USER MANUAL

TSUNAMI
REFRIGERATED DRYER

COMPRESSED AIR REFRIGERATED AIR DRYERS

SET UP | INSTRUCTIONS | MAINTENANCE | TROUBLESHOOTING

www.tsunami.us.com

RSD 015 to 300

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GENERAL INFORMATION

FUNCTIONAL DESCRIPTION

Refrigerated compressed air dryers are designed to efficiently remove moisture from compressed air by cooling it to approximately 37.4°F to 50°F. This process minimizes the footprint of the unit while effectively eliminating condensate.

The operating principle of the dryers is illustrated in the air and refrigeration circuit diagrams (page 16). As air passes through the dryer, moisture is condensed and separated from the airstream. The resulting condensate is automatically discharged using the built-in drain system.

To reduce the size of the unit and prevent condensation on the outside of the tubing, the incoming warm air is used to preheat the treated, outgoing air in a counterflow heat exchanger before it exits the dryer. This

SAFETY INSTRUCTIONS

Please check whether or not these instructions correspond to the device type.
Please adhere to all advice given in these operating instructions. They include essential information which must be observed during installation, operation and maintenance. Therefore, it must be ensured that these operating instructions are read by the installer and the responsible operator or certified skilled personnel prior to installation, start-up, and maintenance.

The operating instructions must be acccessible where the refrigerated dryer is installed. In addition to these operating instructions local, state, and federal regulations need to be observed, where required.

Ensure that operation of the Tsunami Refrigerated Dryer only takes place within the permissable limit values indicated on the name plate. Any deviation from these limit values involves a risk for persons and for the equipment, and may result in malfunction or a breakdown.

Once the dryer has been installed correctly and according to the instructions in this manual, it's ready for operation; no additional setup is required. The unit runs fully automatically. Ongoing maintenance is minimal and consists of periodic inspections and cleaning, which are detailed in the following sections.

This manual must be available at all times for future reference and is a constituent part of the dryer. If you have any questions regarding these installation and operating instructions, please contact the service center.

SAFETY INSTRUCTIONS

SAFETY PICTOGRAMS


Observe operating instructions


General danger symbol


Supply voltage


Danger: component or system under pressure


Hot surfaces


Non-breathable air


Do not use water to extinguish the fire


Do not operate with open cover (housing)

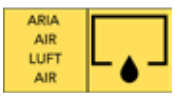

Maintenance works or controlling measures must only be carried out by qualified personnel[1]


Do not smoke


Note

Connection point compressed air inlet

Connection point compressed air outlet



Connection point condensate drain

Installation and maintenance can be carried out by the operator of the plant, provided that they are skilled accordingly.

NOTE: Text that contains important specifications to be considered does not refer to safety precautions.

[1]Certified skilled personnel are persons who are authorized by the manufacturer, with experience and technical training who are well-grounded in the respective provisions and laws and capable of carrying out the required works and of identifying and avoiding any risks during the machine transport, installation, operation and maintenance. Qualified and authorized operators are persons who are instructed by the manufacturer regarding the handling of the refrigeration system, with experience and technical training, and who are well-grounded in the respecitve provisions and laws.

SAFETY INSTRUCTIONS

This device was carefully designed with particular attention paid to environmental protection:

- CFC-free refrigerants
- CFC-free insulation material
- Energy-saving design
- Limited acoustic emissions
- Dryer and packaging compromise reusable materials

This symbol advises the user to observe the environmental aspects and comply with the recommendations connected with this symbol.

SIGNAL WORDS

Danger!	Imminent hazard Consequences of non-observance: serious injury or death
Warning!	Potential hazard Consequences of non-observance: possibile serious injury or death
Caution!	Imminent hazard Consequences of non-observance: possibile injury or property damage
Notice!	Potential hazard Consequences of non-observance: possibile injury or property damage
Important!	Additional advice, info, hints Consequences of non-observance: disadvantages during operation and maintenance, no danger

SAFETY OVERVIEW

Certified skilled personnel
Installation must be carried out by qualified skilled personnel. Prior to using the Tsunami Refrigerated Dryer, the skilled personnel is required to learn about the device by carefully studying the operating instructions. The operator is responsible for the adherence to these provisions. The respective directives in force apply to the qualification and expertise of the skilled personnel.
For safer operation, the device must only be installed and operated in accordance with the indications in the operating instructions. Operation must comply with federal, state, and local statutory regulations.

Danger!
Compressed air!
Risk of serious injury or death through contact with quickly or suddenly escaping compressed air or through bursting and/or unsecured plant components.
Compressed air is a highly dangerous energy source. Never work on a dryer when the system is under pressure. Never direct the compressed air outler or condensate drain hoses at people.
The used is responsible for the proper installation of the dryer. Failure to follow and observe all installation instructions will void warranty.. Improper installation may result in dangerous situations for the personnel and/or the device.

Danger!
Supply voltage!
Contact with non-insulated parts carrying supply voltage involves the risk of an electric shock resulting in injuries and death.
Only qualified and skilled personnel are authorized to connect the dryer to the main power source.
Prior to undertaking maintenance on the dryer, the following requirements must be met:
Make sure that the power supply is switched off and the dryer has been properly secured through a lock out/tag out procedure.

SAFETY INSTRUCTIONS

Caution!
Refrigerant!
The compressed air refrigerant dryer uses HFC-containing refrigerants as coolant.
Please observe the corresponding paragraph entitled "Maintenance Works at the Refrigeration Cycle".

Warning!
Refrigerant leak!
A refrigerant leak involves the danger of serious injury and damage to the environment.

The Tsunami Refrigerated Dryer contains fluorinated greenhouse gas/refrigerant.

Installation, repair, and maintenance done to the refrigeration system must only be carried out by skilled personnel (specialists). Certified in accordance with EPA section 608 technician certification requirements.

The requirements of the EPA 608 technician certification must be met under all circumstances. Please refer to the indications on the name plate regarding the type and amount of refrigerant.

Comply with the following protective measures and rules of conduct:

1. **Storage:** Keep the container tightly closed. Keep it in a cool, dry place. Protect it against heat and direct sunlight. Keep it away from igniting sources.
2. **Handling:** Take measures against electrostatic charging. Ensure good ventilation/suction at the workplace. Check fittings, connections and ducts for tightness. Do not inhale gas. Avoid contact with eyes and skin.
3. Prior to working on refrigerant carrying parts, remove the refrigerant for safer maintenance conditions.
4. Do not eat, drink or smoke during work. Keep out of reach of children.
5. **Breathing protection:** Ambient air dependent respirator (at high concentrations).
6. **Eye protection:** Sealing goggles.
7. **Hand protection:** Protective gloves (e.g. made of leather).
8. **Personal protection:** Protective clothing.

Caution!
Hot surfaces!
During operation, several components can reach surface temperatures of more than 140°F (60°C). There is a risk of burns.
All components concerned are installed inside of the closed housing. The housing must only be opened by certified skilled personnel.

Caution!
Improper use!

The device is intended for the separation of water in compressed air. The dried air cannot be used for breathing air purposes and is not suitable for the direct contact with food. This dryer is not suitable for the treatment of contaminated air or air containing solids.

SAFETY INSTRUCTIONS / PROPER USE

Note!
Contaminated intake air!
In the event that the intake air is strongly contaminated (ISO 8573-1:2010 (3, -, 3) or poorer quality), we recommend the additional installation of a prefilter (Tsunami Air Filters), to avoid clogging of the heat exchanger.

Caution!
Risk of explosion in fire!
In the event of a fire, the refrigerant system's containers and pipes can rupture due to excessive heat. Follow these steps to ensure safety:

1. Turn off the refrigeration unit immediately.
2. Shut down any mechanical ventilation in the equipment area.
3. Use respiratory protection that is independent of ambient air.
4. Be aware: while refrigerants are non-flammable, exposure to high temperatures can break them down into highly toxic substances.
5. If possible, move refrigerant containers and equipment out of the fire zone to prevent explosion.
6. Cool containers and cylinders with a directed water spray from a safe distance.
7. Use an approved fire extinguisher. Do not use water to extinguish electrical fires.

Important: Only trained and informed personnel should perform fire response procedures due to the specific risks associated with refrigerants and pressurized systems.

Caution!
Unauthorized intervention!
Unauthorized interventions may endanger persons and plants and lead to malfunction.
Unauthorized interventions, modification and abuse of the pressure devices are prohibited. The removal of sealings and leadings on safety devices is prohibited. Operators of the devices must obsrve the local and national pressure equipment regulations in the country of installation.

Note!
Ambient conditions!
In the event that the dryer is not installed under suitable ambient conditions, the ability of the device to condense refrigerant gas is impaired. This can result in a higher load of the refrigerating compressor, and in a loss of efficiency and performance of the dryer.
This causes the condenser fan motor to overheat, leading to electrical component failure and subsequent dryer malfunction. Failures of this type affect warranty eligibility.
Do not install the dryer in an environment where chemicals with a corrosive effect, explosive gases, toxic gases, evaporation heat, high ambient temperatures, or extreme dust and dirt can be found.

PROPER USE

This dryer was designed, manufactured and tested to condense and separate the moisture which normally exists in compressed air. Any other use is considered improper. The manufacturer will not be liable for problems occurring as a consequence of improper use. The user alone is responsible for any damage resulting from that. Furthermore, the correct use includes complying with the installation instructions, particulary in respect of:

- The voltage and frequency of the main voltage supply.
- The pressure, temperature and flow rate of the inlet air
- The ambient temperature

When delivered, the dryer is tested and fully assembled. The customer only needs to connect the device to the system in accordance with the instructions in the following sections.

TRANSPORT / STORAGE / LIFTING & CARRYING

TRANSPORT

At the time of delivery, the customer must fully inspect the dryer to verify its integrity and presence of all the items listed in the shipping documentation.
Claims for missing and/or damaged parts must be addressed directly to Tsunami within 8 (eight) days from the date on which the goods have been received.
It is mandatory to keep the dryer in a vertical position, as indicated by the symbols present on the packaging.

Remove the packaging after positioning the dryer at the installation site. We suggest keeping the original packaging for the entire duration of the refrigerated dryer warranty. Do not forget to dispose of the various materials in compliance with local regulations.

Until installed, the dryer can be stored in its packaging in a dust-free and protected site at a maximum temperature of 122°F/50°C, ensuring the humidity does not exceed 90%.

STORAGE

Keep the device away from extreme weather conditions, even when packaged.
Keep the dryer in an upright position while it is stored. Tilting the dryer or turning it upside down can cause irreparable damage to some components.
When the dryer is not in use, it can be stored in its packaging in a dust-free and protected place between the minimum temperature of 34°F/1°C and the maximum temperature of 122°F/50°C with a humidity max of 90%. If the storage period exceeds 12 months, contact the manufacturer.

The packaging material is recyclable.
Dispose of the packaging material in accordance to local regulations.

LIFTING & CARRYING

The complete pallet package consists of a wooden shipping pallet with the dryer secured with a corner strip and straps.

Model RSD	Shipping Size inch	Shipping Weight lbs
15	14.37 x 18.11 x 18.11	40
20		40
35	16.14 x x 20.08 x 19.69	42
50		46
75	18.9 x 23.42 x 23.62	60
100		77
125		90
150		
175	23.23 x 23.23 x 32.48	121
220	22.44 x 26.38 x 45.28	159
300		172

Only a trained and authorized operator is permitted to operate the forklift.
Inspect the forklift periodically to check for oil or water leaks, deformation, etc.
If neglected, components will wear quickly and a fatal accident could occur.

INSTALLATION

INSTALLATION SITE

While preparing a proper site for the installation of the dryer, please take the following requirements into account:

- The machine must be protected from atmospheric agents and not be directly exposed to sunlight.
- A seating base flat and capable of holding the weight of the machine.
- Ambient temperature complying with the nominal data of the dryer.
- A clean, dry, unforced draft (we suggest blowing the warm air outside the installation site).
- Make sure to leave sufficient clearance around the dryer in order to allow an adequate cooling of the machine and for maintenance and/or control operations.
- The dryer is installed indoors.
- Max altitude of 6560 ft or 2000m.
- Temperature is between 36°F and 122°F.
- Max relative humidity is 85% for max. temp, decreasing to 33% relative humidity at 36°F.

The incoming air must be free from smoke or flammable vapors which could lead to explosion or fire risks.

INSTALLATION LAYOUT

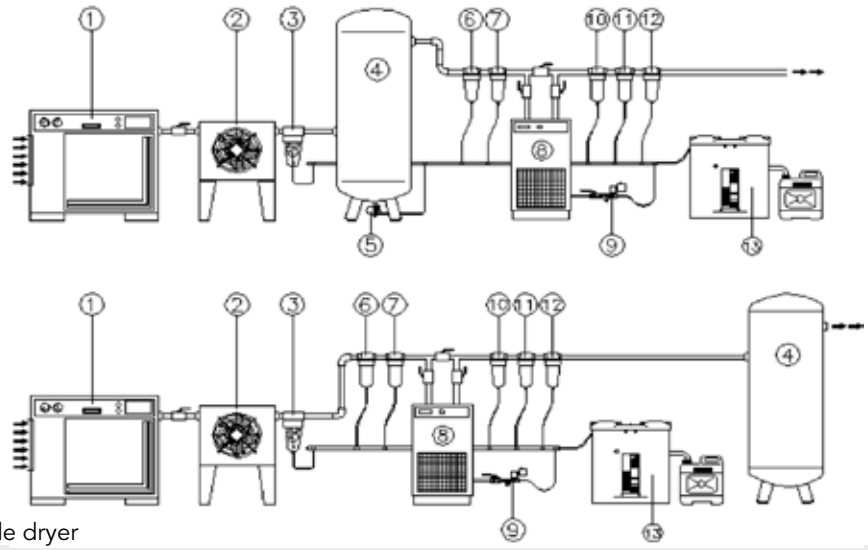
Before attempting any installation operation, make sure that:

- No part of a system is under pressure.
- No part of the system is electrically powered.
- Tubing to be connected to the dryer are free of impurities.

After having verified the points listed above, you can proceed to the installation of the machine.

1. Connect the dryer to the compressed air lines indicated in the diagrams below. If not already existing, we suggest installing a bypass allowing to isolate the machine from the plant, thus to facilitate eventual maintenance operations.
2. Check the condensate drainage assembly, and connect the drain tubing to the draining line, keeping in mind that **the condensate separated by the dryer contains oil particles, therefore in order to dispose of it in compliance with local regulations, we suggest a water-oil separator having adequate capacity.**
3. Power the dryer after having checked that the nominal voltage and line frequency are constant and matching the nominal values of the dryer. **The user must provide the installation with an adequate line of protection and a ground terminal complying with electrical regulations.**

1. Air compressor
2. Aftercooler
3. Condensate separator
4. Receiver tank
5. Automatic drain
6. Pre-filter 10µ
7. Dust filter 5µ
8. Refrigerated air dryer
9. Solenoid drain valve*
10. Coalescing filter 1µ
11. Coalescing filter 0.1µ
12. Activated carbon filter 0.003 mg/m^3
13. Water/oil separator



*solenoid located inside dryer

INSTALLATION

To optimize dryer performance, we recommend installing the unit in a location where all control instruments are easy to see and access.

For added protection, install a pre-filter at the air inlet. This helps prevent solid particles and oily residue from building up on the heat exchangers, ensuring better long-term efficiency and reliability.

CONNECTION TO POWER SUPPLY

The electrical connection must be performed by qualified personnel, and all safety systems must comply with local codes and regulations.

Before connecting the dryer to power, verify that the available voltage and frequency match the values shown on the unit's data plate. A tolerance of ±10% is allowed for voltage.

The Tsunami Series Refrigerated Dryer is equipped with a 6.5 ft main power cable, pre-installed at the factory. The power supply socket must include a magneto-thermal differential breaker (I_{Δ} = 0.3A), calibrated according to the dryer's power consumption (refer to the data plate for nominal values).

CONDENSATE DRAIN

The condensate is discharged at the same pressure of the air entering the dryer.
Never point the condensate drain jet towards anybody.
The dryer comes already fitted with drain tubing (6 mm diameter and 5 ft long) for the connection to the collection plant.
The condensate drain occurs through a solenoid valve protected with a mechanical strainer.
In order to avoid clogging of the solenoid valve, the condensate coming from the separator is previously filtered, then discharged. The solenoid valve coil is operated by electronic instrument (dryer controller).
Connect and properly fasten the condensate drain to a collecting container.
The drain cannot be connected to pressurized systems.

Note!
Don't dispose of the condensate by pouring it down the drain or outside.
The condensate collected in the dryer contains oil particles released in the air by the compressor.
Dispose the condensate in compliance with the local rules.
We recommend installing an oil-water separator to collect and treat all condensate discharged from compressors, dryers, tanks, filters, and other system components.

START UP

CONTROL PANEL

The CAREL product is a state-of-the-art device, whose operation is specified in the technical documentation supplied with the product or can be downloaded, even prior to purchase, from www.carel.com. Each CAREL product, in relation to its advanced level of technology, requires setup/configuration/programming/commissioning to be able to operate in the best possible way for the specific application. Failure to complete such operations, which are required/indicated in the user manual, may cause the final product to malfunction; CAREL accepts no liability in such cases.

- Prevent the electronic circuits from getting wet. Rain, humidity and all types of liquids or condensate contain corrosive minerals that may damage the electronic circuits. In any case, the product should be used or stored in environments that comply with the temperature and humidity limits specified in the manual.
- Do not install the device in particularly hot environments. Too high of temperatures may reduce the life of electronic devices, damage them and deform or melt the plastic parts. In any case, the product should be used or stored in environments that comply with the temperature and humidity limits specified in the manual.
- Do not attempt to open the device in any way other than described in the manual.
- Do not drop, hit, or shake the device as the internal circuits and mechanisms may be irreparably damaged.
- Do not use corrosive chemicals, solvents, or aggressive detergents to clean the device.
- Do not use the product for applications other than those specified in the technical manual.

If the compressor icon appears on the display and the compressor fails to operate, check the pressure switch and then press the manual reset button.

ICON DISPLAY VISUALIZATION

Symbol	Name	Description
	Compressor	Compressor on
	Fan	Condenser fan on
	Drain Valve	Drain valve on
	Auxiliary Port	Auxiliary output
	Alarm	Alarm detected
	On/Off	On/Off and increase
	Set/Mute	Set and mute alarm
	Down/Drain	Condensate drain and decrease

STANDARD OPERATION

Start/Stop key: push for 3 seconds to activate or deactivate the process. When the process is deactivated, the display does not show. During the dryer operation, the COMP LED (1) is on.

SET-UP

The device controls the compressor, fan, and condensate solenoid drain of the dryer and allows the calibration of the operating parameters. The user can change the setting of the programmed parameters. The parameters (Pr1-8) which can be set up are shown on the table below. Only parameters dr1 and dr2 can be set by the user.

To access set-up mode:

- Hold the SET button down for at least 3 seconds.
- The first parameter (Pr1) will be on the display.
- Press ON and DRAIN button to increase or reduce the value.
- To confirm press the SET button again.

PARAMETERS TABLE

PARAMETER	DESCRIPTION	UNIT OF MEASURE	MINIMUM	MAXIMUM	DEFAULT	
dr1	Drain time	s	1	20	2	
dr2	Drain cycle time	min	0	60	1	
S1L	Set low dewpoint	°F	-2	+100	32	
S1H	Set high dewpoint	°F	0	+100	44.6	
tS	Activation time energy saving	s	1	199	60	
tS1	Minimum time energy saving	min	1	199	5	
C0	Boot delay compressor and fan	min	0	100	1	
C1	Minimum time and executive startup	min	0	100	3	
F4	Temperature statup condenser fan	°F	-50	200	R134a	R407c
					98-104	102
F5	Differential shutdown condenser fan	°F	0,1	100	R134a	R407c
					1	1
F6	Disable probe 2 fan and alarm		0	1	0	
Adp	Alarm high dewpoint	°F	1	100	62.6	
tdP	Boot delay arm	min	0	60	6	
dh1	Alarm high temperature with compressor OFF	°F	-50	200	122	
dtH	Activation time high temperature alarm	s	0	90	30	
dL1	Alarm low temperature with compressor OFF	°F	-50	200	35.6	
dL2	Alarm low temperature with compressor ON	°F	-50	200	28.4	
dtL	Activation time low temperature alarm	s	0	90	90	
r5	Minimum limit range temperature	°F	-2	r6	37.4	
r6	Maximum limit range temperature	°F	r5	200	44.6	
A4	Remote ON/OFF Input open = OFF Input close = ON			2 = active	0 = inactive	

In gray: parameters that can only be changed by the manufacturer.

DISPLAY MESSAGE

PARAMETER	DESCRIPTION	RESET
ES	**ENERGY SAVING**	**AUTOMATIC**
Adp	Alarm high dewpoint	Manual only, push UP and DOWN simultaneously
P1	Alarm probe 1 dewpoint	Automatic
P2	Alarm probe 2 condenser fan	Automatic
H1	High temperature	Automatic
L1	Low temperature with compressor OFF	Automatic
L2	Low temperature with compressor ON	Manual only, push UP and DOWN simultaneously
IA	External alarm	Digital input closure
OFF	OFF button	Push ON/OFF
CA	OFF digital input (if configurated)	Digital input closure
EE	Error machine parameter	Contact service center
EF	Error parameter	Manual, check default parameter

ALARM HISTORY

The device records alarm history so the operator knows how many events occurred in the last operation.

How to access alarm history:

- Press and hold the SET and DRAIN buttons for 2 seconds.
- You will see the ESd and time energy numbers on the display.
- Press SET for 1 second to reset.
- Press DRAIN for 1 second to move to the next alarm history.
- You will see S1 and the number of times the error occurred.
- Press SET for 1 second to reset.
- Press DRAIN for 1 second to move to the next alarm history.
- You will see d and the number of times the high dewpoint alarm occurred.
- Press and hold the SET and DRAIN buttons for 2 seconds to return to the main display.

BEFORE START UP

Before starting up the machine, ensure all operating parameters correspond to the nominal data.

The dryer supplied is already tested and preset for normal operation, and it doesn't require any calibration. Nevertheless, it's necessary to check the operating performances during the first working hours.

START UP

The operations specified below must be performed after the first start up and at each start up after a prolonged inactive period of time due to maintenance operations, or any other reason.

1. Make sure all instructions found in INSTALLATION SITE and INSTALLATION have been followed.
2. Check if by-pass is locked properly (if applicable).
3. Turn on the main switch and ensure the phase detector is turned on (green LED).
4. Press ON/OFF button on the electronic controller for at least 3 seconds.
5. Wait 5 to 10 minutes until the machine has achieved its standard operating parameters.
6. Slowly open the air outlet valve and successively open the air inlet valve.
7. If existent, close the by-pass.
8. Check to see if the condensate drain is working properly.
9. Check to see if all connecting pipes are properly tightened.

Note!
Before disconnecting the dryer from electrical power supply, press the ON/OFF button on the electronic conteoller and turn off the main switch. After that, wait 10 minutes beofre switching the dryer on again in order to allow freon pressure re-balance.

TECHNICAL CHARACTERISTICS

TECHNICAL FEATURES OF TSUNAMI SERIES DRYERS

RSD SERIES	UNITS	15	20	35	50	51	75	100	150	175	220	300
Air flow rate	CFM	15	20	35	50	60	75	100	150	175	220	300
	m^3/h	25	34	59	85	102	127	170	254	297	374	510
Power consumptions	kW	0.18	0.18	0.23	0.23	0.34	0.34	0.61	0.82	0.82	1.04	1.38
Full load consumptions	kW	0.39	0.39	0.44	0.44	0.55	0.55	0.82	1.00	1.00	1.23	1.64
Nominal current	A	1.77	1.77	2.10	2.10	3.00	3.00	6.80	7.38	7.38	3.85	6.40
Full load current	A	2.47	2.47	2.80	2.80	3.70	3.70	7.50	8.91	8.91	4.59	7.63
Locked rotor current	A	8.50	8.50	10	10	12	12	16	42	42	30	40
Power supply	V/ph/ Hz	115/1/60									230/1/60	
Air connection IN/OUT	NPTF	3/4"					1"				1 1/2"	
Refrigerant type		R134a									R407c	
Charge	lbs	0.66	0.66	0.88	1.10	1.10	1.21	1.32	1.54	2.65	3.31	3.97
Maximum inlet air temperature	°F	130										
Maximum ambient temperature	°F	115										
Maximum inlet air pressure	psi	232										
Fan motor working pressure	psi	Start 159/Stop 116									Start 290/Stop 232	
Sound level	dB	<70										

CORRECTION FACTORS

Correction Factor for Inlet Air Pressure Changes								
Inlet Air Pressure (PSI)	58.0	72.5	87.0	101.5	116.0	145.0	174.0	203.1
Correction Factor	0.77	0.86	0.93	1	1.05	1.14	1.21	1.27

Correction Factor for Inlet Air Temperature Changes							
Inlet Air Temperature (°F)	77	86	95	104	113	122	131
Correction Factor	1.2	1.11	1	0.81	0.67	0.55	0.45

Correction Factor for Ambient Temperature Changes					
Ambient Temperature (°F)	77	86	95	104	113
Correction Factor	1	0.95	0.88	0.72	0.68

Correction Factor for Outlet Dew Point Changes				
Outlet Dew Point (°F)	37.4	41	44.6	50
Correction Factor	0.91	1	1.11	1.26

Use dryer correction factors to calculate the inlet air flow rating with specific inlet conditions to maintain the outlet conditions from the refrigerated dryer.
To calculate the maximum inlet air flow for a specific application, multiply the listed maximum air flow of the dryer by the correction factors for inlet air pressure, inlet air temperature, ambient temperature, and the desired outlet dew point.

Example:

	Condition	Correction Factor
RSD-050 Max. Inlet Air Flow	50 CFM	
Inlet Air Pressure	174 PSI	1.21
Inler Air Temperature	77°F	1.20
Ambient Temperature	95°F	0.88
Outlet Dew Point	34.4°F	0.91
Multiply	50 x 1.21 x 1.20 x 0.88 x 0.91	
Corrected Dryer Max. Inlet Air Flow	58.14 CFM	

TECHNICAL DESCRIPTION

OPERATION

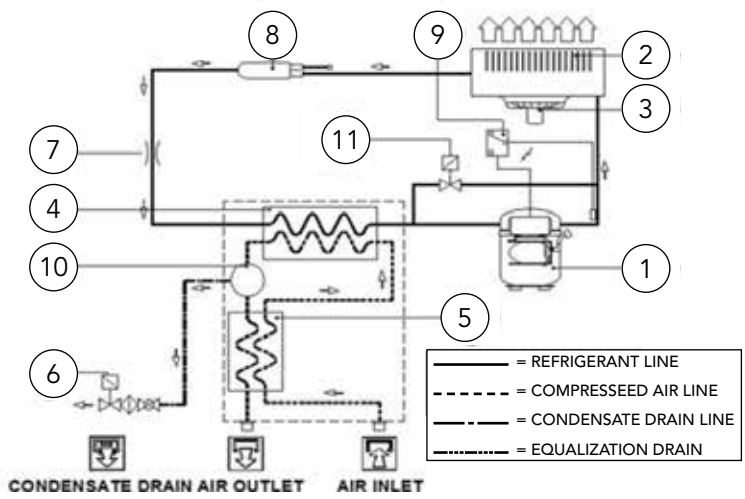
The dryer described in this manual consists of two separate circuits:

1. A compressed air curcuit divided into two heat exchangers
2. A refrigeration circuit

The warm and humid air goes through an air-to-air exchanger before entering the evaporator (air-to-refrigerant exchanger) that cools the air due to contact with the refrigeration circuit, and condenses the humidity in the air.
The condensed humidity is then separated and expelled into the separator.
The cooled air goes through the air-to-air exchanger where it partially warms up while cooling down the entering warm air (pre-refrigeration).
The refrigeration circuit needed for these operations is composed of a refrigeration compressor, a condenser and the evaporator, also called air-to-refrigerant exchanger.

REFRIGERATION CIRCUIT DIAGRAM

(1) Refrigerant compressor
(2) Condenser
(3) Condenser fan
(4) Air-to-air heat exchanger
(5) Air-to-refrigerant exchanger
(6) Condensate drain solenoid valve
(7) Capillary tube
(8) Dehydration filter
(9) Thermostat
(10) Condensate separator
(11) Hot gas bypass valve



REFRIGERANT COMPRESSOR

The refrigerant compressor is the pump of the system where the gas coming from the evaporator (low pressure side) is compressed to the condensation pressure (high pressure side). All the compressors used are manufactured by primary companies and are designed for applications where high compression ratios and vast temperature changes are present. The compressor is fully sealed and gas-tight, ensuring high-energy efficiency and a long lifespan. The pumping unit is supported by dumping springs in order to consistently reduce the sound emmision and vibration diffusion. The electric motor is cooled down by the aspirated refrigerating gas which goes through the coils before reaching the compression cylinders. The internal thermal switch protects the compressor from overheating. The protection is automatically restored as soon as the nominal temperature conditions are reached.

CONDENSER

The condenser is the element where the gas coming from the compressor is cooled down and condensed into a liquid. Mechanically, it's formed by a copper tubing circuit (with gas flowing inside) in an aluminum blade package. The cooling occurs in a high efficiency axial ventilator which, in applying pressure on the air contained within the dryer, forces it into the blade package.

It's vital that the temperature of the ambient air will not exceed the nominal values.
Keep the unit free from dust and other impurities.

DEHYDRATION FILTER

Traces of humidity and slag, which may accumulate inside the refrigeration circuit over time, can reduce compressor lubrication and clog the capillary tube. To prevent this, a dehydration filter is installed before the capillary tubing. Its function is to capture impurities and moisture, helping to maintain proper system operation and protect internal components.

CAPILLARY TUBE

It consists of a piece of small diameter copper tubing located between the capacitor and the evaporator to form a throttling against the flow of the refrigerating fluid. This throttling creates a pressure drop, which causes the temperature to rise in the evaporator: the lower the capillary tube outlet pressure, the lower the evaporation temperature.
The length and the diameter of the capillary tube are accurately sized with the performance to be reached by the dryer; no maintenance/adjustment operations are necessary.

This throttling creates a pressure drop, which is a function of the temperature to be reached within the evaporator: lower pressure at the capillary tube outlet results in lower evaporation temperature.

ALUMINUM HEAT EXCHANGER

The air-to-air and the air-to-refrigerant heat exchangers, plus the demister type condensate separator, are housed in a unique module. The counter flow of compressed air in the air-to-air heat exchanger ensures maximum heat transfer. The large cross section of the flow channel within the heat exchanger causes a lower velocity, and therefore a lower power requirement. The dimensions of the air-to-refrigerant heat exchanger and counter flow gas streams allow the refrigerant to completely evaporate, preventing liquid from entering the compressor.
The high-efficiency condensate separator is located in the heat exchanger. No Maintenance is required; the coalescing effect results in a high degree of moisture separation.

CONTROLS & MAINTENANCE

Before performing maintenance, make sure that:

1. **No parts of the system are under pressure.**
2. **No parts of the system are electrically powered.**

WEEKLY OR EVERY 40 HOURS OF OPERATION

1. Verify the temperature on the control panel display.
2. Visually check that condensate is drained regularly.

MONTHLY OR EVERY 200 HOURS OF OPERATION

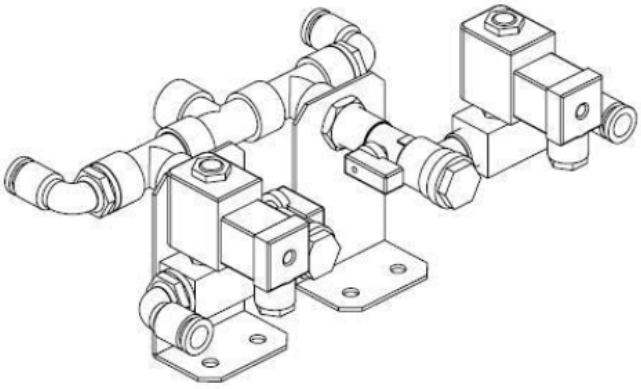
1. Clean the condenser using a compressed air blow gun or can. Take care not to damage the aluminum fins of the condenser.
2. Verify that the the dryer is working properly.

YEARLY OR EVERY 2000 HOURS OF OPERATION

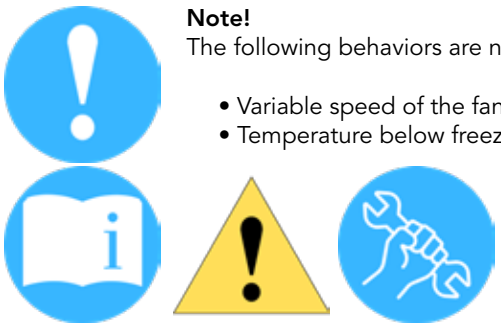
1. Check if the condensate drain tubing is damaged; replace if necessary.
2. Check if all connecting pipes are properly tightened and fixed.
3. Verify that the the dryer is working properly.

CLEANING OF SOLENOID DRAIN VALVE

- Close the ball valve located on the filter/stop installed on the drain tap inlet.
- Depressurize the trap by pushing the TEST button on the control panel.
- Unscrew the plug at the end of the filter/stop to access the filter screen and clean it with a compressed blow gun or can.
- Reassemble and open filter/stop valve.
- Verify there are no leaks around plug.



TROUBLESHOOTING



Note!
The following behaviors are normal characteristics of operation and are not problems:

- Variable speed of the fan
- Temperature below freezing values in case of operation without load

Troubleshooting control and/or maintenance must be performed by qualified personnel.

For maintenance of the refrigeration circuit of the machine, contact a licensed refrigeration technician.

PROBLEM	POSSIBLE CAUSE & REMEDY
Luminous switch / display of the control panel OFF	1. Check if the line is electrically powered. 2. Check power cord. 3. Check the electronic control board; if the problem persists, replace it.
The compressor doesn't start	1. Check power cord. 2. Activation of compressor's internal thermal protection or 1T1 thermal protection; wait one hour and check again. If the fault persists: stop the dryer and call a licensed refrigeration technician. 3. Check the compressor's electrical components. 4. There's a short circuit in the compressor, replace it.
The fan doesn't work	1. Check the protection fuse (if present), if it's broken, replace it. 2. Check power cord. 3. Check the electronic control board; if the problem persists, replace it. 4. There's a short circuit in the compressor, replace it.
Condensate drain absent (no water nor air)	1. Check power cord. 2. The coil of the solenoid drain valve is burned out, replace it. 3. Solenoid drain valve clogged/jammed, clean or replace it. 4. Check the electronic card, if the trouble persists, replace it. 5. The temperature on the display of the control panel is lower than the nominal value, call a licensed refrigeration technician.
Air flows continuously through the condensate drainage.	1. Solenoid drain valve jammed, clean it. 2. Verify the condensate drainage times. 3. Check the control. If the problem persists, replace it.
Water in the pipes downstream of the dryer.	1. The dryer is off; turn it on. 2. Close bypass (if present). 3. Condensate drainage absent; see specific section. 4. The temperature on the control panel display is higher than the nominal value; see specific section.
The temperature on the control panel display is higher than the nominal value.	1. Check if the compressed air inlet/outler is connected properly. 2. The compressor doesn't start; see specific section. 3. The fan doesn't turn; see specific section. 4. The flow rate and/or temperature of the air entering the dryer is higher than the nominal values; restore the nominal conditions. 5. The ambient temperature is higher than the nominal values; restore the nominal conditions. 6. The condenser is dirty; clean it. 7. Condensate drain absent (no water nor air); see specific section. 8. Check if the temperature control probe in the evaporator is positioned improperly or faulty. 9. Gas leak in the refrigerating circuit: stop dryer and call a licensed refrigeration technician. 10. Check power cord.

PROBLEM	POSSIBLE CAUSE & REMEDY
The dryer does not let compressed air flow through.	1. Check if the compressed air inlet / outlet is connected properly. 2. The temperature on the control panel display is lower than the nominal value; call a licensed refrigeration technician 3. Check if the temperature control probe in the evaporator is positioned improperly or faulty. 4. Check if the connecting tubing are clogged; eventually proceed accordingly. 5. Check if by-pass (if present) is installed properly. 6. Check electronic control board. If the trouble persists, replace it.

IMPORTANT:
1) The temperature control probe is extremely delicate. Do not remove the probe from its position. In case of any kind of problem, please contact your service center.
2) Do not attempt to switch on the thermostat while the unit is off without first contacting service support. Unauthorized handling may cause damage or malfunction.

DISMANTLING OF THE DRYER

If the dryer is to be dismantled, it has to be split into homogeneous groups of materials.

PART	MATERIAL
Refrigerant Fluid	R134a or R407C - HFC, Oil
Enclosure	Carbon steel, Epoxy paint
Refrigerant Compressor	Steel, Copper, Aluminum, Oil
Aluminum Heat Exchanger	Aluminum
Condenser Unit	Aluminum, Copper, Carbon steel
Pipe	Copper
Fan	Aluminum, Copper, Carbon steel
Valve	Brass, Steel
Electronic Level Drain	PVC, Aluminum, Steel
Insulation Material	Synthetic gum without CFC, Polystyrene, Polyurethane
Electric Cable	Copper, PVC
Electric Parts	PVC, Copper, Brass

We recommend complying with the safety rules in regards to the disposal of each type of material. The condensate fluid contains droplets of lubrication oil released by the refrigerating compressor. Do not dispose of this fluid in the environment. It has to be discharged from the dryer with a suitable device and then delivered to a collection center where it will be processed to make it reusable.

Note:
In case spare parts are needed, contact the dealer directly. To order a spare part, you need the information on the identification plate; for example: air dryer model and serial number.

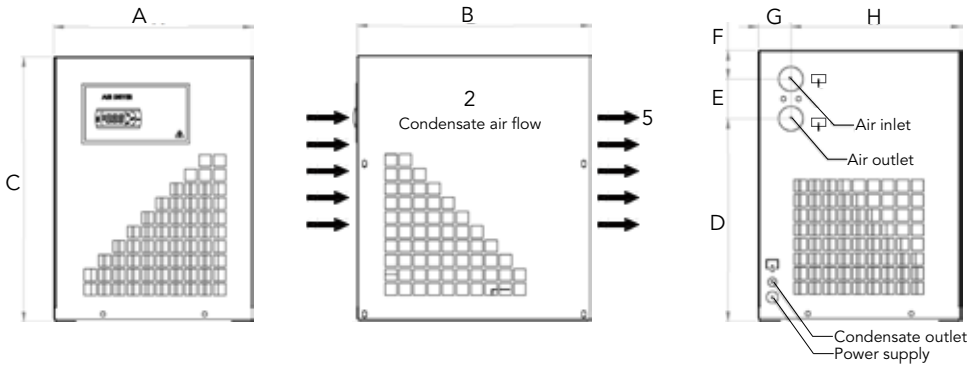
ATTACHMENT

A. LEGEND

PW	Power Supply	
1A1	Electronic Controller	
1M1	Refrigerant Compressor	
1M2	Fan Motor	
1S1	Main Switch	
1R1	Dew Point Sensor	
1R2	Fan Sensor	
CND	Condenser	
FF	Filter Dryer	
SC	Aluminum Heat Exchanger	
	SC/AA	Aluminum Heat-Exchanger Air - Air
	SC/AR	Aluminum Heat-Exchanger Air - Refrigerant
	SC/MC	Mixing Chamber
TS	Thermal Switch	
1B1	Coil Drain Valve	
RBF	Filter	
1V1	Solenoid Valve	
1P1	Pressure Switch	
CT	Capillary Tube	
VB	Bypass Hot Gas Valve	
IM	Moisture Indicator	
SLI	Liquid Separator	
F1	Cartridge Fuse	
R1	Relay	
1C1	Capacity of Compressor	
1C2	Capacitor of Fan Motor	

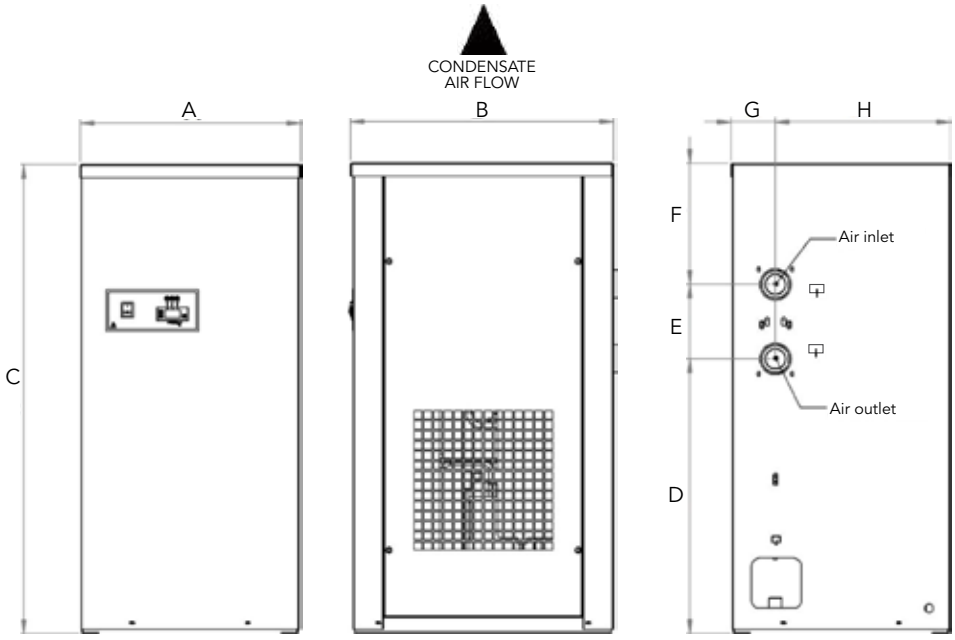
B. DRYER DIMENSIONS

RSD-015 to RSD-175



MODEL	A	B	C	D	E	F	G	H	&		
RSD	inch	inch	inch	inch	inch	inch	inch	inch	inch	inch	V / ph / HZ
015 - 030	13.11	15.43	17.55	13.12	2.56	1.86	2.10	11.01	NPT 3/4"	D.0.24	115 / 1 / 60
050	14.31	17.01	19.13	13.34	3.94	1.84	2.83	11.49			
075 - 150	15.69	18.20	21.29	15.70	3.94	1.65	2.47	13.22	NPT 1"		
175	20.03	20.57	26.82	20.08	4.33	2.41	3.26	16.77	NPT 1.5"		

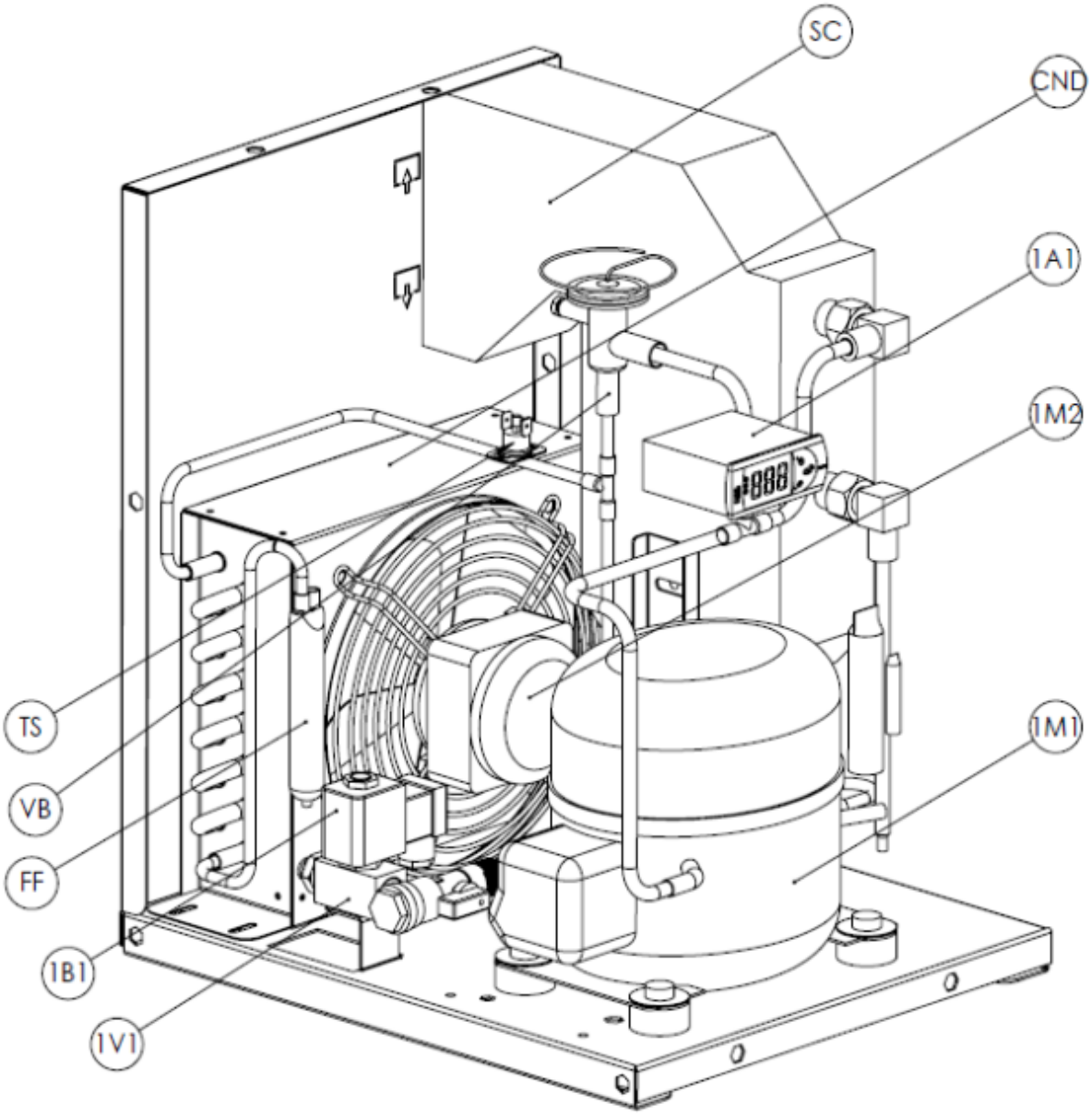
RSD-220 and RSD-300

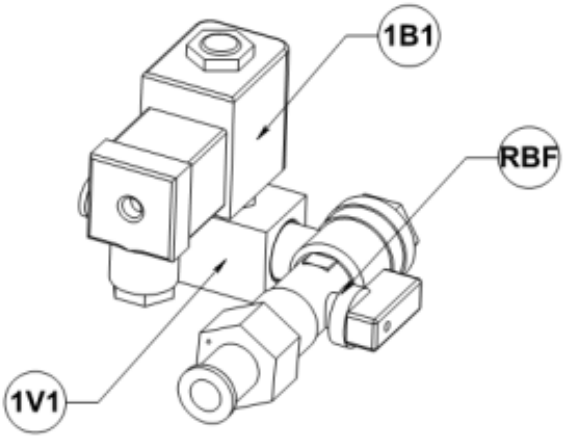


MODEL	A	B	C	D	E	F	G	H	&		
RSD	inch	inch	inch	inch	inch	inch	inch	inch	inch	inch	V / ph / HZ
220-300	20.75	24.69	44.21	25.83	7.01	11.38	4.17	16.57	NPT 1.5"	D.0.24	230 / 1 / 60

C. EXPLODED VIEW

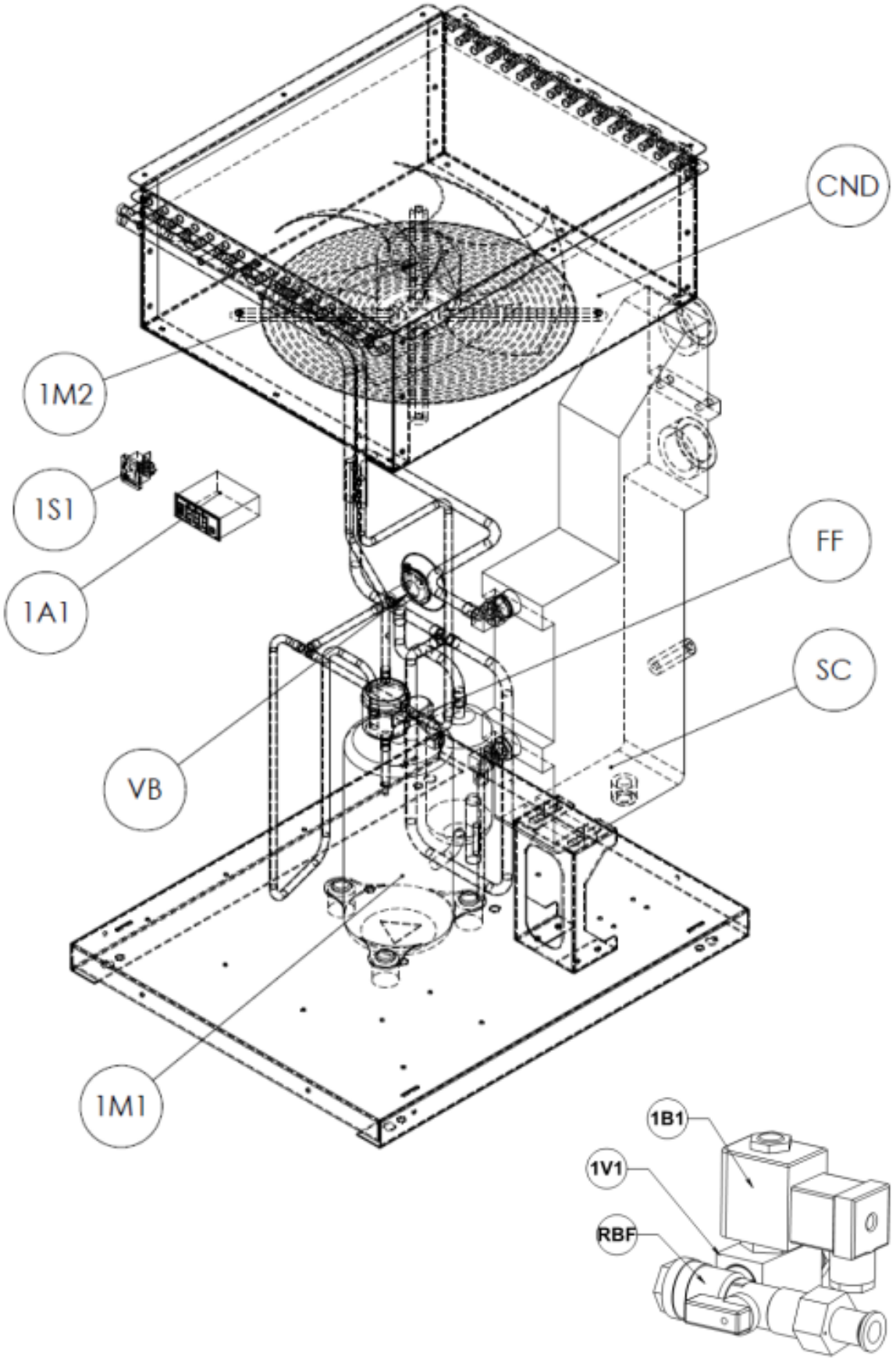
RSD-015 to RSD-175





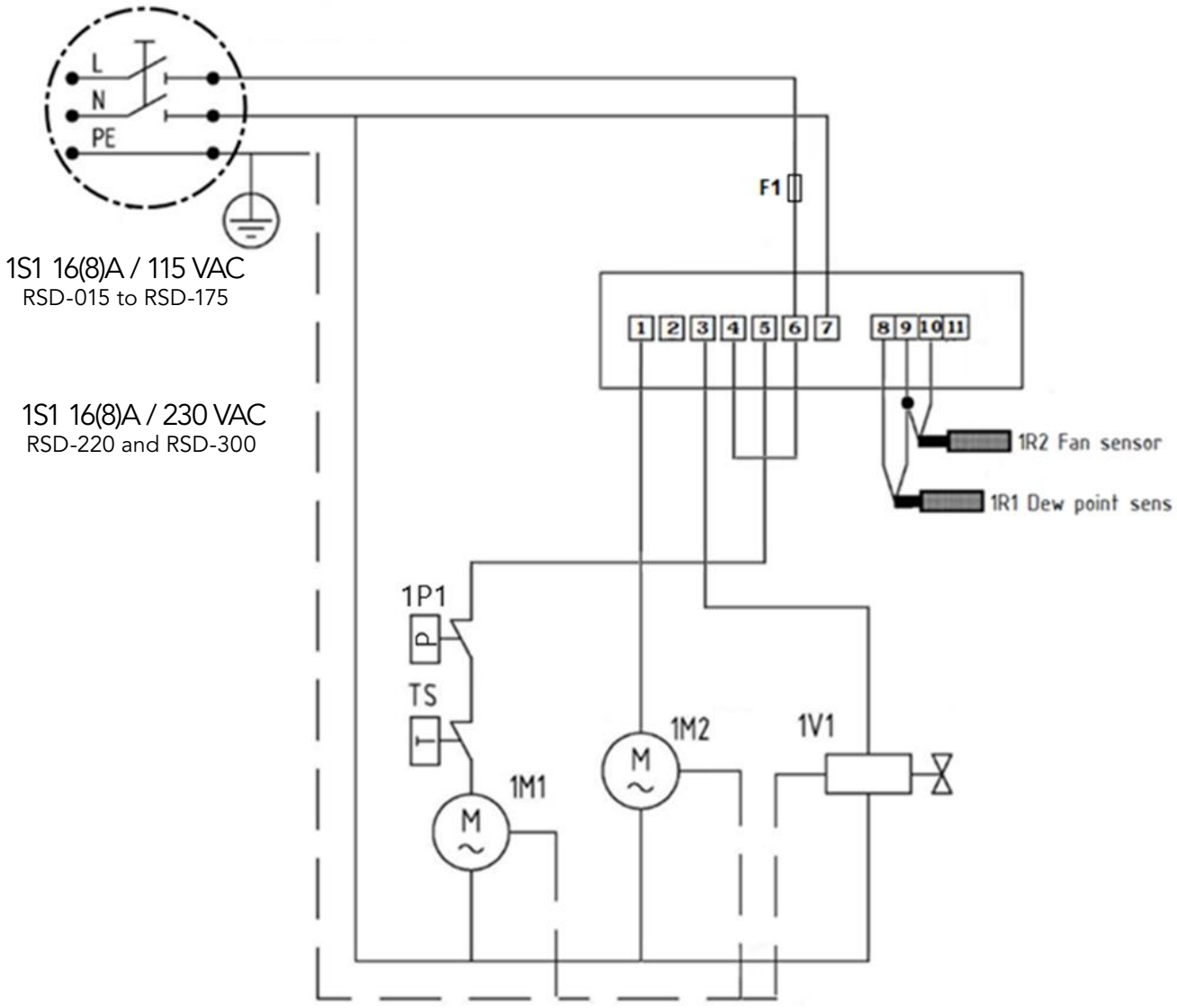
ATTACHMENT

RSD-220 to RSD-300



D. ELECTRICAL DIAGRAM

RSD-015 to RSD-300



1S1 16(8)A / 115 VAC
RSD-015 to RSD-175

1S1 16(8)A / 230 VAC
RSD-220 and RSD-300

WARRANTY

WARRANTY PHILOSOPHY

The dictionary defines warranty as:

1. Official authorization, sanction, or warranty.
2. Justification of valid grounds for an act or a course of action.
3. Law and assurance by the seller of property.

A warranty can also be defined as a protection of investment. Tsunami believes a successful warranty policy should be fair to all parties involved. The content of this manual explains the individual components that make up our warranty philosophy.

FILING A WARRANTY CLAIM

- Contact Tsunami to notify that you are submitting a claim.
- In an email, include the following: invoice of when the unit was purchased, your start up sheet with end user's signature and date, a picture of installation and pictures of the failed item.
    - Example: If there is a broken refrigeration line, take a picture of the break.
- Have Tsunami send an RMA number.

WARRANTY REIMBURSEMENT RATES FOR SERVICE/DEALER

- Labor at a maximum of $75.00 per hour (based on a standard rate schedule). **NO OVERTIME TO BE ACCEPTED.** Time for meals or lodging is not included as billable.
- Travel time at a maximum of $35.00 per hour. Maximum allowable 5 hours for travel to site only. Excludes parking or tolls.
- Mileage at 75¢ per mile. Maximum allowable 100 miles - one way trip.
- Tsunami requires a review of any claim which will result in a claim greater than $1,000 prior to any work performed or product replaced.
- When the customer needs to use a local service company, Tsunami is to be notified in advance of any service work being performed. The customer needs to be informed that Tsunami will only reimberse up to our policy time allowances in the chart below and $/hours as stated above.

REFRIGERATED DRYER AUTHORIZED REPAIR TIMES

WORK	TIME ALLOWANCE
Compressor replacement [1]	4:00
Condenser replacement [1]	2:00
Fan motor	1:00
Aluminum heat exchanger [1]	3:00
Refrigerant filter	1:00
Hot gas valve [2]	N/A
Safety thermostat	1:00
Electronic controller	1:00
Temperature sensor	1:00
Repair leak (brazing)	1:00
Repair leak (tightening)	1:00
Compressor motor switch	1:00
Auxiliary switch	1:00
High/low pressure fan/switch	1:00
Electronic solenoid drain valve [3]	1:00
Electrical repair (change coils, fuse, etc.)	1:00
Unit evaluation	1:00

1. Includes evacuation, refrigerant filter replacement, eventual refrigerant circuit cleaning, pressure test, and refrigerant charge.
2. Hot gas bypass valve adjustment is not covered under warranty.
3. Dirty or clogged drains are not covered under warranty.

WARRANTY

WARRANTY FREIGHT FOR UNIT RETURNS

All units and/or parts need to be returned to Tsunami for evaluation or repair, a Return Material Authorization (RMA) number will be issued along with a specified carrier. Any unit returning without an RMA number or returned using a nonspecified carrier will be refused. Tsunami only covers the cost of outbound freight for units and/or parts to your location. Return items must be clearly labeled with the RMA number on the outside packaging and include the RMA form inside of the package.

WARRANTY REIMBURSEMENT FOR UNIT OR PARTS

Tsunami may send recondition units and/or parts to remedy the component failure at our discretion. Any replacement item is warrantied to the end of the original unit or part warranty period.*
Replacement unit and/or parts must be returned for evaluation before credit will be issued unless given written authorization from Tsunami to dispose of the items locally.

***Note: The replacement components DO NOT start a new warranty period.**

WARRANTY PARTS & RETURNS

Products or components shall not be considered defective if they fulfill published performance requirements set forth in our literature and/or are manufactured in accordance with our stated specifications or government specifications and/or codes when applicable.

In the event a part is required to complete a warranty repair, the following steps will occur:

A. All return parts must have an RMA number.
B. All replacement parts will be shipped by UPS ground service.
C. After the customer/service has installed the replacement part, they must return the suspected defective part to us within 30 days.
D. Returned parts will be evaluated for warranty disposition. If no defect is found in the suspected returned parts or product, the dealer or end user is responsible for payment of the returned parts or product and will be invoiced accordingly.

Note 1: Only Tsunami replacement parts are to be used for repairs under warranty.
Note 2: All warranty claims will be issued as a credit to your account.

WARRANTY

ITEMS NOT COVERED BY WARRANTY

- Failure of consumable components (filter, elements, drains, ect.)
- Failure due to force majeure.
- Failure of any component that was added and/or modified by personnel not authorized by the seller.
- Failure arising from incorrect installation and/or from insufficient maintenance or cleaning.
- Failure and/or malfunctions arising from improper use.
- Failure arising from, excess or lack of electricity, water, and/or air.
- Failure arising from malfunction of auxiliary or subsidiary devices supplied by a third party.
- Failure caused during transportation or unloading. **Tsunami customers will verify the state of all incoming stock and will immediately report any damage caused by transport or movement to the logistics carrier. Tsunami will not be held responsible for materials which have suffered unreported damage.**
- Lost time or production due to equipment failure.
- Damage caused by accident.
- Damage caused by operation outside the rated conditions.
- Failure to operate the unit within ambient rated temperatures.
- Failure to operate the unit in inlet air temperature at rated temperatures.
- Failure to operate within rated CFM.
- Failure to operate within rated psig.
- Failure to operate within and other related parameters relevant to the products.
- Damage caused by corrosion due to environment and/or chemical treatments.
- Economic loss - this warranty does not cover any consequential damage, economic loss, extra expense including payment for the loss of time, pay, inconvenience, storage, removal, reinstallation, loss of dryer use, dryer rental expense, lodging, meals, or other travel.
- Travel cost (travel beyond 100 miles without authorization).
- Travel time (travel time beyond 5 hours round trip without authorization).

COVERAGE

- RSD (Refrigerated Series Dryers)
    - Period: 18 months from date of shipment from the factory or 12 months from date of installation/ start up, whichever occurs first.
    - 100% parts and labor per defined service time allowances.
- Requirements
    - Prefilter & non-corrosive upstream piping required.

CONTACT INFORMATION

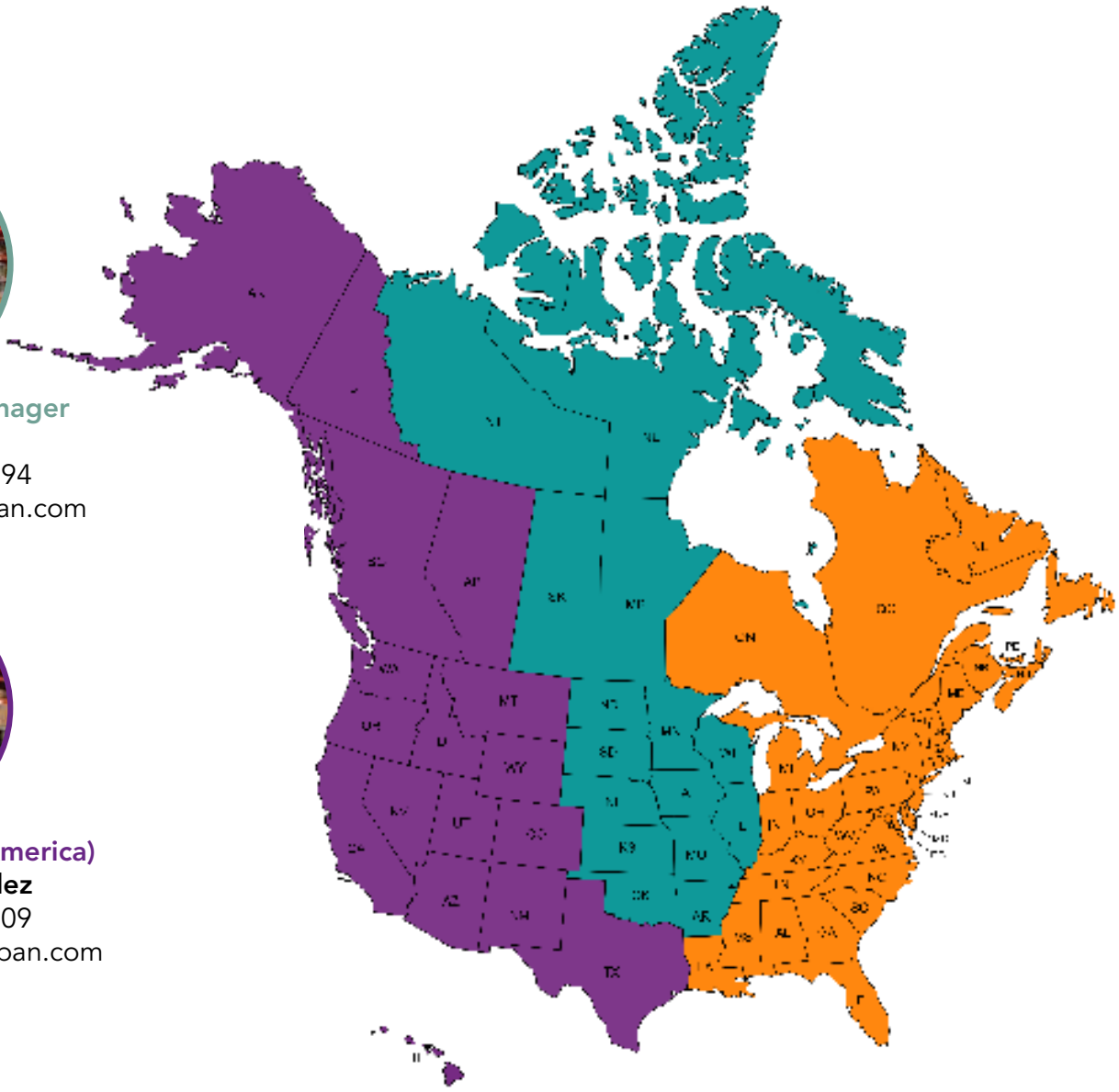
CONTACT YOUR TSUNAMI REPRESENTATIVE

Our team is waiting to answer questions, provide clarification, and schedule a demo!

National Sales Manager
Mike Kreklau
Cell: 763.259.8194
mkreklau@gosuburban.com

West (Mexico & S. America)
Keisha Hernandez
Cell: 832.444.8909
khernandez@gosuburban.com

East (Africa & The Caribbean)
Celia Fussell
Cell: 865.973.1053
cfussel@gosuburban.com



GENERAL CONTACT INFORMATION

Customer Service: 1.800.782.5752
Address: 10531 Dalton Ave NE
Monticello, MN 55362

Website: tsunami.us.com


TSUNAMI
COMPRESSED AIR SOLUTIONS