AUTOMATIC GAS PURGER FOR REFRIGERATION PLANTS

TYPE MSGP-2E

BRINGING ENERGY DOWN TO EARTH:

Save Energy. Think Environment. And vice versa. Any company that is energy conscious is also environmentally conscious. Less energy consumed means less waste, fewer emissions and a healthier environment. In short, bringing energy and environment together lowers the cost industry must pay for both.

MANIK ENGINEERS development in Fully automatic Gas Purger has led to countless saving in energy, time and money.

What are "Non Condensable Gases" in a Refrigeration system?

Refrigeration systems accumulate "foul substances". The foul substance gaseous in nature, are commonly referred to as non-condensable gases. Non-condensable gas constituents commonly include air, nitrogen, hydrogen, and hydrocarbons. The term ''non-condensable" means that, these gases will not liquefy at the temperatures and pressures present in condensers consistent with industrial refrigeration systems. For example, ammonia will change phase from gas to liquid if heat is removed while at a temperature of 35°C and a pressure of 12.5 Kg/cm2. At the same pressure, any nitrogen present would have to be cooled to -264°F (-164°C) in order to liquefy. As a result, any nitrogen that may accumulate in a refrigeration system always will remain in a gaseous state.

FIVE WAYS IN WHICH NON-CONDENSABLES ENTER THE SYSTEM:

1. The refrigerant, when delivered, may contain non-condensables up to 15%.
2. For service and maintenance certain parts of the refrigeration plant are frequently opened, causing air to penetrate into the system. Oil changing and recharging with refrigerant have the same effect.
3. Leakage: Systems operating with suction pressure below atmospheric pressure (i.e., working temperatures below -33°C for ammonia system) can have small leaks (from system piping, valves, vessels valve stem packings, bonnet gaskets, compressor shaft seals, non-welded connections, and control transducers etc.) allowing air to penetrate into the system.
4. Inadequate evacuation before commissioning the refrigeration plant.
5. Decomposition of the refrigerant or the lubricating oil can occur due to catalytic action of the various metals in the installation and due to high discharge temperatures. Ammonia for instance decomposes into nitrogen and hydrogen.

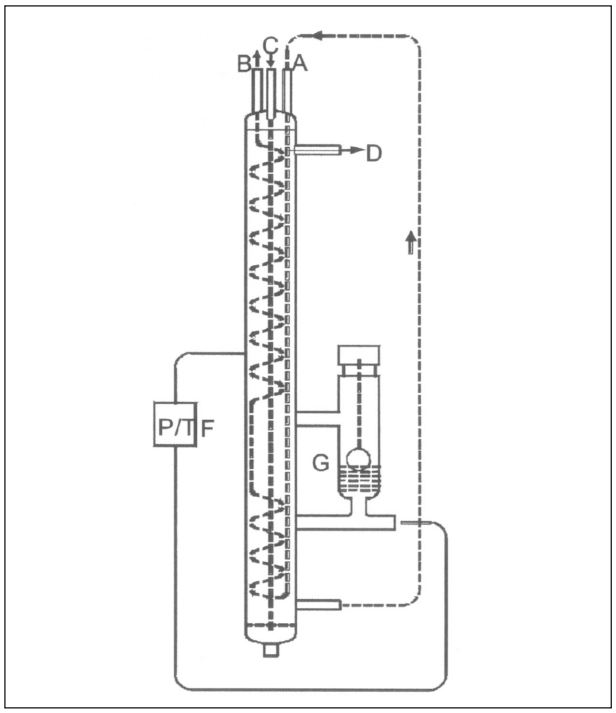
WHY PURGE NON CONDENSABLE GASES FROM YOUR REFRIGERATION SYSTEM ?

Non-condensable gases cause considerable loss of efficiency. Air or other non-condensable gases can dissolve in the refrigerant and come into circulation in the refrigeration system, causing even in small concentrations a significant increase in condensing pressure, resulting in a considerable loss of efficiency.

The Non-condensable gases such as Air in the condenser will raise head pressure, mainly due to its insulating properties. The air molecules in the gas from the compressor will be blown to the quiet end of the condenser. When condenser surfaces are insulated with air, the effective condenser size is reduced.

The presence of non-condensable gases

- Increases electrical power demand
- Decreases Refrigeration system efficiency
- Decreases system efficiency
- Excess head pressure puts more strain on bearing and drive motors. Belt life is shortened and gasket seals are ruptured.
- Increased pressure leads to increased temperature, which shortens the life of compressor valves and promotes the breakdown of lubricating oil.
- Increases condenser scaling



Water content in the Air leads to corrosion inside the refrigeration plant and to problems with automatic controls.

- "Ammonia explosions" due to accumulation of non-condensable hydrogen.

Refrigeration systems must therefore be kept as free as possible from non-condensables. The most effective way of doing this is by automatic purging, as this responds immediately to any entering of non-condensables in the system.

MANIK ENGINEERS makes fully automatic gas purger for refrigeration plants, Type MSGP-2E efficiently and automatically helps maintaining condensing temperature at nearly optimum operating conditions and reduces the concentration of non-condensable gases to a negligible percentage.

HOW MANIK`S MSGP -2E OPERATES

The gas purger has a built-in heat exchanger connected (A) to the liquid line from the receiver or the pump discharge line on the low-pressure side of the refrigeration plant. The outlet (B) must be connected to the low-pressure suction side of the plant. From the condenser and/or the receiver a mixture of refrigerant vapour and non-condensable gases are bled to the gas purger (C). The coil cools down the gas mixture and the refrigerant part of the vapour will condense and gradually fill up the lower part of the purger. The non-condensable gases are retained and concentrated in the upper part of the gas purger and gradually the condensation of refrigerant stops. Consequently the temperature in the gas purger drops below the condensing temperature. The

automatic control (F) adapts deviations between the purge vessel pressure and high pressure to an electronic controller that activates the solenoid valve in the outlet (D) by which the non-condensable gases escape.

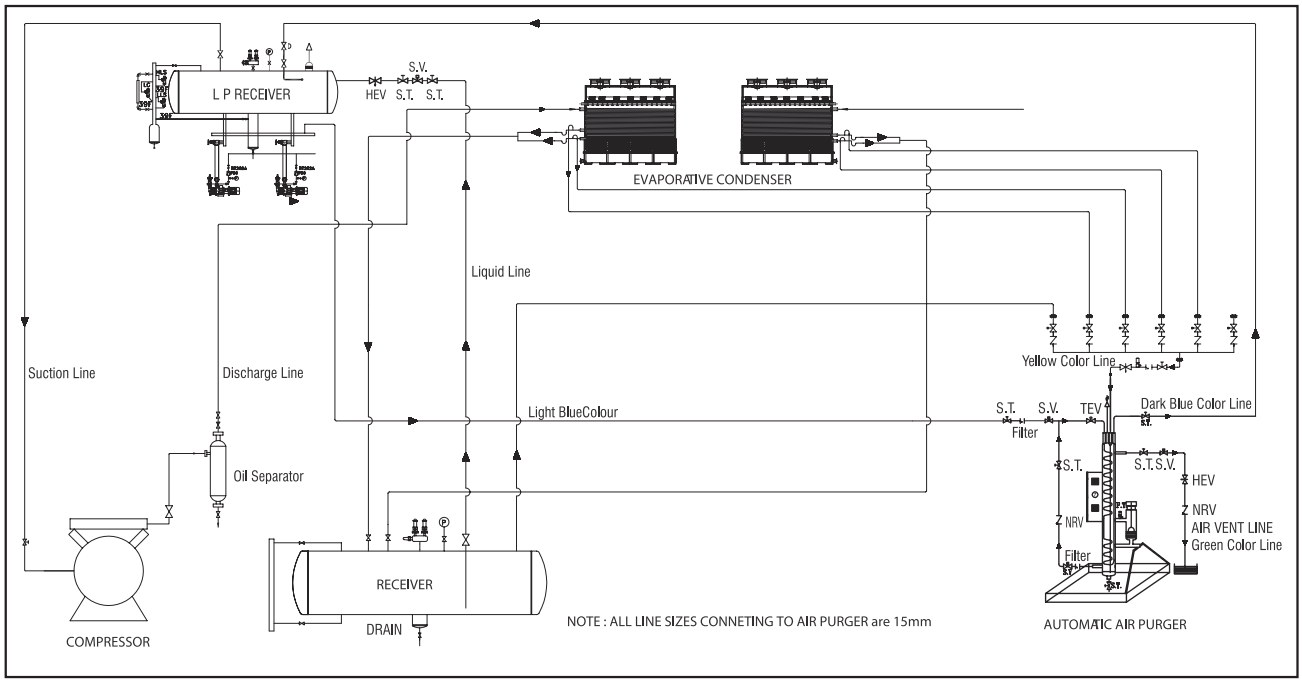
When the liquid refrigerant exceeds the level controlled by the level switch (G) a solenoid valve opens and leads the refrigerant into the liquid line to the cooling coil.

CAPACITY OF GAS PURGER

It is impossible to calculate the amount of non-condensable gases, which has to be removed from a specific refrigeration plant.

Usually plants operating with a suction pressure above the atmospheric pressure are less inclined to collect non-condensable gases than plants operating with a absolute pressure below 1 bar. However, great quantities of non-condensable gases are often found in both categories of plants. For ammonia plants with a suction temperature below -35°C, one gas purger is recommended at capacities below 500 kW. For plants with a suction temperature above -35°C, one gas purger per 1000 kW is recommended as a minimum.

The capacity of the gas purger will be reduced at high ambient temperatures so it is recommended to insulate the vessel.



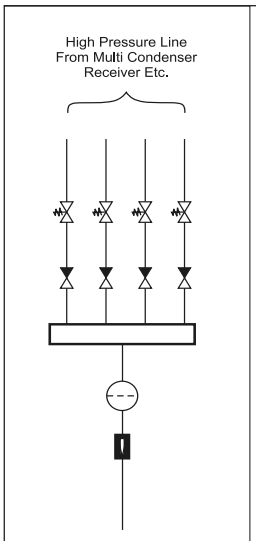
INSTALLATION OF GAS PURGER

The gas purger MSGP-2E can be placed where it is most appropriate. In most cases it is placed in the machinery room.

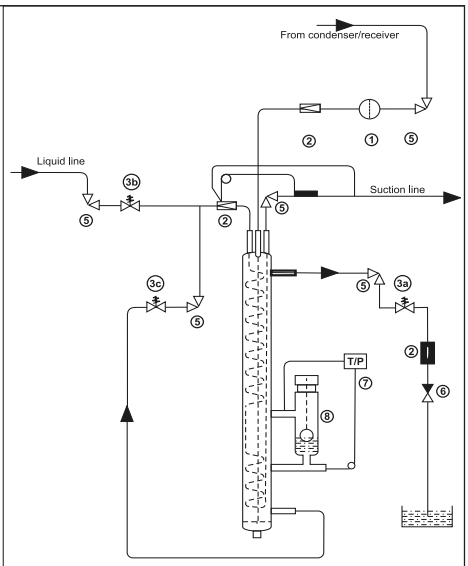
The liquid line (A) to the cooling coil is connected to the liquid line on refrigerant plants with natural circulation.

On pump re-circulation plants it must be connected to the discharge side of the refrigerant pump.

The suction connection (B) should be connected to the lowest possible suction temperature on the refrigeration plant.



Multi point purger header assembly



Natural/ Gravity Cerculation System

The lines from condensers and receiver to air inlet (C) can be provided with Solenoid Valves, and Manik Make Air Purger Sequence Controller each permitting separate purging from each component. The ON and OFF Cycle Time can be set for each Solenoid Valve.

Electronic Controller is used for sensing the deviations between the vessel pressure and the purge point pressure.Pipe Line Connection for Pump Re-circulation

1. Sky Blue: Low Temperature Liquid Line Inlet(A): Lowest Temperature point such as Ammonia Pump Outlet Header
2. Dark Blue(B): Wet suction return line: to be connected to low pressure accumulator
3. Yellow(C): From High temperature line such as condenser outlet, receiver
4. Green: Air vent connection to be immersed in water bucket
5. Red: Safety Relief valve: out let of the valve to be connected LP vessel
6. Black: Provided at the bottom of air purger for oil drain

Temperature Controller TIC 1R01 is set to –7°C. When purger vessel temperature will drop down to –7°C then purger will be in operation.

Pressure Differential Controller PIC 1P02 is set to 2 bar. When differential pressure is 2 bar, Air Vent Solenoid Valve will be ON and when differential pressure rises to 6 bar Air Vent Solenoid will be off. Both Controllers are preset at factory.

The control panel is installed on air purger and pre-wired in factory hence you need to connect only 230VAC, 50Hz, 1Phase supply to electrical panel. Pump Re-circulation System Natural / Gravity Circulation System To order air purger use following models

Pos.	Description	NO	
		Pump Re-circulation	Natural (Gravity) Circulation System
	TA17	2	1
1	Filter TA 5	1	1
3b,1c	Solenoid valve MSA5A3	3	1
5	Stop valve ½"	6	3
6	Non return valve SNRVA15	2	1
7	Electronic Temperature/pressure control	1	1
8	Liquid level control 39FI inclusive control box	1	1
9	Hand Expansion valve	3	1
	Safety Valve	1	1
	Control Panel	1	1

To order air purger use following models

1) Single point Air Purger - SGP2E - 1
2) Two point Air Purger - SGP2E - 2
3) Four point Air Purger - SGP2E - 4
4) Six point Air Purger - SGP2E - 6
5) Eight point Air Purger - SGP2E - 8

Please specify refrigerant such as ammonia(R717), fluorinated refrigeration (R22, R404a) etc.

Dimensions :

Height : 2.1 m x Width : 1 m x Length : 1.5 m

ORDERING INFORMATION

MODEL NO.	Weight (kg)
SGP-2E01	180
SGP-2E02	190
SGP-2E04	201
SGP-2E06	219
SGP-2E-08	233
SGP-2E-12	265

AIR PURGER WITH MHP VALVE

Model No.	Weight (kg)
MSGP-2E-01	179
MSGP-2E-02	189
MSGP-2E-04	200
MSGP-2E-06	218
MSGP-2E-08	232
MSGP-2E-012	264

AIR PURGER WITH MHP VALVE AND PLC

Model No.	Weight (kg)
MSGP-2E-01CMP	179
MSGP-2E-02CMP	189
MSGP-2E-04CMP	200
MSGP-2E-06CMP	218
MSGP-2E-08CMP	232
MSGP-2E-12CMP	264
MSGP-2E-16CMP	300