

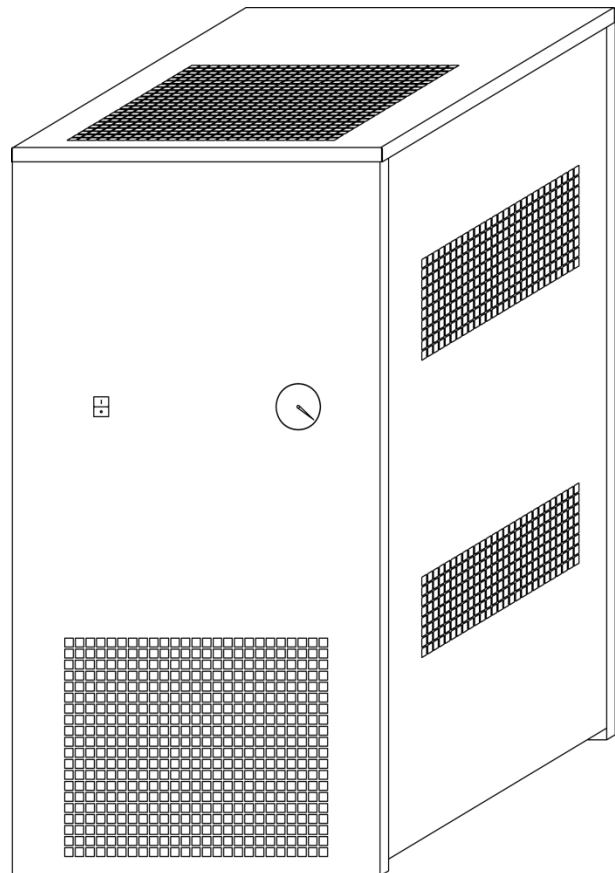


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COMPRESSED AIR DRYER INSTRUCTION MANUAL

GRF-SERIES REFRIGERATION TYPE NON CYCLING STANDARD

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INTRODUCTION



Before attempting any installation or maintenance on the dryer, please carefully read this entire manual.

Great Lakes Air Products genuine parts, manufactured to design tolerances, are developed for optimum dependability – specifically for Great Lakes Air Products dryer systems. Design and material innovations are the result of years of experience with hundreds of different compressor and dryer applications. Reliability in materials and quality assurance are incorporated in our genuine replacement parts.

Your authorized Great Lakes Air Products distributor offers all the backup and reassurance you'll need. Our network of authorized distributors provides the finest product support in the air compressor industry.

Your authorized distributor can support your Great Lakes Air Products Dryer with these services:

1. Trained parts specialists to assist you in selecting the correct replacement parts.
2. Repair and maintenance kits designed with the necessary parts to simplify servicing your dryer.
3. Authorized distributor service technicians are factory trained and skilled in compressor and dryer maintenance and repair. They are ready to respond and assist you by providing fast, expert maintenance and repair services.

To Contact Great Lakes Air Products or locate your local distributor:

Visit: www.glair.com or

Call: (734) 326-7080

Failure to install the compressed air dryer per this manual or any change to the dryer not previously authorized by the manufacture will void the warranty.

The information and specifications in this manual are in accordance with the information in effect at the time of printing. The manufacturer reserves the right to make changes without notice or incurring obligation.

GENERAL SAFETY INFORMATION



General Warning

The associated text outlines conditions, which could indicate a hazardous situation that has some probability of death or severe injury.



Electrical Hazard

The associated text outlines conditions, which could indicate a hazardous situation that has some probability of death or severe injury.

Only qualified personnel can use and service electrically powered devices. Be sure that the voltage is disconnected before any work is performed.



Personnel or Equipment Danger Hazard

A compressed air dryer has two separate pressurized systems each with the potential to be pressurized independently. First is the sealed refrigeration system which should never be opened except by a licensed technician. Second is the actual compressed air circuit. Depressurize the compressed system prior to performing any work or maintenance on that system. Compressed air is a highly hazardous energy source. Never work on equipment with parts under pressure.



Breathing Air

Air treated by this equipment may not be suitable for breathing without further purification. Refer to applicable standards and specifications for the requirements of breathing quality air.

PROPER USE OF DRYER

This dryer has been designed, manufactured and tested to separate humidity normally contained in compressed air **only**. Any other unauthorized use will be considered improper. The manufacturer will void the warranty and not be held responsible for any problem arising from improper use. The correct use requires adherence to installation conditions specified in this manual.

This dryer is supplied tested and fully assembled. The only operation left to the user is the connection to the plant in compliance with the instructions given in the following chapters.

RECEIVING EQUIPMENT

Immediately upon receipt of equipment, remove all crating and packaging around equipment. Examine machinery for any damages either external or internal that may have occurred in transit.

If there is any physical damage or a refrigerant leak, (**suction/analyzer gauge reads zero**) please note all damages on bill of lading during delivery. If damage is detected after the equipment delivery; contact the local terminal to report all damages and file a claim immediately with the transportation company. The carrier is legally responsible for any damages, since the unit is shipped F.O.B.

INSTALLATION LOCATION PIPING & CONNECTION



Particular care is required in selecting the installation site, as an unsuitable location could jeopardize the proper operation of the dryer. This unit is not suitable to be used in an explosive atmosphere, or where the risk of fire could be present.

The unit should be installed in an area that is clean and dry, allowing sufficient space on all sides for routine maintenance and service. It should be located on a level floor or shelf free from vibrations and sufficient to support the total weight of the machinery. Although the dryer package is a freestanding unit, it may be secured by bolting the base to the floor but is not required. **This standard dryer is designed for indoor installation.** Contact distributor if installing unit outdoors.

Installations at altitudes above 4000 feet (1219 meters) will experience a loss of capacity and may require field adjustments of pressure settings. The unit has been factory adjusted to operate up to 4000 feet (1219 meters), and if installation is above this altitude, contact your local distributor for correct refrigerant settings.

Air-Cooled Units

Allow (2') two feet, minimum clearance around the dryer for maintenance access and adequate free circulation of cooling air to the dryer. The ambient temperature around the dryer must not exceed 110°F (37.7°C) or be less than 40°F (10°C).

Water-Cooled Unit & Y-Strainer Installation

The fluid supply lines to the condenser should be sized to deliver the required flow of coolant. If the ambient temperature exceeds the supply fluid temperature by 10°F, insulate the inlet line to the condenser. Cooling fluid quality should be well maintained with proper water treatment and a low differential across the inlet filtration. If cooling supply lines are exposed to ambient that exceed the fluid temperature by 10°F the addition of insulation will help maintain the fluid cooling capacity.

Condenser Cooling Water Supply Requirements	
Fluid Temperature	60°F(15.6°C) to 90°F(32.2°C)
Filtration	16-20 mesh strainer
pH	6.6 to 7.2

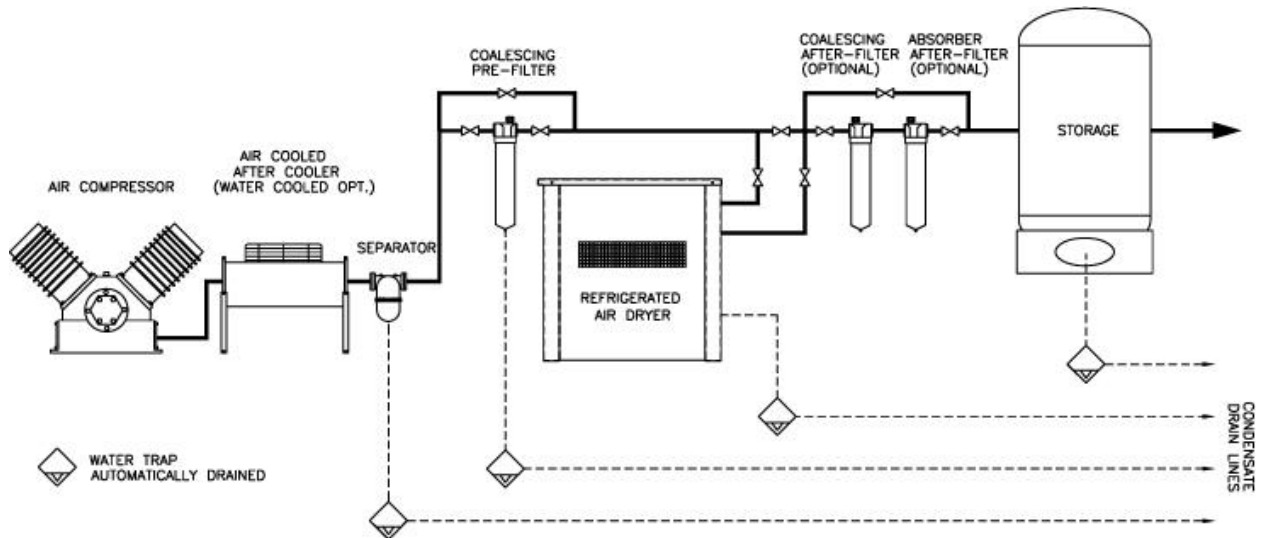
Ambient temperatures below 40°F (10°C) require optional equipment specified below. Sufficient ventilation must be provided to maintain acceptable ambient for efficient operation. Consider heat rejection when locating dryer.

RECOMMENDED SYSTEM DESIGN

A healthy, long-term, and trouble free compressed air supply design should be approached as a complete system, not individual components. The air compressor Intake location is vital to system health; it should supply clean fresh air that is free from possible contaminant (e.g. ammonia, chlorine or methane). Any contaminant entering the compressor intake will be concentrated by a factor of 8 due to the compression process in a typical compressed air system.

A properly sized and maintained compressed air aftercooler is vital to maintaining an acceptable system temperature range. GRF Series refrigerated air dryers are designed to operate at rated flow with a maximum inlet temperature of 100°F (37.7°C). Units can be oversized to accommodate higher inlet temperatures up to 120°F (48.8°C). As dryer inlet temperatures rise above the design 100°F (37.7°C), the moisture holding capacity of the air rises dramatically. The following table represents the additional moisture load at elevated temperatures.

Inlet Temperatures	100°F (37.7°C)	105°F (40.5°C)	110°F (43.3°C)	115°F (46.1°C)	120°F (48.8°C)
Additional Load	0%	15%	32%	51%	75%



The pipe connection to the dryer should match the standard connection ports provided. The chart below is provided as a basic guide to size branch and header piping. It is recommended that shut-off valves with unions be installed at each port, with a valve bypass to permit isolation of the unit for servicing without interruption of plant air supply.

Maximum Recommended Compressed Air Flow Schedule 40 pipe @ 95 to 115 PSIG										
Pipe Size	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	6"
Flow (SCFM)	40	100	150	200	350	650	900	1500	2500	5000

ELECTRICAL CONNECTION



The Nameplate/Data plate located on each unit identifies the power supply requirements and maximum fuse specification. Units supplied with cord and plug requires the installation of a receptacle rated for 15 amps. Units supplied with electrical junctions, require a suitable fused disconnect in compliance with the National and Local Electrical Code requirements.

Three phase versions of the GRF air dryer are NOT sensitive to phase alignment. Rotation of motors is universal.

The wiring of all functional electrical components has been completed and tested at the factory in accordance with the electrical wiring schematic provided with this manual.

CONDENSATE DRAINS



The condensate system is at line pressure and can cause personal injury or equipment damage when discharging. Securely anchor the drain pipes or tubes prior to dryer operation. Prior to any maintenance isolate and depressurize condensate drain valves.

Internal Float Drain GRF-10 through GRF-40	Electronic Drain Assembly GRF-50 through GRF-2250						
<p>When maintaining float drains depressurize the dryer & drain prior to work initiation.</p> <p>Drain line and "Drain Connector" must be removed prior to bowl and float drain removal.</p>	<table border="1" data-bbox="894 915 1256 1010"> <thead> <tr> <th colspan="2">Drain Timer Factory Preset</th> </tr> </thead> <tbody> <tr> <td>4 seconds</td> <td>on time</td> </tr> <tr> <td>10 minutes</td> <td>off time</td> </tr> </tbody> </table> <p>The factory setting is applicable for virtually all industrial applications. If adjustment is required contact your local distributor for alternate settings and procedures.</p>	Drain Timer Factory Preset		4 seconds	on time	10 minutes	off time
Drain Timer Factory Preset							
4 seconds	on time						
10 minutes	off time						
<p>Condensate discharged from the dryer may contain oil/lubricants. Verify and follow local regulations regarding disposal.</p>							

STARTUP PROCEDURE

GRF-20A through GRF-200A

Energize the refrigeration compressor by placing the “on/off” dryer switch with indicating light to the “on (I)” position. The refrigerant compressor and fan motor will begin to operate. The suction/analyzer gauge will fall to a range of 28-35 PSIG. If the suction/analyzer gauge is not in the specified range, contact your local distributor.

GRF-250-2250 or any 3-Phase powered unit REQUIRE AN 8 HOUR CRANK CASE WARMUP PRIOR TO STARTUP



To prevent equipment damage the unit must have primary power applied with the “on/off” switch in the “OFF (0)” position for no less than 8 hours. This energizes the crank case heater to allow any liquid refrigerant in the crankcase to be vaporized prior to startup. Energizing the dryer prior to crank case heating can “wash away” compressor lubricants and will cause premature compressor failure.

GRF-250A through GRF-2250A

Energize the refrigeration compressor by placing the “on/off” dryer switch with indicating light to the “on (I)” position. The refrigerant compressor and fan motor will begin to operate. The suction/analyzer gauge will fall to an upper (RF) orange pie range of 73-82 PSIG and the discharge gauge will raise to a range of 190 to 382 PSIG. These units are equipped with condenser fan cycle controls and operate independent of the compressor. Each fan is controlled via a refrigeration discharge pressure switch (260-200 PSIG) for single fan units and (290-240 PSIG) for two fan units. If the suction/analyzer or discharge gauge is not in the specified range, contact your local distributor.

GRF-100W through GRF-200W

The water-cooled series GRF-100W through GRF-200W utilizes a city or tower fluid supply. The unit is supplied with a water-regulating valve at the outlet of the refrigeration condenser. This valve modulates water flow to maintain a stable refrigerant discharge pressure of 125-145 PSIG. If the refrigeration discharge pressure maintains a pressure above or below this setting, adjustments will be required to the water-regulating valve. Contact your local distributor.

GRF-250W through GRF-2250W

The water-cooled series GRF-250W through GRF-2250W utilizes a city or tower fluid supply. The unit is supplied with a water-regulating valve at the outlet of the refrigeration condenser. This valve modulates water flow to maintain a stable refrigerant discharge pressure of 250-275 PSIG. If the refrigeration discharge pressure maintains a pressure above or below this setting, adjustments will be required to the water-regulating valve. Contact your local distributor.

SHUT DOWN PROCEDURE

When the dryer is to be shut down for service, maintenance, or other reasons switch the dryer off by placing the “on/off” dryer switch with indicating light to the “OFF (0)” position. If service or maintenance is required disconnect and lockout the main power supply, isolate and depressurize the internal compressed air pressure to atmosphere prior to commencement of any work.

If the shutdown resulted in loss of main power interruption, repeat start up procedure so crank case heater has time to raise the crank case temperature.

REQUIRED MAINTENANCE

INSPECTION	Frequency
Verify operation of the solenoid and auto float drain system.	Weekly or as required.
Verify refrigeration analyzer gauge is in the correct range.	
Verify operation of both cooling fans.	



Disconnect and lockout dryer power as well as compressed air supply and depressurize prior to performing the following maintenance items.

General Maintenance	Frequency
Clean refrigeration condenser coil by blowing dust and dirt from the inside of the cabinet out. (Opposite from normal fan air flow) Be sure to clean condenser fan motor to provide adequate cooling and fan blades to allow proper balance.	Monthly
Isolate the valve prior to the Solenoid drain system and remove and clean the strainer screen	Monthly
Replace filter element of inline filters.	6 Months or High differential

Drain Service	Frequency
If the drain system is not discharging condensate and the strainer is clean, try cleaning debris from diaphragm, or replacing the solenoid or timer.	As Required
If the drain system is continually discharging condensate and air from the drain tube, try replacing the solenoid valve diaphragm, or the complete drain valve.	As Required

MODEL CAPACITY CORRECTION MULTIPLIER													
Inlet Temp.		90°F			100°F			110°F			120°F		
Ambient Temp.		90	100	110	90	100	110	90	100	110	90	100	110
Inlet Air Pressure	70	1.10	1.01	0.86	0.81	0.74	0.63	0.60	0.55	0.47	0.45	0.42	0.35
	80	1.23	1.13	0.96	0.90	0.83	0.70	0.67	0.62	0.52	0.51	0.47	0.40
	90	1.35	1.24	1.06	1.00	0.91	0.78	0.74	0.68	0.58	0.56	0.51	0.44
	100	1.48	1.36	1.15	1.09	1.00	0.85	0.81	0.75	0.63	0.61	0.56	0.48
	110	1.61	1.47	1.25	1.18	1.09	0.92	0.88	0.81	0.69	0.66	0.61	0.52
	120	1.73	1.59	1.35	1.29	1.17	0.99	0.95	0.87	0.74	0.72	0.66	0.56
	130	1.86	1.70	1.45	1.37	1.26	1.07	1.02	0.94	0.80	0.77	0.71	0.60
	140	1.98	1.82	1.55	1.46	1.34	1.14	1.09	1.00	0.85	0.82	0.75	0.64
	150	2.11	1.93	1.64	1.55	1.42	1.21	1.16	1.06	0.90	0.87	0.80	0.68

To obtain flow capacities at conditions other than standard (SCFM @ 100 PSIG, 100°F Inlet & 100°F Ambient), locate the multiplier at the interception of actual operating conditions. Multiply the rated capacity of the selected dryer by the selected multiplier. The result is the corrected flow capacity. Flow rates in excess of specified due to capacity correction can result in increasing pressure drop.

TROUBLESHOOTING

Sec	Symptom	Possible Cause(s)	Corrective Action
A	Water downstream of dryer.	1. Residual free moisture remaining in downstream piping	Drain low spots in system and purge with dry air
		2. Air By-pass system is open	Verify valve positions and correct valve positions
		3. Ambient temperature surrounding downstream piping is below the dryer's dewpoint.	Insulate and/or heat trace piping exposed to low ambient temperatures or dry air to a lower dewpoint.
		4. Free water (liquid) is entering the dryer	Dryers are designed to handle saturated air not condensed liquid. Install a separator and coalescing filter upstream of dryer.
		5. Condensate is not being drained	See section B
		6. Dryer is overloaded resulting in high dewpoint	See capacity charts to determine correct load
		7. Refrigeration system is not functioning.	See section E
		8. Suction pressure not in operating range	Contact your local distributor to perform adjustments.
B	Drain System Failure with no condensate discharge on test initiation.	1. Drain strainer is clogged	Depressurize dryer and replace or clean drain strainer.
		2. Solenoid valve or electronic timer failure	Replace drain solenoid and or timer assembly
C	Drain System Failure with continuous condensate or air discharge.	1. Solenoid valve diaphragm rupture or orifice path blocked open	Clean or replace internal diaphragm assembly.
D	High pressure drop across dryer	1. Inlet flow exceeds maximum capacity	Check inlet flow vs. rated capacity
		2. Freezing of moisture in evaporator is restricting inlet air flow	If refrigerant suction pressure is out of standard operating range, contact your local distributor to perform adjustments.
E Refrigeration System Fault			
E1	Power on indicator does not illuminate	1. Power failure, Line fuses blown, or disconnect open.	Have an electrician check electrical feed and connection integrity.
E2	Refrigeration compressor cycles on and off	1. Ambient Conditions are above or below minimum or maximum ranges.	Verify range and rectify ambient conditions.
		2. Air-Cooled Units, Dirty condenser	Clean condenser as per required maintenance.
		3. Water-Cooled Units, High fluid temperature or low fluid flow.	Check fluid temperature, bring in range and check for free fluid flow through condenser. If problem persists contact your local distributor to perform adjustments.

ENGINEERING DATA

Model GRF	10	20	25	40	50	75	100	125	150	200	250	300
Capacity in SCFM @ 100 PSIG, 100°F Inlet & 100°F Ambient	10	20	25	40	50	75	100	125	150	200	250	300
Min. / Max. Inlet Pressure	30 PSIG (2.1 kgf/cm ²) / 220 PSIG (16.2 kgf/cm ²)											
Max. Inlet Temperature	120°F (48.8°C)											
Min. / Max. Ambient Temperature	50°F (10°C) / 110°F (43.3°C)											
Inlet / Outlet Connections (NPT)	3/8 OD	1/2"	1/2"	1/2"	3/4"	3/4"	1"	1"	1-1/4"	1-1/4"	1-1/2"	2"
Delta Pressure / ΔP (PSID) @ Std. Rated Conditions	2.0	1.5	1.7	1.7	1.9	2.7	3.0	3.5	2.4	3.4	3.4	3.9
Product Weight		105	118	123	165	170	249	258	265	267	315	321
Refrigeration Compressor Type	Non Cycling, Hermetic Type											
Refrigeration Compressor Horsepower	1/7	1/7	1/5	1/4	1/3	1/2	5/8	3/4	3/4	1	1-1/2	1-1/2
Ref. Compressor BTU/H @ 35°F Evaporator & 100°F Ambient	969	969	1880	2250	2250	4142	5400	6120	6120	9550	12084	12084
Watts @ 35°F Evap. & 100°F Amb.	210	210	330	410	570	850	1080	1180	1180	1450	2270	2270
Refrigerant Suction Pressure	28-34 PSIG										69-81 PSIG	
Refrigerant Type	R134a										R404A	
Refrigerant Charge	4 oz.	4 oz.	8 oz.	10 oz.	13 oz.	13 oz.	3 Lbs.	4 Lbs.	4 Lbs.	5 Lbs.	7 Lbs.	7 Lbs.
Nominal Voltage (Min-Max Range)	115-1-60 (103-126)											
Min. Circuit Ampacity		2.8	5.0	6.6	7.7	12.4	15	17	17	Not Available		
Maximum Fuse Size (Amps)		15	15	15	15	15	20	20	20	Not Available		
RLA: Rated Load Amps		1.9	3.7	4.9	5.8	9.5	11.3	14.4	14.4	Not Available		
LRA: Locked Rotor Amps		14.4	29	27.5	32	48.0	58.8	69.0	69.0	Not Available		
Nominal Voltage (Min-Max Range)	230/208-1-60 (187-253)											
Min. Circuit Ampacity		Not Available				6.3	7.8	9	9	10.4	11.7	11.7
Maximum Fuse Size (Amps)		Not Available				15	15	15	15	20	20	20
RLA: Rated Load Amps		Not Available				4.8	5.9	7.7	7.7	8.1	9.5	9.5
LRA: Locked Rotor Amps		Not Available				23	27.4	41.8	41.8	41	51	51
Overload	External "Klixon" Thermal and Current (Auto Reset)											

Model GRF	250	300	400	500	650	800	1000	1200	1500	1750	2000	2250
Capacity in SCFM @ 100 PSIG, 100°F Inlet & 100°F Ambient	250	300	400	500	650	800	1000	1200	1500	1750	2000	2250
Min. / Max. Inlet Pressure	30 PSIG (2.1 kgf/cm ²) / 220 PSIG						30 PSIG (2.1 kgf/cm ²) / 150 PSIG (10.6 kgf/cm ²)					
Max. Inlet Temperature	120°F (48.8°C)											
Min. / Max. Ambient Temperature	50°F (10°C) / 110°F (43.3°C)											
Inlet / Outlet Connections (NPT)	1-1/2"	2"	2"	2"	2"	3"	3"	3"	4" Flg	4" Flg	4" Flg	4" Flg
Delta Pressure / ΔP (PSID) @ Std. Rated Conditions	3.4	3.0	3.7	3.8	3.9	3.7	3.9	4.2	3.9	4.0	4.2	4.4
Shipping Weight	315	321	350	549	555	920	1009	1200	1600	1611	1980	2115
Refrigeration Compressor Type	Non Cycling, Hermetic Type											
Refrigeration Compressor Horsepower	1-1/2	1-1/2	2	3	3	4	5	7	9	9	10	10
Ref. Compressor BTU/H @ 35°F Evaporator & 100°F Ambient	12084	12084	14544	26832	26832	36624	47904	60540	74868	74868	87984	87984
Watts @ 35°F Evap. & 100°F Amb.	2270	2270	2743	5169	5169	5710	7544	10070	11760	11760	15210	15210
Refrigerant Suction Pressure	69-81 PSIG											
Refrigerant Type	R404a											
Refrigerant Charge	7 Lbs.	7 Lbs.	7 Lbs.	7 Lbs.	7 Lbs.	18 Lbs.	22 Lbs.	24 Lbs.	40 Lbs.	40 Lbs.	40 Lbs.	40 Lbs.
Condenser Fan Switch Pressure Settings	Primary = Cut In: 300 / Cut Out: 250						Primary = Cut In: 265 / Cut Out: 215 Secondary = Cut In: 300 / Cut Out: 250					
Overload	Internal Thermal and Current (Auto Reset)											
Nominal Voltage (Min- Max Range)	230/200-3-60 (180-253)											
Min. Circuit Ampacity	9.2	9.2	10	19.4	19.4	19.6	26.6	35.4	38.2	38.2	47.1	47.1
Maximum Fuse Size (Amps)	15	15	20	30	30	35	45	70	70	70	90	90
RLA: Rated Load Amps	7.6	7.6	8.2	15.9	15.9	17.1	23.4	30.5	35.1	35.1	42.2	42.2
LRA: Locked Rotor Amps	38	38	38	98	98	117	128	155	157	157	210	210
Nominal Voltage (Min- Max Range)	460-3-60 (414-506)											
Min. Circuit Ampacity	4.6	4.6	5.4	9.1	9.1	10.2	13.1	15.5	19.5	19.5	23.1	23.1
Maximum Fuse Size (Amps)	10	10	10	15	15	20	25	30	35	35	40	40
RLA: Rated Load Amps	3.8	3.8	4.4	7.5	7.5	8.9	11.8	13.7	17.9	17.9	21.1	21.1
LRA: Locked Rotor Amps	16	16	16	38	38	42	67	80	90	90	105	105
Nominal Voltage (Min- Max Range)	575-3-60 (546-603)											
Min. Circuit Ampacity	4.1	4.1	4.8	9.1	9.1	9.5	11.66	13.8	17.37	17.37	20.9	20.9
Maximum Fuse Size (Amps)	15	15	15	15	15	20	30	30	50	50	50	50
Total Amperage	3.04	3.04	3.52	6	6	7.12	9.44	10.96	14.32	14.32	16.88	16.88
LRA: Locked Rotor Amps	16	16	16	38	38	42	67	80	90	90	105	105

WARRANTY

Any standard **GRF Series** Refrigerated Air Dryer manufactured by Great Lakes Air Products is warranted free from defects in material and workmanship under normal use for a period of **5-Years**. The warranty applies to original purchaser effective at date of shipment from manufacturer's warehouse. Said warranty consists of 1-Year job site labor and 5-Years covering OEM replacement parts. The company's obligation under this warranty is limited to repairing or, at its sole option, replacing, during normal working hours at an authorized service facility of the company, any part which in its judgment proved to be not was warranted within the applicable warranty period.

This warranty covers the standard catalog GRF series air dryers including options, ***excluding customer maintained components such as separator float assembly, drain solenoid, drain strainer screen, fan motor lubrication, condenser cleaning, and filter element replacement.***

This warranty applies to equipment installed, operated and maintained in accordance with the procedures and recommendations as outlined in the owner's manual.

Great Lakes Air Products will not be responsible for the following items: Freon, insulation, torch charge, reclaiming charge, truck charges, freight damages, or any parts not original to the GRF series dryer.

In all cases, seller must be given a reasonable opportunity to investigate and inspect any assumed defects. At seller's option, buyer must return any defective materials to seller's plant or authorized depot at buyer's expense. Freight charges for returned or replacement machines or parts are not the responsibility of Great Lakes Air Products. Seller's liability whether on warranty contract or otherwise shall be limited to repair or replacement of material found within such period to be defective. In no event shall the seller be liable for consequential or special damages.

Great Lakes Air Products shall not be responsible for any incidental or consequential damages or other costs resulting from the following; labor charges, delays, vandalism, negligence, fouling caused by foreign material, damage from adverse air conditions, chemicals, or any circumstances over which Great Lakes Air Products has no control.

The liability of Great Lakes Air Products for all loss or damage resulting from non-conforming goods or tender, including breach of any and all warranties, shall be limited to refund of the purchase price of the particular goods with respect to which the loss or damage occurred.

This warranty is in lieu of all other warranties oral or written, expressed or implied, including warranties of merchantability or fitness for a specific purpose are hereby excluded and disclaimed. **This warranty shall not apply to any equipment, which has been subjected to misuse, shipping damage, nonpayment, neglect or accident, nor shall it apply to any equipment that has been repaired or altered by persons not authorized for each incident with a Great Lakes Air Products Authorization number.**