WATER-COOLED SCREW CHILLER

YGWS

Cooling Capacity: 100-200TR
In order to meet continuously changing and increasing HVAC market requirement, Johnson Controls introduces the brand new HFC-134a water-cooled screw chiller YGWS. YGWS offers optimized efficiency at a more competitive price range, with benefit of flexibility, reliability and sustainability. The chiller is suitable for the light commercial market, i.e. hotel, retail store, small and medium-sized factory, hospital and etc.

Chiller Features

**Efficiency**
- High efficiency semi-hermetic screw compressor
- Patent hybrid falling film evaporator offers excellent efficiency of heat transfer with optimized heat exchanger design and compact structure
- Step-less capacity control keeps the compressor operating efficiently at every load point

**Flexibility**
- Button start, easy to install and operate
- Supports remote monitoring and control via Modbus protocol
- Compact design yields a small footprint saving customer installation cost

**Reliability**
- Core component compressor has been sold more than 10,000 units since 2006, with zero failure record of motor and rotor
- Every chiller undergoes functional tests to ensure key parameters meet specific requirement
- Internal oil system provides adequate protection to the unit’s compressor

**Sustainability**
- YGWS chiller uses environment-friendly refrigerant R134a which has no phase-out schedule under Montreal Protocol
- Patent hybrid falling film evaporator operates with less refrigerant charge
Mechanical Specifications

The YGWS model is completely assembled with all interconnecting refrigerant piping and internal wiring, ready for field installation. The unit is pressure tested, evacuated, and fully factory-charged with oil in the refrigerant circuit. After assembly, a run test is performed with water flowing through the cooler to ensure that each refrigerant circuit operates correctly. The chiller conforms to GB25131 Safety requirements for water chillers and heat pumps.

Compressor
Highly efficient and precisely manufactured direct drive, semi-hermetic oil-injected compressor for highest efficiency. 25%-100% step-less capacity control for highest part-load efficiency. Compressor design working pressure of 2.1MPa. The compressor housing is made of cast iron and provides optimal space for two ground-finishing screw rotors. The rotors are manufactured from forged steel with very small clearance but no direct contact. The design ensures that the rotors keep in the right position, reduces wear, prevents leak and prolongs life span. The unique oil separation system design ensures a constant supply of oil to the bearings at all times. An automatic control valve ensures the compressor starts at the minimum motor load and an internal discharge check valve prevents a rotor backspin upon shutdown.

Compressor Motor Protection – The microprocessor motor protection provides over current protection to ensure that the motor is not damaged due to voltage imbalance, excess refrigerant or other problems that could cause excessive motor current. The microprocessor also provides low motor current protection when it senses a motor current of less than 10% FLA. A motor protector module provides over-heat protection.

Capacity Control – The compressor slide valve modulates the capacity from 100% to 25% of the full load. The slide valve will be adjusted according to the system’s load requirement.

Refrigerant System
Liquid line components include a manual shut-off valve, refrigerant recovery valve, moisture sight glass and orifice plate. Suction lines are covered with closed-cell insulation. The orifice of the refrigerant system automatically adjusts to the continuously changing pressure condition and modulates refrigerant flow to the evaporator accordingly.

The condenser shell is capable of storing the entire system refrigerant charge during servicing if the unit is equipped with the optional condenser isolation valve. The unit is furthermore equipped with a suction strainer to prevent any particles from entering the compressor along with the suction gas.

Oil System – The high efficient oil separation system provides adequate protection to the unit’s compressor. It is equipped with an oil heater in oil sump to avoid refrigerant and oil mix when the chiller is not operating. During the chiller operation, the system operation pressure automatically transfers the oil in the oil sump back to the compressor. An oil filter is installed in the oil pipeline to prevent any particles from entering the compressor.

Heat Exchanger
Condenser – The refrigerant circuit water-cooled condenser is a cleanable shell and tube type heat exchanger with seamless external flanged 19mm OD copper tubes rolled into tube plates. The design working pressure on the water side is 1.6MPa. The factory offers standard groove type water pipe connections. Meanwhile HG20615 flange type connections can be offered as an option. The refrigerant side has a safety valve with trip pressure of 2.07MPa. The condenser is manufactured and tested according to China National Standard GB151.

Evaporator – The evaporator utilizes a hybrid falling film design which contains a balance of flooded and falling film technology to optimize efficiency, minimize refrigerant charge, and maintain reliable control. A specifically designed spray distributor provides uniform distribution of refrigerant over the entire length to yield optimum heat transfer. The hybrid falling film evaporator design has suction baffles around the sides and above the falling film section to prevent liquid refrigerant carryover into the compressor. A sight glass of 40mm diameter is also equipped on the shell side for refrigerant level observation. The design working pressure is 2.1MPa for shell and 1.0MPa for tube side. The refrigerant side has a safety valve with trip pressure of 2.07MPa. The refrigerant side is manufactured and tested according to China National Standard GB151. The evaporator shell is covered with 19mm closed-cell insulation. The factory offers groove type water pipe connections as standard. Meanwhile HG20615 flange type connections can be offered as an option. During the installation the contractor should furnish the insulation layer.

Compact Water Box – A removable Compact Water Box is fabricated from steel pipe with 1.0MPa design working pressure. Steel diaphragms are welded inside the water box as per the number of the flow pass. The factory offers groove type water pipe connections as standard. Meanwhile HG20615 flange type connections can be offered as an option. Vent and drain plugs are provided on each evaporator and condenser water box as standard.

Codes & Standards
YGWS meets the following codes & standards:
- China Refrigeration and Air Conditioning Association
- GB25131 - Safety requirements for water chillers (heat pump) using the vapor compression cycle
- GB151 Tubular heat exchangers
- GB/T14834.1-Water chilling (heat pump) packages using the vapor compression cycle – Part 1: Water chilling (heat pump) package for industrial & commercial and similar application

Electronics
Starter and Control Panel – The unit comes equipped with unit mounted wye-delta starter and control panel. All wiring is completely tested in the factory but field installation is excluded.

The painted galvanized steel panel enclosure meets the requirement of IP22 protection. The control panel is divided into a power section and a control section. Power and control sections have separate hinged, latched and gasket sealed doors. The power panel has a single power connection. Each power compartment contains compressor starting contractors, control circuit serving compressor capacity control, compressor contractor coils and compressor motor overloads. The compressor motor overloads contain current transformers as an input to the microprocessor. Compressor power supply protection module protects high input voltage, low input voltage, phase reversal and lack of phase. The control section contains key pad, MMI and microprocessor board.

Microprocessor and display – The user can program and modify set points as well as general using the keypad. Additional changes such as cut-outs for low suction pressure, high discharge pressure, high oil temperature or high discharge pressure unloading set points and compressor motor current percent limit are password protected.

Through standard RS485 interface, the microprocessor can be connected to any Building Management System via MODBUS Protocol.

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The microprocessor system is designed to monitor and control many key variables and can display the following items at its 120 character and 8-line big LCD display in metric unit (°C and kPa):

- Discharge pressure and temperature
- Load limit set points for high discharge pressure and high motor current
- Percent of full load compressor motor current
- Compressor motor current
- Chilled liquid entering and leaving temperature
- Condenser liquid entering and leaving temperature
- Compressor operating hours and number of starts
- Compressor running status
- Anti-recycle timer counts the timing of the next compressor start
- Cut-out status and set-points for entering chilled liquid
- Up to 10 records of shutdowns due to faults
- Available display languages are Chinese and English

Chiller Standard configuration

Chiller Insulation – The unit comes factory fitted with a 19mm thick flexible closed-cell plastic anti-sweat insulation attached to the evaporator shell, tube sheets, suction connection, and (if necessary) to the auxiliary tubing. The 19mm thick insulation can prevent sweating in environments with relative humidity up to 75% and dry bulb temperatures ranging from 10 to 32°C.

Flow switch – The design working pressure of paddle type flow switch is 1.03MPa (Gauge). It is suitable for chilled liquid and condenser liquid pipes. The power supply of flow switch is 125 V.A.C., 1 Phase, 50 Hz.

Painting – The chiller surface is painted with anticorrosion and durable caribbean blue epoxy primer and propionic acid one-component top coat.

Shipping – Production covers are provided for the control center and controller on the unit. Plastic caps or fabric cover plate are provided for all water pipe connectors.

Nomenclature - YGWS100CA50A

25mm Spring Isolators
The unit comes with four loose 25mm thick anti-vibration neoprene pads as standard for field installation. When the unit is installed on the floor, Spring Isolators are recommended to replace the standard neoprene pads. 4 level adjustable Spring Isolators with non-slip mat will be delivered loose and can be conveniently mounted under the tube sheet.

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Thicker Evaporator Insulation (38mm)
The 38mm thicker insulation is an option in case of relative humidity up to 90% and dry bulb temperatures ranging from 10 to 32°C. It is recommended for low temperature or high humidity areas and helps to avoid the sweat on the surface of the unit.

Refrigerant isolation valve
The condenser shell is capable of storing the entire system refrigerant charge during servicing if the unit is equipped with the optional isolation valve.

Refrigerant Storage / Recycling System
A refrigerant storage/recycling system is a self-contained package consisting of a refrigerant compressor with oil separator, storage receiver, water-cooled condenser, filter drier and necessary valves and hoses to remove, replace and distill refrigerant. All necessary controls and safety devices are a permanent part of the system. Typically not required if unit isolation valves are provided.

Options

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### Technical Data

#### Chiller Performance Data

<table>
<thead>
<tr>
<th>Model</th>
<th>Cooling capacity</th>
<th>Input Power kW</th>
<th>COP</th>
<th>FLA</th>
<th>Full load</th>
<th>Condenser</th>
<th>Water Pressure Drop kPa</th>
<th>Water Pressure Drop kPa</th>
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<tbody>
<tr>
<td>YGWS100</td>
<td>97.2</td>
<td>360.8</td>
<td>69.4</td>
<td>4.02</td>
<td>118</td>
<td>2</td>
<td>54.7</td>
<td>125</td>
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<td>YGWS130</td>
<td>121.3</td>
<td>426.5</td>
<td>81.3</td>
<td>4.06</td>
<td>154</td>
<td>2</td>
<td>58.8</td>
<td>125</td>
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<td>555.0</td>
<td>110.4</td>
<td>4.06</td>
<td>187</td>
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<td>68.4</td>
<td>125</td>
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<tr>
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<td>2</td>
<td>78.9</td>
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<td>191.1</td>
<td>671.9</td>
<td>132.7</td>
<td>4.06</td>
<td>226</td>
<td>2</td>
<td>88.8</td>
<td>125</td>
</tr>
</tbody>
</table>

#### Remark:
1. Chilled liquid leaving temperature 44°F, Flow rate 2.4 GPM/ton, fouling factor 0.0001 hr ft² °F / Btu.
2. Condenser liquid entering leaving temperature 85°F, Flow rate 3 GPM/ton, fouling factor 0.00025 hr ft² °F / Btu.
3. The above data are based on Johnson Control's selection software: AECworks 4.7. Please refer to the latest version of the computer selection for specific projects.

#### Physical Data

<table>
<thead>
<tr>
<th>Model</th>
<th>Refrigerant circuit No</th>
<th>Refrigerant Charge Kg</th>
<th>Compressor Qty</th>
<th>Unit Capacity</th>
<th>Weight</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>shipping weight</td>
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<td>78</td>
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<td>2700</td>
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<td>YGWS200</td>
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<td>130</td>
<td>1</td>
<td>25-40%</td>
<td>3900</td>
</tr>
</tbody>
</table>

#### Evaporator Water Pipe Connection

- **YGWS 175/200**
- **YGWS 100/130/160**

#### Condenser Water Pipe Connection

- **YGWS 175/200**
- **YGWS 100/130/160**

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Remark: 1. If there is no “external interlock EXT”, please jumper connect terminal “6” and “13”.
2. The cable selection should conform to the local codes.
3. If the customer’s power supply is 3 phase 4 line (L1/L2/PE), please jumper connect terminal “N” and “PE” in the electric panel.
4. The contact resistance of flow switch, mode transition switch, external interlock and remote switch should be less than 0.5 ohm.
5. The 485 communication cable from 485 converter to terminal must be of the same type of cable.
6. Use twisted-pair cable with characteristic impedance 120 plus/minus 20 ohms in the bus cable.
7. The length of communication cable should be within 1000 meters.

The picture is only for: YGW100, 130, 160, 175, 200
Johnson Controls is a global diversified technology and industrial leader serving customers in more than 150 countries. Our 130,000 employees create quality products, services and solutions to optimize energy and operational efficiencies of buildings; lead-acid automotive batteries and advanced batteries for hybrid and electric vehicles; and seating components and systems for automobiles. Our commitment to sustainability dates back to our roots in 1885, with the invention of the first electric room thermostat. Through our growth strategies and by increasing market share we are committed to delivering value to shareholders and making our customers successful. In 2015, Corporate Responsibility Magazine recognized Johnson Controls as the #14 company in its annual “100 Best Corporate Citizens” list. For additional information, please visit http://www.johnsoncontrols.com or follow us @johnsoncontrols on Twitter.

Johnson Controls Building Efficiency delivers products, services and solutions that increase energy efficiency and lower operating costs in buildings for more than one million customers. Operating from 500 branch offices in more than 150 countries, we are a leading provider of equipment, controls and services for heating, ventilating, air-conditioning, refrigeration and security systems. We have been involved in more than 500 renewable energy projects including solar, wind and geothermal technologies. Our solutions have reduced carbon dioxide emissions by 16 million metric tons and generated savings of $7.5 billion since 2000. Many of the world’s largest companies rely on us to manage 1.8 billion square feet of their commercial real estate.