



INNOVATIVE HEAT TRANSFER PRODUCTS

# FLUID COOLERS

## INSTALLATION AND OPERATING MANUAL

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A SINGLE SOURCE FOR ALL YOUR COIL NEEDS AND CUSTOM ENGINEERED HEAT TRANSFER PRODUCT



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# 1.0 INTRODUCTION

## 1.1 RECIEVING & INSPECTION

Congratulations on purchasing your brand-new Direct Coil Unit, which has been thoroughly inspected and leak tested before shipment to ensure peak performance as promised. Upon arrival of your system, carefully check that all parts of the shipment are present and visually inspect for any damages. If any shortages or damages are noticed, report to the delivering carrier before signing the delivery forms. Direct Coil Inc. is not responsible for any issues that occur while the package is in transit. At this time, you should also check and ensure that all electrical components are in place. Always keep the unit in a dry and safe storage area after delivery, before the installation.

**The installation and maintenance of your unit must always be performed by qualified personnel, who have the experience and knowledge of local codes and regulations to carry out the processes in a safe and acceptable manner.**

## 1.2 UNIT NOMENCLATURE

	FC	07	A	V	6D	0162	T3	XXX
<b>UNIT TYPE</b> FC: FLUID COOLER AC: AIR COOLED CONDENSER								<b>DESIGN VERSION</b>
<b>MOTOR SIZE</b> 04: 1.25 KW, 770 RPM, AC MOTOR 05: 0.68 KW, 550 RPM, AC MOTOR 06: 1.25/0.68 KW, DUAL SPEED, AC MOTOR 07: 2.5 KW, 990 RPM, AC MOTOR 08: 1.4 KW, 710 RPM, AC MOTOR 09: 2.5/1.4 KW, DUAL SPEED, AC MOTOR 10: 3.1 KW, 1100 RPM, EC MOTOR								<b>MAIN SUPPLY VOLTAGE</b> S3: SINGLE PHASE 230V/1 PHASE/60 Hz T3: THREE PHASE 208-230V/3 PHASE/60 Hz T4: THREE PHASE 460V/3 PHASE/60 Hz T5: THREE PHASE 575V/3 PHASE /60 HZ
<b>MOTOR TYPE</b> A, B or Z								<b>NOMINAL CAPACITY</b> 8 TONS UP TO 500 TONS
<b>DESIGN OPTION</b> H: HORIZONTAL AIR FLOW SINGLE COIL SLAB V: VERTICAL AIR FLOW SINGLE COIL SLAB L: LARGE V TWIN COIL SLAB S: SMALL V TWIN COIL SLAB W: W SHAPE QUAD COIL SLAB								<b>NUMBER OF FANS</b> 1 THRU 7: SINGLE ROW OF FANS 4D THRU 9D: DOUBLE ROW FANS

## 1.3 STANDARD FEATURES

**CABINETS-** Heavy-gauge galvanized steel construction with plated hardware for a corrosion free assembly designed for outdoor applications.

**COILS-** Fabricated with corrugated aluminum fins with staggered copper tubes for optimum heat transfer. Pressure tested and dehydrated prior to shipment.

**HEADERS-** Made with seamless copper tube type K/L and MPT/Grooved connections.

**FAN MOTORS-** Totally enclosed, reverse rotor design. Motors have class F insulation and are thermally protected. They have a permanently lubricated deep groove ball bearing.

**VARIOUS FLUID COOLER MODELS-** Available in 208-230V single phase, 208-230V three phase, 460 or 575V three phase motors.

**FANS-** Profiled in a sickle shape design for optimum low noise sound pressure level. Fan hubs are attached to the external motor rotor. They are statistically and dynamically balanced for vibration free operation.

**FAN GUARDS AND MOTOR MOUNTS-** Welded wire construction with baked-on powder epoxy coating for optimum corrosion protection.

**FAN MOTOR LEADS-** Wired to a weatherproof electrical enclosure for single-point field wiring.



# PARAMETERS

## 1.4 UNIT PARAMETERS

MODEL NO.	FAN CONFIG	FPI	550 RPM "05" SOUND LEVEL Dba (1)	770 RPM "04" SOUND LEVEL Dba (1)	710 RPM "08" SOUND LEVEL Dba (1)	990 RPM "07" SOUND LEVEL Dba (1)	1100 RPM "10" SOUND LEVEL Dba (1)	INTERNAL VOLUME US GALLON	APPROX DRY SHIPPING WEIGHT LBS
SINGLE ROW UNITS									
FC**A(V)(H)1010	1X1	9	43	51	50	57	58	3.4	520
FC**A(V)(H)1012	1X1	12	43	51	50	57	58	3.4	535
FC**A(V)(H)1015	1X1	12	43	51	50	57	58	5.1	585
FC**A(V)(H)1018	1X1	12	43	51	50	57	58	6.8	650
FC**A(V)(H)2024	1X2	12	46	54	53	60	61	6.8	845
FC**A(V)(H)2029	1X2	12	46	54	53	60	61	10.2	962
FC**A(V)(H)2035	1X2	12	46	54	53	60	61	13.6	1085
FC**A(V)(H)3038	1X3	9	47	55	54	61	62	15.3	1250
FC**A(V)(H)3046	1X3	12	47	55	54	61	62	15.3	1320
FC**A(V)(H)3051	1X3	12	47	55	54	61	62	20.4	1480
FC**A(V)(H)4063	1X4	12	48	56	55	62	63	20.4	1775
FC**A(V)(H)4071	1X4	12	48	56	55	62	63	27.2	1990
FC**A(V)(H)5080	1X5	12	49	57	56	63	64	25.3	2430
FC**A(V)(H)5089	1X5	12	49	57	56	63	64	33.9	2705
FC**A(V)(H)6098	1X6	12	50	58	57	64	65	30.4	2965
FC**A(V)(H)6108	1X6	12	50	58	57	64	65	40.7	3290
FC**A(V)(H)7116	1X7	12	51	59	58	65	66	35.5	3405
FC**A(V)(H)7127	1X7	12	51	59	58	65	66	47.5	3785
DOUBLE ROW UNITS									
FC**A(V)(H)2D048	2X2	12	48	56	55	62	63	13.6	1535
FC**A(V)(H)2D058	2X2	12	48	56	55	62	63	20.4	1750
FC**A(V)(H)2D070	2X2	12	48	56	55	62	63	27.2	1965
FC**A(V)(H)3D076	2X3	9	50	58	57	64	65	30.4	2370
FC**A(V)(H)3D092	2X3	12	50	58	57	64	65	30.4	2490
FC**A(V)(H)3D102	2X3	12	50	58	57	64	65	40.7	2820
FC**A(V)(H)4D126	2X4	12	51	59	58	65	66	40.8	3270
FC**A(V)(H)4D142	2X4	12	51	59	58	65	66	54.4	3700
FC**A(V)(H)5D160	2X5	12	53	61	60	67	68	50.6	4420
FC**A(V)(H)5D178	2X5	12	53	61	60	67	68	67.8	4940
FC**A(V)(H)6D196	2X6	12	54	62	61	68	69	60.8	5200
FC**A(V)(H)6D216	2X6	12	54	62	61	68	69	81.4	5825
FC**A(V)(H)7D232	2X7	12	55	63	62	69	70	71	6045
FC**A(V)(H)7D254	2X7	12	55	63	62	69	70	95	6800

### NOTES:

\*\*Motor designation

(1) Sound pressure level at 30 Feet distance



# PARAMETERS

MODEL NO.	FAN CONFIG	FPI	550 RPM "05" SOUND LEVEL Dba (1)	770 RPM "04" SOUND LEVEL Dba (1)	710 RPM "08" SOUND LEVEL Dba (1)	990 RPM "07" SOUND LEVEL Dba (1)	1100 RPM "10" SOUND LEVEL Dba (1)	INTERNAL VOLUME US GALLON	APPROX DRY SHIPPING WEIGHT LBS
SINGLE ROW UNITS									
FC**AS10015	1X1	12	43	51	50	57	58	5.1	535
FC**AS10016	1X1	10	43	51	50	57	58	7.7	600
FC**AS10018	1X1	12	43	51	50	57	58	7.7	610
FC**AS10021	1X1	12	43	51	50	57	58	10.3	700
FC**AS20030	1X2	12	46	54	53	60	61	10.2	900
FC**AS2D038	1X2	12	46	54	53	60	61	15.4	1060
FC**AS2D042	1X2	12	46	54	53	60	61	20.6	1200
FC**AS3D059	1X3	12	47	55	54	61	62	23.1	1500
FC**AS3D065	1X3	12	47	55	54	61	62	30.9	1715
FC**AS4D075	1X4	12	48	56	55	62	63	30.8	1925
FC**AS4D084	1X4	12	48	56	55	62	63	41.2	2215
FC**AS5D097	1X5	12	49	57	56	63	64	38.5	2365
FC**AS5D108	1X5	12	49	57	56	63	64	51.5	2720
FC**AS6D110	1X6	12	50	58	57	64	65	46.2	2800
FC**AS6D130	1X6	12	50	58	57	64	65	61.8	3220
FC**AS7D139	1X7	12	51	59	58	65	66	53.9	3245
FC**AS7D154	1X7	12	51	59	58	65	66	72.1	3640
FC**AS8D160	1X8	12	52	60	59	66	67	61.6	3680
FC**AS8D177	1X8	12	52	60	59	66	67	82.4	4210
FC**AS9D181	1X9	12	53	61	60	67	68	69.3	4200
FC**AS9D192	1X9	12	53	61	60	67	68	92.7	4800

## NOTES:

\*\*Motor designation

(1) Sound pressure level at 30 Feet distance



# PARAMETERS

MODEL NO.	FAN CONFIG	FPI	550 RPM "05" SOUND LEVEL Dba (1)	770 RPM "04" SOUND LEVEL Dba (1)	710 RPM "08" SOUND LEVEL Dba (1)	990 RPM "07" SOUND LEVEL Dba (1)	1100 RPM "10" SOUND LEVEL Dba (1)	INTERNAL VOLUME US GALLON	APPROX DRY SHIPPING WEIGHT LBS
<b>DOUBLE ROW UNITS LARGE V SHAPE UNITS</b>									
FC**AL2D076	2X2	12	48	56	55	62	63	30.8	2120
FC**AL2D084	2X2	12	48	56	55	62	63	41.2	2400
FC**AL3D118	2X3	12	50	58	57	64	65	46.2	3000
FC**AL3D130	2X3	12	50	58	57	64	65	61.8	3430
FC**AL4D151	2X4	12	51	59	58	65	66	61.6	3850
FC**AL4D168	2X4	12	51	59	58	65	66	82.4	4430
FC**AL5D193	2X5	12	53	61	60	67	68	77	4730
FC**AL5D215	2X5	12	53	61	60	67	68	103	5440
FC**AL6D220	2X6	12	54	62	61	68	69	92.4	5600
FC**AL6D261	2X6	12	54	62	61	68	69	123.6	6440
FC**AL7D278	2X7	12	55	63	62	69	70	107.8	6490
FC**AL7D307	2X7	12	55	63	62	69	70	144.2	7280
FC**AL8D320	2X8	12	55	63	62	69	70	123.2	7360
FC**AL8D354	2X8	12	49	57	56	63	64	164.8	8420
FC**AL9D362	2X9	12	50	58	57	64	65	138.6	8400
FC**AL9D383	2X9	12	50	58	57	64	65	185.4	9600
<b>DOUBLE ROW UNITS W SHAPE UNITS</b>									
FC**AW2D076	2X2	12	48	56	55	62	63	30.8	2060
FC**AW2D084	2X2	12	48	56	55	62	63	41.2	2340
FC**AW3D118	2X3	12	50	58	57	64	65	46.2	2910
FC**AW3D130	2X3	12	50	58	57	64	65	61.8	3340
FC**AW4D151	2X4	12	51	59	58	65	66	61.6	3730
FC**AW4D168	2X4	12	51	59	58	65	66	82.4	4310
FC**AW5D193	2X5	12	53	61	60	67	68	77	4580
FC**AW5D215	2X5	12	53	61	60	67	68	103	5290
FC**AW6D220	2X6	12	54	62	61	68	69	92.4	5420
FC**AW6D261	2X6	12	54	62	61	68	69	123.6	6260
FC**AW7D278	2X7	12	55	63	62	69	70	107.8	6280
FC**AW7D307	2X7	12	55	63	62	69	70	144.2	7070
FC**AW8D320	2X8	12	55	63	62	69	70	123.2	7120
FC**AW8D354	2X8	12	49	57	56	63	64	164.8	8180
FC**AW9D362	2X9	12	50	58	57	64	65	138.6	8130
FC**AW9D383	2X9	12	50	58	57	64	65	185.4	9330

## NOTES:

\*\*Motor designation

(1) Sound pressure level at 30 Feet distance



# ELECTRICAL DATA

## 1.5 UNIT ELECTRICAL DATA

To ensure smooth operation of your equipment and reduce the possibility of electrical power interruption, the following precautions must be practiced:

- |      |  |     |  |
|------|--|-----|--|
| I.   | All electrical work must be done in accordance with the National Electrical Code and existing local codes. | II. | An adequate power supply must be provided.                               |
| III. | The power supply must be the same as that which appears on the data plate of the motors.                   | IV. | Voltage fluctuations in excess of plus or minus 10% should be corrected. |

Internal wiring connections of the fan motors, optional controls and contactors has been completed at the factory.

**Once wired, make sure the unit has been grounded.**

## MOTOR MODEL INFORMATION

550 RPM "05" MODELS												
NO. OF FAN MOTORS	208-230/3/60				460/3/60				575/3/60			
	TOTAL FLA	MCA	MOP	WATTS	TOTAL FLA	MCA	MOP	WATTS	TOTAL FLA	MCA	MOP	WATTS
1	2.7	3.4	15	680	1.2	1.5	15	680	1.0	1.2	15	680
2	5.4	6.1	15	1360	2.4	2.7	15	1360	1.9	2.2	15	1360
3	8.1	8.8	15	2040	3.6	3.9	15	2040	2.9	3.1	15	2040
4	10.8	11.5	15	2720	4.8	5.1	15	2720	3.8	4.1	15	2720
5	13.5	14.2	15	3400	6.0	6.3	15	3400	4.8	5.0	15	3400
6	16.2	16.9	20	4080	7.2	7.5	15	4080	5.8	6.0	15	4080
7	18.9	19.6	20	4760	8.4	8.7	15	4760	6.7	7.0	15	4760
8	21.6	22.3	25	5440	9.6	9.9	15	5440	7.7	7.9	15	5440
9	24.3	25.0	25	6120	10.8	11.1	15	6120	8.6	8.9	15	6120
10	27.0	27.7	30	6800	12.0	12.3	15	6800	9.6	9.8	15	6800
12	32.4	33.1	35	8160	14.4	14.7	15	8160	11.5	11.8	15	8160
14	37.8	38.5	40	9520	16.8	17.1	20	9520	13.4	13.7	15	9520
16	43.2	43.9	45	10880	19.2	19.5	20	10880	15.4	15.6	20	10880
18	48.6	49.3	50	12240	21.6	21.9	25	12240	17.3	17.5	20	12240

770 RPM "04" MODELS												
NO. OF FAN MOTORS	208-230/3/60				460/3/60				575/3/60			
	TOTAL FLA	MCA	MOP	WATTS	TOTAL FLA	MCA	MOP	WATTS	TOTAL FLA	MCA	MOP	WATTS
1	5.6	7.0	15	1250	2.5	3.1	15	1250	2.0	2.5	15	1250
2	11.2	12.6	15	2500	5.0	5.6	15	2500	4.0	4.5	15	2500
3	16.8	18.2	20	3750	7.5	8.1	15	3750	6.0	6.5	15	3750
4	22.4	23.8	25	5000	10.0	10.6	15	5000	8.0	8.5	15	5000
5	28.0	29.4	30	6250	12.5	13.1	15	6250	10.0	10.5	15	6250
6	33.6	35.0	35	7500	15.0	15.6	20	7500	12.0	12.5	15	7500
7	39.2	40.6	45	8750	17.5	18.1	20	8750	14.0	14.5	15	8750
8	44.8	46.2	50	10000	20.0	20.6	25	10000	16.0	16.5	20	10000
9	50.4	51.8	60	11250	22.5	23.1	25	11250	18.0	18.5	20	11250
10	56.0	57.4	60	12500	25.0	25.6	30	12500	20.0	20.5	25	12500
12	67.2	68.6	70	15000	30.0	30.6	35	15000	24.0	24.5	25	15000
14	78.4	79.8	80	17500	35.0	35.6	40	17500	28.0	28.5	30	17500
16	89.6	91.0	100	20000	40.0	40.6	45	20000	32.0	32.5	35	20000
18	100.8	102.2	110	22500	45.0	45.6	50	22500	36.0	36.5	40	22500



# ELECTRICAL DATA

710 RPM "08" MODELS												
NO. OF FAN MOTORS	208-230/3/60				460/3/60				575/3/60			
	TOTAL FLA	MCA	MOP	WATTS	TOTAL FLA	MCA	MOP	WATTS	TOTAL FLA	MCA	MOP	WATTS
1	4.6	5.8	15	1300	2.2	2.8	15	1300	1.8	2.3	15	1300
2	9.2	10.4	15	2600	4.4	5.0	15	2600	3.6	4.1	15	2600
3	13.8	15.0	15	3900	6.6	7.2	15	3900	5.4	5.9	15	3900
4	18.4	19.6	20	5200	8.8	9.4	15	5200	7.2	7.7	15	5200
5	23.0	24.2	25	6500	11.0	11.6	15	6500	9.0	9.5	15	6500
6	27.6	28.8	30	7800	13.2	13.8	15	7800	10.8	11.3	15	7800
7	32.2	33.4	35	9100	15.4	16.0	20	9100	12.6	13.1	15	9100
8	36.8	38.0	40	10400	17.6	18.2	20	10400	14.4	14.9	15	10400
9	41.4	42.6	45	11700	19.8	20.4	25	11700	16.2	16.7	20	11700
10	46.0	47.2	50	13000	22.0	22.6	25	13000	18.0	18.5	20	13000
12	55.2	56.4	60	15600	26.4	27.0	30	15600	21.6	22.1	25	15600
14	64.4	65.6	70	18200	30.8	31.4	35	18200	25.2	25.7	30	18200
16	73.6	74.8	80	20800	35.2	35.8	40	20800	28.8	29.3	30	20800
18	82.8	84.0	90	23400	39.6	40.2	45	23400	32.4	32.9	35	23400

990 RPM "07" MODELS												
NO. OF FAN MOTORS	208-230/3/60				460/3/60				575/3/60			
	TOTAL FLA	MCA	MOP	WATTS	TOTAL FLA	MCA	MOP	WATTS	TOTAL FLA	MCA	MOP	WATTS
1	9.7	12.1	15	2500	4.2	5.3	15	2500	3.4	4.3	15	2500
2	19.4	21.8	25	5000	8.4	9.5	15	5000	6.8	7.7	15	5000
3	29.1	31.5	35	7500	12.6	13.7	15	7500	10.2	11.1	15	7500
4	38.8	41.2	45	10000	16.8	17.9	20	10000	13.6	14.5	15	10000
5	48.5	50.9	60	12500	21.0	22.1	25	12500	17.0	17.9	20	12500
6	58.2	60.6	70	15000	25.2	26.3	30	15000	20.4	21.3	25	15000
7	67.9	70.3	80	17500	29.4	30.5	35	17500	23.8	24.7	25	17500
8	77.6	80.0	90	20000	33.6	34.7	35	20000	27.2	28.1	30	20000
9	87.3	89.7	90	22500	37.8	38.9	40	22500	30.6	31.5	35	22500
10	97.0	99.4	100	25000	42.0	43.1	45	25000	34.0	34.9	35	25000
12	116.4	118.8	120	30000	50.4	51.5	60	30000	40.8	41.7	45	30000
14	135.8	138.2	140	35000	58.8	59.9	60	35000	47.6	48.5	50	35000
16	155.2	157.6	160	40000	67.2	68.3	70	40000	54.4	55.3	60	40000
18	174.6	177.0	180	45000	75.6	76.7	80	45000	61.2	62.1	70	45000

1100 RPM "10" MODELS								
NO. OF FAN MOTORS	208-230/3/60				460/3/60			
	TOTAL FLA	MCA	MOP	WATTS	TOTAL FLA	MCA	MOP	WATTS
1	9.4	11.8	15	3100	3.8	4.8	15	3100
2	18.8	21.2	25	6200	7.6	8.6	15	6200
3	28.2	30.6	35	9300	11.4	12.4	15	9300
4	37.6	40.0	40	12400	15.2	16.2	20	12400
5	47.0	49.4	50	15500	19.0	20.0	20	15500
6	56.4	58.8	60	18600	22.8	23.8	25	18600
7	65.8	68.2	70	21700	26.6	27.6	30	21700
8	75.2	77.6	80	24800	30.4	31.4	35	24800
9	84.6	87.0	90	27900	34.2	35.2	40	27900
10	94.0	96.4	100	31000	38.0	39.0	40	31000
12	112.8	115.2	120	37200	45.6	46.6	50	37200
14	131.6	134.0	140	43400	53.2	54.2	60	43400
16	150.4	152.8	160	49600	60.8	61.8	70	49600
18	169.2	171.6	180	55800	68.4	69.4	70	55800





## 1.6 TYPICAL WIRING SCHEMATICS

### AQUASTAT FAN CYCLING



### HYBRID FIRST FANS EC, REST OF FANS AC



### HYBRID FIRST 2 FANS 2 SPEED, REST OF FANS SINGLE SPEED



# TYPICAL ELECTRICAL WIRING

## WIRING DIAGRAM INSPECTION

Check and ensure that the wiring diagram supplied with the fluid cooler is correctly installed and completed:

For reference, use the data provided on the unit name plate, which has information on each model.

## MAIN ELECTRICAL CONNECTION

According to local electrical codes and safety standards, it is required that only a licensed electrician connects your unit to the main power supply.

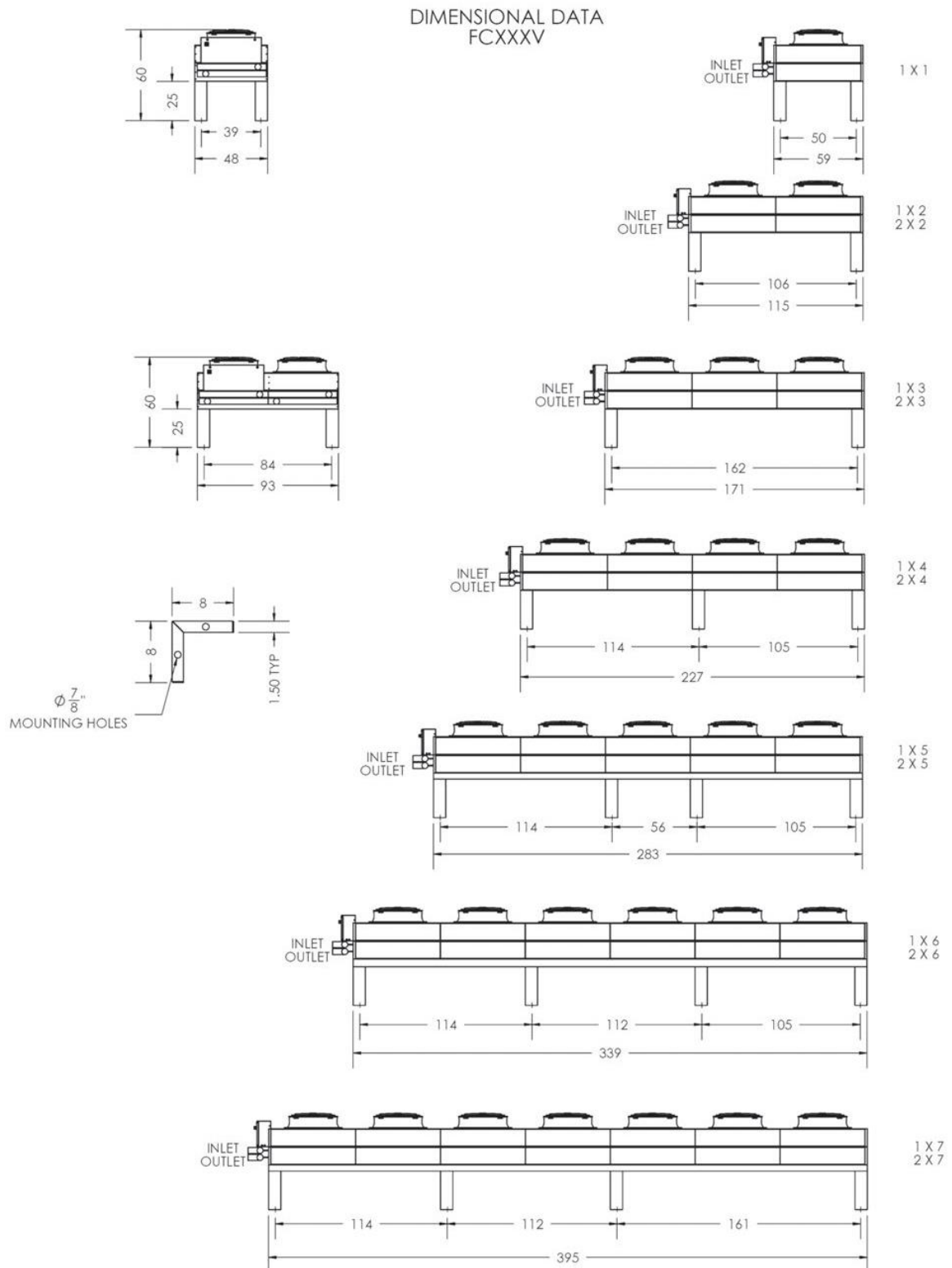
If for local codes or other reasons, the cable size of the power supply line is greater than the terminal size on the main disconnect or power block:

- I. Fit a junction box to the unit to reduce the cable size, while in compliance with local codes, or
- II. Get approval from the manufacturer to replace the main disconnect switch or power block of the unit.



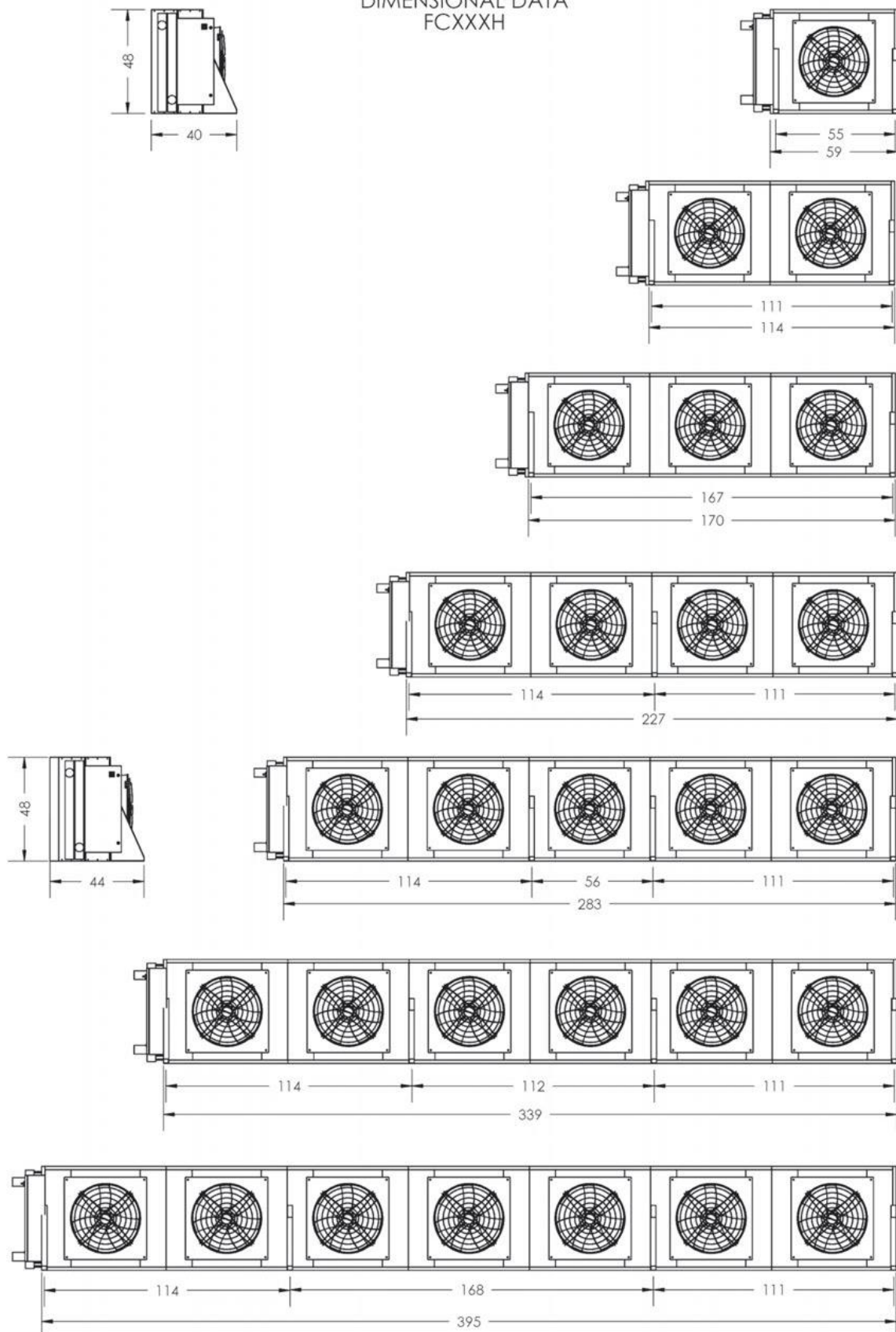
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## 1.7 DIMENSIONAL DRAWINGS

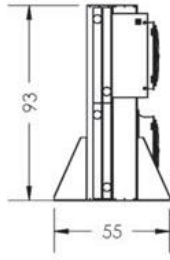


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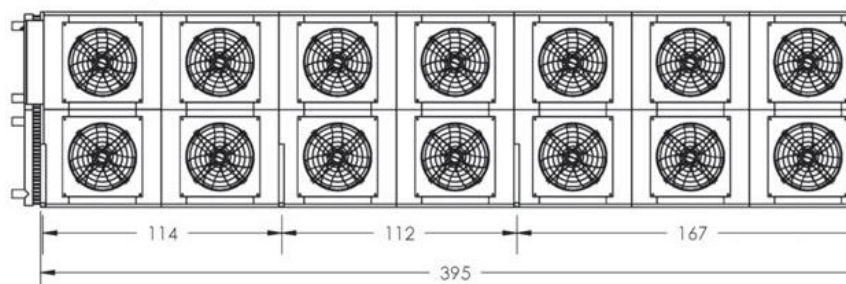
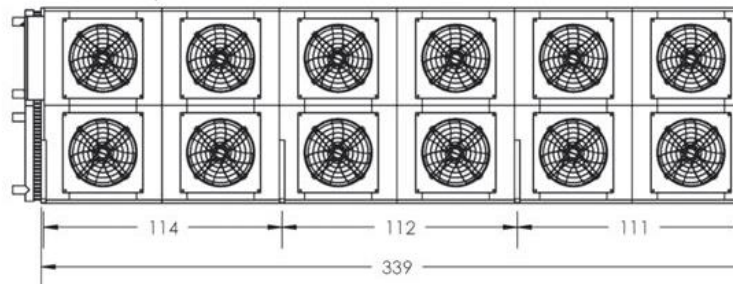
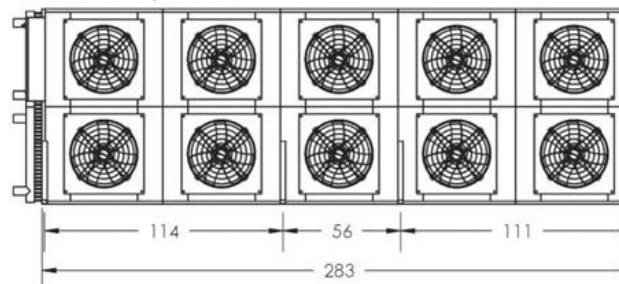
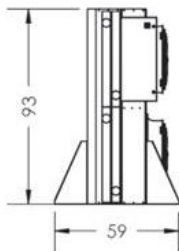
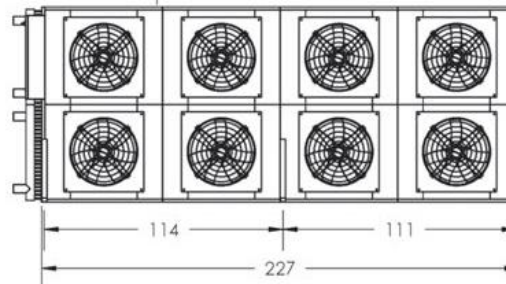
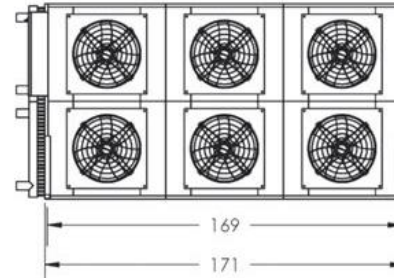
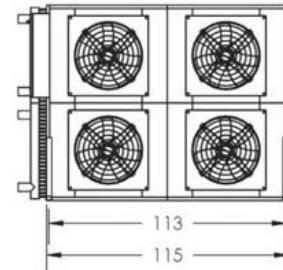
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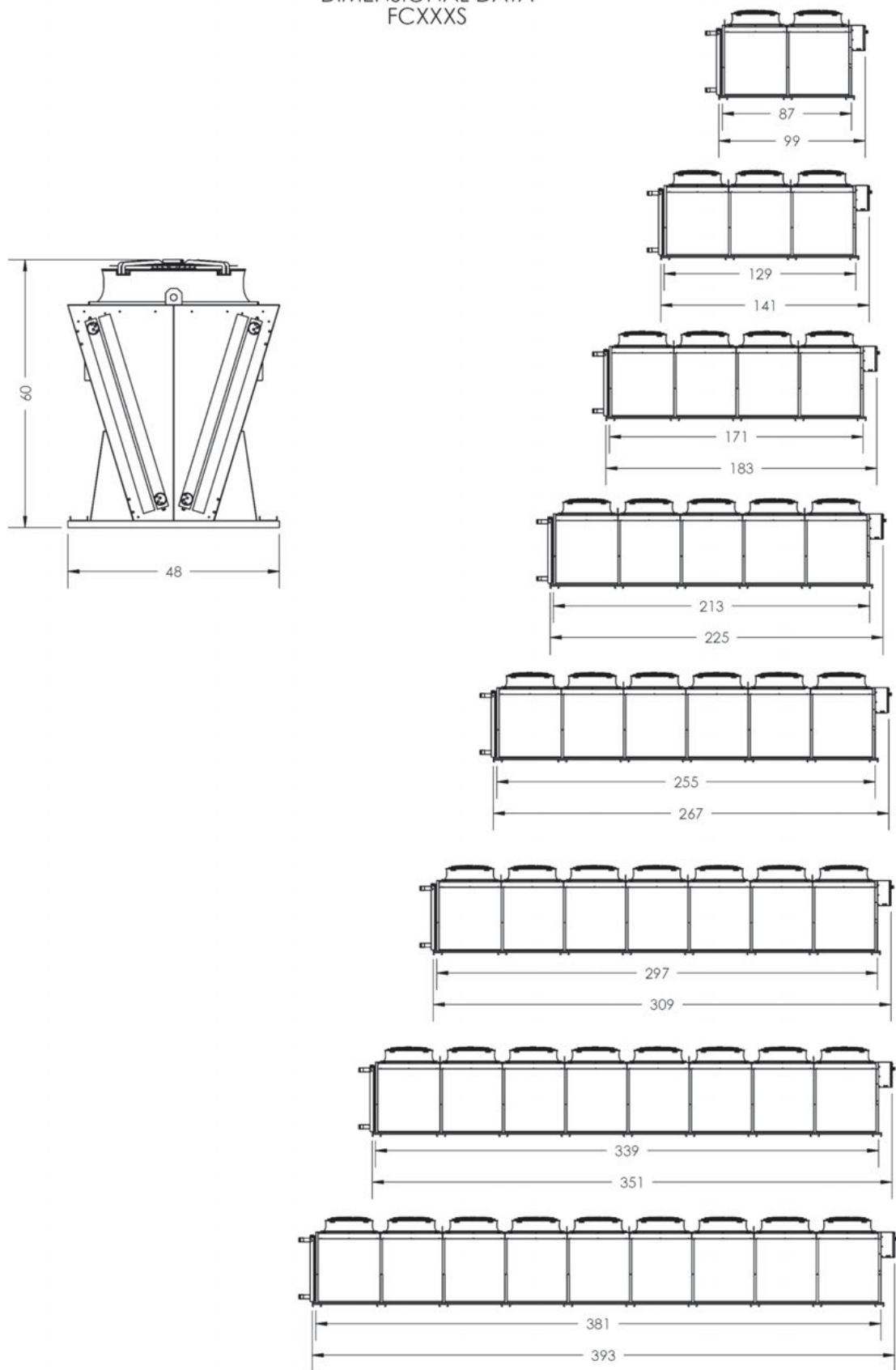
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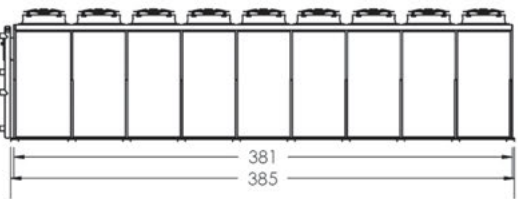
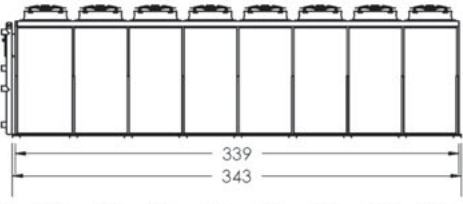
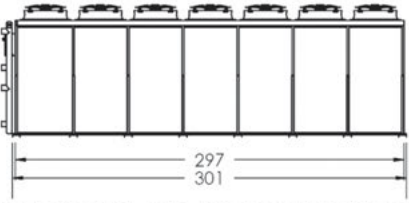
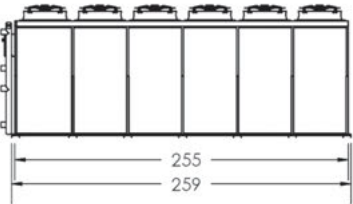
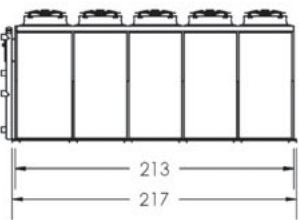
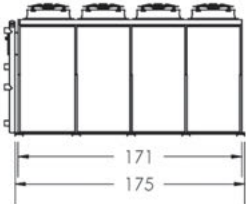
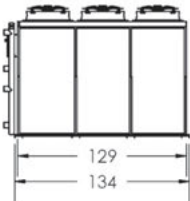
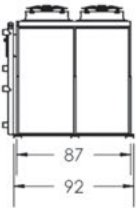
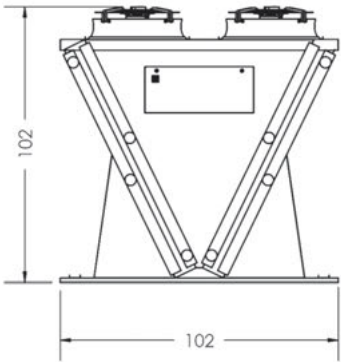
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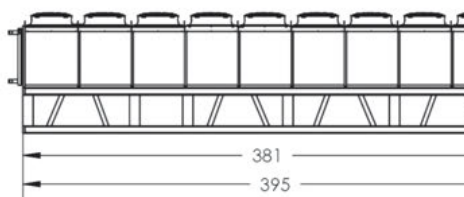
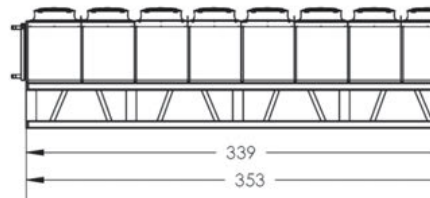
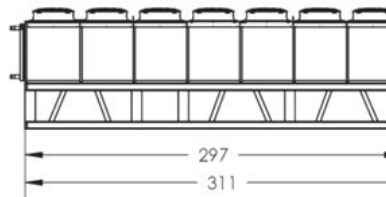
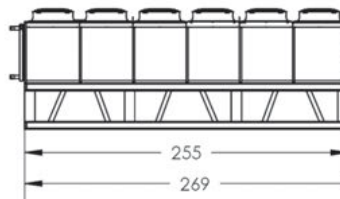
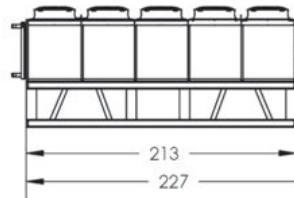
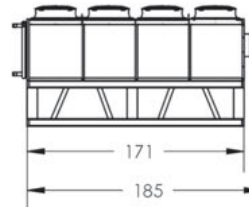
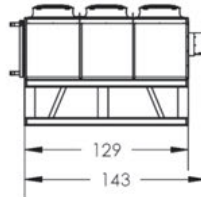
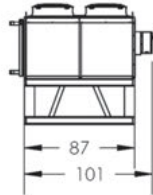
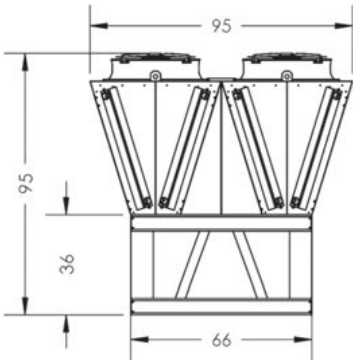
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## 2.0 INSTALLATION

### 2.1 SITE SELECTION

For optimum performance of your unit, consider the following factors when selecting a location for its operation;

1. **Availability of ambient air to the fluid cooler unit, and space for removal of heated air** - If space is not given for airflow, the unit will operate poorly leading to a reduced lifespan if it continues to run in those conditions for a long period of time.
2. **Distance to suitable electrical and fluid supply** – If the unit is placed too far from an electrical and fluid supply, extra costs may apply as wiring and piping will need to be extended. Extra pumps may also be necessary in order to achieve the desired flow rate.
3. **Distance from noise sensitive spaces** - Vibrations and noise from the motors and fans should be considered.
4. **Loading capacity of the roof or floor** –Fluid coolers can get to large sizes and weights that will require a proper support structure to stand on. If the structure's loading capacity is relatively low, it may lead to concaving and eventual failure.
5. **Building codes.**

All sides of the unit must be a minimum of 4 feet away from any walls or obstacles. It is crucial not to place units under a covered area, to allow the dispersal of the exhaust air.

The height of the walls around the unit should not exceed the height of the unit, as the walls can block the exhaust air from leaving, leading to recirculation and poor performance of your unit. *Table 2 - Distance from wall* demonstrates the best orientations and dimensions for the best performance of your unit(s) in the different cases. The specific dimensions can be found in *Table 1 - Distance from wall dimensions*. The special case of a unit in a pit (4 -walls) is demonstrated in *Figure 1-Units in Pit*. The dimension for H can be determined by checking the height of your unit in section 1.7 *DIMENSIONAL DRAWINGS*, which should never be greater than the unit height.

DIMENSION	VERTICAL, V AND W UNITS	HORIZONTAL UNITS
①	96"	96"
②	48"	48"
③	48"	48"
④	48"	48"
⑤	48"	48"
⑥	48"	48"
⑦	48"	48"
⑧	96"	96"

*Table 1 - Distance from wall dimensions*



CASE	VERTICAL, V AND W UNITS	HORIZONTAL UNITS
UNITS SIDE BY SIDE		
SINGLE WALL		
TWO WALLS		
TWO WALLS, TWO UNITS		
TWO WALLS (CORNER)		
THREE WALLS		

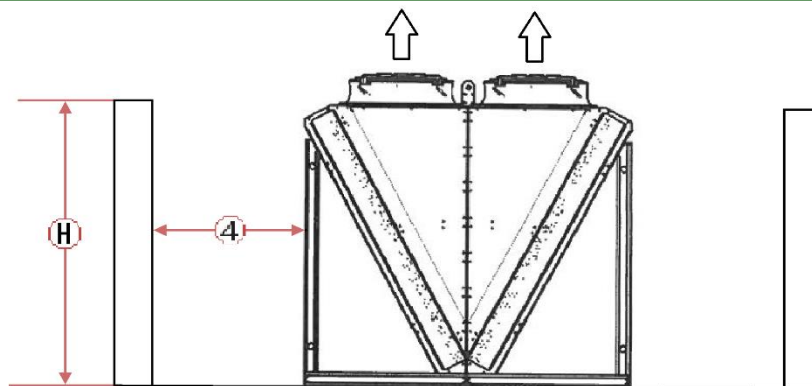


Figure 1-Units in Pit

## 2.2 LIFTING INSTRUCTIONS

Fluid coolers are large, heavy mechanical equipment and must be handled as such. A Crane may be required to unload the unit from the flat bed.

**Never drop the unit, as it could lead to serious damages or personal injury.**

The following are safety guidelines you should follow when lifting the unit:

1. Insert hooks, chains or straps in the rigging supports located at the top of the unit (*Figure 2- Large V Unit, Figure 3- Horizontal Unit & Figure 4- Vertical Unit*), ensuring that the crane is away from power lines or any hanging objects that could disrupt its operation. **If the crane comes in contact with power lines, it could lead to electrocution.**
2. Attach lifting slings to lifting holes as shown in *Figure 2- Large V, Figure 3- Horizontal & Figure 4- Vertical Unit* (depending on your unit). **Note: Same lifting points for W and small V units as Figure 2- Large V Unit.**
3. Making sure lifting straps are not twisted or kinked, take the other looped end of each strap and slide it over the hook on the crane and constantly check to see that they are not twisted around each other.
4. Spreader bars must be used when lifting or moving the air-cooled fluid cooler, so that lifting forces are applied vertically.
5. Instruct the crane operator to slowly start lifting until there is slight tension on all the straps. Take a walk around the unit to check that none of the straps have come loose. Have the crane operator lift the unit a few inches off the ground and ensure the unit is rising in a level fashion.
6. Lift the unit into its final resting place on the ground and disconnect all straps from the unit.

**Note:** Under no conditions should the coil headers, or return bends be used in lifting or moving the fluid cooler. The crane, hooks, chains, traps, and load spreader bars must be determined according to the unit weight.

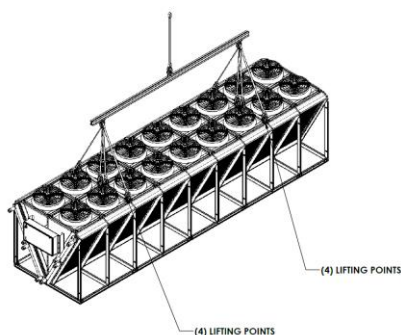


Figure 2- Large V Unit

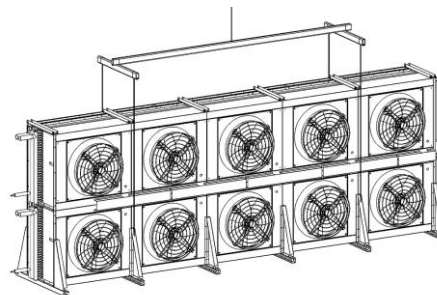


Figure 3- Horizontal Unit

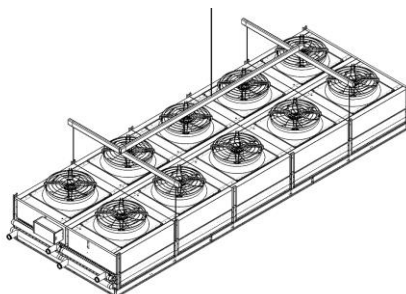


Figure 4- Vertical Unit

For problem free operation, follow the basic rules described below;

1. Make sure air is blown out either horizontally/vertically depending on your purchased unit (**DO NOT PLACE UNIT AT AN ANGLE**).
2. Make sure there are no heat sources nearby as heated air intake must always be avoided.

Once the unit is in place, tightly connect the appropriate pipes to the inlet and outlet at the headers as well as the power supply.

## 2.4 START UP

**Note: Start up must be performed by authorized personnel only.**

After installation, ensure the unit is ready to operate by going through the checklist for completed installation, prior to start up. Fill in the table in page 27 and send a copy to Direct Coil for confirmation.

Follow the steps below to ensure a problem free start-up for your unit:

- I. Check for correct fan rotation, which can be done by quickly jogging the fan contactor and making sure the fans run freely.
- II. Check the electrical characteristics of all components to be sure they agree with the power supply.
- III. Check tightness of all electrical connections.
- IV. Pressure test the system before adding the water/glycol solution. Test pressure should not exceed 60 PSI
- V. Pour premixed water and glycol into expansion tank. Fill the system until the expansion tank is half full, then purge air from all vents. Operate system for a minute then purge all vents again and add glycol as required. Repeat the purging of all vents after the first hour of operation and again after several hours of operation.
- VI. For roof mounted units, to fill the system, a premixed water and glycol mixture is needed, and is to be poured into the expansion tank. Fill the system until half full, then eliminate the air from all vents.
- VII. Once the system is completely full of fluid, start the fluid circulating pump. To assure proper fluid flow, adjust the shut off valve for the required GPM by checking the pump curve and observing gauge pressure, or by using an in-line flow meter.
- VIII. Keep all wiring diagrams, instructions, list of spare parts, within easy reach of the installed fluid cooler, for future references.

## 2.5 PIPING SCHEMATICS

After both glycol lines are connected, the entire system must be leak tested. Care should be given to those parts which will be inaccessible in future dates. This section is a guide for the correct installation of the cooled water piping system, enclosing this fluid cooler. However, Direct Coil accepts no responsibility whatsoever for the installation of the unit or the associated piping.

**All piping must be installed only by a licensed plumbing contractor, and in compliance with local codes.**

**DO NOT USE GALVANIZED PIPING IF GLYCOL IS TO BE USED IN THE CHILLED WATER SYSTEM.**

Chemical reaction between the glycol and the galvanized piping can be detrimental to the cooling system, the glycol and unit. Piping material may be copper, plastic, carbon or stainless steel depending on the requirements of each installation.

It is the responsibility of the engineer and/or the piping contractor to ensure that the piping is correctly sized in relation to the installation, and the available dynamic head of the pump installed inside the chiller. The chilled water pipe connections on the chiller are not necessarily the appropriate size for the system piping. As a general guide, the chiller pipe connections should be considered as minimum pipe size required for the installation. Drastic reduction in pipe sizing (small hoses, etc.) will reduce the chilled water flow and may cause a low flow alarm, or freezing damage to the evaporator. Note: Installation with low water flow/high water temperature rise should always have a full ported bypass installed between the chiller inlet and outlet connections, with a manually adjustable gate valve in the bypass line. Correctly adjusted, this blended return water will maintain an adequate flow through the chiller, at an acceptable return temperature.

**ALWAYS install a filter/strainer on the inlet of the chiller in order to prevent particulates (rust, dirt and installation debris) from blocking the evaporator. Blockage will severely impair chiller performance and is not covered by warranty.**

**Always install a pressure gauge in the return piping to the chiller. This is essential for monitoring system pressure and pump performance.**

It is good piping practice, especially on systems with short piping runs and/or low system pressure loss, to install a gate valve in the discharge line from the chiller for throttling purposes. This allows the operator to maintain optimum pump performance by adding resistance to the system. NEVER throttle the water flow on the return line to the unit. This will cause cavitation and over-heating of the pump. The figure below (Figure 5- Typical Piping Schematics) illustrates a typical configuration when installing pipes.



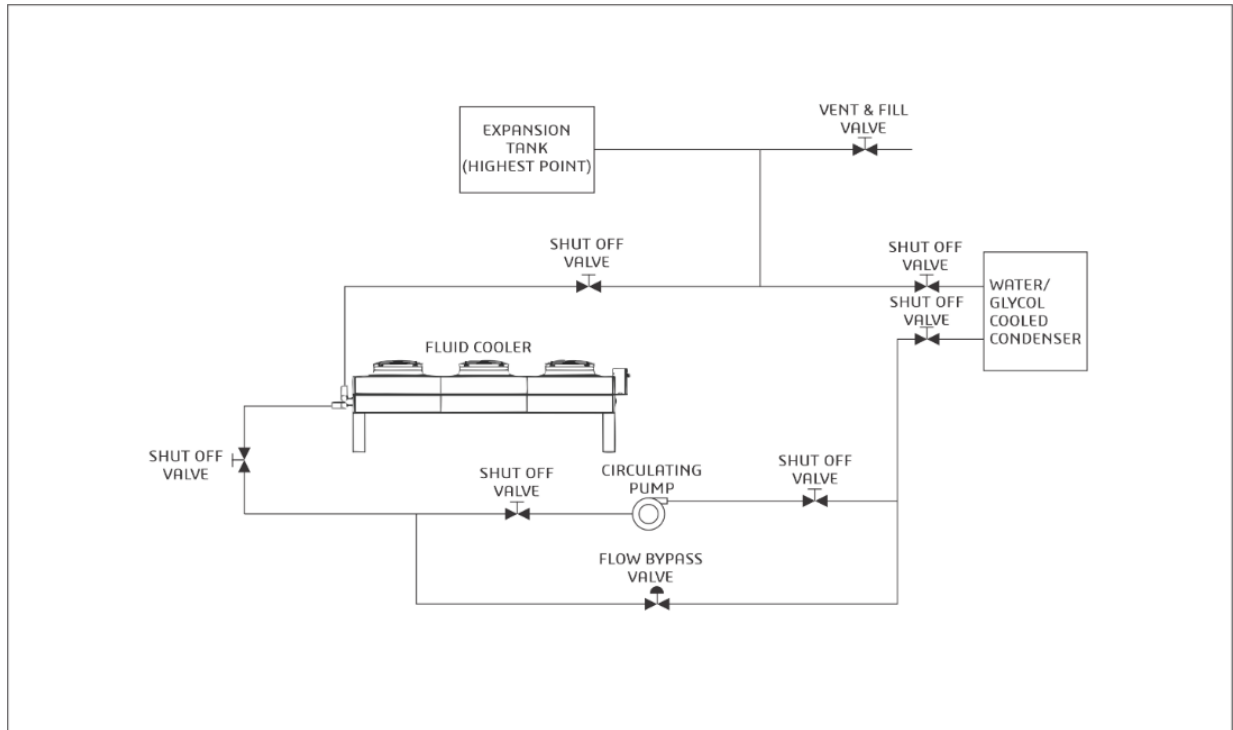


Figure 5- Typical Piping Schematics

## 3.0 MAINTENANCE

Inspection must always be carried out by a qualified service mechanic it is recommended that it takes place semiannually. **Always have the main power supply disconnected when carrying out inspection.**

During inspection, be sure to;

1. Check electrical components and tighten any loose connections.
2. Check control capillary tubes and lines for signs of wear due to excessive vibration or rubbing on metal. Secure if necessary.
3. Check tightness of all fans and motor mounts. Remove any deposits which could affect fan balance. Note: Fan motors are permanently lubricated and require only visual inspection.
4. Clean the condenser coil using compressed air or by flushing with cool water or coil cleansers

### 3.1 HEAT EXCHANGER CLEANING

Make sure to regularly clean up your heat exchanger to prevent building up of dust, which will affect the performance of your unit if left unattended.

Before cleaning up the unit, make sure to shut off the unit and power off the fans to eliminate the risk of getting shocked.

Clean the Heat exchanger with one of the following procedures:

1. Hydraulic
2. Compressed air

**Note: The fins can be damaged by using too high pressure or if the jet hits the fins at an angle. Mechanical cleaning using steel brushes could damage the heat exchanger. Ensure that electrical connections and motors are not touched by water.**

### Hydraulic Cleaning

Use a maximum pressure of 500 PSI.	Use warm water 80 F.
Maintain a minimum distance of 8" from the fins.	Always aim the jet vertically.
Cleaning should ideally be done against the airflow direction, from top to bottom.	Hold the jet vertical to the fins to avoid bending the fins.
With oily and greasy dirt, it helps to add a cleaning agent to the water.	Ensure that the cleaning agent is environment friendly and compatible with the unit material.
When using chemical agents ensure that they are not aggressive towards the unit materials. Rinse the unit after the treatment.	The unit should be completely dry before switching the fans on.

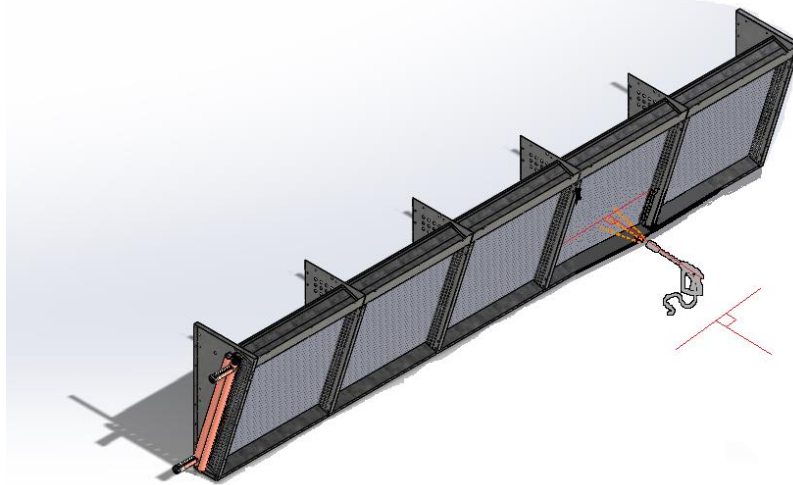


Figure 6 - Pressure Cleaning

### Cleaning with compressed air

Blast the heat exchanger with a maximum 1000 PSI pressure compressed air against the airflow to remove the dirt and contaminants.	Hold the jet of the cleaner vertical to the fins to avoid bending the fins.
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## 3.2 TROUBLESHOOTING & RECOMMENDATIONS

Possible malfunctions to the fluid cooler may occur due to:

1. Changes in operating conditions
2. Insufficient maintenance and inspection
3. External environmental factors
4. Internal machine factors
5. System factors
6. Operating errors

Causes of Malfunctions can be divided into three groups and these are:

- i. Faults due to the water circuit
- ii. Electrical faults
- iii. Faults in the refrigerant circuit

The table below lists a large portion of problems that might occur in practice and gives descriptions intended for information only. **The information in the table must not be considered as a repair manual.** Often the cause of failure is due to multiple factors and therefore can only be evaluated by a qualified refrigeration company with precise knowledge of the functional interactions.



## TROUBLESHOOTING AND RECOMMENDATIONS

SYMPTOM	PROBABLE CAUSE	RECOMMENDATION
<b>Unit Fails to Start</b>	Incorrect phasing or voltage	Correct phase or voltage input
	Power failure	Check power source, power input and fuses. Check control wiring and connections.
	Overload protection tripped	Check for cause of overload and repair
	Fuse blown	Change fuse – Identify the fault
<b>Control is Erratic</b>	Wiring improperly connected or broken.	Check wiring against schematic diagram.
<b>Pressure Too High</b>	Low dry cooler airflow. (Indicated by excessive warm air leaving the dry cooler fan).	Open air passages. Clean coil. Check dry cooler fan(s).
	Dry cooler fan(s) not operating	i. Check main voltage power source to unit. ii. Check fan motor, contactor and fan cycling switch. iii. Check temperature switches and motor. Replace as needed.
	Condenser pressure regulating valve setting too high.	Adjust to obtain correct pressure.
	Air in the system	Purge air with additional water/glycol solution.
<b>Erratic Fan Operation</b>	Dirty or blocked dry cooler coil.	Clean coil or remove blockage.
<b>Pump will not prime or retain prime after operation</b>	Air leak in suction line	Repair or replace suction Line
	Low glycol charge	Add glycol
<b>Flow rate is low</b>	Piping is fouled or damaged	Clean or replace damaged piping.
	Clogged impeller or worn impeller.	Clean or replace impeller.
	Discharge line restricted or undersized.	Remove restrictions.
	Plumbing restrictions.	Remove restrictions.
	Low glycol charge.	Add glycol.
	Air in system	Purge
<b>Pump runs but no fluid is pumped</b>	Low voltage	Consult Direct Coil.
	Faulty suction piping	Replace piping
	Valves closed	Open valves
<b>Liquid drips from point where shaft enters the pump is full of liquid.</b>	Refrigeration valves closed	Start refrigeration system adjust valves
	Damaged mechanical seal	Replace mechanical
<b>Excessive noise while pump in operation</b>	Temperatures over 210 F, liquid is not compatible with seal	Replace seal
	Pump not secured to firm foundation	Secure pump properly
	Piping not supported to relieve any strain on pump assembly.	Make necessary adjustments
	Restricted suction line	Clean or correct strainer
	Low glycol charge	Add glycol
<b>Main voltage too low</b>	By-pass valve requires adjustment	Check
<b>Damaged contacts or burnt coil</b>	Main power grid low	Contact electric company
<b>Poor system performance</b>	Defective starter contactor	Repair or replace
	System not balanced	Balance system
	Bypass not installed	Install system in accordance with recommended piping diagrams
	Worn impeller or seals	Replace impeller or seals as necessary
	Worn motor bearings	Replace pump

Table 3 - Troubleshooting and Recommendations



## 4.0 ADIABATIC COOLING SYSTEM



Figure 7 - Adiabatic Cooling System Assembly

The adiabatic cooling system uses the concept of evaporation to cool down air going through the mesh, leading to an improved performance of your fluid cooler unit. The system is equipped with a water spray which is triggered by an intelligent controller, that calculates optimal time intervals and spray duration, which helps in keeping water consumption at a minimum. The spray has low pressure nozzles that can operate with mains water pressure (29 PSI). The cooling system works best in warm, dry conditions and the efficiency is usually higher in locations where the condensing temperatures are low. As the efficiency increases (average of 20-30% higher output), the consumption of electricity decreases as well as the running costs (an average of 15-25% in annual cost savings).

The system has three major components:

- I. A non-metallic mesh fitted across the air path to the air-cooled condenser.
- II. A water supply system, which intermittently sprays water onto the mesh to ensure that it is always saturated.
  - a. If the water pressure is low, a pumping system may be required. If not, water direct from the mains can be used. Note: For spray system to operate efficiently, the mains pressure must be around 29 PSI or above
- III. A controller to ensure the water is controlled and only used when required to cool the air.

### 4.1 INSTALLATION

In most cases, Direct Coil takes care of the mesh installation during the manufacturing of your unit, but if you wish to install the system at a later date, or wish to have a different **qualified contractor** to install it for you, the guidelines in this section show how the system is installed. More information on the product can be found on the company website.

If the installation of the adiabatic cooling system has been performed by Direct Coil, only the water supply would need to be connected to the headers of the system once your unit is fully installed on site. If the water is supplied by the city mains water without any tank, reservoir or pump, there will be no requirement to report the installation to local authorities. If other water sources are used, a filter may be necessary in order to protect the spray nozzles. This is due to water hardness, which is a result of naturally occurring calcium and magnesium salts. Water containing small amounts of these salts is said to be soft whilst hard water contains greater levels.

Temporary hardness is usually the result of dissolved calcium carbonate typically seen as the whitish colored scale seen in kettles. Permanent hardness contains sulphates of calcium and magnesium which remain soluble in most ambient temperatures. It is therefore vital to observe that the coil remains dry when the nozzles are spraying to prevent scale build up, which would require mechanical removal. If the water is evaporated on the mesh only, no water requirement will be necessary, but may cause scaling on the mesh, so it is important to make sure that the airflow is not blocked. Treatment is only required if the water is very hard and may be required if it is hard.

### 4.2 MAINTENANCE

The adiabatic cooling system requires minimal maintenance since it has no moving parts and has self-cleaning filter features, however, regular quarterly and annual visits are recommended in order to check on the condition of the mesh. The three main groups; the **mesh panels**, the **water header** and **control circuit**, all need to be considered when performing maintenance. If you wish to keep a record of your maintenance checks, scan the table below and fill in the checkboxes if applicable. Record the date of the maintenance check at the bottom of the table and keep in file.

## ADIABADIC COOLING SYSTEM

MESH PANELS				
DESCRIPTION	QUARTERLY		ANNUAL	
	CHECK FOR	RECOMMENDATION	CHECK FOR	RECOMMENDATION
<b>Mesh Panels</b> a) Edges b) Fine Mesh c) Coarse Mesh	<input type="checkbox"/> Visual damage	<input type="checkbox"/> Repair/ Replace Damaged Panels	<input type="checkbox"/> Visual damage	<input type="checkbox"/> Repair/ Replace Damaged Panels
CONTROL CIRCUIT				
DESCRIPTION	QUARTERLY		ANNUAL	
	CHECK FOR	RECOMMENDATION	CHECK FOR	RECOMMENDATION
<b>Controller</b> a) Power Circuit b) Terminals c) Probe d) Functions e) Settings	<input type="checkbox"/> Visual damage <input type="checkbox"/> Malfunction	<input type="checkbox"/> Repair, Replace <input type="checkbox"/> Reboot system	<input type="checkbox"/> Visual damage <input type="checkbox"/> Spray interval and control settings <input type="checkbox"/> Correct ambient temperature reading at probe unit	<input type="checkbox"/> Repair, Replace
<b>Temperature Probe</b> a) Terminal b) Connection c) Location	<input type="checkbox"/> Visual damage <input type="checkbox"/> Malfunction	<input type="checkbox"/> Repair, Replace	<input type="checkbox"/> Visual damage <input type="checkbox"/> Faulty connection and test against an external temperature reading	<input type="checkbox"/> Repair, Replace
<b>Solenoid Valve</b> a) Terminal b) Connection c) Function	<input type="checkbox"/> Visual damage	<input type="checkbox"/> Repair, Replace	<input type="checkbox"/> Check any visual damage, test via temperature controller override function and cable connections	<input type="checkbox"/> Repair, Replace
<b>Power Supply</b> a) Fuses b) Connections c) Circuit d) Earth e) Leakage	<input type="checkbox"/> Visual damage <input type="checkbox"/> Loose connections	<input type="checkbox"/> Repair, Replace	<input type="checkbox"/> Check any visual damage and test the circuit for any earth leakage and check the overall power supply condition and repair where necessary <input type="checkbox"/> Visual damage	<input type="checkbox"/> Repair, Replace

WATER HEADER				
DESCRIPTION	QUARTERLY		ANNUAL	
	CHECK FOR	RECOMMENDATION	CHECK FOR	RECOMMENDATION
<b>Header</b> a) Water Intake b) Main Header c) Nozzle Sets d) Connections e) End Stop	<input type="checkbox"/> Visual damage <input type="checkbox"/> Leakage	<input type="checkbox"/> Repair where necessary	<input type="checkbox"/> Visual damage <input type="checkbox"/> Water leakage <input type="checkbox"/> Quality of water flow <input type="checkbox"/> Free nozzle spray	<input type="checkbox"/> Repair, Replace
<b>Leakage</b> a) Pipe Connections b) Fittings c) Nozzles d) Solenoid Valve	<input type="checkbox"/> Visual damage <input type="checkbox"/> Malfunction	<input type="checkbox"/> Repair, Replace	<input type="checkbox"/> Visual damage <input type="checkbox"/> Water flow condition	<input type="checkbox"/> Ensure full nozzle flow
<b>Spray Pattern</b> a) Angle b) Distance c) Flow Pattern d) Coverage	<input type="checkbox"/> Visual damage <input type="checkbox"/> Malfunction	<input type="checkbox"/> Repair, Replace <input type="checkbox"/> Re-adjust angle of the nozzles <input type="checkbox"/> Adjust the water pressure	<input type="checkbox"/> Visual damage <input type="checkbox"/> Faulty connection on header and nozzle fittings	<input type="checkbox"/> Repair, Replace
<b>Nozzles</b> a) Nozzle tip b) Body/Holder c) Check valve d) Pipe Clip e) Rings/ Seals	<input type="checkbox"/> Visual damage <input type="checkbox"/> Nozzle tips <input type="checkbox"/> Valve and pipe connections	<input type="checkbox"/> Repair, Replace where necessary	<input type="checkbox"/> Unequal nozzle flow	<input type="checkbox"/> Repair, Replace <input type="checkbox"/> Override the controller and ensure equal flow and spray pattern from all the nozzles.
		Date performed: _____	Date performed: _____	





## START UP CHECKLIST

Fill in the following information for your Direct Coil Unit package. Forward a copy of this registration sheet to [info@directcoil.com](mailto:info@directcoil.com) to register your warranty.

GENERAL INFORMATION			
Job Number: _____		Contractor Name: _____	
Pump Package Serial Number: _____		Project Name: _____	
Pump Package Model: _____		Direct Coil Rep: _____	
Fluidcooler Serial Number: _____		Test Technician's Initials: _____	
Fluidcooler Model: _____		Date: ____/____/____	
OPERATING INFORMATION		ELECTRICAL COMPONENTS	
Return Glycol Temp: _____ °F DB		Flow Switch: <input type="checkbox"/> Pass <input type="checkbox"/> N/A	
Supply Glycol Temp: _____ °F DB		Pump-1 Overload: <input type="checkbox"/> Pass <input type="checkbox"/> N/A	
System Flow Rate: _____ GPM		Pump-2 Overload: <input type="checkbox"/> Pass <input type="checkbox"/> N/A	
Total System Head: _____ Ft H2O		Pump-3 Overload: <input type="checkbox"/> Pass <input type="checkbox"/> N/A	
Glycol Solution: <input type="checkbox"/> Ethylene <input type="checkbox"/> Propylene		Pump Enable: <input type="checkbox"/> Pass <input type="checkbox"/> N/A	
Glycol Solution: _____ %		Fluidcooler Enable: <input type="checkbox"/> Pass <input type="checkbox"/> N/A	
Static Pressure Setting: _____ psig		Alarm Contacts: <input type="checkbox"/> Pass <input type="checkbox"/> N/A	

ELECTRICAL MEASUREMENTS	
Main Power (Design): _____ V/ _____ Ph _____ Hz	
Main Power (Measured): _____ V	
Control Voltage (Measured): _____ V	

	Line #1 (Amps)	Line #2 (Amps)	Line #3 (Amps)	Rated (Amps)
Pump-1:				
Pump-2:				
Pump-3:				
FluidCooler Fan-1:				
FluidCooler Fan-2:				
FluidCooler Fan-3:				
FluidCooler Fan-4:				
FluidCooler Fan-5:				
FluidCooler Fan-6:				
FluidCooler Fan-7:				
FluidCooler Fan-8:				
FluidCooler Fan-9:				
FluidCooler Fan-10:				
FluidCooler Fan-11:				
FluidCooler Fan-12:				
FluidCooler Fan-13:				
FluidCooler Fan-14:				
FluidCooler Fan-15:				
FluidCooler Fan-16:				
FluidCooler Fan-17:				
FluidCooler Fan-18:				

Notes:





## PRODUCT SUPPORT

Direct Coil is committed to supporting its product installations, so if any problems occur during the installation of your unit, Direct Coil is happy to assist in resolving the matter. You can contact us at any time between 8:30 a.m. – 5:00 p.m. Monday through Friday on our office number;

Phone : +1 (613) 544-2200

email: info@directcoil.com

Fax : +1 (613) 544-7779

For prompt and accurate support, please prepare the following information when you contact us:

Name: \_\_\_\_\_ Company: \_\_\_\_\_ Phone #: \_\_\_\_\_

Serial Number (XXMM-XXXX-##-##) : \_\_\_\_\_

Part Number (FC-XXXX) : \_\_\_\_\_

If you are unable to catch us during business hours, please leave a message and we will get back to you as soon as possible.

### Maintenance and Service Checklist

Date: \_\_\_\_\_ Monthly

☐ Area around fluid cooler unit is clean and clear of obstructions.

Date: \_\_\_\_\_ Semi-Annually

☐ Check Water/Glycol Charge Level

☐ Ensure Motor Mounts are Secured

☐ Check % Water/Glycol Fluid Solution

☐ Clean Unit if Necessary

☐ Ensure piping is secured

☐ Check Coil(s) and clean if necessary

☐ Tighten Electrical Connections

### Annually

☐ Inspect Piping System for Leaks and Corrosion

☐ Conduct a complete check of all services listed above and clean unit's interior

Notes:

Signature: \_\_\_\_\_



## WARRANTY



### PRODUCT WARRANTY

**Direct Coil Inc.** warrants to its direct purchasers that Products, including Service Parts, manufactured by the **Direct Coil Inc.** shall be free of defects in material or workmanship, under normal use and service for a period of one (1) year from date of original installation , or eighteen (18) months from date of shipment by Direct Coil, whichever first occurs. This warranty is not applicable if the purchaser has not fulfilled their payment obligations as per terms and conditions of sale.

Any Products covered by this warranty found to Direct Coil's satisfaction to be defective upon examination at Direct Coil's factory will at Direct Coil's option, be repaired or replaced and returned to Buyer via lowest common carrier, or Direct Coil may at its option grant Buyer a credit for the purchase price of the defective Product. Buyer must pay all costs for transportation of Products to Direct Coil's factory. The repair or replacement of such defects shall constitute full performance by Direct Coil of its obligations under this warranty. Product loss of any type is not covered. Refrigerant loss is not covered.

**Direct Coil Inc.** shall have no liability for expenses incurred for repairs made by Buyer except by prior, written authorization. Any claim under this warranty shall be made to Direct Coil in writing within the warranty period specified above otherwise such claim shall be deemed waived. In the event that parts of equipment have to be returned to the factory for repairs, return goods authorization number must be obtained by contacting sales department. No return goods shipment will be accepted without an authorization number.

**Direct Coil Inc.** shall have no warranty obligation whatsoever if its products have been subjected to alteration, misuse, negligence, free chemicals in system, corrosive atmosphere, accident, or if operation is contrary to Direct Coil's or manufacturer's recommendations, or if the serial number has been altered, defaced, or moved.

**Direct Coil Inc.** makes no warranty, express or implied, of fitness for any particular purpose, or of any other nature, with respect to products manufactured or sold by Direct Coil, except as specifically set forth above. No one is authorized to change this warranty or to create for on behalf of the Company any other obligation or liability in connection with the Products.

It is expressly understood and agreed that **Direct Coil Inc.** shall not be liable to buyer, or any customer of buyer, for direct or indirect, special, incidental, consequential or penal damages, or for any expenses incurred by reason of the use or misuse by buyer or third parties of the products.

All written correspondence is to be made to:

Direct Coil Inc.  
P.O. Box 430, Millhaven, Ontario, K0H 1G0  
+1 (613) 544-2200 (Phone)  
+1 (613) 544-7779 (Fax)











INNOVATIVE HEAT TRANSFER PRODUCTS



5055 Taylor Kidd Boulevard  
Millhaven, Ontario K0H 1G0  
Phone: +1 (613) 544-2200  
Fax: +1(613) 544-7779

