Remote Air Cooled Ultimate Chiller Solution

Model UCR 30, 50 & 70 Ton

Installation, Operation & Maintenance Manual

CLIMA COOL®

THE ULTIMATE CHILLER SOLUTION®

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Introduction

General Description

The UCR configurable remote air cooled modular chiller is designed to provide the most environmentally friendly, maneuverable, efficient, reliable and serviceable modular chiller in the industry. The UCR model has the ability to offer a hot gas bypass option utilizing environmentally friendly R-410A refrigerant for Green building designs.

Modules are available in 30, 50 and 70 tons, which when combined can obtain specific project turndown and capacity requirements from 30 to 400 tons per bank.

Safety

Throughout this manual, warning, danger, caution and attention notices appear. Read these items carefully before attempting any installation, service or troubleshooting of the equipment. All labels on unit access panels must be observed.

DANGER: Immediate hazardous situation which, if not avoided, **will** result in death or serious injury.

WARNING: Potentially hazardous situation which, if not avoided, **could** result in death or serious injury.

CAUTION: Potentially hazardous situation or an unsafe practice which, if not avoided, **could** result in minor or moderate injury or product or property damage.

ATTENTION: Notification of installed, operation or maintenance information which is important, but **not** hazard related.

CAUTION/ATTENTION

Use only copper conductors for field installed wiring. Unit terminals are not designed to accept other types of conductors.	Utilisez uniquement des conducteurs en cuivre pour le câblage. Bornes de l'unité ne sont pas conçus pour accepter d'autres types de conducteurs.

⚠ CAUTION/ATTENTION

3 PHASE SCROLL COMPRESSOR UNITS	UNITÉ DE COMPRESSEUR SCROLL 3-PHASE
If this unit uses a 3 Phase Scroll Compressor, the following instructions MUST BE followed: • Unit power supply MUST BE wired in the proper sequence to avoid damage to the 3 Phase Scroll Compressor; • Scroll Compressors with INCORRECT rotation show the following characteristics: - High sound level; - High suction pressure and low discharge pressure; - Low current draw. • If any of the three above characteristics exist, swap two of the three supply wires at the disconnect and recheck compressor for incorrect rotation.	Si cet appareil utilise compresseur scroll 3-Phase, les instructions suivantes doivent être suivies: • L'alimentation de l'appareil doit être monté dans l'ordre correct pour éviter endommager le compresseur scroll 3-Phase • Compresseurs scroll avec rotation incorrecte montrent les caractéristiques suivantes: - Haut niveau de son; - Pression d'aspiration élevée et une faible pression de décharge; - Faible ampérage • Si l'un des trois éléments mentionnés ci-dessus sont remplies , échanger deux des trois lignes électriques alimen tant la interrupteur de sécurité et vérifier la rotation du compresseur.

⚠ WARNING/AVERTISSEMENT

To avoid possible injury or death due to electrical shock, open the power supply disconnect switch and secure it in an open position during installation.	Pour éviter les blessures ou la mort par électrocution, ouvrir la interrupteur de sécurité et fixez-le en position ouverte lors de l'installation.

⚠ CAUTION/ATTENTION

Excessive Chlorine, undissolved solids and other improper water conditions WILL DAMAGE the internal heat exchanger & WILL VOID YOUR WARRANTY!	Chlore excessive, solides non dissous et les autres impropre conditions de l'eau, ENDOMMAGERA l'échangeur de chaleur interne et ANNULERA VOTRE GARANTIE!

⚠ WARNING/AVERTISSEMENT

WATER AND REFRIGERANT SYSTEMS UNDER PRESSURE	EAU ET FRIGORIGÈNE EQUIPEMENTS SOUS PRESSION
• Isolate/Lockout source and relieve pressure BEFORE servicing equipment. • Failure to relieve pressure may result in property damage, serious bodily injury or death!	• Isoler la source / de verrouillage et de soulager la pression avant entretien de l'équi-pement. • Le défaut de soulager la pression peut entraîner des dommages matériels, des blessures corporelles graves ou la mort!

ATTENTION

To avoid the release of refrigerant into the atmosphere, the refrigerant circuit of this unit must be serviced only by technicians who meet local, state and federal proficiency requirements.

All refrigerant discharged from this unit must be recovered WITHOUT EXCEPTION. Technicians must follow industry accepted guidelines and all local, state and federal statues for the recovery and disposal of refrigerants.

If a compressor is removed from the unit, system refrigerant circuit oil will remain in the compressor. To avoid leakage of compressor oil, the refrigerant lines of the compressor must be sealed after it is removed.

⚠ WARNING/AVERTISSEMENT

Disconnect power supply (ies) before servicing. Refer servicing to qualified service personnel. Electric shock hazard. May result in injury or death!		Debrancher avant d'entre-prendre le dépannage de l'appareil. Consulter un réparateur qualifie pour le dépannage. Risque de choc électrique. Résiltat de mai dans dommages ou la mort!

⚠ CAUTION/ATTENTION

Unit to be serviced by qualified personnel only. Refrigerant system under pressure. Relieve pressure before using torch. Recover refrigerant and store or dispose of properly.		Conifer la maintenance à un technicien qualifie. Le systéme frigorifique sous pression. Décomprimer avant d'exposer à la flamme. Récuperer le frigorigene et le stocker ou le détrulre correctement.

ATTENTION

Never dispense liquid refrigerant into the suction port of a compressor while it is not running. If adding additional refrigerant is necessary, you must gradually meter liquid refrigerant into suction port of the compressor ONLY WHILE THE COMPRESSOR IS RUNNING and only through a metering valve.

⚠ WARNING/AVERTISSEMENT

Cylinder pressures must be closely monitored whenever a refrigerant cylinder is being heated in ANY manner. Allowing pressures to exceed those for which the cylinder is rated may result in cylinder rupturing, personal injury and/or property damage or even death.	Pression des cylindres doit être surveillée étroitement chaque fois qu'une bouteille de réfrigérant est chauffe de toute manière. Permettant des pressions supérieures à celles pour lesquelles le cylindre est évalué peut entraîner dans le cylindre une rupture, des blessures corporelles ou dommages matériels ou même la mort.

CAUTION/ATTENTION

Never dispense refrigerant amounts into the receiver which may exceed its liquid holding capacity. The refrigeration system in our model UCR030 is equipped with 72 pound receivers (at 80% full). Both refrigeration systems in models UCR050 and UCR070 are equipped with 84 pound receivers (at 80% full).	Jamais distribuer montants réfrigérant dans le récepteur, qui peut dépasser sa capacité de rétention liquide. Le système de réfrigération dans notre modèle UCR030 est équipé de 72 livres récepteurs (à 80 % complet). Les deux systèmes de réfrigération pour les modèles UCR050 et UCR070 sont équipés de récepteurs de 84 livres (à 80 % complet).

⚠ WARNING/AVERTISSEMENT

Unit charged with 50-psi Nitrogen from factory. Pressure level should be checked upon arrival to detect leaks caused from shipping the unit.	Unité chargée avec 50-psi usine d'azote. Le niveau de pression doit être vérifié à l'arrivée pour les fuites causées par le transport.

CAUTION/ATTENTION

All pressure transducers should be removed before evacuating or pressure testing unit. Failure to do so will result in damage to the transducers.	Tous les capteurs de pression doivent être retirés avant l'évacuation ou de test d'unité de pression. Faute de quoi se traduira par des dommages à des capteurs.

⚠ CAUTION/ATTENTION

Never attempt to vapor charge into the system high side, whether the compressor is ON or OFF. This may result in refrigerant flowing from the refrigeration system into the charging cylinder. Cylinders can quickly be over pressurized causing them to rupture with resultant injury or property damage.	Ne jamais essayer de vapeur frais dans le côté élevé du système, si le compresseur est ON ou OFF. Cela peut entraîner dans le réfrigérant qui se jettent dans le système de réfrigération dans le cylindre de charge. Les bouteilles peuvent être rapidement sursous la pression obligeant à rompre avec les blessures qui en résultent ou dommages matériels.

Inspection

Upon receipt of equipment, carefully check the shipment against the bill of lading and inspect each chiller for any damage incurred during shipment. Thoroughly check for any visible damage of control panels and electrical and/or refrigeration components or broken copper lines. The carrier must make proper notation of any damages or shortages on all copies of the bill of lading and complete a common carrier inspection report prior to final acceptance of the shipment. **Note:** It is the responsibility of the purchaser to file all necessary claims with the carrier. In addition, please notify the ClimaCool Customer Service Department at 405-815-3000 or customerservice@climacoolcorp.com of all damage immediately.

Storage

Chillers should be stored in an upright position and kept in a clean, dry area.

Handling of Modules

Carefully remove the module's packaging. The chiller's steel base cut-outs provide maneuverability by fork lift or pallet jack into its final position (see Rigging and Lifting Procedures Figures 3 - 5 on page 9). Verify that all header grooved couplings and mounting hardware kits are on site prior to connecting the modules. **Note:** Consult factory for handling other than in the upright position.

Rigging and Lifting

Each module should be lifted by using a pallet jack or fork lift. If it is necessary to utilize a crane for rigging or lifting, each module shall be lifted by using lifting straps and spreader bars using rigging points identified on page 9 - Rigging and Lifting Procedures.

Warranty

To ensure proper equipment longevity, design performance and reliability, all ClimaCool chillers must be installed, operated and maintained in accordance with ClimaCool IO&M manuals. Water quality is of the utmost importance for the proper care and maintenance of the modular chiller system and regular treatment of the water will increase longevity of the system. **Failure to provide adequate filtration or treatment of evaporator water will void the ClimaCool module's warranty.** A factory authorized technician is required to perform the start-up of the ClimaCool chiller. Please contact the ClimaCool Customer Service Department at 405.815.3000 or email Technical Support at technicalsupport@climacoolcorp.com to schedule. **There is a minimum of three (3) weeks notice required to schedule the factory start-up.**

Physical Data

Model UCR Module and Compressor	30	50	70
Capacity (Tons)[1]	27.4	45	59
Refrigerant Circuits (quantity)	2	2	2
Compressor Type	Scroll	Scroll	Scroll
Compressor Quantity	2	2	2
Compressor Nominal Hp (per circuit)	15	25	35
Oil Factory Charge (per Circuit) (oz.)	110	230	213
Module Operating Weight w/Water (lbs)[2]	1265	1945	2085
Module Shipping Weight (lbs)[3]	1170	1785	1925
Model UCR Evaporator	**30**	**50**	**70**
Heat Exchanger (Type)	Brazed Plate	Brazed Plate	Brazed Plate
Independent Refrigerant Circuits (quantity)	2	2	2
Water Storage Volume HX Only (gals)	2.8	5.1	6.5
Water Storage Volume HX Plus 6" Main Headers (gals)	12.8	15.7	17.1
Maximum Design Working Pressure - Water Side (PSI)	300	300	300
Header Water Connections - Inlet/Outlet (inches)[4]	6	6	6

Notes:

1. Unit tonnage ARI rating conditions: 44°F leaving chilled water temperature, and 2.4 GPM per ton through the evaporator; 95°F entering condenser air temperature (dry bulb); 30°F condenser "TD" and 15°F liquid subcooling.
2. Module operational weight includes water, compressor oil, and refrigerant charge. Multiply times the number of modules for a total system operational weight.
3. Unit shipping weight includes compressor oil and packaging.
4. Main header water/fluid connections are ASME, 6" schedule 40 pipe with grooved couplings, 300 psig maximum working pressure.
5. The minimum/maximum flow rates are based on a temperature differential of 5.5°F to 20°F through the evaporator.
6. Minimum chiller unloading % can be as low as 4.8% of total systems. Calculate system unloading by dividing ½ of smallest module by total system tons.
7. Remote condensers shipped with a nitrogen holding charge. See pages 60-61 for estimated field charging of refrigerant.

Remote Condenser Physical Data: 30°F TD & 110°F Maximum Ambient

Remote Condenser "H" Series Model UCR →	30	50	70
Model RC (1140 RPM /30°F TD /110°F Max Ambient)	RC1-008A*H20	RC2-026A*H48	RC2-031A*H48
Quantity of Remote Condensers Needed	2	1	1
Heat Exchanger (Remote Air-Cooled Type)	Alum. fin/cu tube	Alum. fin/cu tube	Alum. fin/cu tube
Fins per Inch (FPI)	10	8	8
Independent Refrigerant Circuits (Quantity)	1	2	2
Fan Motor Drive Type | Fan Dia. (in.)	Direct | 26"	Direct | 30"	Direct | 30"
Total CFM	12,900	39,600	38,100
Fan Speed	1140	1140	1140
Fan Motor Hp (ea)	1/3 hp	1.5 hp	1.5 hp
Quantity of Fan Motors	2	4	4
kW Input (ea.) Fan Motor | Total kW Input for All Motors	1.2 | 2.4	1.93 | 7.7	1.93 | 7.7
FLA per Fan Motor @ 460V-3-60 | Total FLA @ 460V-3-60	1.3 | 2.6	3.5 | 14	3.5 | 14
Total Heat Rejection @ 1°F TD | THR @ 30°F TD (MBH)	8.0 | 240	26.2 | 786	31.4 | 942
Max. Design Working Pressure – Ref. side | Test Pressure (Psig.)	600 | 650	600 | 650	600 | 650
Condenser Refrigerant Inlet Connection; Qty. @ Size O.D. (Inches)	1 @ 1-3/8"	2 @ 1-3/8"	2 @ 1-5/8"
Condenser Refrigerant Outlet Connection; Qty. | Size O.D. (Inches)	1 @ 1-1/8"	2 @ 1-3/8"	2 @ 1-3/8"
Sound Level (dB @ 10')	74.5	78.4	78.4
Dimensions: W x L x H (Inches)	43 x 97 x 40.5	88 x 127 x 49	88 x 127 x 49
Net Weight | Shipping Weight (lbs)	530 | 680	1340 | 1520	1440 | 1620

Remote Condenser "X" Series Model UCR →	30	50	70
Model RC (830 RPM / 30°F TD / 110°F Max. Ambient)	RC2-018A*X48	RC2-026A*X40	RC2-032A*X44
Quantity of Remote Condensers Needed	1	1	1
Heat Exchanger (Remote Air-Cooled Type)	Alum. fin/cu tube	Alum. fin/cu tube	Alum. fin/cu tube
Fins per Inch (FPI)	8	10	14
Independent Refrigerant Circuits (Quantity)	2	2	2
Fan Motor Drive Type | Fan Dia. (in.)	Direct | 30"	Direct | 30"	Direct | 30"
Total CFM	31,700	30,500	29,300
Fan Speed	830	830	830
Fan Motor Hp (ea)	1.0 hp	1.0 hp	1.0 hp
Quantity of Fan Motors	4	4	4
kW Input (ea.) Fan Motor | Total kW Input for All Motors	1.1 | 4.4	1.1 | 4.4	1.1 | 4.4
FLA per Fan Motor @ 460V-3-60 | Total FLA @ 460V-3-60	2.4 | 9.6	2.4 | 9.6	2.4 | 9.6
Total Heat Rejection @ 1°F TD | THR @ 30°F TD (MBH)	17.5 | 525	26.2 | 786	32.0 | 960
Max. Design Working Pressure – Ref. side | Test Pressure (Psig.)	600 | 650	600 | 650	600 | 650
Condenser Refrigerant Inlet Connection; Qty. @ Size O.D. (Inches)	2 @ 1-3/8"	2 @ 1-3/8"	2 @ 1-5/8"
Condenser Refrigerant Outlet Connection; Qty. | Size O.D. (Inches)	2 @ 1-1/8"	2 @ 1-3/8"	2 @ 1-5/8"
Sound Level (dB @ 10')	66.9	66.9	66.9
Dimensions: W x L x H (Inches)	88 x 127 x 49	88 x 127 x 49	88 x 127 x 49
Net Weight | Shipping Weight (lbs)	1240 | 1420	1340 | 1520	1440 | 1620

Remote Condenser "Q" Series Model UCR →	30	50	70
Model RC (540 RPM / 30°F TD / 110°F Max. Ambient)	RC2-017A*Q42	RC2-025A*Q44	RC2-032A*Q62
Quantity of Remote Condensers Needed	1	1	1
Heat Exchanger (Remote Air-Cooled Type)	Alum. fin/cu tube	Alum. fin/cu tube	Alum. fin/cu tube
Fins per Inch (FPI)	12	14	12
Independent Refrigerant Circuits (Quantity)	2	2	2
Fan Motor Drive Type | Fan Dia. (in.)	Direct | 30"	Direct | 30"	Direct | 30"
Total CFM	22,300	20,800	32,300
Fan Speed	540	540	540
Fan Motor Hp (ea)	1/2 hp	1/2 hp	1/2 hp
Quantity of Fan Motors	4	4	6
kW Input (ea.) Fan Motor | Total kW Input for All Motors	0.43 | 1.72	0.43 | 1.72	0.43 | 1.72
FLA per Fan Motor @ 460V-3-60 | Total FLA @ 460V-3-60	1.75 | 7.0	1.75 | 7.0	1.75 | 10.5
Total Heat Rejection @ 1°F TD | THR @ 30°F TD (MBH)	17.3 | 519	24.5 | 735	32.4 | 972
Max. Design Working Pressure – Ref. side | Test Pressure (Psig.)	600 | 650	600 | 650	600 | 650
Condenser Refrigerant Inlet Connection; Qty. @ Size O.D. (Inches)	2 @ 1-3/8"	2 @ 1-3/8"	2 @ 1-5/8"
Condenser Refrigerant Outlet Connection; Qty. @ Size O.D. (Inches)	2 @ 1-1/8"	2 @ 1-3/8"	2 @ 1-5/8"
Sound Level (dB @ 10')	55.7	55.7	57.3
Dimensions: W x L x H (Inches)	88 x 127 x 49	88 x 127 x 49	88 x 180 x 49
Net Weight | Shipping Weight (lbs)	1240 | 1420	1440 | 1620	1990 | 2230

Remote Condenser Physical Data: 20°F TD & 120°F Maximum Ambient

Remote Condenser "H" Series	Model UCR →	30	50	70
Model RC (1140 RPM /20°F TD /120°F Max. Ambient)		RC2-026A*H48	RC2-038A*H44	RC2-047A*H62
Quantity of Remote Condensers Needed		1	1	1
Heat Exchanger (Remote Air-Cooled Type)		Alum. fin/cu tube	Alum. fin/cu tube	Alum. fin/cu tube
Fins per Inch (FPI)		8	14	12
Independent Refrigerant Circuits (Quantity)		2	2	2
Fan Motor Drive Type | Fan Dia. (in.)		Direct | 30"	Direct | 30"	Direct | 30"
Total CFM		39,600	38,100	59,400
Fan Speed		1140	1140	1140
Fan Motor Hp (ea)		1.5 hp	1.5 hp	1.5 hp
Quantity of Fan Motors		4	4	6
kW Input (ea.) Fan Motor | Total kW Input for All Motors		1.93 | 7.7	1.93 | 7.7	1.93 | 11.55
FLA per Fan Motor @ 460V-3-60 | Total FLA @ 460V-3-60		3.5 | 14	3.5 | 14	3.5 | 21
Total Heat Rejection @ 1°F TD | THR @ 20°F TD (MBH)		26.2 | 524	38.3 | 766	46.7 | 934
Max. Design Working Pressure – Ref. side | Test Pressure (Psig.)		600 | 650	600 | 650	600 | 650
Condenser Refrigerant Inlet Connection; Qty. @ Size O.D. (Inches)		2 @ 1-3/8"	2 @ 1-3/8"	2 @ 1-5/8"
Condenser Refrigerant Outlet Connection; Qty. | Size O.D. (Inches)		2 @ 1-1/8"	2 @ 1-3/8"	2 @ 1-3/8"
Sound Level (dB @ 10')		78.4	78.4	80.0
Dimensions: W x L x H (Inches)		88 x 127 x 49	88 x 127 x 49	88 x 180 x 49
Net Weight | Shipping Weight (lbs)		1340 | 1520	1440 | 1620	1990 | 2230

Remote Condenser "X" Series	Model UCR →	30	50	70
Model RC (830 RPM / 20°F TD / 120°F Max. Ambient)		RC2-026A*X40	RC2-039A*X60	RC2-047A*X62
~~Quantity of Remote Condensers Needed~~		~~1~~	~~1~~	~~1~~
Heat Exchanger (Remote Air-Cooled Type)		Alum. fin/cu tube	Alum. fin/cu tube	Alum. fin/cu tube
Fins per Inch (FPI)		10	10	12
Independent Refrigerant Circuits (Quantity)		2	2	2
Fan Motor Drive Type | Fan Dia. (in.)		Direct | 30"	Direct | 30"	Direct | 30"
Total CFM		31,700	45,700	44,000
Fan Speed		830	830	830
Fan Motor Hp (ea)		1.0 hp	1.0 hp	1.0 hp
Quantity of Fan Motors		4	6	6
kW Input (ea.) Fan Motor | Total kW Input for All Motors		1.1 | 4.4	1.1 | 6.6	1.1 | 6.6
FLA per Fan Motor @ 460V-3-60 | Total FLA @ 460V-3-60		2.4 | 9.6	2.4 | 14.4	2.4 | 14.4
Total Heat Rejection @ 1°F TD | THR @ 20°F TD (MBH)		26.2 | 524	39.4 | 788	47.0 | 934
Max. Design Working Pressure – Ref. side | Test Pressure (Psig.)		600 | 650	600 | 650	600 | 650
Condenser Refrigerant Inlet Connection; Qty. @ Size O.D. (Inches)		2 @ 1-3/8"	2 @ 1-3/8"	2 @ 1-5/8"
Condenser Refrigerant Outlet Connection; Qty. | Size O.D. (Inches)		2 @ 1-1/8"	2 @ 1-3/8"	2 @ 1-3/8"
Sound Level (dB @ 10')		66.9	68.5	68.5
Dimensions: W x L x H (Inches)		88 x 127 x 49	88 x 180 x 49	88 x 180 x 49
Net Weight | Shipping Weight (lbs)		1340 | 1520	1990 | 2230	2140 | 2380

Remote Condenser "Q" Series	Model UCR →	30	50	70
Model RC (540 RPM / 20°F TD / 120°F Max. Ambient)		RC2-025A*Q44	RC2-039A*Q64	RC2-048A*Q82
Quantity of Remote Condensers Needed		1	1	1
Heat Exchanger (Remote Air-Cooled Type)		Alum. fin/cu tube	Alum. fin/cu tube	Alum. fin/cu tube
Fins per Inch (FPI)		14	14	12
Independent Refrigerant Circuits (Quantity)		2	2	2
Fan Motor Drive Type | Fan Dia. (in.)		Direct | 30"	Direct | 30"	Direct | 30"
Total CFM		20,800	31,200	41,600
Fan Speed		540	540	540
Fan Motor Hp (ea)		1/2 hp	1/2 hp	1/2 hp
Quantity of Fan Motors		4	6	8
kW Input (ea.) Fan Motor | Total kW Input for All Motors		0.43 | 1.72	0.43 | 2.58	0.43 | 3.44
FLA per Fan Motor @ 460V-3-60 | Total FLA @ 460V-3-60		1.75 | 7.0	1.75 | 10.5	1.75 | 14.0
Total Heat Rejection @ 1°F TD | THR @ 20°F TD (MBH)		24.5 | 490	39.5 | 790	47.6 | 952
Max. Design Working Pressure – Ref. side | Test Pressure (Psig.)		600 | 650	600 | 650	600 | 650
Condenser Refrigerant Inlet Connection; Qty. @ Size O.D. (Inches)		2 @ 1-3/8"	2 @ 1-3/8"	2 @ 1-5/8"
Condenser Refrigerant Outlet Connection; Qty. | Size O.D. (Inches)		2 @ 1-1/8"	2 @ 1-3/8"	2 @ 1-3/8"
Sound Level (dB @ 10')		55.7	57.3	58.6
Dimensions: W x L x H (Inches)		88 x 127 x 49	88 x 180 x 49	88 x 233 x 49
Net Weight | Shipping Weight (lbs)		1440 | 1620	2140 | 2380	2830 | 3650

Variable Speed Remote Condenser Physical Data: 30°F TD & 110°F Maximum Ambient

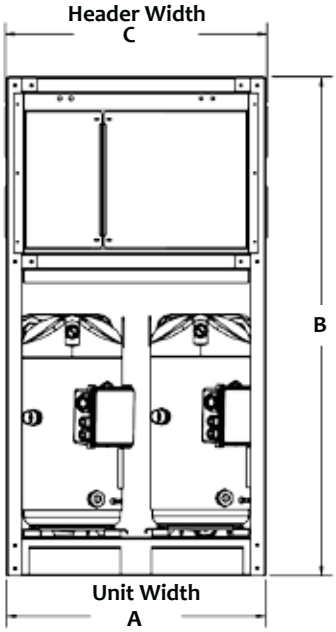
Remote Condenser "V" Series Model UCR →	30	50	70
Model RC (Variable Spd /30°F TD /110°F Max. Amb.)	RC2-020A*V48	RC2-025A*V42	RC2-033A*V42
Quantity of Remote Condensers Needed	1	1	1
Heat Exchanger (Remote Air-Cooled Type)	Alum. fin/cu tube	Alum. fin/cu tube	Alum. fin/cu tube
Fins per Inch (FPI)	8	12	12
Independent Refrigerant Circuits (Quantity)	2	2	2
Fan Motor Drive Type | Fan Dia. (in.)	Var Spd| 30.5	Var Spd| 30.5	Var Spd| 30.5
Total CFM	46,700	46,700	44,100
Fan Speed	215 to 1030	215 to 1030	215 to 1030
Fan Motor Hp (ea)	1.5 hp	1.5 hp	1.5 hp
Quantity of Fan Motors	4	4	4
kW Input (ea.) Fan Motor | Total kW Input for All Motors	2.2 | 8.8	2.2 | 8.8	2.2 | 8.8
FLA per Fan Motor @ 460V-3-60 | Total FLA @ 460V-3-60	3.5 | 14	3.5 | 14	3.5 | 21
Total Heat Rejection @ 1°F TD | THR @ 30°F TD (MBH)	20.4 | 612	24.8 | 744	33.1 | 993
Max. Design Working Pressure – Ref. side | Test Pressure (Psig.)	600 | 650	600 | 650	600 | 650
Condenser Refrigerant Inlet Connection; Qty. @ Size O.D. (Inches)	2 @ 1-3/8"	2 @ 1-3/8"	2 @ 1-5/8"
Condenser Refrigerant Outlet Connection; Qty. | Size O.D. (Inches)	2 @ 1-1/8"	2 @ 1-3/8"	2 @ 1-3/8"
Sound Lvl @ 215 RPM | Sound Lvl @ 1030 RPM (dB @ 10')	46.5 | 73.1	46.5 | 73.1	46.5 | 73.1
Dimensions: W x L x H (Inches)	88 x 127 x 49	88 x 127 x 49	88 x 127 x 49
Net Weight | Shipping Weight (lbs)	1290 | 1510	1290 | 1510	1390 | 1610

Variable Speed Remote Condenser Physical Data: 20°F TD & 120°F Maximum Ambient

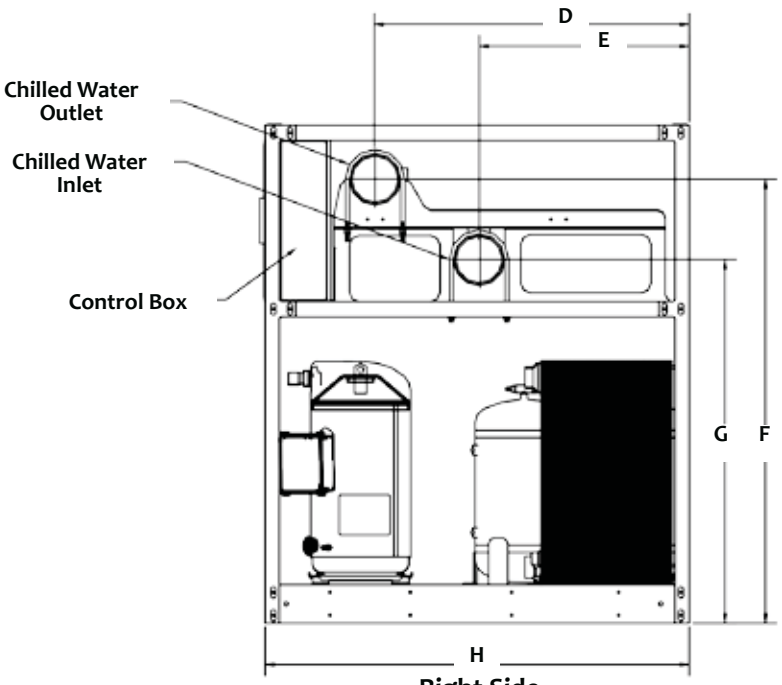
Remote Condenser "V" Series Model UCR →	30	50	70
Model RC (Variable Spd /20°F TD /120°F Max. Amb.)	RC2-025A*V42	RC2-038A*V42	RC2-046A*V60
Quantity of Remote Condensers Needed	1	1	1
Heat Exchanger (Remote Air-Cooled Type)	Alum. fin/cu tube	Alum. fin/cu tube	Alum. fin/cu tube
Fins per Inch (FPI)	12	12	10
Independent Refrigerant Circuits (Quantity)	2	2	2
Fan Motor Drive Type | Fan Dia. (in.)	Var Spd| 30.5	Var Spd| 30.5	Var Spd| 30.5
Total CFM	46,700	41,900	66,100
Fan Speed	215 to 1030	215 to 1030	215 to 1030
Fan Motor Hp (ea)	1.5 hp	1.5 hp	1.5 hp
Quantity of Fan Motors	4	4	6
kW Input (ea.) Fan Motor | Total kW Input for All Motors	2.2 | 8.8	2.2 | 8.8	2.2 | 13.2
FLA per Fan Motor @ 460V-3-60 | Total FLA @ 460V-3-60	3.5 | 14	3.5 | 14	3.5 | 21
Total Heat Rejection @ 1°F TD | THR @ 20°F TD (MBH)	26.2 | 524	38.3 | 766	46.2 | 924
Max. Design Working Pressure – Ref. side | Test Pressure (Psig.)	600 | 650	600 | 650	600 | 650
Condenser Refrigerant Inlet Connection; Qty. @ Size O.D. (Inches)	2 @ 1-3/8"	2 @ 1-3/8"	2 @ 1-5/8"
Condenser Refrigerant Outlet Connection; Qty. | Size O.D. (Inches)	2 @ 1-1/8"	2 @ 1-3/8"	2 @ 1-3/8"
Sound Lvl @ 215 RPM | Sound Lvl @ 1030 RPM (dB @ 10')	46.5 | 73.1	46.5 | 73.1	48.0 | 74.7
Dimensions: W x L x H (Inches)	88 x 127 x 49	88 x 127 x 49	88 x 180 x 49
Net Weight | Shipping Weight (lbs)	1290 | 1510	1490 | 1710	2060 | 2510

Dimensional Data and Piping Arrangement

Figure 1 - Dimensional Drawings



Front View



Right Side View

Table 1 - Dimensional Data

Unit Dimensions (in inches)												
Model UCR	Voltage	A Unit Width Inches	B Unit Height Inches	C Header Width Inches	D Header Location Inches	E Header Location Inches	F Header Location Inches	G Header Location Inches	H Unit Depth Inches	Header Connection Size Inches	Unit Weight[1] Pounds	Operating Weight[2] Pounds
030	208/230/460/575/3/60	33⅞	65⅛	34 ¼	41 ¼	27 ½	58	47 ½	55 ½	6	1170	1265
050	208/230/460/575/3/60	33⅞	65⅛	34 ¼	41 ¼	27 ½	58	47 ½	55 ½	6	1785	1945
070	208/230/460/575/3/60	33⅞	65⅛	34 ¼	41 ¼	27 ½	58	47 ½	55 ½	6	1925	2085

Note:
1. Unit shipping weight includes compressor oil and packaging.
2. Operational weight includes refrigerant charge, compressor oil and water.

Figure 2 - Refrigerant Piping Arrangement

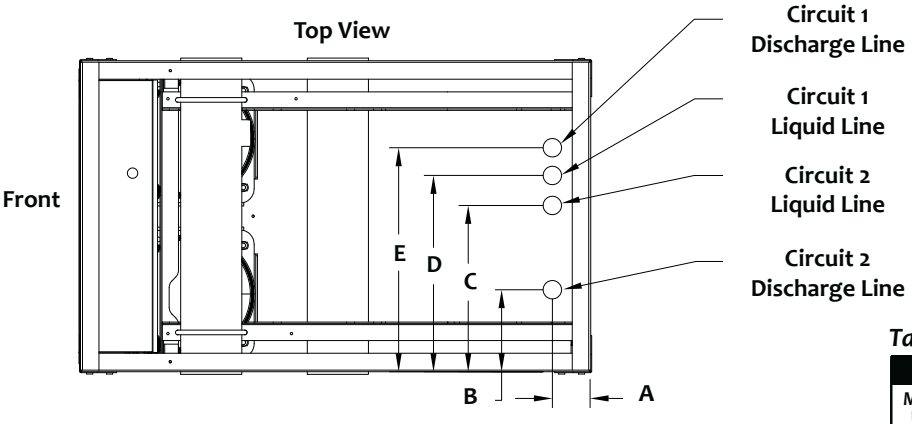


Table 2 - Refrigerant Piping Data

Unit Dimensions (in inches)					
Model UCR	A	B	C	D	E
030	4	8⅞	18	21 ¼	24 ¼
050	4	8⅞	18	21 ¼	24 ¼
070	4	8⅞	18	21 ¼	24 ¼

Rigging

Each module should be lifted by using lift straps threaded through the steel base cut outs and the use of a spreader bar.
Note: If no spreader bar is used, damage to the unit may occur.

Figure 3

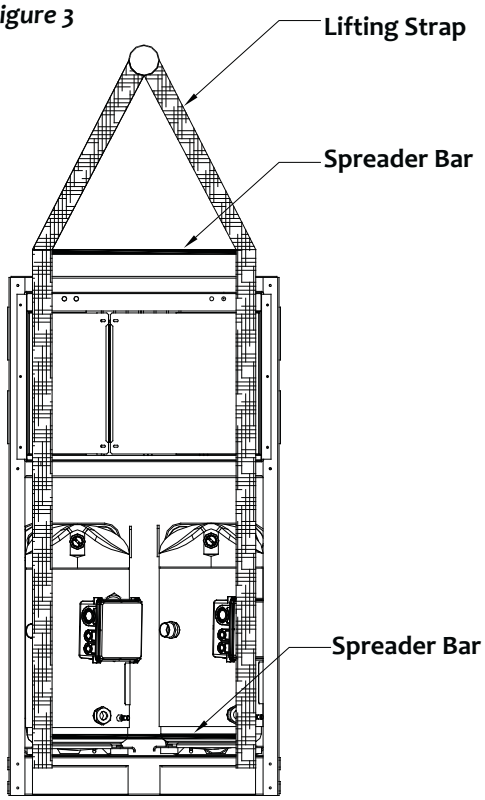
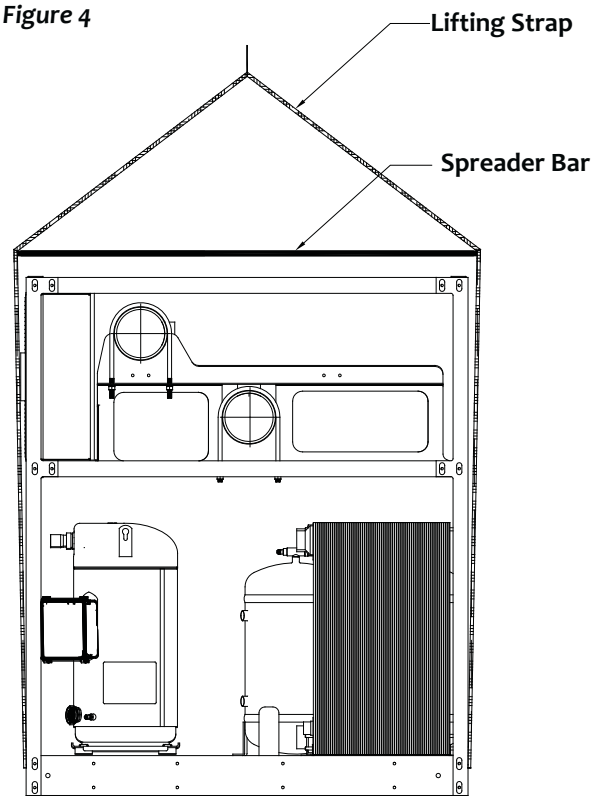


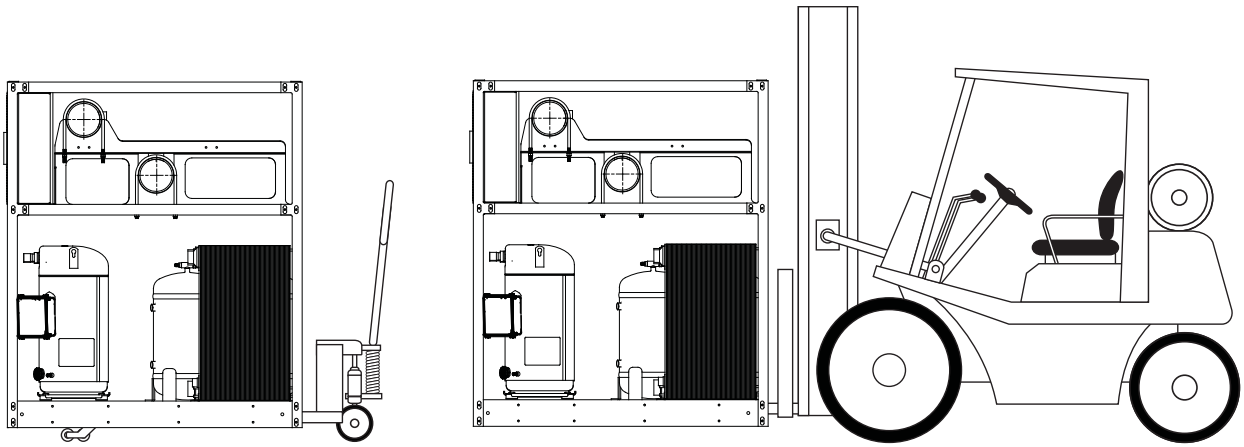
Figure 4



Lifting and Transporting Modules

Pallet jacks or fork lifts are required for lifting and transporting the module. Each module has base cutouts provided for ease of maneuverability. 60" forks are recommended to prevent damage to the chiller base.

Figure 5



Mounting Rail and Vibration Isolation

ClimaCool recommends locking down the chiller to a concrete base or to three (3) 4" base mounting rails using the six (6) bolt holes provided in each base pan. Due to the low vibration of the modules, the application of spring isolators or pads is not required. Should isolators or pads be desired, install in accordance with Figures 6 and 7.

Figure 6 - Spring Vibration Isolators Option

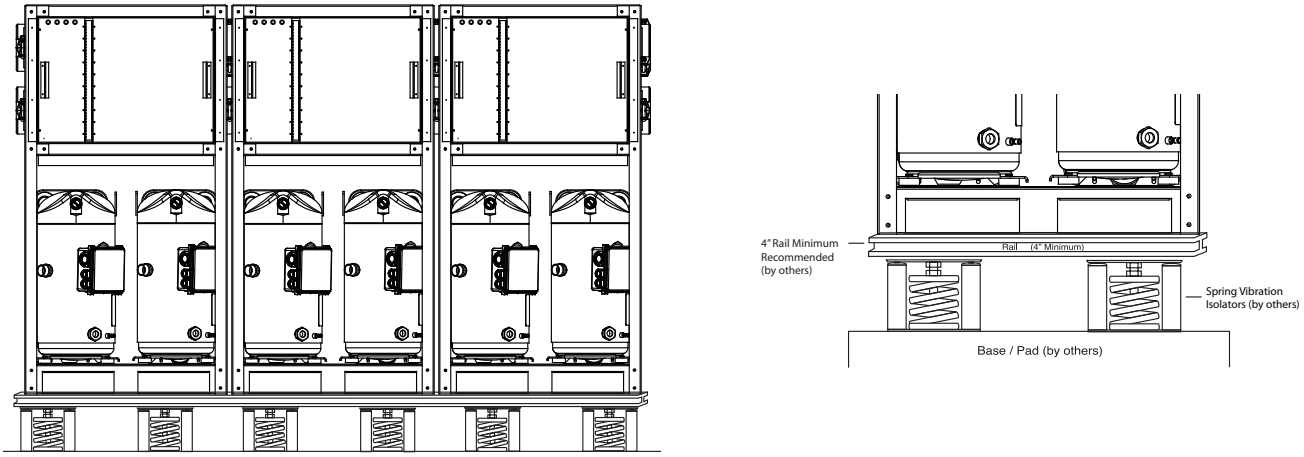
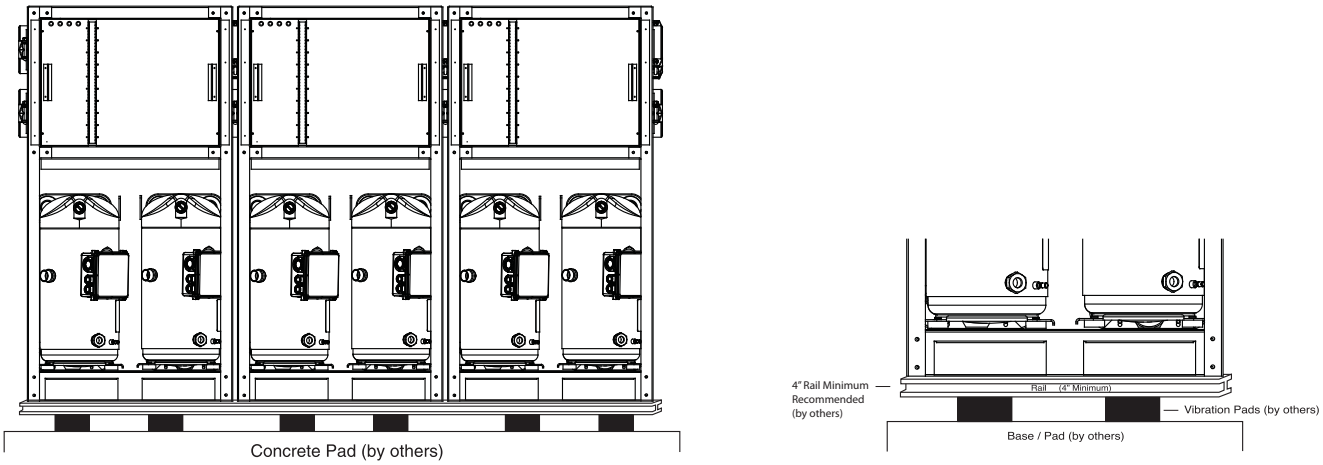
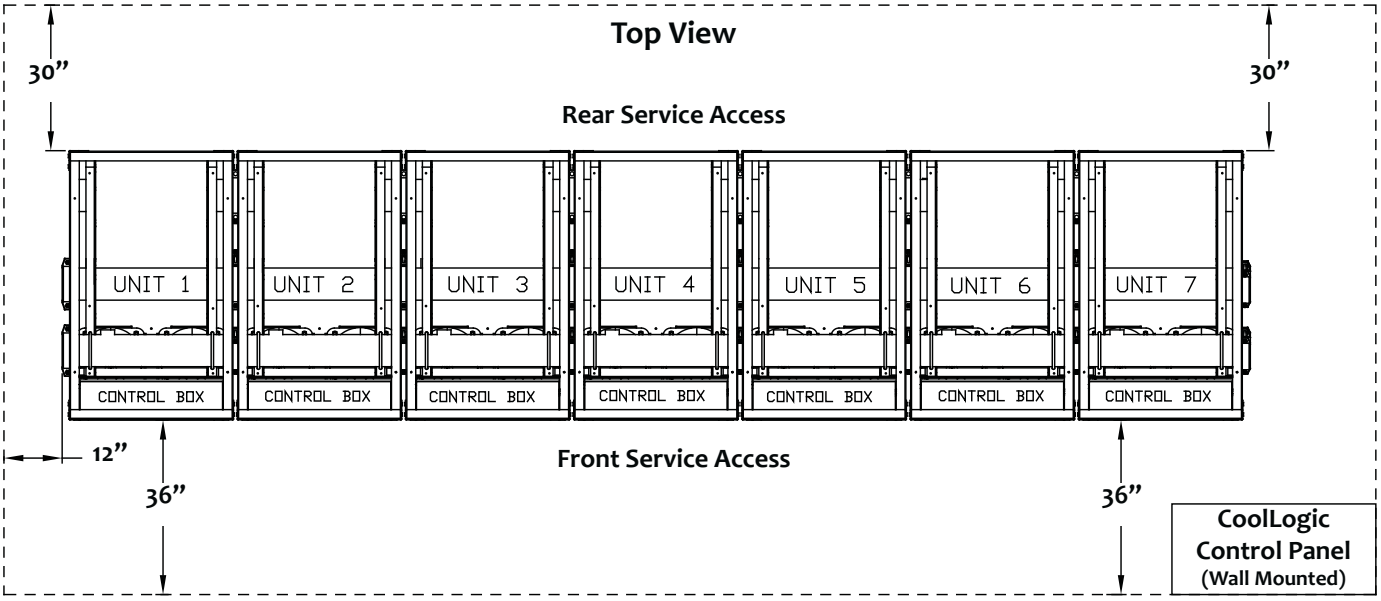


Figure 7 – Vibration Isolation Pads Option



Note: Size and weight distribution is to be determined by a qualified structural engineer per individual job requirements.

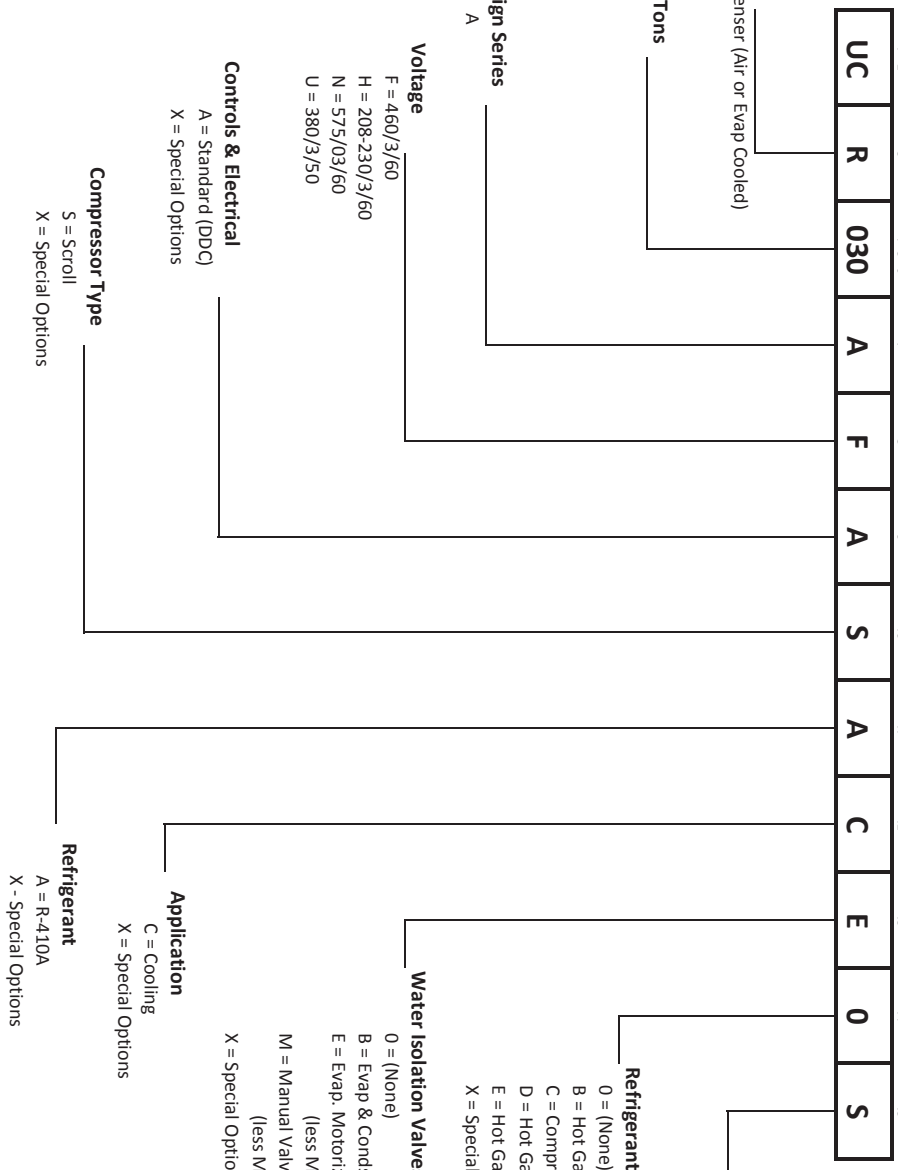
Recommended Service Clearances



Notes:

1. Allow 36” clearance for electrical panels and 30” clearance for rear access to modules.
2. Allow a minimum of 18” height clearance for service.
3. Local building or electrical codes may require additional clearance. Consult applicable codes.

Ultimate Chiller Solution Model Key



Unit Placement

ClimaCool modular chillers must be installed in a conditioned and dehuimidified space. The minimum foundation requirement for the ClimaCool chiller is a level surface capable of bearing the combined operating weight of the modules (see Physical Data - page 4).

Service Access

The recommended service clearances are 36" for front service access, 18" height clearance for service and 30" for rear service access as identified in the Recommended Service Clearances on page 11. Local building or electrical codes may require additional clearance – consult applicable codes.

Draining

When performing standard maintenance procedures such as flushing a heat exchanger, it will be necessary to close off a section of a module. ClimaCool modular chillers offer optional water isolation valves for this purpose. Access to a floor drain is helpful when performing standard maintenance procedures. **Warning: Water valves must be reopened after flushing is complete.**

Assembling Modules

ClimaCool recommends locking down the chiller to a concrete base, or to three (3) 4" base mounting rails, using the six (6) bolt holes provided in each base pan. Although the compressors are installed on anti-vibration mountings, further isolation of the chiller from the structure is recommended by installing vibration—eliminating springs or pads under the base rails on which the chiller will rest (see page 10 – Mounting Rail and Vibration Isolation). One end of the modules should be chosen as the reference module and carefully located.

Field installed mounting accessories are provided for adjoining each module.

- Header grooved coupling kits containing two (2) grooved couplings with gaskets.
- Mounting hardware kit containing necessary bolts, spacers, nuts and washers.
- Header bank end cap kit containing two (2) grooved couplings with gaskets and two (2) end caps.

Field installing the mounting hardware kit will assist with alignment of the modules in a bank and eliminate offset inconsistencies. The ½" mounting holes are provided on sides of the unit base pan. The first module should be set, then set the adjacent unit on mounting surface roughly aligned 1 ½ inches away from the first unit. While holding spacer in place, work through first modules front base cutout to place a washer and insert bolt through front mounting hole and spacer. Repeat the process for the rear mounting hole. Line up mounting hole of adjacent module with bolt from previous module. Work through adjacent modules front base cutout by placing a washer, split lock washer and nut. Using the appropriate tools, tighten hardware assembly until seated.

Figure 8 - Hardware Kit

Figure 9 - Spacer Holes

Inspect the pipe ends to ensure they are free from any indentations, projections, roll marks or other harmful surface defects such as loose paint, scale, dirt, chips, grease and rust. Inspect the grooved coupling gasket for any defects. Apply a thin layer of silicone or other non-petroleum lubricant to the sealing lips of the gasket as well as to the exterior of the gasket. Install gaskets on the pipe ends of one of the two modules to be mated. **Be sure the gasket is completely on the pipe to avoid damage in the next step.** Move the second module into position and line up the piping. Ensure the operator is maintaining alignment for any additional modules to be added. When pipe ends are aligned, slide the gasket over the ends and center it between the grooves. No part of the gasket should protrude into the groove of either pipe end. Place the coupling halves over the gasket and make sure that the coupling keys (the part that goes into the groove) are engaged into the grooves. Insert the bolts and install nuts to hand tighten. Ensure the oval neck of the bolt engages into the bolt hole of the housing. **Tighten nuts alternately and equally until the bolt pads meet and make metal to metal contact.** Tighten nuts by another quarter to half turn to make sure the nuts and bolts are snug and secure. The use of a torque wrench is usually not required. **Uneven tightening of bolts may cause the gasket to be pinched resulting in immediate or delayed leaks.**

Header Insulation

Chilled water piping is pre-insulated on each module at the factory with ¾" closed cell insulation. After bolting all modules together and leak testing, the entire coupling connection will need to be insulated by the installing contractor.

Sound Attenuation Panels and Gasket

Attenuation panels are enclosures made of 18 gauge galvanized steel with powder coat paint finish and fiberglass insulation. Field Installed panel package includes one (1) upper panel made out of two (2) sections and one (1) lower panel for each side of bank (field installed), four (4) panels for each module in the bank (factory installed) and gasket sealant tape for installation between modules. Install panels by setting in place and locking down with the half turn latches or self tapping screws. **Note: Panel package includes a compressed 1" x 1" gasket sealant tape for installation between modules. Install the tape on the outer frame on the side of one module prior to installing the adjacent modules.**

The power for all modules is taken from a suitable circuit breaker/fused disconnect power supply within the main panel. The electrical service enters the individual modules through the top into the module's control panel enclosure. Proper grounding of the module is mandatory. Before carrying out any electrical work, confirm that the main supply is isolated. A typical power wiring is located on page 28 – Power Distribution Drawing. Knockout drawings are provided. Do not drill into cabinet as shavings can damage electronic components. The power for all individual modules must be in compliance with all local and national codes.

CoolLogic Control System Wiring

A separate 115 volt power supply is required to power the *CoolLogic* master control panel. Communication between the master control panel and chiller modules requires a simple two-conductor 22 AWG shielded cable rated at 60°C minimum, daisy chain connection. **Control wiring cannot be installed in the same conduit as line voltage wiring or with wires that switch highly inductive loads such as contactor and relay coils.** Refer to the Power Distribution Drawing on page 28 of this manual for more information. All wiring must be in compliance with all local and national codes.

Electrical Phase Sequencing

Proper clockwise rotation for scroll compressor motors is important to prevent damage to the compressors. ClimaCool recommends the use of a phase sequence indicating instrument following the manufacturers directions. An alternative is to "bump test" the compressors one at a time with pressure gauges attached to the high and low gauge ports of the compressors to check for proper rotation. Energize the compressor for a few seconds to ensure the discharge pressure gauge increases significantly. If the discharge pressure does not increase, proper rotation is reversed. Compressor rotation can be reversed by opening the main electrical disconnect and switching any two of the main power supply leads feeding that compressor's contactor.

Proper Voltage Balance

Occasionally, in three phase circuits, a voltage imbalance occurs between phases. It is not recommended to operate equipment when an imbalance greater that 2% occurs. This causes motors to run at high temperatures and may affect their longevity. The following example describes how to calculate the average voltage of the three phases to see if the imbalance is greater than 2%.

Example: Line 1 = 226v Line 2 = 230v Line 3 = 228v

The average is: (226+230+228) / 3 = 228v

Next, [100(228-226)] / 228 = 0.9%

The voltage imbalance of the three phase circuit is 0.9%. This is well under the 2% range.

Voltage/Phase Monitor

Voltage/phase monitors are factory supplied for field installation with the *CoolLogic* Master Control Panel. The voltage/phase monitor helps guard the chiller bank against voltage fluctuations, phase failure or phase reversal conditions which could void the warranty. The voltage/phase monitor has three wires that connect to the main three phase power chiller bank input. Two low voltage control wires are connected to the *CoolLogic* Master Control Panel. Do not install control wiring in the same conduit as line voltage wiring or with wires that switch highly inductive loads such as contactor and relay coils. **Note: It is mandatory to install one (1) monitor per bank at main power distribution panel to monitor voltage and phasing of power to the modules. See Wiring Diagram on page 16.**

CAUTION/ATTENTION

Use only copper conductors for field installed wiring. Unit terminals are not designed to accept other types of conductors.	Utilisez uniquement des conducteurs en cuivre pour le câblage. Bornes de l'unité ne sont pas conçus pour accepter d'autres types de conducteurs.

⚠ WARNING/AVERTISSEMENT

Disconnect power supply (ies) before servicing. Refer servicing to qualified service personnel. Electric shock hazard. May result in injury or death!		Debrancher avant d'entreprendre le dépannage de l'appareil. Consulter un réparateur qualifie pour le dépannage. Risque de choc électrique. Résiltat de mai dans dommages ou la mort!

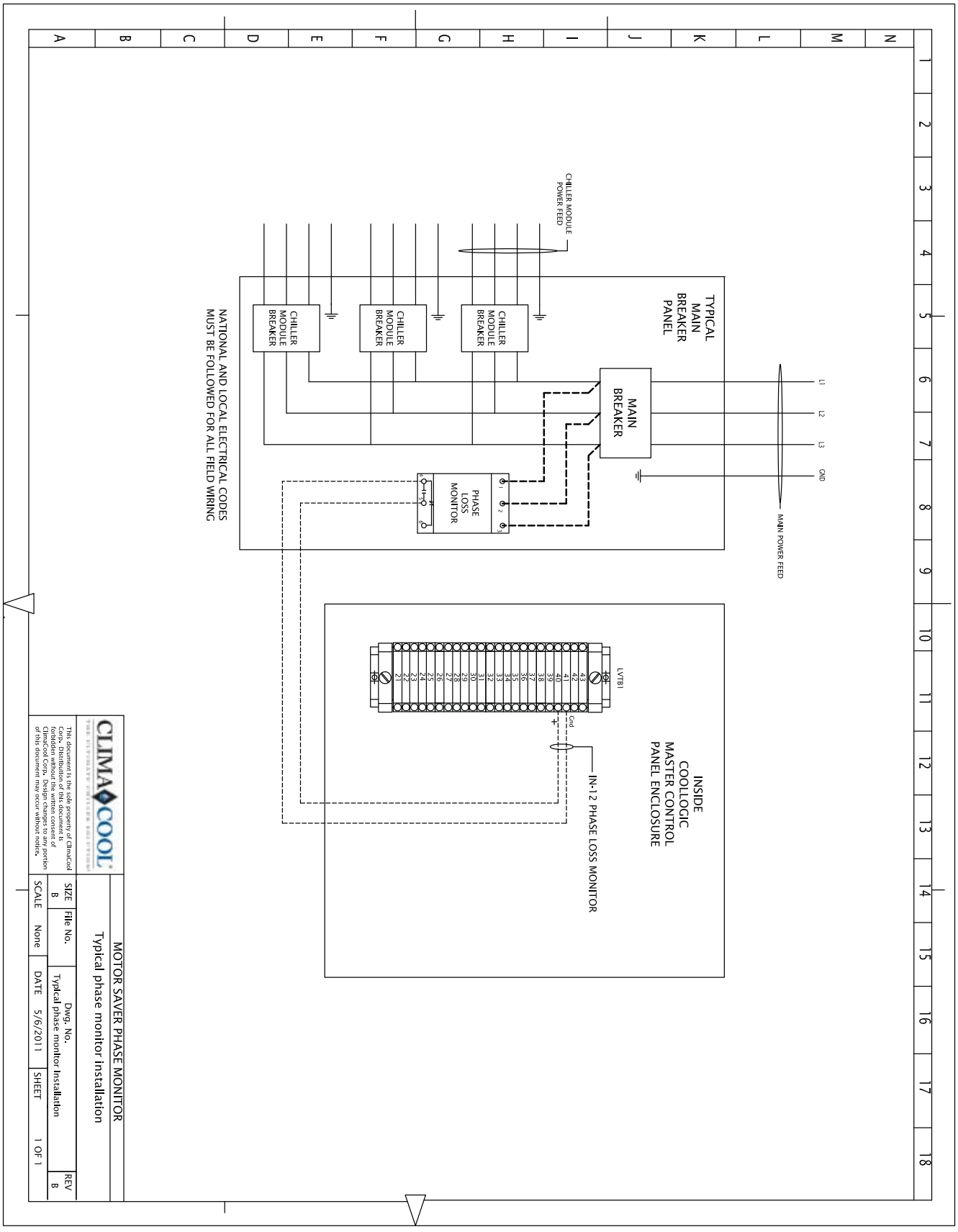
⚠ CAUTION/ATTENTION

Unit to be serviced by qualified personnel only. Refrigerant system under pressure. Relieve pressure before using torch. Recover refrigerant and store or dispose of properly.		Conifer la maintenance à un technicien qualifie. Le systéme frigorifique sous pression. Décomprimer avant d'exposer à la flamme. Récuperer le frigorigene et le stocker ou le détrulre correctement.

⚠ CAUTION/ATTENTION

3 PHASE SCROLL COMPRESSOR UNITS	UNITÉ DE COMPRESSEUR SCROLL 3-PHASE
If this unit uses a 3 Phase Scroll Compressor, the following instructions MUST BE followed: • Unit power supply MUST BE wired in the proper sequence to avoid damage to the 3 Phase Scroll Compressor; • Scroll Compressors with INCORRECT rotation show the following characteristics: - High sound level; - High suction pressure and low discharge pressure; - Low current draw. • If any of the three above characteristics exist, swap two of the three supply wires at the disconnect and recheck compressor for incorrect rotation.	Si cet appareil utilise compresseur scroll 3-Phase, les instructions suivantes doivent être suivies: • L'alimentation de l'appareil doit être monté dans l'ordre correct pour éviter endommager le compresseur scroll 3-Phase • Compresseurs scroll avec rotation incorrecte montrent les caractéristiques suivantes: - Haut niveau de son; - Pression d'aspiration élevée et une faible pression de décharge; - Faible ampérage • Si l'un des trois éléments mentionnés ci-dessus sont remplies , échanger deux des trois lignes électriques alimen tant la interrupteur de sécurité et vérifier la rotation du compresseur.

Voltage/Phase Monitor Wiring Diagram



As with any water system, it is important that the system be clean. If care is taken during installation, the possibility of dirt related problems are avoided in future operation of the chiller. The pipe work installer must remove weld scale, rust and contamination during pipe work fabrication. The system water piping must be flushed thoroughly with recommended alkaline flush or other chemicals that are compatible with 316 stainless steel, prior to making connections to the ClimaCool chiller. There are certain necessary components that should always be installed in the chilled water system. (See Figures 13 and 14 on page 19 - Water Piping Configurations). Piping configurations on multiple modules may also be found on page 19. All water piping must be installed in accordance with applicable codes and standards.

Temperature Sensor and Wells

ClimaCool provides two (2) temperature sensors and wells with each chiller system programmed by the *CoolLogic* Control System. The temperature sensor and wells must be field installed a minimum of 36" but no more than 60" away from the bank and before the strainer, on the chilled water inlet, chilled water outlet (See Water Piping Configuration on page 19). **Note: Sensors must be fully inserted into the well to obtain proper readings and must be 2 ½ pipe diameter minimum before or after an elbow.**

Pressure Differential Flow Sensor

It is imperative that minimum and maximum water flow rates, as defined in the Operational Limitations tables on page 55, are not exceeded. To prevent operation of the chiller without sufficient water flow to the evaporator it is required to install pressure differential flow sensors in the chilled water circuit, downstream of the strainer on the inlet and outlet of a straight pipe as close to the module as possible. **Do not put in an elbow on the outlet.** (See Water Piping Configurations on page 19). **Note: Evaporator and condenser sides both require sensors of equal pressure ranges.**

Pressure Taps

The installing contractor must provide access ports for connecting the pressure differential flow sensor and pressure gauges for the chilled water system. A ¼" pressure tap is required on the inlet and the outlet of the chilled water system for a total of four (4) taps. If a port is shared by the pressure differential flow sensor and the pressure gauge it will require two (2) ½" taps. (See Water Piping Configurations – page 19).

Water Isolation Valves

It is recommended to provide bank water isolation valves for proper isolation and maintenance of the chiller, pump and strainer (see Water Piping Configurations – page 19).

Strainers – Minimum 60 Mesh Screen Required

ClimaCool chillers employ brazed plate heat exchangers which are extremely sensitive to debris. **Therefore, it is mandatory that all chilled water systems include a strainer with a minimum of 60 mesh screen for proper filtration and be in place at all times while chillers are in operation.** The strainers must be installed as shown in the Water Piping Configurations on page 19.

ClimaCool's warranty does not cover and does not apply to products which have defects or damages due to freezing of the water supply, an inadequate or interrupted water supply, corrosives or abrasives in the water supply, or improper or inadequate filtration or treatment of the water supply.

Chiller System Water Header Bypass

A bypass is required for any chilled water/evaporator, hot water/condenser and source water side (geothermal, cooling tower or closed circuit cooler) with variable pumping. The bypass must be piped in such a way that the temperature and differential pressure sensors are still sensing active flow (see Water Piping - Figures 10 and 11 on page 18). The purpose of the chiller system bypass is to prevent deadheading of the pumps when all of the internal unit valves go closed as well as allow temperature and differential pressure sensors to sense active flow. The bypass should be sized for an absolute minimum of one module's worth of design flow. (Refer to selection submittals for design flow rates).

Modules can also be designated for use as an internal bypass, however, use of a module acting as a bypass can cause increased wear of heat exchangers due to abrasion from excessive bypass flow.

ClimaCool offers two types of water header bypass kits, direct return (Figure 10 on page 18) and reverse return (Figure 11 on page 18). The bypass kits must be installed on each water source loop and controls are integrated with the *CoolLogic* software. Installation location can be found on page 19 – Water Piping Configuration.

Figure 10 - Direct Return

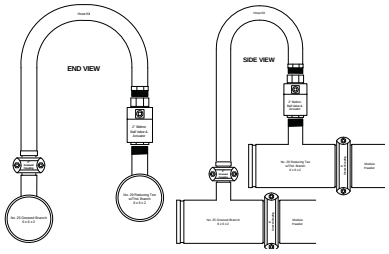
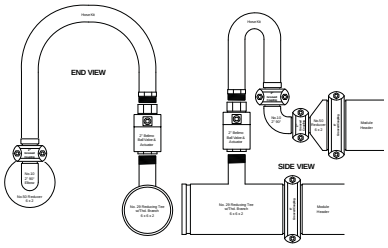


Figure 11 - Reverse Return



This bypass can also be created with field supplied piping. The design piping must accommodate one module's worth of design flow, and be positioned so that the temperature and differential flow sensors sense active flow in the bypass mode (see Figures 13 and 14 on page 19 - Water Piping Configuration). **The field supplied piped chiller system bypass must be controlled by others.** There are system communication delays, polling and network conflicts that strictly prohibit the use of ClimaCool sensors and controls for control of field supplied bypasses or other field supplied items. The recommended method is to control via differential pressure or gpm flow meters across the chilled water system.

Load Side System Bypass (Air Handlers, Fan Coils, etc.)

A load system bypass is required for preventing pump deadheading, allowing active flow system sensing and preventing starving flow from the chiller system. Examples of an acceptable load side system bypass are:

- Utilize a quantity of 3-way control valves on the largest loads farthest from the chiller/heater system.
- Field piping with a control valve to provide a bypass across the larger system loads when their 2-way valves go closed.

Please refer to Figure 11 for a typical load bypass valve arrangement.

The load side system bypass should be sized for an absolute minimum of one module's worth of design flow. (Please refer to selection submittals for design flow rates). A minimum of (6) six gallons per nominal system ton are also required to maintain proper system thermal inertia. This is to avoid short cycling of compressors in the chiller system as well as prevent nuisance alarms.

Figure 12 - Typical Load Bypass Valve Arrangement

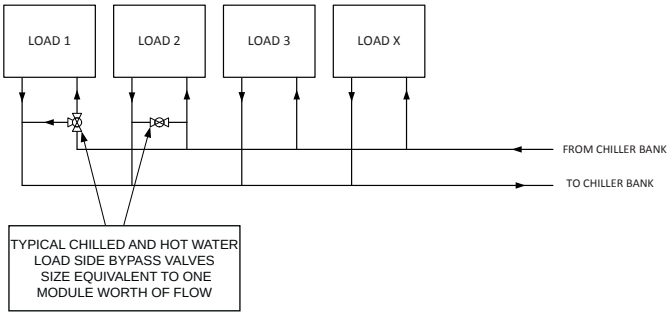


Figure 13 - Field Piping Direct Return

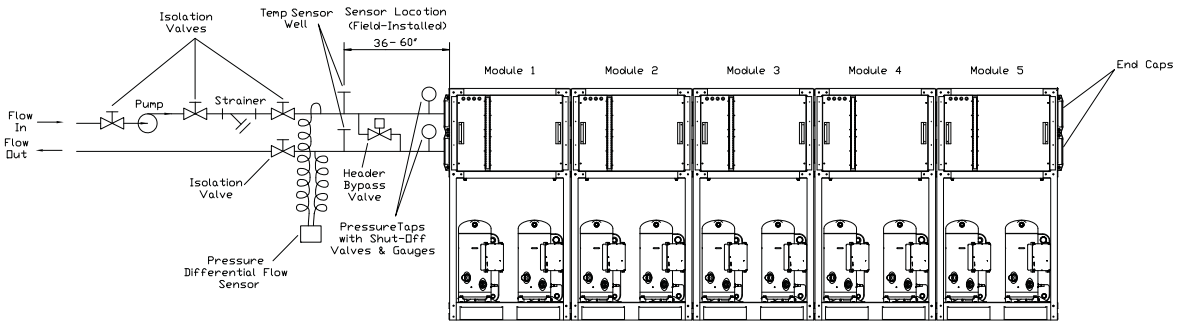
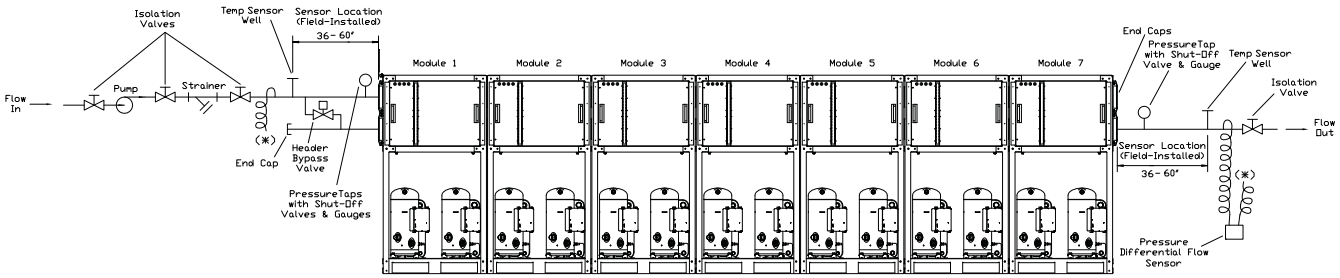


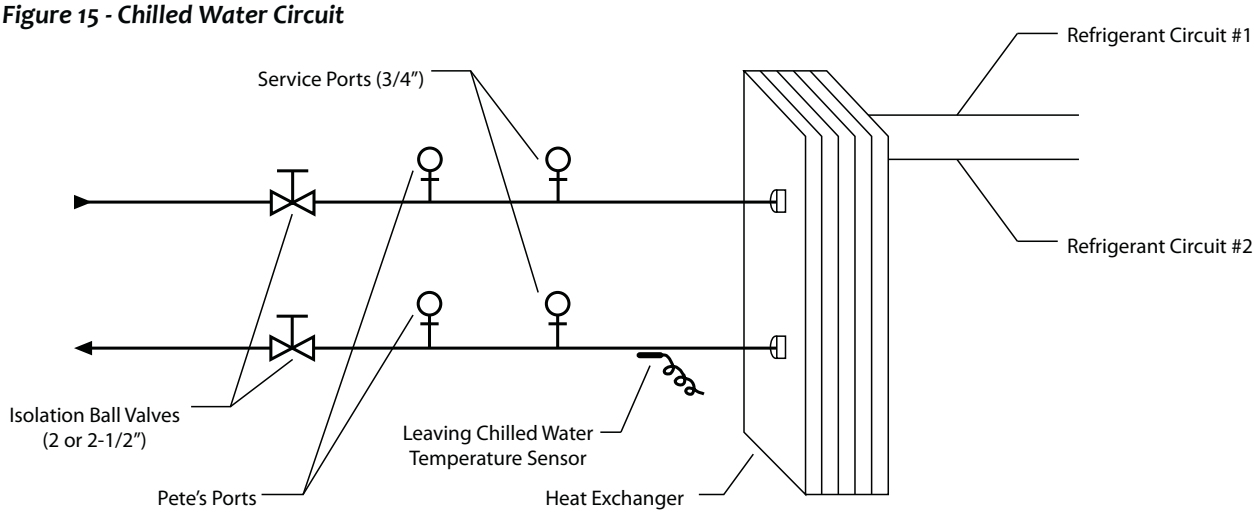
Figure 14 - Field Piping Reverse Return



Notes:

1. Figures 13 and 14 are required piping for proper water regulation and distribution through ClimaCool modular chillers.
2. Module order and incoming/outgoing water flow as shown in both Figure 13 and 14 can be set up as either a left-to-right or right-to-left configuration.
3. Piping configurations are similar for the chilled water hydronic circuit.
4. For chilled water inlet/outlet location dimensions, refer to page 8 - Dimensional Data and Drawings.
5. A pressure differential flow sensor is a required safety device for ClimaCool modular chillers on the chilled water circuits.
6. A strainer with a minimum of 60 mesh stainless steel screen is a required safety to protect the brazed plate heat exchangers on chilled water side of the system.
7. Maximum water flow rates for chilled water header system for 30, 50 and 70 ton modules in one bank is 1,000 gpm.
8. Bypass is **mandatory** for systems utilizing motorized valves.
9. Header bypass valve may be installed at either end of bank.
10. For over seven (7) modules, consult the factory.

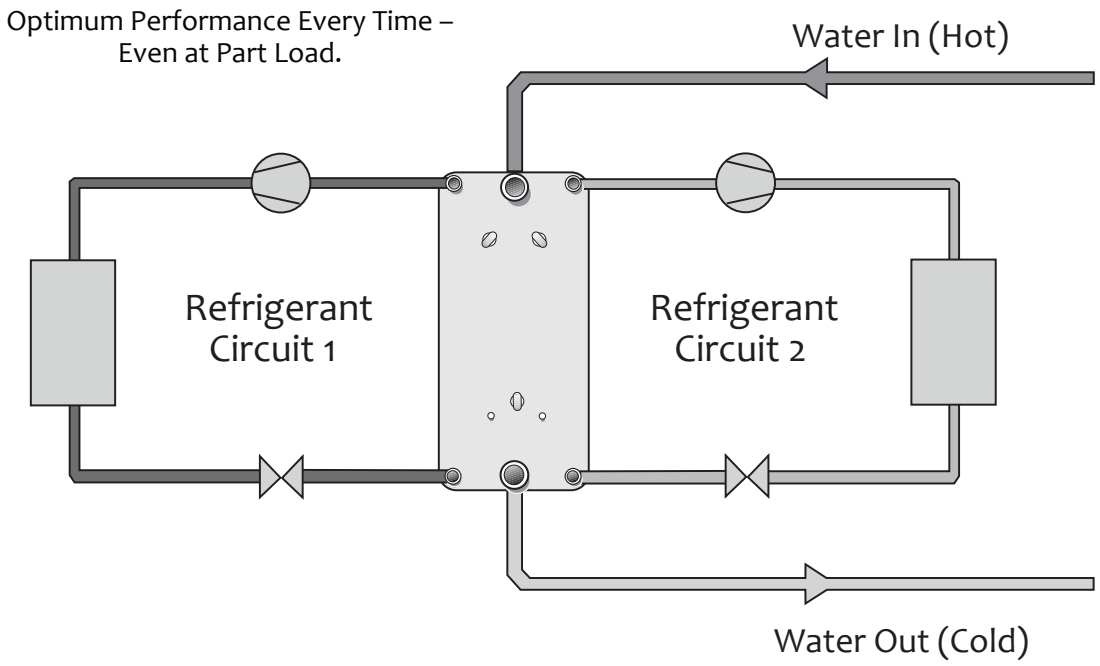
Figure 15 - Chilled Water Circuit



Note: Figure 15 depicts hydronic piping in each ClimaCool chiller module and is shown with water isolation valves.

Part-Load Performance Advantage

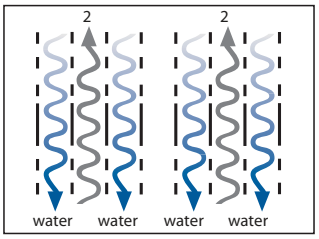
Figure 16



ClimaCool modular chillers employ reliable and highly efficient brazed plate heat exchangers. These compact exchangers are true dual-circuit heat exchangers in which each water channel is flanked by two refrigerant circuits. This design gives maximum performance, even at part-load.

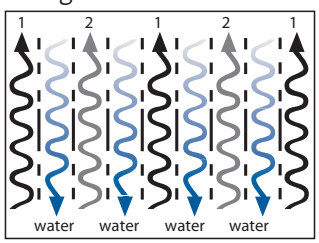
Refrigerant Circuit 2 Only

If circuit 1 is cut, the unique design allows each water channel to remain in contact with refrigerant circuit 2, providing optimum heat transfer.



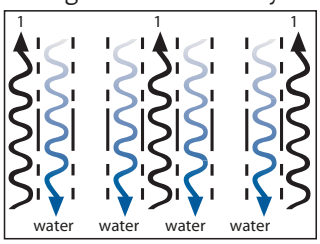
Refrigerant Circuits 1 and 2

Of course, full performance is attained when the dual-circuit heat exchangers are run to full-load (i.e. with both refrigerant circuits).



Refrigerant Circuit 1 Only

The same results are achieved if circuit 1 is ran and circuit 2 cut out; optimum heat transfer, even at part-load.



It is imperative that the water systems are free from debris prior to initial operation (see Water Treatment for a comprehensive list of precautions on page 23).

Filling, Purging and Leak Testing the System

After the water systems have been properly installed, visually inspect all joints for tightness. If the chiller is to be installed in an existing system, the cleanliness of the existing system can be judged from the operating conditions of the present machines. The cooling tower in particular, should be inspected and cleaned, if required. It is good practice to flush and, ideally, to acid wash the existing system **before** connecting a new chiller.

The following method is recommended to fill and leak check the water system for modules **WITH** water isolation valves:

1. Close all water isolation valves inside each module which isolate the individual heat exchangers.
2. Ensure that all drain valves are closed and that all water main isolation valves are opened.
3. The system should be filled with clean water sent through the strainers and the system checked for leaks.
4. Once the main water lines and the chiller headers are filled with clean water, purge and repeat the filling process at least three times.
5. All modules are equipped with ¾" fill and flush valves with lines teed into the inlet and outlet connections into and out of each heat exchanger. Ensure these ¾" valves are **CLOSED**.
6. Open the water isolation valves inside each modular chiller and repeat the filling process, this time also checking for leaks inside each module.
7. Following the final filling and leak checking procedure, air should be purged from the system.

The following method is recommended to fill and leak check the water system for modules **WITHOUT** water isolation valves:

1. Ensure that all drain valves are closed.
2. All modules are equipped with ¾" fill and flush valves with lines teed into the inlet and outlet connections into and out of each heat exchanger. Ensure these ¾" valves are **CLOSED**.
3. The system should be filled with clean water sent through the strainers and the system checked for leaks.
4. Once the main water lines and the chiller headers are filled with clean water, purge and repeat the filling process at least three times.
5. Following the final filling and leak checking procedure, air should be purged from the system.

Cleaning the System

The following method is recommended to properly clean the water systems:

1. Before cleaning the system, install a temporary bypass line between the main supply and return water headers of both chilled and condenser water systems when possible. Open the main header bypass lines to divert the initial water flow around the module heat exchangers until operator is confident the circulating water is mostly pure.
2. Provided main header bypass lines are installed, close all water isolation valves inside all modular chillers equipped with manual or automatic water isolation valves. If the modules are **NOT** equipped with water isolation valves, ClimaCool recommends installing 3-way main header bypass valves so the initial water flow bypasses all module heat exchangers.
3. It is mandatory to run the pumps with the strainers in place (see Starting the Pumps section below for proper pump startup). All external hydronic branches should be open to all devices in the system.
4. Pressure drop across the strainer must be observed and as pressure change reaches 50% of the initial read, strainers must be isolated and cleaned.
5. Open all water isolation valves inside each module equipped with manual or automatic water isolation valves (see step 6 for modules **NOT** equipped with water valves). If bypass lines are not installed (described in step 1), it is recommended to drain out the initial fill of water to help flush out debris. Close off the main header bypass lines referred to in step 1 and open the flow to the main water headers. Repeat steps 3 and 4 until there is no more debris being collected by the strainers.
6. If bypass lines are not installed (described in step 1) and the modules are **NOT** equipped with water isolation valves, it is recommended to drain out the initial fill of water to help flush out debris. Remove and clean the strainers before refilling and purging the system again. Repeat steps 3 and 4 until there is no more debris being collected by the strainers.

Starting the Pumps

Follow the manufacturer's recommendations when starting the pumps for the first time. The system should be checked for leaks and air purged with the pumps in operation. The pressure drop across the heat exchangers will give a good indication of flow through the system (see Evaporator Water Pressure Drop Charts on page 25). This should be immediately checked against the expected pressure drop for the flow rate required. **If the pressure drop begins to fall and the flow rate is falling, this could indicate the need to clean the strainers.**

Water quality is of the utmost importance for the proper care and maintenance of the modular chiller system. Proper water treatment is a specialized industry and ClimaCool recommends consulting an expert in this field to analyze the water for compliance with the water quality parameters listed in Table 3. The material used in the ClimaCool chiller exposed to the water are type 316 stainless steel, pure copper, and carbon steel. Other materials may exist external to the ClimaCool chiller. It is the user's responsibility to ensure these materials are compatible with the treated water. Regular treatment of the water will increase longevity of your system. **Failure to provide adequate filtration or treatment of evaporator water will void the ClimaCool module's warranty.**

Heavy-Contaminated Water

In such instances whereby the particulates in the water are excessive, it is recommended to install an intermediate plate and frame heat exchanger to isolate the ClimaCool chiller from the building water system.

Cooling Tower

The cooling tower should be located away from sources of external contaminates such as trees, dust or grass cuttings. Insect infiltration can be reduced by eliminating lights near the tower. A periodic visual inspection of the tower system should be made and contaminates removed as required.

Table 3 - Water Quality Parameters

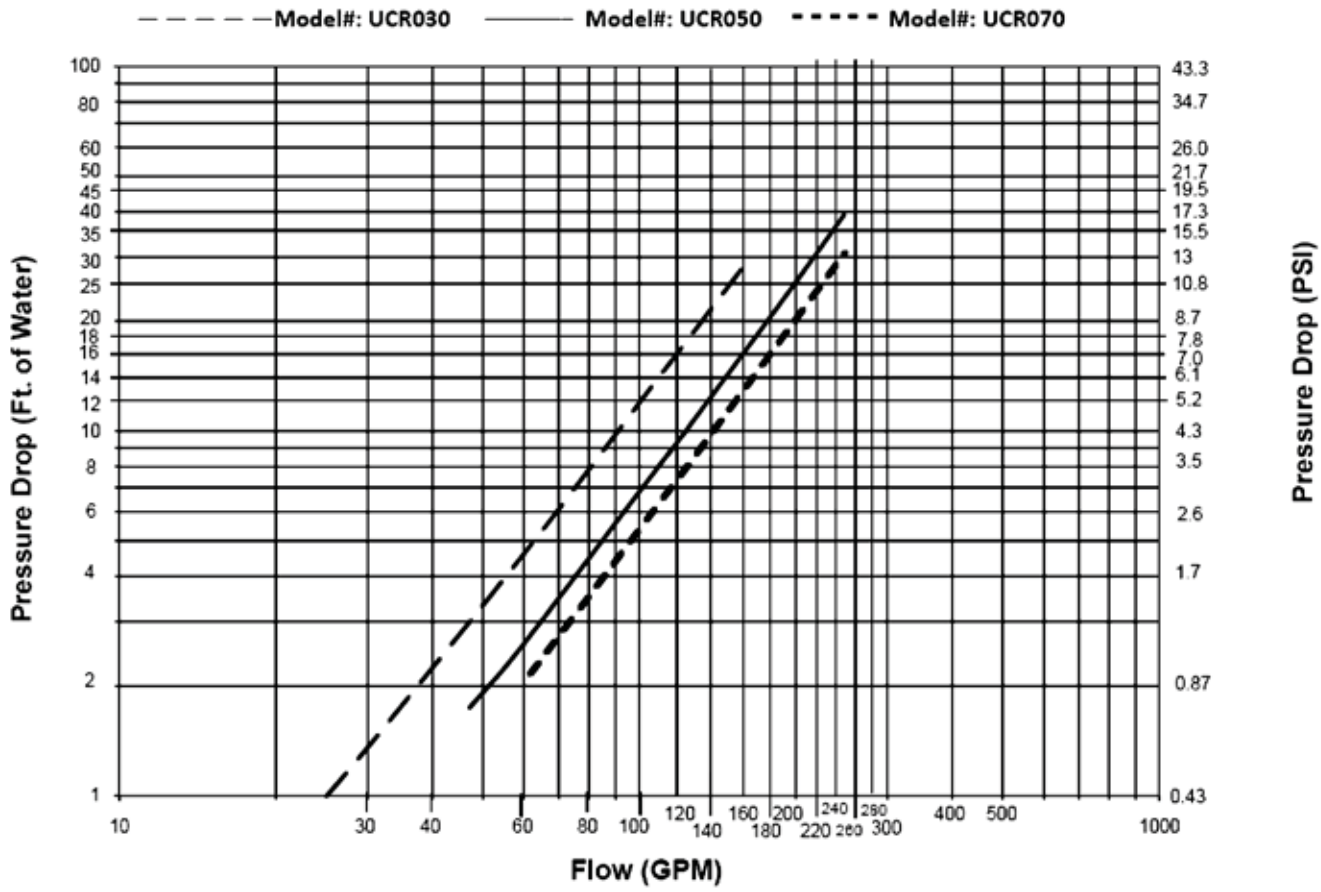
WATER CONTAINING	CONCENTRATION
Ammonia	Less than 2.0 mg/l
$CaCO_3$ Alkalinity	30 - 500 mg/l
$CaCO_3$ Hardness	30 - 500 mg/l
Chlorides	Less than 200 mg/l
Dissolved Solids	Less than 1000 mg/l
Iron	Less than 5.0 mg/l
Manganese	Less than 0.4 mg/l
Nitrate	Less than 100 mg/l
pH	7.0 - 9.0
Sulphate	Less Than 200 mg/l

⚠ CAUTION/ATTENTION	
Excessive Chlorine, undissolved solids and other improper water conditions WILL DAMAGE the internal heat exchanger & WILL VOID YOUR WARRANTY!	**Chlore excessive, solides non dissous et les autres impropre conditions de l'eau, ENDOMMAGERA l'échangeur de chaleur interne et ANNULERA VOTRE GARANTIE!**

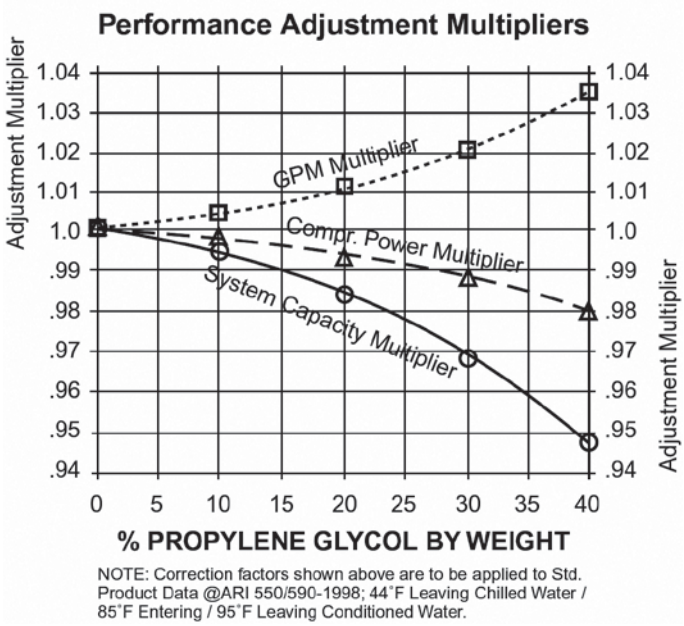
Chilled Water Temperature

Modules are designed for a leaving water temperature range from 40°F to 62°F. All cataloged modules can operate safely in this range without the need of special controls or glycol additives. Leaving water temperatures below 40°F can result in evaporator suction temperatures below the freezing point of water. Therefore, a glycol solution additive is required that will protect the evaporator from freeze ups at lower operating suction temperatures. The full range of leaving chiller fluid using glycol is 20°F to 62°F.

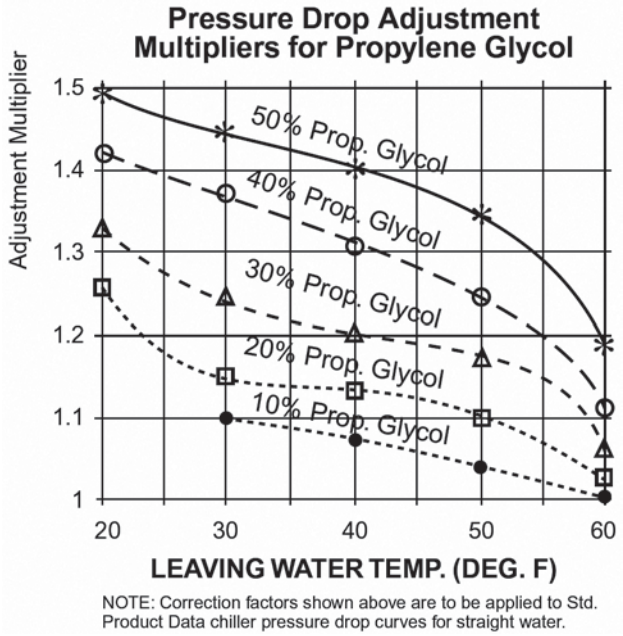
30, 50 & 70-Ton, "Ultimate Chiller" Series



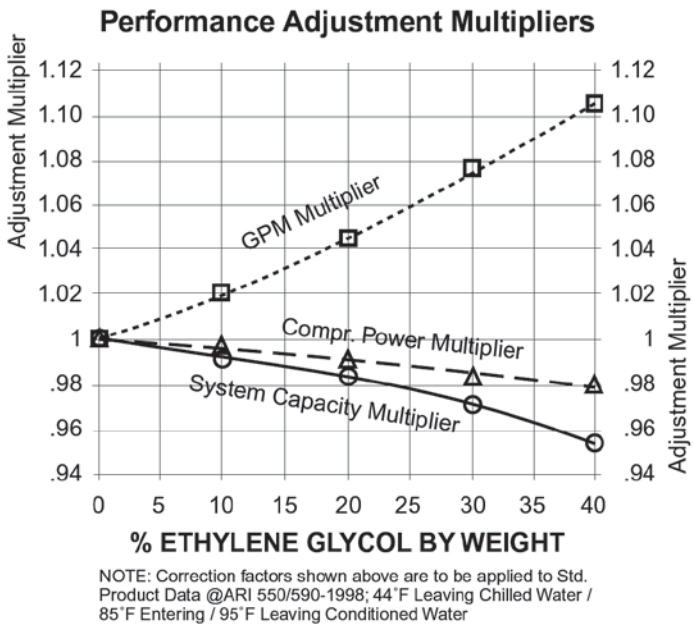
Glycol Performance Adjustments Factor Charts



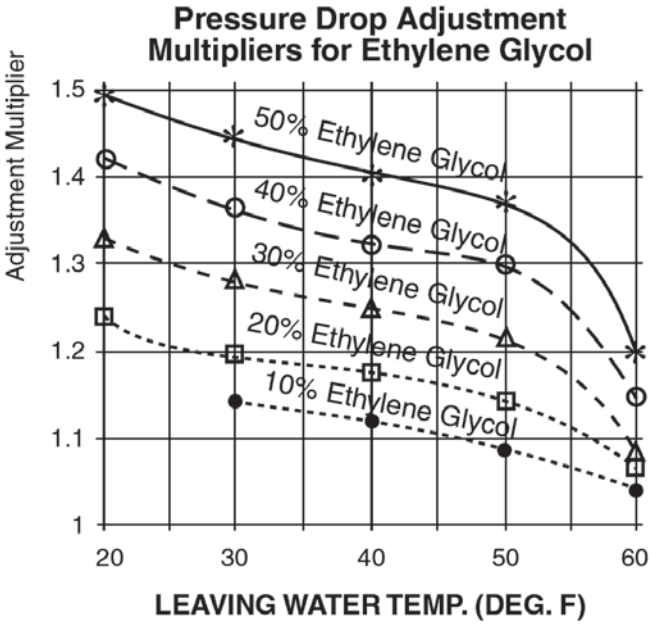
NOTE: Correction factors shown above are to be applied to Std. Product Data @ARI 550/590-1998; 44˚F Leaving Chilled Water / 85˚F Entering / 95˚F Leaving Conditioned Water.



NOTE: Correction factors shown above are to be applied to Std. Product Data chiller pressure drop curves for straight water.



NOTE: Correction factors shown above are to be applied to Std. Product Data @ARI 550/590-1998; 44˚F Leaving Chilled Water / 85˚F Entering / 95˚F Leaving Conditioned Water



NOTE: Correction factors shown above are to be applied to Std. Product Data chiller pressure drop curves for straight water.

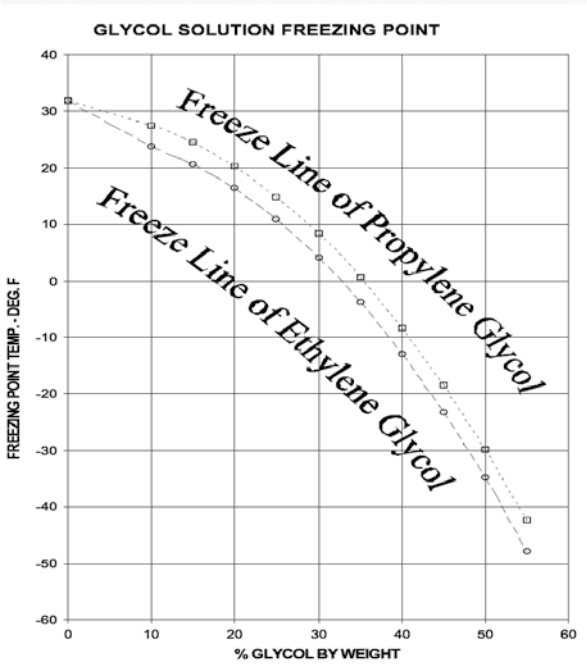


Table 4 - Performance Adjustment Factors vs. Altitude vs. Chiller Temperature Drop

Chiller	Sea Level			2000 ft.			4000 ft.			6000 ft.		
Water Temp. °F	Capacity Multiplier	Flow gpm Multiplier	kW Power Multiplier	Capacity Multiplier	Flow gpm Multiplier	kW Power Multiplier	Capacity Multiplier	Flow gpm Multiplier	kW Power Multiplier	Capacity Multiplier	Flow gpm Multiplier	kW Power Multiplier
8	0.995	1.246	0.998	0.990	1.244	1.003	0.986	1.238	1.006	0.980	1.232	1.012
10	1.000	1.000	1.000	0.993	0.997	1.004	0.989	0.990	1.007	0.983	0.996	1.014
12	1.005	0.834	1.001	0.996	0.831	1.004	0.992	0.826	1.008	0.986	0.821	1.016
14	1.010	0.716	1.001	0.998	0.714	1.005	0.994	0.709	1.009	0.989	0.704	1.018

Power Distribution Drawing

Figure 17

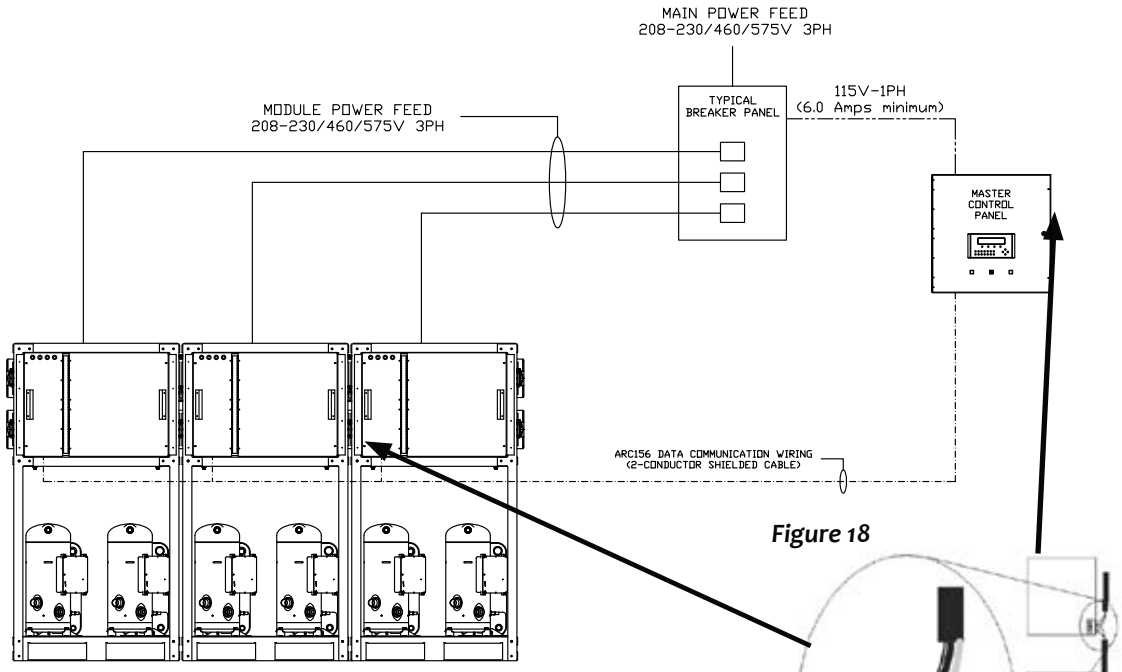
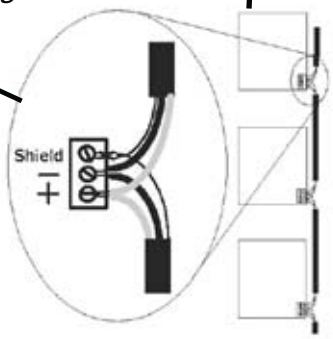


Figure 18



Notes:

1. Breaker panel represents field power supply and is to be installed by others. Not provided as part of the ClimaCool modular chiller system.
2. Breaker panels can be supplied for skid mount pump/tank packages or new construction projects as options. Consult the local ClimaCool Representative.
3. Control wiring by others.
4. Field connections are simplified requiring only a two-conductor shielded cable daisy chain from the master controller to the modules (see Figure 18).

Specifications for ARC156 Wiring

- Description - Single twisted pair, low capacitance, CL2P, TC foam FEP, plenum rated cable
- Conductor - 18 AWG (7x30) stranded copper (tin plated) 0.0.0 in. (0.762mm) O.D.
- Insulation – Foamed FEP, 0.015 in. (0.381mm) wall, 0.060 in. (1.524mm) O.D.
- Twist Lay – 2 in. (50.8mm) lay on pair, 6 twists/foot (20 twists/meter) nominal
- Shielding – Aluminum/Mylar shield with 24 AWG (7x32) TC drain
- DC Resistance – 15.2 Ohms/1000 feet (50 Ohms/km) nominal
- Capacitance – 12.5 pF/ft (41 pF/meter) nominal conductor to conductor
- Characteristic Impedance – 100 Ohms

Cable Shields

Do not ground the shield to earth ground or to the control module's power ground. The PROT485 and the individual control modules allow the shield to float a limited amount so that there are no ground loops. If the voltage on the shield becomes too great relative to the earth ground, then the excess voltage is bled off with protective devices on the PROT485 or on the control modules.

Noise Avoidance

Avoid running communication wires or sensor input wires next to AC power wires or the control module's relay output wires. These can be a source of noise that can affect signal quality.

Common sources of noise are:

Spark ignitors	Induction heaters
Radio transmitters	Large contactors (ex.motor starters)
Variable speed drives	Video display devices
Electric motors (> 1hp)	Lamp dimmers
Generators	Fluorescent lights
Relays	Parallel runs with power lines
Transformers	Other electronic modules

If noise is a problem and you cannot move the wiring, use ferrite clamp-on chokes on the cabling to improve signal quality.

Space and Location Requirements

The most important consideration which must be taken into account when deciding upon the location of air cooled equipment is the provision for a supply of ambient air to the condenser, and removal of heated air from the condenser area. Where this essential requirement is not adhered to, it will result in higher head pressures, which cause poor operation and possible eventual failure of equipment. Units must not be located in the vicinity of steam, hot air or fume exhausts.

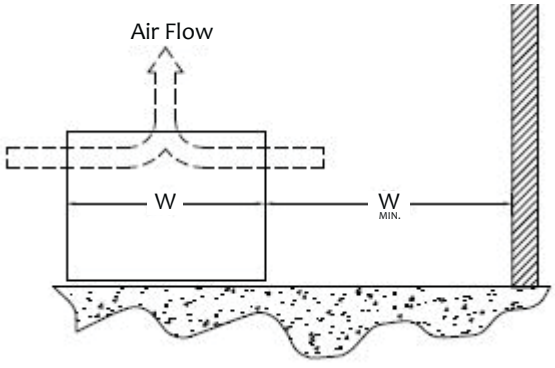
Another key consideration is that the unit should be mounted away from noise sensitive spaced and must have adequate support to avoid vibration and noise transmission into the building. Units should be mounted over corridors, utility areas, restrooms and other auxiliary areas where high levels of sound are not an important factor. Sound and structural consultants should be retained for recommendations.

Consideration should also be made to make sure there is sufficient space for removal/replacement of micro-channel coils (when supplied). A minimum of one unit width should be allowed on the header end of the unit to provide sufficient clearance.

Walls or Obstructions

The unit should be located so that air may circulate freely and not be recirculated. For proper air flow and access, all sides of the unit should be a minimum of "W"* away from any wall or obstruction. It is preferred that this distance be increased whenever possible. Care should be taken to see that ample room is left for maintenance work through access doors and panels. Overhead obstructions are not permitted. When the unit is in an area where it is enclosed by three walls, the unit must be installed as indicated.

Figure 19 - Clearance from Walls or Obstructions

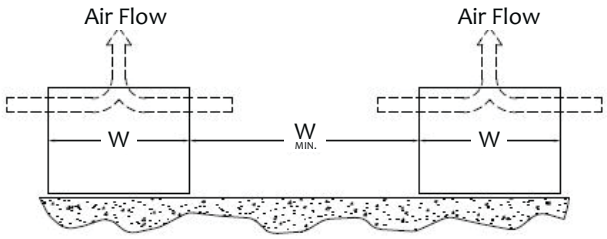


*W = Total width of the condenser

Multiple Units

For units side by side, the minimum distance between units is the width of the largest unit. If units are placed end to end, the minimum distance between units is 4 feet.

Figure 20 - Clearance for Multiple Units Placed Side by Side

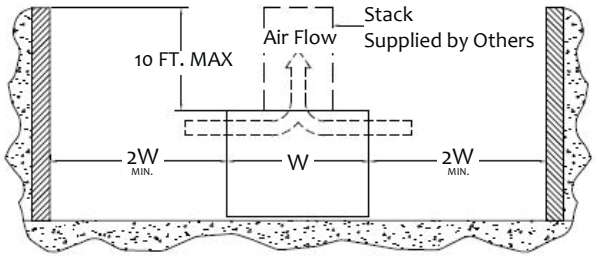


Units in Pits

The top of the unit should be level with the top of the pit, and side distance increased to "2W."

If the top of the unit is not level with the top of the pit, discharge cones or stacks must be used to raise discharge air to the top of the pit. This is a minimum requirement.

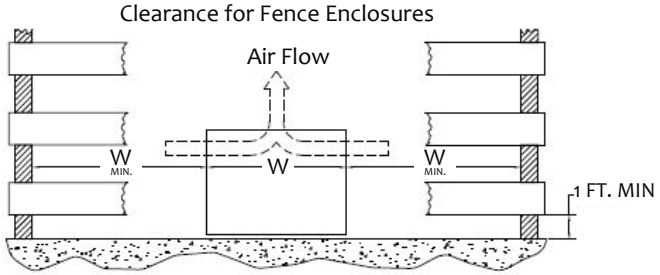
Figure 21 - Clearance for Units in Pits



Decorative Fences

Fences must have 50% free area, with 1 foot undercut, a "W" minimum clearance, and must not exceed the top of the unit. If these requirements are not met, unit must be installed as indicated for "Units in pits."

Figure 22 - Clearance for Fence Enclosures



Control Panels

Factory assembled fan cycling control panels are available to cycle fans for head pressure control either on ambient temperature or condensing pressure. Contact ClimaCool for custom applications for fan speed control or customer built control panels.

- All fans are cycled with contactors.
- Condensers with a single row cycle fans separately with one contactor per fan (e.g. Model #RC1-008A).
- Condensers with two rows of fans will have each row of fans dedicated to one specific refrigeration circuit. Since the fans closest to the header (or lead) end of the unit run continuously, the second fan in each row will cycle independently to control head pressure corresponding to the circuit it serves.
- Standard control circuit voltage is 24 volts. Optional control circuit voltages of 230 or 115 volts are available upon request.
- Standard control circuits require an external power supply for powering control circuit (by others).
- Optional factory mounted control circuit transformer is available on 460 volt condenser fan motor voltage to provide power to the control circuit.

Low Ambient Control

Standard at or above 45°F

- Mechanical head pressure fan cycling on all fans.

Optional +20°F

- Variable speed control furnished for lead fans.
- Mechanical head pressure fan cycling control provided for on all others.

Optional -20°F

- Factory furnished, field installed LAC-10 flooded head pressure control valves required for each circuit.
- Condenser fans are provided with ambient temperature fan cycling control.

Table 5 - Minimum Ambient for Fan Cycling

Number of Fans		Design Temperature Differential °F				
Single Row	Double Row	30°	25°	20°	15°	10°
2	4	35°	45°	55°	60°	70°
3	6	15°	30°	40°	55°	65°
4	8	0°	15°	30°	45°	60°
5	10	0°	10°	20°	35°	55°
6	12	0°	0°	10°	30°	50°

Table 6 - Ambient Fan Cycling Thermostat Settings

Number of Fans		Design Temperature Differential °F	Thermostat Setting		
Single Row	Double Row		1	2	3
2	4	30°	60°		
		25°	65°		
		20°	70°		
		15°	75°		
		10°	80°		
3	6	30°	60°	40°	
		25°	65°	55°	
		20°	70°	60°	
		15°	75°	65°	
		10°	80°	65°	
4	8	30°	60°	50°	30°
		25°	65°	55°	40°
		20°	70°	65°	50°
		15°	75°	70°	60°
		10°	80°	75°	70°

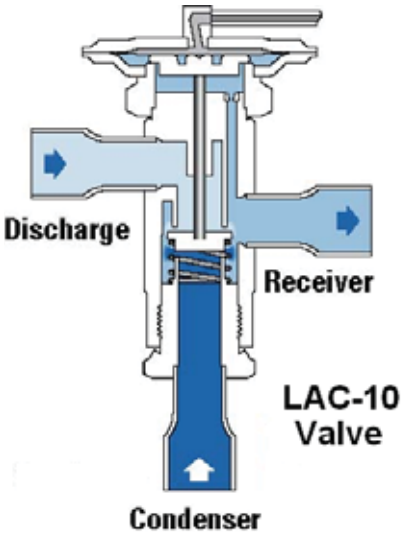
High and Low Ambient Stability

The design of air conditioning systems, utilizing air cooled condensing units, involves two main problems that must be solved if the system is to operate reliably and economically; **high ambient** and **low ambient** operation. If the condensing unit is properly sized, it will operate satisfactorily during extremely high ambient temperatures, however, some units will be required to operate at ambient temperatures below their design dry bulb temperature during most of the year. The solution to low ambient operation is more complex.

Without good head pressure control during low ambient operation, the system can experience both running cycle and off-cycle problems. Since the pressure differential across the thermostatic expansion valve port affects the rate of refrigerant flow, low head pressure generally causes insufficient refrigerant to be fed to the evaporator. Failure to have sufficient head pressure will result in low suction pressure and/or iced evaporator coils. The primary off-cycle problem is refrigerant migration to the condenser. Insufficient flow through the TXV will cause a low suction pressure.

The typical method of maintaining normal head pressure in a refrigeration system during periods of low ambient temperature is to restrict liquid flow from the condenser to the receiver, and at the same time divert hot gas to the inlet of the receiver. This backs liquid refrigerant up into the condenser reducing its capacity which in turn increases the condensing pressure. At the same time the hot gas raises liquid pressure in the receiver, allowing the system to operate normally.

Figure 23



LAC-10 Valve Operation

The valve designation LAC stands for **Low Ambient Control**. The LAC-10 is a three-way modulating valve that responds to receiver pressure. As shown in Figure 23, the receiver pressure acts under the diaphragm. As the receiver pressure drops below the valve setting, the seat moves away from the discharge port allowing discharge gas to bypass the condenser. This discharge gas warms the liquid in the receiver and raises the pressure to the valve setting. At the same time discharge gas is bypassing the condenser, liquid flow from the condenser is restricted, which allows liquid to back up in the condenser. Flooding the condenser reduces the area available for condensing thus raising the condensing pressure. During summer conditions, the seat closes the discharge port due to high pressure in the receiver. Therefore, there is full liquid flow from the condenser to the receiver.

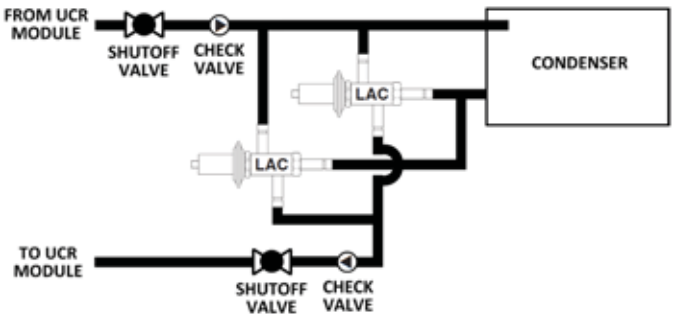
Refrigerant Migration

During an off cycle there is a potential for refrigerant to migrate from the warm receiver to the cold condenser. An auxiliary check valve should be used in the liquid line between the LAC valves and the receiver to prevent this from occurring (see Figure 24).

Piping Suggestions

The piping schematic shown in Figure 24 is only to illustrate the general location of the head pressure control valves in the system. Refer to the Refrigeration Circuit Diagram on page 57 for more information. Note that the schematic shown on Figure 24 reflects the use of two LAC-10 valves required per circuit on 50 ton and above models, only one LAC-10 valve is required per circuit on 30 ton and below models.

Figure 24



Brazing Procedures for Head Pressure Control Valve

Any of the commonly used brazing alloys for high side usage are satisfactory, however, when soldering or brazing, it is very important that the internal parts be protected by wrapping the valve with a WET cloth to keep the body temperature below 250°F for the LAC. Also, when using high temperature solders, the torch tip should be large enough to avoid prolonged heating of the copper connections. Always direct the flame away from the valve body.

CAUTION: Inert gases must be added to the system carefully through a pressure regulator. Unregulated gas pressure can seriously damage the system and endanger human life. Never use oxygen or explosive gases.

The table below lists the maximum values each valve can withstand without damage. Precautions must be taken to keep test or operating pressures below these values.

Table 7

Type Valve	Maximum Rated Pressure PSIG
LAC-10	680

Determining Amount of Charge

When "refrigerant side" head pressure control is utilized on a system, one of the most important factors is determining the total system refrigerant charge. While on most packaged units the amount of charge is listed on the unit, the required charge for a field built-up system cannot be listed by the manufacturer. Charge is usually added when the system is started up until "proper" system performance is reached, however, if the system is to function properly **year-round,** the correct amount of extra charge must be calculated ahead of time.

Completely Flooded Condenser

The easiest method is to calculate the **volume** of the condenser coil and then use the density factor of the refrigerant shown in Table 8 to figure the pounds of refrigerant necessary to **completely** flood the condenser coil at the appropriate ambient. The factors involved in calculating the extra pounds of refrigerant are:

1. Length of tubing and return bends in condenser
2. Minimum ambient temperature at which systems will be required to function
3. Tubing size and wall thickness
4. Refrigerant

The primary point to remember in selecting the proper density factor is that when the liquid drain valve LAC is throttling, the refrigerant temperature will be at the same temperature as the ambient.

Example: Calculate the extra refrigerant charge necessary for a refrigerant R-410A, roof mounted remote condenser (40°F evaporator and a minimum condensing temperature of 90°F) with compressor unloading to 50% of full compressor capacity. To determine the equivalent length of tubing in a condenser, proceed as follows: First, count the number of tubes and multiply this by their length.

Example: 150 tubes x 7.55 feet = 1132.5 feet

Next, count the return bends and multiply them by the factor shown in Table 8.

Example: 150 bends x .250 for 1/2 inch bends = 37.5 feet

Then add this 37.5 feet to the 1132.5 feet for a total of 1170 feet

The system uses a 30 hp condensing unit with a condenser coil containing 1170 equivalent feet of ½ inch tubing tubes and return bends. Assume a design temperature of minus 20°F minimum ambient. From Table 8, find the density factor necessary to calculate the pounds of extra refrigerant to **completely** flood the condenser at minus 20°F: 1170 feet x .102 pounds/foot = 119 pounds.

Partially Flooded Condenser

On many systems it is not necessary to **completely** flood the condenser to maintain sufficient operating head pressure (equivalent to approximately 90°F condensing temperature) because of a milder climate. Therefore, a second method is available. The additional information found in Tables 9 and 10 can be used to figure more closely the charge necessary to properly flood the condenser for sufficient head pressure at various minimum ambient temperatures. (The multipliers are applied to the extra refrigerant charge that was calculated in the method to **completely** flood the condenser).

Example: The example calls for a compressor equipped with capacity unloading at roughly 50% using hot gas bypass/combination liquid injection circuits. Since the chiller controller will likely call for unloading during low ambient, this must be taken into consideration. This is necessary since as the compressor unloads, the condenser's capacity increases and additional flooding is required. Using the same roof mounted remote condenser as in the earlier example (40°F evaporator and minus 20°F minimum ambient), a

multiplier of .79 is shown in Table 8. And since there is hot gas bypass (50%), this .79 is used to enter Table 10 to find a multiplier of .91. This final multiplier is applied to the 119 pounds calculated earlier to arrive at the final extra charge requirement: 119 x .91 = 108 pounds. This is added to the normal system charge to arrive at a total system charge.

Table 8

Refrigerant	Minimum Ambient °F	Equivalent Length Of Tubing for Each Return Bend		
		3/8"	1/2"	5/8"
R-410A	-40	0.2	0.25	0.3
	-20			
	0			
	20			
	40			
	60			
	70			

Density Factor - Pounds Per Foot Of Tubing					
Tubing O.D. and Wall Thickness (Inches)					
3/8" (0.016)	1/2" (0.017)	5/8" (0.018)	0.875 (0.045)	1.125 (0.05)	1.375 (0.055)
0.053	0.098	0.157	0.278	0.474	0.722
0.052	0.095	0.152	0.270	0.460	0.701
0.050	0.092	0.147	0.262	0.446	0.679
0.048	0.089	0.142	0.253	0.431	0.656
0.046	0.086	0.137	0.243	0.414	0.631
0.044	0.081	0.129	0.229	0.391	0.595
0.043	0.080	0.128	0.227	0.387	0.589

Table 9

Condenser Ambient Temperature °F	Percent of Condenser to be Flooded High Suction Temperature A/C Chillers Evaporating Temperature ° F			
	35	40	45	50
80	0	0	0	0
70	0	0	0	0
60	26	20	10	4
50	45	40	33	28
40	56	52	46	42
30	64	60	55	51
20	69	66	62	59
0	76	73	70	68
-20	80	79	76	73

Refrigerant Charging Procedures for Head Pressure Control Valve

Once the amount of extra refrigerant charge is calculated, care must be taken in charging the system to ensure the proper total amount of refrigerant getting into the system. This is especially true if the ambient temperature is below 70°F and the liquid drain valve (LAC) is throttling the refrigerant flow from the condenser. A step by step procedure is given below for the two possible situations that can exist. And depending on the ambient temperature at the time the system is charged, each should be carefully followed to ensure proper system operation in both summer and winter. In either case, a liquid seal must be established in the receiver before the system can start to function correctly.

Note: While charging any system with head pressure control, the outdoor ambient temperature must be known. And if the system has hot gas bypass valves, it is important to know if they are functioning during the charging procedure. To keep this procedure as simple as possible, it is recommended that the hot gas bypass valves be locked out (compressor fully loaded) during charging.

Table 10

Condensing Flooding with NO Unloading	Percent of Full Compressor Capacity = 50%
05	0.50
10	0.53
15	0.57
20	0.60
25	0.63
30	0.66
35	0.69
40	0.72
45	0.74
50	0.76
55	0.79
60	0.81
65	0.83
70	0.86
75	0.88
79	0.91
80	0.92
85	0.96

Charging of Systems with Sporlan Head Pressure Control in Ambient ABOVE 70°F

(After normal evacuation procedures)

Before starting system:

1. Connect refrigerant cylinder to a charging or gauge port on the receiver outlet valve.
2. Open the receiver valve approximately one-half way (so receiver and liquid line are connected to charging or gauge port).
3. Charge liquid refrigerant into the high side of the system. Weighing the charge is recommended with the initial charge consisting of approximately 2.5 pounds per system ton.
4. Remove the refrigerant drum and connect it to the suction side of the compressor.

5. Charge refrigerant vapor into the low side until the pressure is above atmospheric pressure. Do not admit liquid refrigerant into the low side.
6. Start the system.
7. Observe sight glass (at receiver outlet) to see if system is properly charged for normal refrigeration cycle. **CAUTION: Bubbles in the sight glass can be caused by flashing due to pressure drop from pipe or accessory losses, etc.**
8. If the sight glass shows bubbles, more refrigerant should be added, while allowing sufficient time for the refrigerant to stabilize and clear the sight glass.
9. The extra refrigerant charge for head pressure control should be weighed in now by admitting liquid refrigerant to the high side.

Charging of Systems with Sporlan Head Pressure Control in Ambient BELOW 70˚F

(After normal evacuation procedures)

Note: When charging in ambient below 70˚F the procedure is very critical. Be sure to adhere to the following steps without fail. Failure to do so will result in overcharging the system.

1. Follow instructions 1 through 9 above.
2. If the LAC valve setting is correct for the system being charged, it is quite likely that some refrigerant will be backed up into the condenser and the sight glass will indicate bubbles in the liquid line.
3. Add more refrigerant, while allowing sufficient time for the refrigerant to stabilize and clear the sight glass.
4. At this point the system is correctly charged for this type of head pressure control at the ambient temperature that exists while the charging procedure is taking place.
5. If the system is designed to operate at ambient below the ambient that exists during charging, additional charge will have to be added now.
6. To calculate the additional charge required, follow the examples outlined under the Refrigerant Charge section. Remember that the "head pressure control charge" is partially charged already. Refer to Tables 9 and 10.

The difference in percentages between the minimum **design** ambient temperature and the ambient temperature at the time the system is charged gives the percent of **extra** charge still needed in the system. Example: if this system was charged at an ambient of 50˚F, there is approximately 40% of the **extra** charge in the system. This holds true as long as the compressor is not allowed to unload during charging. Therefore, the additional charge required is 95 minus 40 or 55% of the total **extra** charge calculated previously. This is .55 x 119 or 65 pounds.

Service Procedures

There are several possible causes for system malfunction with "refrigerant side" head pressure control and these may be difficult to isolate from each other. As with any form of system trouble-shooting, it is necessary to know the existing operating temperatures and pressures before system problems can be determined. Once the actual malfunction is established, it is easier to pinpoint the cause and then take suitable corrective action. The following chart lists the most common malfunctions, the possible causes, and the remedies. Since the LAC valves are hermetic, the valves cannot be disassembled for inspection and/or replacement of parts. The valves must be replaced if they become inoperative.

Malfunction – Low Head Pressure Chart

Possible Cause	Remedy
Insufficient refrigerant charge to adequately flood condenser	Add refrigerant
LAC fails to close due to: a. Foreign material in valve b. Loss of air charge in element	See Below : a. Cause LAC to open by raising condensing/receiver pressure above valve setting by cycling condenser fan. If foreign material does not pass through valve, replace LAC b. Replace LAC
LAC receiver port fails to open due to : a. Less that 20 psi pressure drop across inlet to receiver port b. Internal parts damaged by overheating when installed	See Below: a. Check LAC causes/remedies b. Replace LAC
Discharge line to LAC restricted	Remove restriction in fitting(s) or line

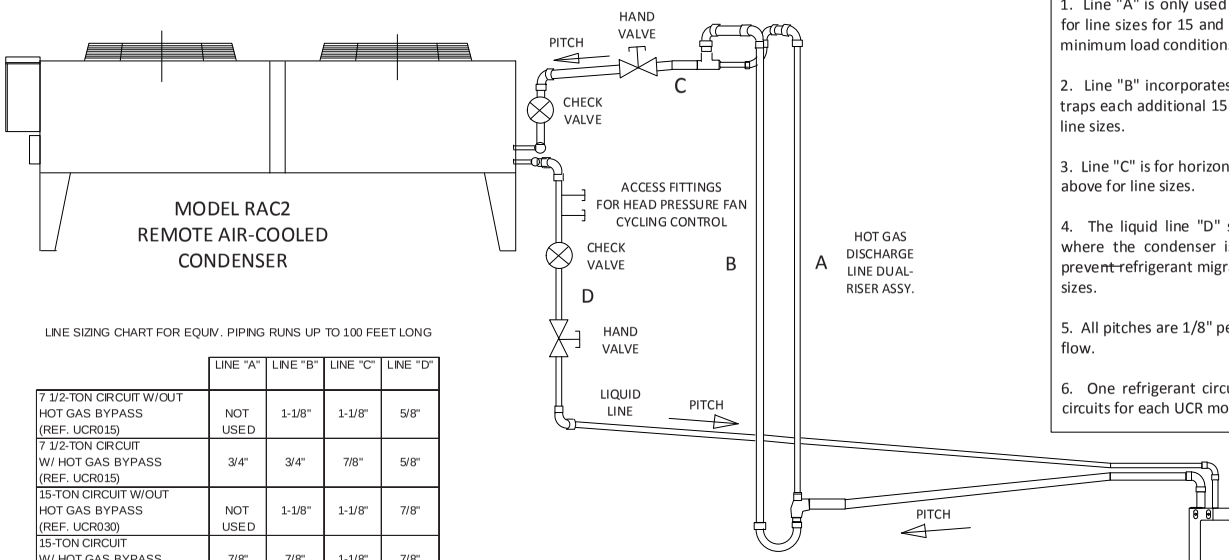
Malfunction – High Head Pressure Chart

Dirty condenser coil	Clean coil
Air on condeser blocked off	Clean area around condenser
Too much refrigerant charge	Remove charge until proper head pressure is maintained
Undersized receiver	Check receiver capacity against refrigerant required to maintain desired head pressure
Non-condensibles (air) in system	Recover, evacuate and recharge
Bypassing hot gas when not required due to: a. Internal parts of the Inlet to receiver port of the LAC are damaged by overheating when installed b. If pressure drop across the condenser, associated piping and LAC exceeds 14 psi under full load conditions	See Below: a. Replace LAC b. Contact Factory
Liquid port or liquid line plugged	Remove blockage in port or liquid line
Condenser fans not running	Repair or replace fan motor

WARNING: Serious injury could result from an explosion caused by the rapid expansion of trapped liquid refrigerant subjected to high temperature. **ALWAYS OPEN OR VENT THE SYSTEM BEFORE APPLYING HEAT TO REMOVE SYSTEM COMPONENTS.** Break the element charging cap tube on valve dome by hand or with a clean cut tool. DO NOT use side cutters, which may seal the opening.

Installation Precautions

1. Do not overcharge — see charging procedures on page 33.
2. Be sure that the piping does not allow liquid refrigerant to be trapped in sections where hydrostatic pressure can develop.
3. Be sure that the receiver is large enough to hold the entire charge during "warm" operation.
4. Do not overheat — see brazing procedures on page 32.



NOTES:
1. Line "A" is only used for systems with hot gas bypass. See chart above for line sizes for 15 and 25 ton circuits. Line "A" is sized to carry the oil at minimum load conditions.

2. Line "B" incorporates inverted "p"-traps as shown, with additional "p"-traps each additional 15 feet of rise, up to 50 ft. max. See chart above for line sizes.

3. Line "C" is for horizontal hot gas lines and carries the full flow. See chart above for line sizes.

4. The liquid line "D" should incorporate a check valve for applications where the condenser is at a lower temperature than the receiver, to prevent refrigerant migration during the off-cycle. See chart above for line sizes.

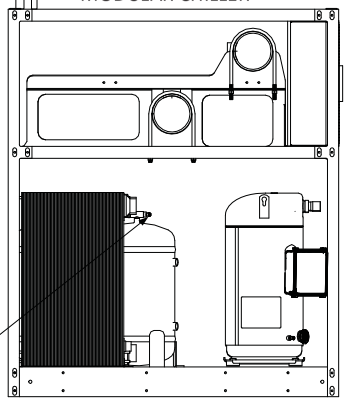
5. All pitches are 1/8" per foot downward in the direction of the refrigerant flow.

6. One refrigerant circuit is shown. There are two separate refrigerant circuits for each UCR module.

LINE SIZING CHART FOR EQUIV. PIPING RUNS UP TO 100 FEET LONG

	LINE "A"	LINE "B"	LINE "C"	LINE "D"
7 1/2-TON CIRCUIT W/OUT HOT GAS BYPASS (REF. UCR015)	NOT USED	1-1/8"	1-1/8"	5/8"
7 1/2-TON CIRCUIT W/ HOT GAS BYPASS (REF. UCR015)	3/4"	3/4"	7/8"	5/8"
15-TON CIRCUIT W/OUT HOT GAS BYPASS (REF. UCR030)	NOT USED	1-1/8"	1-1/8"	7/8"
15-TON CIRCUIT W/ HOT GAS BYPASS (REF. UCR030)	7/8"	7/8"	1-1/8"	7/8"
25-TON CIRCUIT W/OUT HOT GAS BYPASS (REF. UCR050)	NOT USED	1-5/8"	1-5/8"	1-1/8"
25-TON CIRCUIT W/ HOT GAS BYPASS (REF. UCR050)	1-1/8"	1-1/8"	1-5/8"	1-1/8"
35-TON CIRCUIT W/OUT HOT GAS BYPASS (REF. UCR070)	NOT USED	1-5/8"	1-5/8"	1-1/8"
35-TON CIRCUIT W/ HOT GAS BYPASS (REF. UCR070)	1-1/8"	1-1/8"	1-5/8"	1-1/8"
42 1/2-TON CIRCUIT W/OUT HOT GAS BYPASS (REF. UCR085)	NOT USED	2-1/8"	2-1/8"	1-3/8"
42 1/2-TON CIRCUIT W/ HOT GAS BYPASS (REF. UCR085)	1-3/8"	1-3/8"	1-5/8"	1-3/8"

MODEL UCR
MODULAR CHILLER



REFRIGERANT PRESSURE RELIEF VALVES, ONE ½" FLARE CONNECTION PER CIRCUIT,
MAY REQUIRE TO BE PIPED TO THE OUTSIDE BY THE INSTALLING CONTRACTOR BASED ON LOCAL CODE

NOTE: ALL DIM'S ARE IN INCHES

LEGEND:

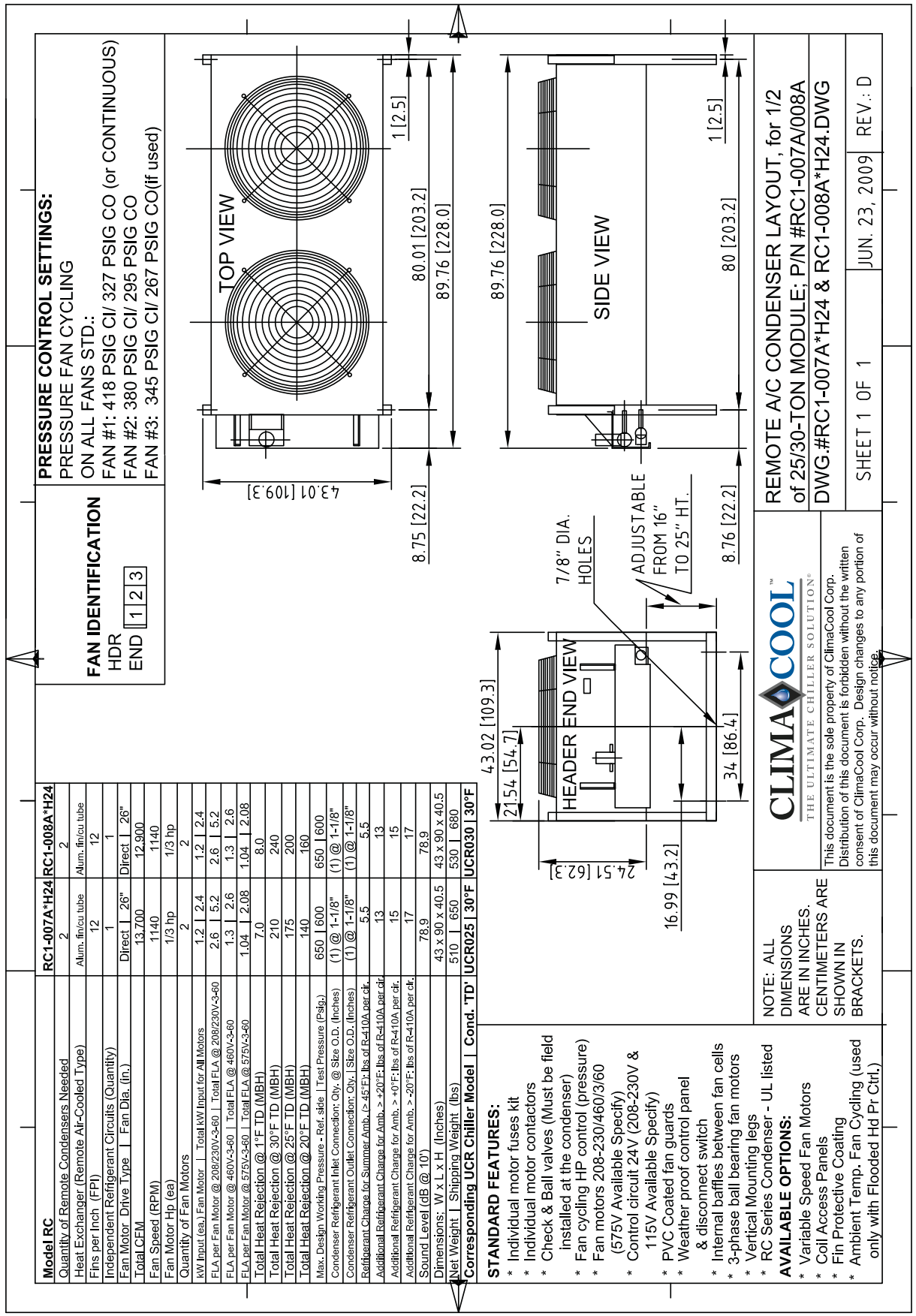
CLIMACOOL® THE ULTIMATE CHILLER SOLUTION®

RAC2 REMOTE A/C CONDENSER AND UCR CHILLER INSTALLATION DIAGRAM

DWG.#RAC2 x UCR_INSTALL.DWG

SHEET 1 OF 1 | 01/05/2016

Condenser Layout for RC1-007A*H24 and RC1-008A*H24, 1-Row, 2-Fan, 1140RPM



Model RC	RC1-007A*H24	RC1-008A*H24
Quantity of Remote Condensers Needed	2	2
Heat Exchanger (Remote Air-Cooled Type)	Alum. fin/cu tube	Alum. fin/cu tube
Fins per Inch (FPI)	12	12
Independent Refrigerant Circuits (Quantity)	1	1
Fan Motor Drive Type | Fan Dia. (in.)	Direct | 26"	Direct | 26"
Total CFM	13,700	12,900
Fan Speed (RPM)	1140	1140
Fan Motor Hp (ea)	1/3 hp	1/3 hp
Quantity of Fan Motors	2	2
kW Input (ea.) Fan Motor | Total kW Input for All Motors	1.2 | 2.4	1.2 | 2.4
FLA per Fan Motor @ 208/230V-3-60 | Total FLA @ 208/230V-3-60	2.6 | 5.2	2.6 | 5.2
FLA per Fan Motor @ 460V-3-60 | Total FLA @ 460V-3-60	1.3 | 2.6	1.3 | 2.6
FLA per Fan Motor @ 575V-3-60 | Total FLA @ 575V-3-60	1.04 | 2.08	1.04 | 2.08
Total Heat Rejection @ 1°F TD (MBH)	7.0	8.0
Total Heat Rejection @ 30°F TD (MBH)	210	240
Total Heat Rejection @ 25°F TD (MBH)	175	200
Total Heat Rejection @ 20°F TD (MBH)	140	160
Max. Design Working Pressure - Ref. side | Test Pressure (Psig.)	650 | 600	650 | 600
Condenser Refrigerant Inlet Connection: Qty. @ Size O.D. (Inches)	(1) @ 1-1/8"	(1) @ 1-1/8"
Condenser Refrigerant Outlet Connection: Qty. | Size O.D. (Inches)	(1) @ 1-1/8"	(1) @ 1-7/8"
Refrigerant Charge for Summer Amb. (> 45°F): lbs of R-410A per cir.	5.5	5.5
Additional Refrigerant Charge for Amb. > +20°F: lbs of R-410A per cir.	13	13
Additional Refrigerant Charge for Amb. > +0°F: lbs of R-410A per cir.	15	15
Additional Refrigerant Charge for Amb. > -20°F: lbs of R-410A per cir.	17	17
Sound Level (dB @ 10')	78.9	78.9
Dimensions: W x L x H (Inches)	43 x 90 x 40.5	43 x 90 x 40.5
Net Weight | Shipping Weight (lbs)	510 | 650	530 | 680
Corresponding UCR Chiller Model | Cond. 'TD'	**UCR025 | 30°F**	**UCR030 | 30°F**

STANDARD FEATURES:

* Individual motor fuses kit
* Individual motor contactors
* Check & Ball valves (Must be field installed at the condenser)
* Fan cycling HP control (pressure)
* Fan motors 208-230/460/3/60 (575V Available Specify)
* Control circuit 24V (208-230V & 115V Available Specify)
* PVC Coated fan guards
* Weather proof control panel & disconnect switch
* Internal baffles between fan cells
* 3-phase ball bearing fan motors
* Vertical Mounting legs
* RC Series Condenser - UL listed

AVAILABLE OPTIONS:

* Variable Speed Fan Motors
* Coil Access Panels
* Fin Protective Coating
* Ambient Temp. Fan Cycling (used only with Flooded Hd Pr Ctrl.)

Condenser Layout for RC2-019A, 026A and 31A*H48 and RC2-038A*H44, 2-Row, 4-Fan, 1140RPM

Model RC	RC2-019A*H48	RC2-026A*H48	RC2-031A*H48	RC2-038A*H44
Quantity of Remote Condensers Needed	1	1	1	1
Heat Exchanger (Remote Air-Cooled Type)	Alum. fin/cu tube	Alum. fin/cu tube	Alum. fin/cu tube	Alum. fin/cu tube
Fins per Inch (FPI)	8	8	8	14
Independent Refrigerant Circuits (Quantity)	2	2	2	2
Fan Motor Drive Type | Fan Dia. (in.)	Direct | 30"	Direct | 30"	Direct | 30"	Direct | 30"
Total CFM	41,000	39,600	38,100	38,100
Fan Speed (RPM)	1140	1140	1140	1140
Fan Motor Hp (ea)	1.5 hp	1.5 hp	1.5 hp	1.5 hp
Quantity of Fan Motors	4	4	4	4
kW Input (ea.) Fan Motor | Total kW Input for All Motors	1.93 | 7.7	1.93 | 7.7	1.93 | 7.7	1.93 | 7.7
FLA per Fan Motor @ 208/230V-3-60 | Total FLA @ 208/230V-3-60	7.0 | 28	7.0 | 28	7.0 | 28	7.0 | 28
FLA per Fan Motor @ 460V-3-60 | Total FLA @ 460V-3-60	3.5 | 14	3.5 | 14	3.5 | 14	3.5 | 14
FLA per Fan Motor @ 575V-3-60 | Total FLA @ 575V-3-60	2.8 | 11.2	2.8 | 11.2	2.8 | 11.2	2.8 | 11.2
Total Heat Rejection @ 1°F TD (MBH)	19.2	26.2	31.4	38.3
Total Heat Rejection @ 30°F TD (MBH)	576	786	942	1149
Total Heat Rejection @ 25°F TD (MBH)	480	655	785	958
Total Heat Rejection @ 20°F TD (MBH)	384	524	628	766
Max. Design Working Pressure - Ref. side | Test Pressure (Psig.)	650 | 600	650 | 600	650 | 600	650 | 600
Condenser Refrigerant Inlet Connection; Qty. @ Size O.D. (Inches)	2 @ 1-3/8"	2 @ 1-3/8"	2 @ 1-5/8"	2 @ 1-3/8"
Condenser Refrigerant Outlet Connection; Qty. | Size O.D. (Inches)	2 @ 1-1/8"	2 @ 1-1/8"	2 @ 1-5/8"	2 @ 1-3/8"
Refrigerant Charge for Summer Amb. (> 45°F); lbs of R410A per circuit	25	25	19	25
Additional Refrigerant Charge for Amb. > +20°F: lbs of R410A per circuit	11	11	7	11
Additional Refrigerant Charge for Amb. > +0°F: lbs of R410A per circuit	18	18	14	18
Additional Refrigerant Charge for Amb. > -20°F: lbs of R410A2 per circuit	23	23	17	23
Sound Level (dB @ 10')	78.4	78.4	78.4	57.3
Dimensions; W x L x H (Inches)	88 x 127 x 49	88 x 127 x 49	88 x 127 x 49	88 x 127 x 49
Net Weight | Shipping Weight (lbs)	1240 | 1420	1340 | 1520	1440 | 1620	1440 | 1620
Corresponding AR2 Chiller Model | Cond. 'TD'	UCR025 | 20°F	UCR030 | 20°F	UCR070 | 30°F	UCR050 | 20°F
Corresponding AR2 Chiller Model | Cond. 'TD'		UC0050 | 30°F		

FAN IDENTIFICATION

8	6	4	2
7	5	3	1

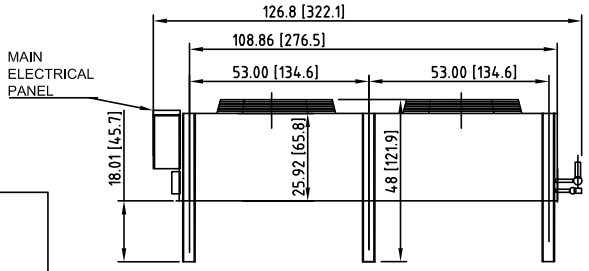
HDR NOTE: EVEN # FANS ARE FOR STG. 2 ONLY.
END ODD # FANS ARE FOR STG. 1 ONLY.

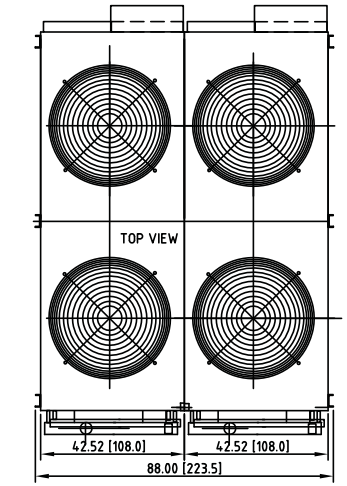
PRESSURE CONTROL SETTINGS:
PRESSURE FAN CYCLING STD.
ON ALL ROWS, ALL FANS:
FANS #1 & #2: 418 PSIG CI/ 327 PSIG CO (or OPERATE CONTINUOUS)
FANS #3 & #4: 380 PSIG CI/ 295 PSIG CO
FANS #5 & #6: 345 PSIG CI/ 267 PSIG CO (if used)

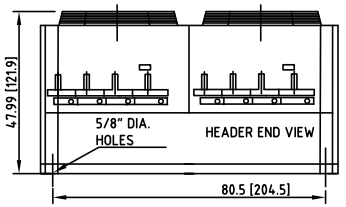
STANDARD FEATURES:
- Individual motor fuses kit
- Individual motor contactors
- Check & Ball valves (Must be field installed at the condenser)
- Fan cycling HP control (pressure)
- Fan motors 208-230/460/3/60 (575V Available Specify)
- Control circuit 24V (208-230V & 115V Available Specify)
- PVC Coated fan guards
- Weather proof control panel & disconnect switch
- Internal baffles between fan cells
- 3-phase ball bearing fan motors
- Vertical Mounting legs
- RC Series Condenser - UL listed

AVAILABLE OPTIONS:
- Variable Speed Fan Motors
- Coil Access Panels
- Fin Protective Coating
- Ambient Temp. Fan Cycling (used only with Flooded Hd Pr Ctrl.)

NOTES:
1. ALL DIMENSIONS ARE IN INCHES. CENTIMETERS ARE SHOWN IN BRACKETS.
2. EACH RC CONDENSER MODEL LISTED CAN ONLY BE PAIRED UP TO ONE CORRESPONDING AR2 MODEL.
3. THE * IN THE RC MODEL NUMBER INDICATES THE PRIMARY FAN MOTOR VOLTAGE CODE. THE LETTER "H" STANDS FOR 230V-3PH-60HZ; "F" WOULD INDICATE 460V-3PH-60HZ; AND "N" INDICATES 575V-3PH-60HZ.







CLIMACOOL™ THE ULTIMATE CHILLER SOLUTION®

REMOTE A/C CONDENSER; 4-FAN; TYPE "H"; 1140 RPM, HIGH CAPACITY FAN MOTORS; DWG.# RC2-4-FAN-H CAD LAYOUT.DWG

SHEET 1 OF 1 | JUN. 23, 2009 | REV.: C

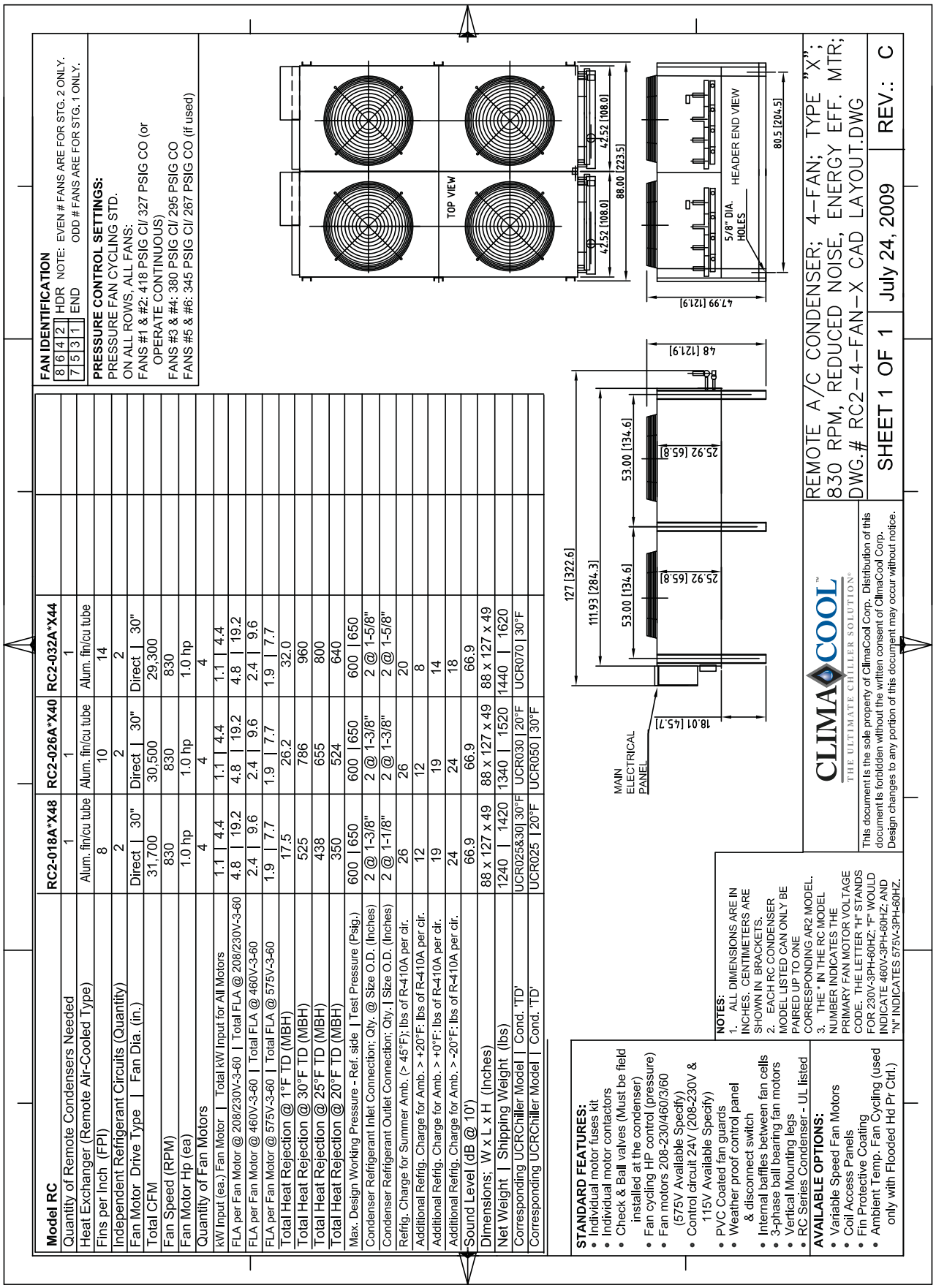
Condenser Layout for RC2-018A*X48, RC2-026A*X40 and RC2-032A*X44, 2-Row, 4-Fan, 830 RPM

Model RC	RC2-018A*X48	RC2-026A*X40	RC2-032A*X44
Quantity of Remote Condensers Needed	1	1	1
Heat Exchanger (Remote Air-Cooled Type)	Alum. fin/cu tube	Alum. fin/cu tube	Alum. fin/cu tube
Fins per Inch (FPI)	8	10	14
Independent Refrigerant Circuits (Quantity)	2	2	2
Fan Motor Drive Type | Fan Dia. (in.)	Direct | 30"	Direct | 30"	Direct | 30"
Total CFM	31,700	30,500	29,300
Fan Speed (RPM)	830	830	830
Fan Motor Hp (ea)	1.0 hp	1.0 hp	1.0 hp
Quantity of Fan Motors	4	4	4
kW Input (ea.) Fan Motor | Total kW Input for All Motors	1.1 | 4.4	1.1 | 4.4	1.1 | 4.4
FLA per Fan Motor @ 208/230V-3-60 | Total FLA @ 208/230V-3-60	4.8 | 19.2	4.8 | 19.2	4.8 | 19.2
FLA per Fan Motor @ 460V-3-60 | Total FLA @ 460V-3-60	2.4 | 9.6	2.4 | 9.6	2.4 | 9.6
FLA per Fan Motor @ 575V-3-60 | Total FLA @ 575V-3-60	1.9 | 7.7	1.9 | 7.7	1.9 | 7.7
Total Heat Rejection @ 1°F TD (MBH)	17.5	26.2	32.0
Total Heat Rejection @ 30°F TD (MBH)	525	786	960
Total Heat Rejection @ 25°F TD (MBH)	438	655	800
Total Heat Rejection @ 20°F TD (MBH)	350	524	640
Max. Design Working Pressure - Ref. side | Test Pressure (Psig.)	600 | 650	600 | 650	600 | 650
Condenser Refrigerant Inlet Connection: Qty. @ Size O.D. (Inches)	2 @ 1-3/8"	2 @ 1-3/8"	2 @ 1-5/8"
Condenser Refrigerant Outlet Connection: Qty. | Size O.D. (Inches)	2 @ 1-1/8"	2 @ 1-3/8"	2 @ 1-5/8"
Refrig. Charge for Summer Amb. (> 45°F); lbs of R-410A per cir.	26	26	20
Additional Refrig. Charge for Amb. > +20°F: lbs of R-410A per cir.	12	12	8
Additional Refrig. Charge for Amb. > +0°F: lbs of R-410A per cir.	19	19	14
Additional Refrig. Charge for Amb. > -20°F: lbs of R-410A per cir.	24	24	18
Sound Level (dB @ 10')	66.9	66.9	66.9
Dimensions; W x L x H (Inches)	88 x 127 x 49	88 x 127 x 49	88 x 127 x 49
Net Weight | Shipping Weight (lbs)	1240 | 1420	1340 | 1520	1440 | 1620
Corresponding UCRChiller Model | Cond. 'TD'	UCR025&30] 30°F	UCR030 | 20°F	UCR070 | 30°F
Corresponding UCRChiller Model | Cond. 'TD'	UCR025 | 20°F	UCR050 | 30°F	

FAN IDENTIFICATION

8	6	4	2	HDR	NOTE: EVEN # FANS ARE FOR STG. 2 ONLY.
7	5	3	1	END	ODD # FANS ARE FOR STG. 1 ONLY.

PRESSURE CONTROL SETTINGS:
PRESSURE FAN CYCLING STD.
ON ALL ROWS, ALL FANS:
FANS #1 & #2: 418 PSIG CI/ 327 PSIG CO (or OPERATE CONTINUOUS)
FANS #3 & #4: 380 PSIG CI/ 295 PSIG CO
FANS #5 & #6: 345 PSIG CI/ 267 PSIG CO (if used)



STANDARD FEATURES:
- Individual motor fuses kit
- Individual motor contactors
- Check & Ball valves (Must be field installed at the condenser)
- Fan cycling HP control (pressure)
- Fan motors 208-230/460/3/60 (575V Available Specify)
- Control circuit 24V (208-230V & 115V Available Specify)
- PVC Coated fan guards
- Weather proof control panel & disconnect switch
- Internal baffles between fan cells
- 3-phase ball bearing fan motors
- Vertical Mounting legs
- RC Series Condenser - UL listed

AVAILABLE OPTIONS:
- Variable Speed Fan Motors
- Coil Access Panels
- Fin Protective Coating
- Ambient Temp. Fan Cycling (used only with Flooded Hd Pr Ctrl.)

NOTES:
1. ALL DIMENSIONS ARE IN INCHES. CENTIMETERS ARE SHOWN IN BRACKETS.
2. EACH RC CONDENSER MODEL LISTED CAN ONLY BE PAIRED UP TO ONE CORRESPONDING AR2 MODEL.
3. THE * IN THE RC MODEL NUMBER INDICATES THE PRIMARY FAN MOTOR VOLTAGE CODE. THE LETTER "H" STANDS FOR 230V-3PH-60HZ; "F" WOULD INDICATE 460V-3PH-60HZ; AND "N" INDICATES 575V-3PH-60HZ.

CLIMACOOL™ THE ULTIMATE CHILLER SOLUTION®

REMOTE A/C CONDENSER; 4-FAN; TYPE "X"; 830 RPM, REDUCED NOISE, ENERGY EFF. MTR; DWG.# RC2-4-FAN-X CAD LAYOUT.DWG

SHEET 1 OF 1 | July 24, 2009 | REV.: C

Condenser Layout for RC2-014A*Q48, RC2-017A*Q42, RC2-021A*Q48 and RC2-025A*Q44, 2-Row, 4-Fan, 540 RPM

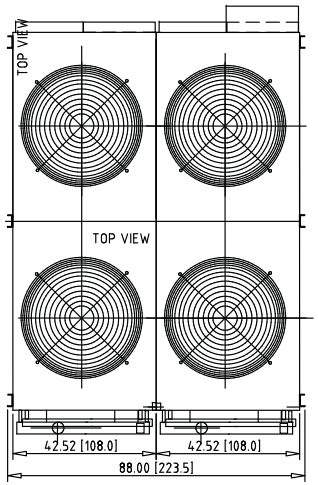
Model RC	RC2-014A*Q48	RC2-017A*Q42	RC2-021A*Q48	RC2-025A*Q44
Quantity of Remote Condensers Needed	1	1	1	1
Heat Exchanger (Remote Air-Cooled Type)	Alum. fin/cu tube	Alum. fin/cu tube	Alum. fin/cu tube	Alum. fin/cu tube
Fins per Inch (FPI)	8	12	8	14
Independent Refrigerant Circuits (Quantity)	2	2	2	2
Fan Motor Drive Type | Fan Dia. (in.)	Direct | 30"	Direct | 30"	Direct | 30"	Direct | 30"
Total CFM	22,300	22,300	21,500	20,800
Fan Speed (RPM)	540	540	540	540
Fan Motor Hp (ea)	1/2 hp	1/2 hp	1/2 hp	1/2 hp
Quantity of Fan Motors	4	4	4	4
kW Input (ea.) Fan Motor | Total kW Input for All Motors	0.43 | 1.72	0.43 | 1.72	0.43 | 1.72	0.43 | 1.72
FLA per Fan Motor @ 208/230V-3-60 | Total FLA @ 208/230V-3-60	3.5 | 14	3.5 | 14	3.5 | 14	3.5 | 14
FLA per Fan Motor @ 460V-3-60 | Total FLA @ 460V-3-60	1.75 | 7.0	1.75 | 7.0	1.75 | 7.0	1.75 | 7.0
Total Heat Rejection @ 1°F TD (MBH)	14.3	17.3	20.7	24.5
Total Heat Rejection @ 30°F TD (MBH)	429	519	621	735
Total Heat Rejection @ 25°F TD (MBH)	358	433	518	613
Total Heat Rejection @ 20°F TD (MBH)	286	346	414	490
Max. Design Working Pressure - Ref. side | Test Pressure (Psig.)	600 | 650	600 | 650	600 | 650	600 | 650
Condenser Refrigerant Inlet Connection; Qty. @ Size O.D. (Inches)	2 @ 1-3/8"	2 @ 1-3/8"	2 @ 1-3/8"	2 @ 1-3/8"
Condenser Refrigerant Outlet Connection; Qty. | Size O.D. (Inches)	2 @ 1-1/8"	2 @ 1-1/8"	2 @ 1-1/8"	2 @ 1-3/8"
Refrig. Charge for Summer Amb. (> 45°F); lbs of R-410A per circuit	26	26	20	26
Additional Refrig. Charge for Amb. > +20°F: lbs of R-410A per circuit	12	12	8	12
Additional Refrig. Charge for Amb. > +0°F: lbs of R-410A per circuit	19	19	15	19
Additional Refrig. Charge for Amb. > -20°F: lbs of R-410A per circuit	25	25	19	25
Sound Level (dB @ 10')	55.7	55.7	55.7	55.7
Dimensions; W x L x H (Inches)	88 x 127 x 49	88 x 127 x 49	88 x 127 x 49	88 x 127 x 49
Net Weight | Shipping Weight (lbs)	1240 | 1420	1240 | 1420	1340 | 1520	1440 | 1620
Corresponding UCR Chiller Model | Cond. 'TD'	UCR025 | 30°F	UCR030 | 30°F	UCR025 | 20°F	UCR030 | 20°F
Corresponding UCR Chiller Model | Cond. 'TD'				UCR050 | 30°F

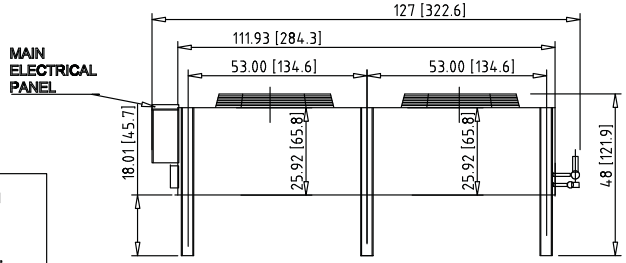
FAN IDENTIFICATION

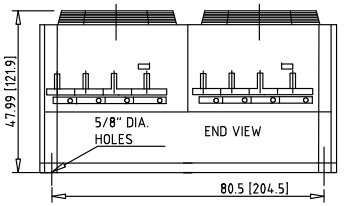
8	6	4	2	HDR
7	5	3	1	END

NOTE: EVEN # FANS ARE FOR STG. 2 ONLY.
ODD # FANS ARE FOR STG. 1 ONLY.

PRESSURE CONTROL SETTINGS:
PRESSURE FAN CYCLING STD.
ON ALL ROWS, ALL FANS:
FANS #1 & #2: 418 PSIG CI/ 327 PSIG CO (or OPERATE CONTINUOUS)
FANS #3 & #4: 380 PSIG CI/ 295 PSIG CO
FANS #5 & #6: 345 PSIG CI/ 267 PSIG CO (If used)







STANDARD FEATURES:
- Individual motor fuses kit
- Individual motor contactors
- Check & Ball valves (Must be field installed at the condenser)
- Fan cycling HP control (pressure)
- Fan motors 208-230/460/3/60 (575V NOT AVAILABLE)
- Control circuit 24V (208-230V & 115V Available Specify)
- PVC Coated fan guards
- Weather proof control panel & disconnect switch
- Internal baffles between fan cells
- 3-phase ball bearing fan motors
- Vertical Mounting legs
- RC Series Condenser - UL listed

AVAILABLE OPTIONS:
- Variable Speed Fan Motors
- Coil Access Panels
- Fin Protective Coating
- Ambient Temp. Fan Cycling (used only with Flooded Hd Pr Ctrl.)

NOTES:
1. ALL DIMENSIONS ARE IN INCHES. CENTIMETERS ARE SHOWN IN BRACKETS.
2. EACH RC CONDENSER MODEL LISTED CAN ONLY BE PAIRED UP TO ONE CORRESPONDING AR2 MODEL.
3. THE * IN THE RC MODEL NUMBER INDICATES THE PRIMARY FAN MOTOR VOLTAGE CODE. THE LETTER "H" STANDS FOR 230V-3PH-60HZ; "F" WOULD INDICATE 460V-3PH-60HZ.

CLIMACOOL® THE ULTIMATE CHILLER SOLUTION®

REMOTE A/C CONDENSER; 4-FAN; TYPE "Q"; 540 RPM, LOW NOISE, LOW kW FAN MOTORS; DWG.# RC2-4-FAN-Q CAD LAYOUT.DWG

SHEET 1 OF 1 | Nov. 6, 2009 | REV.: E

Condenser Layout for RC2-020A*V48, RC2-025A*V42, RC2-033A*V42 and RC2-038A*V42, 2-Row, 4-Fan, Variable Speed

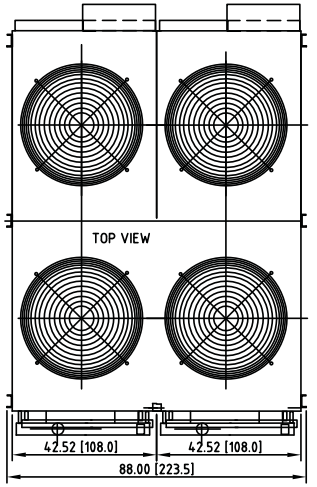
Model RC	RC2-020A*V48	RC2-025A*V42	RC2-033A*V42	RC2-038A*V42
Quantity of Remote Condensers Needed	1	1	1	1
Heat Exchanger (Remote Air-Cooled Type)	Alum. fin/cu tube	Alum. fin/cu tube	Alum. fin/cu tube	Alum. fin/cu tube
Fins per Inch (FPI)	8	12	12	12
Independent Refrigerant Circuits (Quantity)	2	2	2	2
Fan Motor Drive Type | Fan Dia. (in.)	Var Spd | 30.5	Var Spd | 30.5	Var Spd | 30.5	Var Spd | 30.5
Total CFM	46,700	46,700	44,100	41,900
Fan Speed (RPM)	215 to 1030	215 to 1030	215 to 1030	215 to 1030
Fan Motor Hp (ea)	1.5 hp	1.5 hp	1.5 hp	1.5 hp
Quantity of Fan Motors	4	4	4	4
kW Input (ea.) Fan Motor | Total kW Input for All Motors	2.2 | 8.8	2.2 | 8.8	2.2 | 8.8	2.2 | 8.8
FLA per Fan Motor @ 208/230V-3-60 | Total FLA @ 208/230V-3-60	7.0 | 28	7.0 | 28	7.0 | 28	7.0 | 28
FLA per Fan Motor @ 460V-3-60 | Total FLA @ 460V-3-60	3.5 | 14	3.5 | 14	3.5 | 14	3.5 | 14
FLA per Fan Motor @ 575V-3-60 | Total FLA @ 575V-3-60	2.8 | 11.2	2.8 | 11.2	2.8 | 11.2	2.8 | 11.2
Total Heat Rejection @ 1°F TD (MBH)	20.4	24.8	33.1	38.3
Total Heat Rejection @ 30°F TD (MBH)	612	744	993	1149
Total Heat Rejection @ 25°F TD (MBH)	510	620	828	958
Total Heat Rejection @ 20°F TD (MBH)	408	496	662	766
Max. Design Working Pressure - Ref. side | Test Pressure (Psig.)	600 | 650	600 | 650	600 | 650	600 | 650
Condenser Refrigerant Inlet Connection; Qty. @ Size O.D. (Inches)	2 @ 1-3/8"	2 @ 1-3/8"	2 @ 1-5/8"	2 @ 1-3/8"
Condenser Refrigerant Outlet Connection; Qty. | Size O.D. (Inches)	2 @ 1-1/8"	2 @ 1-3/8"	2 @ 1-3/8"	2 @ 1-3/8"
Refrig. Charge for Summer Amb. (> 45°F); lbs of R-410A per cir.	26	26	20	26
Additional Refrig. Charge for Amb. > +20°F: lbs of R-410A per cir.	12	12	8	12
Additional Refrig.Charge for Amb. > +0°F: lbs of R-410A per cir.	19	19	15	19
Additional Refrig. Charge for Amb. > -20°F: lbs of R-410A per cir.	25	25	19	25
Sound Lvl @215 RPM | Sound Lvl @ 1030 RPM(dB@10')	46.5 | 73.1	46.5 | 73.1	46.5 | 73.1	46.5 | 73.1
Dimensions; W x L x H (Inches)	88 x 127 x 49	88 x 127 x 49	88 x 127 x 49	88 x 127 x 49
Net Weight | Shipping Weight (lbs)	1290 | 1510	1290 | 1510	1390 | 1610	1490 | 1710
Corresponding UCR Chiller Model | Cond. 'TD'	UCR025&30|30°F	UCR050 |30°F	UCR070 | 30°F	UCR050 | 20°F
Corresponding UCR Chiller Model | Cond. 'TD'	UCR025 | 20°F	UCR030 | 20°F		UCR050 | 30°F

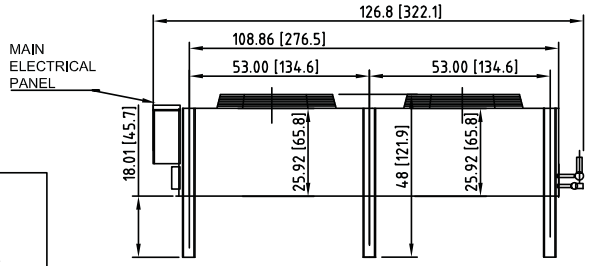
FAN IDENTIFICATION

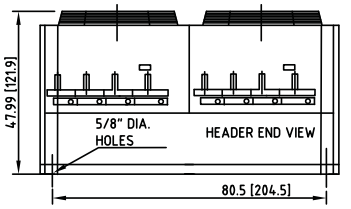
8	6	4	2	HDR
7	5	3	1	END

NOTE: EVEN # FANS ARE FOR STG. 2 ONLY.
ODD # FANS ARE FOR STG. 1 ONLY.

PRESSURE CONTROL SETTINGS:
PRESSURE FAN CYCLING STD.
ON ALL ROWS, ALL FANS:
FANS #1 & #2: 418 PSIG CI/ 327 PSIG CO (or OPERATE CONTINUOUS)
FANS #3 & #4: 380 PSIG CI/ 295 PSIG CO
FANS #5 & #6: 345 PSIG CI/ 267 PSIG CO (if used)







STANDARD FEATURES:
- Individual motor fuses kit
- Individual motor contactors
- Check & Ball valves (Must be field installed at the condenser)
- Fan cycling HP control (pressure)
- Fan motors 208-230/460/3/60 (575V Available Specify)
- Control circuit 24V (208-230V & 115V Available Specify)
- PVC Coated fan guards
- Weather proof control panel & disconnect switch
- Internal baffles between fan cells
- 3-phase ball bearing fan motors
- Vertical Mounting legs
- RC Series Condenser - UL listed

AVAILABLE OPTIONS:
- Variable Speed Fan Motors
- Coil Access Panels
- Fin Protective Coating
- Ambient Temp. Fan Cycling (used only with Flooded Hd Pr Ctrl.)

NOTES:
1. ALL DIMENSIONS ARE IN INCHES. CENTIMETERS ARE SHOWN IN BRACKETS.
2. EACH RC CONDENSER MODEL LISTED CAN ONLY BE PAIRED UP TO ONE CORRESPONDING AR2 MODEL.
3. THE * IN THE RC MODEL NUMBER INDICATES THE PRIMARY FAN MOTOR VOLTAGE CODE. THE LETTER "H" STANDS FOR 230V-3PH-60HZ; "F" WOULD INDICATE 460V-3PH-60HZ; AND "N" INDICATES 575V-3PH-60HZ.

CLIMACOOL™ THE ULTIMATE CHILLER SOLUTION®

REMOTE A/C CONDENSER; 4-FAN; TYPE "V"; VARIABLE SPEED, HIGH CAP; LOW NOISE; DWG.# RC2-4-FAN-V CAD LAYOUT.DWG

SHEET 1 OF 1 | July 24, 2009 | REV.: C

Condenser Layout for RC2-047A*H62, RC2-046A*V60, RC2-032A*Q62, RC2-039A*Q64, RC2-039A*X60 and RC2-047A*X62, 2-Row, 6-Fan

Model RC	RC2-047A*H62	RC2-046A*V60	RC2-032A*Q62	RC2-039A*Q64	RC2-039A*X60	RC2-047A*X62
Quantity of Remote Condensers Needed	1	1	1	1	1	1
Heat Exchanger (Remote Air-Cooled Type)	Alum. fin/cu tube	Alum. fin/cu tube	Alum. fin/cu tube	Alum. fin/cu tube	Alum. fin/cu tube	Alum. fin/cu tube
Fins per Inch (FPI)	12	10	12	14	14	12
Independent Refrigerant Circuits (Quantity)	2	2	2	2	2	2
Fan Motor Drive Type | Fan Dia. (in.)	Direct | 30"	Var Spd| 30.5	Direct | 30"	Direct | 30"	Direct | 30"	Direct | 30"
Total CFM	59,400	66,100	32,300	31,200	45,700	44,000
Fan Speed (RPM)	1140	215 to 1030	540	540	830	830
Fan Motor Hp (ea)	1.5 hp	1.5 hp	1/2 hp	1/2 hp	1.0 hp	1.0 hp
Quantity of Fan Motors	6	6	6	6	6	6
kW Input (ea.) Fan Motor | Total kW Input for All Motors	1.93 | 11.55	2.2 | 13.2	0.43 | 2.58	0.43 | 2.58	1.1 | 6.6	1.1 | 6.6
FLA per Fan Motor @ 208/230V-3-60 | Total FLA @ 208/230V-3-60	7.0 | 42	7.0 | 42	3.5 | 21	3.5 | 21	4.8 | 28.8	4.8 | 28.8
FLA per Fan Motor @ 460V-3-60 | Total FLA @ 460V-3-60	3.5 | 21	3.5 | 21	1.75 | 10.5	1.75 | 10.5	2.4 | 14.4	2.4 | 14.4
FLA per Fan Motor @ 575V-3-60 | Total FLA @ 575V-3-60	2.8 | 16.8	2.8 | 16.8	1.4 | 8.4	1.4 | 8.4	1.9 | 11.5	1.9 | 11.5
Total Heat Rejection @ 1°F TD (MBH)	46.7	46.2	32.4	39.5	39.4	47
Total Heat Rejection @ 30°F TD (MBH)	1401	1386	972	1185	1182	1410
Total Heat Rejection @ 25°F TD (MBH)	1168	1155	810	987.5	985	1175
Total Heat Rejection @ 20°F TD (MBH)	934	924	648	790	788	940
Max. Design Working Pressure - Ref. side | Test Pressure (Psig.)	600 | 650	600 | 650	600 | 650	600 | 650	600 | 650	600 | 650
Condenser Refrigerant Inlet Connection; Qty. @ Size O.D. (Inches)	2 @ 1-5/8"	2 @ 1-5/8"	2 @ 1-5/8"	2 @ 1-3/8"	2 @ 1-3/8"	2 @ 1-5/8"
Condenser Refrigerant Outlet Connection; Qty. | Size O.D. (Inches)	2 @ 1-3/8"	2 @ 1-3/8"	2 @ 1-5/8"	2 @ 1-3/8"	2 @ 1-3/8"	2 @ 1-3/8"
Refrig. Charge for Summer Amb. (> 45°F); lbs of R-410A per circuit	26	26	20	26	26	26
Additional Refrig.Charge for Amb. > +20°F: lbs of R-410A per circuit	12	12	8	12	12	12
Additional Refrig. Charge for Amb. > +0°F: lbs of R-410A per circuit	19	19	14	19	19	19
Additional Refrig. Charge for Amb. > -20°F: lbs of R-410A per circuit	24	24	18	24	24	24
Sound Level (dB @ 10')	80	48.0 | 74.7	57.3	57.3	68.5	68.5
Dimensions; W x L x H (Inches)	88 x 180 x 49	88 x 180 x 49	88 x 180 x 49	88 x 180 x 49	88 x 180 x 49	88 x 180 x 49
Net Weight | Shipping Weight (lbs)	1990 | 2230	2060 | 2510	1990 | 2230	2140 | 2380	1990 | 2230	2140 | 2380
Corresponding UCR Chiller Model | Cond. 'TD'	**UCR070 | 20°F**	**UCR070 | 20°F**	**UCR070 | 30°F**	**UCR050 | 20°F**	**UCR050 | 20°F**	**UCR070 | 20°F**

STANDARD FEATURES:
- Individual motor fuses kit
- Individual motor contactors
- Check & Ball valves (Must be field installed at the condenser)
- Fan cycling HP control (pressure)
- Fan motors 208-230/460/3/60 (575V Available Specify)
- Control circuit 24V (208-230V & 115V Available Specify)
- PVC Coated fan guards
- Weather proof control panel & disconnect switch
- Internal baffles between fan cells
- 3-phase ball bearing fan motors
- Vertical Mounting legs
- RC Series Condenser - UL listed

AVAILABLE OPTIONS:
- Variable Speed Fan Motors
- Coil Access Panels
- Fin Protective Coating
- Ambient Temp. Fan Cycling (used only with Flooded Hd Pr Ctrl.)

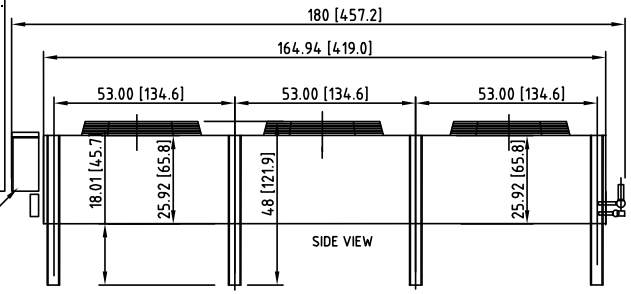
FAN IDENTIFICATION

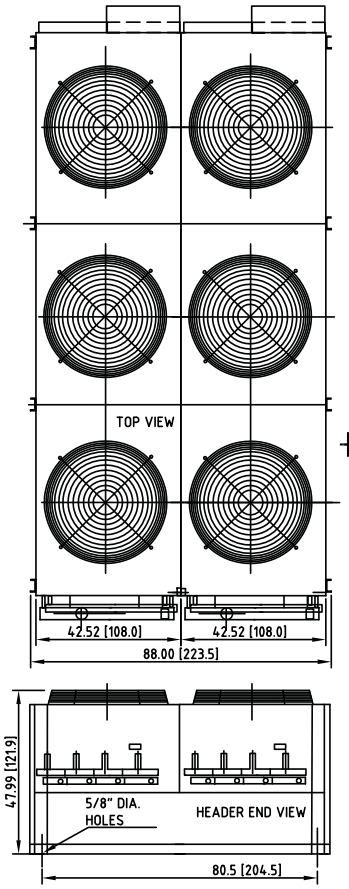
8	6	4	2	HDR
7	5	3	1	END

NOTE: EVEN # FANS ARE FOR STG. 2 ONLY. ODD # FANS ARE FOR STG. 1 ONLY.

PRESSURE CONTROL SETTINGS:
PRESSURE FAN CYCLING STD.
ON ALL ROWS, ALL FANS:
FANS #1 & #2: 418 PSIG CI/ 327 PSIG CO (or OPERATE CONTINUOUS)
FANS #3 & #4: 380 PSIG CI/ 295 PSIG CO
FANS #5 & #6: 345 PSIG CI/ 267 PSIG CO (if used)

NOTES:
1. ALL DIMENSIONS ARE IN INCHES. CENTIMETERS ARE SHOWN IN BRACKETS.
2. EACH RC CONDENSER MODEL LISTED CAN ONLY BE PAIRED UP TO ONE CORRESPONDING AR2 MODEL.
3. THE * IN THE RC MODEL NUMBER INDICATES THE PRIMARY FAN MOTOR VOLTAGE CODE. THE LETTER "H" STANDS FOR 230V-3PH-60HZ; "F" WOULD INDICATE 460V-3PH-60HZ; AND "N" INDICATES 575V-3PH-60HZ.



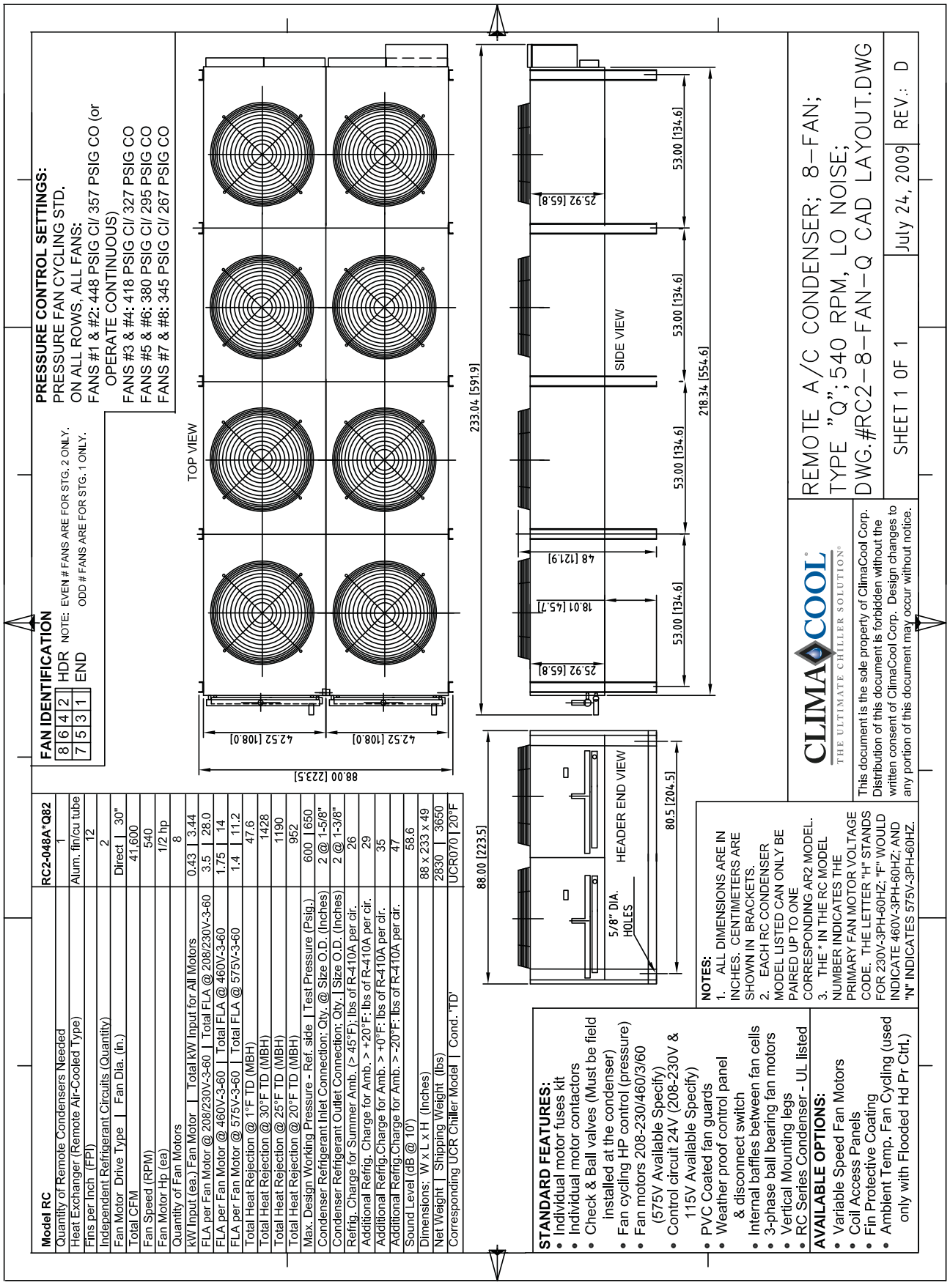


CLIMACOOL® THE ULTIMATE CHILLER SOLUTION®

REMOTE A/C CONDENSER; 6-FAN; ALL TYPES; ALL RPMs, ALL NOISE & kW FAN MOTORS;
DWG.# RC2-6-FAN-ALL CAD LAYOUT.DWG

SHEET 1 OF 1 | July 24, 2009 | REV.: C

Condenser Layout for RC2-048A*Q82, 2-Row, 8-Fan, 540RPM



Model RC	RC2-048A*Q82
Quantity of Remote Condensers Needed	1
Heat Exchanger (Remote Air-Cooled Type)	Alum. fin/cu tube
Fins per Inch (FPI)	12
Independent Refrigerant Circuits (Quantity)	2
Fan Motor Drive Type | Fan Dia. (in.)	Direct | 30"
Total CFM	41,600
Fan Speed (RPM)	540
Fan Motor Hp (ea)	1/2 hp
Quantity of Fan Motors	8
kW Input (ea.) Fan Motor | Total kW Input for All Motors	0.43 | 3.44
FLA per Fan Motor @ 208/230V-3-60 | Total FLA @ 208/230V-3-60	3.5 | 28.0
FLA per Fan Motor @ 460V-3-60 | Total FLA @ 460V-3-60	1.75 | 14
FLA per Fan Motor @ 575V-3-60 | Total FLA @ 575V-3-60	1.4 | 11.2
Total Heat Rejection @ 1°F TD (MBH)	47.6
Total Heat Rejection @ 30°F TD (MBH)	1428
Total Heat Rejection @ 25°F TD (MBH)	1190
Total Heat Rejection @ 20°F TD (MBH)	952
Max. Design Working Pressure - Ref. side | Test Pressure (Psig.)	600 | 650
Condenser Refrigerant Inlet Connection: Qty. @ Size O.D. (Inches)	2 @ 1-5/8"
Condenser Refrigerant Outlet Connection: Qty. | Size O.D. (Inches)	2 @ 1-3/8"
Refrig. Charge for Summer Amb. (> 45°F): lbs of R-410A per cir.	26
Additional Refrig. Charge for Amb. > +20°F: lbs of R-410A per cir.	29
Additional Refrig.Charge for Amb. > +0°F: lbs of R-410A per cir.	35
Additional Refrig.Charge for Amb. > -20°F: lbs of R-410A per cir.	47
Sound Level (dB @ 10')	58.6
Dimensions: W x L x H (Inches)	88 x 233 x 49
Net Weight | Shipping Weight (lbs)	2830 | 3650
Corresponding UCR Chiller Model | Cond. 'TD'	UCR070 | 20°F

STANDARD FEATURES:
- Individual motor fuses kit
- Individual motor contactors
- Check & Ball valves (Must be field installed at the condenser)
- Fan cycling HP control (pressure)
- Fan motors 208-230/460/3/60 (575V Available Specify)
- Control circuit 24V (208-230V & 115V Available Specify)
- PVC Coated fan guards
- Weather proof control panel & disconnect switch
- Internal baffles between fan cells
- 3-phase ball bearing fan motors
- Vertical Mounting legs
- RC Series Condenser - UL listed

AVAILABLE OPTIONS:
- Variable Speed Fan Motors
- Coil Access Panels
- Fin Protective Coating
- Ambient Temp. Fan Cycling (used only with Flooded Hd Pr Ctrl.)

NOTES:
1. ALL DIMENSIONS ARE IN INCHES. CENTIMETERS ARE SHOWN IN BRACKETS.
2. EACH RC CONDENSER MODEL LISTED CAN ONLY BE PAIRED UP TO ONE CORRESPONDING AR2 MODEL.
3. THE * IN THE RC MODEL NUMBER INDICATES THE PRIMARY FAN MOTOR VOLTAGE CODE. THE LETTER "H" STANDS FOR 230V-3PH-60HZ; "F" WOULD INDICATE 460V-3PH-60HZ; AND "N" INDICATES 575V-3PH-60HZ.

All startups must be performed by ClimaCool factory trained personnel. Prior to chiller startup, there are certain essential checks which must be completed. Failure to carry out these checks could result in damage to the chiller voiding the modules warranty.

Electrical

It is imperative to turn off the main electrical power supply and follow proper lock-out/tag-out procedures prior to servicing any of the chiller's electrical components. **The following procedures can be performed only after the electrical power is confirmed to be off:**

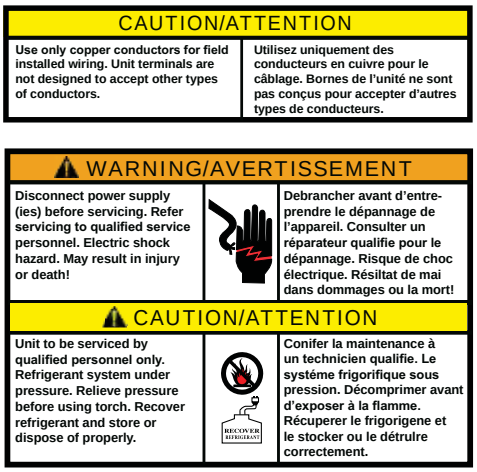
1. The installation must be inspected and approved by the respective agent and be in compliance with all local and national electrical codes.
2. Check and tighten all electrical terminal connections on each module as required. Utilize any lock-out/tag-out procedures required for your project location when performing this operation. If no procedure exists, take all precautions necessary to prevent the power from being turned on. **A systematic tightening of all terminals inside the electrical control panel on each module should be carried out.** This will include the compressor motor terminals, which would require removal of the compressor terminal cover. Check connections at each safety and every termination in the panel.
3. Verify that a separate 115 volt power supply is used to power the *CoolLogic* Control System. Field connections are simplified requiring only a two conductor shielded cable daisy chain from the master control panel to the modules. These control wires should be two-conductor shielded having #22 AWG minimum up to 50 feet, rated at 60˚C minimum. All field wiring must be identified (tagged). Refer to Power Distribution Drawing on page 28.
4. All field connections should be checked for tightness.
5. Check all fuses for proper sizing as indicated on the chiller data plate and/or the electrical diagram on the inside door of the electrical panel.
6. Verify proper operation of the **mandatory** field installed pressure differential flow sensor or switch.
7. On 208/230v units, confirm tranformers are properly tapped for the measured incoming power supply.
8. Verify proper installation of the **mandatory factory provided, field installed voltage/phase monitor.**

Refrigeration

1. Refrigerant piping and components should be inspected for damage.
2. Place refrigerant gauges on the discharge and suction access ports of each refrigerant circuit to ensure a refrigerant charge is present. Leave the gauges on for compressor rotation check.
3. Confirm the settings on all pressure sensors.

Water System

1. Confirm that leak testing has been carried out.
2. Confirm that the system is clean.
3. Confirm that necessary water treatment systems are in place with both the evaporator and condenser water systems.
4. Confirm that both the chilled water and condenser water circulating pumps are operational and water is flowing through both exchangers.
5. Shut the entering water valve and blow out some water to check for particles or coloration from suspended particles. Record the pressure differential across the chiller and condenser heat exchangers, measured at the pete's ports at each module.
6. Confirm correct water flow rates through the condenser and evaporator. Acquire the design parameters for the chiller bank from the ClimaCool Selection Program data (available from the local representative). Compare the measured differential pressures from step 5 above with the predicted flow rates to ensure proper correlation to the flow results.
7. Verify proper installation of the mandatory factory provided, field installed temperature sensors and wells **(sensor should be fully inserted in the well)** and verify calibration of sensors read through the *CoolLogic* control system.
8. Confirm installation of **mandatory field installed condenser and chilled water strainers with a minimum of 60 mesh screens.**



CLIMACOOL
THE ULTIMATE CHILLER SOLUTION

Pre Start-Up Checklist* (Air-Cooled) UCR

E-mail technicalsupport@climacoolcorp.com • Fax: 405.815.3052

Project Name: **Date:**

Address/Phone:

		YES	NO
1.	Are modules connected properly "per Codes and ClimaCool Installation Manual and completed Remote Condenser Warranty Agreement/Acknowledgement"? (Installation, Operation & Maintenance (IOM) Manual is available at www.climacoolcorp.com)	☐	☐
2.	Is there a 60-80 mesh strainer on the evaporator inlet water? (Fill water to chiller being sure to pass through a 60-80 mesh strainer.)	☐	☐
3.	Is chilled water system filled, flushed and all air purged from system? (All air **must be** purged from system prior to startup. See Filling the Water System in IOM)	☐	☐
4.	Are all pumps tested and operational?	☐	☐
5.	Are required GPM's (verified by pressure differential) supplied to the chiller? (See project specifications or selection and performance sheets available from ClimaCool Sales Rep)	☐	☐
6.	Are the pressure differential flow sensors properly installled and wired to the CoolLogic controller?	☐	☐
7.	Have all chiller coupling connections been leak tested?	☐	☐
8.	Is water presently circulating through chiller?	☐	☐
9.	Verified that temperature sensors and voltage/phase monitor have been installed?	☐	☐
10.	Verified power supply agrees with chiller nameplate?	☐	☐
11.	Is power and communication wiring complete to each module?	☐	☐
12.	Verified that wiring and devices meet with approved electrical submittal drawings?	☐	☐
13.	Is required load available to run multiple compressors at start-up?	☐	☐
14.	Is condenser functional to maintain condenser required operation? (This includes maintaining "minimum" inlet temperature. See "Operational Limitations" in IOM).	☐	☐

Note: Air Cooled Condenser installation, charging and checkout by others.

If you checked "No" to any question above, provide the line reference number and the date of scheduled completion below. Please note **all conditions must be complete prior to the start-up date**.

*This form must be completed and submitted to ClimaCool Corp. **three (3) weeks** prior to final scheduling of any Start-up.
Note: If any of the above items are not complete at time of start-up, backcharges will be assessed for additional costs.

Contractor Name:

Address:

(Authorized Signature)

Phone: **Date:**

All startups must be performed by ClimaCool factory trained personnel.

1. Review all items are complete from the Pre-Startup Checklist.
2. Cross reference model number with submittal sheet to verify that the units are the correct model type and voltage requirements.
3. Verify the location and wiring connections of all main header temperature sensors (should be a minimum of 36" but no more than 60" from the bank). Confirm that all sensors are FULLY INSERTED into their sensor wells and wired back to the correct terminals in the Master Control Panel.
4. Verify the location and ports for all water differential pressure sensors used for flow detection ((+) port piped to the inlet headers and the (-) ports piped to the outlet headers).
   - Verify the correct wiring using the +5VDC power supply to the differential sensor inputs.
   - Verify the correct output wiring from the differential sensors back to the master controller universal input (UI) channels 8 and 11. Confirm inputs 8 & 11 jumpers are set for 'volts'. **Note:** The differential sensor ports should NOT be piped to a location which includes strainer pressure drops.
5. Verify that strainer inlet includes a strainer assembly equipped with a 60 mesh screen.
6. Inspect all refrigerant piping for oil leaks which may have occurred during shipment which might indicate a refrigerant leak. Check the high pressure cutout setting of the pressure controls. The setting should be 385 psig cutout for all UCR models.
7. Verify the location and settings of the phase loss monitor. It should be in a location to sense the voltage condition in the main, high voltage panel which feeds high voltage to each module independently (review Electrical Connection on page 15). Verify the low voltage output wiring from the phase loss monitor (terminals 4 and 5) back to the main *CoolLogic* controller, input channel 12.
8. Determine if the chiller modules are equipped with motorized water isolation valves. If so, verify the settings of the motorized valves auxiliary switch dial settings, to ensure they close near:
   - 15% for load side (evaporator or heat).
9. Confirm that the main water pumps are driven by VFD's, and that all VFD's are controlling the pump speeds to produce a nominal differential pressure drop across the chiller bank headers, measured precisely at the differential pressure sensor locations in step 4 above. Nominal differential pressure ranges are from 3 to 10 psid.
10. Confirm the jumper locations for all master controller and module controllers as shown on the wiring diagrams provided on the inside electrical door panels.
    - Set the rotary switches for the MAC Address of the master controller to be "01."
    - Set the rotary switches for the module controllers to be "02" for module #1, "03" for module #2, and so on.
11. Tighten every screw and lug connection inside the *CoolLogic* master control panel and inside each module control panel high voltage section. Check auxiliary contacts on contactors ensure #1 auxiliary is wired on the #1 contactor. Open up the compressor junction box located on the front of each compressor and verify main electrical terminal lug tightness and the low voltage wires on protection module.
12. Verify the communication cable wiring to ensure it is 22 AWG, simple two conductor shielded cable and that the wiring is alone inside solid conduit between the master control panel and the first module control panel. Verify the cable's outer jacket is not stripped more than one inch. If so, the wires may have become untwisted, causing signal reflections. Confirm the wires are connected correctly to the terminal blocks at the master and each module as follows:
    Black wire to Net-
    White wire to Net +
    Shield wire to Shield
    Verify that the shield part of the wires continues the daisy chain connection through to the last module but, that this shield is NOT connected to a terminal lug inside any module.
13. Power-up the master control panel and download the appropriate clipping file into the master controller, following instructions.
14. Power up each module control panel, turn OFF the two toggle switches located on the inside bottom of the low voltage side of the module electrical panel. Download the appropriate clipping file into the module controllers, following instructions.
15. Check for proper line or high voltage values at each module input power block, and the 24 VAC low voltage values for correctness (+/- 10% of nominal values).
16. On 208/230V units, confirm transformer(s) are properly tapped for the measured incoming power supply.
17. Use refrigerant gauge set suitable for the high pressure R-410A, and hook up to the suction and discharge ports of each module's compressor stages separately. Bump start the compressors either by depressing the contactor manually, or by using the manual run commands from the Master Control Panel, (found in the FN 7, or the service menu). Bump the compressor only for 1-2 seconds to ensure the correct rotation of the scroll compressors (indicated by a rising highside pressure and a falling suction pressure).
18. Verify proper communications from each module back to the master controller using the "STATUS" menu, then indexing down to the desired compressor data screen.
    - If the compressor data parameters all read "0," then communications are not yet established, and communications cable troubleshooting is required.
    - When all compressor data parameters read actual values which agree with the refrigerant gauge set and refrigerant line temperatures, then it is safe to assume that communications are established.
19. Set up the master controller parameters according to the specific job submittal sheets.

- All parameters can be found in the FN 2 menu (setup), FN 6 menu (module factory settings), FN 7 menu (service), FN 8 menu (master factory settings).
- It is imperative to access EVERY MENU and EVERY PARAMETER to ensure all settings are appropriate.

20. Set up the Building Automation System (BAS) interface parameters (as required) using the FN 0 menu (network number selection, IP addressing), FN 4 menu (device instances).

Adjusting Unit Charge and Thermal Expansion Valves Using Subcooling and Superheat Method

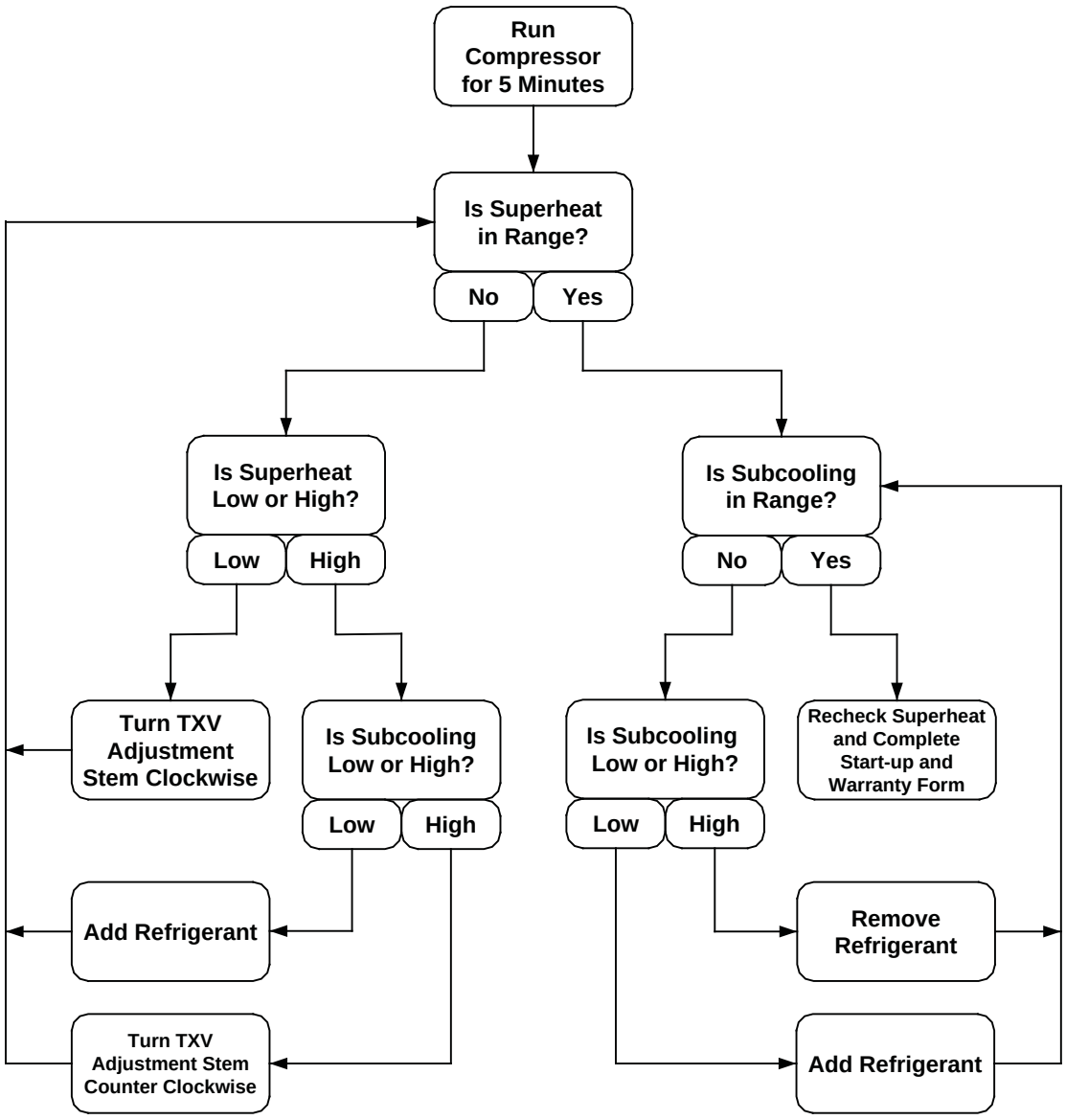
Due to varying installation conditions/applications and to optimize performance, proper refrigerant charge and thermal expansion valve (TXV) adjustment must be confirmed.

After checking compressor rotation, choose a circuit to be tested first. Connect test equipment to monitor the suction line and liquid line temperatures simultaneously. Place a manifold gauge set on the suction line and liquid line then start the compressor. As long as the suction pressure is high enough to prevent the low pressure switch from tripping, run the compressor for five minutes.

Verify proper subcooling. This is accomplished by subtracting the liquid line temperature from the saturated condensing temperature. The saturated condensing temperature is found by converting the liquid line pressure reading on the manifold gauge to the related temperature. The normal subcooling temperature range at the condenser is 5-15°F, BUT for total accuracy, follow the charge recommendations found in the selection program. If subcooling is too low, then refrigerant must be added to the system. Add charge and wait five minutes before checking results. If subcooling is too high, then refrigerant must be removed from the system.

Verify proper superheat by subtracting the saturated evaporative temperature from the suction line temperature. The saturated evaporative temperature is found by converting the suction pressure reading on the manifold gauge to the related temperature. The proper superheat temperature range is 6-18°F at normal operating conditions (typically 44°F leaving chilled water temperature). If superheat is low, this may indicate that the expansion valve is overfeeding. To adjust the expansion valves, turn the adjustment stem clockwise. This will cause the superheat to rise. Wait five minutes before checking the results of this adjustment. Repeat until the desired superheat is achieved.

Once adjusted, also check the discharge gas superheat (DGSH) to confirm reading is not less than 50°F and the discharge line temperature is not more that 220°F. To check discharge gas superheat, first obtain the saturated condensing temperature by converting the discharge pressure to saturated refrigerant temperature using a pressure temperature chart. Next, measure the discharge line temperature 6 to 10 inches from the compressor. Subtract the saturated condensing temperature from the discharge line temperature to find the discharge gas superheat. If the DGSH is below 50°F, liquid refrigerant is still present in the suction gas vapor returning to the compressor. The TXV will require additional clockwise adjustment to raise the discharge gas superheat into the acceptable range.



Caution: Do not charge to achieve subcooling temperature when the expansion valve is overfeeding. If the expansion valve is overfeeding, readings may still indicate low subcooling and low superheat, but circuit may not be undercharged.

Startup Documentation

All startup paperwork and documentation must be submitted to ClimaCool. Future warranty claims cannot be processed without a completed Startup and Warranty Registration form on file (see page 50).
Note: Electronic version of the startup forms are available on www.climacoolcorp.com in the Service page.

Water Testing

Extract three water samples from each water loop, Hot Water/Condenser, Chilled Water/Evaporator using the bottles provided (three (3) bags; each bag containing three (3) bottles) from the water sample test kit. Confirm that the sample bottles are filled to the top leaving no air in the bottles. All the sample bottles must have labels completed per instructions included with the bottles. Ship the bottles immediately to the appropriate water testing laboratory per the instructions.

Once installation is complete, check the following:

- All refrigerant and electrical connections must be tight. Tighten all loose wire terminal connections that may have loosened in shipping.
- The compressor oil is at the proper level in the oil sight glass for the compressor being used (See page 56 - Compressor Information).
- Check initial settings of thermostats and pressure controls. All adjustable pressure controls and valves will require a final adjustment with the use of a compatible gauge.
- Check the control panel to be sure that all wiring is in accord with the unit wiring diagram.
- Check all three phase motors for proper rotation.

Compressor Precautions

Care must be taken when initially starting a system or when the system has been off for an extended period. At this time, the compressor may contain liquid refrigerant. Simply starting the system and walking away may result in irreparable compressor damage not covered under warranty. To prevent compressor damage, one or more of the following steps may be used:

Step 1: All compressors are supplied with a crankcase heater. It must be activated 24 hours prior to starting the compressor. Be sure to check that the heater is functional. This can be done by simply touching the compressor in the area of the heater. It should feel warm to the touch. This check should be performed shortly after energizing the heater and again prior to starting the compressor. If the compressor is cold, do not attempt to start it. Locate the source of the problem, correct it and wait 24 hours before starting the compressor.

Step 2: Use a safe heat source such as a heat lamp on the compressor crankcase for approximately 1/2 hour before startup. Never use a torch or heat gun. They can raise system pressures to dangerous levels in a very short time resulting in injury to personnel as well as property damage.

Step 3: After following steps 1 and 2 above, the operator can be relatively certain that no liquid refrigerant is left in the compressor. This does not mean that liquid refrigerant is not present elsewhere in the low side. To avoid compressor damage on startup, deactivate the liquid solenoid and "bump" the compressor, using the controller "POWER" switch, several times. The first two or three times the compressor is "bumped" it should not be allowed to run more than 2 or 3 seconds. Increase the run time to 5, 10 and 15 seconds over the next three "bumps". This will rapidly reduce low side pressure causing any liquid to boil off quickly. At this point it is usually safe to allow the compressor to run.

Step 4: After starting the compressor, listen for unusual sounds such as knocking. If heard, immediately stop the compressor. Do not restart until the problem is resolved. While scroll compressors are more tolerant to liquid refrigerant than reciprocating types of compressors, the above precautions should still be observed. Rotational direction is very important with three phase scroll compressors. Running these compressors with reversed rotation will result in damage not covered by warranty. When starting a three phase scroll compressor, refrigerant pressure gauges must be attached to both the high and low pressure ports provided on the system. With the compressor rotating in the proper direction, system suction pressure should drop and discharge pressure should rise to appropriate levels within a few seconds after the compressor is started. If this is not the case, the compressor is probably running in reversed rotation. Each chiller is computer tested and all three phase motors, (pumps and compressors) are in proper phase prior to leaving the factory. Turn the power off at the main disconnect and reverse any two of the three main power leads and restart. Observe the suction and discharge pressure gauges to verify that the compressor is rotating correctly. If pressures are still not appropriate, another problem may have developed which must be found and corrected prior to running the system.

Attention: It is imperative that you refer to the remote condenser IO&M inside each unit prior to start up.

⚠ CAUTION/ATTENTION	
3 PHASE SCROLL COMPRESSOR UNITS	**UNITÉ DE COMPRESSEUR SCROLL 3-PHASE**
If this unit uses a 3 Phase Scroll Compressor, the following instructions MUST BE followed: • **Unit power supply MUST BE wired in the proper sequence to avoid damage to the 3 Phase Scroll Compressor;** • **Scroll Compressors with INCORRECT rotation show the following characteristics:** - **High sound level;** - **High suction pressure and low discharge pressure;** - **Low current draw.** • **If any of the three above characteristics exist, swap two of the three supply wires at the disconnect and recheck compressor for incorrect rotation.**	**Si cet appareil utilise compresseur scroll 3-Phase, les instructions suivantes doivent être suivies:** • **L'alimentation de l'appareil doit être monté dans l'ordre correct pour éviter endommager le compresseur scroll 3-Phase** • **Compresseurs scroll avec rotation incorrecte montrent les caractéristiques suivantes:** - **Haut niveau de son;** - **Pression d'aspiration élevée et une faible pression de décharge;** - **Faible ampérage** • **Si l'un des trois éléments mentionnés ci-dessus sont remplies , échanger deux des trois lignes électriques alimen tant la interrupteur de sécurité et vérifier la rotation du compresseur.**

Startup and Warranty Registration Form (Remote Air Cooled UCR)

Sign, date and E-mail to: technicalsupport@climacoolcorp.com or
Fax: 405.815.3052 Attn: Technical Support

Ambient Temp: ____ Page 1 of 1

Project Name: _____ Contractor Name: _____

Address: _____ Address: _____

City/State _____ City/State _____

Startup Date: _____ Phone No.: _____

Module

Model No.: _____

Serial No.: _____

Chiller No.: _____ Bank No.: _____

Compressor

Model No.: _____

Serial No. 1: _____

Serial No. 2: _____

Bank Water Pressures Entering / Leaving

Evaporator: ____ / ____ ____ Δ P

Water Samples Taken: (Mark "X")

Evaporator: ☐ Yes ☐ N/A

Evaporator "flow devices" shut of chiller below approx 40% loss of flow: ☐ Yes

For initial MANDATORY water samples, bottles are provided. Follow instructions on label and mail the day sample is taken.

► All wiring terminations in module panel, safeties and compressors tightened: ☐ Yes ☐ No

► Rotation of scroll compressor is correct ☐ Yes ☐ No

Voltage / Ground

L1 _____ L2 _____ L3 _____

Low Voltage (24V): _____

Phase / Phase

L1/L2 _____ L2/L3 _____ L1/L3 _____

Compressor Circuit #1

Amperage: L1 ____ L2 ____ L3 ____	
Sight Glass Oil Level:	____
Suction Pressure (psig):	____
Suction Temperature (F):	____
Compressor Superheat (F):	____
Discharge Pressure (psig):	____
Discharge Temperature (F):	____
Discharge Gas Superheat (F):	____
Condenser Liquid Line Temperature (F):	____
Condenser Liquid Subcooling Temp (F):	____
Evaporator Entering Water Temp. (F):	____
Evaporator Leaving Water Temp. (F):	____
Condenser Entering Air Temp. (F):	____
Condenser Leaving Air Temp. (F):	____
Evaporator Pressure Differential (psig):	____

Compressor Circuit #2

Amperage: L1 ____ L2 ____ L3 ____	
Sight Glass Oil Level:	____
Suction Pressure (psig):	____
Suction Temperature (F):	____
Compressor Superheat (F):	____
Discharge Pressure (psig):	____
Discharge Temperature (F):	____
Discharge Gas Superheat (F):	____
Condenser Liquid Line Temperature (F):	____
Condenser Liquid Subcooling Temp (F):	____
Evaporator Entering Water Temp. (F):	____
Evaporator Leaving Water Temp. (F):	____
Condenser Entering Air Temp. (F):	____
Condenser Leaving Air Temp. (F):	____
Evaporator Pressure Differential (psig):	____
Software Version:	_____

► Verify Safety Setting Limits:

Low Temp:	High Pressure:	Low Pressure:
☐	☐	☐

► Verify Safety Setting Limits:

Low Temp:	High Pressure:	Low Pressure:
☐	☐	☐

Notes: _____

Rep Signature: _____ Print Name: _____

E-Signature: ☐ Check Box (Authorized Signature)

Doc: Remote AirCooledStartupWarranty UCR
SD #0016 Rev. 6.11.14

Remote Condenser Warranty Agreement

E-mail technicalsupport@climacoolcorp.com Fax 405.815.3052

Project Name : _____

Project Address: _____

_____

Installing Contractor Name (Print): _____ **Date:** _____

In the left-hand margin, indicate you have verified the accuracy of each line item by initialing each numbered item below.

_____ **1. Minimum Outdoor Temperature for Condenser Design**

The minimum winter outdoor temperature for design is ***(check one):*** +45F ❑ 20F ❑ -20F ❑
For +45F: 2-Stage Condenser fan cycling by refrigerant pressure is standard option for +45F minimum outdoor. (See Refrigeration Circuit Diagram).
For +20F: Pressure fan cycling on all stages except variable speed header fan(s) (See Refrigeration Circuit Diagram).
For -20F: Flooded head pressure control must be factory approved. All condenser fans except the header end fan will cycle on individual pressure fan cycling controls. Field installed flooded head pressure controls are required (See Refrigeration Circuit Diagram).

_____ **2. Compressor Hot Gas Bypass**

Each module can be equipped with Hot Gas Bypass on both circuits. If required, is this option in place? Yes ❑ No ❑

_____ **3. A/C Condenser Location relative to Chiller Module**

A/C Condenser is located at a HIGHER elevation relative to chiller Module Yes ❑ No ❑

_____ **4. Refrigerant Piping Geometry to Remote A/C Condenser; Vertical Distance**

A/C Condenser is located **Less than 10 feet Higher Elevation** relative to chiller module _____ **ft.**
A/C Condenser is located **Less than 30 feet Higher Elevation** relative to chiller module _____ **ft.**

_____ **5. Refrigerant Piping Geometry to Remote A/C Condenser; Horizontal Distance**

A/C Condenser is located at an aggregate total distance equal to the sum of the vertical distance from Item 4 above plus the total horizontal distance, which **SHALL NOT EXCEED 100 FEET**. Enter the distance: _____ **ft.**

_____ **6. Refrigerant Piping Geometry to Remote A/C Condenser; Oil Return "P" Traps**

The installing contractor MUST agree to the installation of the following: If the A/C Condenser is located **Greater than 10 feet Higher Elevation** relative to the chiller module, install ALL inverted "P" traps as shown on Remote Condenser Installation Guidelines drawing.

_____ **7. Refrigerant Piping Geometry to Remote A/C Condenser; Oil Return "P" Traps with Hot Gas Bypass**

If the module is equipped with hot gas bypass the installing contractor MUST agree to the installation of the following: If the A/C Condenser is located **Greater than 10 feet Higher Elevation** relative to the chiller module, install ALL inverted "P" traps with double vertical riser lines as shown on Remote Condenser Installation Guidelines drawing.

_____ **8. Refrigerant Piping Geometry to Remote A/C Condenser: Sloped for Oil Return**

The installing contractor MUST agree to the installation of the following: The discharge line to the Condenser AND the condenser liquid return line to the module must slope downward in the direction of the refrigerant flow at 1/8" per foot.

_____ **9. Refrigerant Piping Geometry to Remote A/C Condenser; Isolation and Check Valves**

The installing contractor MUST agree to the installation of the following: All necessary isolation and check valves as shown on the Remote Condenser Installation Guidelines drawing and the Refrigeration Circuit Diagram.

_____ **10. Refrigerant Piping Geometry to Remote Condenser; NO change in ^/v Direction**

Starting at the module, the discharge line to condenser and the condenser liquid return line from condenser DO NOT have any changes in the elevation direction throughout the piping runs, e.g. UP 20 feet, then DOWN 10 feet to the condenser connections. In other words, all piping runs MUST follow a Consistent Upward Path from the module to the condenser; with the only exception being 1/8" per foot sloped piping, as outlined in Item 7 above.

By signing below, the Installing Contractor warrants the accuracy of the information contained in this document. Further, by signing below, the Installation Contractor warrants that the installation work scope will include but shall not be limited to ALL of the items presented herein. Failure to provide accurate information and/or the failure to follow the above minimum installation instructions may result in an interruption in and/or cause the Warranty provided on the unit to be void. After completing this document, please e-mail: technical support@climacoolcorp.com or Fax 405.815.3052.

_____ _____

Installing Contractor **Date**

Doc: Remote condsr war agreement
SD #0025 Rev. 10.27.15

Pressure and Temperature Log

A log of temperatures and pressures should be taken regularly. Periodically conduct a visual inspection of the chiller to identify problems before they reach the point of failure. As with any mechanical system, it is necessary to conduct a series of checks to the ClimaCool chiller to confirm
correct operation.

Maintaining a Daily Log

Date							
Chiller No.							
Technician							
	Sun.	Mon.	Tue.	Wed.	Thur.	Fri.	Sat.
Chiller Water Entering Temperature							
Chilled Water Leaving Temperature							
Chilled Water Pressure Drop							
Faults: Note By Module Number							

Daily

- A daily operational log should be kept.
- Perform visual inspection.
- Record entering and leaving chiller water temperatures and pressures.
- Note any problems that may exist and immediately plan for further investigation. If repair is necessary, schedule for earliest possible date.
- Properly document all data taken.

Weekly

- Review daily log from previous week.
- Perform visual inspection.
- Properly document all data taken.
- Note any problems that may exist. Immediately plan for further investigation. If repair is necessary, schedule for earliest possible date.

Quarterly

- Check controller operating parameters and setpoints.
- Check temperature drop/rise on heat exchanger. *
- Check compressor oil level.
- Check compressor oil color.
- Check water flow rates and pressure drops across evaporator heat exchanger.
- Properly document all data taken.

* The temperature drop/rise on a fully loaded (both compressors) heat exchanger is generally 10°F. If only one compressor is running the temperature drop/rise will be approximately 5°F. Some projects are designed to have a higher temperature drop on the evaporator depending on application. Consult the bank performance sheet for the project for these values. If the temperature drop/rise is greater than the design, the heat exchanger may need to be back flushed or the strainer may need to be cleaned.

Annual

- Back flush all heat exchangers. If fouling is suspected use only ClimaCool recommended de-scalers (see page 53 - Chemical Clean In Place Washing).
- Remove and clean all waterside strainers.
- Manually operate all waterside isolation valves, if provided, on each module.
- Check all electrical connections for tightness.
- Perform leak check on all refrigerant circuits.
- Check all header piping couplings for tightness.
- Check oil level and color on each compressor.
- Check and test all refrigerant safeties for proper operation.
- Check all peripheral systems for proper operation.
- Check and test *CoolLogic* master control system.
- Verify set points, sensors and general control configuration.
- Properly document all data taken.

Remote Condenser

Air cooled condensing units require a periodic cleaning and this can be accomplished by a brush, vacuum cleaner, or pressurized air stream of commercially available coil cleaning foam. All of the condenser fan motors have sealed bearings. The only acceptable service to these bearings is replacement.

Draining

When performing standard maintenance procedures such as flushing a heat exchanger, it will be necessary to close off a section of a module. This can easily be done if factory mounted water isolation valves are provided. Access to a floor drain is helpful when performing standard maintenance procedures.

Back Washing

It may become evident from the recorded weekly log data that the performance of the chiller is gradually degrading. This could be due to a buildup of debris or sludge obstructing the free passage of flow through the heat exchangers. This debris can be removed by a back washing process, which involves the introduction of a forced, violent, backwards flow through the heat exchanger, using a carefully formulated flushing solution. To be effective, this back flow should be slightly higher than the normal flow, and in the opposite direction. The difficulties and practicality of this method depends on the back wash pumping system itself. Another method would be to back flush each heat exchanger using city water as opposed to system water (see Figure 25 on page 54 – City Water Cleaning Arrangement). The back washing procedure is accomplished by isolating each individual heat exchanger and introducing the city water using a connection hose to the ¾" service port to flow in an opposite direction from the normal heat exchanger flow direction. On the opposite ¾" service port, connect a drain hose to run to a suitable floor drain. Continue back flow until all debris is removed. **WARNING: Water valves must be re-opened after flushing is complete.**

Chemical Clean In Place Washing Without Water Isolation Valves

Chemical clean in place washing will typically provide the best debris removal, even from severely clogged heat exchangers. In order to clean the heat exchangers for modules **WITHOUT** water isolation valves, it will be necessary to mechanically and electrically isolate each module separately from the bank of modules. The rest of the chiller modules will need to be disabled during this cleaning procedure, as the flow through the main bank header will be interrupted. The cleaning tank, pump and pump strainer should be arranged in the manner shown in Figure 26 on page 54 - In Place Cleaning Arrangement. The flow of the cleaning is arranged in the opposite flow to the normal operational direction. Connection points are provided using the ¾" service ports at each heat exchanger. The cleaning solution used can be either a detergent or hot water to remove particles and simple cleaning. If correct water treatment has been implemented, this should provide adequate cleaning for most situations. The solution can be pumped through the heat exchangers and allowed to "soak" for a time and then pumped again. Upon successful cleaning of a module, proceed to isolate a second module separately from the bank to repeat the cleaning process.

Chemical Clean In Place Washing With Water Isolation Valves

Chemical Clean in place washing will typically provide the best debris removal, even from severely clogged heat exchangers. It is only necessary to mechanically and electrically isolate one chiller module at a time. The rest of the chiller modules can continue to operate to satisfy the cooling load required. The cleaning tank, pump and pump strainer should be arranged in the manner shown in Figure 26 - In Place Cleaning Arrangement. The flow of the cleaning is arranged in the opposite flow to the normal operational direction. Connection points are provided using the ¾" service ports at each heat exchanger. The cleaning solution used can be either a detergent or hot water to remove particles and simple cleaning. If correct water treatment has been implemented, this should provide adequate cleaning for most situations. The solution can be pumped through the heat exchangers and allowed to soak for a time and then pumped again. If it is required to remove carbonates, then an acidic wash should be used. A 2% solution of phosphoric or sulfamic acids in pure water are generally acceptable. These acid solutions should only be allowed to circulate within the heat exchanger for 10 to 15 minutes, followed by a thorough pure water flush for 10 to 15 minutes. **Hydrochloric or sulfuric acids must not be used.** In any case, consult the chemical supplier to establish the correct formulation and handling process. The materials, which will be exposed to the wash, are stated on page 23 – Water Treatment.

Once the washing is complete, the solution should be flushed out completely by pumping clean, fresh water through the chiller. To achieve a reasonable level of dilution, it may be required to change the water several times. After cleaning, the water quality and water treatment should be confirmed.

Figure 25 - City Water Cleaning Arrangement

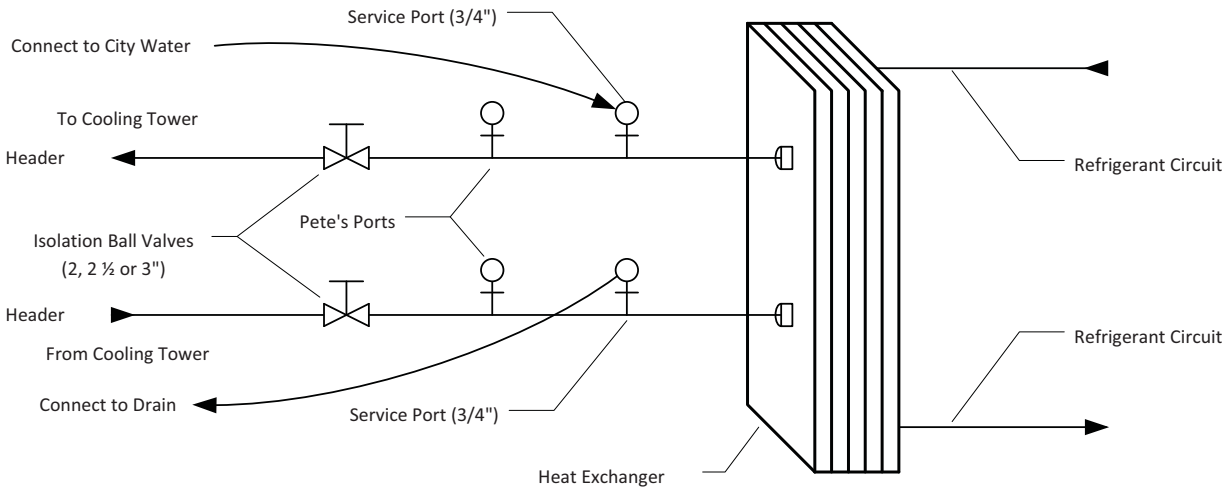
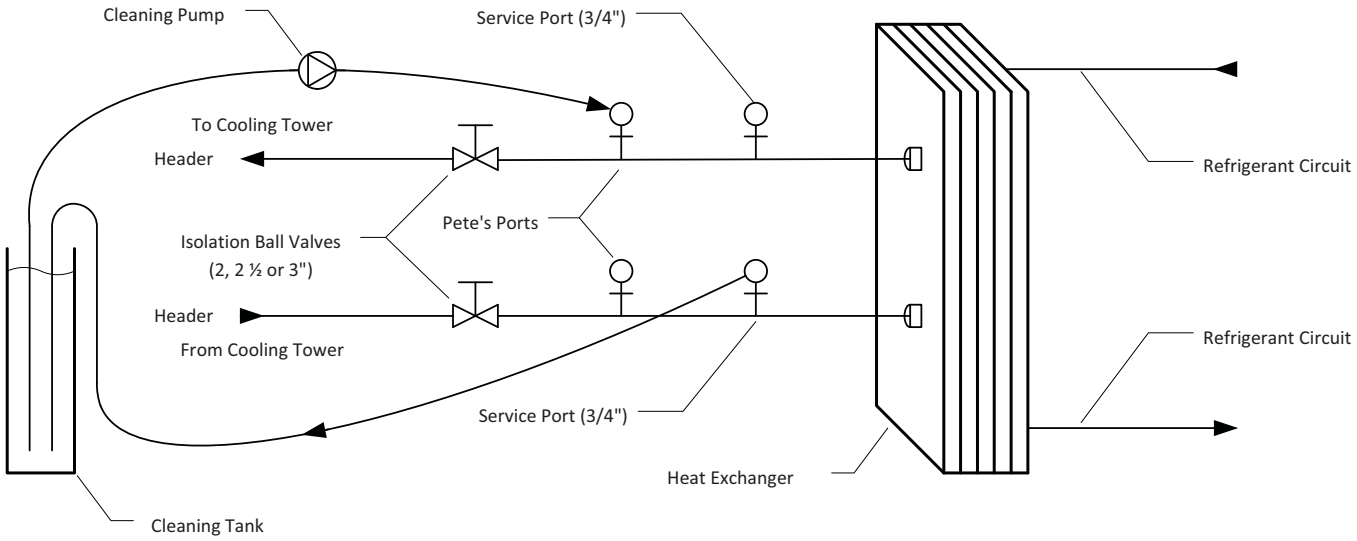


Figure 26 - In Place Cleaning Arrangement



Notes:

1. When backwashing, be sure to flush in opposite direction of flow.
2. Be sure to open all manual valves before unit is put back into operation.

Voltage Limitations		
The following voltage limitations are absolute and operation beyond these limitations may cause serious damage to the compressor.		
Nominal Voltage	**Minimum Voltage**	**Maximum Voltage**
208/230/3/60	187	253
460/3/60	414	506
575/3/60	518	632

Water Flow Data	UCR030	UCR050	UCR070
Minimum Evaporator Water Flow (GPM)	30	45	60
Maximum Evaporator Water Flow (GPM)	165	250	250
Minimum Leaving Evaporator Water Temperature (No Glycol)(°F)	40	40	40
Minimum Leaving Evaporator Water Temperature (with Glycol)(°F)	20	20	20
Maximum Leaving Evaporator Water Temperature (°F)	60	60	60
Minimum Evaporator Water Differential Temperature (°F)	5	5.4	5.9
Maximum Evaporator Water Differential Temperature (°F)	20	20	20
Minimum Entering Condenser Air Temperature (°F)	-20	-20	-20
Maximum Entering Condenser Air Temperature (@ 20FTD)(°F)	120	120	120
Maximum Entering Condenser Air Temperature (@30FTD)(°F)	110	110	110
Minimum Condenser Temperature Differential (TD)(°F)	20	20	20
Maximum Condenser Temperature Differential (TD)(°F)	30	30	30
Equipment Room Data	**UCR030**	**UCR050**	**UCR070**
Minimum Equipment Room Ambient Temperature (°F)	55	55	55
Maximum Equipment Room Ambient Temperature (°F)	105	105	105
Compressor Operating Limitations	**30, 50, 70 Tons**		
Maximum Compression Ratio	5.7:1		
Minimum Operating Pressure Differential (PSI)	85		
Maximum Operating Pressure Differential (PSI)	475		
Minimum Discharge Pressure (PSIG)	215		
Maximum Discharge Pressure (PSIG)	590		
Minimum Suction Pressure (No Glycol)(PSIG)	105		
Maximum Suction Pressure (PSIG)	175		
Minimum Suction Pressure (With Glycol)(PSIG)	70		
Maximum Discharge Temperature (°F)	265		
Minimum Subcooling (°F)	5		
Maximum Subcooling (°F)	15		
Minimum Superheat at Compressor (°F)	6		
Maximum Superheat at Compressor (°F)	12		
Maximum Oil Temperature (Max) (°F)	200		
Maximum Saturation Discharge Temperature (°F)	145		

Compressor Information

Model UCR uses scroll compressors which are highly efficient and extremely reliable. The information contained in this manual will be useful for their care.

Compressor Rotation

All scroll-type machines are unidirectional and will only compress in one direction. Operating in the reverse rotation can be destructive and will be indicated by a load operating noise together with a lack of compression.

Compressor Anti-Short Cycle Timer

Built into the logic of the *CoolLogic* Control System is an anti-short cycle timer which will prevent the compressors from restarting immediately following a compressor shutdown. Minimum on 75 seconds and minimum off 200 seconds.

Compressor Lubrication

The compressor operates on a sealed system and oil can only be lost if leak occurs. There are few cases when oil will need to be added to a machine in normal operation.

Oil Type

The oil in scroll compressors will be either polyolester type oil (POE) or polyvinyl-ether type oil (PVE). Both refrigerant oils require special handling and should be protected from contamination. They are extremely hygroscopic and will absorb moisture rapidly from the air. It is strongly recommended to store and dispense both oils from sealed metal cans. **Note: Refer to compressor name plate for proper oil type. Different oils cannot be mixed.**

Oil Levels

The oil level in the compressor should be checked with the compressor running. The compressor oil level may vary during operation and particularly on the startup. The normal operating compressor oil level should be between ⅓ and ½ of the sight glass. During operation, a certain amount of oil is carried out into the refrigerant system. The system has been designed to bring the oil back to the compressor. If the level in the sight glass falls, it may be due to the operating conditions and enough time should be given to allow the oil to return before more oil is added. This could take up to six hours of operation. The compressor should not be allowed to operate with less than ⅛ of the sight glass for longer than four to six hours.

Adding Oil

The compressor must never be ran in a vacuum. A suitable hydraulic pump should be used to add oil and reserved for this process. **It is imperative that oil type be verified prior to adding to a compressor.** Oil should only be added to a compressor while it is operating to observe valid oil sight glass levels. Oil is pressure-injected either into a gauge connection on the suction line or injected into the oil process port at the bottom of the compressor housing. Only enough oil should be added to raise the level above the ⅓ sight glass point.

ATTENTION

To avoid the release of refrigerant into the atmosphere, the refrigerant circuit of this unit must be serviced only by technicians who meet local, state and federal proficiency requirements.

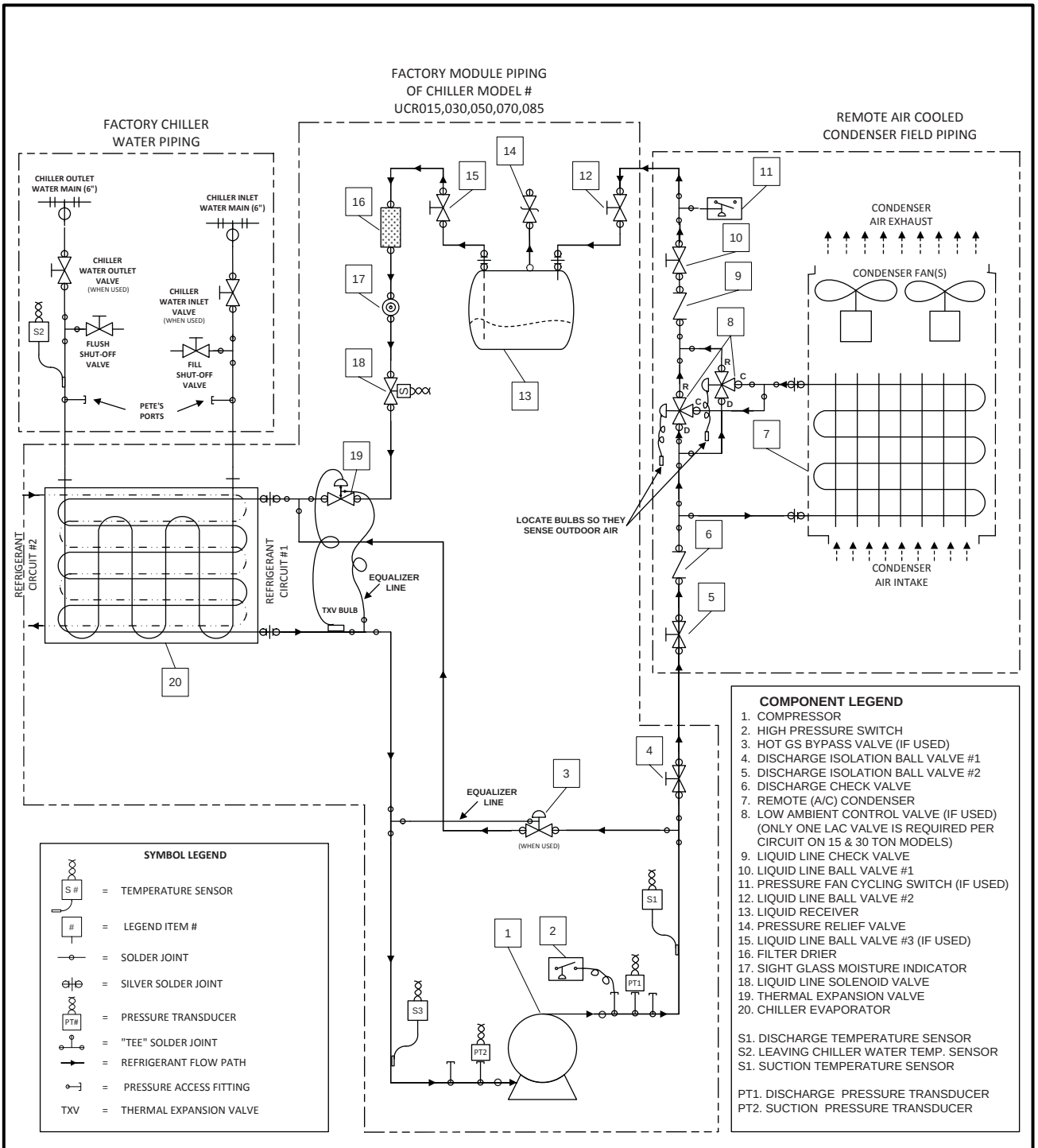
All refrigerant discharged from this unit must be recovered WITHOUT EXCEPTION. Technicians must follow industry accepted guidelines and all local, state and federal statues for the recovery and disposal of refrigerants.

If a compressor is removed from the unit, system refrigerant circuit oil will remain in the compressor. To avoid leakage of compressor oil, the refrigerant lines of the compressor must be sealed after it is removed.

⚠ CAUTION/ATTENTION

3 PHASE SCROLL COMPRESSOR UNITS	UNITÉ DE COMPRESSEUR SCROLL 3-PHASE
If this unit uses a 3 Phase Scroll Compressor, the following instructions MUST BE followed: • Unit power supply MUST BE wired in the proper sequence to avoid damage to the 3 Phase Scroll Compressor; • Scroll Compressors with INCORRECT rotation show the following characteristics: - High sound level; - High suction pressure and low discharge pressure; - Low current draw. • If any of the three above characteristics exist, swap two of the three supply wires at the disconnect and recheck compressor for incorrect rotation.	Si cet appareil utilise compresseur scroll 3-Phase, les instructions suivantes doivent être suivies: • L'alimentation de l'appareil doit être monté dans l'ordre correct pour éviter endommager le compresseur scroll 3-Phase • Compresseurs scroll avec rotation incorrecte montrent les caractéristiques suivantes: - Haut niveau de son; - Pression d'aspiration élevée et une faible pression de décharge; - Faible ampérage • Si l'un des trois éléments mentionnés ci-dessus sont remplies , échanger deux des trois lignes électriques alimen tant la interrupteur de sécurité et vérifier la rotation du compresseur.

Refrigeration Circuit Diagram



CLIMACOOL THE ULTIMATE CHILLER SOLUTION	TITLE	REFRIGERATION CIRCUIT DIAGRAM (CIRCUIT #1 OF 2 SHOWN)			
REVISED	DESCRIPTION	REMOTE AIR-COOLED MODULAR CHILLER CLIMACOOL Model # UCR015,030,050,070,085			
REVISED	SIZE A	ClimaCool Corp. RefrigDiag-UCR.vsd		DWG NO RefriDiag-UCR	REV
APPROVED / DATE 08/07/2014 / FILENAME REFRIGDIAG UCR (080714).VSD	SCALE NONE	DRAWN BY Engineering	DATE 08/07/2014	SHEET 1 OF 1	

Conforming to local and national codes is the responsibility of the service technician or installing contractor. The service technician should be familiar with the following codes:

- ASHRAE Standard Safety Code for Mechanical Refrigeration, ANSI/ASHRAE 15-1978
- American National Standard Code for Pressure Piping, ANSI B31.5-1974

Factory Tested

ClimaCool modular chillers have been pressure-tested, evacuated and both refrigeration circuits pressurized with 50 psig of dry nitrogen prior to shipment. The split system chillers require interconnecting refrigeration piping between the ClimaCool UCR modular remote air cooled chiller and the remote condenser section. The condenser section provided by ClimaCool is typically a remote air-cooled condenser configuration. Contact the factory for guidelines for customer supplied, field integration to other permissible condenser types, such as evaporative condenser configurations. The refrigerant charge will be weighed-in in the field based on the condenser configuration and condenser model. The ClimaCool UCR030 model is equipped with a 72 pound liquid receiver capacity per compressor circuit. The UCR050 and UCR070 models have an 84 pound liquid receiver installed per circuit. All ClimaCool UCR models MUST be charged with R-410A refrigerant. Field installation of additional receiver capacity may be required depending on the refrigerant retaining volume of the remote condenser and interconnecting piping. After the total refrigerant amount is charged into each circuit (weighed in using an appropriate refrigeration scale), the resulting weight should be recorded on the UCR module data plate for future reference. See Refrigerant Charging Procedure – page 60 - 61 for specific charging guidelines. Also refer to the job specific submittal data for the appropriate refrigerant charge amount.

UCR Modular Chiller Refrigeration Piping Connections

The discharge and liquid line stub-out connections at the UCR module section are equipped with shut-off valves with capped leads. Never uncap these leads without checking the shutoff valves to be sure that they are fully closed and the units are ready for piping. All scroll compressors in ClimaCool UCR modules are equipped with POE refrigeration oil. Systems with compressors using POE oils must be kept closed at all times except when the interconnecting piping is being directly installed. POE oils are extremely hygroscopic in nature and will absorb an undesirable amount of moisture from normal ambient air within a few minutes.

Copper Tubing, Brazing and System Reprocessing Recommendations

Copper tubing must be refrigeration grade (ACR type "L"). Be sure to install appropriate copper fittings rated for ACR applications. Never leave refrigerant lines open when they are not directly being installed. Never rely on the last refrigerant connection joint at a specific section (UCR module or condenser section) to provide structural support for the interconnecting piping. Line pulsation may occur at start-up and shut down of scroll compressors. Additional line support may be required to prevent vibration transmission or movement in the line. Ensure that all interconnecting piping is properly and independently braced at 7 feet minimum intervals, and within 2 feet from each section's final connection location, to prevent joint fracture due to line vibrations or liquid hammering.

Use 15% silver-phosphorus braze filler rod when brazing copper-to-copper joints. When brazing copper-to-brass joints, apply "sta-silv" brazing paste (or equivalent) sparingly to the joint areas, and use 45% silver-phosphorus braze filler rod. Always purge a generous flow of dry nitrogen (approximately 10 CFH) through the lines while brazing to prevent internal scaling of copper oxide on heated copper surfaces exposed to air.

When sizing the interconnecting refrigerant lines, never use the stub-out sizes at the UCR module section as the determining factor. For proper operation, all discharge and liquid lines must be sized in accordance with the recommendations provided in the following piping sections. After installing the interconnecting piping, proper system evacuation and reprocessing guidelines are provided in the Refrigeration System Reprocessing section of the Split System Interconnecting Piping on page 59.

Liquid Line Piping Recommendations

All liquid lines should be kept as short as possible, and the line sizing is determined to provide for a low-pressure drop to prevent liquid line flashing. There should always be a gradual negative elevation change when traversing from the remote condenser location to the UCR module section. Avoid any reversing elevation changes throughout this liquid line run. Horizontal liquid lines should be sloped downward in the direction of refrigerant flow at a pitch of 1/8" per foot. The total equivalent distance between the condenser and the UCR section (including allowances for U-bends and 90° elbows) should not exceed 100 feet. Avoid routing liquid lines through heated spaces which may result in undesirable flash gas generated at the TXV inlet. Avoid insulating liquid lines.

Discharge Line Piping Recommendations

All discharge lines should be kept as short as possible and the line sizing is determined to provide for a low-pressure drop. There should always be a gradual negative elevation change when traversing from the remote condenser location to the UCR module section. Avoid any reversing elevation changes throughout this discharge line run. Horizontal discharge lines should be sloped downward, in the direction of refrigerant flow, at a pitch of 1/8" per foot. **The total equivalent distance between the condenser and the UCR section (including allowances for U-bends and 90° elbows) should not exceed 100 feet.** Vertical discharge lines greater than 5 feet require a P- trap at the base of the riser as well as an inverted trap at the top of the discharge line run (See Remote Condenser and UCR Chiller Installation Diagram – page 36). The inverted trap should be the highest point in the discharge line. Additional P-traps should be added at every 15 feet of additional vertical rise in the discharge line. **The maximum vertical distance between the lower UCR module section and the higher remote condenser location should be less than 50 feet.** UCR modules equipped with optional compressor unloading by means of hot gas bypass require the use of double risers for vertical discharge line runs (See Remote Condenser and UCR Chiller Installation Diagram – page 36).

Remote Condenser Piping Connections

The discharge and liquid line connections at the remote condenser section are equipped with capped, stub-out tubes. It is mandatory that isolation ball valves and check valves are field installed at both the inlet and outlet connections locations of each remote condenser. These ball valves and check valves are shipped loose with every ClimaCool UCR split systems chiller package. Refer to Remote Condenser and UCR Chiller Installation Diagram – page 36 for schematic representation of the isolation and check valve functions.

Leak Testing – Refrigeration Side

Prior to startup, the entire system should be leak tested using electronic leak detection. Carefully leak test both factory and field made joints including condenser coils. Although each unit is factory leak tested, joints may loosen and sometimes break during shipment.

Refrigeration System Reprocessing

Once a refrigeration system has been exposed to atmosphere for any length of time (several minutes to an hour), it is imperative that the system undergo a thorough evacuation to remove moisture and non-condensibles. With split systems, provisions should be made to evacuate the interconnecting discharge and liquid lines prior to opening the shutoff valves provided in each section. Non-condensibles (air, nitrogen trace gases, etc.) trapped in the systems will elevate condensing pressures. This will result in inefficient system operation and potentially cause nuisance head pressure trips. Moisture in the system can cause chemical reactions with many POE oil additives resulting in the formation of undesirable acids which corrode the system.

IMPORTANT: NEVER start the compressors while in a vacuum. Serious damage can occur to the motor windings in this condition. Only use a vacuum pump of known reliable operation, specifically, one that can achieve a vacuum level of 100-200 microns with the pump service port closed. Prior to evacuation, make sure all refrigerant isolation valves are OPEN and that the main liquid line solenoid valves are energized (apply 24VAC to the solenoids coils using a 75VA transformer or equivalent). Alternatively, the operator may choose to manifold multiple evacuation hoses together and connect vacuum lines to refrigeration access fittings on both sides of the liquid line solenoid valves. Ensure that the vacuum pump is connected to both high and low sides of the system with copper tube or vacuum hoses. A vacuum gauge capable of reading vacuum levels in microns (with readability as low as 100 microns) must be connected to the system, preferably close to the compressor module. **Ordinary gauges from a standard charging manifold are unacceptable!**

Operate the vacuum pump until a vacuum level below 500 microns is achieved. Close the vacuum pump service valves to isolate the pump from the refrigeration system. This initiates a "vacuum decay test" by monitoring system pressure rise for a time period of 15 minutes. The refrigeration system vacuum gauge should not rise more than 200 microns within this 15 minute period. Pressures that rise beyond this decay criteria indicate the existence of a leak, or more likely, indicate the presence of moisture or non-condensable in the system. If a leak is suspected, it must be identified and corrected before proceeding with the evacuation. If moisture contamination is the suspected problem, rapid evacuation processes may serve only to freeze the moisture inside the system, allowing only for the slow process of sublimation to remove all of the water. Then it is recommended to apply heat lamps to the compressor and receiver to elevate the temperature inside the system above the freezing point while evacuating. Successive dry nitrogen fills and purges can prove equally beneficial in removing excessive moisture from a system.

ATTENTION

To avoid the release of refrigerant into the atmosphere, the refrigerant circuit of this unit must be serviced only by technicians who meet local, state and federal proficiency requirements.

All refrigerant discharged from this unit must be recovered WITHOUT EXCEPTION. Technicians must follow industry accepted guidelines and all local, state and federal statues for the recovery and disposal of refrigerants.

If a compressor is removed from the unit, system refrigerant circuit oil will remain in the compressor. To avoid leakage of compressor oil, the refrigerant lines of the compressor must be sealed after it is removed.

Refrigerant Charging

Once leak testing and evacuation are complete, refrigerant charging may commence. Always refer to the unit nameplate and guidelines within this section in order to establish the quantity of refrigerant required. **IMPORTANT:** Always introduce refrigerant into a system using a charging manifold with gauges, along with a refrigerant scale to accurately weigh the refrigerant cylinder throughout the entire charging process. **As noted in an earlier section, the end user and installing contractor must provide and field charge refrigerant R-410A.**

CAUTION/ATTENTION	
Never dispense refrigerant amounts into the receiver which may exceed its liquid holding capacity. The refrigeration system in our model UCR030 is equipped with 72 pound receivers (at 80% full). Both refrigeration systems in models UCR050 and UCR070 are equipped with 84 pound receivers (at 80% full).	Jamais distribuer montants réfrigérant dans le récepteur, qui peut dépasser sa capacité de rétention liquide. Le système de réfrigération dans notre modèle UCR030 est équipé de 72 livres récep-teurs (à 80 % complet). Les deux systèmes de réfrigéra-tion pour les modèles UCR050 et UCR070 sont équipés de récepteurs de 84 livres (à 80 % complet).

As much refrigerant as possible should be charged in this manner until the receiver holding capacity is achieved, or system pressures equalize preventing additional refrigerant from being added. Even if system equalization occurs, it is still possible to inject liquid refrigerant into the system by placing the refrigerant cylinder into a luke warm water bath. **NO WARMER THAN 110˚F.**

⚠ WARNING/AVERTISSEMENT	
Cylinder pressures must be closely monitored whenever a refrigerant cylinder is being heated in ANY manner. Allowing pressures to exceed those for which the cylinder is rated may result in cylinder rupturing, personal injury and/or property damage or even death.	Pression des cylindres doit être surveillée étroitement chaque fois qu'une bouteille de réfrigérant est chauffe de toute manière. Permettant des pressions supérieures à celles pour lesquelles le cylindre est évalué peut entraîner dans le cylindre une rupture, des blessures corporelles ou dommages matériels ou même la mort.

Once system and refrigerant cylinder tank pressures have equalized, it will be necessary to finish the refrigerant charging process by gradually metering small bursts of liquid refrigerant into the suction line of the compressor while it is operating.

⚠ CAUTION/ATTENTION	
Never attempt to vapor charge into the system high side, whether the compressor is ON or OFF. This may result in refrigerant flowing from the refrigeration system into the charging cylinder. Cylinders can quickly be over pressurized causing them to rupture with resultant injury or property damage.	Ne jamais essayer de vapeur frais dans le côté élevé du système, si le compresseur est ON ou OFF. Cela peut entraîner dans le réfrigérant qui se jettent dans le système de réfrigération dans le cylindre de charge. Les bouteilles peuvent être rapidement sursous la pression obligeant à rompre avec les blessures qui en résultent ou dommages matériels.

ATTENTION
Never dispense liquid refrigerant into the suction port of a compressor while it is not running. If adding additional refrigerant is necessary, you must gradually meter liquid refrigerant into suction port of the compressor ONLY WHILE THE COMPRESSOR IS RUNNING and only through a metering valve.

The only exception to the above recommendations to meter in liquid refrigerant into the suction line is the following: Providing the ENTIRE contents of the refrigerant cylinder is intended to be added to a refrigeration system. It is perfectly acceptable to vapor charge from this cylinder into the compressor suction line until all refrigerant is injected.

The amount of refrigerant required in a system depends on the following:

- Model size of the equipment.
- The distance of the interconnecting lines between the UCR module and the condenser section.
- The specific head pressure control methods used for low ambient operation.
- What (if any) fan cycling controls are supplied with the condenser.
- Whether optional compressor unloading is possible using hot gas bypass.

Refer to Tables 10 and 11 on page 61 as a guideline to determine the total amount of additional refrigerant at initial startup which accommodates all dependant variables listed above. Although the charge in the table refers to a winter charge, it is suitable for both winter and summer operation. The total charge amount is also listed in the job specific submittal data. The most accurate charge will appear in the project submittals.

Table 11 – UCR030 Additional Refrigerant

Model #	Minimum Outdoor Temp.	Condenser Fan RPM	Foot of Liquid Line (⅞" OD) (External)	Total Winter Charge lbs R-410A
UCR(030)	45F	1140	50	**74.8**
	+25F	1140	50	**81.8**
	-20F	1140	50	**88.8**
	45F	1140	75	**77.8**
	+25F	1140	75	**84.9**
	-20F	1140	75	**91.9**
	45F	1140	100	**80.9**
	+25F	1140	100	**87.9**
	-20F	1140	100	**94.9**
	45F	1140	125	**119.1**
	+25F	1140	125	**122.2**
	-20F	1140	125	**125.2**
	45F	1140	150	**130.8**
	+25F	1140	150	**133.8**
	-20F	1140	150	**136.9**

Table 12 – UCR050/070 Additional Refrigerant

Model #	Minimum Outdoor Temp.	Condenser Fan RPM	Foot of Liquid Line (1 ⅛" OD) (External)	Total Winter Charge lbs R-410A
UCR(050/070)	45F	1140	50	**124.5**
	+25F	1140	50	**136.0**
	-20F	1140	50	**147.5**
	45F	1140	75	**130.5**
	+25F	1140	75	**142.1**
	-20F	1140	75	**153.6**
	45F	1140	100	**136.6**
	+25F	1140	100	**148.1**
	-20F	1140	100	**159.7**
	45F	1140	125	**188.2**
	+25F	1140	125	**194.3**
	-20F	1140	125	**200.3**
	45F	1140	150	**205.6**
	+25F	1140	150	**211.7**
	-20F	1140	150	**217.7**

General

Factory-assembled and wired remote air cooled chiller. Chiller consists of two compressors, one evaporator, safety and operational controls. The modular remote air cooled chiller shall incorporate one or more modules with two independent refrigerant circuits. Modules shall be capable of independent operation powered by a field installed fused disconnect switch (or equivalent module circuit breaker) supplied by others, so that any one module can be shut down for repair without interrupting the remaining remote air cooled chiller modules in operation.

Basic Construction

The frame design shall consist of heavy gauge galvanized steel with 3 mil powder coat paint finish baked at 350° for resilience in transport and installation. The module must have a low center of gravity, detachable schedule 40 carbon steel pipe water headers, designed to connect to adjacent modules through the use of 300PSI rated grooved couplings, base with cutouts for forklifts or pallet jacks and the frame must be designed to fit through a standard 36" doorway.

Refrigeration Circuit

All refrigeration circuits shall contain R-410A non-ozone depleting HFC. Each independent circuit shall consist of a scroll compressor, thermostatic expansion valve for refrigerant metering, liquid line solenoid valve, liquid receiver, refrigerant isolation valves, sight glass, filter drier, and high and low pressure controls and safety controls. The modular remote air cooled chiller bank must be able to produce chilled water even in the event of a failure of one or more refrigerant circuits.

Evaporator

Each evaporator shall be highly efficient, refrigerant to water, dual circuited, brazed plate heat exchangers constructed of 316 stainless steel; designed, tested, and UL stamped in accordance with ASME Section VIII pressure vessel code for 650 psig working refrigerant pressure. The evaporator heat exchanger shall be mounted to eliminate the effect of migration of refrigerant to the cold evaporation with consequent liquid slugging on start-up. The evaporator shall be mounted on two layers of noise attenuating rubber isolation pads which also acts as a thermal barrier. The evaporator shall be wrapped with ¾ inch closed cell insulated blanket and closed cell insulation shall be provided on suction side refrigerant tubing including refrigerant to chiller heat exchanger to prevent condensation.

Compressors

Each module shall contain two scroll compressors independently circuited for redundancy. Each compressor shall be mounted with rubber isolated compressor mounts to the module base and each shall include compressor overload protection, high discharge pressure and low suction pressure cutouts.

Starter/Control Panel

Master Controllers shall be provided for individual control as well as system integration. The control shall consist of a simple two-conductor shielded daisy chain connection to allow communication between modules with minimal field wiring. The remote air cooled chiller control panel shall be a NEMA Type 1 enclosure including: power distribution block, compressor fusing, contactors, finger safe control fusing, transformer, isolation relays, status and alarm relay, 16-bit microprocessor master controller with built in native Building Automation System (BAS) communication protocols, (BACnet, LonWorks, Modbus and N2), status indicating lights showing: 1) compressor operation (on/off), 2) unit alarm status, 3) power on, two toggle switches to disable each individual compressor during start-up or troubleshooting.

Condenser – Remote Air Cooled

Remote air cooled condensers shall be constructed with galvanized steel casing, independent refrigeration circuits, 1140 RPM direct drive propeller and copper tube/aluminum fin condenser coils. The condenser coils shall have aluminum fins bonded to seamless copper tubes in a floating tube arrangement to eliminate tube sheet leaks with an aluminum fin selection spacing of 8, 10, 12 or 14 fins per inch. The condenser shall have a minimum of two refrigerant circuits, with single or dual ball bearing direct drive fan motors and equipped with PVC coated steel wire safety guards. Optional 540 or 830 rpm fan motors must be available for efficiency and/or low noise criteria applications. The remote air cooled condenser is to have a refrigerant design side working pressure of 650PSIG, pressure fan cycling control required for winter operation and flooded head pressure control valve used in conjunction with fan cycling for operation in areas with lower than 45°F ambient operation. Custom built control panel to interface with *CoolLogic* Control System.

CoolLogic Control System

Remote Master Control system shall be fully compatible with the Building Automation System via native BACnet and LonWorks, Modbus and N2 communication. Scheduling of the various compressors shall be performed by the master microprocessor based controller. A compressor run time equalization sequence is provided to ensure even distribution of compressor run time. A load limit control shall be available to limit the number of compressors that can be energized at one time.

The *CoolLogic* Control System shall monitor and report the following for each refrigeration circuit in each module:

- Discharge pressure and temperature faults
- Suction pressure and temperature faults
- Compressor winding high temperature fault
- Low evaporator leaving chilled water temperature fault

The Master Controller shall monitor and report the following system parameters for the chiller system:

- Chilled water entering and leaving temperature
- Evaporator water flow availability

Any module failure condition shall cause a "fault" indication at the Master Control Panel and shutdown of that compressor circuit with the transfer of the load requirements to the next available compressor circuit. In the case of a system "fault" the entire chiller will be shut down. When any fault occurs, the *CoolLogic* Control System shall record conditions at the time of the fault, and store the data for recall. This information shall be capable of recall through the keypad of the Master Control Panel and displayed on the 4 line by 40 character, back-lit LCD. A history of faults shall be maintained including date and time for each fault (up to the last 100 occurrences). Internal leaving chilled water reset control will insure that the parallel evaporators are operated above the freeze point for part load operation.

Factory Testing

Each remote air cooled chiller module shall be pressure-tested, evacuated and charged with nitrogen.

Automatic CS Series Strainer Package

Field installed, high quality, low maintenance stainless steel filtration systems with 60 or 80 mesh stainless steel screens will reduce operating costs and prevent nuisance condenser issues. Strainer package can be equipped with optional pressure differential alarm and automatic time flush.

Hot Gas Bypass

Factory installed on both circuits allowing unit operation below the minimum step of unloading.

Manual Strainers

Field installed strainers utilize Y-style and basket strainers of cast iron 200 psi or carbon 275 psi with 60 mesh stainless steel screens to increase efficiency and ensure long equipment life. All strainers are field installed external to the chiller bank for ease of service.

Motorized or Manual Water Isolation Valves and Flush Ports

Factory installed water isolation valves and flush ports shall provide isolation to the module for maintenance and cleaning of evaporator heat exchangers while adjacent modules continue normal operation. Both motorized and manual valves include standard ¾" fill and flush valves. Available choices include:

- One each motorized valve for evaporator with one each manual valve for the evaporator
- Two each manual valves for the evaporator

Pressure Differential Flow Sensor

Field installed to prevent operation of chiller without sufficient water flow to the evaporator and/or condenser.

Water Header Bypass

Field installed water header bypass may be utilized to prevent deadheading the pump. A bypass is mandatory with all motorized valve applications.

Options available for following:

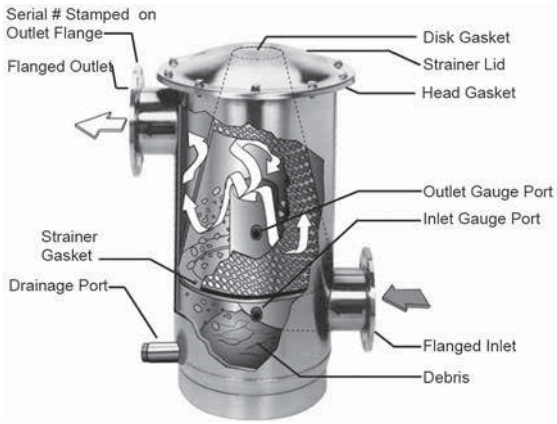
Direct Return:

- Motorized evaporator/condenser water isolation valves
- Motorized evaporator/manual condenser water isolation valves

Reverse Return:

- Motorized evaporator/condenser water isolation valves
- Motorized evaporator/manual condenser water isolation valves

Figure 27 - Stainless Steel Strainer



Safety Considerations

Prior to installation, this manual must be read carefully and all instructions understood. Personal injury or product damage can occur if the following safety precautions are overlooked or ignored. ClimaCool strongly recommends that the operator follows these safety precautions and avoids the potential hazards listed below when operating and maintaining the strainer:

1. After unpacking the strainer, carefully inspect the strainer housing, lid assembly and screen for damaged or missing parts. Contact ClimaCool's customer service department for any replacement parts.
2. The strainer should not be modified or used in a manner not consistent with the manufacture's recommendations. If there are any questions regarding its application or installations, contact ClimaCool's customer service department.
3. Absolutely under no condition should the strainer lid or pressure gauges be removed while the strainer is pressurized.
4. Standard bolted lid models should never exceed 150 psi; V-Band clamp models should never exceed 125 psi.
5. Install back-flow prevention devices (or check valves) both upstream and downstream of the strainer to prevent back flow or vacuum effects which can cause damage to the strainer housing or screen.
6. Install properly sized pressure relief valves both upstream and downstream of the strainer. This will help prevent damage to the strainer and screen in the event that water flow is stopped abruptly, or if water hammering occurs. The pressure relief valves should be set to relieve pressure at 1.2 times the strainer's maximum operating pressure (not to exceed the maximum rated pressure). Consult the ClimaCool dealer or pressure relief valve manufacturer to obtain properly sized valves for your application.

Note: Minimum 60 mesh screen is required. At no time should the internal pressure exceed the maximum rated pressure of the strainer.

Strainer Installation Recommendations

Follow the recommended guidelines below for the strainer installation:

1. The carbon steel (CS) strainer should be placed on a firm, supporting surface. Failure to do so can cause stress on the weld joints. It is recommended a concrete pad be poured under the base of the strainer. The weight of the CS strainer should not be supported by the main water lines connecting it.
2. The inlet and outlet connections should be securely fastened. The arrows depict flow direction (see Figure 27).
3. The back-mount pressure gauges should be installed in the gauge ports located on the front of the strainer body. These gauges will allow the operator to monitor the pressure differential across the strainer screen providing an indication when the strainer element is clogged and requires cleaning.
4. The CS strainer lid must be securely fastened according to the following torque specifications to ensure product safety and an adequate seal.

Torque Specifications

Clamped Lid Models: CS strainer models 3CS and 4CS have "over-center latch clamp" lid designs. The over-center clamp does not require adjustment when installing or removing the lid. The lock washer is set at the factory for proper clamp compression and normally requires no field adjustment. Minor tightening may be necessary over time. The lids are installed as follows:

1. Place the clamp around the strainer lid.
2. Latch the T-bolt with the receiver and push the latch handle towards the strainer body until the safety catch engages.

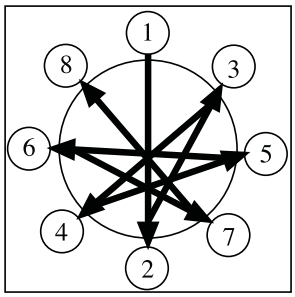
Bolted Lid Models: CS strainer models 6CS, 8CS and 10CS have "bolted" lid designs. Grade 5 zinc-plated bolts, nuts and washers are used to attach the lids to these strainers. See Table 13 for proper lid bolt size and torque rating for each strainer (see page 66). (Exercise care when tightening the lid bolts so as not to damage the strainer lid or housing).

It is important to follow the torque specifications as over-tightening may result in premature failure of the bolts. It is equally important to follow a star wheel torque pattern when tightening the lid bolts (see Figure 28). The strainer lid may not be seated down completely after the first torque sequence. A second torque sequence should be adequate to seat the lid securely to the body.

Table 13

Strainer	Bolt Size (inches)	Recommended Torque (ft. lbs)
3CS	5/16 - 18	60 - 80
4CS	3/8 - 16	15 - 25
6CS	1/2 - 13	45 - 55
8CS	1/2 - 13	45 - 55
10CS	5/8 - 11	80 - 100

Figure 28 - Recommended Torquing Sequence



Strainer Operation

Periodically, it will be necessary to flush out the debris that is collected and settles to the bottom of the strainer reservoir. CS-3 strainers must have a valve installed on the drainage port. The larger CS strainers (4CS, 6CS, 8CS and 10CS) are equipped with a flush port (or drainage port) extending inside the strainer. When it becomes time to clean the strainer, the flush port valve should be opened while the strainer is in operation (while pressurized and with water flowing). A thorough flushing of the strainer reservoir will depend upon the length of time the flush valve remains opened. This flush time will typically range from 15 to 60 seconds depending on the flow, inlet water pressure and the amount of debris collected by the strainer. As a general rule, the larger strainers will require higher inlet water pressures in order to achieve a complete flushing. For example, the 4CS model can be flushed with inlet water pressures as low as 15-20 psi, while the 6CS can be flushed with 30-35 psi. The 8CS and 10CS models should be flushed with inlet water pressures greater than 40 psi.

Note: When shutting down the chiller for extended periods of time, the strainer should be isolated and completely drained.

Strainer Element Cleaning

If the strainer assembly is equipped with optional pressure gauges, the operator will be able to monitor the pressure differential between the inlet and outlet sides of the strainer. When this pressure differential reaches 5-10 psi the strainer element may require cleaning.

Caution: Prior to dismantling the strainer for cleaning, it is imperative that the strainer assembly is isolated and completely de-pressurized.

Follow the steps below when cleaning the CS strainer element:

Step 1. (Bolted Lid Models): Remove the top of the strainer by removing the grade 5 zinc plated bolts from the lid.

Step 1. (Clamped Lid Models): Remove the top of the strainer by taking off the band-clamp assembly.*

Step 2. Lift the strainer element (conical screen) out of the strainer body.

Step 3. Carefully scrub down the strainer element with a rigid nylon brush until all matter is loosened.

Do not use a steel brush.

Step 4. Wash the strainer element off with clean water. It is preferable to use a hose with a significant amount of water pressure.

Do not use a pressure washer.

Step 5. Wash all matter from the strainer gaskets and clean the inner-ring where the bottom of the strainer element rests.

Step 6. Make sure the U-shaped gasket is fitted securely to the bottom of the strainer element. Reposition the strainer element into the body of the strainer.

Step 7. Make sure the strainer head gasket is secure on top of the strainer body. On V-band models, O-rings should be seated completely in the body flange. Reposition the strainer lid back on the strainer body. **Tighten the lid securely either with the bolts or with the band-clamp.**

* For clamped models, opening and closing is achieved without adjusting the lock nut. It is tightened at the factory to the correct compression. (Minor tightening may be necessary if the gasket loses memory over time.) To open the clamp, depress the safety latch and pull the over-center lever outward. To close the clamp, make sure the T-bolt is seated in its receiver and push the over-center lever back toward the strainer housing. **Be sure that the safety latch is engaged before putting the unit to use.**

What is Water Hammer?

Water hammer is a phenomenon that can occur in fluid systems with long pipes. Water hammer is a rapid change of pressure caused by a rapid change in velocity. If the flow has been abruptly shut off downstream, the pressure in the entire system is raised very quickly.

What Causes Water Hammer?

Any action that can cause a rapid change in the velocity of the flow can set off a water hammer, such as closing a downstream valve, pump stoppage, etc. Typically, for short lengths of pipe (below 500 feet) downstream valves that are closed within 1/10 of a second can generate water hammer.

What Can Water Hammer Do?

Pressure spikes from water hammer can raise fluid pressures to dangerously high values. These pressure spikes can cause serious damage to valves, pipes, strainers, joints, etc. The CS strainer is rated to an absolute maximum pressure of 150 psi for bolted lid models, and 125 psi for clamped lid models. A water hammer pressure spike that raises the pressure higher than the maximum rated pressure may result in strainer damage, voiding the manufacturer's warranty.

What Can I Do to Prevent Water Hammer?

There are certain precautions that can be taken to prevent or decrease the effect of water hammer. The addition of a surge tank or accumulator fitted with a suitable pressure relief valve strategically located within the water system may provide adequate protection against the effects from water hammer. Careful attention should be given to the design and control strategy for valves and pumps so the actions do not invite a water hammer.

Stainless Steel Strainer Options

Automatic Timer Flush (ATF) Package Option

The ATF-EA-1.5 flush valve package provides an automatic method for flushing away the debris collected in the strainer's reservoir. The power supply and timer controls for the valve package are housed inside the ATF control box. The ATF controls can be pre-programmed to set the flushing duration and the time interval between flushes.

System Components

1. Timer based valve controller: (see Figure 29) sets the flush duration (length of the flush) and the flush interval (time between flushes).
2. Electric ball valve: designed for dirty water use (see Figures 30 and 31).

Figure 29

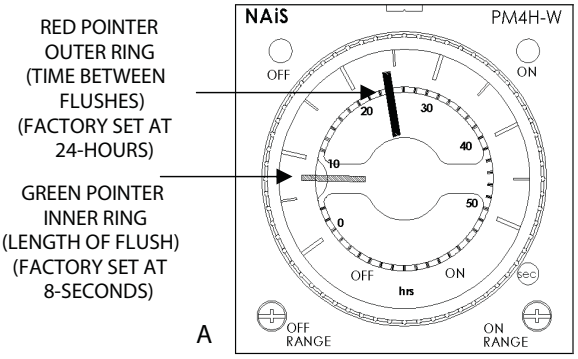


Figure 30

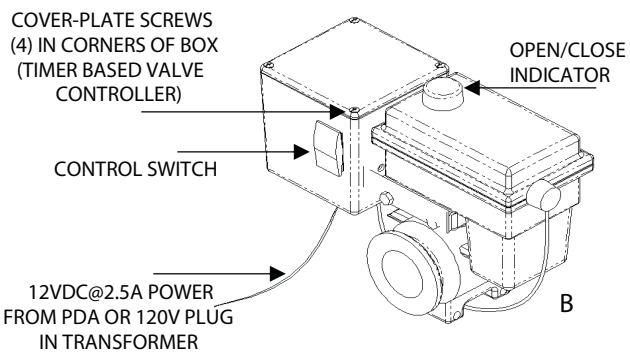
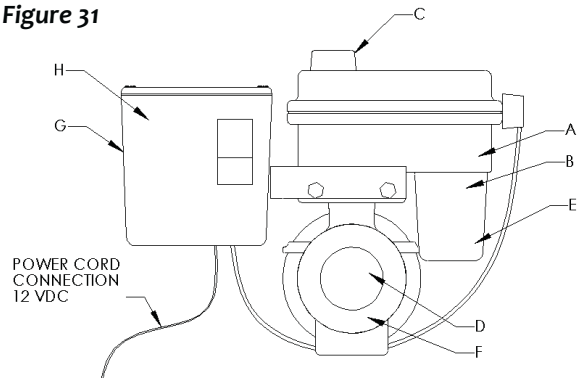


Figure 31



Valve Specifications

A. Water-resistant polypropylene motor case
B. High torque motors with perma-lube gears
C. Open and close indicator
D. Stainless steel ball valve and hardware
E. Auto reset circuit breaker
F. 90° bi-directional rotation
G. Controller case

Operation Instructions

Flush valve line must be piped to atmospheric pressure such as an open floor drain. The flush line should not undergo any changes in elevation and should be sloped downward in the direction of drainage. **Do not pipe the flush or drain line into a pressurized line.**

Note: The Automatic Timer Flush Package needs to be programmed when it is received by the end-user. The programming is simple and takes only a few moments. However, because every application has different parameters that affect the required frequency between flushes and the duration of the flush, the end-user must choose the controller's settings (refer to the specific strainer manual).

To Program the ATF Controller

1. Plug the transformer into a 120-VAC outlet.
2. Insert the 12-VDC plug coming from the transformer into the jack on the underside of the ATF box.
3. Test for power by pressing the manual flush side of the control switch (lower switch light should come on then the valve will start to open).
4. Adjust the "ON TIME" (Valve Open) by turning the inner timer ring with the GREEN POINTER clockwise to increase duration. The ON TIME RANGE is factory set at eight seconds (see Figure 29).
5. Adjust the "OFF TIME" (Valve Close) by turning the outer ring with the RED POINTER clockwise to increase duration. The OFF TIME RANGE is factory set at twenty-four (24) hours (see Figure 29).
6. Set the control switch to auto flush. The red off light on the timer will come on and the upper light on the switch will come on and stay on. During the flush cycle the on light on the timer and the lower switch light will come on.

Control Switch

Control switch flushing is initiated by pressing and holding down the manual control switch located on the front of the controller (see Figure 30). The manual flush control switch can also be used to conveniently drain the water out of the strainer before removing the conical screen element from the strainer housing. A yellow indicator arrow on top of the ATF valve will rotate in sync with the ball valve to show the valve position (open or closed). When the manual flush control switch is released, the valve will automatically close.

SAFETY FIRST! - Keep fingers away from valve opening to avoid getting caught in the moving parts. The electric motor supplied a sufficient amount of power to cause personal injury. Take precaution when handling.

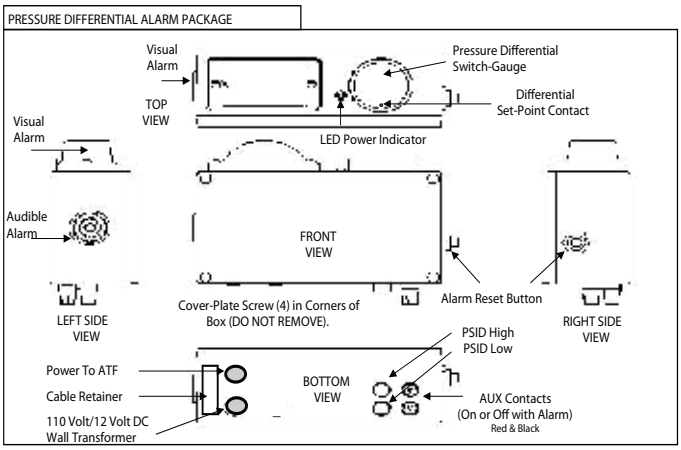
Water Resistance

The valve and controller are water-resistant, but not water-proof. Do not install below ground level where the component can be submerged in water. Only remove the cover plate from the valve controller when setting or changing the flush settings. Keep the cover tightly sealed on the unit during normal operation.

Pressure Differential Alarm Package Option

The pressure differential alarm (PDA) option continually monitors and displays the strainer's inlet and outlet differential pressure. When the strainer element (conical strainer basket) becomes significantly clogged, the pressure differential switch-gauge will trigger an audible siren and a visual flashing alarm light. These alarms are intended to alert maintenance personnel that the strainer element must be removed and cleaned (see Strainer Element Cleaning on page 66).

Figure 32



Operation Instructions

Remove the power supply and insert the connector end into the socket on the bottom of the PDA housing (See Figure 32 above) and plug the transformer into the power source. Standard systems are supplied with a 120V power supply to the primary of the transformer, with an output secondary of 12 VDC. The pressure differential switch-gauge is factory set to 7-8 psi. The CS strainer operates at a pressure differential slightly less than 1 psi during maximum flow when the strainer screen is clean. By the time the differential pressure reaches 7-8 psi, the strainer element will be significantly clogged and require immediate removal and cleaning. To adjust the pressure differential switch-gauge setting, insert a 1/16" allen wrench and rotate the differential set point contact to the desired location (see Figure 27). **Note:** It is not recommended to set the differential switch-gauge higher than 10 psi. Disabling the alarm or increasing the alarm set point could result in damage to the strainer element and allow debris to pass into the system.

When the differential set point is reached, both the audible and visual alarms will be triggered and will remain engaged until both the alarm condition is corrected and the alarm-reset button is pressed. If the alarm-reset button is pressed but the differential pressure is beyond the set point, the alarms will re-engage immediately. After the strainer is cleaned and put back in service, the differential pressure should return to 1 psi.

Auxiliary Contacts

The PDA option is equipped with a remote alarm feature. The remote alarm contacts are located at the two black and red banana clip posts (see Figure 29). The alarm can be set up in one of two ways:

1. A remote alarm signal of 12 VDC can be sent to a central monitoring station or
2. A set of auxiliary contacts will indicate a "closed" condition when the alarm activates. (Locate the Auxiliary Contact Schematic inside the PDA box by removing the four screws on the cover plate).

Water Resistance

The Pressure Differential Alarm Controller is water-resistant, but not water proof. Do not install below ground level where the box can be submerged in water. **Do not remove** the cover plate from the PDA controller. Keep the cover tightly sealed on the module during normal operation.

Table 14

Troubleshooting for ATF Package		
Problem		**Solution**
Valve is leaking past ball	• Seals damaged or worn out	• Install repair kit
	• Valve is not stopping at proper closed position	• Adjust limit switches
Valve stem leaks	• Worn stem seals	• On metal valves: tighten stem packing nut 1/2 turn. CAUTION! Over tightening stem nut could cause drag on motor and trip internal circuit breaker. May require repair kit or new valve.
Valve body leaks	• Loose body bolts or excessive operation pressure	• Check bolts and observe recommended pressure ratings
	• Defective seals	• Install repair kits or new valve
Valve hard to turn	• Swollen seals or product buildup in valve chamber	• Check valve for compatibility with product, may require valve cleaning or new valve
	• Valve bolts too tight	• Loosen bolts slightly
	• Stem nut too tight	• Loosen stem nut slightly

Pre Installation Checklist:

1. Ensure working conditions (pressure/temperature) are within the specified capacity of the product being installed. Please refer to the certified drawings to assist in determining these values.
2. Inspect all sealing surfaces to ensure gasket surfaces are free of defects (no nicks or cuts). The pipeline should also be checked for proper alignment. WYE strainers should never be utilized to realign an existing piping system.
3. Ensure that the pipeline's mating flanges are the same type as the WYE strainer being installed. Raised face flange ends cannot be mated to flat face flange ends.
4. Ensure strainer end-to-end length and installation gap are within ¼ in gap for gasket, and have sufficient clearance for easy opening of cover and screen removal.
5. If the WYE strainer is to be located on the discharge side of a pump, then a safety release valve must be installed between the WYE strainer and the pump.

Figure 33: WYE Strainer Straining Illustration

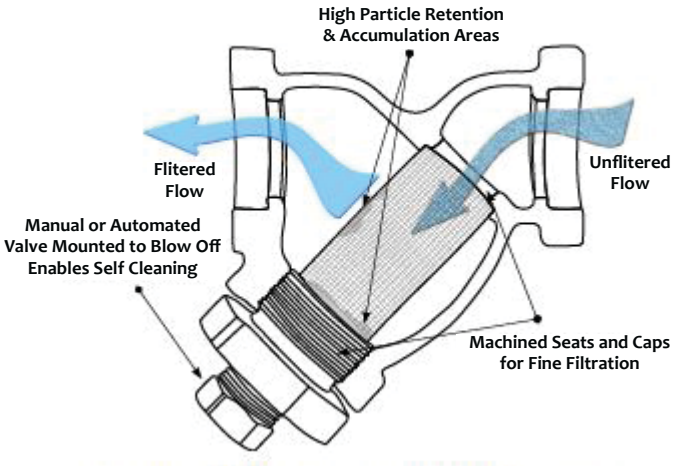
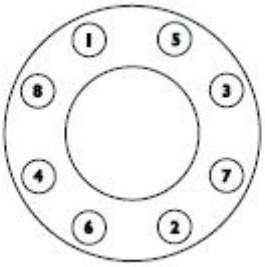


Figure 34: WYE Strainer - Flanged Ends

Installation Procedure:

1. Also, for maximum efficiency, install a differential pressure gauge at inlet and outlet connections or at the strainer gauge tap (if provided).
2. WYE strainers must be positioned in the pipeline ahead of the equipment requiring protection.
3. To provide for easier maintenance, the WYE strainer should be located where the drain plug can be removed. Additionally, ensure the drain or blow-off is located at the lowest position when installed. If installed in the vertical position, the WYE side of the strainer must be pointing downward.
4. Ensure there is ample space at the WYE side of the strainer for screen removal.
5. Before placing the WYE strainer into place, support the existing pipeline with pipe supports near the inlet and outlet connections.
6. Place the WYE strainer into the pipeline ensuring that the flow arrow on the body of the WYE strainer is pointing in the direction of the pipeline flow. For large or heavy strainers, appropriate material handling equipment must be used.
7. Install a standard ANSI (⅛" thick) flange gasket between the WYE strainer and pipeline flanges, on both sides. Install lubricated flange bolts and hand tighten. Flange bolts should then be tightened, using a star or crisscross pattern to evenly load the bolts, in accordance with established piping standards. This is illustrated in figure 35.

Figure 35: Bolting Sequence Pattern



Note: Excessive bolt torque may damage flanges. Please refer to established flange bolt torques for guidelines.

Operation

Once proper installation has been successfully completed, start the system gradually, at start up as well as after shut down. This eliminates sudden shock to the strainer and other equipment in the line. This is extremely important for steam service.

Start-Up Procedure

1. To remove all fluid from the strainer belly, a drip-leg can be installed or the piping can be placed at a ¼" slope. **Note:** With piping systems that contain fluids other than water or when the working temperature is above 120°F, fluid must be drained to safe area, away from the operator. Operators should always be fitted with appropriate equipment (goggles, gloves, vests etc.) when venting or servicing is performed.
2. Start the piping system by opening the outlet valve nearest the WYE strainer's outlet first. Then gradually open the inlet valve nearest the WYE strainers' inlet, approximately 25% of normal operational flow. It is important to start the system gradually to avoid displacing or damaging the WYE strainer.
3. Continue to open the inlet valve until the desired service flow has been reached.

Maintenance

WYE strainers require little monitoring once they are properly installed. The pressure differential across the strainer should be checked periodically to determine if the screen needs to be cleaned or replaced. If the pressure differential goes unchecked and the screen becomes completely clogged, the screen will break and require replacing. **Note:** Strainer screens are not designed to withstand the same pressure ratings as the housings. If the screen becomes completely clogged, it will be exposed to the same pressure as the housing. In most cases, this will cause the screen to fail and potentially damage downstream equipment.

Regular maintenance involves:
- Timely cleaning or replacement of screen
- Periodically checking for leaks

During normal use, the screen will become clogged with foreign matter, causing the differential pressure to increase. Once the differential pressure has increased to an unacceptable value, typically by 5 psi to 10 psi, it is time to clean or replace the screen. It is not advisable to let the differential pressure increase by 20 psi. This may cause the screen to fail and possibly damage downstream equipment.

A convenient and safe way to determine when the screen needs to be replaced is to install pressure gauges on the inlet and outlet sides of the strainer. The maximum acceptable pressure drop across the strainer will indicate when the screen needs to be replaced. Screen size and construction determine the maximum pressure drop that a strainer screen can withstand.

Screen Removal/Cleaning/Replacement

1. Isolate the strainer by closing the inlet and outlet valve connections on either side of the WYE strainer. Make sure valves are bubble tight.
2. Open vent to relieve pressure inside and drain fluid from the strainer.
3. Once pressure is relieved, remove the WYE side cap or cover.
4. Remove screen and clean. Do not permit screed to dry as it will be difficult to remove debris after it has hardened. Avoid banging or hitting the screen to remove stubborn debris.
5. Inspect screen and cover gasket for damage. If either is damaged, replace. Always ensure there is a spare gasket and screen on hand prior to maintenance.
6. Remove any debris or sludge from within the strainer.
7. Replace cleaned or new screen into its original position, ensuring it is squarely positioned on the screen.
8. Replace cover gasket and cap or cover. Tighten cap or cover to specified torque rating.

Follow the Start-up procedure outlined within the Operation Instructions.

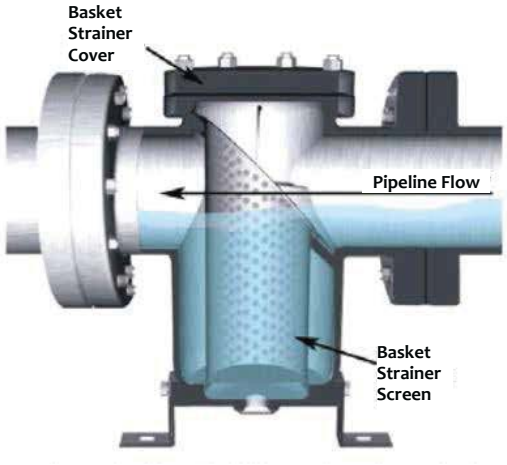
Basket Strainers

The correct size of Basket Strainer is determined by its job function, not by the size of the pipeline.

Pre Installation Checklist:

1. Inspect the basket strainer's flange ends and the pipeline's mating flanges to ensure gasket surfaces are free of defects. The pipeline should also be checked for proper alignment. Strainers should never be utilized to realign an existing piping system.
2. Ensure that the pipeline's mating flanges are the same type as the basket strainer being installed. Raised face flange ends cannot be mated to flat face flange ends.
3. Ensure that the pipeline setup allows a horizontal installation of the basket strainer.
4. If pipeline strain is a concern when installing larger basket strainers (6" and above), a concrete or steel pad should be used to provide additional support. Larger basket strainers can also be fitted with legs to assist in reducing strain on the pipeline.
5. If the basket strainer is to be located on the discharge side of a pump, then a safety release valve must be installed between the basket strainer and the pump.

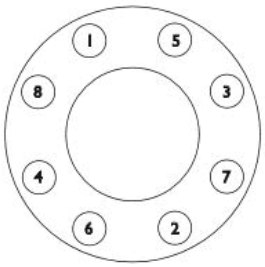
Figure 36 - Installed Basket Strainer with Bolted Cover



Installation Procedure:

1. To provide for easier maintenance, the basket strainer should be located where the drain plug can be removed and where there is ample space above the basket strainer for screen removal.
2. Before placing the basket strainer into place, support the existing pipeline with pipe supports near the inlet and outlet connections of the basket strainer.
3. Place the basket strainer into the pipeline ensuring that the flow arrow on the body of the basket strainer is pointing in the direction of the pipeline flow. For large or heavy strainers, lift the basket strainer into place using slings positioned underneath the inlet and outlet connections.
4. Install a standard ANSI (⅛" thick) flange gasket between the basket strainer and pipeline flanges, on both sides. Install lubricated flange bolts and hand tighten. Flange bolts should then be tightened, using a star or crisscross pattern to evenly load the bolts, in accordance with established piping standards. This is illustrated in figure 37.

Figure 37: Bolting Sequence Pattern



Note: Excessive bolt torque may damage flanges. Please refer to established flange bolt torques for guidelines.

Operation

Once proper installation has been successfully completed, start the system gradually, at start up as well as after shut down. This eliminates sudden shock to the strainer and other equipment in the line. This is extremely important for steam service.

Start-Up Procedure

1. Remove air from the pipeline by opening the vent near the basket strainer. **Note:** With piping systems that contain fluids other than water or when the working temperature is above 120°F, fluid must be drained to safe area, away from the operator. Operators should always be fitted with appropriate equipment (goggles, gloves, vests etc.) when venting or servicing is performed.
2. Start the piping system by opening the outlet valve nearest the basket strainer's outlet first. Then gradually open the inlet valve nearest the basket strainer's inlet, approximately 25% of normal operational flow. It is important to start the system gradually to avoid displacing or damaging the basket strainer.
3. Continue to open the inlet valve until the desired service flow has been reached.

Start the piping system by opening the outlet valve nearest the basket strainer's outlet first. Then gradually open the inlet valve nearest the basket strainer's inlet, approximately 25% of normal operational flow. It is important to start the system gradually to avoid displacing or damaging the basket strainer. Continue to open the inlet valve until the desired service flow has been reached.

Maintenance

Basket strainers require little monitoring once they are properly installed. The pressure differential across the strainer should be checked periodically to determine if the screen needs to be cleaned or replaced. If the pressure differential goes unchecked and the screen becomes completely clogged, the screen will break and require replacing. **Note:** Strainer screens are not designed to withstand the same pressure ratings as the housings. If the basket becomes completely clogged, it will be exposed to the same pressure as the housing. In most cases, this will cause the basket to fail and potentially damage downstream equipment.

Regular maintenance involves:

- Periodically checking for leaks
- Timely cleaning or replacement of screen

During normal use, the basket will become clogged with foreign matter, causing the differential pressure to increase. Once the differential pressure has increased to an unacceptable value, typically by 5 psi to 10 psi, it is time to clean or replace the screen. It is not advisable to let the differential pressure increase by 20 psi. This may cause the screen to fail and possibly damage downstream equipment.

A convenient and safe way to determine when the screen needs to be replaced is to install pressure gauges on the inlet and outlet sides of the strainer. The maximum acceptable pressure drop across the strainer will indicate when the screen needs to be replaced. Screen size and construction determine the maximum pressure drop that a strainer screen can withstand. Please consult factory for exact pressure ratings.

Strainer Element Cleaning

Before removing the cover of the basket strainer, the pressure inside the vessel must be reduced to atmospheric via suction or venting. Failure to do so may result in serious bodily injury.

1. Isolate the basket strainer by closing the inlet and outlet valve connections on either side of the basket strainer.
2. Open vent or drain plug to relieve pressure inside the basket strainer. Drain fluid up to screen seat level.
3. Once pressure is relieved, remove the cover.
4. Remove baskets and clean. Avoid banging or hitting the screen to remove stubborn debris.
5. Inspect basket and cover gasket for damage. If either is damaged, replace. Always ensure there is a spare gasket and basket on hand prior to maintenance.
6. Remove any debris or sludge from within the basket strainer.
7. Replace clean basket into its original position, enrusing it is squarely positioned on the screen seat.
8. Replace cover gasket and replace and tighten cover.

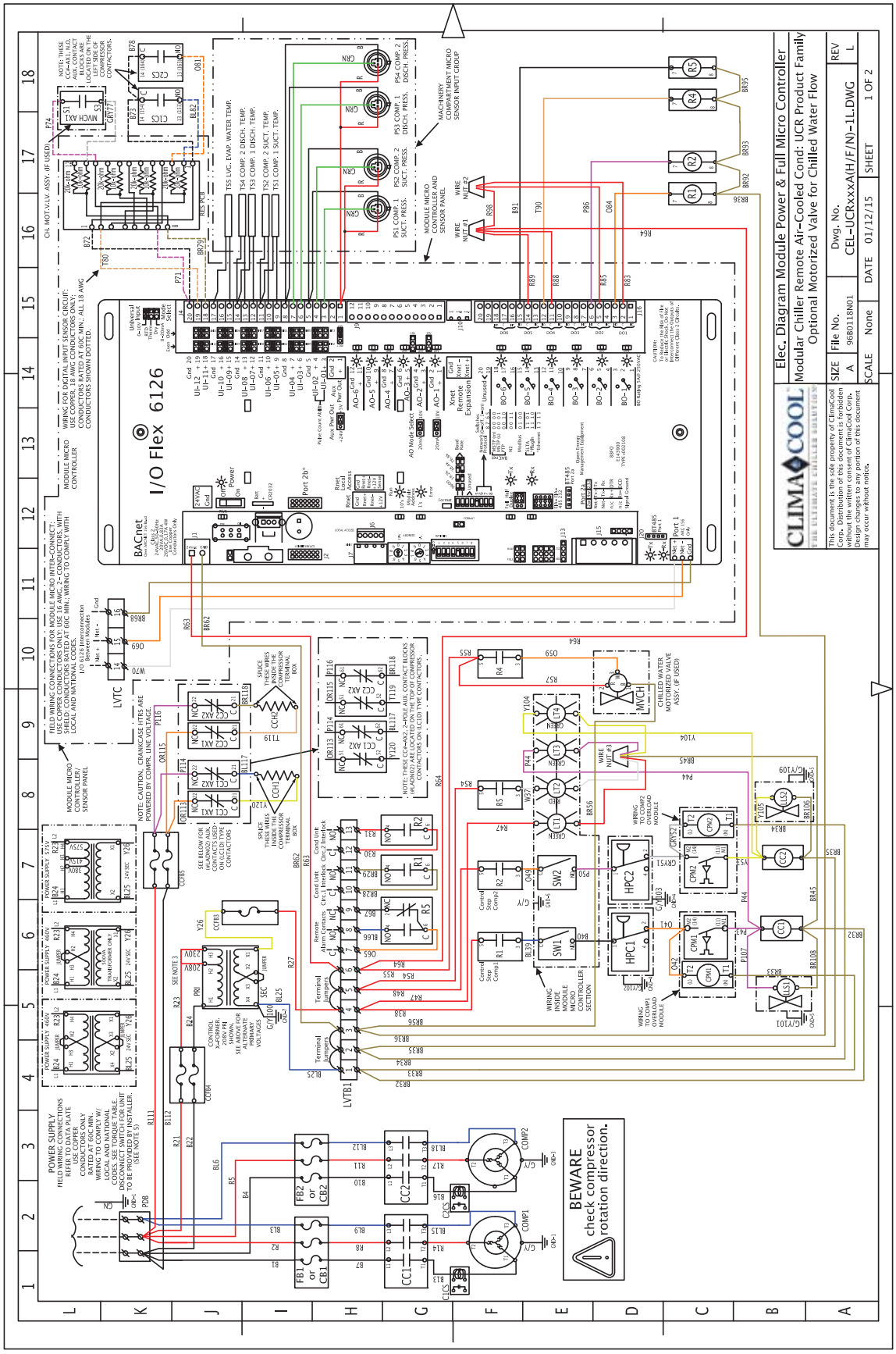
Follow the Start-up precedure outlines within the Operation Instructions.

Ultimate Model Type	Voltage	Power Wiring - per Module					Internal Wiring - per Compressor				
		Rated Load Amps[1]	Min.Cir. Amps (MCA)[2]	MaxFuse Size (MOP)[3,8]	Rec. Fuse Size[4,8]	Discon. Switch Size[9]	Rated Load Amps[1]	Min.Cir. Amps (MCA)[2]	Locked Rotor (LRA)[5]	MaxFuse Size (MOP)[3]	Rec. Fuse[4] Size
UCR030	208V-230V/ 3PH/ 60HZ	114	128	175	150	175	57.0	71.2	425	125	90
UCR030	460V/ 3PH/ 60HZ	52	58	80	70	80	25.8	32.2	173	50	40
UCR030	575V/ 3PH/ 60HZ	41	46	60	60	70	20.6	25.8	128	45	35
UCR050	208V-230V/ 3PH/ 60HZ	188	211	300	250	300	94.0	117.5	605	200	150
UCR050	460V/ 3PH/ 60HZ	85	96	125	110	150	42.5	53.1	272	90	70
UCR050	575V/ 3PH/ 60HZ	68	76	110	90	110	34.0	42.5	238	70	60
UCR070	208V-230V/ 3PH/ 60HZ	246	277	400	325	400	123.1	153.9	599	250	200
UCR070	460V/ 3PH/ 60HZ	111	125	175	150	175	55.7	69.6	310	125	90
UCR070	575V/ 3PH/ 60HZ	89	100	125	125	150	44.5	55.7	239	100	70

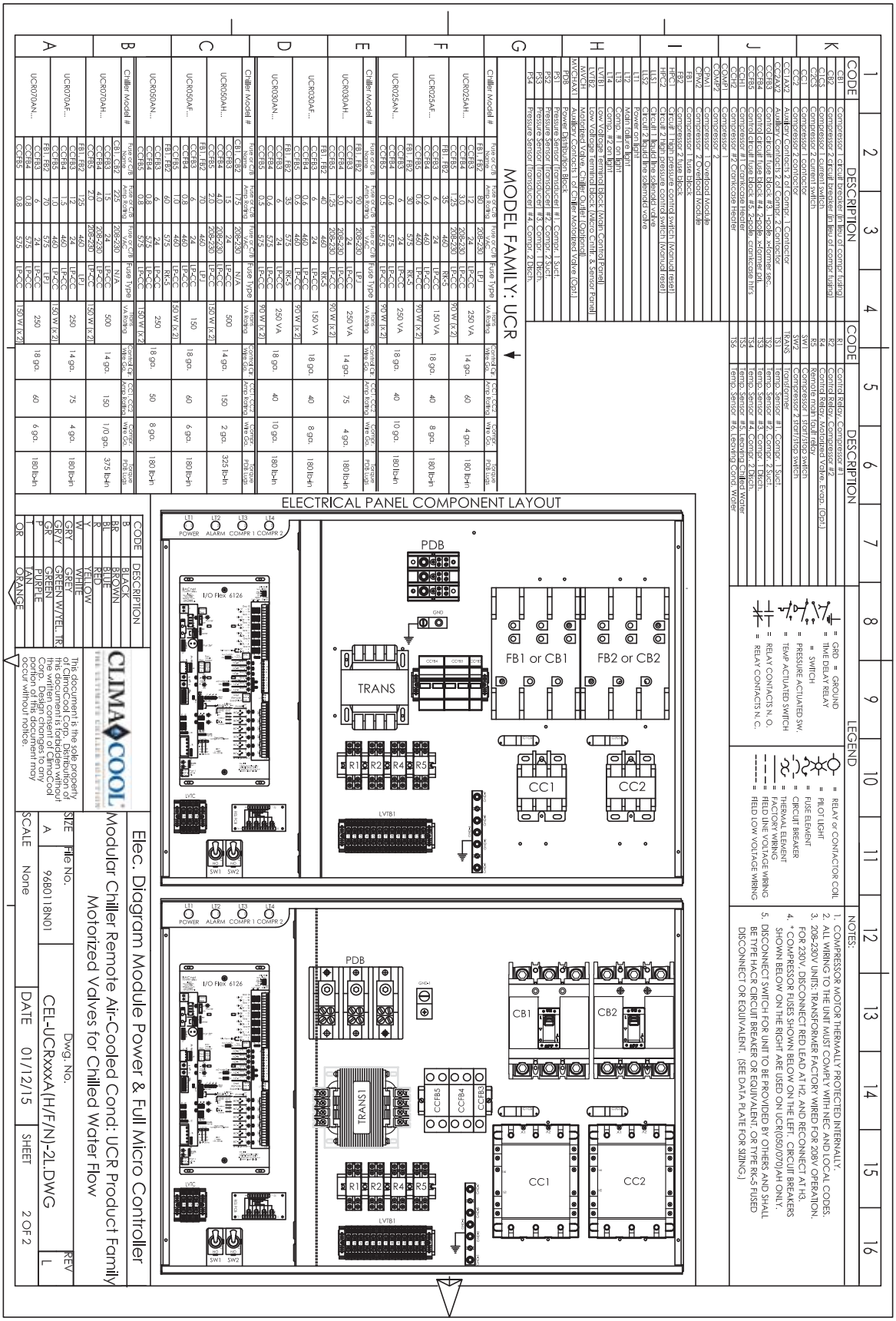
NOTES:

1. RLA - Rated Load Amps are calculated as per UL1995.
2. MCA - Minimum Circuit Ampacity is: [125% of the RLA of the largest compressor motor plus 100% of the RLA of all other concurrent motors and/or electrical loads].
3. MOP - Maximum Overcurrent Protection or Max.Fuse Size is rounded down from: [225% of the RLA of the largest compressor motor plus 100% of the RLA of all other concurrent electrical loads].
4. Recommended Dual Element Fuse Sizing: Rounded up from 150% of the RLA of the largest compressor motor plus 100% of the RLA of all other concurrent electrical loads.
5. LRA - Locked Rotor Amps are instantaneous starting amperage per compressor.
6. Module internal wiring is per NEC.
7. Voltage Tolerance Range
   - 208-230V / 60 Hz: Min. 187V Max. 253V
   - 460V / 60 Hz: Min. 414V Max. 506V
   - 575V / 60 Hz: Min. 518V Max. 632V
8. MOP Device or Recommended Fusing Device for Module Power Wiring supplied by others. These are recommended values for electrical power protection of Modules selected.
9. Disconnect Switch for Module Power Wiring supplied by others. These are recommended values for electrical power protection of Modules selected.

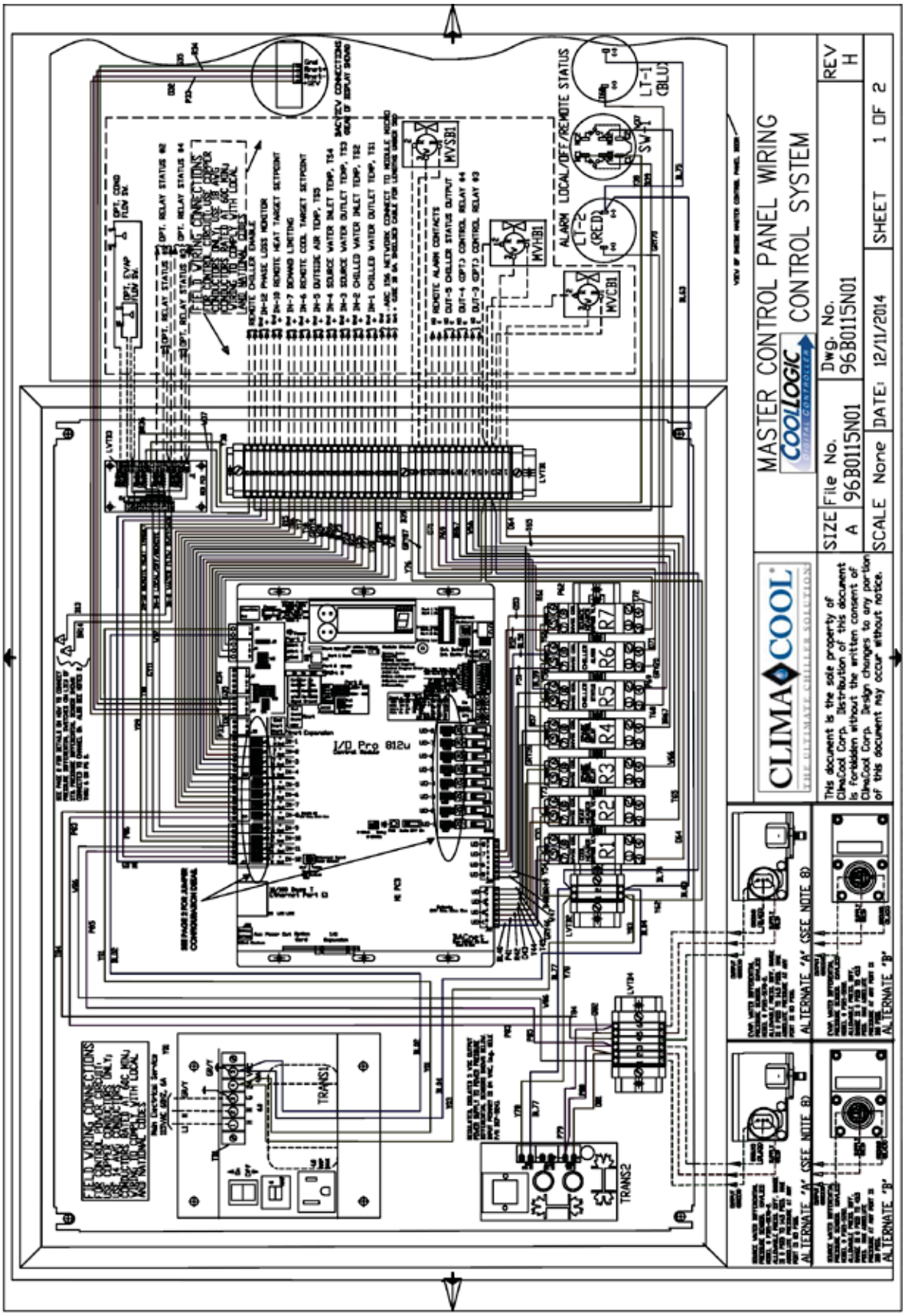
Wiring Diagram



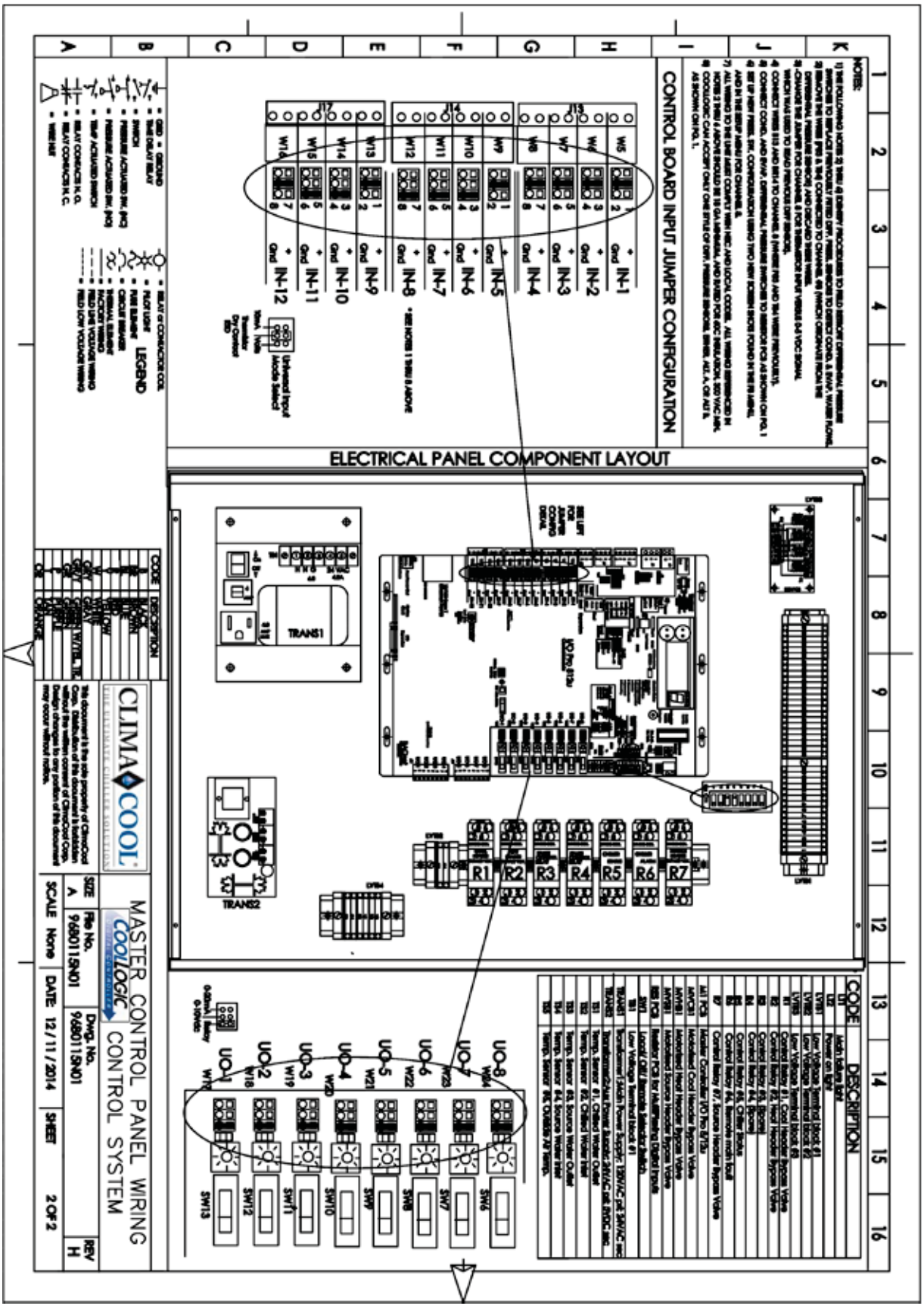
Wiring Diagram



Wiring Diagram - Master Control Panel



Wiring Diagram - Master Control Panel



WARNING!

The troubleshooting guidelines recommended in this section could result in exposure to electrical safety hazards. Refer to the safety warnings provided in this manual. Failure to follow all of the recommended safety warnings provided could result in death or serious injury. When possible, disconnect all electrical power including remote disconnects before servicing. Follow proper lockout-tagout procedures. Only a qualified licensed electrician or operators trained to handle live electrical components should only be allowed to work with energized electrical components.

Chiller Will Not Start	
Possible Cause	**Remedy**
Power off	Check main disconnect switch
Main Line open	Check main fuses
Incorrect wiring	Check the wiring diagram
Loose terminals/connections	Tighten the terminal connections
Control circuit open	Check interlocks with auxiliary equipment, pressure and temperature controls
Improper phasing of main power	Change any two of three phases of main power
Compressor Hums But Does Not Start	
Possible Cause	**Remedy**
Low voltage	Check at main power entry and power entry at unit (Consult power company if low)
Phase Loss	Check power wiring and fuses
Compressor Runs But Does Not Cool	
Possible Cause	**Remedy**
Improper phasing of main power	Switch any two of three phases of main power
Compressor Cuts Out On Low Pressure Safety Control	
Possible Cause	**Remedy**
Main chilled water valve closed or restricted	Open valve to full open position
Module chilled water isolation valves, if provided, closed or restricted	Open valves to full open position
Refrigerant shortage	Check for leaks - add refrigerant
No load on water chiller	Check water pump operation
Restriction in liquid line	Plugged liquid line drier - replace liquid line drier
Expansion valve clogged or inoperative	Repair/Replace the expansion valve
Low discharge pressure	Raise and control discharge pressure within design limits
Low water flow through the cooler	Check water flow through the cooler
Chilled water temperature too cold	Raise water temperature setpoint
Fouled evaporator brazed plate heat exchanger	Clean-in-place heat exchanger as described on page 53.
Improper chilled water circulation	Use an ample sized cleanable strainer in the chilled water circuit; make certain the strainer is clean to insure full flow of chilled water (strainer screen must be 60 mesh minimum)
Faulty suction pressure transducer	Verify transducer calibration using a calibrated manifold gauge and replace if defective.
Wrong suction pressure cutout setpoint	Verify suction pressure cutout setpoint to be set equal to the corresponding leaving chilled solution freeze temperature equivalent pressure on a PT chart. (i.e. if the solution freeze point is 32°F the equivalent pressure setpoint will be 101 PSIG)

Compressor Cycles On High Pressure Control	
Possible Cause	**Remedy**
Water regulating valve incorrectly set or defective	Reset or replace
Compressor discharge valve partially closed	Open valve to full open position
Non-condensable gases in hydronic system	Purge non-condensable gases from bleed valve on condenser or at bleed valve of the building condenser water system
Overcharge of refrigerant	Purge refrigerant from system while in operation until the first sign of bubbles are shown in the sight glass. Add back refrigerant just until bubbles clear.
Defective high pressure switch	Replace high pressure switch
Causes and Prevention of Freeze-Up	
Possible Cause	**Prevention**
Improper charging	Charge per ClimaCool® data plate information, located on the chiller, following the Superheat and Subcooling procedure described on page 48.
Improper chilled water circulation	Use an ample sized cleanable strainer in the chilled water circuit; make certain the strainer is clean to insure full flow and velocity of chilled water (strainer screen must be 60 mesh minimum). It may sometimes be necessary to treat the water to prevent formation of deposits.
Not draining for winter shutdown	When the system is shut down for the winter, remove the drain plugs and drain the cooler. Blow out remaining water with air.
Faulty leaving chilled solution temperature sensor	Verify sensor calibration using a calibrated thermometer and replace if defective.
Wrong freeze-up protection temperature setpoint	Verify leaving chilled solution freeze protection temperature setpoint to be set at 8°F above solution freeze point.

CLIMACOOL CORPORATION
LIMITED EXPRESS WARRANTY/LIMITATION OF REMEDIES AND LIABILITY
WITH EXTENDED COMPRESSOR WARRANTY

WARRANTY DISCLAIMER
It is expressly understood that unless a statement is specifically identified as a warranty, statements made by ClimaCool Corp., an Oklahoma corporation ("CC"), or its representatives, relating to CC's products, whether oral, written or contained in any quote, sales literature, catalog or any agreement, are not express warranties and do not form a part of the basis of the bargain, but are merely CC's opinion or commendation of CC's products. **EXCEPT AS SPECIFICALLY SET FORTH HEREIN, THERE IS NO EXPRESS WARRANTY AS TO ANY OF CC'S PRODUCTS. CC MAKES NO WARRANTY AGAINST LATENT DEFECTS. CC MAKES NO WARRANTY OF MERCHANTABILITY OF THE GOODS OR OF THE FITNESS OF THE GOODS FOR ANY PARTICULAR PURPOSE.**

GRANT OF LIMITED EXPRESS WARRANTY
CC warrants CC's products purchased and retained in the United States of America and Canada to be free from defects in material and workmanship under normal use and maintenance only as follows:

FOR MODULAR CHILLERS: (a) All modular chillers built or sold by CC for twelve (12) months from the date of unit start-up or eighteen (18) months from date of shipment (from CC's warehouse), whichever comes first; and (b) Any repair and replacement parts, which are not supplied under warranty, for ninety (90) days from date of shipment (from CC's warehouse) and (c) If such extended warranty is purchased, the compressors in all modular chillers built or sold by CC shall extend for sixty (60) months from the date of shipment (from CC's warehouse).

FOR ROOF TOP UNITS: (a) All roof top units built or sold by CC for twelve (12) months from the date of unit start-up or eighteen (18) months from date of shipment (from CC's warehouse), whichever comes first; (b) All compressors supplied by CC with CC's roof top units for sixty (60) months from date of shipment (from CC's warehouse); (c) All gas fired stainless steel heat exchangers supplied by CC with CC's roof top units for ten (10) years from date of shipment (from CC's warehouse); and (d) Any repair and replacement parts, which are not supplied under warranty, for ninety (90) days from date of shipment (from CC's warehouse).

All parts must be returned to CC's warehouse in Oklahoma City, Oklahoma, freight prepaid, no later than sixty (60) days after the date of the failure of the part. If CC determines the part to be defective and within CC's Limited Express Warranty, CC shall, when such part has been either replaced or repaired, return such to a CC recognized dealer, contractor or service organization, F.O.B. CC's warehouse, Oklahoma City, Oklahoma, freight prepaid. The warranty on any part repaired or replaced under warranty expires at the end of the original warranty period.

This warranty does not cover and does not apply to: (1) Fuses, refrigerant, fluids, oil; (2) Products relocated after initial installation; (3) Any portion or component of the system that is not supplied by CC, regardless of the cause of the failure of such portion or component; (4) Products on which the units identification tags or labels have been removed or defaced; (5) Products on which payment to CC is or has been in default; (6) Products which have defects or damage which result from improper installation, wiring, electrical imbalance characteristics or maintenance (including, without limitation, defects or damages caused by voltage surges, inadequate voltage conditions, phase imbalance, any form of electrical disturbances, inadequate or improper electrical circuit installation or protection, failure to perform common maintenance, etc.); or are caused by accident, misuse or abuse, fire, flood, alteration or misapplication of the product; (7) Products which have defects or damage which result from a contaminated or corrosive air or liquid supply, operation at abnormal temperatures, or unauthorized opening of refrigerant circuit; (8) Products subjected to corrosion or abrasion or chemicals; (9) Mold, fungus or bacteria damage; (10) Products manufactured or supplied by others; (11) Products which have been subjected to misuse, negligence or accidents; (12) Products which have been operated in a manner contrary to CC's printed instructions; (13) Products which have defects, damage or insufficient performance as a result of insufficient or incorrect system design or the improper application of CC's products; (14) Products which have defects or damages due to freezing of the water supply, an inadequate or interrupted water supply, corrosives or abrasives in the water supply, or improper or inadequate filtration or treatment of the water or air supply: (15) Products which are defects caused by overfiring, use of incorrect fuel, or improper burn or control adjustments; or (16) Products which have incomplete or inadequate combustion.
CC is not responsible for: (1) The costs of any fluids, refrigerant or other system components, or the associated labor to repair or replace the same, which is incurred as a result of a defective part covered by CC's Limited Express Warranty; (2) The costs of labor, refrigerant, materials or service incurred in removal of the defective part, or in obtaining and replacing the new or repaired part; or, (3) Transportation costs of the defective part from the installation site to CC or the return of any part not covered by CC's Limited Express Warranty.

Limitation: This Limited Express Warranty is given in lieu of all other warranties. If, notwithstanding the disclaimers contained herein, it is determined that other warranties exist, any such warranty, including without limitation, any express warranties or any implied warranties of fitness for any particular purpose and merchantability, shall be limited to the duration of the Limited Express Warranty.

LIMITATION OF REMEDIES
In the event of a breach of this Limited Express Warranty, CC will only be obligated at CC's option to repair the failed part or module or to furnish a new or rebuilt part or module in exchange for the part or module which has failed. If, after written notice to CC's Head Office in Oklahoma City, Oklahoma of each defect, malfunction or other failure and a reasonable number of attempts by CC to correct the defect, malfunction or other failure and the remedy fails of its essential purpose, CC shall refund the purchase price paid to CC in exchange for the return of the sold good(s). Said refund shall be the maximum liability of CC. **THIS REMEDY IS THE SOLE AND EXCLUSIVE REMEDY AGAINST CC FOR BREACH OF CONTRACT, FOR THE BREACH OF ANY WARRANTY OR FOR CC'S OWN NEGLIGENCE OR IN STRICT LIABILITY.**

LIMITATION OF LIABILITY
CC shall have no liability for any damages if CC's performance is delayed for any reason or is prevented to any extent by any event such as, but not limited to any, war, civil unrest, government restrictions or restraints, strikes, or work stoppages, fire, flood, accident, allocation, shortages of transportation, fuel, material or labor, acts of God or any other reason beyond the sole control of CC. **CC EXPRESSLY DISCLAIMS AND EXCLUDES ANY LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGE IN CONTRACT, FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY, OR IN TORT, WHETHER FOR CC'S OWN NEGLIGENCE OR AS STRICT LIABILITY.**

OBTAINING WARRANTY PERFORMANCE
Normally, the contractor or service organization who installed the products will provide warranty performance for the owner. Should the installer be unavailable, contact any CC recognized contractor or service organization. If assistance is required in obtaining warranty performance, write:

ClimaCool Corp. • P.O. Box 2055 • Oklahoma City, Oklahoma 73101 • (405) 815-3000 • e-mail: Claims@climacoolcorp.com

NOTE: Some states or Canadian provinces do not allow limitations on how long an implied warranty lasts, or the limitation or exclusion of consequential or incidental damages, so the foregoing exclusion and limitations may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state and from Canadian province to Canadian province.

Please refer to the CC Installation, Operation and Maintenance Manual for operating and maintenance instructions.

CLIMACOOL®
THE ULTIMATE CHILLER SOLUTION®

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COOLLOGIC
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