

# OPERATOR'S MANUAL

## MARCO® 400 CFM AIR DRYER



### **⚠ WARNING**

Before using this equipment, read, understand and follow all instructions in the Operator's Manuals provided with this equipment. If the user and/or assistants cannot read or understand the warnings and instructions, the employer of the user and/or assistants must provide adequate and necessary training to ensure proper operation and compliance with all safety procedures pertaining to this equipment. If Operator's Manuals have been lost, please visit [www.allredi-us.com](http://www.allredi-us.com), or contact Allredi at 563.324.2519 for replacements. Failure to comply with the above warning could result in death or serious injury.

**✓ ALLREDI™**

## Company Profile

Allredi was formed in the early 2020, when two of the largest distributors in the blasting, coating, safety, and environmental industry, APE Companies and Marco Group International, joined forces. While the qualities both companies are known for have not changed, a lot about our business is new. New abilities. New agilities. New ways to help you win. This calls for a new name, Allredi.

This name exemplifies what we have become. It is completely oriented to the needs of our customers. To your needs. It says that when you call us for anything – products, service, expert advice, anything – you can consider it done. Or even better, Allredi done.

We are your right-now supplier. From skills to SKUs, we deliver the goods fast. So you can be more agile every minute, every day. This is who we are. This is what our new name means. Go ahead and expect excellence, because we're bringing it.

## The Allredi Difference

- **Industry Experience** – With Allredi on your team, you have access to expertise which can only come from decades of industry leadership. We have organized our engineering department, production specialists, customer operations, and safety support into a “Center of Competence.” As an Allredi customer, you have access to hundreds of years of cumulative experience related to your operations.
- **Manufacturing Excellence** – Allredi is a U.S. based manufacturer of equipment for the Surface Preparation and Protective Coatings industries. Allredi’s engineers benchmark the industry to ensure that we design and manufacture superior products that set the “Gold Standard” for performance, safety, and quality.
- **Legendary Customer Service** – Allredi’s legendary customer service team is staffed by friendly, highly-trained individuals who are focused on providing the highest level of product support, order accuracy, and customer satisfaction.
- **Product Availability** – We stock over 10,000 SKU’s and have over 45 shipping locations to serve North American and International markets for all major brands of blasting, coating, environmental, and safety equipment. Allredi is your right-now supplier, so you can keep your projects moving. From our foundation of strong relationships, we have built a nationwide network that puts vast inventory and ready service close to our customers. We provide advanced expertise, and we deliver the goods fast – so you can easily access the products and services you need to me more agile every minute, every day.
- **Technology Leadership** – Our website provides: Operator’s Manuals, Part Numbers and Schematics Guides, SDS information, and key product features and specifications, providing access to information 24/7.

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## DEFINITION OF TERMS

### **DANGER**

This is an example of danger. This indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

### **CAUTION**

This is an example of a caution. This indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It can also be used to alert against unsafe practices.

### **WARNING**

This is an example of a warning. This indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

### **NOTICE**

This is an example of a notice. This indicates policy or practice directly related to safety of personnel or protection of property.

# HAZARD IDENTIFICATIONS

## **WARNING**

### **Failure to comply with ANY WARNING listed below could result in death or serious injury.**

- ▶ OSHA sets exposure limits to protect workers from exposure to respirable crystalline silica, 29 CFR 1910.1053. Airborne dust could increase the exposure levels beyond permissible limits. Breathing dust containing silica could cause silicosis, a fatal lung disease. Breathing dust during abrasive blasting operations, post-blast cleaning operations, and/or servicing equipment within the abrasive blasting area may expose an individual to conditions that could cause asbestosis, lead poisoning and/or other serious or fatal diseases. Harmful dust containing toxic material from abrasives or surfaces being abrasive blasted can remain suspended in the air for long periods of time after abrasive blasting has ceased. A NIOSH-approved, well-maintained, respirator designed for the specific operation being performed must be used by anyone abrasive blasting, handling or using the abrasive, and anyone in the area of the dust.
- ▶ Contact NIOSH and OSHA offices to determine the proper respirator for your specific application. The air supplied to the respirator must be at least Grade D quality as described in Compressed Gas Association Commodity Specification G-7.1 and as specified by OSHA Regulation 1910.134. Ensure air filter and respirator system hoses are not connected to non-air sources or in-plant lines that may contain nitrogen, oxygen, acetylene or other non-breathable gases. Before removing respirator, use an air monitoring instrument to determine if the atmosphere is safe to breathe.
- ▶ You must comply with all OSHA, local, City, State, Province, Country and jurisdiction regulations, ordinances and standards, related to your particular work area and environment. Keep unprotected individuals out of the work area.
- ▶ Abrasive blasting operators must receive thorough training on the use of abrasive resistant attire which includes: supplied-air respirator, abrasive blasting suit, safety shoes, gloves, ear protection and eye protection. Protect the operator and bystanders by complying with NIOSH and OSHA Safety Standards.
- ▶ Inspect all equipment for wear or damage before and after each use. Failure to use Original Equipment Manufacturer repair parts and failure to immediately replace worn or damaged components could void warranties and cause malfunctions.
- ▶ OSHA requires abrasive blasting nozzles be equipped with an operating valve, which shall be designed to be held open only by continuous hand pressure and shall close immediately upon release of hand pressure (i.e., a “deadman” control). The valve shall not be modified in any manner that would allow it to remain open without the application of continuous hand pressure by the operator. Failure to comply with the above warning could result in release of high speed abrasive and compressed air resulting in death or serious injury. OSHA 29CFR 1910.244(b)
- ▶ Point the abrasive blasting nozzle only at the surface being abrasive blasted. Never point the abrasive blasting nozzle or abrasive stream at yourself or others.
- ▶ Unless otherwise specified, maximum working pressure of abrasive blasting pots and related components must not exceed 150 psi. Exceeding maximum working pressure of 150 psi could cause the abrasive blasting pot and components to burst. Failure to comply with the above warning could result in death or serious injury.
- ▶ Never weld, grind or drill on the abrasive blasting pot (or any pressure vessel). Doing so will void ASME certification and manufacturer’s warranty. Welding, grinding or drilling on the abrasive blasting pot (or any pressure vessel) could weaken the vessel causing it to burst. Failure to comply with the above warning could result in death or serious injury. (ASME Pressure Vessel Code, Section VIII, Division 1)
- ▶ This equipment is not intended for use in any area that might be considered a hazardous location, as described in the National Electric Code NFPA 70, Article 500. Use of this equipment in a hazardous location could cause an explosion or electrocution.
- ▶ Never attempt to move an abrasive blasting pot containing abrasive. Never attempt to manually move abrasive blasting pots greater than 6.5 cubic foot capacity. Always use at least two capable people to manually move an abrasive blasting pot on flat, smooth surfaces. A mechanical lifting device must be used if an abrasive blasting pot is moved in any other manner.

# HAZARD IDENTIFICATIONS

## **WARNING**

**Failure to comply with ANY WARNING listed below could result in death or serious injury.**

- ▶ This product is not for use in wet environments. Always use a Ground Fault Interrupter Circuit (GFI) for all electrical power source connections. Use of this product in wet environments could create a shock or electrocution hazard.
- ▶ Frozen moisture could cause restrictions and obstructions in pneumatic control lines. Any restriction or obstruction in the pneumatic control lines could prevent the proper activation and deactivation of the remote control system, resulting in the release of high speed abrasive and compressed air. In conditions where moisture may freeze in the control lines an antifreeze injection system approved for this application can be installed.
- ▶ Do not cut, obstruct, restrict or pinch pneumatic control lines. Doing so could prevent the proper activation and deactivation of the remote control system, resulting in the release of high speed abrasive and compressed air.
- ▶ Use of Marco remote control switches with other manufacturer's remote control systems could cause unintended activation of remote control systems resulting in the release of high speed abrasive and compressed air. Only Marco remote control switches should be used with Marco remote control systems.
- ▶ Always be certain to have secure footing when abrasive blasting. There is a recoil hazard when abrasive blasting starts that may cause user to fall and misdirect the abrasive stream at operator or bystander.
- ▶ Never use an abrasive blasting pot or attachments as a climbing device. The person could slip and fall. The abrasive blasting pot could become unstable and tip over.
- ▶ For equipment manufactured by entities other than Allredi, you must consult the Original Equipment Manufacturer operator's manuals, information, training, instructions and warnings, for the proper and intended use of all equipment.
- ▶ Flammable fumes, such as solvent and paint fumes in the work area can present an ignition or explosion hazard if allowed to collect in adequate concentrations. To reduce conditions that could result in a fire or an explosion, provide adequate ventilation, eliminate all ignition or spark sources, keep the work area free of debris, store solvents and solvent contaminated rags in approved containers, follow proper grounding procedures, do not plug/unplug power cord or turn on/off power switches when flammable fumes are present, keep a working fire extinguisher or provide another fire suppression system in the work area. Cease all operations and correct condition if a spark or ignition source is identified during operation.
- ▶ Always depressurize the entire system, disconnect all power sources and lockout/tagout all components before any maintenance or troubleshooting is attempted. Failure to comply with the above warning could cause electrical shock and inadvertent activation of equipment resulting in death or serious injury.
- ▶ Moving parts can present an area where crushing, pinching, entanglement or amputation may occur. Do not place body parts or foreign objects in any area where there are moving parts.
- ▶ Surfaces of heated supply tanks, drums and/or lines as well as the adjoining plumbing may become hot during normal use. Do not touch these heated surfaces without proper protection. Deactivate and allow sufficient time for all surfaces to cool before attempting any maintenance.
- ▶ High-pressure fluid from gun, hose leaks, or ruptured components can pierce skin and can cause a serious injury that may result in amputation. Do not point gun or spray tip at anyone or at any part of the body. Keep clear of any leaks or ruptures. Depressurize the entire system before attempting cleaning, inspecting, or servicing equipment.
- ▶ Exposure to toxic fluids or fumes may occur during the normal operation of this system. Before attempting to fill, use, or service this system, read SDS's to know the specific hazards of the fluids you are using. Always use proper Personal Protective Equipment when attempting to fill, use, or service this system.
- ▶ The use of this product for any purpose other than originally intended or altered from its original design is prohibited.
- ▶ Never hang objects from the abrasive blasting pot handle. Doing so may cause the abrasive blasting pot to become unstable and tip over.

## HAZARD IDENTIFICATIONS

### CAUTION

**Failure to comply with ANY CAUTION listed below may result in minor or moderate injury.**

- ▶ Static electricity can be generated by abrasive moving through the abrasive blasting hose causing a shock hazard. Prior to use, ground the abrasive blasting pot and abrasive blasting nozzle to dissipate static electricity.
- ▶ High decibel noise levels are generated during the abrasive blasting process which may cause loss of hearing. Ensure appropriate Personal Protective Equipment and hearing protection is in use.

### NOTICE

**Failure to comply with ANY NOTICE listed below could pose a hazard to personnel or property.**

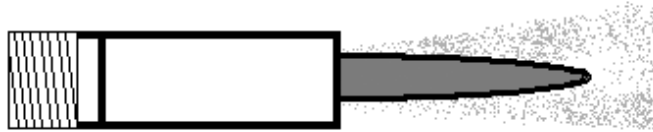
- ▶ See Air & Abrasive Consumption Chart for estimated abrasive consumption rates and required air flow (cubic feet per minute). Your system must meet these minimum requirements to ensure proper function and performance.
- ▶ Always use abrasive that is dry and properly screened. This will reduce the potential for obstructions to enter the remote control system, abrasive metering valve and abrasive blasting nozzle.
- ▶ Moisture build-up occurs when air is compressed. Any moisture within the abrasive blasting system will cause abrasive to clump, clogging metering valves, hoses and nozzles. Install an appropriately sized moisture separator at the inlet of the abrasive blasting system. Leave the moisture separator petcock slightly open to allow for constant release of water. If insufficient volume of air exists and petcock is unable to be left open (at all times) petcock should be opened frequently to release water.
- ▶ To reduce abrasive intrusion in the air supply hose, depressurize the abrasive blasting pot before shutting off air supply from compressor.
- ▶ Inspect abrasive blasting nozzle before placing into service. Damage to abrasive blasting nozzle liner or jacket may occur during shipping. If you receive a damaged abrasive blasting nozzle, contact your distributor immediately for replacement. Abrasive blasting nozzles placed into service may not be returned. Abrasive blasting nozzle liners are made of fragile materials and can be damaged by rough handling and striking against hard surfaces. Never use a damaged abrasive blasting nozzle.
- ▶ Abrasive blasting at optimal pressure for the abrasive used is critical to productivity. Example: For an abrasive with an optimal abrasive blasting pressure of 100 psi at the abrasive blasting nozzle, one pound per square inch of pressure loss will reduce abrasive blasting efficiency by 1.5%. A 10 psi reduction in air pressure will cause a 15% loss of efficiency. Use a Needle Pressure Gauge to identify pressure drops in your system. Consult with your abrasive supplier for the requirements of your abrasive.
- ▶ Replace abrasive blasting nozzle if liner or jacket is cracked or damaged. Replace abrasive blasting nozzle if original orifice size has worn 1/16" or more. Determine abrasive blasting nozzle wear by inserting a drill bit 1/16" larger than original size of abrasive blasting nozzle orifice. If the drill bit passes through abrasive blasting nozzle, replacement is needed.

# AIR & ABRASIVE CONSUMPTION CHART

## NOTICE

Failure to comply with ANY NOTICE listed below could pose a hazard to personnel or property.

- ▶ See Air & Abrasive Consumption Chart for estimated abrasive consumption rates and required air flow (cubic feet per minute). Your system must meet these minimum requirements to ensure proper function and performance.
- ▶ When it comes to air & abrasive mixtures, more is not necessarily better. Optimum abrasive blasting efficiency takes place when a lean air & abrasive mixture is used. To correctly set the abrasive metering valve, begin with the valve fully closed and slowly increase the amount of abrasive entering the airstream. As you increase the abrasive flow, watch for a “blue flame” at the exit of the abrasive blasting nozzle. Faster cutting, reduced abrasive consumption and lower clean up costs, are benefits of the “blue flame”.
- ▶ Abrasive blasting at optimal pressure for the abrasive used is critical to productivity. Example: For an abrasive with an optimal abrasive blasting pressure of 100 psi at the abrasive blasting nozzle, one pound per square inch of pressure loss will reduce abrasive blasting efficiency by 1.5%. A 10 psi reduction in air pressure will cause a 15% loss of efficiency. Use a Needle Pressure Gauge to identify pressure drops in your system. Consult with your abrasive supplier for the requirements of your abrasive.



“Blue Flame”

## NOTICE

Inspect abrasive blasting nozzle before placing into service. Damage to abrasive blasting nozzle liner or jacket may occur during shipping. If you receive a damaged abrasive blasting nozzle, contact your distributor immediately for replacement. Abrasive blasting nozzles placed into service may not be returned. Abrasive blasting nozzle liners are made of fragile materials and can be damaged by rough handling and striking against hard surfaces. Never use a damaged abrasive blasting nozzle.

## Air & Abrasive Consumption Chart\*

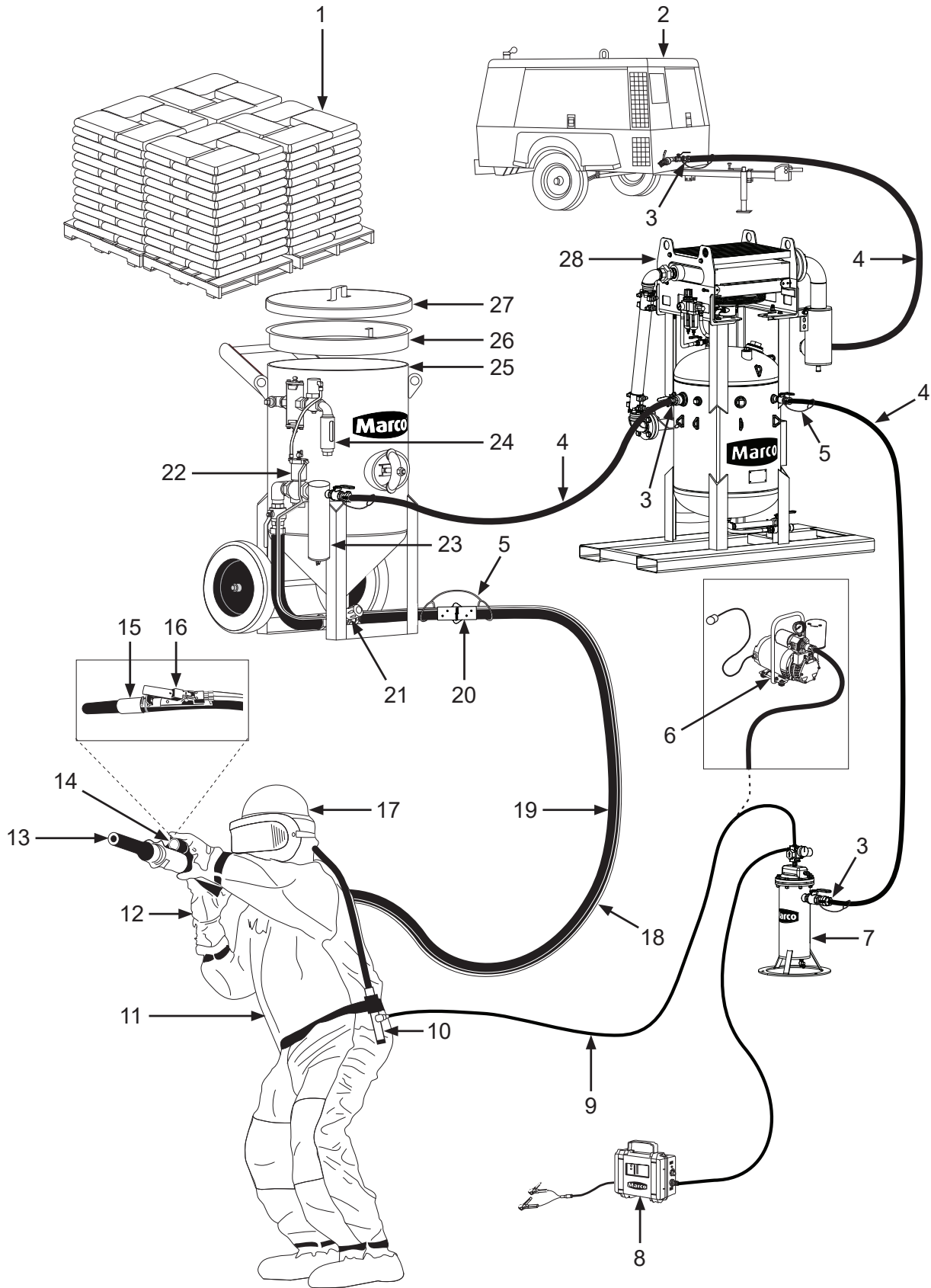
Nozzle Orifice	Pressure at the Nozzle (PSI)								Air (in cfm), Abrasive & Compressor Requirements
	50	60	70	80	90	100	125	140	
No. 2 (1/8")	11	13	15	17	18	20	25	28	Air (cfm)
	67	77	88	101	112	123	152	170	Abrasive (lbs/hr)
	2.5	3	3.5	4	4.5	5	5.5	6.2	Compressor Horsepower
No. 3 (3/16")	26	30	33	38	41	45	55	62	Air (cfm)
	150	171	196	216	238	264	319	357	Abrasive (lbs/hr)
	6	7	8	9	10	10	12	13	Compressor Horsepower
No. 4 (1/4")	47	54	61	68	74	81	98	110	Air (cfm)
	268	312	354	408	448	494	608	681	Abrasive (lbs/hr)
	11	12	14	16	17	18	22	25	Compressor Horsepower
No. 5 (5/16")	77	89	101	113	126	137	168	188	Air (cfm)
	468	534	604	672	740	812	982	1100	Abrasive (lbs/hr)
	18	20	23	26	28	31	37	41	Compressor Horsepower
No. 6 (3/8")	108	126	143	161	173	196	237	265	Air (cfm)
	668	764	864	960	1052	1152	1393	1560	Abrasive (lbs/hr)
	24	28	32	36	39	44	52	58	Compressor Horsepower
No. 7 (7/16")	147	170	194	217	240	254	314	352	Air (cfm)
	896	1032	1176	1312	1448	1584	1931	2163	Abrasive (lbs/hr)
	33	38	44	49	54	57	69	77	Compressor Horsepower
No. 8 (1/2")	195	224	252	280	309	338	409	458	Air (cfm)
	1160	1336	1512	1680	1856	2024	2459	2754	Abrasive (lbs/hr)
	44	50	56	63	69	75	90	101	Compressor Horsepower
No. 10 (5/8")	308	356	404	452	504	548	663	742	Air (cfm)
	1875	2140	2422	2690	2973	3250	3932	4405	Abrasive (lbs/hr)
	68.5	79.5	90	100.5	112	122	146	165	Compressor Horsepower
No. 12 (3/4")	432	504	572	644	692	784	948	1062	Air (cfm)
	2672	3056	3456	3840	4208	4608	5570	6238	Abrasive (lbs/hr)
	96	112	127	143	154	174.5	209	236	Compressor Horsepower

\*Abrasive consumption is based on abrasive with a bulk density of 100 lbs per Cubic Foot

## NOTICE

Replace abrasive blasting nozzle if liner or jacket is cracked or damaged. Replace abrasive blasting nozzle if original orifice size has worn 1/16" or more. Determine abrasive blasting nozzle wear by inserting a drill bit 1/16" larger than original size of abrasive blasting nozzle orifice. If the drill bit passes through abrasive blasting nozzle, replacement is needed.

# "THE BIG PICTURE"





# DAILY PRE-OPERATION CHECKLIST

## Daily Pre-operation Checklist

- 1. Abrasive
- 2. Air Compressor
- 3. Air Hose Couplings & Gaskets
- 4. Air Hose
- 5. Safety Cable
- 6. Ambient Air Pump\*
- 7. Breathing Air Filter
- 8. CO Monitor
- 9. Breathing Line
- 10. Climate Control Device
- 11. Abrasive Blasting Suit
- 12. Gloves
- 13. Abrasive Blasting Nozzle
- 14. Lighting System\*
- 15. Abrasive Blasting Nozzle Holder
- 16. Remote Control Switch
- 17. Supplied-Air Respirator
- 18. Control Line
- 19. Abrasive Blasting Hose
- 20. Abrasive Blasting Hose Couplings & Gaskets
- 21. Abrasive Metering Valve
- 22. Remote Control System
- 23. Moisture Separator
- 24. Abrasive Blasting Pot Exhaust Muffler
- 25. Abrasive Blasting Pot
- 26. Abrasive Blasting Pot Screen
- 27. Abrasive Blasting Pot Lid
- 28. Aftercooler\*

\* *Optional or alternative device.  
Ask your Marco Representative  
for more details.*

**Abrasive** – Select the correct Abrasive (1) for the application. Review the SDS (*Safety Data Sheet*) to ensure the correct PPE (*Personal Protective Equipment*) and Environmental Controls have been selected and are in place.

**Air Compressor** – Select an Air Compressor (2) of adequate size to support all equipment requirements. Refer to “Air & Abrasive Consumption Chart” for Abrasive Blasting Nozzle (13) air consumption requirements. Before connecting Air Hose (4), sample the air being produced by the air compressor (2) to ensure it is free of petroleum contaminants.

**Air Hose, and Air Hose Couplings & Gaskets** – Select Air Hoses (4) of sufficient size to support all subsequent volumetric requirements and with a sufficient PSI (*pound per square inch*) rating. Inspect all Air Hoses (4), and Air Hose Couplings & Gaskets (3) for damage or wear. Repair or replace damaged or worn components.

**Abrasive Blasting Hose, Abrasive Blasting Hose Couplings & Gaskets, and Abrasive Blasting Nozzle Holder** – Select an Abrasive Blasting Hose (19) that has an inner diameter 3 to 4 times larger than your Abrasive Blasting Nozzle (13). Inspect Abrasive Blasting Hose (19), Abrasive Blasting Hose Couplings & Gaskets (20), and Abrasive Blasting Nozzle Holder (15) for damage or wear. Repair or replace damaged or worn components.

**Safety Cables** – Install a Safety Cable (5) at each Abrasive Blasting Hose (19), and Air Hose (4) connection points.

**Aftercooler and Moisture Separator** – Ensure Aftercooler (28) is positioned on stable ground. Keep petcock drain of Moisture Separator (23) slightly open during use. Drain both devices after each use.

**Supplied-Air Respirator, Breathing Line, Breathing Air Filter, Climate Control Device, CO Monitor, Ambient Air Pump** – You MUST consult the Operator’s Manual supplied with your Respiratory Equipment (6, 7, 8, 9, 10, 17) for ALL applicable instructions and warnings. Inspect all Respiratory Equipment components for damage or wear. Repair or replace damaged or worn components.

**Abrasive Blasting Suit and Gloves** – Select an abrasive-resistant Abrasive Blasting Suit (11) that is slightly oversized to allow ease of movement and allows air to flow around your body. Select abrasive-resistant Gloves (12) with a tight fit and a long cuff that overlaps the sleeve of the Abrasive Blasting Suit (11).

**Abrasive Metering Valve and Abrasive Blasting Pot** – Confirm Abrasive Blasting Pot (25) is positioned on stable ground. Inspect Abrasive Blasting Pot (25) and Abrasive Metering Valve (21) for damage or wear. Repair or replace damaged or worn components.

**Abrasive Blasting Pot Screen and Abrasive Blasting Pot Lid** – Always use an Abrasive Blasting Pot Screen (26) when filling Abrasive Blasting Pot (25) with Abrasive (1) to prevent debris from entering the Abrasive Blasting Pot (25). Remove Abrasive Blasting Pot Lid (27) before operating the Abrasive Blasting Pot (25). Install Abrasive Blasting Pot Lid (27) after use to protect the Abrasive Blasting Pot’s (25) interior.

**Remote Control System, Remote Control Switch, Control Line,** – Inspect Remote Control System (22) and Control Line (18) for damage or wear. Repair or replace damaged or worn components. Ensure Control Line (18) fittings connected to the Remote Control System (22) are tight and free of leaks. Ensure Remote Control Switch (16) is functioning properly. Consult Remote Control Switch Operator’s Manual for applicable instructions.

**Abrasive Blasting Pot Exhaust Muffler** – Inspect Abrasive Blasting Pot Exhaust Muffler (24) at start and end of daily use. Replace element of Abrasive Blasting Pot Exhaust Muffler (24) per Operator’s Manual instructions.

**Lighting System** – Ensure the Lighting System (14) is connected to a proper power supply before use.

# OPERATING INSTRUCTIONS

## WARNING

Inspect all equipment for wear or damage before and after each use. Failure to use Original Equipment Manufacturer repair parts and failure to immediately replace worn or damaged components could void warranties and cause malfunctions. Failure to comply with the above warning could result in death or serious injury.

## WARNING

This product is not for use in wet environments. Always use a Ground Fault Interrupter Circuit (GFI) for all electrical power source connections. Use of this product in wet environments could create a shock or electrocution hazard. Failure to comply with the above warning could result in death or serious injury.

## WARNING

This equipment is not intended for use in any area that might be considered a hazardous location, as described in the National Electric Code NFPA 70, Article 500. Use of this equipment in a hazardous location could cause an explosion or electrocution. Failure to comply with the above warning could result in death or serious injury.

## WARNING

W-556

All electrical connections are to be made by a qualified electrician in accordance with all applicable codes, ordinances and good practices. Failure to comply with the above warning could result in death or serious injury.

## Description

The Marco® 400 CFM Air Dryer removes up to 99% of moisture, oil, and other debris commonly found in compressed air. Dry air eliminates wet abrasive that leads to clogged metering valves and excessive equipment wear, air motor freeze-up, and contamination of coatings. Removing moisture from the compressed air is a three-stage process. The first stage passes the compressed air through a heat exchanging aftercooler, lowering the temperature of the air. This brings the air closer to the dew point temperature and allows condensation to occur. The second stage maximizes the dwell time by forcing the air to rapidly expand in to the pressure tank. This action releases additional energy in the form of heat, further cooling the air. In the third stage, the air passes through moisture-absorbing desiccant tablets, removing water vapor suspended in the compressed air. Combining these three actions into a design that provides the maximum dwell time, the Marco® 400 CFM Air Dryer out performs other passive air tanks or stand-alone aftercoolers! Typical applications include blast rooms, blast yards, bridges, oil refineries, pipelines, shipyards, and storage tanks.

## Operational Requirements

### *Pneumatic:*

- Air supply of 65 cfm @ 85 psi.

### *The following may cause safety hazards or reduced performance:*

- Improper installation and/or maintenance of components.
- Incorrect disassembly and/or incorrect reassembly.
- Allowing heat exchanger to become obstructed or coated with dust/dirt.
- Improper air supply pressure and/or volume.
- Insufficient volume of desiccant.
- Not maintaining lubrication for air motor.

### *The following may cause safety hazards or reduced performance:*

- Improper installation and/or maintenance of components.
- Incorrect disassembly and/or incorrect reassembly.
- Allowing heat exchanger to become obstructed or coated with dust/dirt.
- Improper electric supply.
- Insufficient volume of desiccant.

# OPERATING INSTRUCTIONS

## Pneumatic



# OPERATING INSTRUCTIONS

## Operating Instructions

### Pneumatic

#### WARNING

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#### WARNING

W-578  
Transporting, lifting, or moving this device must be in accordance with applicable OSHA standards and ASME B30 standards, as well as any applicable local, state, or federal requirements. Failure to comply with the above warning could result in death or serious injury.

#### **Before use:**

- Ensure the Marco® 400 CFM Air Dryer unit is placed on a flat, solid, level surface capable of supporting the unit's weight and is in a stable position.
- Inspect unit for loose fittings, bolts, or damage. Tighten any loose fittings or bolts and replace any damaged components before use.
- Inspect Aftercooler (3), Fan Blades (2), and Air Motor (1) for dust, dirt, debris or obstructions. Clean or clear away any foreign matter.
- Using a screw driver or similar device, gently rotate Fan Blades (2) to confirm free movement. If the Fan Blades do not move freely, remove obstruction or replace Air Motor (1) before use.
- Remove and inspect Air Motor Lubricator Bowl (12) for debris. If debris is found, drain, then clean bowl. Fill Lubricant Bowl with SAE 10 detergent motor oil or a winter grade pneumatic tool lubricant/antifreeze, then install.
- Open all Drain Valves (6,7,11,16) fully to release any liquid. Close Drain Valves once liquid stops flowing.
- Check desiccant tablet levels using Sight Glass (5). See Loading the Marco® 400 CFM Air Dryer.
- Connect air hose to Air Outlet (8).
- Connect air hose from compressor to Air Inlet (10).
- Slowly turn on air supply to unit, looking and listening for leaks. If leaks are found, turn off air supply, open Drain (6), allow air pressure to completely release and address leaks, as needed.
- Slightly open Drain Valves (6,7,11,16) to release collected moisture.
- Slowly open Air Supply Ball Valve (9) to Air Motor Lubricator (13).
- Adjust Air Motor Pressure Regulator (15) to 60 PSI for proper Cooling Fan speed. Watch the lubricant flow through the combination Control Knob/Site Dome (14) on top of the Air Motor Lubricator (13), adjust the flow to one drop per minute.

*Note: Failure to maintain lubrication of Air Motor (1) will cause the motor to fail.*

- Slowly turn on air supply to connected device(s). If leaks are found, turn off air supply, open Drain (6), allow air pressure to completely release and address leaks, as needed.

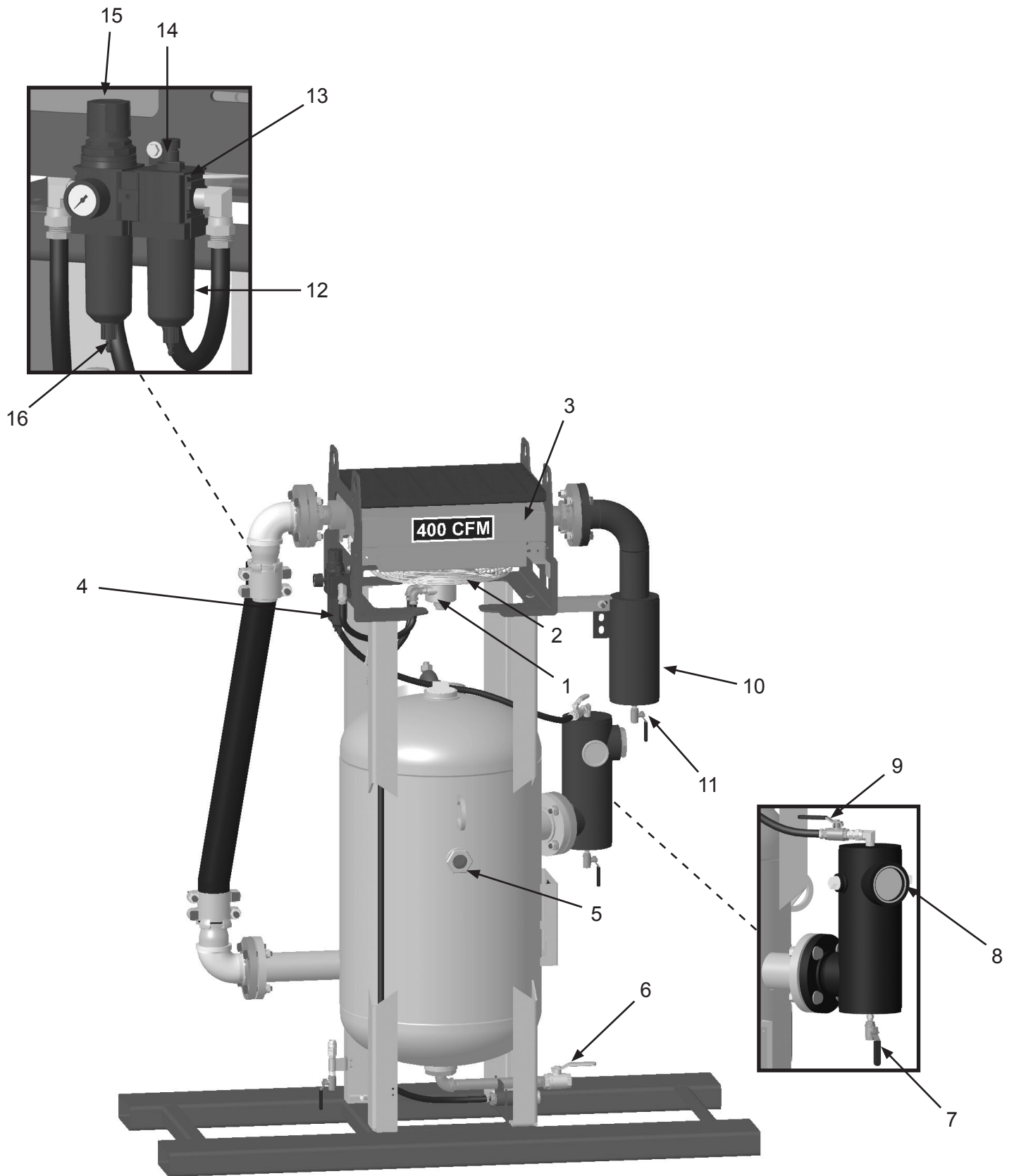
#### **During use:**

- Every hour, observe lubricant level (12) in Air Motor Lubricator (13). Add lubricant through In-use Filler (*Not Shown*), if necessary.
- Observe Drain Valves (6,7,11,16) for release of liquids. If no liquid is being released, adjust as needed.
- Observe desiccant levels through Sight Glass (5).

#### **After use:**

- Turn off air supply to connected device(s).
- Turn off air supply to unit.
- Close Air Supply Ball Valve (9) to Air Motor Lubricator (13).
- Slowly open Drain Valves (6,7,11) to release collected liquid and stored compressed air.
- Once all pressure is released, disconnect air hose from Air Inlet (10) and Air Outlet (8).
- Close all Drain Valves (6,7,11,16).
- Cover or move unit inside for storage.

# OPERATING INSTRUCTIONS



# OPERATING INSTRUCTIONS

## **⚠ WARNING**

W-562  
Always depressurize the entire system, disconnect all power sources and lockout/tagout all components before any maintenance or troubleshooting is attempted. Failure to comply with the above warning could cause electrical shock and inadvertent activation of equipment resulting in death or serious injury.

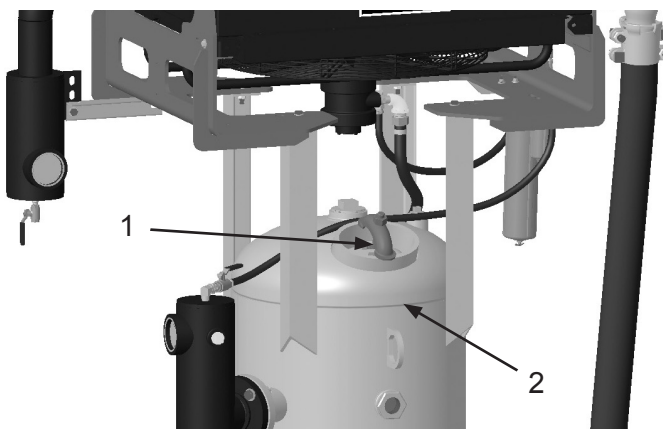
## **⚠ WARNING**

Inspect all equipment for wear or damage before and after each use. Failure to use Original Equipment Manufacturer repair parts and failure to immediately replace worn or damaged components could void warranties and cause malfunctions. Failure to comply with the above warning could result in death or serious injury.

## Loading the Marco® 400 CFM Air Dryer

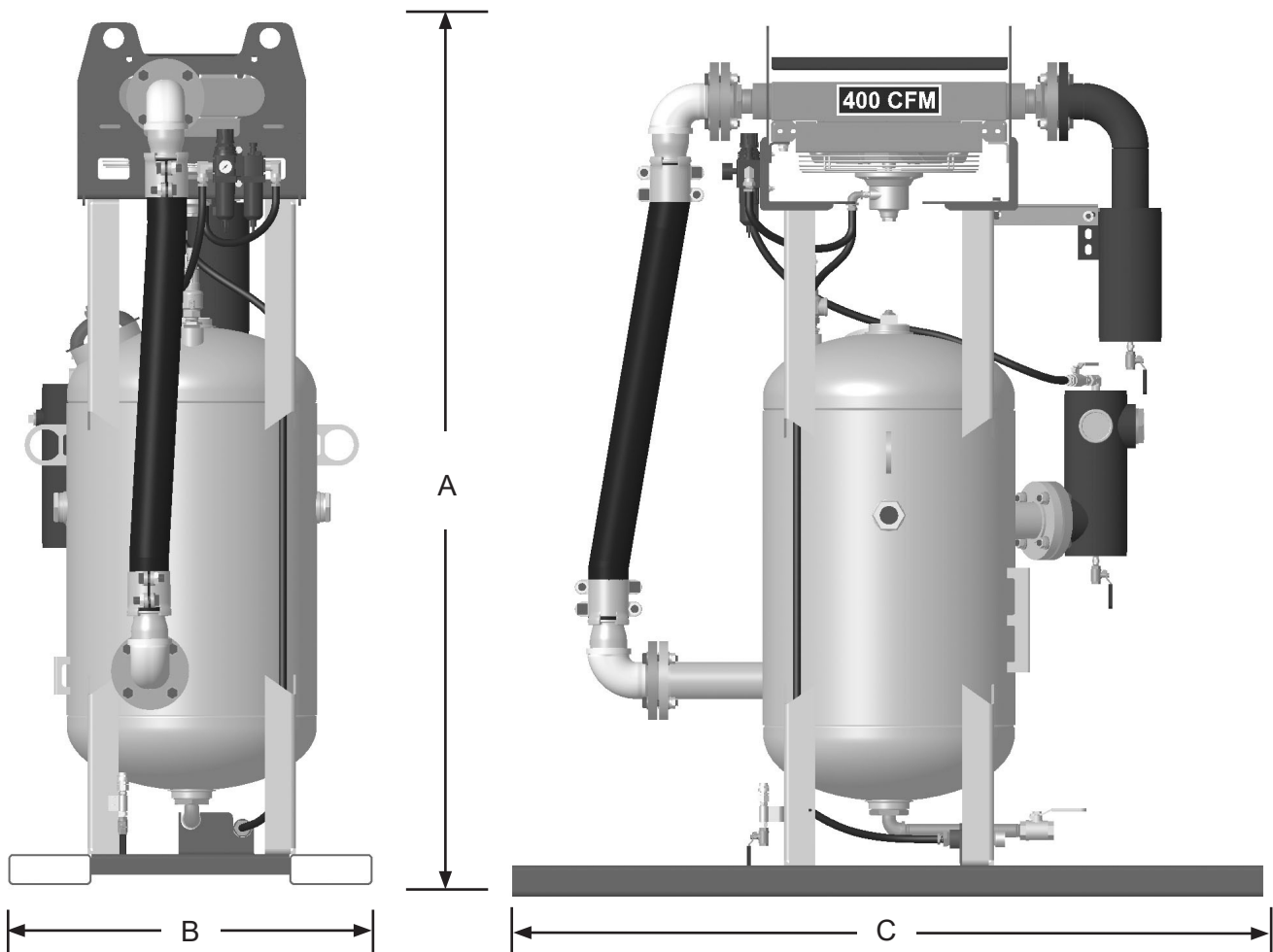
*Note: See Desiccant SDS Sheet for proper handling of Desiccant Tablets.*

- 1) Depressurize Marco® 400 CFM Air Dryer.
- 2) Remove Inspection Door (1). See Remove and Install Inspection Door.
- 3) Ensure Spherical Tower Packing are in tank, evenly distributed to a depth of approximately two inches.
- 4) Load with Desiccant Tablets until level reaches upper Weld Seam (2). Allow room for installing Inspection Door (1). Full Desiccant charge is approximately 400 pounds.
- 5) Install Inspection Door (1). See Remove and Install Inspection Door.



# SPECIFICATIONS

Lubrication	SAE 10 oil or Air Tool Anti-freeze Lubricant
Tank Outlet Ports	2 – 3" 1 – 1-1/4" 2 – 1"
Tank Inlet Ports	1 – 3"



Empty Weight: 900 lbs

Overall Dimensions:

A: 83"  
B: 35"  
C: 72"

Pneumatic model shown. Electric model has same dimensions.

# MAINTENANCE

## Remove & Install Inspection Door

### **WARNING**

W-562

Always depressurize the entire system, disconnect all power sources and lockout/tagout all components before any maintenance or troubleshooting is attempted. Failure to comply with the above warning could cause electrical shock and inadvertent activation of equipment resulting in death or serious injury.

### **WARNING**

Inspect all equipment for wear or damage before and after each use. Failure to use Original Equipment Manufacturer repair parts and failure to immediately replace worn or damaged components could void warranties and cause malfunctions. Failure to comply with the above warning could result in death or serious injury.

### **NOTICE**

N-524

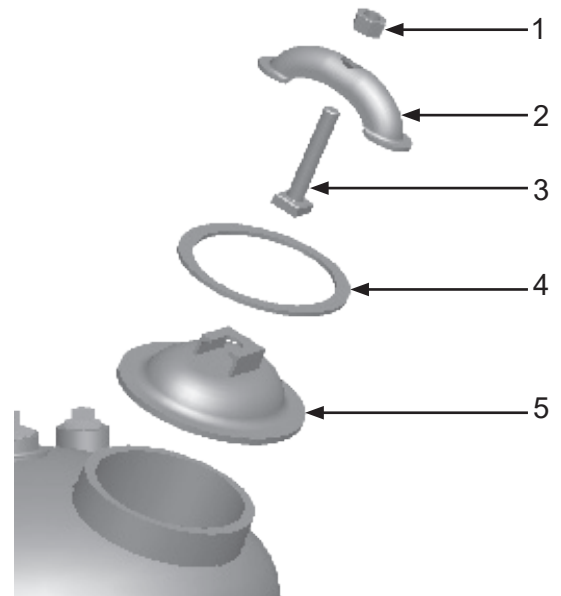
Piping may loosen during transit. Ensure all piping is aligned and tightened before use.

### **NOTICE**

N-519

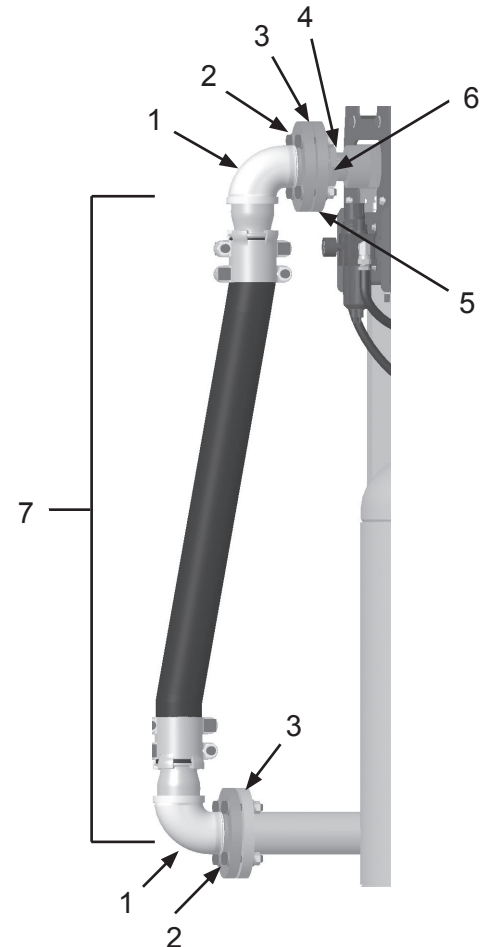
Apply pipe thread sealant to all pipe threads to ensure an airtight seal.

- 1) Depressurize entire system.
- 2) Loosen Nut (1) from Bolt (3). Do not remove Nut.
- 3) Grasp Fill Hatch Door (5). Remove Nut (1) from Bolt (3).
- 4) Remove Yoke (2) from Bolt (3).
- 5) Remove Bolt (3) from Inspection Door (5). Push Inspection Door toward the interior of the Marco® 400 CFM Air Dryer to free Inspection Door and Gasket (4).
- 6) Remove Inspection Door (5) and Gasket (4).
- 7) Install parts in reverse order.



## Remove & Install Transfer Hose Assembly

- 1) Depressurize entire system.
- 2) Remove Bolts, Washers, Lock Washers and Nuts (2) from Flange (3).
- 3) Remove Bushing (6), Nipple (4), Flange (5) and Transfer Hose Assembly (7).
- 4) Remove Elbows (1).
- 5) Disassemble Transfer Hose Assembly (7). See Disassemble and Assemble Transfer Hose Assembly.
- 6) Install parts in reverse order.



Pneumatic model shown, Electric model is similar.



# MAINTENANCE

## Remove & Install Outlet Filter Assembly (*Pneumatic Only*)

### **WARNING**

W-562

Always depressurize the entire system, disconnect all power sources and lockout/tagout all components before any maintenance or troubleshooting is attempted. Failure to comply with the above warning could cause electrical shock and inadvertent activation of equipment resulting in death or serious injury.

### **WARNING**

Inspect all equipment for wear or damage before and after each use. Failure to use Original Equipment Manufacturer repair parts and failure to immediately replace worn or damaged components could void warranties and cause malfunctions. Failure to comply with the above warning could result in death or serious injury.

### **NOTICE**

N-524

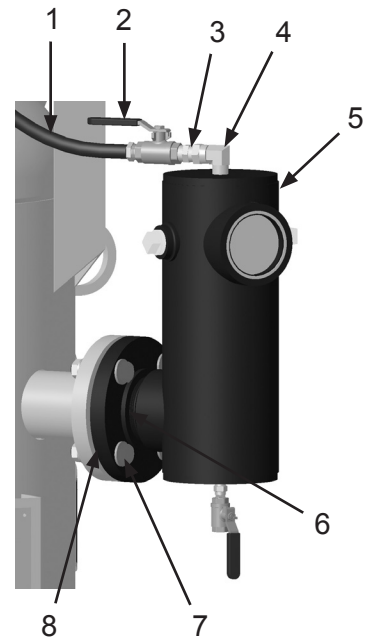
Piping may loosen during transit. Ensure all piping is aligned and tightened before use.

### **NOTICE**

N-519

Apply pipe thread sealant to all pipe threads to ensure an airtight seal.

- 1) Depressurize entire system.
- 2) Disconnect Hose (1), Full Port Ball Valve (2), Hex Nipple (3) and 90° Swivel (4).
- 3) Remove Bolts, Washers, Lock Washers and Nuts (7) from Flange (8) to remove Outlet Filter Assembly (5).
- 4) Remove Flange (8) and Nipple (6) from Outlet Filter Assembly (5).
- 5) Install parts in reverse order.



# MAINTENANCE

## Remove & Install Air Filter/Regulator/Lubricator Assembly

*(Pneumatic Only)*

### **WARNING**

Always depressurize the entire system, disconnect all power sources and lockout/tagout all components before any maintenance or troubleshooting is attempted. Failure to comply with the above warning could cause electrical shock and inadvertent activation of equipment resulting in death or serious injury.

### **WARNING**

Inspect all equipment for wear or damage before and after each use. Failure to use Original Equipment Manufacturer repair parts and failure to immediately replace worn or damaged components could void warranties and cause malfunctions. Failure to comply with the above warning could result in death or serious injury.

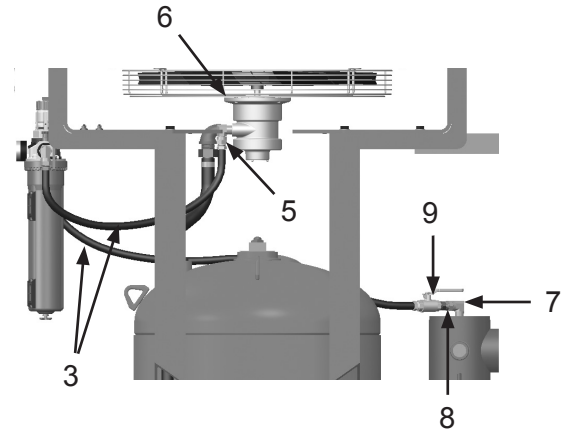
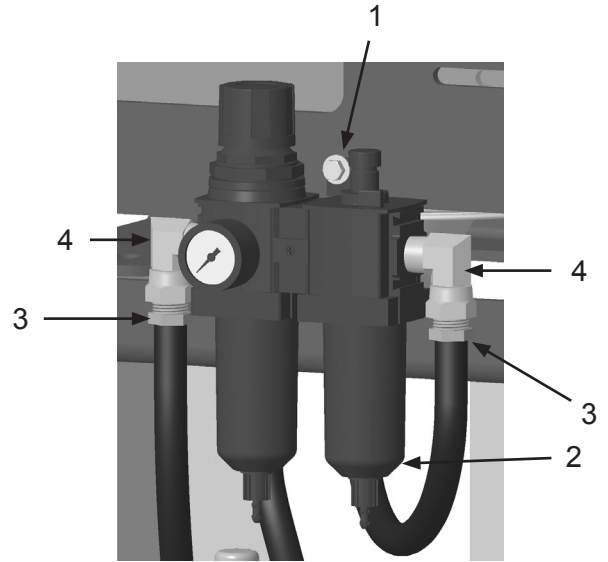
### **NOTICE**

Piping may loosen during transit. Ensure all piping is aligned and tightened before use.

### **NOTICE**

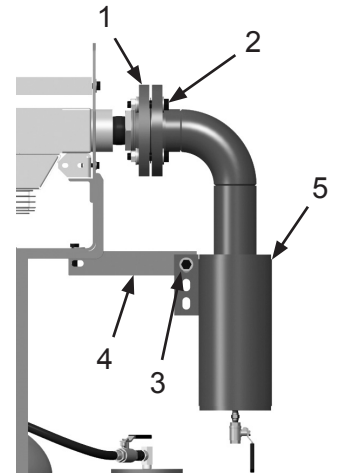
Apply pipe thread sealant to all pipe threads to ensure an airtight seal.

- 1) Depressurize entire system.
- 2) Disconnect Hoses (3) and Swivels (4) from Filter/Regulator/Lubricator Assembly (2).
- 3) Disconnect Hoses (3) and 90° Swivel (5) from Air Motor (6).
- 4) Remove Full Port Ball Valve (9), Nipple (8) and 90° Swivel (7) from tank.
- 5) Remove two Bolts, two Nuts (1) and remove Filter/Regulator/Lubricator Assembly (2).
- 6) Install parts in reverse order.
- 7) Fill Lubricator with SAE 10 oil or air tool anti-freeze lubricant.



## Remove & Install Intake Filter Assembly

- 1) Depressurize entire system.
- 2) Remove Bolts, Washers, Lock Washers and Nuts (2) from Flange Assembly (1).
- 3) Remove Bolts, Washers, Lock Washers and Nuts (3) from Mounting Bracket (4) to remove Inlet Filter (5).
- 4) Install parts in reverse order.



Pneumatic model shown, Electric model is similar.

# MAINTENANCE

## Remove & Install Aftercooler Assembly (Pneumatic Only)

### **WARNING**

W-562

Always depressurize the entire system, disconnect all power sources and lockout/tagout all components before any maintenance or troubleshooting is attempted. Failure to comply with the above warning could cause electrical shock and inadvertent activation of equipment resulting in death or serious injury.

### **WARNING**

W-586

Moving parts can present an area where crushing, pinching, entanglement or amputation may occur. Do not place body parts or foreign objects in any area where there are moving parts. Failure to comply with the above warning could result in death or serious injury.

### **WARNING**

Inspect all equipment for wear or damage before and after each use. Failure to use Original Equipment Manufacturer repair parts and failure to immediately replace worn or damaged components could void warranties and cause malfunctions. Failure to comply with the above warning could result in death or serious injury.

### **NOTICE**

N-524

Piping may loosen during transit. Ensure all piping is aligned and tightened before use.

### **NOTICE**

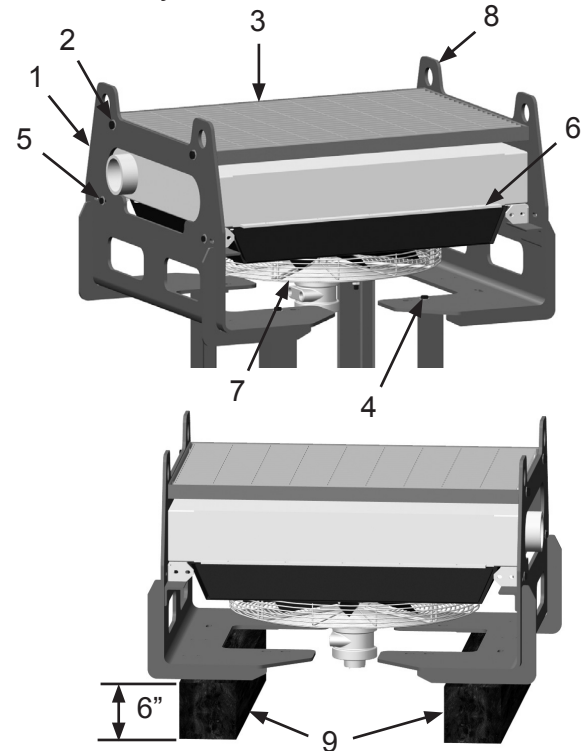
N-519

Apply pipe thread sealant to all pipe threads to ensure an airtight seal.

- 1) Depressurize entire system.
- 2) Remove Transfer Assembly. See Remove & Install Transfer Hose Assembly.
- 3) Remove Intake Filter Assembly. See Remove & Install Intake Filter Assembly.
- 4) Remove Air Filter/Regulator/Lubricator Assembly. See Remove & Install Air Filter/Regulator/Lubricator Assembly.

*Note: Approximate weight of Aftercooler Assembly is 200 pounds. Use suitable lifting devices to support or maneuver Aftercooler Assembly.*

- 5) Attach a suitable lifting device to Main Frame Lifting Lugs (8).
- 6) Remove four Bolts, eight Washers, four Lock Washers and four Nuts (4). Remove Aftercooler Assembly and lower onto Blocks (9) that are at least 6" high.
- 7) Remove four Bolts, eight Washers, four Lock Washers and four Nuts (2) and remove Protective Grate (3) from Main Frame (1).
- 8) Remove four Bolts, eight Washers, four Lock Washers and four Nuts (5) from Core Assembly (6) and remove from Main Frame (1).
- 9) Remove Fan Assembly (7) by removing four bolts attaching Fan Guard to Core Assembly (6).
- 10) Install parts in reverse order.



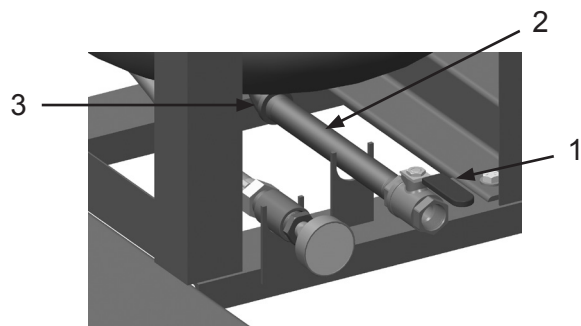
# MAINTENANCE

## Remove & Install Tank Drain Assembly

### **WARNING**

W-562  
Always depressurize the entire system, disconnect all power sources and lockout/tagout all components before any maintenance or troubleshooting is attempted. Failure to comply with the above warning could cause electrical shock and inadvertent activation of equipment resulting in death or serious injury.

- 1) Depressurize entire system.
- 2) Remove Full Port Ball Valve (1), Nipple (2) and Street Elbow (3) from drain port.
- 3) Install parts in reverse order.



### **NOTICE**

N-519  
Apply pipe thread sealant to all pipe threads to ensure an airtight seal.

Pneumatic model shown.

## MAINTENANCE

### Remove & Install Muffler and Hose Assembly (*Pneumatic Only*)

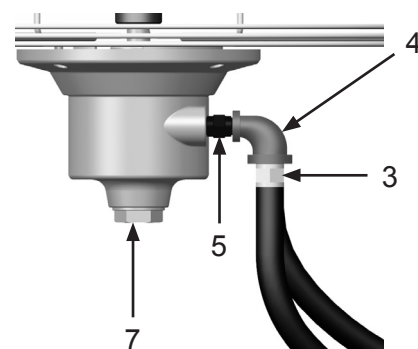
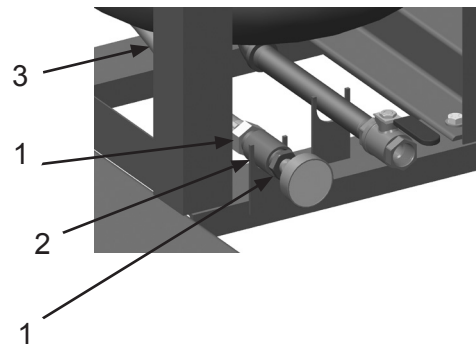
#### **WARNING**

W-562  
Always depressurize the entire system, disconnect all power sources and lockout/tagout all components before any maintenance or troubleshooting is attempted. Failure to comply with the above warning could cause electrical shock and inadvertent activation of equipment resulting in death or serious injury.

#### **NOTICE**

N-519  
Apply pipe thread sealant to all pipe threads to ensure an airtight seal.

- 1) Depressurize entire system.
- 2) Disconnect Hose (3).
- 3) Remove Bushings (1) from Coupling (2).
- 4) Remove Elbow (4) and Hex Nipple (5) from Motor (7).
- 5) Install parts in reverse order.



# MAINTENANCE

## Disassemble and Assemble Transfer Hose Assembly

### **WARNING**

Always depressurize the entire system, disconnect all power sources and lockout/tagout all components before any maintenance or troubleshooting is attempted. Failure to comply with the above warning could cause electrical shock and inadvertent activation of equipment resulting in death or serious injury.

*Note: Interlocking clamps (including nuts and bolts) are for a single use only! Once removed, discard.*

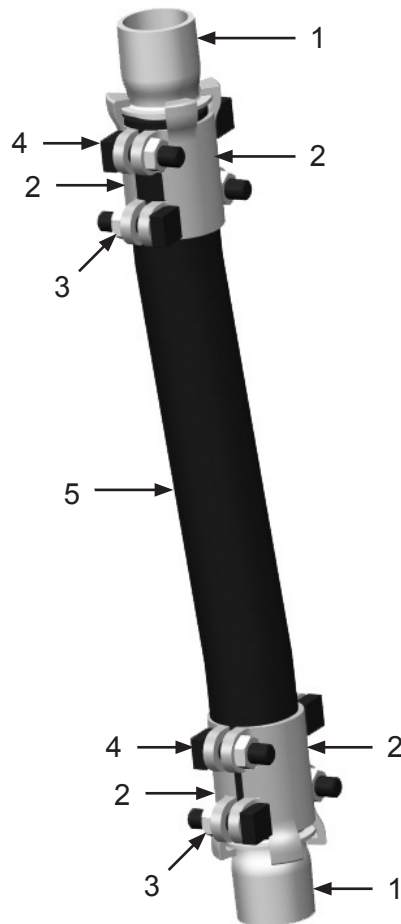
- 1) Remove Bolts (4), Nuts (3) and Interlocking Clamps (2) and discard.
- 2) Separate Hose (5) from Hose Stems (1). Discard hose.
- 3) Install parts in reverse order using the following special instructions:

*Note: Periodic bolt re-tightening is necessary due to "cold-flow" present in all rubber hoses.*

Tighten Bolts (4) by hand until there is equal thread engagement. Using a torque wrench, tighten bolts to 60 ft-lbs using the following sequence:

- Back bolt, one full turn.
- Front bolt, one full turn.
- Snug by hand, nuts on opposite side of bolts just tightened.
- Opposite back bolt, one full turn.
- Opposite front bolt, one full turn.
- Snug by hand, nuts on opposite side of bolts just tightened.
- Repeat until all bolts are tightened.

*Note: Clamp bolts are designed to bend during tightening. This "bending" allows the clamp to conform to the hose circumference.*



# MAINTENANCE

## Maintenance Schedules Quick Reference Charts

### AIR DRYER

Perform inspections at the intervals specified. Repair or replace damaged parts as needed.

Item	Maintenance Required	Daily	Weekly	Monthly
Moisture Accumulation	With system pressurized, open all drain valves to purge moisture and debris.	X		
Aftercooler	Visually inspect condition of radiator, fan, shroud, guard, and motor. Inspect the unit for loose bolts and/or connections.	X		
Aftercooler	Pressure wash downward through the top head coupling. A degreasing agent may be used to remove oil buildup. Clean thoroughly before placing back into service.			X
Heat Transfer Surface	Visually inspect for corrosion and dirty/clogged heat transfer surface (cooling coil). Dirt and dust should be removed. Check surface for bent fins.		X	
Fan shroud, Fan and Motor	Visually inspect condition of Fan shroud, Fan and Motor. Dirt and grease should be removed. Rusty or corroded surfaces should be sanded clean and repainted.			X
Air Motor	Visually inspect condition of motor. Fill the lubricator reservoir with SAE 10 oil or Air Tool Anti-freeze Lubricant. Adjust the lubricator to feed one drop of oil for every 50-75 CFM of air passing through the air motor.	X		
Electric Motor	Visually inspect condition of motor. Keep outside surface free of dirt and grease so motor will cool properly. Make sure cooling air over motor is not obstructed. See motor Operator's Manual for lubrication instructions.	X		
Pressure Vessel	Visually inspect the exterior of pressure vessel for corrosion, pitting, or other damage (i.e. dents, gouges or bulges). If damaged, remove from service and contact Marco. Replace as needed.	X		
Pressure Vessel	Visually inspect the interior of pressure vessel for corrosion, pitting, or other damage. If damaged, remove from service and contact Marco. Replace as needed.			X
Pressure Vessel	Check deliquescent/desiccant level monthly. Check inside the separator tank for looseness of deliquescent/desiccant tablets. Break apart fused tablets. Fill with tablets to the top of separator tank.			X
Pressure Vessel	Hydrostatic Test	Every 5 years unless otherwise directed by local, state, or jurisdictional requirements.		
Decals	Verify that all decals are in position and legible.			X

# MAINTENANCE

## Short-Term Storage Procedure

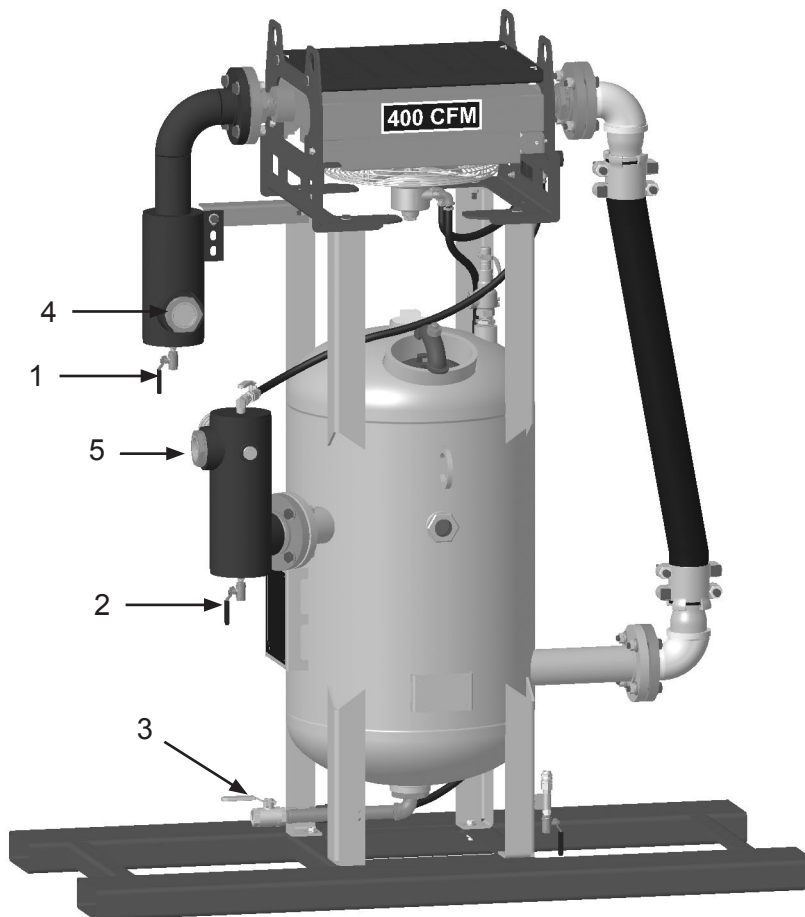
### **⚠ WARNING**

W-562  
Always depressurize the entire system, disconnect all power sources and lockout/tagout all components before any maintenance or troubleshooting is attempted. Failure to comply with the above warning could cause electrical shock and inadvertent activation of equipment resulting in death or serious injury.

### **⚠ WARNING**

Inspect all equipment for wear or damage before and after each use. Failure to use Original Equipment Manufacturer repair parts and failure to immediately replace worn or damaged components could void warranties and cause malfunctions. Failure to comply with the above warning could result in death or serious injury.

- 1) Depressurize Marco® 400 CFM Air Dryer.
- 2) Open Ball Valves (1,2,3) to drain any excess moisture.
- 3) Close Ball Valves (1,2,3).
- 4) Disconnect air hose from Inlet (4) and Outlet (5).
- 5) Install a cover on Inlet (4) and Outlet (5) to prevent ambient moisture from entering the air dryer during storage.





# MAINTENANCE

## Long-Term Storage Procedure

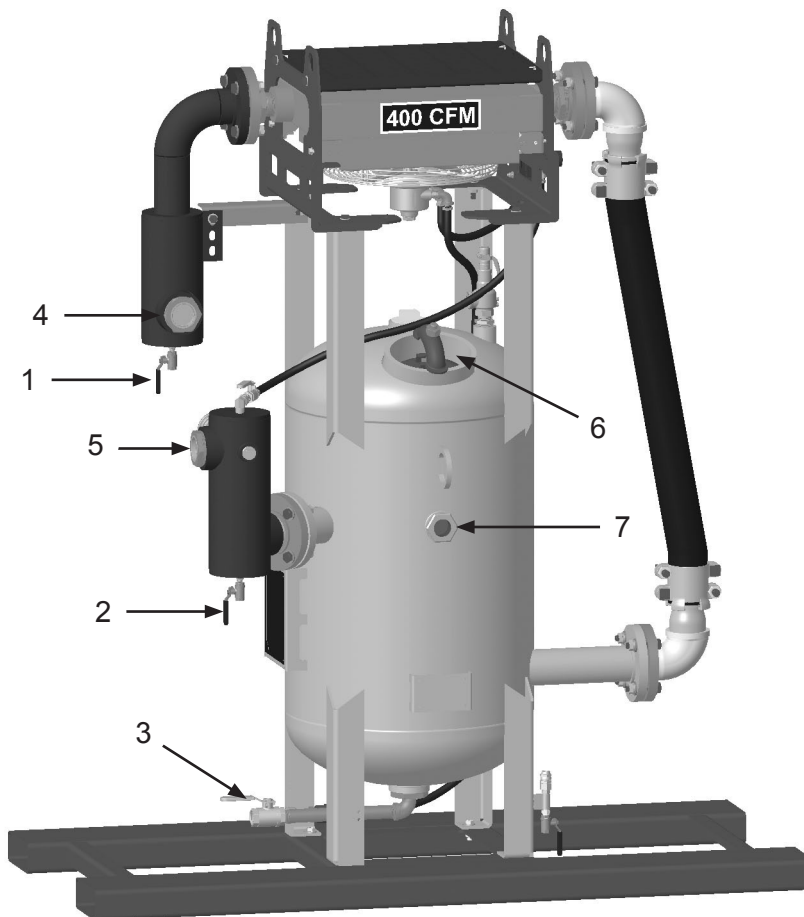
### **WARNING**

W-562  
Always depressurize the entire system, disconnect all power sources and lockout/tagout all components before any maintenance or troubleshooting is attempted. Failure to comply with the above warning could cause electrical shock and inadvertent activation of equipment resulting in death or serious injury.

### **WARNING**

Inspect all equipment for wear or damage before and after each use. Failure to use Original Equipment Manufacturer repair parts and failure to immediately replace worn or damaged components could void warranties and cause malfunctions. Failure to comply with the above warning could result in death or serious injury.

- 1) Depressurize Marco® 400 CFM Air Dryer.
- 2) Open Ball Valves (1,2,3) to drain any excess moisture.
- 3) Close Ball Valves (1,2,3).
- 4) Disconnect air hose from Inlet (4) and Outlet (5).
- 5) Remove Inspection Door (6). See Remove and Install Inspection Door.
- 6) Remove Desiccant Tablets. Observe levels through Site Glass (7), being careful not to remove Spherical Tower Packing.
- 7) Remove and wash Spherical Tower Packing.
- 8) Clean inside of tank to reduce internal corrosion caused by moisture and desiccant residue.
- 9) Place Spherical Tower Packing back in unit for storage. See Load Tank.
- 10) Store with Inspection Door removed.



# TROUBLESHOOTING

## WARNING

Always depressurize the entire blasting system, disconnect all power sources and lockout/tagout all components before any maintenance or troubleshooting is attempted. Failure to comply with the above warning could cause electrical shock and inadvertent activation of equipment resulting in death or serious injury.

## WARNING

W-586

Moving parts can present an area where crushing, pinching, entanglement or amputation may occur. Do not place body parts or foreign objects in any area where there are moving parts. Failure to comply with the above warning could result in death or serious injury.

If the Marco® 400 CFM Air Dryer does not function properly, check the following:

## Pneumatic

### **SYMPTOM (Cause)**

### **ACTION**

---

#### **Fan Blades not turning**

*(Improper air supply, Obstruction, Damaged components, Lack of lubricant, Muffler obstructed or fouled)*

Check air supply to air motor - confirm supply air is on and set to 85 psi.

Clear any obstructions from fan blades.

Inspect fan blades for damage. Replace damaged components.

Test fan blades for free movement. If air motor does not move, repair or replace air motor.

Clear any obstructions from exhaust muffler. Replace muffler if fouled.

---

#### **Fan Blades turning slowly**

*(Improper air supply, Obstruction, Damaged components, Lack of lubricant, Muffler obstructed or fouled)*

Check air supply to air motor - confirm supply air is on and set to 85 psi.

Clear any obstructions from fan blades.

Inspect fan blades for damage. Replace damaged components.

Test fan blades for free movement. If air motor moves, but not freely (see Operating Instructions), confirm lubricator is working properly, introduce some lubricant directly into air motor intake, rotate fan blades 3 to 4 complete rotations, then test again. If blades do not move freely, repair or replace air motor.

Clear any obstructions from exhaust muffler. Replace muffler if fouled.

---

#### **Inlet Filter/Tank not draining collected moisture**

*(Damaged components, Obstruction)*

Inspect drain valve for damage. Replace damaged components.

Inspect drain valve for visible obstruction. Clear obstruction.

If no damage or visible obstructions are found, disassemble drain pipe string, inspecting for internal obstructions. With pipe string removed from tank, examine attachment point for debris or obstructions.

Clean Aftercooler Core.

Ensure tank contains Desiccant. Load tank. See Load Instructions.

Check that desiccant tablets move freely. Moisture can cause desiccant to fuse together, preventing collected moisture from draining.

---

# TROUBLESHOOTING

## WARNING

Always depressurize the entire blasting system, disconnect all power sources and lockout/tagout all components before any maintenance or troubleshooting is attempted. Failure to comply with the above warning could cause electrical shock and inadvertent activation of equipment resulting in death or serious injury.

## WARNING

W-586

Moving parts can present an area where crushing, pinching, entanglement or amputation may occur. Do not place body parts or foreign objects in any area where there are moving parts. Failure to comply with the above warning could result in death or serious injury.

## WARNING

W-556

All electrical connections are to be made by a qualified electrician in accordance with all applicable codes, ordinances and good practices. Failure to comply with the above warning could result in death or serious injury.

If the Marco® 400 CFM Air Dryer does not function properly, check the following:

## Electric

### **SYMPTOM (Cause)**

### **ACTION**

#### **Fan Blades not turning**

*(Failed fuse, Improper electric supply, Improper connection, Obstruction, Damaged components)*

Check the thermal unit and replace as needed.

Check the power supply and confirm power supply is compatible with electric motor.

Check the connections to power supply and confirm solid contact.

Clear any obstructions from fan blades.

Inspect fan blades for damage. Replace damaged components.

Test fan blades for free movement. If electric motor does not move freely, replace electric fan blade and motor assembly.

#### **Fan Blades turning slowly**

*(Improper electric supply, Improper connection, Obstruction, Damaged components)*

Check the connections to power supply and confirm solid contact.

Clear any obstructions from fan blades.

Inspect fan blades for damage. Replace damaged components.

Test fan blades for free movement. If electric motor does not move freely, replace electric fan blade and motor assembly.

#### **Inlet Filter not draining collected moisture**

*(Damaged components, Obstruction)*

Inspect drain valve for damage. Replace damaged components.

Inspect drain valve for visible obstruction. Clear obstruction.

If no damage or visible obstructions are found, disassemble drain pipe string, inspecting for internal obstructions. With pipe string removed from tank, examine attachment point for debris or obstructions.

Clean Aftercooler Core.

Ensure tank contains Desiccant. Load tank. See Load Instructions.

Check that desiccant tablets move freely. Moisture can cause desiccant to fuse together, preventing collected moisture from draining.







## **ADDITIONAL TECHNICAL DATA**

The associations listed below offer information, materials and videos pertaining to abrasive blasting and safe operating practices.

- **American Society for Testing and Materials (ASTM)**

100 Barr Harbor Drive  
West Conshohocken,  
PA 19428-2959

Phone: (610) 832-9585

FAX: (610) 832-9555

[www.astm.org](http://www.astm.org)

- **Occupational Safety & Health Administration (OSHA)**

United States

Department of Labor

200 Constitution Avenue  
Washington, DC 20210

Phone: (800) 321-OSHA

(800) 321-6742

[www.osha.gov](http://www.osha.gov)

- **The National Board of Boiler & Pressure Vessel Inspectors**

1055 Crupper Avenue  
Columbus, Ohio 4322

Phone: (614) 888-8320

FAX: (614) 888-0750

[www.nationalboard.org](http://www.nationalboard.org)

- **The Association for Materials Protection and Performance (AMPP)**

800 Trumbull Drive

Pittsburgh, PA 15205

Phone: (277) 281-7772

15835 Park Ten Place

Houston, TX 77084

Phone: (800) 797-6223

4501 Mission Bay Drive

Suite 2G

San Diego, CA 92109

Phone: (858) 768-0828

[www.ampp.org](http://www.ampp.org)

- **American National Standards Institute (ANSI)**

1899 L Street, NW, 11th Floor

Washington, DC 20036

Phone: (202) 293-8020

FAX: (202) 293-9287

[www.ansi.org](http://www.ansi.org)

## **LIMITED WARRANTY**

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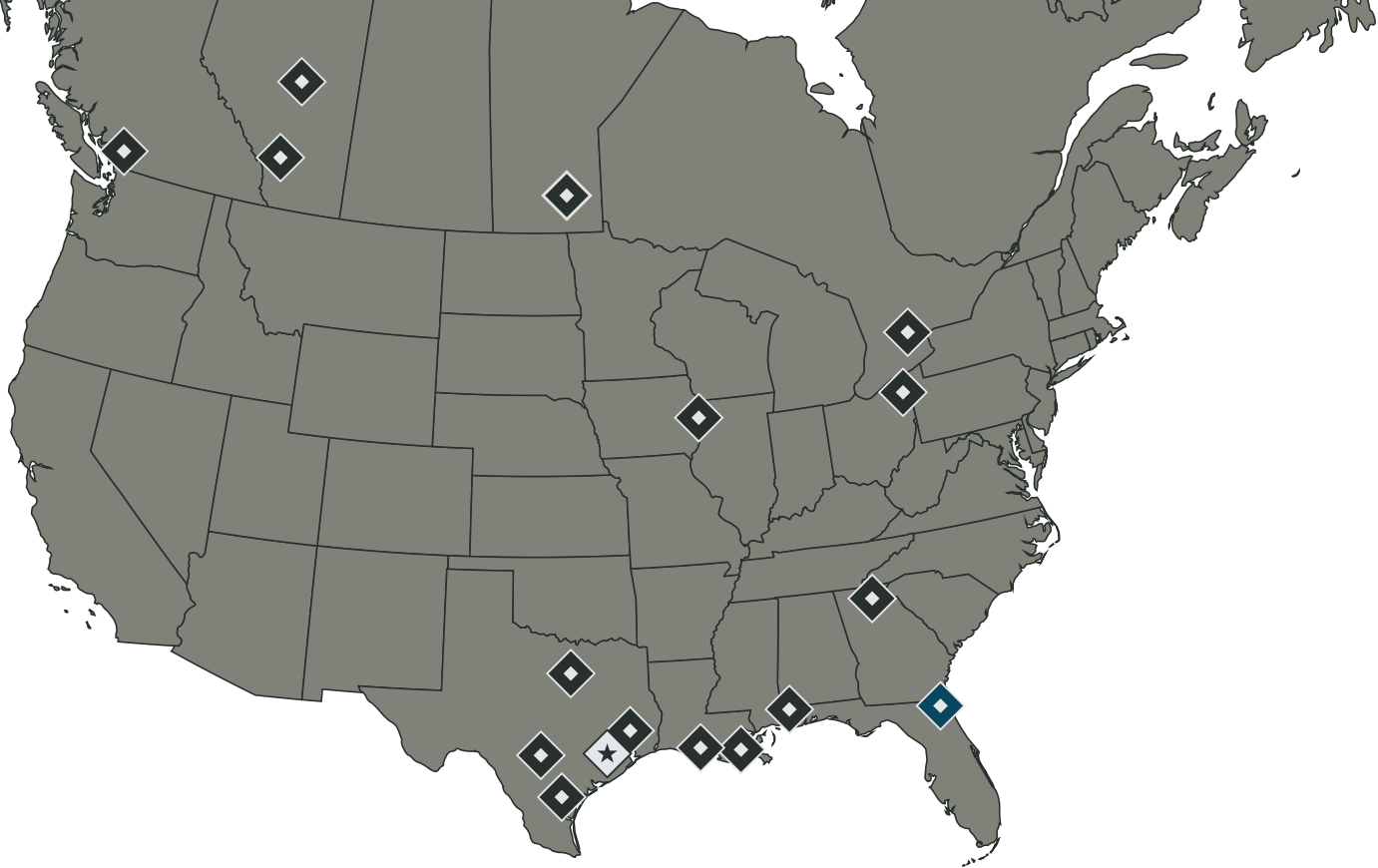
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Literature #1091182\_9/20/2022