OSHP
LEADS Data Centers
EQUIPMENT OPERATIONS
GUIDE

The Ohio State Highway Patrol

At

Lancaster - Post 23
Alum Creek Facility
Shipley Building
EMS Center

Prepared For:

State of Ohio

Department of Public Safety/Facility Management

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PART 1 - OVERVIEW

1.1 EQUIPMENT OPERATIONS OVERVIEW

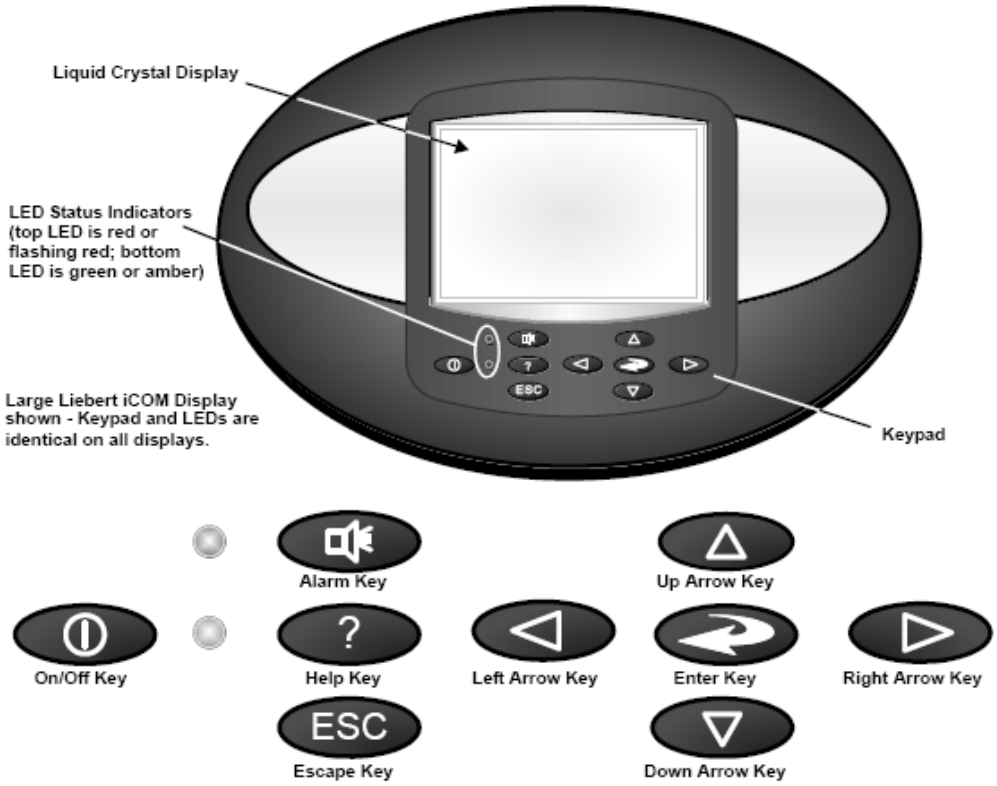
1. This document is prepared to help guide the operational staff and maintenance technicians to the normal operating condition, normal set-points and to help guide when equipment might be in an alarm or out of normal condition.

2. Photographs and manufacturers diagrams have been used to illustrate the most common operational modes expected to be encountered in these facilities and conditions of use, however not all modes or alarm conditions have been addressed or indicated in this report.

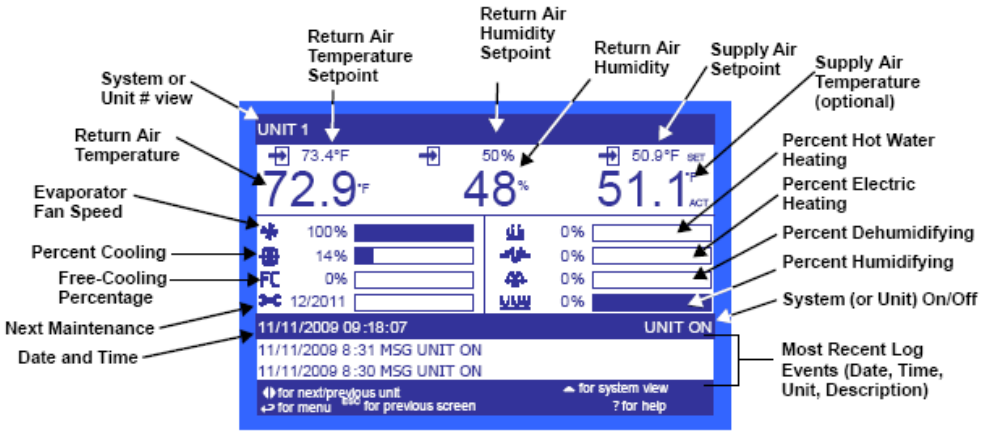
PART 2 - HVAC EQUIPMENT

2.1 CRAC UNITS

Figure 2 Liebert iCOM display components



Design space conditions are as follows:



1. Room temperature – 72-74 F varying to maintain inlet rack temperature.

2. Inlet air temperature to front of IT equipment rack - 78 F (max). Note: This is the driving setpoint to control all other temperature settings. The Rack inlet air temperature should be monitored periodically to maintain 72-74 degree F inlet air temperature (78 F max) at any point alone the face of the race, top to bottom. If temperatures drop below desired range (72-74 F) increase return air setpoint at the CRAC upwards until the desired range is achieved. If the inlet temperatures rise above the desired range (72-74 F) decrease return air setpoint until rack inlet temperature fall back to acceptable range. Periodic adjustments will be required as operational loads are increased and decreased, however, setpoints should always be set and check with operational loads at their normal maximum load during the day, and should not be adjusted daily to compensate for day-night load fluctuations. Normal operation would normally see night time temperatures falling below desired ranges due to decreased operational loads.

3. Unit return air temperature – 10 to 15 degree delta T design

4. Unit Humidity – 30% min to 70% Max.

5. Units in operation

    a. Alum Creek and Lancaster – 1 unit operational, 1-unit standby mode

b. SHIPLEY:

1) DX Units – 1 unit operational, 1-unit standby mode – or:

2) Glycol Units – 2 units operational, 1- unit standby mode.

c. EMS – 1 unit operational.

ICOM CONTROLS

SETPOINTS 1/2
UNIT 02
U101 PASSWORD (Actual Level 0) ????
U102 Temperature Setpoint Act / Set 68 / 68°F
U103 Temperature Control Sensor Return Sensor
U104 Humidity Setpoint 45.0%
U105 Humidity Control Sensor Return Sensor
U106 Humidity Control Type Predictive
U107 Fan Setpoint °F
U108 Fan Control Sensor
U109
U110 Smart Aisle Enabled No
U111
for next/previous unit to select parameter
then to change parameter to confirm

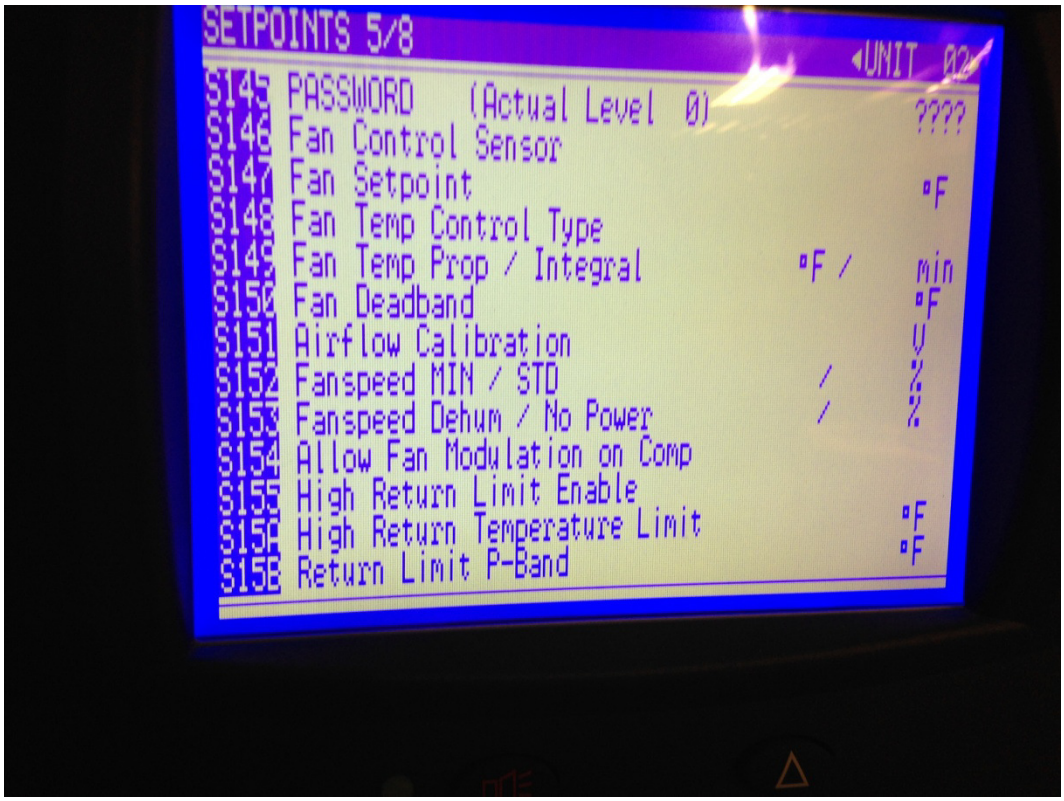
SETPOINTS 2/2
UNIT 02
U112 PASSWORD (Actual Level 0) ????
U113 2nd Temperature Setpoint 73°F
U114 Supply Temp Limit Setpoint °F
U115
U116 BMS Backup Temp Setpoint 73°F
U117 BMS Backup Fan Setpoint °F
U118
U119 Return Compensation Setpoint °F
U120
U121
U122
for next/previous unit to select parameter
then to change parameter to confirm

SETPOINTS 1/8
◀UNIT 02▶
S101 PASSWORD (Actual Level 0) ????
S102 Temperature Control Sensor Return Sensor
S103 Temperature Setpoint Act / Set 68 / 68°F
S104 Temperature Control Type Proportional
S105
S106 Temp Proportional / Integral 11°F/ min
S107
S108 AutoSet Enable No
S109 Temperature DeadBand 2°F
S110 Supply Limit Enabled/Setpoint No / °F
S111 Heater DeadBand 0°F
for next/previous unit to select parameter
then to change parameter to confirm

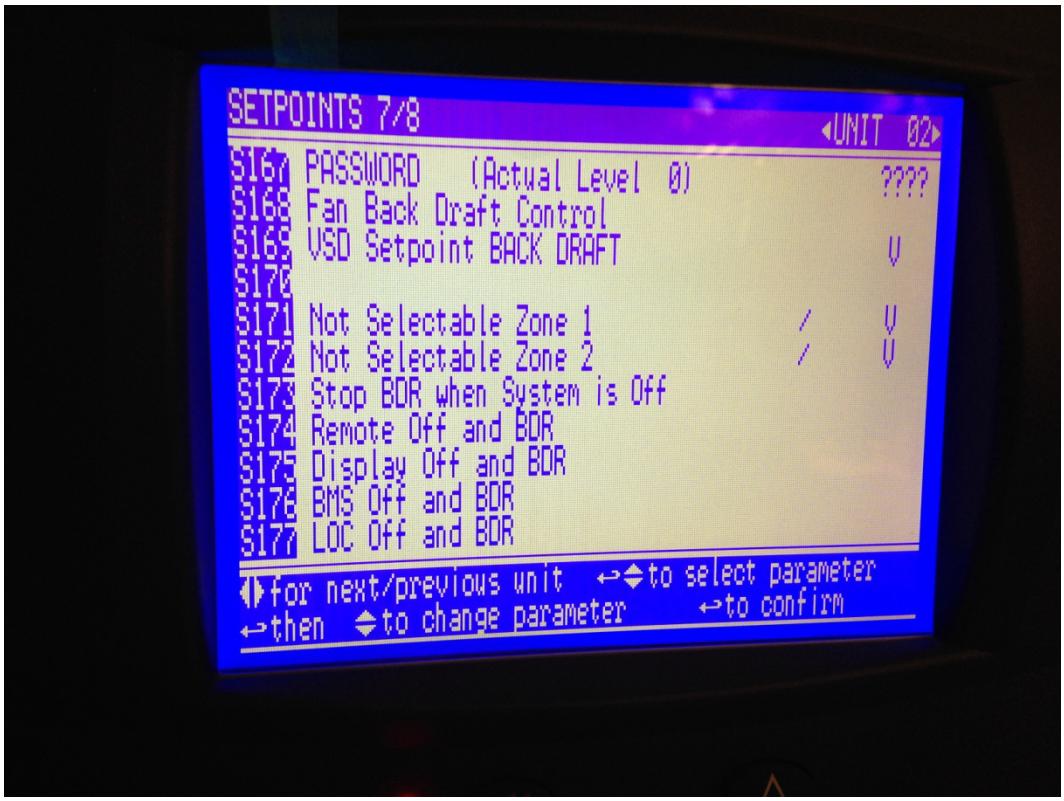
SETPOINTS 2/8
◀UNIT 02▶
S112 PASSWORD (Actual Level 0) ????
S113 Enable Temp Compensation No
S114 Return Compensation Setpoint °F
S115 Return Compensation Band/Value / °F
S116 Supply Compensation Value °F
S117
S118 Comp Cap Filter at 0 - 100% 0.60 / 4.00%/s
S119 Capacity Transition Filter 4.00%/s
S120 CW Cap Filter at 0 - 100% 0.10 / 0.60%/s
S121 BMS Backup Temp Setpoint 73°F
S122 2nd Temperature Setpoint 73°F
for next/previous unit to select parameter
then to change parameter to confirm

SETPOINTS 3/8
◂UNIT 02▸
S123 PASSWORD (Actual Level 0) ????
S124 Humidity Control Sensor Return Sensor
S125 Humidity Setpoint / 45.0%
S126 Humidity Control Type Predictive/
S127 Humidity Proportional Band / 12.0%
S128 Humidity Integration Time 0.0min
S129 Humidity Deadband / 2.0%
S130 Dehum Temp Act / Set °F/ °F
S131 Dehum Setpoint Adjust / Filter °F/ K/s
S132 Dehum Reheat/LL Sensor / Set / °F
S133 Dehum Low Limit LL1 / LL2 °F/ °F
S13A Dehum Reheat Prop Band °F
S13B Estimated Aisle Temp °F

SETPOINTS 4/8
◂UNIT 02▸
S134 PASSWORD (Actual Level 0) ????
S135 DT1 (Room / Outdoor) Type Disabled
S136 DT1 (Room / Outdoor) Value °F
S137 DT2 (Room / FC Fluid) Type Temp
S138 DT2 (Room / FC Fluid) Value 12°F
S139 Minimum CW Temp Enabled
S140 Minimum CW Temp Value 45°F
S141 Lockout FC at FC Fluid below 32°F
S142
S143
S144
for next/previous unit ↵to select parameter
↵then to change parameter ↵to confirm


SETPOINTS 5/8
◂UNIT 02
S145 PASSWORD (Actual Level 0) ????
S146 Fan Control Sensor
S147 Fan Setpoint °F
S148 Fan Temp Control Type
S149 Fan Temp Prop / Integral °F / min
S150 Fan Deadband °F
S151 Airflow Calibration V
S152 Fanspeed MIN / STD / %
S153 Fanspeed Dehum / No Power / %
S154 Allow Fan Modulation on Comp
S155 High Return Limit Enable
S156 High Return Temperature Limit °F
S157 Return Limit P-Band °F

SETPOINTS 6/8
◂UNIT 02▸
S156 PASSWORD (Actual Level 0) ????
S157
S158 Fanspeed Filter at 0 - 100% / %/s
S159 Fanspeed Transition Filter %/s
S160 Fanspeed Reposition Mode/Delay / sec
S161 Max Deceleration Rate %/s
S162 BMS Backup Fan Setpoint °F
S163 BMS Backup Fan Operation
S164 Allow BMS to change Fanspeed
S165
S166 EC-Fan Mode
for next/previous unit to select parameter
then to change parameter to confirm


SETPOINTS 7/8
UNIT 02
S167 PASSWORD (Actual Level 0) ????
S168 Fan Back Draft Control
S169 VSD Setpoint BACK DRAFT V
S170
S171 Not Selectable Zone 1 / V
S172 Not Selectable Zone 2 / V
S173 Stop BDR when System is Off
S174 Remote Off and BDR
S175 Display Off and BDR
S176 BMS Off and BDR
S177 LOC Off and BDR
for next/previous unit to select parameter
then to change parameter to confirm

SETPOINTS 8/8
UNIT 02
S178 PASSWORD (Actual Level 0) ????
S179 SCR Control Type
S180 Start 1st Compressor At %
S181 Stop 1st Compressor At %
S182 1st Compressor Stop Delay min
S183 Start 2nd Compressor At %
S184 Stop 2nd Compressor At %
S185 2nd Compressor Stop Delay min
S186 Cycle Time sec
S187 SCR Factor
S188 Actual SCR Request %
for next/previous unit to select parameter
then to change parameter to confirm

6. ICOM Unit controls are set in the following condition:

    a. Temperature Setpoint: 78 F

    b. Temperature Control Senor: Return Air

    c. Temperature Control type: PI (Proportional/Integral)

    d. Temperature Integration Time: 5 minutes

    e. Temperature Deadband: 2 F

    f. Humidity Control Sensor: Return Sensor

    g. Humidity Control Type: Predictive

    h. Humidity Setpoint: 45 % RH

    i. Humidity proportional band: 10%

    j. Humidity Integration Time: 10 minutes

    k. Humidity Deadband: 20%

    l. Supply Temperature Limit Setpoint: 60 F

    m. Automatic Operation – Teamwork Mode OFF.

    n. Standby/Failover - ON

    o. 78 degree F return air temperature setpoint (adjustable to produce a maximum inlet air temperature to IT equipment racks at front of rack of 78 degrees F.

    p. High Supply Temperature: 80 F

    q. Low Supply temperature Alarm: 62 F

    r. Number of Standby Units: 1 Unit

    s. Rotation Frequency: Yes - weekly

    t. Rotate at: 00:00

    u. Rotate By: 1 Unit

    v. Cascade Units: Yes - Cool Only

    w. Start All Standby Units on HT: Yes

x. Enable Economizer: No

y. Compressor Sequence : Auto

z. Low Pressure Alarm Delay: 5 min.

aa. LWD Connected: Yes

bb. Humidification enabled: Yes

2.2 DRYCOOLERS

Power switch – On.

Alum Creek and Lancaster

1. 1 – Drycooler operational with each CRAC Unit piping system.

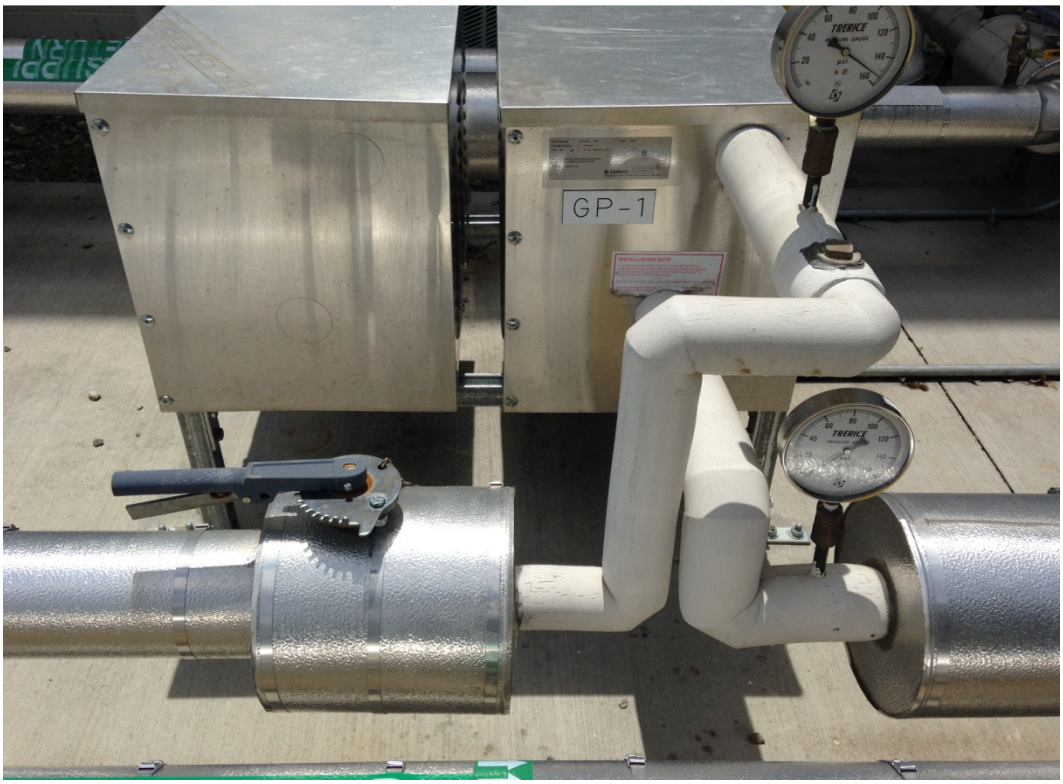
2. Drycooler operation is tied to CRAC unit operation. CRAC-1, Gycol Pump GP-1 and Drycooler DC-1 all work as a system.

3. I system is in Automatic Operation Mode, one system is in Standy Operation Mode.

Shipley

4. (2) Drycoolers are in Normal Operation, (1) Drycooler in Standby Mode.

2.3 GLYCOL PUMPS



Alum Creek and Lancaster

1. 1 – Pump operational with each CRAC Unit piping system.

2. Differential pump pressure should be maintained to achieve 10-12 PSI fluid pressure at highest point of piping system.

Shipley

3. 1 – Pump operational on Glycol system piping system. (1) Pump Standby Mode.

4. Differential pump pressure should be maintained to achieve 10-12 PSI fluid pressure at highest point of piping system.

2.4 GLYCOL FLUID

GENERAL

1. Propylene glycol (Dowfrost) 50 percent concentration:

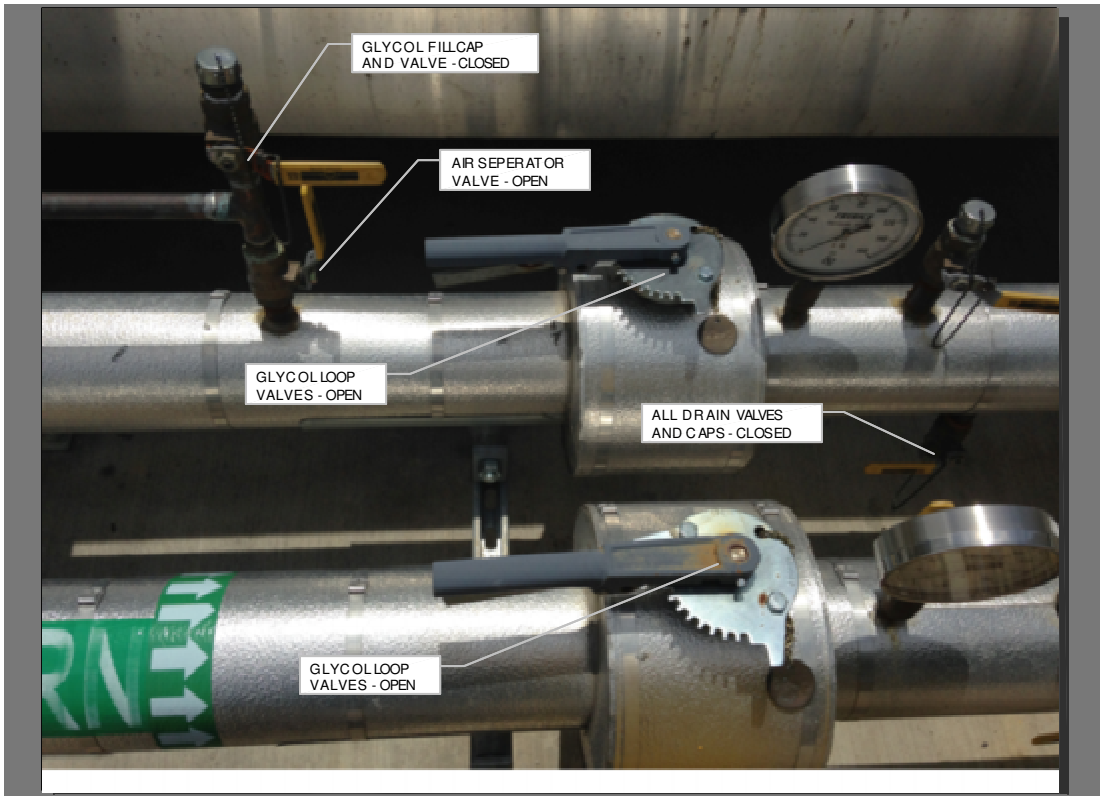
a. Specific gravity @ 60 degree F = 1.050-1.060

b. PH = 9.0-10.0

c. Reserve Alkalinity (min.) = 10.0 ml

d. Freezing Point = (-28.3) F

2.5 VALVES

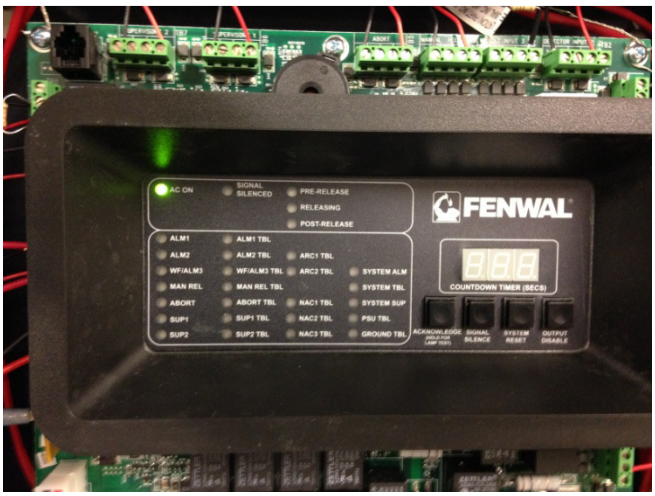


Valve positions shall be as follows:

1. Main glycol loop balance and isolation valves: Open.
2. Expansion tank isolation valve: Open.
3. All gauge isolation valves: Open.
4. All domestic water supply lines for humidifiers: Open.
5. All drain line and fill port valves: Closed and Capped.

PART 3 - FIRE PROTECTION EQUIPMENT

3.1 CLEAN AGENT GASEOUS FIRE SUPPRESSION SYSTEM



System normal operating condition:

1. AC On – Green LED
2. All other lights should have no indication.

System normal operating condition:

1. AC On – Green LED.
2. Maintenance Switch – removed, key – Off.
3. All other lights should have no indication.

3.2 VESDA SMOKE DETECTION SYSTEM

VESDA VLP

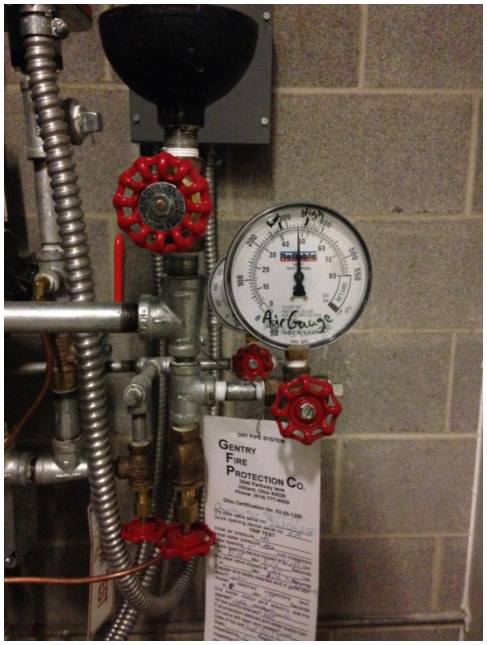
Normal operating condition:

a. No LED lights should be lit except green selector mode for sensitivity/smoke level/zone number.

b. Smoke level should be 00.

c. All other lights should have no indication.

3.3 PRE-ACTION DRY PIPE SPRINKLER SYSTEM (ALUM CREEK ONLY)



Valve positions shall be as pictured.

Pressure between indicators marked on guage.

3.4 FIRE ALARM PANEL (Lancaster - Post 23 Only)

System normal operating condition:

1. Power On – Green LED
2. LCD Screen should display time and Normal Status.
3. All other lights should have no indication.

Remote Annunciator in Post 23 Dispatch:

4. System normal operating condition:

a. Power On – Green LED

b. LCD Screen should display time and Normal Status.

c. All other lights should have no indication.

PART 4 - ELECTRICAL EQUIPMENT

4.1 DISTRIBUTION PANELS

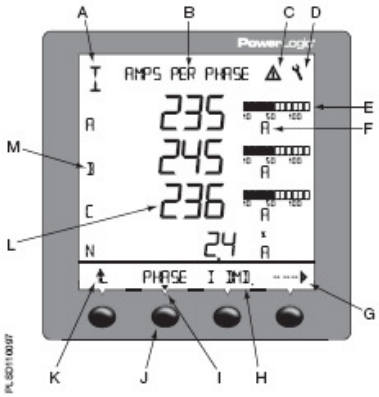
METERING EQUIPMENT

Power Meter Display

The power meter is equipped with a large, back-lit liquid crystal display (LCD). It can display up to five lines of information plus a sixth row of menu options. Figure 3–1 shows the different parts of the power meter display.

Figure 3–1: Power Meter Display

A. Type of measurement
B. Screen title
C. Alarm indicator
D. Maintenance icon
E. Bar chart (%)
F. Units (A, V, etc.)
G. Display more menu items
H. Menu item
I. Selected menu indicator
J. Button
K. Return to previous menu
L. Values
M. Phase



1. System normal operating condition:
   a. Voltage:
      1) Phase to Phase: 208 volts
      2) Phase to Ground (Neutral): 120 volts
      3) Frequency: 60 Hz

4.2 EMERGENCY POWER OFF (EPO) SYSTEM

NORMAL OPERATION

EPO On Led– Lights when the EPO lock relay is energized.

EPO Inhibit On Led– Lights when the EPO Inhibit switch is locked out.

Power On Led– Lights when power is on to the TM-XL

EPO Reset Switch– Press the Reset switch to reset the TM-XL after an EPO shutdown.

EPO Inhibit Key Lock Switch– Turning this switch horizontal locks out the EPO output relays from the locking relay preventing the EPO output relays from latching.

Fuse– 2 Amp power fuse.

System normal operating condition:

1. Power On – Green LED
2. EPO INHIBIT SWITCH - OFF
3. All other lights should have no indication.
4. EPO buttons: Red “PUSH” extended out.

4.3 AUTOMATIC TRANSFER SWITCH (LANCASTER POST 23 ONLY)

System normal operating condition:

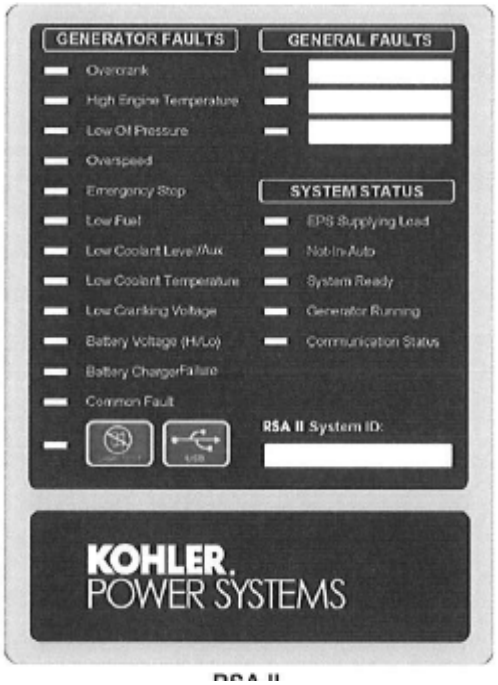
1. Source N Position – Red LED
2. Source N Available – Green LED
3. All other lights should have no indication.

4.4 GENERATOR (LANCASTER POST 23 ONLY)

CONTROL PANEL

1. System normal operating condition:
   a. Switch position – AUTO.
   b. System Ready – Green LED on.
   c. Emergency Stop Switch – Pulled out.
   d. All other lights should have no indication.

REMOTE ANNUNCIATOR (Located in patrol station dispatch).



2. System normal operating condition:
    a. System Ready – Green LED on.
    b. All other lights should have no indication.

BATTERY CHARGER

3. System normal operating condition:
    a. DC OUTPUT – Green LED on.
    b. AC INPUT – Green LED on.
    c. POWER ON – Green LED on.
    d. DC Volts meter: 12-14 VDC.
    e. Ammeter: varies on charging current.

PART 5 - REFERENCED EQUIPMENT

5.1 OSHP LEADS DATA CENTER – LANCASTER POST 23

CRAC UNITS

1. LIEBERT DS UNITS Model Number: DS053KDC0EI
    a. Quantity: 2

DRYCOOLERS

2. LIEBERT Model Number: DSO491Y32
    a. Quantity: 2

GLYCOL PUMPS

3. LIEBERT Single Pump Model Number: S3Y
    a. Quantity: 2

GLYCOL FLUID

4. DOW DOWFROST Inhibited Propylene Glycol Fluid

CLEAN AGENT GASEOUS FIRE SUPPRESSION SYSTEM

5. 3M NOVEC 1230 Engineered Fire Suppression System

VESDA SMOKE DETECTION SYSTEM

6. XTRALIS VESDA VLP DETECTOR
    a. Quantity: 2

FIRE ALARM PANEL

7. FENWAL – FENWALNET 6000 Fire Alarm/Suppression System Control Unit
8. FENWAL – Model RDCM Remote Display/Control Module

DISTRIBUTION PANELS

9. GENERAL ELECTRIC Type AQP
10. GENERAL ELECTRIC Type AQ

EMERGENCY POWER OFF (EPO) SYSTEM

11. DARWELLIT TRIPMASTER XL

AUTOMATIC TRANSFER SWITCH

12. KOHLER MODEL KCT-ACVA-06008

GENERATOR

13. KOHLER MODEL 125REZGB

5.2 OSHP LEADS DATA CENTER – ALUM CREEK FACILITY

CRAC UNITS

1. LIEBERT DS UNITS Model Number: DS053KDA0EI
    a. Quantity: 2

DRYCOOLERS

2. LIEBERT Model Number: DSO491A32
    a. Quantity: 2

GLYCOL PUMPS

3. LIEBERT Single Pump Model Number: S3A
    a. Quantity: 2

GLYCOL FLUID

4. DOW DOWFROST Inhibited Propylene Glycol Fluid

DOMESTIC COLD WATER BACKFLOW PREVENTER

5. WATTS Series 9D Dual Check Valve with Intermediate Atmospheric Vent, 3/4” Model M2

CLEAN AGENT GASEOUS FIRE SUPPRESSION SYSTEM

6. 3M NOVEC 1230 Engineered Fire Suppression System
7. FENWAL 732 Fire Alarm -Suppression Control Unit

VESDA SMOKE DETECTION SYSTEM

8. XTRALIS VESDA VLP DETECTOR
    a. Quantity: 2

PRE-ACTION DRY PIPE SPRINKLER SYSTEM

9. GENTRY FIRE PROTECTION COMPANY # 55312C

FIRE ALARM PANEL

10. NOT INCLUDED

DISTRIBUTION PANELS

11. SCHNEIDER ELECTRIC I-LINE PANELBOARD
12. SCHNEIDER ELECTRIC NQ PANELBOARD
13. LIEBERT ACCUVAR TVSS MODEL ACV277Y111RK
14. LIEBERT ACCUVAR TVSS MODEL ACV120Y111RK

EMERGENCY POWER OFF (EPO) SYSTEM

15. DARWELLIT TRIPMASTER XL

5.3 OSHP DATA CENTER – SHIPLEY BUILDING

CRAC UNITS

1. LIEBERT DS DX UNITS Model Number: DS105AUA0EI
   a. Quantity: 2
2. LIEBERT DELUXE SYSTEM 3 GLYCOL UNITS Model Number: FH192GUAAM0415, serial numbers 340415-005, 340415-006 and 340415-007.
   a. Quantity: 3
3. LIEBERT DELUXE SYSTEM 3 GLYCOL UNITS Model Number: FH110GUAAM0415, serial numbers 340415-008 and 340415-009.
   a. Quantity: 2
4. LIEBERT DELUXE SYSTEM 3 DX UNITS Model Number: UH125AUAAM0415, serial number 340415-004
   a. Quantity: 1
5. LIEBERT CHALLENGER UNIT GLYCOL Model Number: BU046WGAAM0415, serial number 340415-003

a. Quantity: 1

6. LIEBERT CHALLENGER UNIT DX Model Number: BU042AAAM0415, serial numbers 340415-001 and 340415-002.

   a. Quantity: 2

7. LIEBERT MINI-MATE UNIT DX Model Number: MME036E-XH1, serial numbers 93155, 93159, 93167, 93168, 93204 and 93205.

   a. Quantity: 6

DRYCOOLERS

8. LIEBERT DX CONDENSER Model Number: TCDV415A

   a. Quantity: 2

9. LIEBERT GLYCOL DRYCOOLER Model Number: DDNT350A, serial numbers 97030224, 97030225, 97030226.

   a. Quantity: 3

10. LIEBERT DX CONDENSER Model Number: DCSF083LZ , serial numbers 97030181 and 97030232

    a. Quantity: 2

11. LIEBERT DX CONDENSER Model Number: DCDF165LA , serial number 97030297

    a. Quantity: 1

12. LIEBERT DX CONDENSER Model Number: PFC037A-YL0, serial numbers D042758, D042759, D042762, D042763, D042776 and D042777.

    a. Quantity: 6

GLYCOL PUMPS

13. LIEBERT DUPLEX PUMP PACKAGE Model Number: 018-0551, serial number 0896-L2236/896-L2237.

    a. Quantity: 1

5.4 OSHP DATA CENTER – EMS FACILITY

CRAC UNITS

1. LIEBERT CHALLENGER UNIT CHILLED WATER upflow unit Model Number: BU102C-CDEI626A, serial number N12M740191

    a. Quantity: 1

2. LIEBERT CHALLENGER UNIT CHILLED WATER down flow unit Model Number: BF102C-CDEI756A, serial number N12K740050

    a. Quantity: 2