Subject: ERC Diagnostics

SCOPE
All Multiplex Refrigeration Units with ERC (Electronic Refrigeration Controls)

ACTION
When encountering error codes or troubleshooting Multiplex units with ERC use the following flowcharts to diagnose.

TROUBLESHOOTING FLOW CHARTS FOR ELECTRONIC REFRIGERATION CONTROL SYSTEM (ERC) 020001985

NOTE:
1. FIRST, ALWAYS MEASURE SUPPLY POWER TO L1 AND L2 ON ERC, VERIFY CORRECT.
2. SECOND, TO VERIFY ERROR, TURN UNIT POWER SUPPLY OFF FOR 10 SECONDS, AND THEN ON, TO RESET MICROPROCESSOR
MULTIPLEX ELECTRONIC REFRIGERATION CONTROL (ERC) PROGRAMMING PAGE 2

SUPPLY POWER ON

POWER UP DELAY SHOWS “Pd30” AND COUNTS DOWN TO “Pd00”

COMP/AGIT SWITCH ON

ERROR CODE(S)

NORMAL RUN MODE
DISPLAY SHOWS CIRC WATER TEMP(S) OR WATER BATH TEMP IN BEER MODE

ERROR CODE(S) DISPLAYS TILL CORRECTED MULTIPLE ERRORS CYCLE
PGM MODE 4 OVERRIDES

ERROR

RESPECTIVE LED COMES ON CONSTANTLY, FLASHES IF LOAD CONTROL CIRCUIT ON

PRESS ANY SWITCH TO TURN ON LOAD OR LOAD CONTROL CIRCUIT

PRESS PGM SWITCH FOR MINIMUM OF 3 SECONDS, DISPLAY SHOWS “0001”
TO ENTER PROGRAM MODE

PROGRAM MODE 1
READ CONDUCTIVITY, TEMPERATURE, PRESSURE CHANGE UNITS
WAIT 3 SECONDS
DISPLAY SHOWS “C000”

“C000” (CONDUCTIVITY)
PRESS COMP/AGIT SWITCH TO SHOW ICE BANK PROBE
“CC11” = NO ICE COMPRESSOR ON
“CC10” = ICE BANK TOO LARGE (E7)
PRESS CARB A SWITCH TO SHOW LLC PROBE
“CA00” = NO WATER CARB A MOTOR ON
“CA11” = LOW & HIGH SENSOR COMpressor OFF
“CC00” = ICE BANK TOO LARGE (E7)
PRESS CARB A SWITCH TO SHOW ICE BANK PROBE
“CL_1” = WATER
“CL_0” = LOW WATER (E3)
PRESS CIRC A SWITCH TO SHOW WATER LEVEL PROBE
PRESS PGM SWITCH ONCE (1)

PROGRAM MODE 2
PROGRAM ONE (1) OR TWO (2) MORE CIRCULATING PUMPS
PRESS PGM SWITCH ONCE (1) IN LESS THAN 3 SECONDS DISPLAY “0002”, WAIT THREE (3) SECONDS DISPLAY “-002”

“F000” (TEMPERATURE)
PRESS CARB A SWITCH TO SHOW WATER BATH TEMP
PRESS CIRC A SWITCH TO SHOW LIQUID LINE TEMP
PRESS CIRC B SWITCH TO SHOW SUCTION TEMP
PRESS PGM SWITCH ONCE (1)

“P000” (PRESSURE)
PRESS CARB A SWITCH TO SHOW WATER SUPPLY PRESSURE
PRESS CARB B SWITCH TO SHOW CO2 PRESSURE
PRESS PGM SWITCH ONCE (1)

PROGRAM MODE 3
PROGRAM TEMPERATURE CONTROL OF WATER BATH (BEER)
PRESS PGM SWITCH TWICE (2) IN LESS THAN 3 SECONDS, DISPLAY “0003”, WAIT THREE (3) SECONDS DISPLAY “-003”

“F000” (TEMPERATURE)
PRESS CARB A SWITCH TO SHOW WATER BATH TEMP
PRESS CIRC A SWITCH TO SHOW LIQUID LINE TEMP
PRESS CIRC B SWITCH TO SHOW SUCTION TEMP
PRESS PGM SWITCH ONCE (1)

“P000” (PRESSURE)
PRESS CARB A SWITCH TO SHOW WATER SUPPLY PRESSURE
PRESS CARB B SWITCH TO SHOW CO2 PRESSURE
PRESS PGM SWITCH ONCE (1)

PROGRAM MODE 4
TEMPORARILY DISABLE ERRORS
PRESS PGM SWITCH THREE TIMES (3) IN LESS THAN 3 SECONDS DISPLAY “0004”, WAIT THREE (3) SECONDS DISPLAY “-004”

“F000” (TEMPERATURE)
PRESS COMP/AGIT SWITCH ONCE (1) TO CHANGE TEMPERATURE UNITS
WHEN “F000” PRESS COMP/AGIT SWITCH ONCE (1) TO CHANGE TEMPERATURE UNITS TO CENTIGRADE “FC00”

“P000” (PRESSURE)
PRESS COMP/AGIT SWITCH ONCE (1) TO CHANGE PRESSURE UNITS TO BAR “Fb00”

NOTE:
SET POINT = COMPRESSOR OFF DIFFERENTIAL IS FIXED AT 2° ABOVE SET POINT
PRESS COMP/AGIT SWITCH ONCE (1) TO CHANGE TEMPERATURE UNITS
WHEN “F000” PRESS COMP/AGIT SWITCH ONCE (1) TO CHANGE TEMPERATURE UNITS TO CENTIGRADE “FC00”

“E1” = Low Water Supply Pressure
“E2” = Low Co2 Pressure
“E3” = Low Water Level - Water Bath
“E4” = High Water Bath Temperature
“E5” = High Water Supply Pressure
“E6” = High Refrigeration Temperature
“E7” = High Ice Bank Size (Probe Sensor 2)
“E8” = Long Carb A Run Time
“E9” = Long Carb B Run Time

SHORTED TRANSDUCER = “---”
OPEN TRANSDUCER = “-----”

PRESS CARB A SWITCH TO CONVERT CARB A MOTOR TO CIRC MOTOR
“-102”
PRESS CARB B SWITCH TO CONVERT CARB B MOTOR TO CIRC MOTOR
“-112”

PRESS CIRC A SWITCH TO LOWER SET POINT TEMPERATURE
PRESS CIRC B SWITCH TO RAISE SET POINT TEMPERATURE

PRESS CIRC A SWITCH TO SHOW WATER BATH TEMP
PRESS CIRC B SWITCH TO RAISE SET POINT TEMPERATURE

PRESS PGM SWITCH ONCE (1)

TO CHANGE UNITS
WHEN “F000” PRESS COMP/AGIT SWITCH ONCE (1) TO CHANGE TEMPERATURE UNITS
TO CENTIGRADE “FC00”

WHEN “P000” PRESS COMP/AGIT SWITCH ONCE (1) TO CHANGE PRESSURE UNITS TO BAR “Fb00”

PRESS PGM SWITCH ONCE (1)

PRESS PGM SWITCH ONCE (1)

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PRESS PGM SWITCH ONCE (1)

PRESS PGM SWITCH ONCE (1)
**ERROR CODE TROUBLESHOOTING PAGE 3**

<table>
<thead>
<tr>
<th>E1</th>
<th>E2</th>
<th>E3</th>
<th>E4</th>
<th>E5</th>
<th>E6</th>
<th>E7</th>
<th>E8</th>
<th>E9</th>
</tr>
</thead>
</table>

**E1**
- Normally caused by water pressure < 5 PSI for 5 seconds. Must stay above 10 PSI to correct.
- Go into program mode 1 pressure readout "P000".
- Press carb A button to verify water pressure "PXXX".
- Display pressure > 15 PSI?
  - No: Replace ERC circuit board 020001985.
  - Yes: Go into program mode 1 pressure readout "P000".

**E2**
- Normally caused by CO2 pressure < 10 PSI for 5 seconds. Must stay above 15 PSI to correct.
- Verify CO2 supply pressure to unit > 20 PSI or not, with another gauge in the supply system.
- Pull carb A or B connector off ERC, error goes away (can use temp).
- E3 error goes away.
- Replace level probe 020002143.

**E3**
- Normally caused by water level in water bath below probe conductors.
- Verify water level above probe tips.
- Add water to water bath above level of probe tips.
- Go into program mode 1 conductivity "C000".
- Press circ A button to verify conductivity "C_L_X".
- Display conductivity = "C_L_1"?
  - Yes: Replace ERC circuit board 020001985.
  - No: "C_L_0". Remove level probe conn from ERC, short ERC level probe pins.

**E4**
- Verify incoming water supply pressure to unit > 15 PSI or not with another gauge in the supply system.
- Supply pressure > 15 PSI?
  - No: Replace water press transducer 020001992.
  - Yes: Troubleshoot water supply system, to fix low water pressure condition.

**E5**
- Verify CO2 supply pressure to unit, > 20 PSI or not, with another gauge in the supply system.
- Supply pressure > 20 PSI?
  - No: Replace CO2 press transducer 020001992.
  - Yes: Troubleshoot CO2 supply system, to fix low pressure condition.

**E6**
- Verify water supply system, to fix low water pressure condition.

**E7**
- Verify CO2 supply system, to fix low pressure condition.

**E8**
- Verify water level above probe tips.
- Add water to water bath above level of probe tips.
- Go into program mode 1 conductivity "C000".
- Press circ A button to verify conductivity "C_L_X".
- Display conductivity = "C_L_1"?
  - Yes: Replace ERC circuit board 020001985.
  - No: "C_L_0". Remove level probe conn from ERC, short ERC level probe pins.

**E9**
- Verify water supply pressure to unit > 15 PSI or not with another gauge in the supply system.
- Supply pressure > 15 PSI?
  - No: Replace water press transducer 020001992.
  - Yes: Troubleshoot water supply system, to fix low water pressure condition.

**NOTE:**
- All carb motors and all circ motors will go off, with this error compressor and agitator stay on.
- E3 error goes off.

- Normally caused by water pressure < 5 PSI for 5 seconds. Must stay above 10 PSI to correct.
- Normally caused by CO2 pressure < 10 PSI for 5 seconds. Must stay above 15 PSI to correct.
- Supply pressure > 20 PSI?
  - No: Replace level probe 020002143.
  - Yes: Replace level probe 020002143.
**ERROR CODE TROUBLESHOOTING**

<table>
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**NORMALLY CAUSED BY WATER BATH TEMPERATURE > 45°F**
- Go into programming mode 1, "F000" press CARB A button to show water bath temp "FXXX" °F
- Water bath temp display >45 °F
  - Yes
  - No
- Verify temp with second thermometer if still <45°F, replace ERC board 020001985
- Verify temperature with second thermometer
- Temperature verified
  - Yes
  - No
- Go to compressor troubleshooting to fix refrigeration system
  - Replace water bath thermistor 020002142

**NORMALLY CAUSED BY WATER PRESSURE > 75 PSI**
- Go into programming mode 1, "F000" press CARB A button to show water pressure "PXXX" PSI
- Water pressure >75 PSI
  - Yes
  - No
- Verify pressure with second press gauge
- Pressure verified
  - Yes
  - No
- Troubleshoot water supply system to fix high water pressure, regulator bad, needed
  - Replace water pressure transducer 020001992

**NORMALLY CAUSED BY LIQUID SIDE TEMPERATURE > 200°F**
- Go into programming mode 1, "F000" press CIRC A button to show liquid line temp "FXXX" °F
- Liquid line temp >200°F
  - Yes
  - No
- Verify temperature with second press gauge
- Temperature verified
  - Yes
  - No
- First check for condenser failure or hot gas bypass
  - Go to compressor / refrigeration system troubleshooting
  - Replace discharge/liquid line temperature thermistor 020001991
  - Verify temp with second thermomter if still <200°F
  - Replace ERC control board 020001985
  - Replace water bath thermistor 020002142
ERROR CODE TROUBLESHOOTING

**E1**

- Normally caused by ice on ice bank probe pin #2 (middle pin)
- Verify visually that ice is over ice bank probe pin #2 (middle pin)
- Pin #2 covered in ice
- No

**E2**

- Normally caused by CARB motor A running > 7 minutes continuously
- First check for leak in CARB system
- Leak in system
- No
- Fix leak

**E3**

- Normally caused by ice on ice bank probe pin #2 (middle pin)
- Verify ice bank probe installed correctly/Plastic step on probe away from evap
- Unplug carb B connector from ERC (#1) to verify conductivity OK
- "E7" error goes away
- Yes

**E4**

- "E7" error goes away
- No

**E5**

- Unplug ice bank probe connector (#3) from ERC board
- "E7" error goes away
- Yes

**E6**

- Replace ice bank probe 020002091
- Replace ERC control board if problem continues 020001985

**E7**

- First check for leak in CARB system
- Leak in system
- Yes
- Fix leak
- No

**E8**

- Then check for pump output (32 oz in less than 20 sec)
- PUMP GOOD
- Yes
- Unplug carb B connector from ERC (#1) to verify conductivity OK
- "E7" error goes away
- No

**E9**

- Compressor on too long/Go to compressor / refrigeration troubleshooting
- Yes
- If "E8" and/or "E9" continue to occur replace ERC control board 020001985
- No
- Replace pump

SAME AS E8 FOR CARB B MOTOR/PUMP
COMPONENT TROUBLESHOOTING

CIRCULATING SYSTEM A OR B

- CARB MOTOR DOES NOT TURNON
  - VERIFY NO "E1" ERROR
  - PROGRAM MODE 1 CONDUCTIVITY "C000"
  - PRESS CARB A AND/OR CARB B BUTTON, VERIFY CARB A AND/OR B CONDUCTIVITY PROBES "CX_ X=A OR B"
  - "CX00" CARB MOTOR SHOULD BE ON
    - YES / END
  - VOLTAGE AT ERC AGIT OUTPUT TERMINALS
    - NO
    - REPLACE ERC CONTROL BOARD 020001985
  - "CX11" CARB MOTOR SHOULD BE OFF
    - YES / END
  - VOLTAGE AT ERC AGIT OUTPUT TERMINALS
    - NO
    - REPLACE ERC CONTROL BOARD 020001985
  - CHECK ALL WIRES AND CONNECTORS TO CARB TANK WIRING HARNESS CHECK CARB MOTOR
- CIRC MOTOR DOES NOT TURNON
  - FIRST VERIF Y PRG MODE 2 IS SET TO ‘-002’ FOR BOTH CARB PUMPS
  - VERIFY VOLTAGE AT CIRC OUTPUT TERMINALS ON ERC
    - NO
    - KEYPAD BUTTONS NOW WORK
      - YES
      - REPLACE ERC CONTROL BOARD
    - NO
      - DISPLAY SHOWS POWER UP COUNTDOWN "PdXX"
        - YES
        - REPLACE KEYPAD / DISPLAY 020001986
        - NO
        - REPLACE ERC CONTROL BOARD 020001985
  - VOLTAGE AT CIRC MOTOR
    - YES
    - REPLACE ERC CONTROL BOARD 020001985

ERC CONTROL BOARD AND KEYPAD / DISPLAY

- KEYPAD / DISPLAY NOT WORKING
  - VERIFY KEYPAD / DISPLAY WORKS, CIRC LED GOES ON AND OFF
  - VERIFY VOLTAGE AT CIRC OUTPUT TERMINALS ON ERC
    - NO
    - KEYPAD BUTTONS NOW WORK
      - YES
      - REPLACE ERC CONTROL BOARD
    - NO
      - DISPLAY SHOWS POWER UP COUNTDOWN "PdXX"
        - YES
        - REPLACE KEYPAD / DISPLAY 020001986
        - NO
        - REPLACE ERC CONTROL BOARD 020001985
  - CHECK ALL WIRES AND CONNECTORS TO CIRC MOTOR, CHECK CIRC MOTOR
    - REPLACE ERC CONTROL BOARD 020001985
- ERC POWER LED NOT ON
  - VERIFY PROPER VOLTAGE ON ERC TERMINALS L1 AND L2
  - POWER ERC OFF THEN ON, VERIFY NO COUNTDOWN "PdXX" ON DISPLAY

GENERAL NOTE: FOR DISPLAY PROBLEMS, IF COUNTDOWN OCCURS ON POWER UP, "PdXX", THEN DISPLAY IS PROBABLY AT FAULT, NOT ERC
PROGRAMMING / AUTO SET TROUBLESHOOTING PAGE 8

- Compressor does not react to ice bank probe (soda & chiller units) or beer unit does not react to water temp probe
  - Go into program mode 3 and verify compressor control setting correct -003 for soda & chiller units (-1273 for beer unit only)

- Carb A and/or Carb B motor stays on constantly when respective button activated instead of stopping when carb tank is full
  - Go into program mode 2 and verify carb pump settings

- Only a or b (or none) circulating water temperature displayed on keypad, unit has two circ system
  - If two circulating system unit, verify both thermistors are good

- ERC program checks on every power up, if good thermistor(s) (0-200°F) are plugged into circ A and circ B connectors on ERC
  - If only one, (or none) good thermistor is plugged in, then only that connector (A or B) circ temperature will display (auto-set)

- Display reads -003
  - Yes
    - If program mode 3 is set right for soda / chiller unit (-003), go to compressor troubleshooting, if compressor still not coming on/off when it should
    - Display reads "1273" which is beer mode only - program mode 3 to ice bank probe -003 by pressing comp/agit button once
  - No
    - Reprogramming fixes problem

- Display reads -002
  - Yes
    - Exit, and go into program mode 1 conductivity "C001" press carb A/B button
  - No
    - Displays reads "C000"

- Troubleshoot carb tank wiring harness and connectors, look for open connection and repair / replace
  - Repeat for carb B system settings if necessary
  - Only one circ system temperature (or none) is displaying on a two circ system unit
  - Replace bad thermistor(s) 020001991 (not measuring 0-200°F) or good thermistor(s) not plugged in
  - If either or both "0" digits is a "1", re-program to "0" via program mode 2 instructions
  - Verify carb A & B systems work now, see carb system troubleshooting if necessary
  - Verify both good thermistors are plugged in, then turn unit power off, then on, to register new thermistor(s)
  - If no temp display go to ERC / display troubleshooting
ERC COMPONENT (OUTPUT) CONNECTOR LAYOUT

PLUG THIS PIN