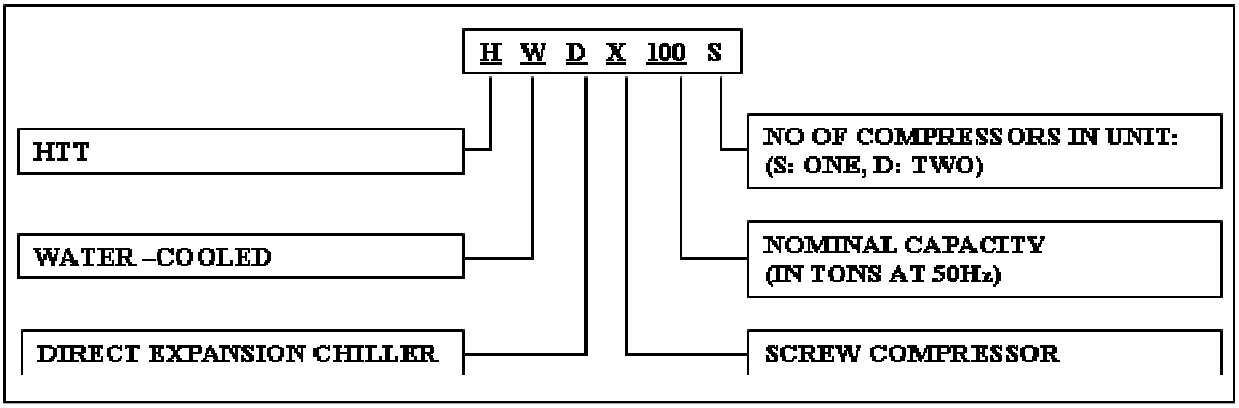
HTT INDUSTRIES (M) SDN BHD

QUALITY.SERVICE.TECHNOLOGY.SAFETY

WATER-COOLED SEMI-HERMETIC SCREW CHILLERS

HWDX SERIES 40 To 255 Tons
R22 / R407C (50Hz / 60Hz)

NOMENCLATURE



INTRODUCTION

The HTT HWDX water-cooled chillers range is the latest addition to HTT's growing family of commercial products, featuring the most current technologies advances. The HWDX main features are its high reliability and serviceability. In addition, it's also highly efficient and comes in a competitive footprint.

The HWDX range covers models from 40 to 255 tons at 50Hz, 60Hz models are also available upon request. Standard model operate with R22 and R407C. Models operating on other type of refrigerants are also available on request.

STANDARD FEATURES & BENEFITS

High-Efficiency Shell & Tube Heat Exchanger
Both the evaporator and condenser used in the HWDX range are designed and manufactured to a very high standard of quality and efficiency. Inner-grooved tubes are used in the evaporator to provide better efficiency while high-efficiency enhanced finned tubes are used for the condenser.

The heat exchangers also come with removable headers which allow physical cleaning of the tubes. This makes the unit easier to service and maintain. This serviceable is important, as mineral deposits and fouling from the condenser water causes the unit performance to deteriorate over time. However, with removable headers and proper maintenance ensuring that tube fouling is kept low and system efficiency is maintained.

As a standard, heat exchangers are provided with flange water connections (BS Standard Table E). All evaporator are supplied fully insulated.

All the heat exchangers are built according to ASME code and are by JKKP approved fabricator. All pressure vessels are designed to withstand pressure up to 300psig on the refrigerant side and 150psig on the water side.

Serviceable & redundancy
All individual compressors used in the unit have their own separated refrigerant circuits. Which means that in the rare event of any problem occurs to a particular circuit of compressor, all the other circuits and compressor could continue to operate.

This means that remedial work could be carried out while the unit continues to function. In additions service valve and shutoff valves at the compressor's suction and discharge port as well as on the liquid line allows refrigerant on each circuit to be isolated.

STANDARD FEATURES & BENEFITS

Microprocessor control
All HWDX chillers are precisely controlled by a central microprocessor, which monitor all analog and digital feedback from a variety of sensors in the unit and modulates the cooling capacity of the screw compressor accordingly. This enables the unit to quickly & accurately response to changes in the system.

The interface to the microprocessor is via a simple-to use button keypad with a 120x32 pixel, multi line 80 character alphanumeric LCD displays. Here the user interacts with a menu driven software to access & manage the operation of the chillers. Through this interface the user can easily set, manage & check the operating conditions, control set points, alarm history as well as others sensors measurements such as the leaving chilled water temperature, entering chilled water temperature, evaporating & condensing pressure for each refrigerant circuit, suction superheat & liquid sub-cooling, system voltage and current, number of operational compressor and so forth(please note that some of these information are only available if the relevant optional feature is selected). The user could also manually over-ride the operation of the chillers trouble-shooting purpose. The interface could be password locked to prevent unauthorized access.

Semi-Hermetic Screw Compressor
All HWDX models utilize highly efficient & reliable semi-hermetic horizontal screw compressor. One of its main advantages is the capability to unload linearly according to the demand load, thus enabling the unit to accurately meet the required cooling capacity while lowering energy consumption at the part load conditions.

Screw compressors are well known to have better part load performance compared to centrifugal compressors and are efficient than their reciprocating counterparts. In additions, the semi-hermetic screw compressors are fully serviceable which enable easier overhaul and maintenance. All compressors in the HWDX series also comes with a complete set of suction and discharge service valves which enable the compressor to be isolated from the rest of the system in the overhaul or maintenance.

The different in the semi-hermetic compressor used in the HWDX model compared with other screw compressors in the market is the design of the 5:6 male & female rotor profile used provides higher volumetric efficiency. In addition, the rotor of the compressor is manufactured to tight tolerances and with high precision resulting in its high performance. The compressors also have lower vibration and noise as it rotor are dynamically balanced and support by precision bearing, enabling the compressor to operate smoothly.

All compressors are supplied from the factory with oil heaters to prevent oil dilution. In addition, the compressor have a built in oil separator which reduces the amount of oil going out to the system, thus improving the system efficiency & reduce the need for maintenance.

OPTIONAL FEATURES

Hot Gas Bypass
Allows improved capacity control by bypassing discharge gas from the condenser to the evaporator inlet. Reduce the need of the compressor from cutting in & out during periods of fluctuating load, thereby reducing wear and prolonging the life of the compressor. This is highly recommended for use in process cooling with fluctuating loads.

Non Standard Heat Exchanger
For special applications, an oversized or custom evaporator or/ and condenser could be supplied to suit the specific needs of the application. Heat exchanger built to withstand 300psig pressure on the water side could also be supplied on demand.

Optional Water Connections
Different type of water connections for both the evaporator and condenser could be provided to suit the needs of the system. Standard types of water connections provided to suit the needs of the system. Standard types of water connections available are flanges (specify standard), threaded (specify standard) and victual.

Water Flow Switch
In field installations, available for both chilled water and condenser water systems.

Vibrations Isolators
They provide isolation between the chillers and structure to help eliminate vibration transmission. These vibrators are available in both spring type & neoprene.

Power Disconnect Switch
A disconnect switch that disconnect the main power supply to the unit attached to the electrical/ control panel. It prevent opening of panel unless power is disabled. For added safety, this feature will prevent accidental electrocution and is mandatory requirement in certain countries.

Pressure Relief Valve (PRV)
A PRV of fusible plug could be provided for the condenser for extra protection.

Freeze Protection Thermostat
When chilled water outlet temperature drops below a pre-set minimum, the freeze protection thermostat will trip.

Under Voltage & Phase Protection
This device protects against low incoming voltage conditions as well as phase imbalance and phase reversal by shutting down the unit.

Soft Starter
Reduce starting Amp of the Unit.

Amp Meter
This feature provides additional display showing total operating amps of the unit.

Volt Meter
This feature allows an additional display voltage of the unit.

OPTIONAL FEATURES

Entering Chilled Water Temperature Sensor
Additional sensor to monitor the entering chilled water temperature. Connected to the microprocessor and reading could be access from the LCD interface.

Evaporating/ Condensing Pressure & Temperature Probe
Optional digital pressure and temperature probe are available for both evaporating and condensing side separately. The additional of these probes enable the display and calculation of the evaporating pressure and temperature as well as the suction superheat for each refrigerant circuit (if placed on the evaporator/ suction side) as well as the condensing pressure and temperature, together with the liquid sub-cooling (if placed on the condenser/ discharge side). These additional info help ease maintenance, commissioning and trouble-shooting work for the unit as the service technicians & engineer do not have to connect the separate pressure gauges & temperature sensors to the unit. All these info are easily accessed from microprocessor via the LCD.

Electronic Expansion Valve
High precision EEV are available as an option. They provide faster and more accurate response compared to their conventional TXV counterparts thus enabling even better capacity control. Additional evaporating temperature and pressure probes are required for the EEV to function.

HTT INDUSTRIES (M) SDN BHD
Lot 37830, Jalan Bukit Naga, Seksyen 32, 40460 Shah Alam, Selangor Darul Ehsan, Malaysia.
Tel: +603-5162 2936 Fax: +603-5162 2962
Website: www.pmtacm.com

PHYSICAL SPECIFICATIONS

SINGLE COMPRESSOR UNITS **50Hz**

Model	**HWDX-40S**	**HWDX-50S**	**HWDX-60S**	**HWDX-70S**
Cooling Capacity (tons)	44.4	50.1	62.9	79.0
Power Input (kW)	38.5	42.9	56.9	64.1
kW/ton	0.87	0.86	0.90	0.81
Compressor				
Model	RC2-170B	RC2-200B	RC2-260B	RC2-300B
Model	1	1	1	1
Qty	2900	2900	2900	2900
Oil Charge per Compressor (Liter)	7	8	14	16
Evaporator				
Water flow rate (gpm)	98.4	120.72	124.03	170.7
Water Pressure Drop (ftwg)	8.2	10	10.6	12
Water In / Out Connection Size	3”	3”	4”	4”
Water-cooled Condenser				
Water flow rate (gpm)	124.67	149.99	187.15	214.86
Water Pressure Drop (ftwg)	7.9	11.3	7.7	10
Water In / Out Connection Size	4”	4”	4”	4”
Electrical Data @ 400V/3ph/50Hz				
Start-up Method	Star-Delta	Star-Delta	Star-Delta	Star-Delta
Each Compressor RLA	83.5	93.6	123.2	138.8
Each Compressor Nominal Running Current (A)	64.6	72.8	93.4	113
Total Compressor Nominal Running Current (A)	64.6	72.8	93.4	113
Physical Data				
Unit Length (mm)	2235	2235	2540	2540
Unit Width (mm)	635	660	660	864
Unit Height (mm)	1473	1524	1575	1829
Unit Nett Weight (kg)	921	1104	1233	1426
Unit Operating Weight (kg)	1014	1221	1379	1604
Refrigerant Charge (kg)	40	50	60	70

*Manufacturer reserves the right to change specification or design at any time without prior notice.

Note: All performance data are based on the following:

1. **Evaporator in 12.2°C, Out 6.7°C; Medium: water**
2. **Condenser in 30°C, Out 35°C; Medium: water**
3. **Refrigerant R-22**
4. **Evaporator fouling factor of 0.000018m^2 °C/W**
5. **Condenser fouling factor of 0.000044m^2 °C/W**

SINGLE COMPRESSOR UNITS **50Hz**

Model	**HWDX-100S**	**HWDX-125S**	**HWDX-150S**	**HWDX-185S**	**HWDX-230S**
Nominal Capacity (tons)	108.9	136.8	162.2	194.2	259.3
Power Input (kW)	90.0	110.3	128.7	156	202.7
kW/ton	0.83	0.81	0.79	0.80	0.78
Compressor					
Model	RC2-410B	RC2-510B	RC2-580B	RC2-710B	RC2-930B
Model	1	1	1	1	1
Qty	2900	2900	2900	2900	2900
Oil Charge per Compressor (Liter)	15	20	20	28	28
Evaporator					
Water flow rate (gpm)	252.77	319.08	381.38	466.79	580.03
Water Pressure Drop (ftwg)	12.8	13.1	13.8	15.6	18.9
Water In / Out Connection Size	5”	5”	6”	6”	6”
Water-cooled Condenser					
Water flow rate (gpm)	314.86	395.19	470.14	574.45	719.84
Water Pressure Drop (ftwg)	10.8	16.3	14.6	11.9	11.4
Water In / Out Connection Size	5”	6”	6”	6”	6”
Electrical Data @ 400V/3ph/50Hz					
Start-up Method	Star-Delta	Star-Delta	Star-Delta	Star-Delta	Star-Delta
Compressor RLA	118.8	237.9	275.7	332.9	428.6
Each Compressor Nominal Running Current (A)	147.5	183.7	211.6	254.6	330.3
Total Compressor Nominal Running Current (A)	147.5	183.7	211.6	254.6	330.3
Physical Data					
Unit Length (mm)	2540	2540	2540	2540	2540
Unit Width (mm)	1016	1016	1067	1067	1118
Unit Height (mm)	1981	1981	2108	2210	2286
Unit Nett Weight (kg)	1876	1971	2329	2652	3118
Unit Operating Weight (kg)	2105	2223	2642	3047	3660
Refrigerant Charge (kg)	100	125	150	185	230

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Note: All performance data are based on the following:

1. **Evaporator in 12.2°C, Out 6.7°C; Medium: water**
2. **Condenser in 30°C, Out 35°C; Medium: water**
3. **Refrigerant R-22**
4. **Evaporator fouling factor of 0.000018m^2 °C/W**
5. **Condenser fouling factor of 0.000044m^2 °C/W**

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DOUBLE COMPRESSOR UNITS **50Hz**

Model	**HWDX-80D**	**HWDX-95D**	**HWDX-120D**
Nominal Capacity (tons)	88.7	92.1	125.8
Power Input (kW)	77	78.2	106
kW/ton	0.87	0.85	0.84
Compressor			
Model	RC2-170B	RC2-180B	RC2-230B
Qty	2	2	2
Speed (rpm)	2900	2900	2900
Oil Charge per Compressor (Liter)	7	7	14
Evaporator			
Water flow rate (gpm)	195.8	229.3	281.78
Water Pressure Drop (ftwg)	12.2	10.7	13.4
Water In / Out Connection Size	4”	5”	5”
Water-cooled Condenser			
Water flow rate (gpm)	248.86	283.28	354.81
Water Pressure Drop (ftwg)	16.7	23.9	18.6
Water In / Out Connection Size	5”	5”	6”
Electrical Data @ 400V/3ph/50Hz			
Start-up Method	Star-Delta	Star-Delta	Star-Delta
Each Compressor RLA	83.5	86	115.1
Each Compressor Nominal Running Current (A)	64.6	67.2	93.4
Total Compressor Nominal Running Current (A)	129.2	134.4	186.8
Physical Data			
Unit Length (mm)	3556	3606	3606
Unit Width (mm)	762	813	813
Unit Height (mm)	1575	1651	1702
Unit Nett Weight (kg)	1849	2178	2328
Unit Operating Weight (kg)	2055	2435	2623
Refrigerant Charge (kg)	80	95	120

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Note: All performance data are based on the following:

1. **Evaporator in 12.2°C, Out 6.7°C; Medium: water**
2. **Condenser in 30°C, Out 35°C; Medium: water**
3. **Refrigerant R-22**
4. **Evaporator fouling factor of 0.000018m^2 °C/W**
5. **Condenser fouling factor of 0.000044m^2 °C/W**

DOUBLE COMPRESSOR UNITS **50Hz**

Model	**HWDX-135D**	**HWDX-200D**	**HWDX-255D**
Nominal Capacity (tons)	158.1	217.8	273.6
Power Input (kW)	128.2	180	220.6
kW/ton	0.81	0.83	0.81
Compressor			
Model	RC2-300B	RC2-410B	RC2-510B
Qty	2	2	2
Speed (rpm)	2900	2900	2900
Oil Charge per Compressor (Liter)	16	15	20
Evaporator			
Water flow rate (gpm)	341.35	505.58	638.42
Water Pressure Drop (ftwg)	14.9	18.1	17.8
Water In / Out Connection Size	6”	6”	8”
Water-cooled Condenser			
Water flow rate (gpm)	429.72	629.71	790.62
Water Pressure Drop (ftwg)	23.9	17.2	17.1
Water In / Out Connection Size	6”	8”	8”
Electrical Data @ 400V/3ph/50Hz			
Start-up Method	Star-Delta	Star-Delta	Star-Delta
Compressor LRA	138.8	192.9	237.9
Each Compressor Nominal Running Current (A)	113	155.2	193.3
Total Compressor Nominal Running Current (A)	226	310.4	386.6
Physical Data			
Unit Length (mm)	3606	3606	3606
Unit Width (mm)	914	1321	1321
Unit Height (mm)	1880	2184	2286
Unit Nett Weight (kg)	2636	3723	4243
Unit Operating Weight (kg)	2934	4193	4835
Refrigerant Charge (kg)	135	200	255

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Note: All performance data are based on the following:

1. **Evaporator in 12.2°C, Out 6.7°C; Medium: water**
2. **Condenser in 30°C, Out 35°C; Medium: water**
3. **Refrigerant R-22**
4. **Evaporator fouling factor of 0.000018m^2 °C/W**
5. **Condenser fouling factor of 0.000044m^2 °C/W**