GDHM-SERIES

HEATLESS DRYER INSTALLATION, OPERATION & MAINTENANCE MANUAL

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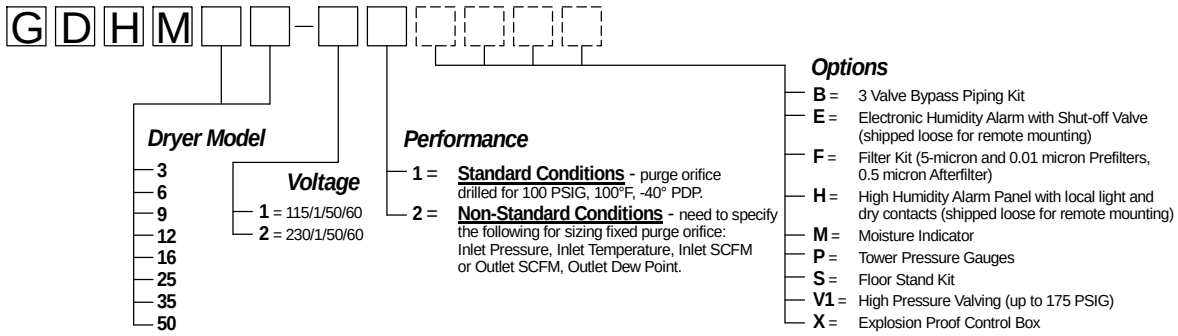
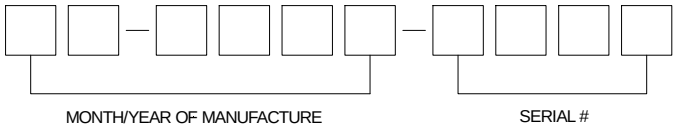
SECTION 1 GENERAL INFORMATION

1.1 MODEL NUMBER CODING



1.2 SERIAL NUMBER CODING



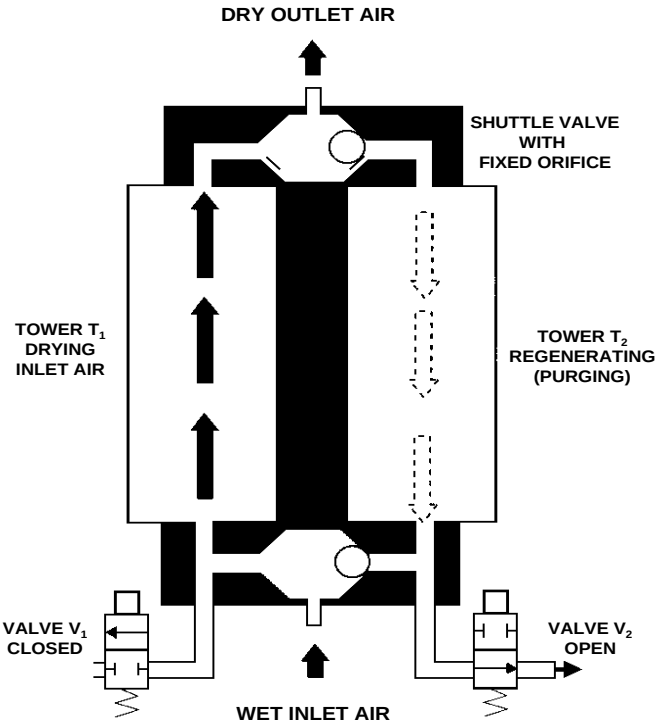
1.3 DESCRIPTION OF OPERATION

The GDHM-SERIES Air Dryers use the pressure swing adsorption method of drying compressed air. This requires two identical towers containing beds of hygroscopic desiccant.

Incoming wet air enters the dryer through a shuttle valve where it is directed to the bottom of the tower containing dry desiccant. The desiccant in this tower removes 99.7+% of the water vapor from the air when operated at catalog conditions. The dried air leaving the top of the tower is directed to the outlet through a second shuttle valve. In this outlet shuttle valve a built-in orifice allows a portion of the dried air to flow into the other tower being regenerated. The orifice reduces the high pressure air down close to atmospheric pressure which lowers the dew point of the dried air even further.

The tower being regenerated/purged of moisture is connected to an energized solenoid valve for a controlled period of time. The electrical signal to the solenoid is monitored by an LED light on the solid state timer. After the desiccant is regenerated, the timer de-energizes the solenoid valve. Air continues to flow through the orifice to repressurize the regenerated tower to line pressure. The middle light on the timer indicates the repressurization function.

Next, the timer opens the valve on the tower containing the wet desiccant. This shifts the shuttle valves, and the tower with the wet desiccant is regenerated while the other tower continues to dry the air. Examining the flow schematic to the right demonstrates the dryer process operation.



GDHM3 - GDHM12 TIMING CYCLE

V_2 Open 33 seconds
T_2 Repressurizing 12 seconds

V_1 Open 33 seconds
T_1 Repressurizing 12 seconds

Total cycle is 90 seconds with 45 seconds drying per tower.

GDHM16 - GDHM50 TIMING CYCLE

V_2 Open 66 seconds
T_2 Repressurizing 24 seconds

V_1 Open 66 seconds
T_1 Repressurizing 24 seconds

Total cycle is 180 seconds with 90 seconds drying per tower.

SECTION 2 SAFETY INSTRUCTIONS

2.1 INSTALLATION SAFETY

Before starting or installing the dryer, be sure that all power to the unit is off, valves are shut, and the air circuit is at atmospheric pressure. DO NOT remove, repair, or replace any component, control filter, or part, while the air circuit is energized or under pressure. Turn off the main to the dryer and de-pressurize the unit before starting installation or maintenance procedures.

MANUFACTURER WILL NOT BE RESPONSIBLE FOR DAMAGE TO EQUIPMENT AS A RESULT OF IMPROPER WIRING OR ELECTRICAL INSTALLATION. IT IS THE CUSTOMERS RESPONSIBILITY TO ENSURE THAT THE ELECTRICAL INSTALLATION IS CORRECT AND UP TO APPLICABLE CODES.

When installing the dryer, ensure that the NEMA rating of the control box is applicable to the installation.

Dryer is rated NEMA 4.

2.2 OPERATION SAFETY

DO NOT OPERATE THE DRYER ABOVE THE STATED WORKING PRESSURE (SEE SPECIFICATION TABLE). FAILURE, INJURY AND EQUIPMENT DAMAGE COULD RESULT.

CAUTION:

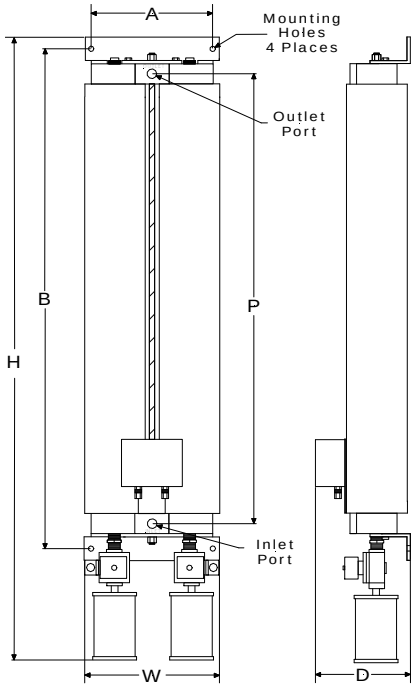
EXCEPT as otherwise specified by the manufacturer, this product is specifically designed for compressed air service and use with any other gas or liquid is a misapplication. Use with or injection of certain hazardous liquids or gases in the system (i.e., alcohol or liquid petroleum gas) could be harmful to the unit and result in a combustible condition or cause hazardous external leakage. Manufacturer's warranties are void in the event of a misapplication and manufacturer assumes NO RESPONSIBILITY for any resulting loss. Before using equipment with fluids or gases other than air, or for non-industrial applications, consult GARDNER DENVER for written approval.

SECTION 3 SPECIFICATIONS

3.1 DIMENSIONS & WEIGHTS

MODEL	H	W	D	P	A	B	PORTS (npt)	MTG HOLE DIA.	WEIGHT (lbs)
GDHM3	13.6	7.4	5.2	9.3	5.8	2.8	3/8	0.3	8
GDHM6	18.2	7.4	5.2	13.0	5.8	2.8	3/8	0.3	9
GDHM9	17.3	7.4	5.2	12.1	5.8	2.8	3/8	0.3	10
GDHM12	20.1	7.4	5.2	14.9	5.8	2.8	3/8	0.3	11
GDHM16	33.0	9.5	6.5	20.7	7.0	23.6	1/2	0.4	29
GDHM25	41.9	9.5	6.5	29.5	7.0	32.5	1/2	0.4	34
GDHM35	39.3	10.0	7.0	26.5	9.0	30.1	1/2	0.4	59
GDHM50	46.3	10.0	7.0	33.5	9.0	37.1	1/2	0.4	65

NOTE: GDHM16 to GDHM50 dryer shown with bracket top and bottom.
GDHM3 to GDHM12 has single 4-hole bracket. Dimensions shown in inches.



3.2 AIR FLOW CAPACITIES

Flow Capacities (in SCFM) at 100 PSIG/100°F Inlet for -40°F/C Outlet Pressure Dew Point								
MODEL NO.	**GDHM3**	**GDHM6**	**GDHM9**	**GDHM12**	**GDHM16**	**GDHM25**	**GDHM35**	**GDHM50**
Inlet Flow	3	6	9	12	16	25	35	50
Purge Flow	0.8	1.6	2.4	3.2	3.4	5.4	7.8	10.8
Outlet Flow	2.2	4.4	6.6	8.8	12.6	19.6	27.2	39.2

Note: Capacities shown are with standard orifice. Capacity is higher when pressure is higher than 100 PSIG. Capacity is lower when pressure is lower than 100 PSIG. Consult factory for non-standard pressures and dew points; an orifice change may be required.

SECTION 4 INSTALLING THE DRYER

4.1 LOCATION

DO NOT INSTALL DRYER IN AN ENVIRONMENT OF CORROSIVE CHEMICALS, EXPLOSIVE GASES, OR AREAS OF HIGH AMBIENT TEMPERATURE CONDITIONS.

Install the dryer indoors. Dryers are not meant to be installed outdoors exposed to the weather. If the dryer must be installed outdoors, it must be in a weatherproof enclosure that provides for proper temperature control.

When mounting, allow 2.5 inches above unit for tower removal and replacement.

The dryer may be installed in a vertical or horizontal (laying flat) orientation. Installation on its side may contribute to possible shuttle valve shifting problems.

4.2 ELECTRICAL CONNECTIONS

Before wiring, check the dryer nameplate for electrical characteristics. Standard electrical characteristics are 115 volt, 1 phase, 50/60 Hz. Models operating on 230 volts are also 1 phase, 50/60 Hz.

IMPORTANT! No overload protection is provided in the dryer and unit should be wired into a protected circuit.

IMPORTANT! When installing electrical service to this machine, comply with the National Electrical Code as well as state and local building codes.

NOTE: Dryer cycle timer has infinite memory capacity. Dryer may be wired to compressor pressure switch or auxiliary contacts to allow dryer to start and stop with compressor or machine tool. Contacts must supply same voltage and phase as dryer requires.

A six foot power cord is installed as standard on the dryer. The control box and bulkhead fittings are NEMA 4 rated.

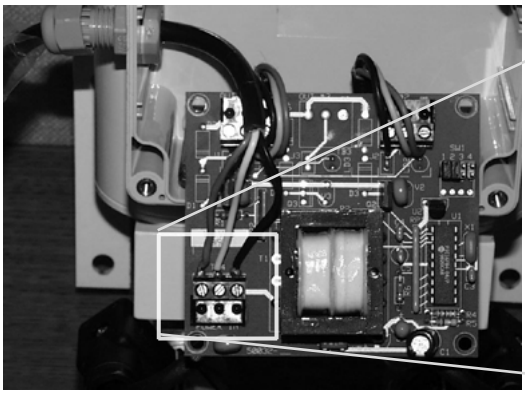
- *If maintaining the NEMA 4 rating of the installation is desired, option A or B below may be used:*

A. Cut off the plug and use a NEMA 4 gasketed bulkhead fitting suitable for .180" diameter power cord to enter a NEMA 4 rated junction box.

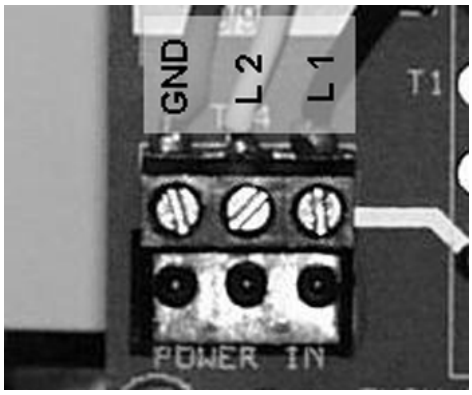
- or -

B. To use flexible liquid-tight conduit and stranded 18 gauge wire:

1. Remove clear cover from control box.
2. Loosen nuts on (3) bulkhead connectors and push an inch or two of each of the electrical cords back into the control box to allow slack to pull out solid state timer board. Remove four screws holding solid state timer board and pull back gently to expose the "power in" terminal block. With small screwdriver, loosen wire clamps on terminal block and disconnect power cord wires.
3. Remove (1) backing nut from inlet power cord bulkhead fitting and remove power cord and bulkhead fitting.
4. Enlarge existing hole to proper size to install your own liquid-tight conduit fitting. Use only flexible liquid-tight conduit as installing rigid conduit may damage polycarbonate control box.
5. Connect to "power in" terminal block with 18 gauge stranded wire only.



BACK SIDE OF TIMER BOARD



POWER IN TERMINAL BLOCK

- *If a NEMA 1 installation is desired:*

A. You may simply plug the power cord into a standard outlet.

- or -

B. Use standard flexible conduit, and follow the instructions for installing liquid-tight conduit above. Use only flexible conduit as installing rigid conduit may damage polycarbonate control box. Connect to inlet power terminal strip with 18 gauge stranded wire only.

4.3 PIPING AND CONNECTIONS

Inlet and outlet piping should be schedule 40 pipe or equivalent I.D. tubing. See specification chart for inlet/outlet NPT thread size. All piping should be deburred and threaded to a proper depth and length before installation. Threads should be inspected for cleanliness and depth of cut. Good quality pipe compound or Teflon tape should be used in the makeup of joints to ensure a good, airtight fit of piping components.

NOTE ON INLET PIPING AND PIPE JOINTS: Make sure piping is clean inside. Apply pipe thread sealant sparingly to the male threads of fittings, keeping the sealant back from the first two threads. Contamination getting into inlet shuttle valve could cause dryer to malfunction.

Install a pipe union at the inlet and outlet ports for easy disconnection prior to tower replacement.

NOTE: If purge air is required to be piped to a remote location, it is necessary to use oversized tubing or piping to prevent back-pressure. Restricting the purge flow can cause the dryer to malfunction.

It is recommended that a bypass line with shut-off valves be installed to provide constant air flow to the system should the dryer require servicing.

4.4 REQUIRED FILTERS

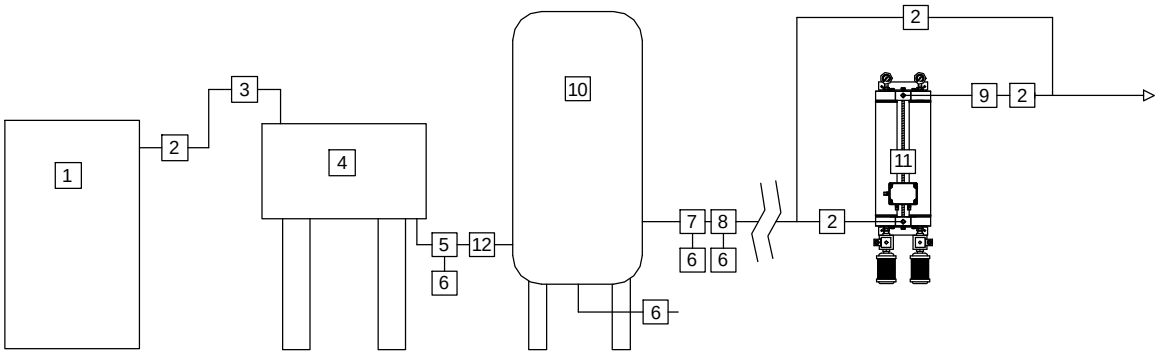
Always install a 5 micron particulate prefilter with automatic drain and a 0.01 micron coalescing filter with automatic drain before dryer to remove entrained particulates, liquid moisture and oil which can cause damage to the desiccant beds. A particulate afterfilter should be installed after the dryer to remove any desiccant dust that may migrate from the desiccant beds. If a filter kit ("F"-Option) was ordered with dryer, the following filters were supplied:

Optional Filter Kit ("F" Option)

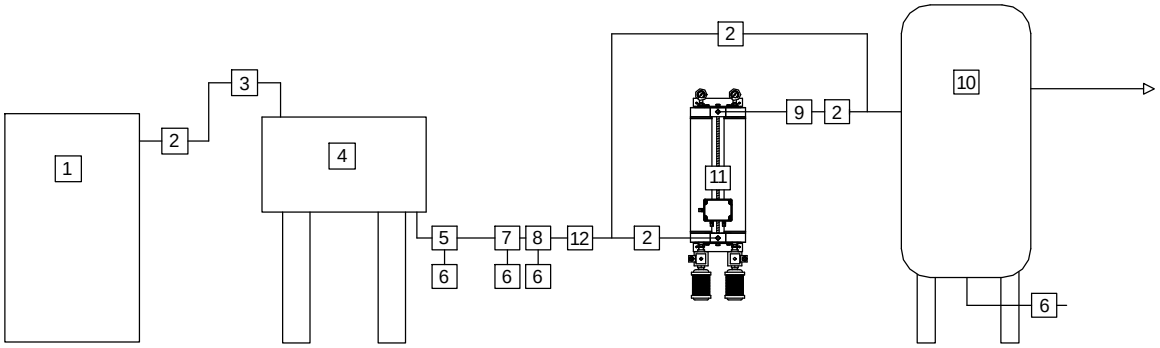
For Model		Pre-Filter		After-Filter
		5 Micron Particulate	0.01 Micron Coalescing	0.5 Micron Particulate
GDHM3	**Filter No.** *Replacement Element No.*	**7024100** *7000810*	**7024102** *7000914*	**7024105** *7000903*
GDHM6	**Filter No.** *Replacement Element No.*	**7024100** *7000810*	**7024102** *7000914*	**7024105** *7000903*
GDHM9	**Filter No.** *Replacement Element No.*	**7024100** *7000810*	**7024102** *7000914*	**7024105** *7000903*
GDHM12	**Filter No.** *Replacement Element No.*	**7024100** *7000810*	**7024102** *7000914*	**7024105** *7000903*
GDHM16	**Filter No.** *Replacement Element No.*	**7000295** *7000810*	**7024103** *7000914*	**7024106** *7000903*
GDHM25	**Filter No.** *Replacement Element No.*	**7000295** *7000810*	**7024103** *7000914*	**7024106** *7000903*
GDHM35	**Filter No.** *Replacement Element No.*	**7024101** *7000811*	**7024104** *7000915*	**7024107** *7000904*
GDHM50	**Filter No.** *Replacement Element No.*	**7024101** *7000811*	**7024104** *7000915*	**7024107** *7000904*

4.5 RECOMMENDED DRYER INSTALLATION

TYPICAL POINT-OF-USE INSTALLATION



TYPICAL SYSTEM DRYER INSTALLATION



Ref.#	Description	Ref.#	Description
1	Compressor	7	Pre-Filter, 5 Micron Particulate, With Automatic Drain
2	Shut-off Valve	8	Pre-Filter, 0.01 Micron Coalescing, With Automatic Drain
3	Flex Connector	9	After-Filter, 0.5 Micron Particulate
4	Aftercooler	10	Storage Tank
5	Liquid Separator	11	GDHM Series Desiccant Dryer
6	Drain Valve	12	Check Valve

SECTION 5 START UP PROCEDURE

BEFORE STARTING THIS DRYER, FOLLOW THE INSTALLATION INSTRUCTIONS AND PROCEDURES COMPLETELY.

DO NOT REMOVE, REPAIR OR REPLACE ANY ITEM ON THE DRYER WHILE THE DRYER IS UNDER PRESSURE.

INITIAL START UPS

1. Confirm that all piping and electrical connections are proper.
2. Shut off electrical power.
3. If a bypass is installed around the dryer, open the inlet and outlet isolation valves. Close the bypass valve. **WARNING - When operating this dryer without the mufflers, use hearing protection.**
4. Wait approx. 20 seconds to equalize pressure in the desiccant chambers.
5. Turn on the electrical power. Dryer should start cycling.
6. Verify purge cycle timing as described in Dryer Operation section.

SECTION 6 MAINTENANCE AND REPAIR

WARNING - DO NOT REMOVE, REPAIR, OR REPLACE ANY ITEM ON THE DRYER WHILE THE DRYER IS UNDER PRESSURE.

BEFORE BEGINNING ANY REPAIRS, MAINTENANCE, OR INSTALLATION WORK, VERIFY THAT THE POWER IS OFF AND THE DRYER IS DEPRESSURIZED.

BEFORE WORKING ON THE DRYER OR RELATED EQUIPMENT, ENSURE THAT ALL PERSONNEL HAVE READ AND UNDERSTAND THE SAFETY AND OPERATION INSTRUCTIONS IN THIS MANUAL.

PREVENTIVE MAINTENANCE SCHEDULE

This is a suggested schedule based on average dryer conditions. As conditions such as dirty environment, humidity conditions, ambient temperature, etc. change, the frequency of the inspections may change.

Daily

1. Inspect the dryer for proper operation.
2. Inspect inlet filters and drains for proper operation.
3. Verify proper inlet and ambient air conditions.

Semi-Annually

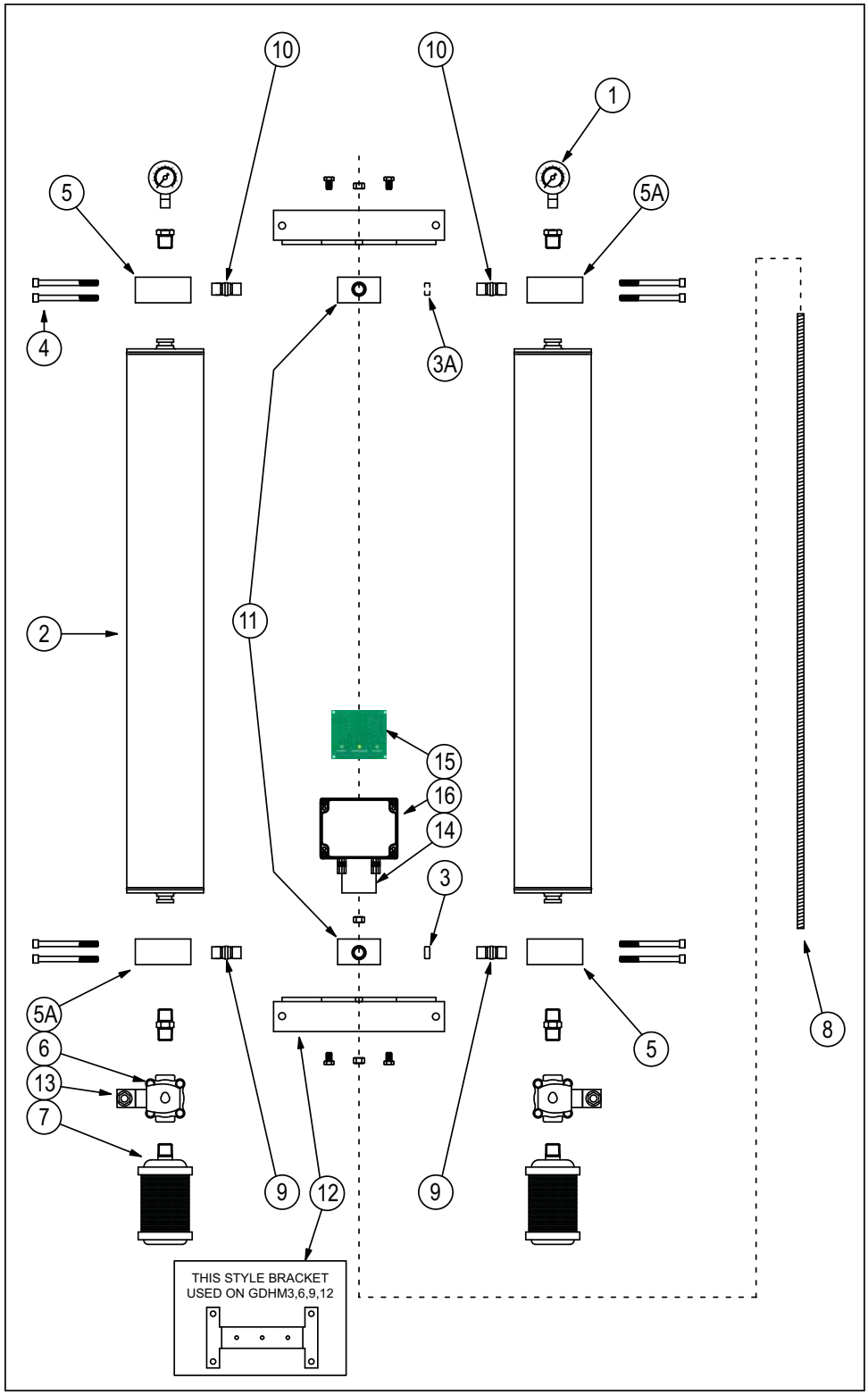
1. Inspect entire assembly for loose connections, screws, etc.
2. Perform audible inspection of purge cycling and purge flow.
3. Visual inspection of exhaust area for signs of oil or desiccant attrition.

SECTION 7 TROUBLESHOOTING GUIDE

A	**PROBLEM: AIR DRYER DELIVERS WET AIR**		
	POSSIBLE CAUSE	**CHECK**	**CORRECTIVE ACTION**
A1	No power to unit.	Power supply.	Correct power problem.
A2	High inlet air temperature.	For standard units, inlet air temperature should not exceed 100°F. For specially sized units, inlet air temperature should not exceed sizing criteria stated at purchase.	Reduce inlet air temperature to proper level. An aftercooler may need to be installed after compressor.
A3	Air flow through dryer in excess of rated capacity.	Make sure inlet flow to dryer (compressor output, or if installed at point-of-use, total of air usage downstream of dryer plus purge flow) does not exceed inlet flow rating of dryer.	Reduce air usage downstream.
A4	Low inlet pressure.	For standard units, inlet air pressure should be 100 psig. For specially sized units, inlet air pressure should be same as sizing criteria stated at purchase.	Increase inlet pressure or call factory to resize dryer for actual inlet conditions.
A5	Dirty or obstructed inlet air filter.	Check inlet airline filter elements.	Replace.
A6	Purge orifice plugged.	Remove and inspect purge orifice.	Clean orifice hole of debris. Use air gun to clean.
A7	Solenoid coil burned out.	Check magnetic field from coil operation. Place iron or steel material (a screwdriver works well) at top of coil to feel the magnetic effect when coil should be energized. (Note: see Section 1, for timing cycle for your unit.)	Replace.
A8	Oil contamination of desiccant beds.	Verify particle/coalescing inlet filtration is adequate and functioning properly.	Towers must be replaced if contamination is suspected.
A9	Timer not operating properly.	Verify correct timing cycle by observing tower indicator lights on front panel. (Note: see Section 1, for timing cycle for your unit.)	Replace timer if defective.
A10	Purge flow restricted.	Check mufflers (or purge piping if installed) for excessive back-pressure. Note: unit is originally supplied with "no-clog" mufflers.	If purge air is piped away from unit, oversized piping should be used and length of run should be as short as possible.
B	**PROBLEM: RESTRICTED FLOW THROUGH UNIT**		
	POSSIBLE CAUSE	**CHECK**	**CORRECTIVE ACTION**
B1	Improper operating conditions.	See A2, A3, A4 above.	
B2	Dirty or obstructed inlet air filter.	See A5 above.	
B3	Plugged air passages.	Check inlet and outlet air passages and piping for blockages.	Clear restrictions.
C	**PROBLEM: EXCESSIVE PURGE / BLOWDOWN**		
	POSSIBLE CAUSE	**CHECK**	**CORRECTIVE ACTION**
C1	Inlet or outlet shuttle not shifting.	See A3, A4, A5, A6 above.	
C2	Inlet or outlet shuttle not shifting.	Check for damage or contamination of inlet and outlet shuttles.	Clean or replace ans necessary.
C3	Purge orifice plugged.	See A6 above.	
C4	Timer not operating properly.	See A9 above.	
C5	Timer not operating properly.	Incoming power may not be "clean". Fluctuations in voltage can occur in power circuits shared by devices such as electric motors and welding equipment.	Supply line voltage from another source.
C6	Dirty or obstructed inlet air filter.	See A5 above.	
C7	Leakage.	With dryer pressurized, remove power from dryer. Check purge ports on dryer and air system connections for large leaks.	Repair as necessary.

SECTION 8 REPLACEMENT PARTS

GDHM Dryer Exploded View



See chart on next page for part information.

See Exploded View on previous page for reference numbers.

REPLACEMENT PARTS			FOR MODEL							
REF#	**DESCRIPTION**	**KIT CONTAINS QTY**	**GDHM3**	**GDHM6**	**GDHM9**	**GDHM12**	**GDHM16**	**GDHM25**	**GDHM35**	**GDHM50**
1	TOWER GAUGES (OPTIONAL)	2	7024389	7024389	7024389	7024389	7024390	7024390	7024390	7024390
2	DESICCANT TOWER	1	7026643	7026645	7026646	7026647	7026663	7026665	7037337	7026667
3	SHUTTLE DISC, INLET	1	7026675	7026675	7026675	7026675	7026682	7026682	7026682	7026682
3A	SHUTTLE DISC, OUTLET W/ORIFICE *	1	7026676	7026677	7026678	7026679	7026666	7026668	7037338	7026671
4	SCREW	1	7026635	7026635	7026635	7026635	7026656	7026656	7026656	7026656
5	END BLOCK, TOP-L OR BOTTOM-RT	1	7026633	7026633	7026633	7026633	7026654	7026654	7026654	7026654
5A	END BLOCK, TOP-RT OR BOTTOM-L	1	7026634	7026634	7026634	7026634	7026655	7026655	7026655	7026655
6	SOLENOID VALVE ASSY, 115V	1	7026636	7026636	7026636	7026636	7026657	7026657	7026657	7026657
	SOLENOID VALVE ASSY, 230V	1	7026637	7026637	7026637	7026637	7026658	7026658	7026658	7026658
7	PURGE MUFFLER KIT	2	7026648	7026648	7026648	7026648	7026669	7026669	7026669	7026669
8	TIE ROD	1	CF	CF	CF	CF	CF	CF	CF	CF
9	INLET SHUTTLE VALVE SEAT	1	7026632	7026632	7026632	7026632	7026653	7026653	7026653	7026653
10	OUTLET SHUTTLE VALVE SEAT	1	7026632	7026632	7026632	7026632	7026653	7026653	7026653	7026653
11	SHUTTLE VALVE BODY	1	7026631	7026631	7026631	7026631	7026652	7026652	7026652	7026652
12	DRYER MOUNTING BRACKET	1	7026639	7026639	7026639	7026639	7026660	7026660	7026660	7026660
13	SOLENOID DIN CONNECTOR	1	7026638	7026638	7026638	7026638	7026659	7026659	7026659	7026659
14	CONTROL BOX BRACKET	1	7026649	7026649	7026649	7026649	7026664	7026664	7026664	7026664
15	TIMER, SS, 115VAC	1	7026650	7026650	7026650	7026650	7026680	7026680	7026680	7026680
	TIMER, SS, 230VAC	1	7026651	7026651	7026651	7026651	7026681	7026681	7026681	7026681
16	CONTROL BOX (BOX ONLY)	1	7026674	7026674	7026674	7026674	7026674	7026674	7026674	7026674
NOT SHOWN	VITON O-RING KIT**	**	7026673	7026673	7026673	7026673	7026670	7026670	7026670	7026670
	GAUGE PORT PLUG	1	7026642	7026642	7026642	7026642	7026661	7026661	7026661	7026661
	POWER CORD, 6', 115V WITH PLUG	1	7026640	7026640	7026640	7026640	7026640	7026640	7026640	7026640
	POWER CORD, 6', 230V WITHOUT PLUG	1	7026641	7026641	7026641	7026641	7026641	7026641	7026641	7026641

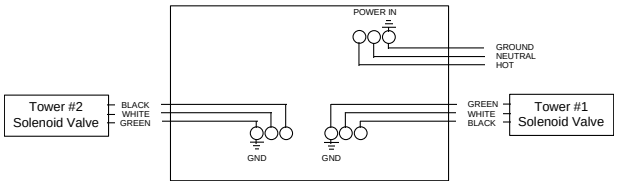
NOTE: * INCLUDES STANDARD ORIFICE - CALL FACTORY FOR NON-STANDARD ORIFICES

NOTE: ** VITON O-RING KIT INCLUDES ALL O-RING SEALS

NOTE: CF = CALL FACTORY

SECTION 9 WIRING DIAGRAM

SOLID STATE TIMER
WIRE CONNECTIONS



SECTION 10 WARRANTY AND WARRANTY CLAIM INFORMATION

GARDNER DENVER GDHM-Series air dryers are warranted to be free of defects in materials and workmanship under proper use, installation and application. This limited warranty shall cover parts only, not including contaminated desiccant chambers and solenoid wearing parts for a period of 3 years from date of shipment

ALL FREIGHT DAMAGE CLAIMS ARE NOT THE RESPONSIBILITY OF THE MANUFACTURER AND ARE NOT COVERED UNDER WARRANTY AS ALL PRODUCTS ARE SHIPPED F.O.B. SHIPPER. PLEASE DIRECT ALL FREIGHT CLAIMS TO THE FREIGHT CARRIER IN QUESTION.

ALL FREIGHT DAMAGE CLAIMS SHOULD BE FILED WITHIN 15 WORKING DAYS AND SHOULD BE DIRECTED TO THE FREIGHT CARRIER.

This warranty does not apply to any unit damaged by accident, modification, misuse, negligence, or misapplication.

Any covered GDHM-Series air dryer part or material found defective will be repaired, replaced or refunded, at GARDNER DENVER's option, free of charge, provided that GARDNER DENVER is notified within the above stated warranty period. All returns of defective parts/equipment must have prior written Returned Material Authorization (RMA). RMA may be obtained from our dryer service department. All defective parts/equipment must be returned freight prepaid to the GARDNER DENVER factory within 30 days of RMA issue date. Any shipment returned to the factory collect will be refused.

If an item is found to be warrantable, the repaired item or replacement will be shipped via standard ground freight prepaid within the continental US and Canada.

Any replacement part or material is warranted only to the extent of the remaining warranty period of the dryer or to the extent as provided by the supplier, whichever is longer.