CONTRACTOR(S) SHALL VERIFY EXISTING CONDITIONS AND CORRELATE DIMENSIONS PRIOR TO PROVIDING THE WORK DETAILED IN THESE DRAWINGS. AND SHALL PROMPTLY NOTIFY THE ARCHITECT OF ANY DISCREPANCIES.
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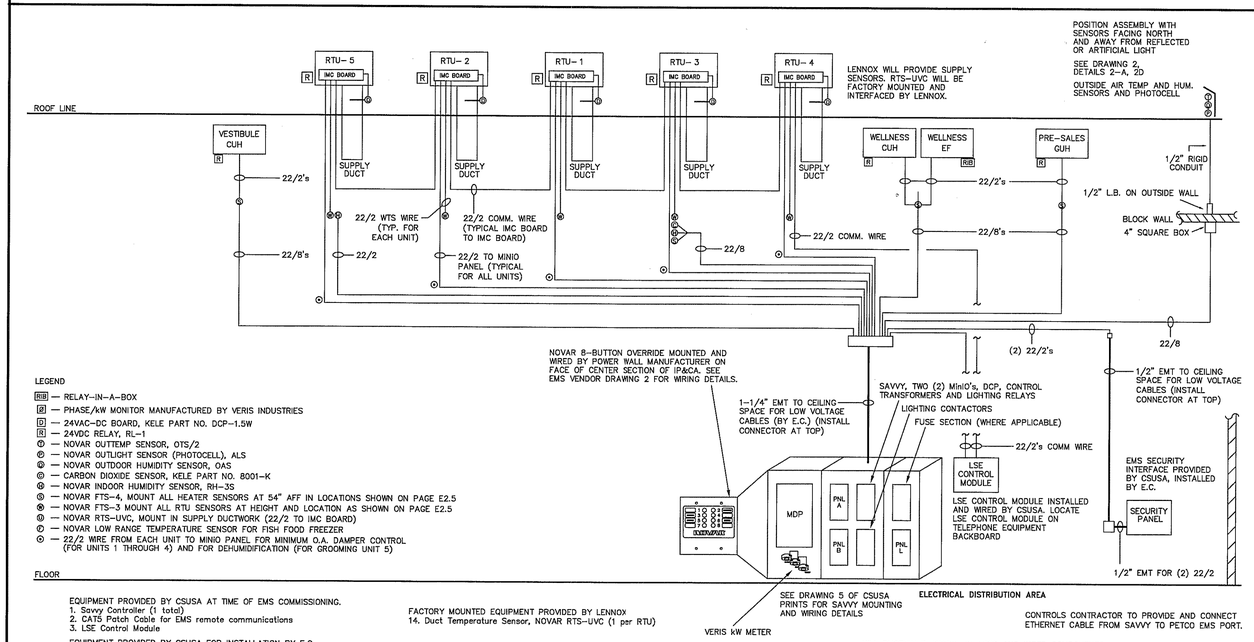
# EMS SINGLE LINE DIAGRAM




LEGEND

- RIB — RELAY-IN-A-BOX
- P — PHASE/kW MONITOR MANUFACTURED BY VERIS INDUSTRIES
- D — 24VAC-DC BOARD, KELE PART NO. DCP-1.5W
- R — 24VDC RELAY, RL-1
- T — NOVAR OUTTEMP SENSOR, OTS/2
- P — NOVAR OUTLIGHT SENSOR (PHOTOCELL), ALS
- H — NOVAR OUTDOOR HUMIDITY SENSOR, OAS
- C — CARBON DIOXIDE SENSOR, KELE PART NO. 8001-K
- H — NOVAR INDOOR HUMIDITY SENSOR, RH-3S
- S — NOVAR FTS-4, MOUNT ALL HEATER SENSORS AT 54" AFF IN LOCATIONS SHOWN ON PAGE E2.5
- S — NOVAR FTS-3 MOUNT ALL RTU SENSORS AT HEIGHT AND LOCATION AS SHOWN ON PAGE E2.5
- D — NOVAR RTS-UVC, MOUNT IN SUPPLY DUCTWORK (22/2 TO IMC BOARD)
- T — NOVAR LOW RANGE TEMPERATURE SENSOR FOR FISH FOOD FREEZER
- ⊙ — 22/2 WIRE FROM EACH UNIT TO MINI0 PANEL FOR MINIMUM O.A. DAMPER CONTROL (FOR UNITS 1 THROUGH 4) AND FOR DEHUMIDIFICATION (FOR GROOMING UNIT 5)

EQUIPMENT PROVIDED BY CSUSA AT TIME OF EMS COMMISSIONING.
1. Savvy Controller (1 total)
2. CAT5 Patch Cable for EMS remote communications
3. LSE Control Module

EQUIPMENT PROVIDED BY CSUSA FOR INSTALLATION BY E.C.
3. Wall Temperature Sensors, FTS-3 (1 per RTU)
4. Wall Temperature Sensors, FTS-4 (1 per heater)
5. OSD – Outdoor Sensor Device (1 total)
6. CO2 Sensor, 8001-K (1 total)
7. Space Humidity Sensor, RH-3S (2 total)
8. Security Alarm Panel, S.I.P. (1 total)
9. NOVAR low range temp sensor for fish freezer (1 total)
10. RL-1 low voltage relays for RTU/heater control (one per RTU/heater)

EQUIPMENT PROVIDED BY CSUSA TO POWER WALL MANUFACTURER
11. Savvy baseplate (1 total)
12. Veris Energy Meter, H8167-0800-3-3 (1 total)
13. NOVAR 8-Button Override (1 total)

FACTORY MOUNTED EQUIPMENT PROVIDED BY LENNOX
14. Duct Temperature Sensor, NOVAR RTS-UVC (1 per RTU)

GENERAL CONSTRUCTION NOTES:
The Electrical Contractor (E.C.) shall furnish the labor and installation materials required to provide a roughed-in and terminated EMS system as shown on this drawing and installation documentation provided by the EMS vendor with the EMS equipment package (parts 3 through 10 listed at left). After the installation has been completed and all roof top units have been started, the E.C. shall complete the EMS Check-off sheet and fax it to (317) 246-4265. Comfort Systems USA will then schedule to commission the NOVAR energy management system (EMS).

HILL PHOENIX FACTORY MOUNTED AND WIRED COMPONENTS

The Savvy baseplate and MiniO boards will be factory mounted in the top right of the center section. The Savvy will arrive on site pre-wired to all lighting control relays as detailed on the contactor schedule on page E1.3 of this set of drawings.

The Veris kW Meter/Phase Loss Monitor will be factory mounted in the left section of the Power Wall Cabinet. The kW pulse output will be wired to Savvy terminals 63 & 64. The phase loss output (normally open, closed on alarm) will be wired to Savvy terminals 65 & 66.

Hill Phoenix will factory install a NOVAR 8-Button override on the face of the center section. This lighting override will be wired to the Savvy override inputs at the factory.

Hill Phoenix will provide three (3) 120-24VAC, 40VA transformers in the Savvy section of the switchgear. One transformer will be used to power the Savvy Controller (terminals 75 & 76). One will power the two (2) MiniO boards (terminals 28 & 29) and the other transformer will be used to operate the lighting control relays.

# INTEGRATED POWER & CONTROL ASSEMBLY (IP & CA)

Overview

For the purposes of these documents, the "Integrated Power & Control Assembly" refers to the PowerPlus as manufactured by Hill-Phoenix. Refer to the Project Manual for more information. For this sheet, the "manufacturer" refers to hill Phoenix, which is PETCO's vendor for this equipment.

For the purposes of these documents, PETCO's "EMS System Vendor" refers to Comfort Systems USA / National Accounts of Indianapolis, IN. PETCO contracts directly with Comfort Systems.

The Hill Phoenix PowerPlus integrates the line voltage distribution equipment and some limited components to interface with the Energy Management System (EMS). If the wiring diagrams and circuiting on the plans and in the shop drawings are closely adhered to, all of the sequences described on the sheet will occur automatically upon start-up and checkout of the system.

Notes

The Integrated Power & Control Assembly is installed by the Electrical Contractor (EC) and purchased by the EC through a national account between PETCO and the manufacturer. Some provisions are made by the EC to facilitate the commissioning of the EMS system components by the EMS system vendor at some point near substantial completion of the project.

The main electrical distribution equipment and some contactors & relays are prefabricated by the manufacturer in freestanding, UL listed cabinets. These cabinets eliminate the need for panelboard backboxes, circuit breakers & covers, all associated gutter boxes, interconnecting conduits & wiring, nipples and connectors normally required.

The Power Wall manufacturer will also factory mount and wire the EMS controller baseplate, kW monitor, MiniO input-output modules and lighting override button. The EMS devices will be factory interfaced with all lighting control relays. These devices will be provided to the Power Wall manufacturer by PETCO's EMS vendor.

The System is UL listed. With the General Electric Main Distribution Panel (MDP) as part of the package, the system is rated at 65,000 AIC, and all subpanels up to and including the circuit breakers are series rated at 65,000 AIC. Series rating is not valid with MDP manufactured by anyone other than General Electric using the following circuit breakers:
MDP @ 120/208V: TEY (100A Max) & SELA (125A), SFMA (225A Max) & SKHA (800A Max)
MDP @ 277/480V: SELA & FCNT (125A Max), SFHA (225A Max), & SGLA (400A Max)
Do not deviate without expressed, written permission by the PETCO Project Manager.

Contractor must order the Integrated Power & Control Assembly at least six (6) weeks prior to required ship date. EC shall arrange for the receipt and dry, safe storage of the Integrated Power & Control Assembly and the EMS equipment.

Notes (continued)

The Integrated Power & Control Assembly will be shipped on a pallet. The Electrical Contractor (EC), at his discretion, may request from the manufacturer to have the assembly crated and shipped by section. If so, wiring which crosses the sections will be coiled back and labeled for connection in the field by the EC. See the manufacturer's shop drawings for exact dimensions, arrangements & wiring diagrams. Any discrepancy between these documents and the shop drawings must immediately be brought to the attention of the engineer. Coordinate rough-in locations with the shop drawings.

Electrical Contractor shall coordinate access to the building with the General Contractor for the installation of the Integrated Power & Control Assembly.

Circuits identified by "(N)" are controlled automatically via the EMS. The EC must terminate all controlled branch circuits and control wiring at the factory-installed and pre-labeled terminal strips at the top or the bottom of the Integrated Power & Control Assembly or directly to the load side of the associated contactor. EC must terminate branch circuits for uncontrolled loads and for rooftop air conditioners directly to respective circuit breakers. Deviations from the arrangement will have a negative affect on the building function. Refer to Sequence of Operation in this drawing set.

If underground conduits require a bond, use bonding bushing and bond to main bonding jumper in the Integrated Power & Control Assembly.

# ENERGY MANAGEMENT SYSTEM NOTES

I. General
- A. Overview
  - 1.) All control functions described below are set via the EMS communication buss with some local occupant control for limited override capability.
  - 2.) All lighting control is provided throughout the building via the EMS system. Some rooms have additional automatic control provided via light level or occupancy sensors to comply with the energy code in force in the state. These functions are not described below since they are not part of the EMS system.
- B. Energy Code Compliance
  - 1.) With the HVAC and lighting specifications elsewhere in the documents, and with the control functions listed below, the documents attempt to convey conformance with the Energy Code in force in the State.

II. Air Conditioning System (HVAC) Control
- A. Rooftop Unit (RTU) Control
  - 1.) Description: Inclusive of unit control are all rooftop package units and split systems that provide "packaged" cooling and heating within the store, with no more than two stages of cooling and two stages of heating per unit. Economizer override control is provided via EMS controls so as to provide capability of demand controlled ventilation.
  - 2.) Schedules: Because there are different configurations for all stores, the following is a guideline for how the schedule for the RTU's will be configured. The majority of the units will utilize a program called "optimal start/stop" that turns the units on and off efficiently so that the units are at setpoint by the time the store is open for business.
  - 3.) Setpoints: A fixed zone temperature setpoint will be utilized for all RTU's. Below are the defined setpoints for all stores.
    - a. Occupied: Cooling – 75'F, Heating – 70'F, (Retail Area)
    - b. Occupied: Cooling – 75'F, Heating – 70'F, Humidity – 60% (Grooming Area)
    - c. Unoccupied: Consideration has been given to the environmental conditions required for animal welfare. These are PETCO setback settings for the stores:
      Setback: Cooling – 78'F, Heating – 65'F (Retail Area)
      Setback: Cooling – 78'F, Heating – 62'F (Grooming Area)
      Setback: Heating – 58'F (Vestibule and Pre-Sales Area)
  - 4.) Damper & fan control
    - a. During Unoccupied periods, the outside dampers shall be closed and the fan shall run only upon a call for heating or cooling.
    - b. During occupied periods, a CO2 sensor will determine whether fresh air is required. If the sales CO2 level rises above the following conditions, the RTU fan will be turned on and the O.A. damper shall open to scheduled maximum O.A. setpoint.
      RTU 1: O.A. Damper open above 725ppm, at minimum below 715ppm
      RTU 4: O.A. Damper open above 750ppm, at minimum below 735ppm
      RTU 2: O.A. Damper open above 775ppm, at minimum below 760ppm
      RTU 3: O.A. Damper open above 800ppm, at minimum below 785ppm
    - c. The packaged units shall come equipped with economizer control to take advantage of free cooling when the outside enthalpy is conducive. Unit's mixed air temperature sensor shall be left in place to modulate the damper to maintain 55'F (Adj.)
- B. Gas & Electric Unit Heater Control and Exhaust Fan Control
  - 1.) Description: For store with unit heaters, only the Pre-sales area gas unit heater, the Vestibule electric unit heater, and the Wellness Room electric unit heater will be directly controlled directly by the EMS system. All other heaters will not be on the EMS system and will be controlled with the thermostat provided by the unit manufacturer or as otherwise specified.
  - 2.) Some exhaust fans run continuously. Some exhaust fans are controlled indirectly by the EMS via contactor only. The Wellness room exhaust fan is controlled directly by the EMS via a relay provided by the EC.

III. Lighting Control
- A. Night Lights
  - 1.) Description: These lights are not controlled by the EMS system.
  - 2.) Schedule: On 24 hours / day
- B. Employee Lights
  - 1.) Description: All non-sales floor lights in Manager's Office, Pre-sales area, Work Room, Break Room, Toilets and Bird Habitat.
  - 2.) Schedule: On one (1) hour prior to store opening or with security system disarm signal, Off One (1) hour after store closing or when security system is armed.
- C. Stock Lights
  - 1.) Description: Provides approximately 40-50% of Sales fluorescent lighting.
  - 2.) Schedule: Same as employee lights (see above).
- D. Customer Lights
  - 1.) Description: Balance of sales floor fluorescent lighting and lighting highlighting aisleways.
  - 2.) Schedule: On one (1) hour after store opening, Off at store closing.
- E. Grooming Lights
  - 1.) Description: All lights in the grooming area including Cage Room and Tub Room.
  - 2.) Schedule: Store specific dependent on Grooming Operating Hours.
- F. Aquarium Tank Lights
  - 1.) Description: Lights inside of the aquarium tanks. NO PUMP CONTROL!
  - 2.) Schedule: On one (1) hour before store opening, Off 30 minutes after store closing.
- G. Security Lights
  - 1.) Description: Building mounted wall packs.
  - 2.) Schedule: On at Dusk, Off at Dawn.
- H. Exterior Signs
  - 1.) Description: All building mounted signage.
  - 2.) Schedule: On when store is open and photocell allows for exterior lighting to be on.
- I. Parking Lot Lights (where applicable)
  - 1.) Description: All parking area lighting. Typically controlled by landlord.
  - 2.) Schedule: On at Dusk, Off One (1) hour after store closing.

IV. Other Control & EMS Issues
- A. Remote Communication
  - 1.) Remote access to EMS is via PETCO's Wide Area Network (WAN). All monitoring, alarming and programming is accessible through this dedicated connection.
  - 2.) PETCO will provide an available port for CSUSA to plug into a time of EMS commissioning. CSUSA will provide up to a 25' long patch cable and make final connection if router is present. If router is not present, communications contractor will make final connection.
- B. Other mechanical and Electrical Control
  - 1.) Certain exhaust fans on/off control.
  - 2.) Certain selected power devices on/off control.
- C. Other Control and Monitoring Points
  - 1.) Veris Watts Transducer for kilowatts and kilowatt-hours.
  - 2.) Fish Food Freezer Temp Sensors (Alarm if outside of -15'F to 15'F for 45 minutes)
  - 3.) Security system interface
    - a. Interlock with security keypad for activation of Employee & Stock Lighting upon deactivation of alarm. Turn functions off when alarm is activated.
    - b. Interlock security alarm contact (normally closed) to the EMS. Upon alarm detection, turn on all lights & turn off HVAC to create a fully lit, quiet store.

V. EMS Notes for Contractor
- A. General Notes
  - 1.) The smoke detectors for the RTU shall be wired such that they shall shut down the supply fan and send a signal to the fire alarm panel upon sensing smoke. Where required by code, the fire alarm system will have individual relay modules for each RTU, independent of the EMS, such that the signal from any smoke detector shall, in turn, deenergize the supply fan in all RTU's. The proper location for the shutdown contacts in the RTU control circuit shall be determined and provided by PETCO's fire alarm vendor. Shut down relay shall not intercept or otherwise disturb the EMS wiring.
  - 2.) The EMS vendor will provide a checkout of the control system as part of its national account agreement with PETCO. The checkout includes verification that the controls installation is complete and that the building functions as intended.
  - 3.) Following installation by the EC and checkout by the EMS vendor, a deficiency report will be prepared by the EMS vendor and issued with the project punch list to the GC. EC shall complete all items on the deficiency report before leaving site.
  - 4.) All EMS system installation manuals are to remain at the site. They need not be made part of the close-out documentation by the Contractor.
  - 5.) See EMS system shop drawings for field wiring diagrams of RTU's, sensors, heater control wiring schematics, outdoor sensor mounting, wiring details and general notes.
- B. Substantial Completion
  - 1.) Contractor must be substantially complete for the beneficial occupancy ("EMS ready) for the EMS vendor to proceed with their responsibilities. EC must remain on site to wire fixtures provided by others and assist in EMS commissioning.
  - 2.) EMS is scheduled to start commissioning of the system 6 days prior to FDO (typically a Monday). When the items on this list are complete, please fill-in and fax a copy of the sections to the PETCO Project Manager.
  - 3.) Items to be Performed by the EC prior to EMS commissioning:
    - a. ____ Permanent power brought to building.
    - b. ____ Power installed to all RTU. All RTU's started up.
    - c. ____ All lighting contactors and lights wired & operational.
    - d. ____ All space temp. & humidity sensors mounted & wired.
    - e. ____ CO2 sensor mounted and wired.
    - f. ____ Low voltage riser from IP&CA to ceiling space
    - g. ____ Conduit, wire & termination of outdoor sensor assembly.
    - h. ____ All unit heaters controlled by EMS installed & wired.
    - i. ____ Ethernet router installed by communications vendor.
  - 4.) Items to be Performed by the Mechanical Contractor:
    - a. ____ Gas for RTU's turned on & operational.
    - b. ____ All RTU's started up & heating/cooling operational.
    - c. ____ Test & balance completed on all RTU's
    - d. ____ All unit heaters and exhaust fans operational.
  - 5.) Signatures
    - a. GC Name and Signature: _____, _____
    - b. EC Name and Signature: _____, _____
    - c. MC Name and Signature: _____, _____
- C. Wiring & Accessories Specifications
  - 1.) EC shall furnish & install EMS wiring in accordance with these plans and documentation provided by the EMS vendor as specified below:
    - a. 22/2 shielded cable for communications for RTU controllers.
    - b. 22/2 shielded cable for all sensor runs.
    - c. 22/8 to all controlled heaters and outdoor assembly.
    - d. 22/2 6500FE, 22/8 is 6506FE or Belden equivalent.
- D. Warranty
  - 1.) The EMS vendor shall provide an eighteen (18) month warranty for all parts supplied by Comfort Systems USA/National Accts.

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PETCO ANIMAL SUPPLIES STORES, INC.
PETCO "CARY, NC"
213 CROSSROADS BOULEVARD
CARY, NC 27518

PETCO
9125 RESEDA BLVD.
NORTHRIDGE, CALIFORNIA 91324

| DISTRIBUTION: | DATE: |
|---|---|
| 25% SUBMISSION | 01-15-10 |
| 75% SUBMISSION | 01-29-10 |
| 98% SUBMISSION | 02-25-10 |
| ISSUED FOR CONSTRUCTION | 02-26-10 |

| SBLM JOB# | PETCO P.M. JOB # |
|---|---|
| 09147 | 09277 |
| DRAWN: | CHECKED: |
| MTH/JCC/JMM | BJT |

DRAWING TITLE:
ENERGY MANAGEMENT SYSTEM INFORMATION

EMS1.1

0 1/4" 1" 2" 3" 4" 5" 1/2"