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- ☐ NO EXCEPTION TAKEN ☐ REVISE - NO RESUBMISSION REQUIRED
☒ **As Noted** ☐ REVISE AND RESUBMIT
☐ REJECTED ☐ RETURNED WITHOUT ACTION
☐ SUBMIT SPECIFIED ITEM

Corrections or comments made on the shop drawings during this review do not relieve contractor from compliance with requirements of the drawings and specifications. This check is only for review of general compliance with the design concept of this project and general compliance with the information given in the contract documents. The contractor is responsible for sequencing and correlating all quantities and dimensions, selecting fabrication processes and techniques of construction coordinating his work with that of all other trades, and performing his work in a safe and satisfactory manner.

SYSKA HENNESSY GROUP, INC.

Date: 7/1/09 By: S. Stand

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03/31/09

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Building Automation System
Submittal for

Maryland Forensic Medical Center
West Baltimore Street
Baltimore, MD
USA

Gaudreau, Inc/
McClaren, Wilson + Lawrie
ARCHITECT

Syska Hennessey Group
ENGINEER

Gilbane Building Company
CONTRACTOR

GILBANE
Maryland Forensics Medical Center
Project No. 4281

REVIEWED

Submittal No. 0003-15900-0

Spec Section: 15900-1.5.A/B

By: K. FINN Date: 04 JUN 09

This review does not constitute nor does it assume design responsibility nor does it relieve the trade contractor/supplier from complying with the contract requirements, coordinating their work with other trade contractors and verifying field dimensions.

Maryland Forensic Medical Center

44OP-043820

SUBMITTAL NOTES

Specification Sections 15900 and 15960

1. The UPS system to supply backup power to Siemens Field Panels is not included in this submittal. See previously submitted RFI from Siemens requesting information about type and capacity requirements.
2. Siemens has changed the sequence of operations for several systems to more closely reflect what we believe is the intended operation of the equipment. All changes are shown in bold on the sequence of operations.
3. Carbon Monoxide (CO) sensors for the garage area communicate via the Siemens network and will trigger the exhaust fan as specified.
4. Unit Heaters in the garage area are enabled/disabled by a common BAS point. When enabled, the unit mounted thermostat shall have control over the UH operation.
5. AHU high discharge temperature alarms will be accomplished through an alarm setpoint within the BAS system.
6. Siemens has written several RFIs concerning questions that arose during the final days of design for this project. These include:
 - Operation of the BSL-3 and General Exhaust Fans
 - AHU supply static locations
 - UHs 8-13 on 4th Floor
 - EF-5
 - BSL-3 Key SwitchWhile reviewing this submittal, please see these RFIs.
7. The AFMS supplied by Siemens are not in this submittal. These will be submitted shortly under separate cover.
8. Terminal Box controls were submitted previously under separate cover. Shop drawings for these controls were included again here for the purposes of having a complete submittal package for review.

Maryland Forensic Medical Center 44OP-043820

SUBMITTAL NOTES

Specification Sections 15900 and 15960

9. Specification Deviations/Clarifications

- 15900.1.5.B.8.b – Room temperature sensors, differential pressure monitors and control panel locations are shown on contract documents.**
- 15900.1.5.B.9 – Graphics will be completed near the end of the project in order to reflect any construction changes. These can be submitted if requested.**
- 15900.1.5.C – The Siemens Insight workstation will be provided with the BACnet Client option, to allow direct communication to third party BACnet IP equipment.**
- 15900.1.5.D – These items will be provided at the end of the project during turnover to the owner and maintenance staff.**
- 15900.1.5.E – These will be submitted shortly under separate cover.**
- 15900.1.5.F – These items will be provided at the end of the project during turnover to the owner and maintenance staff.**
- 15900.1.8.B – No BAS equipment is specified to interface with the lighting system.**
- 15900.1.8.C – No BAS equipment is specified to directly interface with the fire alarm system. Fire alarm to provide relays for shutdown of AHUs and other equipment as specified.**
- 15900.2.3.A.10 – The UPS system to supply backup power to Siemens equipment is not included in this submittal. See previously submitted RFI from Siemens requesting information about type and capacity requirements.**
- 15900.2.3.A.11.a – The Siemens Insight workstation will be provided with the BACnet Client option, to allow direct communication to third party BACnet IP equipment.**
- 15900.2.4.A.1 – Siemens Terminal Equipment Controllers have programs and settings burned into non-volatile EEPROM and do not require a battery to return to operation after a power outage.**
- 15900.2.5.C.1 – See Document 149-261P25 included in this submittal.**
- 15900.2.5.E.1 – Repeatability is not specified for the Setra 231 series.**
- 15900.2.5.E.3 – 150 psi Proof Pressure.**
- 15900.2.6.E – Feedback is not specified to be monitored by BAS, therefore no feedback signals were provided.**
- 15900.2.7.A – CO sensors were selected for 0-100ppm range. 0-200ppm also available if desired. Siemens system will monitor analog level and operate fans as specified.**
- 15900.2.8 – The AFMS supplied by Siemens are not in this submittal. These will be submitted shortly under separate cover.**
- 15900.2.9.C – Up to 3.5 deg F deadband for heat/cool applications.**

**Maryland Forensic Medical Center
44OP-043820**

SUBMITTAL NOTES

Specification Sections 15900 and 15960

15900.2.10.A.5/6 – Damper actuators sized for 7in-lb per square foot damper area.

15900.2.13 – Siemens standard control cables are specified on shop drawing “ABAC”.

15900.3.2.E – Damper actuators are typically installed on extended shafts. If installed outdoors, a weather cover will be provided.

This submittal has been reviewed and is believed to be in compliance with project specification and drawing requirements unless noted above.

Jamie Swam, Project Engineer

Please distribute copies of this submittal to other trades for review of dimensions and installation requirements related to Building Automation installation and operation.

ENGINEERING DATA
FOR
MARYLAND FORENSIC MEDICAL CENTER
44OP-043820

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TAB 7	PANEL LAYOUTS

Insight—Advanced Workstation

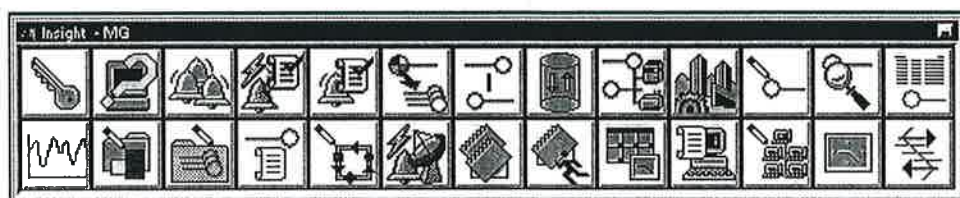


Figure 1. Insight Advanced Main Menu.

Description

The Insight® Advanced Workstation transforms a personal computer into a powerful Insight workstation.

The Insight Advanced Workstation provides a graphical approach to manage and control a building from an easy-to-use interface. Additionally, the Insight Advanced Workstation provides for facility-wide efficiencies and cost effective information sharing.

With the Insight Advanced Workstation the user can:

- Graphically monitor and control the building environment
- Schedule and modify mechanical equipment operation and automatic report generation
- Collect, view, and analyze trend information
- Connect other Insight workstations together, with centralized system management, using the networking feature
- Perform many tasks simultaneously (multi-task) through Windows Server 2003/2008 or Windows XP/Vista
- Troubleshoot and tune the system with Dynamic Plotter
- Make management decisions with information and reporting capabilities
- Store and retrieve long-term information
- Edit and modify all system databases

Purpose

Insight software provides the latest in user interface design. This user interface is designed to simplify the tasks an operator commonly performs.

Navigation

The Insight workstation provides the most advanced graphical interface in the industry. Operators can quickly and easily access any application in the workstation. Additionally, users can carry and exchange information among Insight applications by simply "dragging and dropping". This increases an operator's productivity by eliminating the need to copy data from one application and paste to another.

Flexibility

Provides support for a combination of Ethernet®, BACnet®/IP, BACnet over Ethernet, RS-485, and dedicated autodial connections (only with RS-485 networks) to field panel networks simultaneously.

Each Insight workstation can manage up to 64 logical Ethernet Automation Level Networks (EALN) and each Ethernet ALN can be defined with up to 100 nodes, with an overall performance limit of up to 6400 Ethernet field panel nodes per Insight workstation.

Each workstation can manage up to 4 dedicated Automation Level Networks (RS-485 ALN), and each RS-485 ALN can support up to 100 nodes. Each Insight workstation can manage up to 8 autodial modems, servicing up to 300 remote autodial RS-485 ALN sites.

Networking

Linking of Insight workstations over a TCP/IP Ethernet Network provides seamless operation of the APOGEE Automation System from any Insight workstation location. The system can be centrally administered for greater efficiency over a Management Level Network (MLN).

Open System Environment

Insight, with the BACnet Client option enabled, can communicate with both Insight and third-party BACnet devices and systems, enabling functionality such as: monitor and command BACnet objects, establish BACnet schedules and calendars, back up databases in BACnet devices, receive and acknowledge BACnet alarms, trend BACnet objects, and establish and read BACnet trend logs.

Applications

Operator Access and Privilege

Universal Access and Privilege™ allows the system manager to assign different capabilities to every operator for each application. For example, an operator may need to edit a scheduled event, but not edit points. Every application has an assignable View, Edit, and Command privilege. Assigned privileges will follow the operator system-wide to any terminal (workstation or operator interface at the field panel). This gives the system manager the ability to "custom-fit" privilege to the various levels of operator expertise or need.

- User accounts are based on existing Windows User Accounts to allow the system to leverage Windows integrated security while eliminating the need for users to maintain another set of logins.
- Privilege for each application is based on View, Edit, and Command capabilities that can be assigned to any individual operator.
- Each operator has a unique password.
- Universal Access and Privilege are system wide.
- Access can also be assigned to objects (for example, points).
- Operator activity is captured for the Insight workstation and field panel logons and logoffs.

Alarm Management

Insight Alarm Management allows operators to troubleshoot alarms as they occur without disturbing the current task. In addition, Alarm Management allows operators to view and troubleshoot only the alarms that are relevant to their jobs or locations.

Alarm Management features include:

- Alarm Summary with current list of alarms and status

- Alarm priority with six priority levels that can be assigned different color codes for at-a-glance viewing
- Audible alarms with selectable .wav file
- Enhanced Alarm Routing
- Alarm Acknowledgment which includes operator identification
- Ability to view recent alarm history
- Attach a memo to the alarm record
- Customizable alarm messages for each alarm to provide specific instructions to the operator
- Optional Alarm Issue Management procedure

Trending

Insight software provides trending capabilities that allow an operator to easily monitor and store a record of point values trended by time or change of value (COV). Trending is especially useful in monitoring critical points or other points of interest such as discharge air temperatures or relative humidity.

Trended point data can be collected automatically at the Insight workstation from the field panel (or third-party BACnet devices with BACnet option enabled) and is available at any workstation on the network. Trend reports are easy to set-up. The easy-to-use **Trending Wizard** guides the operator through the simple configuration of trending strategies. Users do not need to understand the intricacies of the building system to report on trended information.

Scheduler

Scheduling is easy to use and understand, allowing users to create schedules that reflect their specific building activities.

Schedule configurations include weekly schedules with normal days and exception days, and exception schedules for holidays and special events. This flexibility allows for optimal configuration based on planned facility usage by allowing equipment and reports to be scheduled years in advance.

Creating and Editing Graphics

Graphics are easy to create and modify with Micrografx Designer®, a powerful graphics package that runs on Microsoft Windows.

Designer contains basic drawing features including freehand lines, boxes, circles, arcs, ellipses, and more. Text is displayed in a variety of scalable fonts, sizes and colors. With Designer's wide array of color palettes, the operator can choose the standard colors, or customize colors.

Designer supports library features that allow the operator to select HVAC symbols from a template window and place them in a new graphic. The operator can also import existing drawings from an equivalent

Micrografx drawing package, or even AutoCAD® drawings.

Insight software comes with an extensive library of HVAC and automation symbols including fans, valves, motors, chillers, standard ductwork diagrams, and laboratory symbols.

Electronic Documentation

A robust library of electronic documents is available with every revision including current Release Notes, Online help, and printable User and Training Guides. These documents detail step-by-step procedures for using each application to its fullest capacity and allow quick navigation of the system.

System Configuration and Maintenance

The Insight Backup Utility provides the following capabilities:

- Back up and restore databases
- Schedule recurring backups
- Delete unwanted backups to free disk space

System Profile is the Insight application that gives you graphical, system-wide control for defining, configuring, and maintaining your entire building control network.

Dynamic Plotter

Dynamically plot the values of up to 15 points simultaneously to troubleshoot and tune the system. Capture and store trend graph charts for future reference. Easily set up and save points in templates to be run when the need arises.

Information and Reporting Capabilities

The information and reporting capabilities of Insight software are greatly expanded to provide users not just information, but insight into their buildings. Simplified report setup is standard. The user does not have to be concerned with the complexities of the building control system when information is needed. The Insight software package includes over 60 configurable reporting templates.

Once a report is set up, it can be scheduled years in advance and run as often as it is required. Reports can

be scheduled to print, saved to a file, and/or e-mailed to select individuals. Once the report is scheduled, users can walk away with the confidence that they will not miss a report and important information.

System Activity

Capture and report on individual operator activity to identify system utilization and training needs.

Through the use of the System Activity Log, system managers can determine if they need to alter an operator's privilege and access. The System Activity Log captures all Insight operator actions to the system including database changes. By recording the actions an operator is taking on the APOGEE Automation System. The System Activity Log can be used as a useful tool to help determine if additional training is needed for an operator or to document or change an operational procedure.

Dynamic Graphics

- Point information displays and dynamically updates on the Insight graphic.
- Graphics can be linked in a logical structure that makes the most sense for the facility, allowing the operator to navigate from building floor plans to associated air handling units in seconds.
- Graphics can be accessed directly by name or point association from other application screens such as the alarm screen or trend plot.
- Animated graphics allow you to define the visual movement of the control based on the point's value.
- Point values can be viewed and commanded from each graphic.
- Analog bars can be used to monitor and control analog values such as setpoints or static air pressure. High and low limits are also displayed on the scale.
- Graphics can be linked to related applications or documents.
- Graphics can be created and customized to suit any operator's need.

Specifications

Operating System Environment	Windows Server 2008, Windows Server 2003, Windows XP Professional, Windows Vista Business or Enterprise
Object Oriented Database	Objectivity®
Graphics Package	Micrografx Designer®

Insight Database Server on Management Level Network	Any dual-core processor or better (Intel® Pentium® D/AMD Athlon™ 64 X2 or better) 2 GB RAM 7200 RPM hard drive or better USB port CD-ROM Drive
Insight Database Client	Any Single-core processor or better (Intel® Pentium® D/AMD Athlon™ 64 X2 or better) 1 GB RAM 7200 RPM hard drive or better USB port CD-ROM Drive

NOTES on Specifications:

- Windows Server 2003 or 2008 Enterprise Edition is required if you intend to install the Insight software on a Windows cluster.
- The performance of your computer may be affected by the size and amount of animated graphic controls on a graphic. In addition, the performance and efficiency of the InsightDBCSServer is highly dependent on the current running hardware. In general, upgrading to the recommended hardware will improve the responsiveness of your Insight software.
- For Insight Database Servers, we recommend a DVD-RW, CD-RW/DVD-ROM combination drive, or CD-RW drive. Having a DVD-RW drive available on the Insight Database Server will allow for fewer disks to be used when backing up your Insight database.

Ordering Information

Description	Product Number
Insight Advanced Software Package (includes one user license and one Sentinel Key)	571-010-391-USB ←
Note: Dynamic Plotter, System Activity Log, Program Editor, and Report Scheduler are standard features in the Advanced package.	

Take advantage of new features and keep your system current by ordering update software for your existing Advanced Package:

Description	Product Number
Insight 3.7, 3.8, and 3.8.1 to 3.9.1 Advanced Server Update Package (first server)	571-016-391 (non-SA) or 571-063-391 (SA)
Insight 3.7, 3.8, and 3.8.1 to 3.9.1 Advanced Server Update Package (multiple servers, for 2 nd server and above)	571-067-391 (SA only)
Insight 3.7, 3.8, and 3.8.1 to 3.9.1 Advanced User License Update	571-017-391 (non-SA) or 571-064-391 (SA)
Insight 3.4, 3.5, 3.5.1 and 3.6 to 3.9.1 Advance Server Update Kit	571-842-4T9
Insight 3.4, 3.5, 3.5.1 and 3.6 to 3.9.1 Advance Client Update Kit	571-843-4T9
Insight 3.1, 3.2, and 3.3 to 3.9.1 Advance Server Update Kit	571-838-1T9
Insight 3.1, 3.2, and 3.3 to 3.9.1 Advance User Update	571-839-1T9

Increase your system utilization by adding one or more of the following options to the Package:

Insight Auto-Dial Option	571-180
➔ BACnet Client Option	571-188
BACnet Server Option	571-189

RENO™ Option	571-181
Terminal Services Option	571-105
Text to Speech Option for use with RENO	571-186
Compliance Support Option (CSO)	571-126
Alarm Issue Management Option (AIM)	571-127
Validation Options Bundle (includes both CSO and AIM)	571-125
Soft Controller	571-620
Field Panel Go Graphics Conversion	571-304
OPC Server Option – 1000 Point Capacity	571-162
OPC Server Option – 5000 Point Capacity	571-163
APOGEE GO for Insight Base	571-305
APOGEE GO for Insight 2-User	571-317
APOGEE GO for Insight 20-User	571-318
APOGEE GO for Insight Unlimited-User	571-319

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Country of Origin: U.S.
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DELLTM OPTIPLEXTM 760



Businesses and large organizations that demand a versatile mainstream desktop solution with proven technology are ideally suited for the OptiPlex 760. The flexible OptiPlex 760 delivers a reliable desktop solution to support your business' unique needs — from increased user flexibility, including a diskless option to support flexible computing environments, to increased manageability, security, and energy efficiency. The OptiPlex 760 is an ideal mid-range solution, equipped with productivity options you can fine tune to your users' needs ranging from high speed Intel[®] Processors, generous memory options, and integrated support for dual video displays. Data stays protected with your choice of leading-edge hardware and software security options. A range of manageability tools and desktop services to support OptiPlex systems frees up valuable IT support time. Designed with practical features, the OptiPlex 760 is just one of the reasons Dell is a leader in business desktops — and why OptiPlex is the easiest choice you'll make today.



OPTIPLEX MEANS BUSINESS

The OptiPlex 760, simple to customize with proven features designed to move your business forward:

- Long-range planning support with up to a 15-month lifecycle, stable images, globally available configurations, managed transitions, and support for legacy ports and slots
- Equipped with Intel[®] Core[™]2 Duo Processors for outstanding productivity
- The free-for-life Dell Client Manager provides centralized remote control and automation of common system maintenance tasks
- The right fit for every user with your choice of four expandable chassis sizes

OPTIPLEX SECURITY

Offering a wide array of security options, OptiPlex gives you the power to choose your level of security:

- Identify threats earlier with Dell Client Manager support for iAMT security technology
- Protect your critical data with range of enterprise-class security options including biometric finger print reader or Smart Card keyboard
- Fast and efficient control over your security features with Dell ControlPoint[™]

OPTIPLEX IS EASY TO OWN

OptiPlex desktops are stable, reliable, and armed with a suite of highly customizable global service and support offerings to help you throughout the PC lifecycle. For users and IT professionals alike, the OptiPlex 760 is easy to own, offering:

- Improved multi-tasking through integrated support for dual video displays
- Time-saving tool-less design and Dell exclusive DirectDetect troubleshooting LEDs resulting in reduced maintenance and service costs
- Dell Client Manager support for iAMT, allowing management for remote inventory, diagnosis, and system monitoring

OPTIPLEX GETS GREEN

The OptiPlex 760 uses energy-efficient technologies, which can lower the impact on the environment and your organization's energy bill:

- Help reduce power consumption — and cost — with Dell's up to 88% efficient power supplies
- Help minimize power usage with Dell Energy Smart power management technology
- Help promote environmental sensitivity with the OptiPlex 760's EPEAT-Gold status



OptiPlex™ 760 Technical Specifications					
Processors	E8000 series Intel® Core™2 Duo 6M, 1333 FSB E7000 series Intel® Core™2 Duo 3M, 1066 FSB E2000 series Intel® Pentium® Dual Core 1M, 800 FSB		E1000 series Intel® Celeron® Dual Core 512K, 800 FSB 400 series Intel® Celeron® 512K, 800 FSB		
Chipset	Intel® Q43 Express Chipset w/ICH10D				
Operating System	Microsoft® Windows Vista® Business (32 & 64 bit); Microsoft Windows® XP Professional via Business Downgrade Rights; Microsoft Windows Vista Home Basic (32bit); Novell® SLED (China only)				
Video	Integrated Intel® Graphics Media Accelerator 4500; DVI Adapter card; 256MB ATI® RADEON® HD 3450 (Dual DVI or VGA via cable adapters plus S-video output); 256MB ATI RADEON HD 3470 dual DisplayPort output (Dual VGA and DVI supported via cable adapters)				
Memory	Up to four DIMM slots (2 in USFF chassis); Non-ECC dual-channel 800MHz DDR2 SDRAM, supporting 1GB to 8GB (up to 4GB on USFF)				
Networking	Integrated 10/100/1000 Ethernet (Intel® WG82567LM LOM); Optional 802.11 Draft N Wi-Fi® wireless PCIe card				
Standard I/O Ports	8 USB 2.0 ports, 2 front, 6 rear (+ 1 internal flex bay) MT; 8 USB 2.0 ports, 2 front, 6 rear (+ 1 internal flex bay) DT and SFF; 2 front, 5 rear USFF; 1 RJ-45; 1 VGA; 1 Display Port; 1 serial; 1 SATA; 2 Line-in (stereo/microphone); 2 Line-out (headphone/speaker)				
Hard Drives	80GB, 160GB, 250GB, and 320GB 7200 RPM SATA II, 3.0GB/s; 80GB and 160GB 10K RPM SATA II 3.0GB/s; second hard drive available on mini tower; diskless option with no hard drive available to support flexible computing environments				
Chassis		MINI TOWER	DESKTOP	SMALL FORM FACTOR	
	Dimensions (H x W x D)	16.3" x 7.3" x 17.3" 41.4 cm x 18.5 cm x 43.9 cm	17.1" x 17.1" x 16.9" 43.2 cm x 43.2 cm x 42.8 cm	11.6" x 14.5" x 13.1" 29.4 cm x 36.8 cm x 33.3 cm	ULTRA SMALL FORM FACTOR 10.2" x 11.2" x 10.2" 25.9 cm x 28.4 cm x 25.9 cm
	Weight	25.8 lbs.	25.2 lbs.	15 lbs.	10 lbs.
	Number of Bays	2 internal 3.5" 1 external 3.5" 2 external 5.25"	1 internal 3.5" 1 external 3.5" 2 external 5.25"	1 internal 3.5" 1 external 3.5" 2 external 5.25"	1 internal 3.5" 1 external 3.5" 2 external 5.25"
	Expansion Slots	1 full height PCIe x16 1 full height PCIe x1 2 full height PCI	1 full height PCIe x16 1 full height PCIe x1 2 full height PCI	1 full height PCIe x16 1 full height PCIe x1 2 full height PCI	1 full height PCIe x16 1 full height PCIe x1 2 full height PCI
	Power	305W Standard Power Supply; 255W 88% Efficient Power Supply, ENERGY STAR 4.0 compliant, Active PFC	255W Standard Power Supply; 255W 88% Efficient Power Supply, ENERGY STAR 4.0 compliant, Active PFC	255W Standard Power Supply; 255W 88% Efficient Power Supply, ENERGY STAR 4.0 compliant, Active PFC	255W Standard Power Supply; 255W 88% Efficient Power Supply, ENERGY STAR 4.0 compliant, Active PFC
Peripherals	Monitors Flat Panel Analog: Dell 17" E178FP Flat Panel; Dell 19" E198FP Flat Panel Widescreen Flat Panel Analog: Dell 16" 1609W; Dell 17" E178WFP Widescreen Flat Panel; Dell 19" E198WFP Widescreen Flat Panel; Dell 20" E207WFP Widescreen Flat Panel; Dell 22" E228WFP Widescreen Flat Panel; Dell 24" E248WFP Widescreen Flat Panel Dell UltraSharp™ Digital Flat Panel, Adjustable Stand, VGA/DVI: Dell UltraSharp 17" 1708FP Flat Panel; Dell UltraSharp 19" 1908FP Flat Panel Dell UltraSharp Digital Widescreen Flat Panel, Adjustable Stand, VGA/DVI: Dell UltraSharp 17" 1708FPW Widescreen; Dell UltraSharp 19" 1908FPW Widescreen; Dell UltraSharp 20" 2009FPW Widescreen; Dell UltraSharp 22" 2209FPW Widescreen; Dell UltraSharp 24" 2408FPW Widescreen; Dell UltraSharp 27" 2709FPW Widescreen All-in-One options: Optional Dell 17" Standard or 19" Widescreen monitor mounting bracket for Ultra Small Form Factor				
	Keyboards: Dell USB Entry keyboard, Dell USB QuietKey keyboard; Dell USB Enhanced Multimedia keyboard; Smart Card Reader USB keyboard, Bluetooth® Keyboard and Mouse				
	Mouse: Dell USB optical two-button entry, Dell USB Premium five-button, Dell USB Laser				
	Audio Speakers: Internal Dell Business audio speaker, Dell AX210 2.0 Speakers, AX510 and AX510PA sound bars available with select FP monitors				
Security	Trusted Platform Module (TPM) 1.2, Dell ControlPoint, Chassis loop lock support (with cable locks available), Chassis intrusion switch, Setup/BIOS Password, I/O Interface Security, Smart Card and Bio-metric readers, Intel® Trusted Execution Technology				
Systems Management	Intel® Standard Management DASH 1.0, ASF 2.0 (Legacy Systems Management), No Management (Management Disabled)				
Environmental, Ergonomic, and Regulatory Standards	Environmental Standards (eco-labels): CECP, ENERGY STAR 4.0 TCO 05, WEEE, EPEAT GOLD, Japan Energy Law, CES, Japan Green PC, FEMP, South Korea Eco-label, EU RoHS, China RoHS Other Environmental Options: Dell Energy Smart settings: Carbon Off-set; System Recycle (Asset Recovery Service); Ultra-small form factor is halogen reduced				
Warranty*	Limited Hardware Warranty*; 3-year Dell ProSupport™ for IT and 3-year Next Business Day On Site Service after Remote Diagnosis* (Standard); 4 year and 5 year (Optional)				

SIMPLIFY DESKTOP COMPUTING AT DELL.COM/OptiPlex

***Important Information:** Remote Diagnosis is determination by online/phone technician of cause of issue; may involve customer access to inside of system and multiple or extended sessions. If issue is covered by Limited Hardware Warranty and not resolved remotely, technician and/or part will be dispatched, usually within 1 business day following completion of Remote Diagnosis. Availability varies. Other conditions apply. For copy of Ltd Hardware Warranty, write Dell USA LP, Attn: Warranties, One Dell Way, Round Rock, TX 78682 or see www.dell.com/warranty.

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DELLTM LATITUDETM MAINSTREAM E6400 & E6500



Featuring dramatic innovations in performance, durability, and security, Dell Latitude Mainstream laptops provide exceptional productivity and a low total cost of ownership.

INSPIRED DESIGN

You'll notice the difference before you even turn it on. The new design of the Latitude E6400 and E6500 combines stunning style and thoughtful details: robust hinges and latches, a bright screen, and a precision-tuned keyboard which is accurate, comfortable, and comes available with a backlit option. The new Mainstream laptops also incorporate smaller docks and peripherals which enable a seamless transition from on-the-move to desktop computing.

ALL-DAY MOBILE COMPUTING¹

Latitude Mainstream laptops introduce a dramatic step forward in battery life. Achieve up to 19¹ hours of battery life¹ on the E6400 with the combination of our standard 9-cell battery, new high-capacity battery slice, and exclusive Dell ControlPoint™ software. Stay connected with anytime, anywhere wireless connectivity² with support for current and emerging wireless technologies (Wi-Fi, High Performance Wireless-N, mobile broadband² WiMAX™, Bluetooth® 2.1).

PEACE OF MIND

Dell ProSupport Mobility Services³, offer solutions designed to minimize downtime, protect your investment, and ensure your data is yours and yours alone. We enable your mobile workforce by providing great service that doesn't stop at the border. Latitude Mainstream laptops also offer a full suite of industry-standard security options, so you can get a fully secure system direct from our factory.

TOTAL CONTROL OF OWNERSHIP

The ultimate team player, Latitude Mainstream laptops can be managed virtually anywhere in the world without leaving your desk. With image and systems management tools like Dell ImageDirect, Dell Client Manager, and Intel vPro™ technologies, you can simplify systems management and free IT to focus on more strategic business challenges.





FEATURES	E6400	E6500
Operating System	Genuine Windows Vista® Ultimate Genuine Windows Vista® Business Genuine Windows Vista® Business 64-Bit Genuine Windows Vista® Home Basic Genuine Windows Vista® Ultimate or Business Downgrade Genuine Windows® XP Professional Loaded ⁴	Genuine Windows Vista® Ultimate Genuine Windows Vista® Business Genuine Windows Vista® Business 64-Bit Genuine Windows Vista® Home Basic Genuine Windows Vista® Ultimate or Business Downgrade Genuine Windows® XP Professional Loaded ⁴
Processor Type	Intel® Core™ 2 Duo Processor up to T9600 (2.8GHz, 6MB L2 Cache)	Intel® Core™ 2 Duo Processor up to T9600 (2.8GHz, 6MB L2 Cache)
Chipset	Intel® 45 Express Chipset	Intel® 45 Express Chipset
Graphics⁵	NVIDIA® Quadro® NVS 160M 256MB DDR2 Mobile Intel® GMA 4500MHD	NVIDIA® Quadro® NVS 160M 256MB DDR2 Mobile Intel® GMA 4500MHD
Display	14.1" Premium WXGA (1280x800) Display 14.1" Premium Electronic Privacy WXGA (1280x800) LED Display 15.4" Premium, UltraSharp™ WXGA+ (1440x900) LED Display 14.1" Privacy Widescreen WXGA (1280x800) LED Display	15.4" Premium WXGA Display (1280x800) 15.4" Premium WXGA+ (1440x900) LED Display (Anti-Glare View) 15.4" Premium, UltraSharp™ WXGA+ (1440x900) Display with High Brightness (WVA View)
Memory⁵	Dual Channel DDR2 Memory Two Memory slots offering up to 8GB ⁶ Memory Bandwidth: 800MHz	Dual Channel DDR2 Memory Two Memory slots offering up to 8GB ⁶ Memory Bandwidth: 800MHz
Battery	4-cell, 6-cell, or 9-cell "Smart" Lithium Ion Primary battery featuring ExpressCharge™; 12 cell high-capacity battery slice	4-cell, 6-cell, or 9-cell "Smart" Lithium Ion Primary battery featuring ExpressCharge™; 12 cell high-capacity battery slice
Power Supply	90 Watt AC adapter with cord wrapping, 65w Auto/Air/AC Travel Adapter	90 Watt AC adapter with cord wrapping, 65w Auto/Air/AC Travel Adapter
Primary Storage⁷	Solid State Hard Drive up to 128GB 7200RPM Free Fall Sensor Hard Drive up to 250GB 5400RPM Encrypted Hard Drive up to 120GB ⁸ 5400RPM up to 250GB 7200 RPM Encrypted Hard Drive with Free Fall Sensor up to 160GB	Solid State Hard Drive up to 128GB 7200RPM Free Fall Sensor Hard Drive up to 250GB 5400RPM Encrypted Hard Drive up to 120GB ⁸ 5400RPM up to 250GB 7200 RPM Encrypted Hard Drive with Free Fall Sensor up to 160GB
Connectivity Options	10/100/1000 Gigabit Ethernet 56K v92a Internal Modem (Optional) Wireless LAN: Dell Wireless 1397 (802.11g), Dell Wireless 1510 (802.11 a/g/n 2x2), Intel® WiFi Link 5100 [802.11a/g/n (1x2)]; Intel WiFi Link 5300 [802.11a/g/n (3x3)] Mobile Broadband² & GPS: Dell Wireless 5720 (EvDO & GPS) Mobile Broadband mini card, Dell Wireless 5530 (Tri-band HSDPA 7.2/HSUPA 2.0 & GPS) Mini-Card Bluetooth & Ultra-Wideband: Dell Wireless 370 Bluetooth® 2.1, Dell Wireless 410 Bluetooth® 2.1 with UWB	10/100/1000 Gigabit Ethernet 56K v92a Internal Modem (Optional) Wireless LAN: Dell Wireless 1397 (802.11g), Dell Wireless 1510 (802.11 a/g/n 2x2), Intel® WiFi Link 5100 [802.11a/g/n (1x2)]; Intel WiFi Link 5300 [802.11a/g/n (3x3)] Mobile Broadband² & GPS: Dell Wireless 5720 (EvDO & GPS) Mobile Broadband mini card, Dell Wireless 5530 (Tri-band HSDPA 7.2/HSUPA 2.0 & GPS) Mini-Card Bluetooth & Ultra-Wideband: Dell Wireless 370 Bluetooth® 2.1, Dell Wireless 410 Bluetooth® 2.1 with UWB
Security	Smart Card Reader and Contactless Smart Card Reader, Fingerprint Reader (optional), Dell ControlPoint Security Manager, Dell ControlVault™ Privacy Filter (optional), TPM 1.2 ⁹	Smart Card Reader and Contactless Smart Card Reader, Fingerprint Reader (optional), Dell ControlPoint Security Manager, Dell ControlVault™ Privacy Filter (optional), TPM 1.2 ⁹
Media Bay	E-Family modular media bay: 8X DVD-ROM, 24X CDRW/DVD, 8X DVD+/-RW, second Hard Drive or Travel Lite Module	E-Family modular media bay: 8X DVD-ROM, 24X CDRW/DVD, 8X DVD+/-RW, second Hard Drive or Travel Lite Module
Collaboration	2 speakers, optional digital microphone, optional VGA camera	2 speakers, optional digital microphone, optional VGA camera
Expansion Slots	1 Type I/II PCMCIA OR Expresscard/54, 5-in-1 card reader	1 Type I/II PCMCIA and Expresscard/54, 5-in-1 card reader
Ports	IEEE 1394, docking connector, USB 2.0 (x4), VGA, Display Port, RJ-11 (optional), RJ-45, eSATA, USB PowerShare, headphone/speaker out, mic	IEEE 1394, docking connector, USB 2.0 (x4), VGA, Display Port, RJ-11 (optional), RJ-45, eSATA, USB PowerShare, headphone/speaker out, mic
Systems Management	Intel vPro™ Technology's advanced management features (optional, requires Intel WiFi® Link WLAN), DASH, Dell Client Manager	Intel vPro™ Technology's advanced management features (optional, requires Intel WiFi® Link WLAN), DASH, Dell Client Manager
Input	Dual-pointing, Back-lit keyboard option	Dual-pointing, Back-lit keyboard option
Dimensions/Weight (starting)	PRELIMINARY Starting weight with 4-cell battery is 4.3lbs/1.95kg ⁹ 13.2" x 9.4" x 1.0 - 1.2" (335.0 x 238.3 x 25.4-31.0mm)	PRELIMINARY Starting weight with 4-cell battery is 5.7lbs/2.6kg ⁹ 14.1" x 10.2" x 1.09 - 1.3" (357.0 x 259.0 x 27.6-33.0mm)
Docking	E-Port, E-Port Plus, E-Legacy Extender, E-Flat Panel Stand, E-Monitor Stand, E-View Laptop Stand, E-Media Bay, CoolSlice™	E-Port, E-Port Plus, E-Legacy Extender, E-Flat Panel Stand, E-Monitor Stand, E-View Laptop Stand, E-Media Bay, CoolSlice™
Color Choices	Available	Available
Key Accessories	Choice of carrying cases, Dell M109S Projector, 3M Custom-fit LCD Privacy Filter and CoolSlice	Choice of carrying cases, Dell M109S Projector, 3M Custom-fit LCD Privacy Filter and CoolSlice

Battery life based on Dell lab testing on a Latitude E6400 with integrated graphics and SSD. Varies by configuration, operating conditions and other factors. Maximum battery capacity decreases with time and use.

¹ Subject to wireless provider's coverage area. Mobile broadband subscription required. Additional charges apply, not available in all regions.

² Dell ProSupport Mobility Services not available in all countries. For terms of service please visit www.dell.com/servicesdescriptions

³ The Genuine Windows Vista® Downgrade options come with Genuine Windows® XP Professional pre-installed along with media and technical support for both Genuine Windows® XP and Genuine Windows Vista® so you may transition to Genuine Windows Vista® when you're ready.

⁴ Significant system memory may be used to support graphics, depending on system memory size and other factors.

⁵ Up to 1 GB may not be available with 32-bit operating systems due to system resource requirements.

⁶ GB means 1 billion bytes and TB equals 1 trillion bytes; actual capacity varies with preloaded material and operating environment and will be less.

⁷ Not available in all regions.

⁸ Preliminary starting weight with 4-cell, 2.5" thin SSD, 14.1" LED, Integrated Graphics, and Travel Lite module is 4.3lbs/1.95kg. Weight varies with configuration and manufacturing variability.

⁹ Preliminary starting weight with 4-cell, 2.5" thin SSD, 15.4" LED Integrated Graphics, and Travel Lite module is 5.7lbs/2.6kg.

REVOLUTIONIZE YOUR LAPTOP AT DELL.COM/Latitude



Cisco SD208 8-Port 10/100 Switch

Cisco Small Business Unmanaged Switches

Easy-to-Use, Flexible Switching for Small Businesses

Highlights

- Designed for small businesses that require speed, reliability, and simple management
- Connects up to eight devices - PCs, printers, and wireless access points, with auto-sensing ports
- Works right out of the box with no software to configure
- Compact size provides multiple placement options for areas with limited space

Figure 1. Cisco SD208 8-Port 10/100 Switch



Product Overview

The Cisco® SD208 8-Port 10/100 Switch can significantly increase the speed of your network traffic. A switch serves the same function as a hub in a network design, tying your network equipment together. But unlike a simple-minded hub, which divides the network's bandwidth among all the attached devices, a switch delivers full network speeds at each port. Installing this cost-effective 8-port 10/100 switch can potentially give you eight times your current network speed.

It's also the perfect way of integrating 10-Mbps Ethernet and 100-Mbps Fast Ethernet devices. All eight ports are auto speed negotiating and have automatic medium dependent interface (MDI) and MDI crossover (MDI-X) detection, so you don't have to worry about the cable type. Each port independently negotiates for best speed and half- or full-duplex mode, for up to 200 Mbps of bandwidth per port. Fast store-and-forward switching prevents damaged packets from being passed on to the network.

The ultra-compact case design is sure to fit into your workgroup environment. Let the Cisco SD208 8-Port 10/100 Switch kick your 10/100 network into high gear.

Features

- Ideal for integrating your 10BASE-T and 100BASE-TX network hardware
- Eight 10/100 ports provide dedicated bandwidth in half- or full-duplex modes
- Each port supports auto MDI/MDI-X cable detection
- Compatible with all major network operating systems
- Advanced store-and-forward packet switching optimizes data transfers
- Auto partitioning protects PCs from downed network lines
- Signal regeneration ensures data transfer integrity

Specifications

Table 1 contains the specifications, package contents, and minimum requirements for the Cisco SD208 8-Port 10/100 Switch.

Table 1. Specifications for the Cisco SD208 8-Port 10/100 Switch

Specifications	
Standards	IEEE 802.3, IEEE 802.3u
Ports	8 RJ-45 10/100
Cabling type	Category 5 Ethernet
LEDs	System, Port Status 1 through 8
Environmental	
Dimensions W x H x D	5.12 x 1.18 x 5.00 in. (130 x 30 x 127 mm)
Unit weight	15 oz. (0.43 kg)
Power	DC 12V, 500 mA
Certification	FCC Class B, CE
Operating temperature	32° to 122°F (0° to 50°C)
Storage temperature	-40° to 158°F (40° to 75°C)
Operating humidity	20% to 95%, noncondensing
Storage humidity	5% to 90%, noncondensing
Package Contents	
<ul style="list-style-type: none"> • Cisco SD208 8-Port 10/100 Switch • Power adapter • Printed user guide • Registration card 	
Minimum Requirements	
<ul style="list-style-type: none"> • 200-MHz or faster processor • 64 MB RAM recommended • Ethernet adapter capable of 10 Mbps • Windows 95/98/Me/NT 4.0/2000/XP 	
Product Warranty	
Limited lifetime hardware warranty with return to factory replacement and 1-year limited warranty for fans and power supplies	

Cisco Limited Lifetime Hardware Warranty

Cisco Small Business products offer a limited lifetime hardware warranty with return to factory replacement and a 1-year limited warranty for fans and power supplies. In addition, Cisco offers software application updates for bug fixes and telephone technical support at no charge for the first 12 months following the date of purchase. To download software updates, go to:

<http://www.cisco.com/go/smallbiz>.

Product warranty terms and other information applicable to Cisco products are available at

<http://www.cisco.com/go/warranty>.

For More Information

For more information on Cisco Small Business products and solutions, visit:

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Cisco SD216 16-Port 10/100 Desktop Switch Cisco Small Business Unmanaged Switches

Easy-to-Use, Flexible Switching for Small Businesses

Highlights

- Designed for small businesses that require speed, reliability, and simple management
- Connects up to 16 devices - PCs, printers, and wireless access points with autosensing ports
- Works right out of the box with no software to configure
- Compact size provides multiple placement options for areas with limited space

Figure 1. Cisco SD216 16-Port 10/100 Desktop Switch



Product Overview

The Cisco® SD216 16-Port 10/100 Desktop Switch (Figure 1) can significantly increase the speed of your network traffic. A switch serves the same function as a hub in a network design, tying your network equipment together. But unlike a simple-minded hub, which divides the network's bandwidth among all the attached devices, a switch delivers full network speeds at each port. Installing this cost-effective 16-port 10/100 switch can potentially give you 16 times the network speed you currently have.

It's also the perfect way to integrate 10-Mbps Ethernet and 100-Mbps Fast Ethernet devices. All 16 ports are auto speed negotiating and have automatic medium dependent interface (MDI) and MDI crossover (MDI-X) detection, so you don't have to worry about the cable type. Each port independently negotiates for best speed and half- or full-duplex mode, for up to 200 Mbps of bandwidth per port. Fast store-and-forward switching prevents damaged packets from being passed on to the network.

The ultra-compact case design is sure to fit into your workgroup environment. Let the Cisco SD216 16-Port 10/100 Switch kick your 10/100 network into high gear.

Features

- Ideal for integrating your 10BASE-T and 100BASE-TX network hardware
- Sixteen 10/100 ports provide dedicated bandwidth in half- or full-duplex modes
- Each port supports auto MDI/MDI-X cable detection
- Compatible with all major network operating systems
- Advanced store-and-forward packet switching optimizes data transfers
- Auto partitioning protects PCs from downed network lines
- Signal regeneration ensures data transfer integrity

Specifications

Table 1 contains the specifications and package contents for the Cisco SD216 16-Port 10/100 Desktop Switch.

Table 1. Specifications for the Cisco SD216 16-Port 10/100 Desktop Switch

Specifications	
Standards	IEEE 802.3, IEEE 802.3u
Ports	16 RJ-45 10/100
Cabling type	Category 5 Ethernet
LEDs	System, Port Status 1 through 16
Environmental	
Dimensions W x H x D	5.12 x 1.18 x 5.00 in. (130 x 40 x 127 mm)
Unit weight	19 oz. (0.54 kg)
Power	DC 12V, 1.5A
Certification	FCC Class B, CE
Operating temperature	32° to 122°F (0° to 50°C)
Storage temperature	-40° to 158°F (-40° to 75°C)
Operating humidity	20% to 95%, noncondensing
Storage humidity	5% to 90%, noncondensing
Package Contents	
<ul style="list-style-type: none"> • Cisco SD216 16-Port 10/100 Desktop Switch • Power adapter • Printed user guide • Registration card 	
Minimum Requirements	
<ul style="list-style-type: none"> • 200-MHz or faster processor • 64 MB RAM recommended • Ethernet adapter capable of 10 Mbps • Windows 95/98/Me/NT 4.0/2000/XP 	
Product Warranty	
Limited lifetime hardware warranty with return to factory replacement and 1-year limited warranty for fans and power supplies	

Cisco Limited Lifetime Hardware Warranty

Cisco Small Business products offer a limited lifetime hardware warranty with return to factory replacement and a 1-year limited warranty for fans and power supplies. In addition, Cisco offers software application updates for bug fixes and telephone technical support at no charge for the first 12 months following the date of purchase. To download software updates, go to:

<http://www.cisco.com/go/smallbiz>.

Product warranty terms and other information applicable to Cisco products are available at

<http://www.cisco.com/go/warranty>.

For More Information

For more information on Cisco Small Business products and solutions, visit:

<http://www.cisco.com/smallbusiness>.



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Easy integration and maximum productivity in demanding print environments



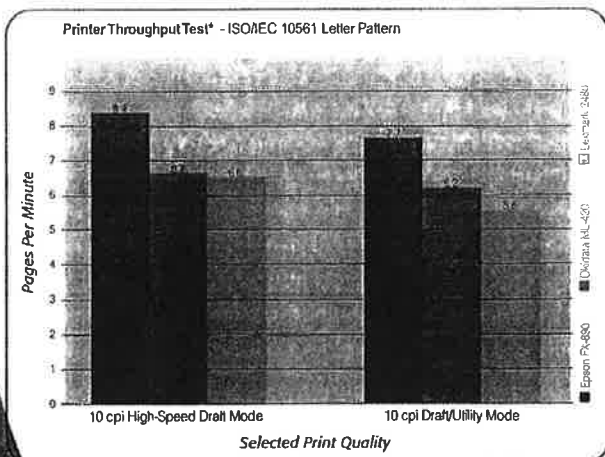
Epson FX-890

A full-featured, high-value performer, the Epson FX-890 offers the durability and ease of use required for critical daily print requirements. This 9-pin, narrow-carriage workhorse boasts an MTBF rating of 20,000 power-on hours (POH) and speeds of up to 680 cps.

Engineered for seamless integration into virtually any system, it provides standard Parallel, USB, and additional connectivity options. And, it includes Epson Remote Configuration Manager™ software for easy printer setup and simple setting selections via most Windows® operating systems. Ideal for rugged environments, this robust printer is the perfect drop-in replacement for the Epson FX-880/880+/980 or Okidata® Microline® 320/320 Turbo.

An extremely reliable, high-speed performer, the Epson FX-890 races through forms up to 7 parts thick through four convenient paper paths. Its easy-to-install 7.5 million character ribbon cartridge boosts productivity and ensures a low cost per page, while its 400 million character print head life offers added dependability.

Complete with a newly designed control panel featuring a lock-out mode and other intuitive functions, this versatile product is the ideal solution for demanding print environments. And, as part of a comprehensive three-year warranty, it's backed by superior technical support from the world leader in impact printing.



Key Features

- Ultra fast 9-pin printing
 - Speeds through multipart forms, reports, labels, and more at up to 680 cps
- Extreme reliability in demanding print environments
 - Offers an MTBF rating of 20,000 POH and a 400 million character print head life
- User-friendly setup and operation
 - Facilitates easy printer configuration using a newly designed control panel or its Windows-based Epson Remote Configuration Manager
- Easy system integration
 - Provides resident Epson, IBM® and Microline printer languages for increased compatibility
 - Includes standard Parallel and USB connections, plus an additional slot for optional interface cards
- Easy-to-install 7.5 million character ribbon cartridge
 - Ensures a lower cost per page, and reduces the need for frequent user intervention
- Advanced paper handling capabilities
 - Provides four convenient paper paths to accommodate cut sheet paper and continuous forms up to 7 parts thick
- Standard three-year warranty
 - Includes access to Epson's superior technical support



Epson FX-890

EPSON® **IMPACT PRINTER**
FX-890

Printer Method

9-pin, serial impact dot matrix

Print Direction

Bidirectional logic seeking for text and graphics printing. Unidirectional text or graphics printing can be selected using software commands.

Print Speed

Ultra Speed Draft	680 cps (12 cpi)
	566 cps (10 cpi)
High Speed Draft	559 cps (10 cpi)
Draft	419 cps (10 cpi)
Letter-quality	104 cps (10 cpi)

(Note: Normal print speed is achieved when printer safety cover is fully closed)

Character Sets13 character tables
13 international character sets**Resident Bitmapped Fonts**

Ultra Speed Draft	10, 12 cpi
High Speed Draft	10, 12, 15, 17, 20 cpi
Draft	10, 12, 15, 17, 20 cpi
NLQ (Roman/Sans Serif)	10, 12, 15, 17, 20 cpi, proportional

Column Width

10 cpi	80
12 cpi	96
15 cpi	120
17 cpi	137
20 cpi	160

Bar Code Fonts

EAN-13, EAN-8, Interleaved 2 of 5, UPC-A, UPC-E, Code 39, Code 128, POSTNET, Codabar (NW-7), Industrial 2 of 5, Matrix 2 of 5

Formatting1/6-inch or programmable in 1/432-inch increments
Line Spacing: 6 lines per inch default
(8 lpi option available on FX-890 Okidata Mode only)**Paper Feed Mechanism**

Feeding method	Friction feed (front, rear)
	Push tractor (front, rear)
	Pull tractor (front, bottom, rear)
	Push and pull tractor** (front, rear)
	Cut-sheet feeder (optional)
	Roll paper holder (optional)

Paper Feed Speed62 millisecond per 1/6"
5" per second continuous feed**Paper Path**

Manual insertion	Front or rear in, top out
Cut sheet feeder	Top in, top out
Tractor	Front rear or bottom in, top out
Pull push tractor	Front or rear in, top out

Input Buffer

128K

Software Drivers

Windows 95, 98, 2000, Me, XP and NT 4.0

InterfaceBidirectional Parallel (IEEE 1284 Nibble Mode supported),
USB 1.1, Type-B slot for optional interface cards**Printer Language**Epson ESC/P[®], IBM PPDS, Okidata Microlines (FX-890, Okidata Mode only)**Paper Handling**Forms: continuous multipart, original plus 5 carbonless copies,
1 + 6 copies with pull tractor, maximum thickness .018"

Width	
Single sheets	3.9" to 10.1"
Continuous	4.0" to 10.0"
Cut-sheet feeder	7.2" to 8.5"

Length	
Single sheets	3.9" to 14.3"
Continuous	4.0" to 22.0"
Cut-sheet feeder	10.1" to 14.0"

No. 6 envelopes	6.5" x 3.6"
No. 10 envelopes	9.5" x 4.1"
Labels	2.5" x 0.94" (minimum)
Roll paper	8.5" width

Sound Level

55 dBA (ISO 7779 pattern)

Power Requirements

Rated voltage	120V AC
Input voltage range	103.5 to 132V
Rated frequency range	50 to 60 Hz
Input frequency range	49.5 to 60.5 Hz

Physical Dimensions

Height	6.6"
Width	16.3"
Depth	13.8"
Weight	16.8 lb

Control Panel Functions

Font, pitch, pause, tear-off, bin selection, line feed, form feed, load, eject, micro-adjust, top-of-form adjustment, panel lockout, reset, menu, default setting selection

Reliability

Total print volume	52 million lines (except print head)
MTBF	20,000 POH (25% duty cycle)
Print head life	400 million characters at 14 dots/character
Ribbon life	7.5 million characters at 14 dots/character

Warranty

Three-year limited warranty in the U.S. and Canada

* Advanced print head design provides unmatched fast speed, allowing the Epson FX-890 to maximize performance by consistently performing at or near top speeds. Standardized ISO 10561 throughput tests illustrate how Epson's superior technology results in faster printing and greater print volume over time. Test conducted by Seiko Epson Corporation.

** Additional tractor unit required

Product Code	Description	UPC Code
Epson FX-890 and Accessories		
C11C524001	Epson FX-890 Impact Printer	0 10343 84673 9
S015329	Ribbon Cartridge	0 10343 84803 1
C800201	Additional Push/Pull Tractor Unit	0 10343 80010 6
C806371	Single Bin Cut Sheet Feeder	0 10343 06003 6
C806381	High Capacity Cut Sheet Feeder	0 10343 06004 3
8310	Roll Paper Holder	0 10343 82984 8
C823051	Serial Interface Board	0 10343 07003 5
C823071	32KB Serial Interface Board	0 10343 07004 2
C823121	LocalTalk Interface	0 10343 81167 6
C823141	Coax Interface Board	0 10343 80016 8
C823151	Twinax Interface Board	0 10343 80017 5
C823452	Bidirectional Parallel Interface Board	0 10343 81245 1
C12C823912	EpsonNet Multiprotocol 10/100 Base-TX Type-B Ethernet Print Server	0 10343 83773 7

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PXC Modular Series

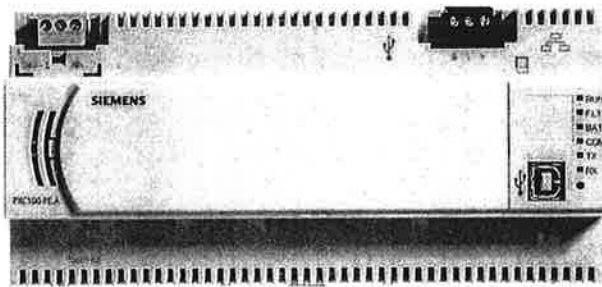


Figure 1. PXC Modular.

Description

The PXC Modular (Programmable Controller - Modular) is an integral part of the APOGEE[®] Automation System. It is a high performance, modular Direct Digital Control (DDC) supervisory field panel.

The field panel operates stand-alone or networked to perform complex control, monitoring, and energy management functions without relying on a higher level processor.

- Up to 100 modular field panels communicate on a peer-to-peer network.
- With the addition of TX-I/O modules and a TX-I/O Power Supply on a self-forming bus, the PXC Modular can directly control up to 500 points.

With the addition of an Expansion Module, the PXC Modular also provides central monitoring and control for distributed Field Level Network (FLN) devices.

Features

- Modular hardware components match initial control requirements while providing for future expansion.
- DIN rail mounting and removable terminal blocks simplify installation and servicing.
- Proven program sequences to match equipment control applications.
- Sophisticated Adaptive Control, a closed loop control algorithm that auto-adjusts to compensate for load/seasonal changes.
- Built-in energy management applications and DDC programs for complete facility management.
- Comprehensive alarm management, historical data trend collection, operator control and monitoring functions.
- Support for peer-to-peer communications over Industry standard 10/100Base-T TCP/IP networks.

Hardware

PXC Modular

- The PXC Modular is a microprocessor-based multi-tasking platform for program execution and communication with other field panels. It scans field data, optimizes control parameters, and manages operator requests for data in seconds.
- The program and database information stored in the PXC Modular memory is battery-backed. This eliminates the need for time-consuming program and database re-entry in the event of an extended power failure. When battery replacement is necessary, the PXC Modular illuminates a "battery low" status LED and can send an alarm message to selected printers or terminals.
- The PXC Modular firmware, including the operating system, is stored in non-volatile flash memory.
- The PXC Modular provides both an Ethernet port as well as an RS-485 port for communication on Automation Level Networks using either TCP/IP or RS-485.
- An HMI RS-232 port is provided as a connection to a laptop computer for local operation and engineering.
- LEDs provide instant visual indication of overall operation, network communication, and low battery warning.
- Two self-forming buses are an integral part of the flexibility of the PXC Modular. A self-forming bus to the right of the controller supports up to 500 points through TX-I/O™ modules. Another self-forming bus to the left of the controller supports hardware connection to subsystems through Expansion Modules.

TX-I/O Modules

TX-I/O Modules are modular expansion I/O consisting of an electronics module and terminal base. The electronics modules perform A/D or D/A conversion, signal processing, and point monitoring and command output through communication with the PXC Modular. The terminal bases provide for termination of field wiring and connection of a self-forming bus. For more information, see *TX-I/O* (149-476).

The TX-I/O Power Supply provides power for TX-I/O modules and peripheral devices. Multiple Power Modules can be used in parallel to meet the power needs of large concentrations of I/O points (Figure 2 and Figure 3). For more information, see *TX-I/O Power Supplies* (149-476).

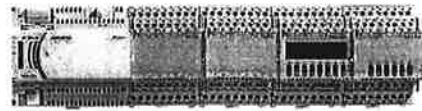


Figure 2. TX-I/O Power Supply and TX-I/O Modules.

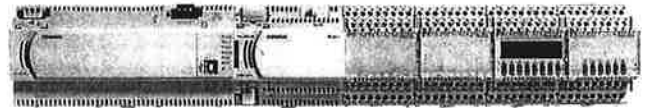


Figure 3. PXC Modular, TX-I/O Power Supply, and TX-I/O Modules.

PXC Modular Expansion Module

The PXC Modular Expansion Module (see Figure 4) provides the hardware connection for Field Level Network (FLN) devices. Using the Triple RS-485 Expansion Module, the PXC Modular supports up to three RS-485 networks of Field Level Network devices (see Figure 5).



Figure 4. RS-485 Expansion Module.



Figure 5. RS-485 Expansion Module and PXC Modular.

Modular Control Panels with Application Flexibility

The PXC Modular is a high performance controller with extensive flexibility to customize each field panel with the exact hardware and program for the application. As a result, the user only purchases what is needed.

For example, in monitoring applications, the control panel can be customized with the number and type of points to match the sensor devices. For monitoring and controlling a large number of (on-off) fans or

motors, more digital points can be added (see Figure 6).

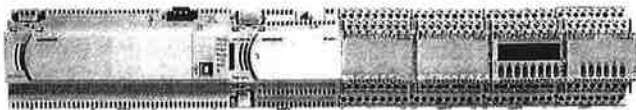


Figure 6. PXC Modular, TX-I/O Power Supply, and TX-I/O Modules.

Alternately, if no local point control is required, the PXC Modular can be used to monitor and control Field Level Network devices using the Expansion Modules (see Figure 7).

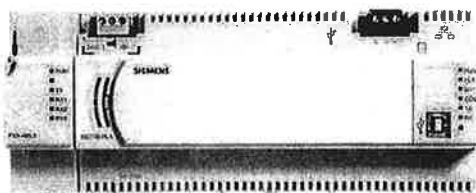


Figure 7. RS-485 Expansion Module and PXC Modular.

Of course, the PXC Modular can be used for both direct point monitoring and control **and** as a system controller for Field Level Network devices (see Figure 8).



Figure 8. RS-485 Expansion Module, PXC Modular, TX-I/O Power Supply, and TX-I/O Modules.

The control program for each field panel is customized to exactly match the application. Proven Powers Process Control Language (PPCL), a "BASIC" type programming language, provides direct digital control and energy management sequences to precisely control equipment and optimize energy usage.

In a stand-alone configuration, the PXC Modular can fulfill all requirements of a supervisory network coordinator by managing operation schedules and alarms and communicating for the connected devices.

Global Information Access

Each PXC Modular is equipped with an RS-232 port. This port supports the connection of a computer. Devices connected to the terminal port gain global information access.

Multiple Operator Access

Multiple operators can access the network simultaneously. When using the Ethernet ALN option, multiple operators may access the controller through concurrent Telnet sessions and/or local operator terminal ports.

Menu Prompted, English Language Operator Interface

The PXC Modular field panel includes a simple, yet powerful menu driven English Language Operator Interface that provides, among other things:

- Point monitoring and display
- Point commanding
- Historical trend collection and display for multiple points
- Equipment scheduling
- Program editing and modification via Powers Process Control Language (PPCL)
- Alarm reporting and acknowledgment
- Continual display of dynamic information

Built-in Direct Digital Control Routines

The PXC Modular provides stand-alone Direct Digital Control (DDC) to deliver precise HVAC control and comprehensive information about system operation. It receives information from sensors in the building, processes the information, and directly controls the equipment. The following functions are available in the PXC Modular:

- Adaptive Control, an auto-adjusting closed loop control algorithm. Provides more efficient, adaptive, robust, fast, and stable control than the traditional PID control algorithm. Superior in terms of response time, holding steady state, and minimizing error, oscillations, and actuator repositioning.
- Closed Loop Proportional, Integral and Derivative (PID) control.
- Logical sequencing.
- Alarm detection and reporting.
- Reset schedules.

Built-in Energy Management Applications

The following applications are programmed in the PXC Modular and require simple parameter input for implementation:

- Peak demand limiting
- Start-Stop time optimization
- Equipment scheduling, optimization and sequencing
- Duty cycling
- Economizer control

Licensable Options

The following features are available on the PXC Modular P2 controllers and require a license for implementation:

- Field Panel GO
- Virtual AEM

Specifications

Dimensions

PXC Modular Series	7.56" L × 3.54" W × 2.76" D (192 mm L × 90 mm W × 70 mm D)
Expansion Module with three P1 RS-485 FLN connections	1.26" L × 3.54" W × 2.76" D (32 mm L × 90 mm W × 70 mm D)

Electrical, Processor, Battery, and Memory

Power Consumption	24 VA @ 24 Vac
Processor	MPC885 (PowerPC®)
Processor Clock Speed	133 MHz
Memory	72 MB (64 MB SDRAM, 8 MB Flash ROM)
Secure Digital Input/Output (SDIO) card	Expandable or removable non-volatile memory
Battery backup of SDRAM	30 days (accumulated) AA (LR6) 1.5 Volt Alkaline (non-rechargeable)
Battery backup of Real Time Clock	12 months (accumulated) Cell coin 3 Volt lithium

Communication

Ethernet Automation Level Network (EALN) port	10Base-T or 100Base-TX compliant
BACnet I/P Ethernet Automation Level Network port	
RS-485 Automation Level Network (ALN) port	1200 bps to 115.2 Kbps
Expansion Bus for support of sub-system networks	1200 bps to 115.2 Kbps
TX-I/O Self forming bus connection	115.2 Kbps
Human-Machine Interface (HMI) port	RS-232 compliant
USB Device Port	Standard 1.1 and 2.0 USB device port, full speed 12 Mbps, low speed 1.5 Mbps, Type B connector
USB Host port	Standard 1.1 and 2.0 USB host port, full speed 12 Mbps, low speed 1.5 Mbps, Type A connector

Electrical Rating

AC Power	NEC Class 2
Communication	NEC Class 2

Operating Environment

Ambient operating temperature	32°F to 122°F (0°C to 50°C), <93% rh, non-condensing
Ambient operating environment	Operate in a dry location, which is protected from exposure to salt spray or other corrosive elements. Exposure to flammable or explosive vapors must be prevented.
Shipping and Storage environment	-40°F to +185°F (-40°C to +85°C) <93% rh, non-condensing
Shipping environment	-13°F to 158°F (-25°C to 70°C), 5% to 95% rh, non-condensing
Mounting Surface	Building wall or structural member

Agency Listings

UL	UL 864 UUKL Smoke Control Equipment UL 864 UUKL7 Smoke Control Equipment CAN/ULC-S527-M8 UL 916 PAZX UL 916 PAZX7
Agency Compliance	FCC Compliance Australian EMC Framework European EMC Directive (CE) – with enclosure

Product Ordering Information

		Description	Product Number
AHU-2 AHU-4 1st FLR ONLY	→	PXC MOD, P2, 96 NODE, APOGEE	PXC00-PE96.A
	→	PXC MOD, P2, TX-I/O, 96 NODE, APOGEE	PXC100-PE96.A
		PXC MOD, BACnet, 96 NODE, APOGEE	PXC00-E96.A
		PXC MOD, BACnet, TX-I/O, 96 NODE, APOGEE	PXC100-E96.A
		Add support for TX-I/O	PXF-TXIO.A
		Virtual AEM License	LSM-VAEM
		Field Panel GO License	LSM-FPGO
	→	Expansion Module, three RS-485 connections	PXX-485.3

Document Ordering Information

Description	Document Number
PXC Modular Series Owner's Manual	125-3582
Powers Process Control Language (PPCL) User's Manual	125-1896

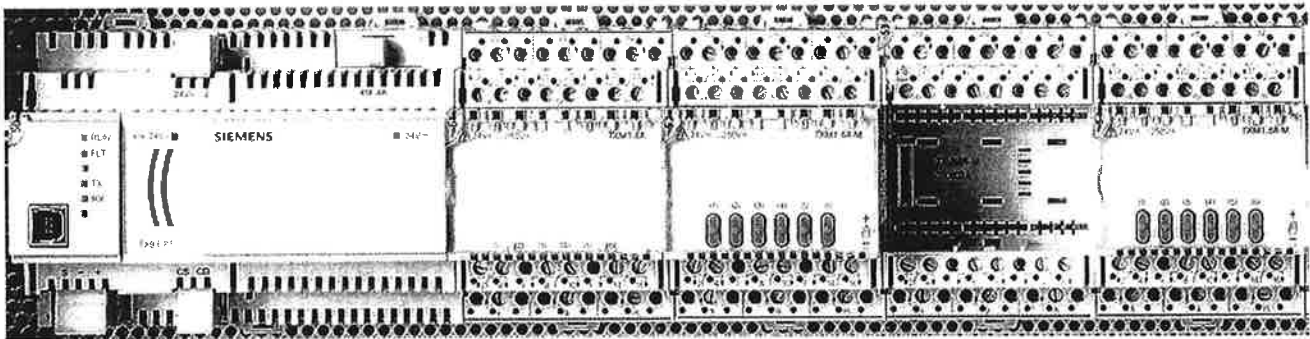
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TX-I/O Product Range



Description

TX-I/O™ is a line of I/O modules with associated power and communication modules for use within the APOGEE system. TX-I/O products include eight types of I/O modules, modular TX-I/O Power Supplies, Bus Connection Modules, and Bus Interface Modules.

TX-I/O Modules provide I/O points for APOGEE based upon TX-I/O Technology. TX-I/O Technology provides flexibility of point types, tremendous flexibility of signal types and support for manual operation.

There are eight types of TX-I/O modules:

- 8 point DI module (TXM1.8D)
- 16 point DI module (TXM1.16D)
- 6 point DO with Relay module (TXM1.6R)
- 6 point DO with Relay and Manual Override module (TXM1.6R-M)
- 8 point Universal module (TXM1.8U)
- 8 point Universal with local override/identification device (LOID) module (TXM1.8U-ML)
- 8 point Super Universal module (TXM1.8X)
- 8 point Super Universal with LOID module (TXM1.8X-ML)

Features

The *self-forming TX-I/O bus* transmits power as well as communication signals. The TX-I/O bus can be extended a maximum of 160 feet (50 meters).

Hot-swappable electronic components allow powered electronics to be disconnected and even replaced without removing terminal wiring or disturbing the self-forming bus.

The *removable label holder* allows for customized point labels.

LEDs provide status indication and diagnostic information for the I/O module, as well as for each point on the module.

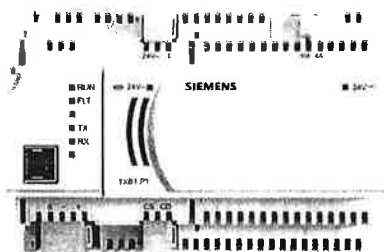
All TX-I/O modules are also:

- DIN rail mounted
- High density (point count to physical dimensions)
- Hardware addressed with address keys
- Separable into terminal base and plug-in I/O module electronics for:
 - Improved installation workflow, allowing field wiring to be terminated prior to installation of electronics.

- Optimum diagnostics - connected peripheral devices can be measured without affecting or being affected by the I/O module.
- Quick replacement of electronics for service.

Module Introduction

P1 Bus Interface Module (TXB1.P1)

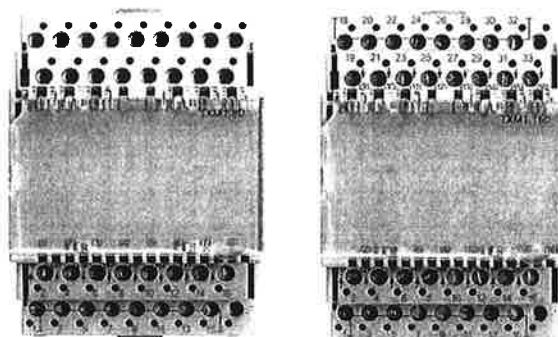


The P1 Bus Interface Module (P1 BIM) provides P1 FLN communication and power for TX-I/O modules. It does not contain application or control for the TX-I/O modules.

Features

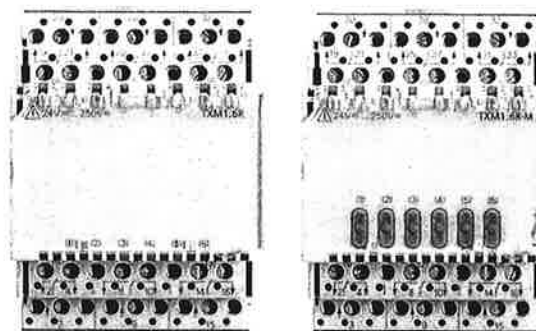
- Communication on the P1 FLN or MEC Expansion Bus
- Support for 80 TX-I/O points
- Support for 10 I/O modules
- 24 Vac input
- Generation of 24 Vdc at 600 mA to power TX-I/O modules and peripheral devices
- Transfer of 24 Vac at a maximum of 4A to power peripheral devices
- Plug-in screw terminals
- AC Fuse isolates the peripheral device supply in case of overload or short-circuit. The fuse can be accessed from an installed module.
- Separate LEDs for module operation, FLN communication activity, 24 Vdc present on the TX-I/O bus, and monitoring of the 24 Vac fuse

Digital Input Modules (TXM1.8D and TXM1.16D)



The TXM1.8D and TXM1.16D are dedicated to monitoring, respectively, 8 and 16 digital input points. They monitor status signals from normally open (NO) or normally closed (NC), latched voltage free/dry contacts. All 8 points on the TXM1.8D module as well as 8 of the 16 points on the TXM1.16D module may be used as pulse counters up to 10 Hz. Each input point has a green LED for status indication.

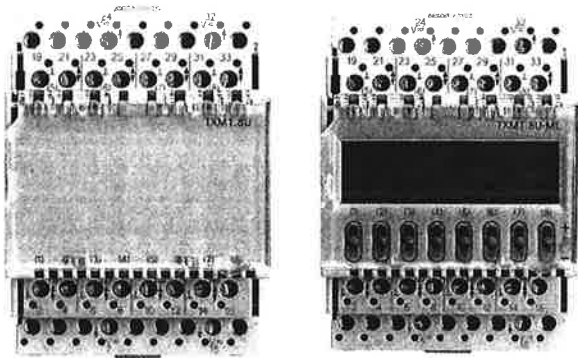
Digital Output Modules (TXM1.6R and TXM1.6R-M)



The Digital Output Modules provide six NO or NC (form C), maintained or pulsed, voltage free/dry contacts. The contacts are rated for a maximum of 250 Vac at 4A. Each I/O point has a green LED for status indication.

The TXM1.6R-M module is also equipped with manual override switches. An orange LED per override switch indicates override status individually per point.

Universal Modules (TXM1.8U and TXM1.8U-ML)



The TXM1.8U and TXM1.8U-ML are universal modules, allowing each of their 8 points to be individually software configured as digital input, analog input, or analog output to best meet the specific application needs.

Features

All Universal modules provide:

- AC supply voltage for peripheral devices such as valves and actuators
- Green LED status per I/O point that varies in intensity according to the voltage and current (directly proportional)

Digital input support includes:

- Voltage free/dry contacts
- Pulse counters up to 25 Hz

Analog input sensor support includes:

- 1k Nickel – Landis & Gyr curve
- 1k Platinum – 375 and 385 coefficient
- 10k and 100k Thermistor – Type II Curve

Active input and output support includes:

- Analog input voltage 0-10 Vdc
- Analog output voltage 0-10 Vdc

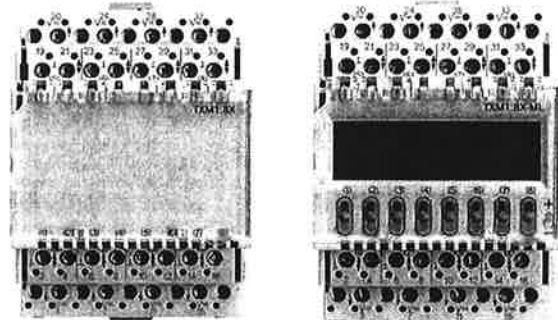
NOTE: Active inputs and outputs are permitted on the same module when connected sensors are powered from that module. When sensors are externally powered, active inputs and outputs should be on separate modules.

TXM1.8U-ML modules are also equipped with a local override/identification device (LOID), which includes an LCD signal display. The LCD displays the following information for each IO point:

- Configured signal type
- Symbolic display of process value
- Notification of faulty operation, short circuit, or sensor open circuit

Orange LEDs indicate override status individually per point.

Super Universal Modules (TXM1.8X and TXM1.8X-ML)

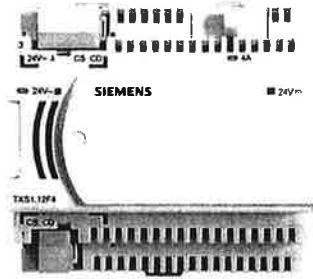


TXM1.8X and TXM1.8X-ML Super Universal modules share all of the Universal module features, and also provide:

- Analog input current 4-20 mA
- Analog output current 4-20 mA (four current outputs maximum per module on Points 5 through 8)
- 24 Vdc supply voltage for sensors at a maximum of 200 mA per module

NOTE: Active inputs and outputs are permitted on the same module when connected sensors are powered from that module. When sensors are externally powered, active inputs and outputs should be on separate modules.

TX-I/O Power Supply (TXS1.12F4)

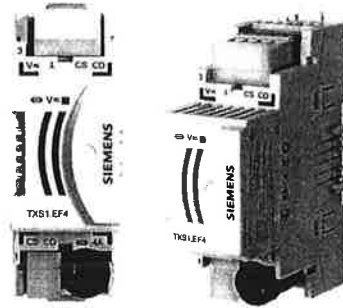


Features

The TX-I/O Power Supply:

- Generates 24 Vdc at 1.2A to power TX-I/O modules and peripheral devices.
- An LED provides an indication of 24 Vdc on the TX-I/O bus.
- Up to 4 TX-I/O Power Supplies can be operated in parallel, with a maximum of two per DIN rail.
- Transfers 24 Vac at 4A to power TX-I/O modules and peripheral devices.
- Can be located within a row of TX-I/O modules or at the beginning of a new DIN rail.
- Routes CS (+24 Vdc Communication Supply) and CD (Communication Data signal) between DIN rails.
- Provides an input point for 24 Vac to power additional peripheral devices.
- Isolates the 24 Vac peripheral device supply in case of overload or short-circuit. The replaceable AC fuse can be accessed from an installed module.
- Indicates the AC fuse status (via LED) for easy diagnostics.

TX-I/O Bus Connection Module (TXS1.EF4)



Features

The Bus Connection Module:

- Transfers 24 Vac at 4A to power TX-I/O modules and peripheral devices.
- Can be located within a row of TX-I/O modules or at the beginning of a new DIN rail.
- Routes CS (+24 Vdc Communication Supply) and CD (Communication Data Signal) between DIN rails.
- Provides an input point for 24 Vac to power additional peripheral devices.
- Isolates the 24 Vac peripheral device supply in case of overload or short-circuit. The replaceable AC fuse can be accessed from an installed module.
- Indicates the AC fuse status (via LED) for easy diagnostics.

I/O Functions by Module

TX-I/O™ function	Description	Module type							
		TXM1.8D	TXM1.16D	TXM1.8U	TXM1.8U-ML	TXM1.8X	TXM1.8X-ML	TXM1.6R	TXM1.6R-M
		Maximum number of functions per module							

Digital inputs

Binary Input	Status indication, voltage-free/dry contact	8	16	8	8	8	8		
Counter	Count/accumulator, voltage-free/dry pulse contact,	8	8	8	8	8	8		

Analog Inputs	Temperature LG-Ni1000			8	8	8	8		
	Temperature Pt 1000 375			8	8	8	8		
	Temperature Pt 1000 385			8	8	8	8		
	Temperature (NTC) 10 K			8	8	8	8		
	Temperature (NTC) 100 K			8	8	8	8		
	Voltage, DC 0 ... 10V *			8	8	8	8		
	Current DC 4... 20 mA *					8	8		

Digital outputs

BO OnOff	Latched contact, AC/DC 250V, 4A							6	6
BO Pulse	Pulse							6	6

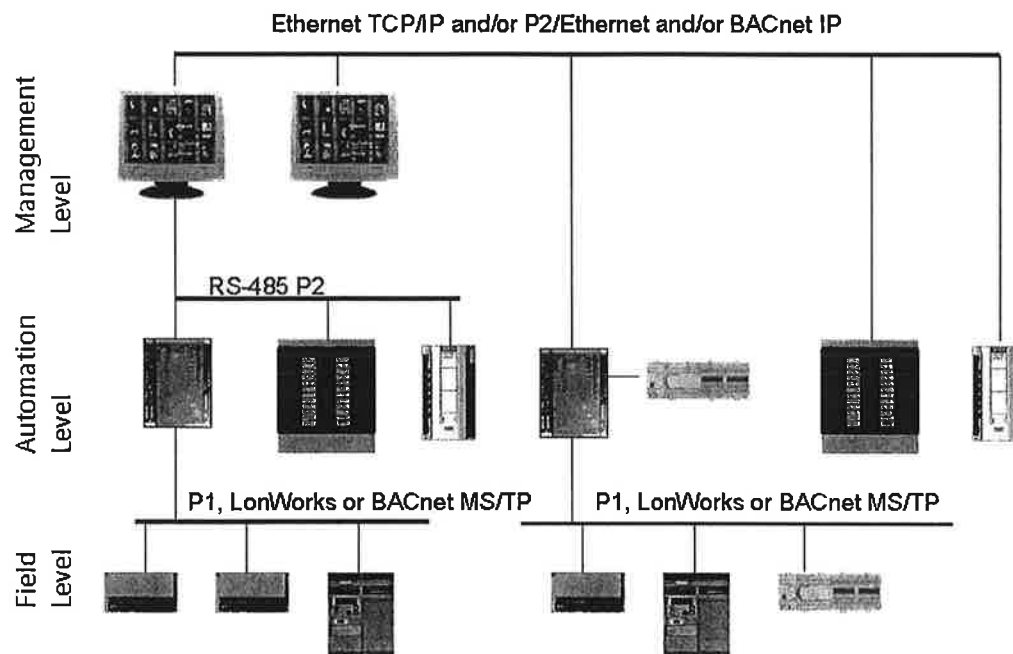
Analog Outputs	DC 0..10 V *			8	8	8	8		
	DC 4 ... 20 mA *					4	4		

* Active inputs and active outputs (0-10V and 4-20 mA) must be located on different modules if sensors are externally powered.

TX-I/O Network Architecture Examples

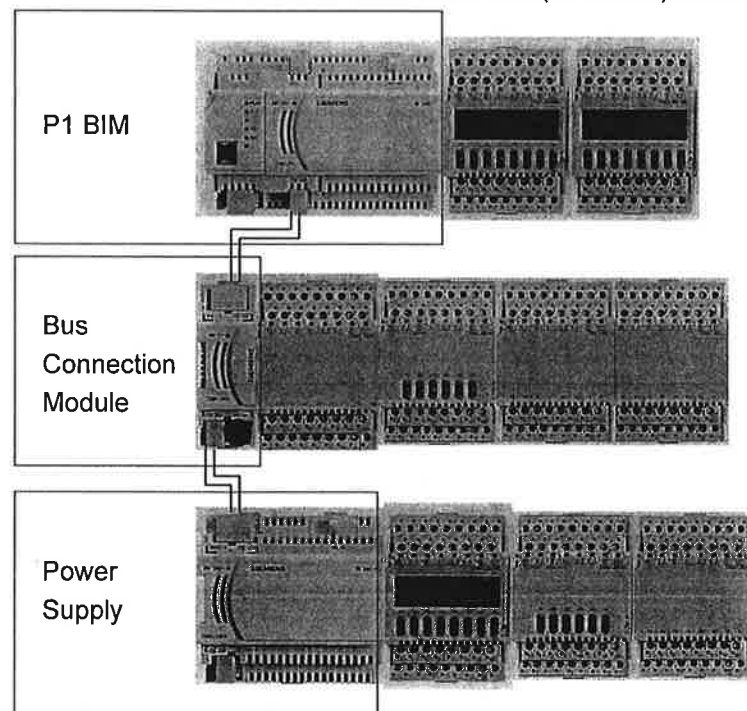
The following architecture picture shows TX-I/O modules connected to a P1 BIM located on:

- the Field Level Network
- the MEC Expansion Bus



TX-I/O Bus Extension

The following picture shows the TX-I/O bus extended using a Bus Connection Module and TX-I/O Power Supply. The TX-I/O bus can be a maximum of 160 feet (50 meters) and may extend outside an enclosure.



Technical Specifications:

Voltage requirements 24 Vac +/- 20% @ 50/60 Hz

Power Consumption

Power Supply 20 VA

P1 BIM 35 VA

With the above power consumption, the Power Supply produces 1.2A 24VDC (28.8 W) and the BIM provides 0.6A 24VDC (14.4 W) to be used by the following:

TXM1.8D 1.1 W

TXM1.16D 1.4 W

TXM1.8U 1.5 W

TXM1.8U-ML 1.8 W

TXM1.8X 2.2 W

TXM1.8X-ML 2.3 W

TXM1.6R 1.7 W

TXM1.6R-M 1.9 W

Terminations

I/O Terminals 20-12 AWG Solid

20-14 AWG Stranded

BIM and Power Supply 2 or 3 position screw terminal pluggable blocks

Operating Environment

+32°F to +122°F (0°C to 50°C)

5 to 95% rh (non-condensing)

Agency Listings

UL 864 UUKL

ULC-C100 UUKL7

UL 916 PAZX

CSA 22.2 No. 205 PAZX7

Agency Compliance

FCC Compliance

Australian EMC Framework (C-Tick)

European EMC Directive (CE)

European Low Voltage Directive (CE)

Dimensions

TX-I/O Modules: 2.52" (64 mm) L × 3.54" (90 mm) W × 2.75" (70 mm) D

TX-I/O BIM, P1 5" (128 mm) L × 3.54" (90 mm) W × 2.75" (70 mm) D

TX-I/O Power Supply 3.78" (96 mm) L × 3.54" (90 mm) W × 2.75" (70 mm) D

TX-I/O Bus Connection Module: 1.26" (32 mm) L × 3.54" (90 mm) W × 2.75" (70 mm) D

TX-I/O Ordering Information

Description	Product Number
→ TX-I/O Module, 8 DI points	TXM1.8D
→ TX-I/O Module, 16 DI points	TXM1.16D
TX-I/O Module, 8 Universal points	TXM1.8U
→ TX-I/O Module, 8 Universal points with LOID	TXM1.8U-ML
TX-I/O Module, 8 Super Universal points	TXM1.8X
→ TX-I/O Module, 8 Super Universal points with LOID	TXM1.8X-ML
TX-I/O Module, 6 DO with Relay points	TXM1.6R
→ TX-I/O Module, 6 DO with Relay points with manual override	TXM1.6R-M
→ TX-I/O Power Supply, 1.2 A, 4A Fuse	TXS1.12F4
TX-I/O Bus Connection Module, 4A Fuse	TXS1.EF4
TX-I/O Bus Interface Module, P1	TXB1.P1
2 sets, Address Keys 1-12	TXA1.K12
→ Address Keys 1-24	TXA1.K24
Address Keys 25-48	TXA1.K-48
Address Keys 49-72	TXA1.K-72
Labels for TX-I/O 100 sheets/pack Letter format	TXA1.LLT-P100
Replacement Label Holders	TXA1.LH

Regions where this Product is Sold

(US, Asia Pacific, Canada, Latin America, UK)

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PXC Compact Series

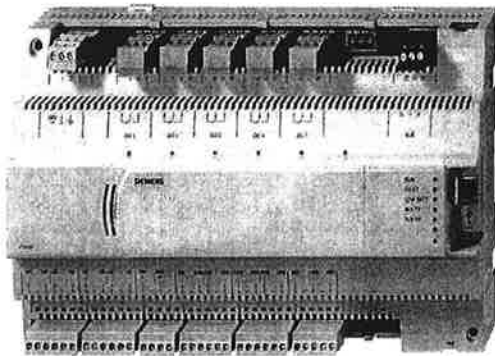


Figure 1. PXC Compact Series Controller (PXC-24 shown).

Description

The PXC Compact Series (Programmable Controller—Compact) is a high-performance Direct Digital Control (DDC) supervisory equipment controller, which is an integral part of the APOGEE® Automation System.

The PXC Compact Series offers integrated I/O based on state-of-the-art TX-I/O™ Technology, which provides superior flexibility of point and signal types, and makes it an optimal solution for AHU control. The controller operates stand-alone or networked to perform complex control, monitoring, and energy management functions without relying on a higher-level processor.

The PXC Compact Series supports the following configuration options:

- Ethernet TCP/IP
- Ethernet TCP/IP with VAEM
- Ethernet TCP/IP with FLN
- RS-485 ALN

The PXC Compact is available in 16- or 24-point versions with optional support for FLN devices (requires additional license). Selected models also include an extended temperature range for the control of rooftop devices.

Features

- Several styles of controllers available to match application requirements.
- DIN rail mounting and removable terminal blocks simplify installation and servicing.
- Proven program sequences to match equipment control applications.
- Sophisticated Adaptive Control, a closed loop control algorithm that auto-adjusts to compensate for load/seasonal changes.
- Built-in energy management applications and DDC programs for complete facility management.
- Comprehensive alarm management, historical data trend collection, operator control, and monitoring functions.
- Message control for terminals, printers, pagers, and workstations.
- Uses Siemens state-of-the-art TX-I/O™ Technology, which provides increased flexibility through highly-configurable I/O.
- Models with either 16 or 24 inputs/outputs to cost-effectively match the needs of the application.
- HMI RS-232 port provides laptop connectivity for local operation and engineering.
- Extended battery backup of Real Time Clock.
- ➔ Optional peer-to-peer communications over industry-standard 10Base-T/100Base-T Ethernet networks.
- Optional operation as a P1 FLN device with default applications.
- Optional P1 Wireless FLN support.
- Optional extended temperature range for rooftop installation.
- Optional support for up to 32 FLN devices when the ALN is connected to TCP/IP. (Additional license required.)
- Optional support for Virtual AEM when the ALN is connected to RS-485. (Additional license required.)

The Compact Series

Several styles of controllers provide flexibility to meet application needs.

PXC-16

In addition to building and system management functions, the PXC-16 provides control of 16 points, including 8 software-configurable universal points.

Point count includes: 3 Universal Input (UI), 5 Universal I/O (U), 2 Digital Input (DI), 3 Analog Output (AOV), and 3 Digital Output (DO).

PXC-24

In addition to building and system management functions, the PXC-24 provides control of 24 points, including 16 software-configurable universal points.

Point count includes: 3 Universal Input (UI), 4 Universal I/O (U), 4 Super Universal I/O (X), 3 Analog Output (AOV), 5 Digital Output (DO).

Available Options

The following options are available to match the application:

Ethernet or RS-485 ALN

Support for APOGEE P2 ALN through TCP/IP or RS-485 networks.

FLN Support

The "F" models of the PXC Compact Series support one P1 RS-485 FLN network of up to 32 devices when the ALN is connected to TCP/IP. (Additional license required.)

A Wireless FLN may also be used to replace some traditional P1 FLN cabling with wireless communication links that form a wireless mesh network. Additional hardware is required to implement the Wireless FLN.

For more information about FLN support, contact your local Siemens Building Technologies representative.

P1 FLN Operation

The PXC Compact can be configured as a programmable P1 FLN device. In the P1 FLN mode, the PXC Compact functions as an equipment controller with customized programming and default applications.

Virtual AEM Support

Without additional hardware, the Virtual AEM connects an RS-485 APOGEE Automation Level Network or individual field panels to a P2 Ethernet network. (Additional license required.) FLN support is not available when a Virtual AEM license is installed.

Extended Temperature Operation

The "R" models of the PXC Compact Series support extended temperature operation, allowing for rooftop installations.

Hardware

The PXC Compact Series consists of the following three major components, all included on a single board.

Input/Output Points

- The PXC Compact contains 16 or 24 points that perform A/D or D/A conversion, signal processing, point command output, and communication with the controller processor. The terminal blocks are removable for easy termination of field wiring.
- The Universal and Super Universal points leverage TX-I/O™ Technology from Siemens Building Technologies to configure an extensive variety of point types.
- Universal Input (UI) and Universal Input/Output (U) points are software-selectable to be:
 - 0-10V input
 - 4-20 mA input
 - Digital Input
 - Pulse Accumulator inputs
 - 1K Ni RTD @ 32°F (L&G Ni 1K)
 - 1K Pt RTD (375 or 385 alpha) @ 32°F
 - 10K NTC Type 2 Thermistor
 - 100K NTC Type 2 Thermistor
 - 0-10V Analog Output (Universal Input/Output (U) points only)
- Super Universal (X) points (PXC-24 only) are software-selectable to be:
 - 0-10V input
 - 4-20 mA input
 - Digital Input
 - Pulse Accumulator inputs
 - 1K Ni RTD @ 32°F (L&G Ni 1K)
 - 1K Pt RTD (375 or 385 alpha) @ 32°F
 - 10K NTC Type 2 Thermistor
 - 100K NTC Type 2 Thermistor
 - 0-10V Analog Output
 - 4-20 mA Analog Output
 - Digital Output (using external relay)
- Dedicated Digital Input (DI) points (PXC-16 only) are dry contact status sensing.
- Digital Output (DO) points are 110/220V 4 Amp (resistive) Form C relays; LEDs indicate the status of each point.
- Dedicated Analog Output (AOV) points support 0-10V.

Power Supply

- The 24 volt DC power supply provides regulated power to the input/output points and active sensors. The power supply is internal to the PXC Compact housing, eliminating the need for external power supply and simplifying installation and troubleshooting.
- The power supply works with the processor to ensure smooth power up and power down sequences for the equipment controlled by the I/O points, even through brownout conditions.

Controller Processor

- The PXC Compact Series includes a microprocessor-based multi-tasking platform for program execution and communications with the I/O points and with other PXC Compacts and field panels over the ALN.
- An RS-232 operator terminal port, with a quick-connect phone jack (RJ-45), supports operator devices (such as a local user interface or simple CRT terminal), and a phone modem for dial-in service capability.
- When battery replacement is necessary, the controller board illuminates a "battery low" status LED.
- The firmware, including the operating system, is stored in non-volatile flash ROM memory. Flash ROM is easily upgradeable at the job site. This provides for ease of upgrade as new firmware updates are made available.
- Brownout protection and power recovery circuitry protect the controller board from power fluctuations.
- LEDs provide instant visual indication of overall operation, network communication, and low battery warning.

Programmable Control with Application Flexibility

The PXC Compact Series of high performance controllers provides complete flexibility, which allows the owner to customize each controller with the exact program for the application.

The control program for each PXC Compact is customized to exactly match the application. Proven Powers Process Control Language (PPCL), a text-based programming structure like BASIC, provides direct digital control and energy management sequences to precisely control equipment and optimize energy usage.

Global Information Access

The HMI port supports operator devices, such as a local user interface or simple CRT terminal, and a phone modem for APOGEE dial-in service capability. Devices connected to the operator terminal port gain global information access.

Multiple Operator Access

Multiple operators can access the network simultaneously. Multiple operator access ensures that alarms are reported to an alarm printer while an operator accesses information from a local terminal. When using the Ethernet ALN option, multiple operators may also access the controller through concurrent Telnet sessions and/or local operator terminal ports.

Menu Prompted, English Language Operator Interface

The PXC Compact field panel includes a simple, yet powerful, menu-driven English Language Operator Interface that provides, among other things:

- Point monitoring and display
- Point commanding
- Historical trend collection and display for multiple points
- Event scheduling
- Program editing and modification via Powers Process Control Language (PPCL)
- Alarm reporting and acknowledgment
- Continual display of dynamic information

Built-in Direct Digital Control Routines

The PXC Compact provides stand-alone Direct Digital Control (DDC) to deliver precise HVAC control and comprehensive information about system operation. The controller receives information from sensors in the building, processes the information, and directly controls the equipment. The following functions are available in the PXC Compact:

- Adaptive Control, an auto-adjusting closed loop control algorithm. Provides more efficient, adaptive, robust, fast, and stable control than the traditional PID control algorithm. It is superior in terms of response time, holding steady state, and minimizing error, oscillations and actuator repositioning.
- Closed Loop Proportional, Integral and Derivative (PID) control
- Logical sequencing
- Alarm detection and reporting
- Reset schedules

Built-in Energy Management Applications

The following applications are programmed in the PXC Compact and require simple parameter input for implementation:

- Automatic Daylight Saving Time switchover
- Calendar-based scheduling
- Economizer control
- Equipment scheduling, optimization and sequencing
- Event scheduling
- Holiday scheduling
- Night setback control
- Peak Demand Limiting (PDL)
- Start-Stop Time Optimization (SSTO)
- Temperature-compensated duty cycling
- Temporary schedule override

PXC Compact Series Specifications

Dimensions (L × W × D)

PXC Compact Series

10.7" × 5.9" × 2.45"
(272 mm × 150 mm × 62 mm)

Processor, Battery, and Memory

Processor

Motorola MPC852T (PowerPC®)

Processor Clock Speed

100 MHz

Memory

24 MB (16 MB SDRAM, 8 MB Flash ROM)

Battery backup of SDRAM (field replaceable)

Non-rooftop Models
60 days (accumulated), AA (LR6)
1.5 Volt Alkaline (non-rechargeable)

Rooftop (Extended Temperature) Models
90 days (accumulated), AA (LR6)
3.6 Volt Lithium (non-rechargeable)

Battery backup of Real Time Clock

10 years

Communication

A/D Resolution (analog in)

16 bits

D/A Resolution (analog out)

10 bits

Ethernet/IP Automation Level Network (EALN)

10Base-T or 100Base-TX compliant

RS-485 Automation Level Network (ALN)

1200 bps to 115.2 Kbps

RS-485 P1 Field Level Network (FLN) *on selected models only, additional license required*

4800 bps to 38.4 Kbps

Human-Machine Interface (HMI)

RS-232 compliant, 1200 bps to 115.2 Kbps

USB Device port

Standard 1.1 and 2.0 USB device port, full speed 12 Mbps,
low speed 1.5 Mbps, Type B female connector.

Electrical

Power Requirements

24 Vac ±20% input @ 50 or 60 Hz

Power Consumption

20 VA @ 24 Vac

AC Power and Digital Outputs

NEC Class 1 Power Limited

Communication and all other I/O

NEC Class 2

Digital Inputs	Dedicated (PXC-16 only) Contact Closure Sensing Dry Contact/Potential Free inputs only Does not support counter inputs Defined through Universal Input (UI), Universal Input/Output (U), or Super Universal (X) circuits Digital Input Pulse Accumulator Contact Closure Sensing Dry Contact/Potential Free inputs only Supports counter inputs up to 20 Hz
Digital Outputs	Class 1 Relay
Analog Outputs	Dedicated or defined through Universal Input/Output (U) or Super Universal (X) circuits 0 to 10 Vdc On PXC-24 only 4 to 20 mA
Analog Inputs	Defined through Universal Input (UI), Universal Input/Output (U), or Super Universal (X) circuits Voltage (0-10 Vdc) Current (4-20 mA) 1K Ni RTD @ 32°F (Siemens or JCI) 1K Pt RTD (375 or 385 alpha) @ 32°F 10K NTC Type 2 or 3 Thermistor 100K NTC Type 2 Thermistor
Operating Environment	
Ambient operating temperature	32°F to 122°F (0°C to 50°C)
Ambient operating temperature <i>with rooftop (extended temperature) option</i>	-40°F to 158°F (-40°C to 70°C)
Shipping and storage environment	-40°F to 185°F (-40°C to 85°C)
Mounting Surface	Direct equipment mount, building wall, or structural member
Agency Listings	
UL	UL 864 UUKL (except rooftop models) UL 864 UUKL7 (except rooftop models) CAN/ULC-S527-M8 (except rooftop models) UL 916 PAZX (all models) UL 916 PAZX7 (all models)
Agency Compliance	FCC Compliance Australian EMC Framework European EMC Directive (CE) European Low Voltage Directive (LVD)

Ordering Information

PXC Compact Series

Product Number	Description
PXC16.2-P.A	PXC Compact, 16 point, RS-485 ALN
PXC16.2-PE.A	PXC Compact, 16 point, Ethernet/IP ALN
PXC24.2-P.A	PXC Compact, 24 point, RS-485 ALN
PXC24.2-PE.A	PXC Compact, 24 point, Ethernet/IP ALN
PXC24.2-PR.A	PXC Compact, 24 point, RS-485 ALN, rooftop option
PXC24.2-PER.A	PXC Compact, 24 point, Ethernet/IP ALN, rooftop option
PXC24.2-PEF.A	PXC Compact, 24 point, Ethernet/IP or RS-485 ALN, RS 485 FLN or Remote Ethernet/IP (Virtual AEM) supported with additional license
PXC24.2-PERF.A	PXC Compact, 24 point, Ethernet/IP or RS-485 ALN, rooftop option, RS-485 FLN or Remote Ethernet/IP (Virtual AEM) supported with additional license

Available Licenses

Product Number	Description
LSM-FLN	License to enable FLN support on the PXC Compact when the ALN is connected to TCP/IP
LSM-VAEM	License to enable Virtual AEM support when the ALN is connected to RS-485

Service Boxes and Enclosures

Product Number	Description
549-506	Service Box, 115V to 24 Vac, 50/60 Hz, 175 VA
549-507	Service Box, 230V to 24 Vac, 50/60 Hz, 175 VA
PXA-SB115V192VA	PX Series Service Box —115V, 24 Vac, 50/60 Hz, 192 VA
PXA-SB115V384VA	PX Series Service Box— 115V, 24 Vac, 50/60 Hz, 384 VA
PXA-SB230V192VA	PX Series Service Box— 230V, 24 Vac, 50/60 Hz, 192 VA
PXA-SB230V384VA	PX Series Service Box —230V, 24 Vac, 50/60 Hz, 384 VA
PXA-ENC18	18" Enclosure (Utility Cabinet) (UL Listed NEMA Type 1 Enclosure)
PXA-ENC19	19" Enclosure (UL Listed NEMA Type 1 Enclosure)
PXA-ENC34	34" Enclosure (UL Listed NEMA Type 1 Enclosure)

Documentation

Document Number	Description
553-104	PXC Compact Series Owner's Manual
125-1896	Powers Process Control Language (PPCL) User's Manual

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NOTE: SIEMENS PN 650-188 REFERS TO A UNIT CONDITIONER CONTROLLER CONTAINING A CUSTOM APPLICATION FOR FAN COIL UNITS WITH CONDENSATE ALARM MONITORING. ALL OTHER ASPECTS OF THIS CONTROLLER ARE SIMILAR TO THE ONE SHOWN HERE.

Unit Conditioner Controller



Figure 1. Unit Conditioner Controller.

The Unit Conditioner Controller (Figure 1) is an integral part of the APOGEE Automation System. The controller provides high performance Direct Digital Control (DDC) of pressure dependent boxes, fan coil units, and induction units. The Unit Conditioner Controller can operate stand-alone or can be networked to perform complex HVAC control, monitoring, and energy management functions. This controller is designed to reside on the Siemens Building Technologies APOGEE Automation System.

Features

- PID control of HVAC systems to minimize offset and maintain tighter setpoint control
- Unique control algorithms for specific applications
- HVAC diagnostic capability at the BLN level using the TBC Test Tool in CT
- Setpoints and control parameters assigned and changed locally or remotely
- Electrically Erasable Programmable Read Only Memory (EEPROM) used for storing setpoints and control parameters—no battery backup required

- Returns from power failure without operator intervention
- Meets low duct static pressure requirements
- Uses proven APOGEE Automation System DDC architecture
- No calibration required, thereby reducing maintenance costs
- Secure Mode (P/N 540-110C) prevents unauthorized users from making changes to the TEC through the MMI port or room sensor (supports FDA 21 CFR Part 11 compliance – guidelines for protection of electronic records)
- Applications in P/N 540-110C include a user-adjustable offset for the room temperature reading when required for validation purposes
- UL and cUL Listed for Smoke Control

Applications

Operating independently, or as part of the APOGEE Automation System, the Unit Conditioner Controller can control a variety of applications, including:

- Pressure Dependent Terminal Boxes:
 - Heating or Cooling
 - Hot Water Reheat
- Fan Coil Units:
 - Heat or Cool
 - Heating and Cooling
 - Three-Stage Electric Heat & Chilled Water
 - Three-Stage Electric Heat and Two Stage Cooling
 - Hot Water Heat and Two-Stage Cooling
- Induction Units

Control algorithms are preprogrammed. The controller is ready to operate after selecting the application and assigning the unit's controller address. If desired, the operator may adjust the air volume setpoints in CFM (l/s), room temperature setpoints and other parameters. The controller is designed for operation and modification without vendor assistance.

Secure Mode Features

Secure Mode

The Unit Conditioner Controller is also offered with an optional feature, Secure Mode (P/N 540-110C). Secure Mode prevents unauthorized users from making any changes to the TEC through the MMI port or room sensor. This functionality allows the TEC to support FDA 21 CFR Part 11 compliance - guidelines for protection of electronic records.

Hardware

Controller Board

The Unit Conditioner Controller consists of an electronic controller assembly. This controller provides all wiring terminations for system and local communication, and power. The cable from the room sensor (purchased separately) connects to the RJ-11 jack on the controller. All other connections are removable blocks. The controller assembly is mounted on a plastic track that mounts directly on the fan coil unit, induction unit, or pressure dependent box. An optional enclosure protects the controller assembly. The controller interfaces with the following external devices:

- Floating control valve and damper actuators
- Temperature sensors (room, pipe, and duct)
- Service and commissioning tools
- APOGEE Automation System
- Digital input devices (dry contacts from motion sensors, alarm contacts)
- Digital output devices (fan, stages of heat or stages of DX cooling)

Room Sensor

The room sensor connection to the controller board consists of a quick-connect RJ-11 jack. This streamlines the installation and reduces the TEC's start-up time. See the Room Temperature Sensors Technical Specification Sheet, P/N 149-312P25, for more information.

Unit Conditioner Controller Specifications

Power Requirements	
Operating Range	19 to 27.6 Vac 50 or 60 Hz
Power Consumption	60 VA maximum @ 24 Vac
Input	
Analog	1 room temperature sensor 1 setpoint (optional) 1 auxiliary temperature sensor
Digital	2 dry contact
Output	
	6 DO 24 Vac optically isolated solid state switch @ 0.5 Amp (0.25 Amp for Smoke Control)
Controlled Temperature Accuracy, Heating, or Cooling	
	± 1.5°F (0.9°C)
Dimensions	
	4-1/8" W x 7-3/4" L x 1-1/2" H (105 mm x 197 mm x 38 mm)
Weight	
	Approx. 3 lbs. (1.35 kg)
Communications	
Remote	FLN Trunk
Local	Portable Operator's Terminal
Ambient Conditions	
Storage Temperature	-40°F to 167°F (-40°C to 75°C)
Operating Temperature	32°F to 122°F (0°C to 50°C)
Humidity Range	10% to 92% (non-condensing)
Agency Listings	
UL Listing	CE, C-tick
CUL Listed	UL 916 PAZX
CSA Certified	UL 864, UUKL
FCC Compliance	

Optional Accessories

Pneumatic Transducer

The PTS Pneumatic Transducer contains the transducers that provide the signal conversion from electronic to pneumatic. The module is piped to the pneumatic actuator and wired to the Unit Conditioner Controller. This transducer provides for accurate control of pneumatic actuators for precise temperature and air volume control.

Specifications

Maximum Input Pressure	30 psi (207 kPa)
Air Consumption	0 SCIM
Power Consumption	4 VA @ 24 Vac max.
Dimensions	
	3-1/2" L x 2-1/4" W x 1-1/2" H (87 mm x 57 mm x 38 mm)
Weight	
	9 oz (0.3 kg)

Product Ordering Information

Description	Product Part Number
Unit Conditioner Controller	540-110
Unit Conditioner Controller with Secure Mode	540-110C
Smoke Control Listed Unit Conditioner Controller	540-110K
Smoke Control Listed Unit Conditioner Controller with Secure Mode	540-110CK
Smoke Control Listed Large Equipment Controller Enclosure	550-002K
Smoke Control Listed Small Equipment Controller Enclosure	540-155K
UL Listed Class 2 transformer with 120/240/277/480 Vac 50/60 HZ 0.4A primary w/ hub and 24Vac 50VA secondary w/ hub and circuit breaker for use with Smoke Control Listed Equipment Controllers	5041MWCB (SBT P/N MUC0240502TFCB)
UL Listed Class 2 transformer with 120/240/277/480 Vac 50/60 HZ 0.5A primary w/ hub and 24Vac 96VA secondary w/ hub and circuit breaker for use with Smoke Control Listed Equipment Controllers	10041MWCB (SBT P/N MUC0241002TFCB)
Pneumatic Transducer	PTS4

Document Ordering Information

Specification Sheet/Application Bulletin	Document Part Number
Room Temperature Sensors – Series 1000	149-312P25
Open Air Damper Actuators	155-188P25 (GDE/GLB131.1P)
Siemens Valves and Electronic Actuators: Powermite 599 Series – MT Series Terminal Unit Valve and Actuator Assembly Selection	155-306P25

NOTE: SIEMENS PN 550-188 REFERS TO A UNIT CONDITIONER CONTROLLER CONTAINING A CUSTOM APPLICATION FOR FAN COIL UNITS WITH CONDENSATE ALARM MONITORING. ALL OTHER ASPECTS OF THIS CONTROLLER ARE SIMILAR TO THE ONE SHOWN HERE.

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Room Temperature Sensors, Series 1000 and Standard Design and Semi-Flush Mount Series 2000 (Interactive)



Figure 1. Room Temperature Sensor--Series 1000 Shown with All Available Options.

The **Series 1000** and **Series 2000** Room Temperature Sensors from Siemens Building Technologies, Inc., offer a wide range of features and functionality that work in concert with the APOGEE® Automation System to deliver exceptional occupant comfort in even the most demanding application environments. The product family includes plain sensing-only variants, and fully interactive types with a two-line LCD that permits viewing and modifying controller points directly from the sensor's keypad and display as well as a semi-flush mount model (Series 2000). All sensors incorporate precision temperature sensing elements to accurately and reliably measure room temperature. Their compact, low profile design results in an attractive, inconspicuous installation. A styled ventilation ring optimizes airflow through the cover for fast measurement response and superior control.

Series 1000

The **Series 1000** Room Temperature Sensor provides accurate, reliable sensing of room temperature Terminal Equipment Controllers (TECs), Modular Building Controllers (MBCs), Remote Building Controllers (RBCs), Programmable Modular Controllers (PXC) and Modular Equipment Controllers (MECs).

TEC Applications

Room temperature sensors for TEC applications incorporate a thermistor element and plug-in Portable Operator's Terminal port located on the bottom of the cover. The plug-in Portable Operator's Terminal port provides a convenient means of communicating with the TEC to command or troubleshoot the system. These sensors connect to TECs via a six-wire cable terminated with a plug-in RJ-11 connector. The cable transmits the temperature, the communication with the Portable Operator's Terminal, and the optional setpoint and override signals.

MBC, RBC, PXC, and MEC Applications

Room temperature sensors for MBC, RBC, PXC and MEC applications incorporate a platinum RTD element. Connections to field panels are made via 18 to 22 AWG twisted pair cabling. A conveniently located unpluggable termination block simplifies both installation and service.

Optional Features

- **Digital temperature display:** The digital temperature display provides an easy-to-read room temperature value in degrees Fahrenheit or Celsius.
- **Setpoint adjustment:** The high accuracy setpoint adjustment incorporates dual temperature scale indication and an access door that covers the setpoint adjustment switch.
- **Override button:** The flush mounted override button allows an occupant to change to an occupied control schedule during the unoccupied cycle for a predetermined time period.
- **Maintenance free:** These sensors draw a small amount of power directly from the controller and do not use batteries. This eliminates the cost of battery replacement and disposal. Specifications (Series 1000)

Specifications (Series 1000)

Temperature Range	
Setpoint	55°F to 95°F (13°C to 35°C)
Operating	55°F to 95°F (13°C to 35°C)
Output Signals	Changing resistance
Sensing Element Type	
540 Models	10K NTC Thermistor (Type II)
544 Models	1K Platinum RTD (375 ALPHA)
Accuracy	
10K ohm Thermistor	
55 - 80.6°F (13 - 27°C)	±0.5°F (±0.3°C)
80.6 - 95°F (27 - 35°C)	±1.0°F (±0.5°C)
1,000 ohm RTD mid-range	
75°F (24°C)	±0.75°F (± 0.4°C)
Calibration Adjustments	None required
Installation	
TEC	100 ft. Maximum cable length. 6C #24 AWG, Belden 1228A or equal, NEC Class 2
MBC/RBC/PXC/MEC	300 to 750 ft Max. cable length 18 to 22 AWG twisted pair NEC Class 2
Installation Adjustments	None required
Cover	
Dimensions	3-11/32" H × 2-1/2" W × 1-1/2" D (85 mm × 63 mm × 38 mm)
Color	Desert beige or white
Power Consumption ¹	8.6 mW maximum
544-7xx units	

¹ Power consumption values apply only to those units with single line display.



Figure 2. Room Temperature Sensor and Semi-Flush Mount Room Temperature Sensor--Series 2000.

Series 2000

The **Series 2000** Room Temperature Sensors provide an interactive digital link to Terminal Equipment Controllers (TECs) that allows viewing and adjusting controller points directly from the sensor's liquid crystal display and keypad. These sensors incorporate a precision thermistor to accurately and reliably measure room temperature.

NOTE: The Semi-Flush Mount Sensor can only be mounted in a 2 × 4 box without a gang riser/ring.

Standard Features

- **Programmable Liquid Crystal Display (LCD):** A two-line alphanumeric LCD allows simultaneous display of room temperature, a user-selected critical point, and day/night operation status. Users may configure the screen to:
 - show English or metric units,
 - turn the room temperature display on or off,
 - select a critical point for display, or
 - turn off the critical point display.
- **Digital setpoint adjustment:** The sensor's keypad allows error-free digital setpoint adjustments in one-degree increments. Setpoint values momentarily display as changes are made.
- **Display of operating mode:** Graphic symbols are displayed to indicate the controller's operating mode. A "sun" indicates occupied mode operation and a "moon" indicates night mode operation.
- **Override button:** A flush-mounted override button allows users to change to an occupied control schedule during the unoccupied cycle for a period of time determined by the system operator.

Standard Features, Continued

- **Passkey security:** A special hardware passkey plugs into the sensor's MMI port to allow access to the display configuration menu and the controller's point database.

NOTE: The Semi-Flush Mount Sensor MMI port can only be accessed after the front housing is removed.

- **Backward compatibility:** These sensors are backward compatible with all TECs. The sensors are wired with six-conductor phone cables and standard RJ-11 connectors.
- **Maintenance free:** These sensors draw a small amount of power directly from the controller and do not use batteries. This eliminates the cost of battery replacement and disposal.

Specifications (Series 2000)

Effective Sensing and Setpoint Range (TEC)	55°F to 95°F (13°C to 35°C)
Output Signals	Changing resistance
Room temperature	Changing resistance
Setpoint	Digital
Thermistor Calibration Point (TEC)	77°F (25°C)
Accuracy (10K ohm Thermistor)	
55 - 80.6°F (13 - 27°C)	±0.5°F (±0.3°C)
80.6 - 95°F (27 - 35°C)	±1.0°F (±0.55°C)
Resistance value	10K Ω ohms
Calibration	None required
Installation (TEC)	100 ft maximum cable length 6C #24 AWG, NEC Class 2
Installation Adjustments	None required
Dimensions	3-11/32" H × 2-1/2" W × 1-1/2" D (85 mm × 63 mm × 38 mm)
Color	Desert beige or white

Product Ordering Information

TEC Description	Product Part Number
Series 1000	
Sensing only	540-660 ¹
Sensing only, no logo	540-661 ¹
Sensing with override	540-662 ¹ ←
Sensing with override, no logo	540-663 ¹
Sensing with setpoint	540-664 ¹
Sensing with temperature display	540-666 ²
Sensing with override and setpoint	540-670 ¹
Sensing with override and setpoint, no logo	540-671 ¹
Sensing with override and temperature display	540-672 ²
Sensing with setpoint and temperature display	540-676 ²
Sensing with override, setpoint and temperature display	540-680 ²
Series 2000	
TEC Sensor	540-650 ¹
Semi-Flush Mount Room Temperature Sensor, TEC	QAA1280.FWSC
MBC/RBC/PXC/MEC, Series 1000 Description	Product Part Number
Sensing only	544-760 ¹ ←
Sensing with override	544-762 ¹ ←
Sensing with setpoint	544-764 ¹
Sensing with temperature display	544-766 ²
Sensing with override, setpoint	544-770 ¹
Sensing with override, temperature display	544-772 ²
Sensing with setpoint, temperature display	544-776 ²
Sensing with override, setpoint, temperature display	544-780 ²

¹ Add letter suffix to indicate desired color: A=Desert Beige, B=White (for example, 540-660A).

² Add letter suffix to indicate temperature display units and color: F=°F, C=°C, A=Desert Beige, B=White (for example, 540-680FA).

Accessories Ordering Information

Description	Product Part Number
Occupancy Override Button, 25-pack (Beige)	544-480A
Occupancy Override Button, 25-pack (White)	544-480B
Setpoint Door, 25-pack (Beige)	544-481A
Setpoint Door, 25-pack (White)	544-481B
Blank Bezel, 25-pack (Beige)	544-482A
Blank Bezel, 25-pack (White)	544-482B
Room Temperature Sensor Repair Kit, Single-pack (Beige)	544-483A
Room Temperature Sensor Repair Kit, Single-pack (White)	544-483B
Blanking Override Button, 25-pack (Beige)	544-484A
Blanking Override Button, 25-pack (White)	544-484B
Passkey for Series 2000 Room Temperature Sensors	544-643
→ Single Adapter Base Kit (White)	544-782B
Single Adapter Base Kit (Beige)	544-782A
Double Adapter Base Kit (White)	544-783B
Double Adapter Base Kit (Beige)	544-783A
Extender Ring Kit (White)	544-785B
Extender Ring Kit (Beige)	544-785A
Non-Conduit Rough-In Kit	544-784
Series 2000 (Interactive) Room Temperature Sensors, User Guide	129-363
Sensor Power Supply Module (for MBC applications with digital display option)	PTX6.4SPS
Available with vinyl or plenum jacket in 25-foot, 50-foot and 100-foot lengths. Contact your local Siemens Building Technologies, Inc. field office for more information.	TEC room sensor cables (6 conductor w/RJ-11 connectors on each end)

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Analog Sensors—1000 Ω Platinum (375 α) RTD

Description

1000 Ohm Platinum (375 α) RTD sensors provide input for cost-effective, accurate temperature sensing (detecting) via a 20 AWG twisted, shielded cable pair. The sensor resistance varies according to the temperature being measured. Several models are available for specific mounting and sensing applications.

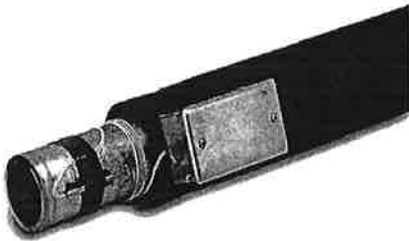


Figure 1. Surface Mounted Temperature Sensor.

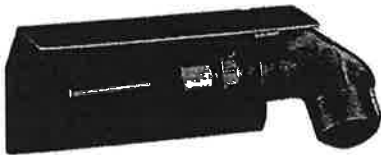


Figure 2. Outside Air Temperature Sensor.

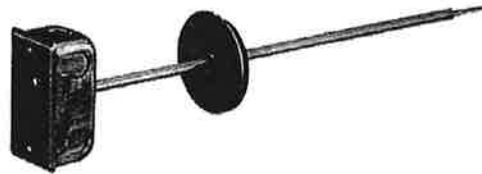


Figure 3. Duct (Single Point) Temperature Sensor (544-339-18 Shown with AQM2000 Accessory).



Figure 4. Duct (Averaging) Flexible Temperature Sensor.



Figure 5. Duct (Averaging) Rigid Temperature Sensor.



Figure 6. Liquid Immersion Temperature Sensor.

Specifications

Temperature Monitoring Ranges	See <i>Sensor Specifications</i>
Output Signal	Changing resistance
Elements	Platinum (or equivalent) wire resistance type
Accuracy	See <i>Sensor Specifications</i>
Reference Resistance at 32°F (0°C)	1000 Ohm

Sensor Specifications

Sensor Applications	Temperature Range (See Tolerance Formula at Bottom of Table)	Element Package	Part Number
Surface Mount - Pipe	-40°F to 240°F (-40°C to 116°C)	2-inch × 4-inch metal box with clamps	544-089
Outdoor Air		Through-the-wall	544-578
Duct - Single Point		4-inch (10 cm) 8-inch (20 cm) 18-inch (45 cm)	544-339-4 544-339-8 544-339-18 ←
Duct - Averaging, Rigid		18-inch (46 cm) 24-inch (60 cm) 36-inch (91 cm) 48-inch (122 cm)	544-343-18 544-343-24 544-343-36 544-343-48
Duct - Averaging, Flexible	Special Tolerances: 20°F ±2.3°F 70°F ±1.0°F 120°F ±2.8°F	8-foot (2.4 m) 16-foot (4.9 m) 25-foot (7.6 m)	544-342-8 544-342-16 544-342-24 ←
Liquid Immersion	-40°F to 240°F (-40°C to 116°C)	2.5-inch (5 cm) 4-inch (10 cm) 6-inch (15 cm) Stainless steel wells NEMA 4/IP56 (immersion heads only)	544-577-25 544-577-40 ← 544-577-60

Tolerance Formula: $\pm(0.54^{\circ}\text{F} + (0.005 \times |T_F - 32|)) \pm(0.3^{\circ}\text{C} + (0.005 \times |T_C|))$

where T_F (T_C) is the operating temperature point within the transmitter's range

(Example: For a sensor operating at 100°F; Tol = $\pm(0.54^{\circ}\text{F} + (0.005 \times |100^{\circ}\text{F} - 32^{\circ}\text{F}|))$ or $\pm 0.88^{\circ}\text{F}$)

Accessories

- AQM2000 Flange Gasket Kit (order separately if an adjustable depth is required for 544-339-18 duct point temperature sensors.)
- 544-577-RK Immersion Repair Kit

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Analog Sensors—100K Ω Thermistor

Description

100K Ohm Thermistor sensors provide input for cost-effective, accurate temperature sensing (detecting) for controllers from Siemens Building Technologies, Inc. via a 20 AWG twisted, shielded cable pair. The sensor resistance varies according to the temperature being measured. Several models are available for specific mounting and sensing applications.

Specifications

Temperature monitoring range	See <i>Sensor Specifications</i>
Output signal	Changing resistance
Elements	Thermistor
Accuracy	$\pm 0.36^{\circ}\text{F}$ ($\pm 0.2^{\circ}\text{C}$) at calibration point 77°F (25°C)
Reference resistance at 77°F (25°C)	100K Ω

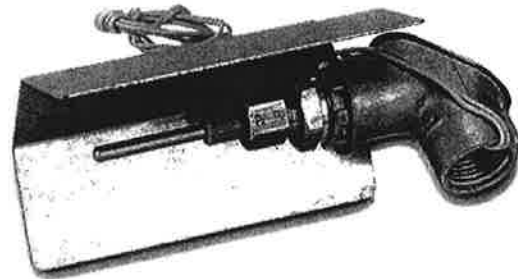


Figure 2. Outside Air Temperature Sensor.

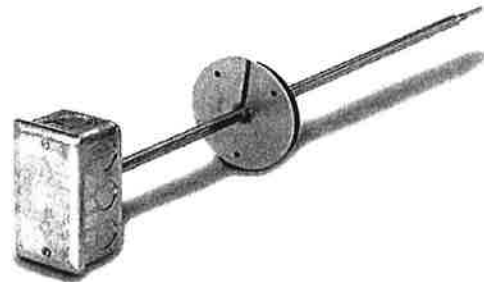


Figure 3. Duct (Single Point) Temperature Sensor (535-741-18 Shown with AQM2000 Accessory).

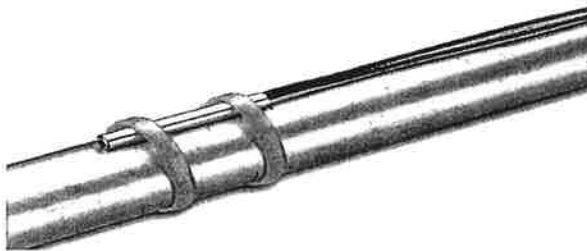


Figure 1. Surface Mounted Pipe Sensor.



Figure 4. Averaging Rigid Temperature Sensor.

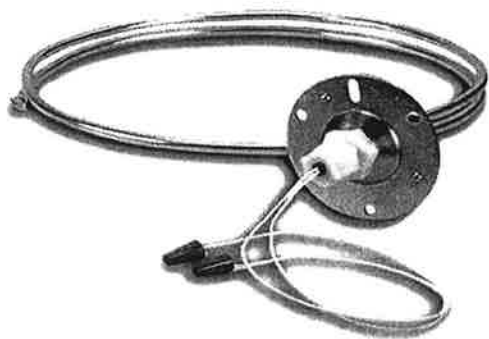


Figure 5. Averaging Flexible Temperature Sensor.

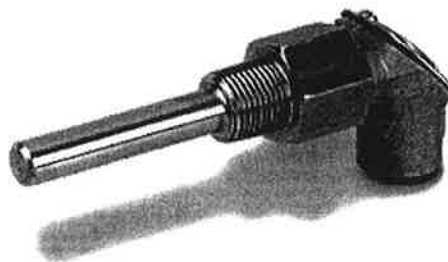


Figure 6. Liquid Immersion Temperature Sensor.

Sensor Specifications

Sensor Applications	Temperature Range*	Element Package	Part Number
Surface Mount - Pipe	-35°F to 240°F (-37°C to 116°C)	1-1/2 inch (3.8 cm) sensor with clamps	540-258
Outdoor Air	0°F to 120°F (-18°C to 49°C)	Through the wall	536-778
Rigid Duct - Single Point	40°F to 150°F (4°C to 66°C)	4-inch (10 cm) 8-inch (20 cm) 18-inch (45 cm)	535-741-4 535-741-8 535-741-18
Averaging	0°F to 180°F (-18°C to 82°C)	18-inch (46 cm) rigid 36-inch (91 cm) flexible 72-inch (18 m) flexible	540-244-18 540-245-36 540-246-72
Liquid Immersion	30°F to 240°F (-1°C to 116°C)	2.5-inch (5 cm) 4-inch (10 cm) 6-inch (15 cm) Stainless steel wells NEMA 4/IP56 (immersion heads only)	536-777-25 536-777-40 536-777-60

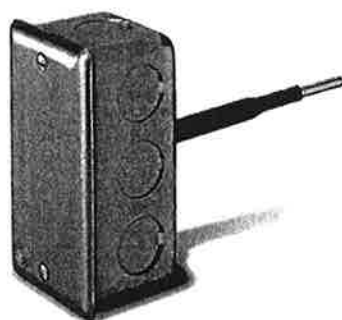
*Application sensing range is determined by controller to which the sensor is connected.

Accessories

- AQM2000 Flange Gasket Kit (order separately if an adjustable depth is required for 535-741-18 duct point temperature sensors)
- 536-777-RK Immersion Repair Kit

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Duct Point Temperature Sensors

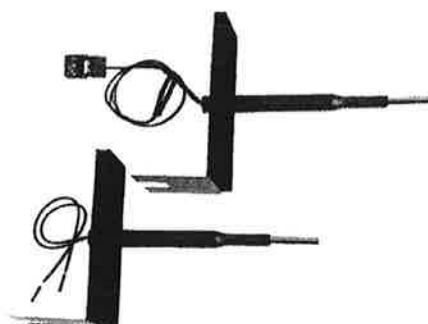


Description

The Duct Point Temperature Sensors provide an input for temperature monitoring and control. The 10K ohm thermistor sensors are available with either a flexible mounting plate or an attached 2 × 4 metal enclosure. The 100K ohm thermistor sensors are only available with a flexible mounting plate. The sensors are designed for quick and easy mounting on either round or rectangular sheet metal ductwork. A gasket and self-drilling screws are included with the sensors. The sensors are wired to the controller via a cable, which transmits the temperature signal to the controller.

Applications

Zone controllers use the Duct Point Temperature Sensors when an accurate, reliable indication of duct temperature is needed. They are well-suited for applications such as heating and cooling, morning warm up/cool-down, and monitoring discharge air temperature. The sensors' resistance varies proportionally to the actual duct air temperature being measured.



Specifications

Temperature Monitoring Range

10,000 ohms	55°F to 95°F (13°C to 35°C)
100,000 ohms	-35°F to 240°F (-37°C to 116°C)

Sensor elements	Thermistor
-----------------	------------

Output signal	Changing resistance
---------------	---------------------

Installation adjustment	None required
-------------------------	---------------

Calibration adjustment	None required
------------------------	---------------

Factory calibration point	77°F (25°C)
---------------------------	-------------

Mid-Range Accuracy

10,000 ohms	± .5°F (± .3°C)
100,000 ohms	± 1.1°F (± .6°C)

Specifications, Continued

Thermistor resistance @ calibration point	10,000 ohms or 100,000 ohms
Installation (maximum cable length shared in conduit with other NEC Class 2 wiring)	100 feet (30.48 m)

Dimensions

Probe length	3 inches (76.2 mm) or 18 inches (457 mm)
Mounting plate	1-1/2" W × 3-1/2" H (37.6 mm × 89 mm)

Ordering Information

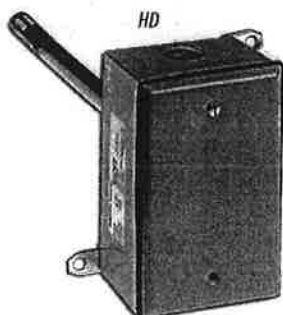
Duct Temperature Sensor

10,000 ohms	
Mounting flange with 4" probe	540-128
2 × 4 box with 4" probe	538-871
2 × 4 box with 18" probe	540-739
100,000 ohms	
Mounting flange	536-811 ←

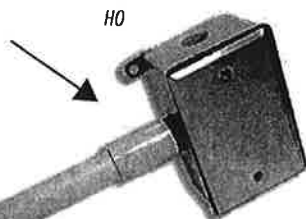
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1% & 2% NIST, or STANDARD
2%, 3%, or 5%

5 Year
Warranty



Die cast metal housing and
an extended five-year warranty



Exceptional accuracy, long-term stability...the
best in the industry for serviceability.
Available in 2%, 2% NIST, 3%, or 5% accuracies

Deluxe Duct and Outdoor Humidity Sensors

HD/HO Deluxe humidity transmitters provide an ideal solution for measuring relative humidity in all conditions. All devices are equipped with a thin-film capacitive sensor that is easily replaceable in the field. These sensors are calibrated to NIST standards, with certificates available.

The duct mounted HD is encased in a die cast metal housing for extra strength. The outdoor HO housing is completely weather proof – the most rugged sensor available.

All Deluxe models come with an extended five-year warranty.

APPLICATIONS

- Managing energy systems
- Controlling HVAC systems for improved comfort and energy savings
- Museums, schools, printing shops, and other locations requiring humidity control
- Facilitating compliance with ASHRAE standards for environmental control and indoor air quality

Sense humidity in harsh environments

- Thin-film polymer capacitive sensor element recovers from 100% saturation
- Fully interchangeable element to 1% (HD only), 2%, 3%, or 5% accuracy. Calibration-free!
- Replace element in the field...maintain accuracy and minimize downtime

Rugged industrial design

- Duct sensor element can be serviced without disturbing conduit
- Polarity insensitive, two-wire 4-20mA, or 3-wire 0-5/0-10VDC versions...flexible systems compatibility

Calibration-free interchangeable NIST traceable HS element

- HS element is microprocessor profiled with on-board nonvolatile memory
- Multi-point digital calibration to NIST standards
- NIST certification available
- Minimizes field calibration downtime

SPECIFICATIONS

HS Element	Digitally profiled thin-film capacitive (32 bit mathematics) U.S. Patent 5,844,138
Accuracy at 25°C from 10-80% RH*	±1% (HD only), 2%, 3%, or 5% (specify); multi-point calibration, NIST traceable
Reset Rate**	24 hours
Stability	±1% @ 20°C (68°F) annually, for two years
Operating Humidity Range	0 to 100% RH (non-condensing)
Hysteresis	1.5% typical
Linearity	Included in accuracy spec.
Duct Only Temperature Effect	±0.1% RH/°C above or below 25°C (typical)
Outdoor Only Temperature Effect	Voltage Versions (0.0015x%RHx(T°C-25))_ (%RHx0.0008xabs(T°C-25)) mA Versions (0.0013x%RHx(T°C-25))
Analog Output	4-20mA version: 2-wire, polarity insensitive, (clipped and capped) 0-5V/0-10V versions: 3-wire, observe polarity
Scaling	0-100% RH
Operating Temperature Range	-40° to 50°C (-40° to 122°F)
Input Power***	4-20mA version: loop powered 12-30VDC only, 30mA max. 0-5V/0-10V versions: 12-30VDC/24VAC, 15mA max.
Optional Temperature Transmitter Output	Digital, 4-20mA (clipped and capped) or 0-5V/0-10V output; HO transmitter accuracy: ±1.3°C (±2.3°F) typical; HD transmitter accuracy: ±0.5°C (1.0°F) typical
EMC Conformance – CE Option	EN 50081-1, EN 50082-1, EN 61000-4-4, EN 61000-4-5, EN 61000-4-3, ENV 50204, EN 61000-4-6

*Specified accuracy with 24VDC supplied power with rising humidity. RTD/Thermistors are not compensated for internal heating of product.

**Reset Rate is the time required to recover to 50% RH after exposure to 90% RH for 24 hours.

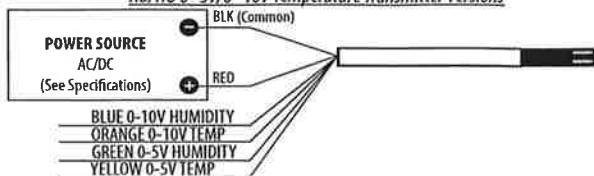
***One side of transformer secondary is connected to signal common, so an Isolation transformer or dedicated power supply may be required.

Shielded cabling is required for conformance to EMC standards. Technical information is available from factory upon request or is available on our website: www.veris.com.

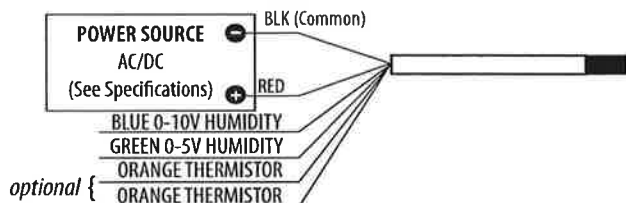


APPLICATION/WIRING DIAGRAMS

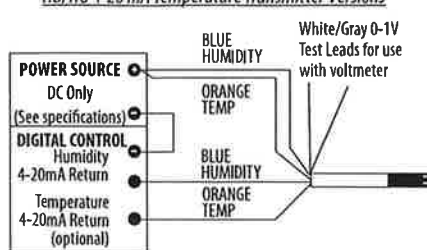
HD/HO 0-5V/0-10V Temperature Transmitter Versions



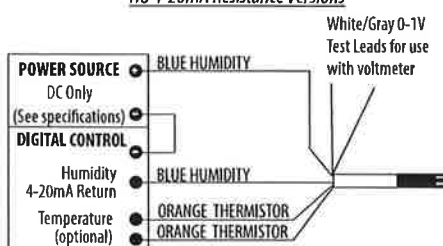
HO (0-5V/0-10V Resistance Versions)



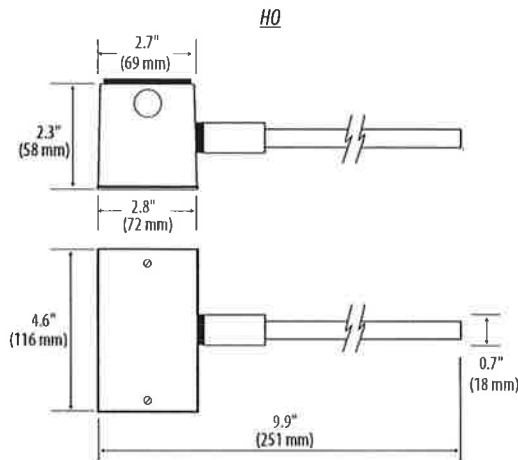
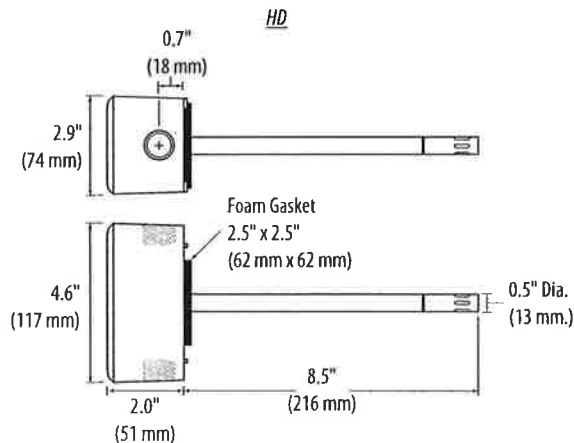
HD/HO 4-20 mA Temperature Transmitter Versions



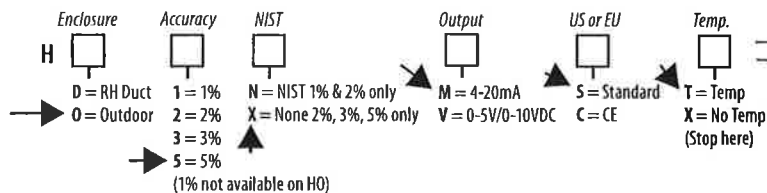
HO 4-20mA Resistance Versions



DIMENSIONAL DRAWINGS



ORDERING INFORMATION



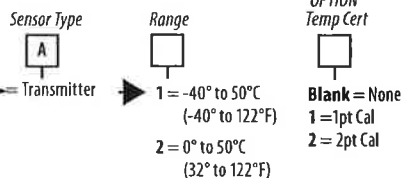
Example: (No Temp)

H O 2 X M S X

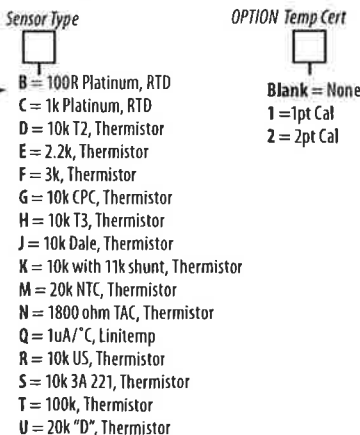
Example: (With Temp)

H D 2 N V C T C 2

Humidity Transmitter Combination



Humidity RTD/Thermistor Combination



ACCESSORIES

Water guard and other accessories...see page 218.
Replacement HS humidity element...see page 76.



800.354.8556



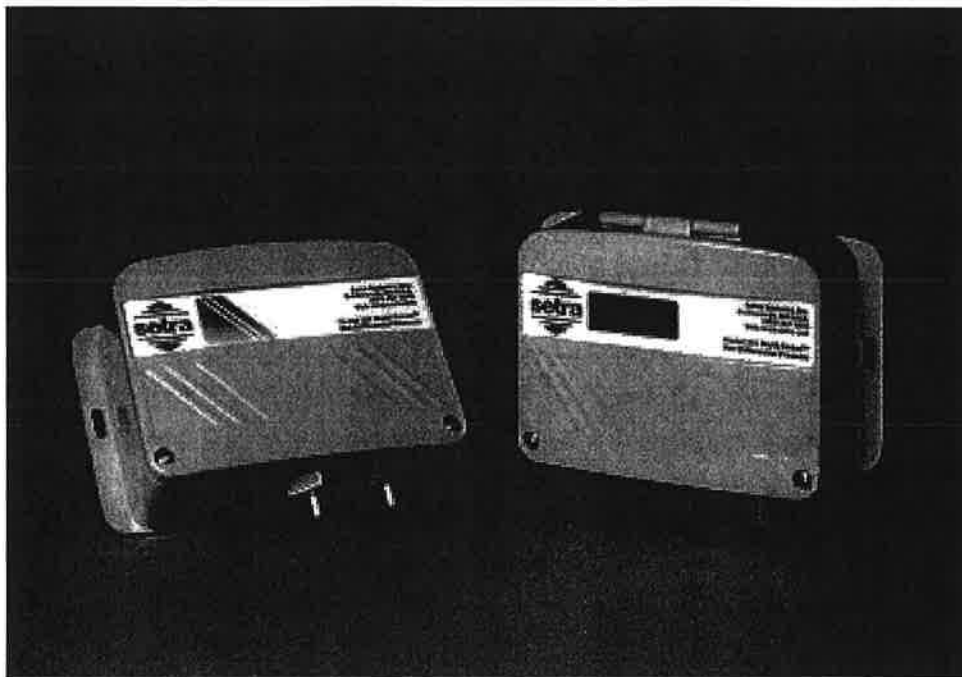
503.598.4564

www.veris.com

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Multi-Sense™ - Model 231

Wet-to-Wet, Differential Pressure Transducer



Setra's Model 231 Multi-Sense™ Wet-to-Wet differential pressure transducer all-inclusive design provides users with field accessible ranging, choice of output and field zeroing.

Choose from three configurable Model 231 pressure transducers: 5 up to 50 psid, 10 up to 100 psid, or 25 up to 250 psid. Each Model 231 has 4 unidirectional and 4 bidirectional switch selectable pressure ranges and can be reconfigured in the field for 0-5 VDC, 1-5 VDC, 0-10 VDC, or 4 to 20 mA output. (The 4 to 20 mA output is operable as a true 2-wire device.) The Model 231 jumper selectable port swap feature eliminates costly replumbing if the pressure transducer is improperly installed or replaced. An optional LCD display is available for on-site indication of line and differential pressure.

The Model 231 is designed with Setra's own dual pressure sensors, which incorporate thin film sensing technology. This technology offers exceptional thermal accuracy and signal linearity. Utilizing this technology, the Model 231 is resistant to long-term drift caused by dopant migration and Fermi-level effects, intrinsic in piezoresistive and silicon based technologies, which are exaggerated at elevated temperatures and by extended pressure cycling.

3-VALVE MANIFOLD

The Model 231 can be supplied with an optional 3-Valve Manifold assembly for ease of installation and maintenance. The 3-Valve Manifold is a machined brass body requiring no internal pipe connections, thereby eliminating the risk of internal leaks. The manifold's rugged, yet compact, construction requires minimum space for installation and use. If the Model 231 is ordered with the 3-Valve Manifold, the system is shipped completely assembled and ready for wall or pipe mounting. (Order as Pressure Fitting Code 3V.)



"All-in-One"
8 Selectable Ranges...One Transducer

NOTE: Setra quality standards are based on ANSI-Z540-1.
The calibration of this product is NIST traceable.

Patent Pending

Applications

- Energy Management Systems
- Process Control Systems
- Flow Measurement of Various Gases or Liquids
- Liquid Level Measurement of Pressurized Vessels
- Pressure Drop Across Filters

Features

- Field Selectable Output
- True 4 to 20 mA Output
- 0-5, 1-5, and 0-10 VDC Output
- Field Selectable Pressure Ranges
- Field Accessible Push-Button Zero and Remote Zero
- Dual Sensors
- Hinged Cover
- Field Selectable Port Swap
- Optional LCD Display
- All Cast Aluminum, NEMA 4 Rated Housing
- Meets CE Conformance Standards
- RoHS Compliant

Benefits

- Hinged Cover for Easy Access to Switch Selectable Features
- Dual Pressure Sensors Provide Independent High and Lo Pressures
- LCD Display for In-Situ Viewing of Hi, Lo, and Differential Pressure
- Field Calibration Saves Time and Money
- Port Swap Feature Eliminates Replumbing Existing Installations
- Reduces Inventory
- Saves Installation Cost



Visit Setra Online:
<http://www.setra.com>

setra
800-257-3872

Model 231 Specifications

Performance Data

Accuracy RSS* (at constant temp.)

Pressure Ranges A, B, C	±1.0% FS
Pressure Range D	±2.0% FS

Pressure Ranges

	A	B	C	D
MS1	50	25	10	5
MS2	100	50	20	10
MS3	250	125	50	25

Thermal Effects**

Compensated Range °F (°C)	+32 to +130 (0 to +54)
Zero Shift %FS/100°F (50°C)	2.0 (1.8)
Span Shift %FS/100°F (50°C)	2.0 (1.8)

Warm-up Shift	<0.12% FS
Response Time	1 to 5 sec. (selectable)
Maximum Working Pressure	Maximum Range of Pressure Ordered

Proof Pressure	2.2 x Full Scale
Burst Pressure	40 x Full Scale

*RSS of Non-Linearity, Non-Repeatability and Hysteresis.

**Units calibrated at nominal 70°F. Maximum thermal error computed from this datum.

Pressure Media

Liquids or Gases Compatible with 17-4 PH Stainless Steel

Note: Hydrogen not recommended for use with 17-4 H stainless steel.

Environmental Data

Temperature	
Operating °F (°C)	-4 to +185 (-20 to +85)
Storage °F (°C)	-4 to +185 (-20 to +85)
Vibration	10g from 50 Hz to 2000 Hz
Shock	200g

*Operating temperature limits of the electronics only.

Pressure media temperatures may be considerably higher or lower.

Physical Description (Model 231)

Case	Die Cast Aluminum, Powder Coated
Pressure Fittings	1/8-18 NPT Internal
Electrical Connection	1/2 in. Conduit
Size	4.0 x 6 x 2 in. (102 x 152 x 51mm)
Weight	1.5 lb
Sensor Cavity Volume	0.2 cc

Electrical Data (Voltage)

Circuit	3-Wire
Excitation	12 to 30 VDC/18 to 28 VAC (Reverse Excitation Protected)
Output*	0 to 5 VDC 0 to 10 VDC 1 to 5 VDC
Output Impedance	30 Ohms
Current Consumption	4 mA (typ.) at 5 VDC 5 mA (typ.) at 10 VDC 40 mA (typ.) at 18-28 VAC

*Calibrated into a 50K Ohm load, operable into a 5000 ohm load or greater.

Electrical Data (Current)

Circuit	2-Wire (Reverse Excitation Protected)
Output*	4 to 20 mA, Clipped and Capped

External Load 0 to 1000 Ohms

Minimum supply voltage (VDC) = 12 + 0.02 x (Resistance of receiver plus line).

Maximum supply voltage (VDC) = 30 + 0.004 x (Resistance of receiver plus line).

*Calibrated at factory with a 24 VDC loop supply voltage and a 250 ohm load.

3-Valve Manifold Assembly*

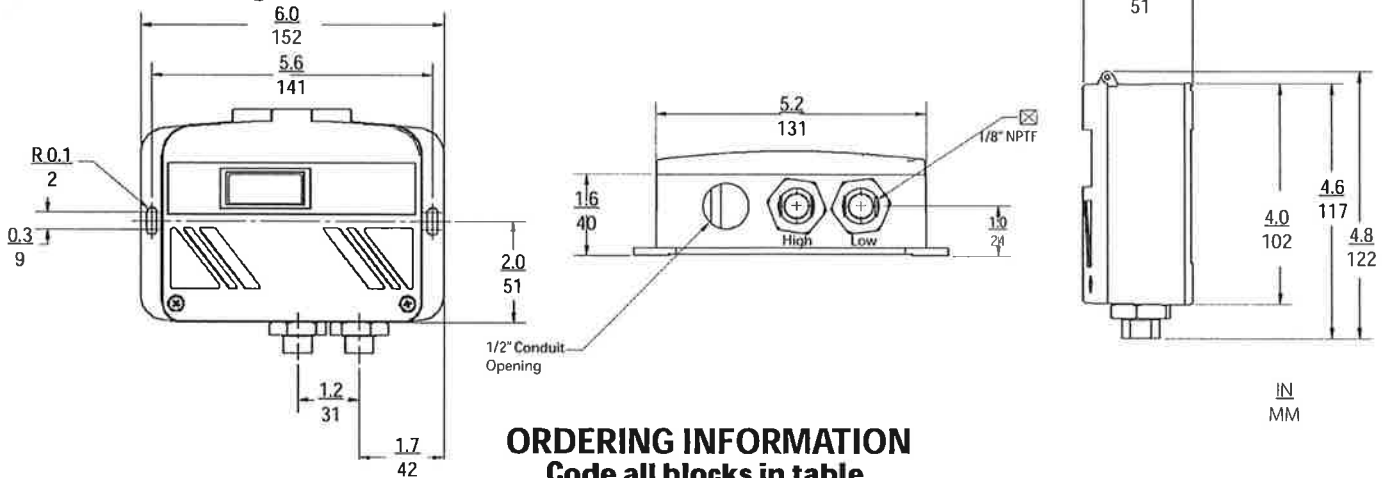
Physical Description

Manifold Block	Brass
Valves (3)	V1 for Connection to +Port V2 for Connection to -Port V3 for Equalizing Pressure
Valve Type	90° On/Off
Process Connections	1/4-18 NPT Internal Thread
Dimensions	6" x 11" (152mm x 279mm)
Weight	3 lbs.

*Order assembled with the Model 231 (Code 3V) or order separately as Accessory 231900-01.

Specifications subject to change without notice.

Outline Drawing



ORDERING INFORMATION

Code all blocks in table.

Example: Part No. 231GMS12FD is a Model 231, 5 PSID up to 50 PSID, 1/8" NPT Female Fitting, and LCD Display

Model	—	Ranges	—	Pressure Connection	—	Option
231G = 231		Unidirectional & Bidirectional		2F = 1/8-18 NPT Female (Standard)		N = No Display
		MS1 = 5, 10, 25 50 psid		Optional		D = LCD Display
		±5, ±10, ±25, ±50 psid		3V = 3-V Manifold assembled w/Model 231		
		MS2 = 10, 20, 50, 100 psid				
		±10, ±20, ±50, ±100 psid				
		MS3 = 25, 50, 125, 250 psid				
		±25, ±50, ±125, ±250 psid				

Please contact factory for versions not shown.

While we provide application assistance on all Setra products, both personally and through our literature, it is the customer's responsibility to determine the suitability of the product in the application.

159 Swanson Road, Boxborough, MA 01719/Tel: 978-263-1400;
Toll Free: 800-257-3872; Fax: 978-264-0292; email: sales@setra.com

setra

SSP231 Rev. A 01/10/07

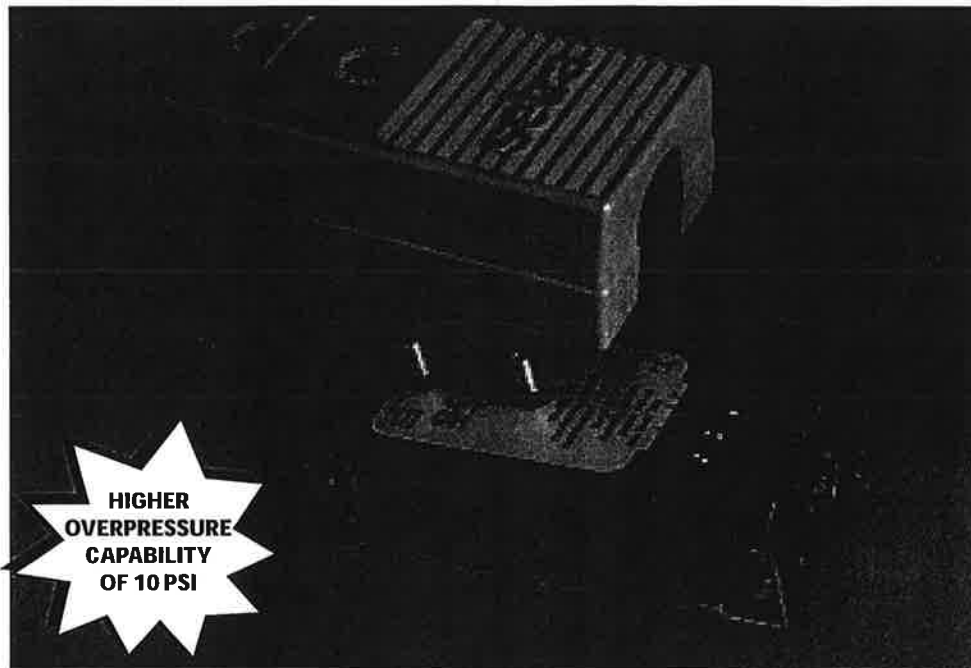
Model 264

Very Low Differential Pressure Transducer

Unidirectional Ranges: 0 - 0.1 to 0 - 100 in. W.C.

Bidirectional Ranges: 0 - ± 0.1 to 0 - ± 50 in. W.C.

Air or Non-Conducting Gas



Setra Systems 264 pressure transducers sense differential or gauge (static) pressure and convert this pressure difference to a proportional electrical output for either unidirectional or bidirectional pressure ranges. The 264 Series is offered with a high level analog 0 to 5 VDC or 4 to 20 mA output.

Used in Building Energy Management Systems, these transducers are capable of measuring pressures and flows with the accuracy necessary for proper building pressurization and air flow control.

The 264 Series transducers are available for air pressure ranges as low as 0.1 in. W.C. full scale to 100 in. W.C. full scale. Static standard accuracy is $\pm 1.0\%$ full scale in normal ambient temperature environments, but higher accuracies are available. The units are temperature compensated to 0.033% FS/ $^{\circ}$ F thermal error over the temperature range of 0° F to $+150^{\circ}$ F.



The Model 264 utilizes an improved all stainless steel micro-tig welded sensor. The tensioned stainless steel diaphragm and insulated stainless steel electrode, positioned close to the diaphragm, form a variable capacitor. Positive pressure moves the diaphragm toward the electrode, increasing the capacitance. A decrease in pressure moves the diaphragm away from the electrode, decreasing the capacitance. The change in capacitance is detected and converted to a linear DC electrical signal by Setra's unique electronic circuit.

The tensioned sensor allows up to 10 PSI overpressure (in either direction) with no damage to the unit. In addition, the parts that make up the sensor have thermally matched coefficients, which promote improved temperature performance and excellent long term stability.

When it comes to a product to rely on - choose the Model 264. When it comes to a company to trust - choose Setra, an ESOP (Employee - Owned) company.

NOTE: Setra quality standards are based on ANSI-Z540-1. The calibration of this product is NIST traceable.

U.S. Patent nos. 4093915; 4358814; 4434203; Other Patents Pending.

159 Swanson Rd., Boxborough, MA 01719/Telephone: 978-263-1400/Fax: 978-264-0292

Applications

- Heating, Ventilating and Air Conditioning (HVAC)
- Energy Management Systems
- Variable Air Volume and Fan Control (VAV)
- Environmental Pollution Control
- Lab and Fume Hood Control
- Oven Pressurization and Furnace Draft Controls

Benefits

- 10 PSI Overpressure on All Ranges.
- Installation Time Minimized with Snap Track Mounting and Easy-To-Access Pressure Ports and Electrical Connections.
- 0 to 5 VDC or 2-wire 4 to 20 mA Analog Outputs Are Compatible with Energy Management Systems.
- Reverse Wiring Protection.
- Internal Regulation Permits Use with Unregulated DC Power Supplies.



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<http://www.setra.com>

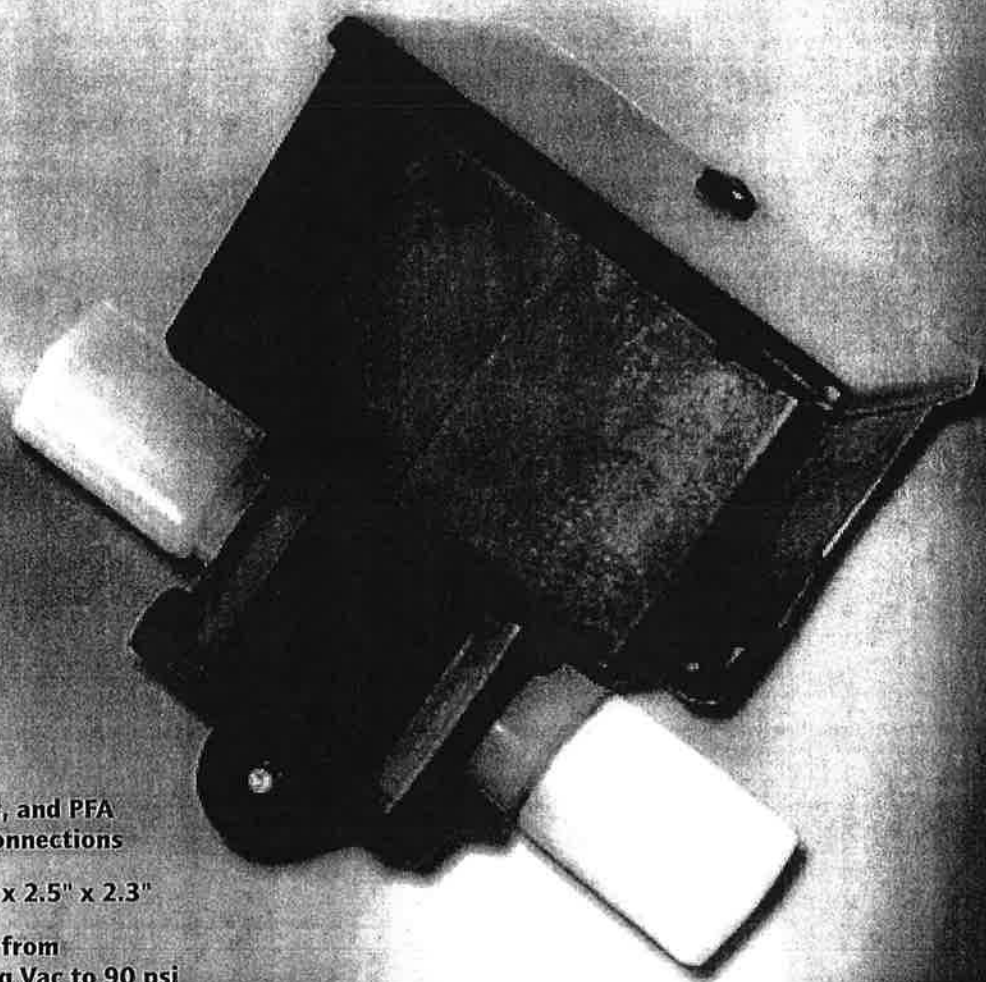
setra
800-257-3872

5SP264 Rev.C 11/01/39

24 Series

24 Series

DELTA-PRO™ DIFFERENTIAL PRESSURE, PRESSURE AND VACUUM SWITCHES



FEATURES

- Brass, Polysulfone®, and PFA Teflon® Pressure Connections
- Compact Size: 3.5" x 2.5" x 2.3"
- Adjustable Ranges from 1 to 45 psid, 30" Hg Vac to 90 psi
- $\pm 1\%$ Repeatability
- Terminal block wiring
- Optional red status light



UNITED ELECTRIC
CONTROLS

24 Series

24 Series

OVERVIEW

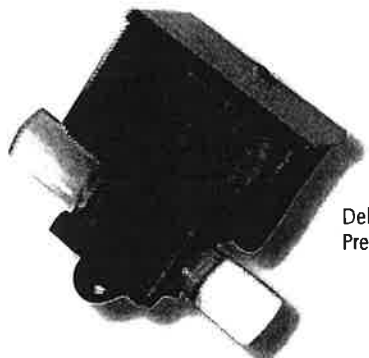
The 24 Series Delta-Pro™ pressure, differential pressure and vacuum switches offer a unique blend of compact size, excellent performance, environmental protection and attractive price. Available with brass, polysulfone®, or PFA Teflon® pressure connections the Delta-Pro will stand up in your most corrosive applications. The precision snap-acting switch and sensitive diaphragms combine to provide a narrow deadband and repeatability of approximately $\pm 1\%$ of range span. The convenient, externally accessible adjustment screw is multi-turn to provide easy set point adjustability. The force-balanced design gives the Delta-Pro excellent vibration resistance.



Delta-Pro with Brass
Pressure Connections



Delta-Pro with Polysulfone®
Pressure Connections



Delta-Pro with Flaretek PFA Teflon®
Pressure Connections

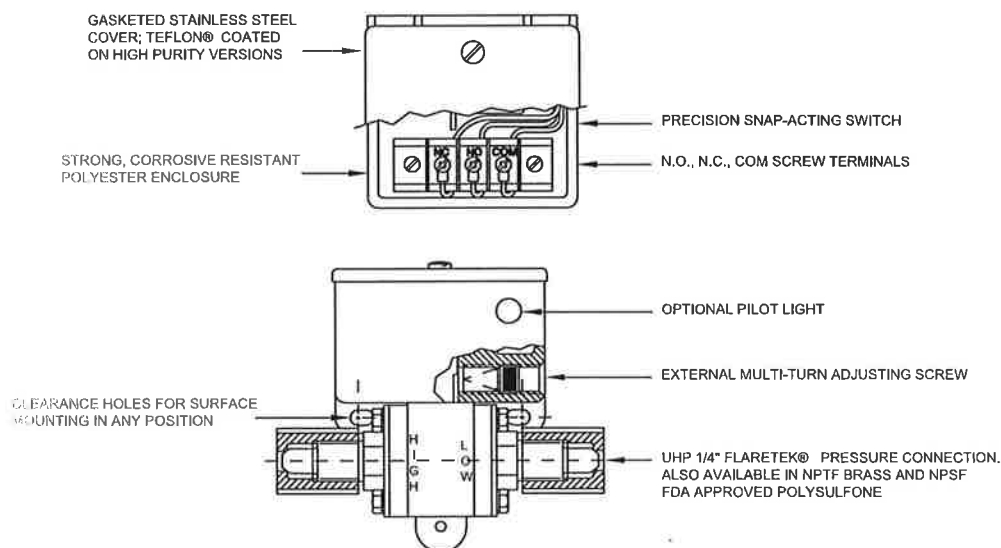
FEATURES

- Vacuum, Pressure or Differential pressure measurement
- Compact size:
3.5" x 2.5" x 2.3"
- 5 A @ 125/250 VAC SPDT snap-acting switch
- External multi-turn adjusting screw
- Complies with enclosure type 4 with watertight conduit fitting

APPLICATIONS

Typical applications include filter monitoring and proof-of-flow. High purity versions may also be used to monitor and control deionized water systems, wet benches, cleaning equipment, corrosive gas lines and bulk chemical handling systems.

TECHNOLOGY



The 24 Series (also known as the Delta Pro™) was designed to be a compact, cost-effective differential pressure switch for applications such as proof-of-flow, filter monitoring, etc. It depends on two opposing diaphragms to sense pressure on the "High" and "Low" pressure outputs of a system. The resulting pressure differential is transmitted through a linkage to a snap-action electrical switch, providing an output when a pre-set difference is exceeded. This set point can be easily modified while under pressure via an external adjusting screw. This adjustment "pre-loads" the actuation mechanism, which results in excellent vibration-resistance. Straight pressure and vacuum versions, with a single diaphragm, are also available.

SPECIFICATIONS

STORAGE TEMPERATURE

-20° to 180° F (-29° to 82°C)

AMBIENT TEMPERATURE

30° to 160°F (-1° to 71°C). Set point typically shifts less than ±0.6% of range for a 50°F (28°C) ambient temperature change; consult factory for special ratings

MAX MEDIA TEMPERATURE

200°F (93°C) at 100 psi working pressure;
160°F (71°C) at 100 psi working pressure for models 030, 031

SHOCK

Set point repeats after 15G, 10 millisecond duration. (MIL-STD-810)

VIBRATION

Set point repeats after 2.5 G, 5-500 CPS. (MIL-STD-810)

ENCLOSURE CLASSIFICATION

Complies with enclosure type 4 requirements with optional water tight conduit connector. Reinforced polyester body, stainless steel cover with neoprene gasket. All external hardware Teflon® coated on models 030 and 031

SET POINT REPEATABILITY

Typically ± 1% of span. Application dependent. Consult factory

SWITCH OUTPUT

SPDT precision snap-acting design with mechanical contact life of 10 million cycles. Actual life depends on electrical load and cycle frequency

ELECTRICAL RATING

Rated to 5 A resistive and 5 A inductive (75% PF) at 125 VAC and 250 VAC, 1/4 HP; 5 A resistive and 3 A inductive at 30 VDC and 0.5 A resistive and 0.25 inductive at 125 VDC. Gold clad silver contacts for minimum loads of 5 mA at 6 VDC, 2 mA at 12 VDC and 1 mA at 24 VDC

WEIGHT

6.5 oz.

ELECTRICAL CONNECTION

7/8" hole for optional 1/2" NPT conduit connector. Terminal block with screw terminals. Max wire size 16 AWG

PRESSURE CONNECTION

1/4" NPT (female) Brass; 1/4" NPS (female) FDA approved polysulfone®, non-tapered to minimize connection stress with 1/4" NPT (male) fittings, Max. torque 2 ft. lbs.; 1/4" Flaretek® style connections (nuts provided). Offers high vibration, leak resistant connections with minimal dead volume. On models 030 and 031 pressure connections are PFA Teflon®, nuts are PVD female

MOUNTING & INSTALLATION

Surface mount with two screws through clearance holes, or mount by pressure connections

Teflon® is a registered trademark of E.I. DuPont Company. Flaretek® is a registered trademark of Fluoroware, Inc
Polysulfone® is a registered trademark of Amoco.

APPROVALS



UL Listed, cUL Certified

Pressure: UL 508; CSA C22.2 No. 14-M95 -- File #E42272



CENELEC/TÜV Süddeutschland Bau und Betrieb GmbH (N.B. #0036)

TÜV certified to PED (97/23/EC)

Category IV, Module H1

Certificate #USA 02/04/38/001 thru USA 02/07/38/033



UEC Compliant to LVD (73/23/EC & 93/68/EEC)

MODEL CHART

Model	Adjustable Range		Typical Deadband		***Max. Working Pressure		**Proof Pressure	
	psi	bar	psid	bar	psi	bar	psi	bar
Polyurethane (polyether) diaphragm, ethylene propylene O-Ring, 1/4" NPT (female) brass pressure connection								
012	1 to 10	70 mbar to 0,7	0.75	0,05	150	10	150	10
014	4 to 45	0,3 to 3	1.0	0,07	150	10	150	10
Polyurethane (polyether) diaphragm, ethylene propylene O-Ring, 1/4" NPS (female) (mechanical) polysulfone® pressure connection								
011	1 to 10	70 mbar to 0,7	0.75	0,05	150	10	150	10
012	4 to 45	0,3 to 3	1.0	0,07	150	10	150	10
PFA Teflon® diaphragm, 1/4" Flaretek® PFA Teflon® pressure connection								
030	1 to 10	70 mbar to 0,7	0.75	0,05	100	7	100	7
031	4 to 45	0,3 to 3	1.0	0,07	100	7	100	7
					*Over Range Pressure		**Proof Pressure	
	psi	bar	psi	bar	psi	bar	psi	bar
Polyurethane (polyether) diaphragm, ethylene propylene O-Ring, 1/4" NPS (female) (mechanical) polysulfone® pressure connection								
015	30" to 2" Hg VAC	-1 bar to -70 mbar	2.5" Hg	0,08	150	10	150	10
016	1 to 10	70 mbar to 0,7	0.75	0,05	150	10	150	10
017	4 to 45	0,3 to 3	1	0,07	150	10	150	10
018	30 to 90	0,7 to 6	3	0,21	150	10	150	10
Polyurethane (polyether) diaphragm, ethylene propylene O-Ring, 1/4" NPT (female) connection								
019	30" to 2" Hg VAC	-1 bar to -70 mbar	0,08	150	10	150	10	
020	1 to 10	70 mbar to 0,7	0.75	0,05	150	10	150	10
021	4 to 45	0,3 to 3	1	0,07	150	10	150	10
022	10 to 90	0,7 to 6	3	0,21	150	10	150	10

*Over Range Pressure: The maximum pressure that may be applied continuously without causing damage and maintaining set point repeatability.

**Proof Pressure: The maximum pressure to which a pressure sensor may be occasionally subjected, which causes no permanent damage. The unit may require calibration (e.g. start-up, testing).

***Working Pressure: The pressure range within which two opposing sensors can be safely operated and still maintain set point adjustability provided the difference in pressure between them does not exceed the designated sensitivity range.

24 Series

24 Series

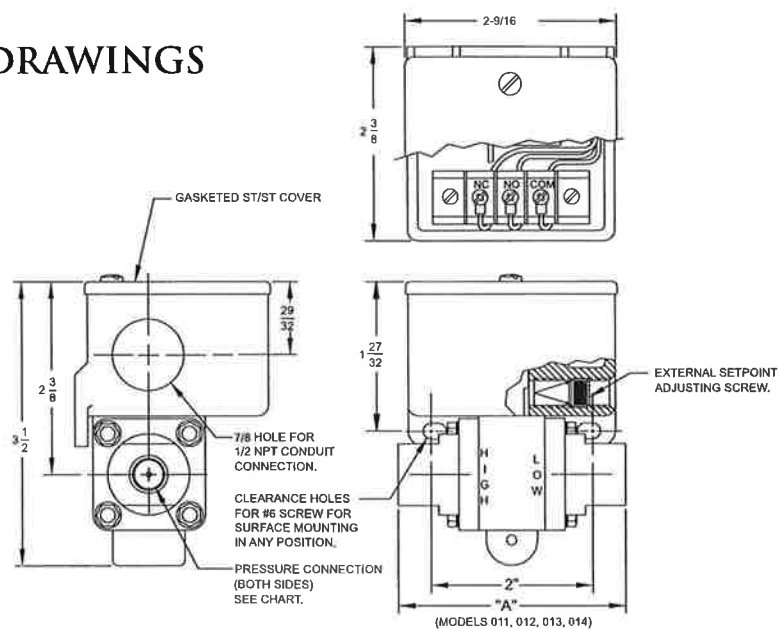
HOW TO ORDER

Build a part number by selecting a model and options. Choose the Sensor Type and the Range from the Model Chart. If options are required, add the code from the option list below. Example: 24 030 * M900.

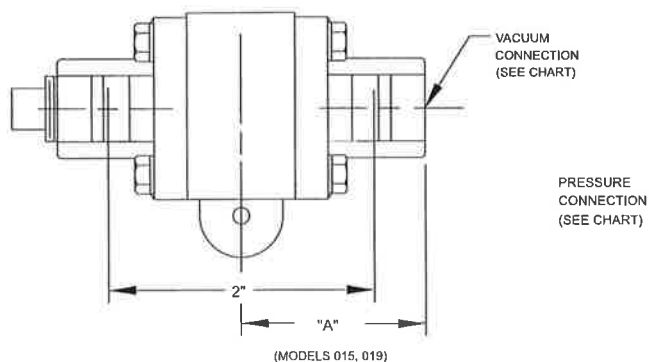
COMPONENTS		24	030	M900
CODE		Select a Type	Select a Model	Select an Option
SERIES DESIGNATION		24	030	M900
DESCRIPTION				
→ 24		Designation for 24 Series product line		
DIFFERENTIAL PRESSURE MODELS *				
011, 012		Polyurethane (polyether) diaphragm, ethylene propylene O-Ring, 1/4" NPS (female) (mechanical) polysulfone® pressure connection		
→ 013, 014		Polyurethane (polyether) diaphragm, ethylene propylene O-Ring, 1/4" NPT (female) brass pressure connection		
030, 031		PFA Teflon® diaphragm, 1/4" Flaretek® PFA Teflon® pressure connection *(See Model Chart for Differential Pressure Ranges)		
PRESSURE MODELS *				
015, 016, 017, 018		Polyurethane (polyether) diaphragm, ethylene propylene O-Ring, 1/4" NPS (female) (mechanical) polysulfone pressure connection		
019, 020, 021, 022		Polyurethane (polyether) diaphragm, ethylene propylene O-Ring, 1/4" NPT (female) brass pressure connection *(See Model Chart for Pressure Ranges)		
OPTIONS				
M020		Red status light, 115 VAC only. Specify whether light turns on or off with increasing or decreasing pressure		
M201		Factory set one switch; specify increasing or decreasing pressure and set point		
→ M262		Buna-N diaphragm and O-Ring: not available on models 030, 031		
M277		Range indicated on nameplate in kPa or MPa		
M278		Range indicated on nameplate in Kg/cm ²		
M407		CE Compliance to Pressure Equipment Directive (category IV) NOT AVAILABLE MODELS 015, 019, 030, 031		
M540		Viton® construction (deadbands and low end of range may increase slightly. Consult factory.) Wetted parts include Viton® diaphragm and/or O-Ring plus standard connection material. Not available on models 030, 031		
M900		Water tight conduit fitting; converts 7/8" hole to 1/2" NPT fitting; must specify for compliance		

DIMENSIONAL DRAWINGS

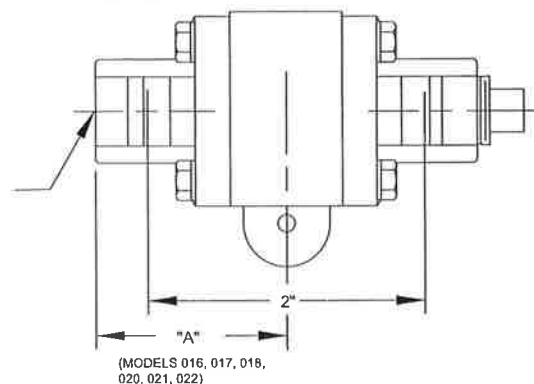
Models 011, 012, 013 & 014



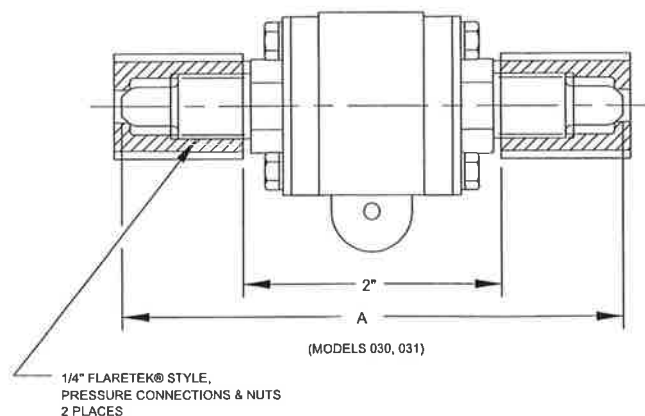
Models 015 & 019



Models 016, 017, 018, 020, 021 & 022



Models 030 & 031



Model	DIMENSION A	Pressure Connection
011, 012	2.75" (69.99mm)	1/4" NPS (F) Polysulfone
013, 014	3.13" (79.5mm)	1/4" NPT (F) Brass
015, 016, 017, 018	1.44" (36.5mm)	1/4" NPS (F) Polysulfone
019, 020, 021, 022	1.56" (39.6mm)	1/4" NPT (F) Brass
030, 031	4.00" (101.6mm)	1/4" Flaretek® Teflon

RECOMMENDED PRACTICES AND WARNINGS

United Electric Controls Company recommends careful consideration of the following factors when specifying and installing UE pressure and temperature units. Before installing a unit, the Installation and Maintenance instructions provided with unit must be read and understood.

- To avoid damaging unit, proof pressure and maximum temperature limits stated in literature and on nameplates must never be exceeded, even by surges in the system. Operation of the unit up to maximum pressure or temperature is acceptable on a limited basis (e.g., start-up, testing) but continuous operation must be restricted to the designated adjustable range. Excessive cycling at maximum pressure or temperature limits could reduce sensor life.
- A back-up unit is necessary for applications where damage to a primary unit could endanger life, limb or property. A high or low limit switch is necessary for applications where a dangerous runaway condition could result.
- The adjustable range must be selected so that incorrect, inadvertent or malicious setting at any range point cannot result in an unsafe system condition.
- Install unit where shock, vibration and ambient temperature fluctuations will not damage unit or affect operation. Orient unit so that moisture does not enter the enclosure via the electrical connection. When appropriate, this entry point should be sealed to prevent moisture entry.
- Unit must not be altered or modified after shipment. Consult UE if modification is necessary.
- Monitor operation to observe warning signs of possible damage to unit, such as drift in set point or faulty display. Check unit immediately.
- Preventative maintenance and periodic testing is necessary for critical applications where damage could endanger property or personnel.
- For all applications, a factory set unit should be tested before use.
- Electrical ratings stated in literature and on nameplate must not be exceeded. Overload on a switch can cause damage, even on the first cycle. Wire unit according to local and national electrical codes, using wire size recommended in installation sheet.
- Do not mount unit in ambient temp. exceeding published limits.

LIMITED WARRANTY

Seller warrants that the product hereby purchased is, upon delivery, free from defects in material and workmanship and that any such product which is found to be defective in such workmanship or material will be repaired or replaced by Seller (Ex-works, Factory, Watertown, Massachusetts, INCOTERMS); provided, however, that this warranty applies only to equipment found to be so defective within a period of 24 months from the date of manufacture by the Seller. Seller shall not be obligated under this warranty for alleged defects which examination discloses are due to tampering, misuse, neglect, improper storage, and in any case where products are disassembled by anyone other than authorized Seller's representatives. EXCEPT FOR THE LIMITED WARRANTY OF REPAIR AND REPLACEMENT STATED ABOVE, SELLER DISCLAIMS ALL WARRANTIES WHATSOEVER WITH RESPECT TO THE PRODUCT, INCLUDING ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

LIMITATION OF SELLER'S LIABILITY

Seller's liability to Buyer for any loss or claim, including liability incurred in connection with (i) breach of any warranty whatsoever, expressed or implied, (ii) a breach of contract, (iii) a negligent act or acts (or negligent failure to act) committed by Seller, or (iv) an act for which strict liability will be inputted to seller, is limited to the "limited warranty" of repair and/or replacement as so stated in our warranty of product. In no event shall the Seller be liable for any special, indirect, consequential or other damages of a like general nature, including, without limitation, loss of profits or production, or loss or expenses of any nature incurred by the buyer or any third party.

UE specifications subject to change without notice.

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56100 Kuala Lumpur, Malaysia
Phone: 603-9133-4122
FAX: 603-9133-4155



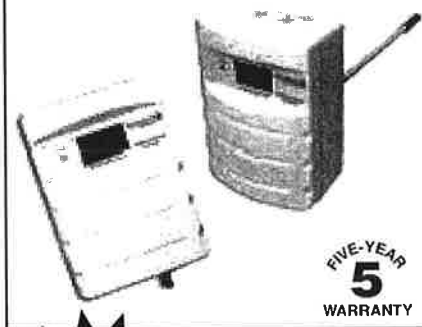
UNITED ELECTRIC
CONTROLS

180 Dexter Avenue, P.O. Box 9143
Watertown, MA 02471-9143 USA
Telephone: 617 926-1000 Fax: 617 926-2568
<http://www.ueonline.com>

EMCO5000403

PX Series Differential Pressure Transducer—Dry Media

Selectable Ranges...LCD Display...
Automatic Zero...



FIVE-YEAR
5
WARRANTY

The digital PX Series differential pressure transducers utilize a highly accurate and stable sensor, which is microprocessor profiled for improved accuracy and reliability. The stability, accuracy and ease of use characteristics of the PX models make them the ideal product for differential pressure monitoring applications.

Designed to monitor duct and static pressure in commercial buildings and to provide exceptional job-site flexibility, all PX models feature four field-selectable range options allowing just two models to cover applications for 0-0.1" to 0-10" W.C. The directional mode jumper provides the means to configure the transducer in unidirectional or bidirectional mode for room and building static pressure applications.

All models feature a pushbutton and digital input terminal to zero the output. A microprocessor algorithm prevents accidental zero adjustment during normal operation.

Advanced pressure sensing technology

PX Series pressure transducers utilize an advanced ceramic capacitive sensing element which provides a highly stable linear output. Output offset errors due to changes in temperature, warm-up and long term drift are significantly reduced compared to conventional sensors.

Applications

- Static pressure in duct or room applications
- Variable air volume system
- Filter status monitoring

Exceptional accuracy and stability

- Improved tolerance to overpressure and vibration reduces field failures
- High accuracy digital sensor maintains calibration and reduces callbacks
- High reliability sensor technology for long-term maintenance-free operation

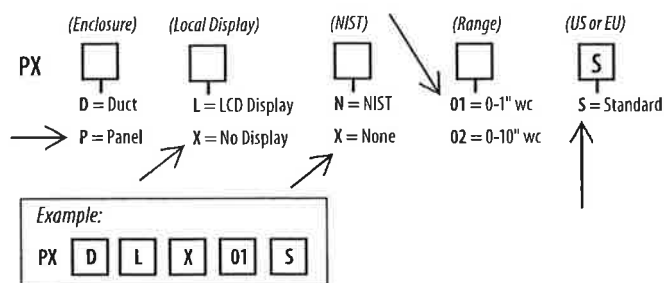
Lowest total installed cost

- Switch-selectable ranges reduce setup time and number of models to stock
- Microprocessor allows for a nine-point calibration increasing product accuracy and reliability
- Brass barb fittings prevent breakage and accommodate popular tubing sizes
- Built-in pickup tube simplifies installation and saves time (duct model)
- Circuit protection, prevents damage due to incorrect wiring

Low-differential room pressure sensor with LCD display

- Ideal for clean rooms, hospitals, fume hoods, computer rooms, and other very low differential pressure applications
- Monitors positive and negative pressure
- Field-adjustable ranges for maximum resolution
- Flush mount directly on wall or duct

ORDERING INFORMATION



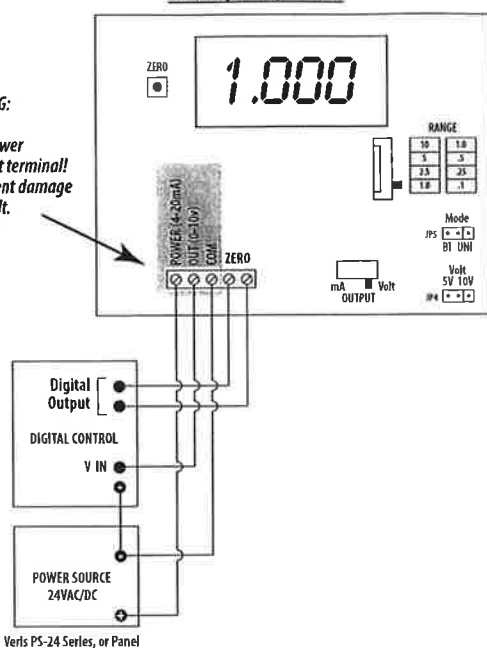
ACCESSORIES

Room and duct static pickup tubes. . .
See page 206

WIRING DIAGRAMS

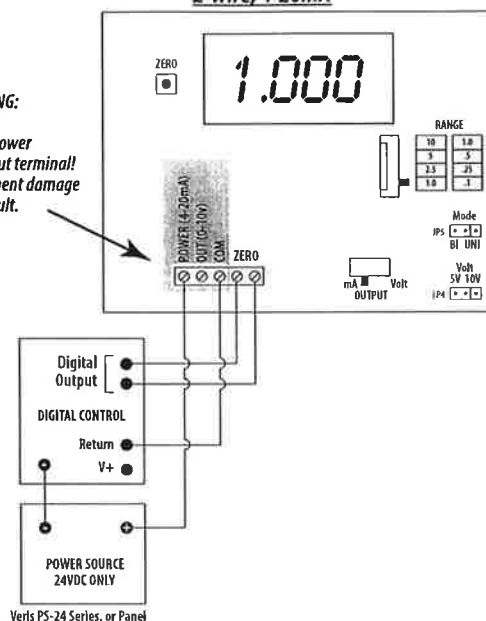
3-wire, 0-5V/0-10V

WARNING:
Do not
apply power
to output terminal!
Permanent damage
will result.

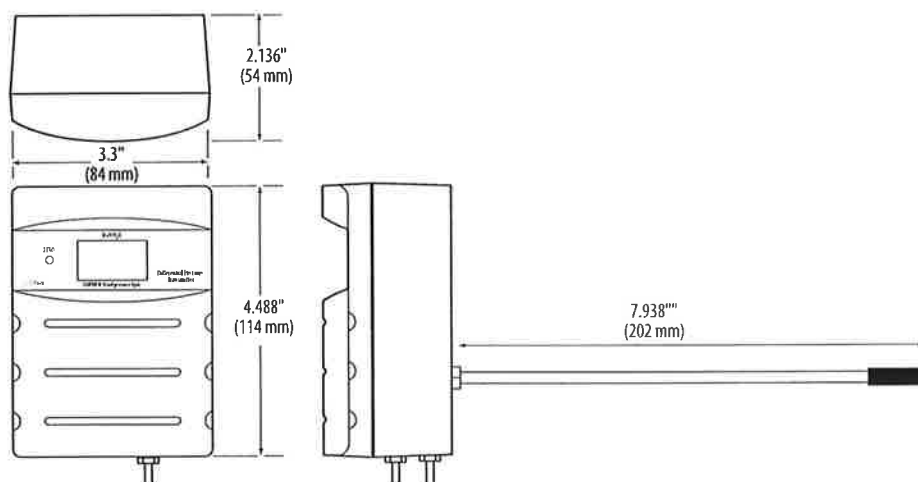


2-wire, 4-20mA

WARNING:
Do not
apply power
to output terminal!
Permanent damage
will result.



DIMENSIONAL DRAWINGS



SPECIFICATIONS

Media Compatibility	Dry air or inert gas
Input Power	12-30VDC, or 24VAC nominal
Output	Field selectable: 2-wire, loop-powered 4-20mA, (clipped and capped), or 3-wire 0-5V/0-10V
Pressure Ranges:	01 Unidirectional: 0.1/0.25/0.5/1.0" W.C. F.S., jumper-selectable
	02 Bidirectional: $\pm 0.1/\pm 0.25/\pm 0.5/\pm 1.0$ " W.C. F.S., jumper-selectable
	Unidirectional: 1.0/2.5/5.0/10" W.C. F.S., jumper-selectable
	Bidirectional: $\pm 1.0/\pm 2.5/\pm 5.0/\pm 10$ " W.C. F.S., jumper-selectable
Mode	Unidirectional or bidirectional, jumper-selectable
Display (option)	Signed 3-1/2 digit LCD, indicates pressure in inches of water column
Proof Pressure	3 psid
Burst Pressure	5 psid
Accuracy	$\pm 1\%$ F.S. Combined linearity and hysteresis
Temperature Effect	1" models: 0.05%/°C; 10" models: 0.01%/°C (Relative to 25°C) 0° to 50°C
Zero Drift (1-year)	1" models: 2.0% max.; 10" models: 0.5% max.
Zero Adjust	Pushbutton auto-zero and digital input (2-pos terminal block)
Operating Environment	0°- 60°C; 0 to 90% RH non-condensing
Fittings	Brass barb; 1/8" o.d.
Physical	High-impact ABS plastic

Hawkeye® Mini Split-Core Adjustable Setpoint Digital Output Current Switches 608 Series

22



H608 MINI SPLIT-CORE

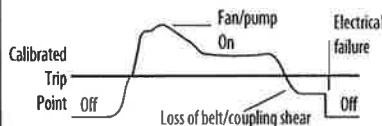
FIVE-YEAR
5
WARRANTY

The Hawkeye 608 Series is a high performance miniature split-core current status switch. Its low minimum setpoint (1.25A) and small size make it ideal for monitoring status of small to medium motor loads. With an amperage range of 1.25 to 50 amps, the 608 series can accurately detect belt loss, coupling shear, or other mechanical failure on loads from 1/5 to 40HP.

APPLICATIONS

- Detect belt loss, coupling shear and mechanical failure
- Verify lighting circuit and other electrical service run times
- Monitor status of industrial process equipment
- Monitor status of critical motors (compressor, fuel, etc.)

Detects belt loss/coupling shear!



Now you can easily detect when drive belts slip, break, or pump couplings shear. In fact, a typical HVAC motor that loses its load has a reduction of current draw of up to 50%. That's why our sensors are the industry standard for status.

New high performance miniature split-core

- Low (1.25A) minimum setpoint...eliminates the need for multiple wraps of the conductor through the sensor even on loads as small as 1/5HP
- Small size fits easily inside small starter enclosures
- Self-gripping iris eliminates the need for drill mounting...easy installation
- Status LEDs for easy setup and local indication
- 1 Amp status output for increased application flexibility

Monitor status of fans, pumps & electrical loads

- Detects belt loss and mechanical failure...ideal for fan/pump status monitoring
- Reliable cost-effective fan/pump status sensor...the 608 series replaces pressure switches and other electromechanical devices...no fitting or tapping required
- Adjustable set point (1.25-50A)
- 100% solid state...no moving parts to fail
- Mounting bracket for installation flexibility
- 5-year limited warranty



ORDERING INFORMATION

MODEL	AMPERAGE RANGE	OUTPUT TYPE (MAX.)	TRIP POINT ADJUSTMENT	STATUS OPEN LED	STATUS CLOSED LED
H608	1.25 - 50A	N.O. 1.0A@30VAC/DC	●	●	●
H606*	1.25 - 50A	N.C. .1A@30VDC	●	●	●
H609	1.25 - 50A	N.O. .2A@120VAC/DC	●	●	●

*Hx06 Models require a constant source of 5-30VDC power to the status contacts

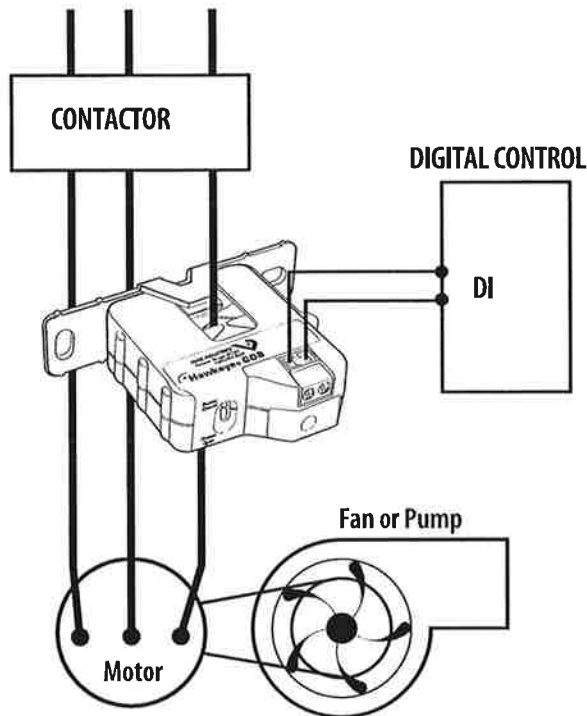


Do not use the LED indicators for evidence of applied voltage

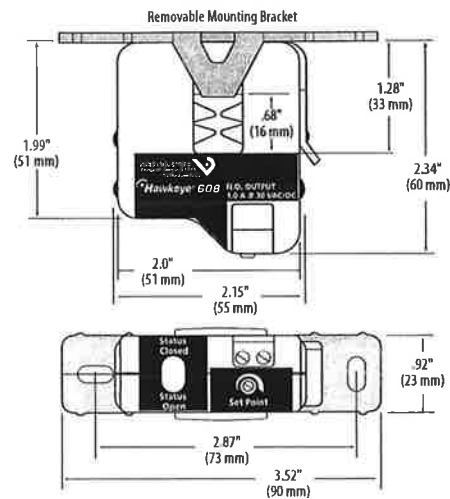
ACCESSORIES

MODEL	DESCRIPTION
AH01	DIN Rail Clip Set

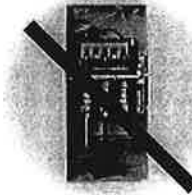
APPLICATIONS/WIRING EXAMPLE



DIMENSIONAL DRAWINGS



NO!

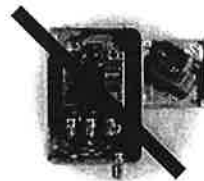


YES!

**The H608 Won't Hang at the Bottom of the Box.**

The H608's self gripping teeth free up the installer's hands making it possible to perform a one hand calibration.

NO!



YES!

**The H608 Eliminates Extra Enclosures.**

The H608's small size (2.33" x 2.0") eliminates the need for extra electrical enclosures and saves you installation time.

NO!



YES!

**The H608 Does Not Require Extra Wraps.**

With a low 1.25 Amp turn-on, multiple wraps of wire through the sensor are eliminated even on loads as small as 1/5HP.

SPECIFICATIONS

Amperage Range	1.25 to 50A
Sensor Power	Induced
Output	Digital switch (see ordering table)
Insulation Class	600VAC rms
Frequency Range	50/60 Hz.
Temperature Range	15° to 60°C
Humidity Range	0 - 95% non-condensing
Hysteresis	10% (typical)
Trip Setpoint	Adjustable 1.25 to 50A
Dimensions... (L x W x H)	(2.34" x 2.0" x .92")
Sensor Opening Size... (L x W)	.52" x .68"
Status Contacts (Hx06 Models)	
Supply Voltage	5-30VDC, permanently connected
Off-state Leakage (max.)	24µA@30VDC
On-state Voltage Drop	1.7VDC (max.)@0.1A

OpenAir™ GCA Series, Spring Return, 142 lb-in Electronic Damper Actuators

Description

The OpenAir GCA Series spring return, 142 lb-in electronic damper actuators provide modulating, two-position and three-position control of building HVAC dampers.

Product Number	Operating Voltage			Control				Cables		Built-in Control Options			
	24 Vac ± 20%	24 Vdc ±10%	120 Vac ± 10%	0 to 10 Vdc	2 to 10 Vdc or 0 to 10 Vdc	3-position	2-position	Standard	Plenum	Position Feedback	Dual Auxiliary Switches	Signal Inversion	Offset 0 to 5 Vdc Span 2 to 30 Vdc
GCA121.1U	•	•					•	•					
GCA121.1P	•	•					•		•				
GCA126.1U	•	•					•	•			•		
GCA126.1P	•	•					•		•		•		
GCA221.1U			•				•	•					
GCA226.1U			•				•	•			•		
GCA131.1U	•	•				•		•					
GCA131.1P	•	•				•			•				
GCA132.1P	•	•				•			•	•			
GCA132.1U	•	•				•		•		•			
GCA136.1P	•	•				•			•		•		
GCA136.1U	•	•				•		•			•		
GCA151.1U	•	•			•			•		•		•	
GCA151.1P	•	•			•				•	•		•	
GCA156.1U	•	•			•			•		•	•	•	
GCA156.1P	•	•			•				•	•	•	•	
GCA161.1U	•	•		•				•		•			
GCA161.1P	•	•		•					•	•			
GCA163.1U	•	•		•				•		•			•
GCA163.1P	•	•		•					•	•			•
GCA164.1U	•	•		•				•		•	•		•
GCA164.1P	•	•		•					•	•	•		•
GCA166.1U	•	•		•				•		•	•		
GCA166.1P	•	•		•					•	•	•		



Features

- Brushless DC motor technology with stall protection
- Bi-directional fail-safe spring return
- Patented self-centering shaft coupling
- Models available with dual independently adjustable auxiliary switches
- All modulating models offer built-in feedback
- Floating control models available with feedback potentiometer
- All metal housing
- Manual override
- 5° preload as shipped from factory
- Mechanical range adjustment capability by moving shaft coupling to desired position
- Easily visible position indicator
- Precabled
- UL60730 and cUL (C22.2 No. 24-93) listed

Technical Data

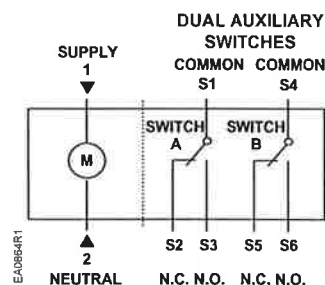
24 Vac, 120 Vac Torque:	142 lb-in (16 Nm) running and spring return <360 lb-in (40 Nm) maximum
Runtime for 90°:	90 sec. operating, 15 sec. typical (30 sec. max.) closing on power loss
Frequency:	50/60 Hz
Power consumption:	8 VA/6W (24Vac/dc; GCA12x, GCA13x)
Running:	9 VA/7W (24Vac/dc; GCA15x) 9 VA (24Vac/dc GCA16x) 9 VA (120 Vac GCA22x)
Power consumption:	3 VA/3W (24Vac/dc; GCA12x)
Holding:	5 VA/4W (24Vac/dc; GCA13x, GCA15x) 5 VA (24Vac/dc; GCA16x) 9 VA (120 Vac; GCA22x)
Equipment rating (24V):	Class 2 per UL/CSA
Noise level:	<45 dBA (running)
Angle of rotation:	90° nominal, 95° max.
Shaft dimensions:	3/8-in to 1-in (8 to 25.6 mm) dia. 1/4-in to 3/4-in (6 to 18 mm) sq. 3/4-in (20 mm) min. length
Operating temperature:	-25°F to 130°F (-32°C to 55°C)
Storage temperature:	-40°F to 158°F (-40°C to 70°C)
Ambient humidity:	95% rh (non-condensing)
Pre-cabled connection:	18 AWG, 3 ft (0.9 m) long
Enclosure:	NEMA 2, IP40 per EN60529
Material:	Die cast aluminum alloy
Agency listings:	CE, UL60730, cUL C22.2 No. 24-93
Gear Lubrication:	Silicone-free
Weight:	4.85 lb (2.2 kg)
Dimensions:	11-13/16 in (300 mm) H 4-3/4 in (120 mm) W 2-7/8 in (72 mm) D

Typical Specifications

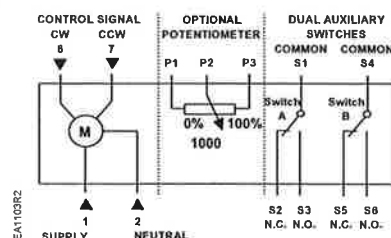
Spring-return damper actuators shall be the type that requires no connecting linkages. The spring return actuators shall have a self-centering damper shaft coupling that assures concentric alignment of the actuator's output coupling with the damper shaft and be capable of direct mounting to a shaft up to a 1-inch diameter. Actuators shall use a brushless DC motor and provide stall protection throughout the full range of rotation. All spring return actuators shall be capable of both clockwise and counterclockwise spring return fail-safe operation using a continuously engaged mechanical return spring that returns the actuator to a fail-safe position in <20 seconds in response to a loss of power. All actuators shall provide a means of manually positioning the output coupling in the absence of power. Dual independently adjustable auxiliary switches must be integral to the actuator. All actuators must be precabled and provide an easily readable high contrast yellow on black position indicator. All actuators shall be UL60730 and CSA22.2 listed and manufactured under ISO 9002 and ISO 14000 procedures. Actuators shall be designed for a minimum of 60,000 full stroke cycles at the actuators rated torque and temperatures. Actuators shall be as manufactured by Siemens Building Technologies, Inc.

Wiring Diagrams

2-Position, 24 Vac/dc:

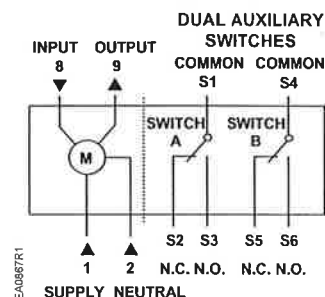


3-Position, 24 Vac/dc:

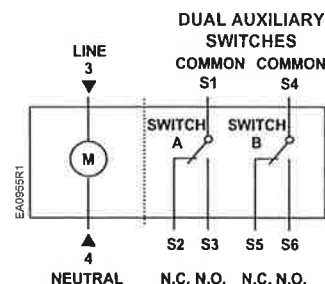


0 to 10 Vdc, GCA16x, 24 Vac/dc;

2 to 10 Vdc, GCA15x, 24 Vac/dc:



2-Position, 120 Vac:



Information in this publication is based on current specifications. The company reserves the right to make changes as design improvements are introduced. OpenAir is a registered trademark of Siemens Building Technologies, Inc. Other product or company names mentioned herein may be the trademarks of their respective owners. © 2006 Siemens Building Technologies, Inc.



GAS & SPECIALTY SENSORS

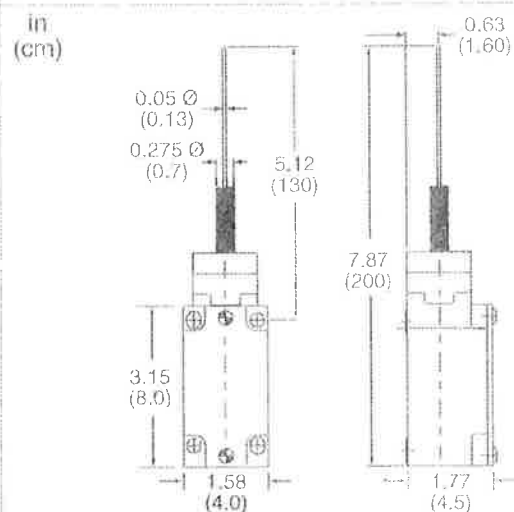
WHISKER SWITCH

LS45M91B11

DESCRIPTION

The **LS45M91B11 Whisker Switch** is a multidirectional metal limit switch. This spring-rod whisker version allows flexibility when applying to damper, valve, and other HVAC applications that need position sensing.

DIMENSIONS



LS45M91B11



SPECIFICATIONS

Operating temp	-13° to 158°F (-25° to 70°C)
Switch angle	14° make 6° reset
Weight	0.5 lb (0.23 kg)
Contacts	One N.O. and one N.C.
Switch rating	10A @ 24 VAC 5A @ 120 VAC 2.8A @ 24 VDC
Enclosure	NEMA 4X
Agency approvals	UL Listed, CE, CSA
Warranty	1 year

ORDERING INFORMATION

MODEL	DESCRIPTION
LS45M91B11	Whisker-style metal limit switch

NON-MERCURY DAMPER POSITION SWITCH

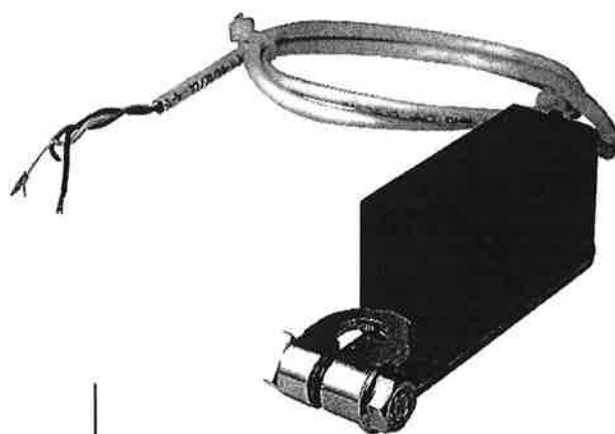
TS-475

DESCRIPTION

The **TS-475** uses a roller ball and mechanical switch. Many applications such as food processing areas will not allow a mercury-type switch. The **TS-475** offers a non-mercury alternative.

SPECIFICATIONS

Switch type	Mechanical
Switch rating	5A 120/250 VAC
Contact operation	SPDT
Switch angle	N.O. makes 20 degrees above horizontal, breaks 15 degrees below horizontal
Mounting	1/2" (1.27 cm) damper crank arm
Operating temp	-30° to 130°F (-34° to 54°C)
Cable	18/3 plenum rated
Enclosure	UL 94V-0 flammability rating
Wiring	
Red	Normally open
Black	Common
White	Normally closed
Dimensions	1.5"H x 4.375"L x 1.5"D (3.8 x 11.1 x 3.8 cm)
Weight	0.4 lb (0.2 kg)
Warranty	1 year



ORDERING INFORMATION

MODEL	DESCRIPTION
TS-475	Non-mercury damper position switch

RH Series — General Purpose Midget Relays

Key features of the RH series include:

- Compact midget size saves space
- High switching capacity (10A)
- Choice of blade or PCB style terminals
- Relay options include indicator light, check button, and top mounting bracket
- DIN rail, surface, panel, and PCB type sockets available for a wide range of mounting applications



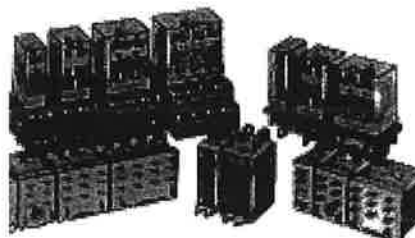
UL Recognized
Files No. E67770
E59804
E64245



CSA Certified
File No. LR35144



File No. BL951113332319



Specifications	Contact Material	Silver cadmium oxide
	Contact Resistance	50mΩ maximum (initial value)
	Minimum Applicable Load	24V DC/30mA, 5V DC/100mA (reference value)
	Operating Time	SPDT (RH1), DPDT (RH2): 20ms maximum 3PDT (RH3), 4PDT (RH4): 25ms maximum
	Release Time	SPDT (RH1), DPDT (RH2): 20ms maximum 3PDT (RH3), 4PDT (RH4): 25ms maximum
	Power Consumption	SPDT (RH1): DC: 0.8W AC: 1.1VA (50Hz), 1VA (60Hz) DPDT (RH2): DC: 0.9W AC: 1.4VA (50Hz), 1.2VA (60Hz) 3PDT (RH3): DC: 1.5W AC: 2VA (50Hz), 1.7VA (60Hz) 4PDT (RH4): DC: 1.5W AC: 2.5VA (50Hz), 2VA (60Hz)
	Insulation Resistance	100MΩ min (measured with a 500V DC megger)
	Dielectric Strength	SPDT (RH1) Between live and dead parts: 2,000V AC, 1 minute; Between contact circuit and operating coil: 2,000V AC, 1 minute; Between contacts of the same pole: 1,000V AC, 1 minute
		DPDT (RH2), 3PDT (RH3), 4PDT (RH4) Between live and dead parts: 2,000V AC, 1 minute; Between contact circuit and operating coil: 2,000V AC, 1 minute; Between contact circuits: 2,000V AC, 1 minute; Between contacts of the same pole: 1,000V AC, 1 minute
	Frequency Response	1,800 operations/hour
	Temperature Rise	Coil: 85°C maximum Contact: 65°C maximum
	Vibration Resistance	0 to 6G (55Hz maximum)
	Shock Resistance	SPDT/DPDT: 200N (approximately 20G) 3PDT/4PDT: 100N (approximately 10G)
	Life Expectancy	Electrical: over 500,000 operations at 120V AC, 10A; (over 200,000 operations at 120V AC, 10A for SPDT [RH1], 3PDT [RH3], 4PDT [RH4]) Mechanical: 50,000,000 operations
	Operating Temperature	-30 to +70°C
	Weight	SPDT: 24g, DPDT: 37g (approximately) 3PDT: 50g, 4PDT: 74g (approximately)



See page D-29 for dimensions.

Operational Characteristics

Maximum Continuous Applied Voltage (AC/DC) at 20°C	110% of the rated voltage
Minimum Operating Voltage (AC/DC) at 20°C	80% of the rated voltage
Drop-Out Voltage (AC)	30% or more of the rated voltage
Drop-Out Voltage (DC)	10% or more of the rated voltage

Ordering Information

Order standard voltages for fastest delivery. Allow extra delivery time for non-standard voltages.

Basic Part No.

RH2B-U

Coil Voltage:

AC110-120V

Part Numbers

Part Numbers: RH Series with Options

Termination	Contact Configuration	Basic Part No.	Indicator Light	Check Button	Indicator Light and Check Button	Top Bracket
B (blade)	SPDT	RH1B-U	RH1B-L*	—	—	RH1B-UT
	DPDT	RH2B-U	RH2B-UL	RH2B-UC	RH2B-ULC	RH2B-UT
	3PDT	RH3B-U	RH3B-UL	RH3B-UC	RH3B-ULC	RH3B-UT
	4PDT	RH4B-U	RH4B-UL	RH4B-UC	RH4B-ULC	RH4B-UT
V2 (PCB 0.078" [2mm] wide)	SPDT	RH1V2-U	RH1V2-L*	—	—	—
	DPDT	RH2V2-U	RH2V2-UL	RH2V2-UC	RH2V2-ULC	—
	3PDT	RH3V2-U	RH3V2-UL	RH3V2-UC	RH3V2-ULC	—
	4PDT	RH4V2-U	RH4V2-UL	RH4V2-UC	RH4V2-ULC	—



1. * RH1B(V2)-L is not UL recognized.
2. For Coil and Contact Ratings, see the next page.

D

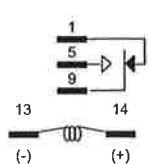
Part Numbers: Sockets

Relay	Standard DIN Rail Mount	Finger-Safe DIN Rail Mount	Surface Mount	Panel Mount	PCB Mount	Spring (optional)
RH1B	SH1B-05	SH1B-05C	—	SH1B-51	SH1B-62	SY2S-02F1 SFA-101 SFA-202 SY4S-51F1 SFA-301 SFA-302
RH2B	SH2B-05	SH2B-05C	SH2B-02	SH2B-51	SH2B-62	SY4S-02F1 SFA-101 SFA-202 SY4S-51F1
RH3B	SH3B-05	SH3B-05C	—	SH3B-51	SH3B-62	SH3B-05F1 SFA-101, -202 SY4S-51F1
RH4B	SH4B-05	SH4B-05C		SH4B-51	SH4B-62	SH4B-02F1 SFA-101, -202 SY4S-51F1

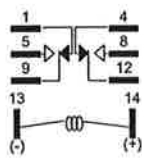


3. See Section F for details on sockets. All DIN rail mount sockets shown above can be mounted using DIN rail BNDN1000.

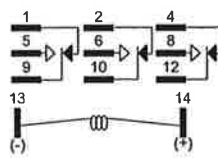
Internal Circuit



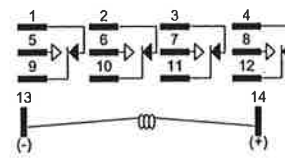
RH1



RH2



RH3



RH4

Ratings

Coil Ratings

Rated Voltage		Rated Current ±15% at 20°C								Coil Resistance ±15% at 20°C			
		60Hz				50Hz							
		SPDT		DPDT		3PDT		4PDT		SPDT	DPDT	3PDT	4PDT
AC	6V	150mA	200mA	280mA	330mA	170mA	238mA	330mA	387mA	18.8Ω	9.4Ω	6.0Ω	5.4Ω
	12V	75mA	100mA	140mA	165mA	86mA	118mA	165mA	196mA	76.8Ω	39.3Ω	25.3Ω	21.2Ω
	24V	37mA	50mA	70mA	83mA	42mA	59.7mA	81mA	98mA	300Ω	153Ω	103Ω	84.5Ω
	120V*	7.5mA	11mA	14.2mA	16.5mA	8.6mA	12.9mA	16.4mA	19.5mA	7,680Ω	4,170Ω	2,770Ω	2,220Ω
	240V†	3.2mA	5.5mA	7.1mA	8.3mA	3.7mA	6.5mA	8.2mA	9.8mA	3,1200Ω	15,210Ω	12,100Ω	91,20Ω
		SPDT		DPDT		3PDT		4PDT		SPDT	DPDT	3PDT	4PDT
DC	6V	128mA		150mA		240mA		250mA		47Ω	40Ω	25Ω	24Ω
	12V	64mA		75mA		120mA		125mA		188Ω	160Ω	100Ω	96Ω
	24V	32mA		36.9mA		60mA		62mA		750Ω	650Ω	400Ω	388Ω
	48V	18mA		18.5mA		30mA		31mA		2,660Ω	2,600Ω	1,600Ω	15,50Ω
	110V‡	8mA		9.1mA		12.8mA		15mA		13,800Ω	12,100Ω	8,600Ω	7,340Ω



* For RH2 relays = 110/120V AC.
† For RH2 relays = 220/240V AC.
‡ For RH2 relays = 100/110V DC.

D

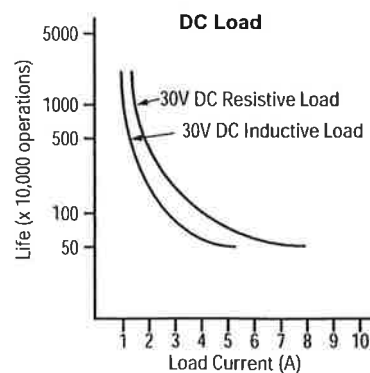
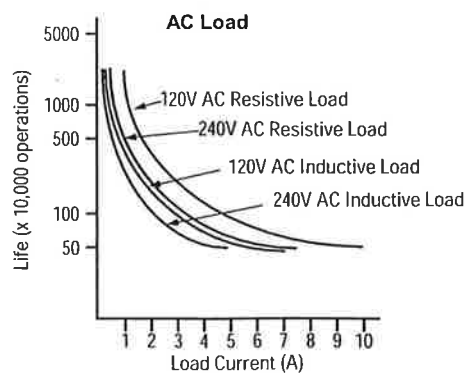
Contact Ratings

		Resistive				Inductive				Motor Load		
Voltage	Rating	SPDT	DPDT	3PDT	4PDT	SPDT	DPDT	3PDT	4PDT	SPDT	DPDT	
28V DC	UL	10A	10A	10A	10A	7.5A	—	—	7.5A	—	—	
30V DC	UL	10A	10A	10A	—	7A	7A	—	—	—	—	
	CSA				10A		7.5A	7.5A	7.5A	—	—	
	Nominal						7.5A		7.5A	—	—	
110V DC	Nominal	0.5A	0.5A	0.5A	0.5A	0.3A	0.3A	0.3A	0.3A	—	—	
120V AC	UL	10A	10A	10A	10A	7.5A	—	—	7.5A	1/6	1/6	
	CSA					7A	7.5A	7.5A		—	—	
	Nominal						7A	7.5A		7.5A	—	—
240V AC	UL	10A	10A	—	7.5A	7A	7A	*	5A	1/3	1/3	
	CSA							7A		7A	—	—
	Nominal							7A		7.5A	7.5A	4.5A



1. * 6.5A/pole, 20A total.
2. Inductive load $\cos \theta = 0.3$, L/R = 7ms.

Electrical Life Curves





310 South Union Street
P.O. Box 368
Russiaville, Indiana
46979-0368

Office (765) 883-5538
Orders (800) 888-5538
Fax (765) 883-7505
<http://www.functionaldevices.com>

RIBU1C

Enclosed Relay 10 Amp SPDT with 10-30 Vac/dc/120 Vac Coil



Functional Devices, Inc. A600B 2004



GENERAL SPECIFICATIONS

Relays & Contact Type: One (1) SPDT Continuous Duty Coil
Expected Relay Life: 10 million cycles minimum mechanical
Operating Temperature: -30 to 140° F
Operate Time: 20mS
Relay Status: LED On = Activated
Dimensions: 1.7" x 2.8" x 1.5" with 1/2" NPT nipple
Wires: 16", 600V Rated
Approvals: UL Listed, UL916, UL864, C-UL Canada
California State Fire Marshal
Housing Rating: Plenum, NEMA 1
Gold Flash: Yes
Override Switch: No

CONTACT RATINGS

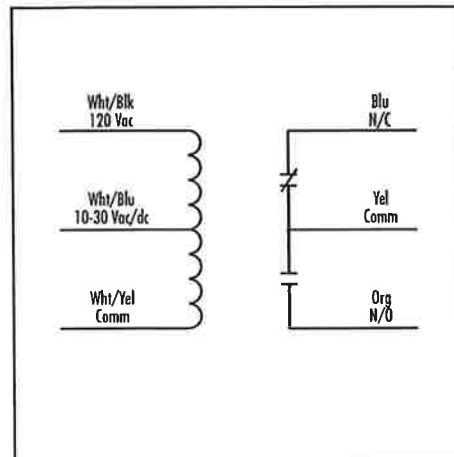
10 Amp resistive	120-277 Vac
10 Amp resistive	28 Vdc
480 VA Pilot Duty	240-277 Vac
480 VA Ballast	277 Vac
600 Watt Tungsten	120 Vac N.O.
240 Watt Tungsten	120 Vac N.C.
1/3 HP for N.O.	120-240 Vac
1/6 HP for N.C.	120-240 Vac
1/4 HP for N.O.	277 Vac
1/8 HP for N.C.	277 Vac

COIL CURRENT

30 mA @ 10 Vac	12 mA @ 10 Vdc
32 mA @ 12 Vac	14 mA @ 12 Vdc
42 mA @ 24 Vac	16 mA @ 24 Vdc
50 mA @ 30 Vac	18 mA @ 30 Vdc
25 mA @ 120 Vac	

COIL VOLTAGE INPUT

10-30 Vac/dc, 120 Vac; 50-60 Hz
DROP OUT = 2.1 Vac / 2.8 Vdc
PULL IN = 9 Vac / 10 Vdc



NOTES

• Can be ordered in a NEMA 4 enclosure by adding "-N4" to the end of the model number.

• Can be ordered in a red enclosure by adding "-RD" to the end of the model number.

NOTES:



PANEL & INSTALLATION MATERIALS

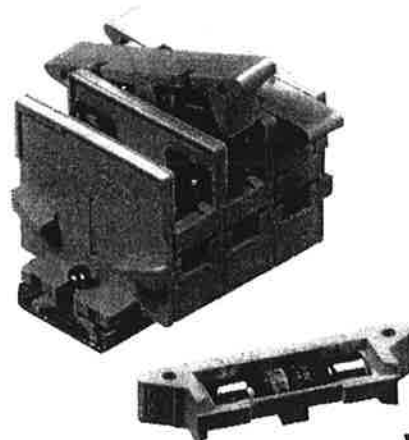
SECTIONAL FUSE HOLDERS MODEL 6W30

DESCRIPTION

Model 6W30 Sectional Fuse Holders are used with Model 6H38 Marathon sectional terminal blocks and may be mounted on the same mounting channel. Each row of fuse holders requires an end section. If the fuse holders are to be mounted alone, two mounting clamps are required in addition to the end section and mounting channel.

FEATURES

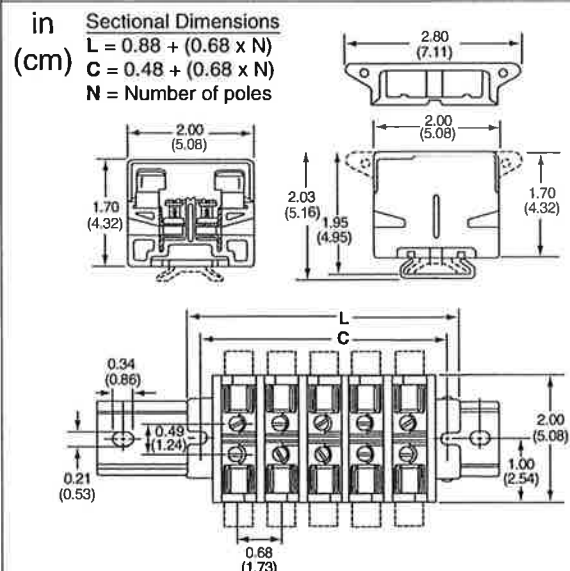
- *Sectional design for layout flexibility*
- *Channel mounting*
- *Built-in fuse puller*
- *Compatible with 6H38 sectional terminal blocks*



SPECIFICATIONS

Rated voltage	600V
Rated current	30A
Base material	White nylon, 221°F (105°C)
Flammability rating	94V-0
Wire range	22-10 AWG
Clip material	Copper alloy, tin plated
Agency approvals	UL-recognized component, File #E35113; CSA certified, File #LR21455
Fuse size	0.41" dia x 1.5"L (1.03 x 3.81 cm) (FLM/FLQ Series)

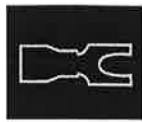
DIMENSIONS



ORDERING INFORMATION

MODEL	DESCRIPTION
→ 6W30A1-C	Sectional fuse holder, channel mount
→ 6WE-C	Fuse holder end section, channel mount
→ MC	Mounting clamp
MPC-3	Pre-punched aluminum mounting channel, 3' (0.91m)

RELATED PRODUCT
FLM/FLQ Fuse



PANEL & INSTALLATION MATERIALS

FUSES

FLM, FLQ, KLK, GF, K235, 251 SERIES, HRK

DESCRIPTION

FLM and FLQ Series Midget Fuses are slow acting fuses used with 6M30 Series, 6W30 Series, and FB2X Series fuse holders.

APPLICATION

- Inductive loads, power supplies, control transformers, and control circuits with high inrush currents

SPECIFICATIONS / ORDERING INFORMATION

AMP RATING	250V MODEL	500V MODEL
0.5	FLM-0.5	FLQ-0.5
0.8	FLM-0.8	FLQ-0.8
1.0	FLM-1	FLQ-1
1.25	FLM-1.25	FLQ-1.25
1.5	FLM-1.5	FLQ-1.5
2.0	FLM-2	FLQ-2
2.5	FLM-2.5	FLQ-2.5
3.0	FLM-3	FLQ-3
4.0	FLM-4	FLQ-4
5.0	FLM-5	FLQ-5
7.0	FLM-7	FLQ-7
10.0	FLM-10	FLQ-10
15.0	FLM-15 (125 VAC)	FLQ-15
20.0	FLM-20 (32 VAC)	FLQ-20
30.0	FLM-30 (32 VAC)	FLQ-30
AMP RATING 3.0A		600V MODEL KLK-3



FLM/FLQ/KLK Series



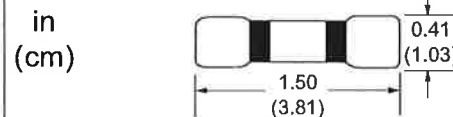
DESCRIPTION

The KLK-3 Series fuses are fast-acting fuses.

APPLICATION

- Watt meters, watt transducers, and control circuits without high inrush currents

DIMENSIONS



DESCRIPTION

GF and K235 Series Glass Fuses are available in slow-blow and fast-acting models.

APPLICATION

- GF Series for use with Model M10/16SFL fuse holder, FB-1 fuse block, and HRK
- K235 Series for use with M4/8 fuse holder and HRK

SPECIFICATIONS / ORDERING INFORMATION

(Sold in packs of 5) (Order QTY 1 = PKG of 5)

AMP RATING	VOLTAGE	FAST-ACTING FUSE	SLOW-BLOW FUSE	FAST-ACTING
0.5	250	GF-0.5	GF-0.5S	K235-0.5
1	250	GF-1	GF-1S	K235-1
1.5	250	GF-1.5	GF-1.5S	K235-1.5
2	250	GF-2	GF-2S	K235-2
2.5	250	GF-2.5	GF-2.5S	K235-2.5
3	250	GF-3	GF-3S	K235-3
5	32	GF-5	GF-5S	K235-5 (125V)
7	32	GF-7	GF-7S	K235-7 (125V)
10	32	GF-10	GF-10S*	K235-10 (125V)
15	32	GF-15*	GF-15S*	
HRK		In-Line Fuseholder, 32V, 15A, For 1/4" fuses 7/8"-1-1/4"		

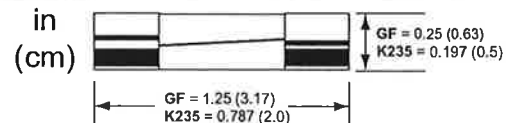
* Ceramic tube fuse



GF, K235 Series



DIMENSIONS



DESCRIPTION

251 Series PICO™ Fuses are fast-acting fuses.

APPLICATION

- Printed circuit board fuses

SPECIFICATIONS / ORDERING INFORMATION

(Sold in packs of 10) (Order QTY 1 = PKG of 10)

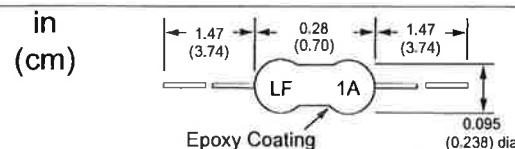
AMP RATING	125V MODEL
1/8	#251.125
1/2	#251.500
1	#251001
2	#251002



251 Series



DIMENSIONS



134

Electric Line Voltage Room Thermostats—Heating/Cooling



134 Electric Line Voltage Room Thermostat—Heating/Cooling.

Description

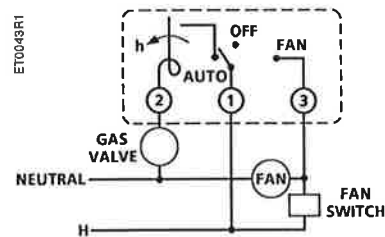
The 134 Electric Line Voltage Room Thermostat is a line voltage On/Off room thermostat for heating and cooling applications.

Models are available with SPST or SPDT contact action and for standard, nominal 1/4 hp / 10 amps noninductive, or heavy duty, nominal 1 hp / 22 amps noninductive applications.

Applications

The 134 Electric Line Voltage Room Thermostat controls heating and cooling applications or year-round air conditioning units in commercial, industrial, or residential installations.

Typical Connections



features

- Single set point dial
- Exposed bimetal thermometer
- Temperature range from 50 to 90°F (10 to 30°C)
- High and low limit stops
- Standard or heavy duty models
- Dual Fahrenheit/Celsius scale plate

Specifications/Product Ordering

Part No. 134-1083

Motor Rating
120 Vac 6.0 A
240 Vac 3.7 A
Switch Action SPST with "Auto-Off-Fan" switch
Dimensions 2.78" W x 5.19" H x 1.88" D
(71 mm W x 132 mm H x 48 mm D)
Shipping Weight 1.3 lbs. (0.6 kg)

Part No. 134-1084

Motor Rating
120 Vac 6.0 A
240 Vac 3.0 A
Resistive Rating
120 Vac 10.0 amps
240 Vac 10.0 amps
Switch Action SPDT
Dimensions 3" W x 4.75" H x 1.44" D
(75 mm W x 120 mm H x 36 mm D)
Shipping Weight 1.0 lb. (0.6 kg)

Part No. 134-1085

Motor Rating
120 Vac 16.0 Heating/8.0 Cooling
240 Vac 8.0 Heating/8.0 Cooling
Resistive Rating
120 Vac 22.0 Heating
240 Vac 22.0 Heating
Switch Action SPDT
Dimensions 3" W x 4.75" H x 1.44" D
(75 mm W x 120 mm H x 36 mm D)
Shipping Weight 1.0 lb. (0.6 kg)

Part No. 134-1086

Motor Rating
120 Vac 6.0 A
240 Vac 3.0 A
Switch Action SPST
Dimensions 3" W x 4.75" H x 1.44" D
(75 mm W x 120 mm H x 36 mm D)
Shipping Weight 1.3 lb. (0.6 kg)

134	Temp. Set Point Range	Temp. Set Point Adjustment	Temperature Difference	Part No.
	40 to 90°F (5 to 30°C)	Concealed	1.8°F (1°C)	134-1083
	40 to 90°F (5 to 30°C)	Concealed	1.8°F (1°C)	134-1086
	40 to 90°F (5 to 30°C)	Exposed Knob or Concealed ¹	1.8°F (1°C) Heating 2.31°F (1.3°C) Cooling	134-1084
	40 to 90°F (5 to 30°C)	Exposed Knob or Concealed ¹	3°F (1.7°C) Heating 3.5°F (2°C) Cooling	134-1085



Ordering Note

- Each thermostat is shipped with a blank faceplate for use when concealed adjustment is desired.

ET 141 Electric Surface Mounted Thermostat



Description

This electric surface mounted thermostat has a Single-Pole, Double-Throw (SPDT) contact mechanism and is designed especially for mounting on pipes.

Warning/Caution Notations

WARNING:		Personal injury or loss of life may occur if you do not perform a procedure as specified.
CAUTION:		Equipment damage may occur if you do not perform a procedure as specified.

Application

As a high event temperature control, the contacts that open on a rise in temperature are used. As a low event temperature control for use on unit heaters, the contacts that open on a decrease in temperature are used. It can also be used as a convector or fan coil changeover control to automatically select either the heating or cooling function of wall type SPDT heating and cooling thermostats.

NOTE: This surface mounted thermostat control is intended to control equipment under normal operating conditions. It is not intended to prevent unsafe operation of air conditioning, heating, air cooling, and ventilating systems.

WARNING:



Failure or malfunction of this unit could lead to an abnormal operating condition that could cause personal injury or damage to the equipment or other property, other devices (limit or safety controls) or systems (alarm or supervisory) intended to warn of or protect against failure or malfunction of the unit temperature control must be incorporated into and maintained as part of the control system.

Product Number

141-0522

Specifications

Switch Action	SPDT
Scale Range	50°F to 200°F (10°C to 93°C)
Maximum Bulb Temperature	240°F (115°C)
Maximum case ambient temperature	131°F (55°C)
Electrical Ratings	See Table 1
Differential	Fixed 4°F (2.2°C)
Cover Finish	Gray baked enamel galvanized steel
Shipping Weight	1.5 lb (0.68 kg)
Dimensions	See Figure 6
Agency certification	UL Listed: File E35198, CCN XAPX CSA Certified: File LR 948, Class 4813 02

Table 1. Electrical Ratings.

Max. Motor Ratings	120 Vac	240 Vac
Full Load Amps	10	6
Locked Rotor Amps	60	36

Installation

Installation Notes

- If the boiler manufacturer recommends a control location, follow such recommendations. If none is offered, the following information gives suggested locations. See Figure 1.
 - On **heating systems**, surface mounted controls can be attached to either a horizontal or a vertical riser approximately 18 inches above the boiler.
 - On **unit heater applications**, they can be attached to the supply or the return line.
- Do not install where the case temperature exceeds 131°F (55°C), or the sensing element temperature exceeds 240°F (115°C).

Boiler Application

NOTE: Do not install this control on a riser pipe containing a flow control device. The flow control device will prevent circulation of hot water unless circulator is operating.

Install the control on the vertical riser pipe from the boiler approximately two feet (0.6 m) above the boiler opening.

Unit Heater Control

Mount the control on the horizontal return line adjacent to the unit heater. In this position, it will close the contacts when hot condensate or hot water is leaving the unit heater.

Other Applications

This control can be mounted in any position on the pipe to sense pipe temperature. The control is not position sensitive. To mount the control, do the following:

1. If a pipe is insulated, remove a 5-inch (127 mm) section of insulation.
2. Scrape pipe surface clean, removing insulating material, scale, and rust.
3. Remove the cover from the control, and fasten the threaded flange of the strap to the control case using only three or four threads of the mounting screw. (See Figure 2.)

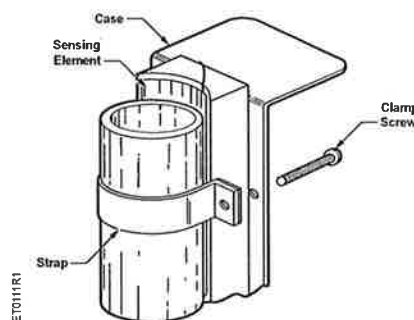


Figure 1. Skeleton View of Control Case, Temperature Sensing Element, and Mounting Strap.

Other Applications

4. Place the control on the pipe, wrap strap around pipe, and place the slot in the strap over the tab on the right side of the case.
5. Tighten the strap screw snugly. Clip off or bend back any excess strap outside the control cover.



WARNING:

Risk of electrical shock. Do not enclose any excess strap inside the enclosure when installing the cover. Doing so may result in the metal strap contacting the wiring terminals and cover, and may result in severe personal injury or death.

6. Replace the pipe insulation removed in Step 1.

NOTE: Insulation attached to the rear of the control minimizes the effect of ambient air temperature on the sensing element.

Operation and Adjustment

The setpoint adjustment screw (see Figure 2) permits screwdriver adjustment of the setpoint between 50°F and 200°F (10°C and 93°C).

The temperature differential is factory set, non-adjustable, and approximately 4°F (2.2°C), depending on the rate of temperature change.

Convertible adjustment models can be field converted from concealed screwdriver slot adjustment to knob adjustment or external screwdriver slot adjustment. For knob adjustment, remove the snap-in plug and assemble the knob to the slotted shaft. For external screwdriver slot adjustment, remove the snap-in plug.

On boiler applications where the control is used as a high temperature operating control, follow the boiler manufacturer's recommendations for temperature settings.

Temperature Setpoint Stop

The temperature setpoint stop is an integral part of these controls, and is field adjustable. To set the stop, do the following:

1. Set dial temperature at desired stop.
2. Remove control cover.
3. Loosen the stop screw, slide the screw to the front of the control against the plastic stop behind the dial, and tighten the screw (see Figure 2). Sometimes, an exact stop setting is not possible, and the stop must be set to the closest stop corresponding to the required dial setting.

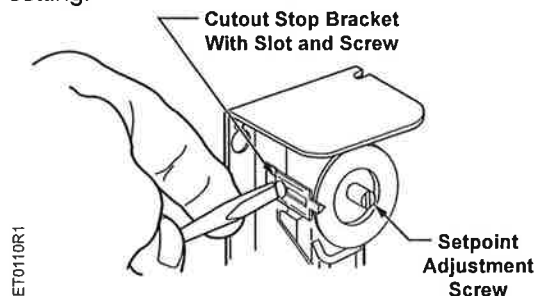


Figure 2. Setpoint Stop Screw.

Wiring Diagrams

All wiring should be done according to the National Electrical Code (NEC) and local regulations.

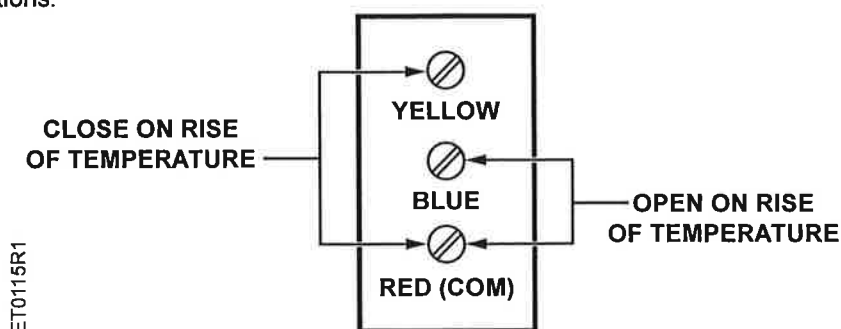


Figure 3. Terminal Identification.

This control has an SPDT snap action switch. The bottom terminal (red) is the common terminal. The middle terminal (blue) has an open-on-rise switch action. The top terminal (yellow) has a close-on-rise switch action. See Figure 3.

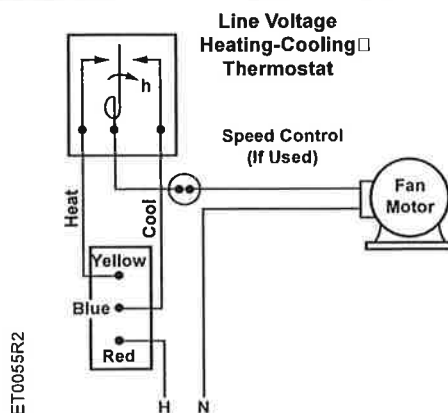
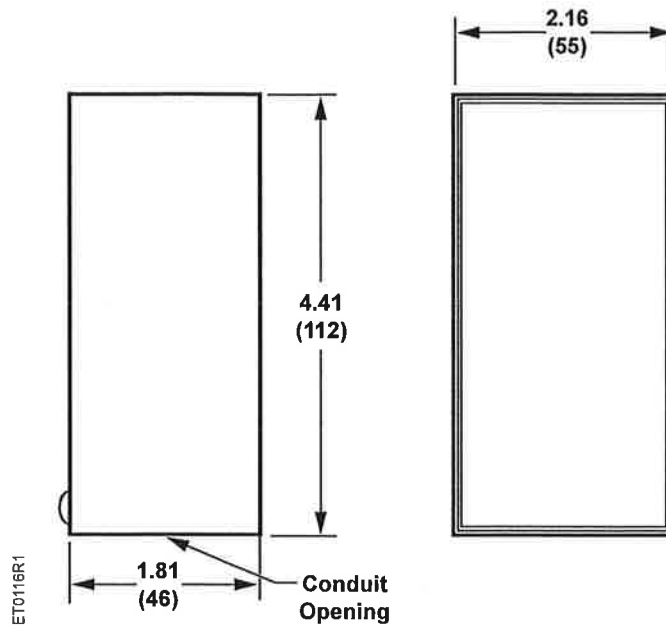


Figure 4. Typical Changeover Wiring.

Service

There is no servicing of this thermostat. Replace if inoperative.

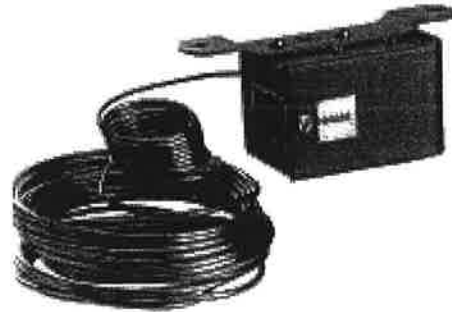
Dimensions

**Figure 5. Dimensions in Inches.
(Millimeters in Parentheses).**

Information in this publication is based on current specifications. The company reserves the right to make changes in specifications and models as design improvements are introduced. Other product or company names mentioned herein may be the trademarks of their respective owners.
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134

Electric Low Temperature Detection Thermostats



134 Electric Low Temperature Detection Thermostat.

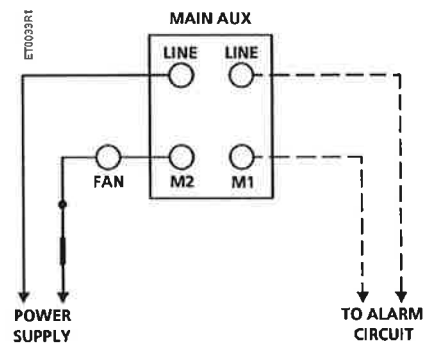
Description

The 134 Electric Low Temperature Detection Thermostat is a remote bulb instrument with a Single Pole, Double Throw switch. Any one foot of the capillary element actuates the thermostat switch, making this control ideal for the protection of large coils where air stratification could cause localized freezing conditions.

Applications

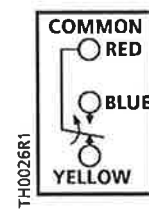
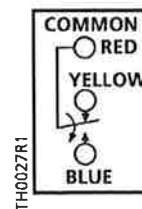
The 134 Electric Low Temperature Detection Thermostats are ideally suited for detecting potential freeze-up conditions of heating coils, cooling coils, liquid heating pipes, and similar applications.

Typical Connections



features

- Compact and durable construction
- Adjustable concealed, low and high range limit stops with a fixed differential
- Available with manual or automatic reset
- Electroplated copper capillary tube for sensitivity and durability
- Switches 120 V or 20 Vac
- Universal mounting bracket included



Specifications/Product Ordering

Part No. 134-1504Dimensions 4" W x 3.25" H x 2.5" D
(102 mm W x 83 mm H x 65 mm D)

Shipping Weight 2.4 lb. (1.1 kg)

Part No. 134-1510Dimensions 2.31" W x 3.19" H x 2.31" D
(59 mm W x 81 mm H x 59 mm D)

Shipping Weight 1.8 lb. (0.8 kg)

Part No. 134-1511Dimensions 2.31" W x 3.19" H x 2.31" D
(59 mm W x 81 mm H x 59 mm D)

Shipping Weight 1.8 lb. (0.8 kg)



134	Temperature Range	Switch Action	Bulb Size	Reset Action	Part No.
	35 to 45°F (1.7 to 7.2°C)	SPDT	1/8" x 20' (3 mm x 6 m)	Automatic	134-1510
	35 to 45°F (1.7 to 7.2°C)	SPDT	1/8" x 20' (3 mm x 6 m)	Manual	134-1511
	15 to 55°F (-9.4 to +12.8°C)	DPST, 4-wire 2 circuit	1/8" x 20' (3 mm x 6 m)	Manual	134-1504



Differential Static Pressure Airflow Switches



141 Differential Static Pressure Airflow Switches.

Description

The 141 Airflow Switch senses static differential pressure and at setpoint open/closes a set of electrical contacts.

Applications

The 141 Airflow Switch actuates electrical circuits (positive pressure), fan inlet (negative pressure), or across the fan (differential pressure) to detect excessively high positive pressures or low negative pressures and turn off the fan before damage occurs to ducts or dampers.

The manual reset switch (141-0575) should be used for applications that require safety lock out (shut down) of the fan. The switch can be used on the fan discharge.

The auto reset switch should be used for applications that require positive proof of airflow (or fan operation) or detect high differential pressures associated with dirty air filters or similar maintenance alarms that do not require safety lock or (shut down) of the fan.

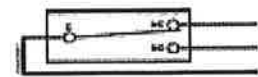
features

- Available in ranges:
 - 0.05 to 1" W.C. (12.45 to 249 Pa)
 - 1 to 12" W.C. (249 to 2988 Pa)
- Available with auto reset
- Can be used in multiple applications:
 - Proof of flow
 - High limit cut out
 - Filter 'dirty' indication

Typical Connections



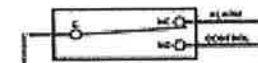
141-0575 Manual Reset Switch.



141-0518 and 141-0574 Auto Reset Switches.



Auto Reset Switches to Prove Excessive Airflow or Pressure.



Auto Reset Switches to Prove Insufficient Airflow or Pressure.

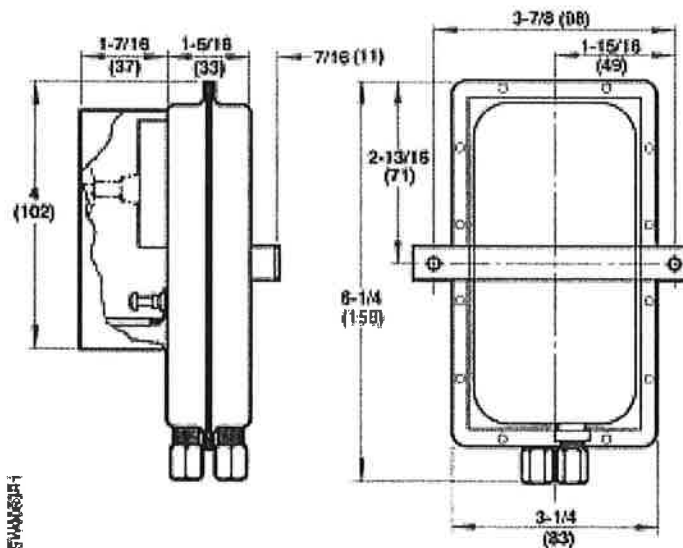
Specifications/Product Ordering

Medium Air
Switch Action Manual Reset
 (must be manually reset by operator) NC; only opens on increasing pressure signal
Ambient Temperature Range -40 to +180°F (-40 to +82°C)
Maximum Overpressure 0.5 psi (3.4 kPa)
Mounting Position Diaphragm in any vertical plane
Body Zinc-plated Steel with blue erudite dip
Electrical Ratings
 Non-inductive 15 amps @ 120 to 277 Vac
 Pilot Duty 300 VA @ 120 to 277 Vac

Conduit Opening 1/2" (13 mm) conduit size
Sample Line Connectors 2 connectors, complete with nuts and ferrules, which accept 1/4" (6 mm) OD copper or polyethylene tubing
Material Aluminized Steel
Agency Approvals UL MFHX File MH9888 CSA 1811M25
Dimensions 6.13" H x 3.88" W x 3.19" D (156 mm H x 98 mm W x 81 mm D)
Shipping Weight 1.0 lb. (0.45 kg)

	Set Point Range (Field Adjustable)	Switching Action/ Reset	Factory Set Point Accuracy	Differential	Part No.
141	1" to 12" W.C. (250 to 3000 kPa)	SPDT/ Auto Reset	1" ± 0.1" W.C. (250 kPa ± 25 kPa) to 12" ± 1.2" W.C. (3000 kPa ± 300 kPa)	0.25" W.C. (62.5 kPa) max. at 1" W.C. (25 kPa) set point to 1.2" W.C. (300 kPa) max. at 12" W.C. (3000 kPa) set point	141-0518
	1" to 12" W.C. (250 to 3000 kPa)	SPST/ Manual Reset	1" ± 0.1" W.C. (250 kPa ± 25 kPa) to 12" ± 1.2" W.C. (3000 kPa ± 300 kPa)	Not Applicable	141-0575
	0.05" to 1.0" W.C. (12.5 to 250 kPa)	SPDT/ Auto Reset	0.05" ± 0.02" W.C. (12.5 kPa ± 5 kPa) to 1.0" ± 0.1" W.C. (250 kPa ± 25 kPa)	0.02" W.C. (5 kPa) at min. set point 0.1" W.C. (25 kPa) at max. set point	141-0574

Dimensions



Dimensions shown in inches (mm).

Accessories and
 Service Kits
 Page
 45



PRESSURE

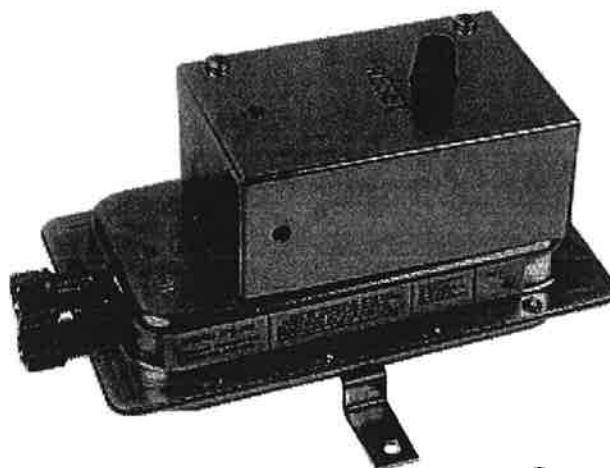
MANUAL RESET DIFFERENTIAL PRESSURE SWITCH MODELS AFS-460, AFS-460-DSS

DESCRIPTION

The **Model AFS-460 Manual Reset Differential Pressure Switch** is designed to sense static or differential pressure and to break an electrical circuit when the set point is exceeded. The electrical circuit will remain open until the reset button on the switch is pressed.

The **Model AFS-460** is furnished with 1/4" compression fittings for copper or plastic tubing. The set point is adjustable from 0.4" to 12" W.C.

The **Model AFS-460-DSS** is the same reliable switch as the **Model AFS-460** with the addition of a second SPST normally closed switch. The **Model AFS-460-DSS** is ideal for the application that requires status as well as an indication of condition.



FEATURES

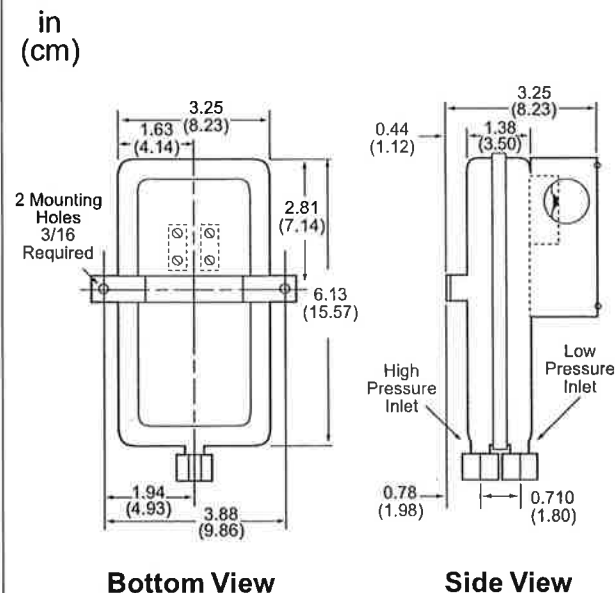
- **Manual reset**
- **SPST contact (normally closed)**

- **1/4" compression fittings**
- **Adjustable range**
- **Optional double SPST contact arrangement**

SPECIFICATIONS

Set point range	0.4" to 12.0" W.C. (99.6 to 2989 Pa)
DSS option	2.0" to 12.0" W.C. (498 to 2989 Pa)
Reset	Manual push button
Mounting position	Diaphragm in any vertical plane
Contacts	SPST (normally closed)
DSS option	2 SPST (normally closed)
Electrical rating	15A @ 125-277 VAC 1/4 HP @ 125 VAC 1/2 HP @ 250 VAC 1/2A @ 125 VDC
Pressure connectors	1/4" compression, suitable for use with 1/4" copper or plastic tubing
Overpressure	0.5 psig (2.5 kPa)
Operating temp	-40° to 180°F (-40° to 82°C)
Approval	UL listed, CE
Weight	
Life	6,000 cycles min @ 0.5 psig (3.5 kPa) max pressure and at max rated load each cycle

DIMENSIONS



PRESSURE

ORDERING INFORMATION

MODEL	DESCRIPTION
→ AFS-460	Manual Reset Differential Pressure Switch
AFS-460-C	Kele Calibrated for Your Application (specify set point)
AFS-460-DSS	Manual Reset Differential Pressure Switch with 2 SPST Switches
AFS-400-DSS-C	Kele Calibrated for Your Application (specify set point)

RELATED PRODUCT

#21121	Duct impact tube
A-301, A-302	Static pressure tip



PANEL & INSTALLATION MATERIALS

ABB PUSH BUTTONS, SELECTOR SWITCHES, PILOT LIGHTS, AND POTENTIOMETERS

MP, M, KT, CL SERIES

DESCRIPTION

This series of operator interface devices offers a wide variety of push buttons, selector switches, and pilot lights. There are also press-to-test pilot lights and a potentiometer added to the product line. These devices use the IEC style of buttons, plus offer economical pricing.

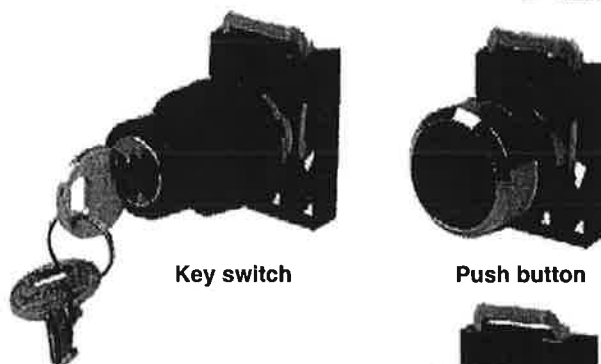
FEATURES

- 22.5 mm size
- Quick release contact blocks
- Press-to-test pilot light offered
- Potentiometer model
- UL listed, File #E57057
- CSA certified, File #LR19700

SPECIFICATIONS

Contact rating	
AC	120, 6A; 240, 3A; 480, 1.5A; 600, 1.2A
DC	120, 0.55A; 240, 0.27A; 480, 0.1A; 600, 0.1A
Contact resistance	<25 mΩ
Rated insulation voltage	690V
Mechanical life	10 million operations
contact block	
Terminals	#14-20 AWG
Contact material	Silver
Mounting	0.874" (2.25 cm) hole
Panel thickness	0.059" to 0.236" (0.15 to 0.6 cm)
Protection rating	NEMA type 1, 3R, 4, 4X, 12, 13
Agency approvals	UL listed, File #E57057; CSA certified, File #LR19700
Warranty	1 year

ABB



Key switch

Push button



Pilot light



Selector switch



SSG-67

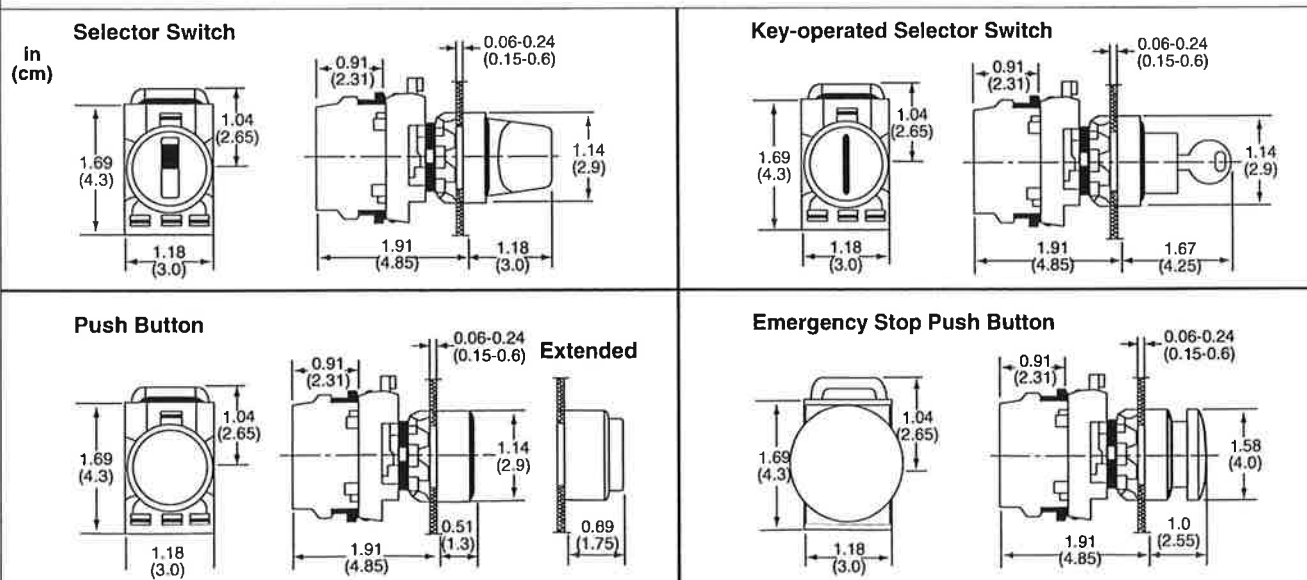


SPA



PANEL & INSTALLATION MATERIALS

DIMENSIONS



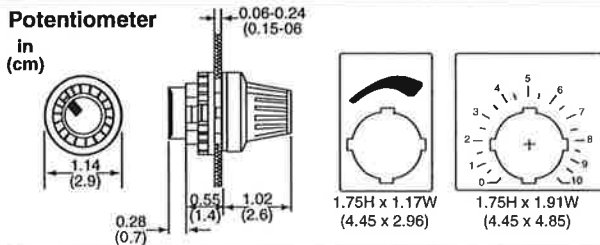


PANEL & INSTALLATION MATERIALS

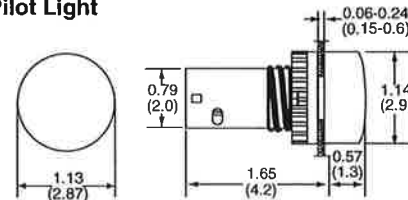
ABB PUSH BUTTONS, SELECTOR SWITCHES, PILOT LIGHTS, AND POTENTIOMETERS MP, M, KT, CL SERIES

DIMENSIONS (CONTINUED)

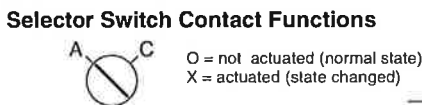
Potentiometer
In
(cm)



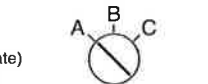
Pilot Light



Selector Switch Contact Functions

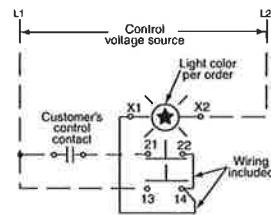


Handle position	Left block	Right block
A	O	O
C	X	X



Handle position	Left block	Right block
A	X	O
B	O	O
C	O	X

Press-to-test Pilot Light Schematic



ORDERING INFORMATION

KEY SWITCHES

M2SSK1	Two-position, key-operated selector switch, key removed each position
M3SSK1	Three-position, key-operated selector switch, key removed each position
60	Chrome bezel
1	Standard key code
	# Normally open contacts (max 2 for 3 pos, 1 for 2 pos)
	# Normally closed contacts (max 2 for 3 pos, 1 for 2 pos)

PUSH BUTTONS

MP	Flush and extended push buttons
1	Flush momentary operator
2	Flush maintained operator
3	Extended momentary operator
4	Extended maintained operator
60	Chrome bezel
Color	R-Red, G-Green, Y-Yellow, L-Blue, W-White, B-Black
	# Normally open contacts (max 3)
	# Normally closed contacts (max 3)

MUSHROOM PUSH BUTTONS

MPM1-60R	Red mushroom momentary, chrome bezel, 40 mm
MPMP3-20R	Red mushroom maintained - pull to release, no bezel, 40 mm
	# Normally open contacts (max 3)
	# Normally closed contacts (max 3)

SELECTOR SWITCHES (Center off only)

M2SS2	Two-position selector switch, maintained each position
M3SS1	Three-position selector switch, maintained each position
60	Chrome bezel
B	Black operator
	# Normally open contacts (max 2)
	# Normally closed contacts (max 2)

PILOT LIGHTS

CL	Pilot light with integrated LED
502	24 VAC/VDC
513	110-130 VAC
Color	R-Red, G-Green, Y-Yellow, L-Blue, W-White

PRESS-TO-TEST PILOT LIGHTS

MP1-MLFPT	Press-to-test illuminated pilot light including one normally open and one normally closed contact
8	24V full voltage incandescent
1	120V full voltage incandescent
L8	24V LED
L1	120V LED
Color	R-Red, G-Green, Y-Yellow, L-Blue, W-White

POTENTIOMETER

KT-310B	0-10,000 cermet potentiometer, 280-degree rotation, metal housing, black knob w/ white marking
SPA	KT-310B, SS plate, custom plate
SK615562-87	Sweep symbol legend plate
SK615562-88	Legend plate with 0 to 10 scale

RELATED PRODUCTS

E-1PBG	One-hole, NEMA 12/13, push-button enclosure
E-2PBG*	Two-hole, NEMA 12/13, push-button enclosure
E-3PBG*	Three-hole, NEMA 12/13, push-button enclosure
E-4PBG*	Four-hole, NEMA 12/13, push-button enclosure
MCB-10	Normally open contact block

* Holes are 22.5 mm in a vertical arrangement

MCB-01	Normally closed contact block
MCBH-00	Holder for three blocks (included in above)
SK615540-1**	29.6 x 39 mm blank legend plate
SK615541-1**	29.6 x 44.5 mm blank legend plate
SSG1-67	Wall plate box mount 7/8" hole
SK616021-71	Spare key for key switch

** Custom plates from factory only



PANEL & INSTALLATION MATERIALS

PUSH-BUTTON SWITCHES

ABW, AOW SERIES

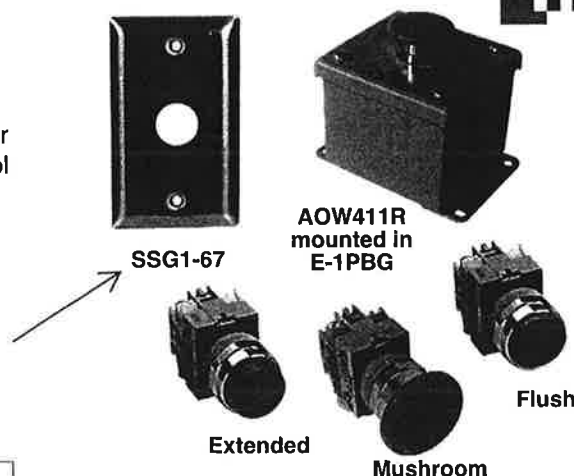


DESCRIPTION

ABW and AOW Series Push-button Switches are for manual control of fans, pumps, compressors, or control circuits.

FEATURES

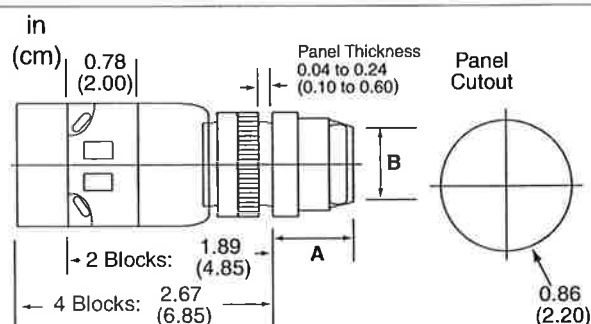
- Flush, extended, or mushroom style available
- Snap-fit blocks with N.O. and N.C. contacts
- Self-cleaning silver contacts
- Rugged, oil-tight construction



SPECIFICATIONS

Contact rating	10A, 600 VAC/VDC 5 mA, 3 VAC/VDC min
Contact resistance	50 mΩ max (initial value)
Insulation rating	600 V
Contact material	Silver
Mechanical life	500,000 min operations
Electrical life	500,000 min operations
Terminals	#6-40 (M3.5) screws
Mounting	0.86" (2.20 cm) hole
Panel thickness	Panel thickness adjustment ring, 0.04" to 0.24" (0.10 to 0.61 cm)
Protection rating	NEMA 1, 2, 3, 3R, 4, 4X, 12, 13
Agency approvals	UL listed, File #E70646; CSA certified, File #LR48366
Warranty	1 year

DIMENSIONS



PUSHBUTTONS	A	B
Flush	0.507 (1.30)	Ø 0.936 (2.40)
Extended	0.741 (1.90)	Ø 0.936 (2.40)

ORDERING INFORMATION

MODEL	DESCRIPTION
ABW	Momentary action push-button switch
AOW	Maintained action push-button switch
1	Flush (includes colored buttons of red, green, and black)
2	Extended (specify color below, red standard)
4	Mushroom (specify color below, red standard)
#	Normally open contacts (max 2)
#	Normally closed contacts (max 2)
	Button color for extended and mushroom models B = Black, G = Green, R = Red

ABW 1 0 1

Example: ABW101 Momentary flush push button with one normally closed contact

RELATED PRODUCTS

HW-C10	Normally open contact	E-2PBG*	Two-hole NEMA 12/13 push-button enclosure
HW-C01	Normally closed contact	E-3PBG*	Three-hole NEMA 12/13 push-button enclosure
TW-DB	Dummy block (needed when only 1 HW-C10 or HW-C01 is used)	E-4PBG*	Four-hole NEMA 12/13 push-button enclosure
NWAR-27	Emergency stop label 2.75" (6.99 cm) round	SSG1-67	Wall plate box mount 7/8" hole
E-1PBG	One-hole NEMA 12/13 push-button enclosure		

* Holes are 22.5 mm in a vertical arrangement.



PRESSURE

AIR PRESSURE SENSORS

A-300 SERIES, 60681, 21121

DESCRIPTION

Static Pressure Sensors

A-300 Series Sensors are used with pressure transmitters and pressure switches to sense duct pressures. Two sensors are required to monitor pressure across coils, filters, and blowers. **A-301-K** and **A-302-K** have four radial sensing holes and a 4" (10.2 cm) insertion depth. The **A-308-K** should be used only where accuracy is not critical. All mount in a 3/8" hole in the duct. If the interior of the duct is not accessible, an optional **A-345-K** flange mounting kit may be used.

Room Static Pressure or Total Pressure Sensor Kit

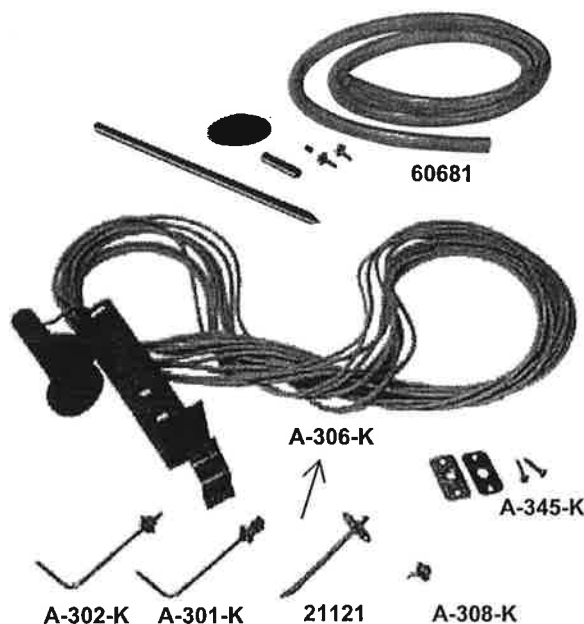
The versatile **Model 60681 Pressure Sensing Kit** is used for monitoring static pressure (aspiration) or total pressure (impact). The kit includes a 7" (17.8 cm) universal sensing probe, adjustable mounting flange, 1/4" adapter, and 3 ft (0.9m) length of tubing (1/4" ID x 3/8" OD). For total (impact) pressure applications, install the curved tip opening facing into the air stream or away from the air stream for vacuum applications.

Total Pressure Sensor

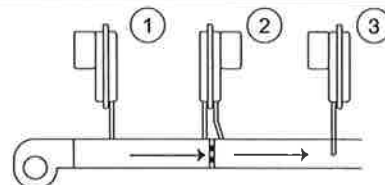
Model 21121 Sensor is used primarily for proving air flow in ducts. The opening in the tip of the 4" (10.2 cm) aluminum tube faces upstream and senses impact (total) pressure.

Outdoor Static Pressure Sensor

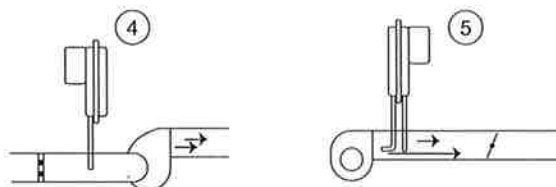
The **A-306-K Outdoor Static Pressure Sensor Kit** provides an outdoor pressure signal for reference in building pressurization applications. The **A-306-K** includes the sensor, 50' (15.24m) of vinyl tubing, mounting bracket, and hardware.



TYPICAL APPLICATIONS



1. Positive static pressure increases as the filter gets dirty.
2. Differential across filter changes as filter gets dirty.
3. Flow is reduced as filter gets dirty.



4. Negative pressure increases as the filter gets dirty.
5. Fan operation and true air flow: varying amounts of static pressure. Probes must be perpendicular to air flow.

ORDERING INFORMATION

MODEL	DESCRIPTION
A-301-K	Duct static pressure tip, 1/4" compression
A-302-K	Duct static pressure tip, 1/4" barb
A-308-K	Duct static pressure fitting, 1/4" barb
A-345-K	Flange mounting kit
60681	Static or total pressure sensing kit
21121	4" aluminum impact tube for 3/8" OD plastic tubing
B-137	1/4" barb adapter for #21121 (standard pack-100)
A-306-K	Outdoor air static pressure kit



PRESSURE

AIR PRESSURE SENSORS, SURGE DAMPENERS RPS, 21121, SD-01

DESCRIPTION

Room Static Pressure Sensors

Model RPS is a stainless steel room static pressure sensor. Mount the sensor directly to a wall or ceiling using a standard electrical box. **Model RPS-W** is designed with a white plastic wall plate and can quickly be installed using a standard electrical box. The Model RPS-I (not shown) is available with an ivory face plate.

Filter Kit

Model A-605 Filter Kit includes an aluminum surface mounting bracket and screws, two 5 ft lengths of 1/4" aluminum tubing, two static pressure tips, and two plastic vent valves.

Surge Dampener

Surge Dampeners absorb rapid pressure fluctuations in order to steady a pressure signal. Each surge dampener has two independent channels – one for the low-pressure tubing and one for the high-pressure tubing. Surge dampeners are typically used with outdoor pressure sensors, which are subject to wind gusts, isolation rooms, clean rooms, or operating rooms where opening or closing doors creates sudden pressure changes.



RPS-W



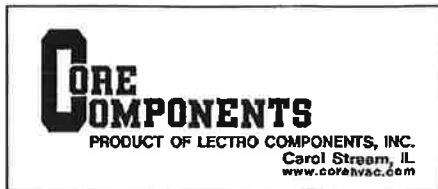
RPS



SD-01

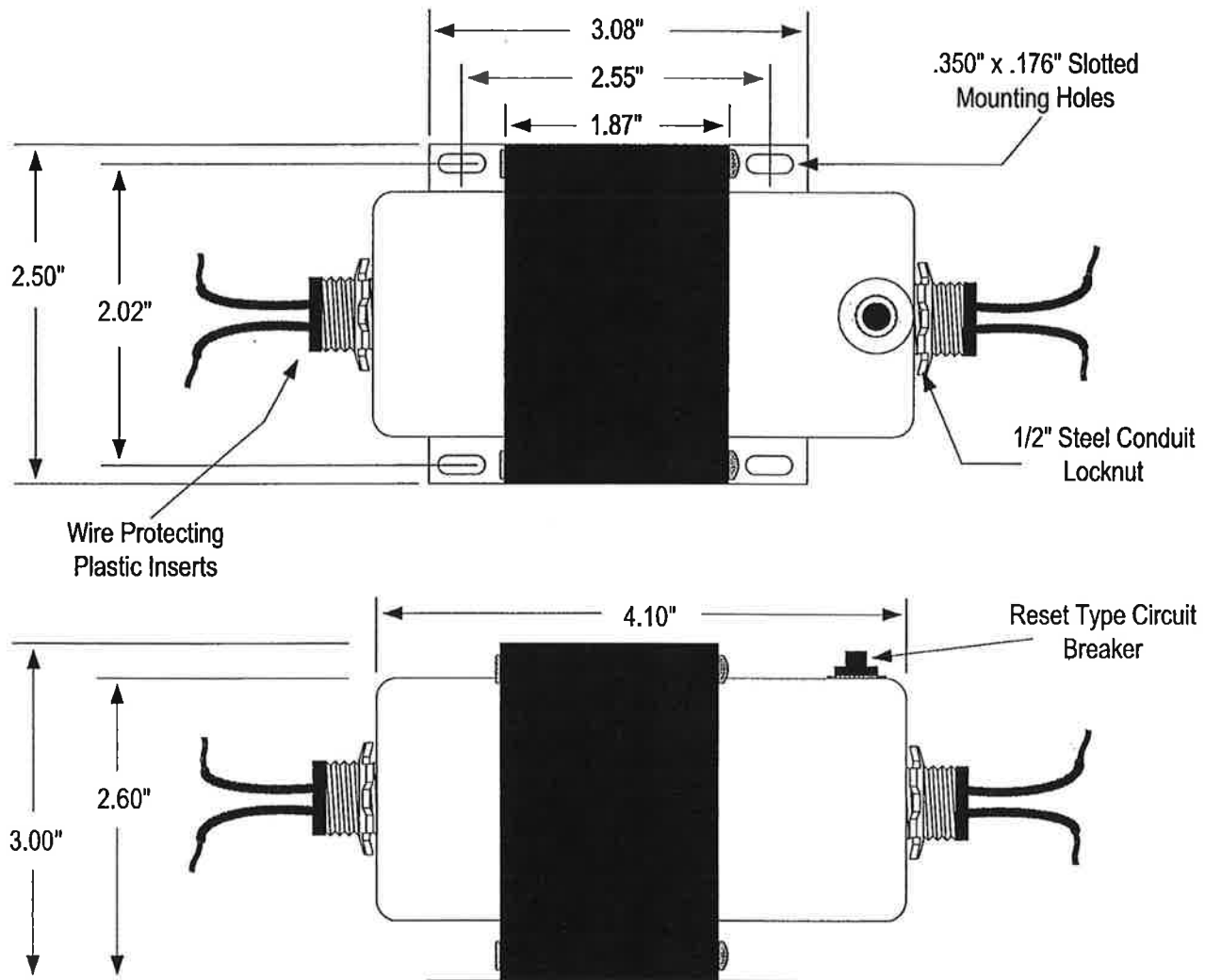
ORDERING INFORMATION

<u>MODEL</u>	<u>DESCRIPTION</u>
→ RPS	Stainless steel room pressure sensor, 1/4" barb
RPS-W	White plastic room pressure sensor, 1/4" barb
RPS-I	Ivory plastic room pressure sensor, 1/4" barb
A-605	Filter kit
SD-01	Surge dampener



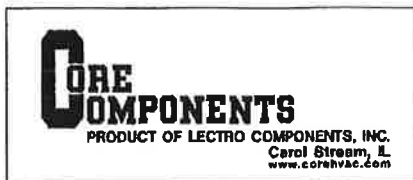
120-24-1002TFCB

Part Number LE12000 - 120-024-100-2TF-CB				
Rev.	Description	By	App.	Date
*	First Release	CDC	CDC	12/11/00
NOTE				
All Dimensions are Ref. Only				



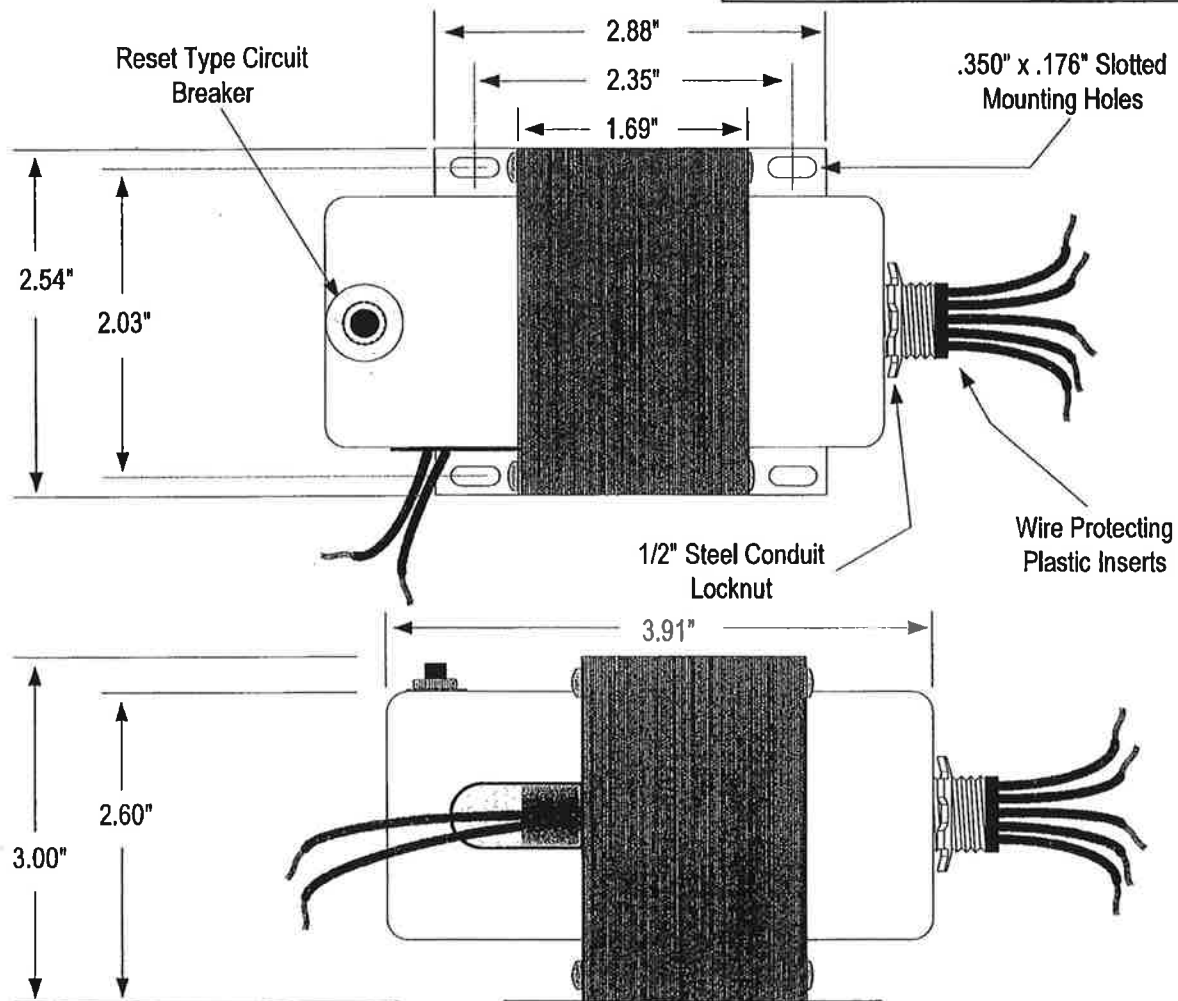
Specifications

Input:	120V
Output:	24V
VA Rating:	96VA
Frequency Rating:	50/60 Hz
Circuit Breaker Type:	4 Amp Manual Reset
Configuration:	Steel End Bells
Mounting(s):	Slotted Foot Mounts and Threaded Flange Hubs
Primary Wires:	9.5" Long with .375" ends Stripped and Tinned
Secondary Wires:	9.5" Long with .375" ends Stripped and Tinned
Approvals:	UL Listed for US and Canada File E173056. Class II Transformer. CSA Certificate LR108412-4.



LE15010

Part Number LE15010 - MUA-024-075-TFSO-CB				
Rev.	Description	By	App.	Date
*	First Release	CDC	CDC	12/11/00
A	Secondary Hub Style recorded in the vocabulary of the part description number. "-TF" now reads "-TFSO-".	CDC	CDC	7/19/01
NOTE				
All Dimensions are Ref. Only				

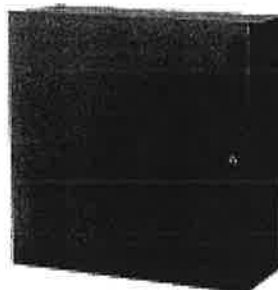


Specifications

Input:	120/208/240/480V
Output:	24V
VA Rating:	75VA
Frequency Rating:	50/60 Hz
Circuit Breaker Type:	3.75 Amp Manual Reset
Configuration:	Steel End Bells
Mounting(s):	Slotted Foot Mounts and Threaded Flange Hub
Primary Wires:	9.5" Long with .375" ends Stripped and Tinned
Secondary Wires:	9.5" Long with .375" ends Stripped and Tinned
Approvals:	UL Listed for US & Canada File E173056. CSA Certificate LR108412-3. Class II Transformer.

CP 567

Control Panels



567-351 Exposed Panel Assembly.

Description

Designed to conveniently group control system components, the 567 Control Panels are available in two styles, exposed and flush mount.

With the exposed panels, the control components can be mounted in the door or mounted within the enclosure using the perforated panel. The cabinet housing, door, and perforated mounting plate may be ordered as a unit or separately.

The flush mount panel is designed to recess the panel into a wall. The controls are mounted within the enclosures on a perforated panel. Order both the cabinet and the mounting kit.

features

- Panels are symmetrical, and can be mounted with door hinge on left or right-hand side
- Removable door with lock and keys
- Removable perforated subpanel permits mounting controls without drilling holes
- Attractive gray finish permits use in occupied areas
- Doors are available with pre-punched cutouts for gauges and controls (special order with the exposed cabinets only)
- Support kit is available for floor mounting (medium and large exposed cabinets only)
- Variety of mounting methods available
- Knockouts are provided for electrical or pneumatic piping
- Panels listed under UL508 Industrial Control Panel Enclosures
- CSA listed under LR 84214
- NEMA Type 1

Applications

The 567 Control Panels provide a convenient central location for equipment mounting, termination of piping, wiring adjustment, and calibration.

Panels may be used with DDC and/or pneumatic systems using either copper or polyethylene tubing for transmission lines, with wired electric/electronic systems, or with a combination of both. Within the panel enclosure, use polyethylene pneumatic tubing for easy installation and arrangement and for a flexible connection to hinged door components.

The empty panel can be installed at the job to permit early rough-in of conduit. Since the door and subpanel can be separated from the cabinet, controls may be mounted to the door subpanel either at the job site or at the field office and connected to the cabinet at your convenience. After reassembly, final connections are then made.

Specifications/Product Ordering

Exposed Panel

Dimensions

Small	19.5" H x 16.38" W x 5.75" D (495 mm H x 416 mm W x 146 mm D)
Medium	24.94" H x 24.38" W x 9.38" D (617 mm H x 619 mm W x 238 mm D)
Large	36.5" H x 24.38" W x 9.38" D (927 mm H x 619 mm W x 238 mm D)

Shipping Weights

Small	20.0 lb. (9 kg)
Medium	39.0 lb. (18 kg)
Large	72.0 lb. (33 kg)

Flush Mount Panel

Dimensions 19.5" H x 16.13" W x 5.13" D
(495 mm H x 410 mm W x 130 mm D)

Shipping Weight 20.0 lb. (9 kg)

Panel Door

Shipping Weights

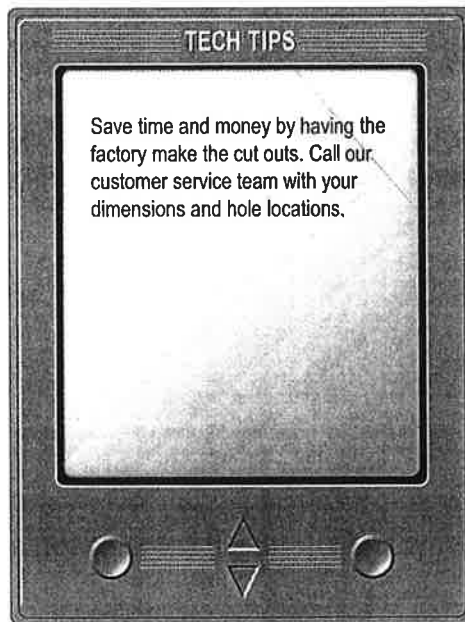
Small	8.0 lb. (3.6 kg)
Medium	13.0 lb. (5.9 kg)
Large	20.0 lb. (9 kg)



Size	Part Nos.		
	No Cutouts in Door	Cutouts in Door	
Small	567-351	567-351A	Exposed Panel Assembly
Medium	567-352	567-352A	
Large	567-353	567-353A	
Small	567-361	567-361A	Panel Door Only
Medium	567-362	567-362A	
Large	567-363	567-363A	
Small	567-371	—	Panel Enclosure
Medium	567-372	—	
Large	567-373	—	
Small	567-381	—	Mounting Plate Only
Medium	567-382	—	
Large	567-383	—	
Flush Mount Panel	567-391	—	Flush Mount Panel & Kit
Flush Mount Kit contains escutcheon, hinged locking door and two keys	567-390	—	

TECH TIPS

Save time and money by having the factory make the cut outs. Call our customer service team with your dimensions and hole locations.



Z Gard[®] S Sensor P1 Output

MSA



Now available:



FEATURES

- Sensor output is Siemens native P1 protocol output, RS-485- P1.
- Standard housing is a 4" x 4" tamper-resistant commercial electrical box constructed of PVC with 3/4" PVC conduit opening. The sensor and electronics are housed in a steel cover plate that mounts to the box with 4 screws.
- Sensor status is shown by the green OK LED, indicating that the device is operating properly.
- Jumpers to drive the output to percentages of full-scale. This feature is useful for testing remote devices, which may be connected to the sensor output.

The Z Gard S Sensor detects the presence of carbon monoxide, nitrogen dioxide or refrigerants in air. All Z Gard S Sensors are available with Siemens Proprietary P1 output for direct integration into an APOGEE Automation System through a RS-485 P-1 output, thus eliminating the need for a Sensor specific control panel.

APPLICATIONS

- Reference Siemens Application Note 2793
- CO monitoring in underground parking areas, vehicle storage and maintenance areas, postal processing plants, airports and courier transfer stations, and facilities monitoring in office buildings, malls and casinos.
- NO₂ (diesel fumes) monitoring in city bus and transit facilities, heavy equipment & locomotive maintenance facilities, and enclosed truck docks.
- Mechanical refrigeration equipment room monitoring in commercial and condominium buildings, hospitals, government buildings and institutions, schools and universities, light industrial buildings, and recreational facilities.

SPECIFICATIONS

Standard Enclosure	Plastic double-gang connection box. Metal front plate secures the sensor and the circuit board.
Enclosures	Optional Metal Enclosure and NEMA 4X available
Dimensions	5.5" H x 5.5" W x 2.2" D
Solid State Sensor:	0-100 or 0-200 PPM
Accuracy	±5%, full scale (FS) at 50% relative humidity
Humidity	0 - 95% RH
Temperature	Operating: 0° to 40°C (32° to 104°F) Storage: -10° to 50°C (14° to 122°F)
Electrochemical Sensor: 0-100PPM, 0-200PPM Carbon Monoxide, 0-10PPM Nitrogen Dioxide	
Accuracy	±5%, full scale (FS)
Humidity	0 - 95% RH
Temperature	Operating: 0° to 40°C (32° to 104°F) Storage: -10° to 50°C (14° to 122°F)
Z Gard S "Apogee AnyWhere" Sensors:	
Operating Power	24 VAC 100mA used with Apogee Automation system. Signal Output RS485 2 wire
Signal Output	Apogee Compatible P1 via RS485 Shielded Pair daisy-chain connection

MSA

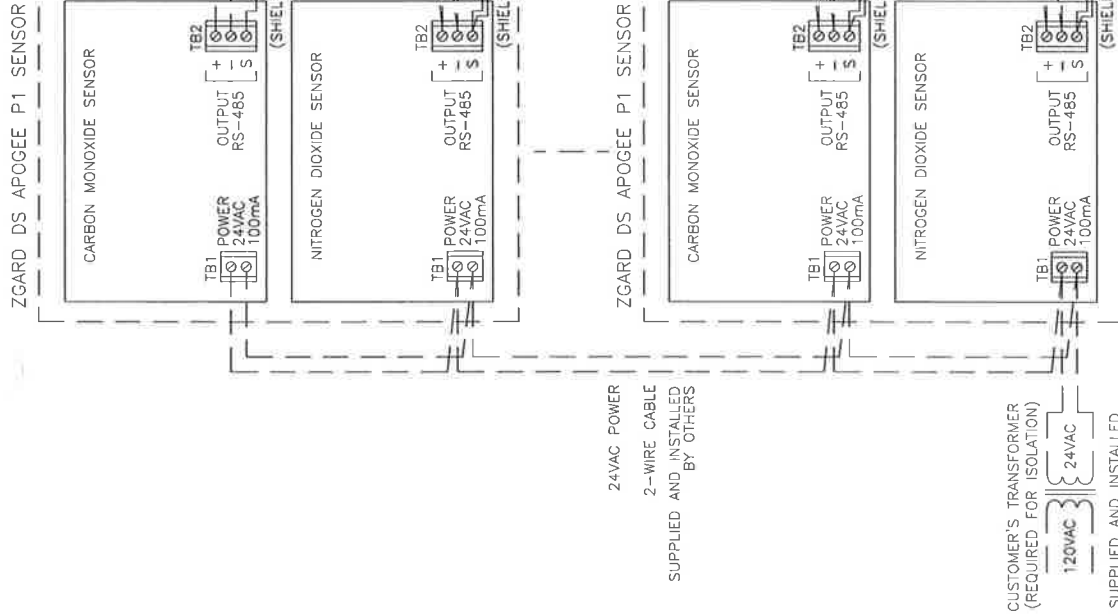
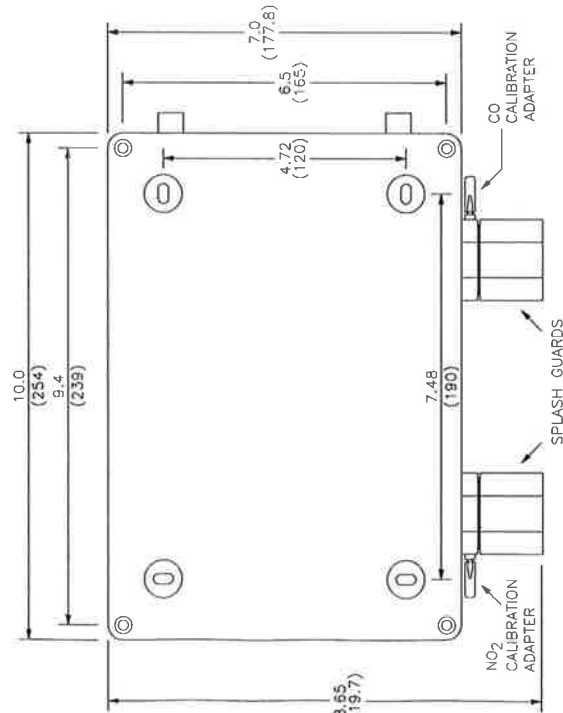
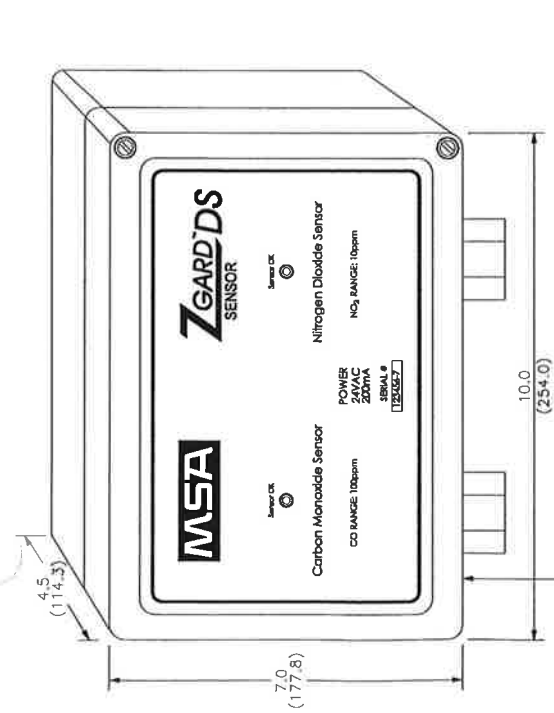
The Z Gard S Sensor with P1 output is specifically designed to operate with Siemens Apogee Anywhere Automation systems via direct communication input connection.



The image shows the MSA Z-GARD 3 Nitrogen Dioxide Sensor. It is a rectangular, dark-colored device with a central display screen. Above the screen, the MSA logo and 'Z-GARD 3' are visible. Below the screen, there are four labels: 'POWER', 'NO2', 'O2', and 'TEMP'. The device is mounted on a metal plate with four screws.

ENTE LA (to CSA Standards)

ISO 9001 Certified Quality System
Visit us online at www.MSAgasdetection.com



NOTES:
1. DIMENSIONS SHOWN IN INCHES (MILLIMETERS).



CHKD:	DATE: Jan. 13/06	DRN: KS
<p style="text-align: center;"> Installation Outline, ZGARD DS APOGEE P1, RS485-P1 Output Sensors </p>		
DWG. NO.:	107139	REV. A



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310 South Union Street
Russiaville, IN 46979
www.FunctionalDevices.com

Office 765.883.5538
Sales 800.888.5538
Fax 765.883.7505
Email sales@functionaldevices.com

PSC40AB10

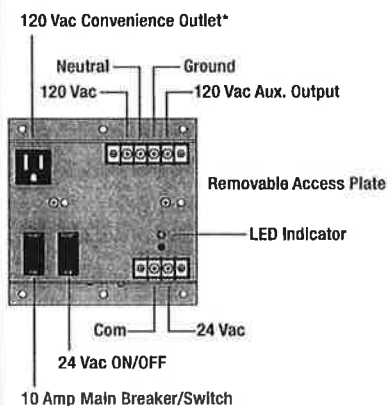
AC POWER SUPPLY

Enclosed Single 40 VA Power Supply, 120 to 24 Vac

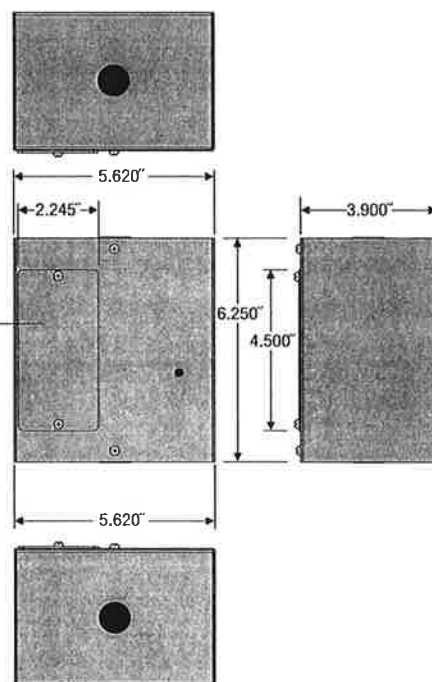


SPECIFICATIONS

Transformer: One 40 VA Split-Bobbin
Primary: 120 Vac
Secondary: 24 Vac, w/ LED Indicator
Frequency: 50/60 Hz
Over Current Protection: Inherently Limited
24 Vac ON/OFF: On / Off Switch
Main Breaker ON/OFF: Switch / Breaker (10 Amp)
(Kills power to entire unit: Outlet, Aux.
Output, and Transformer)*
Total Combined Output 9A
Mounting: Mounting plate included (as shown)
Approvals: Class II UL Listed, UL916, C-UL, CE
Dimensions: 6.250" x 5.620" x 3.900"
Weight: 4.40 lbs.



*Move internal jumper to "HOT" position if you wish outlets to always be hot otherwise outlets will be switched by main breaker.



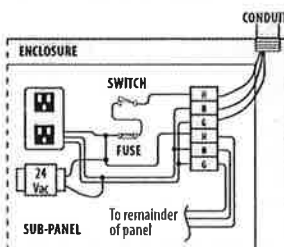
NOTES

CONDENSE WORK SPACE AND WIRING (POWER SUPPLIES)

The PSC, PSH, and PSB Series Power Supplies allow you to save large amounts of time, space, and wiring throughout your panel.

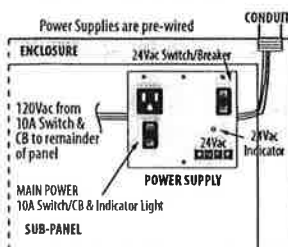
BEFORE

There is a lot of extra wiring in this enclosure which not only takes up space but also increases the difficulty and time associated with installation.



AFTER

By using one of Functional Devices' Power Supplies you will greatly reduce installation time, as well as save space in your enclosure.



POWER SUPPLIES

Any "B10" models in the PSC, PSH, or PSB Power Supply Series

Differential Pressure Monitor

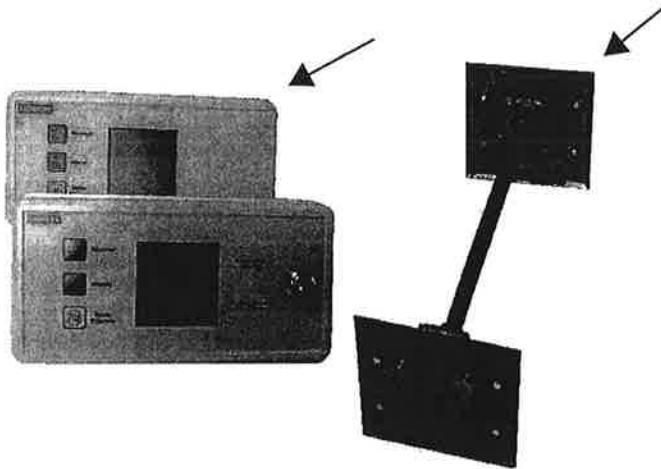


Figure 1. Differential Pressure Monitor with Remote Pressure Transmitter.

The Differential Pressure Monitor (DPM) is an integral part of the APOGEE® Automation System. The monitor measures and displays the differential pressure between a room and its adjoining space. It is used for monitoring in hospital pharmacies and isolation rooms, and also in labs, areas surrounding labs, holding rooms, and other areas where knowledge of the differential pressure is important.

The Differential Pressure Monitor can operate stand-alone or networked to the APOGEE Automation System. When used with the APOGEE Automation System, alarm, differential pressure values, and status point information can be communicated via a Local Area Network (LAN) to a central terminal for display and recording.

Features

- Through-the-wall differential pressure measurement
- Digital display of pressure (inches of water / Pascals)
- LED indicators for normal and alarm status
- Audible horn indicates alarm condition
- Return from power failure without operator intervention
- Optional 2-position keyed switch disables alarms, available in separate models enabling alarms for:
 - > negative pressure (infectious isolation)
 - > positive pressure (protective isolation)
- Control parameters assigned and changed using the Portable Operator's Terminal
- Proven system architecture

Description

The DPM consists of the following:

- A Liquid Crystal Display (LCD) which displays:
 - State of pressure mode key switch (optional)
 - Pressure monitoring mode
 - High pressure alarm
 - Low pressure alarm
 - General failure
 - Status of door switch
 - Anteroom status
 - Differential Pressure (In.w.c. or Pa)
- 2 LED status lights: green indicating normal operation; red indicating alarm condition
- Audible horn with Horn silence button
- Interfaces to:
 - One or two Remote Pressure Transmitters
 - APOGEE LAN communication
 - Portable Operator's Terminal port
 - Auxiliary alarm relay output
 - 4-20 mA output of pressure
 - Door switch contact
- Optional 2-position keyed switch disables alarms for space cleaning and maintenance.
- Separate keyed switch models for:
 - > negative pressure (infectious isolation)
 - > positive pressure (protective isolation)

Monitor Specifications

Power Requirements	
Operating Range	18-28 Vac 50/60 Hz
Power Consumption	2.2 VA @ 24 Vac
Remote Communication	LAN trunk
Local Communication	Portable Operator's Terminal
Inputs	
Digital	2 Remote Pressure Transmitters 1 dry contact
Outputs	
Analog	1 4-20 mA (pressure) 1 resistive (mode switch)
Digital	2 dry contacts
LEDs	1 green, 1 red
Alarm	1 horn, 85 dbs @ 4" (10 cm)
Ambient Conditions	
Storage Temp	-40°F to 167°F (-40°C to 75°C)
Operating Temp	32°F to 120°F (0°C to 49°C)
Humidity Range	10% to 90% (non-condensing)
Dimensions	8.5" W x 4.5" H x 1.5" D (216 mm x 114 mm x 38 mm)
Weight	15 oz (410 g)
Agency Listings	UL 916 PAZX, UL 864 UDTZ CSA Certified FCC Compliance Part 15, Cl. A

NOTE: Authorities having jurisdiction over healthcare facilities may not allow monitors with keyed switches. Please check with local codes before ordering.

→ Remote Pressure Transmitter

The Remote Pressure Transmitter (RPT) measures the differential pressure between a room and its adjoining space. The RPT uses thermal anemometer technology to measure the air pressure differential between two spaces. These values are then transmitted through a proprietary output signal to an input of the DPM, which converts the signal to a differential pressure measurement. The RPT is designed to be mounted in a through-the-wall installation. It is calibrated after installation. This calibration is made easy through the use of a proprietary NIST traceable calibration tool.

RPT Specifications

Power Requirements	
Operating Range	18-28 Vac 50/60 Hz
Power Consumption	1.4 VA @ 24 Vac
Maximum Distance from Differential Pressure Monitor	500 ft. (150 m)
Measurement Range	-0.2" to +0.2" of water (-49.8 to + 49.8 Pascals)
Accuracy	±0.001" of water (±0.3 Pascals)
Airflow Across Sensor	
Minimum	0.0035 CFM (100 CCM)
Maximum	0.35 CFM (10,000 CCM)
Ambient Conditions	
Temperature Range	65°F to 85°F (18°C to 30°C)
Humidity Range	10% to 90% (non-condensing)

Product Ordering Information

Description	Product Part Number
Differential Pressure Monitor (DPM) without Keyed Switch	547-002 ←
DPM with 2-position Keyed Switch, NEGATIVE / NEUTRAL	547-005
DPM with 2-position Keyed Switch, POSITIVE / NEUTRAL	547-006
Remote Pressure Transmitter	547-003 ←
Differential Pressure Monitor Calibration Tool	547-004
Healthcare Isolation Rooms Architectural and Mechanical Design Considerations Technology Report	149-903

NOTE: DPM with 3-position Keyed Switch, 547-001, is only offered as a service replacement part. Contact your local Siemens Building Technologies office for assistance.

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Fume Hood Monitor



Figure 1. APOGEE Fume Hood Monitor.

The APOGEE™ Fume Hood Monitor* (FHM) is a laboratory fume hood safety device which provides continuous measurement and display of fume hood face velocity. The Fume Hood Monitor is the only device available packaged with a service program to install it, start it up, and calibrate it in accordance with laboratory and fume hood performance listing guideline.

The FHM alerts the Fume Hood user with an audible and visual alarm in the event of a fume hood exhaust system failure. It is designed to operate as a standalone monitor and as an integral networked component of the APOGEE Automation System to ensure user safety of constant volume fume hoods.

The FHM utilizes through the wall, thermal anemometer velocity measurement technology. The sensor, mounted within the FHM electronic assembly, measures the velocity of the airflow moving through the fume hood via a sampling tube connected to the fume hood wall.

*Patent No. 5439414

The location of the sample tube is critical to the proper operation of the monitor. The Fume Hood Evaluation Kit, part number 546-00320 will aid an installer in locating the proper location of the sample tube to obtain an accurate velocity measurement. This velocity measurement is calibrated to match the average velocity of air moving through the sash face opening.

Local user alarms for high and low face velocity provide visual and audible annunciation whenever the measured face velocity exceeds the user defined alarm limits. The emergency push-button allows the user to annunciate an emergency condition at the fume hood such as a chemical spill. All alarms can be sent out over the APOGEE network or to a remote alarm horn via the integral digital output (DO) point.

For fume hood exhausts that are turned off or setback during unoccupied hours, the FHM provides an unoccupied mode, which can be set via a local switch and over the APOGEE network. The unoccupied mode eliminates unnecessary alarms when the laboratory is not in use.

The FHM also has an integral digital input (DI) point which provides additional features at the fume hood such as monitoring the sash height, initiating an auxiliary alarm, or connecting to a remote occupied/unoccupied switch.

Networked Fume Hood Monitors throughout your entire facility are integrated to a central safety or maintenance workstation (see Figure 2) to ensure immediate response to critical alarms and to continuously archive fume hood-operating conditions for regulatory compliance.

Features

- Through-the-wall face velocity monitoring for constant volume fume hoods
- Digital display of face velocity in FPM or m/s
- APOGEE FLN communications which transmit FHM status information or receive commands from the workstation PC
- Occupied/unoccupied operating modes via local switch and networked command
- Fume Hood Status LED's for normal and alarm conditions
- User defined alarm limits
- Emergency pushbutton
- User definable auxiliary pushbuttons (network connection)
- Local alarm horn with silence switch tamper proof setup functions
- Digital output for remote alarms
- User definable digital input (e.g., sash height alert)
- Automatic return from power failure
- Set-up parameters defined and modified using the Portable Operators Terminal (Laptop)

Description

The Fume Hood Monitor consists of the following:

- An integral thermistor sensor which monitors face velocity
- A Liquid Crystal Display (LCD) which displays face velocity and operating messages for certain conditions (e.g., low face velocity, high face velocity, general failure, user alarm, OFF)
- 2 LED status lights: green indicating normal operation, red indicating alarm condition or OFF
- Audible alarm buzzer
- Wiring terminators for input, FLN communications, digital input and digital output points
- All required tubing and mounting hardware plus installation, startup and calibration instructions
- Laptop connection for calibration
- 2 auxiliary buttons (host use)

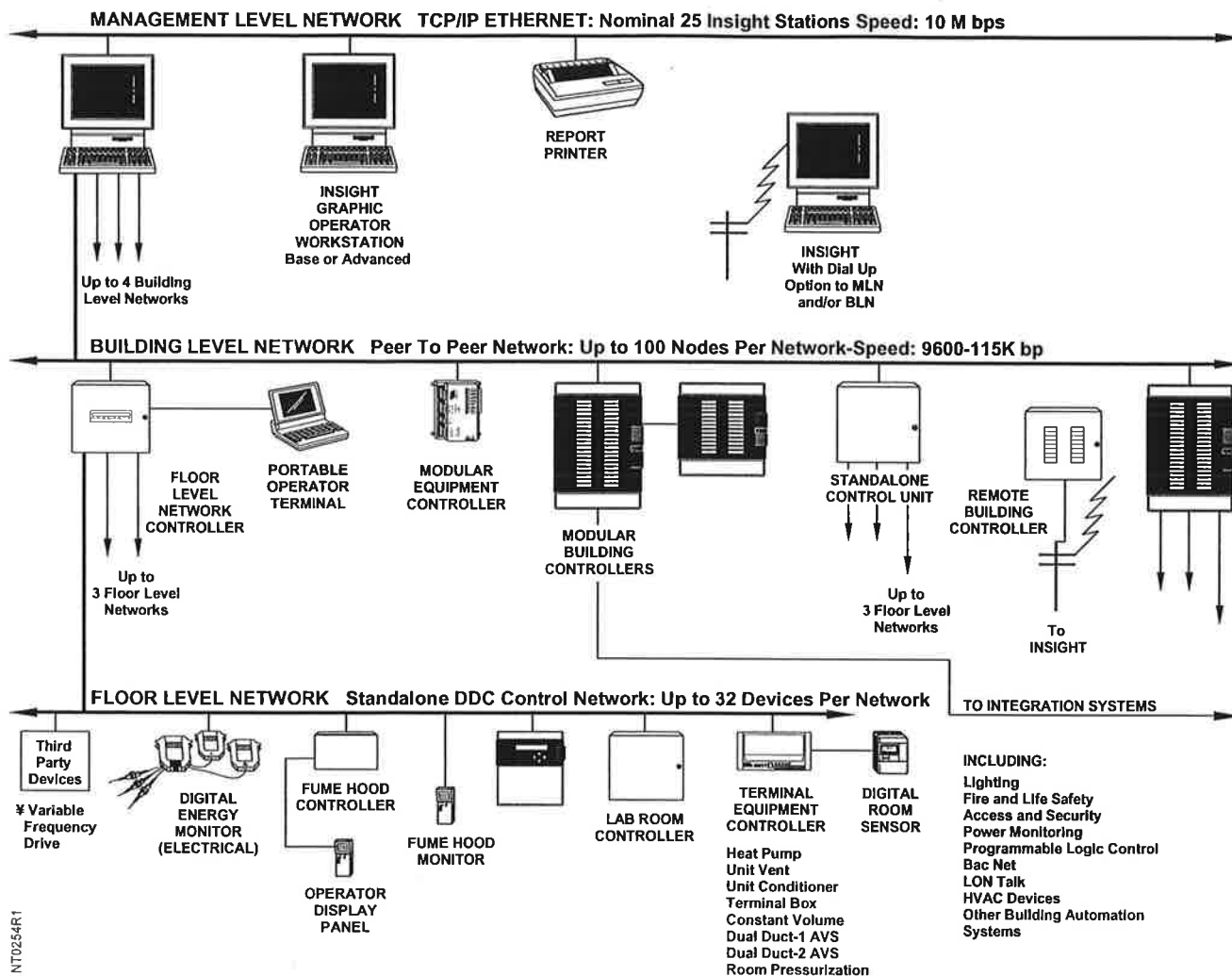


Figure 2. Fume Hood Monitor connection to the APOGEE Automation System.

Specifications

Dimensions 3.08"W x 7.42"H x 1.5"D
(78.23 mm x 188.47 mm x 38.1 mm)

Power Requirements

Operating Range..... 24 Vac 50/60 Hz

Power Consumption..... 2.5 Va (class 2)
@ 24 Vac

Ambient Conditions

Storage Temperature..... -40°F to 167°F
(-40°C to 75°C)

Operating Temperature 32°F to 120°F
(0°C to 49°C)

Humidity Range 20 to 93% (non-condensing)

Display

Size 3 digit LCD

Range 50 to 250 FPM
(0.25 m/s to 1.25 m/s)

Resolution..... 1 FPM (adjustable)
(0.005 m/s)

Update Rate 1 second

LEDs 2 - 1 green
1 red

Alarms 1 audio buzzer
(85 dB @ 10 cm, 2.3 KHz resonance)
1 red LED
Signal to central terminal via
APOGEE FLN

Remote Alarm Output 24 Vac (12 Va) Class 2

Auxiliary Digital Input Dry Contact

Face Velocity Sensor

Accuracy ±10 FPM (0.05 m/s)

Agency Listings

UL Listing
for Smoke Control UL 864, UUKL

UL Listing
for Energy Management..... UL 916, PAZX

UL Listing
for Signal System Unit..... UL 864, UDTZ

UL Listing
for Process
Management Equipment..... UL 916, QUAY

ULC Listed..... UL/ORD-C100

Ordering Information

Description	Part Numbers
→ Fume Hood Monitor	546-00303a
→ Mounting Kit	546-00303b
Fume Hood Monitor User's Card	125-1990
Fume Hood Monitor Owner's Manual	125-1991
Fume Hood Evaluation Kit	546-00320

Information in this document is based on specifications believed correct at the time of publication. The right is reserved to make changes as design improvements are introduced. APOGEE is a trademark of Siemens Building Technologies, Inc. © 2001 Siemens Building Technologies, Inc.

**Gaudreau,
Inc.**

*Architects Planners
Engineers*

*810 Light Street
Baltimore, MD 21230
410-837-5040*

Submittal Review

Project Name: Maryland Forensic Medical Center

Contractor: Gilbane Building Company
- Jobsite

- ☒ Make Corrections Noted
☒ As Noted

Submittal No.: 0995-0003-15900-0

This review is for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

Submittal
Date: June 4, 2009

This review does not authorize changes to the Contract Documents and does not relieve the Contractor from compliance with the requirements of the Contract Documents.

Submittal
Name: HVAC Instrumentation and
Controls - Main Submittal

Contractor is responsible for confirming and correlating dimensions and quantities; information that pertains solely to the fabrication processes or to the means, methods, techniques, sequences and procedures of construction; coordination of the Work of all trades; and performing Work in a safe and satisfactory manner.

Comments:

1. See Engineer's attached submittal review. Respond in writing to Syska Hennessey's three review comments.

2. Siemens "Submittal Notes" note #1 and note # 6 make reference to RFI's contained within the submittal. Such issues shall be dealt with via the RFI format; not within this submittal. Information on UPS system (type and capacity) was issued to Gilbane on 05/14/09. Please share this with Siemens.

Gaudreau, Inc.

Date: 07/06/2009

3. Section 15900 paragraph 1.5B, items 4 & 9: Graphics shall be submitted for review and approval as soon as possible (as opposed to near the end of the project).

By: AJM



Project No: FMD01000

Today's Date: 01JUL09

Project: Maryland Forensic Medical Center

Sheet: 1 of 1

By: Jeffrey Bland

Trade: Mechanical

Submittal Ref: 15900-0003-0,

Contractor: Gilbane

**H-67 – HVAC Instrumentation
and Controls Main Submittal**

Corrections or comments made on the submittals during this review do not relieve contractor from compliance with requirements of the drawings and specifications. This review is for general conformance with the design concept of the project and general compliance with the information given in the contract documents. The contractor is responsible for confirming and correlating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner.

Actions:

1 - No exception taken 2 - Revise - No resubmission required 3 - Revise and resubmit 4 - Rejected 5 - Submit specified item
6 - No action required 7 - Other - =

Spec Section	Manufacturer	Drawing No./ Equipment	Action	Comments
15900	Siemens		7	<ol style="list-style-type: none"> 1. There are question marks followed by a letter that appear on submittal in the sequence of operations. We assume these are tab indicators that did not translate and have no affect on the sequence of operation. (Ref: SBT Dwg 016A, Lab Control-OAVS) 2. Fan Coil Units – Confirm Heating/Cooling coil positions w FCU submittals. 3. Internal batteries are provided in local controllers. This provides compliance with specification section 15900, 2.4 A.1 (72-hour battery back-up). Submittal Note 1 makes reference to UPS units; this issue will be dealt with in the RFI format, not within this submittal.



Submittal Packages

Summary, Grouped by Package Number with Register Items

MD Forensics			Project # 124281000		Gilbane Building Company					
			Tel: Fax:							
Item No	Register No	Rev	Spec Section	Sub Section	Description	Rec'd On	Returned	Action	Logged By	Closed
0003 - 15900 - 0			HVAC Instrumentation and Controls - Main Submittal							
001	03349	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - DDC Equipment - Operator Workstation - Motherboard	5/20/2009				No
002	03350	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - DDC Equipment - Operator Workstation - Processor	5/20/2009				No
003	03352	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - DDC Equipment - Operator Workstation - Monitor	5/20/2009				No
004	03353	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - DDC Equipment - Operator Workstation - Keyboard	5/20/2009				No
005	03354	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - DDC Equipment - Operator Workstation - Operating System	5/20/2009				No
006	03355	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - DDC Equipment - Operator Workstation - Alarm Printer	5/20/2009				No
007	03356	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product	5/20/2009				No
Prolog Manager		Printed on: 5/20/2009		MARO MD Forensics						
Page 1										



Submittal Packages
Summary, Grouped by Package Number with Register
Items

Item No	Register No	Rev	Spec Section	Sub Section	Description	Rec'd On	Returned	Action	Logged By	Closed
008	03357	0	15900	1.5.A.	Data - DDC Equipment - Operator Workstation - Report Printer HVAC Instrumentation and Controls: Product Data - DDC Equipment - Operator Workstation - Application Software	5/20/2009				No
009	03358	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - DDC Equipment - Operator Workstation - Custom Application Software	5/20/2009				No
010	03359	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - DDC Equipment - Diagnostic Terminal Unit	5/20/2009				No
011	03360	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - DDC Equipment - Control Units	5/20/2009				No
012	03361	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - DDC Equipment - Standard Application Programs	5/20/2009				No
013	03362	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - DDC Equipment - Local Control Units	5/20/2009				No
014	03363	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - DDC Equipment - I/O Interface	5/20/2009				No
015	03364	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Unitary Controllers	5/20/2009				No
016	03365	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Electronic Sensors - Thermistor Temperature	5/20/2009				No

Prolog Manager

Printed on: 5/20/2009

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Submittal Packages
Summary, Grouped by Package Number with Register
Items

Item No	Register No	Rev	Spec Section	Sub Section	Description	Rec'd On	Returned	Action	Logged By	Closed
Sensors and Transmitters										
017	03366	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Electronic Sensors - RTDs and Transmitters	5/20/2009				No
018	03367	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Electronic Sensors - Thermistor Temperature Sensors and Transmitters	5/20/2009				No
019	03368	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Electronic Sensors - Humidity Sensors - Bulk Polymer Sensor Element	5/20/2009				No
020	03369	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Electronic Sensors - Pressure Transmitters/Transducers - Static-Pressure Transmitter	5/20/2009				No
021	03370	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Electronic Sensors - Pressure Transmitters/Transducers - Water Pressure Transducers	5/20/2009				No
022	03371	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Electronic Sensors - Pressure Transmitters/Transducers - Water Differential-Pressure Transducers	5/20/2009				No
023	03372	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Electronic Sensors - Pressure Transmitters/Transducers - Differential-Pressure	5/20/2009				No



Submittal Packages
Summary, Grouped by Package Number with Register Items

Item No	Register No	Rev	Spec Section	Sub Section	Description	Rec'd On	Returned	Action	Logged By	Closed
Switch (Air or Water)										
024	03373	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Electronic Sensors - Pressure Transmitters/Transducers - Pressure Transmitters	5/20/2009				No
025	03374	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Electronic Sensors - Room Sensor Cover Construction	5/20/2009				No
026	03375	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Electronic Sensors - Room Sensor Accessories	5/20/2009				No
027	03376	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Status Sensors - Status Inputs for Electric Motors on Fans and Pumps	5/20/2009				No
028	03377	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Status Sensors - Voltage Transmitter	5/20/2009				No
029	03378	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Status Sensors - Power Monitor	5/20/2009				No
030	03379	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Status Sensors - Current Switches	5/20/2009				No
031	03380	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Status Sensors - Electronic Valve/Damper Position Indicator	5/20/2009				No
032	03381	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product	5/20/2009				No

Prolog Manager

Printed on: 5/20/2009

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Submittal Packages
Summary, Grouped by Package Number with Register Items

Item No	Register No	Rev	Spec Section	Sub Section	Description	Rec'd On	Returned	Action	Logged By	Closed
033	03382	0	15900	1.5.A.	Data - Status Sensors - Water-Flow Switches HVAC Instrumentation and Controls: Product Data - Gas Detection Equipment - Carbon Monoxide Detectors	5/20/2009				No
034	03383	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Flow Measuring Stations - Duct Airflow Station	5/20/2009				No
035	03384	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Thermostats - Combination Thermostat and Fan Switches	5/20/2009				No
036	03385	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Thermostats - Low-Voltage, On-Off Thermostats	5/20/2009				No
037	03386	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Thermostats - Line-Voltage, On-Off Thermostats - Electric Heating Thermostats	5/20/2009				No
038	03387	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Thermostats - Line-Voltage, On-Off Thermostats - Selector Switch	5/20/2009				No
039	03388	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Thermostats - Remote-Bulb Thermostats	5/20/2009				No
040	03389	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Thermostats - Room Thermostat Accessories	5/20/2009				No



Submittal Packages
Summary, Grouped by Package Number with Register Items

Item No	Register No	Rev	Spec Section	Sub Section	Description	Rec'd On	Returned	Action	Logged By	Closed
041	03390	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Thermostats - Immersion Thermostat	5/20/2009				No
042	03391	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Thermostats - Airstream Thermostats	5/20/2009				No
043	03392	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Thermostats - Electric, Low-Limit Duct Thermostat	5/20/2009				No
044	03393	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Thermostats - Room Thermostat Accessories	5/20/2009				No
045	03394	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Actuators - Electric Motors - Permanent Split-Capacitor or Shaded-Pole Type	5/20/2009				No
046	03395	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Actuators - Electric Motors - Nonspring-Return Motors for Valves Larger Than NPS 2-1/2	5/20/2009				No
047	03396	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Actuators - Electric Motors - Spring-Return Motors for Valves Larger Than NPS 2-1/2	5/20/2009				No
048	03397	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Actuators - Electric Motors - Nonspring-Return Motors for Dampers Larger Than 25 sq. ft.	5/20/2009				No



Submittal Packages
Summary, Grouped by Package Number with Register Items

Item No	Register No	Rev	Spec Section	Sub Section	Description	Rec'd On	Returned	Action	Logged By	Closed
049	03401	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Actuators - Electric Actuators - Coupling	5/20/2009				No
050	03402	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Actuators - Electric Actuators - Overload Protection	5/20/2009				No
051	03403	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Actuators - Electric Actuators - Fail-Safe Operation	5/20/2009				No
052	03407	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Dampers	5/20/2009				No
053	03408	0	15900	1.5.A.	HVAC Instrumentation and Controls: Product Data - Control Cable	5/20/2009				No
054	03409	0	15900	1.5.B.	HVAC Instrumentation and Controls: Shop Drawings - Schematic Flow Diagrams	5/20/2009				No
055	03410	0	15900	1.5.B.	HVAC Instrumentation and Controls: Shop Drawings - Wiring Diagrams	5/20/2009				No
056	03411	0	15900	1.5.B.	HVAC Instrumentation and Controls: Shop Drawings - DDC System Hardware	5/20/2009				No
057	03412	0	15900	1.5.B.	HVAC Instrumentation and Controls: Shop Drawings - Control System Software	5/20/2009				No
058	03413	0	15900	1.5.B.	HVAC Instrumentation and Controls: Shop Drawings - Controlled Systems	5/20/2009				No

DWG DESCRIPTION

	GENERAL
	Cover Sheet
ABAC	Anixter Building Auto. Cables
FTRM	FLN Termination Specification
PTRM1	PXCC Termination Specification
PTRM2	PXCC Termination Spec. Sheet 2
PWIR	PXCC Wiring Specification
TTRM	TEC Termination Specification
TTRM1	TX-I/O Termination Spec.
TTRM2	TX-I/O Termination Spec. 2
TWIR	TX-I/O Wiring Specification
	CONTROL DRAWINGS
001	RISER DIAGRAM
002	AHU-01 thru AHU-03
003	AHU-04
004	AHU-05
005	CHILLERS & CHW SYSTEM
006	BOILER PACKAGE
007	BSL & GENERAL EXHAUST FANS
008	GARAGE EXHAUST SYSTEM
009	MISC EXHAUST FANS
010	MECH RM RELIEF
011	120 VAC Fan Coil Units
012	VAV SUPPLY BOX w/ REHEAT
013	VAV FAN POWERED BOX w/ RH
014	CV EXHAUST BOX w/ AZM
015	CV SUPPLY BOX w/ REHEAT & AZM
016	LAB CONTROL - OAVS
017	CV AUTOPSY 'A' CONTROL
018	CV AUTOPSY 'B' CONTROL
019	CV SPECIMEN AREA CONTROL
020	CV SPECIMEN AREA CONTROL
021	LAB/BSL PRESSURE MONITORS
022	FUME HOOD MONITORS
023	CRAC UNITS
024	UNIT HEATERS

DWG DESCRIPTION

	DDC PANEL LAYOUTS
L001	AHU-01
L002	AHU-02
L003	AHU-03
L004	AHU-04
L005	AHU-05
L006	CHILLERS
L007	HWHS
L008	1ST FLOOR
L009	AUTOPSY 215
L010	AUTOPSY 218
L011	SPECIMEN 336
L012	SPECIMEN 334

REVISION HISTORY

SIEMENS

SIEMENS BUILDING TECHNOLOGIES, INC
BALTIMORE

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BALTIMORE MD 21244
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PHONE: 410-645-1600
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MD FORENSIC MEDICAL CENTER
BALTIMORE, MD

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
JES	JES	JES		03/31/09

Table of Contents

440P043820

TOCA

BUILDING AUTOMATION CABLES
Specification Catalog

Instruction: Click on SBT Part Number to view detailed cable specifications.

Non-Plenum Cables

SBT Part Number	Description	Application Pts	Jacket Color	Ref.
H-TP18-CMR	HVAC CBL 18AWG,STR,1TP,CMR	DI, DO, AI, AO	Blue	8.3
H-TP20-CM	HVAC CBL 20AWG,STR,1TP,CM	DI, DO, AI, AO	Blue	8.1
H-3P24-CMR	HVAC CBL 24AWG,SOL,3P,CMR	TEC STAT	Blue	8.8
H-3C18-CMR	HVAC CBL 18AWG,STR,3COND,CMR	TEC V/D	Blue	8.4
H-3C20-CM	HVAC CBL 20AWG,STR,3COND,CM	TEC V/D	Blue	8.2
H-2C14-CL3R	HVAC CBL 14AWG,STR,2COND,CL3R	LV Power	Dark Blue	8.5
H-B-TSP24LC-CM	HVAC BL24AWG,STR,TSP,LOCAP,CM	BLN	Orange	8.6
H-F-TSP24LC-CM	HVAC FL24AWG,STR,TSP,LOCAP,CM	FLN	Org/Blu Stripe	8.7
LON-1P22-CM	LON CBL 22AWG,STR,1PAIR,CM	LON	Org/Wht Stripe	8.17
LON-1PS22-CM	LON CBL 22AWG,STR,1PAIR,OAS,CM	LON	Org/Wht Stripe	8.19
LON-2P22-CM	LON CBL 22AWG,STR,2PAIR,CM	LON	Org/Wht Stripe	8.18
LON-2PS22-CM	LON CBL 22AWG,STR,2PAIR,OAS,CM	LON	Org/Wht Stripe	8.20
E-4TP24CAT5-CM	ETHERNET 24AWG,SOL,4TP,CAT5,CM	Ethernet	White	11.1

Plenum Cables

SBT Part Number	Description	Application Pts	Jacket Color	Ref.
H-TP18-CMP	HVAC CBL 18AWG,STR,1TP,CMP	DI, DO, AI, AO	Blue	8.11
H-TP20-CMP	HVAC CBL 20AWG,STR,1TP,CMP	DI, DO, AI, AO	Blue	8.9
H-3P24-CMP	HVAC CBL 24AWG,SOL,3P,CMP	TEC STAT	Blue	8.16
H-3C18-CMP	HVAC CBL 18AWG,STR,3COND,CMP	TEC V/D	Blue	8.12
H-3C20-CMP	HVAC CBL 20AWG,STR,3COND,CMP	TEC V/D	Blue	8.10
H-2C14-CL3P	HVAC CBL 14AWG,STR,2COND,CL3P	LV Power	Dark Blue	8.13
H-B-TSP24LC-CMP	HVAC BLN24AWG,STR,TSP,LOCAP,CMP	BLN	Orange	8.14
H-F-TSP24LC-CMP	HVAC FLN24AWG,STR,TSP,LOCAP,CMP	FLN	Org/Blu Stripe	8.15
LON-1P22-CMP	LON CBL 22AWG,STR,1PAIR,CMP	LON	Org/Wht Stripe	8.21
LON-1PS22-CMP	LON CBL 22AWG,STR,1PAIR,OAS,CMP	LON	Org/Wht Stripe	8.23
LON-2P22-CMP	LON CBL 22AWG,STR,2PAIR,CMP	LON	Org/Wht Stripe	8.22
LON-2PS22-CMP	LON CBL 22AWG,STR,2PAIR,OAS,CMP	LON	Org/Wht Stripe	8.24
E-4TP24CAT5-CMP	ETHERNET 24AWG,SOL,4TP,CAT5,CMP	Ethernet	White	11.2

REVISION HISTORY	SIEMENS 2520 LORD BALTIMORE DRIVE BALTIMORE MD 21244 USA SIEMENS BUILDING TECHNOLOGIES, INC BALTIMORE PHONE: 410-645-1800 FAX: 410-645-1816	MD FORENSIC MEDICAL CENTER BALTIMORE, MD					440P043820
		ENGINEER JES	DRAFTER JES	CHECKED BY JES	INITIAL RELEASE	LAST EDIT DATE 03/31/09	ABAC
		Anixter Building Auto. Cables					

DPU/MPU WIRING TYPE AND GAUGE REQUIREMENTS

TABLE 1

CIRCUIT TYPE	CLASS	WIRE TYPE	MAX. DISTANCE	CONDUIT SHARING
AC LINE POWER (DPU)	1	#12-14 THHN	AS REQUIRED	CHECK LOCAL CODES
POWER TRUNK ¹ (MPU)	2	#14 THHN OR #14 TP	180ft (55 m)	CLASS 1 & 2 CHECK CODES
DIGITAL OUTPUT	1	CHECK LOCAL CODES	SEE TABLE 4	CHECK LOCAL CODES
DIGITAL OUTPUT	2	CHECK LOCAL CODES	SEE TABLE 4	CHECK LOCAL CODES
DIGITAL INPUT	2	#18-22 TP	750ft (230 m)	CLASS 1 & 2 CHECK LOCAL CODES
ANALOG INPUT THERMISTOR	2	#18-22 TP	100ft (30.5 m)	CLASS 1 & 2 CHECK CODES
LAN TRUNK ²	2	#18-22 AWG TSP	4kft (1220 m)	CLASS 2 ONLY

TABLE 1A NOTES:

- DISTANCE WILL DEPEND ON TRANSFORMER LOCATION. USE ONE 100 VA TRANSFORMER FOR EVERY EIGHT (8) MPU'S. 180 FT. USING #14 AWG IS WORST CASE.
- WHEN A TIE IS USED ON A LAN TRUNK, THE LAN TRUNK CAN BE EXTENDED ANOTHER 4000-5000 FEET (DEPENDENT ON WIRE GAUGE). USING THREE TIE'S ON ONE FIELD PANEL COULD ALLOW A MAXIMUM OF 16,000 FEET OF #20 TSP WIRE (THE LOCAL 4000 PLUS 4000 FOR EACH TIE).

DI, AI, AO WIRE SPECIFICATIONS

TABLE 2

SPECIFICATION	WIRE TYPE	
	SHIELDED	UNSHIELDED
CAPACITANCE WIRE TO WIRE	NOT SPECIFIED	NOT SPECIFIED
CAPACITANCE BETWEEN ONE CONDUCTOR WITH OTHER CONDUCTOR CONNECTED TO SHIELD	NOT SPECIFIED	N/A
WIRE LAY	2" MAX.	2" MAX.
AWG	18-22	18-22

TABLE 2 & 4 NOTES:

- OPTIMAL NOISE REDUCTION IS ACHIEVED WITH TIGHTER WIRE LAYS (E.G. 1/2").

LAN TRUNK WIRE

TABLE 3

SPECIFICATION	LENGTH OF TRUNK SECTION	
	4000 FT	10,000 FT
CAPACITANCE WIRE TO WIRE	60pF MAX.	24pF MAX.
CAPACITANCE BETWEEN ONE CONDUCTOR WITH OTHER CONDUCTOR CONNECTED TO SHIELD	100pF MAX.	44pF MAX.
WIRE LAY	2" MAX.	2" MAX.
AWG	18-22	18 MIN.

MAXIMUM DO WIRE RUN LENGTHS

TABLE 4

NOMINAL INRUSH	STARTER SIZE	WIRE SIZE		
		#18	#16	#14
200 VA	0	500ft (152m)	900ft (274m)	1400ft (427m)
550 VA	2	200ft (61m)	300ft (91m)	500ft (152m)
1150 VA	3	100ft (30m)	150ft (46m)	250ft (76m)
1500 VA	4	70ft (21m)	100ft (30m)	200ft (61m)

TABLE 3 NOTES:

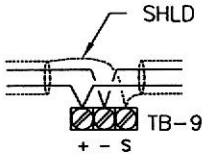
- DISTANCES SHOWN ASSURE LESS THAN 10% VOLTAGE DROP ACROSS THE WIRE FOR A TYPICAL STARTER.
- DPU/MPU DO CONTACT RATING:
1.2A @ 120VAC (INDUCTIVE)
1.2A @ 240VAC (INDUCTIVE)
SIZE 4 MOTOR STARTER

GENERAL NOTES:

- COMPLY WITH LOCAL BUILDING CODES.
- SIZE WIRE FOR LOAD, CURRENT, AND VOLTAGE.
- ALL WIRE TO BE APPROVED OR LISTED FOR THE INTENDED APPLICATION BY AGENCIES SUCH AS UL, CSA.
- ALWAYS REFER TO LOCAL CODES FOR CONDUIT SHARING.
- WIRING MUST HAVE INSULATION RATED FOR HIGHEST VOLTAGE CIRCUIT IN CONDUIT.
- PLENUM WIRING MAY BE USED IN PLACE OF ANY LOW VOLTAGE WIRING WITHOUT CHANGES TO LENGTH EXCEPT FOR PMD OR LAN TRUNK. IN CASES WHERE PLENUM WIRE (#18 OR #20 AWG) IS USED FOR PMD OR LAN TRUNK, USE THE REDUCED LENGTHS OF #20 AWG CABLE.
- THE LAN TRUNK MUST BE AN UNINTERRUPTED RUN BETWEEN CABINETS. NO SPLICES ALLOWED.

NOTE:

- CABINETS MAY BE MULTI-DROPPED ON LAN.

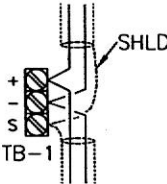


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DPU LAN TERMINATION

NOTE:

- CABINETS MAY BE MULTI-DROPPED ON LAN.



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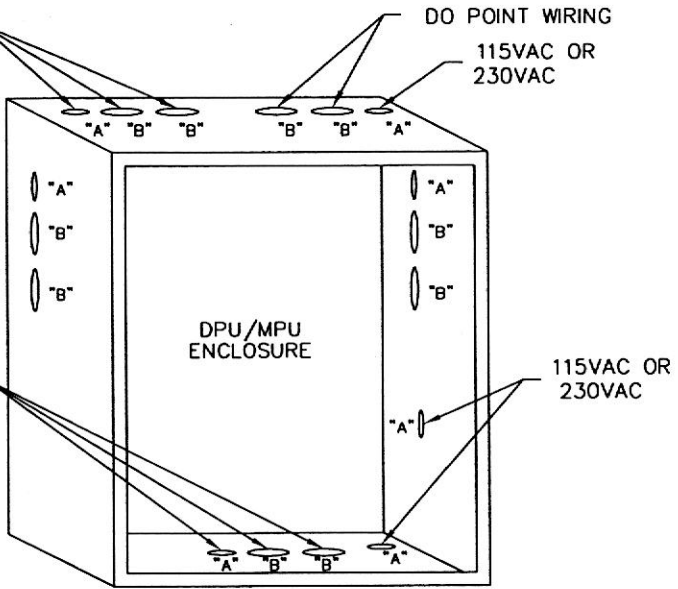
MPU LAN TERMINATION

24VAC (CLASS 2) OR DI, AI POINT WIRING

"A" DENOTES 1/2"-3/4" CONDUIT KNOCKOUTS

"B" DENOTES 1/2"-3/4" CONDUIT KNOCKOUTS

24VAC (CLASS 2) OR DI, AI POINT WIRING

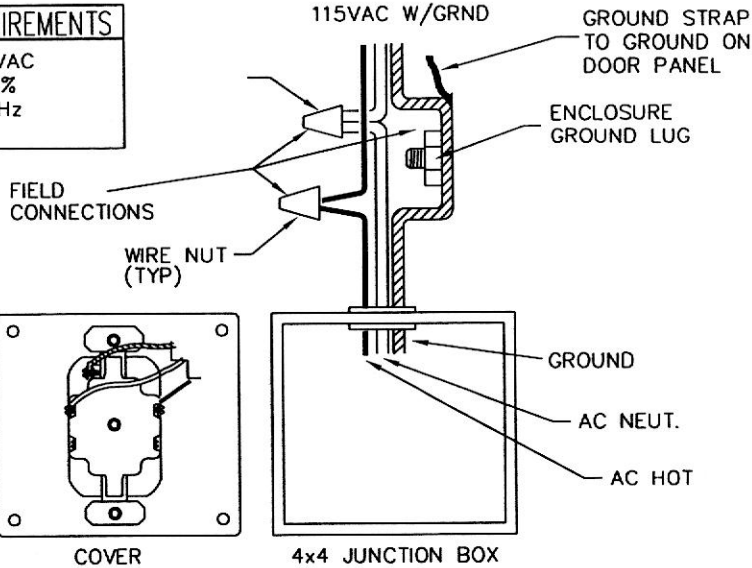


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DPU/MPU CONDUIT PENETRATION

DPU POWER SOURCE REQUIREMENTS

VOLTAGE: 115/230 VAC
+10% -15%
LINE FREQUENCY: 50 / 60 Hz
POWER: 16 VA

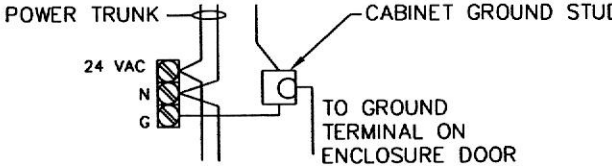


2
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DPU POWER WIRING

MPU POWER SOURCE REQUIREMENTS

VOLTAGE: 24 VAC
+10% -25%
LINE FREQUENCY: 50 / 60 Hz
POWER: 11 VA



3
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MPU POWER WIRING

NOTE:
FOR OPTIONAL 115VAC PLUG-IN TRANSFORMER, REFER TO DETAIL 2.

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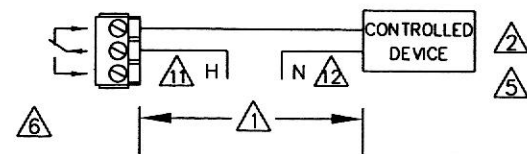
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BALTIMORE, MD

ENGINEER: JES
DRAFTER: JES
CHECKED BY: JES
INITIAL RELEASE: 03/27/09
LAST EDIT DATE: 03/27/09

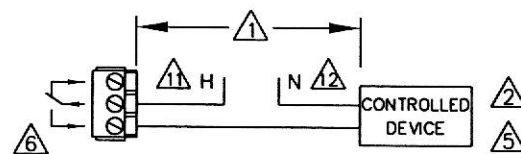
FLN Termination Specification

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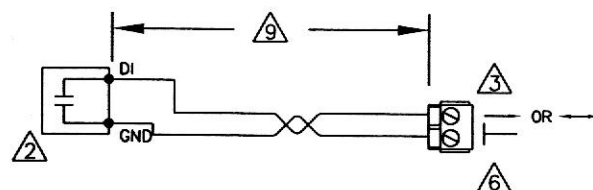
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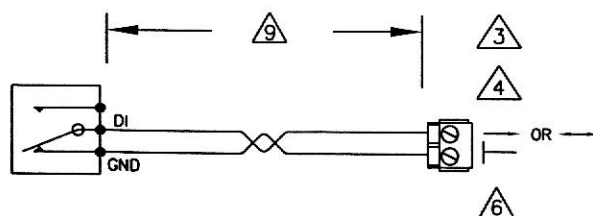
PA
00 DIGITAL OUTPUT (DO) NC
PULSED OR LATCHED



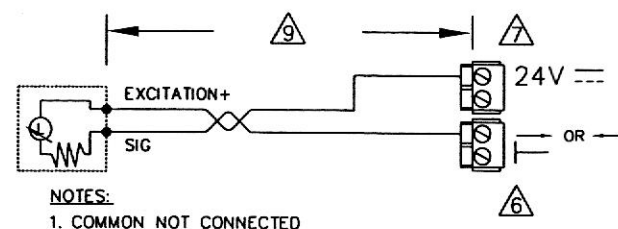
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PULSED OR LATCHED



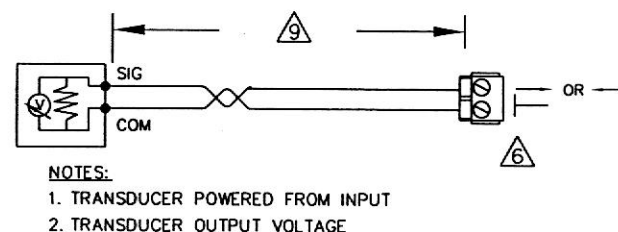
PC
00 DIGITAL INPUT (DI, UI, U)
DRY CONTACT



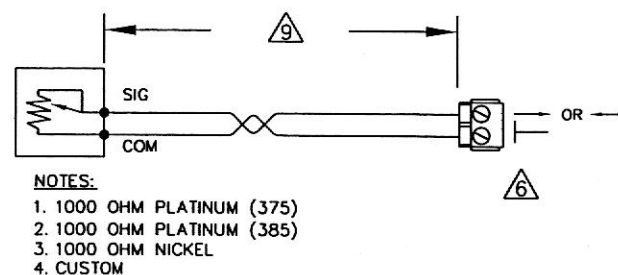
PD
00 DIGITAL INPUT (UI, U)
PULSE ACCUMULATOR



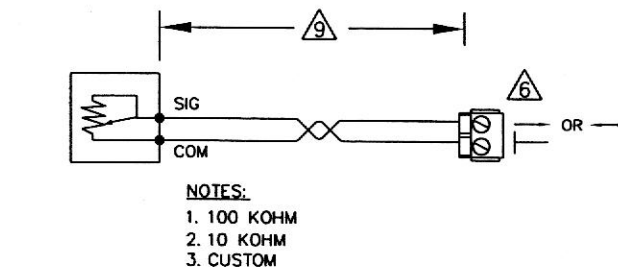
PF
00 ANALOG INPUT (UI, U) 4-20 mA
2-WIRE INTERNAL POWERED



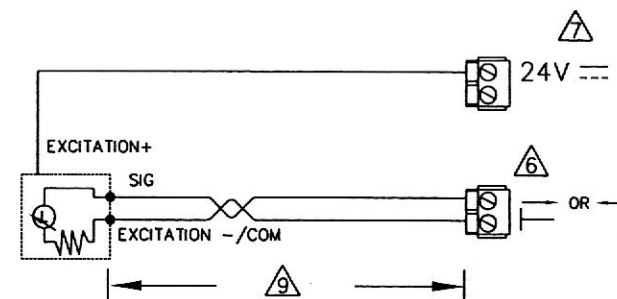
PG
00 ANALOG INPUT (UI, U) 0-10 Vdc
SELF POWERED TRANSDUCER



PH
00 ANALOG INPUT (UI, U) RTD

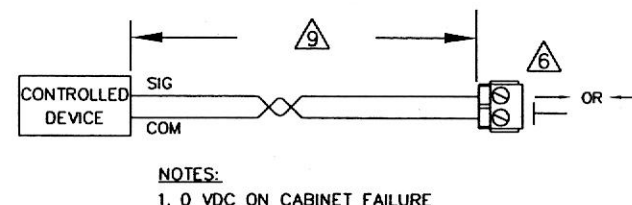


PI
00 ANALOG INPUT (UI, U) THERMISTOR



PJ
00 ANALOG INPUT (UI, U) 0-10VDC
3-WIRE INTERNAL POWERED

PK
00 RESERVED



PL
00 ANALOG OUTPUT (AO, U) 0-10VDC

NOTES:

1. MAXIMUM WIRE RUN LENGTHS ARE BASED ON THE CURRENT DRAW AND WIRE GAGE. SEE DRAWING TWIR.
2. SEE CONTROL DRAWINGS FOR NORMAL DE-ENERGIZED CONTACT STATE
3. MAXIMUM CONTACT CLOSURE RATE IS 10 PER SECOND
DI EXCITATION = 24VDC, 10mA
UI, U EXCITATION = 24VDC, 6mA, 150ms, 1mA

4. DI CANNOT BE USED FOR PULSE ACCUMULATION.
UI, U MAXIMUM PULSE RATE = 20HZ
(25ms PER STATE, 50ms PRE PULSE.)

5. PXCC DO CONTACT RATINGS
AC OPERATION:
4A @ 240VAC (RESISTIVE)
3A @ 240VAC (INDUCTIVE)
SIZE 4 MOTOR STARTER
DC OPERATION:
40W @ < 50VDC
20W @ > 50VDC

6. REFER TO PXCC TERMINATION TABLES FOR ACTUAL POINT ADDRESSES. COMMON TERMINAL MAY BE SHARED BY 2 POINTS. AND ORDER MAY BE REVERSED ON ADJACENT POINTS.

7. REFER TO DRAWING P1 ON PWIR FOR MAXIMUM CURRENT PROVIDED BY THE PXCC 24VDC SENSOR SUPPLY.

8. EXTERNAL POWER SUPPLY CAN EITHER BE A 24VDC POWER SUPPLY OR A 24VAC TRANSFORMER DEPENDING ON THE SENSOR SELECTED. IF NOT AN ISOLATED NC CLASS 2 CIRCUIT THEN POWER SOURCE, NEUTRAL AND PXC MODULAR COMMON MUST BE BOTH CONNECTED TO THE SAME OR BONDED BUILDING APPROVED EARTH GROUND. FOR FURTHER DETAILS SEE EARTH GROUNDING RULES (125-3002) APOGEE WIRING GUIDELINES FOR FIELD PANELS AND EQUIPMENT CONTROLLERS.

9. 50mA OR LESS - 750ft/230m
50mA TO 100mA - 375ft/115m

10. 100mA TO 150mA - 250ft/76m
150mA TO 200mA - 187ft/57m
200mA TO 250mA - 150ft/46m

11. WHERE H TERMINAL IS NOT A NEC CLASS 2 CIRCUIT, RELAY COMMON TERMINAL BRANCH CURRENT MUST BE EXTERNALLY LIMITED TO 10A MAXIMUM BY A NEC APPROVED MEANS. NOT A FUSE.

12. WHERE REQUIRED, NEUTRAL TERMINAL BRANCH CURRENT MUST BE EXTERNALLY LIMITED BY A NEC APPROVED MEANS.

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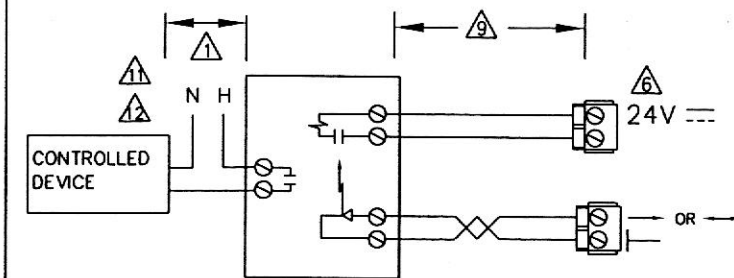
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BALTIMORE, MD

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
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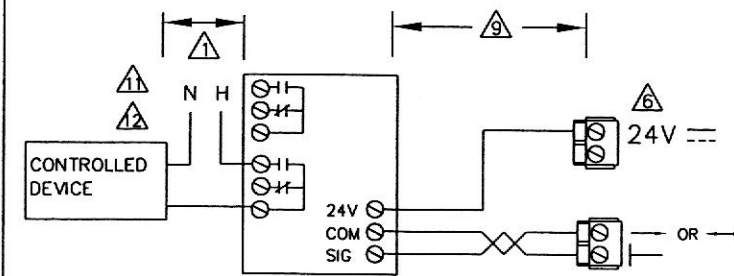
PXCC Termination Specification

440P043820

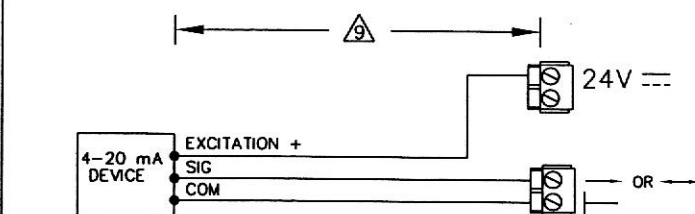
PTRM1



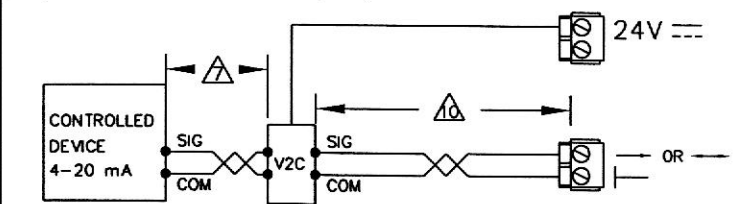
PM 00 DIGITAL OUTPUT (AO,U) LATCHED VOLTAGE TO SOLID STATE RELAY



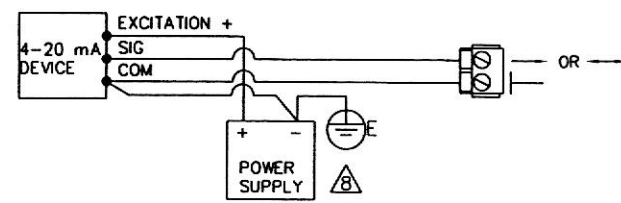
PN 00 DIGITAL OUTPUT(AO,U) SEQUENCED VOLTAGE TO SEQUENCING MODULE



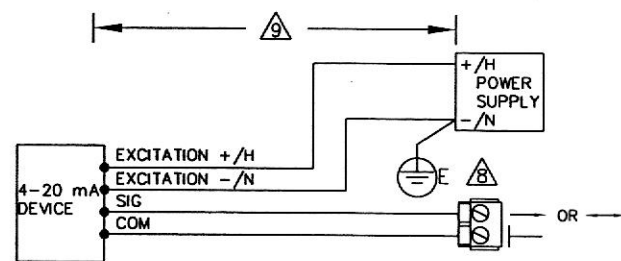
PO 00 ANALOG INPUT(UI,U) 4-20mA 3-WIRE INTERNAL POWERED



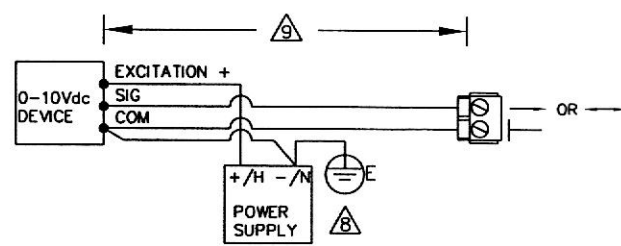
PP 00 ANALOG OUTPUT(AO,U) 4-20mA VOLTAGE TO CURRENT CONVERTER



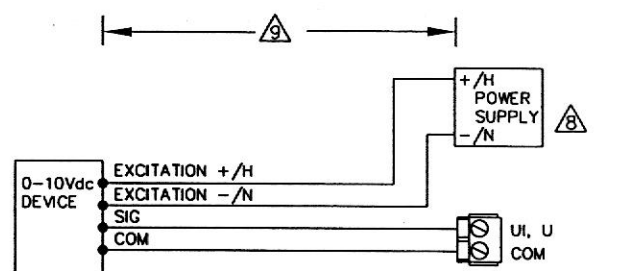
PR 00 ANALOG INPUT(UI,U) 4-20mA 3-WIRE EXTERNAL POWERED



PS 00 ANALOG INPUT(UI,U) 4-20mA 4-WIRE EXTERNAL POWERED



PT 00 ANALOG INPUT(UI,U) 0-10VDC 3-WIRE EXTERNAL POWERED



PU 00 ANALOG INPUT (UI,U) 0-10VDC 4-WIRE EXTERNAL POWERED

Point Address Table for the PXC16.

Point Type	Point Type Number	Connection Terminal		PXC Point Address
		+	-	
Universal Input (UI)	UI1	25	26	1
	UI2	27	26	2
	UI3	28	29	3
Universal Input/Output (U)	U4	30	29	4
	U5	31	32	5
	U6	33	32	6
	U7	34	35	7
	U8	36	35	8
Analog Output (AO)	A01	53	54	9
	A02	55	56	10
	A03	57	56	11
Digital Input (DI)	DI1	58	59	12
	DI2	60	59	13
Digital Output (DO)	DO1	4, 5, 6		14
	DO2	7, 8, 9		15
	DO3	10, 11, 12		16

Point Address Table for the PXC24.

Point Type	Point Type Number	Connection Terminal		PXC Point Address
		+	-	
Universal Input (UI)	UI1	25	26	1
	UI2	27	26	2
	UI3	28	29	3
Universal Input/Output (U)	U4	30	29	4
	U5	31	32	5
	U6	33	32	6
	U7	34	35	7
	U8	36	35	8
	U9	41	42	9
	U10	43	42	10
	U11	44	45	11
	U12	46	45	12
	U13	47	48	13
	U14	49	48	14
	U15	50	51	15
Analog Output (AO)	A01	53	54	17
	A02	55	56	18
	A03	57	56	19
Digital Output (DO)	DO1	4, 5, 6		20
	DO2	7, 8, 9		21
	DO3	10, 11, 12		22
	DO4	13, 14, 15		23
	DO5	16, 17, 18		24

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ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
JES	JES	JES		03/27/09

PXCC Termination Spec. Sheet 2

440P043820

PTRM2

PXCC WIRING TYPE AND GAUGE REQUIREMENTS

TABLE 1

CIRCUIT TYPE	CLASS	WIRE TYPE	MAX. DISTANCE	CONDUIT SHARING ²
AC LINE POWER ¹	POWER	#12-14 THHN	REFER TO NEC	CHECK LOCAL CODES
DIGITAL OUTPUT	1 & 2	TP not required, check job specs & local codes #18 to #24 AWG	SEE TABLE 3	CHECK LOCAL CODES
DIGITAL INPUT	2	TP not required, check job specs & local codes #18 to #24 AWG	750ft (230 m)	CHECK LOCAL CODES
ANALOG INPUT ⁴ 100K/10K Thermistor	2	#18-#24 TP ^{3/8} or TSP ⁵ CM(FT4) or CMP(FT6)	750ft (230 m)	CHECK LOCAL CODES
ANALOG INPUT ⁴ 1K Ni OR RTD	2	#18-#24 TP ^{3/8} or TSP ⁵ CM(FT4) or CMP(FT6)	750ft (230 m)	CHECK LOCAL CODES
ANALOG INPUT 0-10 V	2	#18-#24 TP ^{3/8} or TSP ⁵ CM(FT4) or CMP(FT6)	750ft (230 m)	CHECK LOCAL CODES
ANALOG INPUT 4-20 mA	2	#18-#24 TP ^{3/8} or TSP ⁵ CM(FT4) or CMP(FT6)	750ft (230 m)	CHECK LOCAL CODES
ANALOG OUTPUT 0-10 V	2	#18-#24 TP ^{3/8} or TSP ⁵ CM(FT4) or CMP(FT6)	750ft (230 m)	CHECK LOCAL CODES
ANALOG OUTPUT 4-20 mA	2	#18-#24 TP ^{3/8} or TSP ⁵ CM(FT4) or CMP(FT6)	750ft (230 m)	CHECK LOCAL CODES
ETHERNET BLN	2	#24 (4) TP ⁶ CAT5 OR BETTER	295ft (90 m)	CHECK LOCAL CODES
BLN TRUNK	2	#24 TSP	SEE TABLE 4	CHECK LOCAL CODES

- WHEN DAISY-CHAINING 24VAC POWER TO CONTROLLERS USE #14 WIRE.
- CONDUIT SHARING RULES: ONLY WHERE LOCAL CODES PERMIT. BOTH CLASS1 AND CLASS 2 WIRING CAN BE RUN TO THE PXCC PROVIDED THE CLASS 2 WIRE IS UL LISTED 300V 75°C(167°F) OR HIGHER OR THE CLASS 2 WIRE IS NEC TYPE CM (FT4) (75°C OR HIGHER) OR CMP(FT6) (75°C OR HIGHER). NEC TYPE CL2 AND CL2P IS NOT ACCEPTABLE UNLESS ALSO UL LISTED AND MARKED 300V 75°C (167°F) OR HIGHER.
- TWISTED PAIR, NON-JACKETED UL LISTED 75°C(167°F) AND 300V, CABLE CAN BE USED IN PLACE OF CM(FT4) OR CMP(FT6)(BOTH MUST BE RATED 75°C OR HIGHER) CABLE WHEN CONTAINED IN CONDUIT PER LOCAL CODES. SEE THE FIELD PURCHASING GUIDE FOR WIRE.
- WIRE LENGTH AFFECTS POINT INTERCEPT ENTRY. ADJUST INTERCEPT ACCORDINGLY FOR EACH WIRE GAUGE AND SENSOR TYPE.
- SHIELDED TWISTED PAIR (TSP) IS NOT REQUIRED FOR ELECTRICAL NOISE LEVELS UPTO 10 V/M. AT HIGHER LEVELS TSP MAY BE NEEDED. TERMINATE SHIELD ON ENCLOSURE AND TAPE BACK ON POINT END.
- FOR 24AWG INSTALL CATEGORY5 OR BETTER CABLE PER ANSI/TIA/EIA-568-B.1 OR HIGHER. USE SOLID COPPER BETWEEN JACK BOXES. USE STRANDED COPPER PATCH CABLES 13ft (4m) TO CONNECT PXCC AND 20ft (6m) TO CONNECT SWITCH OR HUB.

PXCC WIRE SPECIFICATIONS

TABLE 2

CABLE CONFIGURATION	LOW-VOLTAGE POINT APPLICATIONS	POINT USAGE	BLN TRUNK	EBLN
	TWISTED PAIR OR TSP	TWISTED PAIR (UNJACKETED) OR TSP	TWISTED SHIELDED PAIR	(4) TWISTED PAIR
GAUGE	#18 TO #22 AWG (STRANDED)	#18 TO #22 AWG (STRANDED)	24 AWG (STRANDED)	24AWG(STRANDED)
CAPACITANCE	n.a.	n.a.	12.5 pf/ft OR LESS	13 pf/ft OR LESS
TWISTS PER FOOT	6 MINIMUM	6 MINIMUM	6 MINIMUM	CATEGORY 5 Min
SHIELDS	NOT REQUIRED (IN CASE OF TSP, 100% FOIL W/ DRAIN WIRE)	NOT REQUIRED (IN CASE OF TSP, 100% FOIL W/ DRAIN WIRE)	100% FOIL W/ DRAIN WIRE	NOT REQUIRED
NEC CLASS	CM, CMP (75°C OR HIGHER)	NOT SPECIFIED	CM, CMP (75°C OR HIGHER)	MM, MMP
CEC CLASS	FT4, FT6 (75°C OR HIGHER)	NOT SPECIFIED	FT4, FT6 (75°C OR HIGHER)	NOT SPECIFIED
UL VOLTAGE RATING	NOT SPECIFIED	300 VAC ²	NOT SPECIFIED	NOT SPECIFIED
UL TEMP. RATING	NOT SPECIFIED	75°C (167°F)	NOT SPECIFIED	NOT SPECIFIED

- UL RECOGNIZED WIRE (LABELED WITH A BACKWARDS 'RU') IS NOT FIELD INSTALLABLE. USE ONLY UL-LISTED WIRE.
- 300 VAC WIRE CAN BE USED IN FIELD PANELS CONTAINING VOLTAGES BELOW 150 VAC.

MAXIMUM DO WIRE RUN LENGTHS

TABLE 3

NOMINAL INRUSH	STARTER SIZE	WIRE SIZE		
		#18	#16	#14
200 VA	0	500ft (152m)	900ft (274m)	1400ft (427m)
550 VA	2	200ft (61m)	300ft (91m)	500ft (152m)
1150 VA	3	100ft (30m)	150ft (46m)	250ft (76m)
1500 VA	4	70ft (21m)	100ft (30m)	200ft (61m)

TABLE 3 NOTES:

- DISTANCES SHOWN ASSURE LESS THAN 10% VOLTAGE DROP ACROSS THE WIRE FOR A TYPICAL STARTER.
- PXCC DO CONTACT RATINGS
4A @ 250VAC & 30VDC
SIZE 4 MOTOR STARTER

MAXIMUM NUMBER HSTIE IN SERIES ON BLN TRUNK

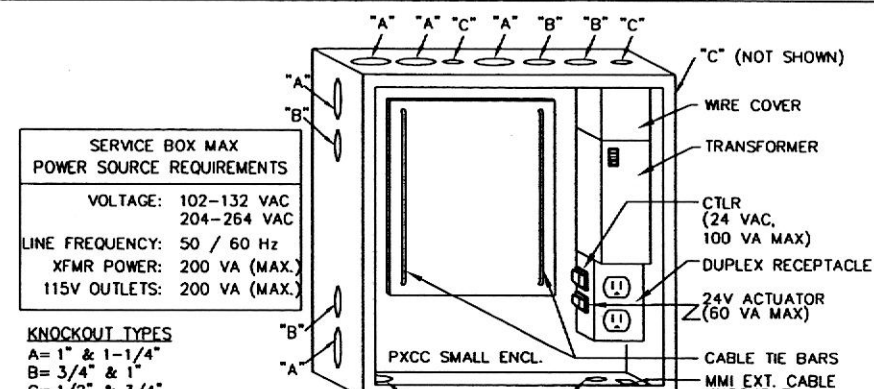
TABLE 4

SPEED	1200 BAUD	4800 BAUD	9600 - 38.4K BAUD	57.6K - 115.2K BAUD
SERIES TIE'S	10	7	6	6
BLN TRUNK DISTANCE	4000ft (1.2km)	4000ft (1.2km)	4000ft (1.2km)	3280ft (1km)

- TIE MUST BE USED TO ISOLATE BLN BETWEEN PXCC CONNECTED TO DIFFERENT SERVICE GROUNDS OR ON BOTH SIDES OF THE BLN CABLE THAT EXITS BUILDING.
- THE MAX BLN DISTANCE APPLIES TO EACH SIDE OF THE TIE.

GENERAL NOTES:

- COMPLY WITH LOCAL BUILDING CODES
- SIZE WIRE FOR LOAD, CURRENT, AND VOLTAGE.
- ALL WIRE TO BE APPROVED OR LISTED FOR THE INTENDED APPLICATION BY AGENCIES SUCH AS UL, NEC, CSA.
- ALWAYS REFER TO LOCAL CODES FOR CONDUIT SHARING.
- WIRING MUST HAVE INSULATION RATED FOR HIGHEST VOLTAGE CIRCUIT IN CONDUIT.
- THE BLN TRUNK MUST BE AN UNINTERRUPTED RUN BETWEEN CABINETS. NO SPLICES ALLOWED.
- CM/CMP/MM/MMP WIRE IS NOT USABLE FOR CLASS 1 CIRCUITS.
- FOR EXTENDED TEMPERATURE INSTALLATIONS USE ONLY COPPER WIRE LISTED FOR 90°C OR HIGHER



PXCC CONDUIT PENETRATIONS

PRODUCT	24VAC VA RATING	24VDC mA
PX COMPACT 16	18	100
PX COMPACT 24	20	100

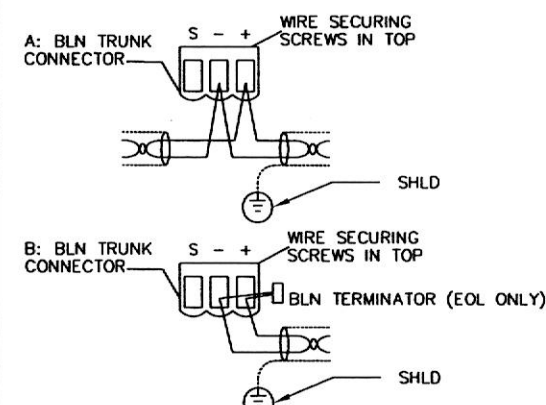
NOTES:

- NO MORE THAN SEVEN (7) FULLY LOADED PXCC CABINETS ALLOWED ON A SINGLE 3-WIRE CIRCUIT.
- RECEPTACLE IS PRE-WIRED AND MOUNTED IN FACTORY, FOR 115VAC SERVICE BOX ONLY.

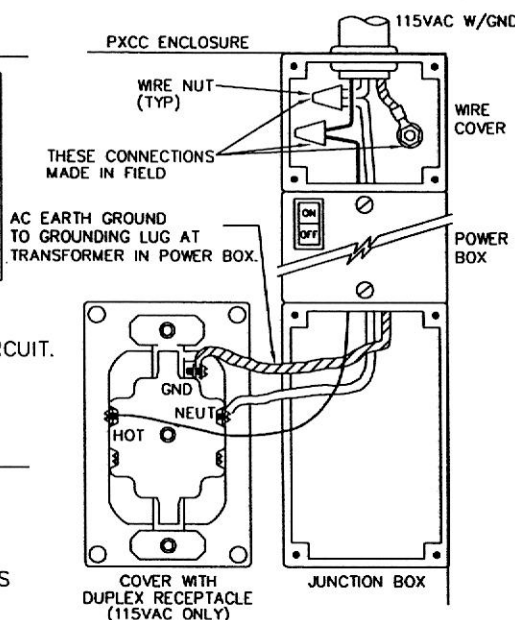
PXCC POWER WIRING

NOTES:

- COMMUNICATION CONNECTORS PLUG INTO PXCC.
- BLN MUST BE DAISEY-CHAINED WHEN RUNNING 19.2 k BAUD OR FASTER AND TRUNK TERMINATORS USED AT BOTH ENDS OF LINE P3C.
- TERMINATE SHIELD AT LEAVING END OF BLN TRUNK ONLY.
- USE BLN SHIELD TERMINATION P3A WHEN 24VAC E TERMINAL IS EARTH GROUNDED.
- USE BLN SHIELD TERMINATION P3B WHEN 24VAC E TERMINAL IS OPEN.



PXCC COMMN TERMINATIONS



PXCC ON ETHERNET CONNECTOR

- E: EBLN ETHERNET CONNECTOR RJ-45 SHIELDED JACK FOR ETHERNET PATCH CABLE
- H: PXCC - HMI⁷ RJ45 JACK FOR RS232 SERVICE MODE SERIAL PRINTER OR PXCC
- 7. DO NOT INSERT RJ-11 6 PIN PLUG WITHOUT PIN 1 AND 8 VOIDS
- G: USB DEVICE CONNECTOR FOR LAPTOP

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PXCC Wiring Specification

440P043820

PWIR

TEC - ELECTRONIC OUTPUT
WIRING TYPE AND GAUGE REQUIREMENTS

TABLE 1A

CIRCUIT TYPE	CLASS	WIRE TYPE	MAX. DISTANCE	CONDUIT SHARING
INPUT POWER	2	CHECK LOCAL CODES	AS REQUIRED	CHECK LOCAL CODES
DIGITAL OUTPUT	2	CHECK LOCAL CODES	150ft (46 m)	CHECK LOCAL CODES
DIGITAL INPUT	2	#18-22 TP #20 AWG TP	150ft (46 m)	CLASS 1 & 2 CHECK LOCAL CODES
ANALOG INPUT	2	#18-22 TP	100ft (30.5 m)	CLASS 2
ANALOG INPUT THERMISTOR	2	#20 TP	100ft (30.5 m)	CLASS 1 & 2 CHECK CODES
ROOM TEMP. SENSOR	2	6-WIRE RJ11	100ft (30.5 m)	CLASS 2
LAN TRUNK ¹	2	#18-22 AWG TSP	4kft (1220 m)	CLASS 2 ONLY

TEC - PNEUMATIC OUTPUT
WIRING TYPE AND GAUGE REQUIREMENTS

TBBLE 1B

CIRCUIT TYPE	CLASS	WIRE TYPE	MAX. DISTANCE	CONDUIT SHARING
POWER TRUNK (LOW VOLTAGE)	2	CHECK LOCAL CODES	AS REQUIRED	CHECK LOCAL CODES
POWER TRUNK (HIGH VOLTAGE)	1	CHECK LOCAL CODES	AS REQUIRED	CHECK LOCAL CODES
DAMPER OUTPUT (LOW VOLTAGE)	2	CHECK LOCAL CODES	AS REQUIRED	CHECK LOCAL CODES
DAMPER OUTPUT (HIGH VOLTAGE)	1	CHECK LOCAL CODES	AS REQUIRED	CHECK LOCAL CODES
DIGITAL INPUT	2	#18-22 TP	100ft (30.5 m)	CLASS 1 & 2 CHECK LOCAL CODES
ANALOG INPUT	2	#18-22 TP	100ft (30.5 m)	CLASS 2
ROOM TEMP. SENSOR	2	6-WIRE RJ11	100ft (30.5 m)	CLASS 2
LAN TRUNK ¹	2	#18-22 AWG TSP	4kft (1220 m)	CLASS 2 ONLY

TABLE 1A & 1B NOTES:

1. DISTANCE WILL DEPEND ON TRANSFORMER LOCATION.

TEC POWER SOURCE REQUIREMENTS

TEC TYPE	VOLTAGE	LINE FREQUENCY	MAX. POWER
ELECTRONIC OUTPUT	24 VAC +15% -20%	50 / 60 Hz	5.2 VA TO 43.5 VA ¹
PNEUMATIC OUTPUT (LOW VOLTAGE)	24 VAC +15% -20%	50 / 60 Hz	17 VA PLUS DAMPER VA
PNEUMATIC OUTPUT (HIGH VOLTAGE)	115/230 VAC +10% -15%	50 / 60 Hz	17 VA PLUS DAMPER VA

NOTES:

1. VA DEPENDS ON TEC APPLICATION.

DI, AI, AO WIRE SPECIFICATIONS

TABLE 2

SPECIFICATION	WIRE TYPE	
	SHIELDED	UNSHIELDED
CAPACITANCE WIRE TO WIRE	NOT SPECIFIED	NOT SPECIFIED
CAPACITANCE BETWEEN ONE CONDUCTOR WITH OTHER CONDUCTOR CONNECTED TO SHIELD	NOT SPECIFIED	N/A
WIRE LAY	2" MAX.	2" MAX.
AWG	18-22	18-22

LAN TRUNK WIRE

TABLE 3

SPECIFICATION	LENGTH OF TRUNK SECTION	
	4000 FT	10,000 FT
CAPACITANCE WIRE TO WIRE	60pF MAX.	24pF MAX.
CAPACITANCE BETWEEN ONE CONDUCTOR WITH OTHER CONDUCTOR CONNECTED TO SHIELD	100pF MAX.	44pF MAX
WIRE LAY	2" MAX.	2" MAX.
AWG	24	18 MIN.

TABLE 2 & 3 NOTES:

1. OPTIMAL NOISE REDUCTION IS ACHIEVED WITH TIGHTER WIRE LAYS (E.G. 1/2").

GENERAL NOTES:

- COMPLY WITH LOCAL BUILDING CODES.
- SIZE WIRE FOR LOAD, CURRENT, AND VOLTAGE.
- ALL WIRE TO BE APPROVED OR LISTED FOR THE INTENDED APPLICATION BY AGENCIES SUCH AS UL, CSA.
- ALWAYS REFER TO LOCAL CODES FOR CONDUIT SHARING.
- WIRING MUST HAVE INSULATION RATED FOR HIGHEST VOLTAGE CIRCUIT IN CONDUIT.
- PLENUM WIRING MAY BE USED IN PLACE OF ANY LOW VOLTAGE WIRING WITHOUT CHANGES TO LENGTH EXCEPT FOR PMD OR LAN TRUNK. IN CASES WHERE PLENUM WIRE (#18 OR #20 AWG) IS USED FOR PMD OR LAN TRUNK, USE THE REDUCED LENGTHS OF #20 AWG CABLE.
- THE LAN TRUNK MUST BE AN UNINTERRUPTED RUN BETWEEN TEC'S. NO SPLICES ALLOWED.

TEC (ELECTRONIC OUTPUT) DO CONTACT RATING

24 VAC HOT @ 0.5 AMPS

WARNING: DO IS NOT A DRY CONTACT!

TEC (PNEUMATIC OUTPUT) DO CONTACT RATING

DO CONTACT RATING NOT SPECIFIED

REVISION HISTORY

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TEC Termination Specification

440P043820

TTRM

TA
00

DIGITAL OUTPUT (6R) NC
PULSED OR LATCHED

TB
00

DIGITAL OUTPUT (6R) NO
PULSED OR LATCHED

TC
00

DIGITAL INPUT (8D, 16D, 8U, 8X)
DRY CONTACT

TD
00

DIGITAL INPUT (8D, 16D, 8U, 8X)
PULSE ACCUMULATOR

TF
00

ANALOG INPUT (8X) 4-20 mA
2-WIRE INTERNAL POWERED

TG
00

ANALOG INPUT (8U, 8X) 0-10 Vdc
SELF POWERED TRANSDUCER

TH
00

ANALOG INPUT (8X, 8U) RTD

TI
00

ANALOG INPUT (8X, 8U) THERMISTOR

TJ
00

ANALOG INPUT (8U, 8X) 0-10VDC
3-WIRE INTERNAL POWERED

TK
00

ANALOG OUTPUT (8X) 4-20 mA

TL
00

ANALOG OUTPUT (8U, 8X) 0-10VDC

NOTES:

1. MAXIMUM WIRE RUN LENGTHS ARE BASED ON THE CURRENT DRAW AND WIRE GAGE. SEE DRAWING TWIR.

2. SEE CONTROL DRAWINGS FOR NORMAL DE-ENERGIZED CONTACT STATE

3. MAXIMUM CONTACT CLOSURE RATE IS 10 PER SECOND
8D, 16d EXCITATION = 24VDC, 8mA
8U, 8X EXCITATION = 24VDC, 8mA, 20ms, 100mA

8D, 16D MAXIMUM PULSE RATE = 10Hz (50ms PER STATE, 100ms PER PULSE)
8U, 8X MAXIMUM PULSE RATE = 20Hz (25ms PER STATE, 50ms PER PULSE)

PXC MODULAR DO CONTACT RATINGS
AC OPERATION:
4A @ 240VAC (RESISTIVE)
3A @ 240VAC (INDUCTIVE)
SIZE 4 MOTOR STARTER
DC OPERATION:
40W @ < 50VDC
20W @ > 50VDC

REFER TO PXC MODULAR PANEL FOR ACTUAL POINT ADDRESSES. REFER TO TXMI TERMINATION TABLES FOR ACTUAL TERMINALS FOR EACH PANEL ADDRESS. COMMON TERMINAL MAY BE SHARED BY 2 POINTS.

REFER TO DRAWING P1 ON TWIR FOR MAXIMUM CURRENT PROVIDED BY THE 24VDC SENSOR SUPPLY ON P1 BIM OR BUS POWER SUPPLY

EXTERNAL POWER SUPPLY CAN EITHER BE A 24VDC POWER SUPPLY OR A 24VAC TRANSFORMER DEPENDING ON THE SENSOR SELECTED. IF NOT AN ISOLATED NC CLASS 2 CIRCUIT THEN POWER SOURCE, NEUTRAL AND PXC MODULAR COMMON MUST BE BOTH CONNECTED TO THE SAME OR BONDED BUILDING APPROVED EARTH GROUND. FOR FURTHER DETAILS SEE EARTH GROUNDING RULES (125-3002) APOGEE WIRING GUIDELINES FOR FIELD PANELS AND EQUIPMENT CONTROLLERS.

50mA OR LESS - 750ft/230m
50mA TO 100mA - 375ft/115m

100mA TO 150mA - 250ft/76m
150mA TO 200mA - 187ft/57m
200mA TO 250mA - 150ft/46m

WHERE H TERMINAL IS NOT A NEC CLASS 2 CIRCUIT, RELAY COMMON TERMINAL BRANCH CURRENT MUST BE EXTERNALLY LIMITED TO 10A MAXIMUM BY A NEC APPROVED MEANS. NOT A FUSE.

WHERE REQUIRED, N TERMINAL BRANCH CURRENT MUST BE EXTERNALLY LIMITED BA A NEC APPROVED MEANS.

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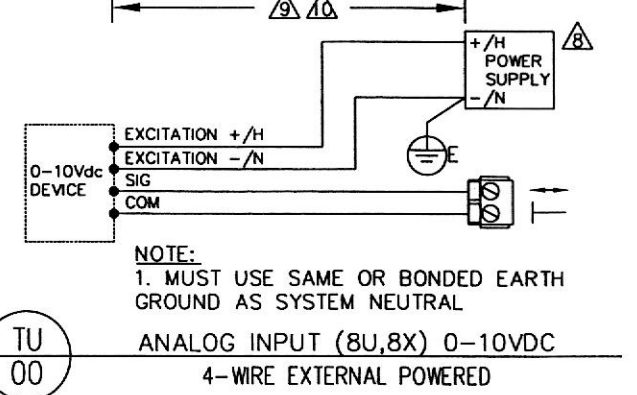
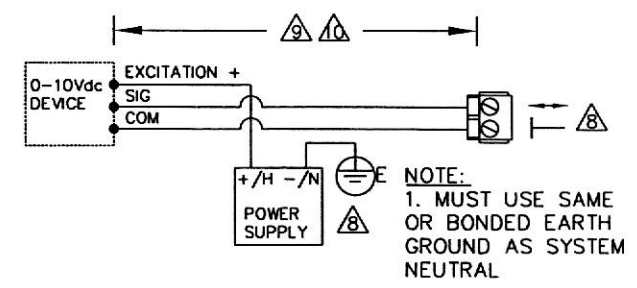
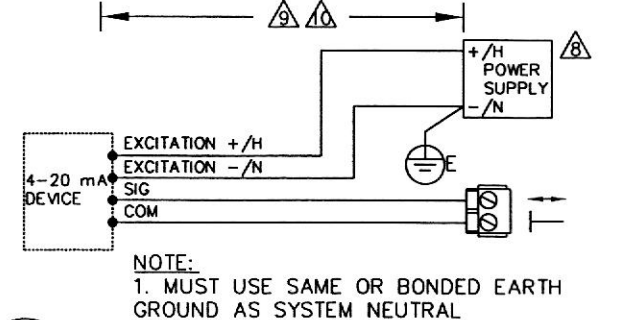
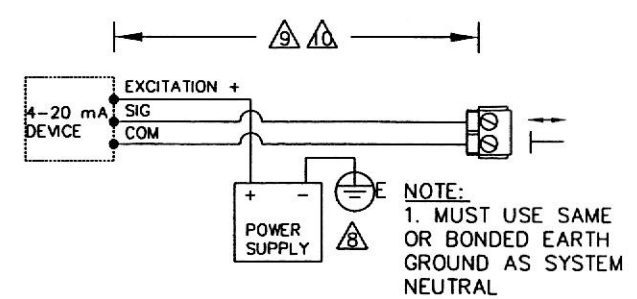
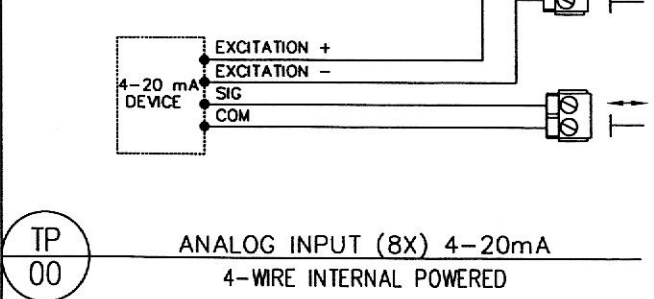
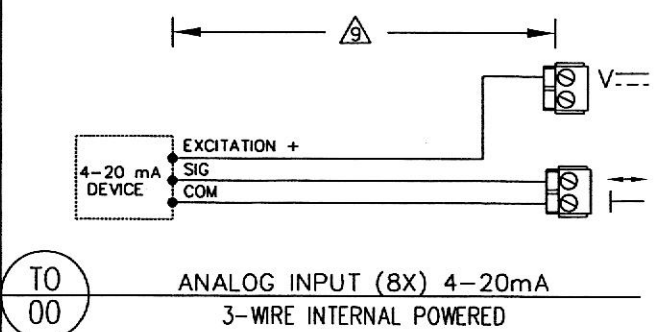
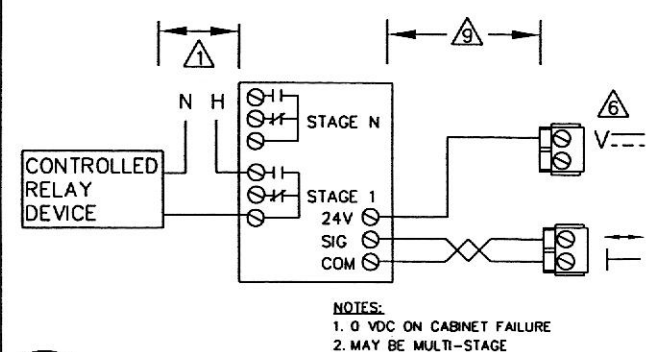
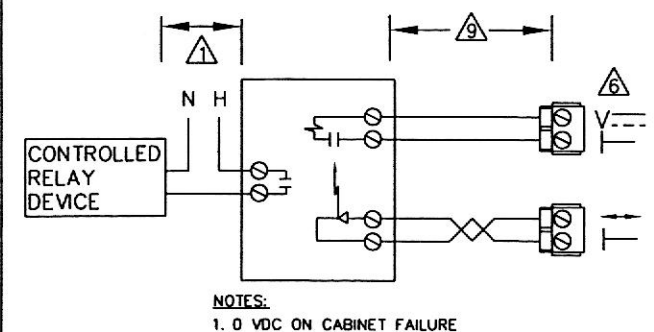
TX-I/O Termination Spec.

440P043820

TTRM1

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TXM1 TERMINATION TABLES

1. ALL TXM1 TERMINALS (MEASURING, NEUTRAL, RELAY, SUPPLY) ARE CONNECTED IN THE PLUG-IN I/O MODULE, NOT IN THE TERMINAL BUS.

TXM1.8D, TXM1.16D								
I/O POINT	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SYSTEM NEUTRAL ¹	1	3	5	7	9	11	13	15
DIGITAL INPUT	2	4	6	8	10	12	14	16

1. NEUTRAL CAN BE CONNECTED TO ANY NEUTRAL TERMINAL ON SAME MODULE AND SEVERAL CAN SHARE SAME NEUTRAL TERMINAL.

TXM1.16D								
I/O POINT	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
SYSTEM NEUTRAL	18	20	22	24	26	28	30	32
DIGITAL INPUT ¹	19	21	23	25	27	29	31	33

1. NO PULSE ACCUMULATOR

TXM1.8U, TXM1.8U-ML								
I/O POINT	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SYSTEM NEUTRAL	2	6	10	14	19	23	27	31
UNIVERSAL I/O	4	8	12	16	21	25	29	33
24V AC/DC ACTUATOR SUPPLY ¹		7		15		24		32

1. 24V DC ONLY AVAILABLE WITH BUS CONNECTOR MODULE (BCM) POWERED EXTERNALLY BY DC SUPPLY.

TXM1.8X, TXM1.8X-ML								
I/O POINT	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SYSTEM NEUTRAL	2	6	10	14	19	23	27	31
UNIVERSAL I/O	4	8	12	16	21	25	29	33
24V AC/DC ACTUATOR SUPPLY ²		7		15		24		32
24V DC SENSOR SUPPLY ³	3		11		20		28	

- 4-20 mA OUTPUT AVAILABLE ON POINTS 5-8 ONLY.
- 24V DC ONLY AVAILABLE WITH BUS CONNECTOR MODULE (BCM) POWERED EXTERNALLY BY DC SUPPLY.
- MAY POWER EXTERNAL SENSORS 0.6w (25mA) OR 1.2w (50mA) PER TERMINATION UP TO 2.4w (100mA) MAXIMUM FOR ALL TERMINATIONS.

TXM1.6R, TXM1.6R-M						
I/O POINT	(1)	(2)	(3)	(4)	(5)	(6)
COMMON ¹	3	9	15	20	26	32
NORMALLY CLOSED	4	10	16	19	25	31
NORMALLY OPEN	2	8	14	21	27	33

1. COMMONS ARE NOT INTERNALLY CONNECTED.

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TX-I/O Termination Spec. 2

440P043820

TTRM2

PXC MODULAR WIRING TYPE AND GAUGE REQUIREMENTS

TABLE 1

CIRCUIT TYPE	CLASS	WIRE TYPE	MAX. DISTANCE	CONDUIT SHARING ²
AC LINE POWER ¹	POWER	#12-14 THHN	REFER TO NEC	CHECK LOCAL CODES
DIGITAL OUTPUT	1 & 2	TP not required, check job specs & local codes #18 to #24 AWG	SEE TABLE 3	CHECK LOCAL CODES
DIGITAL INPUT	2	TP not required, check job specs & local codes #18 to #24 AWG	750ft (230 m)	CHECK LOCAL CODES
ANALOG INPUT ⁴ 100K/10K Thermistor	2	#18-#24 TP ^{3/6} or TSP ⁵ CM(FT4) or CMP(FT6)	750ft (230 m)	CHECK LOCAL CODES
ANALOG INPUT ⁴ 1K Ni OR RTD	2	#18-#24 TP ^{3/6} or TSP ⁵ CM(FT4) or CMP(FT6)	750ft (230 m)	CHECK LOCAL CODES
ANALOG INPUT 0-10 V	2	#18-#24 TP ^{3/6} or TSP ⁵ CM(FT4) or CMP(FT6)	750ft (230 m)	CHECK LOCAL CODES
ANALOG INPUT 4-20 mA	2	#18-#24 TP ^{3/6} or TSP ⁵ CM(FT4) or CMP(FT6)	750ft (230 m)	CHECK LOCAL CODES
ANALOG OUTPUT 0-10 V	2	#18-#24 TP ^{3/6} or TSP ⁵ CM(FT4) or CMP(FT6)	750ft (230 m)	CHECK LOCAL CODES
ANALOG OUTPUT 4-20 mA	2	#18-#24 TP ^{3/6} or TSP ⁵ CM(FT4) or CMP(FT6)	750ft (230 m)	CHECK LOCAL CODES
ETHERNET BLN	2	#24 (4) TP ⁶ CAT5 OR BETTER	295ft (90 m)	CHECK LOCAL CODES
BLN TRUNK	2	#24 TSP	SEE TABLE 4	CHECK LOCAL CODES

- WHEN DAISY-CHAINING 24VAC POWER TO CONTROLLERS USE #14 WIRE.
- CONDUIT SHARING RULES: ONLY WHERE LOCAL CODES PERMIT. BOTH CLASS 1 AND CLASS 2 WIRING CAN BE RUN TO THE PXCC PROVIDED THE CLASS 2 WIRE IS UL LISTED 300V 75°C(167°F) OR HIGHER OR THE CLASS 2 WIRE IS NEC TYPE CM (FT4) (75°C OR HIGHER) OR CMP(FT6) (75°C OR HIGHER). NEC TYPE CL2 AND CL2P IS NOT ACCEPTABLE UNLESS ALSO UL LISTED AND MARKED 300V 75°C (167°F) OR HIGHER
- TWISTED PAIR, NON-JACKETED UL LISTED 75°C(167°F) AND 300V, CABLE CAN BE USED IN PLACE OF CM(FT4) OR CMP(FT6)(BOTH MUST BE RATED 75°C OR HIGHER) CABLE WHEN CONTAINED IN CONDUIT PER LOCAL CODES. SEE THE FIELD PURCHASING GUIDE FOR WIRE.
- WIRE LENGTH AFFECTS POINT INTERCEPT ENTRY. ADJUST INTERCEPT ACCORDINGLY FOR EACH WIRE GAUGE AND SENSOR TYPE.
- SHIELDED TWISTED PAIR (TSP) IS NOT REQUIRED FOR ELECTRICAL NOISE LEVELS UP TO 10 V/M. AT HIGHER LEVELS TSP MAY BE NEEDED. TERMINATE SHIELD ON ENCLOSURE AND TAPE BACK ON POINT END.
- FOR 24AWG INSTALL CATEGORY 5 OR BETTER CABLE PER ANSI/TIA/EIA-568-B.1 OR HIGHER. USE SOLID COPPER BETWEEN JACK BOXES. USE STRANDED COPPER PATCH CABLES 13ft (4m) TO CONNECT PXCC AND 20ft (6m) TO CONNECT SWITCH OR HUB.

PXCM WIRE SPECIFICATIONS

TABLE 2

	LOW-VOLTAGE POINT APPLICATIONS	POINT USAGE	BLN TRUNK	EBLN
CABLE CONFIGURATION	TWISTED PAIR OR TSP	TWISTED PAIR (UNJACKETED) OR TSP	TWISTED SHIELDED PAIR	(4) TWISTED PAIR
GAUGE	#18 TO #22 AWG (STRANDED)	#18 TO #22 AWG (STRANDED)	24 AWG (STRANDED)	24AWG(STRANDED)
CAPACITANCE	n.a.	n.a.	12.5 pF/ft OR LESS	13 pF/ft OR LESS
TWISTS PER FOOT	6 MINIMUM	6 MINIMUM	6 MINIMUM	CATEGORY 5 Min
SHIELDS	NOT REQUIRED (IN CASE OF TSP, 100% FOIL W/ DRAIN WIRE)	NOT REQUIRED (IN CASE OF TSP, 100% FOIL W/ DRAIN WIRE)	100% FOIL W/ DRAIN WIRE	NOT REQUIRED
NEC CLASS	CM, CMP (75°C OR HIGHER)	NOT SPECIFIED	CM, CMP (75°C OR HIGHER)	MM, MMP
CEC CLASS	FT4, FT6 (75°C OR HIGHER)	NOT SPECIFIED	FT4, FT6 (75°C OR HIGHER)	NOT SPECIFIED
UL VOLTAGE RATING	NOT SPECIFIED	300 VAC ²	NOT SPECIFIED	NOT SPECIFIED
UL TEMP. RATING	NOT SPECIFIED	75°C (167°F)	NOT SPECIFIED	NOT SPECIFIED

- UL RECOGNIZED WIRE (LABELED WITH A BACKWARDS 'RU') IS NOT FIELD INSTALLABLE. USE ONLY UL-LISTED WIRE.
- 300 VAC WIRE CAN BE USED IN FIELD PANELS CONTAINING VOLTAGES BELOW 150 VAC.

MAXIMUM DO WIRE RUN LENGTHS

TABLE 3

NOMINAL INRUSH	STARTER SIZE	WIRE SIZE		
		#18	#16	#14
200 VA	0	500ft (152m)	900ft (274m)	1400ft (427m)
550 VA	2	200ft (61m)	300ft (91m)	500ft (152m)
1150 VA	3	100ft (30m)	150ft (46m)	250ft (76m)
1500 VA	4	70ft (21m)	100ft (30m)	200ft (61m)

TABLE 3 NOTES:

- DISTANCES SHOWN ASSURE LESS THAN 10% VOLTAGE DROP ACROSS THE WIRE FOR A TYPICAL STARTER.
- PXCM DO CONTACT RATINGS
4A @ 250VAC & 30VDC
SIZE 4 MOTOR STARTER

MAXIMUM NUMBER HSTIE IN SERIES ON BLN TRUNK

TABLE 4

SPEED	1200 BAUD	4800 BAUD	9600 - 38.4K BAUD	57.6K - 115.2K BAUD
SERIES TIE'S	10	7	6	6
BLN TRUNK DISTANCE	4000ft (1.2km)	4000ft (1.2km)	4000ft (1.2km)	3280ft (1km)

- TIE MUST BE USED TO ISOLATE BLN BETWEEN PXCM CONNECTED TO DIFFERENT SERVICE GROUNDS OR ON BOTH SIDES OF THE BLN CABLE THAT EXITS BUILDING.
- THE MAX BLN DISTANCE APPLIES TO EACH SIDE OF THE TIE.

GENERAL NOTES:

- COMPLY WITH LOCAL BUILDING CODES
- SIZE WIRE FOR LOAD, CURRENT, AND VOLTAGE.
- ALL WIRE TO BE APPROVED OR LISTED FOR THE INTENDED APPLICATION BY AGENCIES SUCH AS UL, NEC, CSA.
- ALWAYS REFER TO LOCAL CODES FOR CONDUIT SHARING.
- WIRING MUST HAVE INSULATION RATED FOR HIGHEST VOLTAGE CIRCUIT IN CONDUIT.
- THE BLN TRUNK MUST BE AN UNINTERRUPTED RUN BETWEEN CABINETS. NO SPLICES ALLOWED.
- CM/CMP/MM/MMP WIRE IS NOT USABLE FOR CLASS 1 CIRCUITS.
- FOR EXTENDED TEMPERATURE INSTALLATIONS USE ONLY COPPER WIRE LISTED FOR 90°C OR HIGHER

ENCLOSURE H x W x D (IN)
 PXA-ENC-19 19 x 22 x 5 3/4
 PXA-ENC-34 34 x 22 x 5 3/4
 PXA-ENC-18 18 x 22 x 6
 KNOCKOUT TYPES
 A= 1" & 1-1/4"
 B= 3/4" & 1"
 C= 1/2" & 3/4"

PXCM CONDUIT PENETRATIONS

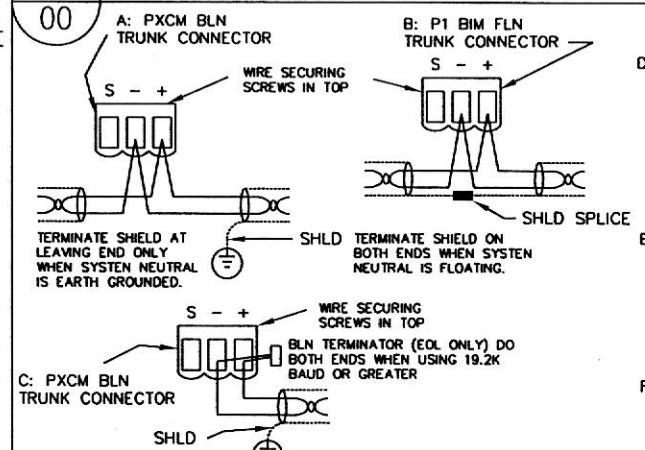
SERVICE BOX MAX POWER SOURCE REQUIREMENTS	
VOLTAGE:	102-132 VAC 204-264 VAC
LINE FREQUENCY:	50 / 60 Hz
115V OUTLETS:	200 VA (MAX.)
PXA-SB115V384VA ²	440 VA (MAX.)
PXA-SB115V192VA ²	220 VA (MAX.)
PXA-SB230V384VA	440 VA (MAX.)
PXA-SB230V192VA	220 VA (MAX.)

PXCM FAMILY VA RATINGS & SENSOR SUPPLY			
PRODUCT	24VDC (W)	24VAC INPUT VA	24VAC OUTPUT VA
PXC00-X	0	24	0
PXC100-X	0	24	0
TXB1.P1	14.4	125	96
TXS1.12F4	28.8	150	96
TXS1.EF4	0	96	96
TX-I/O MODULE	24VDC LOAD (W) MAX.		
TXM1.8D	1.1		
TXM1.16D	1.4		
TXM1.8U	1.5		
TXM1.8U-ML	1.8		
TXM1.8X	2.2		
TXM1.8X-ML	2.3		
TXM1.6R	1.7		
TXM1.6R-M	1.9		

NOTES:

- NO MORE THAN THREE (3) 384VA OR FIVE (5) 192VA FULLY LOADED PXA CABINETS ALLOWED ON A SINGLE 3-WIRE 115V, 15A CIRCUIT.
- RECEPTACLE IS PREWIRED AND MOUNTED IN FACTORY, FOR 115VAC SERVICE BOX ONLY.
- DC INPUT/OUTPUT ONLY AVAILABLE ON BUSS CONNECTION MODULES.

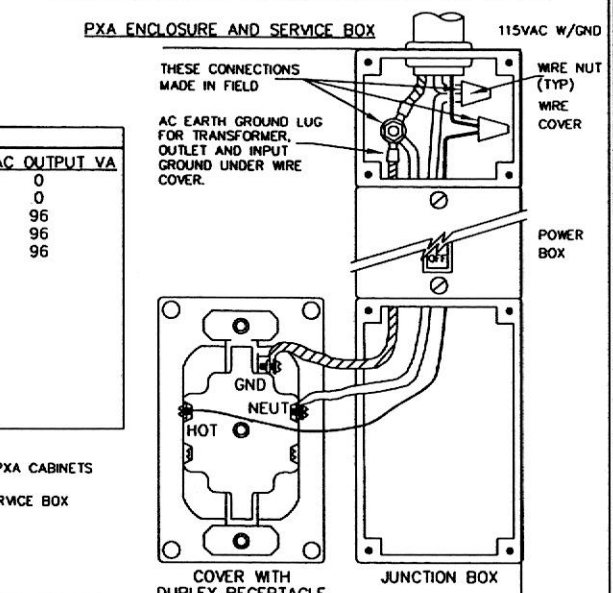
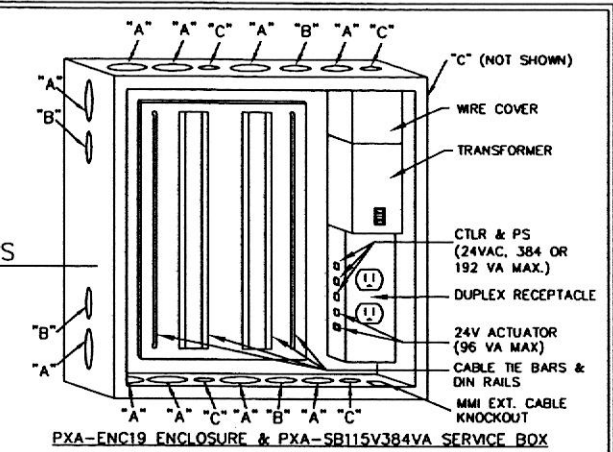
PXCM POWER WIRING



- NOTES:
- COMMUNICATION CONNECTORS PLUG INTO PXCM.
 - BLN MUST BE DAISY-CHAINED WHEN RUNNING 19.2K BAUD OR FASTER AND TRUNK TERMINATORS USED AT BOTH ENDS OF LINE T3C. 3. TERMINATE SHIELD A LEAVING END OF BLN TRUNK ONLY T3A.
 - USE BLN SHIELD TERMINATION T3A WHEN 24VAC E TERMINAL IS EARTH GROUND.
 - USE BLN SHIELD TERMINATION T3B WHEN 24VAC E TERMINAL IS OPEN.

PXCM & P1 BIM COMMUNICATION TERMINATIONS

FOR PXCM MODULAR, SERIES CONTROLLERS AND SUPPLY MODULES



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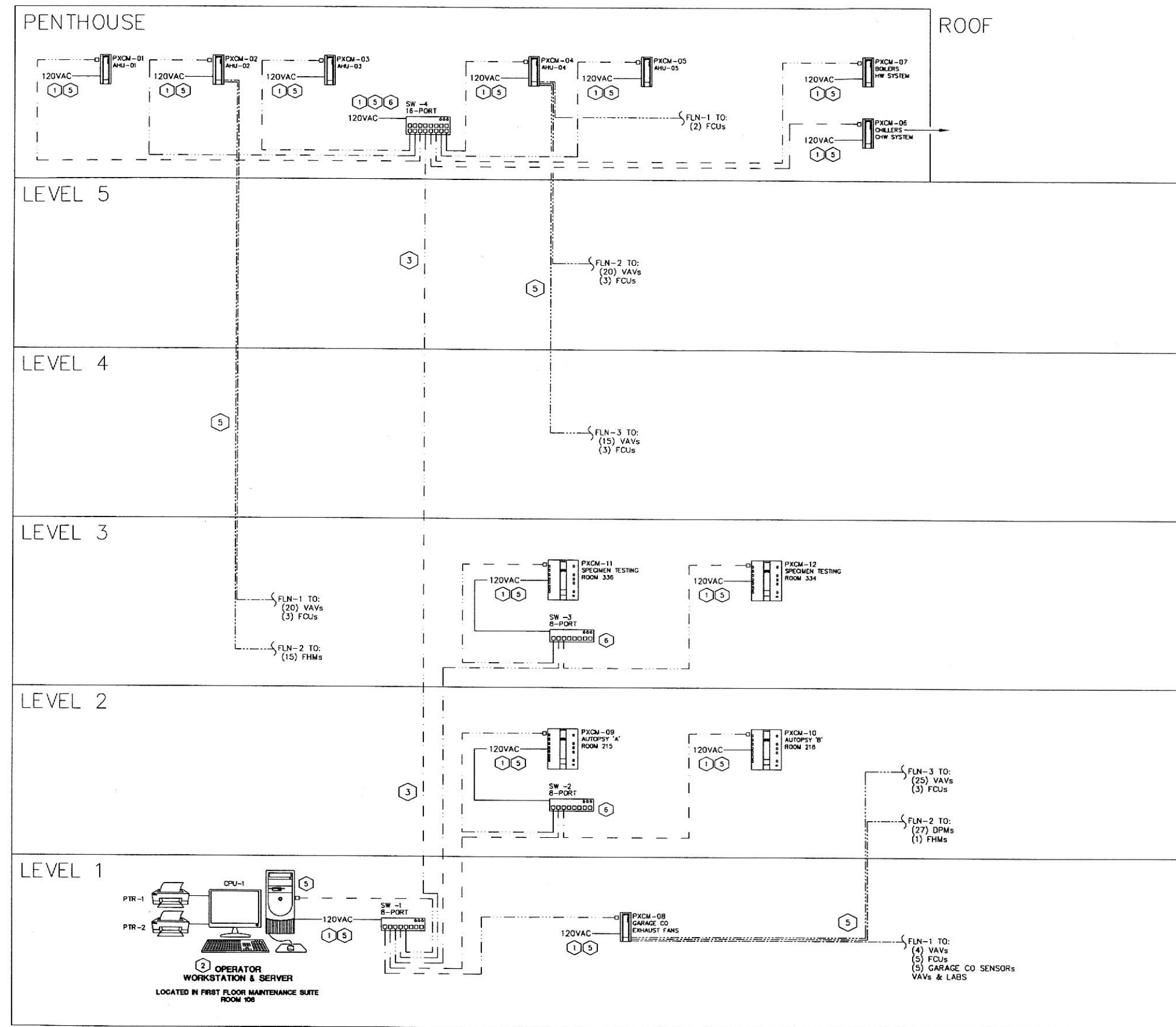
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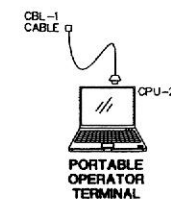
TX-I/O Wiring Specification

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TWIR



- INSTALLATION NOTES:**
- 1 DEDICATED 120VAC CIRCUIT TO EACH DDC PANEL FROM JUNCTION BOXES SHOWN ON CONTRACT DOCUMENTS. DV 16 TO SUPPLY EMERGENCY POWER DISTRIBUTION PANEL.
 - 2 OPERATOR WORKSTATIONS TO BE LOCATED AS DIRECTED BY OWNER OR A/E.
 - 3 THE RISER CONDUITS SHOULD BE SIZED TO ACCOMMODATE FUTURE EXPANSION OF UP TO 2 ADDITIONAL ETHERNET CABLES BETWEEN EACH FLOOR. PULL SPARE CABLES IF AREA WILL BE INACCESSIBLE IN FUTURE.
 - 4 REFER TO MARKED-UP MECHANICAL DRAWINGS FOR SPECIFIC FLN & POWER LAYOUT.
 - 5 SIEMENS BUILDING TECHNOLOGIES CABLE SPECS: (ANIXTER #)
 ETHERNET BLN: E-4TP24CAT5-CMP
 FLN: H-F-TSP24LC-CMP
 18/2 I/O: H-TP18-CMP
 18/3 I/O: H-3C18-CMP
 24V POWER: H-2C14-CL3P
 - 6 LOCATE CAT5 SWITCHES IN A SIEMENS FIELD PANEL CABINET.
 - 7 FIELD PANEL PART NUMBERS CAN BE FOUND WITH THE PANEL LAYOUT DRAWINGS.



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JES	JES	JES	01/15/09	03/30/09											
		RISER DIAGRAM													

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
CPU 1	1	DELL PC	DELL		DELL DESKTOP PC FOR INSIGHT
	1	571-010-3P8-USB	SIEMENS	149333	INS ADV SERVER (USB KEY) KIT
	1	538-732	LGIL	149 273	EPSON FX-890 PRINTER FOR INSIGHT
	1	DELL INKJET PRINTER	DELL		DELL COLOR INKJET DESKTOP PRINTER
	1	DELL LCD MONITOR	DELL		DELL DESKTOP LCD MONITOR
CPU 2	1	DELL LAPTOP	DELL		DELL LAPTOP PC FOR SERVICE TOOL
SW 1-3	3	SD208			SD208 LINKSYS 8-PORT 10/100 SWITCH
SW 4	1	SD216	LINKSYS		SD216 LINKSYS 16-PORT 10/100 SWITCH
Panel Mounted Devices					
CBL 1	1	540143	SIEMENS	154 041	LAPTOP TO TEC CABLE 25 FT

REVISION HISTORY

SIEMENS

SIEMENS BUILDING TECHNOLOGIES, INC
BALTIMORE

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BALTIMORE MD 21244
USA
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FAX: 410-645-1616

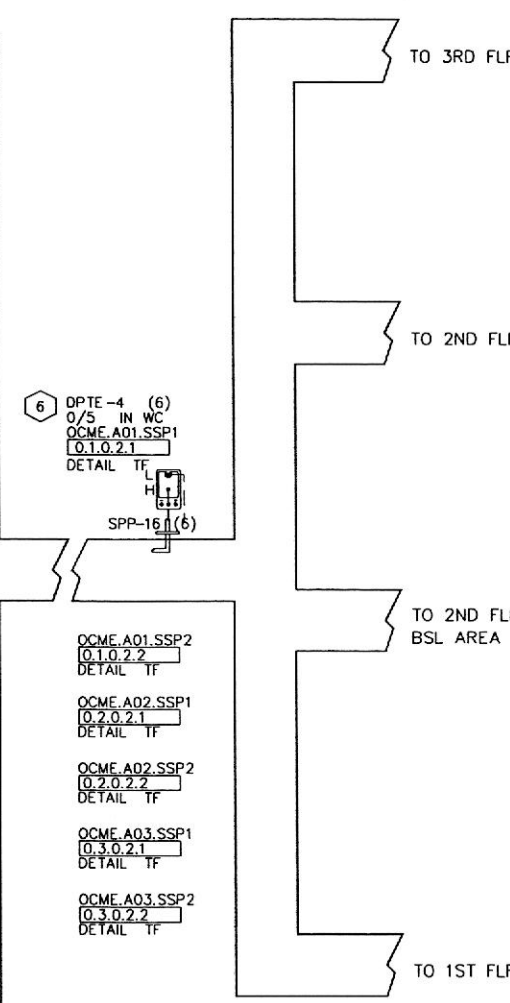
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RISER DIAGRAM

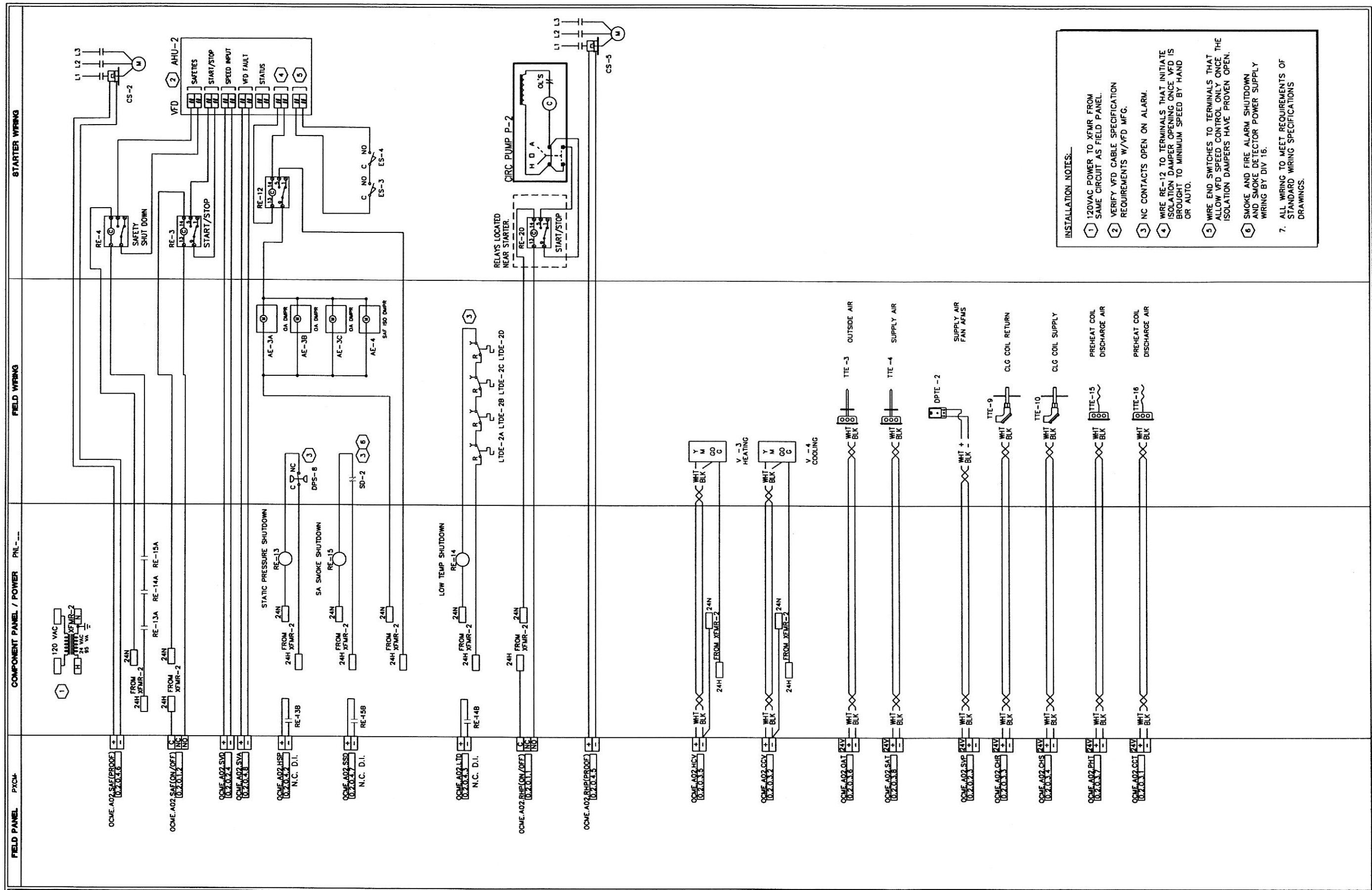
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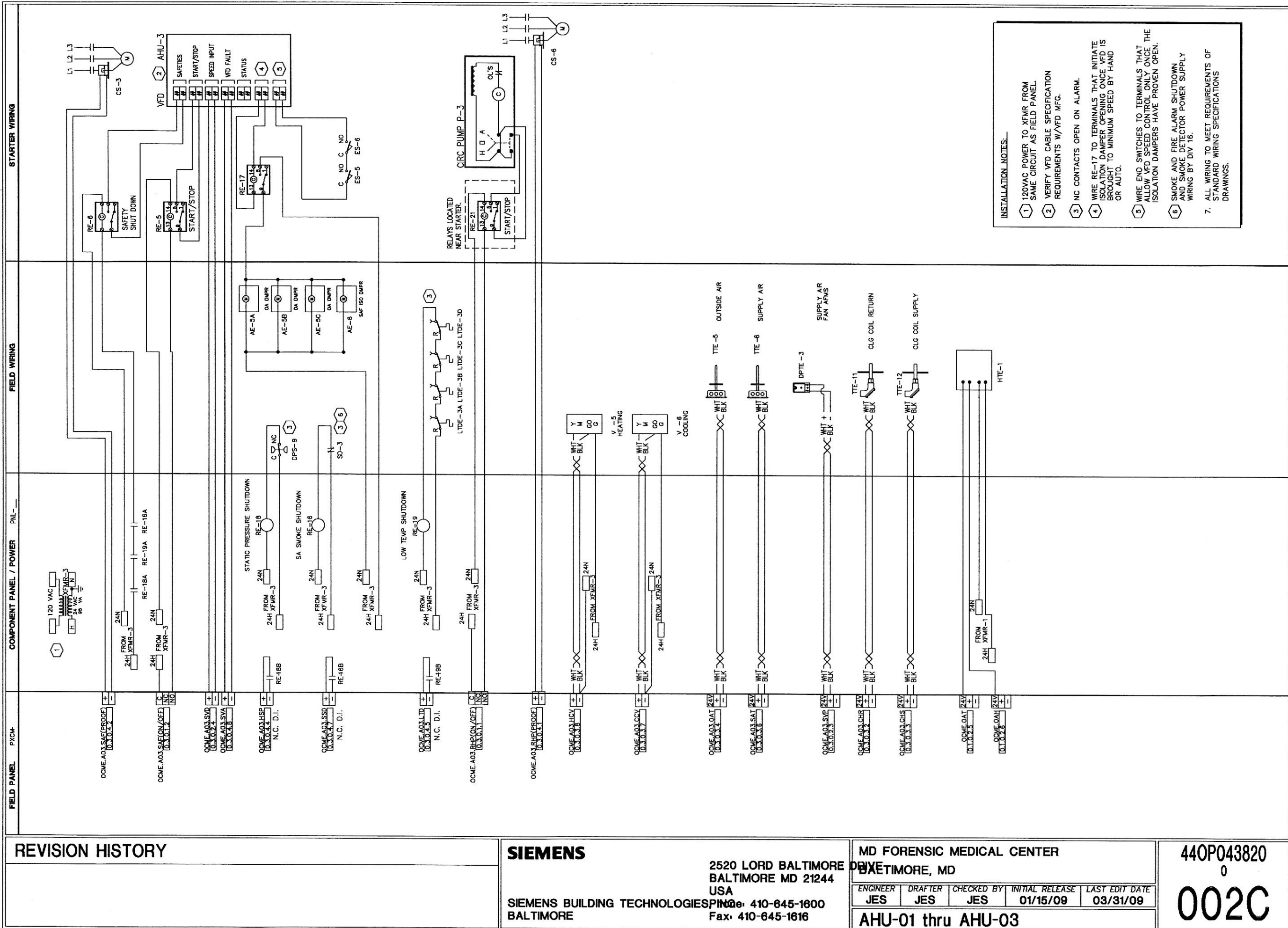
- HTE-1
0-10 VDC
OCME.OAH
0.1.0.2.5
DETAIL TG
- OCME.OAH
0.1.0.2.6
DETAIL TG
-
- Diagram illustrating the HTE-1 sensor assembly. The assembly consists of a rectangular box labeled "WATER GUARD" and a cylindrical component labeled "COMBINATION OA SENSOR: TEMPERATURE & RELATIVE HUMIDITY". The sensor is connected to the box by a horizontal tube. The entire assembly is shown within a dashed rectangular frame.

REVISION HISTORY



- INSTALLATION NOTES:
- 1 120VAC POWER TO XFMR FROM SAME CIRCUIT AS FIELD PANEL.
 - 2 VERIFY VFD CABLE SPECIFICATION REQUIREMENTS W/VFD MFG.
 - 3 NC CONTACTS OPEN ON ALARM.
 - 4 WIRE RE-12 TO TERMINALS THAT INITIATE ISOLATION DAMPER OPENING ONCE VFD IS BROUGHT TO MINIMUM SPEED BY HAND OR AUTO.
 - 5 WIRE END SWITCHES TO TERMINALS THAT ALLOW VFD SPEED CONTROL ONLY ONCE THE ISOLATION DAMPERS HAVE PROVEN OPEN.
 - 6 SMOKE AND FIRE ALARM SHUTDOWN AND SMOKE DETECTOR POWER SUPPLY WIRING BY DIV 16.
 - 7 ALL WIRING TO MEET REQUIREMENTS OF STANDARD WIRING SPECIFICATIONS DRAWINGS.

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		SIEMENS BUILDING TECHNOLOGIES		P.O. Box 410-645-1600 BALTIMORE		Fax: 410-645-1616		002B	
						ENGINEER JES		DRAFTER JES	
						CHECKED BY JES		INITIAL RELEASE 01/15/09	
								LAST EDIT DATE 03/26/09	
								AHU-01 thru AHU-03	



- INSTALLATION NOTES:
- 120VAC POWER TO XFMR FROM SAME CIRCUIT AS FIELD PANEL.
 - VERIFY VFD CABLE SPECIFICATION REQUIREMENTS W/VFD MFG.
 - NC CONTACTS OPEN ON ALARM.
 - WIRE RE-17 TO TERMINALS THAT INITIATE ISOLATION DAMPER OPENING ONCE VFD IS BROUGHT TO MINIMUM SPEED BY HAND OR AUTO.
 - WIRE END SWITCHES TO TERMINALS THAT ALLOW VFD SPEED CONTROL ONLY ONCE THE ISOLATION DAMPERS HAVE PROVEN OPEN.
 - SMOKE AND FIRE ALARM SHUTDOWN AND SMOKE DETECTOR POWER SUPPLY WIRING BY DIV 16.
 - ALL WIRING TO MEET REQUIREMENTS OF STANDARD WIRING SPECIFICATIONS DRAWINGS.

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AE 1-6	12	GCA126.1P	SIEMENS	154001	2 PT SR,24V,MED/S/PLNM.
AFS 1-3	3	AIR MONITOR	N/A	N/A	SEE AFMS SUBMITTAL
CP 1-3	3	567-351	SIEMENS	155 272	CP567 SMALL CABINET (GRAY)
CS 1-6	6	H608	VERIS	1006cut016	CUR SW SPLTCOR-ADJ SETPT W/LED
D					SEE DAMPER SUBMITTAL
DPS 1-6	6	AFS-460	CLEVELAND CONTROLS	1011cut022	AIR FLOW SWITCH
DPS 7-9	3	141-0575	SIEMENS	155 052	AIR FLOW SWITCH.05/12 MAN REST
DPTE 1-3	3	2641001WD11A1C	SETRA	0608cut003	DP TRAN AIR,1%,1" ENC
DPTE 4	6	2641005WD11A1C	SETRA	0608cut003	DP TRAN AIR,1%,5" ENC
ES 1-6	6	TS-475	KELE	N/A	Non-Mercury Damper Position Switch, SPDT
HTE 1	1	HE05VSTA1	VERIS	N/A	OUTDOOR HUMIDITY & TEMP COMBO SENSOR
	1	AA42	VERIS	N/A	OUTDOOR HUMIDITY SENSOR WATER GUARD
LTDE 1-3	12	134-1511	SIEMENS	155 115	LOW TEMP DET STAT MNL RESET
RE 1-7	7	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT
RE 17	1	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT
SD 1-3	3	FBO	N/A	N/A	FURNISHED BY OTHERS
SPP 1-19	24	269-062	SIEMENS	N/A	PR269 ACCESSORY, SENSING TUBE
TTE 1-6	6	544-339-18	SIEMENS	149261	DCT PT SNSR, PT 1K OHM, (375), 18" PROBE
TTE 7-12	6	544-577-40	SIEMENS	149261	IMMWELL SNSR, PT 1K OHM, (375), 4" LGTH
TTE 13-18	6	544-342-24	SIEMENS	149261	FLEX AVER SNSR, PT 1K OHM, 24FT PROBE
V					SEE VALVE SUBMITTAL
XFMR 1-3	3	120-024-100-2TF	LECTRO COM	N/A	TRANSFORMER 120/24 100VA 2 HUB
Panel Mounted Devices					
RE 8-10	3	RH2BUL-AC24V-KIT	LECTRO	N/A	(1) RH2B-ULAC24V and (1) SH2B-05 socket
RE 11-12	2	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT
RE 13-16	4	RH2BUL-AC24V-KIT	LECTRO	N/A	(1) RH2B-ULAC24V and (1) SH2B-05 socket

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
RE 18-19	2	RH2BUL-AC24V-KIT	LECTRO	N/A	(1) RH2B-ULAC24V and (1) SH2B-05 socket
RE 20-21	2	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT

SEQUENCE OF OPERATION:

AHU 1, 2 & 3: GENERAL EXHAUST (GE) FAN PACKAGE, AND BSL-3 EXHAUST FAN PACKAGE ARE ALL INTERLOCKED TO OPERATE WITHIN THIS SEQUENCE:

AHU 1, 2 & 3 ARE THREE IDENTICAL 100% OUTDOOR AIR-ONCE THRU SA-AHUS-THREE UNITS NORMALLY OPERATE TO MAINTAIN DUCT STATIC. ON FAILURE, FAILED FAN ISOLATION DAMPER CLOSES. REMAINING FANS OPERATE TO MAINTAIN DUCT STATIC.

BUILDING AUTOMATION SYSTEMS (BAS) SELECTS OCCUPIED/UNOCCUPIED-SUMMER/WINTER MODE. SELECTED GE FANS AND BSL-3-EF-1 START AND MAINTAIN **SBT ADD:** EXHAUST AIR DUCT STATIC PRESSURE1. **SBT DELETE:** NEGATIVE PRESSURE SETPOINT1. WHEN ANY GE FAN OR BSL-3-EF IS ENERGIZED, SA ISOLATIONS AND OA DAMPERS IN THE THREE AHUS SHALL OPEN. PROVE THIS BY END SWITCH AND THEN START SA FANS TO OBTAIN AND THEN MAINTAIN **SBT ADD:** [SUPPLY AIR DUCT STATIC PRESSURE1. **SBT DELETE:** [SYSTEM STATIC PRESSURE.1]

OCCUPIED WINTER-OA TEMPERATURE 50°F AND BELOW ADJUSTABLE. PRE-HEAT COIL CONTROL VALVE OPENS AND MODULATES. SET PRE-HEAT COIL CONTROL VALVE TO MAINTAIN DISCHARGE AIR SETPOINT AT 50°F ADJUSTABLE, AS SENSED BY DISCHARGE AIR TEMPERATURE SENSOR WHEN OUTSIDE AIR IS 20°F OR BELOW AND RESET TO 52°F WHEN OUTSIDE AIR IS 25°F-52°F. SHOULD FOR ANY REASON THE FREEZE DETECTOR FALL BELOW 40°F SEND A LOCAL ALARM, NOTIFY THE BAS, OPEN PRE-HEAT COIL CONTROL VALVE FULLY, WHEN SITUATION CLEARS, RETURN CONTROL TO VALVE CONTROLLER.

SBT DELETE: EACH ZONE IS SERVED FROM A TWO POSITION SYSTEM PRESSURE INDEPENDENT EXHAUST AIR VALVE. THESE VALVES ARE SET TO MAINTAIN AIR QUANTITY. UNITS MAINTAIN AIRFLOW SETPOINT TCV-Ns-SA-HW REHEAT AND IN SOME CASES, RE-COOL COIL CONTROL VALVES MODULATE TO MAINTAIN SPACE SETPOINT. FOR EACH SA ZONE/TERMINAL UPON SIGNAL FOR NIGHT SETBACK (ADJUSTABLE TIME CLOCK SETTING), EXHAUST BOX AND SUPPLY BOX OPERATE IN UNISON SUCH THAT THE ARE SERVED CAN NEVER MOVE TO POSITIVE PRESSURE.1]

UN-OCCUPIED-WINTER (NIGHT SETBACK) ALL VALVES GO TO UNOCCUPIED SETPOINTS. REHEAT COILS MAINTAIN SPACE TEMPERATURE UNOCCUPIED SETPOINT 33% OF NORMAL OPERATION.

OCCUPIED SUMMER-OA TEMPERATURE 51°F AND ABOVE-ADJUSTABLE. CHILLED WATER IS AVAILABLE FROM THE CHILLER SYSTEM AND MODULATE THE COOLING COIL CONTROL VALVE TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT (52.5°FDB) ADJUSTABLE, AS SENSED BY DISCHARGE AIR TEMPERATURE SENSOR.

SAFETIES

SBT DELETE: END SWITCH-AFTER COMMAND FOR DAMPER OPERATION TO OPEN, END SWITCH MUST BE MADE PRIOR TO THE START OF ANY FAN.1]

SBT ADD: END SWITCH-WHEN ANY SA FAN IS ENERGIZED, THE ASSOCIATED ISOLATION DAMPER MUST BE PROVEN OPEN BEFORE THE FAN IS BROUGHT UNDER SPEED CONTROL. THE VFD WILL GO TO ITS MINIMUM SPEED BEFORE THE DAMPERS HAVE PROVEN OPEN TO PREVENT FAN BACKSPIN.1]

REVISION HISTORY

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SBT DELETE: VFD SOFT START-EXHAUST FANS START FIRST-GE-1 THEN BSL-3-EF-1 THEN GE-2 (GENERAL EXHAUST IN AN ARRAY THAT ALLOWS ANY FAN TO ASSUME A #1, 2, OR 3 POSITION AFTER EACH OF GE-1 AND BSL-3-EF-1 ARE STARTED, FIRST AHU STARTS, THEN GE-2 THEN AHU-2. PROVIDE AVERAGING STATIC PRESSURE SEQUENCE FROM SP SENSOR-RECEIVER TRANSMITTER. THREE EACH ON LEVEL 2 & 3, SO AS TO MAINTAIN NEGATIVE STATIC PRESSURE AT ALL TIMES WITH THE FIXED AIR QUANTITY DIFFERENTIAL.]

SBT ADD: [THE SUPPLY FAN VFD MODULATES TO MAINTAIN THE SA DUCT STATIC PRESSURE SETPOINT. THE EXHAUST FAN VFD MODULATES TO MAINTAIN THE EA DUCT STATIC PRESSURE SETPOINT. SIX STATIC PRESSURE SENSORS ARE LOCATED DOWNSTREAM OF THE SUPPLY FAN, 3 EACH ON LEVELS 2 & 3. THE LOWEST STATIC PRESSURE WILL BE CALCULATED AND THE SUPPLY FAN WILL MODULATE TO MAINTAIN THE DUCT STATIC PRESSURE SETPOINT FOR THAT SENSOR. THE SUPPLY AND EXHAUST AIR TERMINAL UNITS WILL CALCULATE THEIR RESPECTIVE CFMS AND THE BAS WILL MAINTAIN A FIXED AIR QUANTITY DIFFERENTIAL BY SUMMING THE TOTAL CFM IN AND OUT OF THE SPACE.]

PROVIDE HIGH STATIC PRESSURE SENSORS AND ALARMS. PROVIDE A HIGH TEMPERATURE ALARM IN THE DISCHARGE AIR, USING THE DISCHARGE AIR TEMPERATURE SENSOR.

PROVIDE SMOKE DETECTOR TO AUTOMATICALLY DETECT SMOKE WITHIN ANY AHU AND UPON SENSING SMOKE SHUT THE UNIT DOWN, CLOSE THE ISOLATION DAMPERS AND AUTOMATICALLY START AND CONTROL THE LAG AHU(S).

HEATING CONTROL VALVES FAIL OPEN TO THE COIL FACE. COOLING COIL CONTROL VALVES FAIL CLOSED TO THE COIL FACE. **SBT DELETE:** [EXHAUST VALVES FAIL OPEN TO THE MAXIMUM EXHAUST AIR SETPOINT.]

IN EACH BSL-3 ROOM, PROVIDE AIR PRESSURE/FLOW MONITOR TO SEND ALARM. THIS SENSOR SHALL HAVE AN ADJUSTABLE TIME DELAY OF UP TO 10 SECONDS TO ALLOW FOR AIR DISTURBANCES AT DOORWAYS, ETC.

BSL-3 OPERATION:

PROVIDE A STAINLESS STEEL RIMMED-WHITE LAMINATE OPERATOR PAD WITH KEY LOCK SWITCH. LOCATE WHERE SHOWN ON DRAWINGS TO PUT AHU-1, 2, &3 CONTROLS INTO THE BSL-3 OPERATING SEQUENCE. IN GENERAL AND WHEN THE KEY SWITCH IS INDEXED TO BSL-3 IN OPERATION, DISCHARGE AIR TEMPERATURE SETPOINT SHALL BE RESET TO 49°F AND THE PRE-HEAT COIL CONTROL VALVE SHALL OPEN FULLY. ROOM TEMPERATURE SETPOINTS FOR ALL STUS SERVING ALL ROOMS IN THE BSL-3 SUITE SHALL BE AUTOMATICALLY RE-SET TO MAINTAIN 65°F IN THE ROOM. THE BSL-3 SUITE STUS ARE ALL EQUIPPED WITH CHILLED WATER RE-COOL COILS. MODULATE THE RE-COOL COIL CONTROL VALVES TO MAINTAIN THE RESET ROOM TEMPERATURE SETPOINT. UNDER BSL-3 OPERATION RESET ROOM TEMPERATURE SETPOINT IS 66°F.

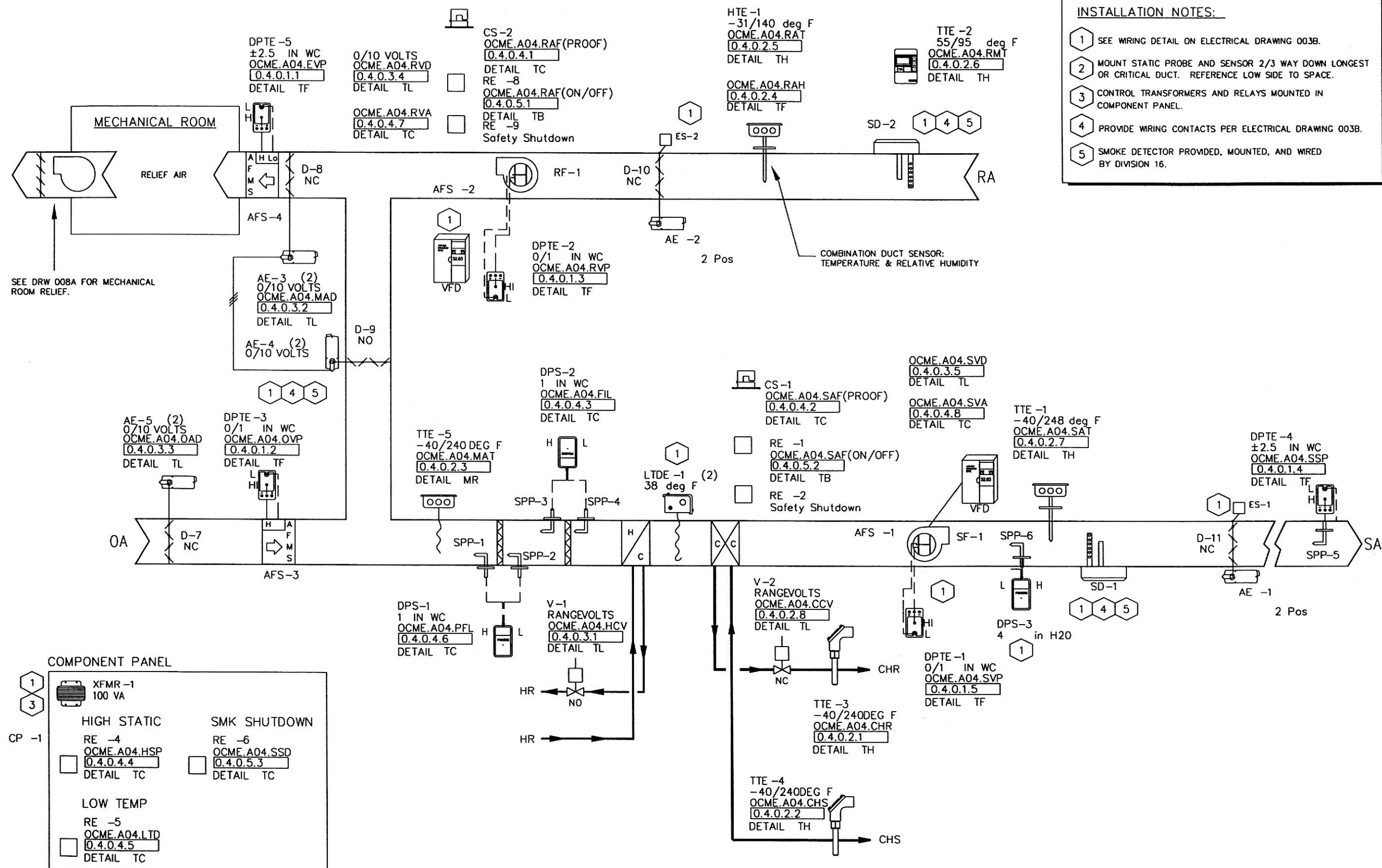
DISABLE TIME CLOCK NIGHT SETBACK OPERATION SO THAT DURING THE BSL-3 ON-SELECTION, UN-OCCUPIED SELECTION CANNOT OCCUR.

THE FOLLOWING POINTS WILL BE MONITORED BY THE BAS:

- PRE-HEAT COIL DISCHARGE TEMPERATURE
- COOLING COIL DISCHARGE TEMPERATURE
- SA FAN CFM
- RA FAN CFM

SBT SPECIALIST: Please note that existing programming for this system can be found at
K:\Jobs\Solutions\043000\800\043820\Saber.

REVISION HISTORY	<div>SIEMENS</div> <div>2520 LORD BALTIMORE DRIVE BALTIMORE MD 21244 USA</div> <div>SIEMENS BUILDING TECHNOLOGIES, INC BALTIMORE</div> <div>PHONE: 410-645-1800 FAX: 410-645-1618</div>	MD FORENSIC MEDICAL CENTER BALTIMORE, MD					440P043820 0 002E
		ENGINEER JES	DRAFTER JES	CHECKED BY JES	INITIAL RELEASE	LAST EDIT DATE 03/30/09	
		AHU-01 thru AHU-03					



REVISION HISTORY

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BALTIMORE, MD

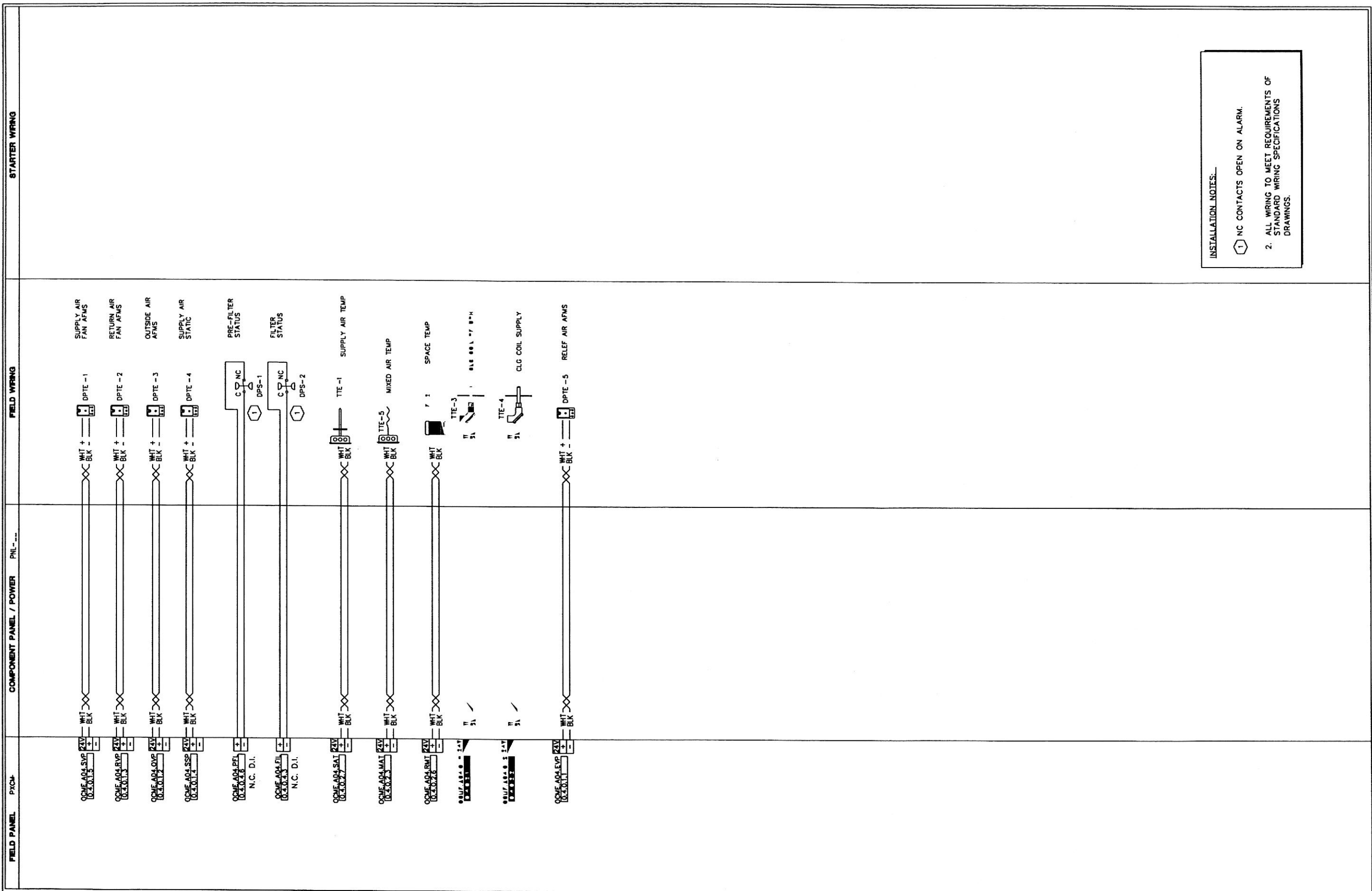
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JES	JES	JES	01/15/09	03/26/09

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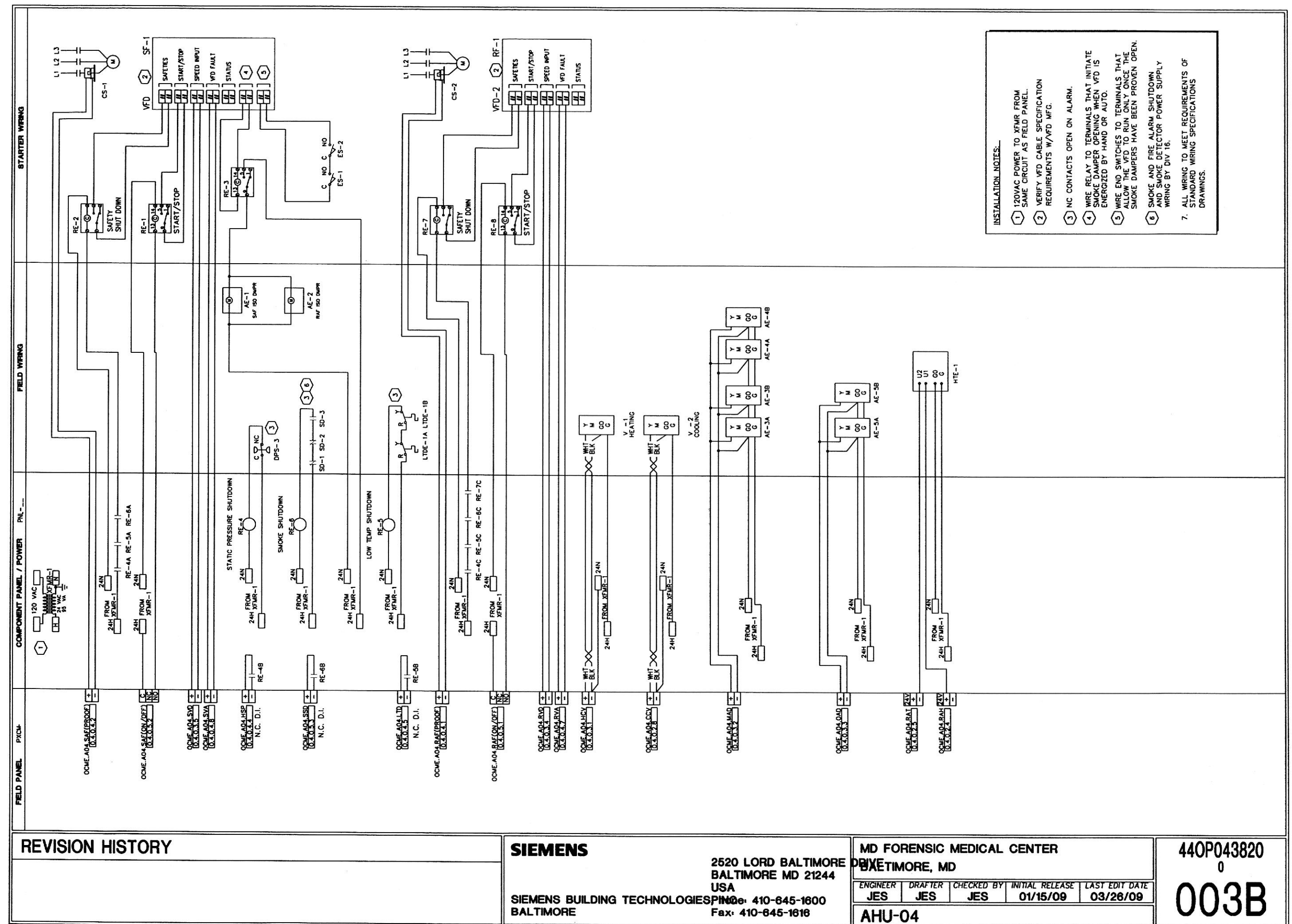
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INSTALLATION NOTES:

- 1 NC CONTACTS OPEN ON ALARM.
2. ALL WIRING TO MEET REQUIREMENTS OF STANDARD WIRING SPECIFICATIONS DRAWINGS.

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		ENGINEER JES	DRAFTER JES	CHECKED BY JES	INITIAL RELEASE 01/15/09



Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AE 1-2	2	GCA126.1P	SIEMENS	154001	2 PT SR,24V,MED/S/PLNM.
AE 4-5	4	GCA161.1P	SIEMENS	154001	MOD(V) SR,24V, MED. PLNM
AE 3A-3B	2	GCA161.1U	SIEMENS	154001	MOD(V) SR,24V, MED.
AE 4A-4B	2	GCA161.1U	SIEMENS	154001	MOD(V) SR,24V, MED.
AE 5A-5B	2	GCA161.1U	SIEMENS	154001	MOD(V) SR,24V, MED.
AFS 1-4	4	AIR MONITOR	N/A	N/A	SEE AFMS SUBMITTAL
CP 1	1	567-351	SIEMENS	155 272	CP567 SMALL CABINET (GRAY)
CS 1-2	2	H608	VERIS	1006cut016	CUR SW SPLTCOR-ADJ SETPT W/LED
D					SEE DAMPER SUBMITTAL
DPS 1-2	2	AFS-460	CLEVELAND CONTROLS	1011cut022	AIR FLOW SWITCH
DPS 3	1	141-0575	SIEMENS	155 052	AIR FLOW SWTCH.05/12 MAN REST
DPTE 1-3	3	2641001WD11A1C	SETRA	0608cut003	DP TRAN AIR,1%,1" ENC
DPTE 4	1	2641005WD11A1C	SETRA	0608cut003	DP TRAN AIR,1%,5" ENC
DPTE 5	1	2641001WD11A1C	SETRA	0608cut003	DP TRAN AIR,1%,1" ENC
ES 1-2	2	TS-475	KELE	N/A	Non-Mercury Damper Position Switch, SPDT
HTE 1	1	QFM2110	SIEMENS	149991	SENSOR (DUCT) RH: 0-10VDC / T: PT1000 (S
LTDE 1	2	134-1511	SIEMENS	155 115	LOW TEMP DET STAT MNL RESET
RE 1-2	2	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT
RE 4-6	3	RH3BUL-AC24V-KIT	LECTRO	N/A	(1) RH3B-ULAC24V and (1) SH3B-05 socket
RE 7-9	3	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT
SD 1-3	3	FBO	N/A	N/A	FURNISHED BY OTHERS
SPP 1-6	6	269-062	SIEMENS	N/A	PR269 ACCESSORY, SENSING TUBE
TTE 1	1	544-339-18	SIEMENS	149261	DCT PT SNSR, PT 1K OHM, (375), 18" PROBE
TTE 2	1	544-760B	SIEMENS	149168	ROOM SENSOR,WHITE
	1	544-782B	SIEMENS	N/A	SINGLE GOOF MOUNTING PLATE KIT
TTE 3-4	2	544-577-40	SIEMENS	149261	IMMWELL SNSR, PT 1K OHM, (375), 4" LGTH

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
TTE 5	1	544-342-24	SIEMENS	149261	FLEX AVER SNSR, PT 1K OHM, 24FT PROBE
V					SEE VALVE SUBMITTAL
XFMR 1	1	120-024-100-2TF-C	BECTRO COM	N/A	TRANSFORMER 120/24 100VA 2 HUB

SEQUENCE OF OPERATIONS

ALL FANS ARE EQUIPPED WITH VFD MOTOR CONTROLLERS. AHU-4 SERVES AND RESPONDS TO A SINGLE FLOOR OF OCCUPANCY-LEVEL 4. LOCATE S.A. FAN MOTOR STATIC PRESSURE SENSOR-TRANSMITTER IN THE SA DUCTWORK WHERE SHOWN. **SBT ADD:** [THE SUPPLY FAN VFD MODULATES TO MAINTAIN THE SA DUCT STATIC PRESSURE SETPOINT. THE RA FAN VFD MODULATES TO MAINTAIN A FIXED CFM DIFFERENTIAL BETWEEN THE SA FAN AND RA FAN] BUILDING AUTOMATION SYSTEM (BAS) SELECTS OCCUPIED/UNOCCUPIED-SUMMER/WINTER MODE.

OCCUPIED-SUMMER: **SBT DELETE:** [OA DAMPER, RA ISOLATION DAMPER AND SA ISOLATION DAMPER OPEN. RELIEF DAMPER REMAINS CLOSED. PROVE ALL ISOLATION DAMPER OPEN POSITION WITH END SWITCH AND AFTER A TWO MINUTE DELAY (ADJUSTABLE) START THE SUPPLY FAN AND TWO MINUTES THEREAFTER SOFT START THE RESPECTIVE RETURN FAN. MODULATE S.A. FAN TO MEET STATIC PRESSURE SETPOINT.]

SBT ADD: [THE SA FAN AND RA FAN ISOLATION DAMPERS OPEN AND PROVE OPEN VIA END SWITCH. THE OA DAMPER OPENS TO THE FIXED MINIMUM POSITION FOR OUTSIDE AIR VENTILATION. WHEN ECONOMIZER COOLING IS ENABLED, THE HEATING COIL VALVE, COOLING COIL VALVE, AND MIXING DAMPERS MODULATE IN SEQUENCE TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT AS SENSED BY THE DISCHARGE AIR TEMPERATURE SENSOR. WHEN ECONOMIZER COOLING IS DISABLED,PREHEAT COIL CONTROL VALVE IS SHUT. MODULATE THE CHILLED WATER COIL CONTROL VALVE TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. **SBT ADD:** [THE MIXING DAMPERS ARE POSITIONED FOR MINIMUM OUTSIDE AIR VENTILATION.]

SBT DELETE: [SENSE THE OUTDOOR AIR TEMPERATURE AND RETURN AIR TEMPERATURE AND OPEN, MODULATE AND CLOSE DAMPERS TO TAKE ADVANTAGE OF 100% OUTSIDE AIR ECONOMIZER MODE.]

INTERLOCK THE RELIEF DAMPERS TO MAINTAIN AHU ZONE AIR BALANCE. **SBT ADD:** [SEE SEQUENCE ON DRW 008B FOR MECHANICAL ROOM OVER PRESSURE RELIEF SEQUENCE.]

UNOCCUPIED-SUMMER-FANS ARE OFF, DAMPERS CLOSED. PROVIDE A SPACE TEMPERATURE SENSOR ON THE FLOOR SERVED TO OVERCALL THE UNOCCUPIED OPERATION IF THE TEMPERATURE IN THE SPACE EXCEEDS SETPOINT. IF SETPOINT IS EXCEEDED (SET AT 82°F ADJUSTABLE) INITIATE THE STARTING SEQUENCE FOR OCCUPIED EXCEPT OA DAMPER REMAINS CLOSED. OPERATE THE UNOCCUPIED OPERATION UNTIL SPACE TEMPERATURE FALLS TO 74°F THEN DISCONTINUE OPERATION, STOP FAN, RETURN ALL SETTING TO PRE-START MODE.

OCCUPIED WINTER-IDENTICAL DAMPER OPERATION/SOFT START FOR FANS. MODULATE MIXING DAMPERS AND PRE-HEAT HOT WATER COIL CONTROL VALVE TO MAINTAIN DISCHARGE AIR TEMPERATURE RESET SCHEDULE (58°FDB WHEN RA TEMPERATURES IS BELOW 74°FDB, 52.5°FDB WHEN RA TEMPERATURE IS ABOVE 74°FDB (ADJUSTABLE).

UNOCCUPIED WINTER-FANS ARE OFF, DAMPERS CLOSED. PROVIDE A SPACE SENSOR ON THE FLOOR TO OVERCALL THE UNOCCUPIED OPERATION IF THE TEMPERATURE IN THE SPACE FALLS TO 58°F (ADJUSTABLE). SHOULD THIS OCCUR, OPEN THE ISOLATION AND RA DAMPERS, START THE FANS, OPERATE THE AHU - UNTIL THE RETURN AIR TEMPERATURE SENSOR

REVISION HISTORY

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REACHES 68°FDB (ADJUSTABLE). TERMINAL UNIT REHEAT COILS SHALL MODULATE TO HEAT SPACES SERVED TO 70°F.
WHEN THIS OCCURS, SHUT THE SYSTEM OFF AND RETURN TO UNOCCUPIED MODE.

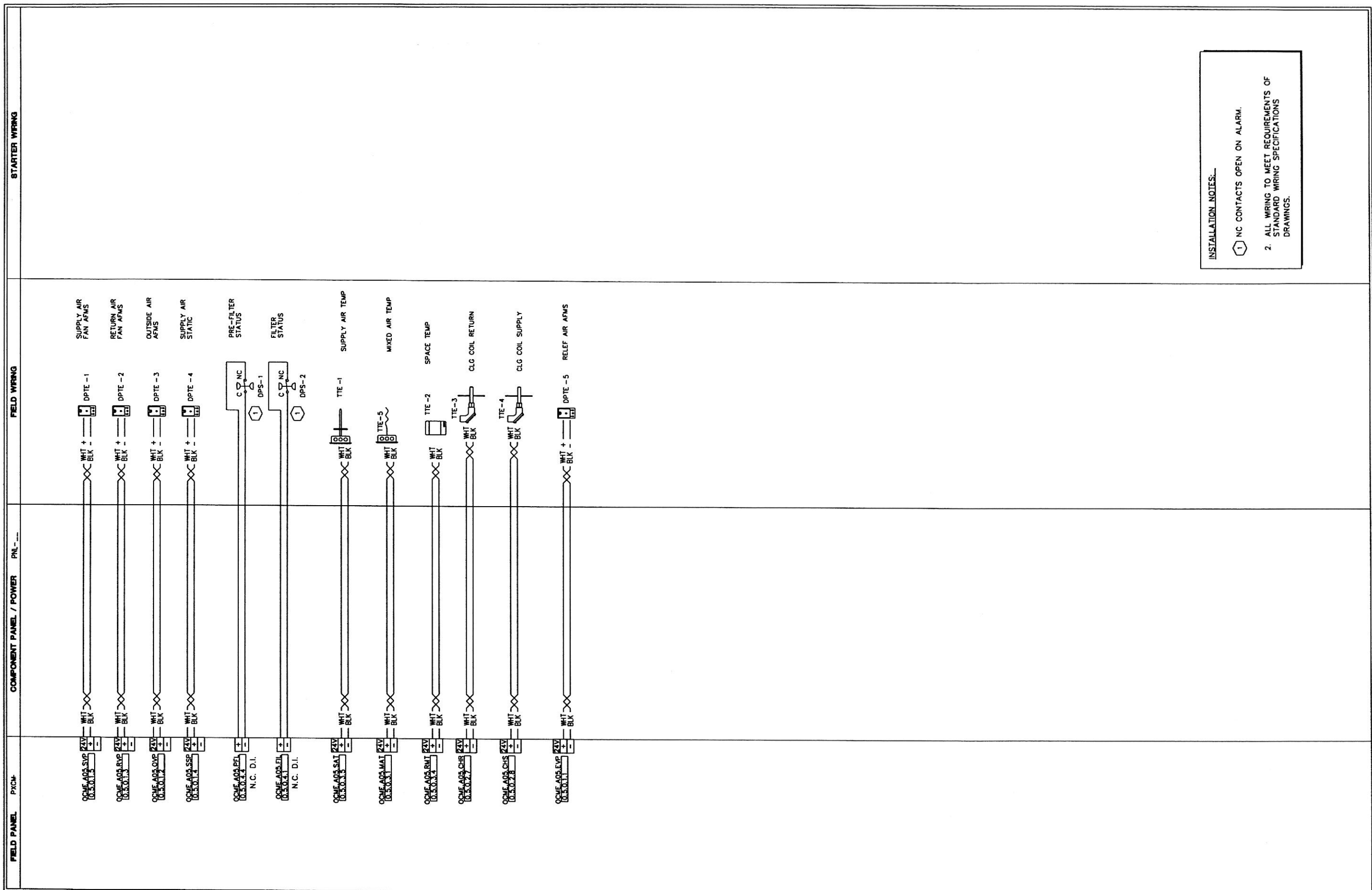
SAFETIES:

END SWITCH TO PROVE OPENING OF **SBT ADD:** [SA AND RA ISOLATION] DAMPERS. END SWITCH MUST BE MADE PRIOR TO THE START OF ANY FAN. SMOKE DETECTOR SHUTS OFF FAN AND CLOSES ISOLATION DAMPER UPON SENSING SMOKE. PROVIDE HIGH STATIC PRESSURE SENSORS AND ALARMS. PROVIDE A HIGH TEMPERATURE ALARM IN THE DISCHARGE AIR, USING THE DISCHARGE AIR TEMPERATURE SENSOR. FANS SHALL SHUT DOWN AND DAMPERS SHALL CLOSE IF ABNORMAL CONDITIONS ARE PRESENT.

SBT ADD: [THE RELIEF AIR CFM WILL BE MONITORED VIA AN AIR FLOW MEASURING STATION.]

SBT SPECIALIST: Please note that existing programming for this system can be found at
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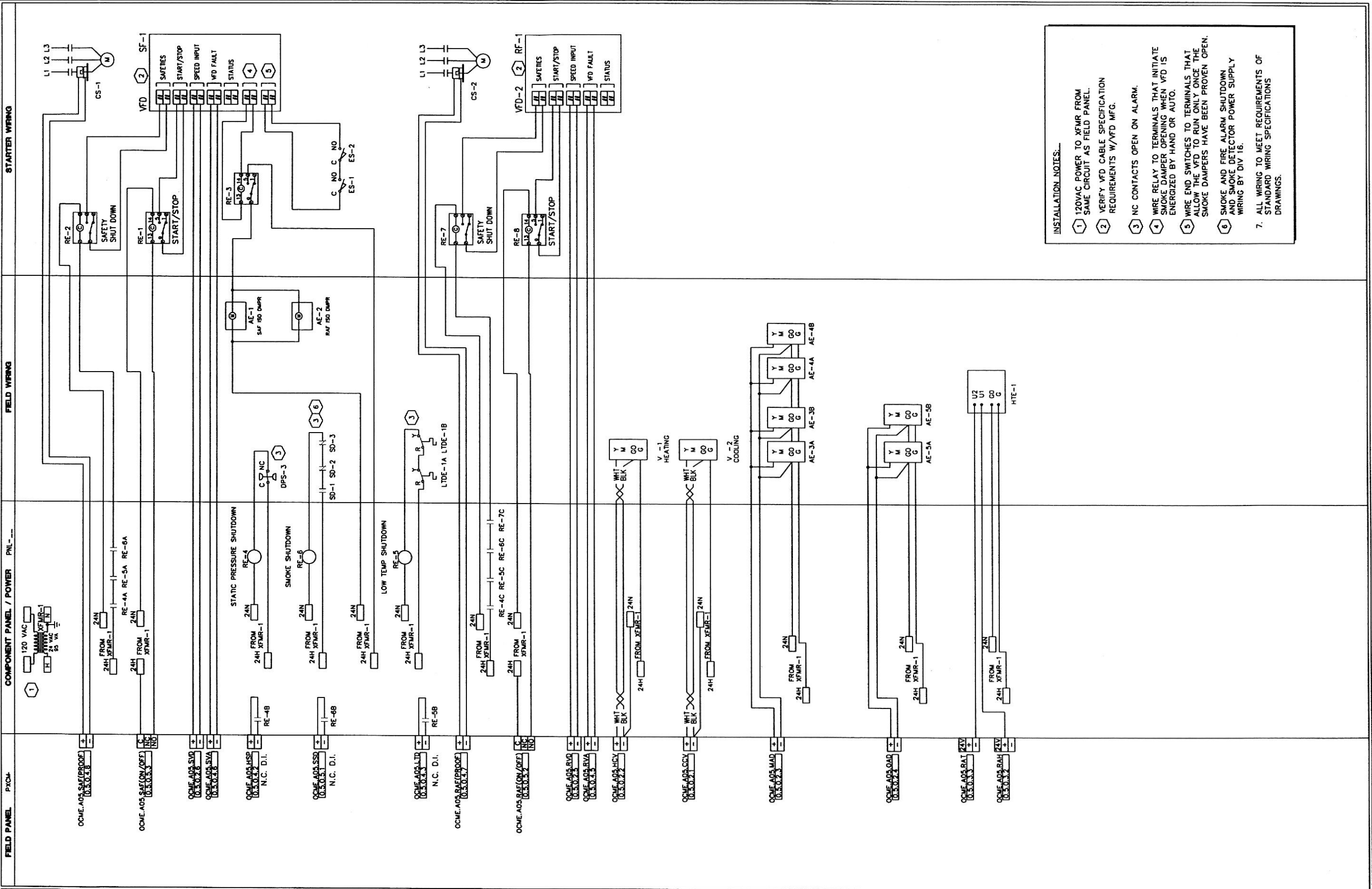
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ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE									
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INSTALLATION NOTES:

- 1) NC CONTACTS OPEN ON ALARM.
2. ALL WIRING TO MEET REQUIREMENTS OF STANDARD WIRING SPECIFICATIONS DRAWINGS.



- INSTALLATION NOTES:
- 1) 120VAC POWER TO XFMR FROM SAME CIRCUIT AS FIELD PANEL.
 - 2) VERIFY VFD CABLE SPECIFICATION REQUIREMENTS W/VFD MFG.
 - 3) NC CONTACTS OPEN ON ALARM.
 - 4) WIRE RELAY TO TERMINALS THAT INITIATE SMOKE DAMPER OPENING WHEN VFD IS ENERGIZED BY HAND OR AUTO.
 - 5) WIRE END SWITCHES TO TERMINALS THAT ALLOW THE VFD TO RUN ONLY ONCE THE SMOKE DAMPERS HAVE BEEN PROVEN OPEN.
 - 6) SMOKE AND FIRE ALARM SHUTDOWN AND SMOKE DETECTOR POWER SUPPLY WIRING BY DIV 16.
 - 7. ALL WIRING TO MEET REQUIREMENTS OF STANDARD WIRING SPECIFICATIONS DRAWINGS.

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		AHU-05		004B	

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AE 1-2	2	GCA126.1P	SIEMENS	154001	2 PT SR,24V,MED/S/PLNM.
AE 3-5	6	GCA161.1P	SIEMENS	154001	MOD(V) SR,24V, MED. PLNM
AE 3A-3B	2	GCA161.1U	SIEMENS	154001	MOD(V) SR,24V, MED.
AE 4A-4B	2	GCA161.1U	SIEMENS	154001	MOD(V) SR,24V, MED.
AE 5A-5B	2	GCA161.1U	SIEMENS	154001	MOD(V) SR,24V, MED.
AFS 1-4	4	AIR MONITOR	N/A	N/A	SEE AFMS SUBMITTAL
CP 1	1	567-351	SIEMENS	155 272	CP567 SMALL CABINET (GRAY)
CS 1-2	2	H608	VERIS	1006cut016	CUR SW SPLTCOR-ADJ SETPT W/LED
D					SEE DAMPER SUBMITTAL
DPS 1-2	2	AFS-460	CLEVELAND CONTROLS	1011cut022	AIR FLOW SWITCH
DPS 3	1	141-0575	SIEMENS	155 052	AIR FLOW SWITCH.05/12 MAN REST
DPTE 1-3	3	2641001WD11A1C	SETRA	0608cut003	DP TRAN AIR,1%,1" ENC
DPTE 4	1	2641005WD11A1C	SETRA	0608cut003	DP TRAN AIR,1%,5" ENC
DPTE 5	1	2641001WD11A1C	SETRA	0608cut003	DP TRAN AIR,1%,1" ENC
ES 1-2	2	TS-475	KELE	N/A	Non-Mercury Damper Position Switch, SPDT
HTE 1	1	QFM2110	SIEMENS	149991	SENSOR (DUCT) RH: 0-10VDC / T: PT1000 (3
LTDE 1	2	134-1511	SIEMENS	155 115	LOW TEMP DET STAT MNL RESET
RE 1-3	3	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT
RE 4-6	3	RH3BUL-AC24V-KIT	LECTRO	N/A	(1) RH3B-ULAC24V and (1) SH3B-05 socket
RE 7-9	3	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT
SD 1-3	3	FBO	N/A	N/A	FURNISHED BY OTHERS
SPP 1-6	6	269-062	SIEMENS	N/A	PR269 ACCESSORY, SENSING TUBE
TTE 1	1	544-339-18	SIEMENS	149261	DCT PT SNSR, PT 1K OHM, (375), 18" PROBE
TTE 2	1	544-760B	SIEMENS	149168	ROOM SENSOR,WHITE
	1	544-782B	SIEMENS	N/A	SINGLE GOOF MOUNTING PLATE KIT
TTE 3-4	2	544-577-40	SIEMENS	149261	IMMWELL SNSR, PT 1K OHM, (375), 4" LGTH

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
TTE 5	1	544-342-24	SIEMENS	149261	FLEX AVER SNSR, PT 1K OHM, 24FT PROBE
V					SEE VALVE SUBMITTAL
XFMR 1	1	120-024-100-2TF	OBECTRO COM	N/A	TRANSFORMER 120/24 100VA 2 HUB

SEQUENCE OF OPERATIONS

ALL FANS ARE EQUIPPED WITH VFD MOTOR CONTROLLERS. AHU-5 SERVES AND RESPONDS TO A SINGLE FLOOR OF OCCUPANCY-LEVEL 5. LOCATE S.A. FAN MOTOR STATIC PRESSURE SENSOR-TRANSMITTER IN THE SA DUCTWORK WHERE SHOWN. **SBT ADD:** [THE SUPPLY FAN VFD MODULATES TO MAINTAIN THE SA DUCT STATIC PRESSURE SETPOINT. THE RA FAN VFD MODULATES TO MAINTAIN A FIXED CFM DIFFERENTIAL BETWEEN THE SA FAN AND RA FAN] BUILDING AUTOMATION SYSTEM (BAS) SELECTS OCCUPIED/UNOCCUPIED-SUMMER/WINTER MODE.

OCCUPIED-SUMMER: **SBT DELETE:** [OA DAMPER, RA ISOLATION DAMPER AND SA ISOLATION DAMPER OPEN. RELIEF DAMPER REMAINS CLOSED. PROVE ALL ISOLATION DAMPER OPEN POSITION WITH END SWITCH AND AFTER A TWO MINUTE DELAY (ADJUSTABLE) START THE SUPPLY FAN AND TWO MINUTES THEREAFTER SOFT START THE RESPECTIVE RETURN FAN. MODULATE S.A. FAN TO MEET STATIC PRESSURE SETPOINT.]

SBT ADD: [THE SA FAN AND RA FAN ISOLATION DAMPERS OPEN AND PROVE OPEN VIA END SWITCH. THE OA DAMPER OPENS TO THE FIXED MINIMUM POSITION FOR OUTSIDE AIR VENTILATION. WHEN ECONOMIZER COOLING IS ENABLED, THE HEATING COIL VALVE, COOLING COIL VALVE, AND MIXING DAMPERS MODULATE IN SEQUENCE TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT AS SENSED BY THE DISCHARGE AIR TEMPERATURE SENSOR. WHEN ECONOMIZER COOLING IS DISABLED,] PREHEAT COIL CONTROL VALVE IS SHUT. MODULATE THE CHILLED WATER COIL CONTROL VALVE TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. **SBT ADD:** [THE MIXING DAMPERS ARE POSITIONED FOR MINIMUM OUTSIDE AIR VENTILATION.]

SBT DELETE: [SENSE THE OUTDOOR AIR TEMPERATURE AND RETURN AIR TEMPERATURE AND OPEN, MODULATE AND CLOSE DAMPERS TO TAKE ADVANTAGE OF 100% OUTSIDE AIR ECONOMIZER MODE.]

INTERLOCK THE RELIEF DAMPERS TO MAINTAIN AHU ZONE AIR BALANCE. **SBT ADD:** [SEE SEQUENCE ON DRW 008B FOR MECHANICAL ROOM OVER PRESSURE RELIEF SEQUENCE.]

UNOCCUPIED-SUMMER-FANS ARE OFF, DAMPERS CLOSED. PROVIDE A SPACE TEMPERATURE SENSOR ON THE FLOOR SERVED TO OVERCALL THE UNOCCUPIED OPERATION IF THE TEMPERATURE IN THE SPACE EXCEEDS SETPOINT. IF SETPOINT IS EXCEEDED (SET AT 82°F ADJUSTABLE) INITIATE THE STARTING SEQUENCE FOR OCCUPIED EXCEPT OA DAMPER REMAINS CLOSED. OPERATE THE UNOCCUPIED OPERATION UNTIL SPACE TEMPERATURE FALLS TO 74°F THEN DISCONTINUE OPERATION, STOP FAN, RETURN ALL SETTING TO PRE-START MODE.

OCCUPIED WINTER-IDENTICAL DAMPER OPERATION/SOFT START FOR FANS. MODULATE MIXING DAMPERS AND PRE-HEAT HOT WATER COIL CONTROL VALVE TO MAINTAIN DISCHARGE AIR TEMPERATURE RESET SCHEDULE (58°FDB WHEN RA TEMPERATURES IS BELOW 74°FDB, 52.5°FDB WHEN RA TEMPERATURE IS ABOVE 74°FDB (ADJUSTABLE).

UNOCCUPIED WINTER-FANS ARE OFF, DAMPERS CLOSED. PROVIDE A SPACE SENSOR ON THE FLOOR TO OVERCALL THE UNOCCUPIED OPERATION IF THE TEMPERATURE IN THE SPACE FALLS TO 58°F (ADJUSTABLE). SHOULD THIS OCCUR, OPEN THE ISOLATION AND RA DAMPERS, START THE FANS, OPERATE THE AHU - UNTIL THE RETURN AIR TEMPERATURE SENSOR

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REACHES 68°FDB (ADJUSTABLE). TERMINAL UNIT REHEAT COILS SHALL MODULATE TO HEAT SPACES SERVED TO 70°F.
WHEN THIS OCCURS, SHUT THE SYSTEM OFF AND RETURN TO UNOCCUPIED MODE.

SAFETIES:

END SWITCH TO PROVE OPENING OF **SBT ADD:** [SA AND RA ISOLATION] DAMPERS. END SWITCH MUST BE MADE PRIOR TO THE START OF ANY FAN. SMOKE DETECTOR SHUTS OFF FAN AND CLOSES ISOLATION DAMPER UPON SENSING SMOKE. PROVIDE HIGH STATIC PRESSURE SENSORS AND ALARMS. PROVIDE A HIGH TEMPERATURE ALARM IN THE DISCHARGE AIR, USING THE DISCHARGE AIR TEMPERATURE SENSOR. FANS SHALL SHUT DOWN AND DAMPERS SHALL CLOSE IF ABNORMAL CONDITIONS ARE PRESENT.

SBT ADD: [THE RELIEF AIR CFM WILL BE MONITORED VIA AN AIR FLOW MEASURING STATION.]

SBT SPECIALIST: Please note that existing programming for this system can be found at
K: \Jobs\Solutions\043000\800\043820\Saber.

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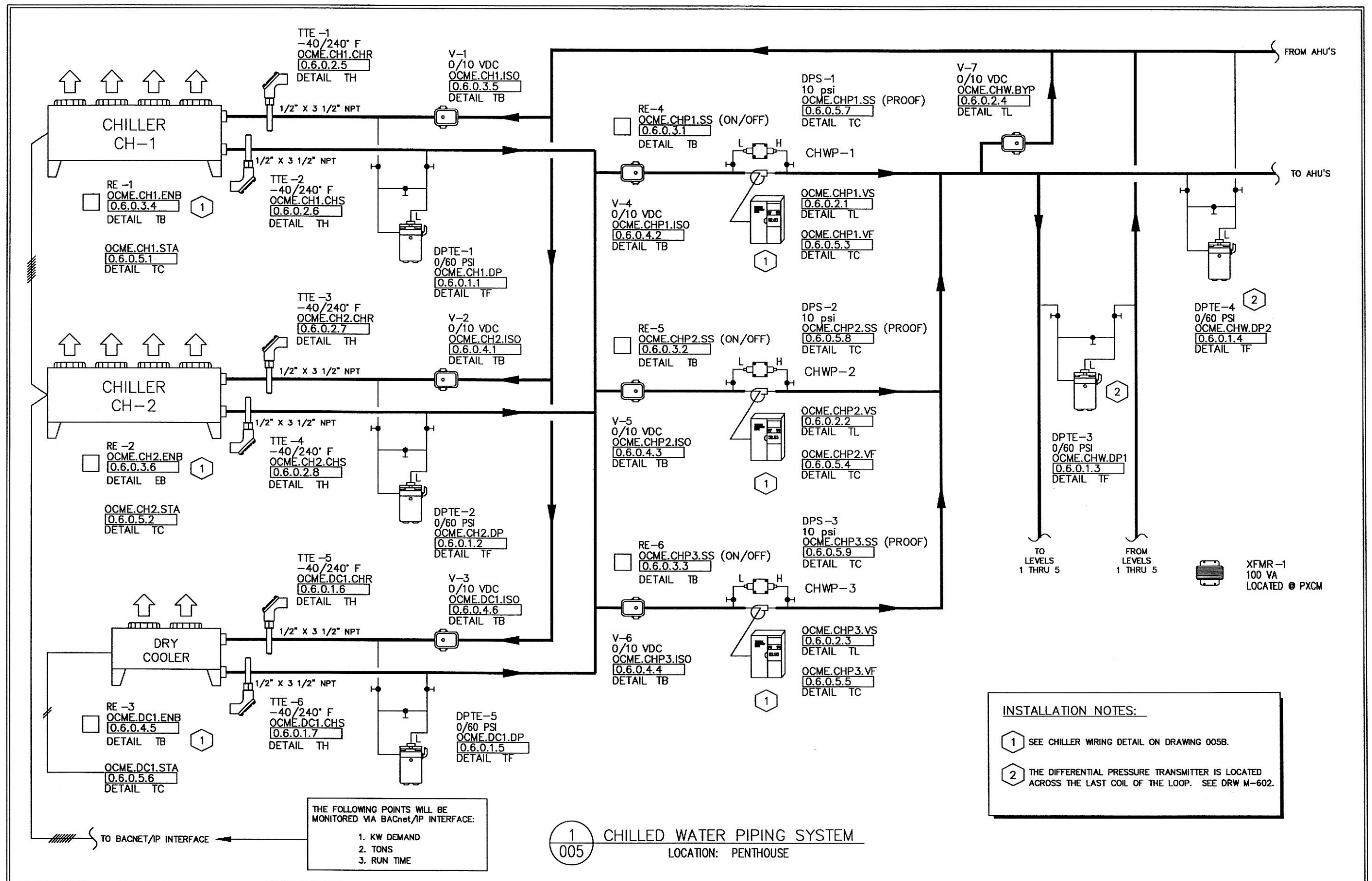
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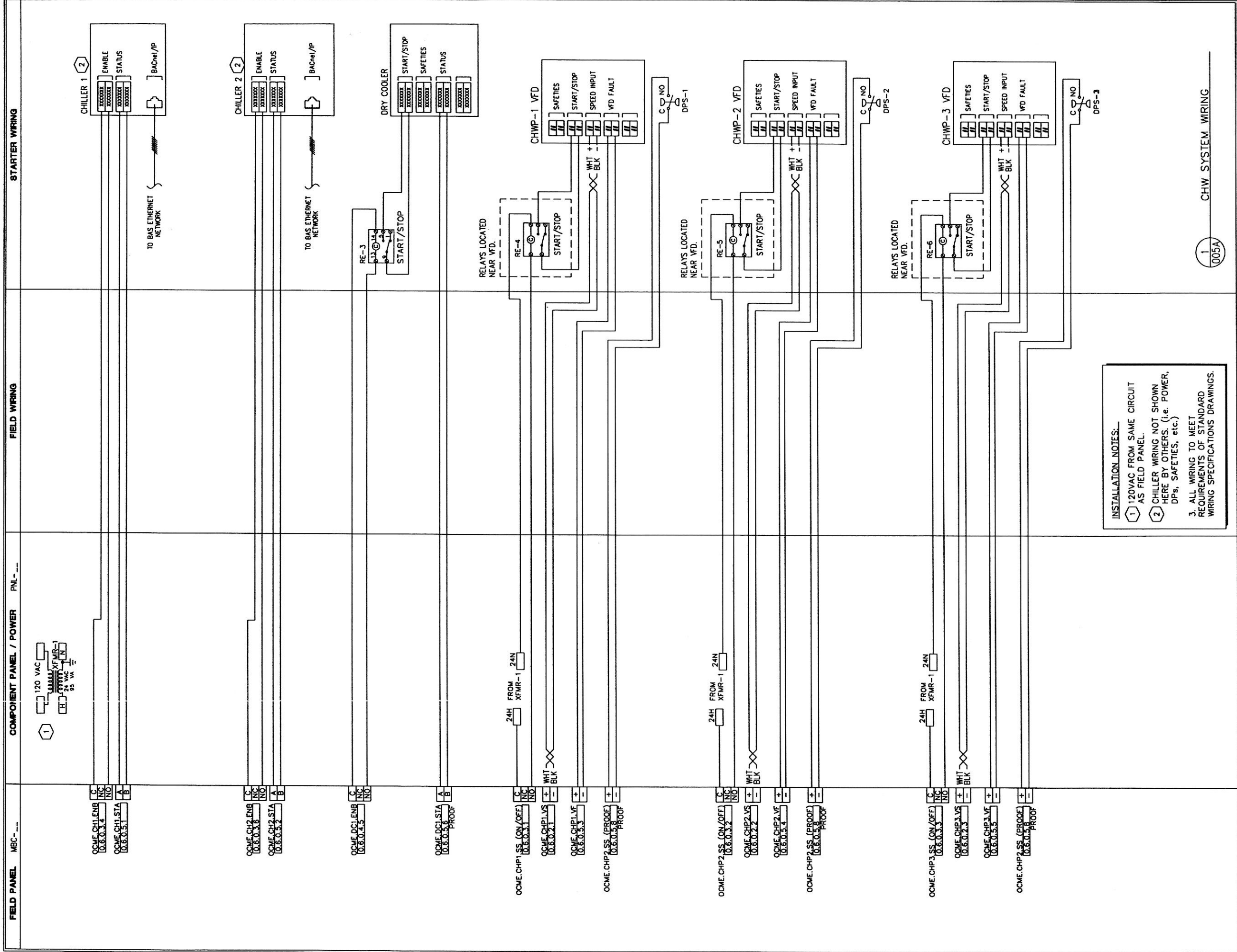
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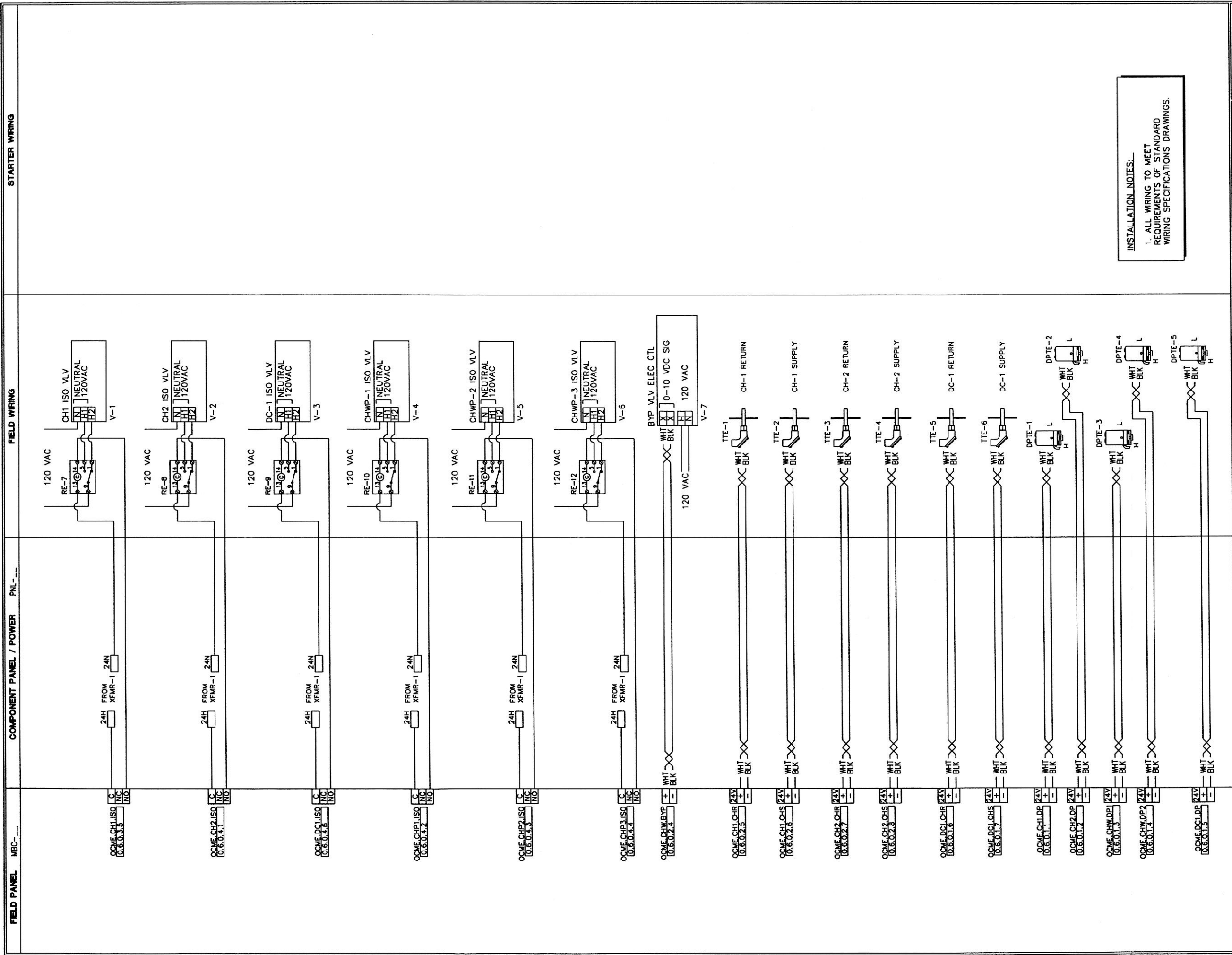
CHILLERS & CHW SYSTEM

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INSTALLATION NOTES:
1. ALL WIRING TO MEET
REQUIREMENTS OF STANDARD
WIRING SPECIFICATIONS DRAWINGS.

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CHILLERS & CHW SYSTEM

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Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
DPS 1-3	3	24-013-M262	UNITED ELECTRIC	0706cut003	DELTA-PRO PRESSURE SW 1-10 PSI
DOTE 1-5	5	231GMS23VN	SETRA	N/A	DIFF PRESS TRANSDUCER W/ 3 VLV MANIFOLD
RE 1-12	12	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT
TTE 1-6	6	544-577-40	SIEMENS	149261	IMMWELL SNSR, PT 1K OHM, (375), 4" LGTH
V					SEE VALVE SUBMITTAL
XFMR 1	1	120-024-100-2TF-0	ELECTRO COM	N/A	TRANSFORMER 120/24 100VA 2 HUB

SEQUENCE OF CONTROL:

AIR COOLED WATER CHILLER, DRY COOLER, CHILLED WATER PUMPS;

AIR COOLED WATER CHILLER LOOP IS 25% ETHYLENE GLYCOL.

CHILLERS ARE SELECTED AT 2/3RDS CAPACITY EACH. SYSTEMS ARE ARRANGED SUCH THAT IN THE EVENT OF AN ELECTRICAL UTILITY POWER FAILURE, WITH SINGLE CHILLER NOT IN OPERATION SHALL AUTOMATICALLY START WITH ANY SELECTED CHILLED WATER PUMP. IF BOTH CHILLERS ARE RUNNING AND A POWER OUTAGE OCCURS, BOTH MACHINES WILL GO THRU THEIR ANTI-RECYCLE SAFETY START PROCEDURE AND THE LEAD CHILLER ONLY SHALL START. SEE EMERGENCY OPERATION NOTE BELOW.

CHILLED WATER PUMPS CHWP-1, 2, & 3, TWO ON, ONE FULL STANDBY. IN NORMAL OPERATION ALL THREE PUMPS MODULATE IN PARALLEL TO MAINTAIN DIFFERENTIAL PRESSURE WHEN BOTH CHILLERS ARE OPERATING. WHEN ONLY ONE CHILLER IS REQUIRED, OPERATE ONLY TWO OF THE THREE PUMPS, ON FAILURE OF A PUMP, ISOLATION VALVE SHUTS, ALARM IS SENT, REMAINING PUMPS SPEED UP TO MAINTAIN SETPOINT.

OUTDOOR AIR TEMPERATURE 45°FDB AND HIGHER SELECTED CHILLER AS LEAD CHILLER, REMAINING CHILLER IS AUTOMATIC LAG CHILLER. AT 45°FDB OUTDOORS (ADJUSTABLE) CHILLED WATER SYSTEM IS ENABLED. OPEN CHILLER CONTROL VALVES ON LEAD CHILLER, OPEN ISOLATION VALVES ON CHWP, WHEN VALVES ARE OPEN START CHWP AND PROVE FLOW. SENSE RETURN WATER TEMPERATURE AND IF RETURN WATER TEMPERATURES EXCEED 45°F ENABLE LEAD CHILLER TO START AND LOAD AND UNLOAD TO MAINTAIN SUPPLY CHILLED WATER SETPOINT (42°F-ADJUSTABLE). WHEN LEAD CHILLER REACHES 100% OF MAXIMUM LOAD, AS SENSED BY ELEVATION OF LEAVING WATER TEMPERATURE ABOVE RESET LWT SENSOR, OPEN LAG CHILLED WATER PUMP ISOLATION VALVES AND LAG CHILLER ISOLATION VALVE AND SOFT START LAG CHILLER SYSTEM LOADING EACH TO APPROXIMATELY 50% OF LOAD THEN LOAD EACH EQUALLY TO MEET CHILLED WATER SUPPLY TEMPERATURE SETPOINT.

PROVIDE A FULL SIZE DIFFERENTIAL PRESSURE BYPASS VALVE TO MAINTAIN MINIMUM FLOW THROUGH THE LEAD CHILLER. MODULATE VALVE TO MAINTAIN MINIMUM SYSTEM CHILLER FLOW.

WHEN OUTDOOR AIR TEMPERATURE FALL BELOW 45°F ADJUSTABLE OR WHEN BOTH CHILLERS ARE OFF BECAUSE OF LOW LOAD, CHILLED WATER COIL CONTROL VALVES WILL BE CLOSED AND THE AIR SIDE ECONOMIZER CONTROL WILL BE IN OPERATION. THE DRY COOLER CONTROL VALVE SHALL OPEN AND CHWP-1 SHALL CONTINUE IN OPERATION TO CIRCULATE

THE GLYCOL / WATER SOLUTION TO THE COMPUTER ROOM AIR CONDITION UNITS (CRACS), FAN COILS, AND BSL-3 RE-COOL COILS. A RISE IN OUTDOOR AIR TEMPERATURE ABOVE 45°F SHALL SIGNAL A REVERSE IN THIS SEQUENCE AND START THE LEAD CHILLER TO OPERATE. A RISE IN RETURN CHILLER WATER TEMPERATURE WILL SIGNAL THE NORMAL CHILLED WATER PUMP START SEQUENCE TO OCCUR.

EMERGENCY OPERATION NOTE:

THE HVAC SYSTEM HAS BEEN DESIGNED TO OPERATE ON NORMAL UTILITY COMPANY POWER. A STANDBY EMERGENCY POWER GENERATOR HAS BEEN SELECTED TO OPERATE PORTIONS OF THE BUILDING DURING A UTILITY COMPANY POWER OUTAGE.

ALL FANS ARE PROVIDED WITH VFD CONTROLLERS. ALL CHILLED WATER, HEATING WATER, FUEL OIL TRANSFER PUMP SYSTEMS ARE PROVIDED WITH VFDs OR LEAD/LAG OPERATION.

THE CHILLERS HAVE BUILT IN ANTI-RECYCLE TIMING SEQUENCE. THE BOILERS ARE ARRANGED FOR LEAD / LAG OPERATION. THE DDC CONTROL SYSTEM HAS A 24 HOUR BATTERY CARRY THRU FOR SIGNAL INITIATION, MENTIONING AND ALARM.

WHEN UTILITY POWER FALTERS, SENSORS IN THE AUTOMATIC TRANSFER SWITCHES CONTROLLING THE VARIOUS ELEMENTS SENSE THE REDUCED VOLTAGE AND COMMAND THE STANDBY POWER GENERATOR TO START. AFTER 10 SECONDS, POWER IS REPLACED TO THE EQUIPMENT VIA THE AUTOMATIC TRANSFER SWITCHES.

AT THAT POINT ALL OF THE HVAC ELEMENTS WITH VARIABLE SPEED DRIVE CONTROL WILL CONTINUE TO SEED THEIR CONTROL POINT. THESE ELEMENTS THAT WERE ONLINE WILL RESUME THEIR FUNCTIONS.

FOR THOSE ELEMENTS THAT ARE PROVIDED WITH LEAD / LAG OPERATION, (BOILERS, FUEL OIL TRANSFER PUMPS, NATURAL GAS COMPRESSORS, VACUUM PUMPS, AIR COMPRESSORS, ETC.), AFTER THE LEAD MACHINE HAS FAILED, SIGNAL TO THE LAG MACHINE WILL ENABLE THE LAG ELEMENTS TO RE-START.

HVAC SUPPLY AIR AND EXHAUST AIR FANS WOULD EXPERIENCE AS MUCH AS A 10 SECOND OUTAGE. THESE ELEMENTS VIA THEIR OWN INERTIAL WILL REMAIN SPINNING. ISOLATION DAMPERS SHALL BE ARRANGED SUCH THAT THEY WILL ALWAYS REMAIN IN THE FAIL POSITION FO A PERIOD OF 120 SECONDS UNLESS THE IN-UNIT SMOKE DETECTOR HAS SIGNALLED THE HVAC ISOLATION DAMPER TO CLOSE BECAUSE OF SMOKE.

PROVIDE CONTACTS, NO, NC, LEAD / LAG RELAYS, ETC. ON ALL EQUIPMENT TO PERFORM THIS AUTOMATED-ATTENDED SEQUENCE. BSL-3 AIR FLOW AND PRESSURIZATION CONTROL SHALL BE PROVIDED SUCH THAT ROOMS 230, 231, 232, AND 234 CAN NEVER GO TO POSITIVE PRESSURE.

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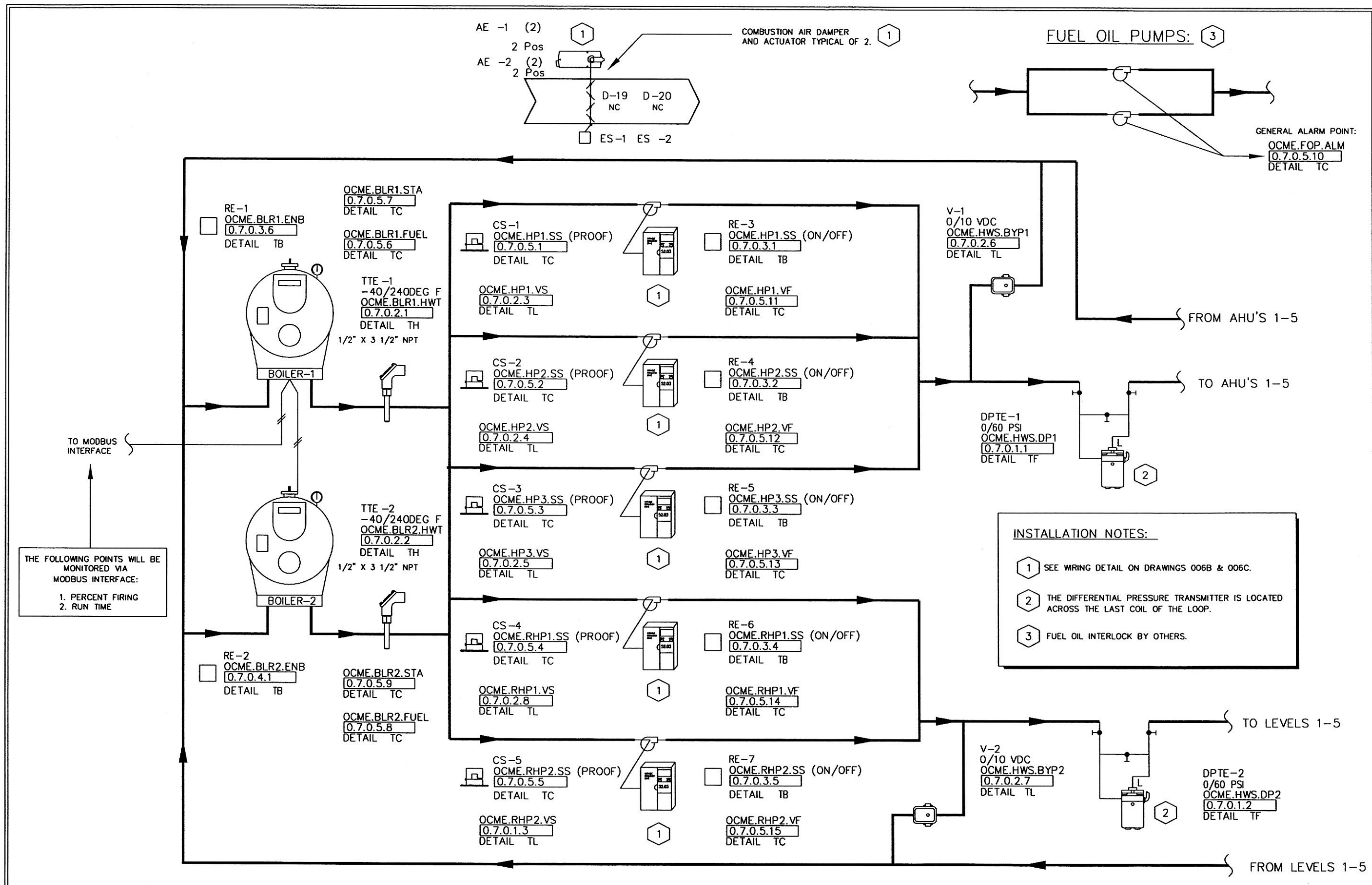
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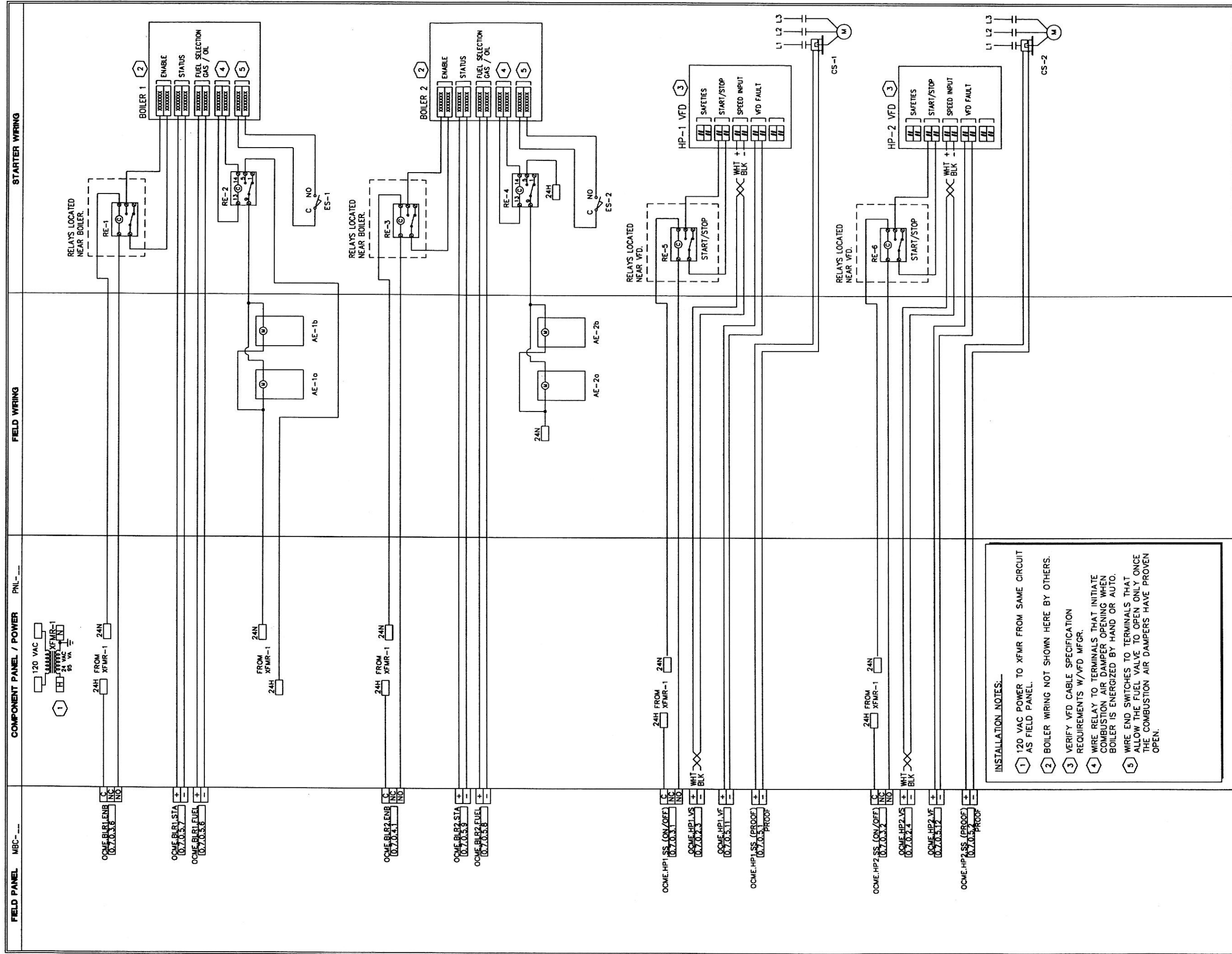
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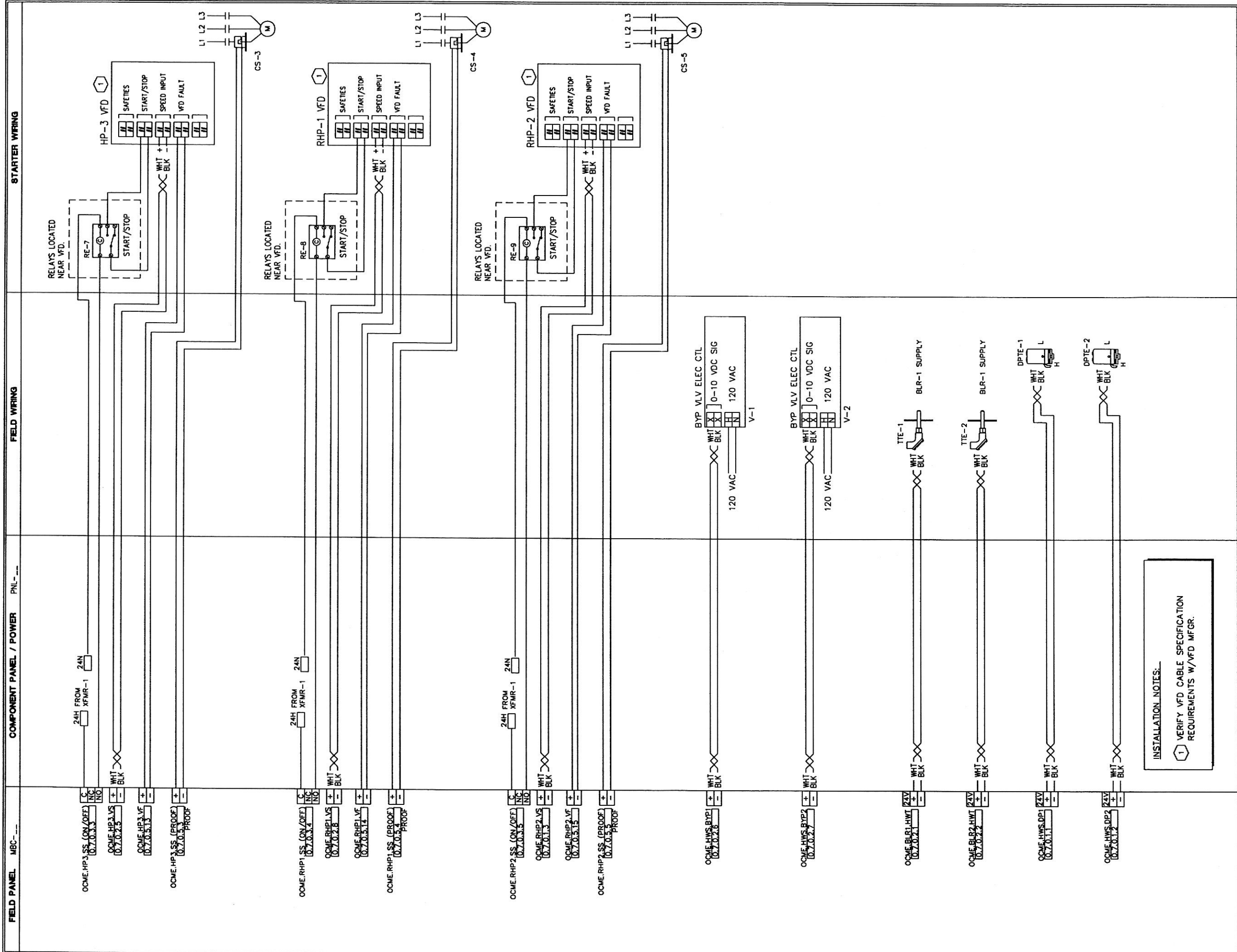
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		BOILER PACKAGE		

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AE 1-2	4	GCA126.1P	SIEMENS	154001	2 PT SR,24V,MED/S/PLNM.
CS 1-5	5	H608	VERIS	1006cut016	CUR SW SPLTCOR-ADJ SETPT W/LED
D					SEE DAMPER SUBMITTAL
DPTE 1-2	2	231GMS23VN	SETRA	N/A	DIFF PRESS TRANSDUCER W/ 3 VLV MANIFOLD
ES 1-2	2	TS-475	KELE	N/A	Non-Mercury Damper Position Switch, SPDT
TTE 1-2	2	544-577-40	SIEMENS	149261	IMMWELL SNSR, PT 1K OHM, (375), 4" LGTH
V					SEE VALVE SUBMITTAL
Panel Mounted Devices					
RE 1-9	9	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT

SEQUENCE OF OPERATION:

THE SYSTEM OPERATES AS FOLLOWS (ALL SETPOINTS ARE ADJUSTABLE):

HEATING WATER SYSTEM:

TWO BOILERS SIZED AT 2/3RDS LOAD EACH ARE PROVIDED. UNITS ARE DUAL FUEL. THREE PRIMARY HEATING WATER PUMPS ARE TWO ON, ONE STANDBY. TWO REHEAT HOT WATER PUMPS ARE ONE ON, ONE STANDBY. BOILERS ARE LEAD LAG OPERATION WHICH CAN BE SELECTED TO EQUALIZE RUNNING TIME ON EITHER MACHINE. REHEAT FOR THE HVAC LABORATORY TEMPERATURE CONTROL WILL REQUIRE THAT ONE BOILER OPERATES DURING SUMMER.

PROVIDE AN OVERALL RESET HEATING WATER TEMPERATURE CONTROL TO REQUIRE 180°F DISCHARGE WATER TEMPERATURE WHEN OUTDOOR AIR DRY BULB TEMPERATURE IS 40°F OR LESS AND 150°F DISCHARGE WATER TEMPERATURE WHEN OUTDOOR AIR IS 55°F OR HIGHER (ADJUSTABLE). ALL HEATING COIL CONTROL VALVES ARE TWO WAY, PUMPS ARE VFD CONTROLLED. PUMPS SHALL BE ARRANGED SUCH THAT SHOULD ONLY ONE BOILER BE REQUIRED FOR LOAD AS SENSED BY REQUIRED LEAVING WATER TEMPERATURE TO HEADER, TWO HEADER WATER PUMPS AT PART LOAD SHALL OPERATE.

PROVIDE A DIFFERENTIAL PRESSURE TRANSMITTER AND FULL SIZE PRESSURE RELIEF BYPASS SUCH THAT ADEQUATE RETURN WATER IS CIRCULATED TO THE BOILER.

IF A BOILER GOES INTO ALARM, IT IS TURNED OFF AND THE NEXT BOILER IN SEQUENCE TAKES OVER. IF A PUMP FAILS, AN ALARM IS GENERATED AND THE NEXT PUMPS IN SEQUENCE TAKES OVER.

THE BOILER CONTROL SYSTEM PROVIDED BY THE BOILER MANUFACTURER, IS FACTORY WIRED EXCEPT FOR FIELD INSTALLED DEVICES (COMBUSTION AIR DAMPER INTERLOCKS, FLOW SWITCHES, LOW WATER CUTOFF, ETC). FLAME SAFEGUARD CONTROLS ARE INCLUDED WITH THE BOILER.

THE DDC SYSTEM USES CURRENT SWITCHES TO CONFIRM THE PUMPS ARE IN THE DESIRED STATE (I.E. ON OR OFF) AND

GENERATES AN ALARM IF STATUS DEVIATES FROM DDC START/STOP CONTROL.

THE DDC SYSTEM MONITORS THE BOILER CONTROLS FOR A COMMON ALARM CONDITION (I.E. LOW WATER CUT OFF, FLAME FAILURE, ETC.).

THE DDC SYSTEM GENERATES AN ALARM WHEN THE WATER TEMPERATURE IS OUTSIDE THE MINIMUMS OR MAXIMUMS AS REQUIRED BY THE BOILER MANUFACTURER (I.E. DIFFERENTIAL TEMPERATURE TOO LARGE OR TOO SMALL, RETURN OR SUPPLY TEMPERATURE TOO LOW, ETC.)

INTERLOCK COMBUSTION AIR DAMPERS SUCH TO OPEN AND REMAIN OPEN WHENEVER WITHER BOILER BURNER AND/OR DOMESTIC HOT WATER HEATER BURNER IS IN OPERATION.

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RE -1
OCME.BSL.EF1.SS (ON/OFF)
0.6.0.8.1
DETAIL TB
CS-1
OCME.BSL.EF1.SS (PROOF)
0.6.0.7.1
DETAIL TC

RE -2
OCME.BSL.EF2.SS (ON/OFF)
0.6.0.8.2
DETAIL TB
CS-2
OCME.BSL.EF2.SS (PROOF)
0.6.0.7.2
DETAIL TC

OCME.BSL.EF1.VS
0.6.0.6.4
DETAIL TL

OCME.BSL.EF2.VS
0.6.0.6.5
DETAIL TL

OCME.BSL.EF1.VF
0.6.0.5.10
DETAIL TC

OCME.BSL.EF2.VF
0.6.0.5.11
DETAIL TC

RE -3
OCME.GEF1.SS (ON/OFF)
0.6.0.8.3
DETAIL TB
CS-3
OCME.GEF1.SS (PROOF)
0.6.0.7.3
DETAIL TC

RE -4
OCME.GEF2.SS (ON/OFF)
0.6.0.8.4
DETAIL TB
CS-4
OCME.GEF2.SS (PROOF)
0.6.0.7.4
DETAIL TC

RE -5
OCME.GEF3.SS (ON/OFF)
0.6.0.8.5
DETAIL TB
CS-5
OCME.GEF3.SS (PROOF)
0.6.0.7.5
DETAIL TC

OCME.GEF1.VS
0.6.0.6.6
DETAIL TL

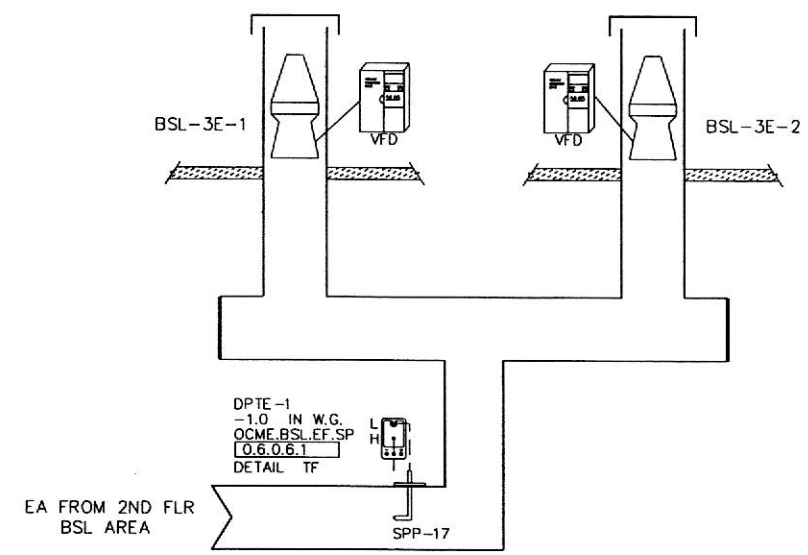
OCME.GEF2.VS
0.6.0.6.7
DETAIL TL

OCME.GEF3.VS
0.6.0.6.8
DETAIL TL

OCME.GEF1.VF
0.6.0.5.13
DETAIL TC

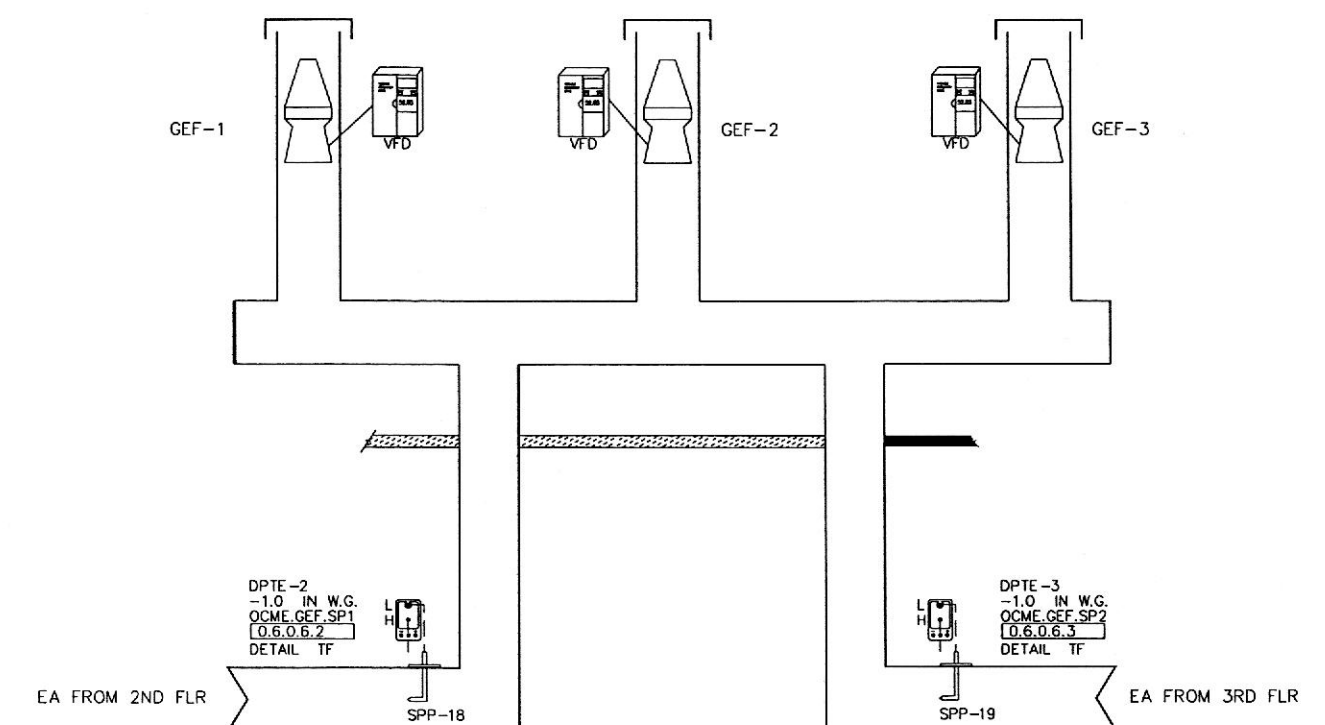
OCME.GEF2.VF
0.6.0.5.14
DETAIL TC

OCME.GEF3.VF
0.6.0.5.15
DETAIL TC

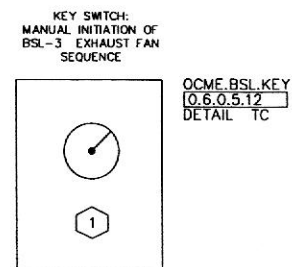


1
007 BSL-3 EXHAUST
BSL-3E-1 & BSL-3E-2
SERVES 2ND FLOOR BSL AREA

INSTALLATION NOTES:
1 LOCATE BSL-3 OPERATOR PAD IN AIRLOCK 235.

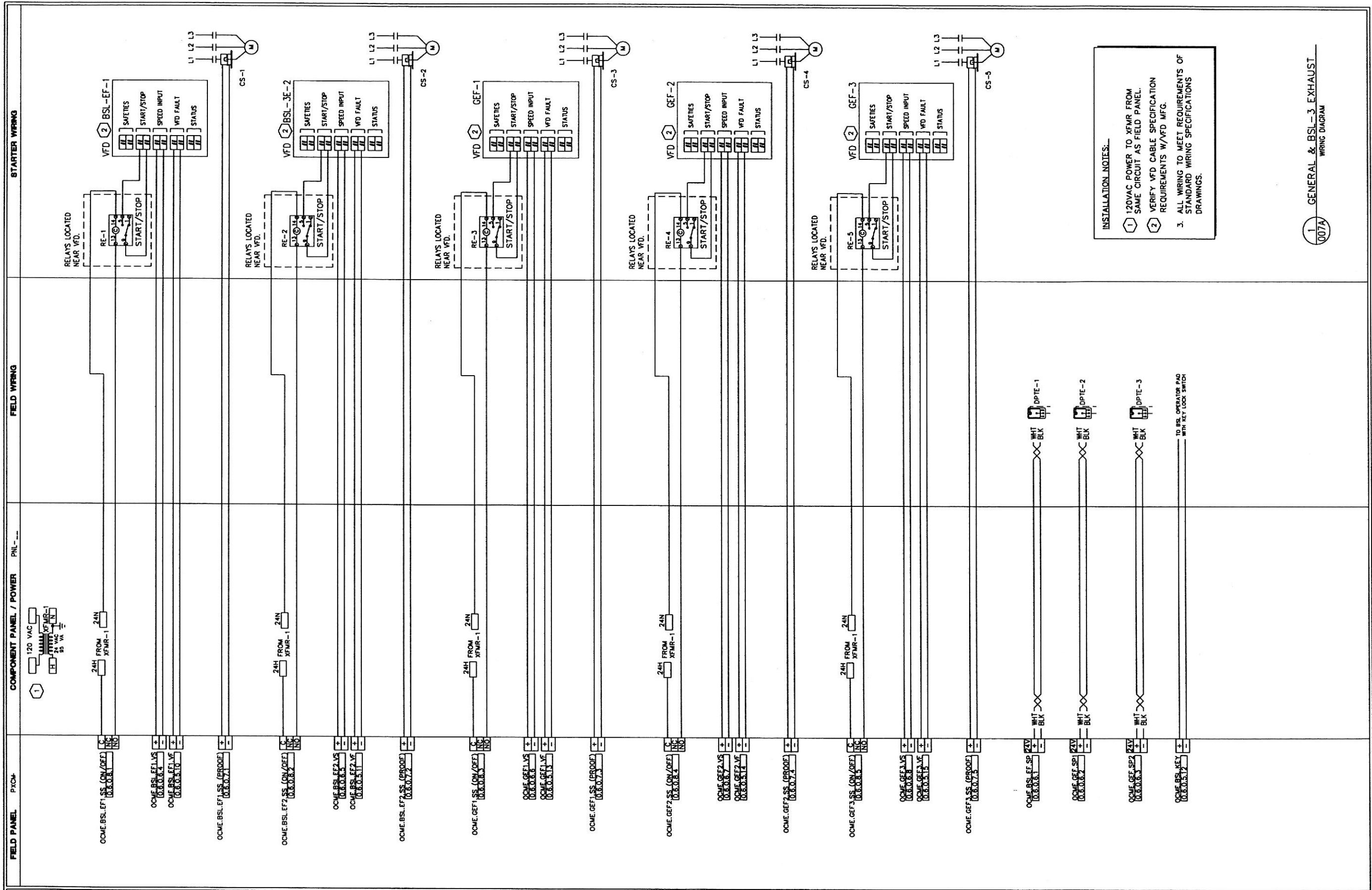


2
007 GENERAL EXHAUST
GEF-1 THRU GEF-3
SERVES 2ND AND 3RD FLOOR



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		SIEMENS BUILDING TECHNOLOGIES INC.		Phone: 410-645-1600 Fax: 410-645-1616		ENGINEER JES		DRAFTER JES	
						CHECKED BY JES		INITIAL RELEASE 01/15/09	
								LAST EDIT DATE 03/31/09	
						BSL & GENERAL EXHAUST FANS		007	

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						ENGINEER JES DRAFTER JES CHECKED BY JES INITIAL RELEASE 01/15/09 LAST EDIT DATE 03/26/09		BSL & GENERAL EXHAUST FANS	

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
CS 1-5	5	H608	VERIS	1006cut016	CUR SW SPLTCOR-ADJ SETPT W/LED
DPTE 1-3	3	2641005WD11A1C	SETRA	0608cut003	DP TRAN AIR,1%,5" ENC
RE 1-5	5	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT
XFMR 1	1	120-024-100-2TF-C	ELECTRO COM	N/A	TRANSFORMER 120/24 100VA 2 HUB
Panel Mounted Devices					
SW 1	1	M2SSK1601	KELE	N/A	2-POS, KEY OPERATED SELECTOR SWITCH
	1	SSG1-67	N/A	N/A	EXTERNAL SIGNALING RELAY

SEE SEQUENCE OF OPERATIONS ON DRW 002E & 002F.

REVISION HISTORY

SIEMENS

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BSL & GENERAL EXHAUST FANS

440P043820

007B

RE -1
OCME.GAR.EF1.SS(ON/OFF)
0.8.0.3.3
DETAIL TB

CS-1
OCME.GAR.EF1.SS(ON/OFF)
0.8.0.3.3
DETAIL TC

OCME.GAR.EF1.VD
0.8.0.4.1
DETAIL TL

OCME.GAR.EF1.VF
0.8.0.2.5
DETAIL TC

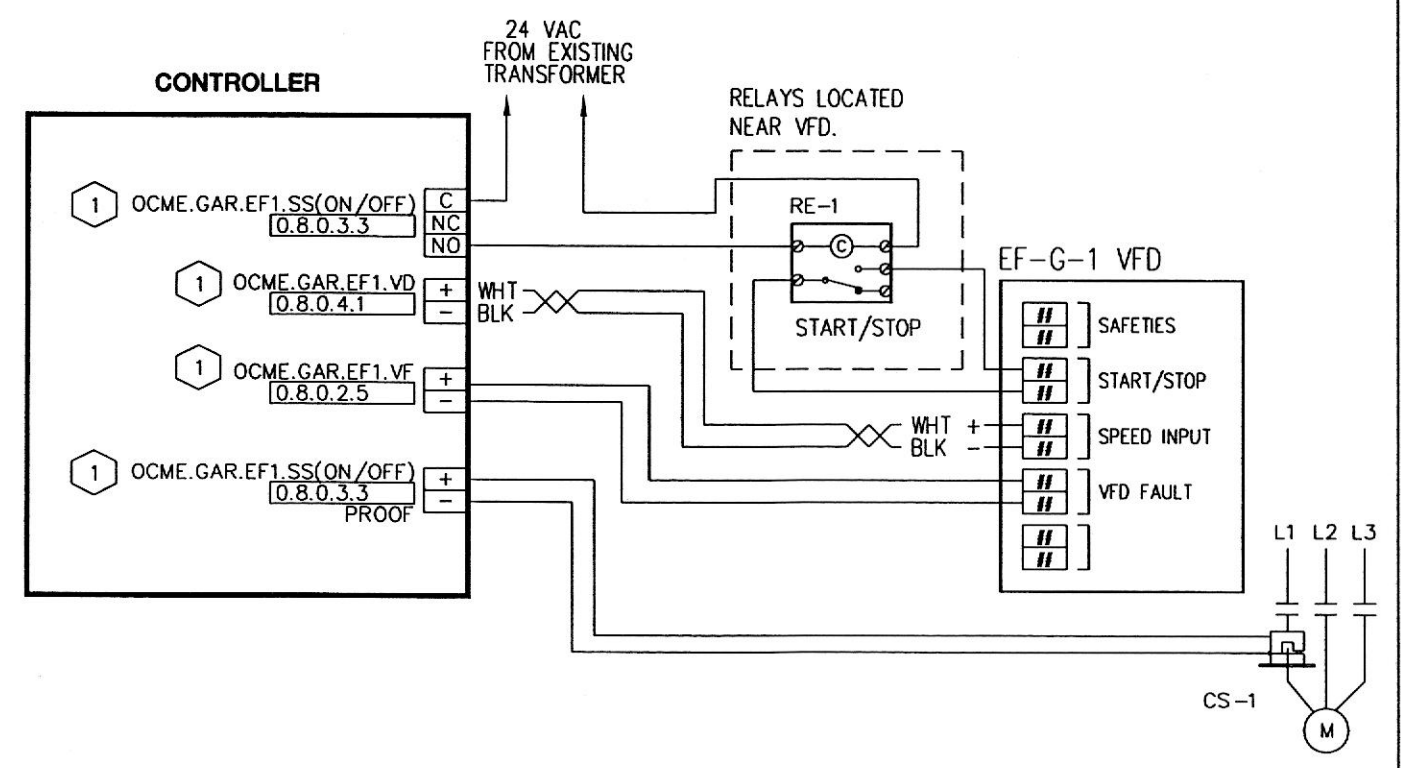
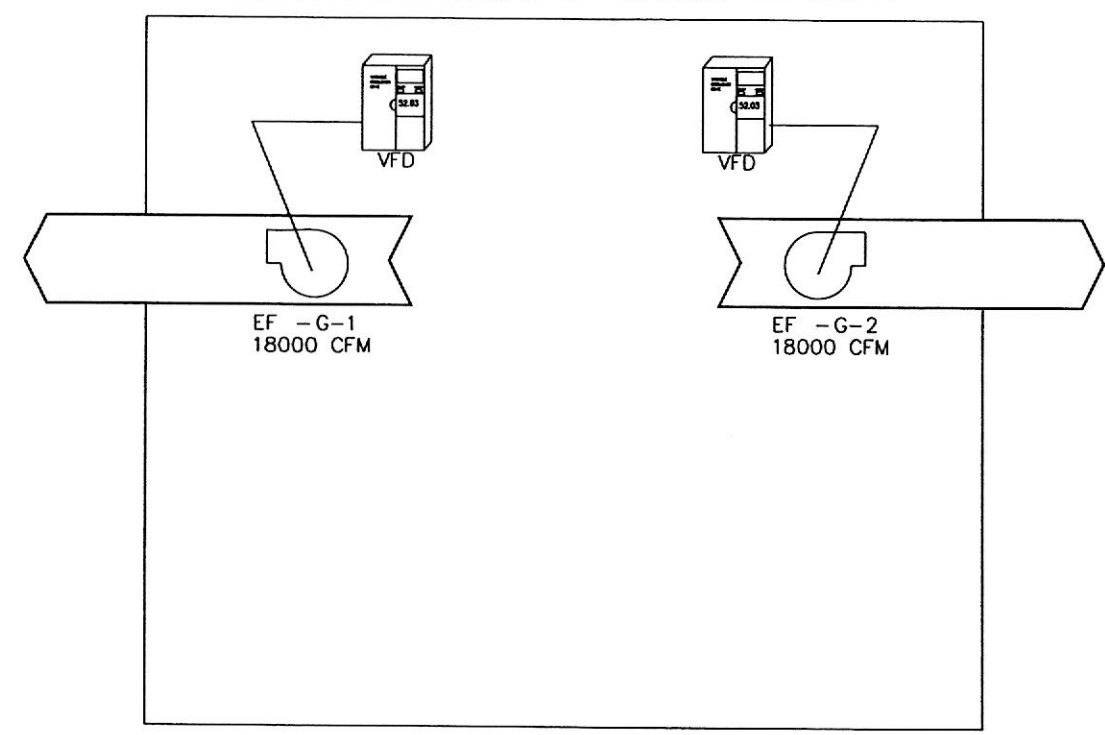
RE -2
OCME.GAR.EF2.SS(ON/OFF)
0.8.0.3.4
DETAIL TB

CS-2
OCME.GAR.EF2.SS(PROOF)
0.8.0.2.4
DETAIL TC

OCME.GAR.EF2.VD
0.8.0.4.2
DETAIL TL

OCME.GAR.EF2.VF
0.8.0.2.6
DETAIL TC

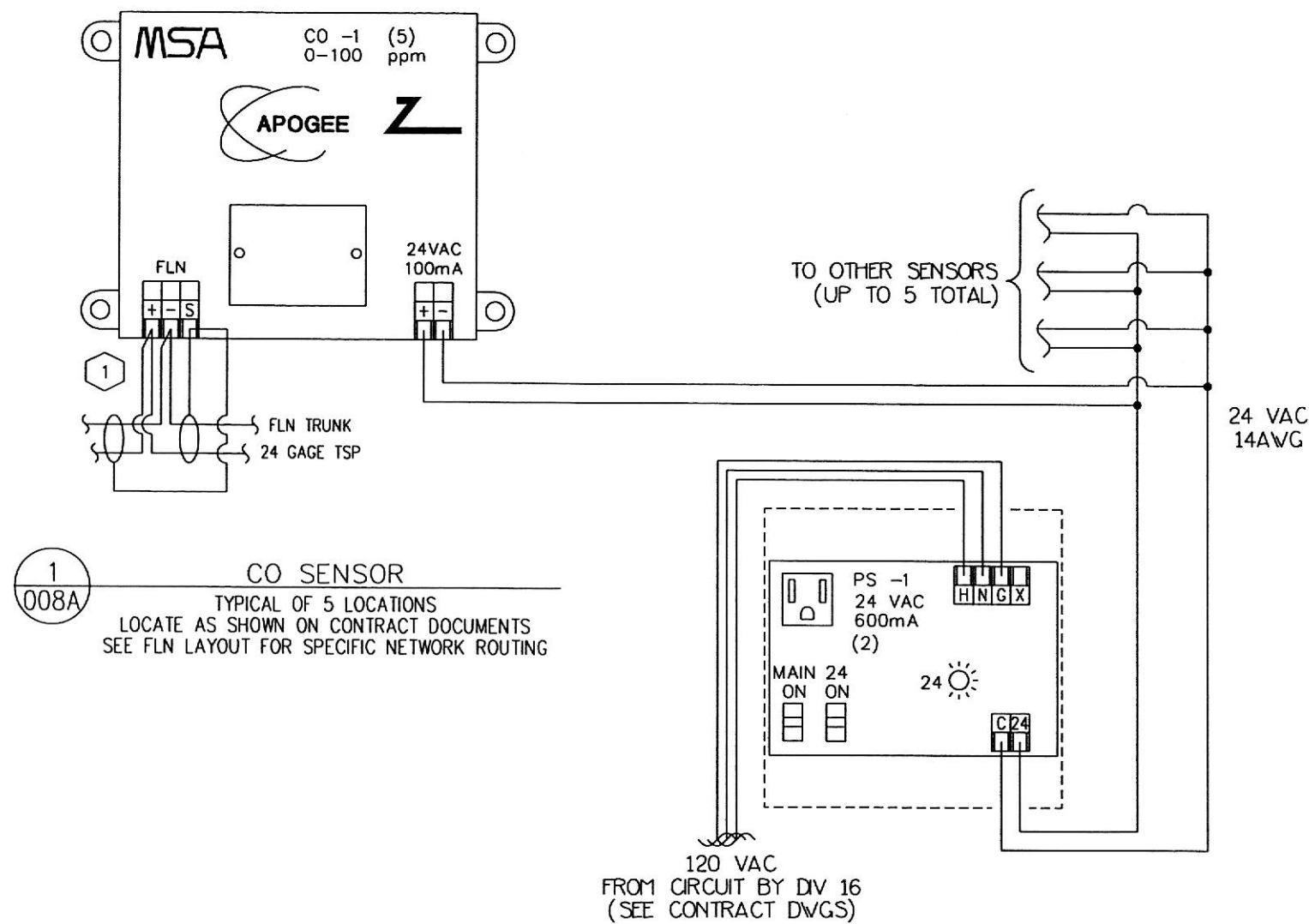
BODY DELIVERY/GARAGE PARKING 104



INSTALLATION NOTES:
1 WIRING TYPICAL FOR EF-G-2.

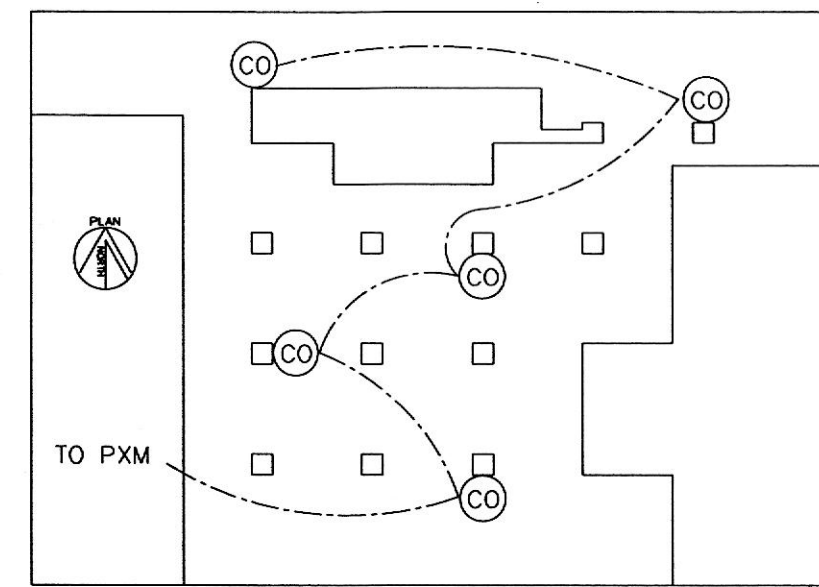
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		ENGINEER JES	DRAFTER JES	CHECKED BY JES	INITIAL RELEASE 01/15/09	LAST EDIT DATE 03/30/09
		GARAGE EXHAUST SYSTEM				

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1
008A CO SENSOR
TYPICAL OF 5 LOCATIONS
LOCATE AS SHOWN ON CONTRACT DOCUMENTS
SEE FLN LAYOUT FOR SPECIFIC NETWORK ROUTING

2
008A 24VDC POWER SUPPLY
TYPICAL OF 3 DEVICES
LOCATE IN MEC PANEL



3
008A CO SENSOR FLN LAYOUT

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GARAGE EXHAUST SYSTEM

440P043820
0

008A

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
CO 1	5	10070230	MSA		MSA Z GARD CO SENSOR 0-100PPM P1 NETWORK
CS 1-2	2	H608	VERIS	1006cut016	CUR SW SPLTCOR-ADJ SETPT W/LED
PS 1	2	PSC40AB10	FUNCTIONAL DEVICES		RIB 40VA POWER SUPPLY W/ENCLOSURE
Panel Mounted Devices					
RE 1-2	2	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT

SEQUENCE OF OPERATION

1. THE SYSTEM SHALL INCLUDE MAINTENANCE FREE SOLID-STATE ELECTRONIC CARBON MONOXIDE DETECTORS LOCATED PER MANUFACTURERS REQUIREMENTS. DETECTORS SHALL CONTINUOUSLY MEASURE / MONITOR THE CARBON MONOXIDE LEVELS IN THE SPACE. GARAGE EXHAUST FANS SHALL OPERATE AT MINIMUM FLOW AND INCREASE SPEED IF NEEDED TO MAINTAIN CO LEVELS IN THE SPACE AT 9 PPM OR LESS.
2. VFD CONNECTION TO CO VIA DDC COMMAND.
3. MINIMUM FLOW SET POINT FOR FANS IS 25% OF CAPACITY.

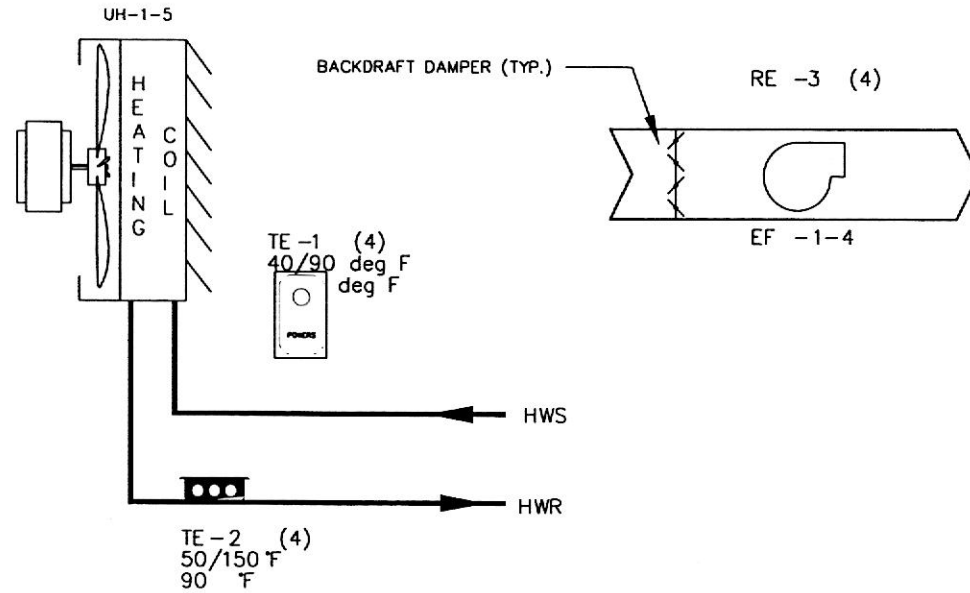
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		ENGINEER JES	DRAFTER JES	CHECKED BY JES	INITIAL RELEASE	LAST EDIT DATE 03/30/09	008B
		GARAGE EXHAUST SYSTEM					

RE -2 (4)
OCME.LVL1.UH5
0.8.0.1.1
DETAIL TB

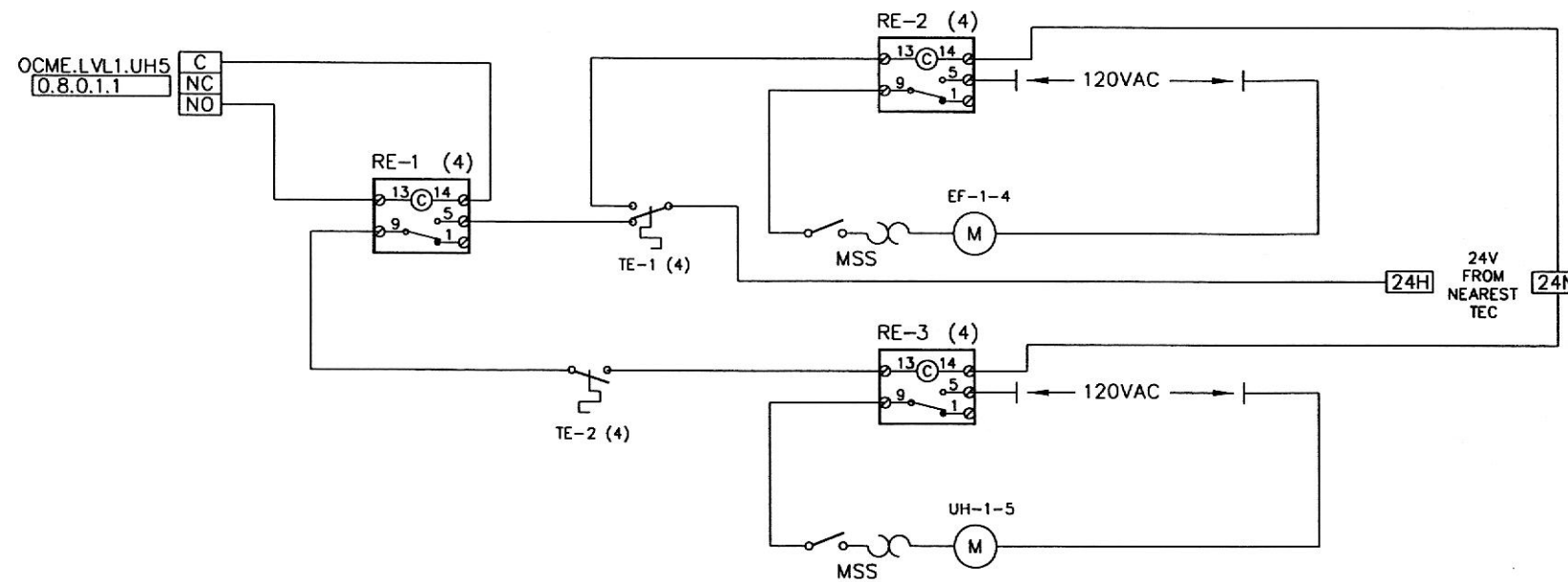
OCME.LVL1.UH6
0.8.0.1.2
DETAIL TB

OCME.LVL1.UH8
0.8.0.1.3
DETAIL TB

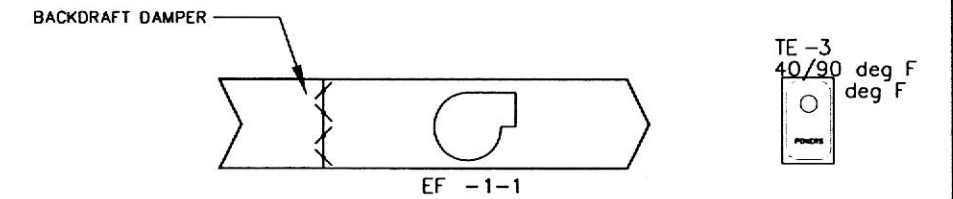
OCME.LVL1.UH9
0.8.0.1.4
DETAIL TB



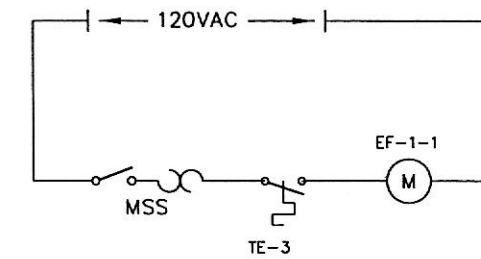
1 UH INTERLOCK W/ EXHAUST FAN
009
TYPICAL OF 4:
UH 1-5 W/ EF-1-4
UH 1-6 W/ EF-1-3
UH 1-8 W/ EF-1-7
UH 1-9 W/ EF-1-2



2 UH INTERLOCK W/ EXHAUST FAN (WIRING)
009
TYPICAL OF 4:
UH 1-5 W/ EF-1-4
UH 1-6 W/ EF-1-3
UH 1-8 W/ EF-1-7
UH 1-9 W/ EF-1-2



3 EF-1-1
009
TYPICAL OF 1
SERVES: ELEC 110



4 EF-1-1 (WIRING)
009
TYPICAL OF 1
SERVES: ELEC 110

REVISION HISTORY

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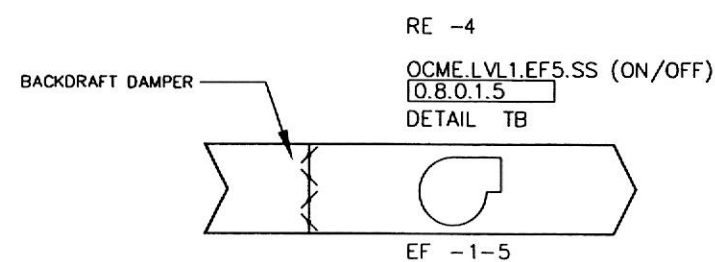
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MISC EXHAUST FANS

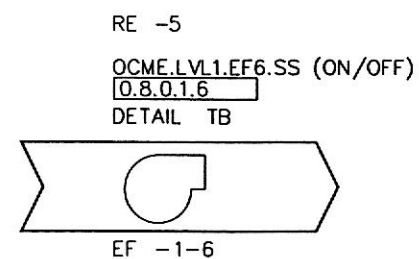
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009



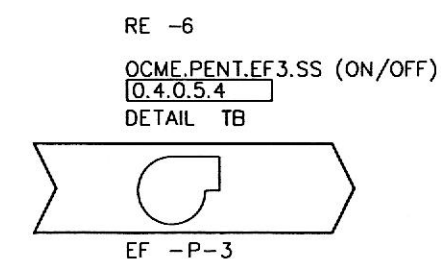
CS-1
OCME.LVL1.EF5.SS (PROOF)
0.8.0.2.1
DETAIL TC

1
009A EF-1-5
TYPICAL OF 1
SERVES: CHEM HOLD 126



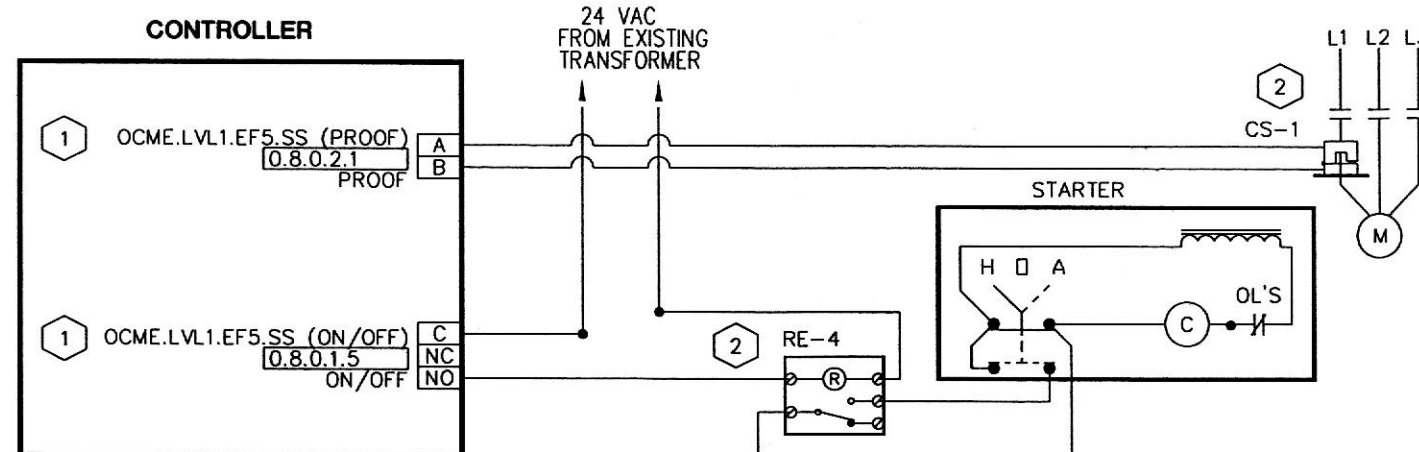
CS-2
OCME.LVL1.EF6.SS (PROOF)
0.8.0.2.2
DETAIL TC

2
009A EF-1-6
TYPICAL OF 1
SERVES: TOILET 119



CS-3
OCME.PENT.EF3.SS (PRROF)
0
DETAIL TC

3
009A EF-P-3
TYPICAL OF 1
SERVES: EAST TOILET



INSTALLATION NOTES:

- 1 EF-1-5 WIRING TYPICAL FOR EF-1-6 & EF-P-3.
- 2 RELAYS & CS LOCATED NEAR STARTER.

4
009A EF-1-5 (WIRING)
TYPICAL OF 3
EF-1-5, EF-1-6, & EF-P-3

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MISC EXHAUST FANS

440P043820
0

009A

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
CS 1-3	3	H608	VERIS	1006cut016	CUR SW SPLTCOR-ADJ SETPT W/LED
TE 1	4	134-1085	SIEMENS	155 017	T'STAT,H/C, LINE VOLT,HVY DUTY
TE 2	4	QAD2030U	SIEMENS	149918	SURFACE MNT'D PIPE SNSR, 2X4 UTIL BOX, N
TE 3	1	134-1085	SIEMENS	155 017	T'STAT,H/C, LINE VOLT,HVY DUTY
Panel Mounted Devices					
RE 1-6	15	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT

SEQUENCE OF OPERATION

EF-1-1:

UPON A RISE IN TEMPERATURE AS SENSED BY SPACE THERMOSTAT, EXHAUST FAN EF-1-1 SHALL BE ENERGIZED TO MAINTAIN THE SPACE TEMPERATURE ADJUSTABLE SETPOINT.

UNIT HEATER INTERLOCK WITH EXHAUST FAN:

TYPICAL OF 4:

UH 1-5 W/ EF-1-4
UH 1-6 W/ EF-1-3
UH 1-8 W/ EF-1-7
UH 1-9 W/ EF-1-2

1. UNIT HEATER SHALL BE INTERLOCKED WITH ITS ASSOCIATED EXHAUST FAN SUCH THAT THERE CAN BE NO EXHAUST FAN OPERATION IN HEATING MODE.
2. UPON A DROP IN SPACE TEMPERATURE AS SENSED BY SPACE THERMOSTAT, UNIT HEATER SHALL BE ENERGIZED TO MAINTAIN THE SPACE TEMPERATURE ADJUSTABLE SETPOINT.
3. UPON A RISE IN TEMPERATURE AS SENSED BY SPACE THERMOSTAT, EXHAUST FAN SHALL BE ENERGIZED TO MAINTAIN THE SPACE TEMPERATURE ADJUSTABLE SETPOINT.
4. DDC SYSTEM SHALL HAVE ABILITY TO ENABLE / DISABLE UNIT HEATER FROM WORKSTATION.

EF-1-5, EF-1-6, & EF-P-3:

DDC SYSTEM SHALL HAVE START/STOP CONTROL OVER EF-1-5, EF-1-6, & EF-P-3. UPON COMMAND FROM OPERATOR WORKSTATION, EXHAUST FAN SHALL START AND RUN CONTINUOUSLY. A CURRENT SENSOR SHALL PROVIDE PROOF AT NETWORK.

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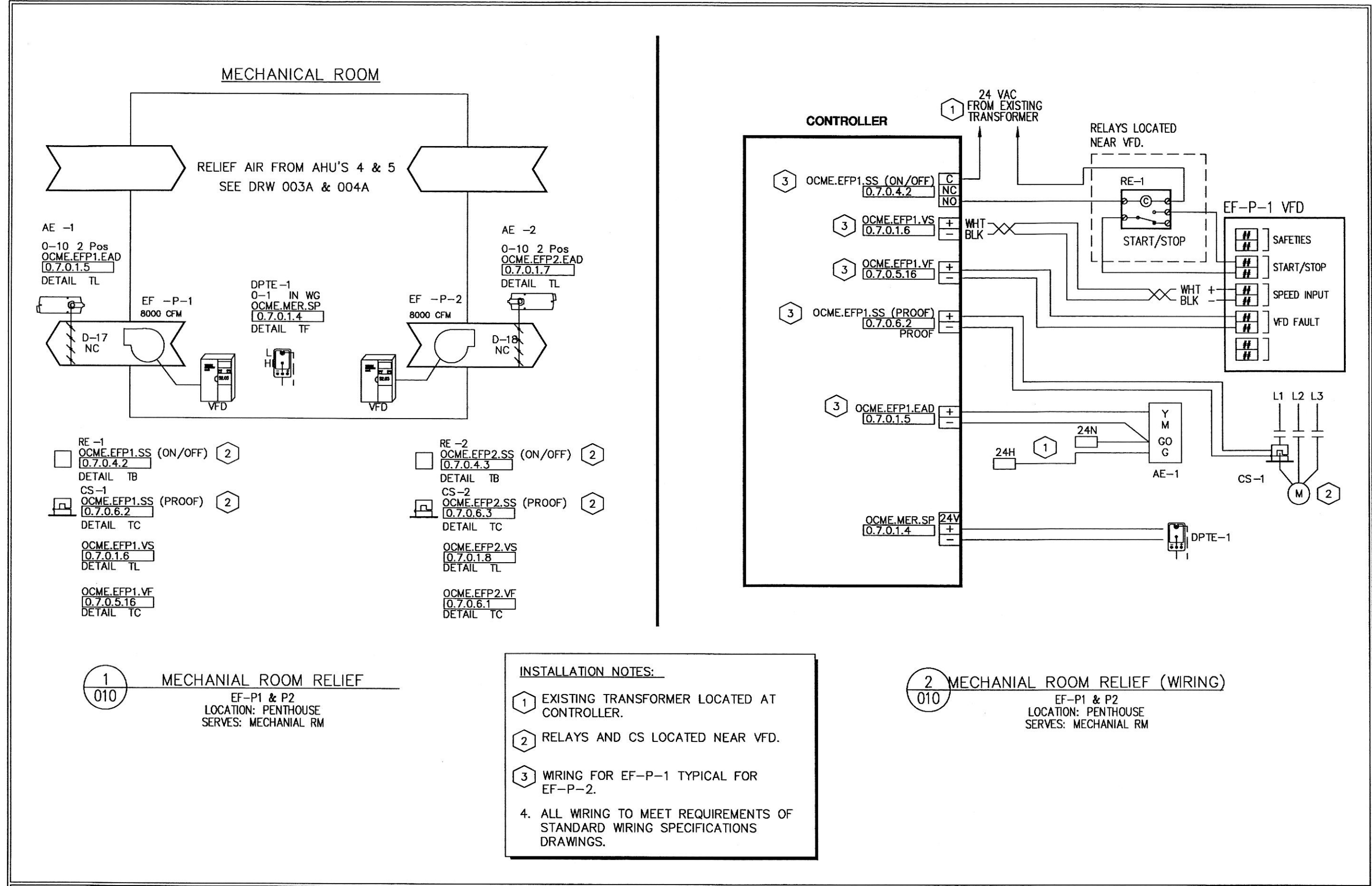
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MISC EXHAUST FANS

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009B

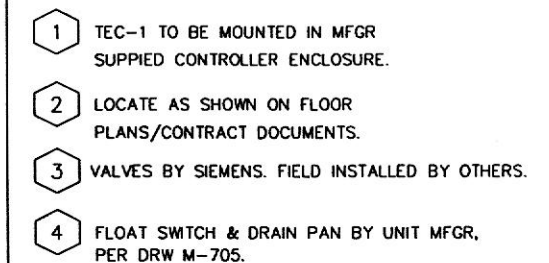


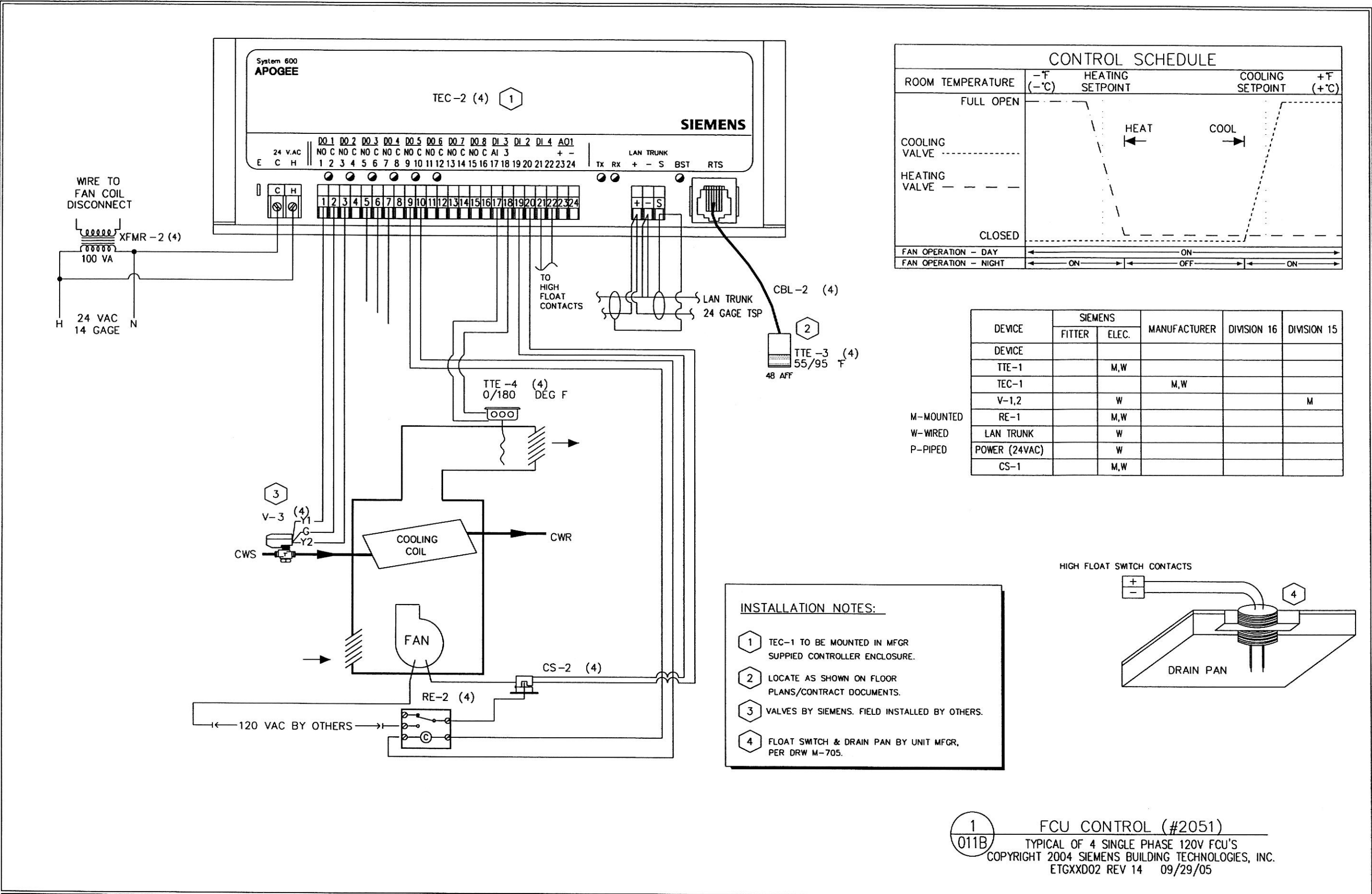
Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AE 1-2	2	GCA126.1P	SIEMENS	154001	2 PT SR,24V,MED/S/PLNM.
CS 1-2	2	H608	VERIS	1006cut016	CUR SW SPLTCOR-ADJ SETPT W/LED
DPTE 1	1	PXPXX01S	VERIS		VERIS DPT PANEL MOUNT ADJ RANGE
	1	A-306K	DWYER		OUTDOOR STATIC PROBE KIT
	1	RPS	PRECON	1011cut060	ROOM STATIC PRESSURE SENSOR
Panel Mounted Devices					
RE 1-2	2	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT

SEQUENCE OF OPERATION:

UPON AN INCREASE IN MECHANICAL ROOM STATIC PRESSURE, RELIEF DAMPERS D-17 AND D-18 SHALL MODULATE TO MAINTAIN MECHANICAL ROOM STATIC PRESSURE SETPOINT. UPON A FURTHER INCREASE IN PRESSURE, EXHAUST FANS EF-P-1 AND EF-P-2 SHALL BE ENERGIZED. MODULATE THE FANS VFDS TO MAINTAIN ROOM STATIC PRESSURE SETPOINT. UPON A DECREASE IN PRESSURE, THE REVERSE SHALL OCCUR.

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				MECH RM RELIEF		010A	





Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
CBL 1-3	19	588-100B	SIEMENS	N/A	6-WIRE 2-RJ11 RS CABLE 50'PLMN
CS 1-3	19	H608	VERIS	1006cut016	CUR SW SPLTCOR-ADJ SETPT W/LED
FUSE 1	1	FLQ-1	KELE	N/A	1 AMP, 500V FLQ SERIES MIDGET FUSE
	1	6WE-C	KELE	N/A	FUSE HOLDER END SECTION, CHANNEL MOUNT
	2	MC	MARATHON	1202cut039	CHANNEL CLAMP
	2	6W30A1-C	KELE	N/A	SECTIONAL FUSE HOLDER, CHANNEL MOUNT
FUSE 2	1	FLQ-1	KELE	N/A	1 AMP, 500V FLQ SERIES MIDGET FUSE
RE 1-3	19	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT
TEC 1-3	19	550-188	SIEMENS	N/A	FAN COIL HEAT&COOL W/COND ALRM
TTE 1	10	540-660B	SIEMENS	149 312	TEC RM SNSR-WHITE
TTE 2	10	540-246-72	SIEMENS	149262	FLEX AVER SNSR, NTC 100K OHM, 6FT PROBE
TTE 3	4	540-660B	SIEMENS	149 312	TEC RM SNSR-WHITE
TTE 4	4	540-246-36	SIEMENS	N/A	FLEX AVER SNSR, NTC 100K OHM, 3 FT PROBE
TTE 5	5	540-660B	SIEMENS	149 312	TEC RM SNSR-WHITE
TTE 6	5	540-246-72	SIEMENS	149262	FLEX AVER SNSR, NTC 100K OHM, 6FT PROBE
V					SEE VALVE SUBMITTAL
XFMR 1-2	14	120-024-100-2TF-C	ELECTRO COM	N/A	TRANSFORMER 120/24 100VA 2 HUB
XFMR 3	5	MUA-024-075-TFSO	ELECTRO	1202cut011	XFRMR MULTITAP/24 75VA 1 HUB

The controller may reset to the Occupied mode for a predetermined time period upon a signal from the control system or manually from a switch at the room sensor.

The DDC system uses a current switch to monitor the FCU fan status.

An application specific DDC controller using electric actuation controls the fan coil unit. The space served by the FCU is controlled in Occupied and Unoccupied modes as follows:

Occupied

The FCU fan operates continuously. The controller monitors the room temperature sensor and modulates the FCU heating/cooling valves in sequence to maintain the space temperature at set point.

Unoccupied

The FCU is controlled using the Unoccupied space temperature set point. The FCU fan is off when the space is satisfied.

REVISION HISTORY

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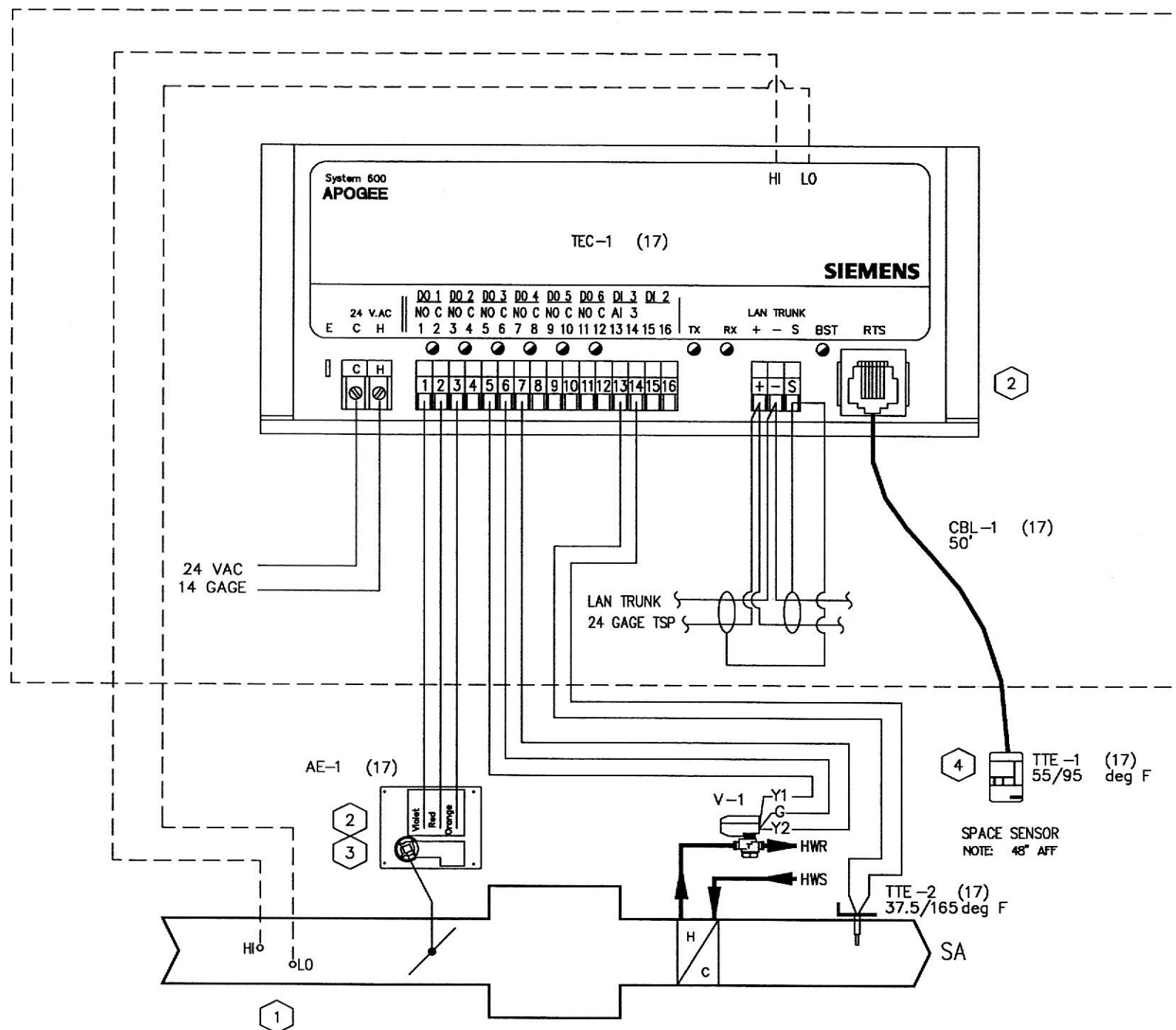
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120 VAC Fan Coil Units

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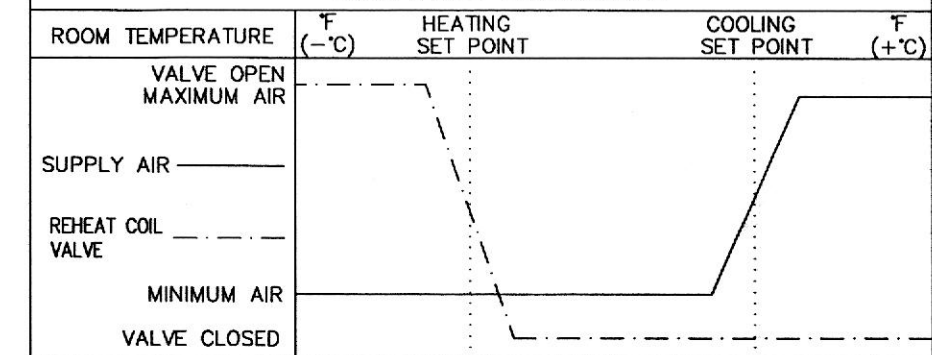
011C



INSTALLATION NOTES:

- BOX INSTALLED BY MECHANICAL CONTRACTOR WITH 3 TO 5 STRAIGHT DUCT DIAMETERS UPSTREAM OF BOX TO PROVIDE PROPER FLOW SENSING.
- TEC-1 & AE-1 TO BE MOUNTED IN MANUFACTURER SUPPLIED CONTROLLER ENCLOSURE
- MOUNT ACTUATOR IN FULL CLOCKWISE POSITION WITH DAMPER FULL OPEN POSITION. VERIFY TEC-1 AND ACTUATOR REQUIREMENT WITH THE BOX MANUFACTURER
- LOCATE AS SHOWN ON FLOOR PLANS/CONTRACT DOCUMENTS

CONTROL SCHEDULE



S-SUPPLIED
M-MOUNTED
W-WIRED
P-PIPED

DEVICE	SIEMENS	ATU MANUFACTURER	DIVISION 16	DIVISION 15
AE-1	S	M,W		
TEC-1	S	M,W,P		
TTE-1,2	S,M,W			
V-1	S,W			M
ENCLOSURE		S,M		
24VAC POWER	W		S	
LAN TRUNK	S,W			

1 VAV SUPPLY BOX w/ REHEAT
012 APPLICATION #2023

REVISION HISTORY

SIEMENS

SIEMENS BUILDING TECHNOLOGIES, INC
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VAV SUPPLY BOX w/ REHEAT

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012

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AE 1	17	GDE131.1U	SIEMENS	154 011	ACT NSR 24/108L 5Nm,NO PLENUM
CBL 1	17	588-100B	SIEMENS	N/A	6-WIRE 2-RJ11 RS CABLE 50'PLMN
TEC 1	17	540-100	SIEMENS	149 171	TERM BOX CTRL ELEC OUT
TTE 1	17	540-660B	SIEMENS	149 312	TEC RM SNSR-WHITE
	17	544-782B	SIEMENS	N/A	SINGLE GOOF MOUNTING PLATE KIT
TTE 2	17	536-811	SIEMENS	149 134	100K OHM DUCT TEMP SENSOR
V					SEE VALVE SUBMITTAL

SEQUENCE OF OPERATION:

SHUTOFF VAV TERMINAL UNITS

1. THE WORK INCLUDES PROVIDING CONTROL SEQUENCING AS SPECIFIED HEREIN AND/OR SHOWN ON THE DRAWINGS FOR SHUT-OFF TYPE VAV BOXES V-1 THROUGH V-5.
2. THE PRIMARY AIR DAMPER IN SHUT-OFF TYPE VAV BOXES SHALL MODULATE OPEN OR CLOSED IN RESPONSE TO A WALL-MOUNTED TEMPERATURE SENSOR MOUNTED IN THE SERVED SPACE.
3. FOR THOSE VAV BOXES PROVIDED WITH A REHEAT COIL, THE FOLLOWING SEQUENCE SHALL BE PROVIDED:
 - A. ON A DROP IN SPACE TEMPERATURE BELOW SET POINT, THE SUPPLY AIR DAMPER SHALL MODULATE TO MINIMUM POSITION TO MAINTAIN THE SPACE TEMPERATURE SET POINT.
 - B. ON A FURTHER DROP IN SPACE TEMPERATURE BELOW SET POINT, THE REHEAT COIL CONTROL VALVE SHALL MODULATE OPEN.
 - C. ON RISE IN SPACE TEMPERATURE ABOVE SET POINT, THE REVERSE SHALL OCCUR.

REVISION HISTORY

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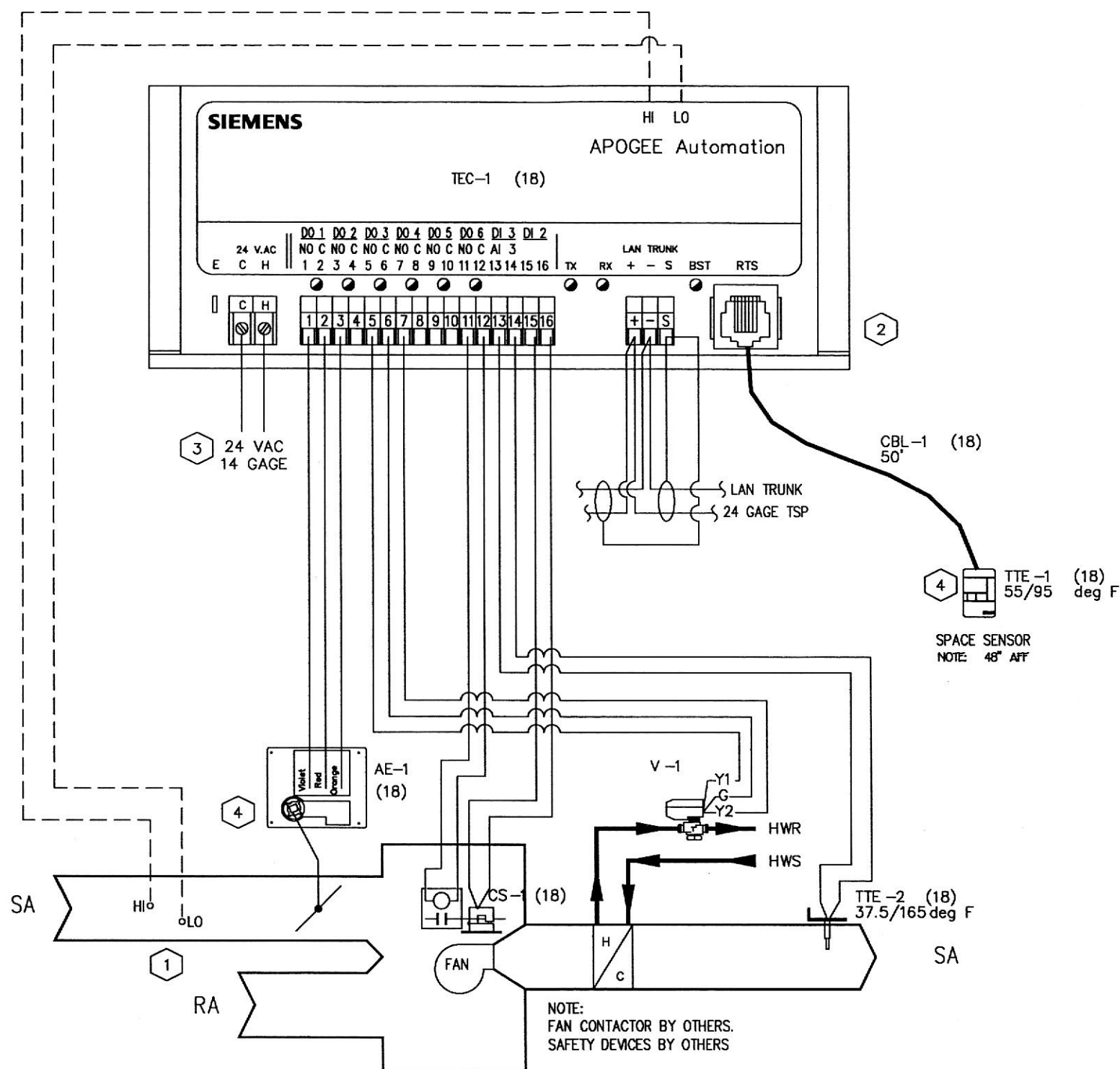
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VAV SUPPLY BOX w/ REHEAT

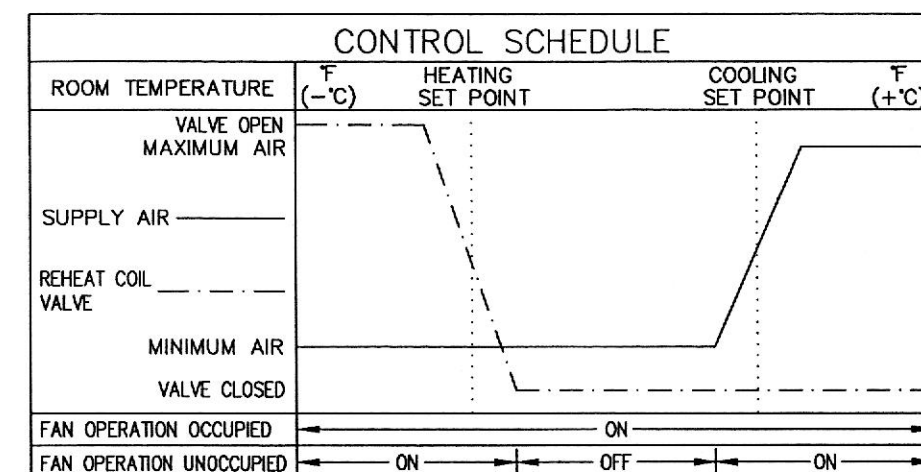
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INSTALLATION NOTES:

- VAV BOX INSTALLED BY MECHANICAL CONTRACTOR WITH 3 TO 5 STRAIGHT DUCT DIAMETERS UPSTREAM OF BOX TO PROVIDE PROPER FLOW SENSING
- TEC-1 TO BE MOUNTED IN MANUFACTURER SUPPLIED CONTROLLER ENCLOSURE
- REFER TO BUILDING POWER TRUNK DRAWING FOR 24 VAC POWER
- MOUNT ACTUATOR WITH DAMPER IN FULL OPEN POSITION. VERIFY TEC-1 AND ACTUATOR REQUIREMENT WITH THE BOX MANUFACTURER
- LOCATE AS SHOWN ON FLOOR PLANS/CONTRACT DOCUMENTS



DEVICE	SIEMENS	ATU MANUFACTURER	DIVISION 16	DIVISION 15
AE-1	S	M,W		
CS-1	S,M,W			
TEC-1	S	M,W,P		
TTE-1,2	S,M,W			
V-1	S,W			M,P
ENCLOSURE		S,M		
24VAC POWER	W		S	
LAN TRUNK	S,W			

S-SUPPLIED
M-MOUNTED
W-WIRED
P-PIPED

1
013 VAV FPB w/ REHEAT COIL
APPLICATION #2025

REVISION HISTORY

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VAV FAN POWERED BOX w/ RH

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Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AE 1	18	GDE131.1U	SIEMENS	154 011	ACT NSR 24/108L 5Nm,NO PLENUM
CBL 1	18	588-100B	SIEMENS	N/A	6-WIRE 2-RJ11 RS CABLE 50'PLMN
CS 1	18	H608	VERIS	1006cut016	CUR SW SPLTCOR-ADJ SETPT W/LED
TEC 1	18	540-100	SIEMENS	149 171	TERM BOX CTRLR ELEC OUT
TTE 1	18	540-660B	SIEMENS	149 312	TEC RM SNSR-WHITE
	18	544-782B	SIEMENS	N/A	SINGLE GOOF MOUNTING PLATE KIT
TTE 2	18	536-811	SIEMENS	149 134	100K OHM DUCT TEMP SENSOR
V					SEE VALVE SUBMITTAL

SEQUENCE OF OPERATION:

SERIES FAN POWERED TERMINAL UNITS

A. THE WORK INCLUDES PROVIDING CONTROL SEQUENCING AS SPECIFIED HEREIN AND/OR SHOWN ON THE DRAWINGS FOR FAN POWERED BOXES FPV-1 THROUGH FPV-6.

B. THE EMCS SHALL ENERGIZE AND DE-ENERGIZE THE SUPPLY FAN IN THE FAN-POWERED BOX WHENEVER ITS ASSOCIATED AIR HANDLING UNIT IS ENERGIZED OR DE-ENERGIZED. THE EMCS SHALL ENERGIZE THE FAN-POWERED BOXES PRIOR TO ENERGIZING THE ASSOCIATED AIR HANDLING UNIT. A CURRENT SENSING RELAY (CS-1) ON EACH FAN-POWERED BOX SHALL ALARM THE EMCS AND DE-ENERGIZE THE FAN-POWERED BOX WHEN THE SUPPLY FAN PRODUCES NO AIR FLOW AFTER A 30 SECOND TIME DELAY (ADJUSTABLE). DURING THE OCCUPIED PERIOD THE FAN SHALL RUN CONTINUOUSLY.

C. SPACE TEMPERATURE SHALL BE MEASURED BY A SPACE SENSOR (TS-01) AND TRANSMITTED TO THE MICROPROCESSOR CONTROLLER ON THE FAN-POWERED BOX. UPON START-UP, THE SUPPLY FAN SHALL BE ENERGIZED. THE RE-HEAT COIL CONTROL VALVE (CV-01) SHALL REMAIN CLOSED, AND THE PRIMARY AIR DAMPER (CD-01) SHALL BE FULLY CLOSED. ONCE FAN OPERATION HAS BEEN PROVEN BY CURRENT SENSING RELAY, CS-1, DAMPER CD-01 SHALL BE MODULATED TO ITS FULLY OPEN POSITION. AS THE SPACE TEMPERATURE DECREASES BELOW TS-01'S SET-POINT, CD-01 SHALL MODULATE TO ITS MINIMUM SETTING. ON A CONTINUED DECREASE IN SPACE TEMPERATURE, CV-01 SHALL MODULATE OPEN TO MAINTAIN SPACE TEMPERATURE. ON AN INCREASE IN SPACE TEMPERATURE THE REVERSE SEQUENCE SHALL OCCUR.

D. DURING UNOCCUPIED PERIODS. PRIMARY AIR DAMPER (CD-01) SHALL CLOSE FULLY AND THE SUPPLY FAN SHALL BE DE-ENERGIZED. NIGHT SET-BACK CONTROL SHALL BE AS DEFINED IN VAV AIR HANDLING UNIT SEQUENCE OF OPERATION.

REVISION HISTORY

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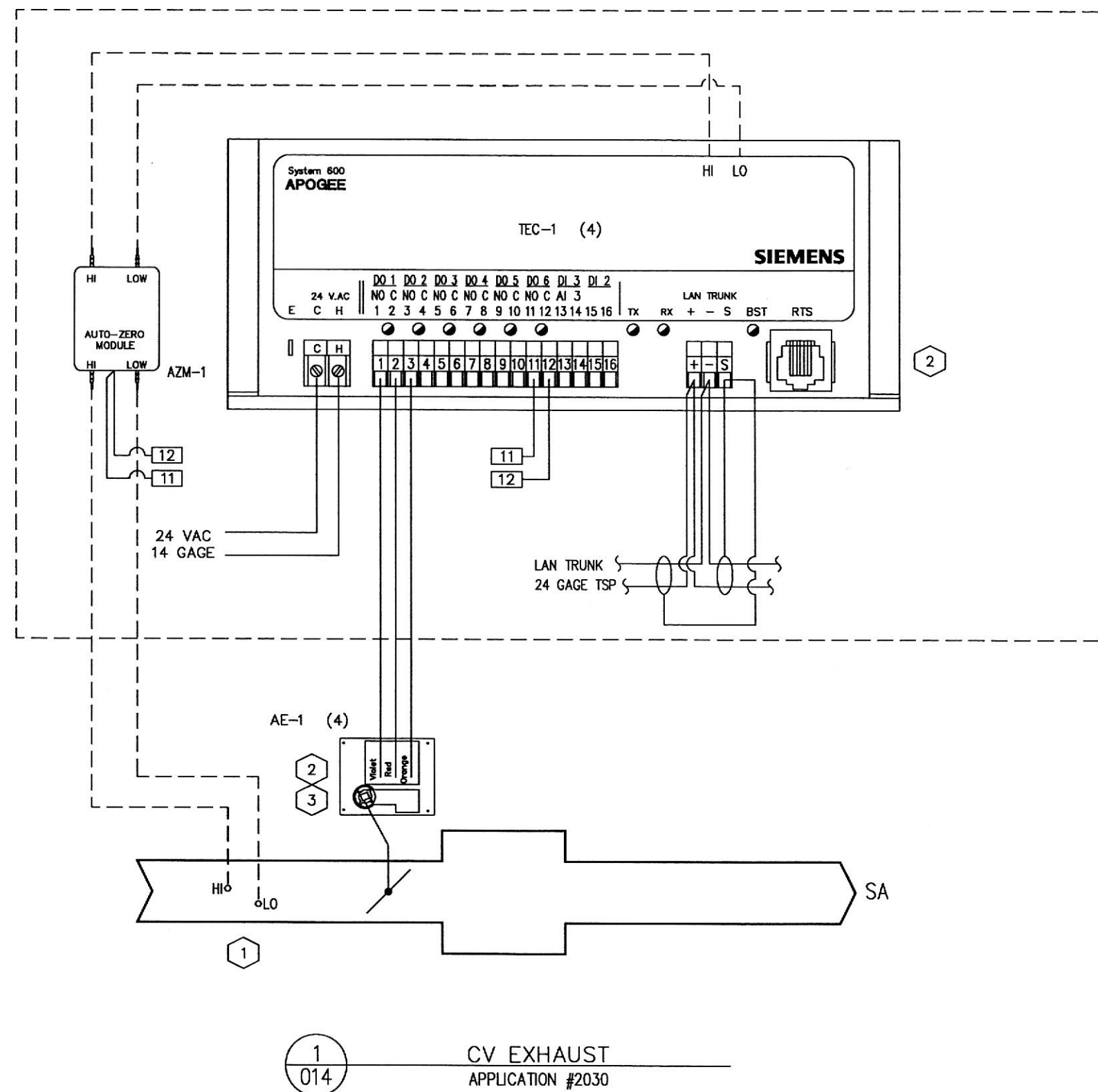
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VAV FAN POWERED BOX w/ RH

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INSTALLATION NOTES:

- 1 BOX INSTALLED BY MECHANICAL CONTRACTOR WITH 3 TO 5 STRAIGHT DUCT DIAMETERS UPSTREAM OF BOX TO PROVIDE PROPER FLOW SENSING.
- 2 TEC-1 & AE-1 TO BE MOUNTED IN MANUFACTURER SUPPLIED CONTROLLER ENCLOSURE
- 3 MOUNT ACTUATOR IN FULL CLOCKWISE POSITION WITH DAMPER FULL OPEN POSITION. VERIFY TEC-1 AND ACTUATOR REQUIREMENT WITH THE BOX MANUFACTURER
- 4 LOCATE AS SHOWN ON FLOOR PLANS/CONTRACT DOCUMENTS

CONTROL SCHEDULE

ROOM TEMPERATURE	-F (-C)	HEATING SET POINT	+F (+C)
OCCUPIED FLOW			
EXHAUST AIR			
UNOCCUPIED FLOW			

DEVICE	SIEMENS	ATU MANUFACTURER	DIVISION 16	DIVISION 15
AE-1	S	M,W		
AZM-1	S	M,W,P		
TEC-1	S	M,W,P		
ENCLOSURE		S,M		
24VAC POWER	W		S	
LAN TRUNK	S,W			

S-SUPPLIED
M-MOUNTED
W-WIRED
P-PIPED

REVISION HISTORY

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CV EXHAUST BOX w/ AZM

440P043820
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Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AE 1	4	GDE131.1U	SIEMENS	154 011	ACT NSR 24/108L 5Nm,NO PLENUM
TEC 1	4	540-104	SIEMENS	149 177	CNST VOL CTLR W/AUTOZERO ELEC

SEQUENCE OF OPERATION:

CV TERMINAL UNITS WITH AUTOZERO MODULE (LAB FLOORS)

1. THE PRIMARY AIR DAMPER SHALL MODULATE TO MAINTAIN THE SPECIFIED AIRFLOW AT ALL TIMES TO MAINTAIN SPACE PRESSURIZATION FOR LAB AREAS. OCCUPIED AND UNOCCUPIED MODES MAY HAVE DIFFERENT SETPOINTS.

REVISION HISTORY

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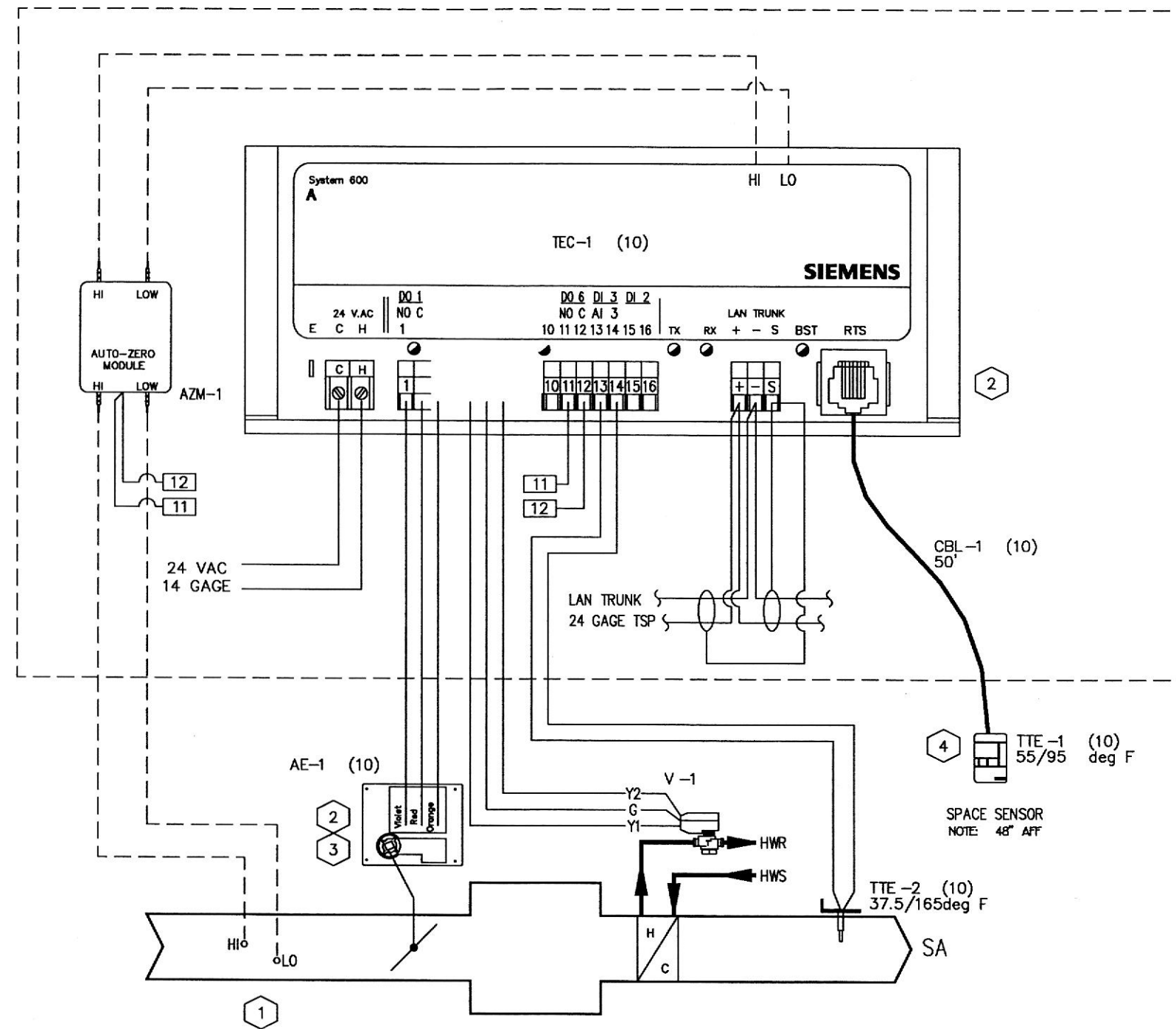
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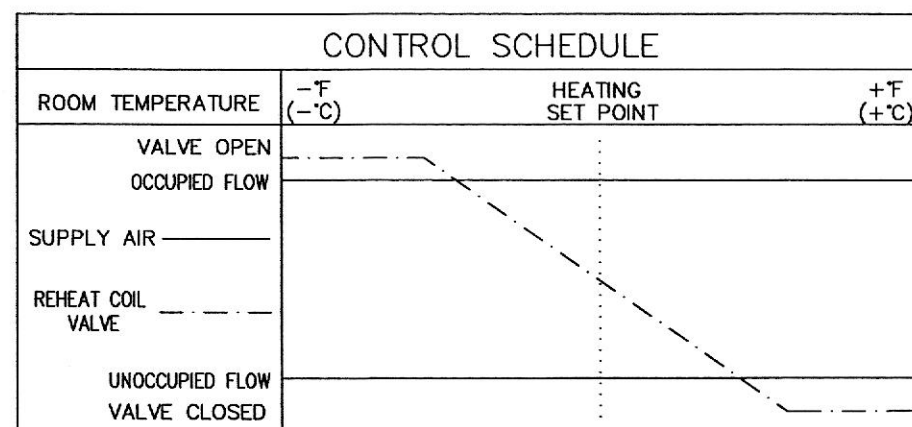
CV EXHAUST BOX w/ AZM

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- INSTALLATION NOTES:**
- BOX INSTALLED BY MECHANICAL CONTRACTOR WITH 3 TO 5 STRAIGHT DUCT DIAMETERS UPSTREAM OF BOX TO PROVIDE PROPER FLOW SENSING.
 - TEC-1 & AE-1 TO BE MOUNTED IN MANUFACTURER SUPPLIED CONTROLLER ENCLOSURE
 - MOUNT ACTUATOR IN FULL CLOCKWISE POSITION WITH DAMPER FULL OPEN POSITION. VERIFY TEC-1 AND ACTUATOR REQUIREMENT WITH THE BOX MANUFACTURER
 - LOCATE AS SHOWN ON FLOOR PLANS/CONTRACT DOCUMENTS



DEVICE	SIEMENS	ATU MANUFACTURER	DIVISION 16	DIVISION 15
AE-1	S	M,W		
AZM-1	S	M,W,P		
TEC-1	S	M,W,P		
TTE-1,2	S,M,W			
V-1	S,W			M,P
ENCLOSURE		S,M		
24VAC POWER	W		S	
LAN TRUNK	S,W			

S-SUPPLIED
M-MOUNTED
W-WIRED
P-PIPED

1
015 CV SUPPLY w/ REHEAT
APPLICATION #2033

REVISION HISTORY 	SIEMENS 2520 LORD BALTIMORE DRIVE BALTIMORE MD 21244 USA Phone: 410-645-1800 Fax: 410-645-1818	MD FORENSIC MEDICAL CENTER BALTIMORE, MD					440P043820 0 015										
		<table border="1"> <tr> <th>ENGINEER</th> <th>DRAFTER</th> <th>CHECKED BY</th> <th>INITIAL RELEASE</th> <th>LAST EDIT DATE</th> </tr> <tr> <td>JES</td> <td>JES</td> <td>JES</td> <td>01/15/09</td> <td>02/03/09</td> </tr> </table>						ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE	JES	JES	JES	01/15/09	02/03/09
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CV SUPPLY BOX w/ REHEAT & AZM																	

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AE 1	10	GDE131.1U	SIEMENS	154 011	ACT NSR 24/108L 5Nm,NO PLENUM
CBL 1	10	588-100B	SIEMENS	N/A	6-WIRE 2-RJ11 RS CABLE 50'PLMN
TEC 1	10	540-104	SIEMENS	149 177	CNST VOL CTLR W/AUTOZERO ELEC
TTE 1	10	540-660B	SIEMENS	149 312	TEC RM SNSR-WHITE
	10	544-782B	SIEMENS	N/A	SINGLE GOOF MOUNTING PLATE KIT
TTE 2	10	536-811	SIEMENS	149 134	100K OHM DUCT TEMP SENSOR
V					SEE VALVE SUBMITTAL

SEQUENCE OF OPERATION:

CV TERMINAL UNITS WITH REHEAT AND AUTOZERO MODULE (LAB FLOORS)

1. THE PRIMARY AIR DAMPER SHALL MODULATE TO MAINTAIN THE SPECIFIED AIRFLOW AT ALL TIMES TO MAINTAIN SPACE PRESSURIZATION FOR LAB AREAS. OCCUPIED AND UNOCCUPIED MODES MAY HAVE DIFFERENT SETPOINTS.
2. A WALL-MOUNTED TEMPERATURE SENSOR MOUNTED IN THE SERVED SPACE SHALL MONITOR SPACE TEMPERATURE AND CONTROL THE REHEAT VALVE. ON A DROP IN SPACE TEMPERATURE BELOW SET POINT, THE REHEAT COIL CONTROL VALVE SHALL MODULATE OPEN.
3. ON RISE IN SPACE TEMPERATURE ABOVE SET POINT, THE REVERSE SHALL OCCUR.

REVISION HISTORY

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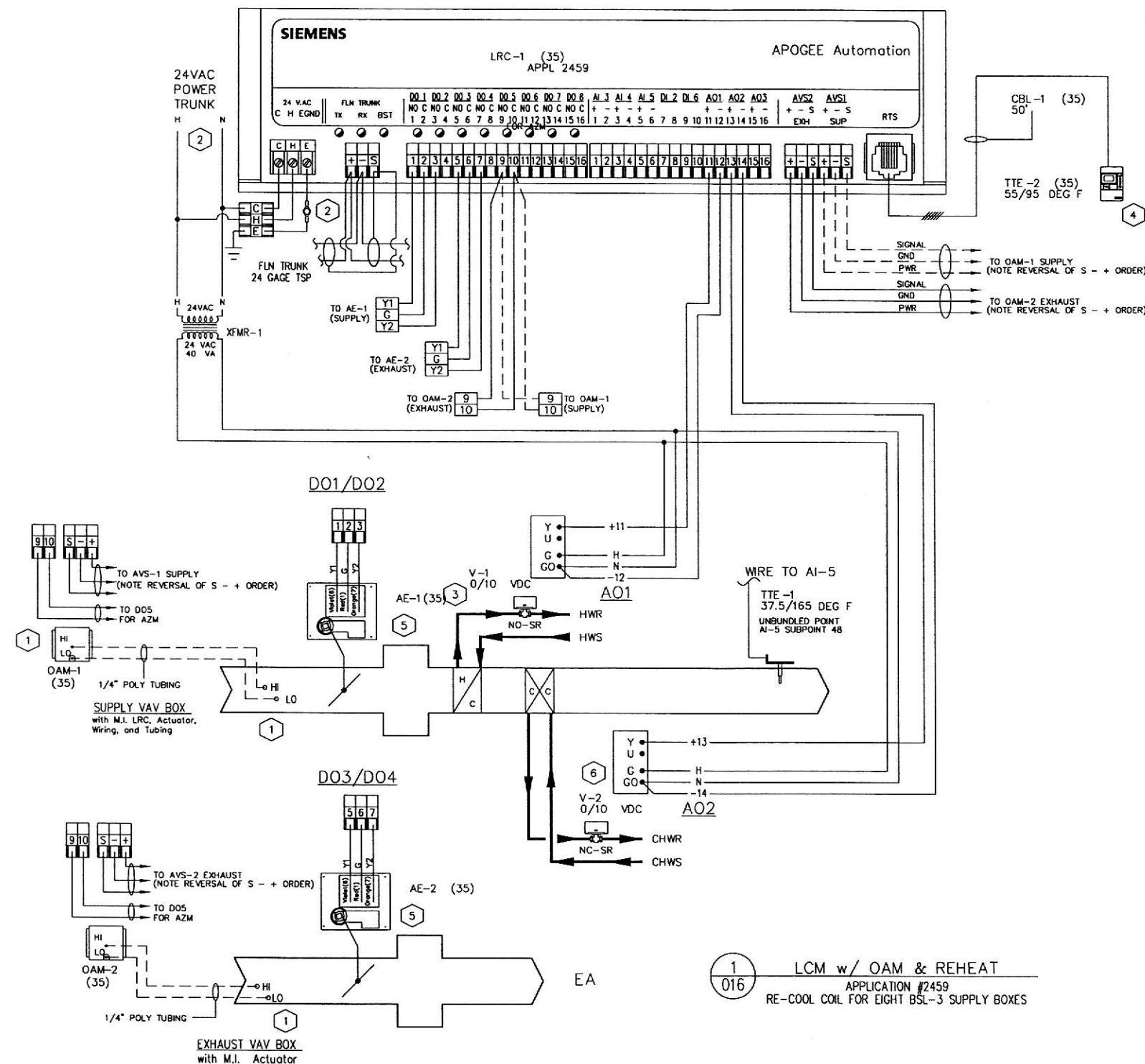
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CV SUPPLY BOX w/ REHEAT & AZM

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- INSTALLATION NOTES:**
- OAM-1 AND OAM-2 ARE MOUNTED AND PIPED AT THE FACTORY.
 - 24 VAC POWER TRUNK WIRING IS FIELD INSTALLED.
ONLY SIGNAL WIRING TO SUPPLY ACTUATOR & OAM IS INSTALLED BY THE FACTORY. REFER TO BUILDING POWER TRUNK DRAWING FOR 24 VAC POWER.
 - ALL AIR VALVES ARE SELECTED FOR HORIZONTAL INSTALLATION. THEY MAY NOT BE FIELD ALTERED FOR VERTICAL INSTALLATION.
 - LOCATE AS SHOWN ON FLOOR PLANS/CONTRACT DOCUMENTS.
 - MOUNT ACTUATOR WITH DAMPER IN FULL OPEN POSITION.
 - WIRE RE-COIL COIL VALVE TO AO2 IF PRESENT (TYP 8).

FIELD WIRING —————

FACTORY WIRING - - - - -

REVISION HISTORY

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LAB CONTROL - OAVS

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Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AE 1-2	70	GDE131.1U	SIEMENS	154 011	ACT NSR 24/108L 5Nm,NO PLENUM
CBL 1	35	588-100B	SIEMENS	N/A	6-WIRE 2-RJ11 RS CABLE 50'PLMN
LRC 1	35	550-767K	SIEMENS	N/A	LCM-OAVS DAMPER SLOW APPL #2459
OAM 1-2	70	550-818A	SIEMENS	N/A	OFF-BOARD AVS-AZM MODULE
TTE 1	35	536-811	SIEMENS	149 134	100K OHM DUCT TEMP SENSOR
TTE 2	35	540-660B	SIEMENS	149 312	TEC RM SNSR-WHITE
	35	544-782B	SIEMENS	N/A	SINGLE GOOF MOUNTING PLATE KIT
V					SEE VALVE SUBMITTAL
XFMR 1	35	024-024-040-TF	CORE	1202cut012	ISOLATION XFMR 24V 40VA 1HUB

LABORATORY SEQUENCE OF OPERATIONS

1. SBT. THE SIEMENS LABORATORY CONTROL SYSTEM CONSISTS OF:

A) ONE (1) SUPPLY 2 POSITION CV BOX WITH REHEAT (& RECOOL ON SELECT BOXES)??B) ONE (1) GENERAL EXHAUST 2 POSITION CV BOX

NOTE: A & B ABOVE ARE REFLECTED ON THIS SERIES OF DRAWINGS AND ARE CONTROLLED BY A COMMON LRC CONTROLLER, MOUNTED ON THE SUPPLY BOX.

C) ONE FUME HOOD MONITOR (FHM or ODP) MOUNTED ON EACH FUME HOOD. SEE DETAILS ON SEPARATE DRAWING.

NOTE: FUME HOODS DO NOT HAVE DEDICATED TERMINAL BOXES. SOME ARE COMMON WITH OTHER HOODS AND OTHERS ARE SHARED WITH ROOM GENERAL EXHAUST.

D) ROOM DIFFERENTIAL PRESSURE MONITORS (DPM) AS SHOWN ON THE CONTRACT DOCUMENTS TO MONITOR ROOM PRESSURE REFERENCED TO SURROUNDING SPACES. SEE DETAILS ON SEPARATE DRAWING.

2. THE (1) LAB ROOM CONTROLLER (LRC) WILL PROVIDE CONTROL FUNCTION FOR LABORATORY. SBT. OCCUPIED/UNOCCUPIED MASTER SCHEDULE IS SET FROM OPERATOR WORKSTATION. INDIVIDUAL ROOM THERMOSTATS HAVE OVERRIDE BUTTONS TO BRING ASSOCIATED SPACE INTO OCCUPIED MODE FOR A PREDETERMINED AMOUNT OF TIME (2 HOURS, ADJUSTABLE).

q. THE TOTAL EXHAUST AIR VOLUME AND THE TOTAL SUPPLY AIR VOLUME FOR THE LAB IS MONITORED AND CONTROLLED TO MAINTAIN A NEGATIVE AIRFLOW RELATIVE TO THE EXHAUST AIR FLOW. DURING BOTH OCCUPIED AND UNOCCUPIED TIME PERIOD, THE LAB SHALL NEVER GO TO POSITIVE PRESSURE. ?r. ALL SET POINTS AND SETTINGS ARE ADJUSTABLE. ?s. ROOM PRESSURIZATION CONTROL ??a) THE LRC USES AIRFLOW SENSORS IN THE AREA SUPPLY AIR TO CONTINUOUSLY MEASURE THE ACTUAL SUPPLY AIR CFM. ??b) THE LRC CALCULATES THE REQUIRED AREA SUPPLY AIR CFM NECESSARY TO MAINTAIN THE PREDETERMINED FLOW TRACKING DIFFERENTIAL BY SUBTRACTING THE FLOW TRACKING DIFFERENTIAL CFM

SETPOINT FROM THE TOTAL AREA EXHAUST CFM. ??c) THE LRC MODULATES THE AREA SUPPLY AIR CFM TO ENSURE THAT THE FLOW TRACKING DIFFERENTIAL CFM IS ALWAYS MAINTAINED BY A CLOSED LOOP CONTROL ALGORITHM. SBT. IN NEGATIVE PRESSURE SPACES, SUPPLY CFM TRACKS EXHAUST CFM. AS SUCH, IF EXHAUST CFM DECREASES FOR ANY REASON, SUPPLY CFM SHALL BE AUTOMATICALLY REDUCED ACCORDINGLY TO MAINTAIN NEGATIVE PRESSURE IN THE SPACE. ?t. ROOM TEMPERATURE CONTROL ??A) THE LRC MEASURES THE TEMPERATURE IN THE ROOM BY MEANS OF THE ROOM TEMPERATURE SENSOR AND MAINTAINS THE ROOM TEMPERATURE AT THE SET POINT BY MODULATING THE HEATING VALVE USING A (PID) CLOSED LOOP CONTROL ALGORITHM. ??B) SBT. SPACE TEMPERATURE IS CONTROLLED WITHIN THE ADJUSTABLE MAXIMUM AND MINIMUM LIMITS. SBT. THIS IS A CONSTANT VOLUME SYSTEM. AS ROOM TEMPERATURE FALLS, THE SUPPLY BOX WILL MODULATE THE REHEAT VALVE OPEN TO MAINTAIN SPACE TEMPERATURE SETPOINT. AS ROOM TEMPERATURE RISES, THE SUPPLY BOX WILL MODULATE THE REHEAT VLAVE CLOSED TO MAINTAIN SETPOINT. ON A CONTINUED RISE IN SPACE TEMPERATURE THE SUPPLY BOX WILL MODULATE THE RECOOL VALVE OPEN, IF EQUIPPED.

7. CONTROL PRIORITY ??A) THE FOLLOWING PRIORITY STRUCTURE APPLIES TO THE ABOVE CONTROL APPLICATIONS TO ENSURE THAT SAFETY IS MAINTAINED AS THE HIGHEST CONTROL PRIORITY WHEN THE HVAC SYSTEMS OR INDIVIDUAL COMPONENTS CANNOT MEET THE REQUIRED DEMANDS PLACED UPON THE SYSTEM. ??i. AREA PRESSURIZATION IS THE FIRST LEVEL OF PRIORITY ??ii. AREA VENTILATION IS THE SECOND LEVEL OF PRIORITY ??iii. AREA TEMPERATURE CONTROL IS THE THIRD HIGHEST PRIORITY ?v. UNOCCUPIED OPERATION - SBT. ON THE SCHEDULE DETERMINED BY THE OWNER, THE LAB/BSL3 CONTROL SYSTEM MAY ENTER UNOCCUPIED MODE. SUPPLY AND EXHAUST CFMS WILL BE SET TO THEIR RESPECTIVE LOWER CFM VALUES, WHILE MAINTAINING ROOM CFM OFFSETS. REHEAT AND RECOOL VALVES SHALL OPERATE AS ABOVE TO MAINTAIN UNOCCUPIED SPACE TEMPERATURE SETPOINTS. INDIVIDUAL ROOM THERMOSTATS HAVE OVERRIDE BUTTONS TO BRING ASSOCIATED SPACE INTO OCCUPIED MODE FOR A PREDETERMINED AMOUNT OF TIME (2 HOURS, ADJUSTABLE).

?OCCUPIED START TIME SET POINT IS 0500, UNOCCUPIED START TIME SET POINT IS 2000 HOURS (ADJUSTABLE).

REVISION HISTORY

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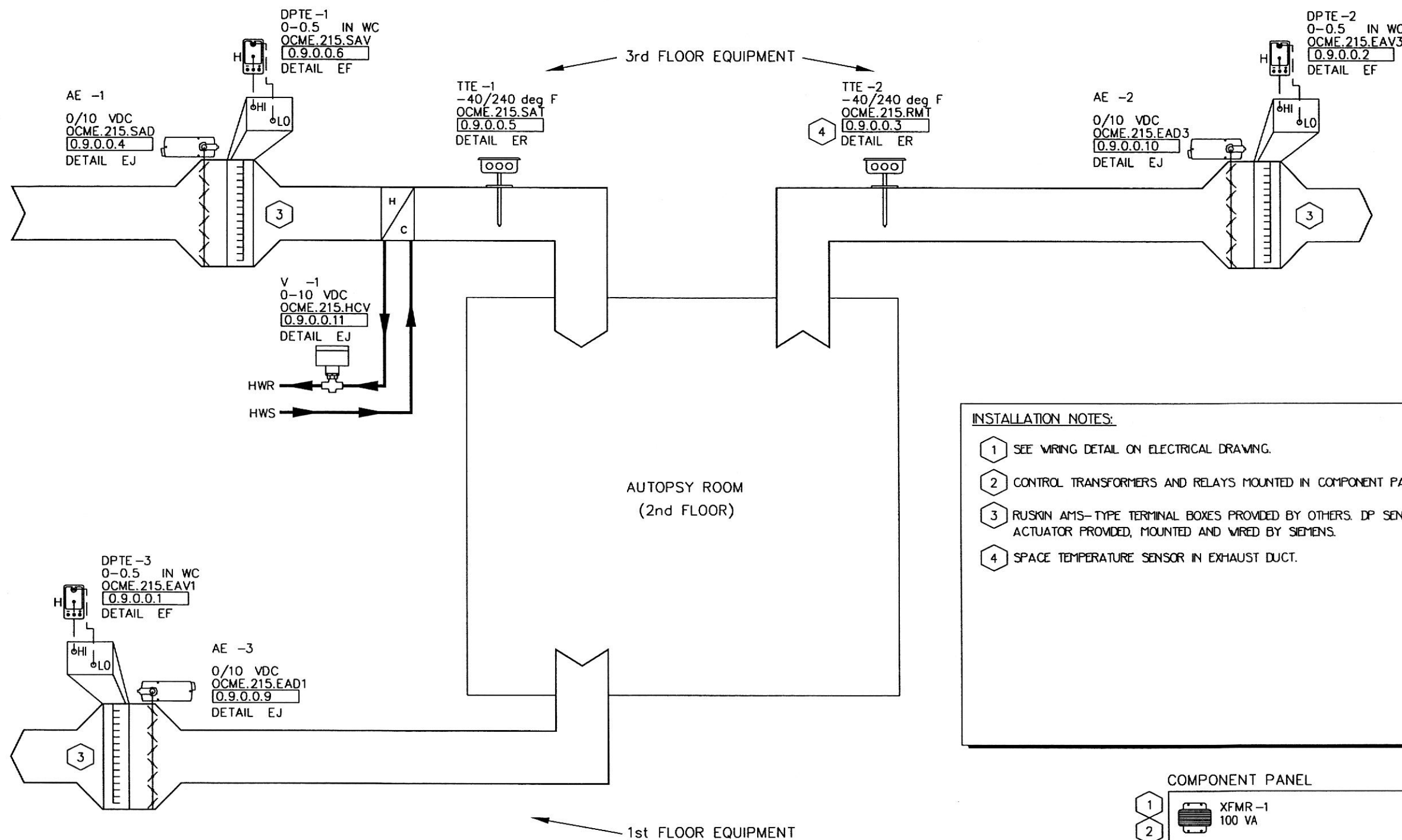
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LAB CONTROL - OAVS

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INSTALLATION NOTES:

- 1 SEE WIRING DETAIL ON ELECTRICAL DRAWING.
- 2 CONTROL TRANSFORMERS AND RELAYS MOUNTED IN COMPONENT PANEL.
- 3 RUSKIN AMS-TYPE TERMINAL BOXES PROVIDED BY OTHERS. DP SENSOR AND DAMPER ACTUATOR PROVIDED, MOUNTED AND WIRED BY SIEMENS.
- 4 SPACE TEMPERATURE SENSOR IN EXHAUST DUCT.

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017 CV AUTOPSY ROOM CONTROL
PXC CONTROL OF LARGE TERMINAL BOXES
SEE ELECTRICAL DRAWING AND SEQUENCE OF OPERATION
FIELD PANEL MOUNTED ABOVE CIELING IN OR NEAR SPACE

REVISION HISTORY

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CV AUTOPSY 'A' CONTROL

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Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AE 1-3	3	GCA163.1P	SIEMENS	154001	MOD(V) SR,24V, MED/ADJ PLNM
CP 1	1	567-351	SIEMENS	155 272	CP567 SMALL CABINET (GRAY)
DPTE 1-3	3	26410R5WD11A1C	SETRA	0608cut003	DP TRAN AIR,1%,0.5" ENC
TTE 1-2	2	544-339-18	SIEMENS	149261	DCT PT SNSR, PT 1K OHM, (375), 18" PROBE
V					SEE VALVE SUBMITTAL
XFMR 1	1	120-024-100-2TF	OBECTRO COM		TRANSFORMER 120/24 100VA 2 HUB

LABORATORY SEQUENCE OF OPERATIONS

1. THE AUTOPSY AREA CONTROL SYSTEM CONSISTS OF:

- A) ONE (1) SUPPLY 2 POSITION CV BOX WITH REHEAT
B) TWO (2) EXHAUST GENERAL 2 POSITION CV BOXES

NOTE: A & B ABOVE ARE REFLECTED ON THIS SERIES OF DRAWINGS AND ARE CONTROLLED BY A COMMON PXC CONTROLLER, MOUNTED IN THE CEILING, NEAR THE SPACE SERVED.

C) ROOM DIFFERENTIAL PRESSURE MONITORS (DPM) AS SHOWN ON THE CONTRACT DOCUMENTS TO MONITOR ROOM PRESSURE REFERENCED TO SURROUNDING SPACES. SEE DETAILS ON SEPARATE DRAWING.

2. OCCUPIED/UNOCCUPIED MASTER SCHEDULE IS SET FROM OPERATOR WORKSTATION. INDIVIDUAL SPACE TEMPERATURE SHALL BE SENSED FROM DUCT SENSOR, LOCATED IN THE GENERAL EXHAUST AS SHOWN. ROOM THERMOSTATS IN ADJOINING SPACES HAVE OVERRIDE BUTTONS TO BRING AN AUTOPSY SUITE INTO OCCUPIED MODE FOR A PREDETERMINED AMOUNT OF TIME (2 HOURS, ADJUSTABLE).

3. THE TOTAL EXHAUST AIR VOLUME AND THE TOTAL SUPPLY AIR VOLUME FOR THE AUTOPSY AREA IS MONITORED AND CONTROLLED TO MAINTAIN A NEGATIVE AIRFLOW RELATIVE TO THE EXHAUST AIR FLOW. DURING BOTH OCCUPIED AND UNOCCUPIED TIME PERIOD, THE LAB SHALL NEVER GO TO POSITIVE PRESSURE.

4. ALL SET POINTS AND SETTINGS ARE ADJUSTABLE.

5. ROOM PRESSURIZATION CONTROL

- a) THE PXC USES AIRFLOW SENSORS IN THE AREA SUPPLY AIR TO CONTINUOUSLY MEASURE THE ACTUAL SUPPLY AIR CFM.
b) THE PXC CALCULATES THE REQUIRED AREA SUPPLY AIR CFM NECESSARY TO MAINTAIN THE PREDETERMINED FLOW TRACKING DIFFERENTIAL BY SUBTRACTING THE FLOW TRACKING DIFFERENTIAL CFM SETPOINT FROM THE TOTAL AREA EXHAUST CFM.
c) THE PXC MODULATES THE AREA SUPPLY AIR CFM TO ENSURE THAT THE FLOW TRACKING DIFFERENTIAL CFM IS ALWAYS

MAINTAINED BY A CLOSED LOOP CONTROL ALGORITHM. IN NEGATIVE PRESSURE SPACES, SUPPLY CFM TRACKS EXHAUST CFM. AS SUCH, IF EXHAUST CFM DECREASES FOR ANY REASON, SUPPLY CFM SHALL BE AUTOMATICALLY REDUCED ACCORDINGLY TO MAINTAIN NEGATIVE PRESSURE IN THE SPACE.

6. ROOM TEMPERATURE CONTROL

A) THE PXC MEASURES THE TEMPERATURE IN THE ROOM BY MEANS OF THE ROOM TEMPERATURE SENSOR AND MAINTAINS THE ROOM TEMPERATURE AT THE SET POINT BY MODULATING THE HEATING VALVE USING A (PID) CLOSED LOOP CONTROL ALGORITHM.

B) SPACE TEMPERATURE IS CONTROLLED WITHIN THE ADJUSTABLE MAXIMUM AND MINIMUM LIMITS. THIS IS A CONSTANT VOLUME SYSTEM. AS ROOM TEMPERATURE FALLS, THE SUPPLY BOX WILL MODULATE THE REHEAT VALVE OPEN TO MAINTAIN SPACE TEMPERATURE SETPOINT. AS ROOM TEMPERATURE RISES, THE SUPPLY BOX WILL MODULATE THE REHEAT VLAVE CLOSED TO MAINTAIN SETPOINT. ON A CONTINUED RISE IN SPACE TEMPERATURE THE SUPPLY BOX WILL MODULATE THE RECOOL VALVE OPEN, IF EQUIPPED.

7. CONTROL PRIORITY

A) THE FOLLOWING PRIORITY STRUCTURE APPLIES TO THE ABOVE CONTROL APPLICATIONS TO ENSURE THAT SAFETY IS MAINTAINED AS THE HIGHEST CONTROL PRIORITY WHEN THE HVAC SYSTEMS OR INDIVIDUAL COMPONENTS CANNOT MEET THE REQUIRED DEMANDS PLACED UPON THE SYSTEM.

i. AREA PRESSURIZATION IS THE FIRST LEVEL OF PRIORITY

ii. AREA VENTILATION IS THE SECOND LEVEL OF PRIORITY

iii. AREA TEMPERATURE CONTROL IS THE THIRD HIGHEST PRIORITY

8. UNOCCUPIED OPERATION - ON THE SCHEDULE DETERMINED BY THE OWNER, THE LAB/BSL3 CONTROL SYSTEM MAY ENTER UNOCCUPIED MODE. SUPPLY AND EXHAUST CFMS WILL BE SET TO THEIR RESPECTIVE LOWER CFM VALUES, WHILE MAINTAINING ROOM CFM OFFSETS. REHEAT AND RECOOL VALVES SHALL OPERATE AS ABOVE TO MAINTAIN UNOCCUPIED SPACE TEMPERATURE SETPOINTS. ROOM THERMOSTATS IN ADJOINING SPACES HAVE OVERRIDE BUTTONS TO BRING AN AUTOPSY SUITE INTO OCCUPIED MODE FOR A PREDETERMINED AMOUNT OF TIME (2 HOURS, ADJUSTABLE).

OCCUPIED START TIME SET POINT IS 0500, UNOCCUPIED START TIME SET POINT IS 2000 HOURS (ADJUSTABLE).

REVISION HISTORY

SIEMENS

SIEMENS BUILDING TECHNOLOGIES, INC
BALTIMORE

2520 LORD BALTIMORE DRIVE
BALTIMORE MD 21244
USA
PHONE: 410-645-1800
FAX: 410-645-1818

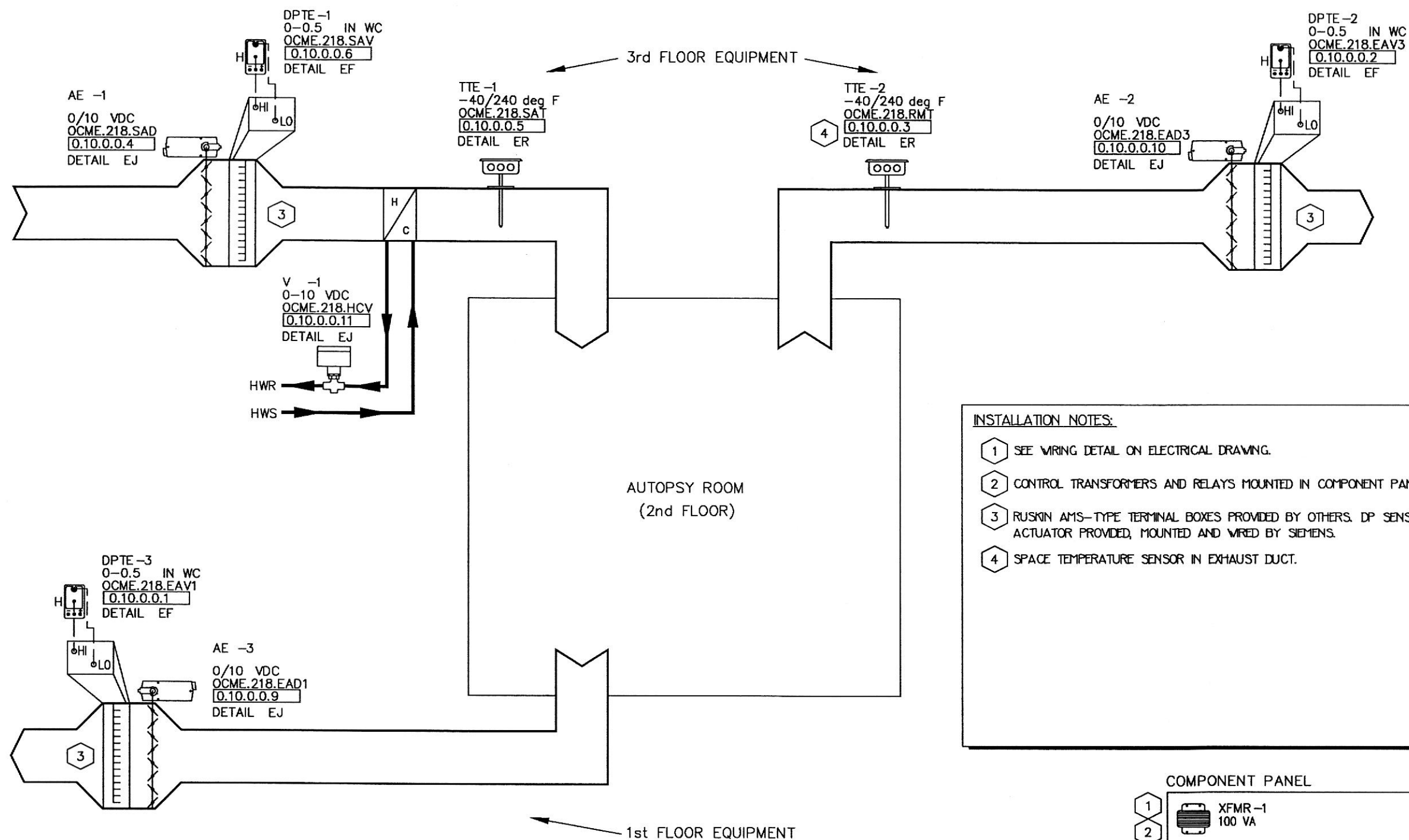
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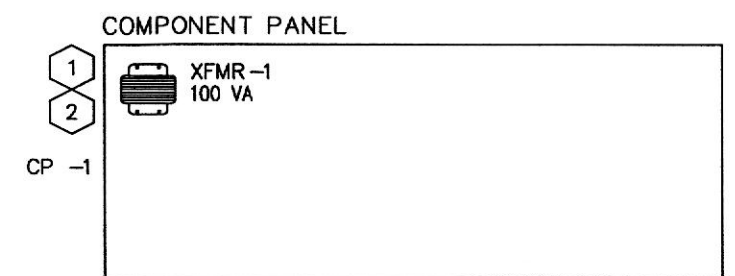
CV AUTOPSY 'A' CONTROL

440P043820

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- INSTALLATION NOTES:**
- 1 SEE WIRING DETAIL ON ELECTRICAL DRAWING.
 - 2 CONTROL TRANSFORMERS AND RELAYS MOUNTED IN COMPONENT PANEL.
 - 3 RUSKIN AMS-TYPE TERMINAL BOXES PROVIDED BY OTHERS. DP SENSOR AND DAMPER ACTUATOR PROVIDED, MOUNTED AND WIRED BY SIEMENS.
 - 4 SPACE TEMPERATURE SENSOR IN EXHAUST DUCT.



1 CV AUTOPSY ROOM CONTROL
018 PXC CONTROL OF LARGE TERMINAL BOXES
SEE ELECTRICAL DRAWING AND SEQUENCE OF OPERATION
FIELD PANEL MOUNTED ABOVE CIELING IN OR NEAR SPACE

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CV AUTOPSY 'B' CONTROL

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Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AE 1-3	3	GCA163.1P	SIEMENS	154001	MOD(V) SR,24V, MED/ADJ PLNM
CP 1	1	567-351	SIEMENS	155 272	CP567 SMALL CABINET (GRAY)
DPTE 1-3	3	26410R5WD11A1C	SETRA	0608cut003	DP TRAN AIR,1%,0.5" ENC
TTE 1-2	2	544-339-18	SIEMENS	149261	DCT PT SNSR, PT 1K OHM, (375), 18" PROBE
V					SEE VALVE SUBMITTAL
XFMR 1	1	120-024-100-2TF-CB	ELECTRO COM		TRANSFORMER 120/24 100VA 2 HUB

LABORATORY SEQUENCE OF OPERATIONS

1. THE AUTOPSY AREA CONTROL SYSTEM CONSISTS OF:

A) ONE (1) SUPPLY 2 POSITION CV BOX WITH REHEAT

B) TWO (2) EXHAUST GENERAL 2 POSITION CV BOXES

NOTE: A & B ABOVE ARE REFLECTED ON THIS SERIES OF DRAWINGS AND ARE CONTROLLED BY A COMMON PXC CONTROLLER, MOUNTED IN THE CEILING, NEAR THE SPACE SERVED.

C) ROOM DIFFERENTIAL PRESSURE MONITORS (DPM) AS SHOWN ON THE CONTRACT DOCUMENTS TO MONITOR ROOM PRESSURE REFERENCED TO SURROUNDING SPACES. SEE DETAILS ON SEPARATE DRAWING.

2. OCCUPIED/UNOCCUPIED MASTER SCHEDULE IS SET FROM OPERATOR WORKSTATION. INDIVIDUAL SPACE TEMPERATURE SHALL BE SENSED FROM DUCT SENSOR, LOCATED IN THE GENERAL EXHAUST AS SHOWN. ROOM THERMOSTATS IN ADJOINING SPACES HAVE OVERRIDE BUTTONS TO BRING AN AUTOPSY SUITE INTO OCCUPIED MODE FOR A PREDETERMINED AMOUNT OF TIME (2 HOURS, ADJUSTABLE).

3. THE TOTAL EXHAUST AIR VOLUME AND THE TOTAL SUPPLY AIR VOLUME FOR THE AUTOPSY AREA IS MONITORED AND CONTROLLED TO MAINTAIN A NEGATIVE AIRFLOW RELATIVE TO THE EXHAUST AIR FLOW. DURING BOTH OCCUPIED AND UNOCCUPIED TIME PERIOD, THE LAB SHALL NEVER GO TO POSITIVE PRESSURE.

4. ALL SET POINTS AND SETTINGS ARE ADJUSTABLE.

5. ROOM PRESSURIZATION CONTROL

a) THE PXC USES AIRFLOW SENSORS IN THE AREA SUPPLY AIR TO CONTINUOUSLY MEASURE THE ACTUAL SUPPLY AIR CFM.

b) THE PXC CALCULATES THE REQUIRED AREA SUPPLY AIR CFM NECESSARY TO MAINTAIN THE PREDETERMINED FLOW TRACKING DIFFERENTIAL BY SUBTRACTING THE FLOW TRACKING DIFF POINT FROM THE TOTAL AREA EXHAUST CFM.

c) THE PXC MODULATES THE AREA SUPPLY AIR CFM TO ENSURE THAT THE FLOW TRACKING DIFFERENTIAL CFM IS ALWAYS

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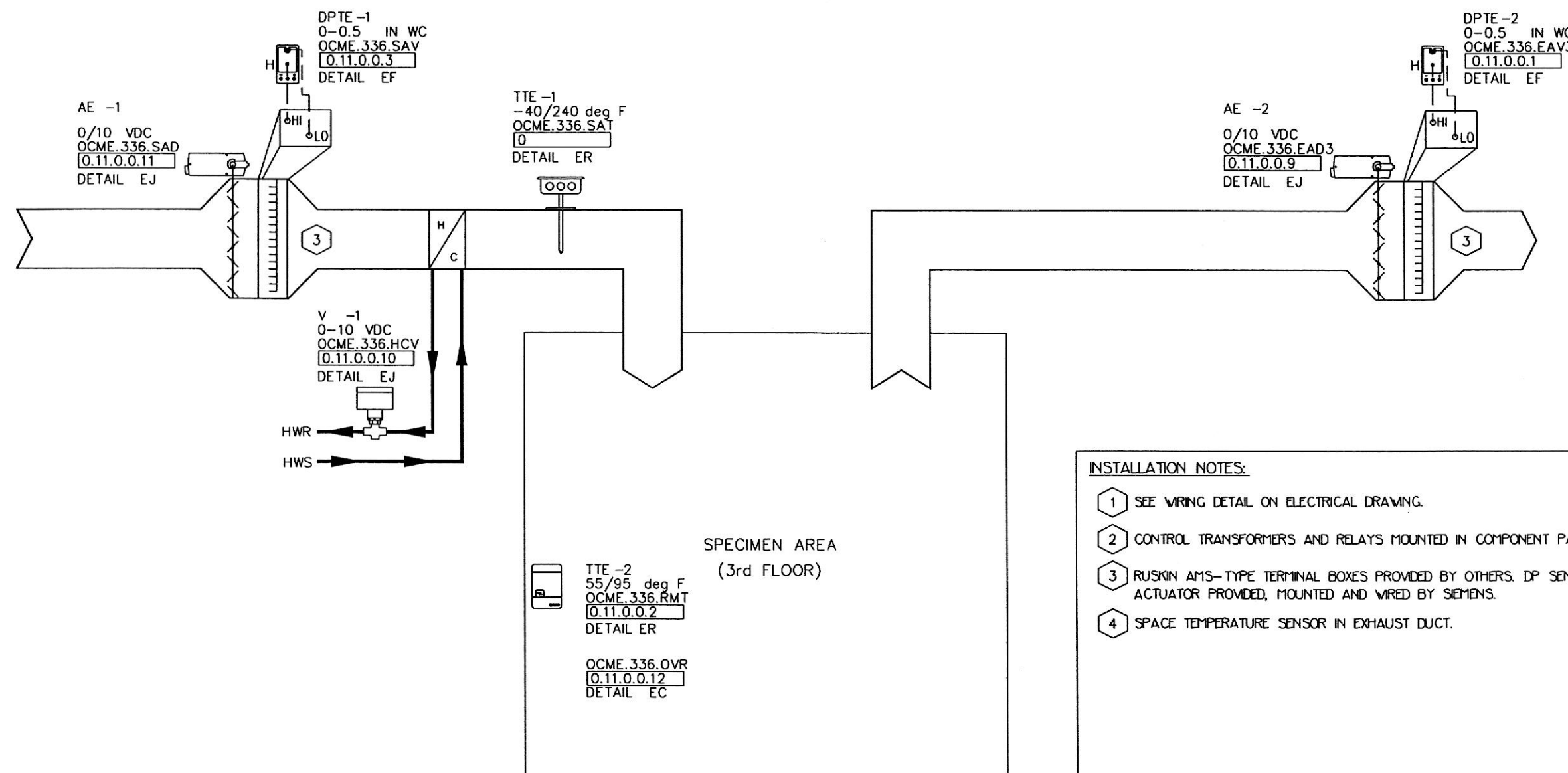
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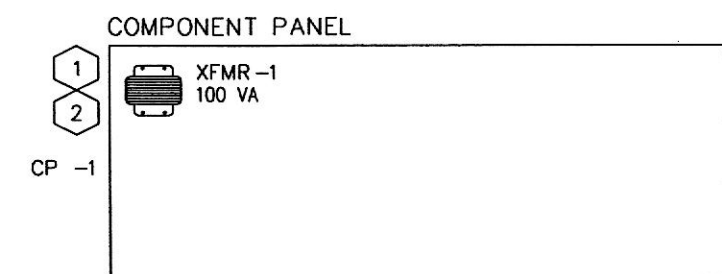
CV AUTOPSY 'B' CONTROL

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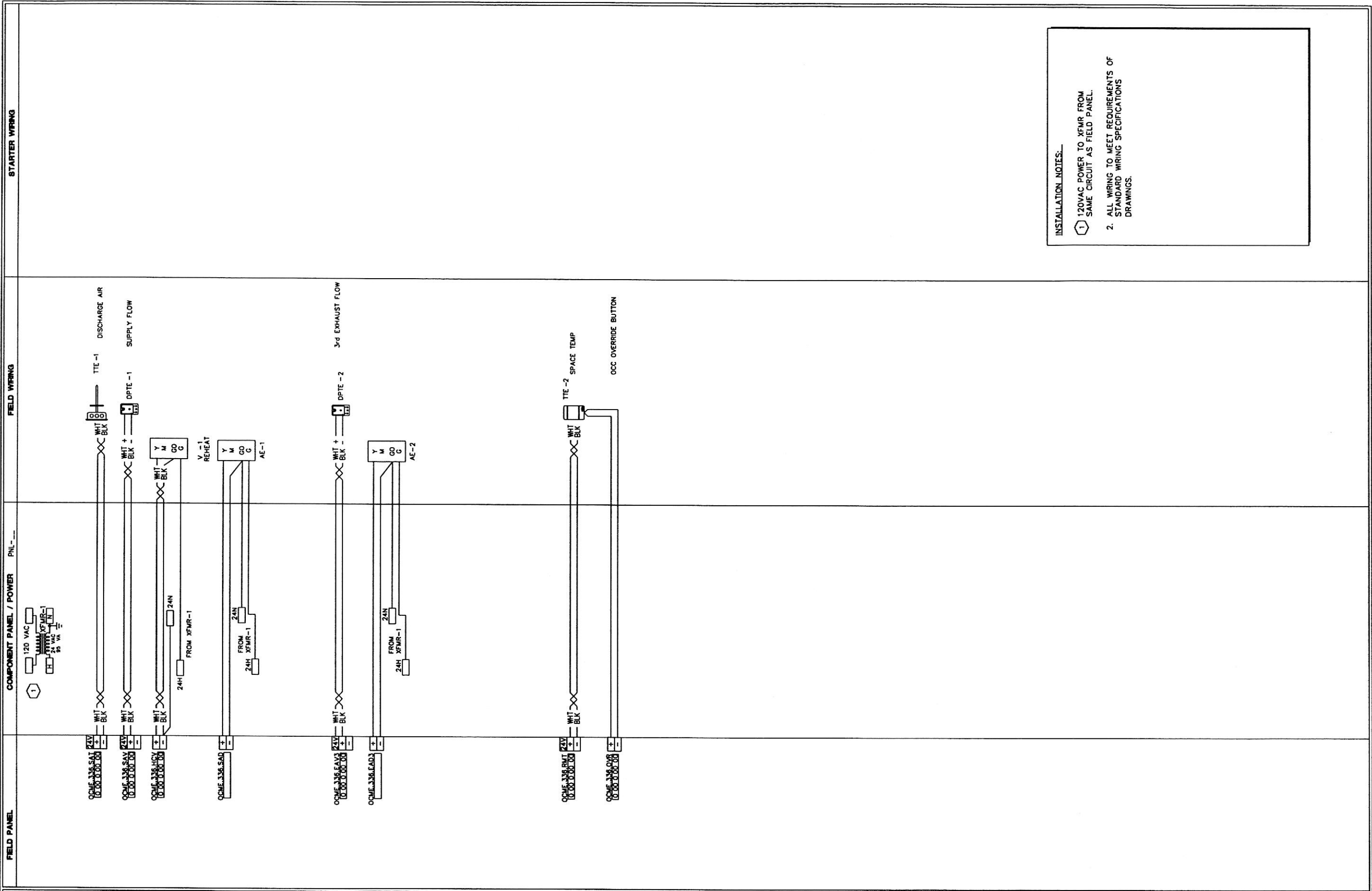


- INSTALLATION NOTES:**
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1 CV SPECIMEN ROOM CONTROL
019 PXC CONTROL OF LARGE TERMINAL BOXES
SEE ELECTRICAL DRAWING AND SEQUENCE OF OPERATION
FIELD PANEL MOUNTED ABOVE CEILING IN OR NEAR SPACE

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		CHECKED BY JES	
		INITIAL RELEASE 01/15/09	
		LAST EDIT DATE 03/30/09	
		CV SPECIMEN AREA CONTROL	



INSTALLATION NOTES:

- 120VAC POWER TO XFMR FROM SAME CIRCUIT AS FIELD PANEL.
- ALL WIRING TO MEET REQUIREMENTS OF STANDARD WIRING SPECIFICATIONS.

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CV AUTOPSY 'A' CONTROL														

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C) ONE FUME HOOD MONITOR (FHM or ODP) MOUNTED ON EACH FUME HOOD. SEE DETAILS ON SEPARATE DRAWING.

NOTE: FUME HOODS DO NOT HAVE DEDICATED TERMINAL BOXES. SOME ARE COMMON WITH OTHER HOODS AND OTHERS ARE SHARED WITH ROOM GENERAL EXHAUST.

2. OCCUPIED/UNOCCUPIED MASTER SCHEDULE IS SET FROM OPERATOR WORKSTATION. INDIVIDUAL ROOM THERMOSTATS HAVE OVERRIDE BUTTONS TO BRING ASSOCIATED SPACE INTO OCCUPIED MODE FOR A PREDETERMINED AMOUNT OF TIME (2 HOURS, ADJUSTABLE).

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REVISION HISTORY

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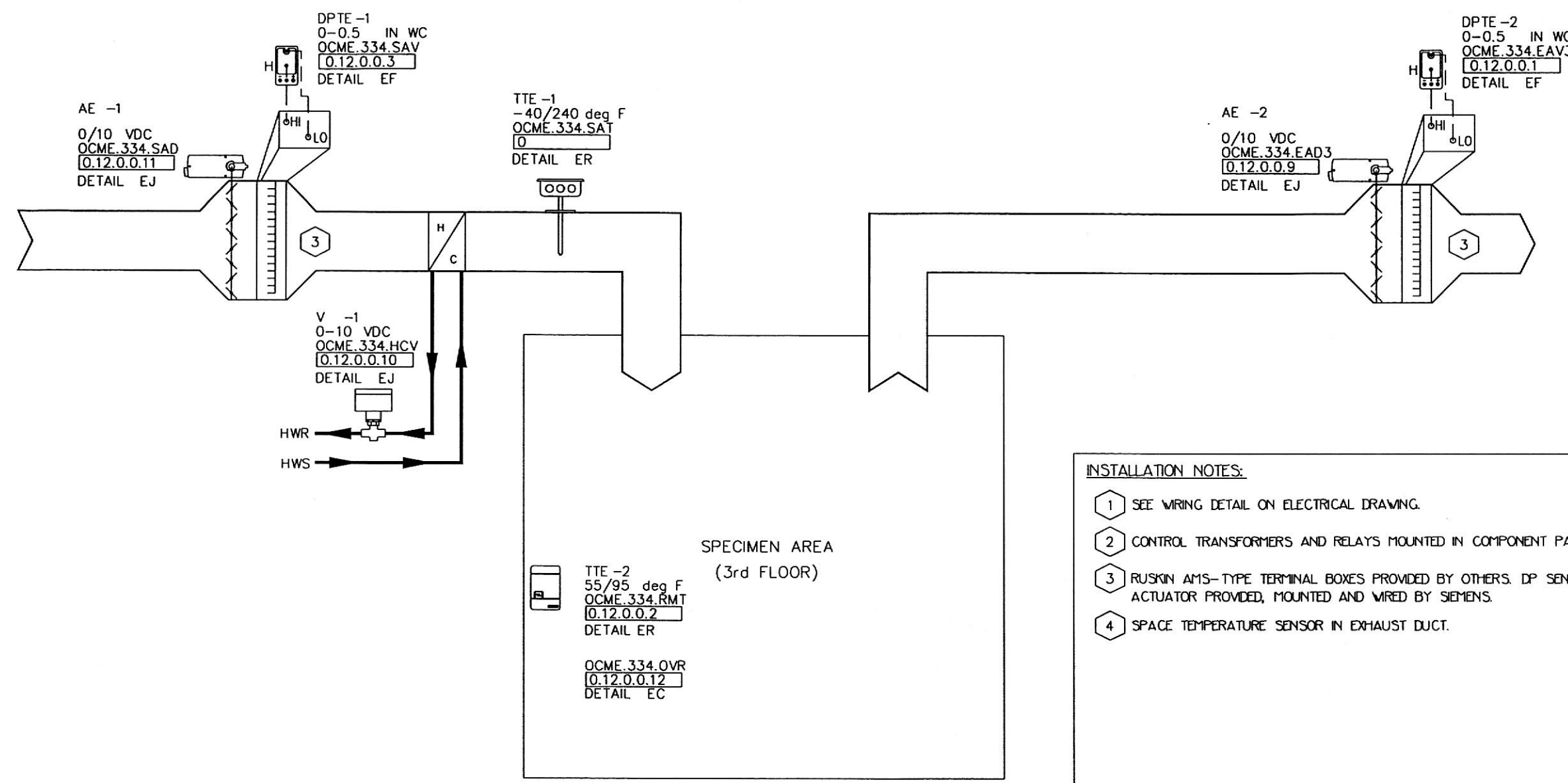
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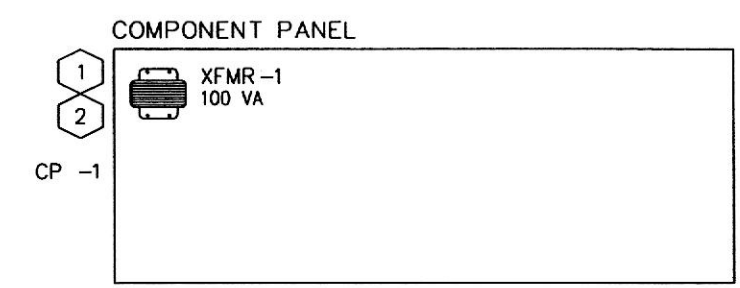
CV SPECIMEN AREA CONTROL

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020 CV SPECIMEN ROOM CONTROL
PXC CONTROL OF LARGE TERMINAL BOXES
SEE ELECTRICAL DRAWING AND SEQUENCE OF OPERATION
FIELD PANEL MOUNTED ABOVE CEILING IN OR NEAR SPACE

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		CV SPECIMEN AREA CONTROL					

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
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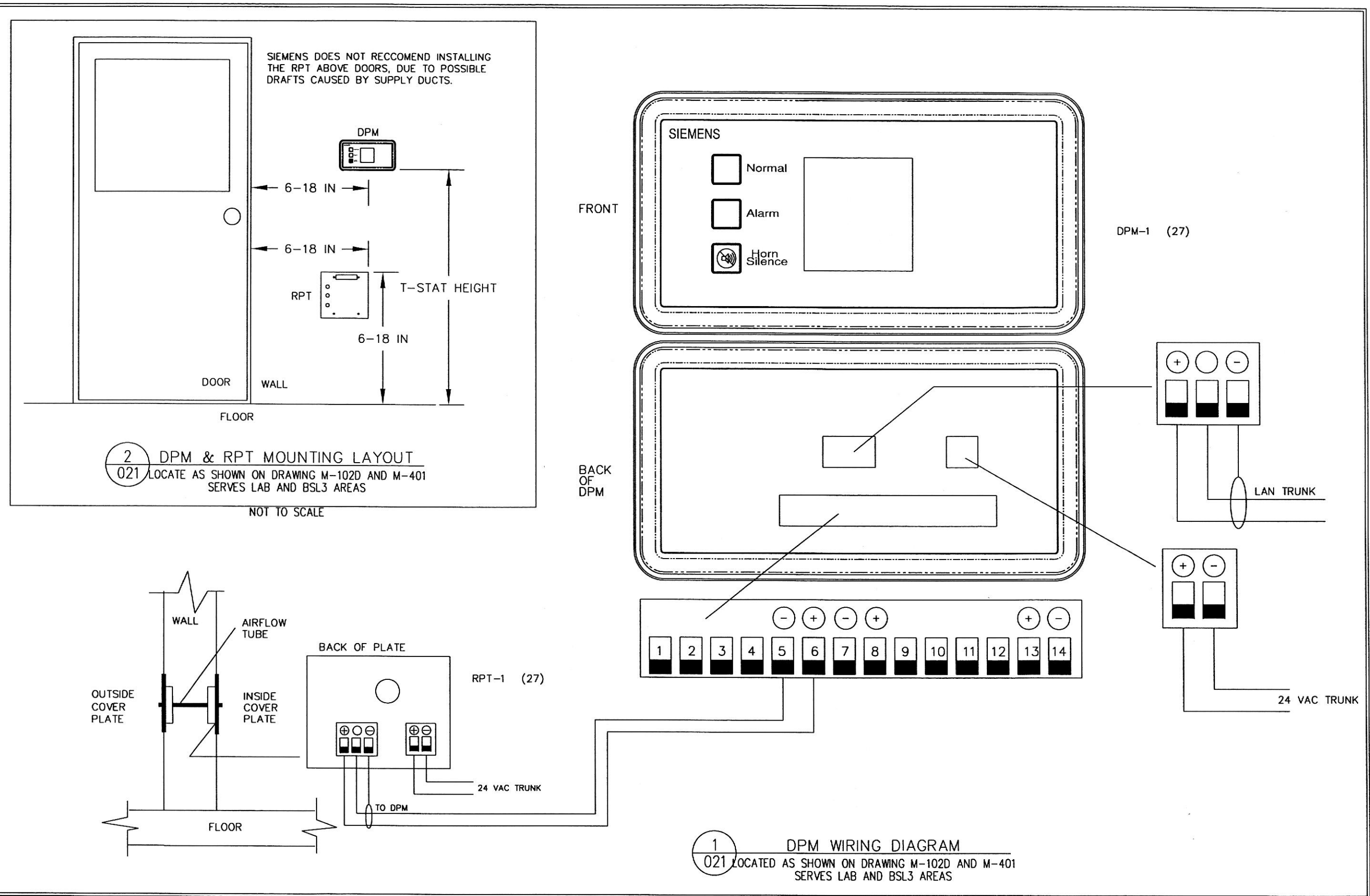
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CV SPECIMEN AREA CONTROL

440P043820

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REVISION HISTORY	SIEMENS 2520 LORD BALTIMORE DRIVE BALTIMORE MD 21244 USA SIEMENS BUILDING TECHNOLOGIES, INC BALTIMORE Phone: 410-845-1600 Fax: 410-845-1616	MD FORENSIC MEDICAL CENTER BALTIMORE, MD					440P043820 0							
		<table><tr><td>ENGINEER</td><td>DRAFTER</td><td>CHECKED BY</td><td>INITIAL RELEASE</td><td>LAST EDIT DATE</td></tr><tr><td>JES</td><td>JES</td><td>JES</td><td>01/15/09</td><td>03/26/09</td></tr></table>	ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE	JES	JES	JES	01/15/09	03/26/09	LAB/BSL PRESSURE MONITORS	
ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE										
JES	JES	JES	01/15/09	03/26/09										

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
DPM 1	27	547-002	SIEMENS	149 311	DIFF PRESS MONITOR W/O SWITCH
RPT 1	27	547-003	SIEMENS	149 311	REMOTE PRESSURE TRANSMITTER

SEQUENCE OF OPERATION

The Differential Pressure Monitor (DPM) monitors the differential pressure in a critical environment relative to an adjacent space and compares it to the pressure set point.

A Remote Pressure Transmitter (RPT) measures the pressure differential between the room and its adjacent space and transmits that value to the DPM. The DPM displays the critical environment space pressurization mode (Neutral, Positive or Negative), measured differential pressure and all alarms. Remote monitoring of the differential pressure is available through a Siemens network connection.

Each alarm (pressure too low or high) is annunciated by a horn. A built in alarm delay (adjustable) protects from nuisance alarms (i.e. doors opening, air flow changes, movement near sensor, etc.) Remote monitoring of alarms is available through a Siemens network connection.

REVISION HISTORY

SIEMENS

SIEMENS BUILDING TECHNOLOGIES, INC
BALTIMORE

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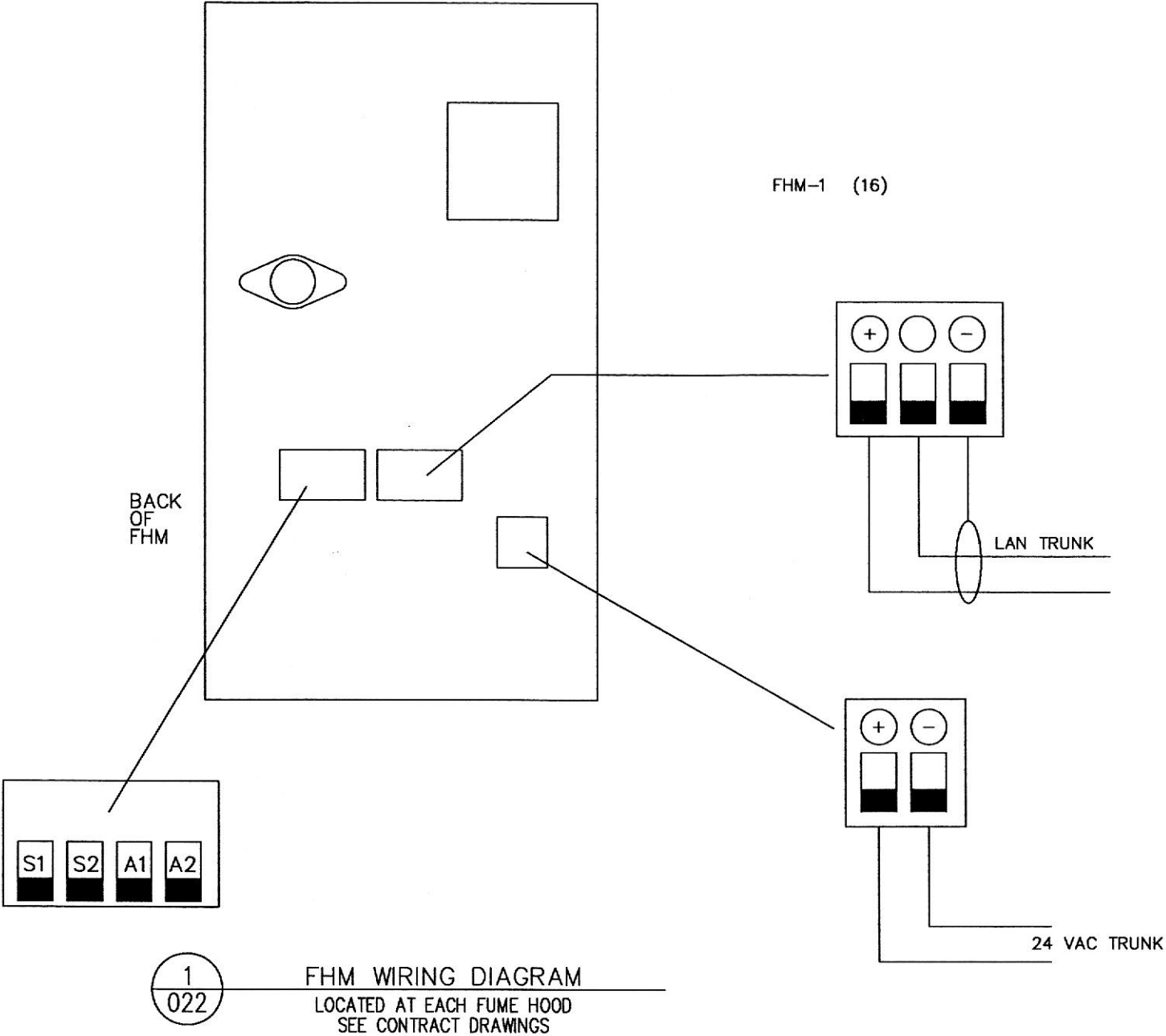
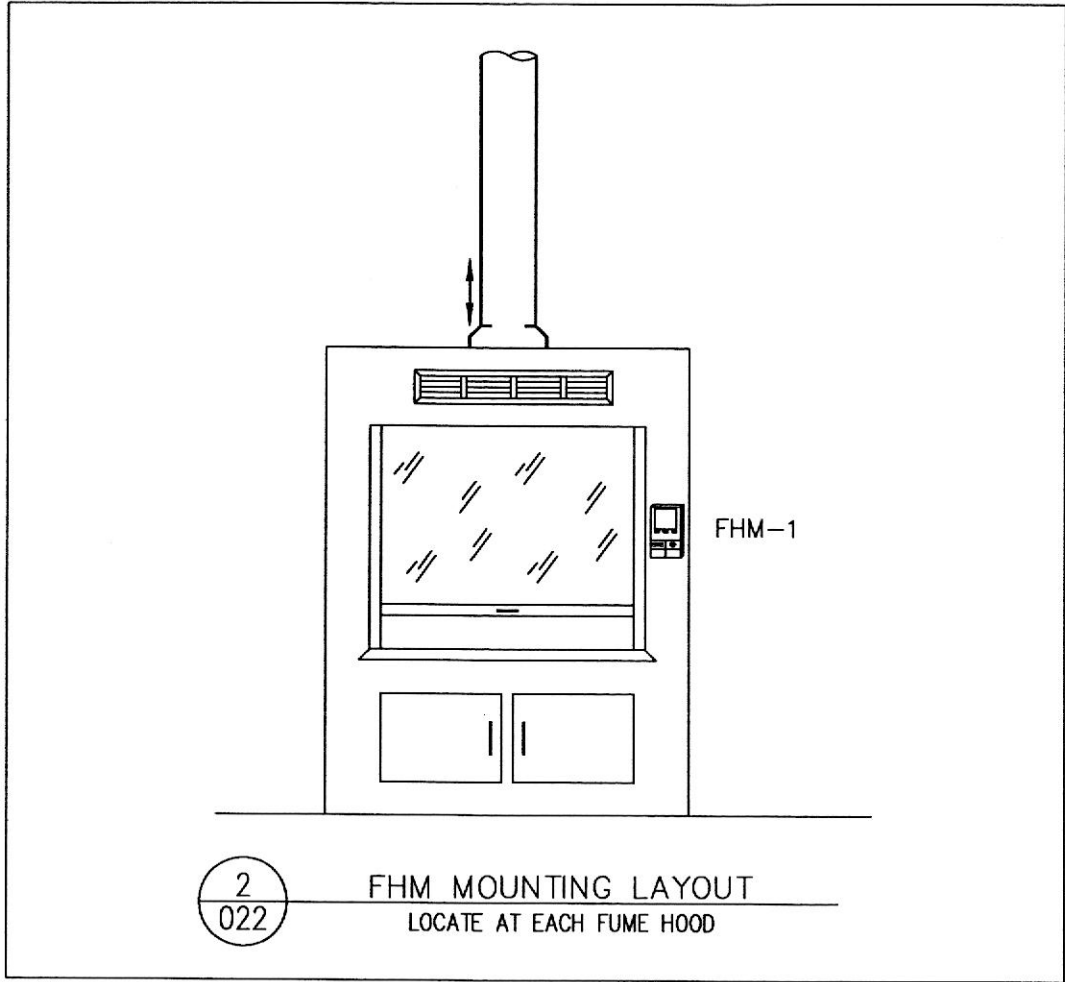
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LAB/BSL PRESSURE MONITORS

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	SIEMENS BUILDING TECHNOLOGIES, INC BALTIMORE	2520 LORD BALTIMORE DRIVE BALTIMORE MD 21244 USA Phone: 410-645-1600 Fax: 410-645-1616	022

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
FHM 1	16	546-00303A	HART & COOLEY	149293	FUME HOOD MONITOR DISPLAY PENL
	16	546-00303B	HART & COOLEY	149293	FUME HOOD MONITOR MOUNTING KIT

SEQUENCE OF OPERATION

The Differential Pressure Monitor (DPM) monitors the differential pressure in a critical environment relative to an adjacent space and compares it to the pressure set point.

A Remote Pressure Transmitter (RPT) measures the pressure differential between the room and its adjacent space and transmits that value to the DPM. The DPM displays the critical environment space pressurization mode (Neutral, Positive or Negative), measured differential pressure and all alarms. Remote monitoring of the differential pressure is available through a Siemens network connection.

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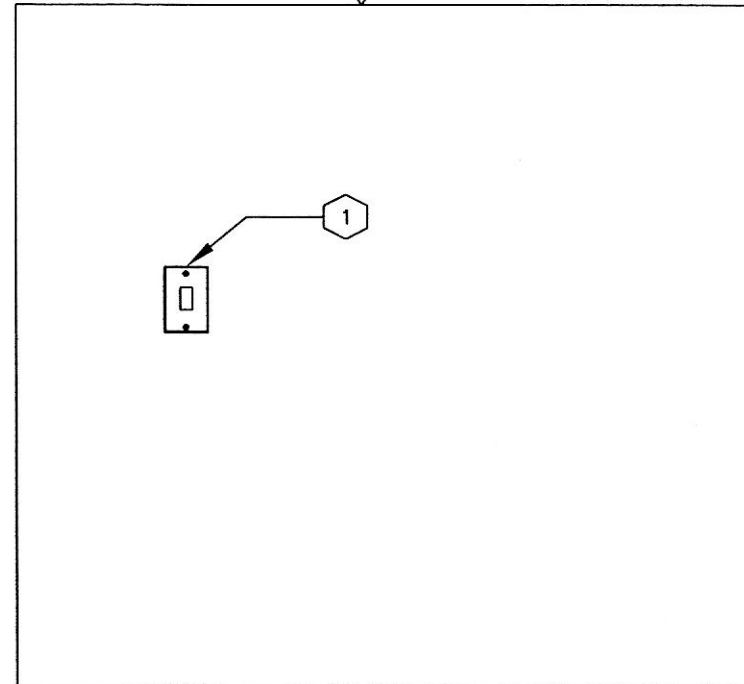
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FUME HOOD MONITORS

440P043820
0

022A



1
023 — CRAC UNIT
TYPICAL OF 9

INSTALLATION NOTES:

- 1 CRAC UNIT CONTROLS PROVIDED & FACTORY MOUNTED BY OTHERS.
- 2 MFGR TO PROVIDE RS-485 MODBUS COMPATIBILITY W/SIEMENS.

THE FOLLOWING ALARM POINTS WILL BE MONITORED VIA RS-485 MODBUS INTERFACE:

1. HIGH RETURN AIR TEMPERATURE.
2. LOW RETURN AIR TEMPERATURE.
3. HIGH RETURN AIR HUMIDITY.
4. LOW RETURN AIR HUMIDITY.
5. HIGH WATER LEVELS IN THE HUMIDIFIER PAN.
6. FILTER CHANGE.
7. LOSS OF AIR FLOW.
8. SHORT CYCLE ALARM.
9. LOSS OF POWER.

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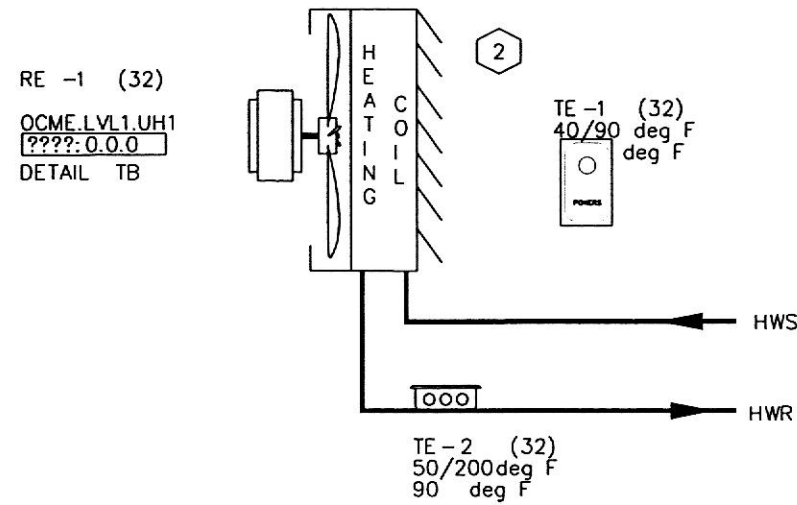
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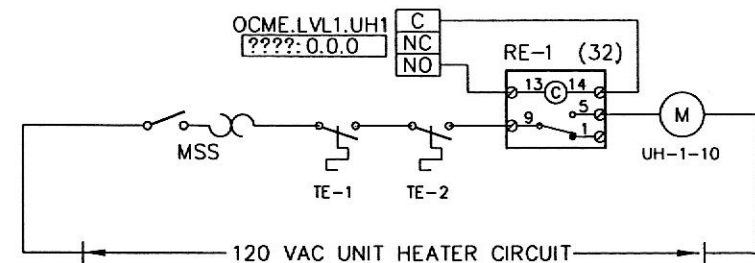
CRAC UNITS

440P043820
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023



1
024 UNIT HEATERS
TYPICAL OF 32



2
024 UNIT HEATERS (WIRING)
TYPICAL OF 32

INSTALLATION NOTES:

- 1 UNIT HEATERS 1-5, 1-6, 1-8, & 1-9 ARE INTERLOCKED WITH EXHAUST FANS EF 1-2, 1-3, 1-4 & 1-7 RESPECTIVELY. SEE DRW 007A.
- 2 SEE ON DRW 009B FOR GARAGE UNIT HEATERS UH-1-10 THRU UH-1-23.
- 3 UNIT HEATER NOT SHOWN ON FLOOR PLANS. SEE RFI # ???.

LEVEL 1 ROOM UNIT HEATERS: 1 2

OCME.LVL1.UH1
[0.0.0.0]
DETAIL TB

OCME.LVL1.UH2
[0.0.0.0]
DETAIL TB

OCME.LVL1.UH3
[0.0.0.0]
DETAIL TB

OCME.LVL1.UH4
[0.0.0.0]
DETAIL TB

OCME.LVL1.UH7
[0.8.0.3.1]
DETAIL TB

LEVEL 2 UNIT HEATERS:

OCME.LVL2.UH1
[0.0.0.0]
DETAIL TB

OCME.LVL2.UH2
[0.0.0.0]
DETAIL TB

LEVEL 4 UNIT HEATERS:

OCME.LVL4.UH1
[0.0.0.0]
DETAIL TB

OCME.LVL4.UH2
[0.0.0.0]
DETAIL TB

OCME.LVL4.UH3
[0.0.0.0]
DETAIL TB

OCME.LVL4.UH4
[0.0.0.0]
DETAIL TB

OCME.LVL4.UH5
[0.0.0.0]
DETAIL TB

OCME.LVL4.UH6
[0.0.0.0]
DETAIL TB

OCME.LVL4.UH7
[0.0.0.0]
DETAIL TB

OCME.LVL4.UH8
[0.0.0.0]
DETAIL TB

OCME.LVL4.UH9
[0.0.0.0]
DETAIL TB

OCME.LVL4.UH10
[0.0.0.0]
DETAIL TB

OCME.LVL4.UH11
[0.0.0.0]
DETAIL TB

OCME.LVL4.UH12
[0.0.0.0]
DETAIL TB

OCME.LVL4.UH13
[0.0.0.0]
DETAIL TB

OCME.LVL4.UH14
[0.0.0.0]
DETAIL TB

OCME.LVL4.UH15
[0.0.0.0]
DETAIL TB

LEVEL 5 UNIT HEATERS:

OCME.LVL5.UH1
[0.0.0.0]
DETAIL TB

OCME.LVL5.UH2
[0.0.0.0]
DETAIL TB

OCME.LVL5.UH3
[0.0.0.0]
DETAIL TB

OCME.LVL5.UH4
[0.0.0.0]
DETAIL TB

OCME.LVL5.UH5
[0.0.0.0]
DETAIL TB

PENTHOUSE UNIT HEATERS:

OCME.PENT.UH1
[0.7.0.4.4]
DETAIL TB

OCME.PENT.UH2
[0.5.0.5.4]
DETAIL TB

OCME.PENT.UH3
[0.1.0.1.3]
DETAIL TB

OCME.PENT.UH4
[0.3.0.1.3]
DETAIL TB

OCME.PENT.UH5
[0.4.0.5.5]
DETAIL TB

UNIT HEATER TAG	DIGITAL OUTPUT POINT FROM:
UH-1-1	SPARE D.O. ON FCU-1-3 TEC
UH-1-2	SPARE D.O. ON FCU-1-4 TEC
UH-1-3	SPARE D.O. ON FCU-1-1 TEC
UH-1-4	SPARE D.O. ON FCU-1-5 TEC
UH-1-5	PXCM-08 1
UH-1-6	PXCM-08 1
UH-1-7	PXCM-08 1
UH-1-8	PXCM-08 1
UH-1-9	PXCM-08 1
UH-2-1	SPARE D.O. ON STU-2-2 TEC
UH-2-2	SPARE D.O. ON STU-2-3 TEC
UH-4-1	SPARE D.O. ON TU-4-15 TEC
UH-4-2	SPARE D.O. ON TU-4-14 TEC
UH-4-3	SPARE D.O. ON TU-4-14 TEC
UH-4-4	SPARE D.O. ON TU-4-1 TEC
UH-4-5	SPARE D.O. ON TU-4-2 TEC
UH-4-6	SPARE D.O. ON TU-4-2 TEC
UH-4-7	SPARE D.O. ON TU-4-3 TEC
UH-4-8	3
UH-4-9	3
UH-4-10	3

UNIT HEATER TAG	DIGITAL OUTPUT POINT FROM:
UH-4-11	3
UH-4-12	3
UH-4-13	3
UH-4-14	SPARE D.O. ON TU-4-12 TEC
UH-4-15	SPARE D.O. ON TU-4-13 TEC
UH-5-1	SPARE D.O. ON TU-5-19 TEC
UH-5-2	SPARE D.O. ON TU-5-20 TEC
UH-5-3	SPARE D.O. ON TU-5-1 TEC
UH-5-4	3
UH-5-5	3
UH-P-1	PXCM-07
UH-P-2	PXCM-05
UH-P-3	PXCM-01
UH-P-4	PXCM-03
UH-P-5	PXCM-04

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SIEMENS

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UNIT HEATERS

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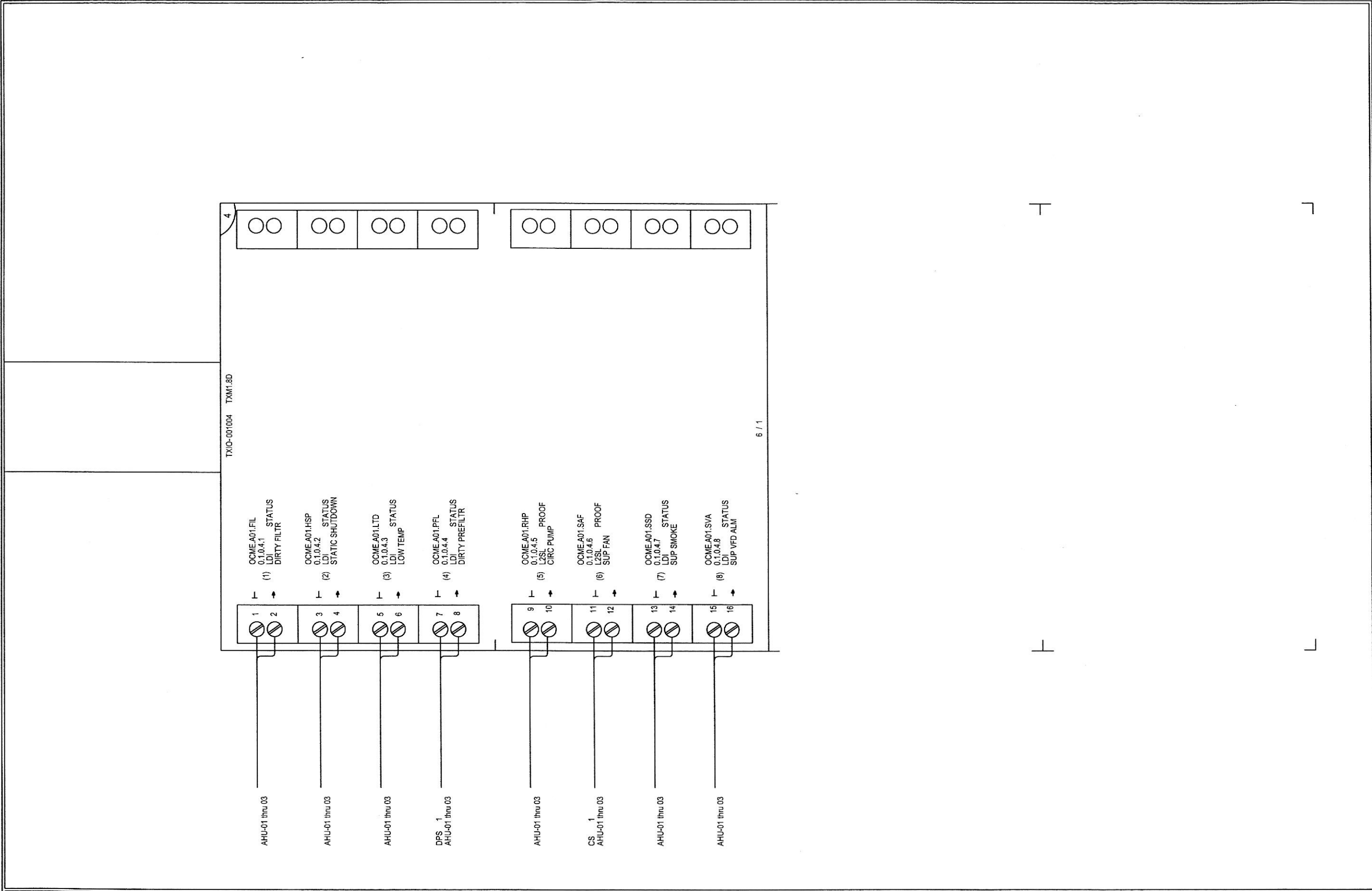
024

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
RE 2	14	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT
TE 1	32	134-1084	SIEMENS	155 017	T'STAT,H/C,LINE VOLT CON/EXP
TE 2	32	141-0522	SIEMENS	155018	ELECTRIC SURFACE MOUNT THERMOSTAT
TE 3	14	134-1084	SIEMENS	155 017	T'STAT,H/C,LINE VOLT CON/EXP
TE 4	14	141-0522	SIEMENS	155018	ELECTRIC SURFACE MOUNT THERMOSTAT
XFMR 1	1	120-24-100TF-CB			
Panel Mounted Devices					
RE 1	32	RIBU1C	FUNCTIONAL DEVICES	1208cut013	RIB 120VAC 24VAC/DC SPDT

SEQUENCE OF OPERATION:

1. SPACE THERMOSTATS SHALL CYCLE UNIT HEATER?7S FANS TO MAINTAIN ITS ADJUSTABLE TEMPERATURE SETPOINT.
2. IF HEATING WATER IS NOT AVAILABLE AS DETERMINED BY THE AQUASTATS, FANS SHALL REMAIN DE-ENERGIZED.
3. DDC SYSTEM SHALL HAVE ABILITY TO ENABLE / DISABLE UNIT HEATER FROM WORKSTATION.

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UNIT HEATERS																				



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JES	JES	JES	01/15/09	03/26/09

PXCM-01p002

440P043820
1

L001A

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Panel Mounted Devices					
PXCM 1	1	PXC100-PE96.A	SIEMENS	149478	PXC-Modular,P2,TX-I/O,96 nodes
	1	PXX-485.3	SIEMENS	149478	Expansion Module 3 x RS-485
	1	TXA1.K24	SIEMENS	149476	ADDRESS KEY 1-24
	1	TXS1.12F4	SIEMENS	N/A	24VDC SUPPLY 1200MA, 4 A FUSE
	1	TXM1.6R-M	SIEMENS	149476	6 RELAY OUTPUT MODULE W/OVD
	1	TXM1.8X-ML	SIEMENS	149476	8 UNIV I/O W/ 4-20MA, OVD&LCD
	1	TXM1.8U-ML	SIEMENS	149476	8 UNIV I/O MODULE W/ OVD&LCD
	1	TXM1.8D	SIEMENS	149476	8 DIGITAL INPUT MODULE
	1	PXA-ENC34	SIEMENS	149475	ENCLOSURE ASSY 34

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2520 LORD BALTIMORE DRIVE
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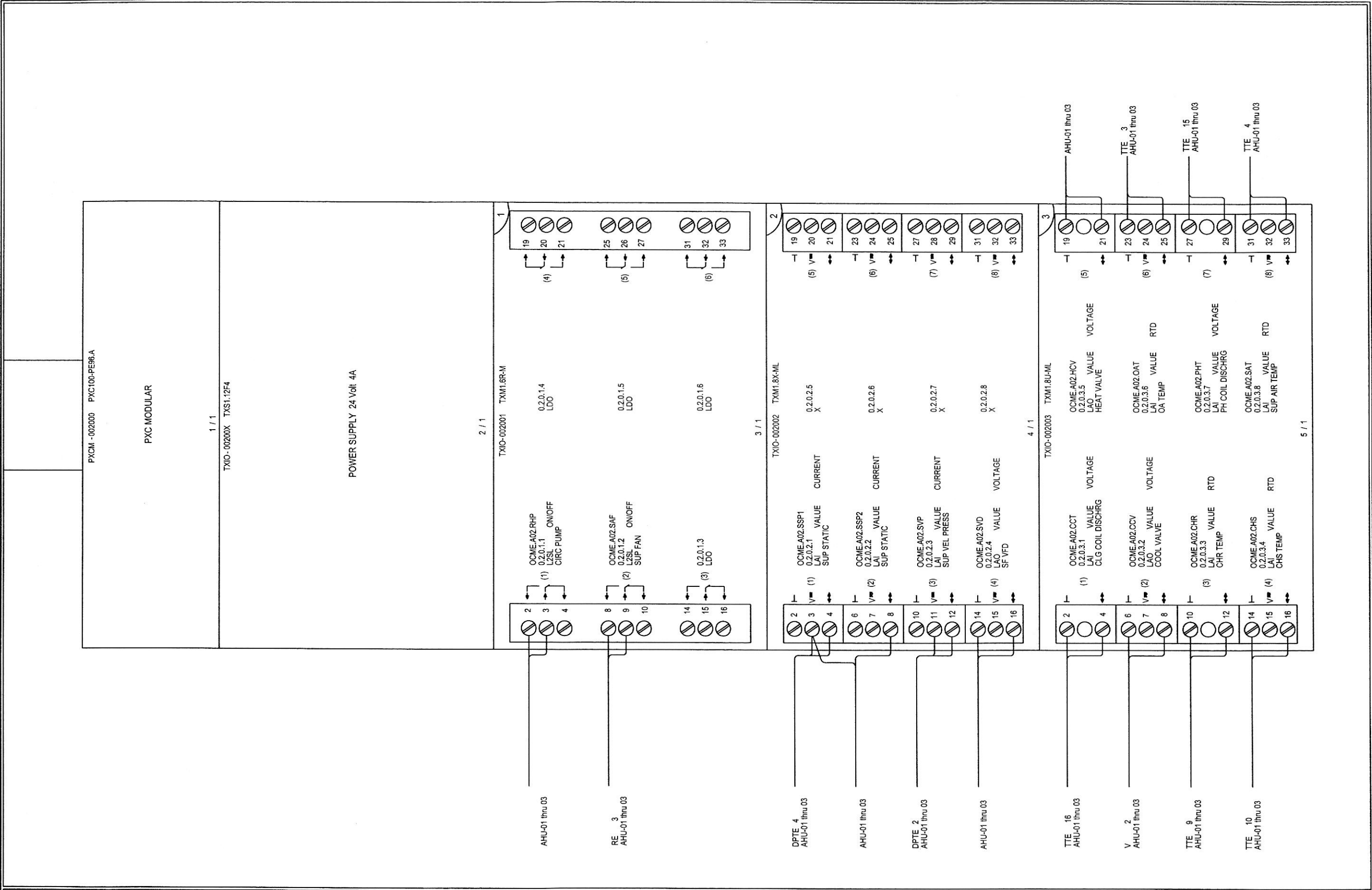
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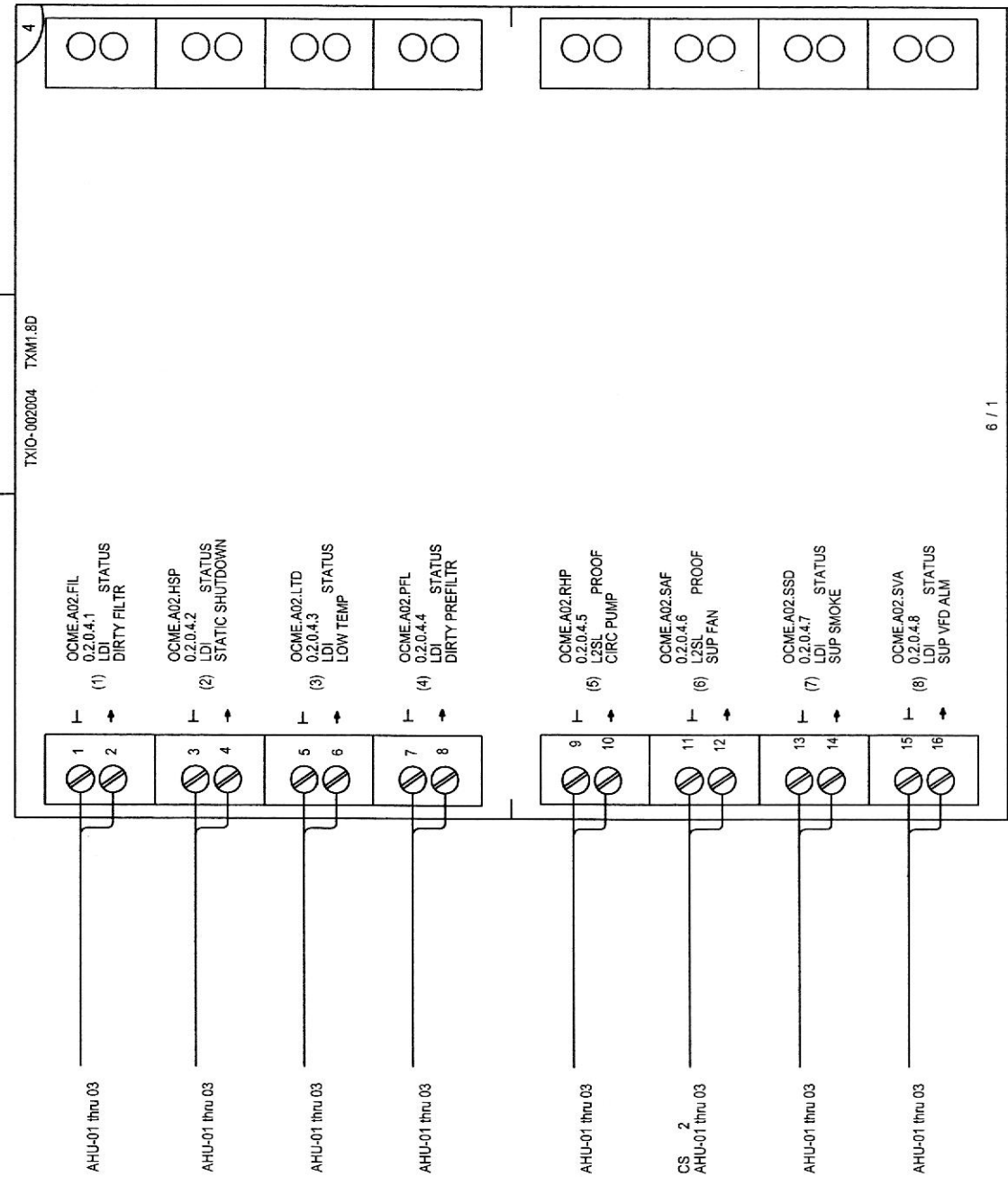
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		ENGINEER JES	DRAFTER JES	CHECKED BY JES	INITIAL RELEASE 01/15/09	LAST EDIT DATE 03/27/09	
		AHU-02					



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JES	JES	JES	01/15/09	03/27/09

PXCM-02p002

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2

L002A

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Panel Mounted Devices					
PXCM 002000	1	PXC100-PE96.A	SIEMENS	149478	PXC-Modular,P2,TX-I/O,96 nodes
	1	PXX-485.3	SIEMENS	149478	Expansion Module 3 x RS-485
	1	TXA1.K24	SIEMENS	149476	ADDRESS KEY 1-24
	1	TXS1.12F4	SIEMENS	N/A	24VDC SUPPLY 1200MA, 4 A FUSE
	1	TXM1.6R-M	SIEMENS	149476	6 RELAY OUTPUT MODULE W/OVD
	1	TXM1.8X-ML	SIEMENS	149476	8 UNIV I/O W/ 4-20MA, OVD&LCD
	1	TXM1.8U-ML	SIEMENS	149476	8 UNIV I/O MODULE W/ OVD&LCD
	1	TXM1.8D	SIEMENS	149476	8 DIGITAL INPUT MODULE
	1	PXA-ENC34	SIEMENS	149475	ENCLOSURE ASSY 34

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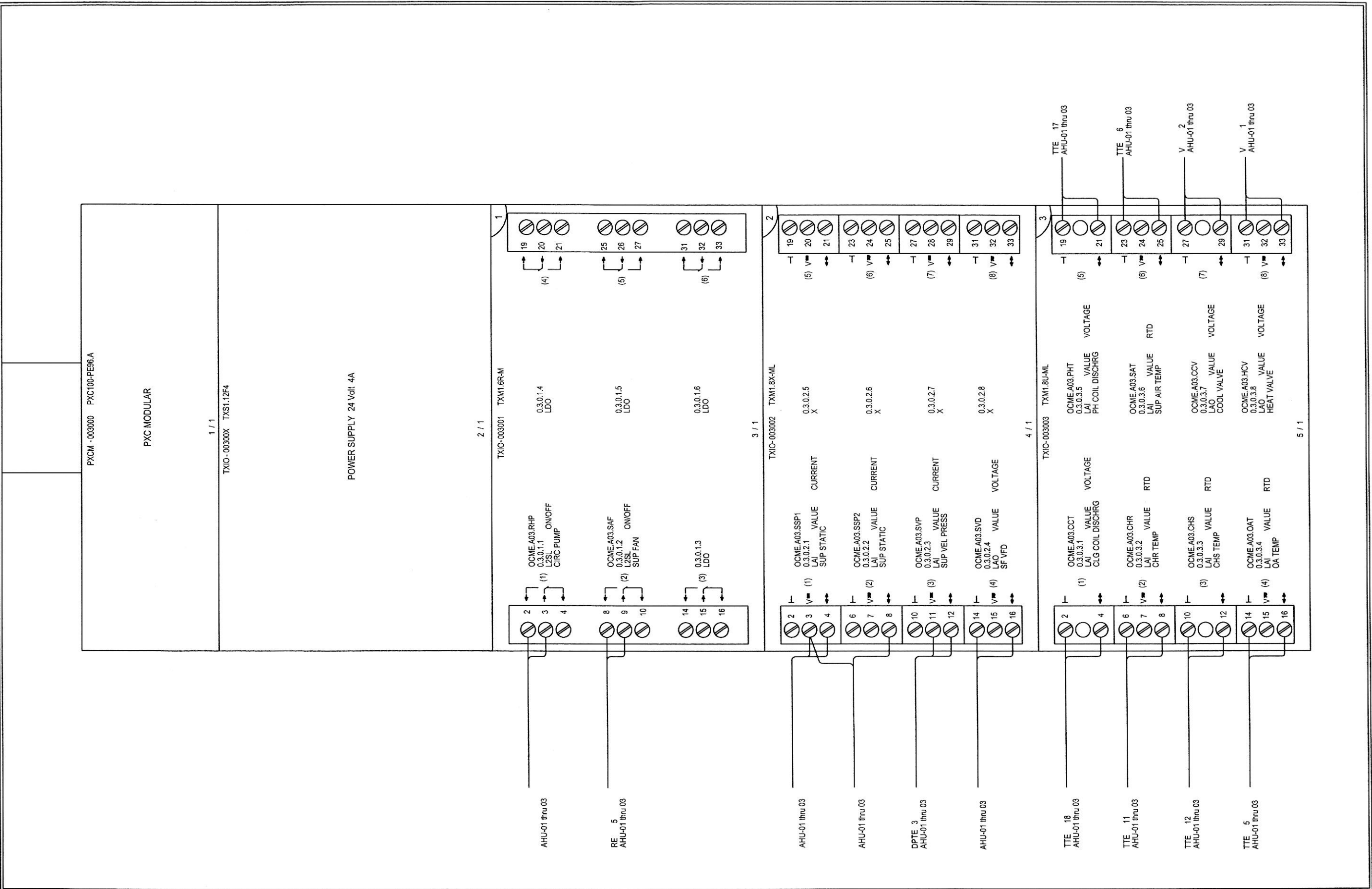
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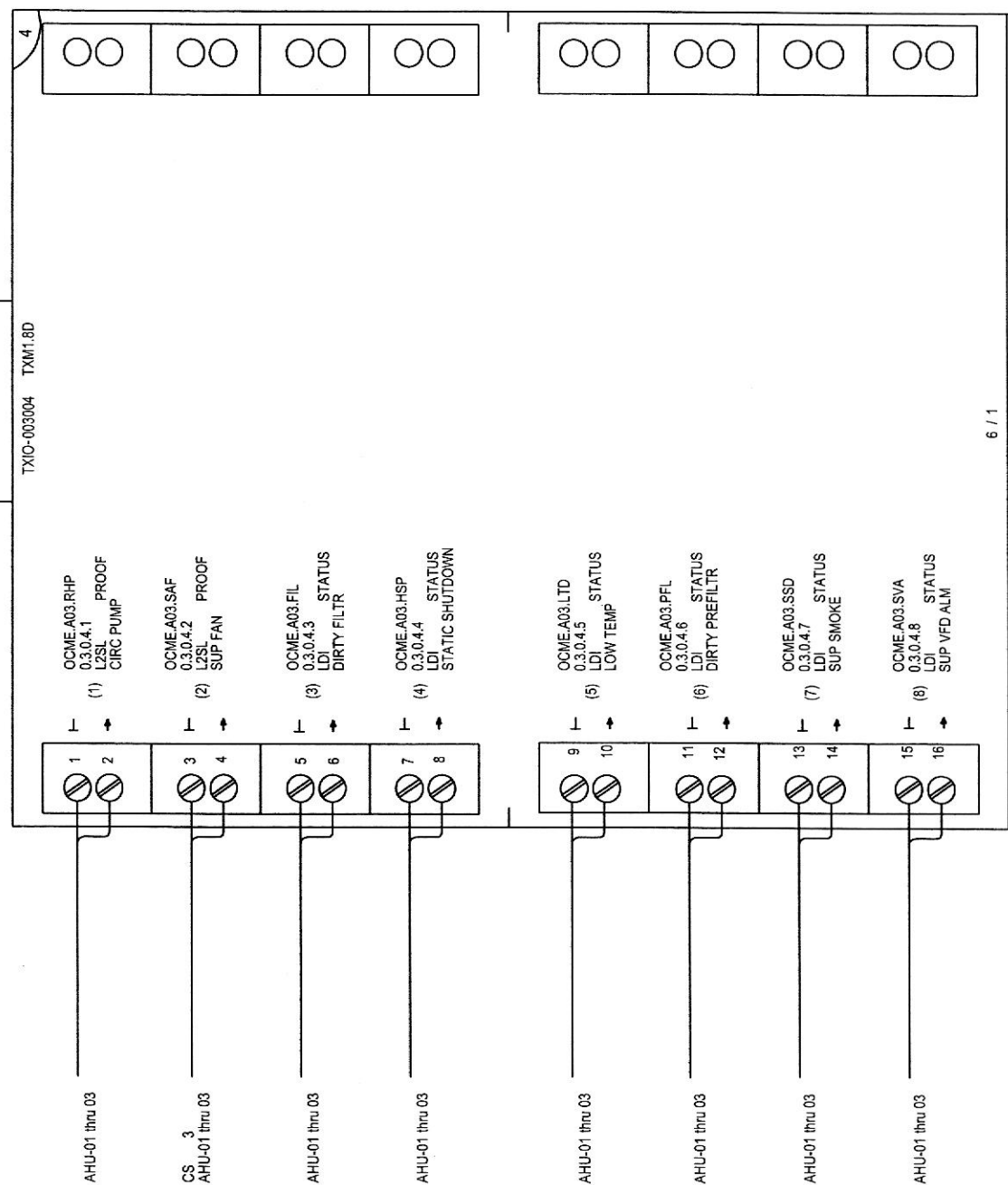
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JES	JES	JES	01/15/09	03/26/09

PXCM-03p002

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Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Panel Mounted Devices					
PXCM 003000	1	PXC100-PE96.A	SIEMENS	149478	PXC-Modular,P2,TX-I/O,96 nodes
	1	PXX-485.3	SIEMENS	149478	Expansion Module 3 x RS-485
	1	TXA1.K24	SIEMENS	149476	ADDRESS KEY 1-24
	1	TXS1.12F4	SIEMENS	N/A	24VDC SUPPLY 1200MA, 4 A FUSE
	1	TXM1.6R-M	SIEMENS	149476	6 RELAY OUTPUT MODULE W/OVD
	1	TXM1.8X-ML	SIEMENS	149476	8 UNIV I/O W/ 4-20MA, OVD&LCD
	1	TXM1.8U-ML	SIEMENS	149476	8 UNIV I/O MODULE W/ OVD&LCD
	1	TXM1.8D	SIEMENS	149476	8 DIGITAL INPUT MODULE
	1	PXA-ENC34	SIEMENS	149475	ENCLOSURE ASSY 34

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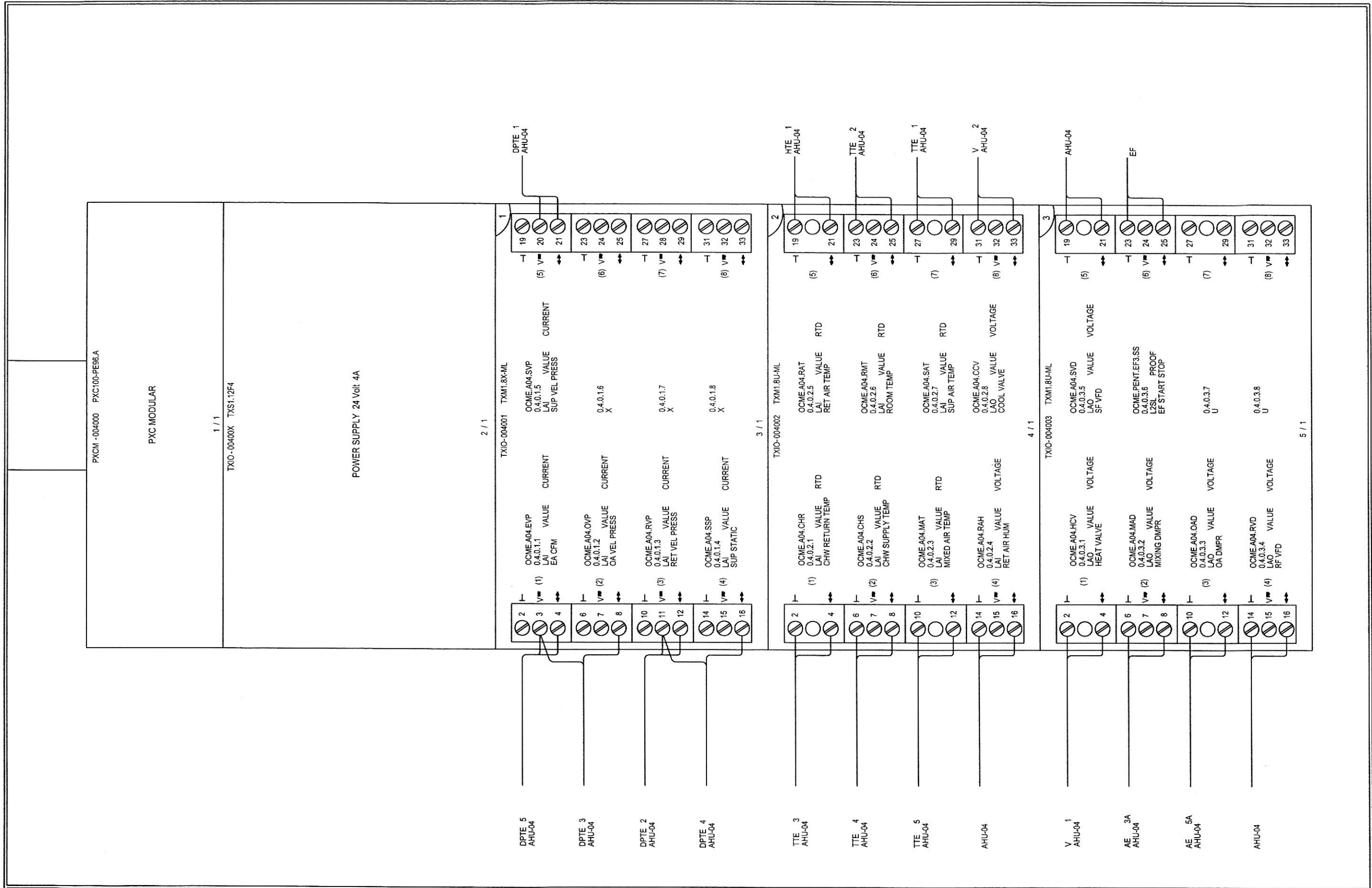
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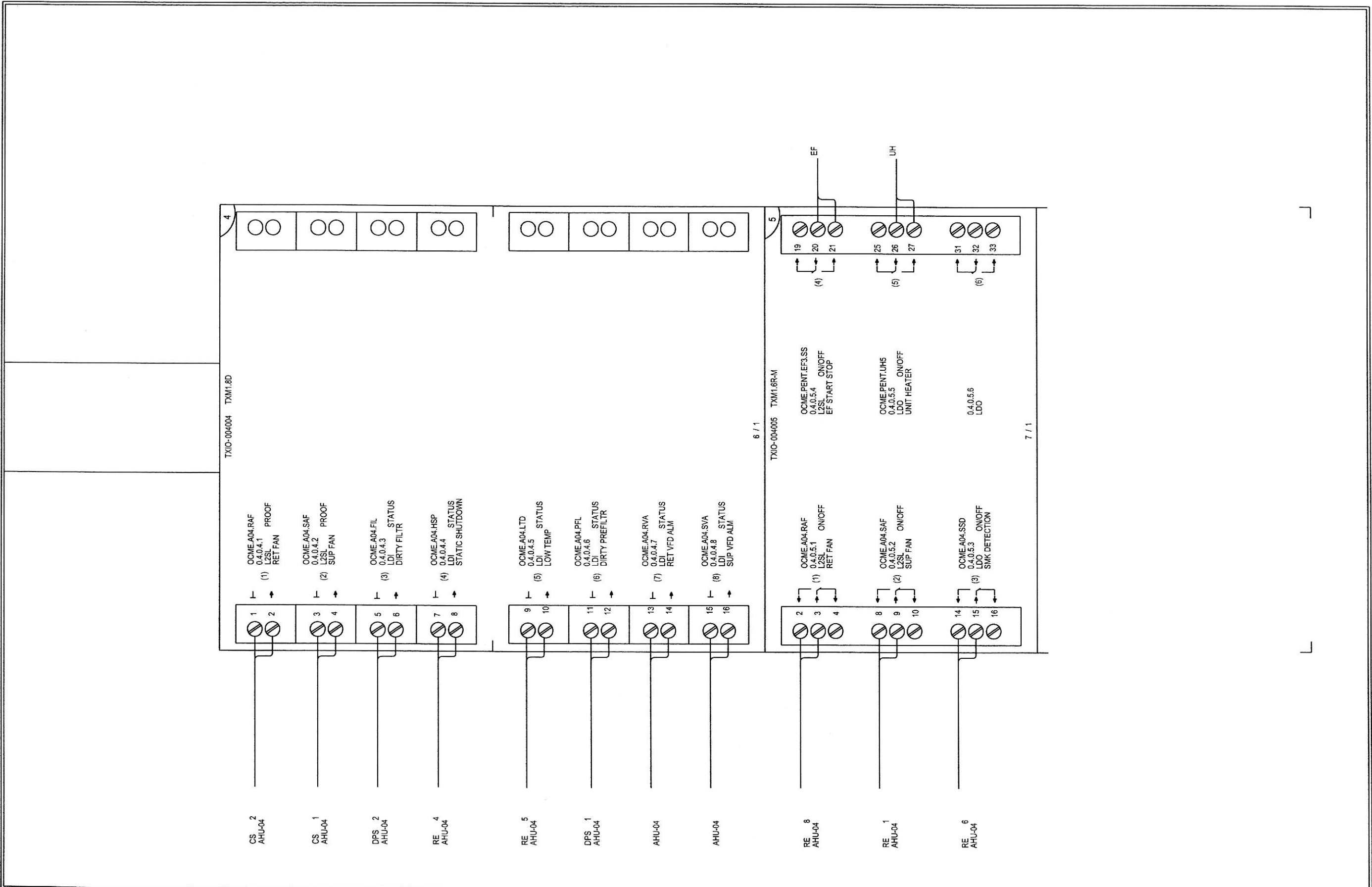
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		SIEMENS BUILDING TECHNOLOGIES BALTIMORE		AHU-04		L004	
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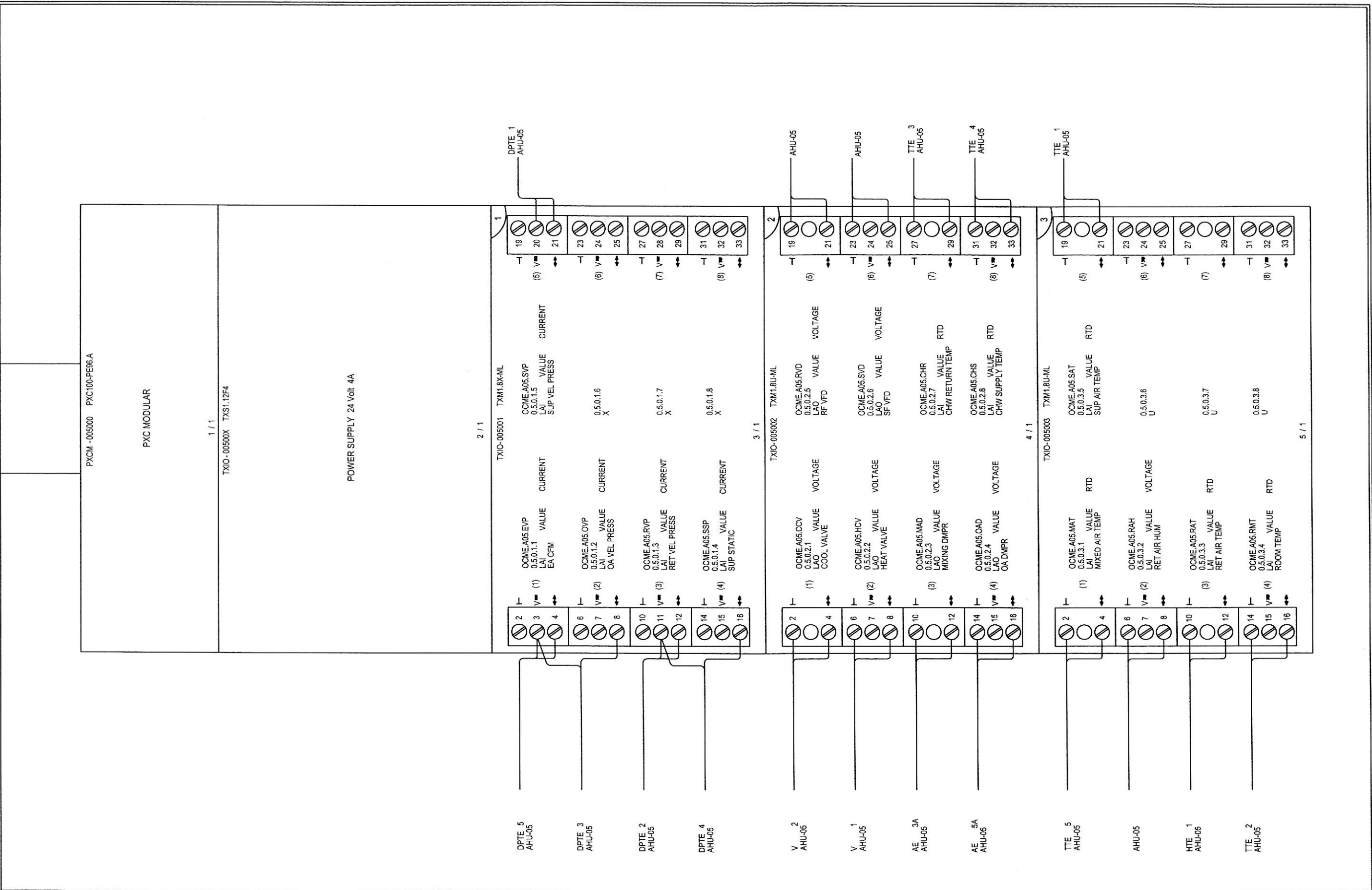
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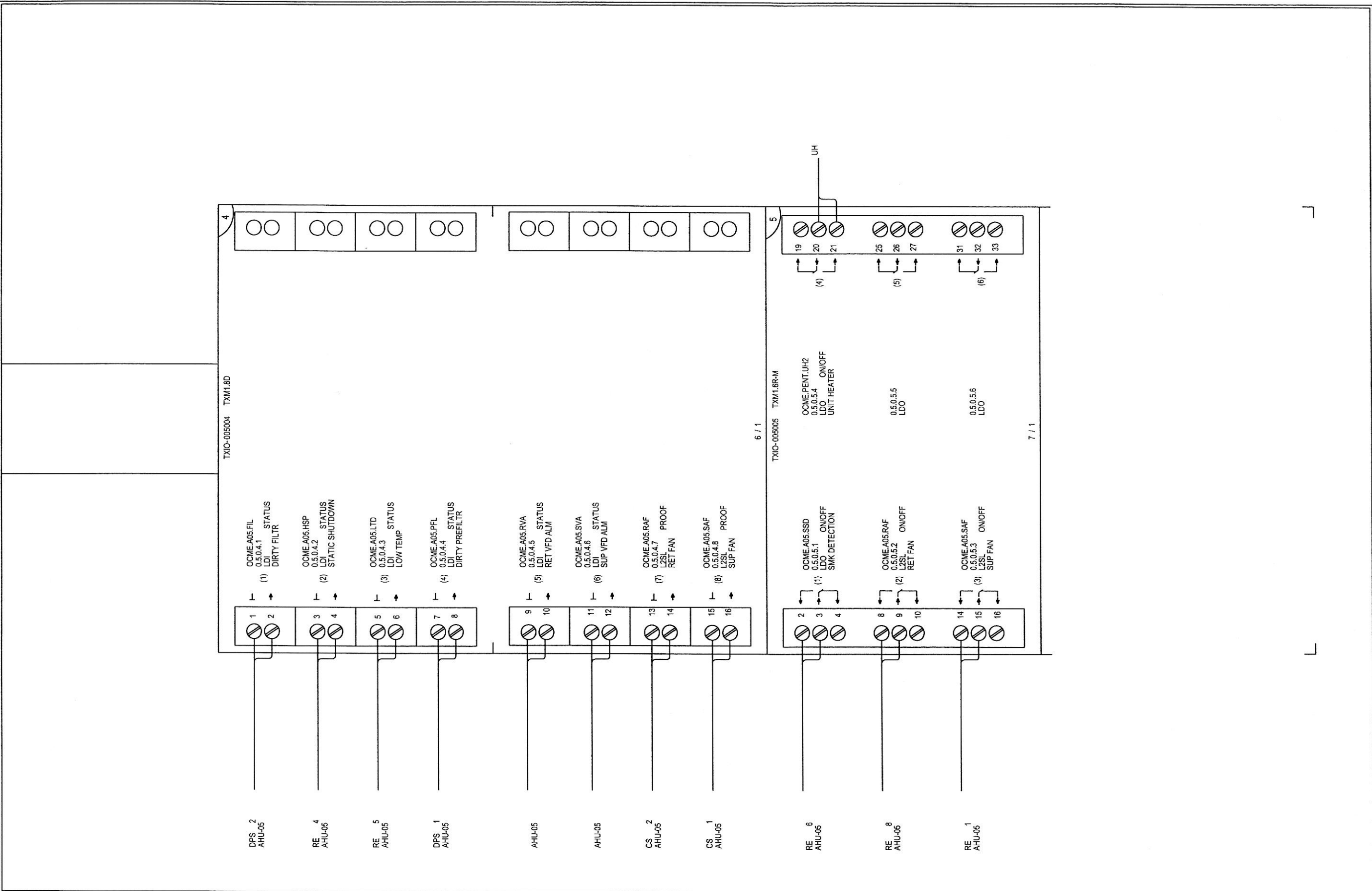
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Panel Mounted Devices					
PXCM 004000	1	PXC100-PE96.A	SIEMENS	149478	PXC-Modular,P2,TX-I/O,96 nodes
	1	PXX-485.3	SIEMENS	149478	Expansion Module 3 x RS-485
	1	TXA1.K24	SIEMENS	149476	ADDRESS KEY 1-24
	1	TXS1.12F4	SIEMENS	N/A	24VDC SUPPLY 1200MA, 4 A FUSE
	1	TXM1.8X-ML	SIEMENS	149476	8 UNIV I/O W/ 4-20MA, OVD&LCD
	2	TXM1.8U-ML	SIEMENS	149476	8 UNIV I/O MODULE W/ OVD&LCD
	1	TXM1.8D	SIEMENS	149476	8 DIGITAL INPUT MODULE
	1	TXM1.6R-M	SIEMENS	149476	6 RELAY OUTPUT MODULE W/OVD
	1	PXA-ENC34	SIEMENS	149475	ENCLOSURE ASSY 34

REVISION HISTORY	SIEMENS	2520 LORD BALTIMORE DRIVE BALTIMORE MD 21244 USA SIEMENS BUILDING TECHNOLOGIES, INC BALTIMORE	MD FORENSIC MEDICAL CENTER BALTIMORE, MD					440P043820 4 L004B
			ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE	
			JES	JES	JES	01/15/09	03/31/09	
			PXCM-04					



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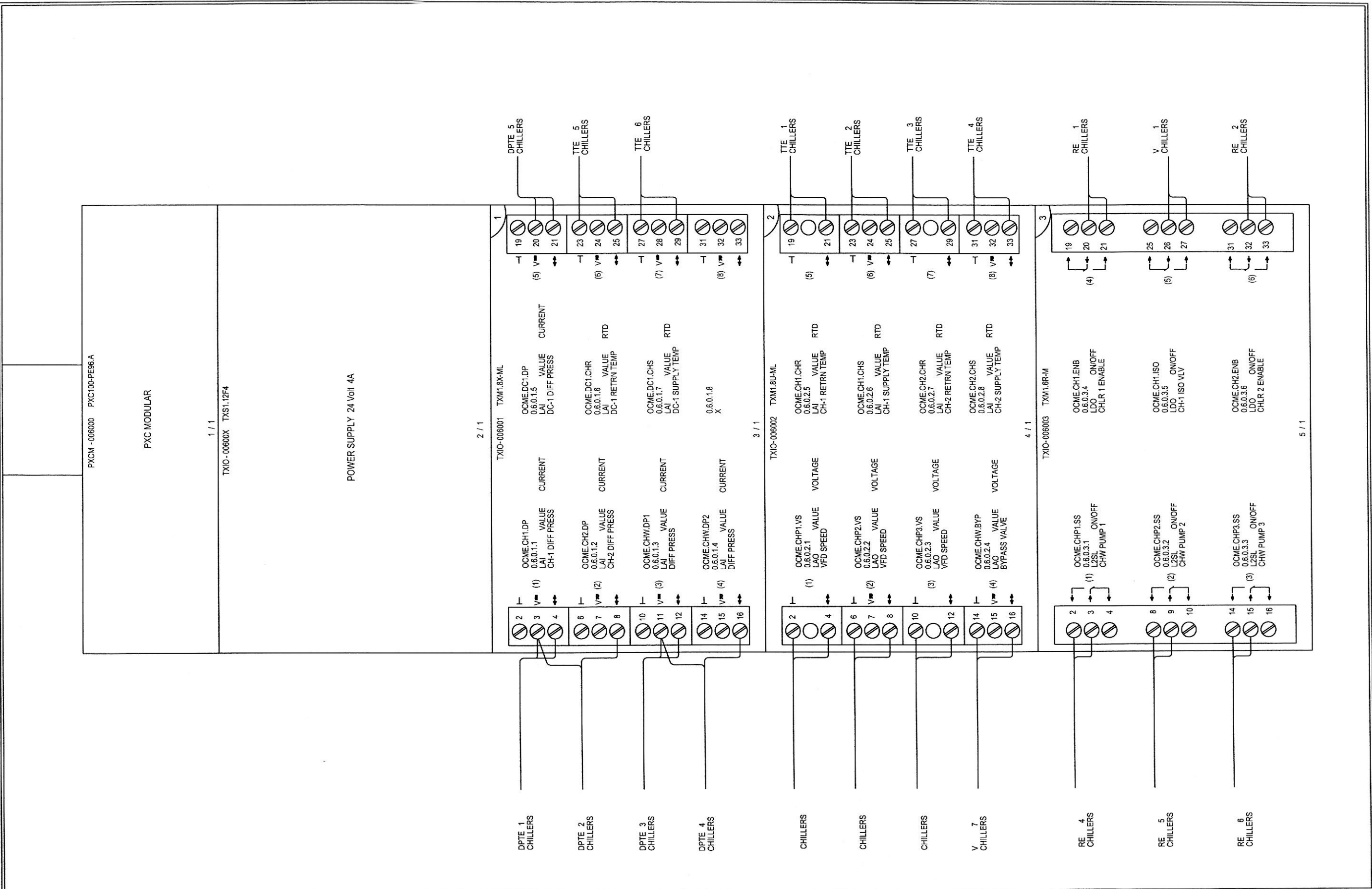
REVISION HISTORY		SIEMENS 2520 LORD BALTIMORE DRIVE BALTIMORE MD 21244 USA SIEMENS BUILDING TECHNOLOGIES INC. BALTIMORE Phone: 410-645-1600 Fax: 410-645-1616	MD FORENSIC MEDICAL CENTER BALTIMORE, MD					440P043820 5	
			ENGINEER JES	DRAFTER JES	CHECKED BY JES	INITIAL RELEASE 01/15/09	LAST EDIT DATE 03/27/09	L005A	
			PXCM-05p002						

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Panel Mounted Devices					
PXCM 005000	1	PXC100-PE96.A	SIEMENS	149478	PXC-Modular,P2,TX-I/O,96 nodes
	1	PXX-485.3	SIEMENS	149478	Expansion Module 3 x RS-485
	1	TXA1.K24	SIEMENS	149476	ADDRESS KEY 1-24
	1	TXS1.12F4	SIEMENS	N/A	24VDC SUPPLY 1200MA, 4 A FUSE
	1	TXM1.8X-ML	SIEMENS	149476	8 UNIV I/O W/ 4-20MA, OVD&LCD
	2	TXM1.8U-ML	SIEMENS	149476	8 UNIV I/O MODULE W/ OVD&LCD
	1	TXM1.8D	SIEMENS	149476	8 DIGITAL INPUT MODULE
	1	TXM1.6R-M	SIEMENS	149476	6 RELAY OUTPUT MODULE W/OVD
	1	PXA-ENC34	SIEMENS	149475	ENCLOSURE ASSY 34

REVISION HISTORY		SIEMENS		MD FORENSIC MEDICAL CENTER		440P043820	
		2520 LORD BALTIMORE DRIVE BALTIMORE MD 21244 USA SIEMENS BUILDING TECHNOLOGIES, INC BALTIMORE		BALTIMORE, MD		5	
		PHONE: 410-645-1600 FAX: 410-645-1616		ENGINEER JES		L005B	
				DRAFTER JES			
				CHECKED BY JES			
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				PXCM-05			

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		ENGINEER JES	DRAFTER JES	CHECKED BY JES	INITIAL RELEASE 01/15/09	LAST EDIT DATE 03/27/09	L006
		CHILLERS					

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Panel Mounted Devices					
PXCM 006000	1	PXC100-PE96.A	SIEMENS	149478	PXC-Modular,P2,TX-I/O,96 nodes
	1	PXX-485.3	SIEMENS	149478	Expansion Module 3 x RS-485
	1	TXA1.K24	SIEMENS	149476	ADDRESS KEY 1-24
	1	TXS1.12F4	SIEMENS	N/A	24VDC SUPPLY 1200MA, 4 A FUSE
	2	TXM1.8X-ML	SIEMENS	149476	8 UNIV I/O W/ 4-20MA, OVD&LCD
	1	TXM1.8U-ML	SIEMENS	149476	8 UNIV I/O MODULE W/ OVD&LCD
	3	TXM1.6R-M	SIEMENS	149476	6 RELAY OUTPUT MODULE W/OVD
	1	TXM1.16D	SIEMENS	149476	16 DIGITAL INPUT MODULE
	1	TXM1.8D	SIEMENS	149476	8 DIGITAL INPUT MODULE
	1	PXA-ENC34	SIEMENS	149475	ENCLOSURE ASSY 34

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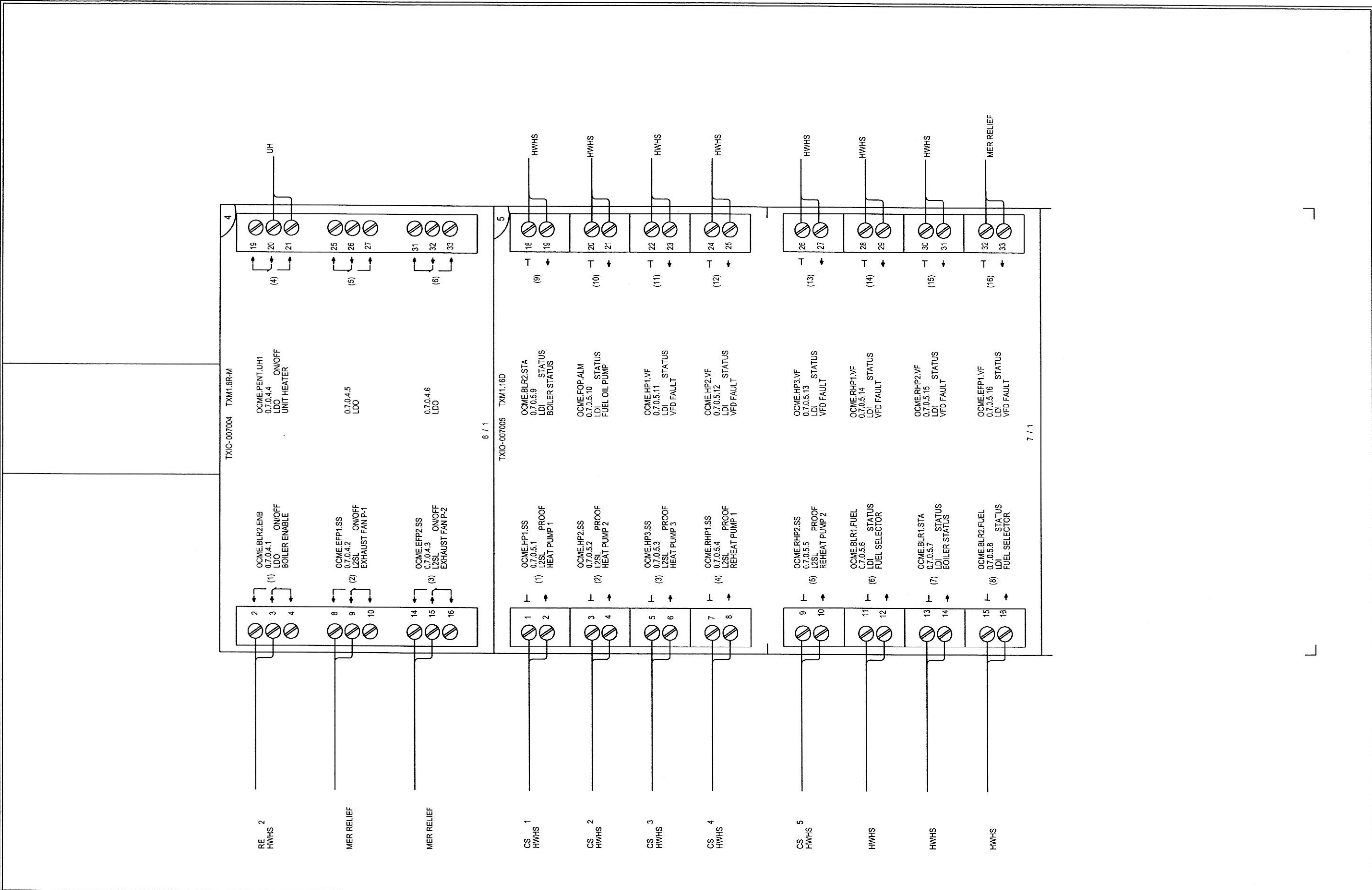
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		ENGINEER JES	DRAFTER JES	CHECKED BY JES	INITIAL RELEASE 01/15/09	LAST EDIT DATE 03/27/09	L007A
		PXCM-07p002					

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Panel Mounted Devices					
PXCM 007000	1	PXC100-PE96.A	SIEMENS	149478	PXC-Modular,P2,TX-I/O,96 nodes
	1	PXX-485.3	SIEMENS	149478	Expansion Module 3 x RS-485
	1	TXA1.K24	SIEMENS	149476	ADDRESS KEY 1-24
	1	TXS1.12F4	SIEMENS	N/A	24VDC SUPPLY 1200MA, 4 A FUSE
	1	TXM1.8X-ML	SIEMENS	149476	8 UNIV I/O W/ 4-20MA, OVD&LCD
	1	TXM1.8U-ML	SIEMENS	149476	8 UNIV I/O MODULE W/ OVD&LCD
	2	TXM1.6R-M	SIEMENS	149476	6 RELAY OUTPUT MODULE W/OVD
	1	TXM1.16D	SIEMENS	149476	16 DIGITAL INPUT MODULE
	1	TXM1.8D	SIEMENS	149476	8 DIGITAL INPUT MODULE
	1	PXA-ENC34	SIEMENS	149475	ENCLOSURE ASSY 34

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JES	JES	JES	01/15/09	03/31/09

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Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Panel Mounted Devices					
PXCM 008000	1	PXC100-PE96.A	SIEMENS	149478	PXC-Modular,P2,TX-I/O,96 nodes
	1	PXX-485.3	SIEMENS	149478	Expansion Module 3 x RS-485
	1	TXA1.K24	SIEMENS	149476	ADDRESS KEY 1-24
	1	TXS1.12F4	SIEMENS	N/A	24VDC SUPPLY 1200MA, 4 A FUSE
	2	TXM1.6R-M	SIEMENS	149476	6 RELAY OUTPUT MODULE W/OVD
	1	TXM1.8D	SIEMENS	149476	8 DIGITAL INPUT MODULE
	1	TXM1.8U-ML	SIEMENS	149476	8 UNIV I/O MODULE W/ OVD&LCD
	1	PXA-ENC34	SIEMENS	149475	ENCLOSURE ASSY 34

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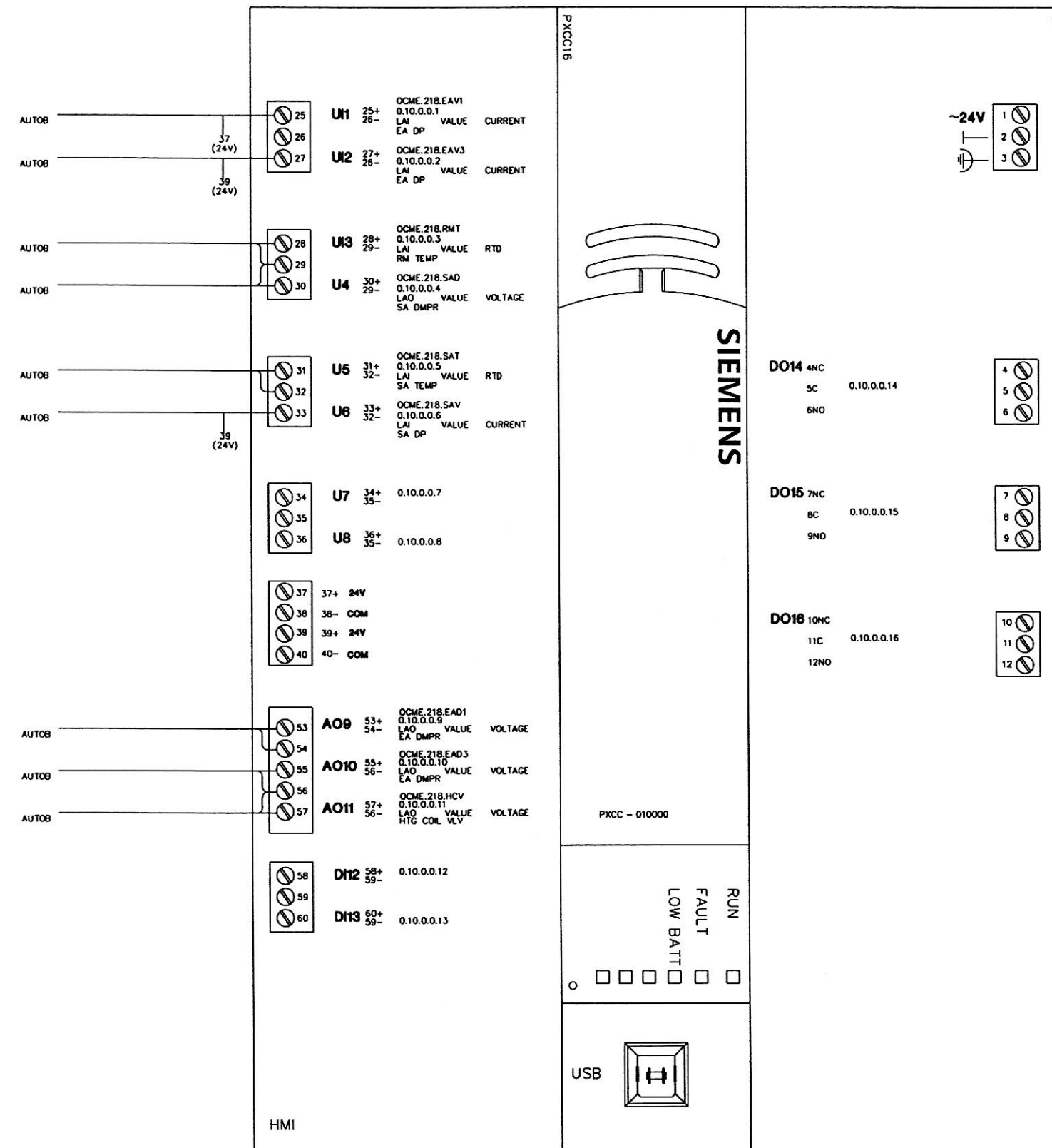
L008B

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Panel Mounted Devices					
PXCC 009000	1	PXC16.2-PE.A	SIEMENS	149487	APOGEE 16pt, P2 Ethernet ALN
	1	PXA-ENC18	SIEMENS	149475	ENCLOSURE ASSY 19"
	1	549-506	SIEMENS	149 344	SERVICE BOX,MEC,115V

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				PXCC-09															

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Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Panel Mounted Devices					
PXCC 010000	1	PXC16.2-PE.A	SIEMENS	149487	APOGEE 16pt, P2 Ethernet ALN
	1	PXA-ENC18	SIEMENS	149475	ENCLOSURE ASSY 19"
	1	549-506	SIEMENS	149 344	SERVICE BOX,MEC,115V

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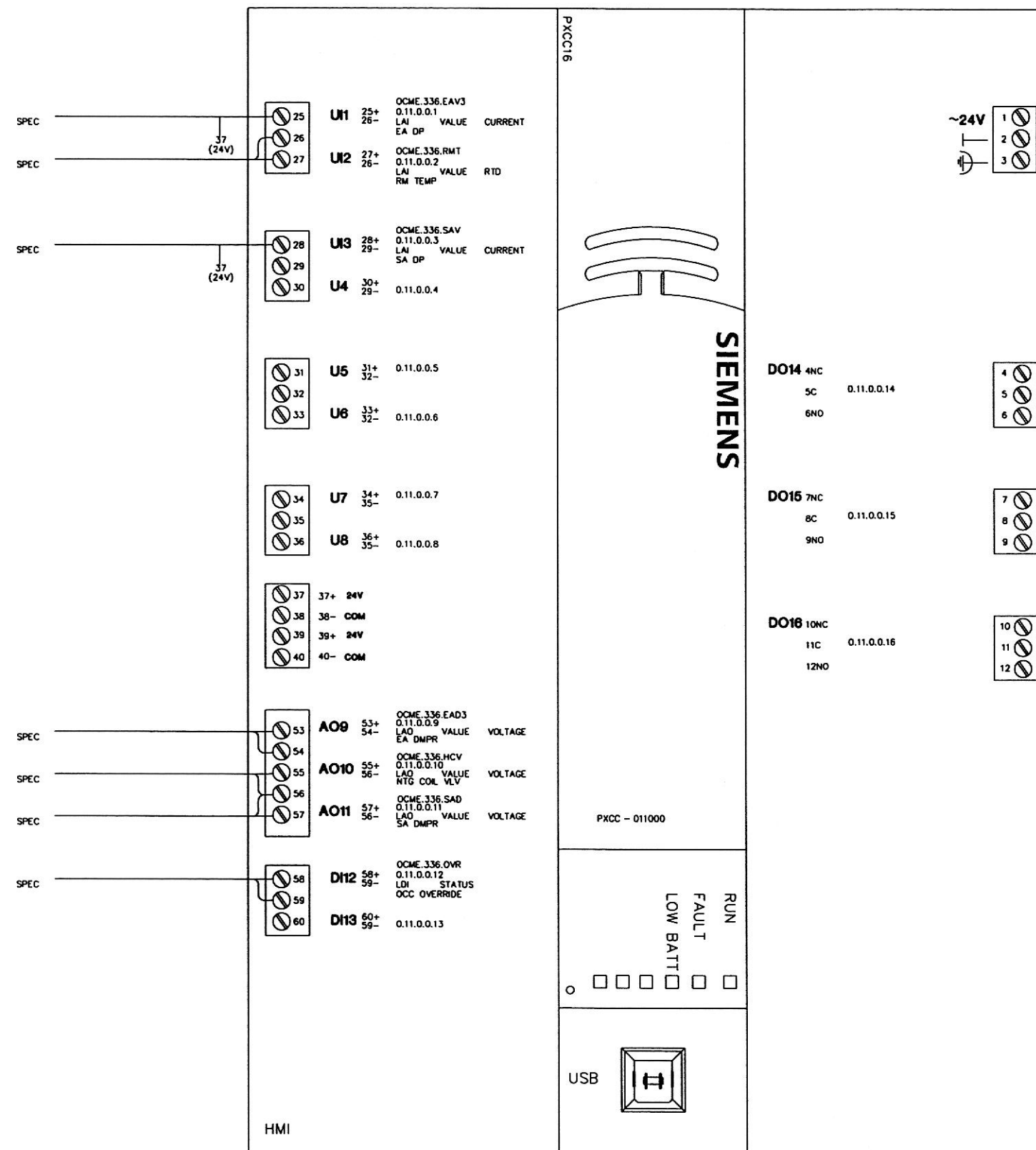
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Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Panel Mounted Devices					
PXCC 011000	1	PXC16.2-PE.A	SIEMENS	149487	APOGEE 16pt, P2 Ethernet ALN
	1	PXA-ENC18	SIEMENS	149475	ENCLOSURE ASSY 19"
	1	549-506	SIEMENS	149 344	SERVICE BOX,MEC,115V

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JES	JES	JES	01/15/09	03/31/09

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Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Panel Mounted Devices					
PXCC 012000	1	PXC16.2-PE.A	SIEMENS	149487	APOGEE 16pt, P2 Ethernet ALN
	1	PXA-ENC18	SIEMENS	149475	ENCLOSURE ASSY 19"
	1	549-506	SIEMENS	149 344	SERVICE BOX,MEC,115V

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