CA Series Fluid Chillers

Installation and Maintenance Instructions.

Installation, commissioning and service must be performed by qualified personnel. Failure to do so may result in serious injury or death.

Safety

Read this manual before installation and commissioning!

All work on chiller must be carried out only by authorized staff.

Chiller contains moving parts, dangerous voltage and current, high pressure, high and low temperatures.

Some parts of the chiller may re-start automatically without warning.

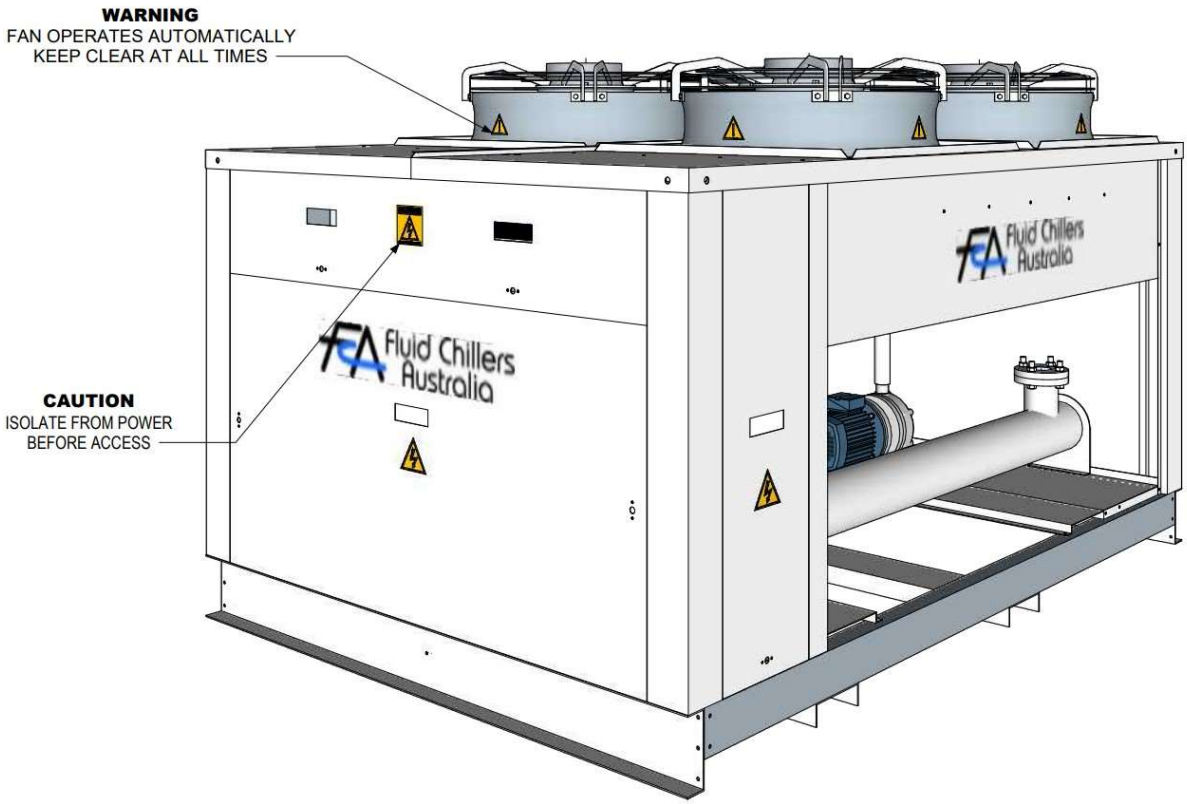
Any work on live electrical components to be performed by a qualified licensed electrician.

Appropriate Personal Protective Equipment to be used when performing work on chillers.

Explanation of symbols:

General Hazardous area. Death or severe injury can occur if corresponding precautions are not taken.

Danger due to electric current. Warning of dangerous voltage or current.



Content

	page
Specifications, Performance data and Operation Parameters	4
Layout and Location Details	8
Controls	11
Installation	14
Commissioning	17
Pre-start Check List	18
Regular and Seasonal Maintenance	19
Troubleshooting	22
Commissioning Data Sheet	24
Notes	25

MODEL	CA10	CA15	CA20	CA26	CA33	CA40	CA52	CA66
REFRIGERATION SYSTEM								
Cooling Capacity at nominal conditions, kW*	11	15	20	25	32	39	51	64
Number of systems	1						2	
Refrigerant charge/system, kg	4	4	5	7.5	7.5	8.5	7.5	7.5
Capacity control steps total/unit	1			2				

COMPRESSORS								
type	recip	recip	recip	recip	recip	scroll	recip	recip
number of compressors	1						2	
Power requirements	400 V, 3 phase, 50 Hz							
Nominal Power input/compressor, kW*	3.6	6.0	6.7	8.9	12.1	11.2	8.9	12.1
Nominal current/compressor, A*	6.9	11.1	12.3	14.4	19.6	20.9	14.4	19.6
Maximum power input/compressor, kW	5.7	8.9	10.4	13.6	17.5	18.6	13.6	17.5
Maximum operating current/compressor, A	12.5	18.5	22.0	27.0	36.0	35.0	27.0	36.0
Oil charge/compressor, L	1.8	1.8	3.9	3.9	3.9	6.2	3.9	3.9

EVAPORATOR								
type	shell & tube							
water connections (vessel only), mm	25	25	25	50	50	50	50	50
Nominal water flow rate, l/s	0.5	0.7	1	1.2	1.6	2	2.5	3.2

CONDENSER								
number of fans	1		1			2		
Power requirements	230 V, 1 ph., 50 Hz		400 V, 3 phase, 50 Hz					
Nominal Total Current, A	3		5			10		
Nominal Total Power, kW	0.55		2.6			5.2		
Total air flow, l/s	2870		4983			6940	7998	
fan sound pressure level, dB(A) at 3 m	48		61			67	65	
Unit maximum operating current, A	15.5	21.5	27.0	32.0	41.0	45.0	64.0	82.0

*All ratings at nominal operating conditions: 12 C water return temperature, 7 C leaving water temperature, 35 C ambient

MODEL	CA80	CA96	CA115	CA132	CA150	CA175	CA200
REFRIGERATION SYSTEM							
Cooling Capacity at nominal conditions, kW*	79	96	114	131	158	191	216
Number of systems	2						
Refrigerant charge/system, kg	9	12	12	15	16	20	20
Capacity control steps total/unit	2	4					

COMPRESSORS							
type	scroll	recip	recip	recip	recip	recip	recip
number of compressors	2						
Power requirements	400 V, 3 phase, 50 Hz						
Nominal Power input/compressor, kW*	11.2	14.6	17.5	22.4	23.7	30.9	37.3
Nominal current/compressor, A*	20.9	25.0	30.6	41.0	41.3	56.1	75.3
Maximum power input/compressor, kW	18.6	21.0	25.0	30.0	35.0	42.0	51.0
Maximum operating current/compressor, A	35.0	37.2	44.0	53.2	62.1	73.9	96.2
Oil charge/compressor, L	6.2	4	4.5	4.75	4.5	4.75	4.75

EVAPORATOR							
type	shell & tube						
water connections (vessel only), mm	50	80	80	80	80	100	100
Nominal water flow rate, l/s	3.8	4.7	5.5	6.5	7.2	8.4	9.5

CONDENSER							
number of fans	4				8		
Power requirements	400 V, 3 phase, 50 Hz						
Nominal Total Current, A	20				40		
Nominal Total Power, kW	10.4				20.8		
Total air flow, l/s	13880			15997	27760		
fan sound pressure level, dB(A) at 3 m	70			68	73		
Unit maximum operating current, A	90.0	94.4	108.0	126.4	164.2	187.8	232.4

*All ratings at nominal operating conditions: 12 C water return temperature, 7 C leaving water temperature, 35 C ambient

NOTE:

- Ratings are based on units with no restriction to recirculation of condenser air
- Ratings are based on units with no ducting to condenser fans. Please refer FCA for application with ducting.
- For stable chiller operation flow rate must be constant +/-10% otherwise controls will not function correctly. Water or fluid pump must be selected to overcome the resistance of the evaporator(s) plus all pipe work, fittings and any other additional head losses in the pumping circuit.
- Standard refrigerant: R407C. Other refrigerants: please refer FCA.

Fluid Chillers Australia Pty Ltd reserve the right to change or modify specifications as required by continuing design and production variations without notice. All specifications should be used as a guide to the application of the equipment.

Full details on specific equipment must be obtained at the time of supply.

This Application Manual does not constitute an offer for sale of any product.

Capacity correction factors.

Leaving water temperature.

Temperature, C	-5.00	-4.00	-2.00	0.00	1.00	2.00	4.00	7.00	8.00	9.00	10.00
factor	0.60	0.63	0.70	0.77	0.80	0.83	0.90	1.00	1.03	1.06	1.09

Operation outside indicated temperature range: please refer FCA.

For applications below +4 C glycol or ethanol antifreeze with appropriate corrosion inhibitor required.

Ambient Air Temperature.

Ambient Temperature, C	25	30	35	40	45
Factor	1.15	1.07	1	0.93	0.86

Operation above +45 C ambient temperature: please refer FCA.

Water flow rate.

Flow Rates other than 5 C temperature difference across the chiller vessel(s).

Temp. difference, C	3.00	3.50	4.00	4.50	5.00	5.50
factor	0.94	0.96	0.97	0.99	1.00	1.02

Operation outside indicated temperature differences: please refer FCA.

Nominal water flow rates and pressure drops.

MODEL	CA10	CA15	CA20	CA26	CA33	CA40	CA52	CA66
Flow rate, l/s	0.5	0.7	1.0	1.2	1.6	2.0	2.5	3.2
Pressure drop, kPa	15	15	15	15	15	28	30	30

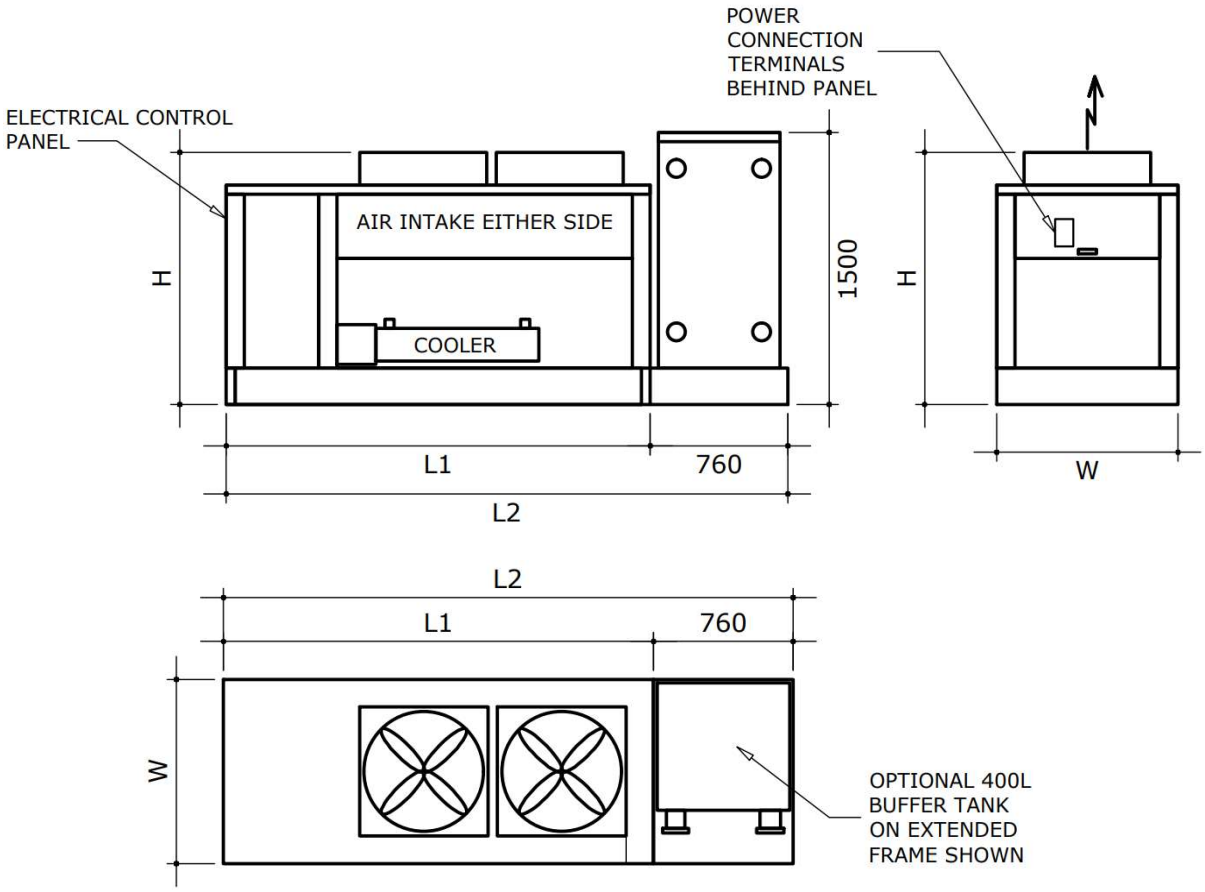
MODEL		CA80	CA96	CA115	CA132	CA150	CA175	CA200
Flow rate, l/s		3.8	4.7	5.5	6.5	7.2	8.4	9.5
Pressure drop, kPa		56	120	120	37	37	41	41

For applications below +4 C glycol or ethanol antifreeze with appropriate corrosion inhibitor required as per the following table.

Minimum Percentage of Antifreeze Required							
Temperature leaving Chiller, C	3	0	-1	-3	-5	-7	-9
Ethanol % vol	15	17.5	20	22.5	25	27.5	30
dP correction factor	1.00	1.01	1.03	1.05	1.07	1.09	1.10
Propylene Glycol % vol	13	16	18	23	27	31	35
dP correction factor	1.05	1.12	1.15	1.20	1.25	1.30	1.40
Ethylene Glycol % vol	7	9	12	16	21	25	29
dP correction factor	1.01	1.03	1.05	1.10	1.15	1.20	1.25

Do not exceed 40% vol antifreeze as performance may be adversely affected.

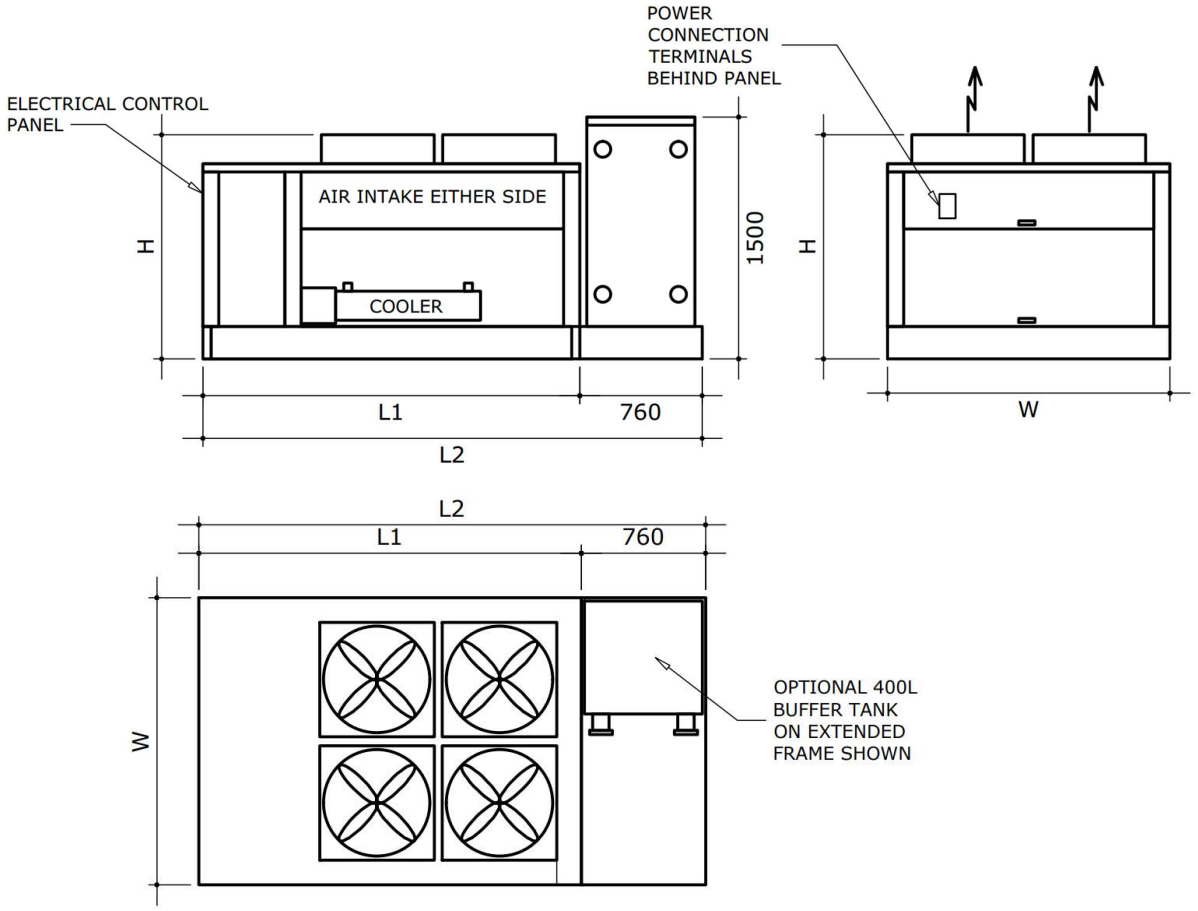
2. Layout and Location Details.



2 fan unit on extended frame with optional 400 L buffer tank indicated.

Note:

- Minimum 1 m clearance required all sides for air intake and unit service
- Sufficient clearance required above the unit to prevent recirculation of vertical discharge condenser air.



4 fan unit on extended frame with optional 400 L buffer tank indicated.

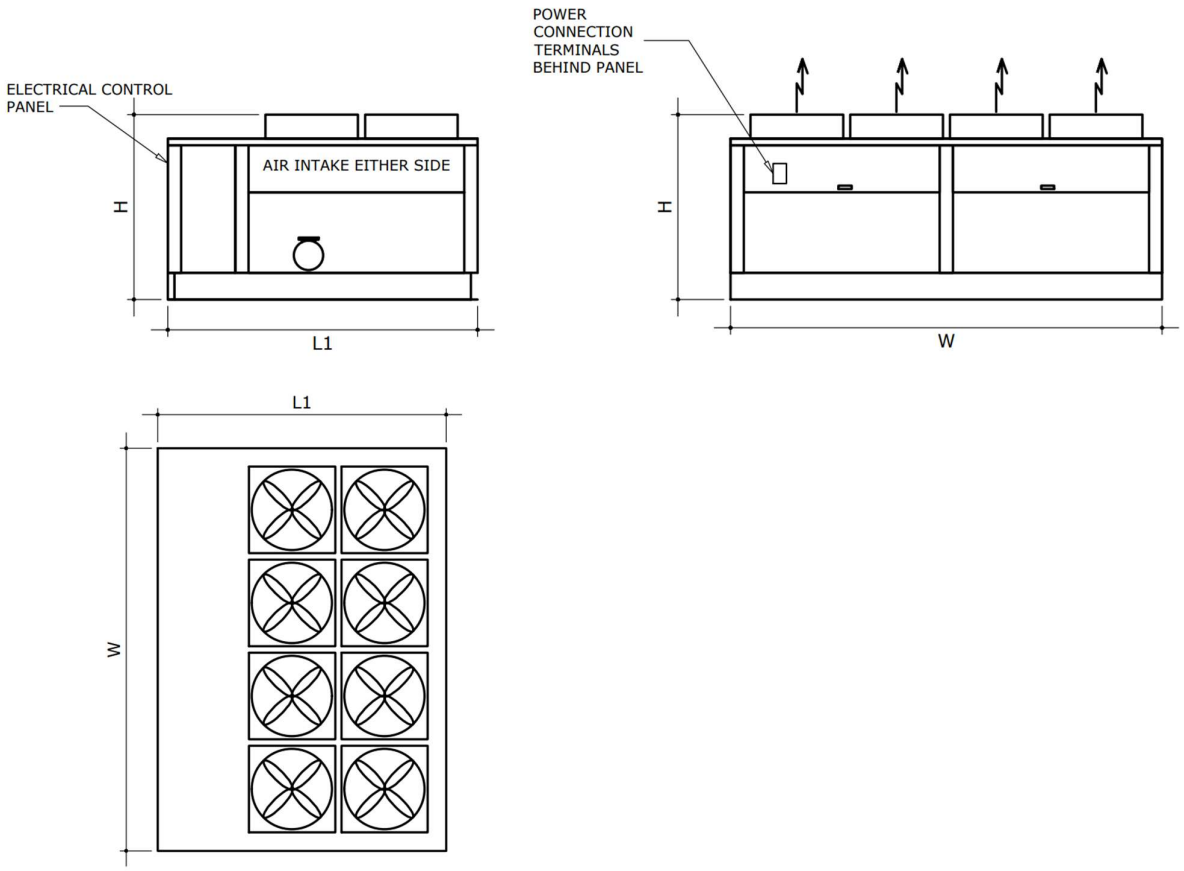
Note:

- Minimum 1 m clearance required all sides for air intake and unit service
- Sufficient clearance required above the unit to prevent recirculation of vertical discharge condenser air.

MODEL	CA10	CA15	CA20	CA26	CA33	CA40	CA52	CA66
Physical data								
Length L1, mm*	1440	1440	2340	2340	2340	2340	2340	2340
Length L2, mm**	2200	2200	3100	3100	3100	3100	3100	3100
Width, W, mm	920	920	920	920	920	1136	1136	1136
Height, H, mm	1370	1370	1490	1490	1490	1490	1490	1490
Nett weight, kg*	280	280	368	375	380	580	590	600

* unit on a standard frame and without accessories.

** unit on extended frame with optional buffer tank



8 fan standard unit indicated.

Note:

- Minimum 1 m clearance required all sides for air intake and unit service
- Sufficient clearance required above the unit to prevent recirculation of vertical discharge condenser air.

MODEL		CA80	CA96	CA115	CA132	CA150	CA175	CA200
Physical data								
Length L1, mm*		2340	2340	2340	2340	2340	2340	2340
Length L2, mm**		3100	3100	3100	3100	-	-	-
Width, W, mm		1684	1684	1684	2370	3266	3266	3266
Height, H, mm		1490	1490	1490	1530	1510	1510	1510
Nett weight, kg*		840	998	1100	1200	1680	1750	1880

* unit on a standard frame and without accessories.

** unit on extended frame with optional buffer tank

3. Control system operation.

The chiller units are fitted with a set of operating and safety controls to ensure reliable and efficient operation of the chiller. Their function and operation are described below.

Electronic Temperature Controller (ETC)

As all the chillers have capacity control, a multi-stage electronic thermostat sensing inlet and outlet water temperatures, controlling the stages of capacity as required. The CA range of chillers have 1, 2, or 4 stages of capacity control depending on model.

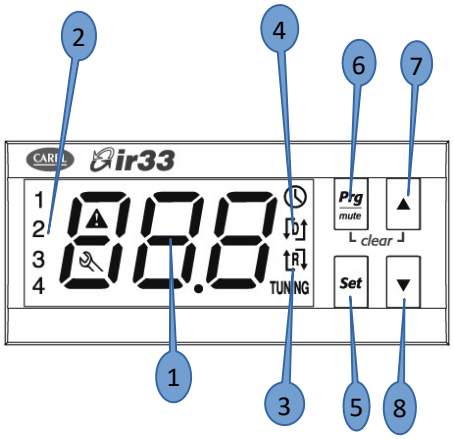
The control sensor (b1-set point) is located in a pocket in the inlet water connection of the chiller vessel.

The set point is factory set to suit the application as ordered, and will provide leaving chilled water at approximately 3-5ºK cooler than the set point at the nominal water flow rate. The set point is adjustable from +18ºC to –7ºC and must be set on site to suit the application. Factory set-point limits are put in place for the designed application and may have to be reprogrammed on-site for different applications.

As the thermostat is sensing return water temperature b1, it must be set approximately 4ºK to 5ºK above the desired leaving water temperature (depending on the water flow rate).

If the desired leaving water temperature is below +4ºC an anti-freeze such as ethanol, DOWFROST, ethylene or propylene glycol must be added to the water.

Programming Instructions



1. Temperature Display
2. Active Outputs (flash on standby)
3. Reverse Mode (heating)
4. Direct Mode (cooling)
5. Key: SET
6. Key: PRG/Mute
7. Key: Up
8. Key: Down

Set Point(s)

1. Press & hold “SET” for 2-3 seconds – on releasing button Set Point 1 (St1) will be displayed.
2. Press arrow “Up” or “Down” to set the desired value.
3. Press “SET” to confirm value

The system has only 1 set point, the controller will display the measured variable (water temperature). If the controller has been programmed for more than one stage the differential will remain constant regardless of set point.
Differential (P1) must be set to match the flow rate. This will normally be 1 to 2ºC per capacity stage.

Low Water Temperature Thermostat (LWT)

This function is performed by temperature probe b2 on the IR33 controller. It senses leaving water temperature and shuts the controller outputs down when this temperature drops below normal safe operating temperature. This control is provided to prevent freezing of the chiller vessel due to low flow or insufficient anti-freeze. The sensing bulb is located in a pocket in the leaving water connection of the chiller vessel.

The set point is factory set at 2ºC with a 2ºK differential, however for low temperature applications the set point is set 2ºC below the minimum desired leaving water temperature.

This thermostat is not included in the safety lockout circuit and will reset automatically.

Low Refrigerant Temperature Thermostat (LRT)-discontinued from February 2022

This thermostat is provided to detect a lower than normal refrigerant temperature resulting from a fault in the refrigerant or water system, which could lead to freezing of the chiller vessel. The sensing element is attached to the low pressure liquid line at the inlet to the evaporator. The set point is factory set at -2ºC with a 2ºC differential, however for low temperature application the set point needs to be set to approximately 8ºK below the desired leaving chilled water temperature. This thermostat is incorporated in the safety lock-out circuit and hence, when activated, it will shut the faulty refrigeration circuit down.

High/Low Refrigerant Pressure Switch (HP/LP)

These switches are provided to protect the compressor in the event of a malfunction in some part of the system. The low pressure switch is factory set to cut out 430kPA and the high pressure switch is factory set to cut out at 2600 kPa.
For low temperature applications the low pressure switch should be set to cut out at 100 kPa. The high pressure switch needs no adjustment.
Both switches are included in the safety lockout circuit and when activated will shut the faulty refrigeration circuit down.

Motor Temperature Thermostats (MT)

Both the compressor and the condenser fan motor(s) are fitted with either an auto-reset Thermal klixon or a contactor mounted thermal overload block which protects the motor(s) by shutting them down should they become overheated due to a malfunction in some part of the system. The klixon embedded in the motor windings is inaccessible. The fan motor thermostats are included in the safety lockout circuit and when activated shut the chiller down.
The compressor internal thermostat shuts down the compressor directly and will automatically reset after some time.

Repeated operation of this device indicates a fault requiring service.

Delay Start Timer

The Electronic Control thermostat (IR33) has inbuilt timers to delay the start of second and following stages and also to provide anti-short cycle timing on compressor start-ups. The factory settings are 60 seconds stage delay and 6 minutes Start to Start anti-short cycle delay.

Oil Pressure Failure Switch, CA96 and above

This control is integral with the operation of the semi-hermetic compressors. The control is factory set and has no user adjustments. The control is mounted on the end of the compressor. On compressor start this control monitors oil pressure and creates a fault if oil pressure is lost for more than 90 seconds. The control will bring up a general fault on low oil pressure and will require to be manually reset if this occurs by means of push button on top of the oil failure control.
If a fault occurs, this control will trip the safety lock-out circuit and must be manually reset.

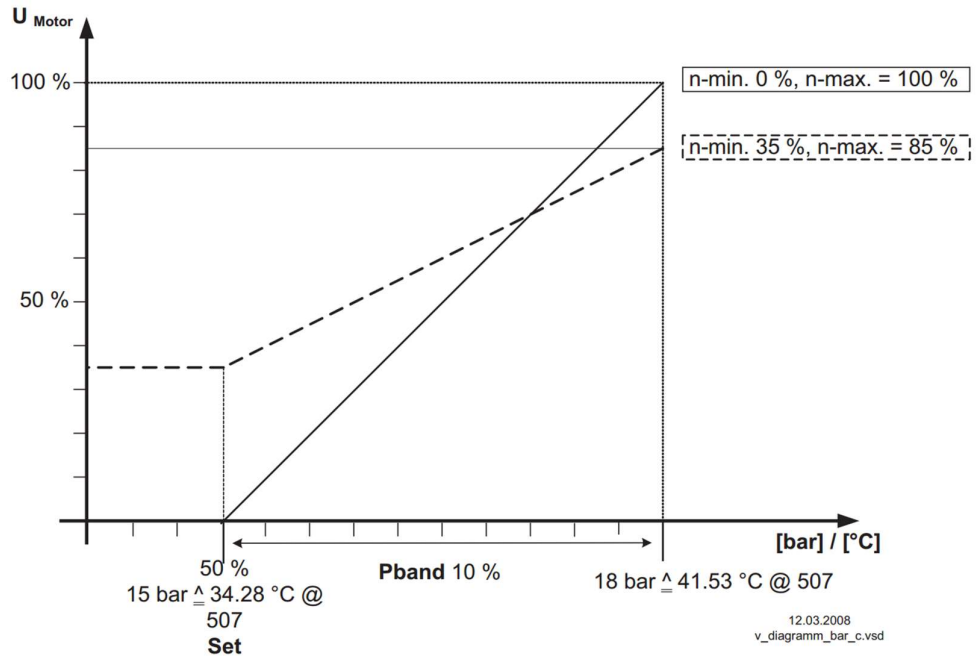
Condenser Fans Speed Controller

All units are fitted with a pressure actuated, proportional fan speed controller to maintain constant head pressure and stable operation. Units with two refrigeration systems (CA52-CA115) have a single fan speed controller with two pressure transducers. This provides automatic control to the pressure sensor with higher value. In case of failure of one pressure sensor the system remains fully operational.

Units with single refrigeration system (CA10-CA40) have a single fan speed controller with one pressure transducer.

Unit models CA132-CA200 have individual fan speed controller for each circuit.

For more details please refer Fan Speed Controller Operating Instructions.



Safety Lock-Out System

All models feature a safety lock-out circuit that shuts the chiller down if one of the safety devices included in the lock-out circuit trips. (The relay mounted red fault light will come on when this occurs). When the cause of the trip (malfunction) has been identified and rectified the safety lock-out circuit can be reset by turning the appropriate system control switch off and then on again.
On the multiple compressor models if the malfunction cannot be identified and rectified immediately, the chiller will continue to run. Isolate the faulty system using the system control switch located in the electrical control box.
All safety devices in the lock-out circuit except for the high pressure cut out, are auto-reset. Some of these devices may take up to 30 minutes to reset.

Do not continue to reset the safety circuit within a short period of time, as frequent stopping and starting may damage the compressors.

Flow Switch

A flow switch (or similar device) must be provided and wired into the chiller electrical circuit, as shown in the wiring diagram.

Phase Sequence Relay

A phase sequence relay is fitted to the CA40, and CA80 units to prevent the scroll compressors from running backwards if wired incorrectly. A yellow indicator will light up it wired correctly. If the indicator does not light up, phase direction will require correction at the main terminal block.

Remote Control Switch

Provision for a remote control switch is provided as shown on the wiring diagram.

4. Installation.

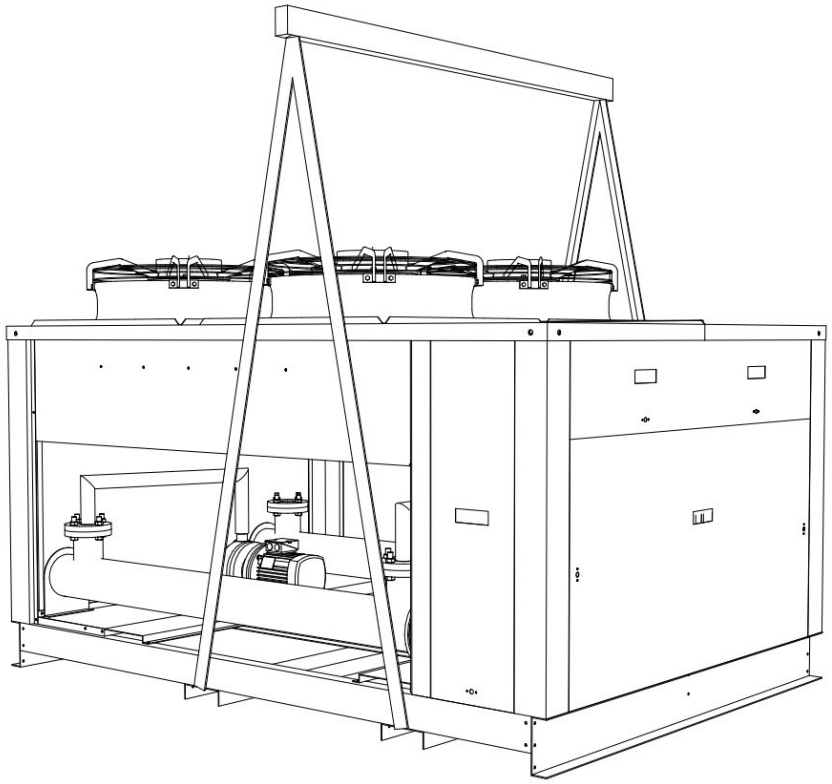
Receiving Unit

Upon receipt, the unit should be carefully examined for any damages that may have occurred in transit, and such damage should be noted on the carrier's delivery documents. It is the consignee's responsibility to make any subsequent claims upon the carrier or the respective insurance company.

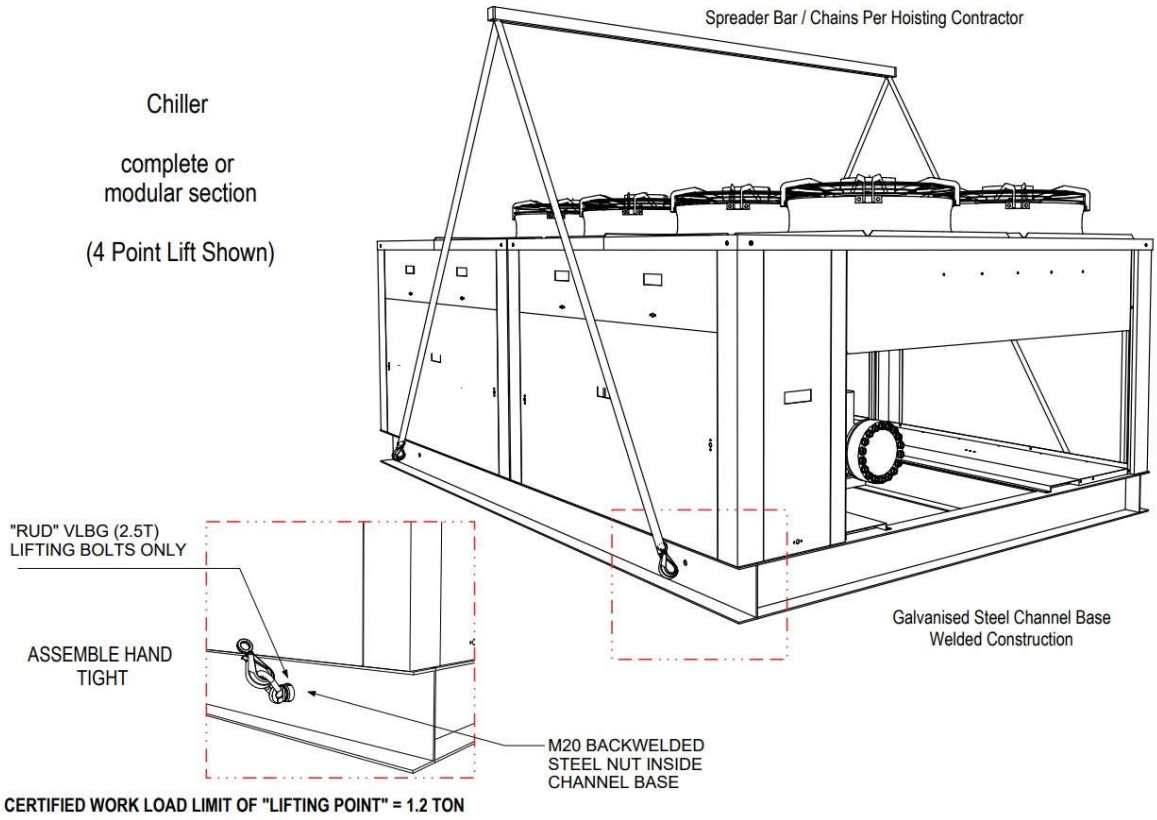
Lifting Unit

When slinging the unit, care must be taken to prevent rope damage to the paintwork or components. The unit can be lifted by means of slings under the bottom rails (refer the picture below). Since the weight is not equally distributed in the placement of the slings in order to obtain the proper balance.

CA10-CA132 lifting:



CA150-CA200 lifting:



Locating the Unit

The CA series units are fully weatherproof and should be located outdoors preferably, or if indoors must be in a well ventilated area. When installed in either indoor or outdoor locations, care should be taken to prevent the re-circulation of air to the condenser.

This range of packaged air cooled chillers are designed to be installed outdoors with no obstructions to the vertical condenser air discharge.

CAUTION: The unit must not be installed indoors or in an area which may restrict condenser air flow, without extreme care being taken to ensure a plentiful, unrestricted and continues supply of ambient temperature air. Ducting of standard condenser fans will void warranty.

The unit must be installed on a firm level foundation, of adequate strength to support its full operating weight. Some form of vibration isolation such as rubber waffle pads should be installed between the unit and the supporting structure.

1. The unit must not be located where it will be subjected to heavy downpour of roof drainage and must be above ground level in areas that are prone to stormwater flooding.
2. All electrical connections to the unit must be made via flexible connections to prevent transmission of vibration.
3. Service and air-flow clearances must be allowed as indicated on the unit dimension sheet. It should be noted that major service may require removal of the top panels.
4. Duct work must not be attached to condenser fan outlets, due to engineering and design considerations.
5. In addition to the service clearances noted on the dimension sheet, it is essential that provisions be made for adequate and safe service access.

Water System Installation

1. To maintain effective system control it is recommended that an insulated Thermal Inertia Tank is included in the chilled water circuit. This tank can also serve as the make-up water tank, fill point and expansion tank.
2. The chilled water piping should be arranged so that the circulating pump is installed on the entering waterside of the chiller (discharges into chiller). The piping should be sized for a velocity not exceeding 2 m/s to minimise the pressure drop in the system.
3. The piping should be located and supported so that excessive weight is not borne by the chiller connections.

PLEASE NOTE:

The chilled water piping must be installed with either barrel unions or flanged fittings to facilitate removal of the chiller vessels for service.

4. All the piping (including PVC pipe) and fittings should be insulated, with a water-resistant material such as Aeroflex or Armaflex. To prevent the formation of condensation and the resultant loss of chiller capacity.
5. The piping should include sufficient shut-off valves to permit draining of the water from the chiller without draining the complete system. It should also include thermometers at the inlet and outlet connections and air vents at the high points.
6. All systems should include a method of measurement to establish flow rate, acceptable methods include:
   a. Pressure tapping either side of the chiller in order that the pressure drop across unit can be determined. (The pressure drops are shown on page 7.)
   b. Flow meter, orifice plate or calibrated balancing valve.
   c. Pump pressure gauge, in conjunction with temperature gauges either side of chiller.
7. A cleanable type water strainer with a Mesh of approximately 20 mesh is recommended at the inlet to the chiller. This is absolutely essential on installations where the chilled water piping is made up of steel pipe with welded joints or where the water or piping is subject to considerable foreign matter.
8. A chilled water flow switch (or similar device) must be installed in the leaving water piping of the cooler. There should be a straight horizontal run of at least 5 pipe diameters on each side of the flow switch. Adjust the flow switch to suit the size of the pipe in which it is to be installed (see manufacturer's instructions furnished with switch). The switch is to be wired to terminals in the control panel as shown in the WIRING DIAGRAM.
9. The pump must be carefully selected to ensure it provides the design water flow against the total resistance of the system: Process heat exchanger, chiller vessel, static head, and all piping, valves and fittings.
10. The working water pressure at the chiller must not exceed 500kPa.

Electrical Connections

A competent licensed electrician must carry out the electrical installation in accordance with local supply authority regulations and the appropriate unit-wiring diagram.

Any modifications carried out without the approval of Fluid Chillers Australia may void the unit warranty.

Mains supply cables must be sized to ensure adequate voltage at the unit terminals when the unit is starting and during full load operation.

Selection of supply cables must be determined by the following criteria:

1. Length of supply cable run.
2. Maximum starting current of unit - cables must supply adequate voltage at unit terminals for starting.
3. Method of installation of supply cables.
4. Capability of cables to carry starting and full load current, are provided on the unit's circuit diagram.

Short circuit protection must be provided at switchboard using HRC fuses or circuit breakers.

Supply cables run within the unit to the isolator switch must be adequately protected against mechanical damage. (Ref: AS3000).

Refrigerant Charge

The chiller is shipped pre-charged with the correct amount of refrigerant in the system.

At unit start–up, the operating pressures and temperatures, should be checked by a properly qualified refrigeration mechanic to verify the unit is properly charged.

Operating Limits

For reliable efficient, trouble-free operation, it is essential that the unit is correctly sized for the job and operates within its recommended water flow and temperature range.

Units must not be selected to operate outside the range of operating conditions as shown in the selection data.

Warranty

Fluid Chillers Australia Pty Ltd warrants its fluid chilling units to be free of defects in workmanship or material under normal use and service.

As Fluid Chillers Australia Pty Ltd has no direct control over field-work done during installation, claims resulting from damage to equipment which can be attributed to this field work cannot be accepted.

Water System

Before attempting to start the unit, the chilled water system must be prepared for operation.

Flushing

Complete chilled water system including chiller vessel and pipework must be thoroughly cleaned by flushing to remove all foreign material and dirt. Use care not to flush any foreign material into or through the chiller vessel.

Fill System

Fill system with clean water, run pump to circulate water and check for leaks. Check pumps run continuously.

Air Removal

All air must be removed from system before starting unit. On “open” systems air is generally removed by simply running the pump. On “closed” systems it may be necessary to fit air bleed points.

Stop pump and check system for air pockets, vent as necessary.

Confirm flow switch functions / is operational.
Check water condition – it evidence of corrosion in system arrange for water sample test.

5. Commissioning

Chiller commissioning must be performed by qualified and appropriately trained refrigeration personnel. Commissioning data sheet (page 23) must be filled out and sent to Fluid Chillers Australia. Failure to do so may void warranty.

Water Treatment

To prevent corrosion and the build-up of scale and to keep the water free of algae and slime it is essential that a suitable corrosion inhibitor be added to the chilled water system.
The required quantity should be added to the system after it has been filled and checked for leaks.

Anti-Freeze Additive (if required)

If system is to run below +4ºC, anti-freeze such as Glycol or Ethanol (DOWFROST or similar) must be added to water in correct proportion. Check anti-freeze concentration in all systems.

NOTE:
Pure Glycol or Ethanol are not corrosion inhibitor, some suppliers add inhibitor at point of manufacture otherwise inhibitor must be added separately.

Establish Water Flow Rate

For efficient and reliable operation of the chiller it is critical that the design water flow rate is established and confirmed before starting the chiller.

Once established the flow rate must not vary more than 10% during operation and must never fall below the minimum flow rate listed for the model.

Non-compliance of above will cause chargeable service calls, erratic unit operation and may also cause damage to unit and void warranty.

6. Pre-start Check List.

Start Up

Clean all surfaces and remove all litter.

Clean down external panels. Remove panels.

Check and tighten all electrical connections. Power must be turned OFF prior to performing the works!

Check drain points and piping are clear.

Check the protection against mechanical damage.

Check the protection of moving parts (fans, pumps, etc)

Electrical Check

Electrical installation has been carried out according to unit wiring diagram and Supply Authority Regulations.

Correct size fuses or circuit breaker installed at switchboard.

Supply voltages as specified on unit circuit diagram.

Check that the actual supply voltage is within the required limits.

With the main isolating switch in the OFF position, make sure all line-started contacts meet with even pressure and all moving parts move freely.

Check that the thermostats are set below the chilled water temperature and that the system ON/OFF switches are in the OFF position.

Visual Check

Clearance around unit including condenser air entry and discharge and service access.

Unit mounted as specified.

For loose or missing bolts or screws.

For refrigerant leaks in connections and components.

Condenser fans blades are clear.

Compressors and Refrigeration System

Compressors sump heater must be operating for at least 6 (six) hours before attempting to start compressor.

Check to make sure that all refrigerant shut-off valves are open.

Running check: Start the compressor, check for any unusual noise and vibration. On CA40 and CA80 check rotation direction of scroll compressors. The reciprocating compressors are bi-directional. Check condenser fans and pumps are operating in correct direction.

If the return water temperature at start-up is too high the compressor(s) may overload causing the chiller to shut down.

To prevent this occurring, temporarily reduce the water flow by closing the balancing valve until the return water drops below 20ºC.

Check that condenser fans are running in correct direction. Air must be discharged upwards.

OPERATING PRESSURES

Operate the unit for a minimum of 20 minutes to ensure that the refrigerant pressures have stabilised, and check that they are within normal operating limits.

OPERATING TEMPERATURE

Check and record discharge, suction and liquid temperatures.

Discharge pressure on cooling cycle should normally not exceed 2500kPa.

Suction superheat should be 7ºK to 12ºK.

Liquid should be sub-cooled to = 5ºKTD.

Check compressor rotolock and service valve caps to ensure they are tight.

In applications where the design leaving water temperature is below +5ºC, the LRT LWT (if fitted) **and** LP **safety controls must be reset for low temperature operation.**

Each application will require its own specific settings.

The Thermostatic Expansion Valves may require re-adjusting to suit particular operating conditions. This will ensure maximum performance and safe operation of the equipment.

If required, after resetting these safety controls, all systems should be rechecked for correct function.

FINAL SYSTEM CHECK

Schraeder valve caps in place and secure.

Carefully and thoroughly leak test all connections in the refrigeration system, particularly the compressor rotolock and the service valve caps.

All panels and fan guards in place and secure.

Unit clean and left over installation material removed from area.

Adjust control thermostat to the temperature required.

Replace and secure all panels.

OPERATOR INSTRUCTIONS

Instruct the operator on proper operation and care of the system.

CAUTION:

The unit isolating switch must be left ON at all times in order to maintain operation of the compressor crankcase heater.

The control box system switch(s) can be turned to the OFF position at such times, or a remote control switch can be installed.

FINAL ELECTRICAL CHECK

Operating voltage:

Re-check voltage at unit supply terminals.

Check the compressor and condenser fan motor(s) amperages to make sure they are normal.

The correct amperage is included in the Electrical Data.

NOTE: The outdoor fan motors are fitted with internal automatic reset overload devices

Controls:

Check unit is wired for correct control of cooling function.

Check all operating and safety controls to ensure they are correctly adjusted (refer to Controls page)

7. Regular and Seasonal Maintenance.

These units have been designed for minimum maintenance. However, there are operational maintenance requirements that require regular attention to ensure optimum performance.

Maintenance of these units must be performed by appropriately trained and experienced personnel.

WARNING: Isolate unit from power supply before working on unit

OUTDOOR COIL

The coil surface will become laden with dust and may be blocked by leaves or papers over a period of time.

The surface should be inspected periodically and cleaned down gently by hosing as required. Extremely dirty coils may require chemical cleaning.

ELECTRICAL

The contact surfaces of relays and contactors should be inspected regularly by a refrigeration mechanic or electrician and replaced as judged necessary.

On these occasions the control box should be cleaned to remove any accumulation of dust or other contaminants.

All thermostats and pressure controls should be checked for correct operation and settings.
Fan and compressor current draw should be checked and compared to normal ratings.

- Check fuse rating and condition.
- Check for loose terminal screws.
- Visually check condition of contacts.
- Generally check for loose wiring. Tighten all electrical connections.

REFRIGERATION

The refrigeration is hermetically sealed and should require no regular maintenance.

However, it is recommended that the system is leak tested and the general operating and control systems be checked on a regular basis.

The operating pressures should be checked particularly at these times, as they are an excellent guide to other areas of the system in need of maintenance.

All pressure controls should be checked to ensure correct settings are being maintained.

- Check for pipes or capillaries rubbing or vibrating.
- Check compressor for unusual noise or vibration.
- Check discharge temperature.
- Confirm crankcase heater is energised during OFF cycle.

CHILLED WATER SYSTEM

Check pump is giving correct water flow rate and supply head pressure, also that it is operating smoothly and quietly.

Check that there are no leaks to system particularly pump gland-shaft seal.

Check pump motor for signs of overheating.

Remove and clean strainers where fitted.

Chiller vessel should require no maintenance other than draining of vessel and checking for sludge if operating in a dirty environment.

SEASONAL SHUTDOWN

If it is intended to shut the chiller down for a period of time the following service procedures should be completed.

SHUTDOWN

Where freezing temperatures may be encountered chiller water piping should be disconnected from the supply and drained of all water.

Remove drain plug from chiller vessels(s).

Remove the pump-drain plug and leave it removed, so that any water which may accumulate, is drained.

Take measures to prevent the shut-off valve in the water supply line from being accidentally turned on.

Open unit-isolating switch and remove fuses only if chillers are drained.

Check for corrosion and clean and paint rusted surfaces.

RESTART AFTER SHUT DOWN

With unit switched OFF at main isolator, check:

- All terminals are tight.
- Wiring clear of or protected from pipe work and sharp edges.
- Clean electrical enclosure.
- Clean out accumulated dirt.
- Replace all drain plugs removed at shut-down time the previous season.
- Refill and check system as detailed under “Start up”.
- Recommission unit as detailed under “Commissioning”.

8. Troubleshooting.

CA Series chillers are fitted with a fault light that if ON, generally indicates an internal fault with the chiller. In some cases external faults can generate a secondary internal fault within the chiller. If the fault is OFF, the fault will normally be external.

SYMPTOM AND PROBABLE CAUSE	PROBABLE REMEDY
No Display on Thermostat control. Refrigeration is not running.	
Control circuit On-Off switch is OFF	Check control switch is ON
Chiller water flow switch is open	Check chiller water pump operation (including direction), check switch.
Pump contactor tripped on overload	Investigate reason for trip & reset if OK
Control circuit breaker tripped	Reset control circuit breaker
Power line open	Reset circuit breaker
Improperly wired controls	Check and rewire
Low supply voltage	Check supply voltage - determine location of voltage drop and remedy deficiency
Condenser fans tripped on internal overload	Wait for fan motor to cool down and auto-reset
Display on Thermostat control is on. Refrigeration not running	
Loose terminal connection	Check connections
Improperly wired controls	Check and rewire
Contactors stuck open	Replace contactor
Motor winding open or short circuited	Check and replace compressor if faulty
Display on Thermostat control is on. Refrigeration not running. Fault light is on.	
Low Refrigerant Pressure Lock Out	
Low or restricted chiller water flow	Set water flow to designed requirements
Brine solution has diluted	Return brine solution concentration to correct level
Low refrigerant charge	Add refrigerant, check for leaks and repair
Compressor suction shutoff valve partially closed	Open valve
Safety device tripped	Reset control circuit with On-Off switch. Determine cause of fault
High Refrigerant Pressure Lock Out - Note: HP lockout must be manually reset on HP control	
Condenser fans not operating	Check motor winding and repair or replace if defective
Dirt or rubbish blocking condenser coil	Clean coil
Compressor discharge valve partially closed	Open valve or replace if defective
Air in system	Purge system of air, find leak and repair
Safety device tripped	Reset control circuit with On-Off switch. Determine cause of fault
Unit Operates Too Long or Continuously	
Control contacts fused	Replace control
Cooling load exceeds chiller capacity	Reduce load on chiller
Non-condensable in system	Purge system of air, find leak and repair
Partially plugged expansion valve or filter drier	Clean or replace
Low refrigerant charge	Add refrigerant and determine reason for loss
System Noisy	

Fan out of balance	Re-balance or replace fan blade or complete assembly
Crankcase heaters not energised during shutdown	Check wiring and relays. Check heater and replace if defective
Compressor noise	Replace compressor if determined faulty

COMISSIONING DATA SHEET

Date of commissioning:			
Model number:		Serial number:	
Commissioning contractor:			
Commissioning mechanic:			
Equipment owner:			
Site address:			

SYSTEM-GENERAL		
Check and tighten all electrical connections. Power must be disconnected prior to performing the works!		
Check the protection of moving parts. Drain points are clear.		
Check chilled water system is flushed		
Check water filled, air purged		
Check water pump(s) direction		
Line Voltage, V		
Ambient air temperature, C		

CHILLED WATER/GLYCOL SYSTEM			
Anti-freeze type and % if used			
Corrosion inhibitor added, YES/NO			
Water/Glycol pressure, kPa	Entering:		Leaving:
Water/Glycol Temperature, C	Entering:		Leaving:
Water/Glycol - flow, L/s measured			

PUMP 1			
Head pressure, kPa			
Current, A	Phase 1:	Phase 2:	Phase 3:

PUMP 2			
Head pressure, kPa			
Current, A	Phase 1:	Phase 2:	Phase 3:

PUMP 3			
Head pressure, kPa			
Current, A	Phase 1:	Phase 2:	Phase 3:

REFRIGERATION SYSTEM		
	System 1	System 2
Discharge pressure, kPa		
Discharge temperature, C		
Suction pressure, kPa		
Suction temperature, C		
Liquid line temperature, C		
Superheat, C		
Compressor current, phase 1, A		
Compressor current, phase 2, A		
Compressor current, phase 3, A		

To ensure prompt warranty consideration please fill out this page and e-mail to Fluid Chillers Australia Pty Ltd

NOTES:

HEAD OFFICE
6-10 SOUFFI PLACE
DANDENONG SOUTH
VICTORIA 3175
AUSTRALIA
Phone 03 8796 4888
Fax. 03 9706 6490
e-mail sales@fluidchillers.com.au
www.fluidchillersaustralia.com.au

Your Agent is:

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