

DUNHAM-BUSH

Products that perform...By people who care

DCLC **Dunham-Bush** **Centrifugal Liquid Chiller**



Refrigeration Capacity

1055-5274kW

300-1500 Tons



R_{134a}

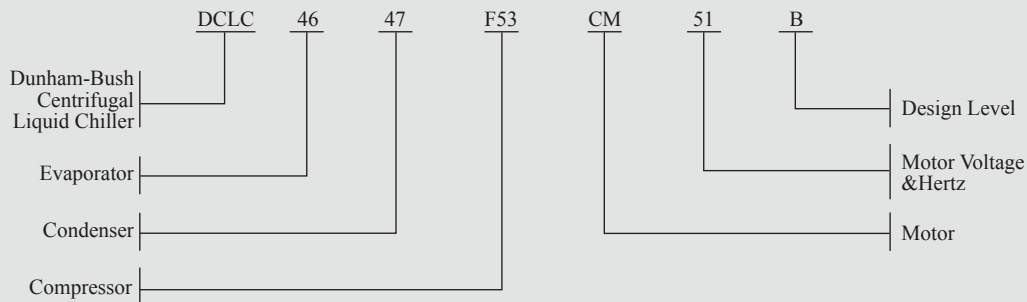
Performance Features

- Single-Stage Positive-Pressure Compressor
- Chlorine-Free HFC-134a Refrigerant
- Flooded Evaporator
- Automatic Refrigerant Purifier
- Advanced PLC Control System
- Option with Variable Frequency Device

Introduction

The Dunham-Bush DCLC Water-Cooled Centrifugal Liquid Chillers are available from 300 to 1500 tons. These units are supplied with single stage centrifugal compressors that have high performance and stability, and the performance of the chillers accord with ARI550/590 Performance

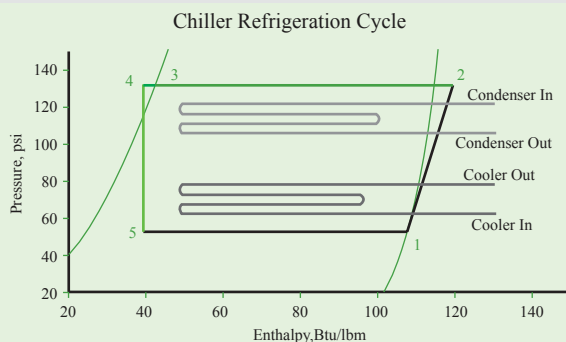
Chiller Nomenclature



High Efficient Refrigeration Cycle

The refrigeration process is shown in a (P.h)-diagram:

- 1-2: Vapor Compression
- 2-3: Vapor Condensing
- 3-4: Subcooling
- 4-5: Throttle Process
- 5-1: Cooling Liquid Vaporization



Chiller Features

- Designed to operate with environmentally safe and economically smart HFC-134a with proven efficiency and reliability

rating of water-chilling packages using the vapor compression cycle". The side by side evaporator/condenser arrangement makes a split design optional for ease of movement through any standard commercial doorway.

All units are factory run tested before shipment.

- Optimal structure configuration
- Convenient for installation and maintenance

Excellent Part Load Performance

Centrifugal Water Chillers combine the efficient operation of the compressor with variable refrigerant management and microprocessor control to yield the best total energy efficiency and significant operating savings under any load.

Adjustable orifice plate and level sensor controls the evaporator liquid level to insure high efficient partial load performance of the chiller, and insure the chillers running stably even the inlet water temperature of condenser being down to 55°F.

Optimal Automatic Refrigerant Purifier

Double-loop design and special automatic oil recovery device insures oil circulation and refrigerant purification

Advanced PLC Microcomputer Control System

Fuzzy logic control theory is used in the PLC microcomputer control system. Key variable detection forecasts operational trends, realize the accurate control of the chiller, besides, The microcomputer comes complete with RS232 and RS485.

communications ports and all hardware and software necessary to remotely monitor and control the packaged chiller up to 50 feet away (hard wired) or by optional phone modem for extended distances by the phone system. This valuable enhancement to the chiller system allows the ultimate in serviceability.

Easy Installation

- No need for vacuum equipment and frequent refrigerant replacement
- Compact structure and small floor area
- Easy installation and maintenance

Installation Flexibility

Modularization design allows the centrifugal chiller to optimally meet customer requirement.



tions and coefficient of performance (COP)

Compressor Characteristic

Single Stage design provides unmatched advantages over other kinds of compressors, such as low vibration level of and noise, light weight, high efficiency, high reliability and low energy consumption.

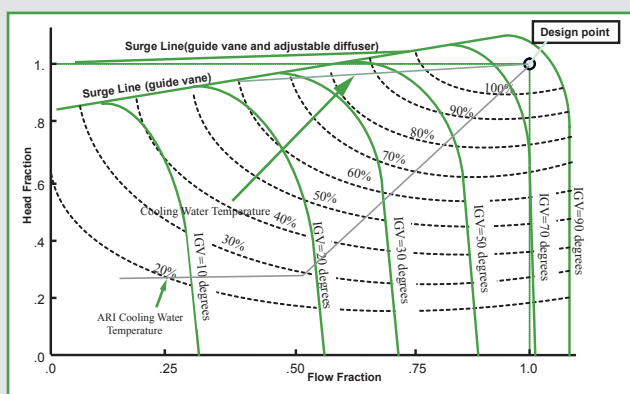
High Efficient Impeller of 3-D Flow Design

- High efficient semi-open impeller designed by 3-D flow theory.
- Special aluminum alloy impeller precision casted by integer mould.
- Precise dynamic balance and 125% over speed testing ensures high efficiency of the chiller at any load of the power network.

New Design! High Precision,
High Efficiency and High
Intensity

Load Regulation Scope

Both the guide vanes and the adjustable diffuser ensure safe running from 10 to 100 percent loading.



Hermetic Motor Cooled by Refrigerant

- Refrigerant cooling of the hermetic motor realize more efficiency and more reliability
- Multi-startup modes decrease the starting current and insure safe condi-

Reliable Oil Circulation

Special babbitt alloy bearings, forced oil cooling system and double protection mode with rich-oil design pattern and high-level oil tank, ensures reliable oil circulation whether the chiller is running or stops suddenly.

Simple Configuration and Convenient Maintenance

- Low voltage control circuits
- Compressor, motor, oil pump and transmission hermetically sealed.
- Oil cooler and oil filter located outside the compressor.
- Replaceable oil filter and oil cooler cores are standard.
- Automated controls self-test on startup.

Heat Exchanger Feature

Flooded Coolers employ the most advanced vessel technology available today. Special internal and external enhanced tubing provides excellent unit efficiency. These coolers are designed and constructed to meet the requirements of the ASME Code, Section VIII, Division 1 for unfired

pressure vessels and are stamped accordingly. The tubing is rolled into the tubesheets and the heads are removable and inter-changeable from end to end for ease of tube maintenance. Vent and drain plugs are provided in each head. Two-pass coolers are standard with optional one and three-pass designs. Victaulic connections are standard.

Display Information

The microcomputer control system has two main functions which are Screen function and control and protection function.

The alphanumeric liquid crystal display utilizes easy-to-understand menu-driven software. Inexperienced operators can quickly work through these menus to obtain the information they require or to modify control parameters. More experienced operators can bypass the menu systems, if desired, and move directly to their requested control function. Easily accessible measurements include:

- Leaving chilled water temperature
- Evaporator pressure
- Condenser pressure
- System voltage
- Guide vane opening degree
- Compressor contactor status
- Water temperature reset value
- Water flow switch status
- External start/stop command status
- Oil temperature
- Oil tank temperature
- Oil tank pressure
- Gears temperature
- Oil pressure difference

System Protection

The following system protection controls will automatically act to insure system reliability:

- Low suction pressure
- High discharge pressure

- Freeze protection
- High oil temperature
- High motor temperature
- Low pressure difference
- Compressor surge
- Sensor error
- Compressor over-current
- Anti-recycle
- Compressor starter failure
- Oil pump overload
- Oil pump starter failure
- Low pressure difference of oil
- Power loss
- Chilled water flow loss

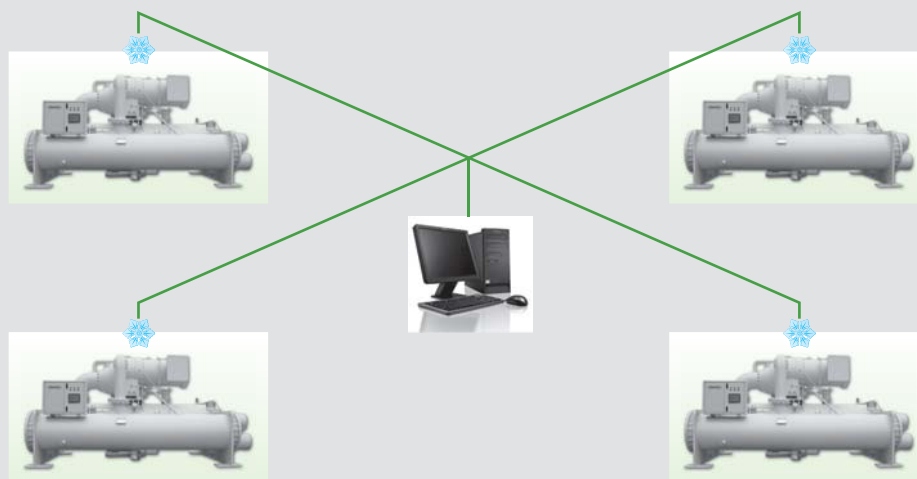
The microcomputer retains the latest thirty alarm conditions complete with time of failure in its alarm history. This tool aids service technicians in troubleshooting tasks enabling downtime and nuisance trip-outs to be minimized.

Remote Monitoring(Optional)

The standard RS232 communications port remote monitoring and control from a simple terminal and optional phone modem. This valuable enhancement to the refrigeration system allows the ultimate in serviceability. The microcomputer comes standard with history files which may be used to take logs which are retrievable via the phone modem periodically. Now owners of multiple buildings have a simple and inexpensive method of investigating potential problems quickly and in a highly cost effective manner. Dunham-Bush has open protocol on its microcomputer to allow direct interface with Building Management Systems.

Remote controller (Option)

The centrifugal chillers are option with alphanumeric liquid crystal controller which has the following advantages:



- Started by set time;
- Save running record
- Display update information of the chillers
- Recovering the factory settings

Besides PC centralized monitoring method, the chillers are option

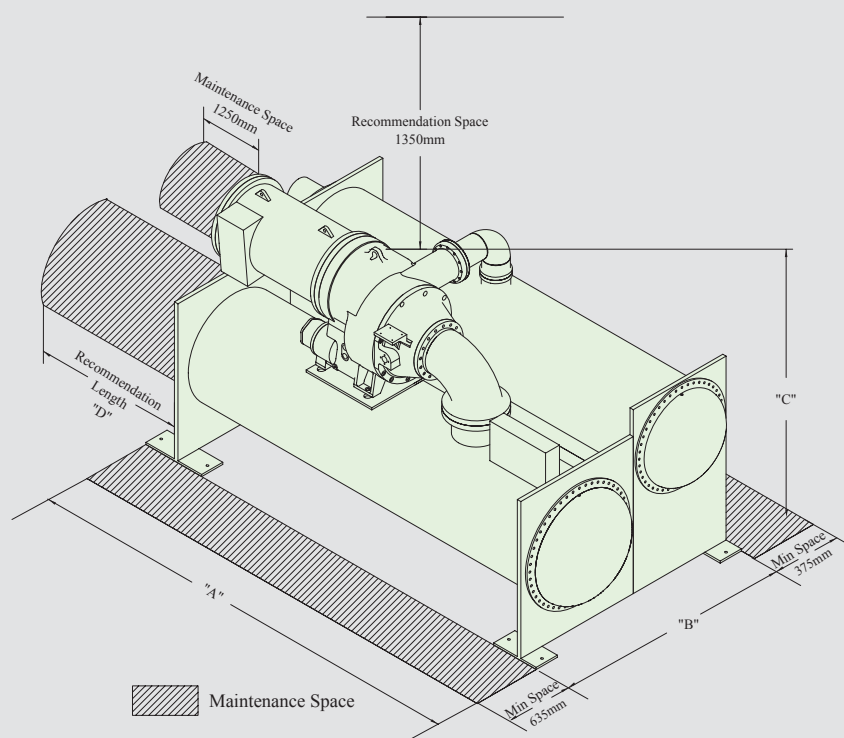
with group control mode, the group control box, a unique monitor, can detect and control up to 32 chillers by twisted-pair, through which the operators can learn water temperature, pressure and alarm date, etc, more over, they can also set running parameters and recover alarm from remote system

Unit Model		DCLC																		
		Cooling Capacity						Input Power						COP						
Cooling Capacity		RT	kW						kW						kW/kW					
Input Power		kW						kW/kW						kW/RT						
Compressor Code		Rated Current						Starting Current						Power Supply						
		A						A						A						
		A						A						A						
		A						A						A						
Motor		Cooling Mode						Refrigerant						380/6000/10000V						
		Code						Code						Code						
		Flow Rate						Flow Rate						Flow Rate						
		Pressure Loss						Pressure Loss						Pressure Loss						
Evaporaotr		Nozzle Pipe Size						DN200						DN250						
		mm						mm						mm						
		l/s						l/s						l/s						
		kPa						kPa						kPa						
Condenser		Nozzle Pipe Size						DN200						DN250						
		mm						mm						mm						
		l/s						l/s						l/s						
		kPa						kPa						kPa						
Dimension		Length (A)						DN200						DN250						
		mm						mm						mm						
		Width (B)						Width (B)						Width (B)						
		Height (C)						Height (C)						Height (C)						
Weights		Rigging Weight						Rigging Weight						Rigging Weight						
		mm						mm						mm						
		kg						kg						kg						
		R134a Weigh						R134a Weigh						R134a Weigh						

1. Work Condition: Cooler Water 12/7°C, Fouling Factor 0.0176(m²·°K)/kW; Condenser Water 32/37°C, Fouling Factor 0.043(m²·°K)/kW

2. Above Chiller Selection according to 380V voltage, if there are other requirements ,please contact with DUNHAN-BUSH.

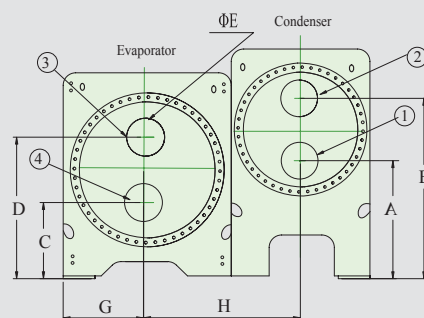
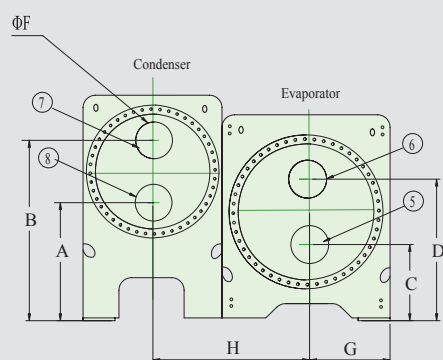
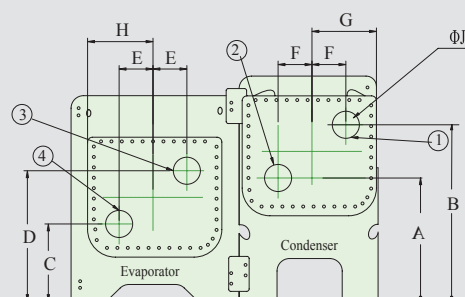
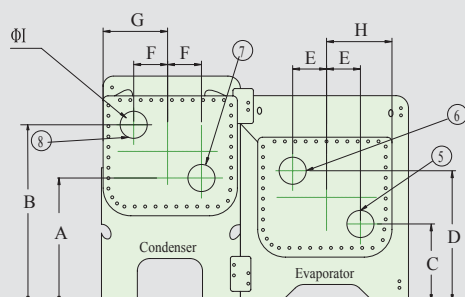
Dimension Data



Code of Evaporator and Condenser			Length "A"	Width "B"	Height "C"	Space "D"
mm						
Frame	2	20~22	4173	1670	2000	3750
		25~27	4694	1670	2000	4350
	3	30~32	4388	1879	2100	3750
		35~37	4909	1879	2100	4350
	4	40~42	4423	1994	2250	3750
		45~47	4944	1994	2250	4350
	5	50~52	4438	2096	2270	3750
		55~57	4959	2096	2270	4350
	6	60~62	5065	2426	2782	4270
		65~67	5675	2426	2903	4880
	7	70~72	5127	2712	2965	4270
		75~77	5737	2712	2965	4880

- Notes:
- 1、The length of A including flanges, where: evaporator and condenser are two passes (close to the switch box in the standard chillers).
 - 2、The above dimensions are based on the pressure bearing at water side, which is 1.0Mpa, and the length A will be changed according to it.
 - 3、The above dimensions are for the standard chillers, if you need non-standard ones, please connect with Dunham-bush.

Configuration Data



Water Chamber Close to the Motor (Model A)

Water Chamber Close to the Compressor (Model B)

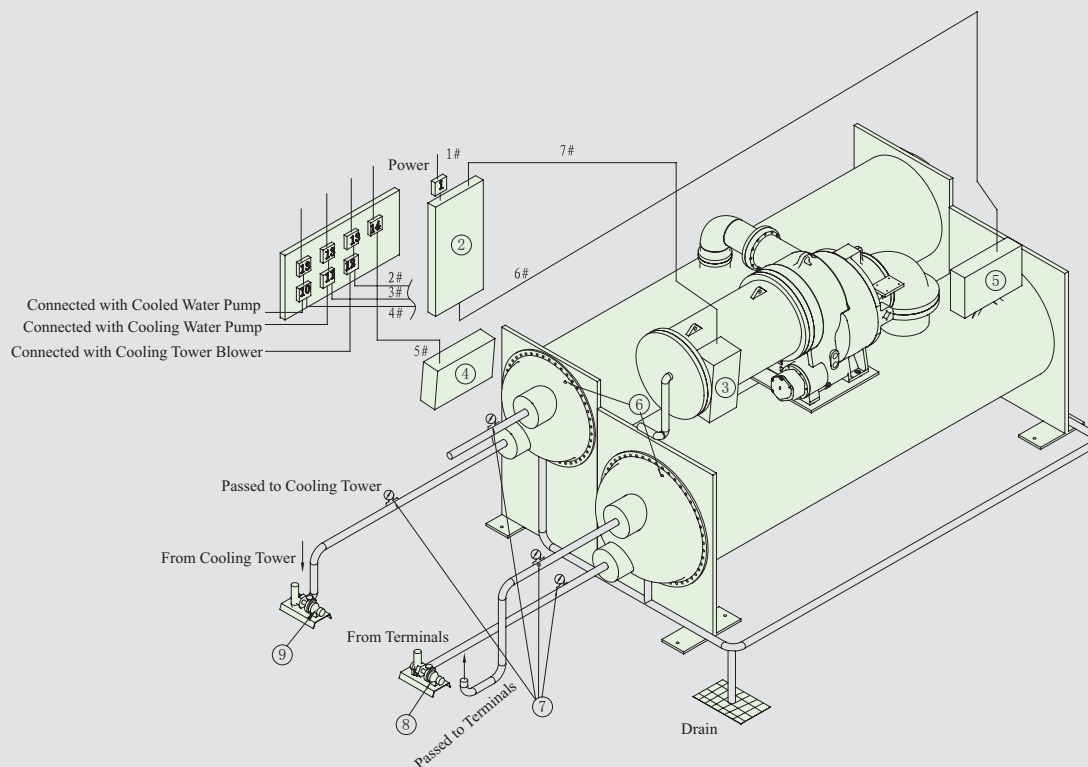
Code of Evaporator and Condenser			A	B	C	D	E	F	G	H	ΦI、ΦJ
Frame	2	20 ~ 22	611	881	390	660	212	212	387	387	DN200
		25 ~ 27									

Code of Evaporator and Condenser			A	B	C	D	ΦE	ΦF	G	H
Frame	3	30 ~ 32	606	976	478	848	DN200	DN200	464	940
		35 ~ 37								
	4	40 ~ 42	747	1117	463	833	DN200	DN250	489	997
		45 ~ 47								
	5	50 ~ 52	799	1169	500	870	DN250	DN250	521	1045
		55 ~ 57								
	6	60 ~ 62	1030	1538	787	1295	DN300	DN300	610	1213
		65 ~ 67								
	7	70 ~ 72	1044	1602	737	1295	DN350	DN350	678	1356
		75 ~ 77								

Notes: 1、Water pipelines of standard chillers are at motor side (Model A), and the inlet and outlet of water are at underside and upside, respectively.

2、The above dimensions are based on the pressure bearing at water side, which is 1.0Mpa, and the length A will be changed according to it.

Classical Pipelines and Connection Figure



(1) Air Switch	(2) Non-airborne Starting Cabinet	(3) Motor Terminal Box	(4) Oil Pump Control Box	(5) Switch Box
(6) Air Vent	(7) Pressure Gauge	(8) Cooled Water Pump	(9) Cooling Water Pump	(10) Cooled Water Pump Starter
(11) Cooling Water Pump Starter	(12) Cooling Tower Starter	(13) Air Switch	(14) Air Switch of Oil Pump	

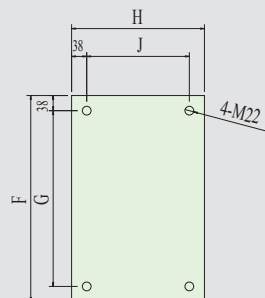
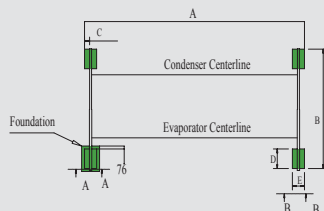
Line No.	Application	Specification
1#	Main Power Entering Starting Cabinet	380V AC: Three Phase, One Neutral Line, One Earth Line. 6300V, 10000V: Three Phase, One Earth Line
2#	From Switch Box to Cooling Tower Starter	Two Control Lines (Option)
3#	From Switch Box to Cooling Pump Starter	Two Control Lines (Option)
4#	From Switch Box to Cooled Pump Starter	Two Control Lines (Option)
5#	From Main Power to Oil Pump Control Box	380V AC: Three Phase, One Neutral Line, One Earth Line.
6#	From Starting Cabinet to Control Box	220V AC: Single Phase, One Neutral Line, One Earth Line. 10 Shield Control Lines, 600V, 80°C, Grounding in the starting Cabinet
7#	From Starting Cabinet to Main Motor	380V AC: 6 Motor Lead lines (the minimum current of it is 0.721 times of rated current), Two Earth Lines 6300V/10kV AC: 3 Motor Lead Lines, One Earth Lines

The Requirements of Connection and Pipelines:

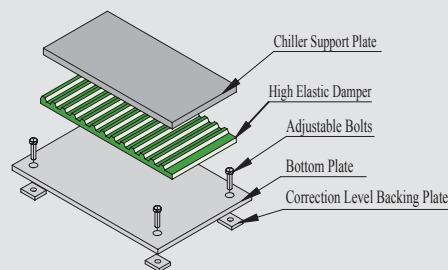
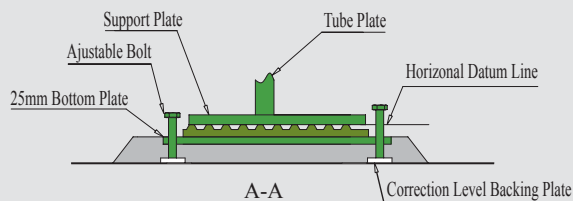
- 1、 All the cables must be set and marked correctly
- 2、 Filters must be set in the cooling water pipelines
- 3、 Temperature gauge (0-50℃) and pressure gauge (0-1MPa or 2MPa) should be set in the inlet/out pipelines
- 4、 It's recommended that vent of the relief valve (R1-1/4", Internal thread) should be led to outside by an steel tube (Outer Diameter:42mm, Thickness:4mm)
- 5、 In order to protect personal safety and health, It's recommended that an oxygen detector should be set in the machine room.

Foundation and Damper

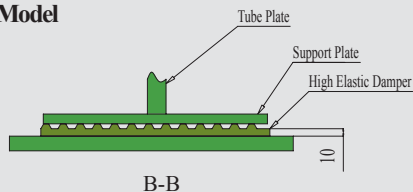
Foundation Dimension



Standard Damper Model



Simple Damper Model



Note:

- 1、There are 4 pieces of bottom plates、16 adjustable bolts and 16 pieces of correction level backing plates in each chiller
- 2、After pouring concrete, the adjustable bolts should be taken out
- 3、Based on the requirement of horizontal adjustment, the thickness of sceondary pouring concrete should be determined according to the actual condition

Code of Evaporator and Condenser			A	B	C	D	E	F	G	H	J
Frame	2	20~22	3960	1670	92	387	229	540	464	254	178
		25~27	4480	1670	92	387	229	540	464	254	178
	3	30~32	3960	1879	92	387	229	540	464	254	178
		35~37	4480	1879	92	387	229	540	464	254	178
	4	40~42	3960	1994	92	387	229	540	464	254	178
		45~47	4480	1994	92	387	229	540	464	254	178
	5	50~52	3960	2096	92	387	229	540	464	254	178
		55~57	4480	2096	92	387	229	540	464	254	178
	6	60~62	4658	2426	176	559	406	711	635	432	356
		65~67	5268	2426	176	559	406	711	635	432	356
	7	70~72	4658	2712	176	559	406	711	635	432	356
		75~77	5268	2712	176	559	406	711	635	432	356

50HZ Motor Data

Motor Code		CB	CC	CD	CE	CF	CG	CH	CJ	CK	CL	CM	CN	CP
Input Power	kW	194	215	241	272	304	335	366	398	429	461	492	523	560
Voltage		Current (A)												
380V	RLA	332	367	419	457	538	571	597	650	695	747	797	848	908
	LRYA	604	609	778	707	877	938	917	984	1234	1231	1351	1469	1280
	LRDA	1903	1916	2441	2208	2741	2929	2990	2158	4013	4007	4398	4775	4181

Motor Code		CQ	CR	CS	CT	DB	DC	DD	DE	DF	DG	DH	DJ	DK
Input Power	kW	597	634	681	738	597	634	681	738	806	856	916	966	1015
Voltage		Current (A)												
380V	RLA	968	1082	1133	1243	1018	1082	1133	1243	1349	1477	1562	1648	1731
	LRYA	1365	2135	2049	2343	1870	2135	2049	2343	2359	3150	3240	3417	3590
	LRDA	4457	6775	6530	7450	5933	6775	6530	7450	7503	9745	10286	10847	11397

Note: 1、Symbol Description: RLA-Rated Current, LRYA-Star Type Stopping-turning Current, LRDA-Delta Stopping-turning Current。

2、If the voltage that you need is different, Please connect with Dunham-bush

Motor Starter

Starter Modes	Solid State Starter	Star-delta Starter	Self Coupling Voltage Transformation Starter			Direct Starter	Primary Reactance Starter	
Voltage	Low	Low	Low	Low/High	Low/High	-	High	High
50Hz	380-415	346-415	346-415	346-10000	346-10000	-	2300-10000	2300-10000
Switch	-	Enclosed	Enclosed	Enclosed	Enclosed	-	Enclosed	Enclosed
% Tap	-	-	57.7	65	80	-	65	80
Ratio of Starting Current Occupied Stopping Turning Current%	45	33	33	42.3	64	100	65	80

Model Selection Discription

Evaporator design pressure at water side: the standard bearing pressure at water side is 1.0MPa, and option with 2.0MPa

Condenser design pressure at water side: the standard bearing pressure at water side is 1.0MPa, and option with 2.0MPa

Damping Device: the centrifugal chillers are standard with rubber damper, and option with spring damper

Noise Control mode: the chillers are option with noise control jacket at the discharge of the centrifugal compressor, as can decrease the noise about 1-2dB (A)。

Dimension Data Discription

The dimension data of the chillers can be referred to the lookup table. As a case of DCLC4647F53, where the code of evaporator and condenser is 46 and 47, respectively, the dimension data of it can be determined by the following method:

Referring to page 6 and from the row of 46~47, the dimension data of it can be obtained

Code of evaporator and condenser	A-Length mm (Including Flanges)	B-Width mm	C-Height mm	D-Pipeline Space mm
45 ~ 47	4944	1994	2250	4350

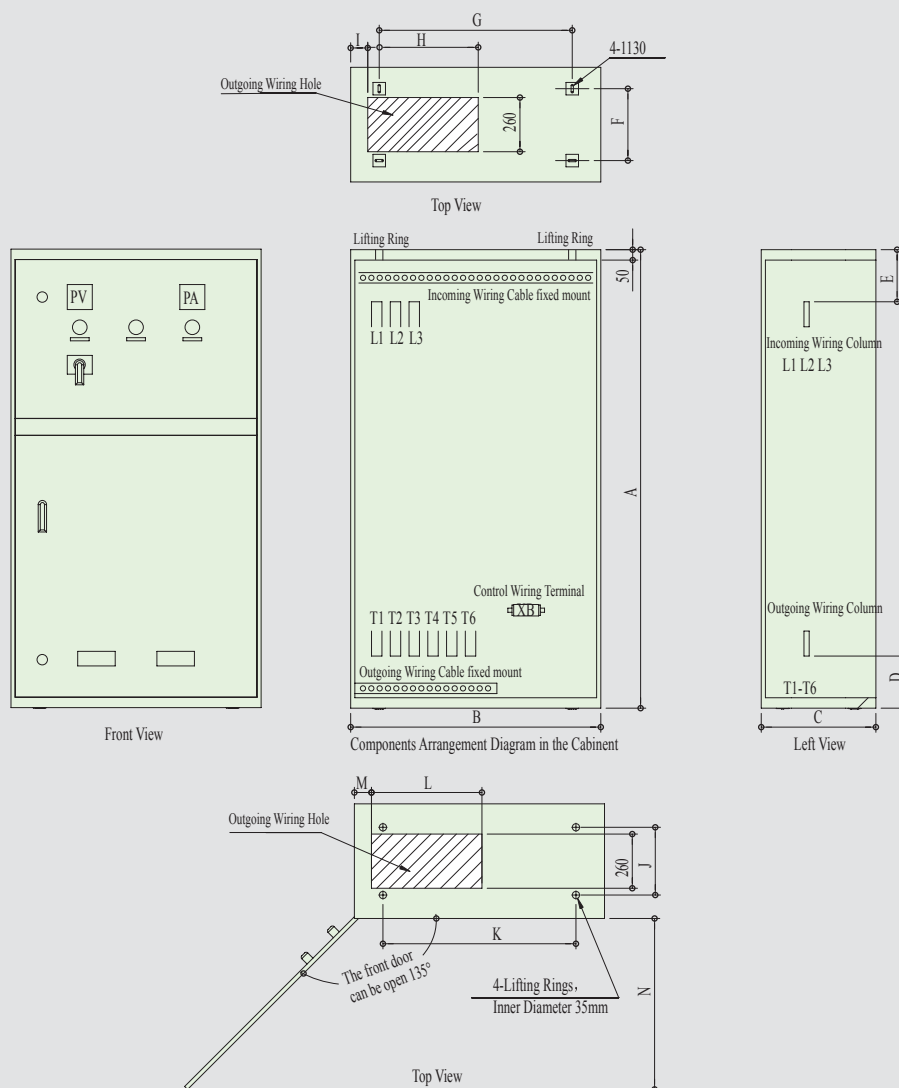
Referring to page 7 and from the row of 46~47, the size of pipeline and flanges can be obtained

Code of evaporator and condenser	A	B	C	D	ΦE	ΦF	G	H
45 ~ 47	747	1117	463	838	DN200	DN250	489	997

Referring to page 9 and from the row of 46~47, the foundation data of it can be obtained

Code of evaporator and condenser	A	B	C	D	E	F	G	H	J
45 ~ 47	4480	1670	92	387	229	540	464	254	178

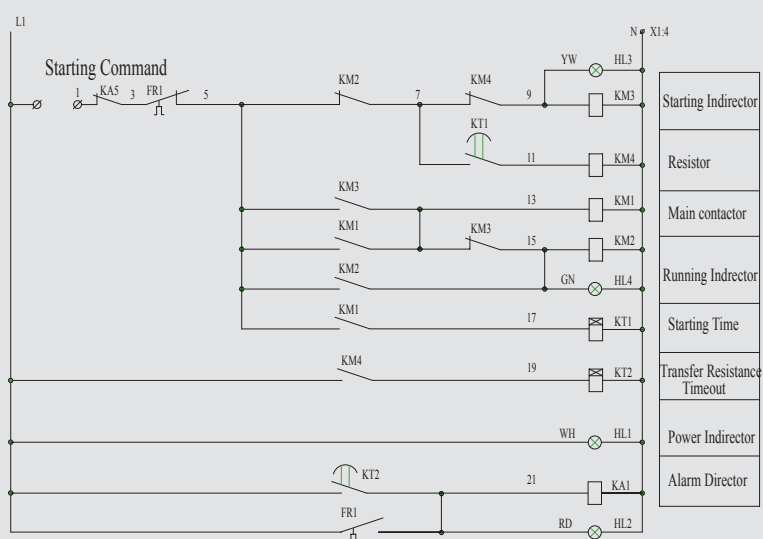
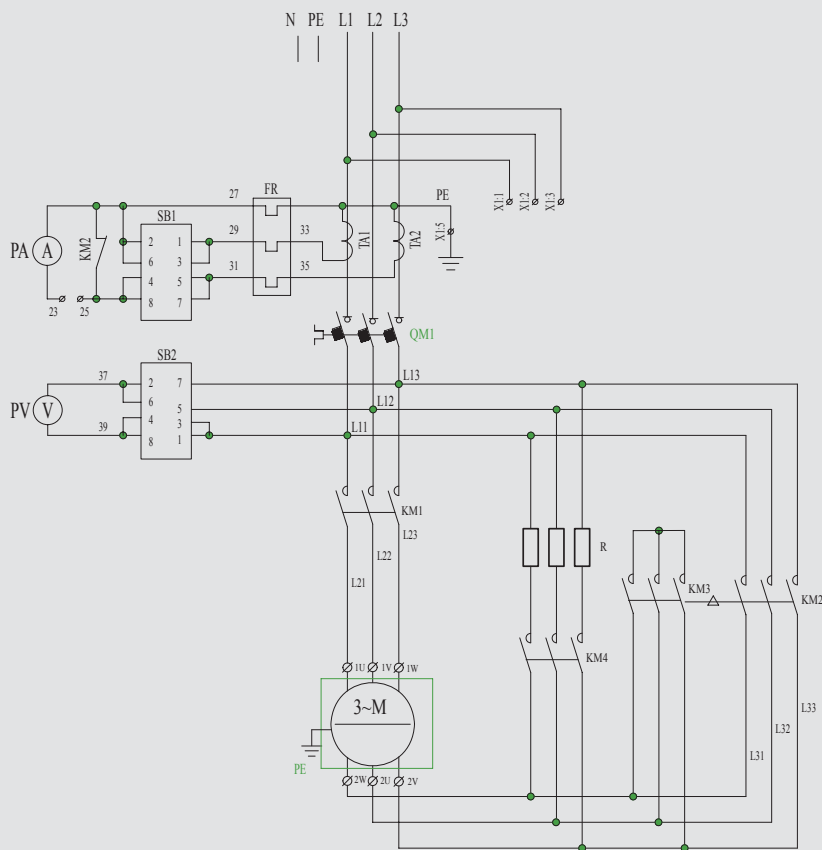
380V Low Voltage Star-delta Starting Cabinet



FLA	A Height	B Width	C Thickness	D	E	F	G	H	I	J	K	L	M	N
0 ~ 495A	1700	800	450	265	240	335	500	380	92	235	636	480	82	600
496 ~ 741A	2000	900	550	300	250	435	600	440	92	325	726	480	82	670
742 ~ 1150A	2100	1100	550	350	250	435	800	440	142	325	926	480	82	810
1151 ~ 1350A	2200	1200	550	250	250	435	900	490	142	325	926	530	82	880

Enclosed Star-Delta Starter Cabinet Wiring Diagram

3N~50HZ 380V/220V



DUNHAM-BUSH

Products that perform...By people who care

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