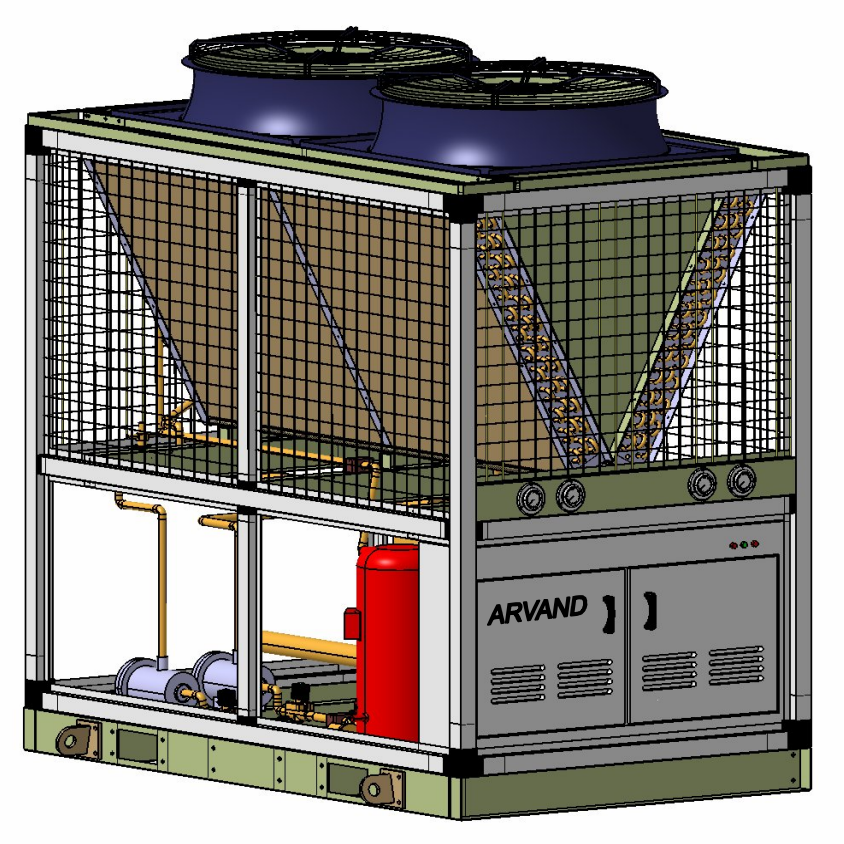
MODULAR AIR COOLED CHILLERS

Air-Cooled Scroll Compressor Water Chiller

AMAC 09 – AMAC 24 – AMAC 32
6 to 120 Tons, 21 to 420 KW
R-22, 50 Hz

YEKTA TAHVIEH ARVAND IND.



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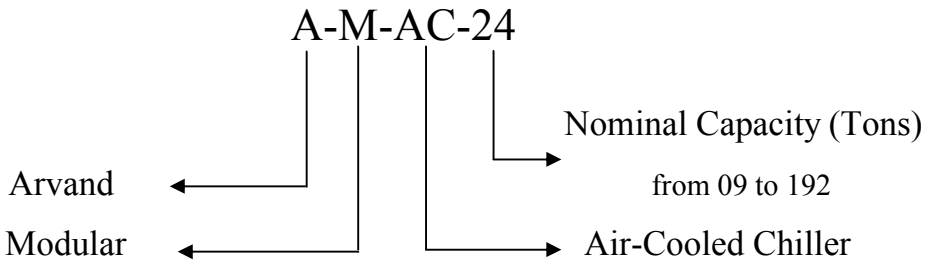
Nomenclature System



Introduction

The Modular AMAC air-cooled scroll chillers countinues Arvand's legacy of high quality, high efficiency, latest technology and quiet operation. Our model AMAC units utilize an advanced compressor design utilizing R-22 refrigerant. These model offer modules of 6, 16 and 20 tons, which can be combined (6 tons. with 6 tons. units, 16 tons. with 16 tons. units, 20 tons. with 20 tons. units, No 6 tons. with 16 or 20 tons. units) to get the desired capacity; gives an incredible flexibility when looking for the perfect combination to match your present and future needs. Perhaps most importantly, they continue Arvand's reputation for quiet operation, making AMAC chillers "building friendly".
Arvand provides one of the best overall values in air-cooled chillers available today!

UTSTANDING RELIABILITY

- Up to 6 modules set up availability
- Factory-run-testing to optimize trouble-free startup

SUPERIOR EFFICIENCY

- Highly efficient Copeland scroll compressor
- Air cooled V-shaped condenser coils with optimum heat exchange capability
- Stainless steel brazed evaporator
- Weather proof high air volume condenser fan

QUIET OPERATION

- Hermetic compressor design
- Low sound power rating
- Virtually vibration-free operation

Features and Benefits

AMAC units are high thermodynamic engineering products, studied with accuracy in balancing compressors, condensers and evaporators in order to offer the best performances and wide safety margins. All the materials and equipments have been chosen without compromising the quality and life expectancy of the product.

Modular Design
The Arvand's modular chillers have been designed in such a way that different loads could be satisfied due to the combination of these units. The largest combination is 6 modules of the same model (combination of different models are not allowed). They are very convenient when transportation and installation become major issues.

Working Reliability
Each module has maximum two circuits and two compressors. As the capacity is increased by means of adding modules, circuits and compressors are going to increase in the same way; resulting in a very reliable product.

Low Installation Cost
The complete assembly of the units and function testing at the factory reduce the cost of installation on site. A rigid base with built-in access lifting points distributes the weight of the unit to the support points and allows simple installation. Also the possibility of transporting and lifting to the site each unit separately reduces the initial mechanical installation.
These units modular design have the flexibility of future capacity increases.

Low Operating Costs – High Efficiency Operation
The AMAC chillers use Copeland scroll compressor design and large heat exchangers for maximum heat transfer. In order to give optimum thermal operation, the complete heat exchanger is insulated.

Robust Cage Design
These units are built with a very strong frame design allowing them to withstand the most severe weather adversities. Handling and installing become a simpler process due to strong configuration of its components.

General Specification

Compressor

AMAC are Equipped with highly efficient Copeland's compliant Scroll compressors. These rugged hermetic compressors are constructed with an internal cast iron frame, cast iron scrolls, three Teflon impregnated bearings, and three oil filtration devices for each compressor. Using Copeland's Compliant Scroll compressor provides two or twelve steps of capacity modulation depending on system load and number of modules. Each refrigerant circuit has specially designed oil and gas equalization lines to control oil migration. The design also offers radial and axial compliance, a large internal volume for liquid handling, a removable suction screen, and a rotary dirt trap and oil screen. In addition, the compressor is self-compensating for wear, handles moderate liquid slugging, and inherently yields the high efficiency. This well protected compressor includes a solid-state motor protection module, 4 individual motor winding sensors, a patented internal discharge temperature probe, and a patented shutdown feature that prevents reverse rotation. An internal discharge check valve help prevent shutdown noise and comes standard with high and low pressure taps with Schrader valves, a sight glass, an oil level adjustment valve, and an off cycle crankcase heater. Units are available 50 and 60 Hertz with voltage configuration from 208 to 460 volts, operating at 3550 RPM.

Air-cooled Condenser

The two air cooled condenser coils with V-shaped consist of staggered rows of 1/2 " OD seamless copper tube, mechanically expanded onto die formed aluminum fins to ensure optimum heat exchange capability.

Condenser Fan Motor

To achieve the high air charge requirement, the unit is equipped with the high air flow propeller fan which is made of Galvanized steel. The fan is direct drive by weatherproof motor to ensure reliable continuous operation.

Evaporator

The heat exchanger is made of stainless steel plates closely arranged and brazed together to ensure high heat exchange efficiency.

Refrigerant Circuit

The refrigerant circuit is factory brazed and evacuated before accurately charged with R-22 to ensure optimum operating requirement. To ensure flawless continuous operation, each refrigerant circuit is equipped with a carefully sized thermostatic expansion or capillary valve. See figures 1 & 2.

Refrigerant Piping

Includes insulated suction line, sealed filter-drier, sight glass, capillary or expansion valve, charging valve and relief valves.

Figure 1, Refrigerant Schematic Diagram (Model AMAC-09)

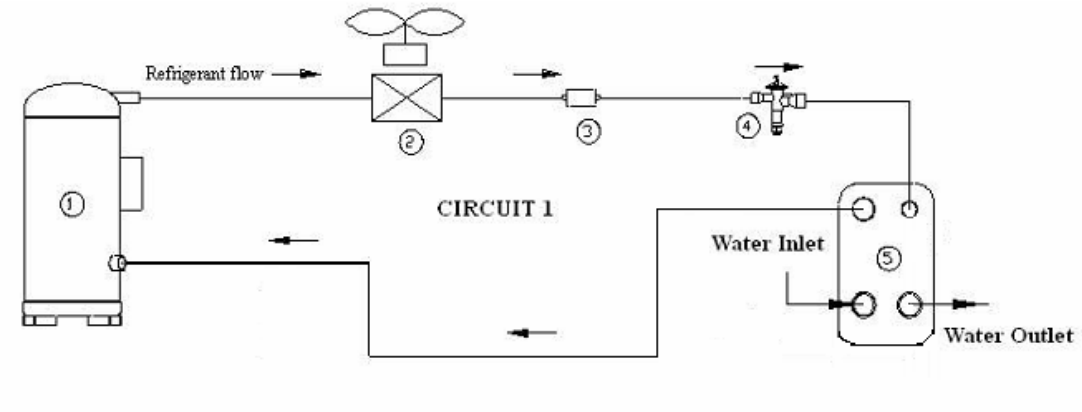
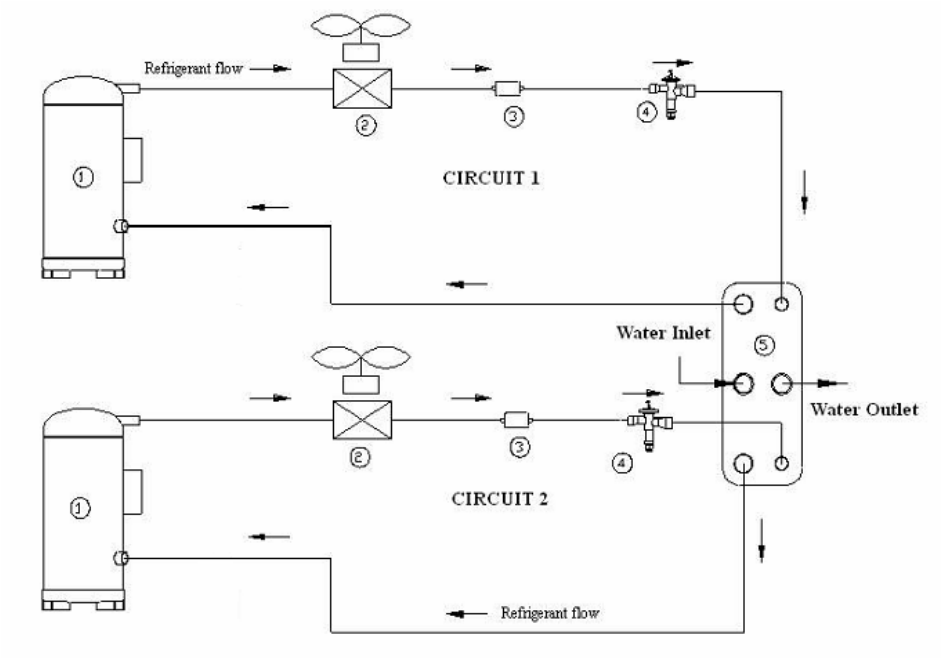


Figure 2, Refrigerant Schematic Diagram (Model AMAC-24 & AMAC-32)



- 1.Compressor
- 2.Condenser Coil
- 3.Filter Dryer
- 4.Expansion valve
- 5.Plate-to-plate evaporator

Performance Data

Table 1, AMAC-09 through AMAC-54, SI Units

AMAC UNIT SIZE	LWT (°C)	Ambient Air Temperature (° C)									
		30		35		40		45		48	
		Cap. KW	THR KW	Cap. KW	THR KW	Cap. KW	THR KW	Cap. KW	THR KW	Cap. KW	THR KW
AMAC-09	4	20.9	26.1	19.7	25.6	18.5	25.2	17.2	24.7	-	-
	5	21.7	26.9	20.5	26.4	19.2	25.9	17.9	25.4	-	-
	6	22.5	27.7	21.2	27.1	20.0	26.6	18.6	26.1	-	-
	7	23.3	28.5	22.0	27.9	20.7	27.3	19.3	26.8	18.4	26.5
	8	24.1	29.4	22.8	28.7	21.5	28.1	20.0	27.5	19.1	27.2
	9	25.0	30.2	23.7	29.5	22.3	28.9	20.8	28.3	19.8	27.9
AMAC-18	4	41.8	52.2	39.4	51.2	36.9	50.4	34.3	49.4	-	-
	5	43.4	53.8	41	52.8	38.4	51.8	35.7	50.8	-	-
	6	45	55.4	42.4	54.2	39.9	53.2	37.1	52.2	-	-
	7	46.6	57	44	55.8	41.4	54.6	38.5	53.6	36.7	53
	8	48.2	58.8	45.6	57.4	43	56.2	40	55	38.2	54.4
	9	50	60.4	47.4	59	44.6	57.8	41.6	56.6	39.6	55.8
AMAC-27	4	62.7	78.3	59.1	76.8	55.35	75.6	51.45	74.1	-	-
	5	65.1	80.7	61.5	79.2	57.6	77.7	53.55	76.2	-	-
	6	67.5	83.1	63.6	81.3	59.85	79.8	55.65	78.3	-	-
	7	69.9	85.5	66	83.7	62.1	81.9	57.75	80.4	55.05	79.5
	8	72.3	88.2	68.4	86.1	64.5	84.3	60	82.5	57.3	81.6
	9	75	90.6	71.1	88.5	66.9	86.7	62.4	84.9	59.4	83.7
AMAC-36	4	83.6	104.4	78.8	102.4	73.8	100.8	68.6	98.8	-	-
	5	86.8	107.6	82	105.6	76.8	103.6	71.4	101.6	-	-
	6	90	110.8	84.8	108.4	79.8	106.4	74.2	104.4	-	-
	7	93.2	114	88	111.6	82.8	109.2	77	107.2	73.4	106
	8	96.4	117.6	91.2	114.8	86	112.4	80	110	76.4	108.8
	9	100	120.8	94.8	118	89.2	115.6	83.2	113.2	79.2	111.6
AMAC-45	4	104.5	130.5	98.5	128	92.25	126	85.75	123.5	-	-
	5	108.5	134.5	102.5	132	96	129.5	89.25	127	-	-
	6	112.5	138.5	106	135.5	99.75	133	92.75	130.5	-	-
	7	116.5	142.5	110	139.5	103.5	136.5	96.25	134	91.75	132.5
	8	120.5	147	114	143.5	107.5	140.5	100	137.5	95.5	136
	9	125	151	118.5	147.5	111.5	144.5	104	141.5	99	139.5
AMAC-54	4	125.4	156.6	118.2	153.6	110.7	151.2	102.9	148.2	-	-
	5	130.2	161.4	123	158.4	115.2	155.4	107.1	152.4	-	-
	6	135	166.2	127.2	162.6	119.7	159.6	111.3	156.6	-	-
	7	139.8	171	132	167.4	124.2	163.8	115.5	160.8	110.1	159
	8	144.6	176.4	136.8	172.2	129	168.6	120	165	114.6	163.2
	9	150	181.2	142.2	177	133.8	173.4	124.8	169.8	118.8	167.4

- Shaded area refer to base design point for common application like Tehran, Isfahan,…
- Ratings based on R-22 and sea level altitude.
  LWT = Leaving Water Temperature
  Cap = Cooling Capacity
  THR = Total Heat Rejection

Performance Data

Table 2, AMAC-24 through AMAC-144, SI Units

AMAC UNIT SIZE	LWT (°C)	Ambient Air Temperature (° C)									
		30		35		40		45		48	
		Cap. KW	THR KW	Cap. KW	THR KW	Cap. KW	THR KW	Cap. KW	THR KW	Cap. KW	THR KW
AMAC-24	4	56.2	70.2	52.8	68.6	49.0	66.8	45.0	65.2	-	-
	5	58.4	72.4	54.8	70.6	51.0	68.8	46.8	67.0	-	-
	6	60.6	74.6	56.8	72.6	53.0	70.8	48.8	68.8	-	-
	7	62.8	76.8	59.0	74.8	55.0	72.8	50.8	70.8	48.0	69.6
	8	65.0	79.0	61.2	77.0	57.2	74.8	52.8	72.8	50.0	71.6
	9	67.4	81.2	63.4	79.2	59.2	77.0	54.8	74.8	52.0	73.4
AMAC-48	4	112.4	140.4	105.6	137.2	98	133.6	90	130.4	-	-
	5	116.8	144.8	109.6	141.2	102	137.6	93.6	134	-	-
	6	121.2	149.2	113.6	145.2	106	141.6	97.6	137.6	-	-
	7	125.6	153.6	118	149.6	110	145.6	101.6	141.6	96	139.2
	8	130	158	122.4	154	114.4	149.6	105.6	145.6	100	143.2
	9	134.8	162.4	126.8	158.4	118.4	154	109.6	149.6	104	146.8
AMAC-72	4	168.6	210.6	158.4	205.8	147	200.4	135	195.6	-	-
	5	175.2	217.2	164.4	211.8	153	206.4	140.4	201	-	-
	6	181.8	223.8	170.4	217.8	159	212.4	146.4	206.4	-	-
	7	188.4	230.4	177	224.4	165	218.4	152.4	212.4	144	208.8
	8	195	237	183.6	231	171.6	224.4	158.4	218.4	150	214.8
	9	202.2	243.6	190.2	237.6	177.6	231	164.4	224.4	156	220.2
AMAC-96	4	224.8	280.8	211.2	274.4	196	267.2	180	260.8	-	-
	5	233.6	289.6	219.2	282.4	204	275.2	187.2	268	-	-
	6	242.4	298.4	227.2	290.4	212	283.2	195.2	275.2	-	-
	7	251.2	307.2	236	299.2	220	291.2	203.2	283.2	192	278.4
	8	260	316	244.8	308	228.8	299.2	211.2	291.2	200	286.4
	9	269.6	324.8	253.6	316.8	236.8	308	219.2	299.2	208	293.6
AMAC-120	4	281	351	264	343	245	334	225	326	-	-
	5	292	362	274	353	255	344	234	335	-	-
	6	303	373	284	363	265	354	244	344	-	-
	7	314	384	295	374	275	364	254	354	240	348
	8	325	395	306	385	286	374	264	364	250	358
	9	337	406	317	396	296	385	274	374	260	367
AMAC-144	4	337.2	421.2	316.8	411.6	294	400.8	270	391.2	-	-
	5	350.4	434.4	328.8	423.6	306	412.8	280.8	402	-	-
	6	363.6	447.6	340.8	435.6	318	424.8	292.8	412.8	-	-
	7	376.8	460.8	354	448.8	330	436.8	304.8	424.8	288	417.6
	8	390	474	367.2	462	343.2	448.8	316.8	436.8	300	429.6
	9	404.4	487.2	380.4	475.2	355.2	462	328.8	448.8	312	440.4

- Shaded area refer to base design point for common application like Tehran, Isfahan,…
- Ratings based on R-22 and sea level altitude.

  LWT = Leaving Water Temperature

  Cap = Cooling Capacity

  THR = Total Heat Rejection

Performance Data

Table 3, AMAC-32 through AMAC-192, SI Units

AMAC UNIT SIZE	LWT (°C)	Ambient Air Temperature (° C)									
		30		35		40		45		48	
		Cap. KW	THR KW	Cap. KW	THR KW	Cap. KW	THR KW	Cap. KW	THR KW	Cap. KW	THR KW
AMAC-32	4	71.6	90.8	66.6	24.6	61.2	85.4	54.8	82.2	-	-
	5	74.4	93.6	69.4	91.0	64.0	88.2	57.6	84.8	-	-
	6	77.2	96.6	72.4	93.8	66.8	90.8	60.4	87.6	-	-
	7	80.2	99.4	75.2	96.8	69.6	93.6	63.2	90.2	59.0	88.0
	8	83.4	102.4	78.2	99.6	72.4	96.6	66.0	93.0	61.8	90.8
	9	86.4	105.6	81.2	102.6	75.4	99.4	69.0	96.0	64.6	93.6
AMAC-64	4	143.2	181.6	133.2	49.2	122.4	170.8	109.6	164.4	-	-
	5	148.8	187.2	138.8	182	128	176.4	115.2	169.6	-	-
	6	154.4	193.2	144.8	187.6	133.6	181.6	120.8	175.2	-	-
	7	160.4	198.8	150.4	193.6	139.2	187.2	126.4	180.4	118	176
	8	166.8	204.8	156.4	199.2	144.8	193.2	132	186	123.6	181.6
	9	172.8	211.2	162.4	205.2	150.8	198.8	138	192	129.2	187.2
AMAC-96	4	214.8	272.4	199.8	73.8	183.6	256.2	164.4	246.6	-	-
	5	223.2	280.8	208.2	273	192	264.6	172.8	254.4	-	-
	6	231.6	289.8	217.2	281.4	200.4	272.4	181.2	262.8	-	-
	7	240.6	298.2	225.6	290.4	208.8	280.8	189.6	270.6	177	264
	8	250.2	307.2	234.6	298.8	217.2	289.8	198	279	185.4	272.4
	9	259.2	316.8	243.6	307.8	226.2	298.2	207	288	193.8	280.8
AMAC-128	4	286.4	363.2	266.4	98.4	244.8	341.6	219.2	328.8	-	-
	5	297.6	374.4	277.6	364	256	352.8	230.4	339.2	-	-
	6	308.8	386.4	289.6	375.2	267.2	363.2	241.6	350.4	-	-
	7	320.8	397.6	300.8	387.2	278.4	374.4	252.8	360.8	236	352
	8	333.6	409.6	312.8	398.4	289.6	386.4	264	372	247.2	363.2
	9	345.6	422.4	324.8	410.4	301.6	397.6	276	384	258.4	374.4
AMAC-160	4	358	454	333	123	306	427	274	411	-	-
	5	372	468	347	455	320	441	288	424	-	-
	6	386	483	362	469	334	454	302	438	-	-
	7	401	497	376	484	348	468	316	451	295	440
	8	417	512	391	498	362	483	330	465	309	454
	9	432	528	406	513	377	497	345	480	323	468
AMAC-192	4	429.6	544.8	399.6	147.6	367.2	512.4	328.8	493.2	-	-
	5	446.4	561.6	416.4	546	384	529.2	345.6	508.8	-	-
	6	463.2	579.6	434.4	562.8	400.8	544.8	362.4	525.6	-	-
	7	481.2	596.4	451.2	580.8	417.6	561.6	379.2	541.2	354	528
	8	500.4	614.4	469.2	597.6	434.4	579.6	396	558	370.8	544.8
	9	518.4	633.6	487.2	615.6	452.4	596.4	414	576	387.6	561.6

- Shaded area refer to base design point for common application like Tehran, Isfahan,…
- Ratings based on R-22 and sea level altitude.

  LWT = Leaving Water Temperature

  Cap = Cooling Capacity

  THR = Total Heat Rejection

Water pressure drop

Table 4, Water Side Pressure Drop, Model AMAC-09

Flow Rate (l/s)	0.5	0.6	0.8	1	1.2
Pressure Drop (kPa)	1	2	3	5	7

Flow Rate (l/s)	1.5	1.8	2	2.5	3.3
Pressure Drop (kPa)	10	15	20	30	50

Flow Rate (l/s)	4	5	6	7	8.5
Pressure Drop (kPa)	70	100	150	200	300

Table 5, Water Side Pressure Drop, Model AMAC-24

Flow Rate (l/s)	1	1.5	2	2.5	3
Pressure Drop (kPa)	1	2	3	5	7

Flow Rate (l/s)	3.5	4.5	5	6.5	8.5
Pressure Drop (kPa)	10	15	20	30	50

Flow Rate (l/s)	10	12	15	17	21
Pressure Drop (kPa)	70	100	150	200	300

Table 6, Water Side Pressure Drop, Model AMAC-32

Flow Rate (l/s)	1	1.5	2	2.5	3
Pressure Drop (kPa)	1	2	3	5	7

Flow Rate (l/s)	3.5	4	5	6	8
Pressure Drop (kPa)	10	15	20	30	50

Flow Rate (l/s)	9	11	13.5	16	19.5
Pressure Drop (kPa)	70	100	150	200	300

Physical Data

Table 7, Physical Data

UNIT	AMAC-09	AMAC-24	AMAC-32
BASIC DATA			
Nominal Capacity (Ton)	9	24	32
Unit Capacity @ ARI , Ton (KW)	5.9 (20.7)	15.6 (55)	19.7 (69.6)
NO. Circuit	1	2	2
Refrigerant Type	R-22		
Cabinet Dimension Lx W x H , mm	1558x 1100 x 1718	1967x 1374 x 1955	2203x 1374 x 2320
Operating Weight (kg)	320	640	750
Shipping Weight (kg)	310	620	730
COMPRESSORS			
Type	Scroll		
Protection Device	High/low Pressure Switch / Thermal And Current Overload Protector		
NO. Compressors	1	2	2
CONDENSER			
Number	1	2	2
No. Refrigerant Circuit per cond.	1	1	1
Tube Diameter (inch)	1/2		
Coil Face Area (m^2)	1	2.7	3.5
Fin Per inch x Row Deep	12 x 3	12 x 3	16 x 3
Fin Thickness (mm)	0.15		
Fin Material	Aluminum		
Condenser Fan			
Type / Drive	Axial / Direct Drive Propeller		
No. of Fan	1	2	2
Fan Diameter (mm)	710		
Air Flow (l/s)	5700	13000	14100
EVAPORATOR			
Type	Brazed plate heat exchanger		
No. Refrigerant Circuit	1	2	2
Water Volume (Lit)	2.54	7.5	11.5
Refrig. Side max.W.P. , (Mpa)	3.1	3.1	3.1
Water. Side max.W.P. , (Mpa)	2.4	2.4	2.4
Evaporator Material	Stainless steel		

- For multiple module units, multiply the single module physical data by the numbers of modules.

Electrical Data

Table 8, Unit electrical data

MODEL	Compressor			Condenser Fan motor				Unit			
	Qty	FLA each	LRA each	Qty	FLA each	KW** each	LRA each	WSA	FLA	Rec Fuse amp	Max Fuse amp
AMAC-09	1	16.8	111	1	3	1.1	14	24	19.8	28.2	40.8
AMAC-24	2	22.3	118	2	3	1.1	14	56.2	50.6	61.8	78.5
AMAC-32	2	39	174	2	3	1.1	14	93.8	84	103.5	132.8

(50 HZ Network voltage (V) 370 – 457*)

*The supply voltage must be with in these limits.
**Maximum motor KW are considered

KW **:** Maximum power input
LRA **:** Located rotor amps
FLA **:** Full load amps
WSA **:** Wire sizing amps per NEC , section 430-24 to use the sum of 125% of the FLA for the largest motor plus 100% of the FLA for all other motor in the unit.

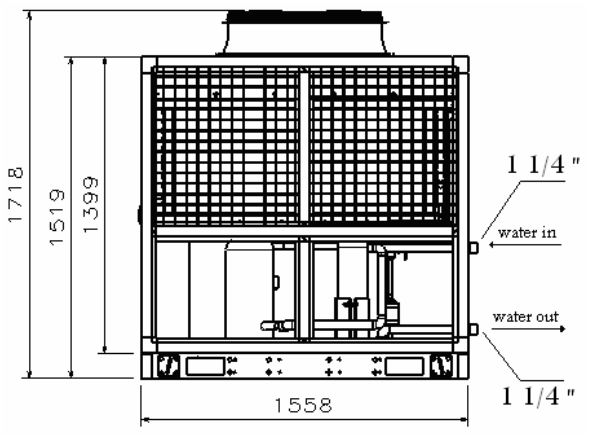
Rec.Fuse AMP **:** Recommended dual element fuse amps, equal to 150% of largest motor FLA plus 100% of the FLA for all other motor in the unit.

Max.Fuse AMP **:** Maximum overcurrent protective amps, equal to 225% of largest motor FLA plus 100% of the FLA for all other motor in the unit

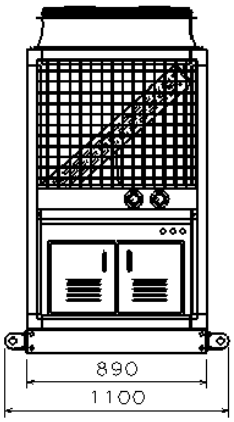
Dimensional Data (mm)

Figure 3, Model: AMAC 09

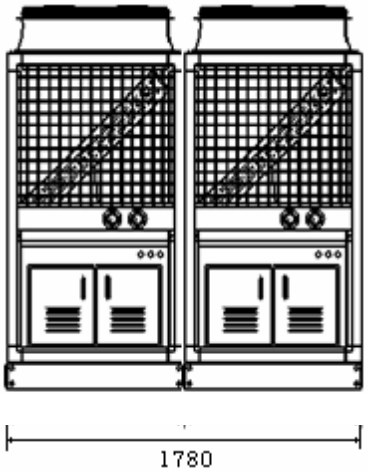
End View



Side view



AMAC-09



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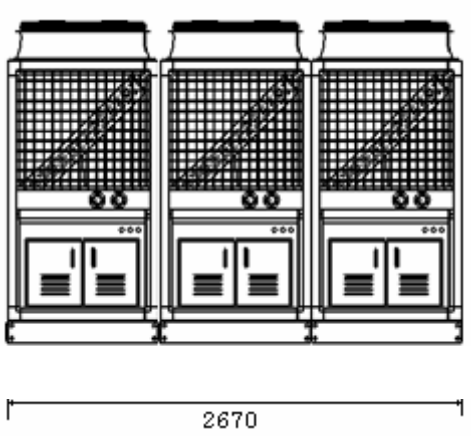

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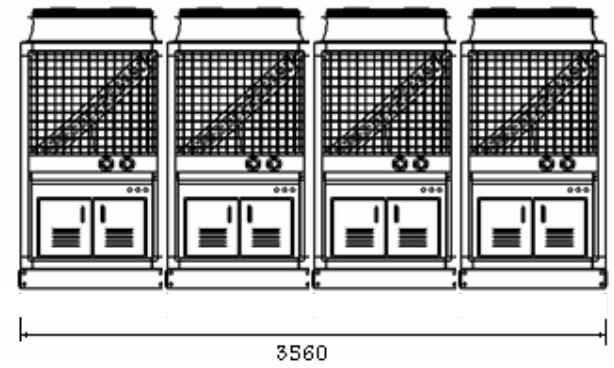

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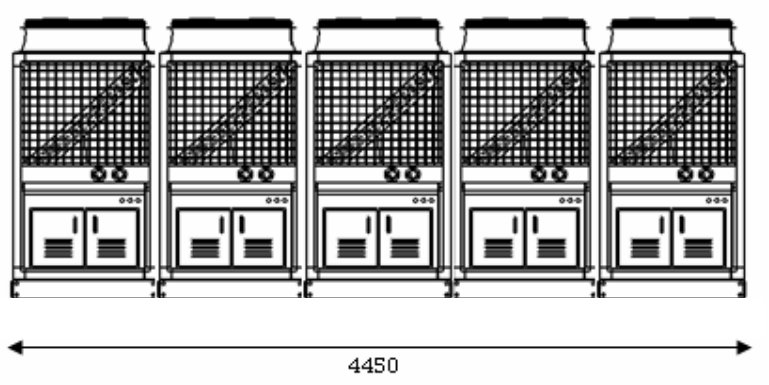

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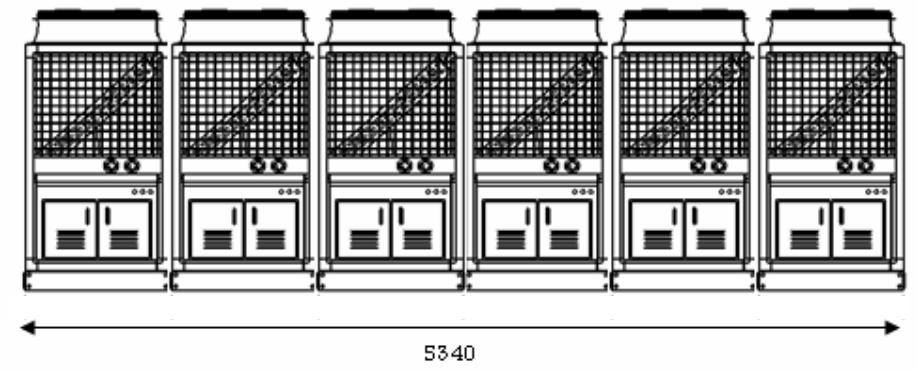
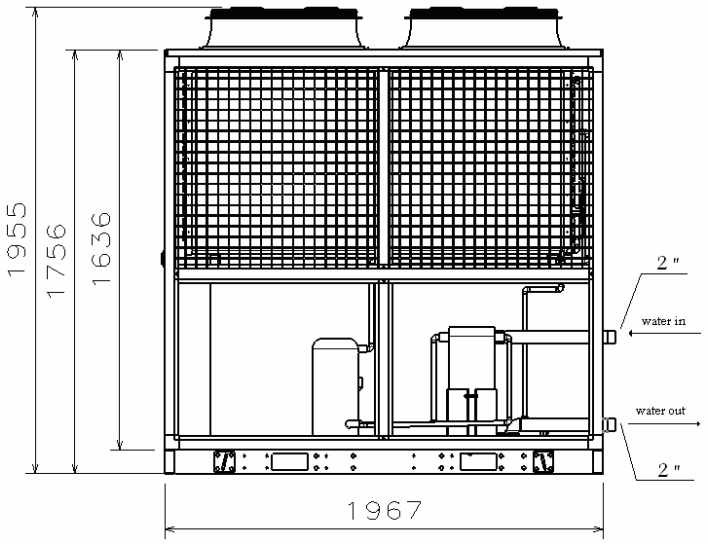


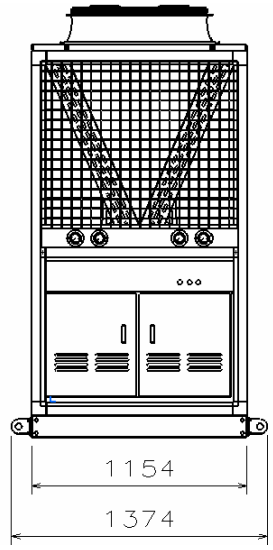
AMAC-54

Figure 4, Model: AMAC 24

End View



Side view



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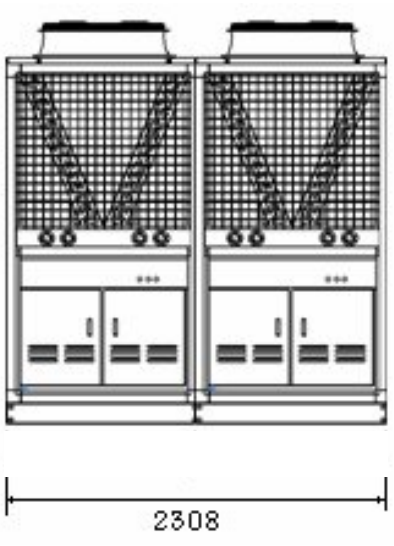

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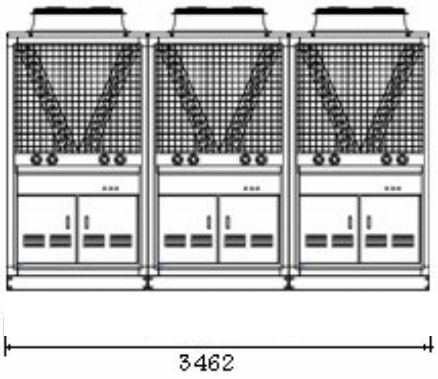

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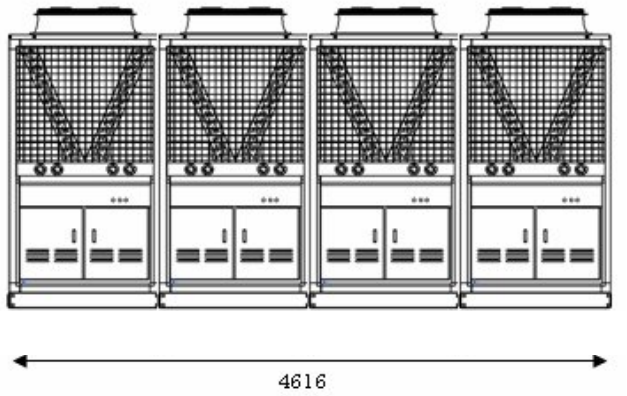

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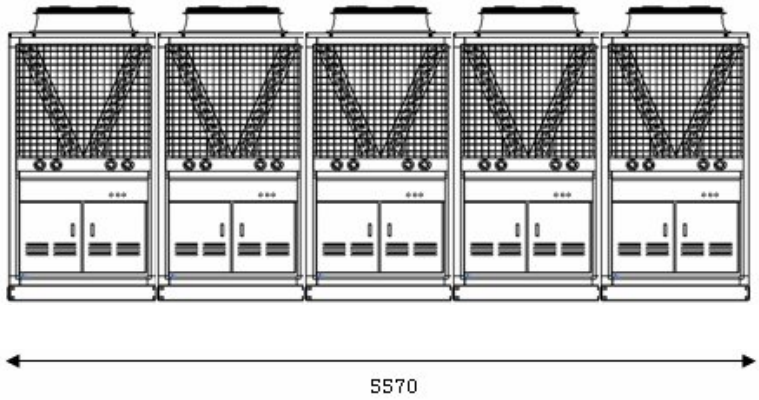

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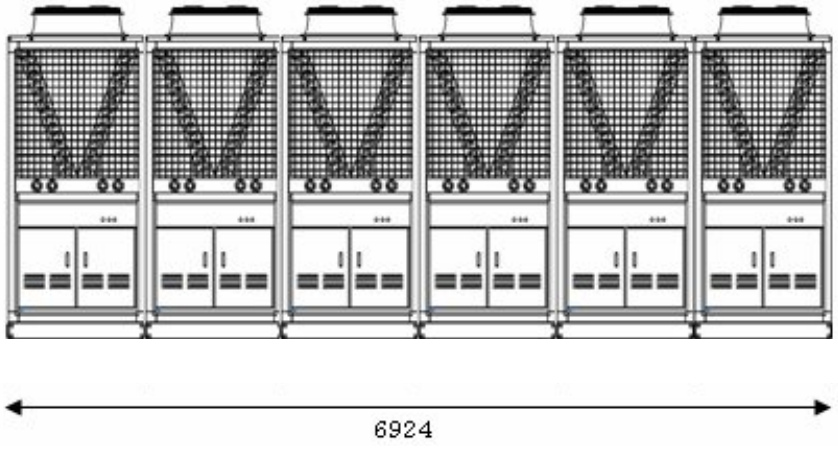
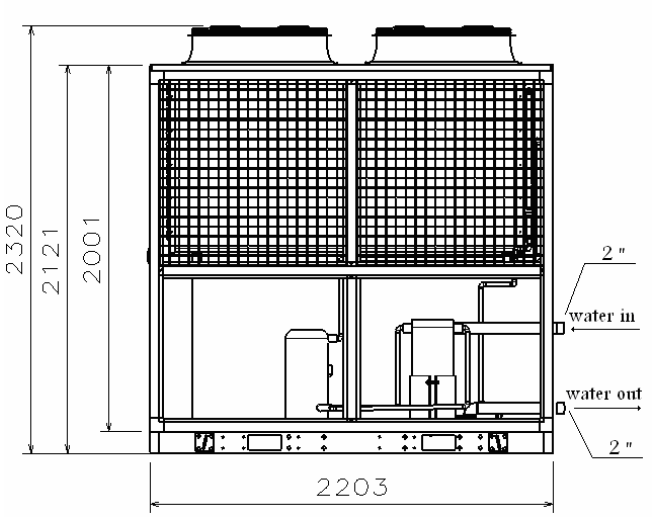


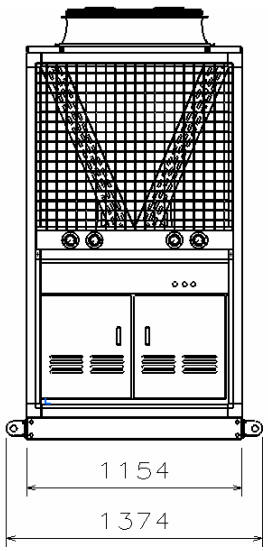
AMAC-144

Figure 5, Model: AMAC 32

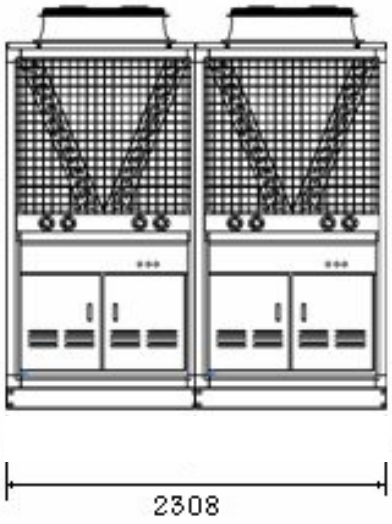
End View



Side view



AMAC-32



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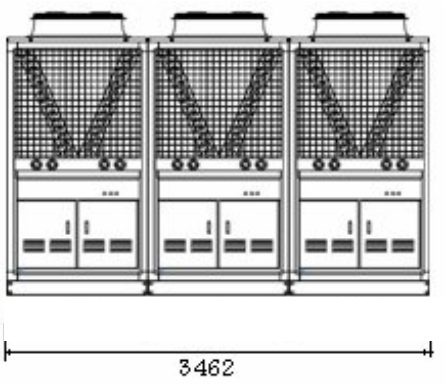
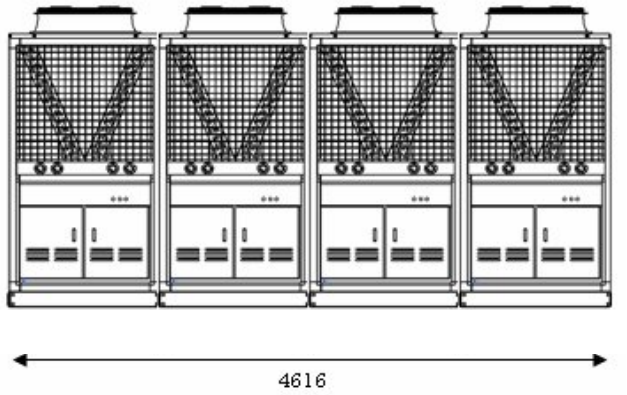
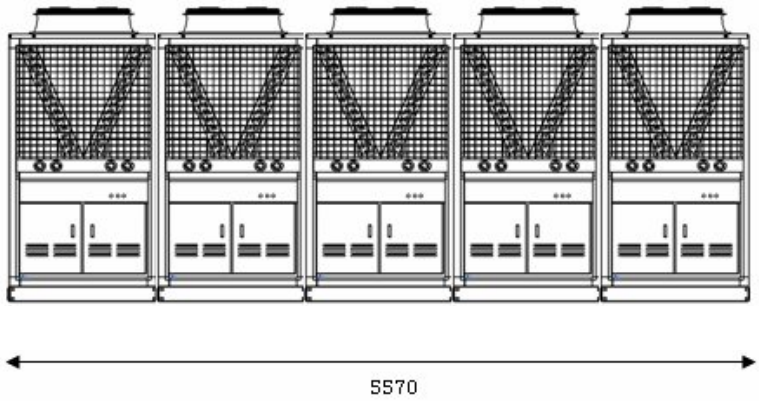


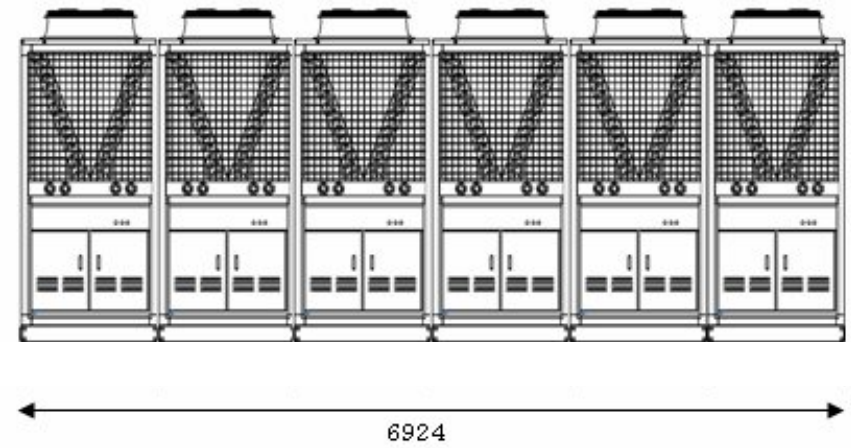
AMAC-96



AMAC-128



AMAC-160



AMAC-196

Location and Installation

Unit placement

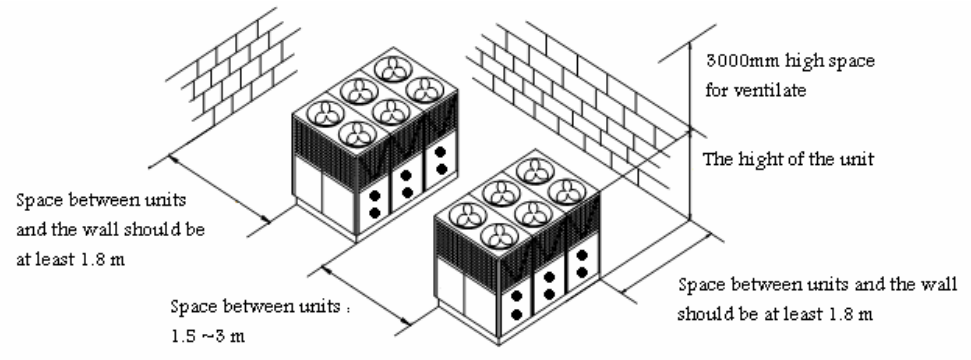
AMAC units are for outdoor applications and can be mounted either on a roof or at ground level. Set units on a solid and level foundation. On roof-mounted applications, install the unit on a steel channel or I-beam frame to support the unit above the roof. On ground-level applications, install the unit on substantial base that will not settle. A one-piece concrete slab with footings extended below the frost line is recommended. Be sure the foundation is level within 1/2 " (13 mm) over its length and width.

The foundation must be strong enough to support the operating weights listed in Table 7.

Standard wire –mesh coil guards protect the condenser coils. On ground-level applications, additional protection security can be achieved by erecting a screen fence. The fence must allow free flow of air to the condenser coil for proper unit operation.

Clearances

The flow of air to and from the condenser coil must not be impeded. Restricting airflow or allowing air recirculation will result in a decrease in unit performance and efficiency because discharge pressures are increased. There must be no obstruction above the unit that would deflect discharge air downward where it could be re-circulated back to the inlet of the condenser coil. The condenser fans are propeller type and will not operate with ductwork on the fan outlet.



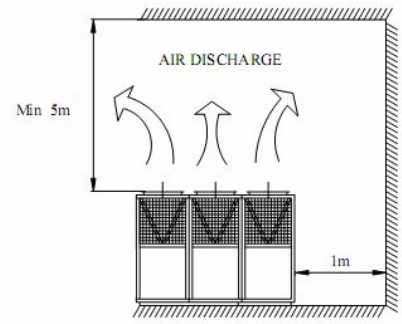


Figure 3, Clearances

Sound Insulation

The most effective isolation method is to locate the unit away from sound sensitive area. Avoid locations beneath windows or between structures where normal operating sounds may be objectionable. Reduce structurally transmitted sound by isolating water lines, electrical conduit and the unit itself. Use wall sleeves and rubber isolated piping hangers to reduce transmission of water or pump noise into occupied spaces. Use flexible electrical conduit to isolate sound through electrical conduit. spring isolators are effective in reducing the low amplitude sound generated by scroll compressors and for unit isolation in sound sensitive areas.

Chilled Water Piping

Flush the system water piping thoroughly before making connections to the unit evaporator. A strainer of 40 meshes must be installed in the return water line before the inlet to the chiller. Design the water piping so that the chilled water circulating pump discharges into the evaporator inlet. Connect the return water line to the evaporator inlet connection (top connection). Connect the supply water line to the evaporator outlet connection (bottom connection).

Provide drain connections at low points in the system to permit complete drainage of the system. Locate air vents at the high points in the system to purge air out of the system. Purge air from the water system before unit start-up to provide adequate flow through the evaporator. Install pressure gauges in the inlet and outlet water lines to the evaporator. A single gauge shall be installed in a bypass line; measure pressure drop through the evaporator to calculate proper flow.

Vibration eliminators are recommended in both the supply and return water lines.

Insulate chilled water piping to reduce heat loss and prevent condensation. Thoroughly drain water from chillers not running in the winter to protect against freezing. If the chiller operates year round, or if the system is not drained for the winter, the chilled water piping exposed to outdoor temperature should be protected against freezing. Wrap the lines with a heater cable and add proper amount of glycol to the system to further protect the system during low ambient periods.

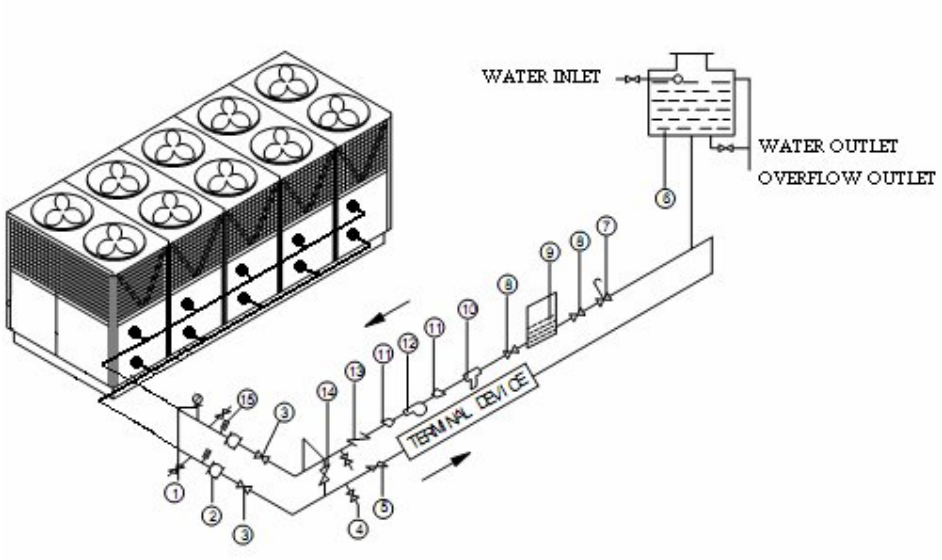


Figure 4, Typical Installation

1	Pressure Gauges (0-1MPa) or differential pressure gauge w shutoff valve	7	Auto Air Vent Valve	13	Triple Duty Valve
2	Flexible Joint	9	Air Separator Tank	14	Bypass Valve
3,5,8	Gate Valve	10	Y-strainer	15	Thermometer(0-100C)
4	Drain Valve	11	Suction Diffuser		
6	Expansion Tank	12	Pump		

*An accumulator tank shall be used if the System Water Volume is not enough

System Water Volume

It is important to have adequate water volume in the system to provide an opportunity for the chiller to sense a load change, adjust to the change and stabilize. As the expected load change becomes more rapid, a greater wate volume is needed. The system water volume is the total amount of water in the evaporator, air handling products and associated piping. If the water volume is too low, operational problems can occur, including rapid compressor cycling, rapid loading and unloading of compressors, erratic refrigerant flow in the chiller, improper motor cooling, shortened equipment life and other undesirable occurrences.

For normal comfort cooling applications, where the cooling load changes relatively slowly, we recommend a minimum system volume of five minutes times the flow rate (GPM). For example, if the design chiller flow rate is 120 GPM, we recommend a minimum system volume of 600 gallons (120 GPM x 5

minutes). Since there are many other factors that can influence performance, systems may successfully operate below these suggestions.
However, as the water volume decreases below these suggestions, the possibility of problems increases.
It's strongly recommended to install a water accumulator tank in the water piping system to compensate what is stated above.