INSTRUCTION MANUAL

Remote Air Cooled Condenser

2150 Elmwood Avenue - Buffalo, NY 14207
P# 716-876-9951 - F#716-874-8048 - www.mokon.com

MOK3007A 05/18

Table of Contents

Section 1 – Safety Considerations

Installing, starting up, and servicing equipment can be hazardous due to system pressures, electrical components and equipment location (roofs, elevated structures, etc.). Only trained, qualified installers and service mechanics should install, start up, and service this equipment.

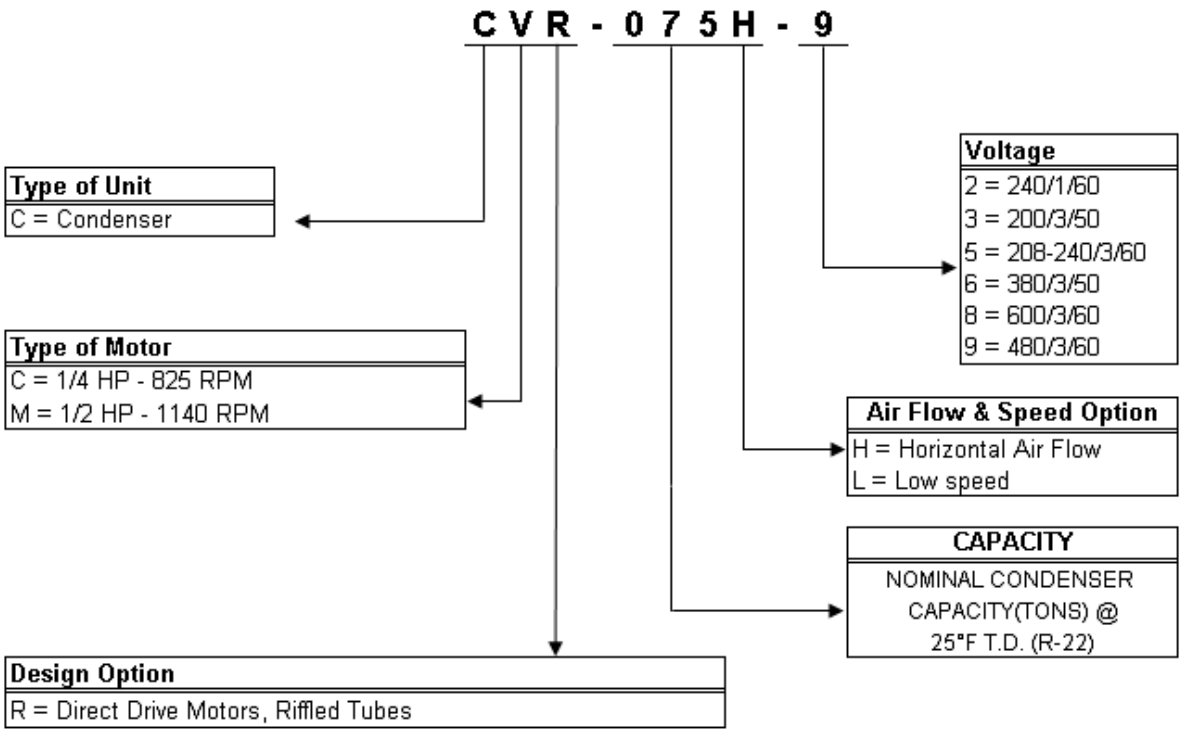
When working on the equipment, observe precautions in the literature and on the tags, stickers, and labels attached to the equipment.

Follow all safety codes. Wear safety glasses and work gloves. Keep quenching cloths and fire extinguisher nearby when brazing. Use care in handling, rigging, and setting bulky equipment.

Warning: Before installation, always check to be sure main power to systems is OFF. Electrical shock can cause personal injury or death.

Section 2 – Introduction

Air Cooled condensers series CCR, CMR, and CNR are designed for refrigerant condensing of refrigeration and air conditioning systems. They can be manufactured for single or multiple circuits, for single or multiple compressors.



Section 3 – Handling

Caution: Do not use forklift truck to handle units. Use only chains with hooks and spread bars to lift units.

When a unit is shipped on its side, two or three hangers are installed. Use them to unload the unit from truck.

A lift truck can be used with the wood base in that position only to lower the unit on the ground.

Two others hangers, four, six or eight legs (depending on the unit) and the required hardware are supplied attached to the cabinet.

Lifting Method 1:

- Install all the legs on the same side as hangers.
- Gently lower the unit on those legs.
- Install hangers on opposite side.
- Raise the other side and install other legs.
- Install chains and spread bars to raise the unit to its final position.

Lifting Method 2:

- Gently lower the unit on a flat surface.
- Install hangers on opposite side.
- Install chains and spread bars to raise the unit.
- Lift the unit and install all the legs.
- Lift the unit to its final position.

See fig # 1 for more details. If the unit has been ordered with extended legs, see fig. #2 for field assembly. Also refer to table #1, #2 for unit weight.

Section 4 – Installation

Step #1 Inspection:

If the unit is suspected of having been damaged in transit, immediately notify the carrier and file a claim with that carrier. The refrigeration coil section(s) of the unit should display a pressurized nitrogen gas holding charge. Unit should then be pressurized to 350 psi with dry nitrogen gas and leak-checked prior to rigging; this to insure no coil damage has occurred after the unit left the factory. Bolts & nuts may have become loose in transit, as well as electrical components. Please make sure that everything is tight prior to startup.

Step #2 Location:

Condensers and fluid coolers are installed on the roof or ground level. If a unit is installed on the ground it must be fenced to prevent possible damage. Heat recovery units are installed inside at the ceiling level. Check loading capacity of the roof, the ceiling or the floor before installation.

The unit is intended to be installed in an atmosphere containing only neutral water vapor, natural precipitation and air. Use in any other atmosphere must be checked for compatibility with metals, materials and coating used in manufacturing of this equipment.

Unit positioning as well as firmness and perfect levelness of mounting base supports are important: Good installation practices are well known and are to be followed. Air flow paths on all sides as well as coil inlet and fan discharge areas are not to be restricted. Unit positioning that may result in air recirculation as well as prevailing wind impedance is to be avoided.

If a unit is to be placed close to a wall and/or side by side the minimum distance should be 48 inches for single row of fans and 96 inches for double row of fans. The chosen location must be convenient and safe accessibility for maintenance.

Step #3 Wiring:

Note: A wiring diagram is provided with the unit, it is located on the inner face of the electrical box access door.

All wiring must be done in accordance with national and local codes. Check the nameplate with the current characteristics to be used for wiring unit. Internal wiring connections of the fan motors, optional controls and contactors has been completed at the factory. Once wired, make sure the unit has been grounded. Disconnect switch at the unit must be provided by others.

On air cooled condensers with flooding valve, one fan (single width unit) or one pair of fans (double width unit) must operate when compressor is operating to avoid internal damage to the condenser coil.

Step #4 Piping

Caution: The unit has not been designed to carry the weight of any extended piping or valves. The piping must be well supported otherwise tube breacking at the coil will most probably occur.

All refrigerant or fluid system components must be installed in accordance with applicable local and national codes and in accordance with good engineering practice required for proper operation.

Use Top quality refrigeration tubing that is internally free of dirt, humidity or other contaminants. Unsealed tubing should not be used. Long radius elbows are recommended.

Dry nitrogen must be swept through the lines while joints are brazed to avoid oxidation and carbon deposits.

Important: The use of a calibrated Pressure gage and regulator must always be used with nitrogen gas cylinders.

To minimise hydraulic shock line breakage possibilities, valving and controls must be designed to eliminate any rapid introduction of hot gas into cold piping. Most especially if the piping contains liquid refrigerant or is at a much lower pressure than the hot discharge gas, which can be the case of double-wide condensers that feature one-half operation during winter. Plans should be for utilising either a slow-shifting three-way/four-way valve or not completely lowering to suction pressure the condenser coil side that deactivates during winter. Most often, a combination of both of these options works well in geographic areas that encounter lower than freezing seasonal outdoor temperatures.

Air-cooled condensers must be provided with inverted "P" trap with a purge connection. A separate sub cooling circuit may be necessary if liquid line must rise to level higher than the unit.

Vibration in the discharge or liquid line must be corrected immediately to avoid piping and/or header breakage and refrigerant loss.

Generally, horizontal-piping runs should grade slightly downwards in the direction of the flow. Liquid line piping must be arranged so that it is free draining from the condenser to the receiver. It is the best to pipe liquid lines so that there is an immediate drop, at least 2 or 3 feet, at the condenser outlet, before headering or running horizontally.

Step #5 Leak Testing

Leak testing and evacuation must be done in accordance with local and national codes.

Once all refrigerant connections are made, leak test all joints before charging the system with refrigerant. After leak testing, all moisture and non-condensable gas must be evacuated from the system. Attach high vacuum line pump and gage on both high and low pressures sides of the system. A minimum vacuum level of 100 microns is required to effectively remove moisture.

Be sure all valves such as compressor, hot gas, receiver, and liquid solenoid valves are open. Break the vacuum in the system with the refrigerant to be used. Always charge the refrigerant into the system through a new 16 cu. in drier (field supplied) in the charging manifold line.

Section 5 – Operation

The notice below depicts the label that is affixed to the control box cover.

Warning: Warranty Condition - One fan (single width unit) or one pair of fans (double width unit) and the compressor must operate simultaneously to avoid damage to the condenser coil.

Not complying to this condition can cause uneven rapid expansion and contraction of the condenser core tubing contributing to condenser tubes failures. Violation of this condition will void the warranty of the misused unit.

For a refrigeration system to function properly, the condensing pressure and temperature must be maintained within certain limits.

To prevent excessively low head pressure during winter operation, two basic control methods are used, refrigerant side control and air side control.

1) A) Refrigerant-side control is accomplished by modulating the amount of active condensing surface available for condensing by flooding the coil with liquid refrigerant. This method requires a receiver and a larger charge of refrigerant. Section 7, Table 1 (Condenser Refrigerant Charge) for required refrigerant charge. The pressure setting of the ORI should be equivalent to a condensing temperature of approximately 100°F, or a receiver pressure equivalent to a temperature of approximately 90°F.

2) Airside control is accomplished by cycling fans in response to condensing pressure or outdoors-ambient temperature. To reduce stress on the condenser coil, one fan or one pair fans must operate when a condenser is operating. Speed control on the constant operating fan may be used to reduce motor cycling and stabilize the operating pressure. See table 2, 3 & 4 Section 10 for proper settings.

For low ambient operation this method must be combined with refrigerant side control.

Fan Motors

Check the fan blade clearances within the venturies, as well as check for proper rotation. Fan motors operating at higher elevations will draw lower than rated amp as well as draw less effective air volume across the coil surface. This is due to the reduced density of the higher altitude air; results, which are higher compressor, discharge pressure along with reduced unit capacity. Please consult factory if you suspect this situation.

The fan motors are permanently lubricated for service free operation. The motor may restart on automatic thermal protection. Motors are readily serviced by removing fan guards and fans. If a motor is inoperative or it cycles on thermal protection, check supply voltage at the motor leads. Fan motors may cycle on thermal protection if the coil is blocked.

Units equipped with axial fans, CVR, CVW, CVX: The entire fan assembly, motor, blade and ventury need to be replaced if there is a failure of any kind. With the two speed version, 3 contactors are used per motor. Do no attempt to manually close one of these contactors; this may result in motor winding damage.

Fan Cycling

Optional temperature or pressure controls are located in the control box. Air temperature sensors are located in the air flow and pressure controls are directly connected to the circuit in a return bend. These must be set, see table 2 to 4 for more information.

Optional line duty controls are connected directly to the fan motors. Controls are double pole single throw, one line remain live on the motors. Units must be completely disconnected before servicing.

Optional pilot duty controls are connected to 3 pole motor contactors. If controls or contactors are defective, they must be replaced.

Section 6 – Maintenance

Cleaning

After one day of operation, check for any vibration that might have developed in the unit. It is recommended that the unit be inspected occasionally for dirt accumulation. Grease and dust should be removed from the fans, fan guards.

Periodical cleaning of finned surface can be done by washing down dust with warm water spray and a mild detergent. Do not use alkaline or acidic solution as it will attack the coil material.

The inner face of the coil may be cleaned by the access panel on the side of the units or by removing the fan guards.

Always pressure clean in reverse of the air flow.

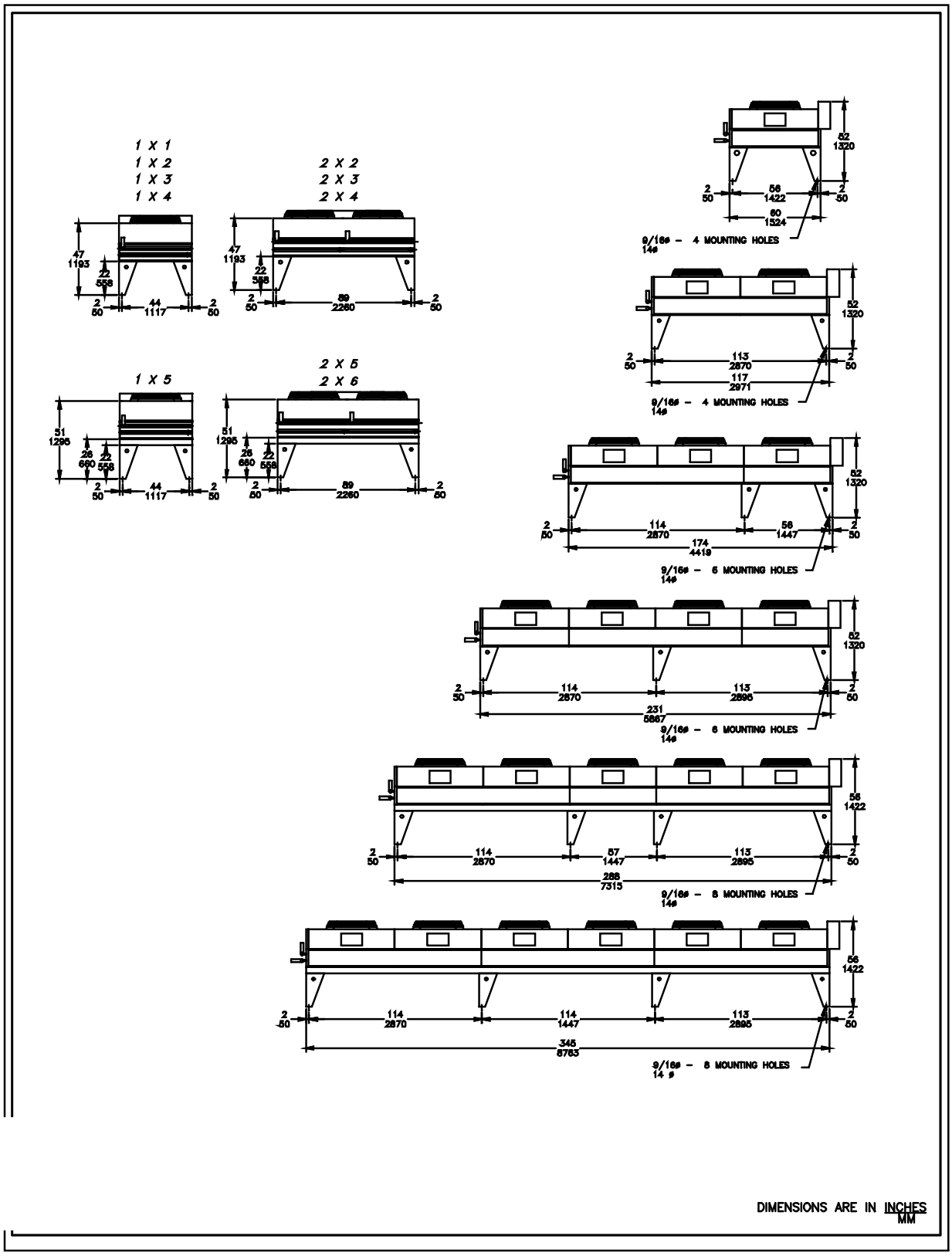
Section 7 – Tables

Table 1: Condenser Refrigerant Charge

Condenser ID	Width (fan)	Length (fan)	Refrigerant Charge Summer (lbs)	Refrigerant Charge Winter (lbs)	Shipping Weight (lbs)	Condenser ID	Width (fan)	Length (fan)	Refrigerant Charge Summer (lbs)	Refrigerant Charge Winter (lbs)	Shipping Weight (lbs)
CCR02	1	1	2	6	190	CNR154	2	4	92	300	3442
CCR03	1	1	3	9	201	CNR171	2	5	136	460	4198
CCR04	1	1	4	12	210	CNR185	2	5	136	460	4298
CNR012	1	1	6	19	515	CNR193	2	5	180	596	4560
CNR014	1	1	6	19	525	CNR202	2	5	180	596	4690
CNR016	1	1	9	29	592	CNR205	2	6	164	552	5136
CNR017	1	1	9	29	602	CNR222	2	6	164	552	5292
CNR018	1	1	12	38	641	CNR231	2	6	218	718	5642
CNR019	1	1	12	38	654	CNR243	2	6	218	718	5798
CNR024	1	2	12	38	985	CMR06	1	1	3	11	308
CNR027	1	2	12	38	1005	CMR07	1	1	5	16	335
CNR032	1	2	17	57	1063	CMR08	1	1	7	22	350
CNR035	1	2	17	57	1091	CMR12	1	2	6	21	489
CNR036	1	2	23	76	1117	CMR15	1	2	10	31	532
CNR039	1	2	23	76	1159	CMR16	1	2	13	42	566
CNR048	1	3	26	85	1460	CMR18	1	3	10	33	727
CNR052	1	3	26	85	1490	CMR22	1	3	15	48	741
CNR054	1	3	34	112	1570	CMR25	1	3	20	66	789
CNR058	1	3	34	112	1609	CMR30	2	4	19	62	1064
CNR063	1	4	34	112	1875	CMR33	2	4	26	84	1132
CNR064	2	4	35	115	1792	CMR36	2	6	20	66	1454
CNR069	1	4	34	112	1915	CMR45	2	6	29	96	1482
CNR070	2	4	35	115	1781	CMR49	2	6	39	132	1578
CNR072	1	4	46	150	2019						
CNR073	2	4	47	153	1934						
CNR077	1	4	46	150	2071						
CNR078	2	4	47	153	2071						
CNR082	2	6	36	114	2323						
CNR085	1	5	68	230	2338						
CNR092	1	5	68	230	2403						
CNR096	1	5	90	298	2475						
CNR101	1	5	90	298	2540						
CNR095	2	6	52	170	2430						
CNR102	1	6	82	276	2730						
CNR104	2	6	52	170	2508						
CNR111	1	6	82	276	2808						
CNR109	2	6	68	224	2664						
CNR116	1	6	109	359	2964						
CNR115	2	6	68	224	2742						
CNR121	1	6	109	359	3000						
CNR127	2	4	68	224	3029						
CNR139	2	4	68	224	3129						
CNR145	2	4	92	300	3338						

Section 8 – Legs Figures

Figure # 1: Standard Legs



Section 9 – Tables

Table #2

Condenser Fan Alignment		Ambient Control Temperature Setting (°F)							
Temperature Control		------	T1	T2	T3	T4	T5	T6	T7
Fan Motor Number	Single Wide Units	M1	M2	M3	M4	M5	M6		
	Double Wide Units	M1 M2	M3 M4	M5 M6	M7 M8	M9 M10	M11 M12	M13 M14	M15 M16
Difference		FAN (S) RUNS WITH ANY COM-PRESSOR	20						
Fan On			60						
Fan Off			40						
Difference			10	15					
Fan On			55	65					
Fan Off			45	50					
Difference			10	5	5				
Fan On			55	60	70				
Fan Off			45	55	65				
Difference			10	5	5	5			
Fan On			55	60	70	75			
Fan Off			45	55	65	70			
Difference			10	5	5	5	5		
Fan On			55	60	65	70	80		
Fan Off			45	55	60	65	75		
Difference			10	5	5	5	5	5	
Fan On			55	60	65	70	75	80	
Fan Off			45	55	60	65	70	75	
Difference			5	5	5	5	5	5	5
Fan On			50	55	60	65	70	75	80
Fan Off			45	50	55	60	65	70	75

Table #3

Condenser Fan Alignment		Pressure Control Pressure Settings (PSIG) (R-134)							
Pressure Control		------	P1	P2	P3	P4	P5	P6	P7
Fan Motor Number	Single Wide Units	M1	M2	M3	M4	M5	M6		
	Double Wide Units	M1 M2	M3 M4	M5 M6	M7 M8	M9 M10	M11 M12	M13 M14	M15 M16
Difference		FAN (S) RUNS WITH ANY COM-PRESSOR	30						
Fan On			125						
Fan Off			95						
Difference			30	30					
Fan On			125	135					
Fan Off			95	105					
Difference			30	30	30				
Fan On			125	130	130				
Fan Off			95	100	110				
Difference			30	30	30	30			
Fan On			125	130	135	145			
Fan Off			95	100	105	115			
Difference			30	30	30	30	30		
Fan On			125	130	135	130	150		
Fan Off			95	100	105	110	120		
Difference			30	30	30	30	30	30	
Fan On			125	130	135	140	145	150	
Fan Off			95	100	105	110	115	120	
Difference			30	30	30	30	30	30	30
Fan On			125	130	135	140	145	150	155
Fan Off			95	100	105	110	115	120	125

Table #4

Condenser Fan Alignment		Pressure Control Pressure Settings (PSIG) (R-407C)							
Pressure Control		------	P1	P2	P3	P4	P5	P6	P7
Fan Motor Number	Single Wide Units	M1	M2	M3	M4	M5	M6		
	Double Wide Units	M1 M2	M3 M4	M5 M6	M7 M8	M9 M10	M11 M12	M13 M14	M15 M16
Difference		FAN (S) RUNS WITH ANY COM-PRESSOR	40						
Fan On			220						
Fan Off			180						
Difference			40	40					
Fan On			220	230					
Fan Off			180	190					
Difference			40	40	40				
Fan On			220	225	235				
Fan Off			180	185	195				
Difference			40	40	40	40			
Fan On			220	225	230	240			
Fan Off			180	185	190	200			
Difference			40	40	40	40	40		
Fan On			220	225	230	235	245		
Fan Off			180	185	190	195	205		
Difference			40	40	40	40	40	40	
Fan On			220	225	230	235	240	250	
Fan Off			180	185	190	195	200	210	
Difference			40	40	40	40	40	40	40
Fan On			220	225	230	235	240	245	250
Fan Off			180	185	190	195	200	205	210