

Air Conditioning Screw Chiller & Ducted Control Panel

Air Conditioning Electrical Control Panel

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Abstract:- This is an introduction to air conditioning systems (frequently referred to as HVAC systems – heating, ventilating and air conditioning systems). It is intended for those engineers, architects and construction professionals who are only peripherally involved with HVAC systems in their professional activities, but would like to learn more about HVAC concepts, principles, systems and equipment. Give design and construction professionals a step forward in understanding this area of building technology.

Keywords:- Switch fuse unit (SFU), HVAC (Heating, Ventilating and Air Conditioning)

I. INTRODUCTION

Samcon is pleased to introduce as a professional Group organization engaged as a manufacturer & supplier of Electrical Control Panels required for HVAC, Engineering, Power Distribution and Process Industries. Samcon is a professionally managed organization having well experienced manpower for designing and manufacturing of complete Control Panel Systems. Our company is having complete infrastructure to make the Electrical Panels & allied products to meet growing requirements of the customers. The main objective of the company is to provide high quality Control Panels to its customer and prompt after sales and Services. . we are doing outhouse project in the SAMCON industrial control private limited. We are focus mainly on the assembly process of the different types of control panels.

II. TYPE OF CONTROL PANELS

A. Screw Chiller Control Panel
Ranging from 75 to Tr to 400 Tr

There are two types of screw chiller control panel:

- *Water Cooled Screw Chiller Control Panel*
- *Air Cooled Screw Chiller Control Panel*

- *Working Principle:-*

Unit cooling, the compressor will evaporator low temperature and low pressure refrigerant into the cylinder, through the compressor work, refrigerant vapor is compressed into high temperature and high pressure gas, Through the exhaust pipe into the condenser. High temperature and high pressure refrigerant gas in the condenser with the cooling water for heat exchange, the heat transfer to the cooling water away, while the refrigerant gas is condensed into high pressure liquid. The high pressure liquid from the condenser is throttled by the thermostatic expansion valve and enters the evaporator. In the evaporator, the low-pressure liquid refrigerant absorbs the heat of the chilled water and vaporizes the chilled water to cool down and becomes the desired low-temperature water. The vaporized refrigerant gas is re-sucked by the compressor and discharged into the condenser, so that it is circulated again and again, thereby cooling the chilled water.

From the unit out of chilled water, into the indoor fan coil, variable air volume air conditioner and other end devices in the indoor and convective air heat exchange, in the process, the water due to the absorption of indoor air heat (to the indoor air heat) And the temperature rises, and the indoor air through the indoor heat exchanger after the temperature drop, driven by the fan, into the room, thereby reducing the indoor air temperature, and the temperature rise after the chilled water in the pump under the re-enter

the unit, so Cycle, so as to achieve the purpose of continuous cooling.



Fig 1:- Screw Chiller Control Panel



Fig 2:- Screw Chiller Control Panel

➤ *Water Cooled Screw Chiller Control Panel:*

Water-cooled screw chillers are also achillers, because of its main components using a screw compressor, so the name can be called water-cooled screw chillers. It is widely used in the fields of plastic, electroplating, electronics, chemical, pharmaceutical, printing, food processing and other industrial refrigeration process to use chilled water, or large shopping malls, hotels, Factories, hospitals and other central air conditioning projects need to use chilled water concentrated cooling areas.this system consist of compressor and oil seperators. Here chilling is done with the help of running water flow.

Blue Star, India’s largest central air conditioning company has been providing expert cooling solutions for over seven decades now. As a leader in the industry, it has been manufacturing a wide range of scroll, screw and centrifugal chillers that provide cool comfort in airports, green buildings, hotels, malls, offices, industries, etc. Based on its continued thrust for research and product development, Blue Star has launched a new state-of-the art configured series of AHRI-certified water cooled screw chillers. These chillers provide application versatility, energy efficiency, control precision, reliability, ease of installation and operational cost effectiveness. The chillers are designed to deliver proven performance plus a hostof other benefits required for industrial and commercial applications.

- *Wide Capacity Range*

The chillers are offered in a wide range of capacities from 80TR to 450TR with single/twin compressors. The performance is fully validated by AHRI for all the models. The number of passes across cooler and condenser can be modified to suit the capacity, pressure drop and efficiency. The chillers operate at 415V, 50Hz on a 3-phase power supply.

- *Single Compressor Range:*

The Single Compressor range is available from 80TR to 235TR.

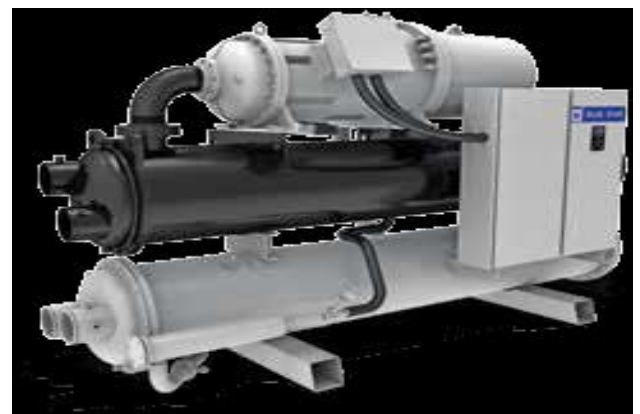


Fig 3:- Single Compressor Water Cooled Screw Chiller Control Panel

• *Double Compressor Range:*

The double compressor range is available from 160TR to 450TR.



Fig.4 Double Compressor Water Cooled Screw Chiller Control Panel

➤ *Air Cooled Screw Chiller Control Panel*

Air-cooled screw chiller because of its key components - the compressor used screw-type air-cooled screw chiller, the unit out of the evaporator by the state of the gas refrigerant; compressed by the compressor after compression, into a high temperature and high pressure state. Compressed gas refrigerant, in the condenser, isostatic cooling condensation, after condensation into liquid refrigerant, and then through the throttle valve to low pressure, into a gas-liquid mixture. Which low temperature and low. The gaseous refrigerant is reintroduced into the compressor via the pipe to start a new cycle. pressure liquid refrigerant, in the evaporator to absorb the heat of cold matter, re-become gaseous refrigerant This is the four cycles of the refrigeration cycle. It is also the main working principle of the screw chiller.

• *Features*

- (1) unit compressor selection of semi-closed screw-type compressor and electronic control components, equipped with heat exchanger and efficient high-quality copper tube condenser and evaporator;
- (2) equipped with various types of security devices, stable performance, low noise, long life, simple operation; use of liquid crystal display man-machine interface, simple and convenient operation, running at a glance;
- (3) models have a single compressor or multi-compressor combination of refrigeration systems. Compressor can change according to the load, automatically turn the operation, balance the number of operating hours of the compressor, to save energy and extend the use of chillers the effect of the deadline. Easy to adjust energy, more energy in the part of the load;
- (4) open structure, machine appearance is beautiful, simple structure, can check the operation of the unit at any time, easy installation and maintenance;
- (5)System composition: Water-cooled screw chiller is mainly composed of semi-enclosed screw compressor, shell and tube condenser, part and dry filter, thermal expansion valve, shell and tube evaporator, and electrical control so on.

(6) the use of international brands compressor, the new high efficiency spiral rotor compressor, compressor performance than the average 20% -30% higher, and access to Europe and the United States multi-national patent IS9001 international quality certification.

(7) high efficiency 5: 6 patent asymmetric rotor tooth profile.3, capacity control can be used four-stage (100% - 75% -50% -25%) or three (100% -66% -33%) and no-stage control system.

(8) the use of 11 bearings and a axial thrust balance drum combination design, a substantial increase in bearing life 2.5-3.5 times.

(9) the use of high efficiency silicon steel special slot design, and equipped with internal and external design of the cooling channel, so that the compressor motor can play under any load the highest efficiency.

(10)a unique built-in hydraulic system, no oil pump to ensure that the compressor to maintain the best lubrication effect Oil separator with double filter, filter effect is good, heat exchanger can play the maximum capacity.

(11)high efficiency, low noise, low vibration.

(12) a variety of refrigerants to choose from, in addition to R22 refrigerant, you can also use R134a, R407c and other environmentally friendly refrigerant.

B. Ducted Control Panel

Range of this control panel starts from the 2.5 Tr (tolne) to 10 Tr.

They are two types of ducted control panel :

- *Ducted package: ranging from 2.5 to 10 Tr*
- *Ducted split : 2.5 to 5 Tr*



Fig 5:- Ducted Control Panel

➤ *The Ducted Package Control Panel:*

• *Air Cooled Package ACs*

Blue Star is a pioneer in the manufacturing of floor-mounted Packaged ACs for over three decades now. These systems are popular in commercial applications due to their distinct advantages of service-friendliness and extended ducting capabilities.

In this range, the floor-mounted indoor unit houses the DIDW blower, coil, filter and compressor, while the outdoor unit houses the high-efficiency condenser and new-design propeller fan. The strategic design, which places the compressors in the proximity of the evaporator in the indoor unit, further enhances the efficiency of this system.

• *Water Cooled Packaged ACs:*

Where water is available in plenty, Blue Star's Water-cooled Packaged ACs offer higher efficiency than air cooled systems since water is a superior cooling medium compared to air. These systems come pre-charged and the unit comprises of the filter, blower, evaporator, compressor and water cooled condenser. These water cooled systems offer both higher efficiency as well as lower power consumption compared to air cooled systems.

➤ *The Ducted Split Control Panel:*

• *Air Cooled Ductable Splits:*

Where floor space is scarce but the AC unit can be housed above the false ceiling, ducted splits are the best choice. The indoor unit houses the evaporator, DIDW blower and filter in a compact powder-coated sheet metal unit, while the outdoor unit houses the compressor, the condenser and the new-design propeller fan.

• *Water Cooled Ductable Splits:*

The water cooled ducted unit is another notable innovation from Blue Star. These units are perfectly suited for shopping malls, office complexes, service apartments, industrial air conditioning and any application with multiple tenants.

• *The advantages of the water cooled unit are as follows:*

- ✓ Independent control and billing is possible in multi-tenant premises.
- ✓ Units can be mounted within the tenants place.
- ✓ Investment can be in phased manner, no need to lock capital.
- ✓ Aesthetically better as outdoor unit is not exposed unlike, in air cooled systems. Also refrigerant pipe limitation is taken care of as condensing unit need not be kept in open space and can be mounted near IDU within the building.
- ✓ New DSW-mini series units are available in smaller capacities: 1 ,STR and 2TR

➤ *Features*

• *Operation at Higher Ambients*

The condenser in this new series of ducted systems is designed to operate effectively at higher ambient temperatures, up to 50C, ensuring efficient cooling even in the harsh summer months, without tripping.

• *Lower Running Cost*

The high-efficiency fan used in these systems is specially designed with blades that offer better air flow. This, along with more coil face area, helps in reducing the condensing temperature, thereby lowering power consumption and running cost.

• *Service-Friendly Design*

The design of the outdoor unit in the ducted system range is such that it offers easy access to the compressors and the control panel on the side. And the fan motor assembly on the front panel is also easily removable for repair. The condenser coil is much easier to clean as well.

• *Scroll Compressor-driven*

Due to their inherent design characteristics, scroll compressors have very high volumetric efficiency. They are ideal for airconditioning applications where the compression ratio is not very high. All Blue Star Packaged ACs and Ducted Splits use scroll compressors.

• *Blue Fin Condenser and Corrosion-resistant Body*

All units have special blue tins and are made of galvanised sheets, which are powder-coated after fabrication, making them corrosion-resistant while looking elegant, improving overall life of the system.

• *Wide Voltage Range of Operation*

The ducted systems can function across a wide voltage range of 360- 440 V. making them a rare breed.

• *Multi-compressor Advantage*

Most of these ducted systems use more than one compressor. This gives them the advantage of high part-load efficiencies, since the entire evaporator surface is available to the system even during part-load conditions.

• *Run-time Equalization*

The Intelligent controller ensures that all compressors (In multi-compressor units) run for equal number of hours, thus ensuring equal wear.

• *Lower Noise Levels*

The outdoor units of these ducted systems are fitted with bird-wing design and high-efficiency fans. This lowers the noise levels significantly.

• *Hydrophilic Coating*

The aluminium fins used on the evaporator coil have a hydrophilic coating. This coating helps retain the moisture on the tins from where they drain to the bottom by

gravity. This helps reduce the moisture carry-over with the supply air.

- *DIDW Blower Design*

These systems use advanced DIDW type centrifugal blowers with forward curved blades, which offer higher air throws.

- *Efficient Air Filters*

Air filters made of non-woven polyester media enclosed in HDPE mesh are provided. These are efficient and can be cleaned easily.

III. CONCLUSION

We are focus mainly on assembly process of various types of control panels which include the different panel sections with filter, fan, MCB(Miniature Circuit Breaker), MPCB(Motor Protection Circuit Breaker) contactor, SFU(Switch Fuse Unit),fuse, chiller after that assembly of scroll chiller material, cutting, and testing also the part of manufacturing process. Their respective applications not only in industrial but Commercial / Industrial Air-conditioning, Window / Split Air conditioners, Refrigeration Systems, mall.

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