WCS Series 50Hz

Water Cooled Scroll Direct Expansion Chillers

Cooling Capacity: 12 to 53 TR (42 to 186 kW)

R407C

DUNHAM-BUSH

Products that perform...By people who care

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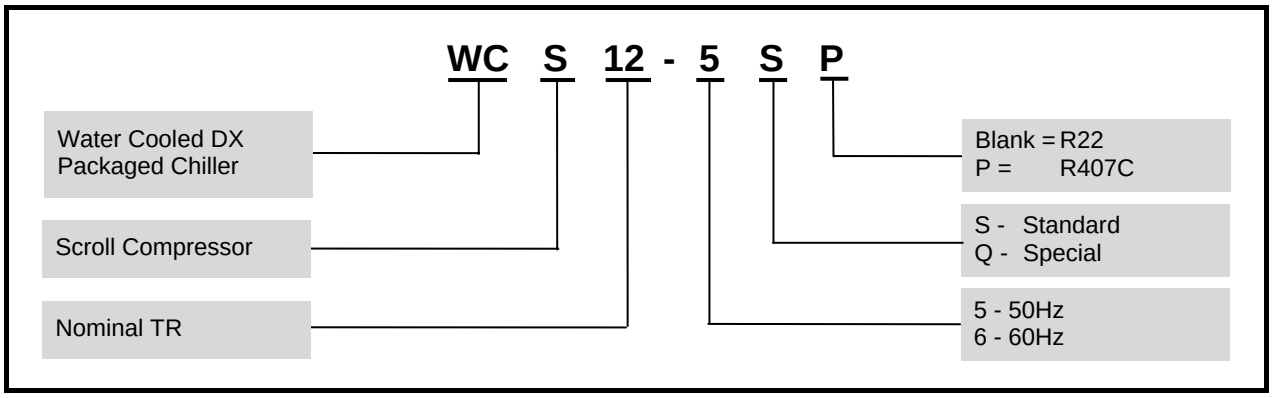
NOMENCLATURE



STANDARD FEATURES

Size Range

- 8 models from 12 to 53 TR [42 to 186 kW].
- Standard version available.
- Rated with R407C. Consult factory for use of other HFC refrigerants.

Compressor

- Scroll hermetic type operating at 2950 RPM (50Hz).
- High EER, low sound power level and high reliability.
- Controlled orbit with floating seals and advanced scroll geometry.
- No-contact scroll design and 100% motor cooled by suction gas.
- Thermostat fitted to prevent thermal overload.
- Capability of 50% tandem unloading.

Evaporator

- Vessels constructed in accordance to ASME CODES Sections Vlll Division I for unfired pressure vessels.
- Dunham-Bush high efficiency inner-fin tubes design for compactness and weight reduction.
- 250psig [17bar] on refrigerant side design pressure.
- 150psig [10bar] on water side design pressure.
- Approval Stamp available from JKKP (Malaysia), UDT (Poland), BPA, China State Bureau of Quality and Technical Supervision of the People's Republic of China and ASME.
- 1"[25mm] thick PE foam closed cell insulation.

Condenser

- Vessels constructed in accordance to ASME CODES Sections Vlll Division I for unfired pressure vessels.
- Removable heads and interchangeable end-for-end for job flexibility.
- 3/4"[19mm] OD seamless, extended surface copper tubes.
- 300psig [21bar] on refrigerant side design pressure.
- 150psig [10bar] on water side design pressure.
- Approval Stamp available from JKKP (Malaysia), UDT (Poland), BPA, China State Bureau of Quality and Technical Supervision of the People's Republic of China and ASME.

Electrical/Control

- Reliable microprocessor based controller with electromechanical system is standard for all models.
- Chilled water pump control.

OPERATING BENEFITS

FIGURE 1 : SCROLL COMPRESSOR

1. **DELIVERING THE HIGHEST EFFICIENCY**
   Scroll compressor gives efficiencies 10% higher than any competitive compressor on the market today – at the right conditions.

2. **DELIVERING THE QUIETEST OPERATION**
   Scroll technology gives you compressor operation that is many times quieter than other technologies.

3. **DELIVERING THE INDUSTRY'S BEST VALUE**
   Scroll compressor clearly delivers more system value because of its high efficiency, fewer required components, increased reliability and quieter operation.

4. **DELIVERING FOR THE FUTURE**
   Scroll compressor is by far the most advanced products in the industry today for air conditioning, refrigeration and heat pump applications.

FIGURE 2: PRINCIPLE OF SCROLL COMPRESSION

The scroll is a simple compression concept first patented in 1905. A scroll is an involute spiral which, when matched with a mating scroll form as shown above, generates a series of crescent-shaped gas pockets between the two members. During compression, one scroll remains stationary (fixed-scroll) while the other form (orbiting scroll) is allowed to orbit (but not rotate) around the first form. As this motion occurs, the pockets between the two forms are slowly pushed to the center of the two scrolls while simultaneously being reduced in volume. When the pocket reaches the center of the scroll form, the gas, which is now at a high pressure, is discharged out of a port located at the center. During compression, several pockets are being compressed simultaneously, resulting in a very smooth process. Both the suction process (outer portion of the scroll members) and the discharge process (inner portion) are continuous.

Compression in the scroll is created by the interaction of an orbiting spiral and a stationary spiral. Gas enters the outer openings as one of the spirals orbits.

The open passages are sealed off as gas is drawn into the spiral.

As the spiral continues to orbit, the gas is compressed into two increasingly smaller pockets.

By the time the gas arrives at the center port, discharge pressure has been reached.

Actually, during operation, all six gas passages are in various stages of compression at all times, resulting in nearly continuous suction and discharge.

SYSTEM CONTROL

CAPACITY CONTROL

The standard system capacity control operates as follows:

- As the chiller load initially drops, the suction of the compressor(s) starts dropping proportionately, thus balancing minor load variations.
- Variation of unit capacity in response to system load requirements is controlled by an operating thermostat, which monitors the return water temperature.
- On multiple compressor units, capacity is controlled by compressor staging.

ELECTRICAL CONTROLS

MCCB/ MCB - Main Circuit Breaker

This is an automatic, calibrated, ambient compensated, magnetic trip circuit breaker, which provides both direct line-break compressor branch circuit. short circuit locked rotor and overload protection. It has a manually operable handle for compressor circuit disconnect.

M - Contactor

The Contactor, operated by the control circuit, provides power individually to the compressors. Contactors are used in single across-the-line start. This device is amp rated to handle both rated load amp and locked rotor amps.

CR - Relays (Miscellaneous Control)

These relays provide the necessary circuit logic for lock-in, lock -out and control functions.

HTR - Crankcase Heater

Energized continuously as long as control circuit power disconnect switch (not supplied with the unit) is closed and compressor is off. This heater maintains crankcase temperature above the system temperature during the compressor off cycle, preventing refrigerant migration into the crankcase and consequent cause compressor damage.

SOL - Liquid Line Solenoid Valve

Closes when the compressor(s) is off to prevent any liquid refrigerant from accumulating in the chiller during the off cycle.

OL - Motor Overload (Manual Reset)

The compressors are protected by thermal overload relays. The overload relays are manually reset.

PCR or UVR - Phase Control Relay (Optional)

Protects the unit from the following electric supply malfunctions: Under voltage, phase reversal, phase loss and phase imbalance. If the PCR or UVR trips, a control relay will de-energize and open the control circuit. A red LED trip light, located on the PCR or UVR, will indicate a supply malfunction. Tile PCR or UVR is a Auto reset control device.

Americas

United States of America

175 South Street,
West Hartford,
CT 06110, USA

Tel: 1-860-249 8671
Fax: 1-860-953 3300

Europe

United Kingdom

8 Downley Road,
Havant, Hampshire,
England PO9 2JD

Tel: 44-23-9247 7700
Fax: 44-23-9245 0396

Africa

South Africa

No. 57 Sovereign Drive
Route 21 Corporate Park
Irene, Pretoria
South Africa

Tel: 27-12-345 4202
Fax: 27-12-345 4203

China

No. 1 Dunham-Bush Road,
Laishan District,
Yantai,
Shandong Province,
China 264003

Tel: 86-535-658 8999
Fax: 86-535-658 1999

Asia

Singapore

146B, Paya Lebar Road,
No. 05-01,
ACE Building,
Singapore 409017

Tel: 65-6842 2012
Fax: 65-6842 2013

Middle East & North Africa

United Arab Emirates

Platinum Business Centre
Office No. 704
P. O. Box 30922,
Al Nahda 2nd, Dubai, UAE

Tel: 971-4-280 6699
Fax: 971-4-280 9886

Russia & CIS

Russia

Lot 11, Novinskiy Boulevard,
Moscow,
121099 Russian Federation

Tel: 7-499-255 6953
Fax: 7-499-255 6953

India

304 Sky Station,
Plot No. 109,
Viman Nagar,
Pune 411014,
India

Tel: 91-20-4131 4682
Fax: 91-20-4131 4683

Malaysia

Lot 5755-6, Kidamai Industrial Park,
Bukit Angkat,
43000 Kajang,
Selangor Darul Ehsan,
Malaysia

Tel: 603-8924 9000
Fax: 603-8739 5020

DUNHAM-BUSH

info@dunham-bush.com
www.dunham-bush.com

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M-S-0485A-0211