MULTISTACK

MULTISTACK INTERNATIONAL LIMITED

MULTISTACK MSCHW210
WATER TO WATER SCREW
HEAT PUMP CHILLER
(HOT WATER)

“MV6” CONTROL
Refrigerant:
R134a

NOMINAL CAPACITY
235 TO 3525 kW(R)

*The **Multistack Modular Chiller** was invented in Australia in 1985 and is now in operation throughout the world. Multistack new water-cooled screw chiller is quiet, smooth operating, more efficient and more reliable as moving parts are only two rotors and few bearings. Its design includes the features described overleaf.*

Features

MSCHW is our another newly developed energy saving products. Through the cooling circulation and absorbing room heating capacity, chiller produces hot water in a very good saving way.

FLEXIBILITY IN DESIGN

A Multistack chiller is a bank of individual chiller modules connected in parallel to operate as a single machine. Each MSCHW210 module contains one completely independent refrigeration circuits. Cooling capacity is matched to load demand by varying the number of refrigeration circuits in operation.

COMPACT AND SPACE-SAVING

With each module approximately 550mm wide, you can install these quiet, compact units in confined, smaller spaces. In new buildings, you can reduce the size of plant rooms and save on structural costs.

LOWER INSTALLATION COST

The compact size of each chiller module means easy access via standard lifts and standard doorways. You don't need expensive cranes or special rigging.

Connecting the modules is simple - you only have four pipes. Clip in the control connections and you're in business. Fast.

ADD-ON FLEXIBILITY

Each module in the Multistack system delivers nominally 235 kW of cooling and contains one semi-hermetic screw compressor, four evaporators, 4 condensers and controls.

As many as 8 modules can be connected together as a Multistack chiller bank, producing a total of nominally 3525 kW. A Multistack chiller bank has inbuilt flexibility useful in tenancy changes and strata title applications.

PEAK ECONOMY AT ALL LOADS

Accumulating working hours scheduling of the chiller's compressors allows Multistack to match the fluctuating cooling load and conserve energy with each unit running at its peak economy. The bottom line is lower cost per rentable sq. metre.

MICROPROCESSOR CONTROL

A fully computerised control and monitoring system runs the Multistack chiller bank and schedules each compressor either off or on and activate or deactivate capacity control unloaders to enable each compressor to operate at 50, 75 or 100% capacity depending on the applied load. The system continuously and comprehensively monitors total operating conditions of all refrigeration circuits of the chiller bank.

FILTRATION

The strainers in the condenser and evaporator water circuit are an integral part of the chiller. They are fitted inside the water distribution header before the heat exchanger. The developed area of the filter is large and therefore only creates an initial clean filter pressure drop of 5 kPa. This is an economical in-line filter solution providing good filtration with a No. 60 # mesh screen. These filters are 316 stainless steel and can be easily removed for cleaning purposes.

UNCOMPLICATED OPERATION

All systems in the chiller are controlled by the dedicated computer which records and displays the operating parameters of the chiller bank in plain English (other languages are available).

UNPARALLELED DEPENDABILITY

Each slave module is identical. In the event of malfunction in a refrigeration circuit, the computer selects the next available standby circuit to provide back up.

For critical air conditioning and industrial process cooling a Multistack modular chiller inherently provides economical standby capacity and unparalleled dependability.

The use of standard components in our chillers also enhances system reliability.

ENVIRONMENT FRIENDLY

Multistack Chillers operate quietly and currently use the well-proven, non-toxic R134a refrigerant.

THE TOUGHEST QUALITY CODE IN EUROPE

Multistack brazed plate heat exchangers are all produced within the established and applied quality system for fabrication of brazed Heat Exchangers, that of the TUV CERT Certification Body of Rheinisch-Westfalischer TUV.

This code requires an audit of the manufacturing process, and a report has been furnished that the requirements are according to ISO 9001-2000.

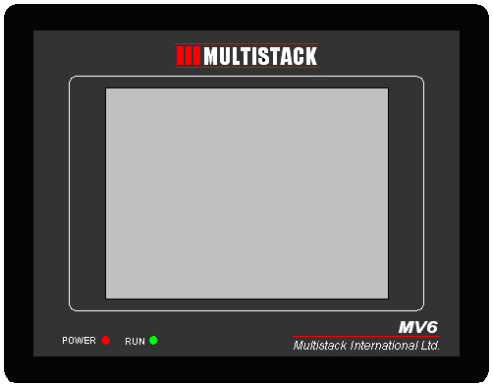
Every single heat exchanger has to pass quality control, over pressure and leak tests using state of the art helium detectors.

Multistack is an accredited manufacturer to ISO 9001-2000.

MODEL NUMBER DESIGNATION

M	SC	HW	210	-	6.0	-	E	A
Modular	Scroll chiller	Water-cooled Heat pump	Model		1 ~ 15		E: R134a	A: 380V/ 50Hz C: 440V/ 60Hz

Computer Control System



COMPUTER CONTROL

A computer control with 5.7" touch panel and monitoring system runs the Multistack chiller bank and schedules each compressor off or on and capacity control of stages, depending on the changing cooling load. The system continuously and comprehensively monitors total operating conditions of all refrigeration circuits of the chiller bank. Maximum 32 compressors can be monitored.

TEMPERATURE CONTROL

Multistack chiller is controlled either by entering water temperature or leaving water temperature. For variable water flow (VWF) models, controller will use leaving chilled water temperature to operate.

SYSTEM DATA AND VARIABLES DISPLAY

A comprehensive range of Chiller system / slave data and variable settings can be selected from the Multistack computerised monitoring system for display on the menu.

System Information:	Water entering / leaving Temperature. Ambient temperature Loading / demand loading Capacity Load / unload time delay % of faults before remote alarm. Lead compressor Compressor run status.
Slave Information:	Suction and discharge pressure. Evaporate Temperature Water leaving Temperature Faults status
System Variables Settings	Password settings Entering / leaving water temperature Lead Compressor Integrating time Economy offset. Load / unload time delay Time and Date.
Slave Variables Settings	Suction and discharge pressure protection Evaporating temperature protection Compressor load / unload time delay.

COMPRESSOR SEQUENCE

MV6 accumulate running hours of each compressor and hence establish working sequence. A standby compressor with least working hours will be activated once call when loading. Same as a compressor with most working hours will be stopped once unloading.

LOAD PROFILE

Cooling capacity of Multistack chiller is divided into 10 sections from 0% to 100%. Controller accumulate the working time of the chiller in each section and each compressor automatically.

FAULT REVIEW

It displays the last 60-recorded faults identified with time and date, system temperatures, individual refrigeration circuit temperatures and type of abnormal conditions.

PASSWORD

For service and maintenance, only personnel with appropriate password can access and modify the controller.

INDIVIDUAL REFRIGERATION SYSTEM MONITORING

Conditions such as high pressure, low pressure, refrigerant temperature, leaving chilled water temperature of individual refrigeration circuits and system conditions are monitored.

SAFETY PROTECTION FEATURES

High pressure cut out.
Low pressure cut out.
Compressor motor protection.
Low leaving chilled water temperature cut out for each slave and system.
Low suction pressure.
High discharge temperature.
Phase failure.
Phase sequence.
High oil differential pressure cut out.

REMOTE CONTROL & MONITORING (RCM)- OPTIONAL

MV6 is fitted with RS485 serial port, which enables remote control monitoring (RCM) :

1. Connect to PC Under software optional supplied bv Multistack, and compatible with Window version, remote control is built to monitor chiller. Maximum communication cable length is 1200m.

2. MV6 is opened to ASCII agreement and communicated with BAS.

With Ethernet-card and a unique IP address, customer can built up its data transmission system via internet… of which is optionally supplied by Multistack.

Capacity and Power input Per Module

COOLING CAPACITY

R134a

Hot Water Leaving Temp.	Chilled Water Leaving Temp.								
	7°C			9°C			11°C		
	Unit Cooling Cap.	Unit Heating Cap.	Comp. Power input	Unit Cooling Cap.	Unit Heating Cap.	Comp. Power input	Unit Cooling Cap.	Unit Heating Cap.	Comp. Power input
°C	kW	kW	kW	kW	kW	kW	kW	kW	kW
35	167	204	37	181	218	37	196	234	38
40	156	196	40	169	210	41	183	225	41
45	144	188	44	157	201	45	170	215	45
50	131	179	49	143	192	49	156	206	50
55	118	171	54	129	183	54	141	196	55

R134a

Hot Water Leaving Temp.	Chilled Water Leaving Temp.								
	13°C			15°C			20°C		
	Unit Cooling Cap.	Unit Heating Cap.	Comp. Power input	Unit Cooling Cap.	Unit Heating Cap.	Comp. Power input	Unit Cooling Cap.	Unit Heating Cap.	Comp. Power input
°C	kW	kW	kW	kW	kW	kW	kW	kW	kW
35	212	250	38	229	268	39	276	316	40
40	199	240	42	215	257	42	259	303	44
45	185	230	46	200	246	46	242	290	48
50	170	220	50	185	235	51	225	277	52
55	154	209	55	168	224	56	206	263	57

NOTES

- This table is based on 1 5.5°K difference in chilled water temperature
- Rating conditions are as per Multistack specifications.
- Interpolation is permissible. Do not extrapolate.

Physical Data Per Module

Model		MSCHW210
Nominal HeatingCapacity *	kW	235
Nominal Power * (cooling)	kW	51
Nominal Cooling Capacity *	kW	170
Nominal Power * (heating)	kW	37
Comperessor		
Type		Hermetic Screw
Number per module		1
Number of stage		0, 50%, 75%, 100%
Refrigerant		
Type		R134a
Charge	kg	24
Chilled Water		
Nominal flow rate	L/s	8.8
Water pressure Drop	kPa	65
Fouling factor m^2k/kW		0.043
Connection pipe		8"
Hot Water		
Nominal flow rate	L/s	11.90
Water pressure Drop	kPa	60
Fouling factor m^2k/kW		0.086
Connection pipe		8"
Dimension		
Length	mm	550
Width	mm	2030
Height	mm	1895
Weight		
Operating	kg	1170

Nominal values based upon:

- Chilled water leaving temp. 7^oC
  Chilled water entering temp. 12^oC
  Condenser water leaving temp. 35^oC
  Condenser water entering temp. 30^oC

CONDENSER WATER QUALITY GUIDE

The following parameters are recommended as a guide for optimum quality of the water circulating through the condenser cooling tower circuit.

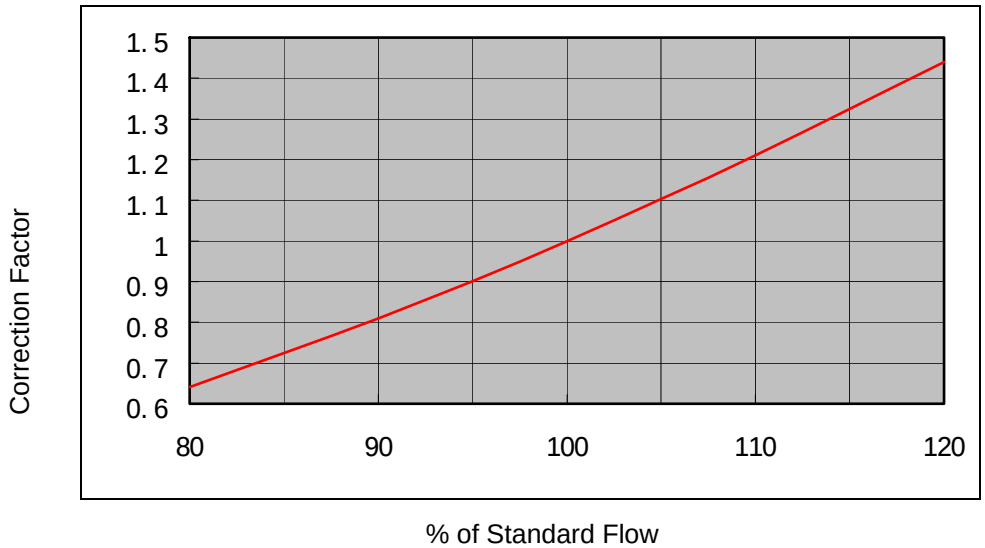
Conditions	*Maximum*	*Affects Corrosion*	*Affects Scaling*
Total Dissolved Solids (TDS)	700 ppm	Yes	Yes
Conductivity	1000 uS/cm	Yes	Yes
Sulphate ions (as SO_4^{2-})	200 ppm	Yes	-
All iron (as Fe)	0.5 ppm	-	Yes
M alkalis (as CaCO3)	100 ppm	-	Yes
All hardness (as CaCO3)	200 ppm	-	-
Silica (as SiO2)	50 ppm	-	Yes
Chloride ions (as Cl) for materials below:			
s.s. 316	400 ppm	Yes	-
pH @ 25.0 ^oC	Range: 6 - 8	Yes	Yes

Important Note:

Corrosion and/or scaling may result from an excess of one condition but water quality should satisfy all conditions to prevent its occurrence. It is recommended that condenser water and water supply be regularly assessed by a reputable test laboratory to ensure maximum system protection.

HEAT EXCHANGER WATER PRESSURE DROP

Pressure drop correction factor for chilled and condenser water circuit.



Electrical Data

Model		**MSCHW4210**
Refrigerant		R134a
Power		AC380V/ 3Ph/ 50Hz
Compressor	RLA (A)	89
	MRC (A)	144
	STC (A)	585

RLA : Rated Load current
MRC : Maximum Rated Current
STC : Starting current

Compressor start method: Part Winding

CABLE SIZING

When selecting mains cable sizes use MRC. Allowance must be made for voltage imbalance, under voltage, ambient temperature and other conditions in compliance with AS 3000 or relevant electrical code.

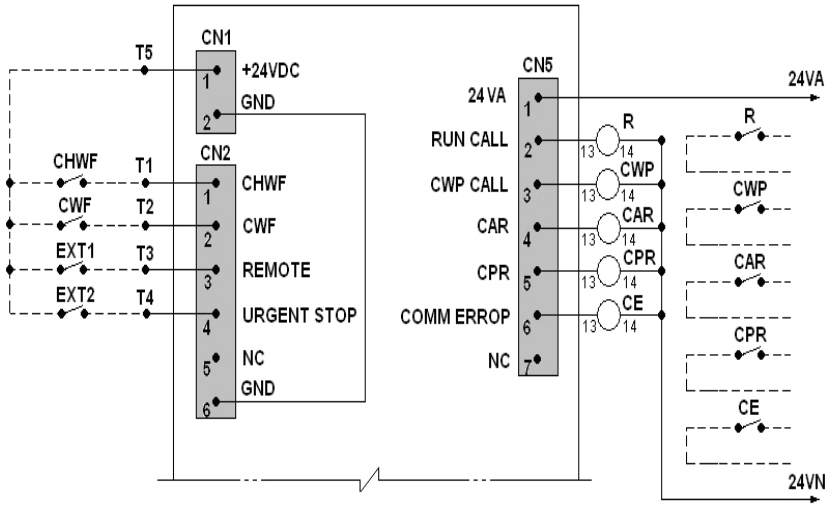
MAINS CABLE ENTRY

Electrical mains entry can be made at either end of the chiller. larger cooling capacity machine may require entry at both ends depending on current drawn and cable size. Refer Installation Manual for details.

Notes:

1. Where two separate supples are used, separate circuit protection devices and warning labels indicating isolation procedures must be used (by others).
2. Design running amps is the steady state current draw at a particular set of conditions, i.e. condenser and chilled water temperatures.
3. Maximum rated current is the maximum expected current draw at transient (pull down) and/or greater than design conditions.

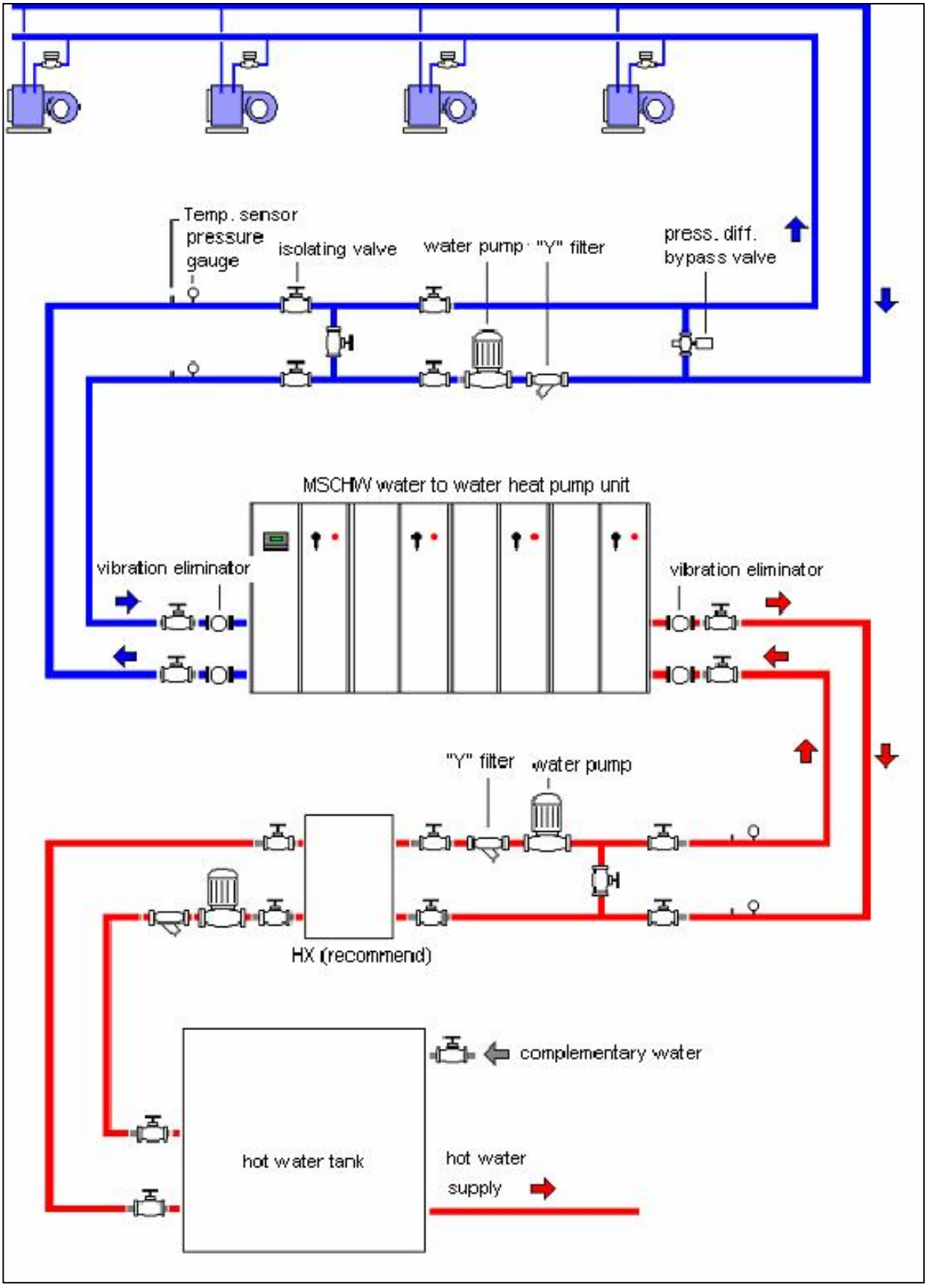
Field Wiring Diagram



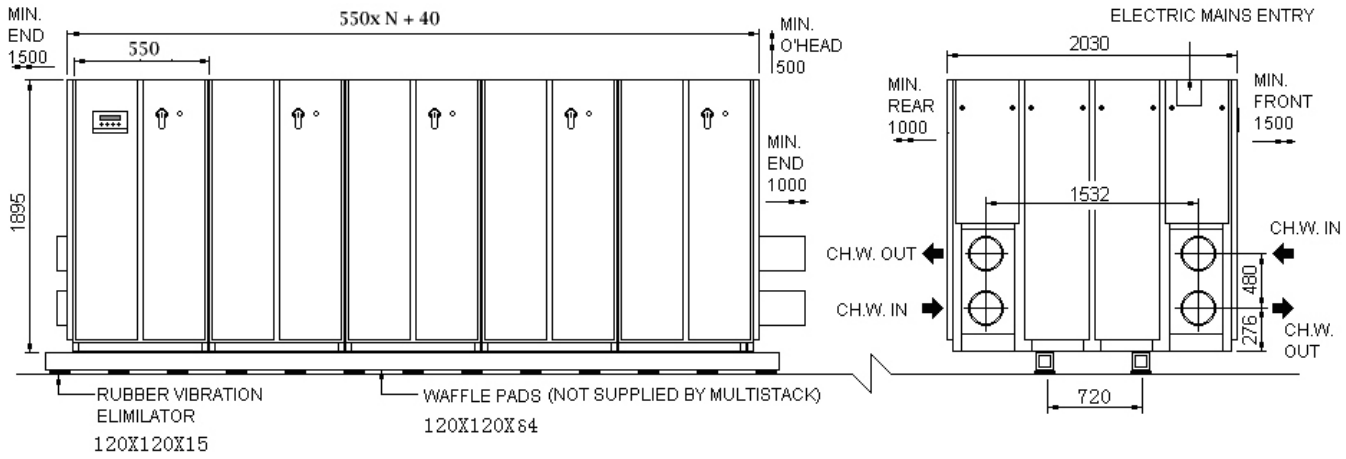
CHWF	Chilled water fflow swtich
CWF	Condenser water flow switch
EXT-1	External interlock device (Aust. reset)
EXT-2	External interlock device (Man. reset)
R.	Running Status
CWP	Condenser water pump status
C.A.R.	Customer fault alarm relay
CPR	Compressor alarm relay
CE	Communication error

- Control wiring to be 18 AWG or 10 sqmm MINIMUM
- Bridge between terminals T3 &T5 if EXT-1 is not utilized.
- Bridge between terminals T4 & T5 if EXT-2 is not utilized.
- Free contacts have a maximum rating of 5Amps.
- Flow switches and external interlock devices are not supplied by Multistack.
- Wiring by Multistack _____ / Wiring by Others ----------

Piping Schematic



Physical Dimensions



Notes:

1. ALL INSTALLATION MUST INCLUDE THE FOLLOWING;
   -3/B" BSP SOCKETS 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 TAPPING FOR FLOW MEASUREMENT (SUPPLIED BY MULTISTACK)
   -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 DRAWN & CABLE SIZE) REQUIRE MAINS ENTRY AT BOTH ENDS. REFER TO ELECTRICAL INSTALLATION MANUAL FOR DETAILS.

3. CHILLED AND CONDENSER WATER CONNECTIONS MAY BE INTERCHANGED END FOR END AS REQUIRED.

Guide Specification

SCREW WATER COOLED CHILLER SET

Supply and install where shown on plans ....(No) water chiller sets, of MULTISTACK design, modular type having cooling capacity schedules. The chiller shall be suitable for the addition of further cooling modules as an integrated system, if and when required.

The chiller set shall be of modular design and construction with each compressor having its own evaporator, condenser and independent refrigeration system.

The chiller shall be totally enclosed within easily removed panels.

The compressor, evaporator and condenser shall be mounted on a heavy fabricated steel chassis with an electrostatically applied powder oven baked finish.

The module's outer metal frames and panels shall be powder coated to approved colour and oven baked.
All refrigeration pipe work and components including all necessary accessories shall be connected in accordance with the best refrigeration practice and shall be charged with R134a

COMPRESSOR

Each module shall be equipped with high quality semi-hermetic screw compressors, factory assembled and tested.

The compressors shall be of approved manufacture, screw type semi-hermetic, hermetically sealed having adequate motor capacity to achieve the required performance. The motor shall be 3 phase, 415 VAC +/- 10% name plate voltage and shall be equipped with devices embedded in each winding for direct protection against overheating or single phasing.
Each compressor shall be equipped with high and low refrigerant pressure, low refrigerant temperature and high discharge temperature, high oil differential pressure, over current and phase sequence.

Each chiller module shall be fitted with part winding starters for each compressor and capable of operation for number of starts per hour stated by compressor manufacturer.

HEAT EXCHANGERS

The heat exchangers for condenser and evaporator duty shall be manufactured from type 316 stainless steel and be of copper brazed plate construction.

The condenser and evaporator shall be suitable for a working pressure of 2400 kPa on the refrigerant side and 1050 kPa on the waterside.
The cooling capacity shall be selected with a fouling factor of 0.086 m^2 K/kW.

HOT WATER

Nominal water flow rate 11.9 l/s maximum pressure drop of 60kPa.

CHILLED WATER

Nominal water flow through the evaporator shall be 8.8/s at a maximum pressure drop 65 kPa.
Each evaporator shall be provided with low refrigerant and low chilled water temperature cut out.

CENTRAL CONTROL SYSTEM

The chiller shall be complete with its own computer based inbuilt capacity controls adjusting both proportionally and integrally to match the required load.

Set point adjustment and interrogation of unit shall be displayed via menu of the 5.7 inch touch panel.

THE CONTROL SYSTEM INCORPORATES THE FOLLOWING FEATURES:

1. Fault memory - the last 60 faults shall be logged and identified with time, date and full operating conditions to allow for complete service review.
2. Full status indication of compressors, showing run/fault status and all individual system operating conditions.
3. Continual update of Load profile data.
4. Accumulating running hours forms the sequence of compressor.
5. Display of main chilled and condenser water entering and leaving temperatures.
6. Timing circuits to limit each compressor starting frequency.

CHILLED WATER MAINS AND HEADERS

Each module shall include 200 NB supply and return header pipes for both chilled and condenser water. All headers shall be constructed of mild steel and housed within panelled enclosure. Headers shall be suitable for 1050 kPa working pressure. Grooved connections shall be provided at each end for use with Victaulic couplings.

All headers shall be coated for corrosion protection. The chilled water headers shall be insulated with closed cell nitrogen filled foam having an integral vapour seal. Insulation shall be at least 19mm thick and self-extinguishing type.

INSTALLATION

The complete chiller assembly shall be mounted off the floor on anti-vibration mountings and rails to be supplied by the contractor.

The contractor shall supply, install, wire and commission a flow switch in the condenser and chilled water pipe work external to the chiller. These flow switches shall stop and/or prevent operation of the chiller in an event of no flow or reduced flow below 85% of design conditions. (Pressure differential or static pressure sensing devices are not acceptable as a substitute for velocity sensors.)

The contractor shall provide flexible pipe connections on water pipes leaving and entering chiller set.

COMMISSIONING

Supervision of connection and commissioning of modules shall be carried out by the manufacturer or factory trained representatives of the manufacturer.

MULTISTACK

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