Service Facts

Customer Propety: Contains wiring and service information. Please retain.

TC✱036-SF-2C

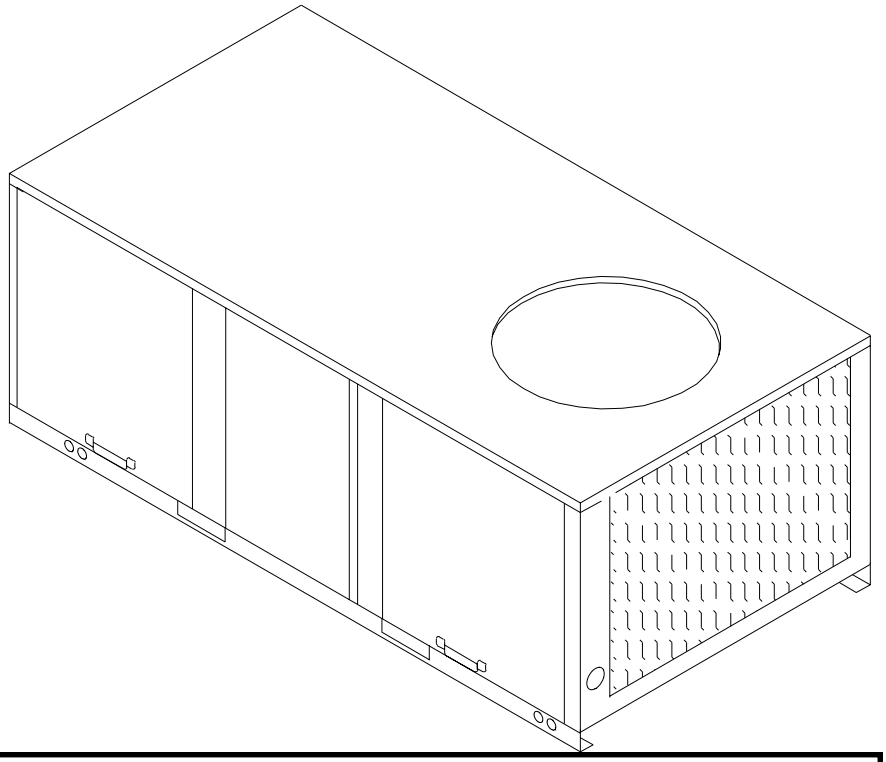
Library	Service Literature
Product Section	Unitary
Product	Package Air Conditioner
Model	TC✶
Literature Type	Service Facts
Sequence	2C
Date	September 1998
File No.	SV-UN-RT-TC✶036-SF-2C 9/98
Supersedes	NEW

Models :

TCD036C300BC
TCD036C30ABC
TCD036C30BBC
TCD036C30CBC
TCD036C30FBC
TCD036C30GBC

Packaged Cooling

3 Ton Rooftop Units with Micro-Electronic Controls



NOTICE

Warnings and Cautions appear at appropriate locations throughout this manual.
Read these carefully

WARNING: Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices and where property-damage-only accidents could occur.

Product Specifications

VOLTS/ PHASE/ HZ	208-230/ 3/ 60
A.R.I. Ratings	
Cooling Net Cap. BTUH (1)	36,000
Indoor Air Flow (CFM)	1200
System Power (KW)	3.99
SEER (BTU per Watt) (2)	10
POWER CONNS	
Min. Circuit Ampacity	
Standard/ Oversize Motor	18.6/ 19.8
Fuse Size - Max. (Amps)	
Standard/ Oversize Motor	25/ 30
COMPRESSOR - No Used	One
Volts/ Ph/ HZ	200-230/ 3/ 60
L.R. Amps	101
R.L. Amps	11.2
OUTDOOR COIL — TYPE	Hi-Performance
Rows / F.P.I.	2/ 16
Face Area (Sq. Ft.)	5.87
Tube Size (In.)	0.375
INDOOR COIL–Type	Hi-Performance
Rows / F.P.I.	2/ 15
Face Area (Sq. Ft.)	3.67
Tube Size (In.)	0.375
Refrigerant Control Device	Short Orifice
Drain Conn. Size (In.)	3/4" PVC
REFRIGERANT	
Charge (Lbs. of R-22) **(3)**	5.6

VOLTS/ PHASE/ HZ	208-230/ 3/ 60
INDOOR FAN	
Type/ No. Used	FC Centrifugal/ 1
Drive/ Dia. x Width (in.)	Direct/ 9 x 9
INDOOR FAN MOTOR	
Motor HP/ RPM/ Speed	
Standard Motor	0.33/ 1075/ 2
Oversize Motor	0.40/ 1400/ 1
Volts/ Ph/ Hz	208-230/ 1/ 60
L.R. Amps/ F.L. Amps	
Standard Motor	7.2/ 2.4
Oversize Motor	6.9/ 3.8
OUTDOOR FAN	
Type/ CFM	Propeller/ 3150
No. Used/ Diameter	1/ 24
Drive/ No. Speeds	Direct/ 1
No. Motors/ HP/ RPM	1/ 0.25/ 850
Volts/ Ph/ Hz	208-230/ 1/ 60
L.R. Amps/ F.L. Amps	5.3/ 2.0
FILTER	Furnished
Type	Throwaway
Filters Size	20 x 25 x 1
Quantity	2
WEIGHT	(Approx. Lbs)
Shipping/ Net	702/ 541
DIMENSIONS	H x W x L
Uncrated (In.)	33-1/2 x 46-5/8 x 83-1/4

Footnotes:

1. Cooling Performance is rated at 95 F ambient, 80 F entering dry bulb, 67 F entering wet bulb and nominal cfm listed. ARI capacity is net and includes the effect of fan motor heat. Rated in accordance with ARI Standard 210.
2. Rated at ARI conditions and in accordance with DOE test procedures.
3. Refrigerant charge shown is a nominal value; for a more precise value see the unit nameplate.

Performance Specifications

Evaporator Fan Performance

External Static Pressure (ESP) In Inches of Water Column						
	Standard Motor				High Static Motor	
Airflow	High Speed		Low Speed			
CFM	ESP	BHP	ESP	BHP	ESP	BHP
1000	0.72	0.30	0.60	0.28	1.48	0.61
1100	0.63	0.32	0.52	0.30	1.34	0.63
1200	0.56	0.34	0.40	0.33	1.16	0.66
1300	0.49	0.36	0.25	0.38	0.97	0.69
1400	0.38	0.38			0.75	0.73
1500	0.27	0.40			0.50	0.77

Note:

Data includes pressure drop due to filters and wet coils.

Performance Specifications

Static Pressure Drops (Inches Water Column)

	Economizer Pressure Drop (Inches of W.C.)		
	100% Return Air	100% Outside Air	
CFM	Downflow/ Horizontal	Downflow	Horizontal
1000	0.01	0.05	
1200	0.01	0.06	
1300	0.01	0.06	
1450	0.01	0.07	
1600	0.02	0.08	
2000	0.03	0.10	
2400	0.06	0.12	

*For Power Fresh Air, “Full Return” is zero.

Filter Pressure Drop

	Filter Pressure Drop (Inches of W.C.)		
	Standard Filters	Area (Sq. Ft.)	Velocity (Ft. per Min.)
CFM	Downflow	Downflow	Downflow
960	0.03	6.9	139
1200	0.04		174
1440	0.04		209

Electric Heater Pressure Drop

Electric Heat Static Pressure (Inches W. C.)			Air Temperature Rise Across Heater[1]	
	Three Phase	Three Phase		
CFM[2]	6 KW & 12 KW	18 KW & 23 KW	6 KW & 12 KW	18 KW & 23 KW
960	0.01	0.01		
1200	0.01	0.02	15.8/ 31.6	46.4/ 60.6
1440	0.02	0.03		

Note:

1. Data given is for rated voltages (240, 480, 600, and 415) @ Nominal CFM. For other than rated voltages, use the following formula to calculate the appropriate correction factor; KW (new) = $Volts^2$ (new) x Rated KW / $Volts^2$ (rated) Multiply temperature rise listed for nominal CFM by the correction factor.
2. Minimum design airflow is ± 20% of nominal CFM. To calculate temperature rise for other than nominal CFM; Temp Rise = KW x 3415 / 1.08 x CFM

Mechanical Data

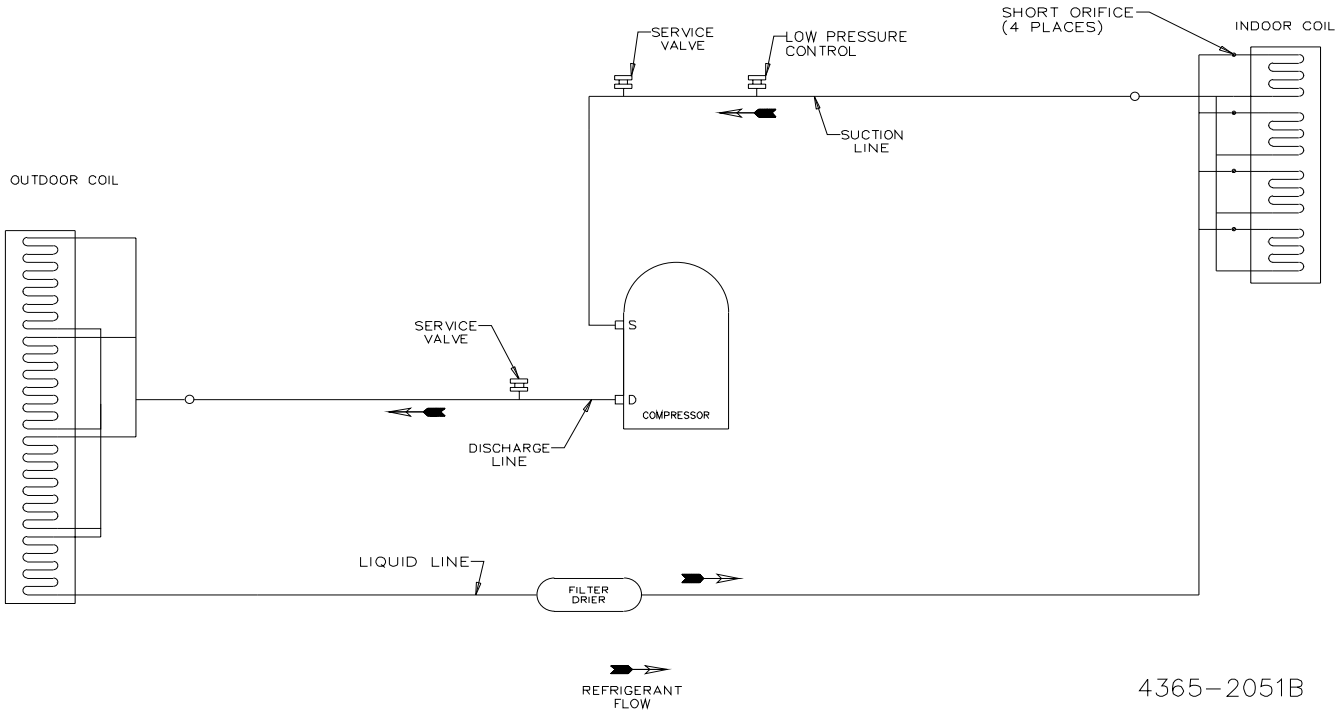
Refrigerant Circuit Diagram

⚠ CAUTION

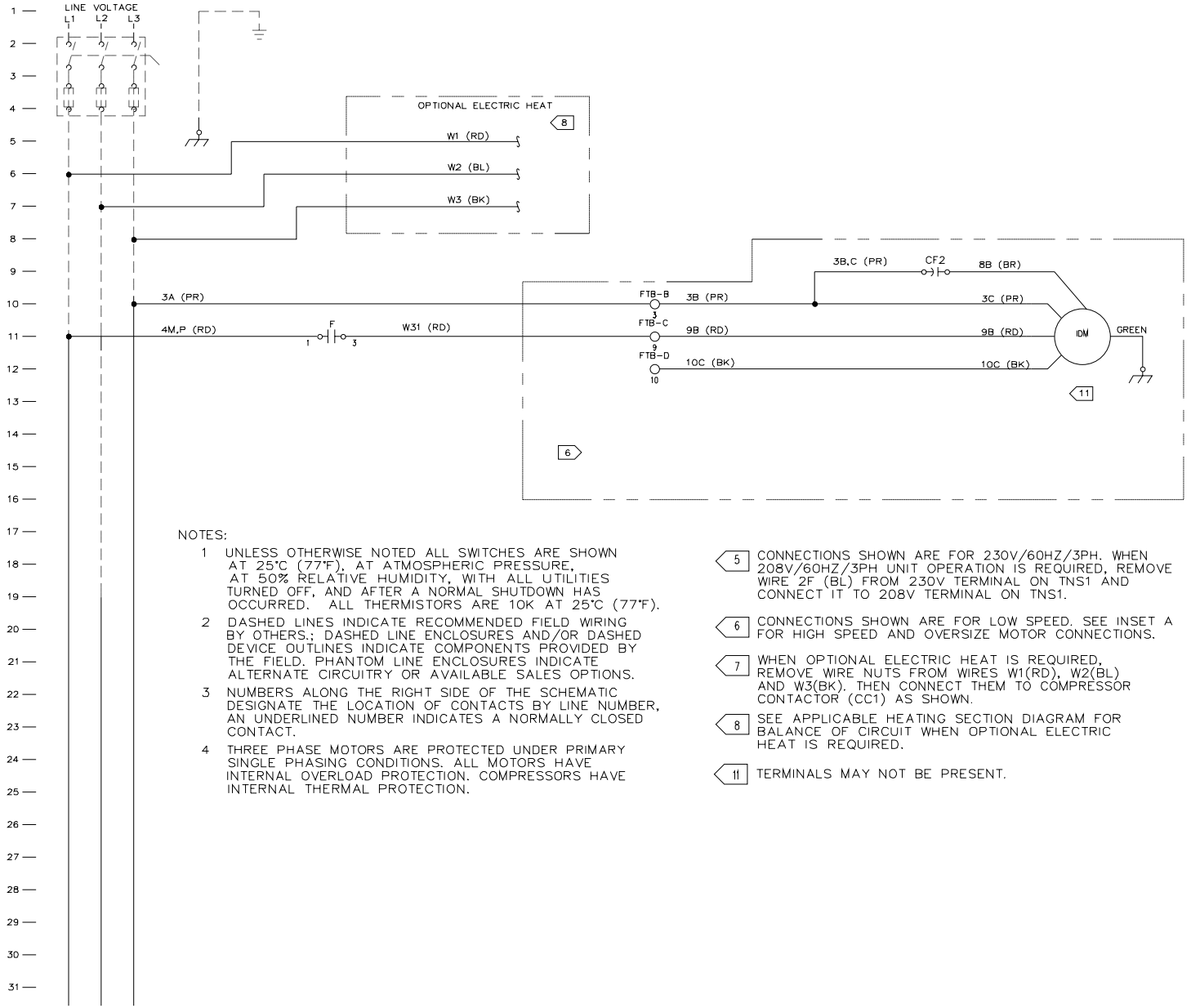
CONTAINS REFRIGERANT!

SYSTEM CONTAINS OIL AND REFRIGERANT UNDER HIGH PRESSURE. RECOVER REFRIGERANT TO RELIEVE PRESSURE BEFORE OPENING THE SYSTEM.

Failure to follow proper procedures can result in personal illness or injury or severe equipment damage.



Power Schematic



NOTES:

1. UNLESS OTHERWISE NOTED ALL SWITCHES ARE SHOWN AT 25°C (77°F), AT ATMOSPHERIC PRESSURE, AT 50% RELATIVE HUMIDITY, WITH ALL UTILITIES TURNED OFF, AND AFTER A NORMAL SHUTDOWN HAS OCCURRED. ALL THERMISTORS ARE 10K AT 25°C (77°F).
2. DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS.; DASHED LINE ENCLOSURES AND/OR DASHED DEVICE OUTLINES INDICATE COMPONENTS PROVIDED BY THE FIELD. PHANTOM LINE ENCLOSURES INDICATE ALTERNATE CIRCUITRY OR AVAILABLE SALES OPTIONS.
3. NUMBERS ALONG THE RIGHT SIDE OF THE SCHEMATIC DESIGNATE THE LOCATION OF CONTACTS BY LINE NUMBER, AN UNDERLINED NUMBER INDICATES A NORMALLY CLOSED CONTACT.
4. THREE PHASE MOTORS ARE PROTECTED UNDER PRIMARY SINGLE PHASING CONDITIONS. ALL MOTORS HAVE INTERNAL OVERLOAD PROTECTION. COMPRESSORS HAVE INTERNAL THERMAL PROTECTION.

<5> CONNECTIONS SHOWN ARE FOR 230V/60HZ/3PH. WHEN 208V/60HZ/3PH UNIT OPERATION IS REQUIRED, REMOVE WIRE 2F (BL) FROM 230V TERMINAL ON TNS1 AND CONNECT IT TO 208V TERMINAL ON TNS1.

<6> CONNECTIONS SHOWN ARE FOR LOW SPEED. SEE INSET A FOR HIGH SPEED AND OVERSIZE MOTOR CONNECTIONS.

<7> WHEN OPTIONAL ELECTRIC HEAT IS REQUIRED, REMOVE WIRE NUTS FROM WIRES W1(RD), W2(BL) AND W3(BK). THEN CONNECT THEM TO COMPRESSOR CONTACTOR (CC1) AS SHOWN.

<8> SEE APPLICABLE HEATING SECTION DIAGRAM FOR BALANCE OF CIRCUIT WHEN OPTIONAL ELECTRIC HEAT IS REQUIRED.

<11> TERMINALS MAY NOT BE PRESENT.

⚠ WARNING

HAZARDOUS VOLTAGE!

DISCONNECT POWER BEFORE SERVICING.

FAILURE TO DISCONNECT POWER BEFORE SERVICING CAN CAUSE SEVERE PERSONAL INJURY OR DEATH.

⚠ AVERTISSEMENT

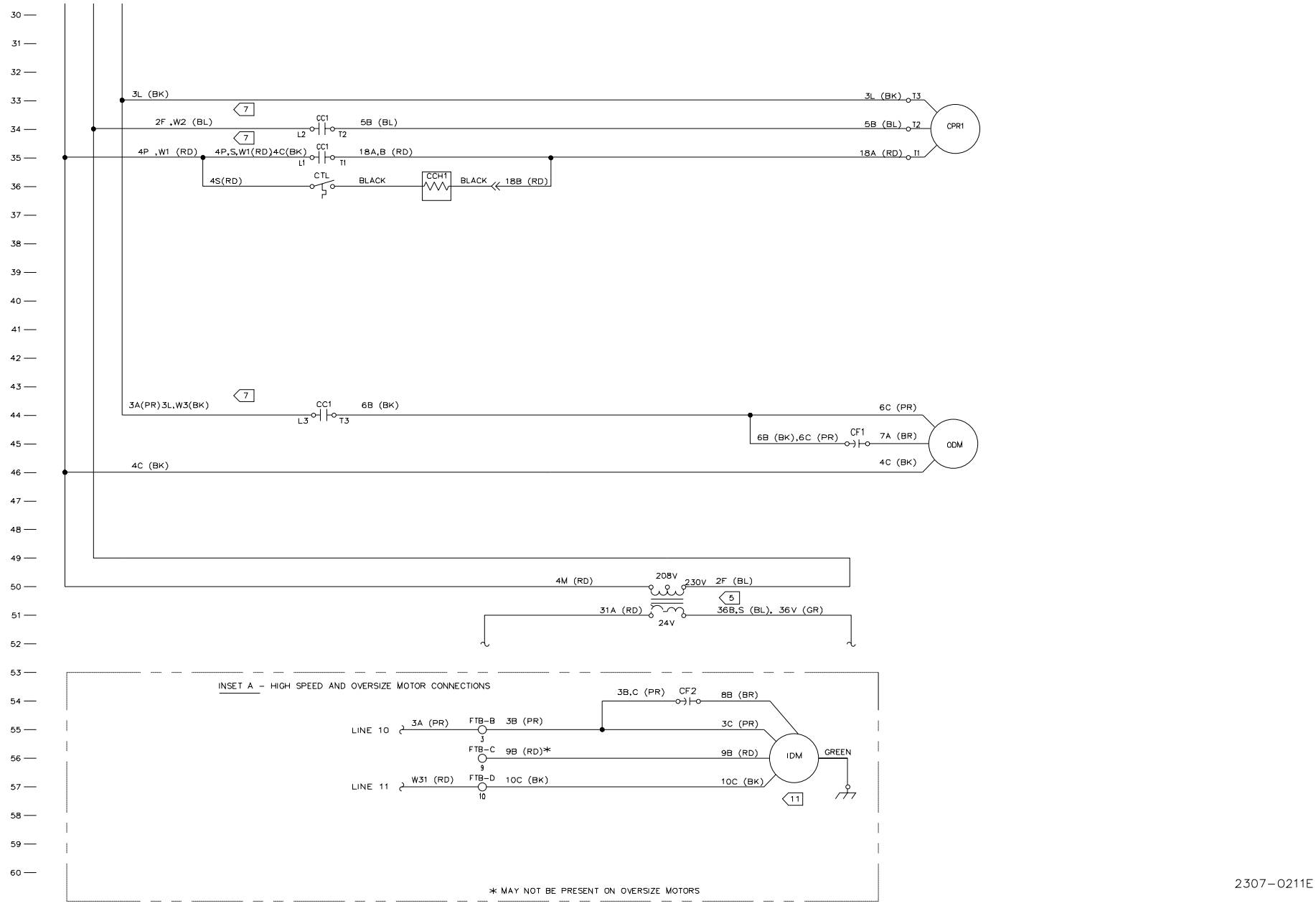
VOLTAGE HASARDEUX!

DECONNECTEZ LA SOURCE ELCECTRIQUE AVANT D'EFFECTUER L'ENTRETIEN.

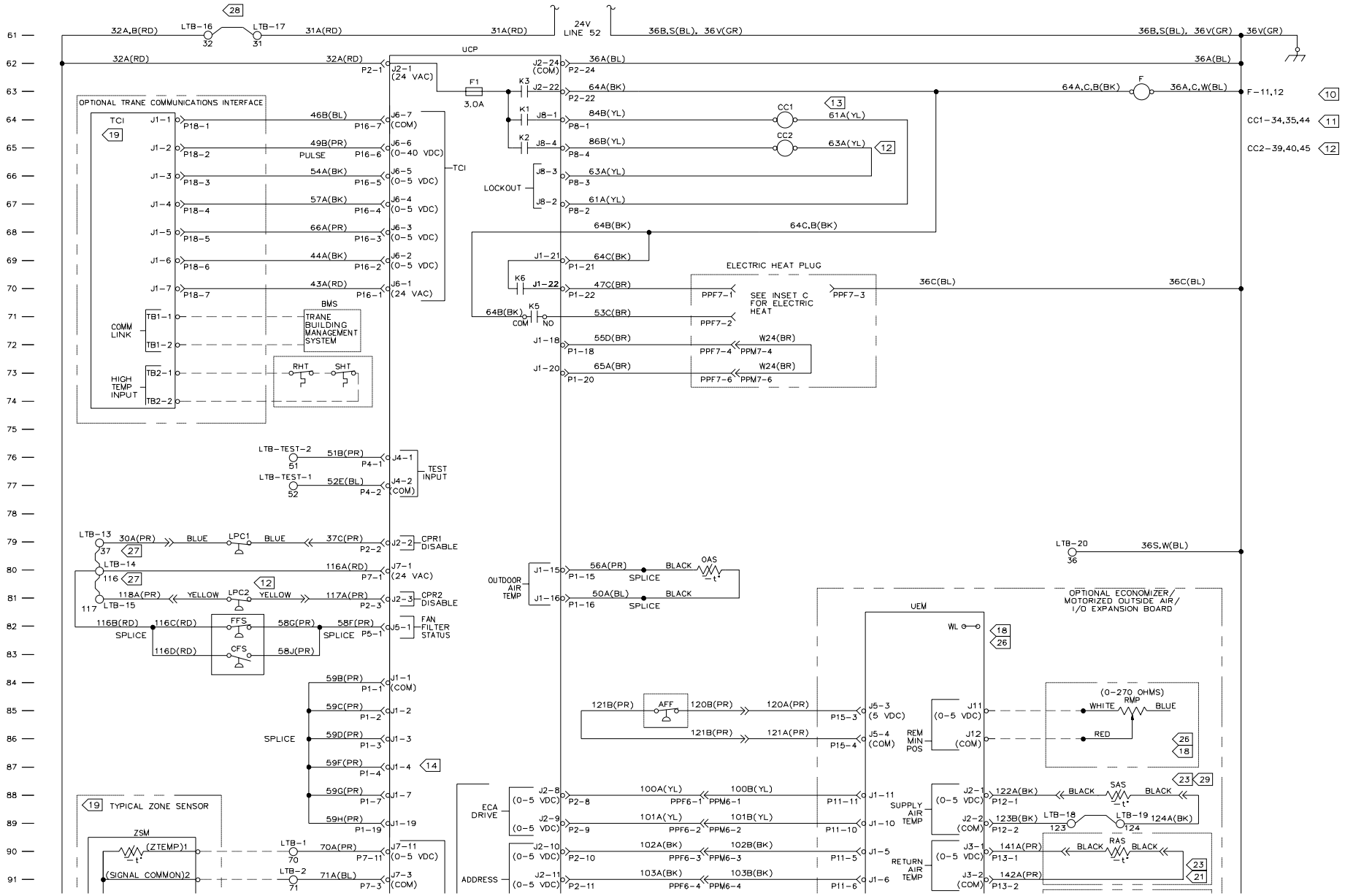
FAUTE DE DECONNECTER LA SOURCE ELECTRIQUE AVANT D'EFFECTUER L'ENTRAINER DES BLESSURES CORPORELLES SEVERES OU LA MORT.

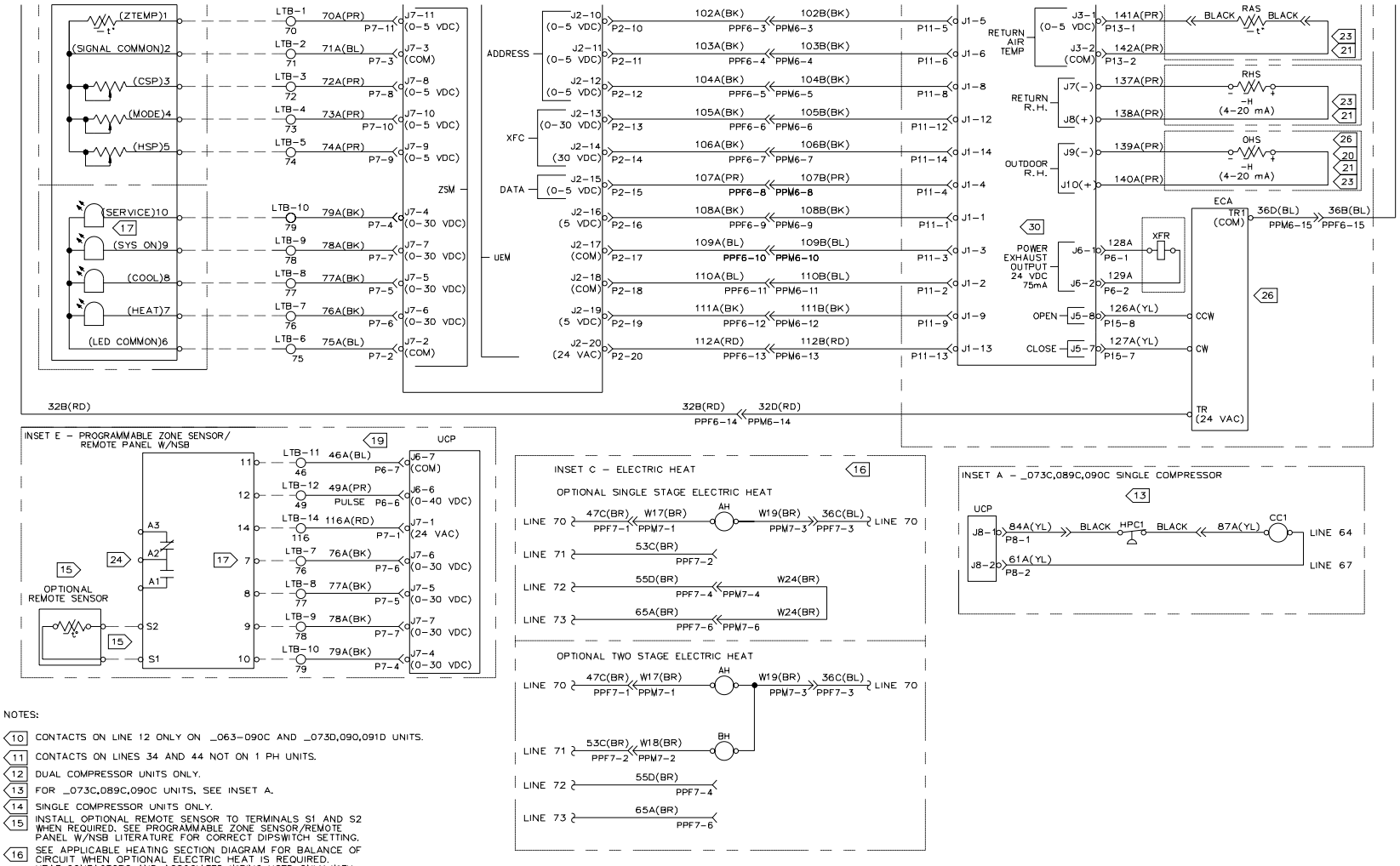
LEGEND		
DEVICE DESIGNATION	DESCRIPTION	LINE NUMBER
AFF	ACTIVE FAN FAILURE SWITCH	85
BMS	BUILDING MANAGEMENT SYSTEM	71
CC1	COMPRESSOR CONTACTOR	64
CCH1	CRANKCASE HEATER	36
CF1	OUTDOOR MOTOR CAPACITOR	45
CF2	INDOOR MOTOR CAPACITOR	9,55
CFS	CLOGGED FILTER SWITCH	83
CPR1	COMPRESSOR	34
CTL	COIL TEMPERATURE LIMIT	36
ECA	ECONOMIZER ACTUATOR	96
F	INDOOR FAN CONTACTOR	63
FFS	FAN FAILURE SWITCH	82
FTB	FAN TERMINAL BLOCK	10–13
F1	UCP FUSE	63
IDM	INDOOR FAN MOTOR	11,56
K5	UCP HEAT RELAY	71
LTB	LOW VOLTAGE TERM BLOCK	
LPC1	LOW PRESSURE CONTROL 1	79
OAS	OUTDOOR AIR SENSOR	80
ODM	OUTDOOR FAN MOTOR	45
OHS	OUTDOOR HUMIDITY SENSOR	94
RAS	RETURN AIR SENSOR	90
RHS	RETURN HUMIDITY SENSOR	92
RHT	RETURN HIGH TEMPERATURE	73
RMP	REMOTE MININUM POSITION	85
SAS	SUPPLY AIR SENSOR	88
SHT	SUPPLY HIGH TEMPERATURE	73
TCI	TRANE COMMUNICATION INTERFACE	64
TNS1	CONTROL POWER TRANSFORMER	50
UEM	UNITARY ECONOMIZER MODULE	82
UCP	UNITARY CONTROL PROCESSOR	62
ZSM	ZONE SENSOR MODULE	89
PPF6,PPM6	ECONOMIZER PLUG	88–102
PPF7,PPM7	ELECTRIC HEAT PLUG	72

WIRE COLOR DESIGNATION			
ABBR	COLOR	ABBR	COLOR
BK	BLACK	PR	PURPLE
BL	BLUE	RD	RED
BR	BROWN	WH	WHITE
GR	GREEN	YL	YELLOW
OR	ORANGE		


3L (BK)
7
3L (BK) T3
2F ,W2 (BL)
CC1
L2
T2
5B (BL)
5B (BL) T2
CPR1
7
4P ,W1 (RD)
4P,S,W1(RD)4C(BK)
CC1
L1
T1
18A,B (RD)
18A (RD) T1
4S(RD)
CTL
BLACK
CCH1
BLACK
18B (RD)
7
3A(PR)3L,W3(BK)
CC1
L3
T3
6B (BK)
6C (PR)
6B (BK),6C (PR)
CF1
7A (BR)
ODM
4C (BK)
4C (BK)
4M (RD)
208V
230V
2F (BL)
5
31A (RD)
24V
36B,S (BL), 36V (GR)
INSET A – HIGH SPEED AND OVERSIZE MOTOR CONNECTIONS
3B,C (PR)
CF2
8B (BR)
LINE 10
3A (PR)
FTB–B
3
3B (PR)
3C (PR)
FTB–C
9
9B (RD)*
9B (RD)
IDM
GREEN
LINE 11
W31 (RD)
FTB–D
10
10C (BK)
10C (BK)
11
* MAY NOT BE PRESENT ON OVERSIZE MOTORS

Control Schematic



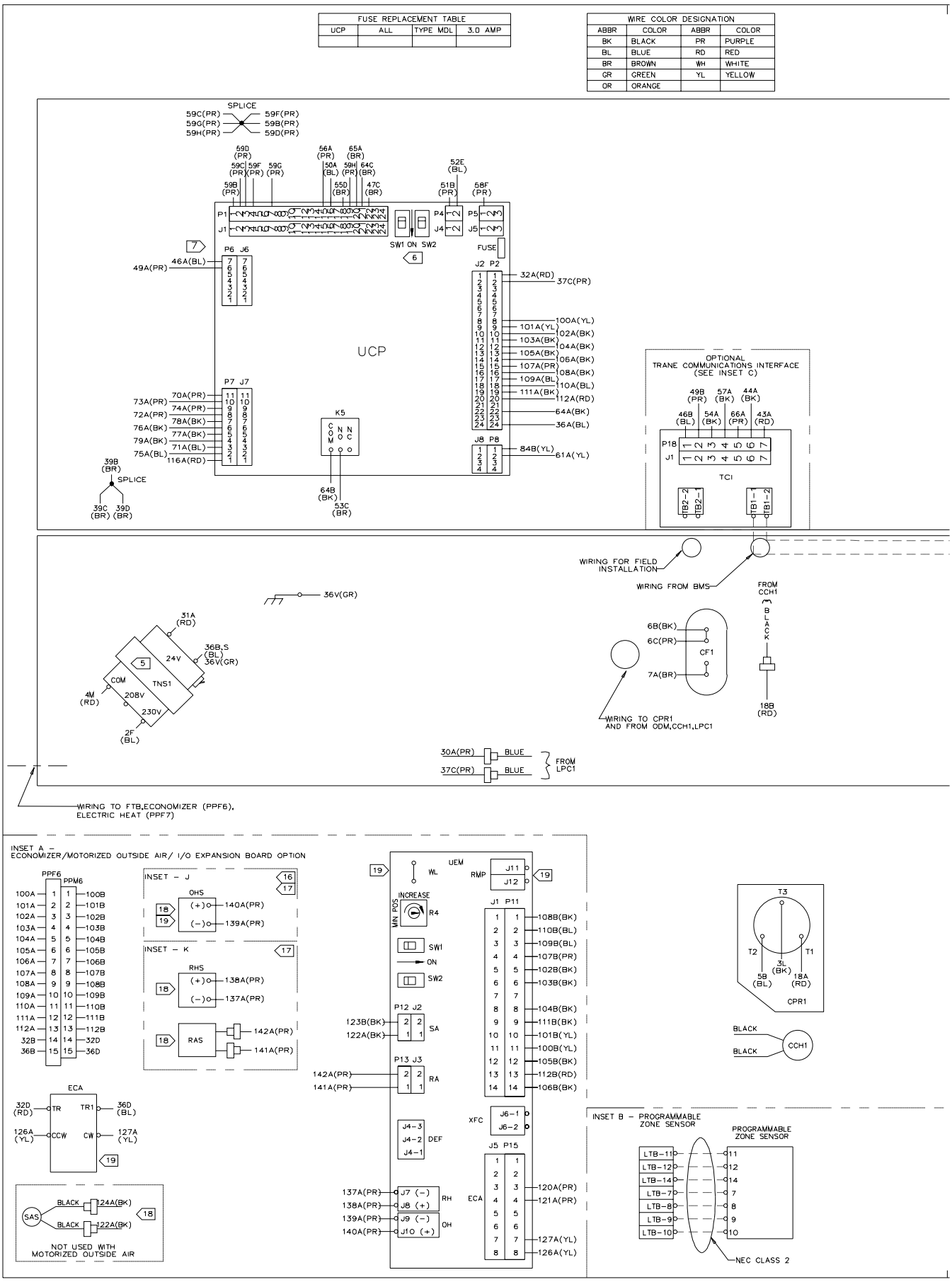


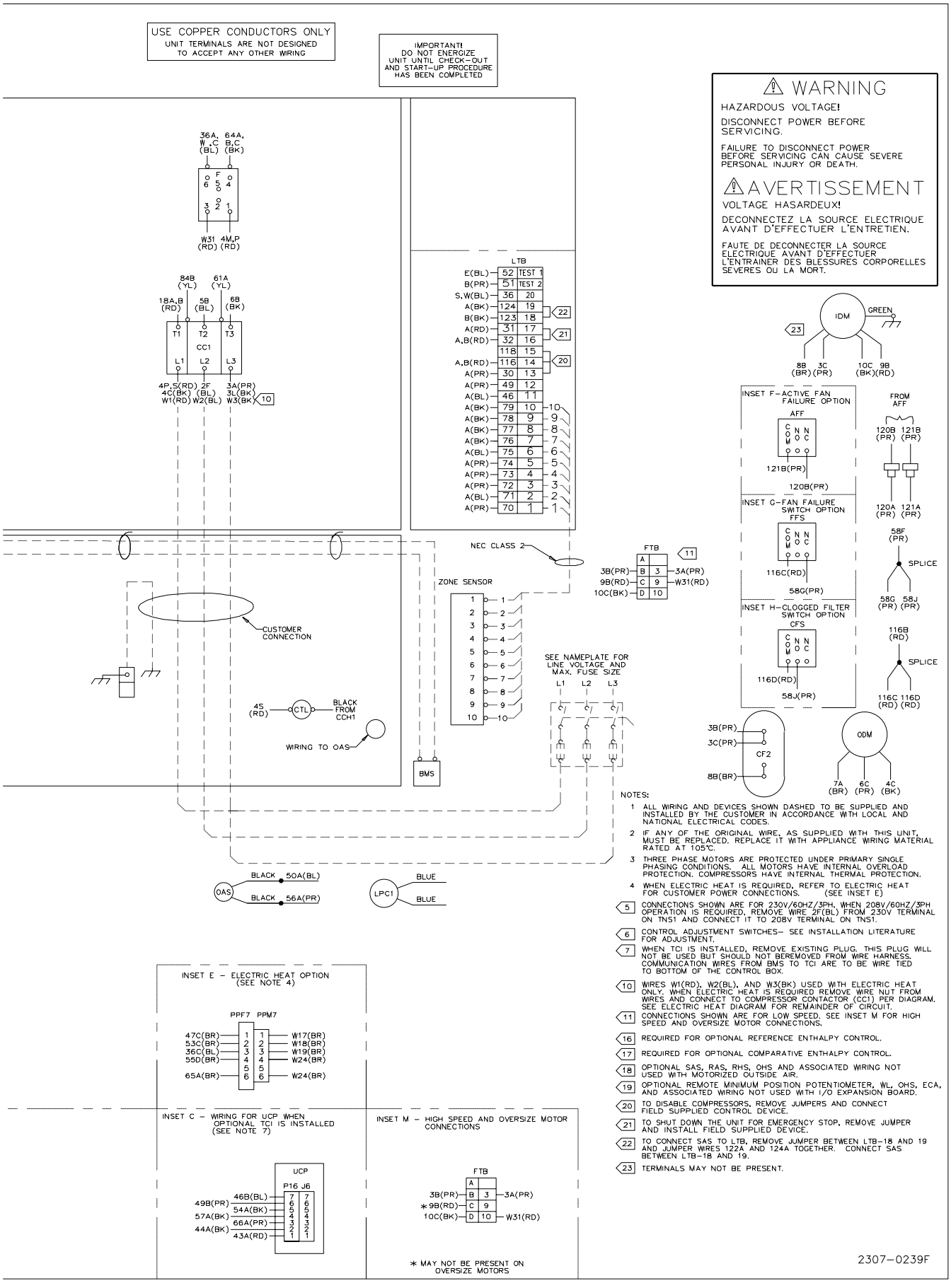
NOTES:

10. CONTACTS ON LINE 12 ONLY ON _063–090C AND _073D,090,091D UNITS.
11. CONTACTS ON LINES 34 AND 44 NOT ON 1 PH UNITS.
12. DUAL COMPRESSOR UNITS ONLY.
13. FOR _073C,089C,090C UNITS, SEE INSET A.
14. SINGLE COMPRESSOR UNITS ONLY.
15. INSTALL OPTIONAL REMOTE SENSOR TO TERMINALS S1 AND S2 WHEN REQUIRED. SEE PROGRAMMABLE ZONE SENSOR/REMOTE PANEL W/NSB LITERATURE FOR CORRECT DIPSWITCH SETTING.
16. SEE APPLICABLE HEATING SECTION DIAGRAM FOR BALANCE OF CIRCUIT WHEN OPTIONAL ELECTRIC HEAT IS REQUIRED. HEAT CONTACTORS AND ASSOCIATED WIRING USED ONLY WITH THE FOLLOWING ELECTRIC HEAT OPTIONS. AH – ALL BH – 27 & 36
17. TERMINALS 7,8,9 AND 10 ARE FOR OPTIONAL INDICATORS.
18. WHEN OPTIONAL REMOTE MINIMUM POSITION POTENTIOMETER IS REQUIRED CUT WIRE LOOP (WL) AND WIRE AS SHOWN.
19. INSET E IS FOR OPTIONAL PROGRAMMABLE ZONE SENSOR.
20. REQUIRED FOR OPTIONAL REFERENCE ENTHALPY CONTROL.
21. REQUIRED FOR OPTIONAL COMPARATIVE ENTHALPY CONTROL.
23. OPTIONAL SAS, RAS, RHS, OHS, AND ASSOCIATED WIRING NOT USED WITH MOTORIZED OUTSIDE AIR OPTION.
24. AUXILIARY RELAY ENERGIZED DURING OCCUPIED PERIODS.
26. OPTIONAL REMOTE MINIMUM POSITION POTENTIOMETER, WL, OHS, ECA, AND ASSOCIATED WIRING NOT USED WITH I/O EXPANSION BOARD.
27. TO DISABLE COMPRESSORS, REMOVE JUMPERS AND CONNECT FIELD SUPPLIED CONTROL DEVICE.
28. TO SHUT DOWN THE UNIT FOR EMERGENCY STOP, REMOVE JUMPER AND INSTALL FIELD SUPPLIED DEVICE.
29. TO CONNECT SAS TO LTB, REMOVE JUMPER BETWEEN LTB-18 AND 19, AND JUMPER WIRES 122A AND 124A TOGETHER. CONNECT SAS BETWEEN LTB-18 AND 19.
30. POWER EXHAUST OUTPUT FOR FIELD SUPPLIED DEVICE.
31. TO ENABLE COMPRESSOR LEAD/LAG OPERATION, CUT WIRE 52F.

2307–0222F

Connections Diagram




USE COPPER CONDUCTORS ONLY
UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT ANY OTHER WIRING
IMPORTANT!
DO NOT ENERGIZE UNIT UNTIL CHECK-OUT AND START-UP PROCEDURE HAS BEEN COMPLETED
WARNING
HAZARDOUS VOLTAGE!
DISCONNECT POWER BEFORE SERVICING.
FAILURE TO DISCONNECT POWER BEFORE SERVICING CAN CAUSE SEVERE PERSONAL INJURY OR DEATH.
AVERTISSEMENT
VOLTAGE HASARDEUX!
DECONNECTEZ LA SOURCE ELECTRIQUE AVANT D'EFFECTUER L'ENTRETIEN.
FAUTE DE DECONNECTER LA SOURCE ELECTRIQUE AVANT D'EFFECTUER L'ENTRAINER DES BLESSURES CORPORELLES SEVERES OU LA MORT.
36A, 64A, W,C B,C (BL) (BK)
W31 4M,P (RD) (RD)
84B (YL) 61A (YL)
18A,B (RD) 5B (BL) 6B (BK)
T1 T2 T3
CC1
L1 L2 L3
4P,S(RD) 2F 3A(PR)
4C(BK) (BL) 3L(BK)
W1(RD) W2(BL) W3(BK) 10
LTB
E(BL) 52 TEST 1
B(PR) 51 TEST 2
S,W(BL) 36 20
A(BK) 124 19 22
B(BK) 123 18
A(RD) 31 17 21
A,B(RD) 32 16
118 15
A,B(RD) 116 14 20
A(PR) 30 13
A(PR) 49 12
A(BL) 46 11
A(BK) 79 10 10
A(BK) 78 9 9
A(BK) 77 8 8
A(BK) 76 7 7
A(BL) 75 6 6
A(PR) 74 5 5
A(PR) 73 4 4
A(PR) 72 3 3
A(BL) 71 2 2
A(PR) 70 1 1
NEC CLASS 2
FTB 11
3B(PR) 3A(PR)
9B(RD) W31(RD)
10C(BK)
ZONE SENSOR
CUSTOMER CONNECTION
45 (RD) CTL BLACK FROM CCH1
WIRING TO OAS
BMS
SEE NAMEPLATE FOR LINE VOLTAGE AND MAX. FUSE SIZE
L1 L2 L3
IDM GREEN
23
8B (BR) 3C (PR) 10C 9B (BK)(RD)
INSET F-ACTIVE FAN FAILURE OPTION
AFF
121B(PR)
120B(PR)
INSET G-FAN FAILURE SWITCH OPTION
FFS
116C(RD)
58G(PR)
INSET H-CLOGGED FILTER SWITCH OPTION
CFS
116D(RD)
58J(PR)
FROM AFF
120B 121B (PR) (PR)
120A 121A (PR) (PR)
58F (PR)
SPLICE
58G 58J (PR) (PR)
116B (RD)
SPLICE
116C 116D (RD) (RD)
3B(PR)
3C(PR)
CF2
8B(BR)
ODM
7A 6C 4C (BR) (PR) (BK)
BLACK 50A(BL)
OAS
BLACK 56A(PR)
LPC1
BLUE
BLUE
INSET E - ELECTRIC HEAT OPTION (SEE NOTE 4)
PPF7 PPM7
47C(BR) W17(BR)
53C(BR) W18(BR)
36C(BL) W19(BR)
55D(BR) W24(BR)
65A(BR) W24(BR)
INSET C - WIRING FOR UCP WHEN OPTIONAL TCI IS INSTALLED (SEE NOTE 7)
UCP
P16 J6
49B(PR) 46B(BL)
54A(BK)
57A(BK) 66A(PR)
44A(BK) 43A(RD)
INSET M - HIGH SPEED AND OVERSIZE MOTOR CONNECTIONS
FTB
3B(PR) 3A(PR)
*9B(RD) W31(RD)
10C(BK)
* MAY NOT BE PRESENT ON OVERSIZE MOTORS
NOTES:
1 ALL WIRING AND DEVICES SHOWN DASHED TO BE SUPPLIED AND INSTALLED BY THE CUSTOMER IN ACCORDANCE WITH LOCAL AND NATIONAL ELECTRICAL CODES.
2 IF ANY OF THE ORIGINAL WIRE, AS SUPPLIED WITH THIS UNIT, MUST BE REPLACED. REPLACE IT WITH APPLIANCE WIRING MATERIAL RATED AT 105°C.
3 THREE PHASE MOTORS ARE PROTECTED UNDER PRIMARY SINGLE PHASING CONDITIONS. ALL MOTORS HAVE INTERNAL OVERLOAD PROTECTION. COMPRESSORS HAVE INTERNAL THERMAL PROTECTION.
4 WHEN ELECTRIC HEAT IS REQUIRED, REFER TO ELECTRIC HEAT FOR CUSTOMER POWER CONNECTIONS. (SEE INSET E)
5 CONNECTIONS SHOWN ARE FOR 230V/60HZ/3PH. WHEN 208V/60HZ/3PH OPERATION IS REQUIRED, REMOVE WIRE 2F(BL) FROM 230V TERMINAL ON TNS1 AND CONNECT IT TO 208V TERMINAL ON TNS1.
6 CONTROL ADJUSTMENT SWITCHES- SEE INSTALLATION LITERATURE FOR ADJUSTMENT.
7 WHEN TCI IS INSTALLED, REMOVE EXISTING PLUG. THIS PLUG WILL NOT BE USED BUT SHOULD NOT BEREMOVED FROM WIRE HARNESS. COMMUNICATION WIRES FROM BMS TO TCI ARE TO BE WIRE TIED TO BOTTOM OF THE CONTROL BOX.
10 WIRES W1(RD), W2(BL), AND W3(BK) USED WITH ELECTRIC HEAT ONLY. WHEN ELECTRIC HEAT IS REQUIRED REMOVE WIRE NUT FROM WIRES AND CONNECT TO COMPRESSOR CONTACTOR (CC1) PER DIAGRAM. SEE ELECTRIC HEAT DIAGRAM FOR REMAINDER OF CIRCUIT.
11 CONNECTIONS SHOWN ARE FOR LOW SPEED. SEE INSET M FOR HIGH SPEED AND OVERSIZE MOTOR CONNECTIONS.
16 REQUIRED FOR OPTIONAL REFERENCE ENTHALPY CONTROL.
17 REQUIRED FOR OPTIONAL COMPARATIVE ENTHALPY CONTROL.
18 OPTIONAL SAS, RAS, RHS, OHS AND ASSOCIATED WIRING NOT USED WITH MOTORIZED OUTSIDE AIR.
19 OPTIONAL REMOTE MINIMUM POSITION POTENTIOMETER, WL, OHS, ECA, AND ASSOCIATED WIRING NOT USED WITH I/O EXPANSION BOARD.
20 TO DISABLE COMPRESSORS, REMOVE JUMPERS AND CONNECT FIELD SUPPLIED CONTROL DEVICE.
21 TO SHUT DOWN THE UNIT FOR EMERGENCY STOP, REMOVE JUMPER AND INSTALL FIELD SUPPLIED DEVICE.
22 TO CONNECT SAS TO LTB, REMOVE JUMPER BETWEEN LTB-18 AND 19 AND JUMPER WIRES 122A AND 124A TOGETHER. CONNECT SAS BETWEEN LTB-18 AND 19.
23 TERMINALS MAY NOT BE PRESENT.
2307-0239F

Sequence of Operation

These units are equipped with a microelectronic control feature which provides operating functions that are significantly different than conventional units. It is referred to as the “Unit Control Processor” **(UCP)**.

The UCP provides compressor anti short cycle timing functions through minimum “Off” and “On” timing to increase reliability, performance and to maximize unit efficiency.

Upon power initialization, the UCP performs self-diagnostic checks to insure that all internal controls are functioning. It checks the configuration parameters against the components connected to the system. When units are equipped with an optional economizer, the UCP drives the economizer dampers toward the open position for 15 to 20 seconds then closes. The economizer is closed for approximately 90 seconds to ensure proper damper calibration.

The LED located on the UCP module is turned “On” within one second after power-up if all internal operations are okay.

Cooling without an Economizer
When the system switch is set to the “Cool” position and the zone temperature rises above the cooling setpoint controlband, the UCP energizes the **(K1)** relay coil located on the UCP. When the K1 relay contacts close, the compressor contactor **(CC1)** coil is energized provided the low pressure control **(LPC1)** is closed. When the CC1 contacts close, compressor **(CPR1)** and the outdoor fan motor **(ODM)** start to maintain the zone temperature to within ± 2 F of the sensor setpoint at the sensed location.

In addition to starting the compressor **(CPR1)** and outdoor fan motor **(ODM)** when the **(CC1)** contacts close, the compressor crankcase heater **(CCH1)** is de-energized through redirection of current flow through the CC1 contacts.

When the cooling requirement is satisfied, the UCP cycles the compressor and outdoor fan motor “Off. Current is allowed to flow through the crankcase heater **(CCH1)** after the CC1 contacts open provided the coil temperature limit **(CTL)** is closed.

Evaporator Fan Operation
When the fan selection switch is set to the “Auto” position, the UCP energizes the **(K3)** relay coil approximately 1 second after energizing the compressor contactor coil **(CC1)** in the cooling mode. In the heating mode, the UCP energizes the **(K3)** relay coil approximately 1 second before energizing the electric heat contactors Closing the **K3** contacts on the UCP energizes the indoor fan relay **(F)** coil to start the indoor fan motor **(IDM)**.

The UCP de-energizes the fan relay **(F)** approximately 60 seconds after the cooling requirement has be satisfied to enhance unit efficiency. When the heating cycle is terminated, the indoor fan relay **(F)** coil is de-energized at the same time as the heater contactors.

When the fan selection switch is set to the “On” position, the UCP keeps the indoor fan relay coil **(F)** energized for continuous fan motor operation.

When the unit is equipped with the optional fan failure switch, wired between terminals J5-1 and J7-1 on the **UCP**, the **UCP** produces an analog output if the fan failure switch **(FFS)** does not open within two minutes after a request for fan operation. When the system is connected to a remote panel, the “SERVICE” LED will be turned on when this failure occurs.

Low Ambient Operation
During low ambient operation, outside air temperature below 55 F, the UCP will cycle the compressor and outdoor fan motor “Off” for approximately 3 minutes after every 10 minutes of accumulated compressor run time. The indoor fan motor **(IDM)** will continue to operate during this evaporator defrost cycle **(EDC)** and the compressor and outdoor fan will return to normal operation once the defrost cycle has terminated and the compressor “Off” time delay has been satisfied.

Sequence of Operation

Cooling with an Economizer
The economizer is utilized to control the zone temperature providing the outside air conditions are suitable. Outside air is drawn into the unit through modulating dampers. When cooling is required and economizing is possible, the UCP sends the cooling request to the unit economizer module **(UEM)** to open the economizer dampers by energizing the economizer actuator **(ECA)**. The UCP tries to cool the zone utilizing the economizer to slightly below the zone temperature setpoint. If the supply air sensor **(SAS)** senses that the supply air temperature is below 50 F, the dampers modulated toward the closed position. If the zone temperature continues to rise above the zone temperature setpoint controlband and the economizer dampers are less than 80% of full open, the UCP energizes the compressor contactor **(CC1)**.

During simultaneous economizing and mechanical cooling (compressor operation), the UEM continues to modulate the economizer dampers open/closed to keep the supply air temperature in the 50 F to 55 F range with the compressor **(CPR1)** operating.

If economizing is not possible, the UEM drives the dampers to the minimum position setpoint when the indoor fan relay **(F)** is energized and allows mechanical cooling operation.

When the unit is equipped with the optional fan failure switch, wired between terminals J5-3 and J5-4 on the **UEM**, the **UCP** will stop all cooling functions and produce an analog output if the active fan failure switch **(AFF)** does not open within 40 seconds after a request for fan operation. When the system is connected to a remote panel, the “SERVICE” LED will flash when this failure occurs.

Economizer Set-Up
The required amount of ventilation air is set by adjusting the minimum position potentiometer located on the unit economizer module **(UEM)**.

Two of the three methods for determining the suitability of the outside air can be selected utilizing the DIP switches on the UEM, as described below:

1. Ambient Temperature - controlling the economizing cycle by sensing the outside air dry bulb temperature. The Table below lists the selectable dry bulb values by DIP switch setting.

2. Reference Enthalpy - controlling the economizer cycle by sensing the outdoor air humidity. The Table below lists the selectable enthalpy values by DIP switch setting. If the outside air enthalpy value is less than the selected value, the economizer is allowed to operate.

3. Comparative Enthalpy - By utilizing a humidity sensor and a temperature sensor in both the return air stream and the outdoor air stream, the unit control processor **(UCP)** will be able to establish which conditions are best suited for maintaining the zone temperature, i.e. indoor conditions or outdoor conditions. The DIP switches located on the UEM are non-functional when both the temperature and humidity sensors are installed.

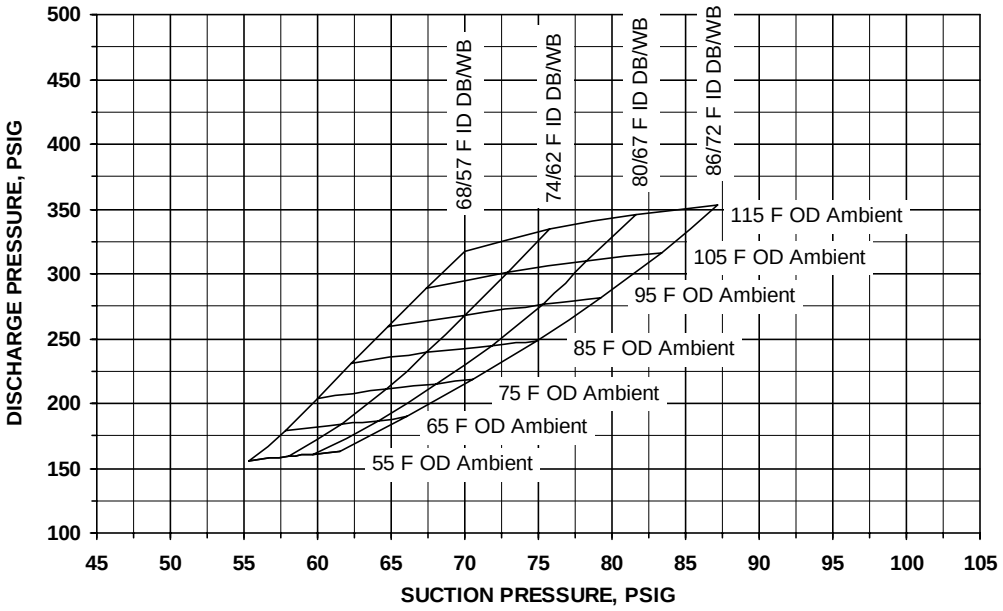
Selection	Dry Bulb	Enthalpy	SW1	SW2
A	60 F	19 BTU/LB	OFF	OFF
B	55 F	22 BTU/LB	OFF	ON
C	65 F	25 BTU/LB	ON	OFF
D	-----	28 BTU/LB	ON	ON

Heating Operation
When the system switch is set to the “Heat” position and the zone temperature falls below the heating setpoint controlband, the UCP energizes **K6** relay coil. When the **K6** relay contacts close, located on the UCP, the first stage auxiliary electric heat contactor **(AH or AH & CH)** is energized.

If the first stage of auxiliary electric heat can not satisfy the heating requirement, the UCP energizes **K5** relay coil. When the **K5** relay contacts close, located on the UCP, the second stage auxiliary electric heat contactor **(BH or BH & DH)** is energized, if applicable. The UCP cycles both the first and second stages of heat “On” and “Off” as required to maintain the zone temperature setpoint.

Refrigeration Data

COOLING CYCLE PRESSURE CURVE
(Based on Indoor Airflow of 400 CFM / Ton)
FULL LOAD

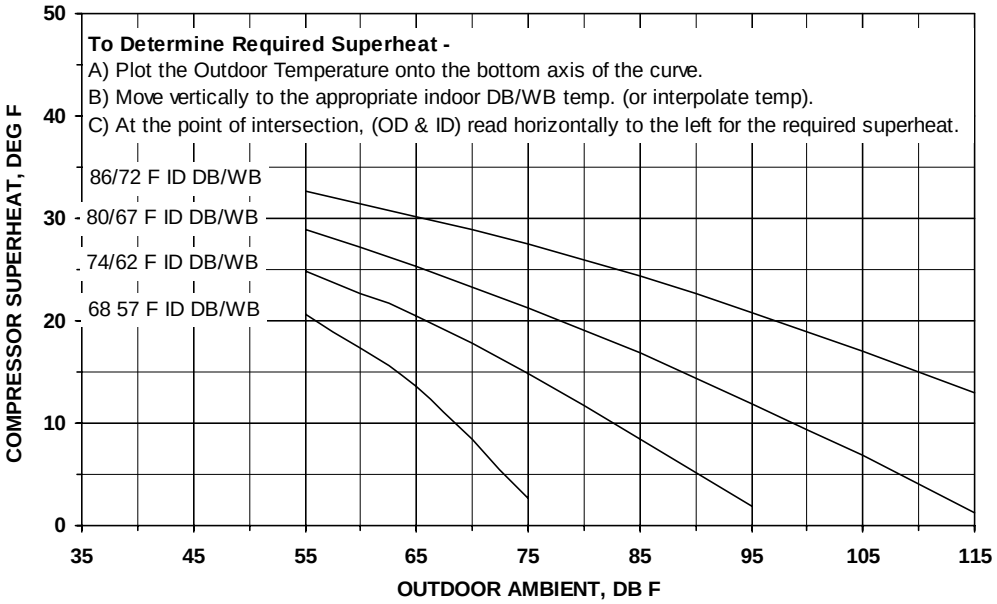


To Check Operating Pressures

1. Start the unit and allow the pressures to stabilize.
2. Measure the indoor DB/WB temperature entering the indoor coil.
3. Measure the outdoor air dry bulb temperature
4. Take discharge and suction pressure readings.
5. Plot the outdoor dry bulb and the indoor DB/WB temperature onto the chart.
6. At the point of intersection, read down for the suction pressure and to the left for the discharge pressure.

Refrigeration Data

SUPERHEAT CHARGING CHART
(Based on Indoor Airflow of 400 CFM / Ton)
FULL LOAD



1) REFRIGERANT CHARGE - ADD if the superheat is more than 5 F above curve value.
- REDUCE if the superheat is more than 5 F below curve value.
- OK if the superheat is within 5 F of curve value.

2) Do not add refrigerant if the superheat is less than 5 F.
3) Curves are based on 400 CFM/Ton Indoor Airflow @ 50% R.H.
4) System must be running at stablized conditions before measuring superheat.