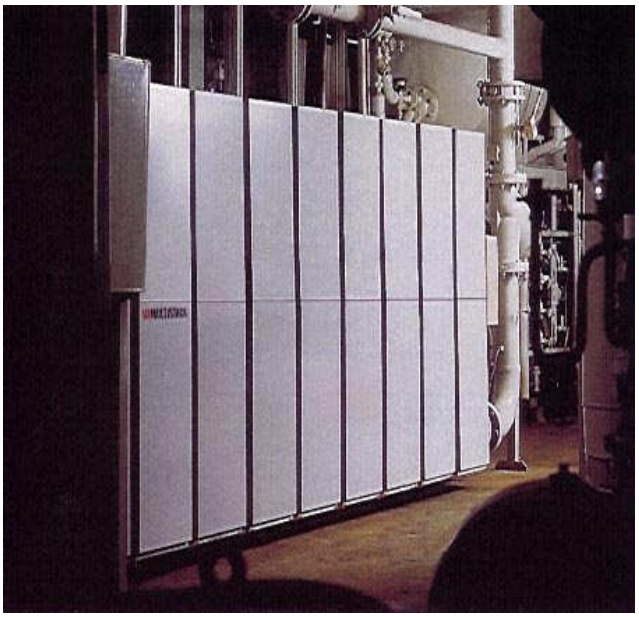
SRW150
MODULAR
WATER COOLED SCROLL CHILLER

"MV6" Control

Refrigerant:

R22 Standard

R407c or R134a (Optional)



NOMINAL CAPACITY (R22)
148 TO 1776 kW(R)

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Features

FLEXIBILITY IN DESIGN

A Multistack chiller is a bank of individual chiller modules connected in parallel to operate as a single machine. Each **SRW150** module contains two 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. An active link connects electrical power. Clip in the control connections and you're in business. Fast.

ADD-ON FLEXIBILITY

Each module in the Multistack system delivers nominally 148 kW of cooling and contains two compressors, two evaporators 2 separate condensers and controls.

As many as 12 modules can be connected together as a Multistack chiller bank, producing a total of nominally 1776 kW. A Multistack chiller bank has inbuilt flexibility useful in tenancy changes and strata title applications.

PEAK ECONOMY AT ALL LOADS

Automatic 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. This is much more economical than a large single unit running at part load.

FILTRATION

The strainers in the condenser 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.

SIMPLE OPERATION

All systems in the chiller are controlled by the dedicated computer which records and displays the operating parameters of the chiller bank.

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.

ENVIRONMENT FRIENDLY

Multistack chillers operate quietly and currently use the well-proven, non-toxic R22 refrigerant, approved under the Montreal Protocol for sale until 2030 as standard and environmental friendly R407c as optional. The refrigerant charge is less than other comparable systems.

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 9002.

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 9002.

SCROLL COMPRESSOR IS OF HIGH EFFICIENCY, QUIET OPEATION AND OUTSTANDING RELIABILITY

High coefficient of performance (COP)-approximately 9% higher-than a reciprocating is achieved by very high volumetric efficiency, minimized pressure losses due to absence of valve plates and reduced heat transfer loss due to better separation of suction and discharge gases.
In addition, scroll compressor offer very low vibration and sound level than the hermetic reciprocating compressor due to absence of dynamic suction and discharge valve and smooth compression process.
Outstanding reliability due to few moving parts, low starting toque, tolerance to flood-back and rigidly-mounted internally.

MODEL NUMBER DESIGNATION

SR	W	150	C	1.0	A	S	V3 • 2
Screw Chiller	Water Cooled	Model Number	Cooling Only	No. of Modules **1 to 12**	Electrical spec. **A** - 415V 50 Hz **B** - 380V 50 Hz **M** - 460V 60 Hz	Compressor **S** – Single Speed	Version V3: G4B Control V4: MV6 Control / Upgrade 1: R22 2: R134 3: R407c

Computer Control System ‘MV6’

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.

Unit Capacity Per Module

COOLING CAPACITY

Leaving Chilled Water Temperature								R22
	6° C		7° C		8° C		10° C	
Condenser Leaving Water Temp. °C	Unit Cap. kW.	Comp Power Input kW.	Unit Cap. KW.	Comp Power Input kW.	Unit Cap. kW.	Comp Power Input kW.	Unit Cap. kW.	Comp Power Input kW.
30	**152.0**	31.1	**155.0**	31.2	**158.0**	31.3	**164.0**	31.5
35	**145.0**	34.4	**148.0**	34.0	**151.0**	34.7	**157.0**	34.9
40	**138.5**	37.7	**141.0**	37.8	**144.0**	37.9	**149.5**	38.2
45	**131.5**	42.0	**134.0**	42.2	**136.5**	42.4	**142.5**	42.7
50	**126.0**	46.8	**128.0**	47.0	**130.5**	47.2	**136.0**	47.5

Leaving Chilled Water Temperature								R407c
	6° C		7° C		8° C		10° C	
Condenser Leaving Water Temp. °C	Unit Cap. kW.	Comp Power Input kW.	Unit Cap. KW.	Comp Power Input kW.	Unit Cap. kW.	Comp Power Input kW.	Unit Cap. kW.	Comp Power Input kW.
30	**149.0**	31.4	**152**	31.4	**155.0**	31.6	**161.0**	31.8
35	**141.0**	34.7	**145**	34.5	**148.0**	34.9	**154.0**	35.2
40	**135.0**	40.1	**138**	38.1	**141.0**	38.3	**146.0**	38.5
45	**128.0**	42.3	**131**	42.4	**133.0**	42.7	**138.0**	43.1
50	**122.0**	47.1	**125**	47.3	**129.0**	47.5	**133.0**	47.9

Leaving Chilled Water Temperature								R134a
	6° C		7° C		8° C		10° C	
Condenser Leaving Water Temp. °C	Unit Cap. kW.	Comp Power Input kW.	Unit Cap. KW.	Comp Power Input kW.	Unit Cap. kW.	Comp Power Input kW.	Unit Cap. kW.	Comp Power Input kW.
30	**101.3**	21.9	**103.3**	22.0	**105.3**	22.1	**109.3**	22.2
35	**96.7**	24.3	**98.7**	24.4	**100.7**	24.5	**104.7**	24.6
40	**92.3**	26.6	**94.0**	26.7	**96.0**	26.8	**99.7**	26.9
45	**87.7**	29.7	**89.3**	29.8	**91.0**	29.9	**95.0**	30.0
50	**84.0**	33.1	**85.3**	33.2	**87.0**	33.3	**90.7**	33.4

Notes

- This table is based on a 5.5 ^{0}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.

Physical Data Per Module

NOMINAL CAPACITY *	
Cooling (kW)	148
COMPRSSOR	
Scroll Hermetically Sealed	
Number per Module	2
CONDENSER	
Brazed Plate Type, Stainless Steel 316	
Number	2
Nominal Water Flow (L/s)	7.9
Condenser water pressure drop (kPa)	42
Max. Working Press. (Refrigerant side)kPa	2400
Max. Working Press. (Water side) (kPa)	1050
Water Volume (litre) including header	19 x 2
EVAPORATOR	
Brazed Plate Type, Stainless Steel 316	
Number	2
Nominal Water Flow (L/s)	6.4
Chilled water pressure drop	46
Max. Working Press. (Refrigerant side)kPa	2400
Max. Working Press. (Water side) (kPa) (Standard)	1050
Water Volume (L) including header	17 x 2
SIZE (mm)	
1250 x 550 x 1640 (LxWxH)	
WEIGHT	
Shipping (kg)	670
Operating (kg)	760
REFRIGERANT CHARGE	
R22 (kg)	9.35
UNIT CASING	
Mild Steel, Zinc annealed	
Substrate Power Coated	

* Nominal Values Based Upon:
- Chilled Water Leaving Temp. 7^{o}C
- Chilled Water Entering Temp. 12.5^{o}C
- Condenser Water Leaving 35^{o}C
- Condenser Water Entering 29.5^{o}C

NOTE:
Minimum Chilled Water Flow Rate Per Module: 5.7l/s
Minimum Condenser Water Flow Rate Per Module: 7.1l/s

(Contact factory Ltd. If lower flow rate is required)

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

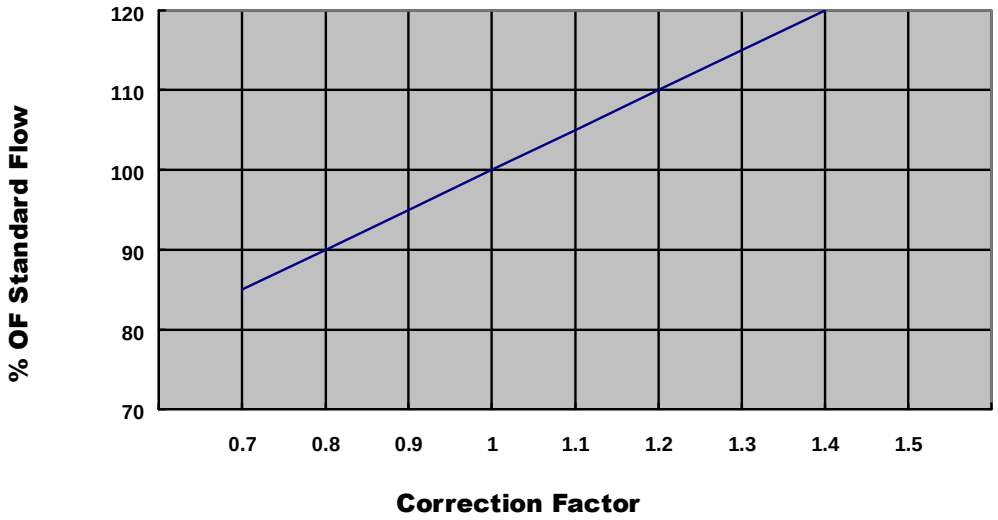
Conditions		Maximum	Affects Corrosion	Affects Scaling
Total Dissolved Solids (TDS)		700 ppm	Yes	Yes
Conductivity		1000 uS/cm	Yes	Yes
Sulphate ions (as SO_4^{2-})		200 ppm	Yes	
All iron (as Fe)		0.5 ppm		Yes
M alkalis (as CaCO3)		100 ppm	-	Yes
All hardness (as CaCO3)		200 ppm	-	-
Silica (as SiO2)		50 ppm	-	Yes
Chloride ions (as Cl) for materials below:				
s.s.	316	400 ppm	Yes	-
pH@25.0 ^{0}C			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 chart for chilled water circuit. Do not extrapolate.



Electrical Data

Supply 380V to 415V-60Hz 3 phase.
Compressor Rated Load Amperage (RLA)=49A (Per half Module)
Compressor Rated Load Amperage (RLA)=98A (Per full Module)
Compressor Locked Rotor Amperage (LRA)=270A

Model	Max. Rated Current (A)	Design Running Current (A)	No. of Compr.
SRW150/1.0	98.0	53.0	2
SRW150/2.0	196.0	106.0	4
SRW150/3.0	294.0	159.0	6
SRW150/4.0	392.0	212.0	8
SRW150/5.0	490.0	265.0	10
SRW150/6.0	588.0	318.0	12
SRW150/7.0	686.0	371.0	14
SRW150/8.0	784.0	424.0	16
SRW150/9.0	882.0	477.0	18
SRW150/10.0	980.0	5300	20
SRW150/11.0	1078.0	583.0	22
SRW150/12.0	1176.0	636.	24

CABLE SIZING

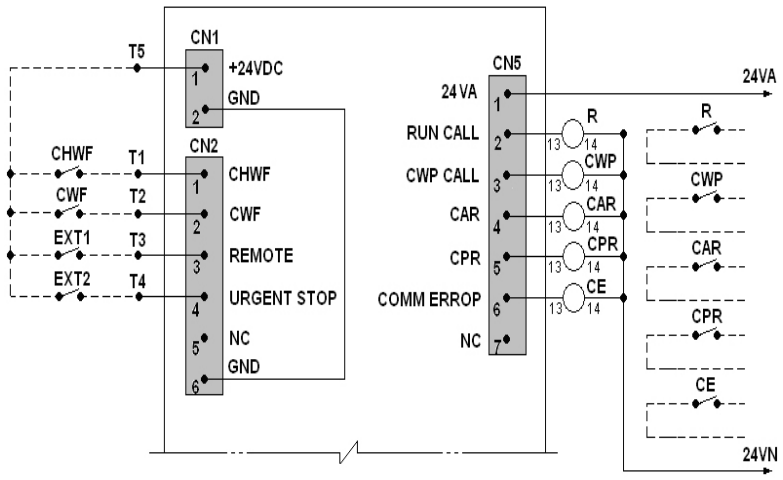
When selecting mains cable size use MRC. Allowance must be made for voltage imbalance, under voltage, ambient temperature and other conditions in compliance with AS3000 or relevant electrical code.

MAIN 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 supplies are used, separate circuit protection devices and warning labels indicating isolation procedures must be used (by others).
2. Design running current 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

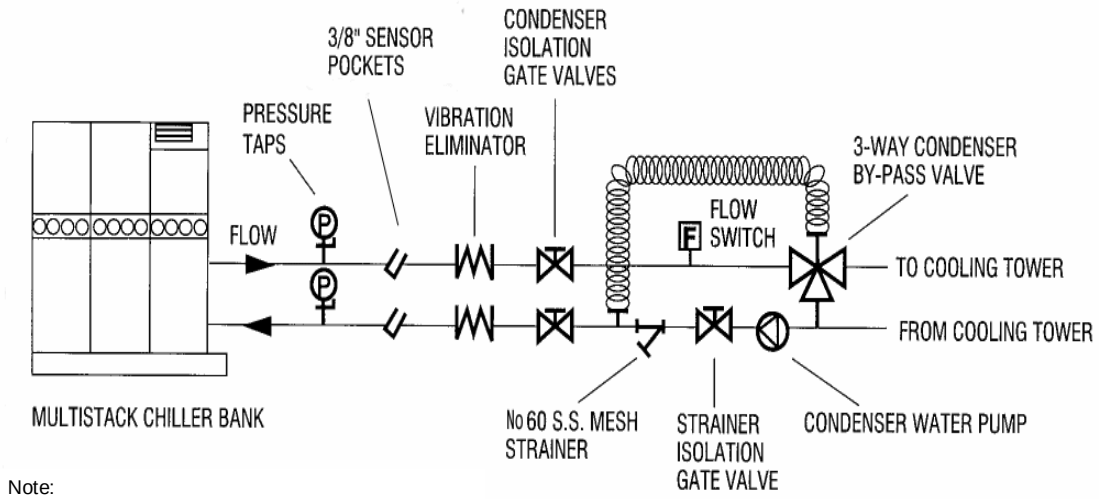


CHWF	Chilled water flow switch
CWF	Condenser water flow switch
EXT-1	External interlock device (Aust. reset)
EXT-2	External interlock device (Man. reset)
R.	Running Status
CWP	Condenser water pump status
C.A.R.	Customer fault alarm relay
CPR	Compressor alarm relay
CE	Communication error

- 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

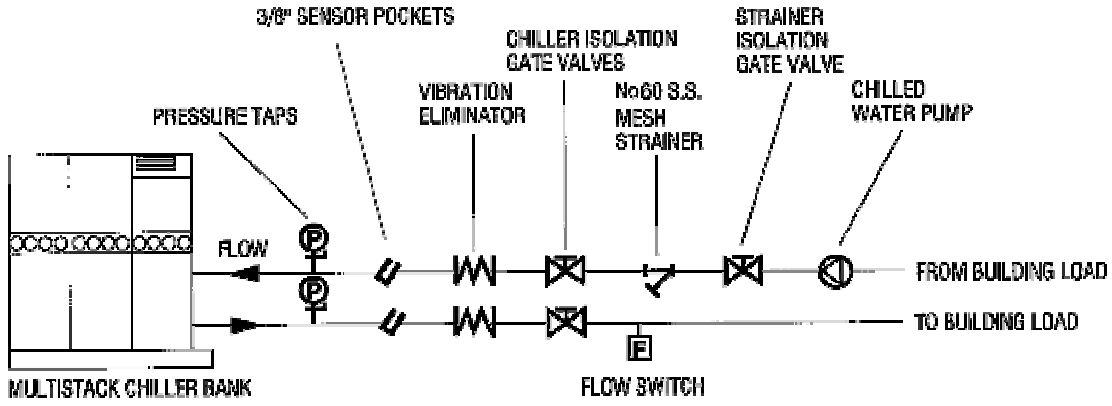
Condenser Water



Note:
Differential Pressure Switches across Condenser
Or Static Pressure Sensors are not acceptable
As substitute for flow switch
Note:
Entering Condenser water temperature to be minimum of 24°C
Pressure Taps and Sensor Pockets Provided in Header Stubs by Multistack

FLOW SWITCH TO BE INSTALLED IN LOCATION WITH 5 TIMES DIA OF PIPE STRAIGHT LENGTH UPSTEAM AND DOWNSTREAM

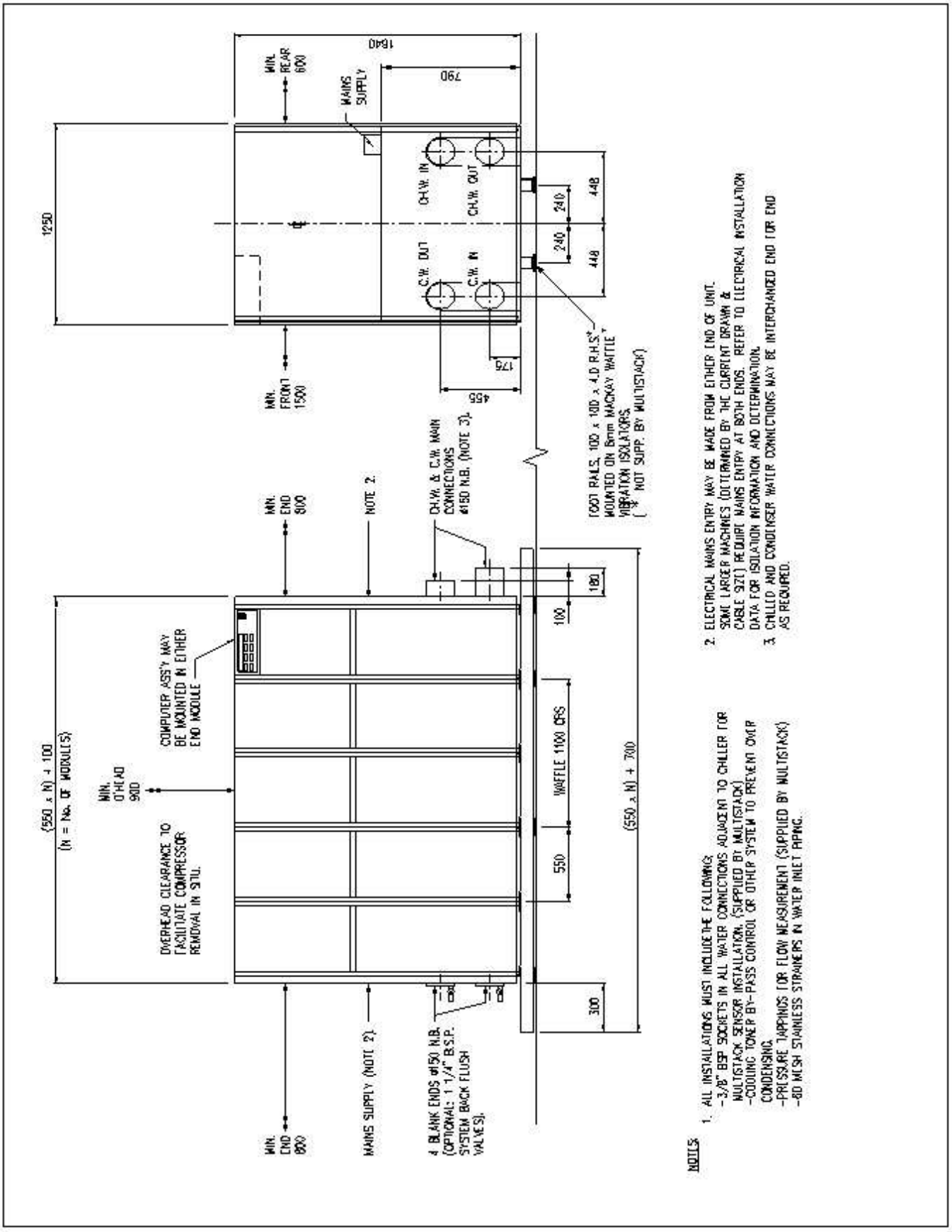
Chilled Water



NOTE:
DIFFERENTIAL PRESSURE SWITCHES ACROSS EVAPORATOR OR STATIC PRESSURE SENSORS ARE NOT ACCEPTABLE AS SUBSTITUTE FOR FLOW SWITCH.

FLOW SWITCH TO BE INSTALLED IN LOCATION WITH 5 X DIA OF PIPE STRAIGHT LENGTH UPSTREAM AND DOWNSTREAM

Physical Dimensions



Guide Specifications

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 electrostatic ally applied powder oven baked finish.

The module's outer metal frames and panels shall be powder coated to approved color 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 HCFC22, R407c as optional

COMPRESSOR

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

The compressors shall be of approved manufacture, reciprocating type dual speed, 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 thermostats 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 suction pressure and high motor temperature safety controls.

Each chiller module shall be fitted with direct-on-line dual speed motor starters for each compressor and capable of operation for the number of starts per hour stated by compressor manufacturer.

HEAT EXCHANGER

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

The evaporator shall be suitable for a working pressure of 2400kPa on the refrigerant side and 1050 kPa on the water side.

CONDENSER

Nominal water flow through the condenser shall be 7.9 L/s at a maximum pressure drop 42kPa
The cooling capacity shall be selected with a fouling factor of 0.044m^2k./kW for condenser and 0.018 m^2k./kW for evaporator.

EVAPORATOR

Nominal water flow through the evaporator shall be 6.4 L/s at a maximum pressure drop 46 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 via menu of the 5.7" touch panel.

The controller shall have an auto restart after power failure if all safety interlocks are clear.

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. Automatic sequencing of compressors on 24-hour cycle.
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 150 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. Suitable strainers with No.60 mesh stainless steel basket shall be installed in the entering lines to the chiller.

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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