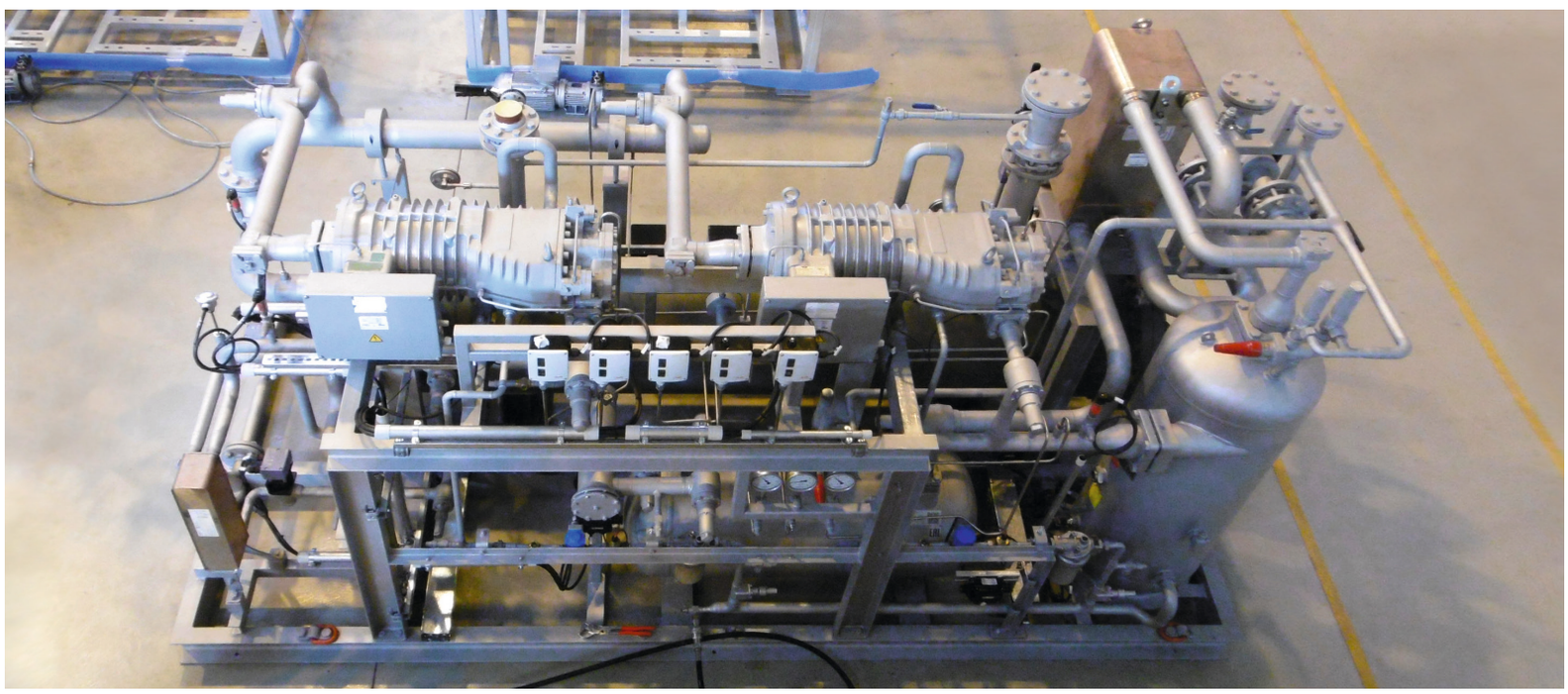
PROJECT REPORT

POLAR
REFRIGERATION GMBH

HEATING AND REFRIGERATION EQUIPMENT FOR PHARMACEUTICAL INDUSTRY



Polar Refrigeration is responsible for design and delivery of the complex cooling and heating system for one of the largest production plants of chemical substances for pharmaceutical industry.

The equipment is intended for the modern facility for the synthesis of active pharmaceutical ingredients. Polar Refrigeration is also responsible for installation, commissioning and start-up of all equipment included in scope of supply.

The process of the the synthesis of active pharmaceutical ingredients comprise a variety of the technological equipment such as reactors, pressure-filters, nutsche-filters, vacuum driers and other apparatuses where the substances must be heated or cooled to a different temperature levels depending on the stage of the process.

Polar Refrigeration scope of supply for this project includes 26 thermostats, complete refrigerating installation for low-temperature circuit, complete refrigerating installation for high-temperature circuit, combined control and MCC panels, delivery of piping, cables, insulation.

The heating and cooling of pharmaceutical apparatuses is done by means of the intermediate heat-carrier fluid which is a thermal oil. The thermostats produced by Polar Refrigeration ensure the heating and cooling of the thermal oil to the required temperature, and the constant thermal oil circulation for equipment.

Thermostats are custom-built to meet the heating and cooling demand of each pharmaceutical apparatus. Where required, the thermostats have the execution suitable for explosive area, Zone 2.

Ex

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Thermostats

The thermostats are used for heating and cooling of the intermediate heat-carrier which is a thermal oil and for supplying it to the pharmaceutical equipment.

Each thermostat comprises built-in glycol cooled heat exchanger, oil circulation pump, electrical heater, expansion tank, all necessary instruments, valves, protection devices and control box with operator panel. All equipment is assembled on a general frame, provided with insulation and cover protection.

The built-in pump provides a constant oil circulation through the loop comprising thermostat and technological apparatus. If there is a heating demand the electrical heater switches on and the oil temperature increases. If there is a cooling demand, the heater is switched off, and the position of the 3-way valve foreseen in the oil circuit redirects the oil to the heat exchanger where it is cooled by means of the glycol circulation. To avoid the spillage of the oil due to temperature expansion, and ensure the sufficient oil level, the thermostat is equipped with an expansion vessel.

Technical data

Heat-carrier fluid	Thermal oil
Heat-carrier fluid temperature range	-20...+160°C
Coolant	Propylene glycol – water solution
Coolant temperature range	-30...+10°C
Cooling capacity	15 ... 75 kW depending on model
Heating capacity	15 ... 130 kW depending on model
Ex execution	For Zone 2 IIB T3 or safe area depending on model

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Low-temperature refrigerating plant inclusive chiller and pump-station

The purpose of the refrigerating plant is to cool the glycol to -30°C, and provide the glycol circulation via the thermostats and vapour recovery condensers. The refrigerating plant consists of assembled chiller, pump station and combined control/ MCC panel.

The chiller is equipped with two semi-hermetic screw compressors, oil separator, glycol-cooled condenser, liquid receiver, DX economiser and shell&tube DX evaporator. The compressors draw off and compress the refrigerant vapour from the evaporator and discharge it to the oil separator where the oil is separated from the refrigerant. High pressure refrigerant gas is then enters the condenser which is cooled by high-temperature glycol. The condensed refrigerant drains to the liquid receiver. The part of the liquid refrigerant from the receiver is injected to economizer where evaporates and subcooles the other part of the liquid flow. After that subcooled refrigerant flow is injected to the DX evaporator where evaporates by cooling the glycol which is pumped through the evaporator by means of the pump station. The cooled glycol is then pumped to the equipment, where it is heated by taking the heat from the process, and pumped back to refrigerating plant.

Technical data

Refrigerant	R507
Coolant	Propylene glycol – water solution
Refrigeration capacity	200 kW
Evaporating temperature	-36°C
Condensing temperature	+25°C
Coolant temperature	-26 / -30°C
Execution	For safe area

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High-temperature refrigerating plant inclusive chiller and pump-station

The purpose of the refrigerating plant is to cool the glycol to +10° C , and provide the glycol circulation via the thermostats and other technological equipment. The refrigerating plant consists of assembled chiller, air cooled condenser, pump station, dry cooler, and combined control/MCC panel.

The chiller is equipped with two semi-hermetic screw compressors, oil separator, glycol-cooled condenser, liquid receiver, and shell&tube DX evaporator. The compressors draw off and compress the refrigerant vapour from the evaporator and discharge it to the oil separator where the oil is separated from the refrigerant. High pressure refrigerant gas is then discharged to the air cooled condenser where from the condensed refrigerant flows to the liquid receiver. Then the refrigerant is injected to the DX evaporator where evaporates by cooling the glycol which is pumped through the evaporator by means of the pump station. The cooled glycol is then pumped to the technological equipment, where it is heated by taking the heat from the process, and pumped back to refrigerating plant. During cold period the chiller can be bypassed and the glycol can be cooled in a dry cooler.

Technical data

Refrigerant	R134A
Coolant	Propylene glycol – water solution
Refrigeration capacity	800 kW
Evaporating temperature	+6°C
Condensing temperature	+45°C
Coolant temperature	+20 / +10°C
Execution	For safe area

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