SUPERFREEZE

AUTOMATIC AIR PURGER

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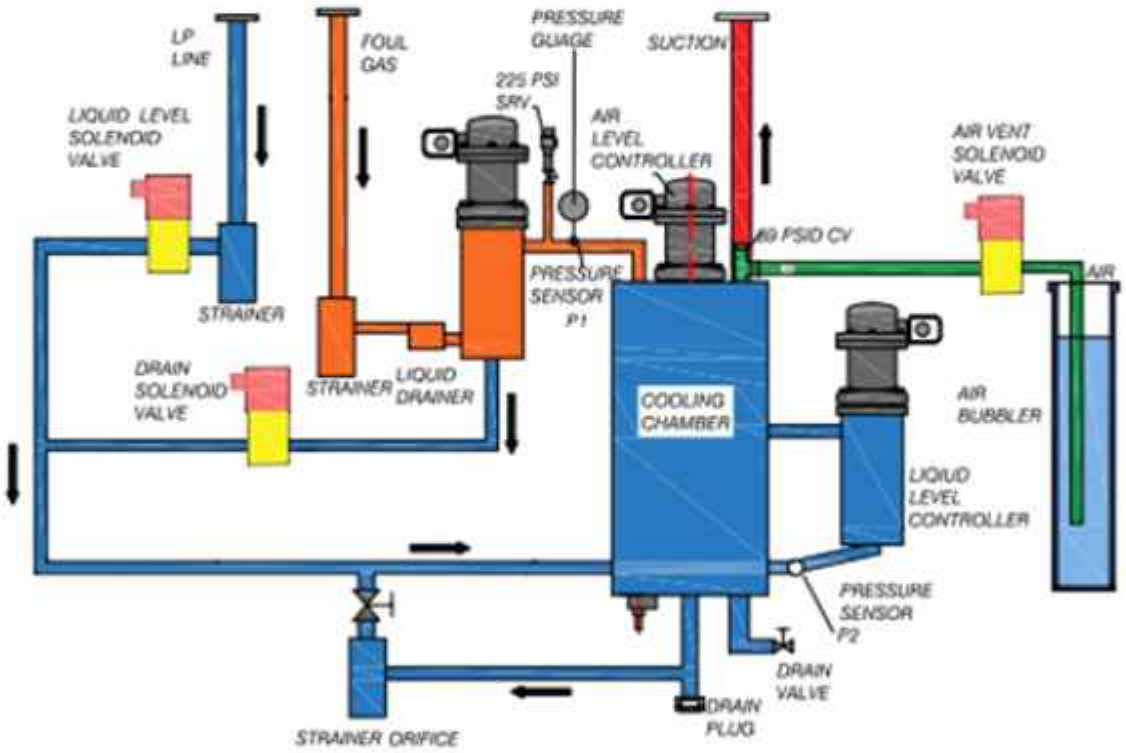
INTRODUCTION

SUPERFREEZE Air Purger is robust, compact, rigid, fully electronically controlled system to remove air and other non-condensable gases from the Ammonia refrigeration system. It does not have any compressor or pump. Therefore, power consumption is very minimal limited to electronic control only. Due to absence of moving parts, break down and maintenance is not required. It can handle up to 8 purge points. The operation of purge point is controlled electronically. The time setting for each purge point is done easily by HMI touch screen. The unit is supplied fully assembled. Only connection to purge points, liquid line and suction line is done at site.
It can be mounted on wall or installed on a pedestal at any convenient location.



The Air Purger is equipped with followings

• Panel	1 no
• Pressure Transducers	2 nos
• Solenoid Valve	3 nos
• Temperature Sensor	1 no
• Level Controller	3 nos
• Strainer	3 nos
• Liquid drainer	1 no
• Safety Relief Valve	1 no
• Pressure Guage	1 no
• Check Valve	1 no
• LP Liquid Line	1 no
• Foul gas Line	1 no
• Suction Line	1 no
• Cooling Chamber	1 no
• Air Chamber	1 no
• Drain Valve	1 no
• Wil GV 15	2 nos
• Wil Gv 20	1 no
• ILCV 20	1 no

For Each Purge Point

• ILCV15	1 no
• Solenoid SFA5	1 no
• Strainer STA5	1 no

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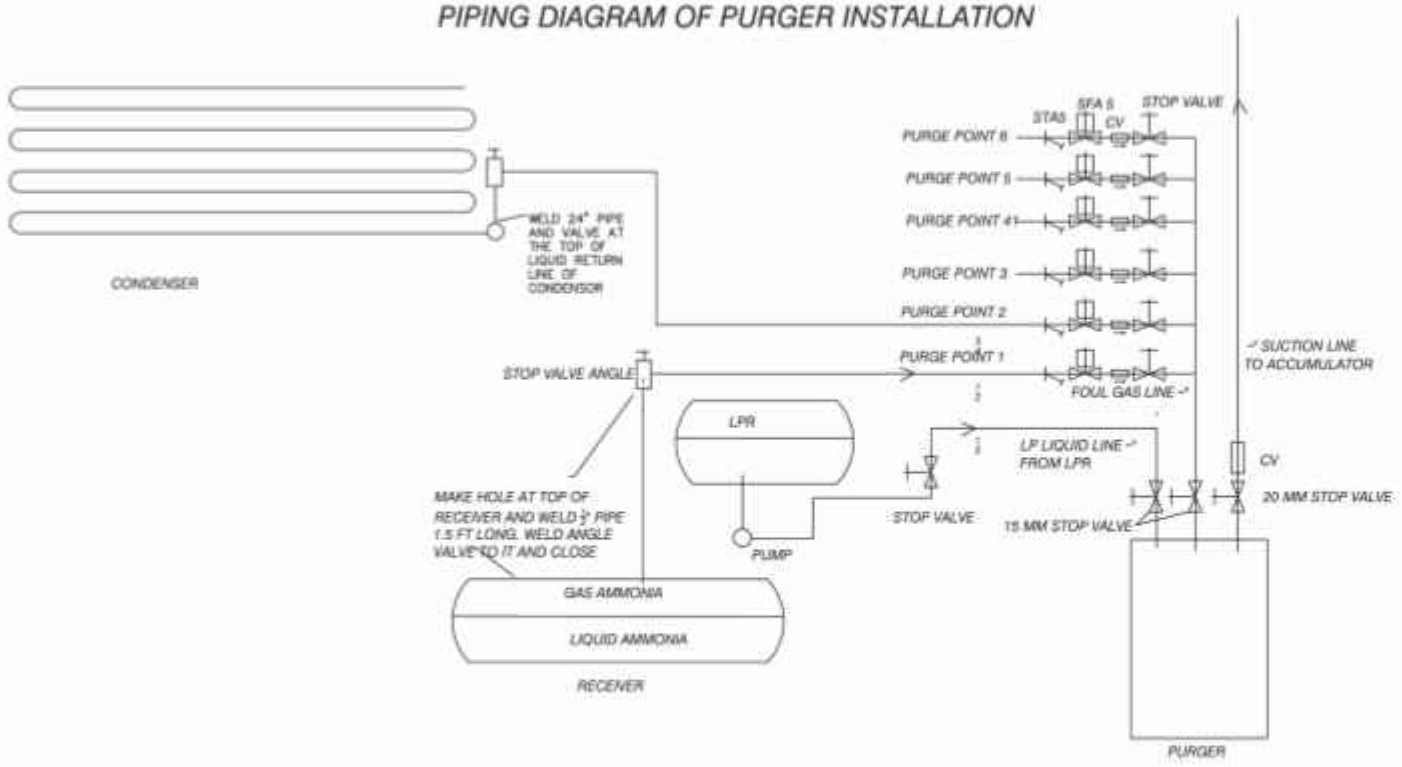
INSTALLATION

The purger is installed in compressor room near LPR. It requires, cooled liquid ammonia, foul gas and suction lines. Power connection of 230 VAC, water supply and drain points are also needed. The purger is placed on a pedestal on a platform about 8 " high. It stood be kept away from walls about 12" for ease of maintenance.
A header of 2" pipe is fabricated above purger for connecting all purge lines as per the figure.

PIPING DIAGRAM OF PURGER INSTALLATION



OPERATION

Air in Ammonia refrigeration system is not good for efficiency of the system. Air is bad conductor of heat. It flows with Ammonia in the pipes and compressor. The energy required by compressor to compress air is wasted and also the air forms an insulating layer between Ammonia and pipe metal. This prevent heat transfer.
The conventional method of purging air is not at all reliable. It completely depends on the wisdom of the operator. Also, valuable refrigerant is also lost to atmosphere while air is removed.

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Working of Automatic Air Purger

The air purger is based on the fact that Ammonia on cooling gets liquified but air do not liquify. Cool liquid from LPR is fed to the purger drum. The drum is connected to suction return line of compressor. The drum is insulated. This brings the system to a temperature below 4° C. The level of liquid in cooling drum is maintained by solenoid valve and level sensor. When liquid in drum is in desired range and temperature below 4°C, foul gas is allowed to enter in the system. This is controlled by PLC. All the purge points are controlled via solenoid valves. The purge solenoid are programmed to open in a sequence, one by one, for the time as desired by the user. Interactive touch screen provide option to user to select purge points, ON time & OFF time for each purge point separately.

The foul gas is collected from various purge points of Ammonia refrigeration system. The purge point may be at condenser out let header, high pressure receiver, low pressure receiver or any other points, that have chances of air accumulation. The foul passes thru an array of stop valve, strainer, inline check valve and solenoid valve. All purge point lines are connected to a common header. The header is finally connected to air purger. Foul gas from each purge point is monitored and controlled by PLC via solenoid valves.

The foul gas passes though a liquid drained. The liquid drainer removes liquid ammonia from foul gas and collect it in a float chamber. When the level of liquid in float chamber is high enough, it is sensed by level sensor and drain solenoid is opened to drain the liquid Ammonia to liquid feed line. Only foul gas is let in the cooling chamber for further process.

The foul gases passes through a coil submerged in cooled liquid Ammonia. Foul gas is the mixture of air and Ammonia. Ammonia in foul gas while passing through the coil gets liquified but air remain gas. At the end of the coil, the liquified ammonia is let into air chamber. Here liquid ammonia settle down and air rise up and collect in the air chamber. Liquid Ammonia is metered back to outer chamber. The air keeps on collecting and is trapped in air chamber. When sufficient volume of air is collected and pressurised, air vent solenoid is opened by PLC program. The air passes through water contained in air bubbler and released to atmosphere.

The air purger is equipped with pressure relief valve set at 250 Psig for safety.
Air vent line have check valve set at 60 psig. This is an addition safety that do not allow air to vent if the air pressure is less than 60 psig.

There are two pressure sensors. One monitors pressure of foul gas and other pressure of the liquid in cooling chamber. On the panel both pressures are displayed as P1 and P2. The differential pressure is also on the display.

The air purger do not interfere in any way with main refrigeration system. It is simply set ON or OFF by a Knob on the panel.

Plants which do not have LPR can also use this air purger. In that case liquid from HPR is fed to Air Purger through an expansion valve.

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PANEL

DISPLAY

The HMI display gives all the required information. It is touch screen type.
It has three parts on HOME screen.
On the left is temperature at the top. Followed by Pressure p1, Pressure p2 and differential pressure.
It the middle is liquid level, drain level and vent level.
On the right part, there are two columns.
First is of liquid solenoid, drain solenoid and vent solenoid. If they are green, it means they are ON.
Second column is of purge points solenoid. Each purge solenoid ON time and OFF time is indicated. If Purge point is green, it means it is in operation.
Top left corner display time and right corner has date.
At the bottom there are three icons.
Alarm- an alarm is raised if any of the parameter is out of range. Touch this icon to mute alarm.
In the middle is power ON /OFF button. This is needed to switch ON the system from screen.On the write is Menu button. This is pass word protected. On entering menu we can set various parameters of pressure, temperature and purge point time.

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