MULTISTACK®

MSCW SERIES

Modular Water Cooled Screw Chiller

MSCW210

Nominal Capacity 188 to 2823 kW(R)

Issue: 3.0 Date 02/11

Contents

Design Features

STRUCTURE

MULTISTACK Water Cooled Chillers are designed and constructed under the modular technology patent. A chiller bank consists of multiple individual chiller modules connected in parallel to operate as a single machine, with cooling or heating capacity to match the load demand by varying the number of operating modules. The chiller modules start from one module to fifteen for MSCW210 while the MSCW445/485 has a maximum of ten (VWF models has a minimum of four modules), giving you full flexibility to increase the capacity as your needs increase.

Each module contains a screw compressor, evaporator, condenser, and sophisticated control and protection equipments. Each module operates as a completely independent refrigeration circuit, and varying to the total load demand. The controller will change the chiller's capacity by either controlling the number of modules in operation or by adjusting the capacity of the last start up compressor.

The chiller is enclosed within an attractive but also sturdy frame and has removable doors for easy access and convenience for maintenance and service. The doors can be lined with acoustic insulation, which further silences the chiller. (optional)

COMPACT AND SPACE-SAVING

The compact size of each module means easy access via standard doorways and lifts. You no longer need special access to install the chiller. In comparison to conventional water cooled chillers you can gain up to 40% more space. Meaning larger capacity chiller can be easily installed in confined and small places.

ADD-ON FLEXIBILITY

As your needs for cooling increases, Multistack has the solution. Being a modular chiller, it has never been easier to expand the system as larger cooling capacity is needed to meet increased building load demands, with no complicated changes to the room, piping system or control system, and all work can be done quite easily.

SAFE AND RELIABLE

Every module works as an independent refrigeration circuit, with adjacent modules operating independently. In the event of a malfunction in the system, the computer selects the next available standby module to provide back up. One failed module will not disrupt the other chillers or system, giving you total piece of mind.

PEAK ECONOMY AT ALL LOADS

Automatic scheduling of the compressors allows the chiller to match the fluctuating cooling loads and conserve energy with each individual unit running at its peak efficiency. This is much more economical when compared to a large single unit running at part load.

SCREW COMPRESSOR

Each module contains a high efficiency semi-hermetic screw compressor. The refrigerant drawn into the compressor flows evenly over the motor sealed inside the compressor case, and cools down the motor thoroughly. This ensures the motor is always working at the ideal temperature condition. The built-in protection part continually monitors the coil temperature via 6 PTC pre-fix in the coil. The compressor will shut down if abnormal temperature is detected.

The compressor has three stage capacity controls: 50%, 75%, 100%. This is accomplished through a slide valve regulating mechanism. Among all the compressors in operation, the last actuated compressor will run at a three stage capacity control mode to meet the load demand more precisely and keep the chiller running at peak efficiency.

There is also a built in pressure relief feature inside the compressor to by-pass pressure from the discharge to the pressure section whenever the discharge pressure is abnormal. This feature will protect the chiller from damage and prevent loss for refrigerant leakage.

CONDENSER AND EVAPORATOR

Condenser and evaporator use our brazed plate heat exchanger, which is manufactured from type 316 stainless steel, and able to withstand a working pressure of 2400 kPa and 2000 kPa for the refrigerant and water side respectively. The nominal chilled water flow through the heat exchanger is 5.6L/s at a maximum pressure drop of 43kPa.

INTERNAL WATER STRAINER

Internal water strainer is made under the Multistack's patent technology, and made from stainless steel. Internal water strainers are supplied and fixed inside both chilled water header pipes and condenser water header pipes for each module. It can be easily dismantled and removed. The internal water strainer can prevent particles contained in the water from getting into the heat exchanger.

Together with another patent product is a header pipe stub which connects to the end of the condenser pipe, which enables the user to flush, clean and drain to the condenser water system very conveniently.

MV6 CONTROL

The MV6 computer control monitors the chiller's operation and schedules the on and off of each compressor and capacity control stages in respect to the change in load demand. The computer continuously and comprehensively monitors the total operation of all modules in the chiller bank. It will also shut down individual module or the entire bank in the event that a fault occurs. A maximum of 32 refrigeration circuits can be monitored at one time.

SYSTEM DATA AND VARIABLES DISPLAY

The controller's 5.7" touch panel can not only display the chiller's operation data but also provides you with direct access to all of the chillers setting and variables for total system control.

Chiller operation status
- chilled water temperature
- condenser water temperature
- % of chiller cooling capacity
- % demand loading
- load / unload time delay
- current fault number
- % of loading limitation
- lead compressor

Module operation status
- compressor suction pressure
- compressor discharge pressure
- evaporating temperature
- chilled water leaving temperature
- faults status

Chiller variables settings
- password
- chilled water temperature
- lead compressor
- temperature integrating time
- economy offset
- load / unload time delay
- time and date

COMPRESSOR SEQUENCE

The MV6 controller accumulates the running hours of each compressor and hence establishes working sequence. A standby compressor with the least working hours will be activated during loading. The same goes for a compressor with the most working hours will be stopped during unloading. This ensures each compressor in the system has an even usage, which will save you time and money in the long run for maintenance.

FAULT REVIEW

The controller will record and display the last 60 faults that occurred, giving detailed information such as time, date, location, cause, current status, as well as the performance data collected at the moment each fault occurred.

LOAD PROFILE

The controller records all working hours of the chiller and compressor and records it accordingly in 10% brackets from 0% - 100%, giving you detailed information for which percentage the chiller is running mostly.

PASSWORD

A two level password protection is included (for both customer and service personnel) to give you piece of mind. For example the service password will give you full access to settings and variables, but the user password will only enable the user see but not change settings and variables.

STANDBY CONTROL

Each module can be set for three modes: auto/ off/independent operation via the slave outstation card installed in the module. Default setting is "auto", with "off" mode for when maintenance is required and "independent" mode (where the module is controlled by its own slave outstation card and operates independently from the controller), is usually for commissioning or emergency operation.

REMOTE CONTROL & MONITORING (OPTIONAL)

MV6 is fitted with a RS485 serial port, which enables remote control monitoring.

(1) Connect it to a pc and install the software (Ms Windows based only) and away you go. Multistack's RCM software give you full access to the chillers controls and settings, with a maximum communication cable length of 1200m.

(2) The MV6 is opened to the ASCII agreement and communicates with BAS.

(3) Connect it to an Ethernet-card and with an IP address you can access the chiller over the internet giving you absolute flexibility.

MODEL NUMBER DESIGNATION

M	SC	W	210	C	-	6	A		F	V
1	2	3	4	5		6	7	8	9	10

1: Modular series
2: Screw compressor
3: Cooling type
A:Air-cooled
W:Water-cooled
4: Model Number
5: C: Cooling Only
H: Heat Pump

6: Number of modules
No. of modules per chiller (1~15)

7: Electrical Specifcations
A: AC380-420V/50Hz/3Ph
B: 380v/60Hz/3 Ph
C: AC440-460V/60Hz/3Ph

8: Configuration
Blank for Standard

9: Refrigerant
E: R134a
F: R22
R: 407c

10: Water system
V: VWF
Blank for normal chiller
* VWF price to be advised on request

Physical Data Per Module

Model		MSCW210(V)		
Refrigerant Type		R22	R407c	R134a
Nominal Cooling Capacity (kW)		188.2	185.1	162.6
Nominal Power Input (kW)		41.4	45.2	35.9
Compressor	Type	Semi-hermetic Screw Compressor		
	Number	1		
	Power	AC380-420V or 415V/50Hz/3Phase		
	Startup Current (A)	218	290	290
	Max. Running Current (A)	92	128	124
	Locked Rotor Amperage (A)	441	485	485
Capacity Stages		0, 50%, 75%, 100%		
Refigerant Charge (kg)		23	20	16
Evaporator	Type	Brazed PLate Type Stainless Steel 316		
	Number	2		
	Nominal Water Flow (L/s)	8.9	8.8	7.8
	Water Pressure Drop (kPa)	55		
	Fouling Factor (m^2k/kW)	0.018		
	Max. Working Press. (Refigerant Side) (kPa)	2400		
	Max. Working Press. (Water Side) (kPa)	2000		
	Water Connection (Pipe size)	8”		
Condenser	Type	Brazed PLate Type Stainless Steel 316		
	Number	2		
	Water Flow (L/s)	10.9	11.0	9.5
	Water Pressure Drop (kPa)	50		
	Fouling Factor (m^2k/kW)	0.044		
	Max. Working Press. (Refigerant Side) (kPa)	2400		
	Max. Working Press. (Water Side) (kPa)	2000		
	Water Connection (Pipe size)	8”		
Dimension (L x W x H) mm		2030 x 550 x 1895		
Operation Weight (kg)		1240		
Shipping Weight (kg)		1300		

Nominal Values based on:

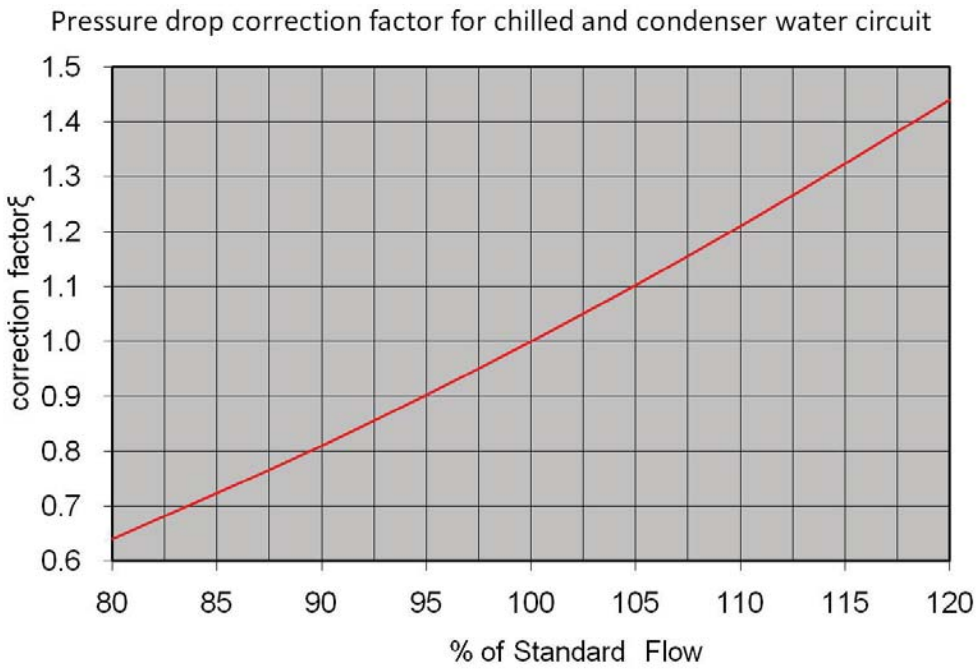
- Chilled Water Leaving Temp. 7°C
- Chilled Water Entering Temp. 12°C
- Condenser Water Leaving Temp. 35°C
- Condenser Water Entering Temp. 30°C

Note:

- Minimum Chilled Water Flow Rate Per Module: Nominal Water Flow Rate less 10%
- Minimum Condenser Water Flow Rate Per Module: Nominal Water Flow Rate less 10%

  Contact Multistack Ltd. If lower flow rate is required.

HEAT EXCHANGER WATER PRESSURE DROP



Pressure drop correction factor: k is related to total number of modules (n) in the chiller bank

N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
MSCW210	1.00	1.00	1.01	1.01	1.02	1.02	1.03	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.11

Note:

1. Water pressure drop calculation

Water flow %

$$= \frac{\text{Actual water flow}}{\text{Nominal water flow}} \times 100\%$$

Heat exchanger actual water pressure drop per module

= heat exchanger nominal water pressure drop × ξ

Total water pressure drop per chiller

=heat exchanger actual water pressure drop per module × k

2. Chiller minimum working water flow

(1) Constant water flow system,no less than 90% of chiller total nominal water flow

(2) Variable water flow system: no less than 90% of module nominal water flow

LOW-TEMPERATURE COOLING PERFORMANCE

MSCW series modular screw chiller can work at low temperatures under -10°C leaving water temperature. Suitable for ice-making operation, or technique process control for industry production. When operating at low temperature, it is recommended to use glycol or other solutions with low freezing points to carry refrigerant, do not use brine or solutions which will rust copper or stainless steel and thus damage the plate heat exchanger. For low temperature application, it is necessary to correct the chiller's cooling capacity, running power input and HX water pressure drop.

(1)Actual cooling capacity

= Nominal cooling capacity x C1 x C2

(2)Actual running power input

= Nominal Rate Current input x C3 x C4

(3)Actual evaporator water pressure drop

= 0% Glycol Water side Pressure Drop x C5

GLYCOL CONCENTRATION TABLE

Weight concentration %	0	5	10	15	20	25	30	35
Freezing point temperature °C	0	-1.4	-3.2	-5.4	-7.8	-10.7	-14.1	-17.9
Maximum working temperature °C	5.0	4.0	2.0	0.0	-2.0	-5.0	-8.0	-12.0
Cooling performance correction factor **C1**	1.000	0.997	0.992	0.988	0.985	0.982	0.980	0.978
Running power correction factor **C3**	1.000	0.999	0.997	0.996	0.995	0.994	0.993	0.993
Evaporator water pressure drop correction factor **C5**	1.00	1.050	1.102	1.220	1.305	1.423	1.536	1.740

COOLING PERFORMANCE CORRECTION FACTOR C2 & RUNNING POWER CORRECTION FACTOR C4

Condenser Leaving Water Temperature °C	Leaving Chilled Water Temperature °C							
	-10	**-8**	**-6**	**-4**	**-2**	**0**	**2**	**4**
	Cooling Performance Correction Factor C2							
30	0.521	0.566	0.614	0.663	0.726	0.794	0.883	0.962
35	0.484	0.531	0.580	0.632	0.688	0.732	0.861	0.916
40	0.462	0.505	0.553	0.607	0.658	0.714	0.791	0.869
45	0.433	0.480	0.528	0.577	0.624	0.672	0.732	0.822
	Running Power Correction Factor C4							
30	0.727	0.754	0.781	0.805	0.833	0.852	0.876	0.902
35	0.778	0.805	0.831	0.858	0.884	0.903	0.932	0.992
40	0.820	0.851	0.892	0.923	0.954	0.987	1.107	1.112
45	0.866	0.879	0.936	0.980	1.011	1.196	1.204	1.231

Unit Capacity Per Module - MSCW210

Leaving Condenser Water Temp. °C	R22		Leaving Chilled Water Temperature °C						R22			
	5		6		7		8		10		12	
	CAP	**PI**	**CAP**	**PI**	**CAP**	**PI**	**CAP**	**PI**	**CAP**	**PI**	**CAP**	**PI**
30	**183.1**	36.1	**190.0**	36.2	**200.7**	36.4	**208.0**	36.4	**223.3**	36.7	**239.4**	36.9
35	**172.1**	41.2	**178.7**	41.3	**188.2**	41.4	**195.9**	41.4	**210.6**	41.6	**226.1**	41.8
37	**167.2**	43.5	**173.7**	43.6	**183.7**	43.6	**190.6**	43.7	**205.0**	43.8	**220.2**	44.0
40	**159.4**	47.2	**165.7**	47.2	**175.4**	47.3	**182.2**	47.3	**196.1**	47.4	**210.8**	47.6
45	**145.4**	54.0	**151.3**	54.0	**160.5**	54.0	**166.9**	54.0	**180.0**	54.1	**193.9**	54.2

Leaving Condenser Water Temp. °C	R407c		Leaving Chilled Water Temperature °C						R407c			
	5		6		7		8		10		12	
	CAP	**PI**	**CAP**	**PI**	**CAP**	**PI**	**CAP**	**PI**	**CAP**	**PI**	**CAP**	**PI**
30	**180.1**	41.5	**190.8**	40.8	**198.2**	41.1	**205.8**	41.4	**221.7**	42.2	**238.5**	43.0
35	**167.6**	46.1	**177.9**	45.0	**185.1**	45.2	**192.2**	45.5	**207.4**	46.1	**223.4**	46.8
37	**162.4**	48.1	**172.5**	46.8	**179.4**	47.1	**186.6**	47.4	**201.4**	47.9	**217.2**	48.5
40	**154.4**	51.3	**164.2**	49.9	**170.9**	50.1	**177.9**	50.3	**192.3**	50.8	**207.6**	51.3
45	**140.3**	57.3	**149.6**	55.5	**156.0**	55.7	**162.7**	55.9	**176.4**	56.3	**191.0**	56.7

Leaving Condenser Water Temp. °C	R134a		Leaving Chilled Water Temperature °C						R134a			
	5		6		7		8		10		12	
	CAP	**PI**	**CAP**	**PI**	**CAP**	**PI**	**CAP**	**PI**	**CAP**	**PI**	**CAP**	**PI**
30	**155.7**	32.1	**165.9**	32.5	**173.0**	32.8	**180.4**	33.1	**195.8**	33.7	**212.2**	34.4
35	**146.1**	35.2	**155.9**	35.6	**162.6**	35.9	**169.7**	36.2	**184.4**	36.8	**200.1**	37.5
37	**142.0**	36.6	**151.6**	37.0	**158.3**	37.3	**165.2**	37.6	**179.7**	38.2	**195.1**	38.9
40	**135.9**	38.8	**145.1**	39.2	**151.6**	39.5	**158.3**	39.8	**172.3**	40.4	**187.2**	41.1
45	**125.2**	42.9	**133.9**	43.3	**140.0**	43.6	**146.3**	43.9	**159.5**	44.5	**173.7**	45.1

CAP Cooling Capacity (kW)

PI Compressor Power input (kW)

Note:

- This table is based on a 5°K difference in water temperature.
- Please contact your local Multistack Agent if you require performance data beyond the limits of the above table.
- Interpolation is permissible. Do not extrapolate.

Chiller Selection

SELECT WATER-COOLED CHILLER ACCORDING TO FOLLOWING CONDITIONS:

1. Entering Chilled Water temperature (ECHW)….....…12.5℃
2. Leaving Chilled Water temperature (LCHW)…….....7℃
3. Chilled Water Flow (CHWF)……..……..……..……122.2 L/s
4. Entering Condenser Water temperature (ECW)…….....30℃
5. Leaving Condenser Water temperature (LCW)…..….....35℃
6. Refrigerant…….....……R22
7. Power……..…….....AC380V±10%/ 50Hz/ 3ph

Calculation

1. Determine cooling capacity required (kW)

= CHWF × 4.187 ×(ECHW-LCHW)

= 122.2 × 4.187 ×(12.5-7)

= 2814 kW required

2. From capacity chart above,

- 1 module at stated conditions will achieve;

CAP= 188.2 kW per MSCW210 module

Divide the required capacity by achieved capacity at specified conditions to determine required number of modules:

= 2814 kW required / 188.2 kW achieved = 14.95 modules

∴ Select 15 modules of MSCW210

The total cooling capacity of the chiller is:

15 × 188.2 = 2823kW

3. Chilled water pressure drop calculation

(1) nominal Water Flow = 15 x 8.9

=133. L/s

Chilled water pressure drop for nominal water flow per module is 55kPa

(2) Actual water pressure drop

chilled water flow % = 122.2 ÷ 133.5 = 91.5%

Use the chart Pressure drop correction factor for chilled and condenser water circuit. The correction ξ is 0.83 for 91.5% of water flow.

Use the table Pressure drop correction factor: k=1.11 for the configuration: 15 modules of MSCW210.

Actual chilled water pressure drop of the chiller is:

0.85 × 55 × 1.11=50.6 kPa

4. Condenser water flow and pressure drop calculation:

(1) Condenser water flow

15×10.9 = 163.5 L/s

(2) Condenser water pressure drop

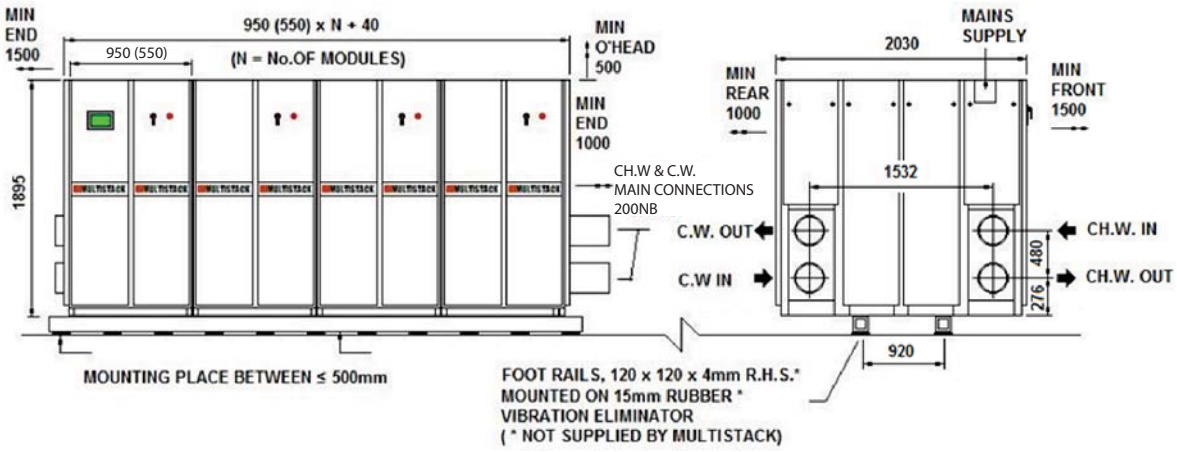
Condenser water pressure drop for nominal water flow per module is 50kpa

Use the table Pressure drop correction factor: k, k=1.11 for the configuration: 15 modules of MSCW210.

Actual condenser water pressure drop is:

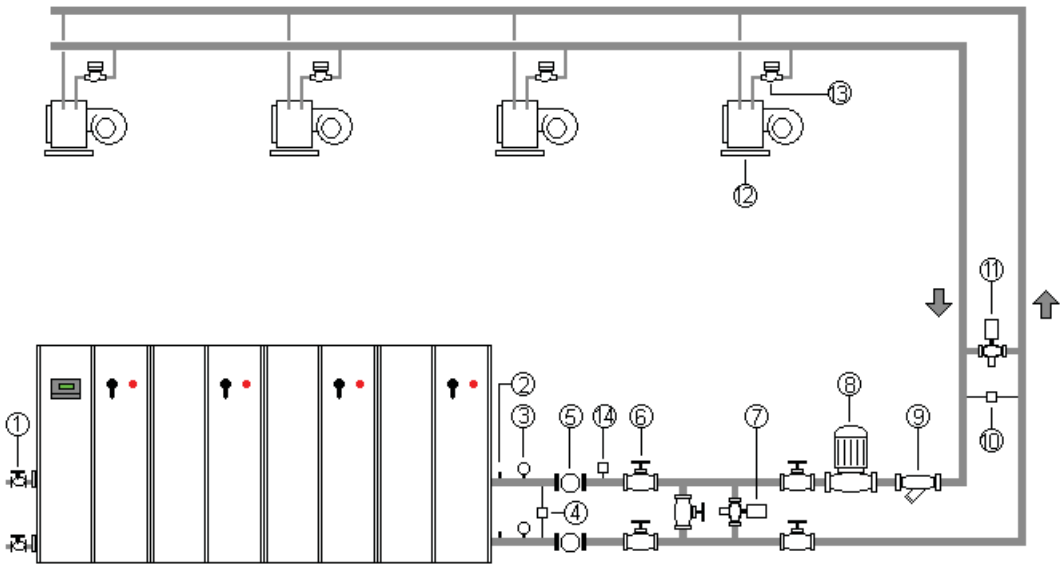
55 × 1.11 = 55.5 kPa

Physical Dimensions



NOTES:

1. All installations must include the following:
   - 3/8" BSP socket in all water connections adjacent to chiller for Multistack sensor installation. (Supplied by Multistack)
   - Cooling tower by-pass control or other system to prevent over condensing.
   - Pressure Tappings for Flow measurement (supplied by Multisatck)
   - 60 Mesh stainless strainers in water inlet piping.
2. Electrical mains entry may be made from either end of unit. Some larger machines (determined by the current draw & cable size) require mains entry at both ends. Refer to electrical installation data for isolation information and determination.
3. Chilled and condenser water connections may be interchanged for end to end as required.



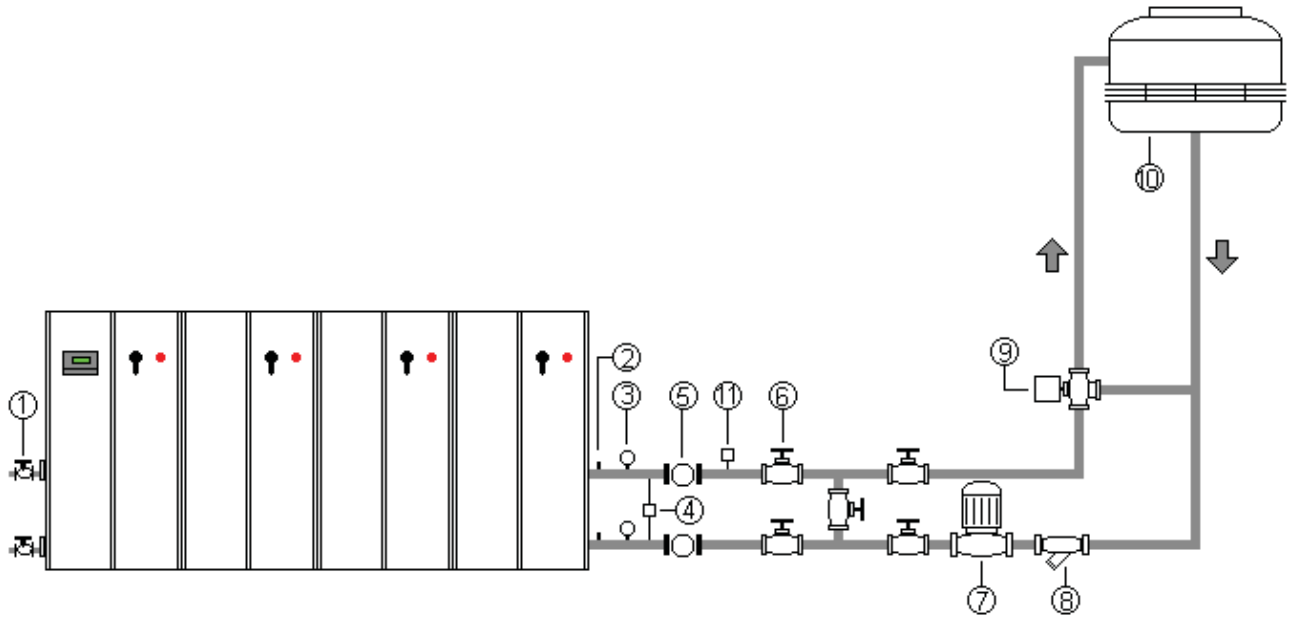
CHILLED WATER PIPING PARTS

Item	Description	Qty	Remarks
1	Drain Valve DG50	2	
2	Chilled Water Temp Sensor	2	supplied with chiller
3	Pressure Gauge	2	
4	Chiller side differential pressure sensor	1	supplied with VWF type chiller only
5	Vibration Eliminator	2	
6	Isolation Gate Valve	5	
7	Load side differential pressure by-pass valve	1	for VWF type chiller only
8	Water Pump		
9	Water Strainer	1	
10	Load side differential pressure sensor	1	supplied with VWF type chiller only
11	chiller side differential pressure by-pass valve	1	
12	terminal air handling equipment		
13	motorized valve		
14	water flow switch	1	only for constant water flow type

VWF——Variable Water Flow

Note:

1. Customer's responsibility for all piping parts, except those included with the chiller.
2. For VWF type chillers, the chiller side differential pressure by-pass valve (7) is optional. Upon installation, the pressure setpoint should be 100kpa for by-pass valve opening
3. For VWF type chiller, our suggestion of by-pass opening pressure for load side differential pressure by-pass valve (11) is: Load side differential pressure setpoint + 50kpa
4. For VWF type chiller, the installed location of load side differential pressure sensor depends on the chiller design, the recommended location is at the most critical point of the system.
5. During the whole installation process, the isolation gate valves on both entering /leaving line to the chiller should be closed. The valves will remain closed until the piping installation; leakage check and cleaning are all completed.
6. To prevent stress on the headers and Victaulic couplings all water pipe work must be properly supported
7. To prevent water accumulation inside the sensor socket grease should be filled in the sensor socket before inserting the chilled water temperature sensor.



CONDENSOR WATER PIPING PARTS

Item	Description	Qty	Remarks
1	Drain Valve DG50	2	
2	Condensor water Temp Sensor	2	supplied with chiller
3	Pressure Gauge	2	
4	Chiller side pressure differential sensor	1	supplied withVWF type chller only
5	Vibration Eliminator	2	
6	Isolation Gate Valve	5	
7	Water Pump		
8	Water Strainer	1	
9	Condensor water by-pass proportion regulating valve	1	optional
10	Cooling Tower		
11	Water Flow Switch	1	for constant water flow type chiller only

VWF——Variable Water Flow

Note

1. It is the customer's responsibility to supply all piping parts, except for those supplied with the chiller.

2. The condenser water by-pass proportion regulating valve will not be neccearry if the cooling tower fan is controlled by the condenser water leaving temperature.

3. The condenser water can be controlled by the cooling tower fan or condenser water by-pass, its leaving temperature shouldn't exceed 25% to prevent the compressor from operating at low suction pressure.

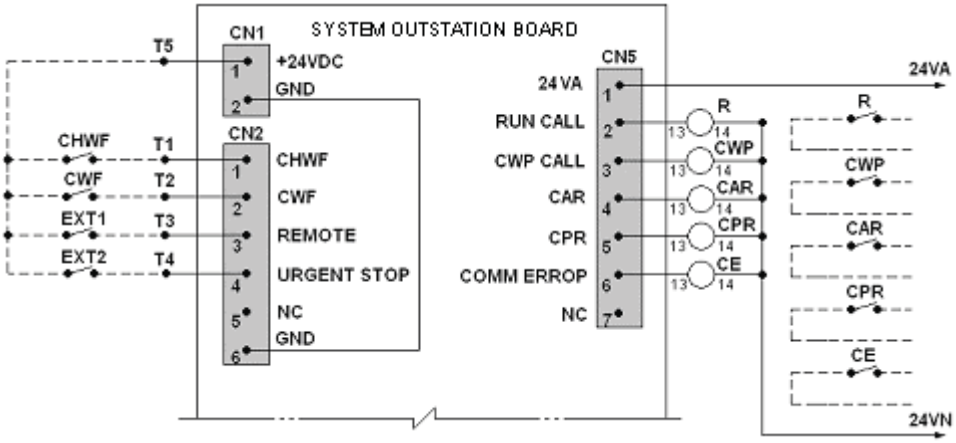
4. During the whole installation process, the isolation gate valves on both entering /leaving line to the chiller should be closed. The valves will remain closed until the piping installation; leakage check and cleaning are all completed.

5. To prevent stress on the headers and Victaulic couplings all water pipe work must be properly supported.

6. To prevent water accumulation inside the sensor socket grease should be filled in the sensor socket before inserting the chilled water temperature sensor.

Electrical Wiring Diagram

Field wiring diagram for mv6 system outstation board and external control circuit



Note

CHWF —— Interlock contacts in series for chilled water flow switch and water pump contact auxiliary (no flow switch for VWF)

CWF —— Interlock contacts in series for chilled water flow switch and water pump contact auxiliary(no flow switch for VWF)

Ext1 —— External remote on/off input

Ext2 —— External emergency stop input

R —— Chiller running status output

CWP —— Condenser water pump running output

CAR —— Fault alarm output

CPR —— Compressor running status output

CE —— Communication error alarm output

Wiring note

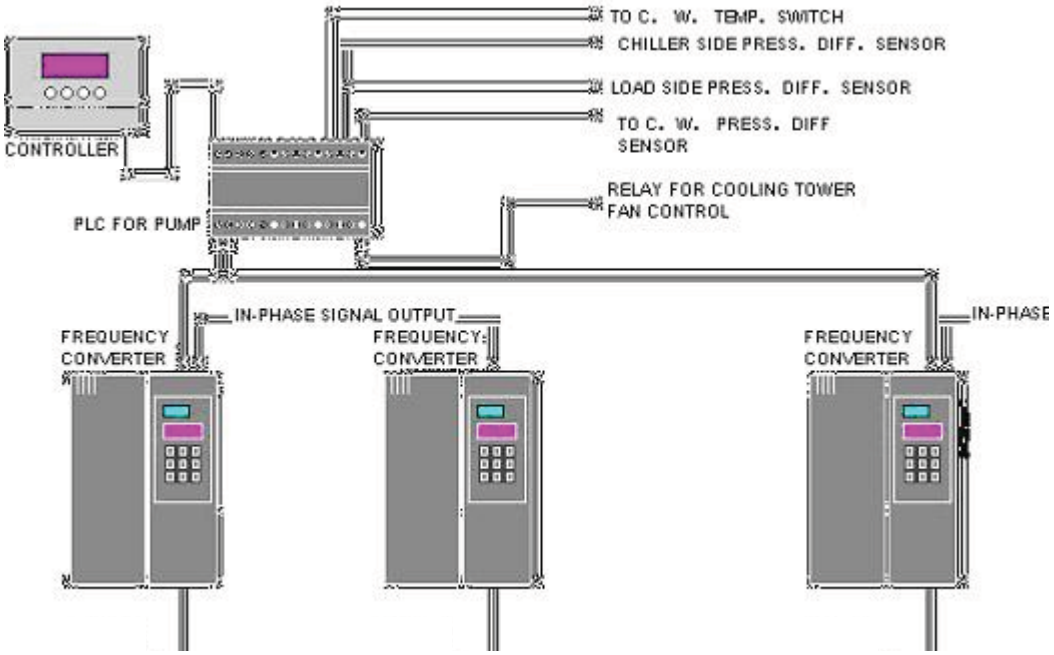
- o Control wiring to be 1mm2 minimum.
- o Bridge between terminals t3&t5 if ext-1is not utilized.
- o Bridge between terminals t3&t5 if ext-1 is not utilized.
- o Free contacts have a maximum rating of 5a.
- o Flow switch and external interlock device are not supplied by Multistack
- o Wiring by Multistack—/ wiring by user-----

ELECTRICAL DATA PER MODULE

Model		MCSW210		
Refigerant		R22	R407c	R134a
Power		AC380 ± 10% V / 50Hz / 3Ph		
Compressor (each)	MRC (A)	92	128	124
	RLA (A)	61	81	73
	STC (A)	218	290	290
MSC		(N-1) x MRC + STC		

Electrical Wiring Diagram

MV6 control for VWF type chiller water pump system (Only for Variable Water Flow Chiller)



1. Frequency converter, water pump supplied by customer.

2. The simulated frequency signal output of water pump controller and frequency converter is 4-20 ma.

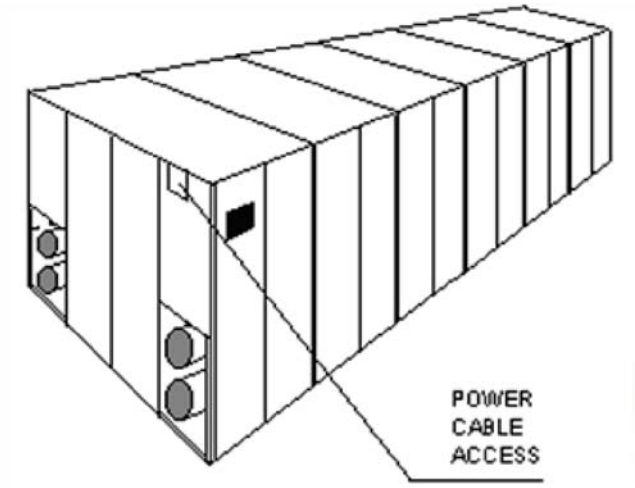
3. All signal cables are shielded cable.

4. The length of the cable-connecting the differential pressure sensor and water pump controller should not be over 30m, otherwise signal amplifier has to be installed. (optional)

5. For applications where more than one chilled water or condenser water pump is required, use frequency to control frequency converters' output to ensure same working frequency for each water pump.

6. Chiller side differential pressure is set in factory; chilled water load side differential pressure is set on site.

Power Connection

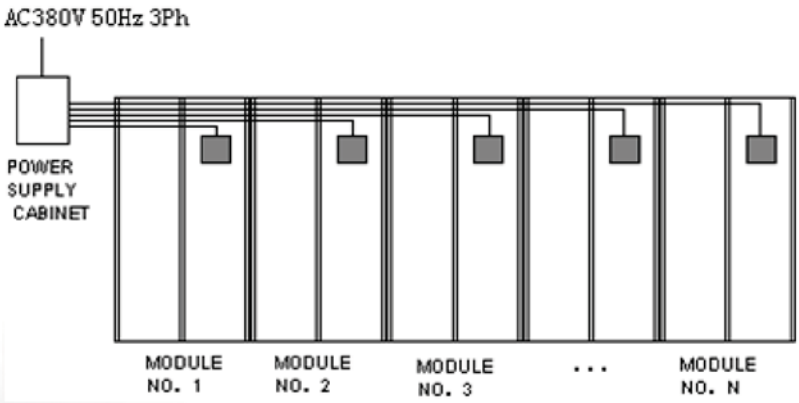


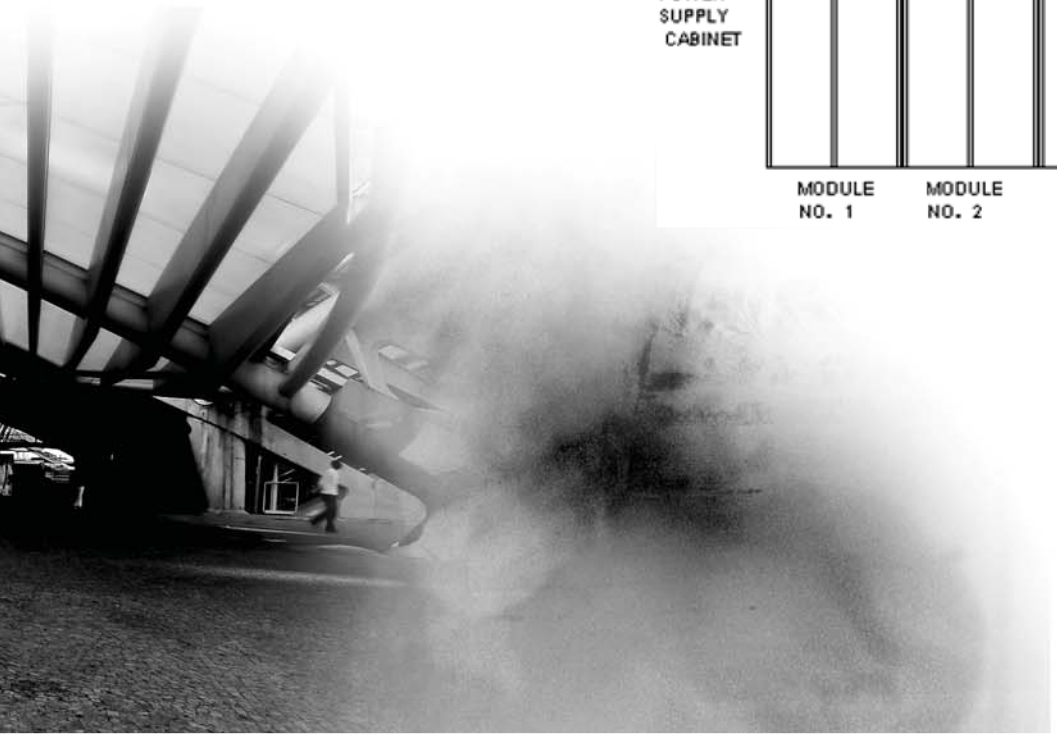
Power mains cables access from side, conduct along cable grill inside chiller.

Note

1. When starting the chiller, the compressor is start up one at a time. The chiller starting current is equal to the total current of operating compressors plus the starting current of the compressor.
2. Electrical mains entry can be made at either end of the chiller. Power cables must be connected to each individual module and conducted along cable grill inside chiller.
3. When selecting mains cable size use MRC. Allowances must be made for voltage imbalance, ambient temperature and other conditions in compliance with AS 3000 or local relevant electrical codes.

Power distribution cabinet (prepared by customer) should provide equal numbers of power cables connecting to each module.





Modular and VWF

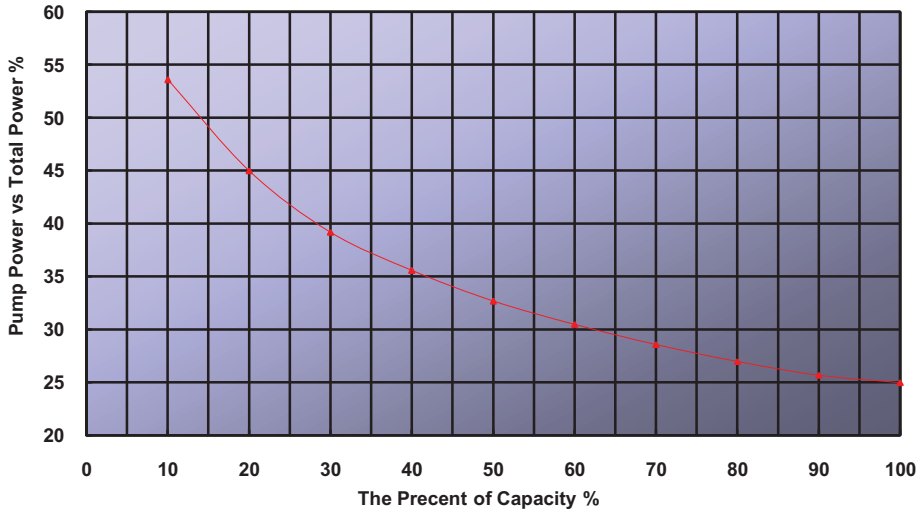
THE SOLUTION TO REDUCE CENTRAL AIR-CONDITIONING UNIT ENERGY CONSUMPTION

Central air-conditioning technology solves air-handling problem for large buildings. And its enormous advantages such as reliability, simplicity and convenient management make it the favorite for large building applications.

Despite of all the advantages stated above, central air-conditioning units has a major drawback to produce constant water flow. This handicap affects the water flow in not being able to change according to the constant variation in load demand, and resulting in excessive water pump power consumption at low load conditions.

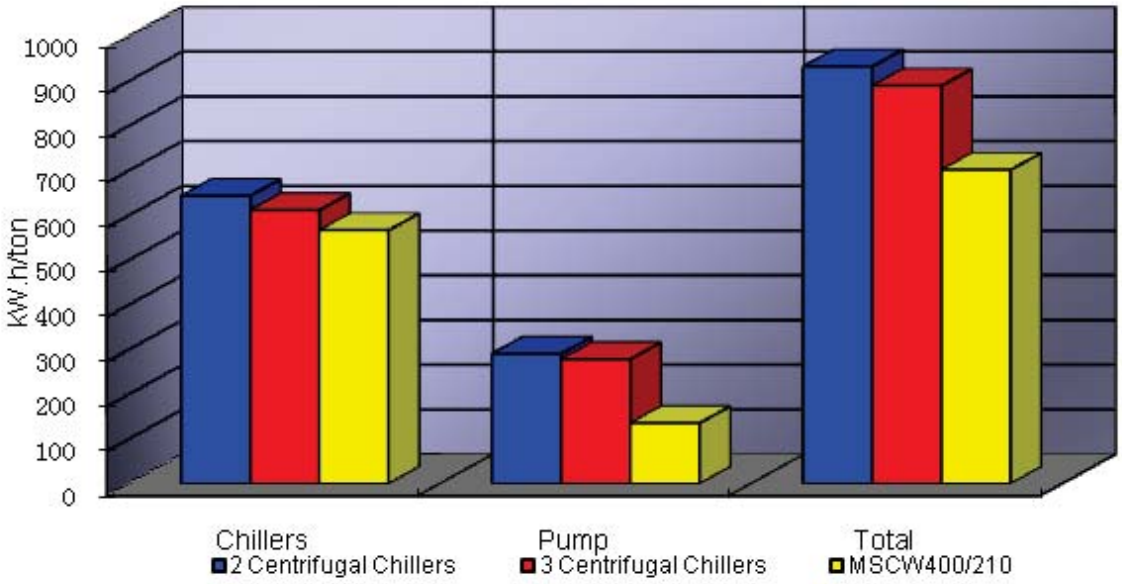
The VWF (variable water flow) is the solution to overcome this drawback. But for some water-cooled chillers, its minimum water flow limitation leaves it no choice except to use two-stage water pump systems to implement the VWF. A two-stage system contains two sets of pumps to control the chiller side water circuit and load side water circuit respectively. In which case, only load side water circuit is implemented with the VWF. Although it partially solves vast water pump power consumption problems, it has some setbacks like a more complicated system in terms of design, operation and management, which can add to extra costs to the customer.

Constant water flow air-conditioning unit of water pump power input vs total Power input under all load capacity



In 1985, Mr. Ron Conry, (Creator of the Multistack modular chiller), designed a chiller with unique operation & control features to make a chiller run at peak efficiency under all load conditions. Furthermore he implemented the VWF system on water-cooled chillers in 1999 and patented the new found technology. This patent technology gets rid of the need of a two-stage water pump system and simplifies it dramatically, thus raising the bar and taking air-conditioning units to a whole new level.

Modular water cooled chillers operates at peak efficiency at all load conditions, this helps to save the power consumption of the overall chiller. The VWF can lower the water pump power consumption by 50% and by combining VWF technology and modular technology, it is possible to save more than 20% total power consumption of the system in comparison to conventional constant water flow chiller/systems.



MULTISTACK INTERNATIONAL LIMITED

140 BERNARD STREET, CHELTENHAM, VICTORIA 3192, AUSTRALIA

TELEPHONE: 61 3 8586 8200 FACSIMILE 61 3 8586 8202

Email: multistack.sales@dunnair.com.au

Web site: www.multistack.com.au