

WAECO/ ADLER-BARBOUR TECHNICAL MANUAL

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1. The Danfoss Compressor

The Danfoss compressor is a brushless DC motor powered reciprocating hermetic compressor. It can be operated from 10v-27vDC. WAECO and Adler-Barbour products use two Danfoss Compressors, the model BD-35 in WAECO products, and the BD-50 in the Adler-Barbour products.

The BTU output of the compressors vary with speed according to the following charts:

BD-35:

Capacity (ASHRAE)										Btu/h
rpm \ °F	-20	-13	-10	0	10	20	30	40	45	50
2,000	74	101	113	159	214	280	361	458	514	575
2,500	95	127	142	199	268	351	452	573	643	
3,000	104	138	155	222	307	410	535	681		
3,500	119	153	171	248	349	473	619			

BD-50:

Capacity (ASHRAE)										Btu/h
rpm \ °F	-20	-13	-10	0	10	20	30	40	45	50
2,000	95	126	142	201	273	359	458	570	632*	697*
2,500	119	157	176	247	335	442	570	723*	809*	
3,000	142	189	211	296	401	529	682*	863*		
3,500	167	220	245	342	464	612*	790*			

With a DC motor, both the rotor and the stator carry a charge. If the charge of the rotor/stator combination remained constant, the rotor would turn to one position and stop. In this position, opposite polarities would attract and the rotor would have no impetus to turn further. To continue to rotate, either the rotor or the stator must be *commutated*, or switched polarity, so that now like poles repel and give the rotor a push. In a normal, brushed DC motor, two brushes ride on a segmented commutator, each segment picking up charge from the brushes and switching the polarity of the rotor.

The Danfoss compressor is electronically commutated by the compressor module. The module reads the “back voltage”, that is, it measures the applied voltage to the three stator windings, and the differences between them from interacting with the permanent magnets on the rotor. It compares the three voltage readings and switches the current according to the one that is different.

Because this continuous “loop” of information must be continuously exchanged between the compressor and module, one of the biggest enemies of the Danfoss system is electronic noise. Any interruption of this “loop” from noise may cause failure of the compressor module. For this reason, it is recommended by Danfoss that their compressor systems be directly connected to a battery with an inline fuse. However, rarely does this happen, so we are stuck with what we get. Some of the biggest sources of electronic noise are communication equipment and engine alternators.

2. The Compressor Module

The compressor module consists of several parts. The power supply varies the power to the compressor in order to control the speed of the compressor. Depending upon the speed of the compressor, the btu output may be changed. The voltage from the module to the compressor may vary from 28 vDC to 49 vDC.

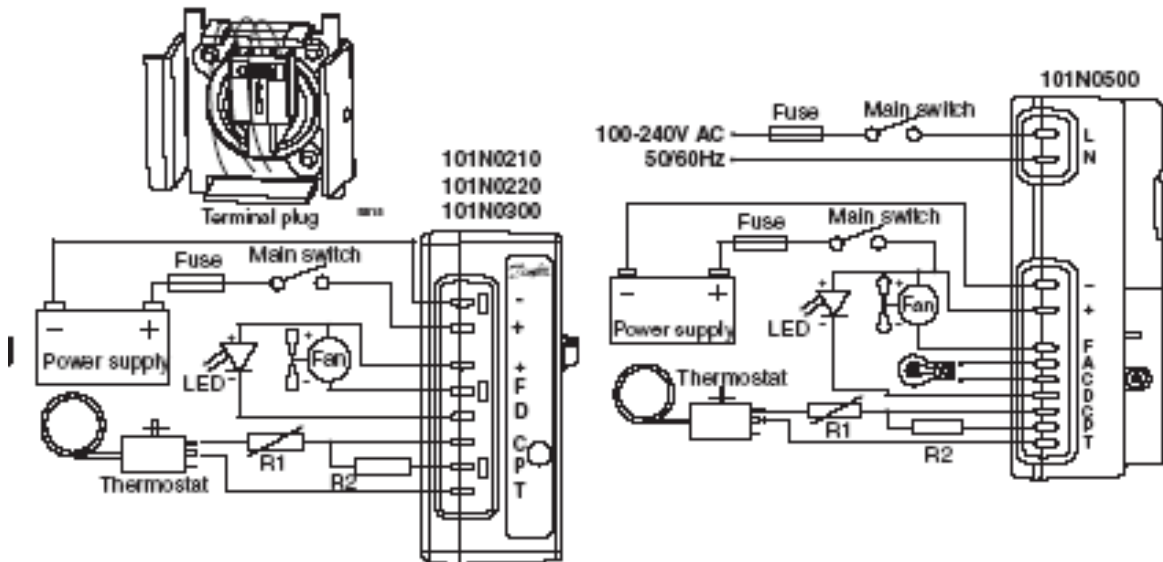
The inverter part of the module commutates the motor and sends the voltage to the compressor pins.

The wiring of WAECO and Adler-Barbour products is through the module. The module has outputs for the fan, thermostat, for an LED, for a speed control resistor, and for a voltage cutout control resistor. Newer modules have inputs for 110/220 VAC and for interior light.

The common models of modules in use are:

101N0210

The “workhorse” module. It is the current most common module used on WAECO units. It has outputs for fan, LED, and thermostat.



101N0500

One of the newest modules, it has added a 100-240VAC input and an output for an interior light.

101N0280

The newest module, will be available on Adler-Barbour products. This module utilizes *Adaptive Energy Optimization (AEO)*. A regular compressor, when starting, pulls high Full Load Amperage (FLA) on startup. Using AEO, the compressor ramps up on startup, since capillary tube systems don't require high torque, thereby saving energy by avoiding FLA. It then regulates capacity by slowly ramping so that cycling time is approximately 24 minutes. If it doesn't reach temperature in 48 minutes, it runs at 4400 rpm for the rest of the cycle.

By regulating the speed, it adapts energy input to the required cooling needs. This makes it more energy efficient and therefore saves energy.

The inputs and outputs on the AEO module are the same as **101N0210**.

101N0220

This module is identical to the **101N0210** except that it is shielded from radio interference with a metal case. It is used on Adler-Barbour units.

3. Wiring:

Refer to wiring diagrams.

DC Power: Between topmost – and + terminals. Be sure of polarity. However, if polarity is reversed, no damage will result but module will not allow unit to come on.

Fan: The fan is wired between **F** and + terminals. This is 12v output and will cycle on with the compressor

LED: An 10 mA LED may be wired to the module for troubleshooting purposes. This is where the Adler-Barbour system gets its error code. Wire an LED between **D** and +. Refer to table on next page for error codes.

Thermostat: The thermostat is connected between **T** and **C**.

Speed Resistor: The speed of the compressor can be set by a resistor in series with the thermostat (**R1**). The resistances and speeds are shown in the chart on the following page.

Voltage Cutout Resistor: The voltage cutout can be set by a resistor between **P** and **C** (**R2**). The resistances and cutout voltages are shown on the following chart.

Standard battery protection settings (no connection C - P)

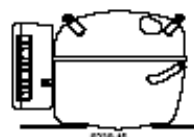
12V cut-out [V]	12V cut-in [V]	24V cut-out [V]	24V cut-in [V]
10.4	11.7	22.8	24.2

Optional battery protections settings (not possible with electronic unit 101N0400)

Resistor (R2)	12V cut-out	12V cut-in	12V max.	24V cut-out	24V cut-in	24V max.
[kΩ]	[V]	[V]	Voltage [V]	[V]	[V]	Voltage [V]
0	9.6	10.9	17.0	21.3	22.7	31.5
1.6	9.7	11.0	17.0	21.5	22.9	31.5
2.4	9.9	11.1	17.0	21.8	23.2	31.5
3.6	10.0	11.3	17.0	22.0	23.4	31.5
4.7	10.1	11.4	17.0	22.3	23.7	31.5
6.2	10.2	11.5	17.0	22.5	23.9	31.5
8.2	10.4	11.7	17.0	22.8	24.2	31.5
11	10.5	11.8	17.0	23.0	24.5	31.5
14	10.6	11.9	17.0	23.3	24.7	31.5
18	10.8	12.0	17.0	23.6	25.0	31.5
24	10.9	12.2	17.0	23.8	25.2	31.5
33	11.0	12.3	17.0	24.1	25.5	31.5
47	11.1	12.4	17.0	24.3	25.7	31.5
82	11.3	12.5	17.0	24.6	26.0	31.5
220	9.6	10.9				31.5

AC Power (101N500 only): 100-240 VAC power may be connected to **L** and **N** at the top of the module.

Light (101N500 only): A 12 VDC light output is provided between **A** and **C**.

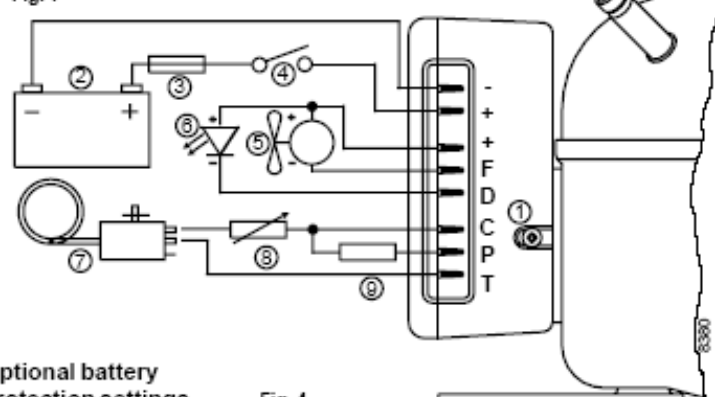


Instructions

Danfoss

Electronic Unit for BD35/50F Compressors,
101N0210, 101N0220 and 101N0300, 12-24V

Fig. 1



Optional battery protection settings

Fig. 4

Resistor (9) kΩ	12V out-out V	12V out-in V	12V max. Voltage	24V out-out V	24V out-in V	24V max. Voltage
0	9.6	10.9	17.0	21.3	22.7	31.5
1.6	9.7	11.0	17.0	21.5	22.9	31.5
2.4	9.9	11.1	17.0	21.8	23.2	31.5
3.6	10.0	11.3	17.0	22.0	23.4	31.5
4.7	10.1	11.4	17.0	22.3	23.7	31.5
6.2	10.2	11.5	17.0	22.5	23.9	31.5
8.2	10.4	11.7	17.0	22.8	24.2	31.5
11	10.5	11.8	17.0	23.0	24.5	31.5
14	10.6	11.9	17.0	23.3	24.7	31.5
18	10.8	12.0	17.0	23.6	25.0	31.5
24	10.9	12.2	17.0	23.8	25.2	31.5
33	11.0	12.3	17.0	24.1	25.5	31.5
47	11.1	12.4	17.0	24.3	25.7	31.5
82	11.3	12.5	17.0	24.6	26.0	31.5
220	9.6	10.9				31.5

Wire dimensions

Cross section mm ²	Max length* m 12V operation	Max length* m 24V operation
2.5	2.5	5
4	4	8
6	6	12
10	10	20

Fig. 2

*Length between battery and electronic unit

Standard battery protection settings

12V cut-out V	12V cut-in V	24V cut-out V	24V cut-in V
10.4	11.7	22.8	24.2

Fig. 3

Compressor speed

Electronic unit	Resistor (8) Ω	Motor speed rpm	Contr.circ. current mA
101N0210 101N0220	0	2,000	5
	277	2,500	4
	692	3,000	3
	1523	3,500	2
101N0300 with AEO	0	AEO	6
	173	2,000	5
	450	2,500	4
	865	3,000	3
	1698	3,500	2

Fig. 5

ENGLISH

The electronic unit is a dual voltage device. This means that the same unit can be used in both 12V and 24V power supply systems. Maximum voltage is 17V for a 12V system and 31.5V for a 24V power supply system. Max. ambient temperature is 55°C. The electronic unit has a built-in thermal protection which is actuated and stops compressor operation if the electronic unit temperature gets too high.

Installation (Fig. 1)

Connect the terminal plug from the electronic unit to the compressor terminal. Mount the electronic unit on the compressor by snapping the cover over the screw head (1).

Power supply (Fig. 1)

The electronic unit must always be connected directly to the battery poles (2). Connect the plus to + and the minus to -, otherwise the electronic unit will not work. The electronic unit is protected against reverse battery connection. For protection of the installation, a fuse (3) must be mounted in the + cable as close to the battery as possible. 15A fuse for 12V and 7.5A fuse for 24V circuits are recommended.

If a main switch (4) is used, it should be rated to a current of min. 20A.

The wire dimensions in Fig. 2 must be observed. Avoid extra junctions in the power supply system to prevent voltage drop from affecting the battery protection setting.

Battery protection (Fig. 1)

The compressor is stopped and re-started again

according to the decided voltage limits measured on the + and - terminals of the electronic unit.

The standard settings for 12V and 24V power supply systems appear from Fig. 3.

Other settings (Fig. 4) are optional if a connection which includes a resistor (9) is established between terminals C and P.

In solar applications without a battery a 220 kΩ resistor is recommended. In AEO (Adaptive Energy Optimizing) speed mode the BD compressor will always adapt its speed to the actual cooling demand within a random operation voltage of 9.6 to 31.5V.

Thermostat (Fig. 1)

The thermostat (7) is connected between the terminals C and T. Without any resistor in the control circuit, the compressor with electronic unit 101N0210 or 101N0220 will run with a fixed speed of 2,000 rpm when the thermostat is switched on. *With the thermostat directly connected to terminal C the electronic unit 101N0300 will adjust its speed to the actual cooling demand.*

Other fixed compressor speeds in the range between 2,000 and 3,500 rpm can be obtained when a resistor (8) is installed to adjust the current (mA) of the control circuit. Resistor values for various motor speeds appear from Fig. 5.

Fan (optional, Fig. 1)

A fan (5) can be connected between the terminals + and F. Connect the plus to + and the minus to F. Since the output voltage between the terminals + and F is always regulated to 12V, a 12V fan must be used for both 12V and 24V power supply systems.

The fan output can supply a continuous current of 0.5A_{avg}. A higher current draw is allowed for 2 seconds during start.

LED (optional, Fig. 1)

A 10mA light emitting diode (LED) (8) can be connected between the terminals + and D.

In case the electronic unit records an operational error, the diode will flash a number of times. The number of flashes depends on what kind of operational error was recorded. Each flash will last 1/4 second. After the actual number of flashes there will be a delay with no flashes, so that the sequence for each error recording is repeated every 4 seconds.

Number of flashes	Error type
5	Thermal cut-out of electronic unit (If the refrigeration system has been too heavily loaded, or if the ambient temperature is high, the electronic unit will run too hot).
4	Minimum motor speed error (If the refrigeration system is too heavily loaded, the motor cannot maintain minimum speed 1,650 rpm).
3	Motor start error (The rotor is blocked or the differential pressure in the refrigeration system is too high (>5 bar)).
2	Fan over-current cut-out (The fan loads the electronic unit with more than 1A _{max}).
1	Battery protection cut-out (The voltage is outside the cut-out setting).

4 RESTART OF COMPRESSOR AFTER OCCURRENCES OF FAULT CONDITIONS.

The unit will try to restart the compressor 66 seconds after the fault condition has disappeared.

This means that the delay situations can be divided into two situations.

1. For the following faults a restart will be made after 66 seconds after the compressor has stopped.

Fan over-current cut-out (5 flashes).

Motor start error (3 flashes).

Minimum motor speed error (4 flashes).

2. For the following 2 type of faults the reason of the fault have to disappear, and then a restart will be made after 66 seconds.

Battery protection cut-out: The voltage has to come above the cut-in voltage of the unit.

Thermal cut-out of electronic unit: The temperature of the heat sink must decrease below cut out temperature.

4. Electrical Service Procedures:

Compressor not running:

Before proceeding any further, make sure you have sufficient voltage AT THE COMPRESSOR. Remember that if the voltage falls below the cutout voltage, the module will keep the unit from running.

ADLER BARBOUR SYSTEMS: Bypass the *Diagnostic Module* by disconnecting the DC power and reconnect it to the compressor module, removing the leads from the diagnostic module.

Unplug fan lead F. If the fan is drawing more than 1 amp, the module will cut out the compressor.

Bypass the thermostat by installing a jumper across T and C on the compressor module.

Apply voltage. *If the compressor runs*, add fan, then add thermostat, and see which component stops the compressor.

If the compressor doesn't run, remove the module and check the compressor windings with an ohmmeter.

Winding resistance:

BD-35: 2.3 ohms, all 3 windings

BD-50: 2.0 ohms, all 3 windings

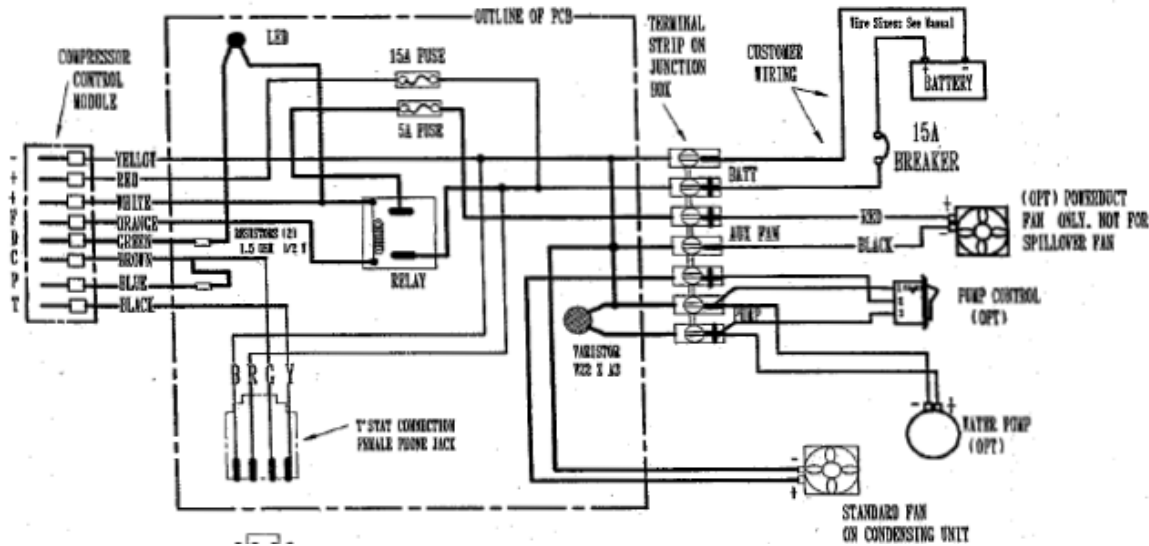
Check from any of the windings to ground-resistance should be infinite.

If compressor is not within specifications, compressor is defective.

If the compressor checks within specifications, compressor module is defective.

Adler-Barbour Main (Diagnostic) Board:

The board has a terminal block for running auxiliary cooling fan and a water pump. These are controlled by a mini-relay on the board, the coil of which is controlled by the F (fan) output on the module.



The LED is controlled by output from the LED output on the module and therefore displays the same error codes.

The “varistor” sets the speed of the water pump.

There is a control fuse on the back of many new units.

Note that the board *does not* step down voltage. There is no transformer. For this reason the Adler-Barbour condensing units are rated at *12 volts DC only*.

Adapting the Adler-Barbour system for the MPS-50:

The MPS-50 has an output of 27vDC. The condenser fan has a 12vDC motor. Since the main board does not step down the voltage, it would receive 27vDC and rapidly burn out. The compressor module, however, will step down voltage. Therefore, by moving the electrical leads to “F” and “+” on the compressor module, a MPS-50 may be used to adapt the system to multi-voltage. This allows two options:

1. Unplug “F” and “+” and plug in the fan leads (note the LED “+” lead will have to be spliced with the “+” lead for the LED to be operative). There will be no power to the mini relay coil and the terminal strip will not be operative.
2. Splice the fan leads to the board leads “F” and “+”. Note that all the board functions will be active but the output will now be 27 volts DC and should be labeled. 12 volt pumps and fans can not be used.

5. Charging:

THE BASIC IDEA

It is simply this: to adjust the refrigerant charge until (a) the entire evaporator is at approximately the same temperature, (b) that temperature plus the suction pressure fall within the table guidelines, and (c) there is little or no frosting of the suction line.

When you achieve this, you will know that:
the condensing unit is doing its job efficiently

the system is not suffering due to air in the refrigerant circuit, partial clogs, a wet drier, the wrong refrigerant, leaky compressor valves, or excessively high head pressures

no energy is being wasted refrigerating the return line and the air outside of the refrigerated box.
the entire evaporator is being effectively used for cooling (a "flooded evaporator")

We should all understand that capillary tube units are what are called "critical charge systems". This means that if the amount of refrigerant is just 1/4 ounce too much or too little, the system will perform poorly.

At our Adler/Barbour factory, we inject the exact charge using a computer-controlled machine that is accurate to +/- 2 grams (+/- 1/12 ounce).

You cannot get this kind of accuracy even by using the best available professional digital refrigerant metering scale. But: you CAN get every A/B system "tuned up" in the field as accurately as we do at our factory. It will just take a little bit longer. This Bulletin will explain how.

BEFORE YOU BEGIN

BASICS

The system must be "clean": couplings tight, no leaks, no trapped air, no clogs, not "wet", with a partial R134a charge (after a thorough evacuation to at least 500 microns if the system has been open). Easiest way: after evacuation, charge (gas only, cylinder upright) until low side is at approx 60 PSIG. Stop there. (The STANDARD FACTORY CHARGE TABLE will show you how little refrigerant is needed!)

The DC power available must be solid and in the range 12.5 VDC to 14 VDC measured at the condensing unit. The thermostat must be bypassed ("jumped out") so the system will not cycle during this procedure. Fastest way: connect "T" and "C" at the control module. Use a stock jumper wire with 2 alligator clips or make up a short wire with 2 female push-on connectors.

If a Spillover Fan is installed between two compartments, turn its switch to OFF.

DETAILS

Q: Where to attach the 3 temperature probes?

A: Near the beginning, at the midway point, and near the end of the stamped refrigerant pattern of the evaporator. This generally means (a) where the capillary tube enters, (b) at the most distant end of the tube pattern, and (c) about 6" from where the return line tees back into the inlet line. For details see the attached photos/drawings showing probe locations for our standard evaporators and for the PowerPlate.

Q: What's the best way to attach them?

A: Use the blue 3M temporary/removeable masking tape- it will prevent damage to the probes and leave no gummy adhesive residue. The evaporator must be clean and dry. You can't get a good thermal contact to a wet or frosted evaporator, and you will get nothing but false readings if you try. The probe tip must remain in good solid contact with the evaporator surface.

Q: What about the air & water cooled SuperColdMachine?

A: Use the same procedure. Get the charge optimized in the air-cooled-only mode. When the owner switches on the water pump he will get the benefit of the increased efficiency (but only if the entering air temperature is well above 100°F)

Q: How long will the typical process take me? Time is money!

A: Evap systems: from scratch, starting with a warm box, not less than 1-1/2 hours and not more than 3 hours.

PowerPlate systems take much longer, typically 5 hours before the solution is completely frozen and the box, (usually a freezer) is at target temperature. See below.

Q: Why is the PowerPlate so different?

A: Because of the "ballast" of all the solution inside it. Basically it works the same way except: everything takes longer...a lot longer. It will take about 5 hours for a hot PP system to get to the point where the solution is frozen, the box is cold, and the refrigerant charge errors will really show themselves. You should consider this: install an approximate charge, fire it up, come back end of day or the next day, continue. After each charge adjustment, wait at least 20-30 minutes for the system to re-stabilize before taking new readings.

THERMOSTAT

Bypass it ("jump it out"). We want the compressor to run continuously during this procedure

Q: What are the basic factory refrigerant charges?

A: See below. All our charges are computed in Grams (one ounce=28.35 Grams so one Gram =.035 ounces)

HERE ARE OUR STANDARD FACTORY CHARGES FOR "ONE-SHOT" COUPLING SYSTEMS WITH STANDARD 15 FT TUBESETS(*)

CU-100 ColdMachine condensing unit air cooled	80 Grams
CU-200 SuperColdMachine condensing unit, air/water cooled	90 Grams
VD-150 and VD-151 Evaps. (15 ft. tubesets)	30 Grams
VD-152 and VD-153 Evaps. (15 ft. tubesets)	40 Grams
VD-154 Evap (15 ft. tubeset)	140 Grams
VD-160 PowerPlate (15 ft. tubeset)	20 Grams
VD-170-8 Refrig Blower (8 ft. tubeset)	10 Grams
VD-171-8 Freezer Blower (8 ft. tubeset)	55 Grams

For non-standard evaporator systems with a tubeset longer or shorter than 15 ft., the factory charge will be different. We will be happy to give you that data, but knowing the exact factory charge is not needed to get any

A/B system tuned up correctly.

(*) Earlier systems using "YOKO" poppet-valve type couplings have approximately the same total refrigerant charge. Same comment applies.

Q: So how accurate does it have to be?

A: We hold it to +/- 2 Grams. Within this range the performance difference is hardly measurable. But, if the

charge is over or under spec by 5 Grams or more, the evap temps will clearly change as follows:

If the system is OVERCHARGED:

The average evap temp will go UP

The start of the evap will be warmer than the middle and the end

The suction line will frost up and/or sweat heavily

The entire evap will probably be frosted but not cold enough

The low side pressure will be too high

P/T/T/ABLE FOR ALL A/B EVAPORATOR SYSTEMS
(SUGGESTION: MAKE A PAD OF XEROX COPIES OF THIS PAGE FOR USE IN THE FIELD)

TIME NEEDED TO DO THE JOB: The Table shows suction pressures and evap surface temps for a correctly charge-adjusted sysem for 2 hours from warm start, in an 80°F ambient temperature and a reasonably well-insulated box with 3" of urethane foam on all surfaces. But because you will be adding or removing refrigerant, your run will take longer from start (over or under charged) to finish (charge adjusted correctly).

VARIATIONS FROM THE TABLE: Obviously if the box is poorly insulated, very large, and/or if the ambient temp is very high, the evap will run warmer, the temp difference between the start and end of the evap will be greater, and the low side pressures will be higher. This situation will persist until the box air temperature finally pulls down to rock bottom single digits (assuming it can do so, ie if the total continuous heat load is within the system's max capability).

HOW ACCURATE MUST YOU BE? As you can see, it may take a very long time to reach total stability—easily 3 hours, as long as 4 to 5 for an evap system, longer for a PowerPlate™. By then, the evap surface would be -14°to-20°. But it is not necessary to wait that long. If you can get readings that track the table approximately on the way down, with 60 o 90 minute evap temps in the range of 0° to -10° and with no more than 5° difference from evap start to evap middle to evap end, all will be well.

USE THIS TABLE FOR:

- ALL CURRENT "ONE SHOT SYSTEMS: CU-100,CU-200 WITH EVAPS VD-150,151,152,153,154,155
- ALL OLDER "YOKO" SYSTEMS:
PB201,PB205,PB210,PB211,PB320,PB321,PB330,PB331

TIME from start of run		TEMP @ evap start °F		TEMP @ evap midway °F		TEMP @ evap end °F		APPROX LO side PSIG		RETURN LINE FROSTING ALLOWED	
Clock time	Elapso time	Target	Actual	Target	Actual	Target	Actual	+/-psig -="Hg		Inside box	Outside box
	0		(80)		(80)		(80)	60+/-			
	15 min	+5/+10		10/15		12/18				0	0
	30 min	0/+5		0/+5		4/10		4 to 5		0	0
	45 min	-2/+5		-1/+3		2/8				0	0
	60 min	-5/0		-2/0		0/+5		1 to 2		0	0
	75 min	-8/-3		-3/0		-1/+2				0	0
	90 min	-10/-5		-5/-3		-3/-1		0 to -1		0/2"	0
	105min	-11/-7		-6/-4		-4/-2				0/4"	0
	120min	-12/-9		-9/-5		-10/-3		1 to -1		0/6"	0
	150min	-14/-11		-10/-8		-11/-6				0/12"	0
	180min	-16/-14		-12/-9		-13/-11		-2 to -3		0/15"	0

P/T/T TABLE FOR POWERPLATE™ SYSTEMS

As described previously, PowerPlate systems take a long time to stabilize before you can fine-tune them. This is because a lot of heat has to be removed from the solution inside the plate in order to freeze it solid. Until it is frozen, your temps and pressures will not be stable or very useful. This must be done before you make any charge adjustments.

Not much happens for the first several hours from a warm start. So if you know that the system has a partial charge, best thing is to apply your temp probes, jump out the thermostat, fire it up, and come back several hours later or even the following day.

If you have pumped the system down to a good vacuum and you have a digital refrigerant scale, you can use it to inject 3 ounces (approx 85 grams) as your starting charge.

Don't forget to wait about 20-30 minutes between refrigerant charge adjustments- it takes a while for the temperatures and the frost line to respond to each adjustment.

USE THIS TABLE FOR:

- CURRENT "ONE SHOT" SYSTEMS
- OLDER "YOKO" SYSTEMS

CU-100 OR CU-200 WITH VD-160 POWERPLATE

PB1001(CM+POWERPLATE),PB1030(SCM+POWERPLATE)

TIME from start of run		TEMP @plate surfaceat refrigerant inlet °F		TEMP @ inside the Tstat bulb well °F		TEMP @ middle of plate surface °F		Approx LO Side PSIG	APPROXIMATE RETURN LINE FROSTING, inches of frost	
Clock time	Elapsed time	Target	Actual	Target	Actual	Target	Actual	+ = psig " = "vac	Inside box	Outside box
	0	ambient		ambient		ambient		60psig+/-		
	1 HR	5		3		6			0	0
	2 HRS	3		2		4		+3/+4	0	0
	3 HRS	0		-1		3		+1/+2	0	0
	4 HRS	-2		-2		0		0/+1	2"/6"	0
	5 HRS	-4		-3		-2 (a)		1"/2"	3"/12"	0
	6 HRS	-6		-6		-4 (b)		2"/3"	6"/18"	0
	7 HRS	-8		-10		-6		3"/4"	6"/24"	0

COLDMACHINE & SUPERCOLD BD50 CHARGES**28.35 grams = 1 oz.****To reconfirm all one-shot product charges as of 5 Feb. 01**

CU-100	80 GRAMS
CU-200	90 GRAMS
VD-150, 151	30 GRAMS
VD-152, 153	40 GRAMS
VD-160	20 GRAMS
VD-170-8 (VD-14 with 8ft tubeset)	10 GRAMS
VD-171-8 (VD-16 with 8ft tubeset)	55 GRAMS

COOLMATIC SERIES 50 & 80 CHARGES**Series 50**

Type of evap.	RPM	Total Filling Qty.	Fill Qty. Evap	Fill Qty. Compressor
VD-01	2500	52 g	17 g	35 g
VD-07	2500	80 g	45 g	35 g
VD-17	2500	80 g	45 g	35 g

Series 80

VD-03	3000	80 g	20 g	60 g
VD-04	3000	90 g	30 g	60 g
VD-05	3000	90 g	30 g	60 g
VD-06	3000	100 g	50 g	60 g
VD-14	3500	105 g	45 g	60 g
VD-15	3000	105 g	45 g	60 g
VD-16	3500	100 g	40 g	60 g
VD-08	3000	100 g	40 g	60 g
VD-09	3000	125 g	65 g	60 g
VD-20	2500	70 g	10 g	60 g

Adler/Barbour

R-134a Field Service Data Sheet

R-134a Charging Data for All Adler/Barbour Systems

Version 7.1.94

Use this table for field charging or adjustment of refrigerant charge on all A/B systems with either aluminum (rollbond) evaporators or PowerPlate evaporators (*)

- All pressures are in PSIG
- Ambient air temperature is assumed +75F.
- Corrections for other local ambients: See notes, charge by frost line.
- Typical frost patterns are described at +75F ambient with box hatch open. (These frosted areas will be smaller at higher ambients)
- All evaporators should be 100% frosted with hatch closed, unit cycling

Product Identification:

CM= ColdMachine (air-cooled only)

SCM= SuperColdMachine (air/water cooled)

P/P= PowerPlate

Standard Evaporator measures 11"x 6"x 12" (11"x 30" before forming into box)

Large Evaporator measures 12"x 6"x 15" (12"x 40" before forming into box)

Refrigerant Charge:

Varies from 3.5 to 5.0 ounces (by product). Charge is critical to 1/10th ounce. Therefore units cannot be correctly charged in field by weighing in the charge. Use this table, observe frost patterns and suction pressure.

Table 1-Suction Gas Pressure (PSIG):

Unit is running continuously						
Unit	Evap	Lid open After 15 min.	Frost? (see notes)	Lid Closed After 30 min	Lid Closed After 60 min	Lid Closed Cycling on TSAT
CM	STD	8 to 10	¼ note (A)	5 to 7	4 to 6	4 to 6
CM	LGE	12 to 13	1/8 note (B)	7 to 10	5 to 7	5 to 7
CM	P/P	8 to 10	cp lngs note (C)	7 to 9	4 to 7	4 to 7
SCM	STD	8 to 10	¼ note (A)	5 to 7	4 to 6	4 to 6
SCM	LGE	12 to 13	1/8 note (B)	7 to 10	5 to 7	5 to 7
SCM	P/P	8 to 10	cp lngs note (C)	4 to 7	4 to 7	4 to 7

Notes:

Initial frost patterns with lid of cabinet open:

- (A) **Standard evaporators:** normal frost pattern is approx. 4-5" of evap frosted about ½ way around from tube entry point. This is about ¼ of the total evap surface in +75F moist ambient, lid open.
- (B) **Large Evaporators:** normal frost pattern is approx. a 2" to 2.5" band all the way around the evap. This is about 1/8th of the total evap surface in +75F moist ambient, lid open.
- (C) **PowerPlate:** normal frost pattern is both couplings frosted, in approx. 60 minutes. Because of the warm solution inside, it takes much longer to frost a part of the plate surface, vs. an aluminum evap.

Information about the Part Numbering System

Example #1 **RPD-1110U/F**

R= Refrigerator

P= Liner (P for plastic, S for Stainless Steel) in this case plastic

D = Direct Evaporator as opposed to "A" which is a refrigerator with an accumulator.

1 = AC/DC 1 if AC/DC; 0 if DC only

110 =Next 3 digits is size in liters – in this case 110 Liters

U = United States version, E would be European. In the case of the RPD the United States version has a black panel front whereas the European version has a wood grain panel. In the case of the RSD version both the European and the United States products have a brushed Stainless Steel front.

/F = In this case it means the refrigerator has a flush mount frame mounted on it. We need to address the case of a "standard" depth saver frame.

Example #2 **RPD-0050U**

Refrigerator, plastic liner, direct evaporator, DC (not AC/DC – that would have a 1), 50 liter, United States version with the black panels

Example # 3 **RSD-1115U/F**

Refrigerator, Stainless Steel interior, direct evaporator, AC/DC, 115 liters, flush mount frame mounted.

Example # 4 **RSF-0115U**

This is actually an all freezer. Stainless Steel interior, Freezer, DC, 115 liter, United States version, flush mount frame.

Example # 5 **RPF-1050U/F**

This is also an all freezer, plastic interior, AC/DC, 50 liter, United States version with a mounted flush mount frame.

Example #6 **RPA-065U**

These are not sold here, but it would be a refrigerator, plastic interior, accumulating feature, DC only, 65 liter, United States version

The New CR Line follows a similar format:

Example CR-1065E/F – W

C = Chinese

R = Refrigerator

1 = ac/dc

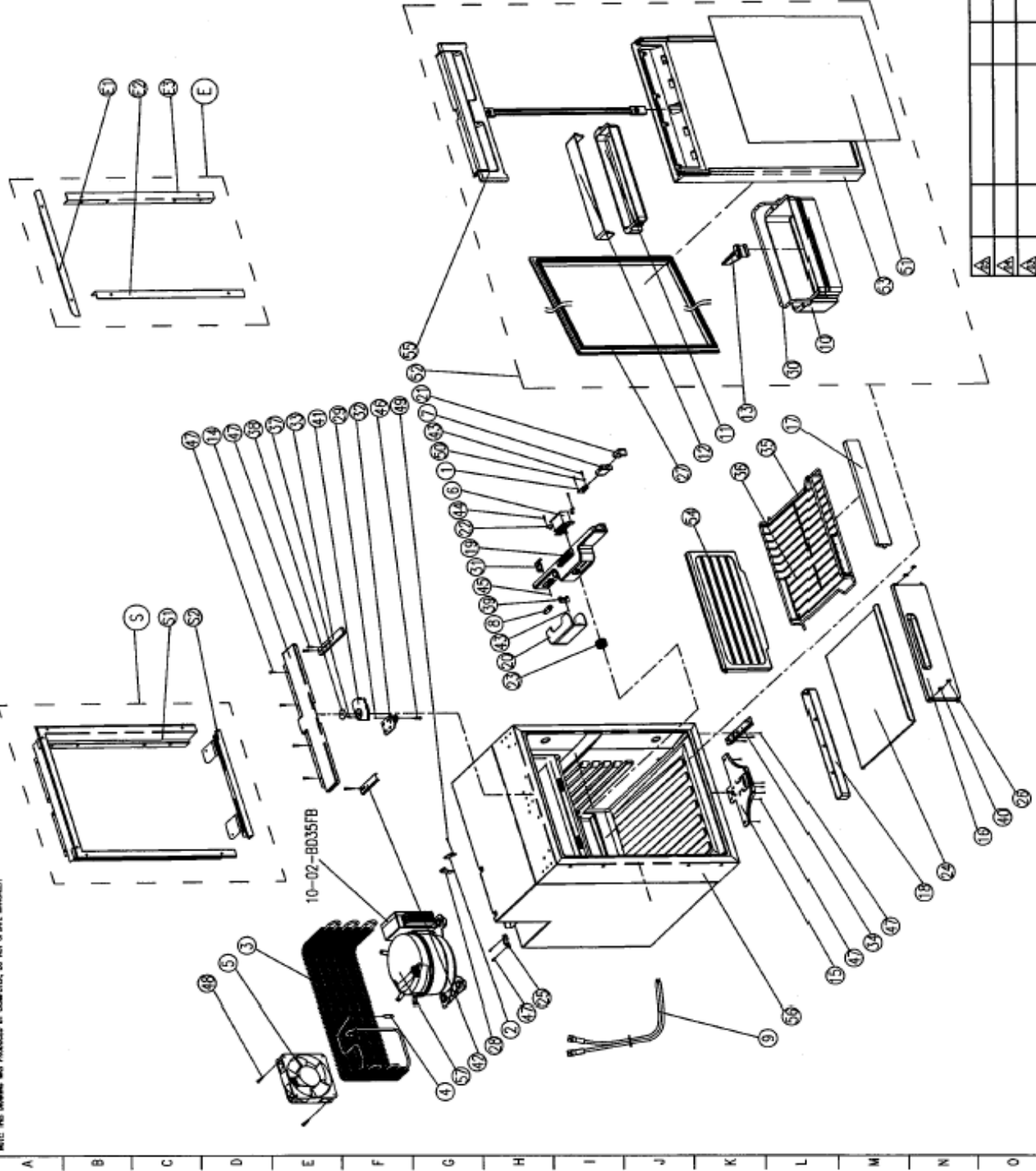
065 = 65 liter

E = European – silver door surround

F = Flush Mount frame (silver)

- **W** = white panel

This incidentally is the product we sell Rinker, although as fate would have it they have the wrong part number in their system.



**** * DENOTES COLOR**

IS	47-08-146	146A	146B	146C	146D	146E	146F	146G	146H	146I	146J	146K	146L	146M	146N	146O	146P	146Q	146R	146S	146T	146U	146V	146W	146X	146Y	146Z	146AA	146AB	146AC	146AD	146AE	146AF	146AG	146AH	146AI	146AJ	146AK	146AL	146AM	146AN	146AO	146AP	146AQ	146AR	146AS	146AT	146AU	146AV	146AW	146AX	146AY	146AZ	146BA	146BB	146BC	146BD	146BE	146BF	146BG	146BH	146BI	146BJ	146BK	146BL	146BM	146BN	146BO	146BP	146BQ	146BR	146BS	146BT	146BU	146BV	146BW	146BX	146BY	146BZ	146CA	146CB	146CC	146CD	146CE	146CF	146CG	146CH	146CI	146CJ	146CK	146CL	146CM	146CN	146CO	146CP	146CQ	146CR	146CS	146CT	146CU	146CV	146CW	146CX	146CY	146CZ	146DA	146DB	146DC	146DD	146DE	146DF	146DG	146DH	146DI	146DJ	146DK	146DL	146DM	146DN	146DO	146DP	146DQ	146DR	146DS	146DT	146DU	146DV	146DW	146DX	146DY	146DZ	146EA	146EB	146EC	146ED	146EE	146EF	146EG	146EH	146EI	146EJ	146EK	146EL	146EM	146EN	146EO	146EP	146EQ	146ER	146ES	146ET	146EU	146EV	146EW	146EX	146EY	146EZ	146FA	146FB	146FC	146FD	146FE	146FF	146FG	146FH	146FI	146FJ	146FK	146FL	146FM	146FN	146FO	146FP	146FQ	146FR	146FS	146FT	146FU	146FV	146FW	146FX	146FY	146FZ	146GA	146GB	146GC	146GD	146GE	146GF	146GG	146GH	146GI	146GJ	146GK	146GL	146GM	146GN	146GO	146GP	146GQ	146GR	146GS	146GT	146GU	146GV	146GW	146GX	146GY	146GZ	146HA	146HB	146HC	146HD	146HE	146HF	146HG	146HH	146HI	146HJ	146HK	146HL	146HM	146HN	146HO	146HP	146HQ	146HR	146HS	146HT	146HU	146HV	146HW	146HX	146HY	146HZ	146IA	146IB	146IC	146ID	146IE	146IF	146IG	146IH	146II	146IJ	146IK	146IL	146IM	146IN	146IO	146IP	146IQ	146IR	146IS	146IT	146IU	146IV	146IW	146IX	146IY	146IZ	146JA	146JB	146JC	146JD	146JE	146JF	146JG	146JH	146JI	146JJ	146JK	146JL	146JM	146JN	146JO	146JP	146JQ	146JR	146JS	146JT	146JU	146JV	146JW	146JX	146JY	146JZ	146KA	146KB	146KC	146KD	146KE	146KF	146KG	146KH	146KI	146KJ	146KK	146KL	146KM	146KN	146KO	146KP	146KQ	146KR	146KS	146KT	146KU	146KV	146KW	146KX	146KY	146KZ	146LA	146LB	146LC	146LD	146LE	146LF	146LG	146LH	146LI	146LJ	146LK	146LL	146LM	146LN	146LO	146LP	146LQ	146LR	146LS	146LT	146LU	146LV	146LW	146LX	146LY	146LZ	146MA	146MB	146MC	146MD	146ME	146MF	146MG	146MH	146MI	146MJ	146MK	146ML	146MN	146MO	146MP	146MQ	146MR	146MS	146MT	146MU	146MV	146MW	146MX	146MY	146MZ	146NA	146NB	146NC	146ND	146NE	146NF	146NG	146NH	146NI	146NJ	146NK	146NL	146NM	146NN	146NO	146NP	146NQ	146NR	146NS	146NT	146NU	146NV	146NW	146NX	146NY	146NZ	146OA	146OB	146OC	146OD	146OE	146OF	146OG	146OH	146OI	146OJ	146OK	146OL	146OM	
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54	47-03-1401506	3202B	141180A	12
55	47-01-540257A	3.5 3202B	500207A	6
56	46-03-30550	BLUSH-MOUNT FRAME	SP02	1
51	46-03-21250	BLUSH MOUNT FRAME	SP02	1

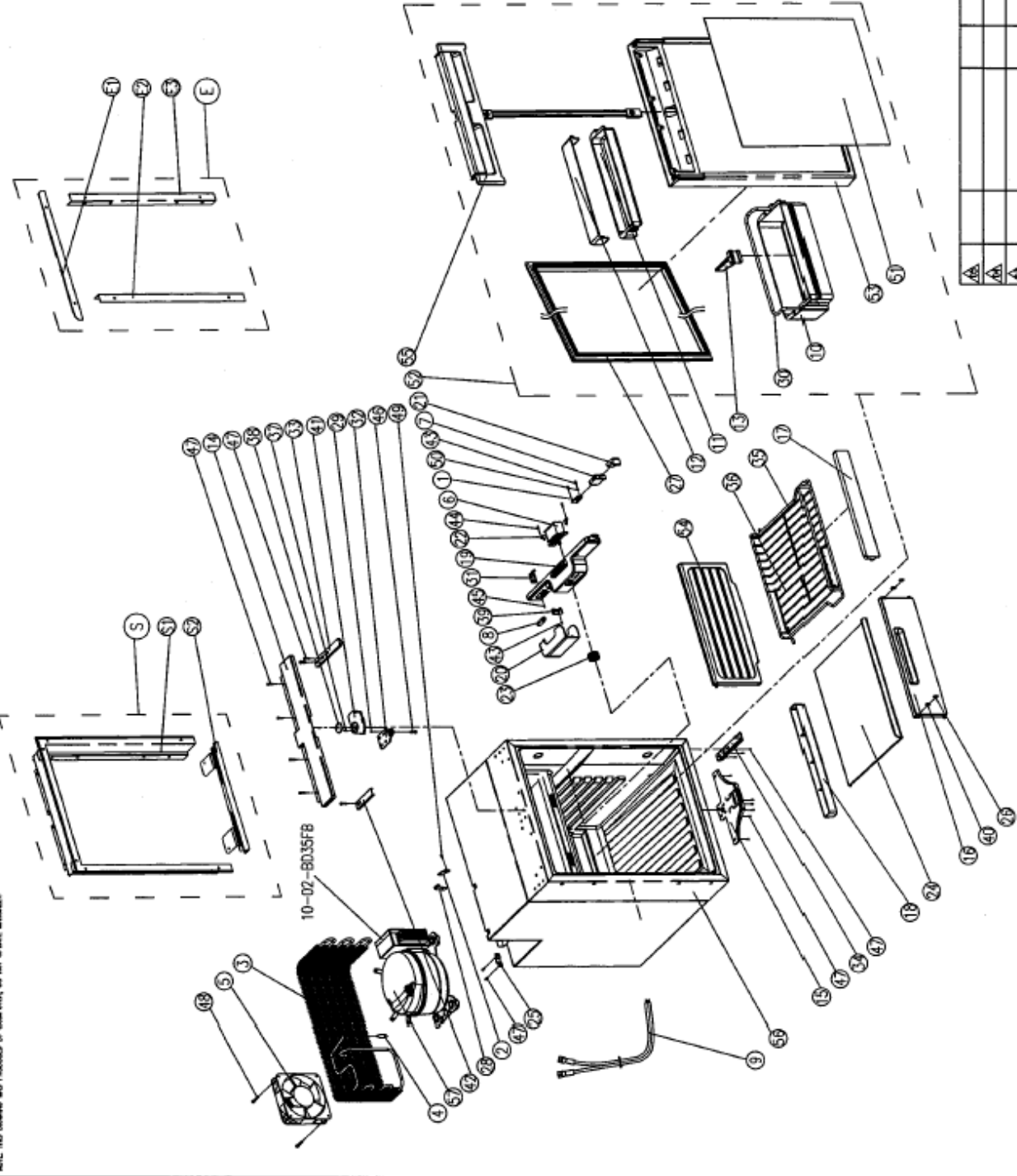
 DWM-Q550C
 (Push - reset button)

[illegible]

TRIGONOMETRY	CR-0050E (MAINTENANCE DRAWING)
	TITLE EXPLODED DRAWING (MA.) MODEL NO. 065 DWS. NO.065-13MB
UEN G.H.ZHONG CHK APPY	SCALE FULL UNIT MM SHEET 1/1
MOBICOOL INTERNATIONAL LTD. REV. 00	

NOTE THIS DRAWING WAS PRODUCED BY COMPUTER, DO NOT UPDATE MANUALLY

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100



** * DENOTES COLOR

1	47-01-1616A	SCREW	100100A	12
2	47-01-1616A	SCREW	100100A	12
3	47-01-1616A	SCREW	100100A	12
4	47-01-1616A	SCREW	100100A	12
5	47-01-1616A	SCREW	100100A	12
6	47-01-1616A	SCREW	100100A	12
7	47-01-1616A	SCREW	100100A	12
8	47-01-1616A	SCREW	100100A	12
9	47-01-1616A	SCREW	100100A	12
10	47-01-1616A	SCREW	100100A	12

(Standard fasteners for CR-005E)

11	47-01-1616A	SCREW	100100A	12
12	47-01-1616A	SCREW	100100A	12
13	47-01-1616A	SCREW	100100A	12
14	47-01-1616A	SCREW	100100A	12
15	47-01-1616A	SCREW	100100A	12
16	47-01-1616A	SCREW	100100A	12
17	47-01-1616A	SCREW	100100A	12
18	47-01-1616A	SCREW	100100A	12
19	47-01-1616A	SCREW	100100A	12
20	47-01-1616A	SCREW	100100A	12

(Thin-mount fasteners)

NO.	DESCRIPTION	QTY	UNIT	REMARKS
1	10-02-8035F8	1	EA	COMPRESSOR
2	10-02-8035F8	1	EA	CONDENSER
3	10-02-8035F8	1	EA	EVAPORATOR
4	10-02-8035F8	1	EA	FAN
5	10-02-8035F8	1	EA	CONTROL PANEL
6	10-02-8035F8	1	EA	WATER PUMP
7	10-02-8035F8	1	EA	WATER TANK
8	10-02-8035F8	1	EA	WATER FILTER
9	10-02-8035F8	1	EA	WATER TANK
10	10-02-8035F8	1	EA	WATER TANK
11	10-02-8035F8	1	EA	WATER TANK
12	10-02-8035F8	1	EA	WATER TANK
13	10-02-8035F8	1	EA	WATER TANK
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97	10-02-8035F8	1	EA	WATER TANK
98	10-02-8035F8	1	EA	WATER TANK
99	10-02-8035F8	1	EA	WATER TANK
100	10-02-8035F8	1	EA	WATER TANK

PART NO.	CR-005E (MAINTENANCE DRAWING)
TRIGONOMETRY	EXPLODED DRAWING (MA)
DRW. G.H.ZHONG	13JUL06
SCALE	1:1
DATE	1/1
NAME	MOBICOOL INTERNATIONAL LTD.
REV.	00

21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

NOTE: THIS FORMING WAS PROCURED BY COMPUTER, DO NOT UPGRADE MANUALLY.



54	47-50-14030A	250W	14030A
55	47-60-24030A	LS 500W	14030A
56	48-001-1252C	FL18W-4000K Fluor	9922
57	48-001-1252C	FL18W-4000K Fluor	9922

⑤ E17-2666K
(Double-mount, lead frame)

① Double-mount. That dooms!

[illegible][illegible][illegible][illegible]

1	40-500-12000	NUMBER OF PLATE	1
2	40-500-12000	ADAPTOR	1
3	40-500-12000	TEMP PLATE	1
4	40-500-12000	DANCO FOR YAK	1
5	40-500-12000	ADAPTOR	1
6	40-500-12000	YAK	1
7	40-500-12000	YAK	1
8	40-500-12000	YAK	1
9	40-500-12000	YAK	1
10	40-500-12000	YAK	1
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96	40-500-12000	YAK	1
97	40-500-12000	YAK	1
98	40-500-12000	YAK	1
99	40-500-12000	YAK	1
100	40-500-12000	YAK	1

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TRIGONOMETRY		TITLE EXPLODED DRAWING (MA)	ON COVER (PARENT) DRAWING
13 JUL 68	13 JUL 68	MODEL NO. 091	OWG. NO. 091-13M
WASH G.H.ZHONG	WASH G.H.ZHONG	SCALE FULL	MAT'L
CHK	CHK	DATE 1968	DATE 1968

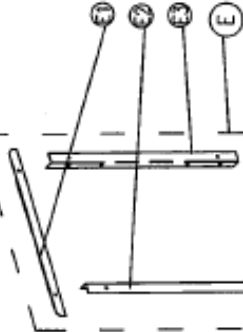
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DATE	NOTE	DATE	CONTENT	ECO NO.	NAME	REV.
						00

MOBICOOL INTERNATIONAL LTD.

DATE	NOTE	DATE	CONTENT	ECO NO.	NAME	REV.
						00

MOBICOOL INTERNATIONAL LTD.



54	41-52-341100A	50009	W1118A	12
55	41-46-30001A	5133099	SA029A	8
56	44-502-1005B	FLUSH-MOUNT FRAME	SP02	1
57	44-500-1205B	FLUSH-MOUNT FRAME	SP02	1

⑤ E74-01102
(Flush-mount ind. frame)

NO.	COMPONENT	NAME	TYPE	QTY	REMARKS
PART NO.		CR-0110E (MAINTENANCE DRAWING)			
TRIGONOMETRY			TITLE EXPLODED DRAWING (MA.)		
JOHN G.H.ZHONG	13JUL06	MODEL NO.	092	DWG. NO.092-13JUL06	
CHIK		SCALE	FULL	MAY17	
APPY		UNIT	MM	SHEET	1/1
MOBICOOL INTERNATIONAL LTD.					
					REV. 00

MOBICOOL INTERNATIONAL LTD. REV. 00

N indicates a Nitrogen holding charge CM - ColdMachine SCM - SuperColdMachine PP - PowerPlate ULTRA - UltraColdMachine

PART #	DESCRIPTION	USED ON	LIST
Z4107	COMPRESSOR, BD35F STYLE, (POE OIL – 134A TYPE)	CM, SCM	\$400.00
Z5005	Compressor, bd50F style	CM, SCM	\$400.00
F150R	Evaporator, small vertical one shot couplings	CM, SCM	\$248.00
F151R	Evaporator, small horizontal one shot couplings	CM, SCM	\$268.00
F152R	EVAPORATOR, Large VERTICAL ONE SHOT Couplings	CM, SCM	\$284.00
F153R	EVAPORATOR, Large HORIZONTAL ONE SHOT Couplings	CM, SCM	\$305.00
F1720N	Evaporator, Small Vertical, Large Couplings	CM, SCM	\$247.00
F1721N	Evaporator, Small Horizontal, Large Couplings	CM, SCM	\$268.00
F1722N	Evaporator, Large Vertical, Large Couplings	CM, SCM	\$284.00
F1729N	Evaporator, Large Horizontal, Large Couplings	CM, SCM	\$305.00
F1724N	Evaporator, Small Vertical, Small Couplings	OLD STYLE CM	\$247.00
F1725N	Evaporator, Small Horizontal, Small Couplings	OLD STYLE CM	\$268.00
F1726N	Evaporator, Large Vertical, Small Couplings	OLD STYLE CM	\$284.00
F1728N	Evaporator, Large Horizontal, Small Couplings	OLD STYLE CM	\$305.00
F1775N	EVAPORATOR, SMALL HORIZONTAL, YOKO COUPLINGS	CM, SCM, ULTRA	\$268.00
F1776N	EVAPORATOR, SMALL VERTICAL, YOKO COUPLINGS	CM, SCM, ULTRA	\$247.00
F1777N	EVAPORATOR, LARGE VERTICAL, YOKO COUPLINGS	CM, SCM, ULTRA	\$284.00
F1778N	EVAPORATOR, LARGE HORIZONTAL, YOKO COUPLINGS	CM, SCM, ULTRA	\$305.00
C9631	Powerplate tube set, one shot couplings	VD STYLE PP	\$175.00
C9627M	PowerPlate	CM, SCM	\$400.00
C9630N	POWERPLATE TUBE SET, YOKO COUPLINGS	CM, SCM, PP	\$175.00
CMR02201N	PowerPlate Tube Set, Large couplings	CM, SCM	\$175.00
C9615N	5FT Tube Set Extension, large couplings	CM, SCM, PP	\$100.00
C9629-134	5FT TUBE SET EXTENSION, YOKO COUPLINGS	CM, SCM	\$100.00
C9617-OS	5Ft TUBE SET EXTENSION, ONE SHOT COUPLINGS	CM, SCM, PP	\$100.00
F1723	Door Assembly, Small Horizontal	CM, SCM	\$50.00
F1723L	Door Assembly, Large Horizontal	CM, SCM	\$76.00
Z3010	Coupling, Male Large	CM, SCM, PP	\$28.00
Z3011	Coupling, Female Large	CM, SCM, PP	\$28.00
Z3014	Coupling, Base Small	OLD STYLE CM, PP	\$4.00
Z3015	Coupling, Male Small	OLD STYLE CM, PP	\$10.00
Z3017	Coupling, "O" Ring Small	OLD STYLE CM, PP	\$1.00
Z3216	Coupling, Female Small	OLD STYLE CM, PP	\$10.00
Z5048	COUPLING, MALE ONE SHOT W/O PORT	CU STYLE CM, SCM	\$10.00
Z5049	COUPLING, FEMALE ONE SHOT W/O PORT	CU STYLE CM, SCM	\$10.00
Z5050	COUPLING, MALE ONE SHOT WITH PORT	VD STYLE EVAP	\$12.00
Z5051	COUPLING, FEMALE ONE SHOT WITH PORT	VD STYLE EVAP	\$10.00
Z4051	Female yoko coupling	FM, CM, SCM, ULTRA	\$18.00
Z4052	MALE YOKO COUPLING	FM, CM, SCM, ULTRA	\$18.00
Z5047	one shot coupling kit	NEW STYLE EVAP	\$35.00
Z3281	fan 12vdc	CM, SCM. ULTRA	\$45.00
F1809	Fan Assembly (12VDC fan and bracket)	OLD STYLE CM	\$68.00
E1399	Spillover Fan 3"	Spillover Kit	\$30.00
Z5020	Spillover Fan, 2 ¼"	Spillover Kit	\$20.00
AB3017	Electronic Module (12VDC)	BD30, BD25	\$292.00
Z5006	Electronic module (12/24vdc)	BD35F, BD50F	\$335.00
D8241S	Filter Drier (solder type)	SCM, ULTRA	\$19.00
F1884	Complete PCB Control Module Assembly	CM,SCM	\$393.00
F1886	PCB W/ Phone Jack and LED, NO Speed Control Resistor	CU STYLE CM, SCM	\$79.00
C1502J	Thermostat, Phone jack harness (freezer) no speed control	PP	\$47.00
F1710J	Thermostat, phone jack harness, no speed control	Cm, SCM	\$45.00
F1710	Thermostat Assembly (REFRIGERATOR)	CM, SCM, FM790	\$35.00
Z3202	Thermostat only	CM, SCM	\$20.00
Z3150	Thermostat Housing	CM, SCM	\$14.00

C1502	Thermostat Assembly (FREEZER)	PP	\$37.00
E1391	Thermostat only	PP	\$23.00
Z3943	Thermostat Knob	PP, CM, SCM	\$2.00
Z3410	Thermostat Wire Harness	CM, SCM, PP	\$10.00
D8072	SPILLOVER THERMOSTAT ONLY	SPILLOVER KIT	\$23.00
Z4071R	DIGITAL THERMOSTAT, REFRIGERATOR	CM, SCM, ULTRA, PP	\$302.00
Z4071F	DIGITAL THERMOSTAT, FREEZER	CM, SCM, ULTRA, PP	\$302.00
F1710JR270	Thermostat, Small Evaporator, Refrig w/ Speed Control	VD150 & VD151	\$50.00
F1710JR680	Thermostat, Large Evaporator, Refrig w/ Speed Control	VD152 & VD153	\$50.00
C1502JR1500	Thermostat, Small/Large Evap., Freezer w/ Speed Control	ALL VD'S	\$50.00
4441100001	Thermostat for VD units 01- 10 and 18-20	WAECO EVAPS	\$25.00
4441100002	THERMOSTAT FOR RECIRCULATORY EVAPORATOR	WAECO EVAPS	\$36.00
4441100003	Deep freezing thermostat	WAECO EVAPS	\$50.00
C7216	SPILLOVER KIT BENETEAU	BENETEAU	\$92.00
C7210	AUTOMATIC SPILLOVER FAN ASSY.	BENETEAU	\$98.00
C7215	SPILLOVER KIT BENETEAU	BENETEAU	\$103.00
C7212	T-STAT ASSY. ONLY SPILLOVER FAN KITS	OEM	\$103.00
C7217	T-STAT ONLY FOR SPILLOVER KIT	OEM	\$55.00
410451/0	THERMOSTAT FOR RSD-0115	RSF-115	\$20.00
410510/0	THERMOSTAT FOR RSF-0115	RSF-115	\$20.00
410010/0	T-STAT FOR RD UNITS	RD UNITS	\$30.00

PART

FROST MATE PARTS ONLY - DESCRIPTION

USED ON

LIST

Z4065	Control Module	FM690	\$195.00
Z4064	Compressor	FM690	\$340.00

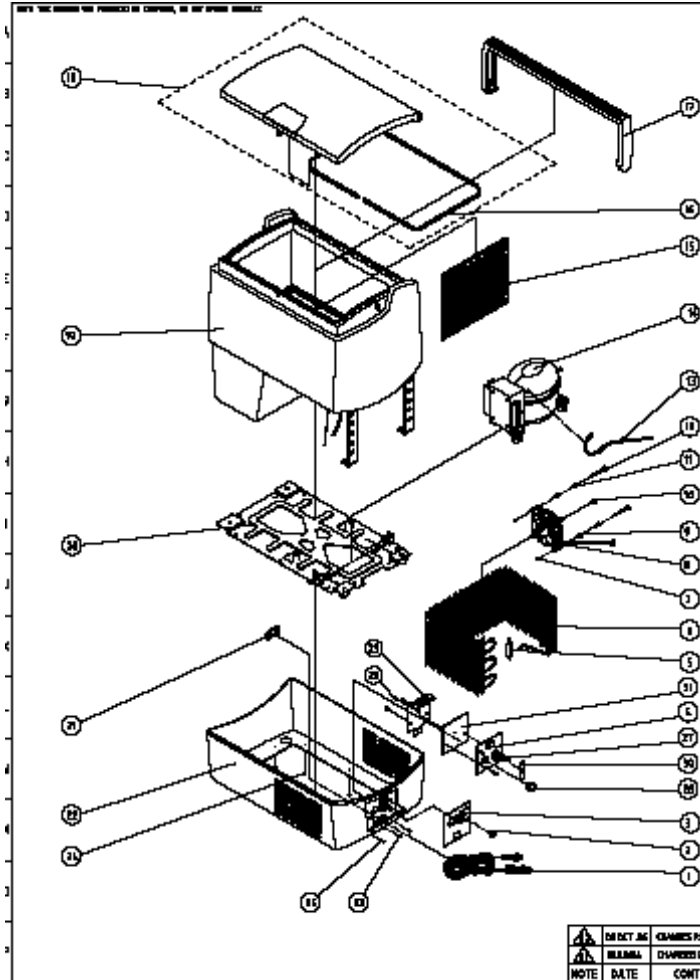
PART

ADDITIONAL COMMON PARTS - DESCRIPTION

USED ON

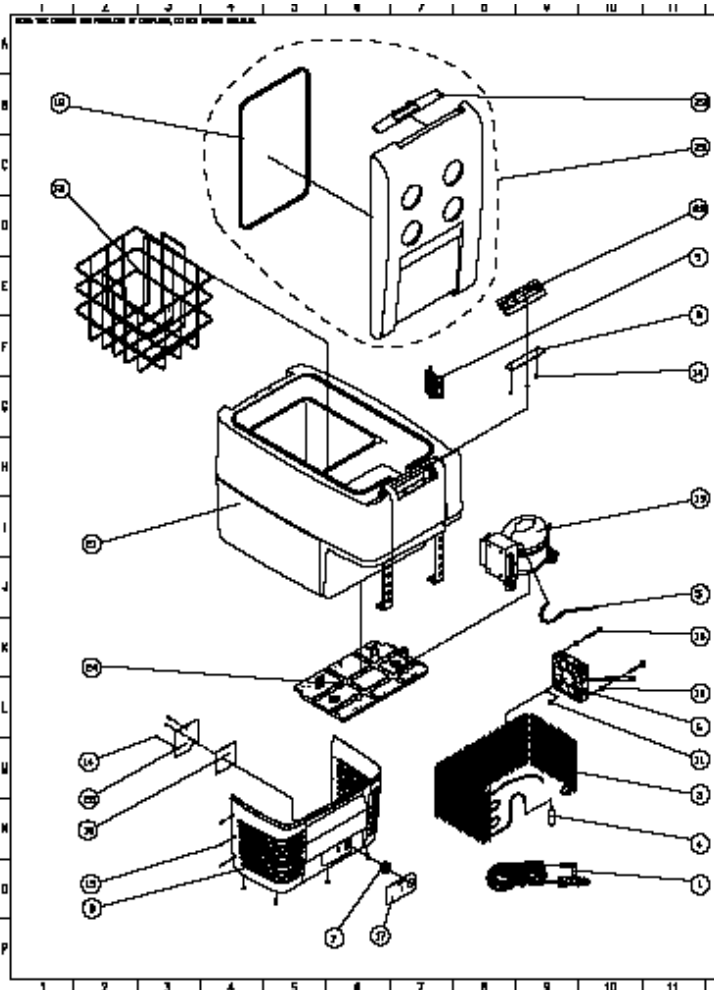
LIST

22CF050	Lid for CF-50 Compressor Cooler	CF-050	\$23.50
120340/0	Freezer door for RPD- 110	RPD-110	\$38.00
4443000090	Frame for Freezer door RPD-110	RPD-110	\$8.95
Z5023 ZZZ5023	AC Power Cord for CF Units	CF Units	\$8.00
80-T2-28000A1	DC Power cable for CF-18,80,110	CF Units	\$21.00
4441300008	DC Power Cord for FC-40, CF-25,35,40,50	CF Units	\$23.50
80-T1-2800A	DC Power cord for thermo-electric units	TE Units	\$12.95
Z5005	Compressor, bd50F style	CM, SCM	\$400.00
Z3212	Relay	SCM, CM	\$11.00
F1701	Verticube Ictray with Polygrid Insert	CM, SCM, ULTRA	\$41.50
Z3064	Separator, Small	CM, SCM, ULTRA	\$26.00
Z3065	Separator, Large	CM, SCM, ULTRA	\$28.00
F1875	Installation Hardware Package	CM, SCM, ULTRA, PP	\$10.00
E1390	Water Pump 12VDC	SCM, ULTRA	\$210.00
E1392	Wet End Rebuild Kit for E1390 pump	SCM, ULTRA	\$25.00
E1240	STRAINER	WATER COOLING KIT	\$120.00
E1134	SS Bulkhead Bracket (CU-100 & 200)	CM, SCM	\$72.50
Z3302	Polygrid Insert	CM,SCM,Ultra	\$5.00



NO.	COMPONENT	NAME	TYPE	QTY	REMARK
31	24-LB-105MSD	PROTECT PAPER		1	4.7M
30	53-22-34MM1A	SWITCH PLATE		1	
29	48-48-78-15PC88	PROTECTOR	PC	3	
28	48-022-TAB10	TUBE BUTTON	AIS	1	
27	44-78-20C	BRASS		3	
26	47-8X-PO52P#	SCREW	PERM105	3	
25	47-8X-PO52P#	SCREW	PERM105	3	
24	47-8X-PO52P#	SCREW	PERM105	3	
23	47-8X-PO52P#	SCREW	PERM105	3	
22	48-022-04PP6G	BOTTOM COVER	PP	1	
21	48-12-29MRG	CLIP FOR SOCKET	AIS	1	
20	48-022-04PP6G	CLIP FOR SOCKET	AIS	1	
19	5P-022-04PP6G	CLIP FOR SOCKET	AIS	1	
18	5P-022-04PP6G	CLIP FOR SOCKET	AIS	1	
17	5P-022-04PP6G	CLIP FOR SOCKET	AIS	1	
16	42-01-22ES06G	GASLET	PE	1	
15	48-022-04PP6G	GASLET	PP	1	
14	5P-022-04PP6G	GASLET	PP	1	
13	5P-022-04PP6G	GASLET	PP	1	
12	5P-022-04PP6G	GASLET	PP	1	
11	5P-022-04PP6G	GASLET	PP	1	
10	5P-022-04PP6G	GASLET	PP	1	
9	5P-022-04PP6G	GASLET	PP	1	
8	5P-022-04PP6G	GASLET	PP	1	
7	5P-022-04PP6G	GASLET	PP	1	
6	5P-022-04PP6G	GASLET	PP	1	
5	5P-022-04PP6G	GASLET	PP	1	
4	5P-022-04PP6G	GASLET	PP	1	
3	5P-022-04PP6G	GASLET	PP	1	
2	5P-022-04PP6G	GASLET	PP	1	
1	5P-022-04PP6G	GASLET	PP	1	

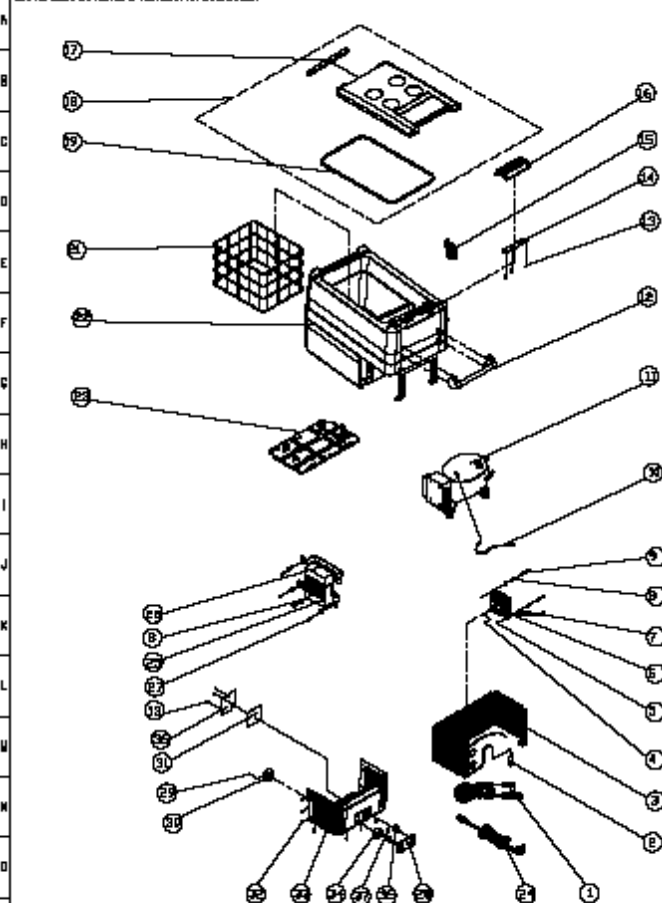
PART NO.	CF-D18 W41A(MAINTENANCE)
TRIGONOMETRY	EXPLODED DRAWING(WA.)
DRW. Z.G.H	02APRO4
CH-K	SCALE FULL
APPV	UNIT MM
	SHEET 1/1
	MOBICOOL INTERNATIONAL LTD.
	REV. 02



NO.	COMPONENT	NAME	TYPE	QTY	REMARK
31	24-LB-105MSD	PROTECT PAPER		1	4.7M
30	53-22-34MM1A	SWITCH PLATE		1	
29	48-48-78-15PC88	PROTECTOR	PC	3	
28	48-022-TAB10	TUBE BUTTON	AIS	1	
27	44-78-20C	BRASS		3	
26	47-8X-PO52P#	SCREW	PERM105	3	
25	47-8X-PO52P#	SCREW	PERM105	3	
24	47-8X-PO52P#	SCREW	PERM105	3	
23	47-8X-PO52P#	SCREW	PERM105	3	
22	48-022-04PP6G	BOTTOM COVER	PP	1	
21	48-12-29MRG	CLIP FOR SOCKET	AIS	1	
20	48-022-04PP6G	CLIP FOR SOCKET	AIS	1	
19	5P-022-04PP6G	CLIP FOR SOCKET	AIS	1	
18	5P-022-04PP6G	CLIP FOR SOCKET	AIS	1	
17	5P-022-04PP6G	CLIP FOR SOCKET	AIS	1	
16	42-01-22ES06G	GASLET	PE	1	
15	48-022-04PP6G	GASLET	PP	1	
14	5P-022-04PP6G	GASLET	PP	1	
13	5P-022-04PP6G	GASLET	PP	1	
12	5P-022-04PP6G	GASLET	PP	1	
11	5P-022-04PP6G	GASLET	PP	1	
10	5P-022-04PP6G	GASLET	PP	1	
9	5P-022-04PP6G	GASLET	PP	1	
8	5P-022-04PP6G	GASLET	PP	1	
7	5P-022-04PP6G	GASLET	PP	1	
6	5P-022-04PP6G	GASLET	PP	1	
5	5P-022-04PP6G	GASLET	PP	1	
4	5P-022-04PP6G	GASLET	PP	1	
3	5P-022-04PP6G	GASLET	PP	1	
2	5P-022-04PP6G	GASLET	PP	1	
1	5P-022-04PP6G	GASLET	PP	1	

PART NO.	CF-200C W41A(MAINTENANCE)
TRIGONOMETRY	EXPLODED DRAWING(WA.)
DRW. Z.G.H	02APRO4
CH-K	SCALE FULL
APPV	UNIT MM
	SHEET 1/1
	MOBICOOL INTERNATIONAL LTD.
	REV. 02

NOTE THE NUMBERING SYSTEM OF PARTS IS BY STOCK NUMBER.

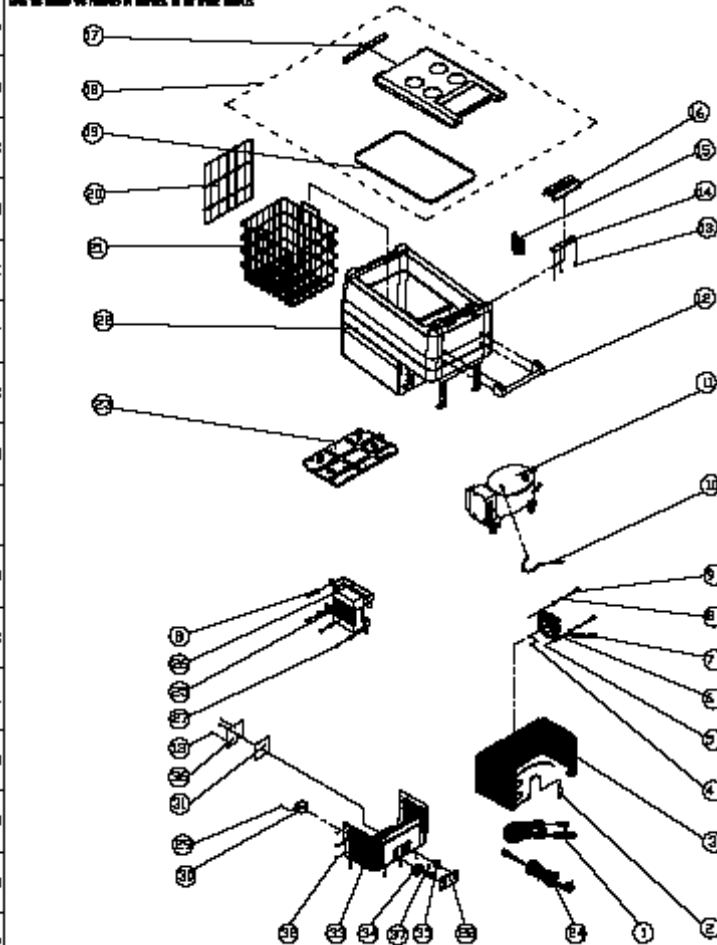


NOTE	DATE	CONTENT	REV	NAME
1				
2				
3				

NO.	COMPONENT	NAME	TYPE	QTY	REMARK
1	15-25-250000	BLANK TUBE FUSE		1	
2	10-4-400000	POWER SWITCH		1	
3	10-4-400000	POWER SWITCH		1	
4	10-4-400000	POWER SWITCH		1	
5	10-4-400000	POWER SWITCH		1	
6	10-4-400000	POWER SWITCH		1	
7	10-4-400000	POWER SWITCH		1	
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28	10-4-400000	POWER SWITCH		1	
29	10-4-400000	POWER SWITCH		1	
30	10-4-400000	POWER SWITCH		1	
31	10-4-400000	POWER SWITCH		1	
32	10-4-400000	POWER SWITCH		1	

PART NO.	CF-35-AC120-U W41A(MAINTENANCE)
TRIGONOMETRY	EXPLODED DRAWING(WA)
DATE	02APR04
MODEL NO.	026-18
SCALE	1:1
UNIT	MM
SHEET	1/1
MOBICOOL INTERNATIONAL LTD.	REV. 03

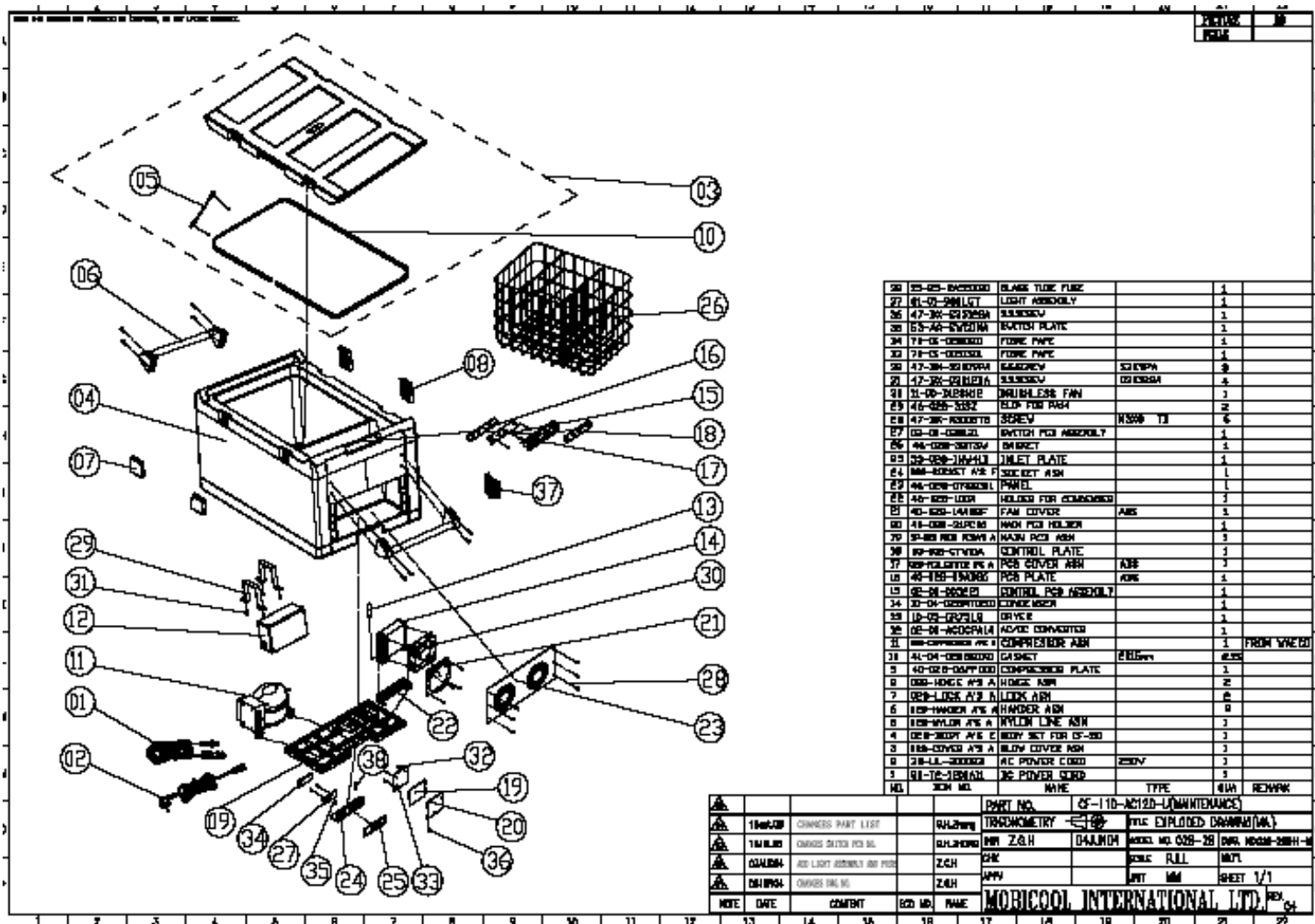
NOTE THE NUMBERING SYSTEM OF PARTS IS BY STOCK NUMBER.



NOTE	DATE	CONTENT	REV	NAME
1				
2				
3				

NO.	COMPONENT	NAME	TYPE	QTY	REMARK
1	15-25-250000	BLANK TUBE FUSE		1	
2	10-4-400000	POWER SWITCH		1	
3	10-4-400000	POWER SWITCH		1	
4	10-4-400000	POWER SWITCH		1	
5	10-4-400000	POWER SWITCH		1	
6	10-4-400000	POWER SWITCH		1	
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14	10-4-400000	POWER SWITCH		1	
15	10-4-400000	POWER SWITCH		1	
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28	10-4-400000	POWER SWITCH		1	
29	10-4-400000	POWER SWITCH		1	
30	10-4-400000	POWER SWITCH		1	
31	10-4-400000	POWER SWITCH		1	
32	10-4-400000	POWER SWITCH		1	

PART NO.	CF-40-AC120-U (MAINTENANCE)
TRIGONOMETRY	EXPLODED DRAWING(WA)
DATE	02APR04
MODEL NO.	026-18
SCALE	1:1
UNIT	MM
SHEET	1/1
MOBICOOL INTERNATIONAL LTD.	REV. 03



QTY	REF	DESCRIPTION	UNIT	QTY
1	01	01-01-000000	REFRIGERANT	1
1	02	02-02-000000	CONDENSER	1
1	03	03-03-000000	EVAPORATOR	1
1	04	04-04-000000	COMPRESSOR	1
1	05	05-05-000000	DRYER	1
1	06	06-06-000000	PIPE	1
1	07	07-07-000000	PIPE	1
1	08	08-08-000000	PIPE	1
1	09	09-09-000000	PIPE	1
1	10	10-10-000000	PIPE	1
1	11	11-11-000000	PIPE	1
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1	36	36-36-000000	PIPE	1
1	37	37-37-000000	PIPE	1
1	38	38-38-000000	PIPE	1

QTY	REF	DESCRIPTION	UNIT	QTY
1	01	01-01-000000	REFRIGERANT	1
1	02	02-02-000000	CONDENSER	1
1	03	03-03-000000	EVAPORATOR	1
1	04	04-04-000000	COMPRESSOR	1
1	05	05-05-000000	DRYER	1
1	06	06-06-000000	PIPE	1
1	07	07-07-000000	PIPE	1
1	08	08-08-000000	PIPE	1
1	09	09-09-000000	PIPE	1
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1	13	13-13-000000	PIPE	1
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1	15	15-15-000000	PIPE	1
1	16	16-16-000000	PIPE	1
1	17	17-17-000000	PIPE	1
1	18	18-18-000000	PIPE	1
1	19	19-19-000000	PIPE	1
1	20	20-20-000000	PIPE	1
1	21	21-21-000000	PIPE	1
1	22	22-22-000000	PIPE	1
1	23	23-23-000000	PIPE	1
1	24	24-24-000000	PIPE	1
1	25	25-25-000000	PIPE	1
1	26	26-26-000000	PIPE	1
1	27	27-27-000000	PIPE	1
1	28	28-28-000000	PIPE	1
1	29	29-29-000000	PIPE	1
1	30	30-30-000000	PIPE	1
1	31	31-31-000000	PIPE	1
1	32	32-32-000000	PIPE	1
1	33	33-33-000000	PIPE	1
1	34	34-34-000000	PIPE	1
1	35	35-35-000000	PIPE	1
1	36	36-36-000000	PIPE	1
1	37	37-37-000000	PIPE	1
1	38	38-38-000000	PIPE	1

MOBICOOL INTERNATIONAL LTD. REV. 04

Teile / Parts

Cooling Unit CU – 85 / 95



Pos. Nr.	Bezeichnung Description	Art.-Nr. Part.-NR.	Pos. Nr.	Bezeichnung Description	Art.-Nr. Part.-NR.
1.	Kompr./ Compr. BDF35 CU-85	4440100001	8.	Halteplatten / Retaining plate	4442500025
1.	Kompr./ Compr. BDF50 CU-95	4440100002	9.	Kupplung / Coupling (Male)	4440500002
2.	Kondensator / Condenser	4440200001	10.	Kupplung / Coupling (Female)	4440500001
3.	Trockner / Dryer	4440400001	11.	Kupplungshalter/Coupling Holder	4442500020
4.	Lüfter / Brush Less Fan	4441200001	12.	Snap On	4445900001
5.	Gummifuß / Rubber foot	4443300001	13.	Clip	4442500004
6.	Elektronik /Electronics	4441000001			
7.	Montageplatte / Mounting Plate	4442000001			

