242-A SIGMA Controller Set-Up and Test Kaeser Air Compressors

USQ # GCX-2

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1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure provides instructions for programming the V.7 SIGMA Controller for Kaeser ASD-30 T Direct Drive Rotary Screw Compressor installed at 242-A Evaporator.

1.2 Scope

This procedure provides directions for Setup and Testing for the Kaeser ASD-30 T Direct Drive Rotary Screw Compressor installed at 242-A Evaporator:

- Clock Check/Synchronization
- Setup and Test “P1/P2” (Lead/Lag) Cycle
- Test SIGMA Controller LED indication
- Checking the Over Temperature Shut-down Function
- Instructions for Entering the Password.

2.0 INFORMATION

2.1 General Information

2.1.1 The “P1/P2” (Lead/Lag) cycle is programmed to swap Lead every 168 hours (once a week), but for testing purposes the “P1/P2” cycle will be reduced to one (1) hour and then returned to the original setting of 168 hours.

2.1.2 SIGMA display values can only be changed when the value is in the 3rd line of display and is denoted by the symbol (see Attachment 6 for graphic).

2.2 Terms and Definitions

- ADT Airend Discharge Temperature
3.0 PRECAUTIONS AND LIMITATIONS

3.1 Personnel Safety

3.1.1 Lockout and tagouts will be performed in accordance with the Lockout/Tagout Procedure during maintenance activities where there exists a potential for personnel injury or equipment damage.

3.1.2 If a lock and tag is required during the performance of this procedure, comply with the DOE-0336, Hanford Site Lockout/Tagout Procedure.

3.1.3 Compliance with DOE-0359, Hanford Site Electrical Safety Program is required when working with this procedure.

3.2 Radiation and Contamination Control

Work in radiological areas will be performed using a Radiological Work Permit following review by Radiological Control per the ALARA Work Planning procedure TFC-ESHQ-RP_RWP-C-03.
4.0 PREREQUISITES

4.1 Special Tools, Equipment, and Supplies

The following supplies may be needed at the work place:
- PPE (e.g., safety glasses, hearing protection)
- Clock/Watch (verify/set controller(s) internal clock time)
- Stopwatch
- Other tools, equipment and supplies as identified by Shift Manager/OE/FWS.

4.2 Performance Documents

The following documents may be needed to perform this procedure:
- TO-620-160 Operate 242-A Evaporator Compressed Air System

NOTE - The following Sigma Control and Service manuals are located in Shift office.
- SIGMA CONTROL – Quick-reference Operating Inst., Version 72.00 05/03
- Service Manual - Screw Compressor ASD T Tri-Voltage 9_5721 06 USE
- Service Manual SIGMA CONTROL Index: 7_7000_0-00 10 USE – BUB 80.XX.

4.3 Field Preparation

4.3.1 OBTAIN Shift Manager's permission prior to performing this procedure.

Signature ___________________________ / Print (First and Last) ___________________________ / Date ___________________________
Shift Manager /OE

4.3.2 REQUEST Shift Manager/OE to turn off and secure any other air compressors that may be supplying the air system.

4.3.3 NOTIFY Operations to perform the applicable Valve and Electrical line-up per Procedure TO-620-160, Sections 5.1, 5.2 and 5.3.

4.3.4 ISOLATE CPE-1 and CPE-2 by performing the following:

4.3.4.1 CLOSE valve HV-CP-E-1-5.

4.3.4.2 CLOSE valve HV-CP-E-2-5.
5.0 PROCEDURE

5.1 Overtemperature Shut-down Function Test

Special Instruction

Overtemperature Shut-down function will be checked on each compressor separately (one-at-a-time).

Ascertaining Offset

5.1.1 NOTIFY Operations it may be necessary to “bleed” the System air to allow the compressors to operate for a minimum of 20 minutes.

5.1.2 OPERATE CPE-1 and CPE-2 in accordance with TO-620-160.

5.1.3 READ the Airend Discharge Temperature (ADT) under load at normal working temperature (first line in the display e.g. 180 °F) AND RECORD the temperature on Data Sheet.

5.1.4 SHUT-DOWN the machine with the “OFF” key.

5.1.5 MONITOR the ADT drop (≈ 15 °F) for an action item in Step 5.1.14.

Setting the Offset

5.1.6 IF the unit does not respond to the pressure setpoints as expected, RESTART the system.

5.1.7 ENTER level 4 Password by referring to Attachment 6.

5.1.8 AT the Main Menu, PRESS the “Up” key repeatedly until “MACHINE TEST” appears in the third line of the display AND PRESS the “Enter” key.

5.1.9 WHEN “TÜV check” appears in the display, PRESS the “Enter” key.
5.1 Overtemperature Shut-down Function (Cont.)

5.1.10 UNTIL the following is displayed, PRESS “Down” key repeatedly AND RECORD the As-Found “offset value” on the Data Sheet.

<table>
<thead>
<tr>
<th>88 psi</th>
<th>180 °F</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADT alarm:</td>
<td>n</td>
<td>2 overttemperature shutdown</td>
</tr>
<tr>
<td>offset:</td>
<td>40 °F</td>
<td>3 offset value set (example)</td>
</tr>
<tr>
<td>ADT:</td>
<td>0 °F</td>
<td>4</td>
</tr>
</tbody>
</table>

NOTE - Over Temperature Shutdown is factory set at 230 °F.

5.1.11 CALCULATE the Offset value as follows:

230 °F Overtemperature Shutdown minus (–) ADT ______ °F (@ Step 5.1.3) = _____ °F Offset.

5.1.11.1 RECORD calculated Offset on Data Sheet.

5.1.12 PRESS the “Enter” key (the third (3rd) line is highlighted).

5.1.13 USE the “Down” key or the ‘Up” key to enter the calculated offset, CONFIRM by pressing “Enter” key.

Carrying Out the Check

5.1.14 ALLOW the machine to cool ≈ 15 °F from reading at Step 5.1.3, PRESS the “Up” key once so that “ADT alarm: n” appears in the third (3rd) line of the display.

5.1.15 PRESS the “Enter” key (the third (3rd) line is highlighted).

NOTE - The “Over Temperature Shutdown” check mode will activate with step 5.1.16.

5.1.16 USE the “Up” key to select “y”.

5.1.17 CONFIRM by pressing ‘Enter”.

NOTE - The “Over Temperature Shutdown” check mode will activate with step 5.1.16.
5.1 Overtemperature Shut-down Function (Cont.)

5.1.18 PRESS the “Down” key once to display operating temperature + offset:

| 88 psi | 160 °F | 1 lowering working temperature (160°F) |
| 50 °F | ADT alarm: Y | 2 overtemperature shutdown |
| ADT ▲: 210 °F | offset: 50 °F | 3 offset value set (example) |
| | | 4 operating temperature + offset |

5.1.19 PRESS the “ON” key to switch the machine to LOAD.

5.1.20 ALLOW the machine to run on LOAD AND

MONITOR the displayed temperature.

NOTE - For the test, the value used is the normal operating temperature plus the offset.

5.1.21 IF the machine does not shut-down when ADT reaches 230 ± 2 °F,

IMMEDIATELY ABORT the test by pressing the “OFF” key AND

NOTIFY Shift Manager/OE.

5.1.22 CONFIRM that when the ADT reaches approximately 230 ± 2 °F, the machine shuts-down within two seconds and alarm displayed.

5.1.23 RECORD the results of test on Data Sheet.

Return to As-Found Condition

5.1.24 PRESS the “Enter” key.

5.1.25 RESET the offset to value recorded in Step 5.1.11 AND

CONFIRM by pressing “Enter” key.

5.1.26 DEACTIVATE “Over Temperature Shutdown” by pressing the “UP” key once AND

CONFIRM ADT “alarm: Y” appears in third (3rd) line of display.
5.1 Overtemperature Shut-down Function (Cont.)

5.1.27 PRESS the “Enter” key.

NOTE - Next Step will deactivate “shutdown temperature” check mode and end test.

5.1.28 USE the “UP” key to select “n” AND

PRESS the “Enter” key to Confirm.

5.1.29 CONFIRM Compressor is reset (not in alarm state) AND

RECORD results on Data Sheet.

5.1.30 PRESS the “Esc” key repeatedly to return to the Main Menu.

5.1.31 REPEAT this Section for the remaining compressor,

OR

IF temperature shut-down testing is complete, GO TO Restoration Section 5.2.
5.2 Restoration

5.2.1 IF any problems were encountered, INFORM Shift Manager/OE.

5.2.2 CHECK equipment restoration by observing indications are consistent with expected conditions.

5.2.3 RECORD the Test Equipment information and calibration status on Data Sheet as applicable.

5.2.4 NOTIFY Shift Manager/OE that testing is complete and system may be returned to normal Operation.

5.3 Acceptance Criteria

Acceptance Criteria has been met when Steps in this procedure have been satisfactorily performed and As-Left values meet the specifications and tolerance(s) per the Data Sheet.

5.4 Review

5.4.1 INFORM FWS test is complete.

5.4.2 FWS REVIEW AND ENSURE the following:

- Completed Data Sheets meet the acceptance criteria.
- Comments sections are filled out appropriately.
- Work requests needed as a result of this procedure are identified and generated.
- Work request number(s) of any work documents generated as a result of this procedure, are recorded in the Comments/Remarks section of the Data Sheet, as applicable.
5.5 Records

This procedure is performed within a work package, as such, the procedure in its entirety will be maintained as a record per the Work Control process.

The record custodian identified in the Company Level Records Inventory and Disposition Schedule (RIDS) is responsible for record retention in accordance with TFC-BSM-IRM_DC-C-02.
Figure 1: Sigma Control Display, Keys and Indicators

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>«ON»</td>
<td>Switches on the machine. The programmed operating mode is active.</td>
</tr>
<tr>
<td>2</td>
<td>«OFF»</td>
<td>Switches the machine off.</td>
</tr>
<tr>
<td>3</td>
<td>«Clock»</td>
<td>Switches clock control on and off.</td>
</tr>
<tr>
<td>4</td>
<td>«Remote control»</td>
<td>Switches remote control on and off.</td>
</tr>
<tr>
<td>5</td>
<td>«LOAD/IDLE»</td>
<td>Toggles compressor between LOAD and IDLE operating modes.</td>
</tr>
<tr>
<td>6</td>
<td>«DOWN»</td>
<td>Scrolls down the menu options. Reduces a parameter value.</td>
</tr>
<tr>
<td>7</td>
<td>«UP»</td>
<td>Scrolls up the menu options. Increases a parameter value.</td>
</tr>
<tr>
<td>8</td>
<td>«escape»</td>
<td>Returns to the next higher menu option level.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Exits the edit mode without Saving.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Returns to the Main Menu when held down at least 10 seconds.</td>
</tr>
<tr>
<td>9</td>
<td>«enter»</td>
<td>Only affects the value in the third line of the display.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Enters the selected menu option.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Exits the edit mode and saves.</td>
</tr>
<tr>
<td>10</td>
<td>«Events &amp; Information»</td>
<td>Displays the event memory. Selection is possible from every menu.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Return with “Esc” key.</td>
</tr>
<tr>
<td>11</td>
<td>«Reset»</td>
<td>Signifies recognition of alarms and warning messages.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Resets the event memory (When Permitted).</td>
</tr>
</tbody>
</table>

Figure 1 continued on next page.
Figure 1: Sigma Control Display, Keys and Indicators (Cont.)

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Display field</td>
<td>Alphanumeric display with 4 lines.</td>
</tr>
<tr>
<td>13</td>
<td>Alarm</td>
<td>Flashes red when an alarm occurs. Lights continuously when acknowledged.</td>
</tr>
<tr>
<td>14</td>
<td>Communication</td>
<td>Lights red if communication via the profibus interface is interrupted.</td>
</tr>
</tbody>
</table>
| 15   | Warning     | Flashes yellow for:  
- maintenance work due,  
- warning messages.  
Lights continuously when acknowledged. |
| 16   | Controller power | Lights green when the power supply to the controller is switched on. |
| 17   | LOAD        | Lights green when the compressor is running under LOAD. |
| 18   | IDLE        | Lights green when the compressor is running in IDLE. Flashes when the «LOAD/IDLE» toggle key is pressed. |
| 19   | Machine ON  | Lights green when the machine switched on. |
| 20   | Clock       | The LED lights when the machine is in clock control. |
| 21   | Remote control | The LED lights when the machine is in remote control. |
Figure 2: Sigma Control Main Menu Overview

- LANGUAGE
- COMMUNICATION
- PACKAGE TEST
- COMPONENTS
- CONFIGURATION
- CLOCK
- PASSWORD

100 psi  80 °F
   key -OFF  ¦  p1 – off
   total               13000 h
   load                12034 h ↕

STATUS

100 psi  80 °F
key -OFF  p1 – off
total 13000 h
load 12034 h

ANALOG DATA

MESSAGES
esc

OPERATING DATA

STATISTICS

MAINTENANCE

PRINT
Figure 3: Configuration Menu Tree

- general
  - version
  - model:
  - PN:
  - SN:
  - weekday: ……
  - date: ……
  - time: ……
  - summer/winter
  - date format:
  - time format:
  - unit of pressure:
  - unit of temperature:

- pressure settings
  - compressor
    - pRV
    - pressure increase
    - nominal pressure
    - setpoint pressure p1
    - setpoint pressure p2
    - system pressure low
    - cut-in pressure minimum
  - vacuum package
    - system pressure high
    - setpoint pressure p2
    - setpoint pressure p1
    - pressure fall
  - load control
    - load control
      - local mode
      - remote mode
      - remote key: y/n
    - settings
      - p1/p2 clock, p1/p2 cycle, p1/p2 RC, idle load, local-load RC, venting mode
      - idle key active: y/n

- control mode
  - control mode => ……
  - settings:
    - Dual
    - Quadro
    - Vario
    - unload period
    - refrigeration dryer
    - modulating valve
  - compressor start
  - compressor ON
  - local mode:
  - key, key+clock
  - clock key: y/n
  - remote mode:
  - key+clock, RC
  - remote key: y/n
  - clock key: y/n
  - remote contact:
  - input
  - compressor OFF
  - venting: y/n
  - holidays
  - holiday period
- reset
  - remote mode
  - remote key: y/n
  - input
- I/O periphery
  - binary output function
  - show quantities
  - external messages
  - switch
  - analog output parameter
- timer
  - OFF
  - ON
  - output
Attachment 1 - Air Compressors CP-E-1/CP-E-2 Clock Check/Synchronization

NOTE - During Clock Check/Synchronization, units must be powered up but should not be at Idle or under Load while synchronizing two units.

[1] IF either unit is running, DETERMINE unit is “IDLE” or unit is under “Load”.
   [1.1] IF unit is at “IDLE”, PRESS “OFF” key.
   [1.2] IF unit is under “LOAD”, PRESS “Load/Idle” key.
       [1.2.1] AFTER unit switches to “IDLE”, PRESS “OFF” key.

[2] CHECK Operations has closed valves HV-CPE1-5 and HV-CPE2-5 from system air per Step 4.3.4.

Checking/Setting Date

[3] CHECK Date on both CP-E-1/CP-E-2 display AND
   RECORD Date in the As-Found column of each unit’s Data Sheet.
[4] IF Date(s) are correct, RECORD Date(s) in As-Left column of Data Sheets AND
   GO TO Step [6].
[5] IF Date(s) are not correct, SET Date(s) by performing the following:
   [5.1] ENTER password by referring to Attachment 6.
   [5.2] FROM Main Menu, SCROLL up to “CONFIGURATION” AND
       PRESS “Enter” key (refer to Figure 1 through Figure 3).
   [5.3] PRESS “Down” key to “GENERAL” AND
       PRESS “Enter” key.
   [5.4] PRESS “Down” key repeatedly until Date is displayed in the 3rd line of display.
   [5.5] PRESS “Enter” key and cursor appears under first numeral of Date.
   [5.6] CHANGE Date with “Down” or “Up” key AND
       SAVE Date with “Enter” key.
   [5.7] REPEAT for month and year.
       RECORD “Date” of CP-E-1 and or CP-E-2 in As-Left column of each unit’s
       Data Sheet.
   [5.8] PRESS “Esc” key repeatedly to return to Main Menu.
Checking/Setting Time


[7] **FROM** Main Menu, **SCROLL** up to “CONFIGURATION” AND **PRESS** “Enter” key (refer to Figure 1 through Figure 3).

[8] **PRESS** “Down” key to “GENERAL” AND **PRESS** “Enter” key.

[9] **PRESS** “Down” key until Time is displayed in 3rd line of display AND **RECORD** “Clock Time” of CP-E-1 and CP-E-2 in As-Found column of each unit’s Data Sheet.

[10] **IF** the As-Found times of both units are synchronized to within one (1) minute, **RECORD** time in As-Left column of each unit’s Data Sheet **AND** **GO TO** Attachment 3.

[11] **IF** units are not synchronized, **ENTER** level 4 password by referring to Attachment 6.

[12] **DETERMINE** the following:
   - Which clock (CP-E-1 or CP-E-2) is closest to actual time
   - Is this time accurate to within ±5 minutes of actual time?

[13] **SET** one clock to actual time.

[14] **SYNCHRONIZE** two clocks to within 1 minute per Data Sheet by using the “Up” and “Down” keys to change Time and “Enter” key to save hour/minutes.

[15] **RECORD** synchronized time in As-Left column on each compressor’s Data Sheet.

[16] **PRESS** “Esc” repeatedly to return to Main Menu [top level].
Attachment 2 - CP-E-1 Setup and Test P1/P2 Cycle for Sigma V.7 Controller

[1] IF unit does not respond to pressure setpoints as expected, RESTART system.


NOTE - SIGMA display values can only be changed when value is in the 3rd line of display and is denoted by the symbol (see Attachment 6 for graphic).


[7] SET to P1 using down key AND CONFIRM by pressing “Enter” key.

[8] SCROLL down to “SETTINGS” AND CONTINUE down to one line past “P1/P2 cycle”.

[9] SET number of hours for P1 and P2 to one (1) hour (for testing purposes) by placing these values in the 3rd line using the up/down keys (normal value is 168 hours for plant operations).

[10] SCROLL down to “START” AND SET to “START P1” (confirm by pressing “Enter” key).

[11] SCROLL down one line AND SET “Start cycle time” for CP-E-1 to approximately 15 minutes in the future (will start this time today).

[11.1] DOCUMENT “Start Cycle Time” ________________.

[11.2] MONITOR this 15 minute time span for coordinated action in Step [27].
Attachment 2 - CP-E-1 Setup and Test P1/P2 Cycle for Sigma V.7 Controller

(Cont.)

[12] **CALCULATE** the following:

“Start cycle time” _________ + 1 hour = _________ = Shift to “P2” Operation.

[12.1] **RECORD** “Shift to P2 Operation” time on Data Sheet AND **MONITOR** this time to be used in Step [25].

[13] **SCROLL** back up to “LOCAL MODE” AND **GO TO** P1.

[14] **CHANGE** “P1” to “P1/P2 cycle”.

[14.1] **PRESS** “Enter” key AND **PRESS** “Esc”.

[15] **SCROLL** up to “COMPRESSOR” AND **PRESS** “Enter” key.

[15.1] **ENSURE** P1 Set Point is 115 psi.

[15.2] **ENSURE** System Differential is -10 psi.

[15.3] **ENSURE** P2 Set Point is 110 psi.

[15.4] **ENSURE** System Differential is -10 psi.

[16] **PRESS** “Esc” repeatedly to return to Main Menu [top level].

[17] **NOTIFY** Shift Manager/OE to adjust system air pressure (i.e., bleed system air) to ≤ 100 psi.

[18] **NOTIFY** Shift Manager/OE to valve-in compressor, CP-E-1 to Plant System Air, by opening valve HV-CPE1-5.

[19] **NOTIFY** Shift Manager/OE to minimize air usage while compressor CP-E-1 is started.

[20] **NOTIFY** Shift Manager/OE that compressor CP-E-1 will be started for setup/testing.

[21] **WAIT** until time documented in Step [11.1] has elapsed, **PRESS** the compressor “ON” key.

[22] **CONFIRM** compressor shifts to “Load” AND **RECORD** on Data Sheet.
NOTE - Once Setpoint is reached the compressor will switch between “IDLE” and “LOAD” as demand varies.

[23] **CONFIRM** compressor shifts to “IDLE” when system air pressure reaches the setpoint of 115 ± 2 psi **AND**

**RECORD** on Data Sheet.

[24] **NOTIFY** Shift Manager/OE they may return to normal air usage.

NOTE - After the one (1) hour test period has elapsed the unit will shift to “P2” mode.

[25] **CONFIRM** CP-E-1 shifts to “P2” operation at the time calculated in Step [12] ± 1 minute **AND**

**RECORD** results on Data Sheet.

NOTE - Compressor will start during the next Step.

[26] **NOTIFY** Shift Manager/OE to momentarily reduce system pressure to ≤ 100 psi.

[27] **CHECK** CP-E-1 indicates “Load” and the pressure begins to rise.

[28] **CONFIRM** at 110 ± 2 psi (cutoff Set Point), CP-E-1 shifts to Idle **AND**

**RECORD** results on Data Sheet.

[29] **WHEN** compressor is at “IDLE”, **COMPARE** display pressure with pressure gauge PI-RE1-1 on air receiver **AND**

**RECORD** results on Data Sheet.

[29.1] **IF** pressure gauge PI-RE1-1 is not within tolerance per Data Sheet, **CALIBRATE** gauge per procedure 6-PCD-509.

[30] **CHECK** “IDLE” is shown on display.

[30.1] **IF** “IDLE” is not displayed, **PRESS** “Load/Idle” key.

[31] **WITH** “IDLE” showing on display, **PRESS** OFF key.
Attachment 2 - CP-E-1 Setup and Test P1/P2 Cycle for Sigma V.7 Controller (Cont.)

Reset P1/P2 Cycle to 168 hours

[32] FROM Main Menu, PRESS “Up” key repeatedly until “CONFIGURATION” appears in third (3rd) line of display AND
PRESS “Enter” key.

[33] PRESS “Down” key until “PRESS SETTINGS” appears AND
PRESS “Enter” key.

[34] PRESS “Down” key until “LOAD CONTROL” appears AND
PRESS “Enter” key.

[35] SCROLL past “LOCAL MODE” to “P1/P2 cycle”, PRESS “Enter” key AND
SET to P1 using up/down keys.

[36] SCROLL down to “SETTINGS” AND
CONTINUE down to “P1/P2 cycle”.

[37] RESET number of hours for P1 and P2 to As-Found value of 168 hours.

[38] PRESS “Esc” repeatedly to return to Main Menu.

[39] RECORD reset to 168 hours on Data Sheet.

[40] CLOSE valve HV-CPE1-5.

[41] NOTIFY Shift Manager/OE that Setup and Testing P1/P2 (Lead/Lag) Cycle has been completed for compressor CP-E-1 and testing will begin for compressor CP-E-2.
Attachment 3 - CP-E-2 Setup and Test P1/P2 Cycle for Sigma V.7 Controller

[1] IF unit does not respond to pressure setpoints as expected, **RESTART** system.


**NOTE** - SIGMA display values can only be changed when value is in the 3rd line of display and is denoted by  symbol (see Attachment 6 for graphic).

[3] **PRESS** “Up” key until “CONFIGURATION” appears in third (3rd) line of display **AND**

PRESS “Enter” key.

[4] **PRESS** “Down” key until “PRESS SETTINGS” appears **AND**

PRESS “Enter” key.

[5] **PRESS** “Down” key until “LOAD CONTROL” appears **AND**

PRESS “Enter” key.

[6] **SCROLL** past “LOCAL MODE” to “P1/P2” cycle, **PRESS** “Enter” key.

[7] **SET** to P1 using the down keys **AND**

**CONFIRM** by pressing “Enter” key.

[8] **SCROLL** down to “SETTINGS” **AND**

**CONTINUE** down to one line past “P1/P2 cycle”.

[9] **SET** number of hours for P1 and P2 to one (1) hour for testing purposes by placing this value in the 3rd line using up/down keys (normal value is 168 hours for plant operations).

[10] **SCROLL** down to “START” **AND**

**SET** to “START P1” (confirm by pressing “Enter” key).

[11] **SCROLL** down one line **AND**

**SET** “Start cycle time” for CP-E-2 to approximately 15 minutes in the future (will start this time today).

[11.1] **DOCUMENT** “Start Cycle Time” ____________.

[11.2] **MONITOR** this 15 minute time span for coordinated action in Step [19].
Attachment 3 - CP-E-2 Setup and Test P1/P2 Cycle for Sigma V.7 Controller (Cont.)

[12] CALCULATE the following:

“Start cycle time” + 1 hour = ________ = Shift to “P2” Operation.

[12.1] RECORD “Shift to P2 Operation” time on Data Sheet AND

MONITOR this time to be used in Step [23].

[13] SCROLL back up to “LOCAL MODE” AND

GO TO P1.

[14] CHANGE “P1” to “P1/P2” cycle.

[14.1] PRESS “Enter” key AND

PRESS “Esc”.

[15] SCROLL up to “COMPRESSOR” AND

PRESS “Enter” key.

[15.1] ENSURE P1 Set Point is 110 psi.

[15.2] ENSURE System Differential is -10 psi.

[15.3] ENSURE P2 Set Point is 115 psi.

[15.4] ENSURE System Differential is -10 psi.

[16] PRESS “Esc” repeatedly to return to Main Menu (top level).

[17] NOTIFY Shift Manager/OE to adjust system air pressure (i.e., bleed system air if required) to ≤ 100 psi.

[18] NOTIFY Shift Manager/OE of the following:

- Valve-in CP-E-2 to Plant System Air by opening HV-CPE2-5
- Minimize air usage while compressor CP-E-2 is started
- Compressor CP-E-2 will be started for setup/testing.


[20] CONFIRM compressor shifts to “Load”

RECORD on Data Sheet.
Attachment 3 - CP-E-2 Setup and Test P1/P2 Cycle for Sigma V.7 Controller (Cont.)

NOTE - Once Set Point is reached the compressor will switch between “IDLE” and “Load” as demand varies.

[21] CONFIRM compressor shifts to “IDLE” when system air pressure reaches the Set Point of 110 ± 2 psi

RECORD on Data Sheet.

[22] NOTIFY Shift Manager/OE they may return to normal air usage.

NOTE - After one (1) hour test period has elapsed unit will shift to “P2” mode.

[23] CONFIRM CP-E-2 shifts to “P2” operation at time recorded in Step [12] ± 1 minute AND

RECORD results on Data Sheet.

NOTE - Compressor will start during the next Step.

[24] NOTIFY Shift Manager/OE to momentarily reduce system pressure to ≤ 100 psi.


[26] CONFIRM at 115 ± 2 psi (cutoff Set Point), CP-E-2 shifts to Idle AND

RECORD results on Data Sheet.

[27] WHEN compressor is at “IDLE”, COMPARE display pressure with pressure gauge PI-RE1-1 on air receiver AND

RECORD results on Data Sheet.

[27.1] IF pressure gauge PI-RE1-1 is not within tolerance per Data Sheet, CALIBRATE gauge per procedure 6-PCD-509.

[28] CHECK “IDLE” is shown on display.

[28.1] IF “IDLE” is not shown on display, PRESS “Load/Idle” key.

[29] WITH “IDLE” showing on display, PRESS “OFF” key.
Attachment 3 - CP-E-2 Setup and Test P1/P2 Cycle for Sigma V.7 Controller

(Cont.)

[30] FROM Main Menu, PRESS “Up” key repeatedly until “CONFIGURATION” appears in third (3rd) line of the display AND PRESS “Enter” key.

[31] PRESS “Down” key until “PRESS SETTINGS” appears AND PRESS “Enter” key.

[32] PRESS “Down” key until “LOAD CONTROL” appears AND PRESS “Enter” key.

[33] SCROLL past “LOCAL MODE”, to “P1/P2 cycle”, PRESS “Enter” key.

[34] SET to P1 using down key AND CONFIRM by pressing “Enter” key.

[35] SCROLL down to “SETTINGS”, CONTINUE down to one line past “P1/P2 cycle”.

[36] RESET number of hours for P1 and P2 to As-Found value of 168 hours.

[37] PRESS “Esc” repeatedly to return to Main Menu.

[38] RECORD reset to 168 hours on Data Sheet.

Attachment 4 - Reset and Synchronize P1/P2 Timers for CP-E-1 and CP-E-2


[5] SCROLL past “LOCAL MODE” to “P1/P2” cycle, PRESS “Enter” key.

[6] SET to P1 using down key AND CONFIRM by pressing “Enter” key.

[7] SCROLL down to “SETTINGS”, CONTINUE down one line past “P1/P2 cycle”.

[8] SCROLL down to “START” AND SET to “START P1” (confirm by pressing “enter” key).

NOTE - The start time for two units have to be set to same time simultaneously (i.e. 4:00 PM, 3:00 PM, 12:00 PM, etc. same day).

[9] SCROLL down one line AND SET “start cycle time” to the agreed time (nearest whole hour in the future).

[10] RECORD synchronized time in the As-Left column on each compressor’s Data Sheet.

Attachment 5 - Test SIGMA Controller LEDs for CP-E-1/CP-E-2

[1] IF unit does not respond to pressure setpoints as expected, RESTART system.


[3] FROM Main Menu, PRESS ‘Down” key repeatedly until “MACHINE TEST” appears in third line of display.


[7] WHEN highlighted cursor appears in “LAMPS TEST: “n”, USE the “UP” key to select “y” AND

CONFIRM by pressing ‘Enter’.

[8] CHECK all LEDs start to flash AND

ALLOW unit to complete testing (≠ 10 seconds).

[8.1] RECORD LED test results, Pass/Fail on Data Sheet.


[10] AFTER testing is complete, PRESS the “Esc” key repeatedly to return to Main Menu.
Attachment 6 - Activate/Enter the Password for CP-E-1/CP-E-2

NOTE - The following passwords have been entered in controller at the factory:

- Password for Level Zero (0): **00000**
- Password for Level Four (4): **12EXP**.

1. **AT** Main Menu, **PRESS** “UP” key repeatedly until “PASSWORD” appears in the third (3rd) line of display **AND**
   **PRESS** the “Enter” key.

2. **PRESS** “Enter” key and cursor appears under first character of password (e.g. XXXXX).

3. **UNTIL** required character appears, **PRESS** “Down” key or “Up” key repeatedly.

4. **PRESS** “Enter” key and cursor jumps to next character of password.

NOTE - After entering last character activated “password level” is displayed (in this case Level Four (4+)).

5. **SET** remaining characters of password until password is complete.

6. **PRESS** “Esc” key repeatedly to return to the Main Menu.