



C – Series

Cool Mass Chillers

High Efficiency

NonStandard Chillers are our Specialty
including CNG, NEMA 4, NEMA 7, Class 1, Class 2, Group A, B, C, D, E & F, Division 1 & 2



C720A



Ten-year prorated heat exchanger and pump warranty is standard on the Pioneer Aqua Saver System.

For one year from the date of purchase, Pioneer Air Systems, Inc. will replace or repair, or provide free of charge any part or parts found to be defective in material or workmanship, provided the equipment is installed and used according to Pioneer's recommendation. One-year mechanical parts only warranty applies to equipment outside the mainland USA, Canada and Mexico.

Manufacturer is not responsible for incidental, consequential, shipping and handling charges.

MicroMonitor & Controller



Covered by our ten-year prorated warranty, the MicroMonitor & Controller in an analog controller that allows you to set your cycle "ON" and "OFF" temperatures to achieve maximum energy cost savings, MicroMonitor & Controller provides freeze protection, and you can easily monitor temperature at six key locations: inlet, suction, discharge, evaporator, chilled water outlet, and ambient. The LCD display monitors temperature in either °F or °C (please specify).

PLC's and customized controls are available.

Chiller Applications

CNG Processing
Lasers
Plating tanks
Quench tanks
Degreasers
Computers
Molding equipment
Welding equipment
Chemical operations
Boiler feed sampling
Machine tools
Film processing
Cement mixing

Plasma cutting
Process analyzers
Packaging machinery
Compressed air/gas cooling
Induction heating equipment
Blower pressure air/gas cooling
Heavy Hydro Carbon Separation
Spot cooling (blowing air) for equipment
Spot cooling (blowing air) for people
Cooling jackets in mixers, ovens, candy molds, ect
Instruments - spectrometers, microscopes, blood cooling, scanners, ect
De-ionized water or liquids (stainless steel systems without brass or copper)
Oil base coolants in drilling, cutting, rolling, grinding and honing operations

Benefits

Improve product quality
Better accuracy
Increased production
Reduce scrap
Increase tool life
Recover heat

Chiller Selection Guide

CHILLER MODEL	Comp HP	Unload Steps	SP/DP PUMP MODEL *2	Reservoir Gallons	APPROX (LB)	Inlet Outlet	A - AIR COOLED *1		W - WATER COOLED *1	
							BTU/HR Refrig. Cap.	APPROX DIM (inch) L x H x W	BTU/HR Refrig. Cap.	APPROX DIM (inch) L x H x W
C60 *1	1/2	1	33	10	200	1/2"	6370	32x27x22	7720	32x27x22
C90	3/4	1	33	10	250	1/2"	9150	32x27x22	10930	32x27x22
C120	1	1	33	10	300	1/2"	14200	32x27x22	16500	32x27x22
C180	1-1/2	1	50	15	400	1"	20600	45x34x37	24300	45x34x37
C240	2	1	50	15	550	1"	26100	45x34x37	30500	45x34x37
C360	3	1	50	15	750	1"	41300	45x34x37	48700	45x34x37
C480	4	1	50	15	1000	1"	56000	56x34x51	65600	56x34x51
C600	5	1	50	15	1250	1"	65300	56x34x51	75600	56x34x51
C720	6	1	50	15	1350	1"	77100	56x34x51	88300	56x34x51
C900	7-1/2	1	75	20	1550	2"	94000	57x48x66	110600	57x48x66
C1200	10	1	75	20	1800	2"	126700	57x48x66	148800	57x48x66
C1440	12	1	100	30	2500	2"	170000	60x48x66	198000	60x48x66
C1800	15	1	150	40	3500	2"	191000	92x66x92	222000	90x48x66
C2400	20	2	150	40	4500	2"	258000	92x66x92	296000	90x48x66
C3000	25	2	200	60	5500	3"	322000	128x66x92	364000	70x60x66
C3600	30	2	200	60	6200	3"	375000	128x66x92	426000	70x60x66
C4200	35	3	300	80	8000	3"	459000	128x92x92	525000	84x60x66
C4800	40	3	300	80	9000	3"	551000	128x92x92	626000	84x60x66
C6000	50	4	300	80	10000	3"	665000	174x92x92	744000	102x60x72
C7200	60	4	500	120	12000	3"	764000	174x92x92	866000	126x60x72
C8400	2 x 35	6	750	200	16000	3"	918000	226x92x92	1050000	84x72x72
C9600	2 x 40	6	750	200	18000	4"	1102000	226x92x92	1252000	84x72x72
C12000	2 x 50	8	1500	400	20000	4"	1330000	226x92x92	1488000	126x90x72
C14400	2 x 60	8	1500	400	25000	4"	1528000	268x92x92	1732000	126x90x72

Notes

- 1) A = Air Cooled / W = Water Cooled - Example C900A would be a air cooled Chiller.
- 2) "SP" = Simplex pumping system; "DP" = Duplex pumping system; Model number indicates HP, eg. SP/DP100 is 1.0 HP
- 3) Refrigeration capacities are based on: 90°F ambient temperature, 60°F discharge water for air cooled/ 80°F cooling water temp.
- 4) Standard voltages: C60-C90 is 115-1-60V or 230-1-60V; C120 & larger 230-3-60V or 460-3-60V. 50Hz, 575-3-60V & other voltages available.

Table 1

Selection and Sizing

IMPORTANT:

Calculate heat load and oversize chiller by 10-20% to allow for pump heatload and losses through piping and equipment.

Use Table 2 & 3 to calculate the heatload and correction factor. Compare the resulting heat load in BTUH to the corresponding refrigeration capacity in Table 1.

Pipe size is governed by acceptable water velocity and pressure loss. Recommended water velocity is 3-7 feet/second and maximum recommended pressure loss is 8 ft./100 ft. of pipe. See Table 4 for pipe selection. All cold pipes should be insulated.

EXAMPLE - Determine the size of an air-cooled chiller required to maintain a temperature differential of 7°F between the water in to the chiller at 67°F and the water coming out of the chiller at 60°F and 15 GPM. Maximum ambient temperature is 100°F.

$$\begin{aligned}
 \text{Q - HEAT LOAD} &= (500 \times \text{GPM} \times \text{TD}) / (\text{TC} \times \text{AC}) \\
 &= (500 \times 15 \times 7) / (1.0 \times 0.93) \\
 &= 56,452 \text{ BTUH}
 \end{aligned}$$

Model C600A is recommended. 1" pipe is adequate for up to 100 ft. equivalent (allowing for fittings) pipe distance. For longer distance, 1-1/2" pipe is required.

Corection Factor

Water out temperature (TC)

Ambient or condenser weater temp (AC)

40°F	50°F	60°F	70°F	70°F	80°F	90°F	100°F	110°F	over 110°F
0.62	0.80	1.0	1.1	1.12	1.06	1.0	0.93	0.87	consult factory

Table 2

CALCULATING HEAT LOAD (Q)

$$Q - \text{HeatLoad} = \text{lbs of fluid/hours} \times \text{TD} \times \text{Sp. Heat}$$

$$\begin{aligned}
 Q (\text{water}) &= \text{GPM} \times 8.33 \times 60 \times \text{TD} \text{ or } \text{GPM} \times 500 \times \text{TD} \\
 8.33 &= (\text{Lb}/\text{Gal}) \quad 60 = \text{minutes}/\text{HR}
 \end{aligned}$$

$$Q (\text{oil}) = \text{GPM} \times 210 \times \text{TD}$$

$$Q (50\% \text{ Freeze Protector}) = \text{GPM} \times 450 \times \text{TD}$$

TD = Temperature Differential
Q = Heat Load

Table 3

Pump Selection

The pump shall have sufficient flow and pressure capabilities (see Figure 3). For critical applications, Duplex pumping system is recommended.

Simplex pumping system

Uses one pump. For example, S100 uses one, 1 HP pump, prepiped and prewired with controls.

Duplex pumping system

Uses two pump. For example, D100 uses two, 1 HP pumps, prepiped and prewired with controls. Each pump is piped with a check valve and inlet and outlet isolation valves. One pump provides backup while the other operates.

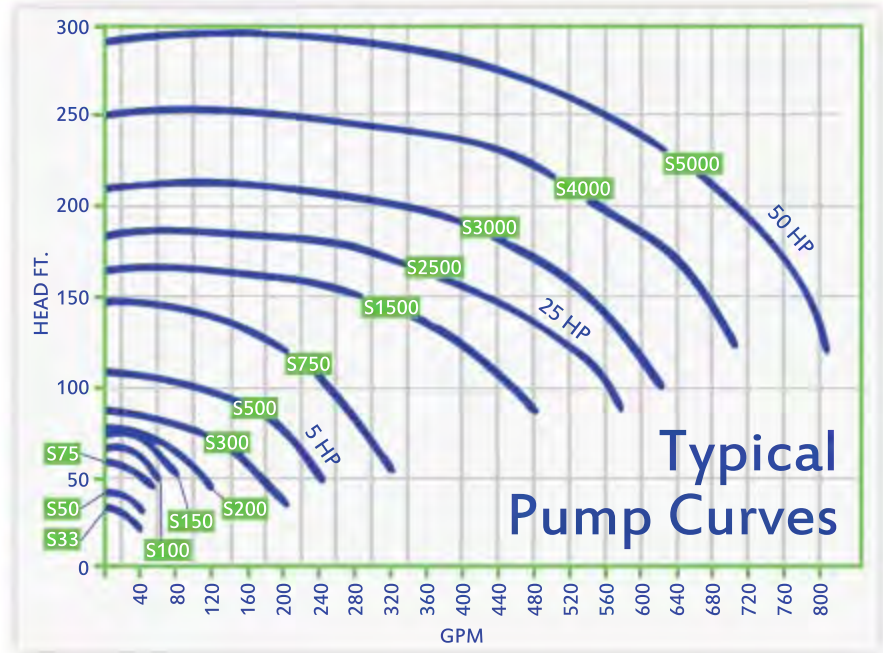


Figure 3

EXAMPLE:

The Flow is 15 GPM and the Pressure is 20 PSIG, the minimum required pump HP is:

$$\frac{15 \times 20}{1714 \times 0.75 \times 0.9} = 0.26 \text{ HP}$$

Recommended 1/2 HP pumping system is more than sufficient. Typically the pump should be oversized by 25% or more.

CALCULATING PUMP HP

$$\text{PUMP HP} = \frac{\text{GPM} \times \text{pressure in PSIG}}{1714 \times \text{pump efficiency} \times \text{motor efficiency}}$$

Table 4

Kleen-Water Filter Option *Recommended!!*

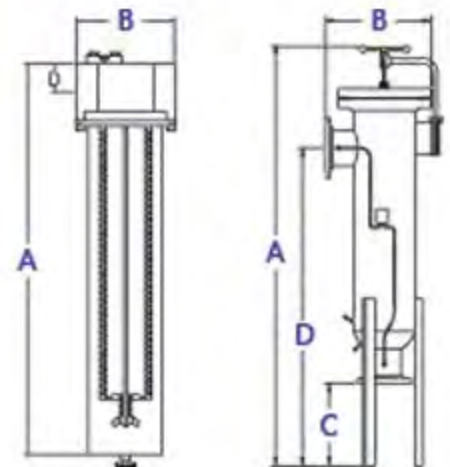
For longevity and dependability, we recommend Kleen-Water Filters which are 99% efficient down to 50 micron.

KW MODEL	PORT SIZE IN	MAX PRESS	MAX GPM	MAX TEMP	DIENSIONS				TYPE
					A	B	C	D	
25	1	150	25	225°F	16 1/4	4 1/5	-	15/16	T
50	1-1/2	150	50	225°F	20 5/8	5 7/16	-	1 1/4	T
100	2-1/2	150	100	225°F	27 3/4	6 7/8	-	1 3/4	T
150	2-1/2	150	150	225°F	37 1/2	6 7/8	-	1 3/4	T
200	3	150	200	225°F	38 3/8	7 5/8	-	2 1/8	T
250	3	150	250	225°F	44 1/4	7 5/8	-	2 1/8	T
300	4 FLG.	150	300	225°F	72	21 3/4	57	15	F
450	6 FLG.	150	450	225°F	85	20 7/8	68	15	F

Table 4

OPTIONS

- Flange connections, where not standard
- Pressure differential Lights / Contacts
- Multi-Filter assemblies with By-Pass valving



T - TYPE

F - TYPE

Metal Housings

Figure 1

Figure 2

Typical Dimensions

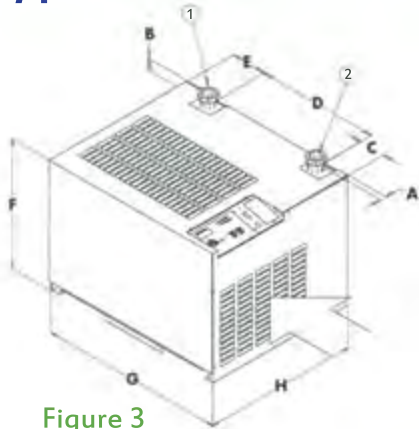


Figure 3
Models C60 - C120

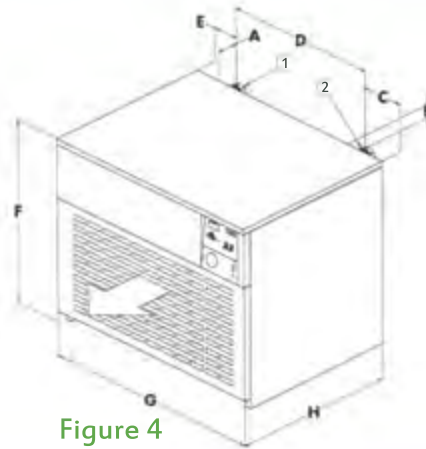


Figure 4
Models C180 - 360

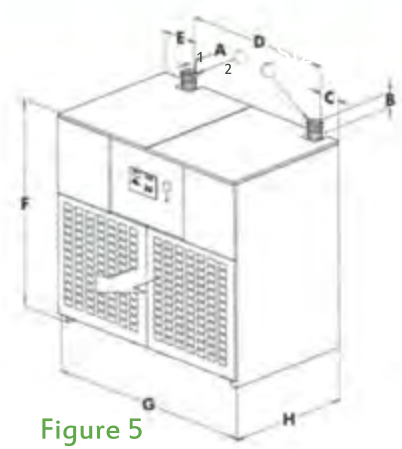


Figure 5
Models C480 - 720
(Cabinet Optional)

MODEL	A	B	C	D	E	F	G	H	IN & OUT
C60-C120	1"	2"	4"	21"	6"	22"	32"	27"	1/2"
C180-C360	4"	2"	8"	31"	5"	36"	45"	34"	1"
C480-C720	2"	4"	6"	41"	10"	52"	57"	34"	1"

1 - Water Outlet 2 - Water Inlet

Table 5

Cool Mass Advantages

- 1) **MicroMonitor & Controller** - for precision temperature control. NEMA 4 electrical
- 2) **Control Panel** - Standard on our Cool Mass Chillers.
- 3) **Rust Free** - The heat exchanger, tank and all cooling fluid piping are constructed of stainless steel providing rust-free service.
- 4) **Cleaner Fluid** - Rust-free, closedloop sealed fluid flow is standard, preventing algae and atmospheric contamination problem. Kleen Water Filters are recommended to remove particles that may be picked up during use of the cooling fluid.
- 5) **Cycling Saves** - Cool Mass chillers cycle just like your refrigerator and air conditioner. For most applications, the chillers shall be sized for the maximum heat load under the most severe ambient conditions with a 10-20% buffer for contingencies. Because the heat load and ambient conditions generally vary, the Cool Mass design uses energy in proportion to the actual heat load being placed on the refrigeration system, thus saving energy and decreasing wear & tear on the equipment.
- 6) **Faster Responce** - Once cooled, the Cool Mass design reduces the time required to lower fluid temp during startup.
- 7) **Cylinder unloading** - futher improves the efficiency of Pioneer Cool Mass chillers by providing variable compressor capacity. (Standard on C2400 and larger)
- 8) **Freeze protection** - Standard on our Cool Mass Chillers.
- 9) **Automatic pump down** - Saves on refrigerant loss and increases compressor life. (Standard on C2400 and larger)
- 9) **Discus semi-hermetic compressor** - Saves up to 10% in energy cost. (Standard on C1800 and larger)
 - * Unique discus valve design increases capacities, minimizes re-expansion gas, and improves volumetric pumping efficiency.
 - * Includes service valves, deep oil sump, crankcase heater and solid state motor protection.
 - * Positive Displacement oil pump maintains required lubrication, Crankcase oil level sight glass, & Capacity control.

Typical Chiller Installation

The heat exchanger and tank combination design-exclusive to Pioneer Cool Mass cycling chillers-is a variation of the patented Triple Tube Design used very successfully in thousands of Pioneer refrigerant dryers.

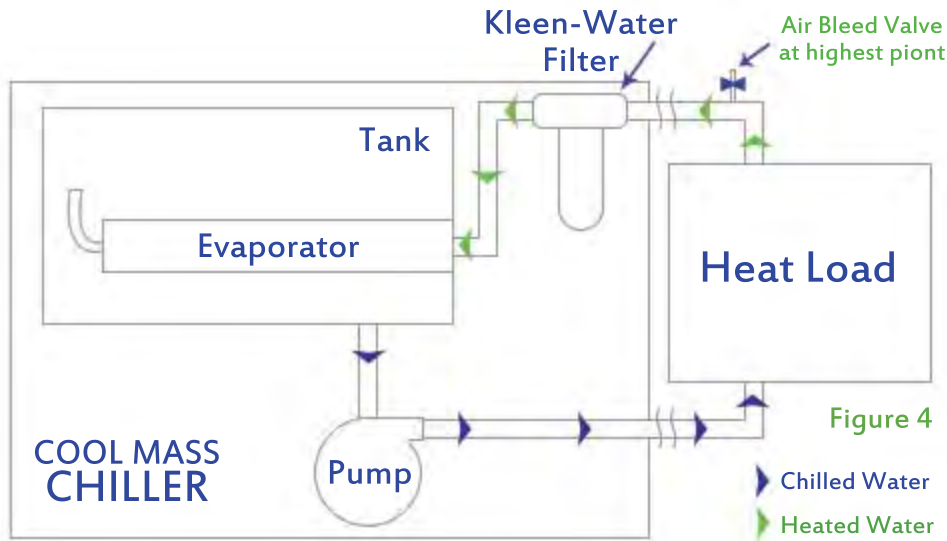


Figure 4

Max. Flow

Pipe Size	GPM @20-50 PSIG
0.5"	8
0.75"	14
1.0"	23
1.25"	36
1.5"	50
2.0"	78
2.5"	120
3.0"	180
4.0"	300
5.0"	450
6.0"	600
8.0"	1200

Table 6

* Table 5 - For 100 ft, or less equivalent pipe length
Oversize for longer lengths.

Hazardous Locations:

Class I - denotes area where flammable gas, vapor or liquid is present.

Class II - denotes area where combustible dust is present.

Group:

Group A - Acetylene

Group B - Hydrogen

Group C - Cyclopropane, ethyl ether

Group D - Acetone, butane, hexane, natural gas, fuel oil

Group E - Combustible metals

Group F - Carbonaceous materials, including coal dust

Division:

Division 1 - denotes areas where flammable or combustible concentrations exist under normal operating conditions or have a high likelihood of presence.

Division 2 - denotes areas where flammable or combustible concentrations exist under abnormal operating conditions or have a high likelihood of presence.

Non-classified or unclassified - denotes area where the presence of hazardous material is so infrequent the Electrical Area Classification is deemed unnecessary.



"Non-Standard Equipment is our Specialty" *Since 1980*

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WATER COOLING SYSTEMS • SEPARATORS • A.S.M.E. VESSELS • HEAT EXCHANGERS
NATURAL GAS FILTRATION & DRYING • BIOGAS CLEANING & DRYING

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