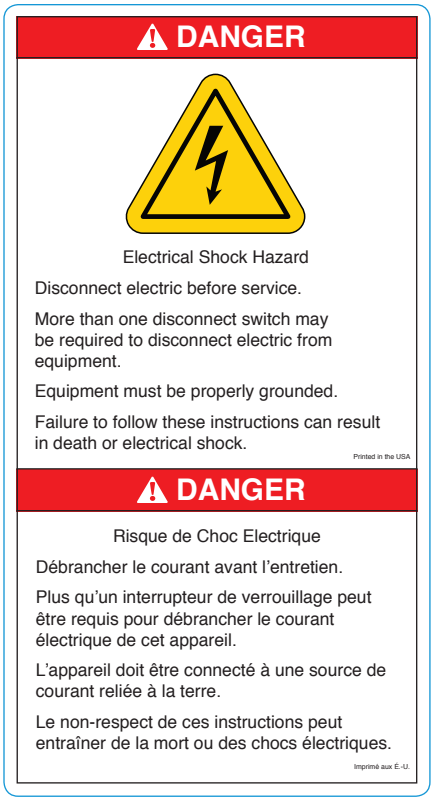
No smoking or open flame within 50 feet of spray booth.

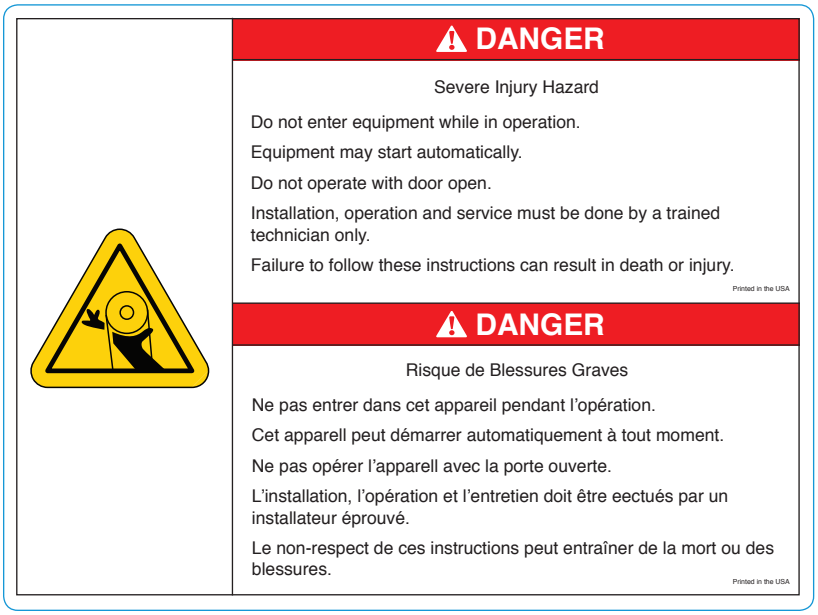
Do not store flammable liquids adjacent to or inside spray booth. Read all product labels and instructions.

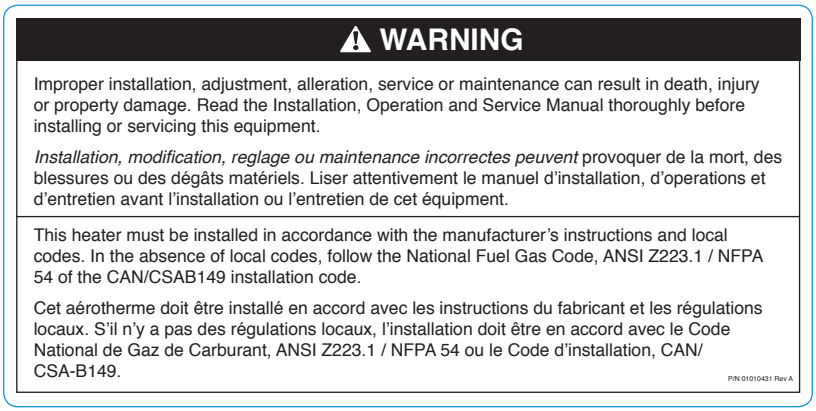
Do not use any electric powered airless spray rigs, pressure washers or similar equipment when applying a low flash point solvent or peel coating. Run spray booth exhaust fan to purge dangerous vapors that could ignite or explode while cleaning or performing maintenance inside spray booth.

AN APPROVED FIRE PROTECTION SYSTEM MUST BE INSTALLED ON YOUR SPRAY BOOTH TO COMPLY WITH NFPA 33, SECTION 9. PORTABLE FIRE EXTINGUISHERS MUST BE LOCATED IN OR AROUND YOUR PAINT MIX ROOM PER NFPA 10.

2.2 Safety Decals







⚠ WARNING

To protect you and others against death or serious injury, all applicable labels shown must be on the booth and must be legible.

If any of these labels are missing or cannot be read, contact your RTT for replacement labels.

2.3 NFPA 33 Standards for Spray Application

Reprinted with permission from NFPA 33-2016, Standard for Spray Application Using Flammable or Combustible Materials, Copyright © 2010, National Fire Protection Association, Quincy, MA. This reprinted material is not the complete and official position of the NF A on the referenced subject, which is represented only by the standard in its entirety. The following is section 10 from NFPA 33:

10.1 General. Maintenance procedures shall be established to ensure that all spray application apparatus and processes are operated and maintained in accordance with the manufacturers specifications and the requirements of this standard. Maintenance shall be the responsibility of the users of the apparatus and processes.

10.1.1 Spray application operations shall not be conducted outside predetermined spray areas.

10.1.2 Inspection of extinguishing systems shall be conducted to ensure that the performance of the extinguishing system components will not be affected by overspray and residues.

10.2 Combustible Deposits.

10.2.1 All spray areas shall be kept free of excessive accumulation of deposits of combustible residues.

10.2.2 Combustible coverings (thin paper, plastic) and strippable coatings shall be permitted to be used to facilitate cleaning operations in spray areas.

10.2.2.1 Where plastic covering is used, it shall be of a static dissipative nature or shall have a maximum breakdown voltage of 4 kV to prevent accumulation of a hazardous static electric charge.

10.2.3 If residue accumulates to excess in booths, duct or duct discharge points, or other spray areas, all spraying operations shall be discontinued until conditions have been corrected.

10.3 High-Pressure Hose Lines. High-pressure hose lines that convey flammable or combustible coating material in “airless” spray application operations shall be inspected daily and shall be repaired or replaced as necessary. Hose lines and equipment shall be located so that, in the event of a leak or rupture, coating material will not be discharged into any space having a source of ignition.

10.4 Maintenance Procedures

10.4.1 Overspray collectors shall be inspected daily and clogged filters shall be discarded and replaced. Maintenance procedures shall be established to ensure that overspray collector filters are replaced before restriction to airflow is reduced below the minimum established by Section 7.2.

10.4.2 At the close of the day’s operation, all discarded overspray collector filters, residue scrapings, and debris contaminated with residue shall be removed immediately to a designated storage location, placed in a noncombustible container with a tight-fitting lid, or placed in a water-filled metal container.

10.5 Waste Containers.

10.5.1 Approved waste containers shall be provided wherever rags or waste are impregnated with sprayed material, and all such rags or waste shall be deposited therein immediately after use. The contents of waste containers shall be placed in a designated storage location.

10.5.2 Waste containers containing flammable liquids shall be located in ventilated areas that meet the requirements of Chapter 7. Such areas shall also meet the electrical area classification requirements of 6.5.5.

10.5.3 Waste containers for flammable liquids shall be constructed of conductive materials and shall be bonded and grounded.

10.5.4 Waste containers for flammable liquids shall be handled and stored in accordance with Chapter 8.

10.6 Clothing. Employees' clothing contaminated with sprayed material shall not be left on the p emises overnight unless kept in metal lockers.

10.7 Cleaning Operations.

10.7.1 Scope. This section shall apply to the use of flammable or combustible liquids for the flushing and cleaning of equipment.

10.7.2 Liquids. Class I and Class II liquids used in cleaning operations shall be in original shipping containers or in listed safety containers.

10.7.3 Location. Cleaning operations using flammable or combustible liquids shall be conducted inside a spray area with ventilating equipment operating or in ventilated areas that meet the requirements of Chapter 7. Such areas shall also meet the electrical area classification requirements of 6.5.5.

10.7.4 Equipment. Equipment using flammable or combustible liquids shall meet the requirements of 6.5.5 and shall be bonded and grounded.

10.7.5 Manual Cleaning. Individual manual cleaning operations shall be limited to not more than 4 L (1 gal) of flammable or combustible liquid for each cleaning operator.

10.7.6 Liquid Storage. Flammable and combustible liquids shall be handled and stored in accordance with Chapter 8. Containers used for handling, storage, or recovery of Class I liquids shall be constructed of conductive materials and shall be bonded and grounded.

10.8 Solvent Distillation Units (Solvent Recyclers).

10.8.1 Scope.

10.8.1.1 Section 10.8 shall apply to solvent distillation units having distillation chambers or still pots that do not exceed 227 L (60 gal) capacity and are used to recycle Class I, Class II, and Class IIIA liquids. [30:19.6.1.1]

10.8.1.2 This section shall not apply to research, testing, or experimental processes; to distillation processes carried out in petroleum refineries, chemical plants, or distilleries; or to distillation equipment used in dry cleaning operations. [30:19.6.1.2]

10.8.2 Equipment. Solvent distillation units shall be approved or shall be listed in accordance with ANSI/UL 2208, Standard for Solvent Distillation Units. [30:19.6.3]

10.8.3 Solvents. Solvent distillation units shall only be used to distill liquids for which they have been investigated and that are listed on the unit's marking or contained within the manufacturer's literature. [30:19.6.3]

10.8.3.1 Unstable or reactive liquids or material shall not be processed unless they have been specifically listed on the systems markings or contained within the manufacturer's literature. [30:19.6.3.1]

10.8.4 Location [30:19.6.4]

10.8.4.1 Solvent distillation units shall only be used in locations in accordinance with their approval or listing.

10.8.4.2 Solvent distillation units shall not be used in basements.

10.8.4.3 Solvent distillation units shall be located away from potential sources of ignition, as indicated on the unit's marking.

10.8.5 Liquid Storage. Distilled liquids and liquids awaiting distillation shall be stored in accordance with Chapter 6 of NFPA 30.

10.9 Spontaneous Ignition Hazards. The same spray booth shall not be alternately used for different types of coating materials if the combination of the materials is conducive to spontaneous ignition, unless all deposits of the first-used coating material are removed from the booth and exhaust ducts prior to spraying with the second coating material.

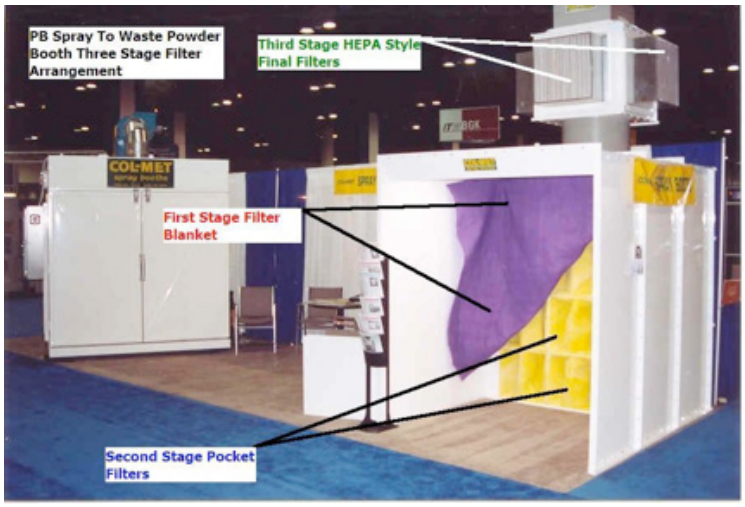
10.10 Chlorinated Solvents. Coating materials containing chlorinated solvents shall not be used with spray application apparatus or fluid-handling equipment if the chlorinated solvent will come into contact with aluminum within a piping system, pump, enclosed container, or any enclosure that is capable of being pressurized by the potential reaction. This shall apply even if the container or system has been constructed with pressure relief devices.

10.11 Smoking. Signs stating NO SMOKING OR OPEN FLAMES in large letters on contrasting color background shall be conspicuously posted at all spray areas and paint storage rooms.

10.12 Hot Work. Welding, cutting, and other spark producing operations shall not be permitted in or adjacent to spray areas until a written permit authorizing such work has been issued. The permit shall be issued by a person in authority following his or her inspection of the area to ensure that precautions have been taken and will be followed until the job is completed.

3. Spray to Waste Batch Powder Booth

3.1 Three-Stage Filter System (Pre-Filter, Primary Pocket Filters and Final Filters)



3.2 Manometer

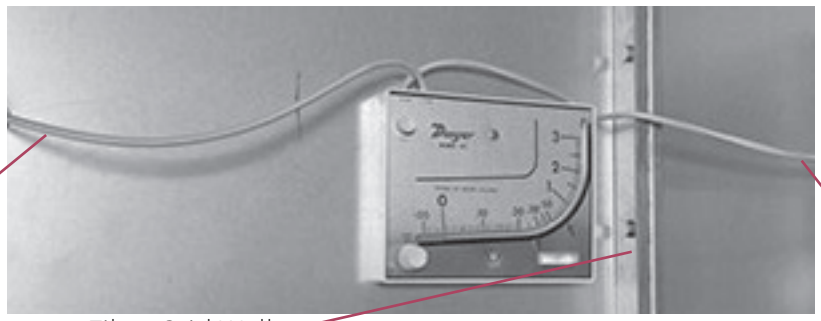
The manometer is used as a gauge to let you know when your exhaust filters need to be changed. Exhaust filters typically have a static rating of .5 inches of water.

Some booths are set up to use additional filters or optional filters that have a higher static rating than the standard .5 inches of water. Check your filter spec sheet to find the exact rating of the filter, but for this guide we will use the standard .5 inches of water column.

Step 1 - Locate the Manometer

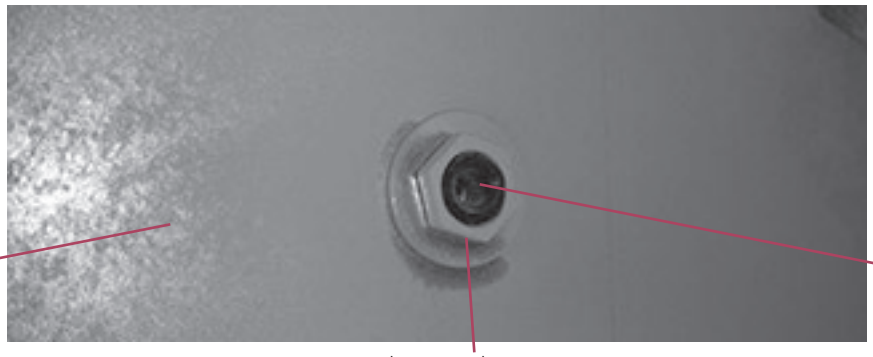
The manometer needs to be located where it can be read daily by the paint department. Locate it on the booth where there are no obstructions such as shelving or walls to interfere with viewing the manometer. Remember, without the manometer, you will have no idea how clogged your exhaust filters are, and therefore, no idea if the booth is performing correctly.

The manometer needs to be installed close to the exhaust filter wall to keep the tubing length to a minimum. Excess tubing length will reduce the accuracy of the manometer. There will be a high port and a low port on the top of the manometer. The high port will need to connect to the work chamber, and the low port will need to connect to the chamber on the suction side of the filter grid.



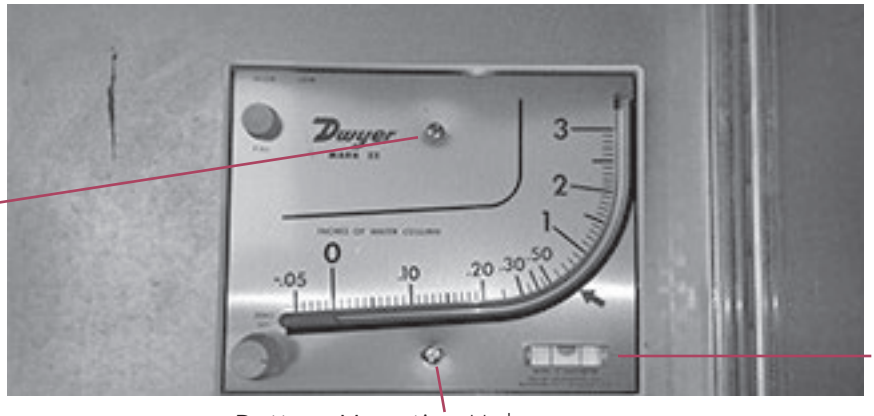
Step 2 - Install the Hose Barbs

Drill a hole in the booth wall just large enough for the plastic hose barb to fit through (approx. 13/32). Then install the washer and nut on the back side. Be careful not to over tighten or you may strip the plastic threads.



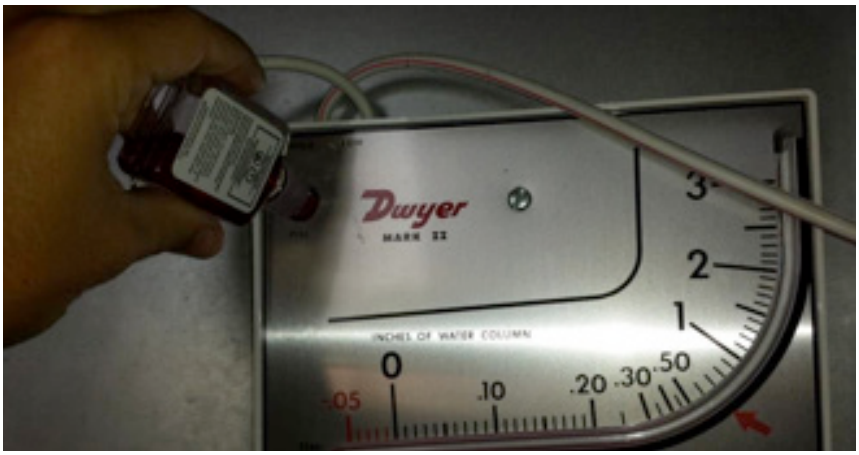
Step 3 - Mount the Manometer

Mount the manometer on the wall of the booth and ensure it is level using the included bubble level at the bottom of the manometer. If the manometer is not level, it will not be accurate.



Step 4 - Fill the Manometer

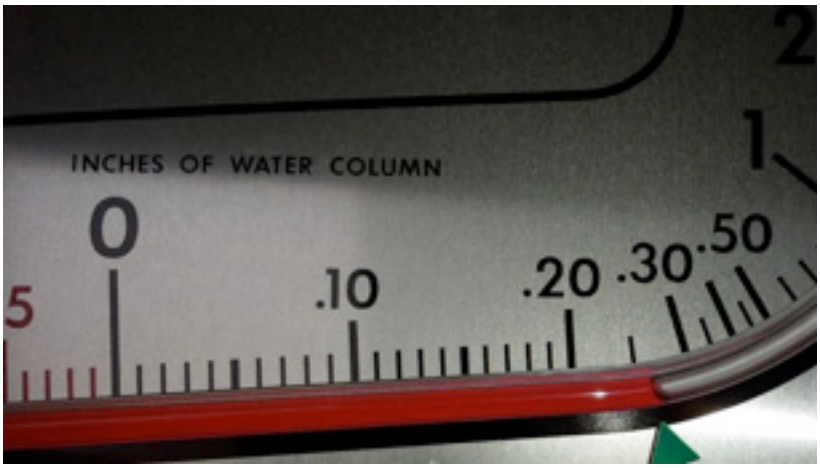
Turn the “Zero Set” knob counter clockwise until it stops, then turn the knob clockwise 3 full turns. This will place the adjustment knob in the middle of its travel range. Remove the fill plug at the top of the manometer and slowly fill with the red fluid. You will not need the entire bottle. Stop filling as soon as you can see the red fluid enter the clear tube at the bottom of the manometer. Then use the “Zero Set” adjustment knob to get the red fluid to sit on the 0 mark. If you overfill the gauge, remove the excess fluid by inserting a pipe cleaner through the fill port to blot up excess oil. Once the red fluid is set on zero, replace the fill cap.



Step 5 - Create Your Baseline Measurement

IMPORTANT: All of the filters in the booth need to be installed and new in order to get an accurate baseline. If the filters have already been used, you will need to remove them and install new, clean filters.

With the new clean filters installed, turn on your exhaust fan. If your exhaust fan is connected to a VFD to control the speed of the fan, make sure it is set to run at full speed. You will notice the red fluid should move up the scale and then settle at a number.

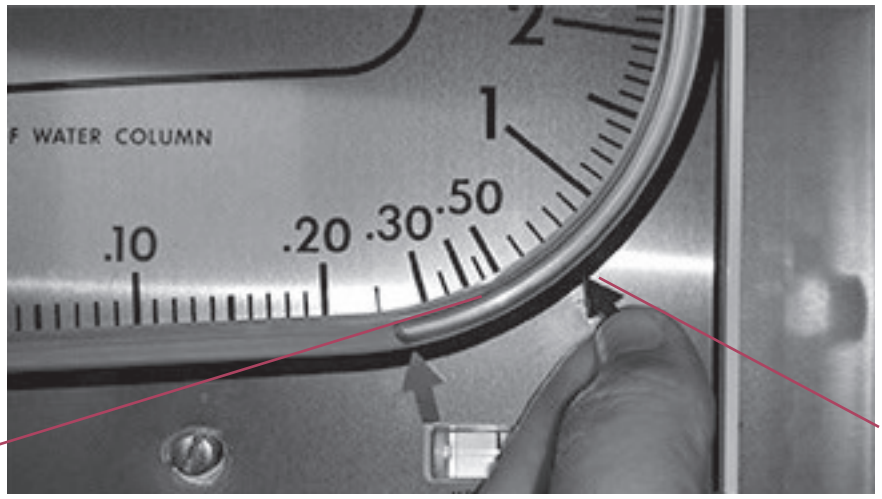


The number will be different from booth to booth, but that does not matter. This is just a baseline setting. Wherever the red fluid stops is where you will place your Green arrow. In this example, the red fluid stopped at .25 inches of water column. So because we know our filters are rated for .5 inches of water column, and we know that with clean filters the fan is drawing .25 inches of water column, we simply add the two numbers together to tell us where the filters will pack out.

.25 inches of water + .5 inches of water = .75 inches of water total

Step 6 - Set Your Change Filter Arrow

Now that the baseline is set, measure up the scale .5 inches of water to allow for your filters to pack out and that is where you will place the Red arrow.



Starting Pressure (Fan on with Clean Filters)

End Pressure (Change Filters)

At this point, your manometer is set up and ready to use. You should never need to move the arrows once they are placed. Always check the manometer before turning the fan on to ensure the red fluid is sitting on the 0 mark. If the fluid is not on 0, simply turn the “Zero Set” knob to adjust the fluid to zero before starting the fan.

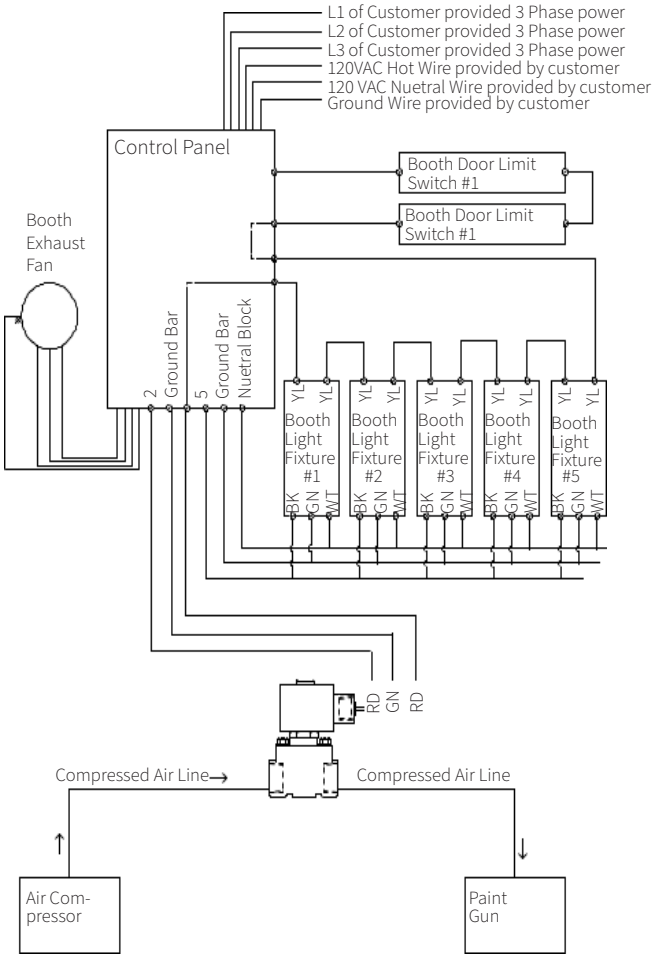
3.3 Air Solenoid Valve

This section contains literature pertaining to the installation, operation and maintenance of the above component.

As a built in safety feature, your RTT powder booth is provided with a two-way solenoid valve for the purpose of ensuring that pressurized air is only available to the powder application equipment if the powder booth is operating properly.

The function of this valve is to interrupt the supply of compressed air to the powder application equipment under certain conditions. This is done to prevent powder coating from occurring when the powder booth is not operating as designed or if any booth doors are open (if equipped). The air solenoid valve is electrically interlocked with the powder booth exhaust fan(s). If the optional switches are purchased, it is also interlocked with the product and personnel doors (if equipped). If the fan is not operating, or if a door (if equipped) is open for longer than a few seconds, the air solenoid valve will shut off the flow of pressurized air to the powder application equipment.

The unit should be installed down stream of any regulators and filters and upstream of the powder application equipment. It should be located as close as possible to the fitting to which the powder application equipment connects in order to insure rapid loss of supply pressure.



3.4 Exhaust Fans

This section contains literature pertaining to the installation, operation and maintenance of the above component.

Your RTT powder booth is equipped with a Aerovent tubeaxial fan for exhausting air from the powder booth. This type of fan was designed specifically for use in applications such as powder booths where the fan drive motor must be located out of the air stream. The fan blades are constructed of non-sparking aluminum for added safety. The fan and drive motor have been sized for the specific air flow of your booth, in accordance with all applicable environmental and safety requirements.

Belt Driven Tubeaxial Fans

The Aerovent model BTABD is a belt driven tubeaxial fan that is designed specifically for reliable and cost effective air movement in paint spray booth applications. Model BTABD exhaust fans are designed for applications requiring either a horizontal or a vertical airflow direction.

- Sizes and Performance
- Arrangement 9 – belt driven
- Available in sizes from 12" to 42" diameter
- Capacity from 1,295 to 36,131 CFM
- Static pressures to 1.25" w.g.

Construction Features

- Aluminum non-sparking propeller dynamically balanced for quiet, vibration-free operation
- Continuously welded, heavy-gauge, corrosion resistant, enamel coated steel housing with pre-punched inlet and outlet flanges
- OSHA belt guards are standard
- No-relubricable "sealed for life" ball bearings in mono-block housing to ensure reliable bearing performance
- Designed for continuous duty

Housing

Housings are heavy-gauge, hot-rolled steel construction, continuously welded and ground smooth to assure efficient airflow through the housing. Inlet and outlet flanges are integrally rolled and punched to allow attachment to ductwork or accessories as necessary. When an inlet bell is required, the housing is formed with a bell shaped inlet instead of the inlet flange, eliminating the need for and the expense of a separate inlet bell.

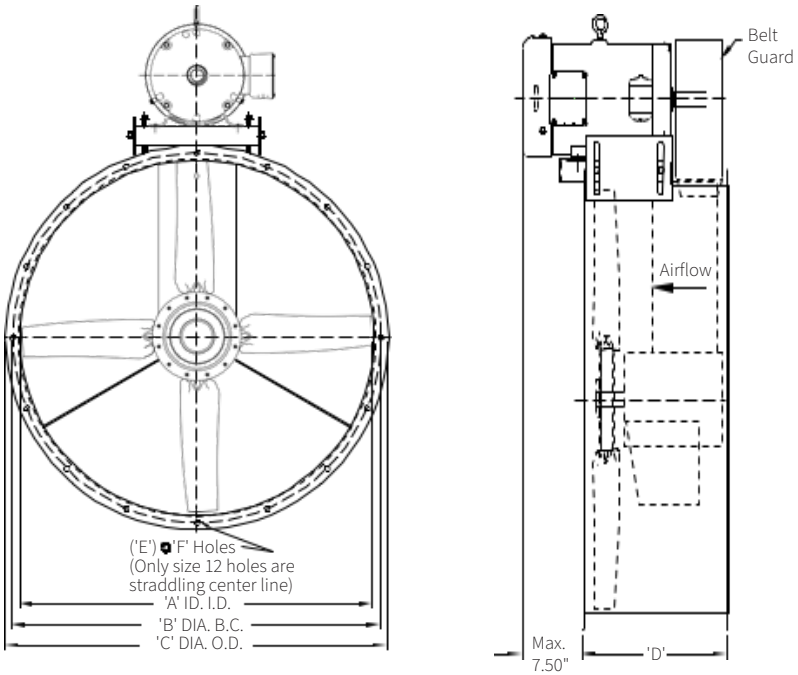
Drive Isolated from Airstream

The shaft and bearing assembly is mounted within an inner cylinder isolated from the airstream. The v-belt drive assembly is enclosed in an aerodynamically designed belt tube which maximizes fan efficiency, minimizes air blockage and reduces noise generation. An access door on the belt tube is standard.

Propeller

- Die Cast aluminum construction
- Unique BackSwept profile with airfoil cross section
- Adjustable pitch blades with factory set blade angles
- Split taper lock bushing for superior holding power on shaft
- Generates low wake turbulence for low noise emission

Dimensional Data



Size	A	B	C	D	E	F	Max. Mtr Frame
12	12.25	13.88	14.88	12.00	8	.44	145T
14	14.25	15.88	16.88	12.00	8	.44	145T
16	16.25	17.88	19.00	12.00	8	.44	145T
18	18.25	19.88	21.00	12.00	8	.44	145T
24	24.25	25.88	27.13	15.50	8	.56	184T
30	30.38	31.88	33.25	15.50	8	.56	184T
34	34.38	35.75	37.38	15.50	8	.56	184T
36	36.38	37.88	39.38	15.50	16	.56	184T
42	42.50	43.75	45.50	15.50	16	.56	215T

Dimensions shown are in inches unless otherwise indicated. R33867

Dimensions are not to be used for construction.

Typical Specifications

Model BTABD, Arrangement 9 – Belt Driven

Fans, where indicated on drawings and schedules, shall be Model BTABD, Arrangement 9, V-belt driven, axial flow type as manufactured by Aerovent, Minneapolis, Minnesota, and shall be of the size and capacity as indicated in the fan schedules. Model BTABD fans have been tested in an AMCA registered laboratory in accordance with AMCA 210 and AMCA 300 test codes for both air and sound. In addition each unit shall be factory run tested and final trim balanced prior to shipment.

CONSTRUCTION — Fan casings shall be welded of ASTM A-1011 low carbon, commercial quality 12-gauge hot rolled steel in sizes through 20" diameter, 10-gauge hot rolled steel from 24" diameter through 28" diameter, and 7-gauge hot rolled steel on sizes greater than 30" in diameter. Inlet and outlet flanges shall be integrally rolled mechanically from fan casing sheet steel to insure concentricity and alignment. Accuracy and uniformity of the fan casing shall be insured through the use of welding jigs and fixtures. The motor base plate shall be fabricated of minimum 3⁄16" steel plate and welded to the exterior of the fan casing.

PROPELLERS — Propellers shall be constructed of non-sparking, die cast aluminum hubs and blades. Fan blade pitch angle shall be preset at the factory. Propellers shall be secured to the fan shaft with a taper lock bushing.

SHAFT & BEARINGS — All fans shall be supplied with a shaft of AISI -1045 steel material that has been properly turned, ground, and polished for accuracy. The shaft shall be supported by a matched set of non-relubricable bearings that are housed in a cast aluminum monoblock. All fan bearings are to have an L-10 minimum life as defined by AFBMA of at least 60,000 hours.

DRIVES — Fan drives shall include cast iron sheaves and non-static conducting belts. Fans equipped with motors up to and including five horsepower will be furnished with a variable pitch type drive sheave to allow for minor speed adjustment of the fan propeller during system balance. Fans equipped with larger motors will be furnished with a fixed drive sheave. A belt guard is to be provided to afford personnel safety and general traffic protection.

MOTORS — Fan motors shall be manufactured in accordance with current applicable standards of IEEE and NEMA. They shall be foot-mounted, NEMA standard, TEFC or ODP, continuous duty, ball bearing with class "B" insulation.

BALANCING — The propeller assembly shall be statically and dynamically balanced in accordance with ANSI/AMCA 204-05 "Balance Quality and Vibration Levels for Fans" to Fan Application Category BV-3, Balance Quality Grade G6.3. In addition, belt driven fan propellers shall be balanced on the fan shaft after final assembly in the fan casing, in the manufacturing facility to the following peak velocity values, filter-in, at the fan test speed:

Fan Application Category	Rigidly Mounted (In/Sec)	Flexibly Mounted (In/Sec)
BV-3	0.15	0.20

Final test room vibration levels in the axial, vertical, and horizontal planes shall be recorded and a written copy shall be available upon request.

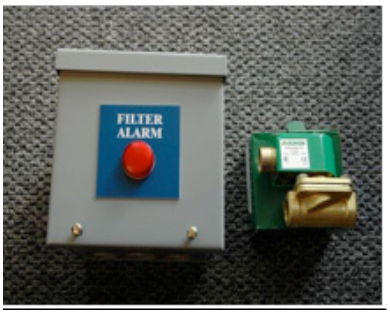
FINISH — The fan housing, after fabrication, shall be cleaned and chemically pretreated by a phosphatizing process and shall be painted inside and out with two coats of air dry enamel.

3.4 Powder Exhaust Filter Proving Assembly

This assembly addresses filter loading in the powder booth requiring that the filters be monitored. An automated signal will alert the operator while shutting down powder spray operations in the event of filter failure.

This is an NFPA 33 Code 15.8.2

Powder Exhaust Filter Proving Assembly



Powder Exhaust Filter Proving Assembly (Open)

3.6 Optional Powder Booth Control Panel

Your RTT powder booth may be equipped with an optional pre-wired electrical control panel. Refer to the electrical control drawings for the electrical schematic and component Bill of Material. Also shown on this drawing is the wiring required at the time of installation. No spare parts are provided with this control panel.

This panel and its associated wiring must be installed under the supervision of a licensed electrician.

The cabinet that houses the controls is either NEMA 1 or NEMA 12 rated. It is not suitable for Class I, Division II area. Refer to Chapter 6 in the NFPA 33 Standard and consult with the local authority having jurisdiction for the definition of this area for your powder booth.

4. Lab, Batch and Pass Through Powder Booths

Photos

Cartridge Batch Powder Booth

Cartridge Collector

Lab Powder Booth

Pass Through Powder Booth

RPC Collector Showing Final Filters and Control

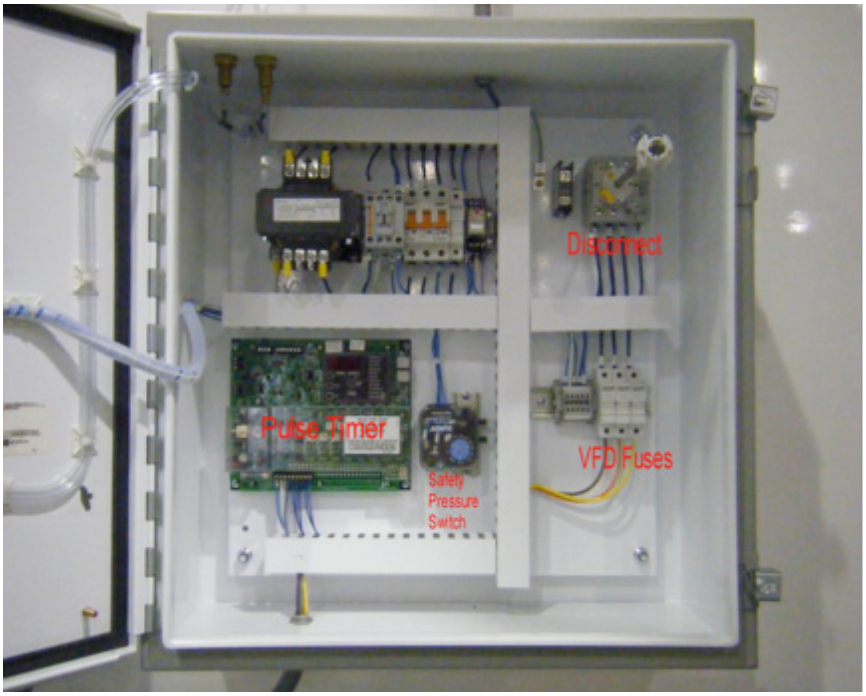
4.1 Control Panel with VFD Drive

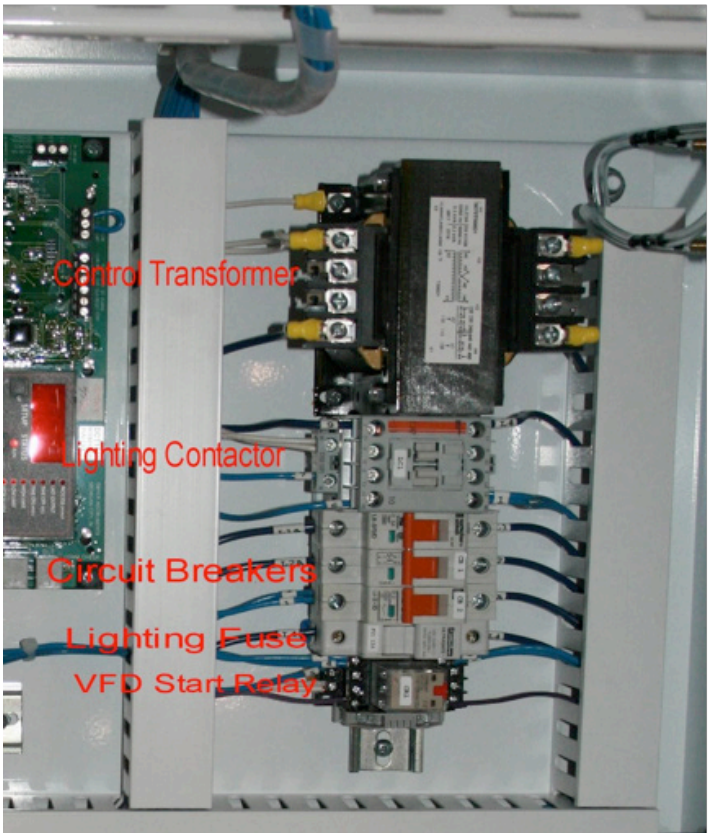
The following contains a description of the LPB, RPB, RPC and EZ Pass Thru Powder Booth Control Panel.

Control Panel (Nema 12) Enclosure with Definitions

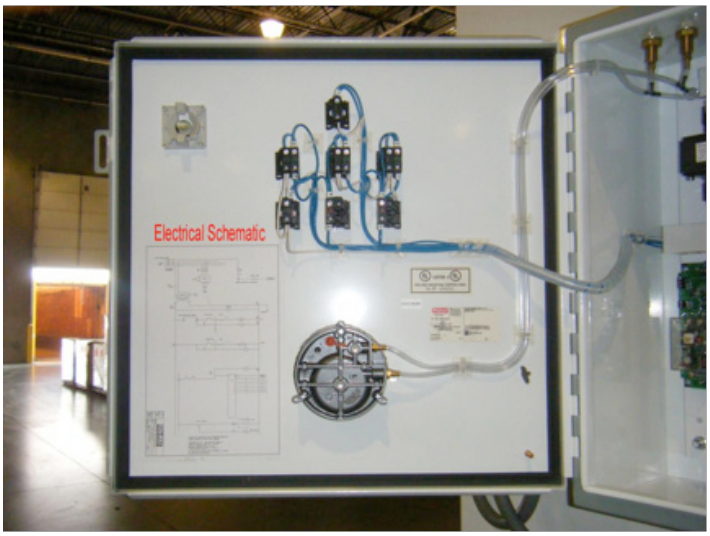
1. Turn power on at Main Disconnect (Blue power light will be illuminated).
2. Turn Lights on using green light on button.
3. Turn fan on using green fan on button.
4. Turn Filter Pulse Control switch to on position. This will pulse filter cartridges in a pre-determined sequence.
5. Check Magnehelic Gauge to assure booth is running within proper parameters. Low end at .25" of water column, high end not to exceed 3.5" water column. If the reading exceeds 3.5" of water column adjust pulse timer down from a 2 minute interval to a 1 minute interval.
6. Filter alarm light only indicates a pressure drop which indicates a filter missing or a hole in the cartridge filter.
7. Adjust Variable Frequency Drive to assure a minimum of 100 FPM lineal face velocity in booth openings.

Control Panel (Nema 12) Enclosure Interior with Definitions





Control Panel (Nema 12) Enclosure Interior Showing Electrical Schematic and UL Sticker



1. Electrical schematic shown inside the NEMA 12 door enclosure.
2. UL Listed label shown inside the NEMA 12 door enclosure.

4.2 Optimizing Your Collector's Performance

Outlined below are some basic collector operating parameters for pulse jet collectors using elements with Non Woven Spun Bond (all finishes) or Conventional Felted Media:

>	Pressure	50 PSI - 80 PSI
>	Frequency (off time)	20 seconds*
>	Duration (on time)	Maximum 200 milliseconds

Reservoir: Requires an unrestricted air supply at least the diameter of the blowpipes and needs to be big enough for valve's demand. Ideal conditions will leave the reservoir at 85% of the operating PSI after firing.

Cleaning Air: Needs to be clean and dry, which could be accomplished with an air dryer. In-line traps/ separators can catch a lot of problems in the air supply prior to getting to the collector.

***Pulse Frequency:** Frequency should be adjusted to balance the collector's delta P and should be monitored frequently during the first seven days after start up. Pulsing frequency can never be any faster than the reservoir recovery to operating PSI.

Pulse Sequence: Needs to be staggered to maximize the distance between the newly cleaned row and the next row to be pulsed.

Hopper: Should not be used for storage. Evacuation equipment (rotary valves, screw conveyors, etc.) should be sized to unload hopper before accumulation occurs. Units with slide gates should be left open and equipped with drum adap ers.

Changing Filters: To change your filters, push the red handle and the filter will drop about an inch. Install the new filter, then pull the red handle and the filter will lift up in o position. Be careful not to crush the new filter by putting too much tension on the clamp. If the new filter doesn't seem to fit, you can adjust the metal plate the filter sits on by loosening the nuts on the all-thread and then moving the plate up or down.

Use the following guide to program the Dwyer Timer Board:

1. Control panel power indicator light should be illuminated blue.
2. Press fan start button and allow the fan to come up to speed.
3. Turn on the "Filters" toggle switch. This will turn on the Dwyer Timer Board.
4. Once the timer board is on push the "Select" button on the timer, "Last Output" LED will light up.
5. Use the "Up" or "Down" button to adjust the number on the display to equal the total number of pulse valve you have on your collector, then press the "Select" button and the "Time Off" LED will light up.

6. Use the “Up” or “Down” button to adjust the number on the display to equal the amount of time between pulses. RTT pre-sets this number to 120, but it can be lowered based on the amount of time needed to re-pressurize the air manifold feeding the pulse valves.
7. Press the “select” button and the “Time On” LED will light up. This is the amount of time the pulse valve will remain on in milliseconds. Use the “Up” or “Down” button to adjust the number on the display. NEVER ADJUST THIS TIME TO MORE THAN 200.
8. Press the “Select” button and then the “Cycle Delay” LED will light up. Use the “Up” or “Down” button to adjust the number on the display to equal 0, then press the “Select” button and the “Down Time Cycles” LED will light up.
9. Use the “Up” or “Down” button to adjust the number on the display to equal 0, then press the “Select” button. The “Process” LED should light up and it will immediately start pulsing the valves to the new settings you have entered.

Use the following guide to change the speed of your fan:

Note: The maximum speed setting is based on the CFM rating of your collector. Some collectors will only accept a maximum setting of F43.00 while other collectors will accept up to F54.00 or even F60.00. If you try to set a speed higher than what the collector is capable of, the drive will simply flash several times, and then go back to the previous setting. Setting the collector too high can cause the powder to be pulled away from the parts which will waste powder. Your powder supplier can help you decide on an optimal speed to run the fan so that you get sufficient air-flow in the booth, but no so much that it’s pulling the powder away from the parts.

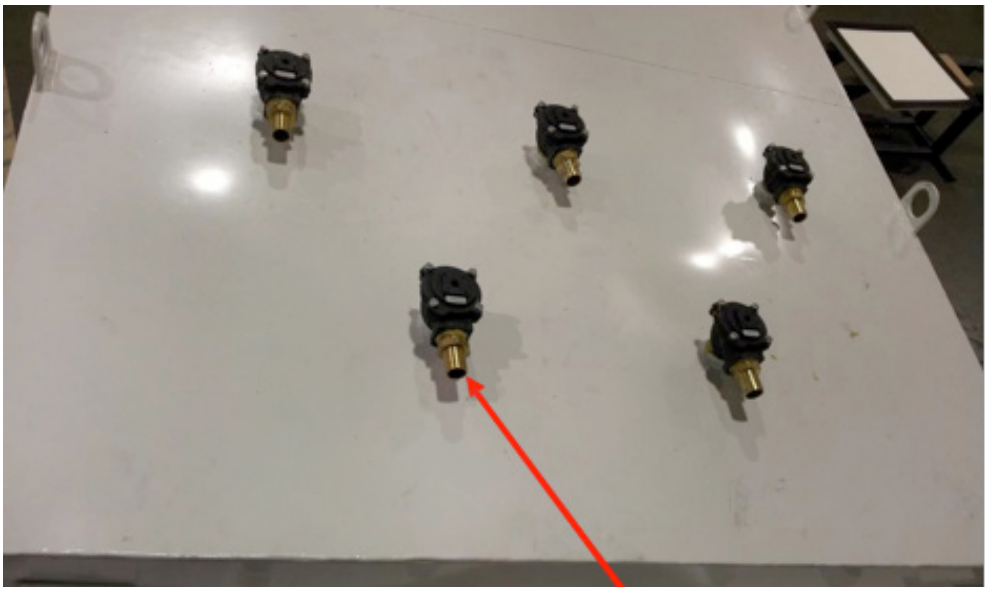
1. Push the “Fans Start” Button on the control panel. The fan should start spinning.
2. Press the “Enter” button on the Yaskawa V1000 mounted next to the control panel. The first digit on the display should be flashing.
3. Use the “/\” or “\/” arrows to change the digit higher or lower. Use the “Reset” button to move over one space to change the second digit. Once you get to the speed you want, press the “Enter” button and the display will flash “End” and the fan will change speed. Press the “ESC” button to make the drive stop flashing.

Note: The maximum speed varies depending on the CFM rating of your collector. If you select a speed that is too high, the display will simply flash and will not accept your speed setting. Try a lower speed.

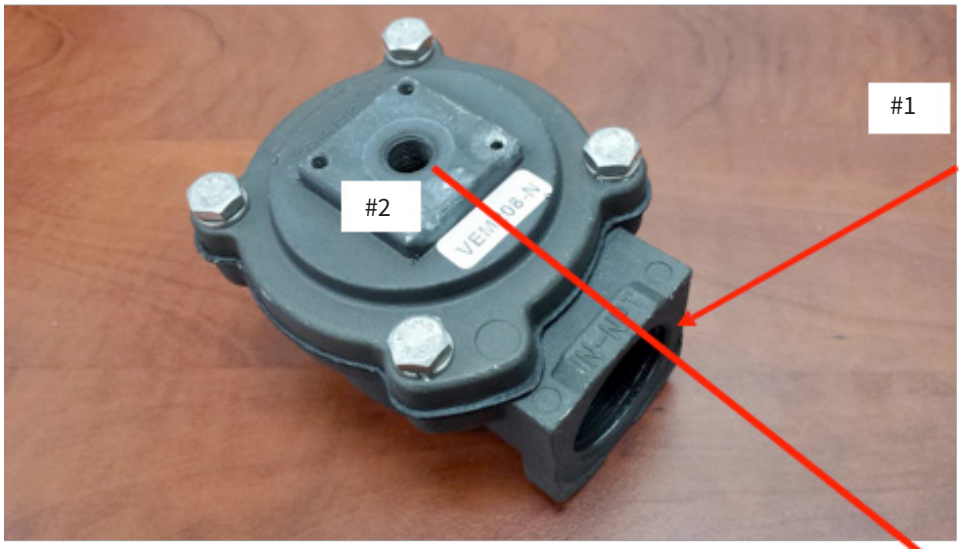
These are general operating parameters. These recommendations are good starting points, but every collector and application has unique operating conditions.

4.3 Understanding the Pulse Down System

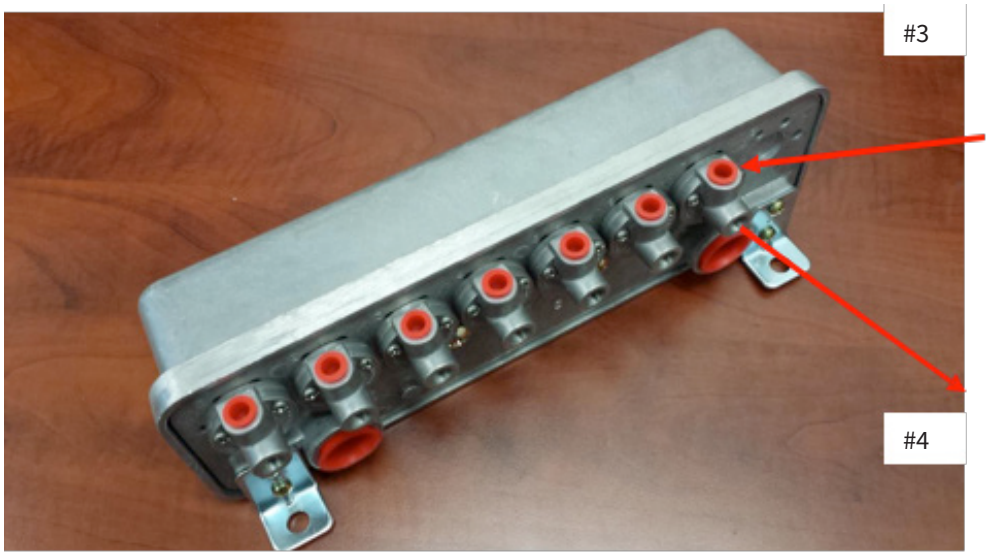
60 to 80 PSI compressed air is plumbed into the manifold on the collector.



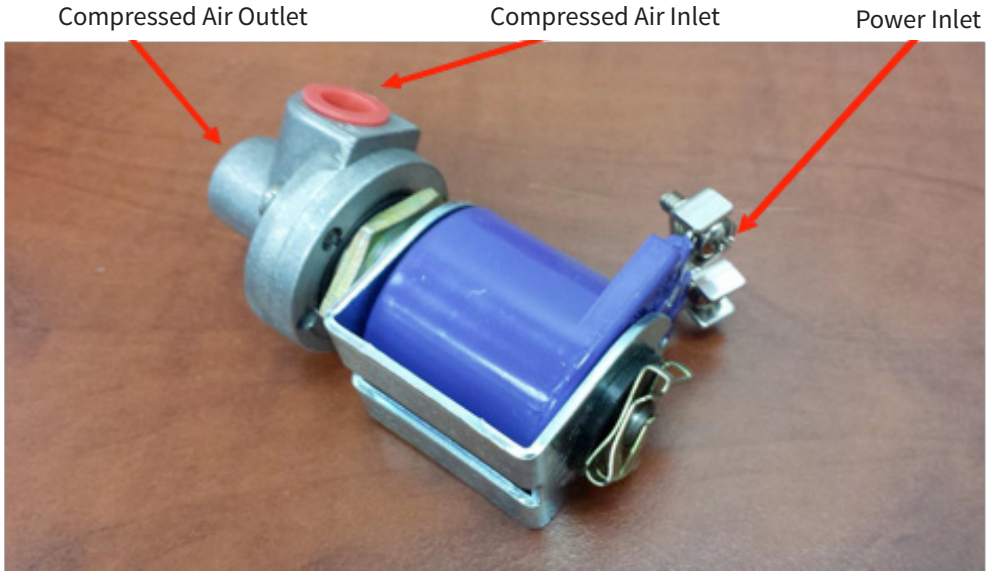
Compressed air feeds from the manifold to each pulse valve.



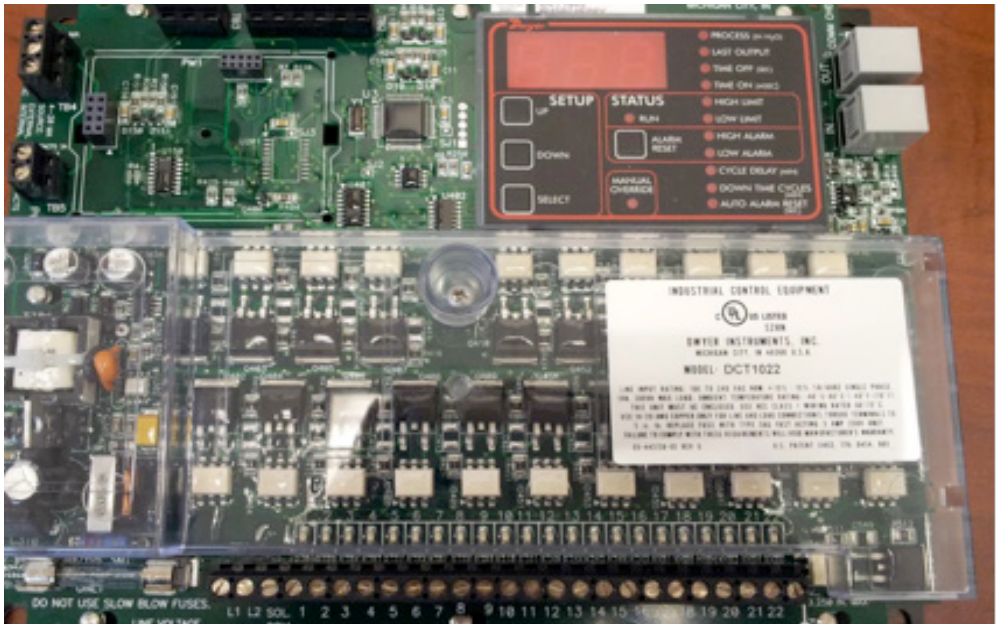
Compressed air feeds from the pilot port on each pulse valve to the solenoid enclosure.



The pulse valve acts like a high volume switch for compressed air. Compressed air is fed into the inlet of the valve and some of the air bleeds off through the pilot port on the top where it feeds over to the solenoid enclosure. The solenoid enclosure is where the air stops, which is what keeps the pulse valve closed. As long as air is not allowed to continuously bleed out of the pilot port on top, then the pulse valve will remain closed. When air is allowed to bleed out of the pilot port on top, then the pulse valve will open until the pilot port is blocked off and pressure is allowed to rebuild.



The solenoid enclosure has 1 solenoid for each of the pulse valves to be operated. Each solenoid acts like an electrical switch for compressed air. The solenoid is closed when it does not have power applied to it, meaning that no compressed air is allowed to pass though until power is applied to the electrical coil of the solenoid. As long as the solenoid stays closed, the system remains pressurized which keeps each pulse valve closed. When power is applied to the coil of the solenoid, a small amount of compressed air is allowed to pass through. This small amount of air is all that is needed for the pulse valve to open and allow a larger amount of compressed air to fire down into the cartridge filter. As long as the solenoid stays on allowing air to escape, the pulse valve will continue to fire air into the cartridge filter.



The Dwyer Timer Board is where the timing can be adjusted for each solenoid. You can adjust the amount of time between pulses (Time Off in seconds) and how long each pulse will last (Time on in milliseconds). For example, if the time off is set for 60 and the time on is set for 150, then the system would perform in the following manner:

Power is applied to the timer board via the “Filters” toggle switch on the door of the control panel. (only active if the fan is in operation).

The first output of the timer board will send out a 150 millisecond 120vac signal to the first solenoid enclosure.

The solenoid will open for 150 milliseconds allowing a small amount of air to pass through which allows air to bleed off from the pilot port on the first pulse valve.

The first pulse valve opens for 150 milliseconds allowing a high volume of compressed air to fire down into the cartridge filter.

After 150 milliseconds has elapsed, the first output of the timer board will turn off, closing the solenoid valve, which blocks off the air bleeding out of the pulse valve, then closes the pulse valve to prevent air from firing into the cartridge filter.

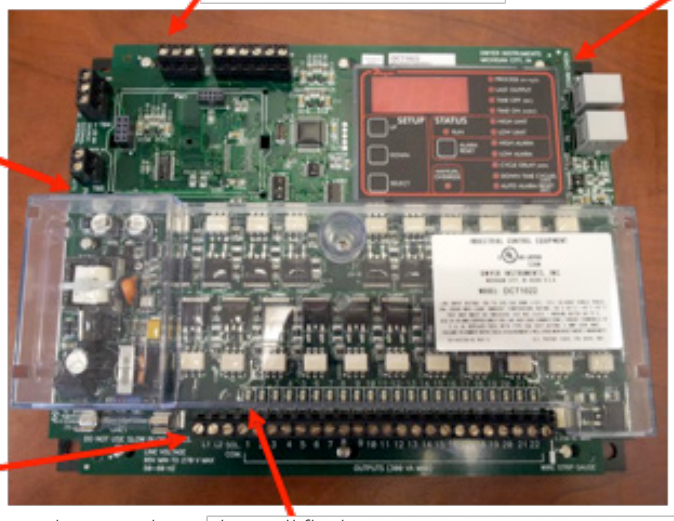
The timer board then waits 60 seconds and then the next output of the board will repeat the steps listed above. The process repeats until the last output is reached, and then starts back at the beginning.

4.4 Troubleshooting Pulse Problems

No Filters Are Pulsing

Check the incoming air pressure to the manifold. The system requires air pressure to pulse at all times. The air pressure should be between 60 and 80 PSI. If the pressure is too low, all of the valves may release air at the same time.

Check the Dwyer timer board. Ensure there is 120VAC at terminals L1 and L2 at the bottom of the board. There should be a solid red LED on the left side of the board and a flashing red LED on the right side of the board. The red LED above each number at the bottom of the board should start flashing one at a time every 60 to 120 seconds as soon as the board is powered up. This flash indicates that the board is outputting 120VAC at that terminal, which feeds the solenoid enclosure located at the top of the collector.



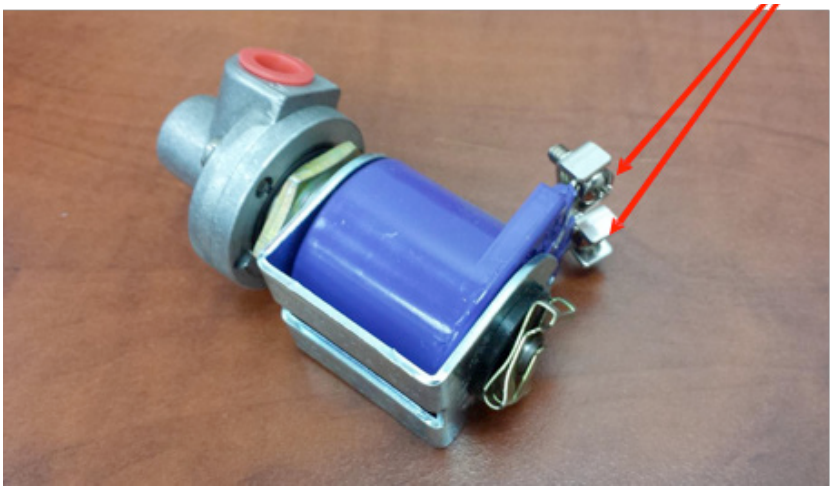
Some Filters Are Pulsing

Check the solenoid enclosure. There should be air pressure feeding though the white tubes into each solenoid. When the solenoid is energized by the Dwyer timer board, the air pressure is allowed to pass though the solenoid, which allows the main pulse down valve to fire air into the filter. If some of the filter pulse but some do not pulse, there could be a problem with the solenoid associated with the pulse valve that's not pulsing. It could be clogged, or it may have failed.

120vac must be present here for the solenoid to open and allow the pulse valve to fire. Check for loose wiring or any discoloring of the solenoid which could indicate it has failed.

To test the solenoid to see if it is bad, first turn off the power to the main control panel. Disconnect the wires leading to the suspect solenoid and use a volt meter set on Ohms to measure between the two terminals on the solenoid. If the volt meter does not show a reading at all, then the coil is open, meaning the solenoid will need to be replaced. If the volt meter does show a reading, then the coil is ok and the problem is somewhere else, possibly a loose wire between the solenoid and the Dwyer timer board.

Place volt meter probes between these two terminals.

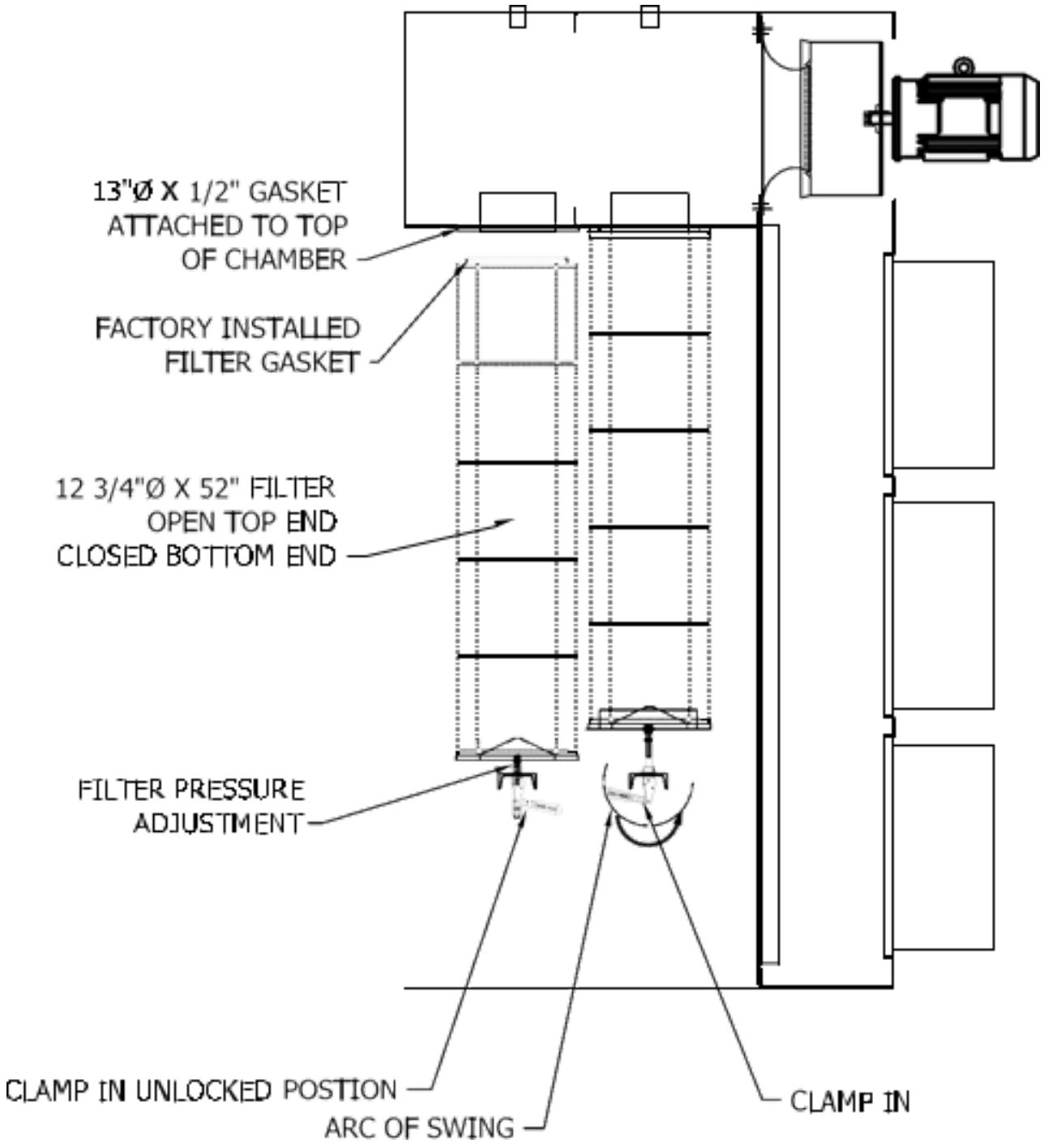


Air is Continuously Firing Into the Filter

Check the white tubing between the pilot port on the pulse valve and the solenoid. Sometimes these tubes can come loose during shipping, or over time develop a leak which allows the compressed air to escape the system. If the air is leaking out of the pilot port on the pulse valve, then the pulse valve will allow air to fire into the cartridge filter. To test this theory, turn off the compressed air and then plug the pilot port on the pulse valve that's leaking and then turn the compressed air back on. If the pulse valve no longer fires air into the cartridge filter, then there is either a leak in the white tubing, or the solenoid that controls the valve has failed and is allowing air to pass through it at all times. If the valve continues to fire air into the cartridge filter even when the pilot port is plugged, then the diaphragm in the pulse valve has failed and will need to be replaced.

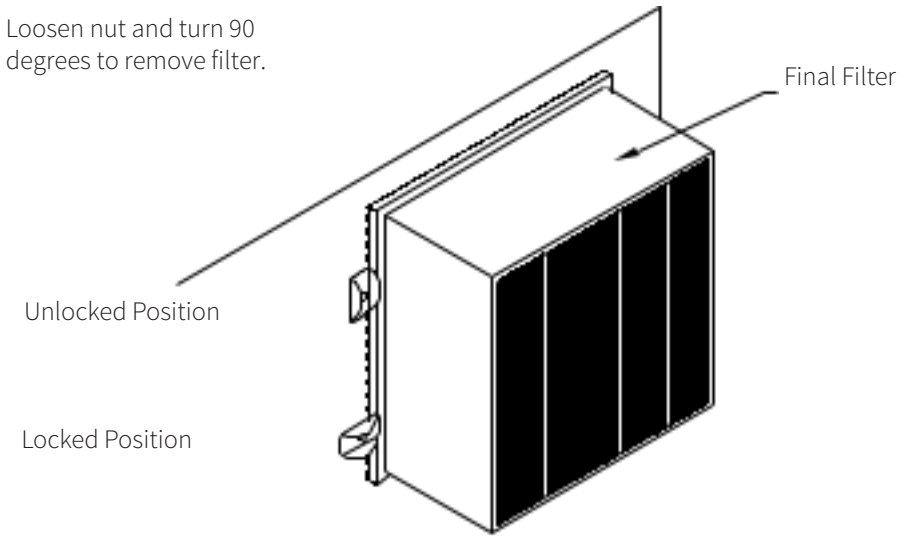
4.5 Exhaust Filter Installation

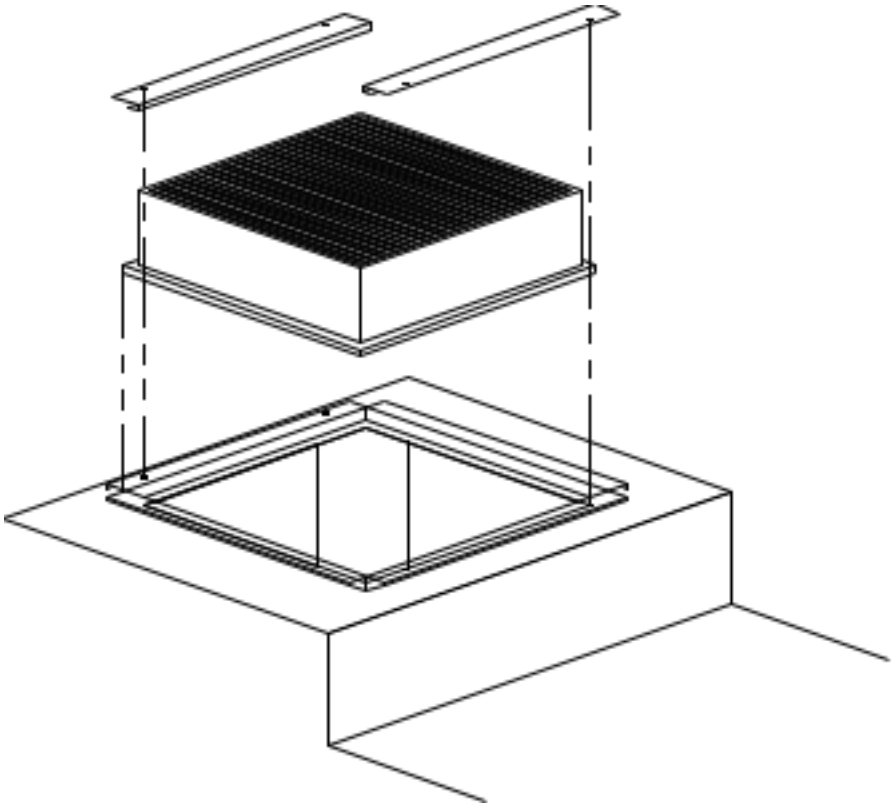
Install one wire grid in each filter cell with prongs facing into booth. Exhaust filters will be attached to prongs.



4.6 Intake Filter Installation

If booth has an intake plenum, insert intake filter into filter grid. The side marked “Air Leaving Side” on filter goes toward inside of booth.





5. General Lighting Fixture

5.1 Light Fixtures

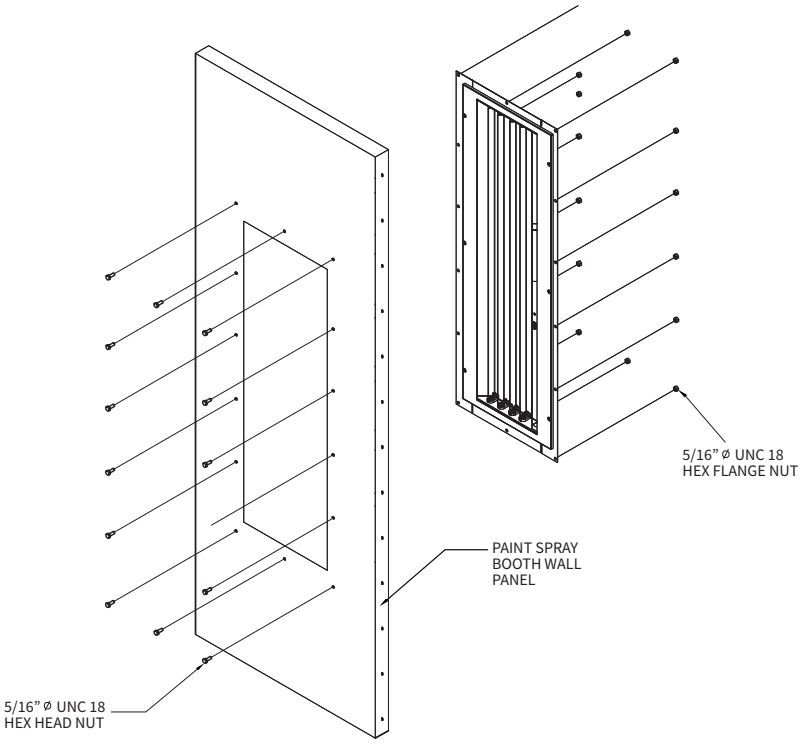
⚠ WARNING

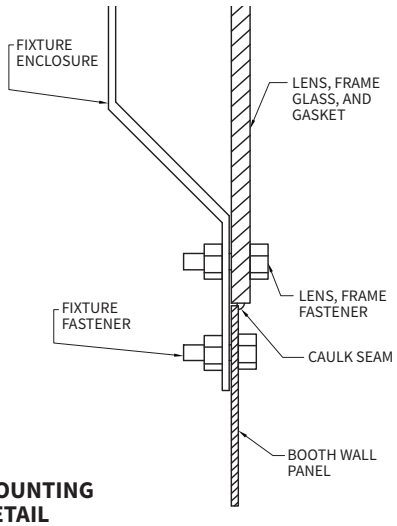
Prevent serious injury or death.

Electrical installations must be performed by qualified electricians.

Installation must conform to all national, local, and provincial codes and standards.

1. Place light fixture into booth panel, center in opening, and mark locations for mounting holes.
2. Install light fixture in panel from outside of booth as shown in drawing.
3. Caulk perimeter of light fixture lens frame with appropriate caulking.
4. The fixture is provided with an interlock switch that has a normally open contact, which opens when the fixture lens is removed from fixture. The switch is to be wired to disable spray equipment used in spray booth.





MOUNTING DETAIL

CAUTION:
WHEN TIGHTENING LENS FRAME FASTENERS, TIGHTEN USING HAND TOOLS ONLY. TIGHTEN UNTIL SIDES OF METAL LENS FRAME MAKES CONTACT WITH FIXTURE ENCLOSURE. OVER TIGHTENING WILL CAUSE LENS FRAME TO WARP AND WILL BREAK DOWN VAPOR SEAL OF LENS

6. General Installation Procedure

6.1 Installation General

General

This manual is a guide for installing a variety of spray booths. The assembly drawings enclosed are specific for the booth you have purchased. This drawing is an exploded isometric drawing showing the relationship of each panel or part to the next one. A packing list of all components is provided and must be used in addition to the drawing to identify all components.

All DAMAGES MUST be reported within 24 hours of receipt and a freight claim filed with the carrier.

Preliminary

RTT booths are manufactured in accordance with NFPA 33, UFC 45 and NEC 516. However, local codes and regulations may apply to the installation and use of this product. All permits and approvals be obtained prior to installation and use of the spray booth.

1. Uncrate and inventory all spray booth components to ensure all of the parts are accounted for. Each component is numbered on the exploded view.
2. The floor surface of the booth must be non-combustible material of such character as to facilitate the safe cleaning and removal of residues. The floor surface must be flat and level.
3. Mark the dimensional outline of booth on floor.
4. Follow the step-by-step instructions provided.

Planning Ahead

1. Clearances between other work areas and combustible storage areas must be held as follows:
    a. 3 ft. minimum clearance at all sides and sealed entry ways (i.e., door ways).
    b. 3 ft. minimum clearance at all non-sealed entry ways (i.e., the open face of spray booth or a silhouette openings).
    c. 10 ft. minimum clearance must be held between the exhaust stack of the booth and the intake of another apparatus. NFPA 33 dictates a minimum discharge clearance of 3 ft. from the nearest combustible material; however, stack height requirements vary with individual states and can be up to 1½ times the building's roof height from grade.
    d. 10 ft. minimum clearance must be held between the intake of this booth and the exhaust of any other apparatus.

2. Permits are not included. It is the responsibility of the end user to acquire all permits to install a booth.

3. A FIRE SUPRESSION SYSTEM IS NOT INCLUDED WITH THE BOOTH BUT IT IS REQUIRED. Generally this is supplied and installed by a licensed local installer.

4. Electrical installation must be performed by a licensed electrician familiar with national, local electrical codes and regulations in your location.

6.2 Booth Assembly

When assembling booth, leave bolts finger tight until each section is assembled. All flanges should face outward. Install bolts from inside so nut is outside booth. Use a drift pin to align panel holes when two or more panels are difficult to align by hand.

Lay out all floor channel for exhaust chamber and walls. As you attach wall panels together, they will also bolt to the floor channel.

⚠ WARNING

Prevent serious injury or death.

Most booth components weigh 50-500 lbs.

Use adequate lifting devices to raise, move and install booth components.

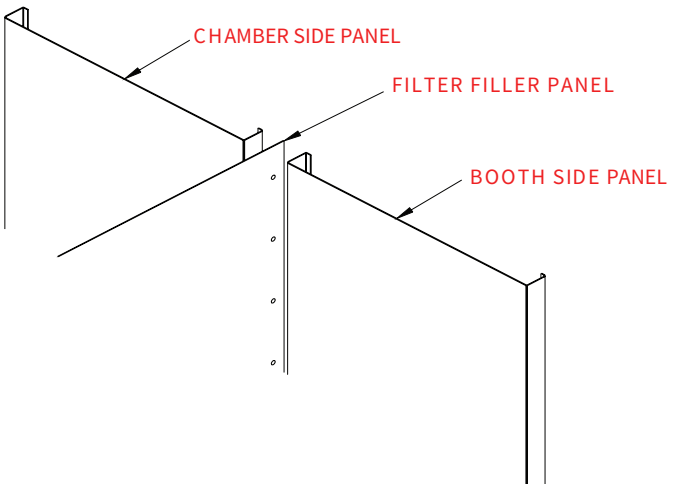
NOTICE

Prevent equipment damage.

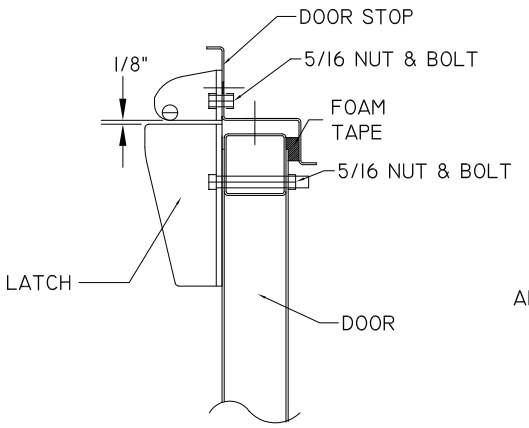
Spray booth roof will not support a person. Do not attempt to stand or walk on spray booth roof.

Refer to exploded view drawings included with your spray booth.

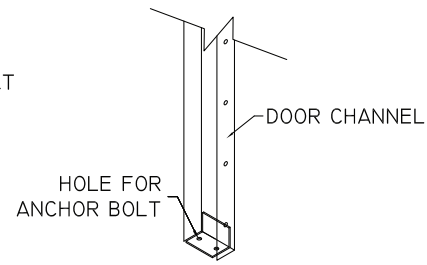
1. Starting with exhaust chamber at either rear corner, bolt one corner panel and one rear wall corner panel together (use tie channel where applicable).
2. Bolt opposite rear sidewall panel to rear wall panel.
3. Bolt all rear wall panels in place.
4. Bolt tie channel along top edge of rear wall panels.
5. Place exhaust fan panel above side and rear wall panels and bolt in place.
6. Insert filter filler panels between sidewall, roof panels and exhaust chamber. Bolt in place.



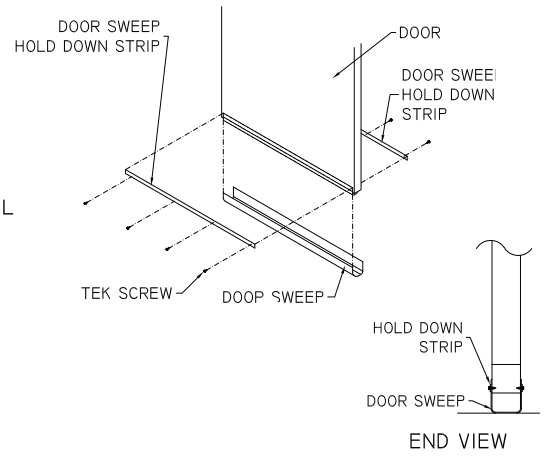
7. Following exploded view drawings, continue alternately assembling wall panels and roof panels to each other until you reach front end of booth. Finish off roof section by attaching fire curtain if needed. If booth has front doors, no fire curtain is needed.
8. Verify walls are plumb and booth is square and on floor layout marks. Tighten all mounting hardware.
9. Anchor floor channel to floor at a minimum of every 12 inches.
10. Caulk all panel joints inside the booth with the caulk provided. Do not use a silicone caulk.
11. If booth is supplied with a personnel door or product doors, apply gasket to perimeter of all door openings. Attach door hardware and adjust latches. Level door with doors off, then attach doors to hinges.



DOOR LATCH AND SEAL DETAIL



DOOR FRAME BASE DETAIL



PRODUCT DOOR DOOR SWEEP DETAIL

6.3 Motor Installation

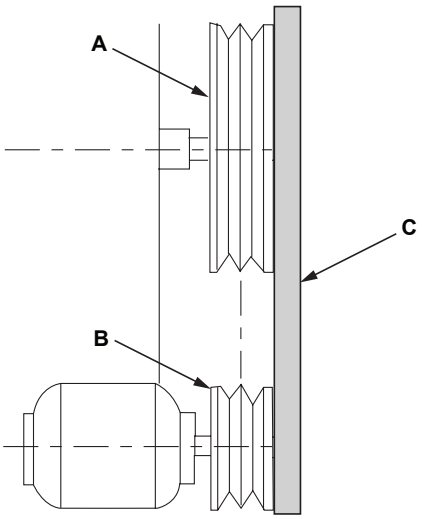
Couplings, drive belts, chains or other mounted devices must be in proper alignment, balanced and secure for safe motor operation.

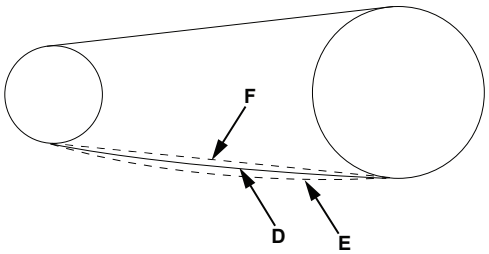
Mounting

This motor must be securely mounted. Sufficient ventilation must be provided to insure proper operation.

Install Sheaves And Fan Belts

1. The fan sheave (A) and motor sheave (B) must be in axial alignment. Shafts must be parallel in both vertical and horizontal planes.
2. The sheaves must be in radial alignment. When sheaves are of equal width, align with a straightedge (C). When sheaves are of unequal width, align center of sheaves.
3. Check fan belts for proper tension and for signs of wear. Belt should have a slight sag at bottom of sheaves. Belt (D) is properly adjusted. Belt (E) is too loose. Belt (F) is too tight.





6.4 Electrical

⚠ WARNING

Prevent serious injury or death.

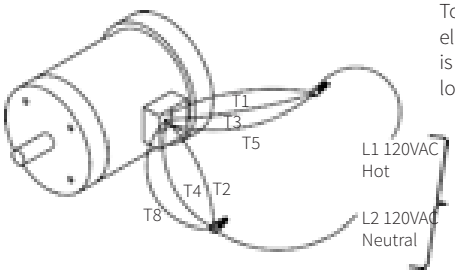
Electrical installations must be performed by qualified electricians.

Installation must conform to all national, local, and provincial codes and standards.

Complete booth assembly and then perform steps 1-5 below to connect electrical service to motor.

1. Determine voltage at your facility. RTT does not recommend using 120V single phase on motors above 1HP.
2. If a control panel or motor starter was ordered with this booth, confirm that the voltage and phase on the control panel matches the voltage and phase you intend to use.
3. Locate the wiring diagram inside the control panel that matches your voltage, phase, and HP.
4. Some motors may have 2 additional red wires. These wires are for an internal thermal overload. We do not use these wires and they should be capped off with wire nuts or electrical tape.
5. Locate the rotation arrow on the fan and verify belts are rotating in the direction of the arrow. If the belts are not rotating in the direction of the arrow, reverse the motor.
6. To insure proper wiring refer to motor nameplate for wiring diagram.

3/4 - 1.5 Hp 120V Single Phase (Wire for "Low Voltage")

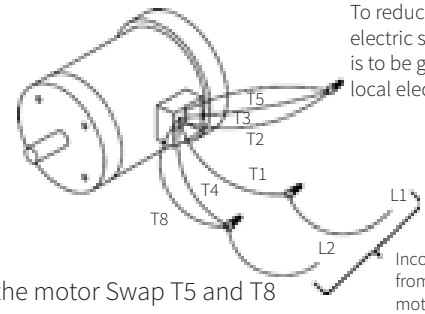


To reduce the risk of electric shock, the motor is to be grounded per local electrical code.

Incoming 1PH power from control panel, motor starter.

To reverse the motor Swap T5 and T8

3/4 - 3 Hp 230V Single Phase (Wire for "High Voltage")

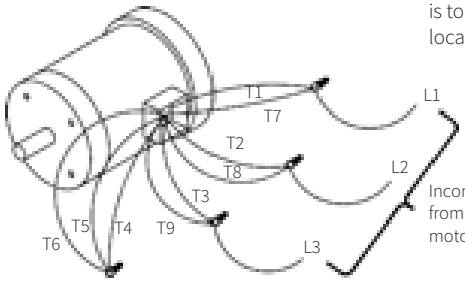


To reduce the risk of electric shock, the motor is to be grounded per local electrical code.

Incoming 1PH power from control panel, motor starter.

To reverse the motor Swap T5 and T8

208 thru 240V Three Phase (Wire for "Low Voltage")

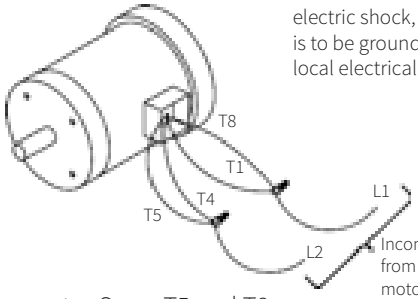


To reduce the risk of electric shock, the motor is to be grounded per local electrical code.

Incoming 3PH power from control panel, motor starter, or VFD.

To reverse the motor Swap L1 and L2

5 Hp 230V Single Phase (Wire for "High Voltage")

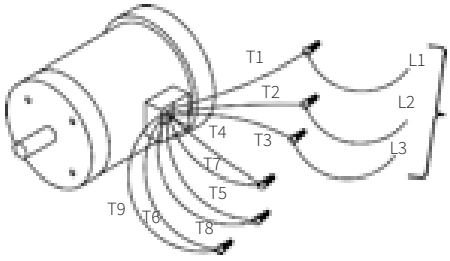


To reduce the risk of electric shock, the motor is to be grounded per local electrical code.

Incoming 1PH power from control panel, motor starter.

To reverse the motor Swap T5 and T8

440 thru 480V Three Phase (Wire for "High Voltage")



Incoming 3PH power from control panel, motor starter, or VFD.

To reduce the risk of electric shock, the motor is to be grounded per local electrical code.

To reverse the motor Swap L1 and L2

6.5 Tubeaxial Fan

⚠ WARNING

Fan assembly is heavy.

Fan assembly weight is approximately 50 - 200 lbs., depending on model. Use an adequate lifting device to install fan assembly.

⚠ WARNING

Prevent serious injury or death.

Electrical installations must be performed by qualified electricians.

Installation must conform to all national, local, and provincial codes and standards.

The fan and motor assembly will bolt to exhaust roof panel.

Checklist

Check the following items prior to start up:

1. Motors wired for proper voltage.
2. All fans and motors turn freely.
3. Lubricate all bearings.
4. Check installation of exhaust fan for proper airflow direction. Generally, exhaust fan airflow is out of booth.
5. Listen for excessive or unusual noise when booth is operating.
6. When door limit switches are applicable, operate the booth and open any door to see if spray gun will shut down. This will verify proper safety operation of the booth.

7. General Maintenance Procedure

This Section contains booth maintenance procedures and techniques which will extend the life of your RTT powder booth and its components and make booth operation a smooth, routine occurrence.

7.1 General Instruction

Operational maintenance and repair instructions for the various mechanical components of your RTT powder booth are described in the manufactures data incorporated in this manual. Please review the applicable safety precautions before performing any maintenance work on the booth's components. SAFETY FIRST.

7.2 Fan & Motor

Periodically check the fan belts for proper tension and signs of wear. (If equipped, normally on PB Style Booth only).

If the booth fails to function properly during normal operation, or if a component fails to come on line during booth start-up, then troubleshooting will be required to identify the problem. It is necessary for the person troubleshooting the booth be familiar with the control system logic.

A good preventative maintenance program will keep your booth on line and reduce unnecessary downtime.

The manufactures data sheets included in this manual contain specific information regarding repair of their components.

7.3 Routine Fan Maintenance

Do not attempt to do any maintenance on a fan unless the electrical supply is properly disconnected. If the powder booth is not supplied with a control panel with a disconnect then it will be necessary to pull the fuses at the control panel and lock control panel to assure power can not be turned on during maintenance or repairs.

Under normal circumstances, handling clean air, the system will require cleaning about once a year. However, the fan and all components should be checked in regular maintenance intervals as required by usage.

A regular inspection of the rotating assembly should be made to detect any indication of weakening of the fan and motor because of corrosion, erosion or metal fatigue.

7.4 Excessive Fan Vibration

Check for material buildup on the fan wheel and clean as necessary. Check for bent, broken or cracked fan blades which may cause fan imbalance. Never allow a fan to operate if the amplitude of the vibration exceeds safe limits. Contact the fan manufacturer for your fan style for this information if not included with this manual.

7.5 High Motor Temperature

Check to make sure that the cooling air to the motor has not been blocked or diverted by dirty guards or similar obstacles. Check the input power for high amperage or excessive amperage draws. An increase in power requirements may indicate that some major changes in the powder system may have occurred.

7.6 High Bearing Temperatures

This condition is usually caused by improper lubrication – either “over or under”. In every case, if the cause of the trouble is not easily determined only experienced personnel should examine the equipment before it put back into service.

7.7 Lubrication

The manufacturer of fans and motors used in the powder booth applications may be different based on the type of powder booth purchased. Due to this variance in these fans or motors refer to the manufacturers literature and instruction for instruction in proper lubrication intervals and procedures.

7.8 Caution

Lubricate fans and motors only when they are at a standstill. Use only clean grease. Remove and replace drain plugs only when the motors are at a standstill. DO NOT mix different types of grease.

7.9 Environmental Limitations of Powder Booth Components

Tubeaxial Fans

- Maximum Air Temperature: 200° F
- Maximum Air Temperature: -20° F

Air Solenoid Valve

- Maximum Air Temperature: 150° F
- Maximum Air Temperature: 32° F

Control Panel – NEMA 12

> Ballast Minimum Air Temperature: 50° F

Mecair – Pulse Valve

> Ambient Temperature: -20° C/ +60° C

8. Warranty

RTT has a full one year warranty that begins from the day of shipment on all parts and materials. This warranty does not extend to include labor costs for the replacement of parts or materials covered under warranty.

If a part is believed defective, please notify our Customer Service Department. A replacement item shall be shipped and regular freight shall be paid by RTT.

If RTT requires the defective part to be returned, appropriate return freight costs shall be paid by RTT.

IMPORTANT: Before returning the defective part(s), you must first get an RGA (Return of Goods Authorization) from our Customer Service Department. A copy of the RGA document MUST be included with the returned item(s).

The Seller warrants to Buyer that the equipment mentioned herein shall be free from defects of materials or workmanship under normal use and maintenance for a period of one (1) year from date of shipment. The liability of Seller under this warranty shall be limited to the repair or replacement, at Seller's option, of any part or component which may prove to be defective under normal use, service and maintenance after Seller, in its sole discretion, determines same to be defective. Said warranty is conditioned upon Buyer giving Seller immediate written notice of an alleged defect and refraining from the attempted repair of alleged defects without prior written consent of Seller. The Seller makes no warranty whatsoever with respect to accessories or components not supplied by Seller. For any components purchased by Seller for use on or in conjunction with the equipment which is the subject of this contract, the Seller extends to the Buyer only the same warranty granted to Seller by the component vendor or manufacturer.

THIS LIMITED WARRANTY IS EXCLUSIVE AND IS IN LIEU OF ANY OTHER WARRANTIES (EXPRESS OR IMPLIED) INCLUDING WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND OF ANY NON-CONTRACTUAL LIABILITIES INCLUDING PRODUCT LIABILITIES BASED ON NEGLIGENCE OR STRICT LIABILITY. EVERY FORM OF LIABILITY FOR DIRECT, SPECIAL, OR CONSEQUENTIAL DAMAGES OR LOSS IS EXPRESSLY EXCLUDED AND DENIED. IN NO CASE SHALL RTT ENGINEERED SOLUTIONS LIABILITY ON THIS WARRANTY EXCEED THE AMOUNT OF THE PURCHASE PRICE.

The performance and safety of the equipment mentioned herein is contingent upon proper installation, the use of suitable process materials and operation and maintenance by properly trained personnel.

During the warranty period, RTT will repair or replace, free of charge, any parts that RTT Engineered Solutions has verified to be defective in materials or workmanship. If inspection of the equipment does not disclose any defect in workmanship of material, repairs will be made at a reasonable charge, which will include the costs of labor, materials and transportation.

6.1 Returning Items For Credit

RTT Engineered Solutions will take back any standard stocked items returned and issue a credit, less a 20% handling and restocking fee. Customer is responsible for all freight charges and the item MUST be returned in its original condition. If the item is damaged in transit you will not receive credit. RTT will mark the Bill of Lading "Damaged" and send you pictures of the damaged item. For custom or non-stock special order items you must contact our Customer Service Department to determine if the item may be returned. Any restocking charges shall be determined on a case by case basis.

If an item needs to be returned, RTT will issue you an RGA (Return Goods Authorization) form. Please ensure that a copy is sent back with returned item(s). Without an RGA the product may be lost or returned to stock with no credit issued. Please note that in some cases the freight may be more than the item is worth when credit is received.

6.2 Back Charges For Material And Labor

RTT shall not be held responsible for any back charges incurred for materials or labor without prior written consent.

Should a problem arise, please notify RTT immediately. Once the issue is investigated, should costs be incurred, an amount shall be agreed on by both parties beforehand. Do NOT attempt modifications or repairs without prior consent as this may void further warranty repairs or credit. RTT will not accept back charges associated with late delivery.

Please address repairs to:

RTT Engineered Solutions
2975 Discovery Blvd.
Rockwall, TX 75032
Attention: Customer Service
Phone: 888-452-6684
Email: sales@rttsolutions.com

888-452-6684
www.rttsolutions.com