

Submittal #455

FO-INTEG-PROJECT-PO0001-REV.03 Gestión de Control de Calidad / Quality Management

Information

Status: In Review

P.R.S

Legend
 Overdue Issue On Time Delayed Start Inactive

Company: Integ Miami LLC

Project (CDC) - Job Number 495-M-BURKE-RIVERMS-010620

Customer Name Burke Construction Group Inc

Project (CDC) - Customer Name Burke Construction Group, Inc

Project (CDC) - Location 3100 RIVERLAND ROAD , FORT LAUDERDALE, Florida 33312

Submittal

Description: HVAC Controls and Instrumentation and Sequence of Operation.

| | | | | | |
|---|----------------|--------------|----------------------|--------------------------|---|
| Title: HVAC Controls and Instrumentation and Sequence of Operation. | Spec 15901 | Subdivision: | Submittal Type: Data | Submitted On: 12-08-2020 | Responsible Contractor: Integ Miami LLC |
| | Section: 15940 | | | | |

Submittal Manager: Carlos Godoy

Issue Date: 12-08-2020 12:00 AM Final Due Date: 26-08-2020

Ball in Burke Construction Court: Lead Time 10 Priority: Critical

Attachment

Attachment: 455-15901-15940-HVAC Controls Rev.01.pdf

Linked Drawings:

Notes:

Stamp Info

Stamp Date:

Other Name:

 Show Stamp on PDF:**Submittal WorkFlow**

Add Submittal LOG

Submittal logs

| Record ID# | Submittal # - Project (CDC) - CDC (Centro de Costo) | Submittal # - Status: | Submittal Status | Submittal # - Description: | Related Submittal # | Date Submittal REV | Comments: | Attachment Document: |
|------------|---|-----------------------|------------------|--|---------------------|--------------------|-------------|--|
| 565 | 495-M-BURKE-RIVERMS-010620 | In Review | Rev 1 | HVAC Controls and Instrumentation and Sequence of Operation. | 455 | 12-08-2020 | For review. | 455-15901-15940-HVAC Controls Rev.01.pdf |

| Record ID# | Submittal # - Project (CDC) - CDC (Centro de Costo) | Submittal # - Status: | Submittal Status | Submittal # - Description: | Related Submittal # | Date Submittal REV | Comments: | Attachment Document: |
|------------|---|-----------------------|---------------------|--|---------------------|--------------------|-------------|---|
| 474 | 495-M-BURKE-RIVERMS-010620 | In Review | Revise and Resubmit | HVAC Controls and Instrumentation and Sequence of Operation. | 455 | 21-07-2020 | | P.001710 New River MS-Cx Sub Rev -HVAC Controls (15900-001.0).pdf |
| 394 | 495-M-BURKE-RIVERMS-010620 | In Review | Rev 0 | HVAC Controls and Instrumentation and Sequence of Operation. | 455 | 22-06-2020 | For review. | 455-15901-15940-HVAC Controls.pdf |

Submittal Approval

Approval

Approvers:

Name/Title:

Signature _____

This submittal has an approval time of 15 days. After this period of time elapses and no response has been provided from the Engineer/GC, Integ reserves the right to assume that the submittal has been approved.

Responsible Genaro Matias

Rp Email General, Project Manager

Created on June 22 at 4:23 PM (PDT). Last updated by [Project M. Asistant](#) today at 1:10 PM (PDT). Owned by [Project M. Asistant](#).



NEW RIVER MIDDLE SCHOOL SMART RENOVATIONS

PROJECT LOCATION
3100 RIVERLAND ROAD
FT. LAUDERDALE, FL 33312

SUBMITTED TO:
INTEG MIAMI LLC
10001 NW 50TH STREET, SUITE 107
SUNRISE, FL 33351
305-297-5826

SUBMITTED BY:
ROTH SOUTHEAST
2260 S.W. 66TH TERRACE
DAVIE, FL 33317
954-423-6640

6/3/2020

MATERIAL LIST

PRODUCT DATA SHEETS

SUBMITTAL DRAWINGS

| | | | | |
|-----------------------|----------------------|--------------------------|-------------------|----------|
| ROTH SOUTHEAST | Project Information: | NEW RIVER MIDDLE SCHOOL | Project Number: | |
| 2260 SW 66TH TERR. | | SMART RENOVATIONS | Project Engineer: | D.C. |
| DAVIE, FL 33317 | | 3100 RIVERLAND ROAD | Date: | 6/3/2020 |
| 954-423-6640 | | FT. LAUDERDALE, FL 33312 | | |

MATERIAL LIST

| PART NUMBER | DESCRIPTION | MANUFACTURER | CUT SHEET # |
|-----------------|---------------------------------|--------------------|-------------|
| SXVAUTSVR100001 | AS CONTROLLER | SCHNEIDER | 1-6 |
| SXWTBASW100001 | AS BASE | SCHNEIDER | 1-6 |
| SXWPS24VX100001 | AS POWER SUPPLY | SCHNEIDER | 7-10 |
| SXWTBPSW10001 | AS POWER SUPPLY BASE | SCHNEIDER | 7-10 |
| SXWTBIOW110001 | AS IO MODULE BASE | SCHNEIDER | 11-15 |
| SXWDOC8XX10001 | AS DO MODULE | SCHNEIDER | 11-15 |
| SXWUI8D4X10001 | AS UI/DO MOUDLE | SCHNEIDER | 16-17 |
| MP-C-15A | IP CONTROLLER | SCHNEIDER | 18-32 |
| ESW-108 | 8-PORT ETHERNET SWITCH | B&B ELECTRONICS | 33-34 |
| ESW-105 | 5-PORT ETHERNET SWITCH | B&B ELECTRONICS | 33-34 |
| ETD500-6 | DUCT MOUNTED TEMP SENSOR | SCHNEIDER | 35-38 |
| ETI500-6 | IMMERSION TEMP SENSOR | SCHNEIDER | 35-38 |
| ETI-WELL-6S | WELL | SCHNEIDER | 35-38 |
| EHD110-500 | DUCT MOUNT TEMP/HUMIDITY SENSOR | SCHNEIDER | 39-40 |
| CDE | DUCT MOUNT CO2 SENSOR | VERIS | 41-42 |
| H608 | CURRENT SWITCH | VERIS | 43-44 |
| AFS-222 | DIFFERENTIAL PRESSURE SWITCH | CLEVELAND CONTROLS | 45-46 |
| CKIT-VM1B-F24 | RELAY KIT | VERIS | 47-48 |
| AFB24-SR-S | DAMPER ACTUATOR | BELIMO | 49-51 |
| CMT-4 | TERMINAL BLOCK | ALTEC | 52 |
| X100CAA | TRANSFORMER | VERIS | 53-54 |
| RET3826 | ENCLOSURE | KELE | 55 |
| 51012218 | POWER RECEPTICAL | KELE | 56 |
| DCP-1.5-W | 1.5A POWER SUPPLY KELE | KELE | 57 |

Automation Server



Introduction

A StruxureWare Building Operation server is the core of the system and performs key functionality, such as control logic, trend logging, and alarm supervision. The Automation Server software is pre-loaded on Schneider Electric supplied hardware that supports communication and connectivity to the I/O and field busses. The distributed intelligence of the Automation Servers ensures fault tolerance in the system and provides a fully featured user interface through WorkStation and WebStation.

Features

The Automation Server is a powerful device that can act as a standalone StruxureWare Building Operation server and also control I/O modules and monitor and manage field bus devices. In a small installation, the embedded Automation Server acts as a stand-alone StruxureWare Building Operation server, mounted with its I/O modules in a small footprint. In medium and large installations, functionality is distributed over multiple Automation Servers that communicate over TCP/IP.

Communications hub

Capable of coordinating traffic from above and below its location, the Automation Server can deliver data directly to you or to other servers throughout the site. The Automation Server can run multiple control programs, manage local I/O, alarms, and users, handle scheduling and logging, and communicate using a variety of protocols. Because of this, most parts of the system function autonomously and continue to run as a whole even if communication fails or individual servers or devices go offline.

Variety of connectivity options

The Automation Server has numerous ports that enable it to communicate with a wide range of protocols, devices, and servers.

The Automation Server has the following ports:

- One 10/100 Ethernet port
- Two RS-485 ports
- One built-in I/O bus port
- Two USB host ports
- One USB device port

The USB device port allows you to upgrade and interact with the Automation Server using the Device Administrator.

WorkStation/WebStation interface

Through any client, the user experience is similar regardless of which StruxureWare Building Operation server the user is logged on to. The user can log directly on to an Automation Server to engineer, commission, supervise, and monitor the Automation Server as well as its attached I/O modules and field bus devices. See the WorkStation and WebStation datasheets for additional information.

Open building protocol support

One of the cornerstones of StruxureWare Building Operation is support for open standards. The Automation Server can natively communicate with three of the most popular standards for buildings: BACnet, LonWorks, and Modbus.

Native BTL-listed BACnet support

The Automation Server communicates directly to BACnet/IP and BACnet MS/TP networks. It is compliant with ASHRAE 135-2004, the Automation Server is BTL-listed as a BACnet Building Controller (B-BC), the most advanced BACnet Device Profile, and as a BACnet Operator Workstation (B-OWS). This capability provides access to the full range of BACnet devices from Schneider Electric and other vendors. See the BTL Product Catalog for up-to-date details on BTL listed firmware revisions on BACnet International's home page. The Automation Server can also serve as a BACnet Broadcast Management Device (BBMD) to facilitate BACnet systems that span multiple IP networks.

Native LonWorks support

The Automation Server has a built in FTT-10 port to communicate to the TP/FTT-10 LonWorks network. Integrated LonWorks functionality enables access to LonWorks devices from Schneider Electric and other vendors. Lonworks networks can be commissioned, bound, and configured from the Automation Server using the built-in LonWorks Network Management Tool. No third-party tools are needed. A protocol analyzer with powerful debugging and network quality monitoring features can be achieved using third-party software, without additional hardware needed.

Native Modbus support

The Automation Server natively integrates Modbus RS-485 master and slave configurations, as well as TCP client and server. This allows full access to third-party products and the range of Schneider Electric products that communicate on the Modbus protocol, such as power meters, UPS, circuit breakers, and lighting controllers.

Web Services support

The Automation Server supports the use of Generic Web Services based on open standards, such as SOAP and REST, to consume data into StruxureWare Building Operation. Use incoming third-party data (temperature forecast, energy cost) over the Web to determine site modes, scheduling, and programming.

EcoStruxure Web Services support

EcoStruxure Web Services, Schneider Electric's Web Services standard, is natively supported in the Automation Server. EcoStruxure Web Services offers extra features between compliant systems whether within Schneider Electric or other authorized systems. These features include system directory browsing, read/write of current values,

alarm receipt and acknowledgement, and historical trend log data. EcoStruxure Web Services is secure. User name and password are required to log on to the system.

Scalable custom configurations

The Automation Server and its family of I/O modules were designed to meet the unique needs of each installation. Depending on the configuration, each Automation Server can control up to 464 I/O points. Because power and communications are delivered along a common bus, multiple modules can be plugged together without tools in a simple one-step process using the built-in connectors.

Two programming options

Unique to the industry, the Automation Server has both Script and Function Block programming options. This flexibility assures that the best programming method can be selected for the application.

4 GB of memory for data and backup

The Automation Server has an available capacity of 4 GB of memory. This represents 2 GB for application and historical data and 2 GB dedicated for backup storage. This ensures that all data is safe from damage, loss, or unintended edits. Users can also manually back up or restore the Automation Server to a storage location on a PC or network. Through the Enterprise Server, users have the ability to perform scheduled backups of associated Automation Servers to network storage for even greater levels of protection.

IT friendly

The Automation Server communicates using the networking standards. This makes installations easy, management simple, and transactions secure.

Supported protocols

- IP addressing (IPv6 ready)
- TCP communications
- DHCP/DNS for rapid deployment and lookup of addresses
- HTTP/HTTPS for Internet access through firewalls, which enables remote monitoring and control
- NTP (Network Time Protocol) for time synchronization throughout the system
- SMTP enables sending email messages

Patented two-piece design

Each module can be separated from its terminal base to allow the site to be wired prior to the installation of the electronics. The patented locking mechanism serves as handles for removing the module from its base. All critical components have a protective cover that permits natural convection cooling to occur.

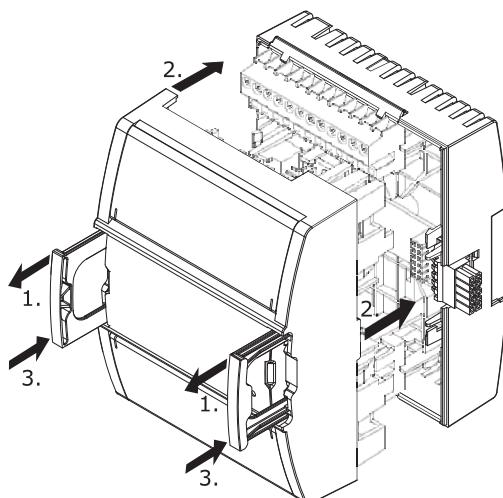


Figure: Two-piece design

Auto-addressing

The auto-addressing feature eliminates the need for setting DIP switches or pressing commission buttons. With the Automation Server family, each I/O module automatically knows its order in the chain and assigns itself accordingly – significantly reducing engineering and maintenance time.

Simple DIN-rail installation

Fasteners easily snap into a locked position for panel installation. The fastener has a quick-release feature for easy DIN rail removal.

Specifications

Electrical

| | |
|-------------------------------|--------|
| DC input supply power | 7 W |
| DC input supply voltage | 24 VDC |

Environment

| | |
|--------------------------------------|-------------------------------|
| Ambient temperature, operating | 0 to 50 °C (32 to 122 °F) |
| Ambient temperature, storage | -20 to +70 °C (-4 to +158 °F) |

| | |
|-----------------------|------------------------|
| Maximum humidity..... | 95 % RH non-condensing |
|-----------------------|------------------------|

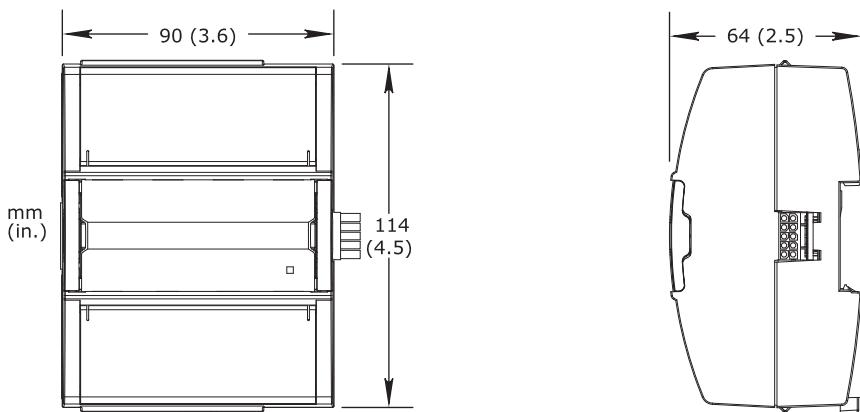
Material

| | |
|---------------------|---------------------|
| Plastic rating..... | UL94-5VB |
| Enclosure | Eco Friendly ABS/PC |

| | |
|-----------------------|-------|
| Enclosure rating..... | IP 20 |
|-----------------------|-------|

Mechanical

| | |
|--|--|
| Dimensions including terminal base | 90 W x 114 H x 64 D mm (3.6 W x 4.5 H x 2.5 D in.) |
|--|--|



| | |
|-------------------------------------|--------------------|
| Weight including terminal base..... | 0.294 kg (0.65 lb) |
| Weight excluding terminal base..... | 0.194 kg (0.43 lb) |

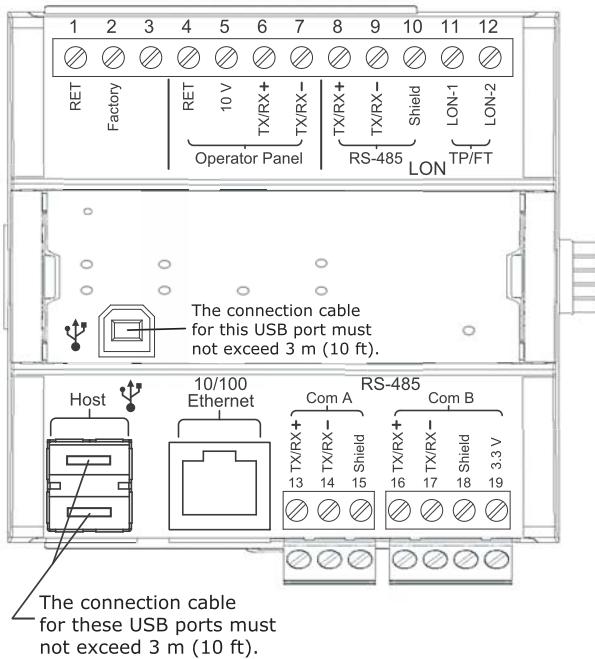
Agency compliances

| | |
|------------------------|--|
| Emission..... | C-Tick; EN 61000-6-3; FCC Part 15, Sub-part B, Class B |
| Immunity | EN 61000-6-2 |
| Safety..... | UL 916 C-UL US Listed |
| Real-time clock backup |30 days |

Communications

| | |
|---|---|
| Ethernet LAN interface | 10/100 Mbit/s; twisted pair cable with RJ-45 connector |
| USB | 1 device and 2 host ports |
| BACnet | BACnet/IP and MS/TPBTL B-BC (BACnet Building Controller) ^aBTL B-OWS (BACnet Operator Workstation) ^a |
| a) See the BTL Product Catalog for up-to-date details on BTL listed firmware revisions on BACnet International's home page. | |
| LonWorks | TP/FT-10 |
| COM A | 2-wire RS-485 |
| COM B | 2-wire RS-485 and 3.3 VDC |
| I/O Modules | RS-485 |
| TCP | Binary, port configurable, default 4444 |
| HTTP | Non-binary, port configurable, default 80 |
| HTTPS | Encrypted supporting SSL 1.0, 2.0, 3.0 and TSL 1.0, port configurable default 443 |
| SMTP | Email sending, port configurable, default 25 |

Terminals



CPU

| | |
|-------------------------|----------------|
| Frequency | 160 MHz |
| SDRAM | 128 MB |
| Flash memory | 4 GB |
| Part numbers | |
| Automation Server | SXWAUTSVR10001 |

TB-AS-W1, Terminal Base for Automation Server
(Required for each Automation Server) SXWTBASW110001

Add-on options

| | |
|---|----------------|
| SW-EWS-1, EcoStruxure Web Services (run-time) option Consume only for one Automation Server, no maintenance | SXWSWEWSX00001 |
| SW-EWS-2, EcoStruxure Web Services (run-time) option Serve & Consume for one Automation Server, no maintenance | SXWSWEWSX00002 |
| SW-EWS-3, EcoStruxure Web Services (run-time) option Serve & Consume, plus Historical trend log data for one Automation Server, no maintenance | SXWSWEWSX00003 |
| SW-GWS-1, Web Services (Generic Consume) option For one Automation Server, no maintenance | SXWSWGWSX00001 |

Internal configuration

All connectors of the Automation Server except for the Ethernet connector refers to signal ground as shown in the figure below.

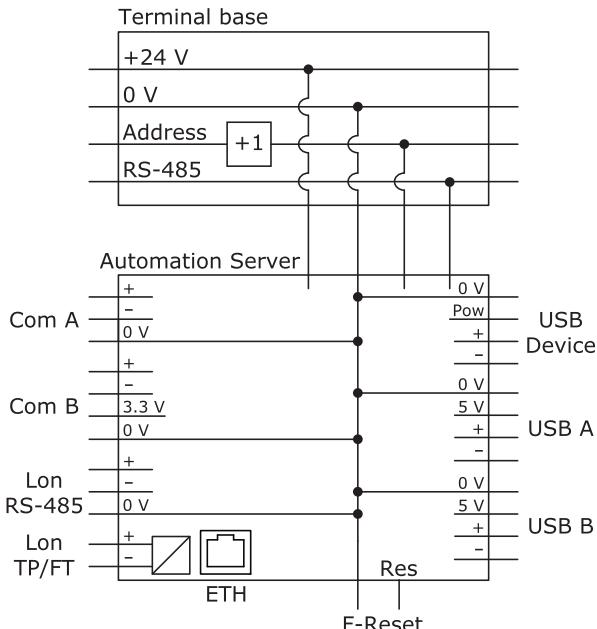


Figure: Automation Server internal configuration

The I/O bus in the terminal base provides the Automation Server with power and an address. The address value in the terminal base is increased by one for each terminal base. The I/O bus also enables RS-485 communication between the Automation Server and the I/O modules.

Regulatory Notices

FCC Federal Communications Commission

FCC Rules and Regulations CFR 47, Part 15, Class B

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference. (2) This device must accept any interference received, including interference that may cause undesired operation.

Industry Canada

ICES-003

This is a Class B digital device that meets all requirements of the Canadian Interference Causing Equipment Regulations.



N1831 C-Tick (Australian Communications Authority (ACA))

AS/NZS 3548

This equipment carries the C-Tick label and complies with EMC and radio communications regulations of the Australian Communications Authority (ACA), governing the Australian and New Zealand (AS/NZS) communities.

Trademarks and registered trademarks are the property of their respective owners.

CE - Compliance to European Union (EU)

2004/108/EC Electromagnetic Compatibility Directive

This equipment complies with the rules, of the Official Journal of the European Union, for governing the Self Declaration of the CE Marking for the European Union as specified in the above directive(s) per the provisions of the following standards: IEC/EN 61326-1 Product Standard, IEC/EN 61010-1 Safety Standard.



WEEE - Directive of the European Union (EU)

This equipment and its packaging carry the waste of electrical and electronic equipment (WEEE) label, in compliance with European Union (EU) Directive 2002/96/EC, governing the disposal and recycling of electrical and electronic equipment in the European community.



UL 916 Listed products for the United States and Canada, Open Class Energy Management Equipment.

Automation Server PS-24V Power Supply

Enables StruxureWare Building
Operation v1.3

Automation Server power supply modules are designed to accommodate the specific power requirements of the Automation Server and its connected I/O modules.



Make the most of your energySM

Schneider
Electric

Automation Server PS-24V Power Supply Module Features



The PS-24V is a power supply module that accommodates 24 VAC or 24 VDC input power.

Reliable consistent output power

Each power supply module delivers reliable and consistent output power of 24 VDC to the backplane.

Modular and scalable system

This power supply supports the Automation Server and its family of I/O modules. This modular system delivers power and communications on a common bus. Connecting modules is a one-step process: just slide the modules together using the built-in connectors.

A 30 W power supply can deliver power to the Automation Server and a number of I/O modules calculated from the Power Budget Table (located on page 3). If more I/O modules are needed, another power supply can be added to the bus. The power supplies are isolated from each other while also providing communication pass-through.



PRODUCT AT A GLANCE

- Reliable consistent output power
- Modular and scalable system
- Polarity independent
- Overload protection
- Patented two-piece design
- Hot-connect / Hot-swap
- Auto-addressing
- Simple DIN-rail installation
- Accommodates multiple row panel installations
- 30 W rating
- Status indicators

Polarity independent

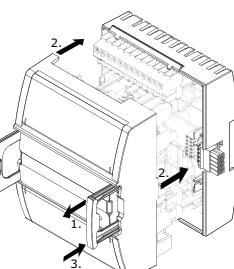
The power supply input (from main power) and output (to modules) are galvanically isolated. This removes the risk of damage due to earth currents and permits the input power to be wired without concern for polarity matching.

Overload protection

When a power supply module's load (total load of Automation Server, I/O modules, communication modules) exceeds its rating, the power supply will protect itself from being damaged.

Patented two-piece design

Each module can be separated from its terminal base to allow the site to be wired prior to the installation of the electronics. The patented locking mechanism serves as handles for removing the module from its base. All critical components have a protective cover that permits natural convection cooling to occur.



Automation Server PS-24 Power Supply Module

Features (continued)

Power Budget Table

| | Power Requirements 24 VDC Power |
|------------------------|------------------------------------|
| Automation Server | 7 W |
| Input Only I/O | |
| DI-16 | 1.6 W |
| UI-16 | 1.8 W |
| Output Only I/O | |
| DO-FA-12 | 1.8 W |
| DO-FA-12-H | 1.8 W |
| DO-FC-8 | 2.2 W |
| DO-FC-8-H | 2.2 W |
| AO-8 | 4.9 W |
| AO-8-H | 4.9 W |
| AO-V-8 | 0.7 W |
| AO-V-8-H | 0.7 W |
| Mixed I/O | |
| UI-8/DO-FC-4 | 1.9 W |
| UI-8/DO-FC-4-H | 1.9 W |
| UI-8/AO-4 | 3.2 W |
| UI-8/AO-4-H | 3.2 W |
| UI-8/AO-V-4 | 1.0 W |
| UI-8/AO-V-4-H | 1.0 W |

Hot-connect / Hot-swap

Because critical applications require 24-hour operation, Schneider Electric designed the entire family of modules for hot-connection of terminal bases and hot-swapping of modules to and from their bases. This design ensures continuous power and communication during service operations.

Auto-addressing

The auto-addressing feature eliminates the need for setting DIP switches or pressing commission buttons. With the Automation Server family, each module automatically knows its order in the chain and assigns itself accordingly.

Simple DIN-rail installation

Fasteners easily snap into a locked position for panel installation. The fastener has a quick-release feature for easy DIN rail removal.

Accommodates multiple row panel installations

The Automation Server module family uses built-in connectors for single row connectivity. If a panel size requires multiple rows, an interconnection cable is available.

30 W rating

This power supply module can supply power for loads up to 30 W. The consumption of downstream modules can vary. A PS-24V can typically power an Automation Server and a number of I/O modules calculated from the Power Budget Table.

Status indicators

The front panel of the PS-24V module includes status LEDs for input and output power. The LED for input power indicates the status of the main power. The output power indicator shows if the power supply output is within the proper range.

Automation Server PS-24 Power Supply Module Specifications

Specifications

Electrical

I/O bus power

24 VDC, max. 30 W per I/O bus power supply, Class 2

Maximum addresses per I/O bus

32

AC input

Nominal voltage

24 VAC, 50/60 Hz

Operating range

24 VAC, $\pm 20\%$, 50/60 Hz

Input current

Max. 2.5 A rms

Recommended transformer rating

≥ 60 VA

DC input

Nominal voltage

24 to 30 VDC

Operating range

21 to 33 VDC

Power consumption

Max. 40 W

DC output

Output voltage

24 V ± 1 V

Output power

Max. 30 W

Mechanical

Enclosure

Eco Friendly ABS/PC

Enclosure rating

IP 20

Plastic rating

UL94-5VB rated plastic

Dimensions (including terminal base)

90 W x 114 H x 64 D mm

(3.6 W x 4.5 H x 2.5 D in.)

Weight (including terminal base)

0.285 kg (0.63 lb)

Weight (excluding terminal base)

0.186 kg (0.41 lb)

Installation

DIN-rail or panel installation

Operation environment

Ambient temperature, operating

0 °C to 50 °C (32 °F to 122 °F)

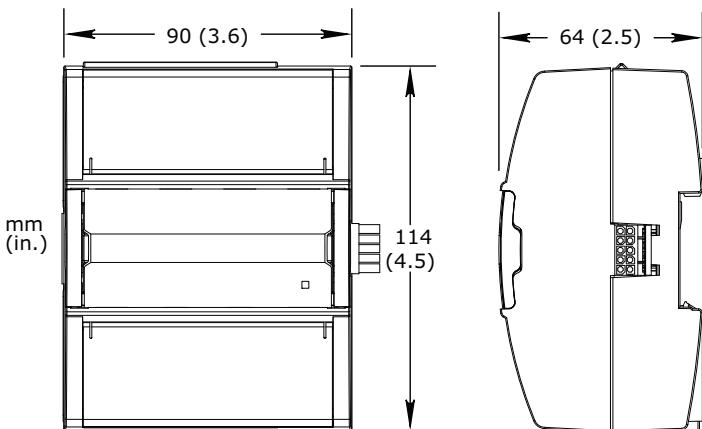
Ambient temperature, storage

-20 °C to +70 °C (-4 °F to +158 °F)

Humidity

Max. 95 % RH (non-condensing)

Dimensional drawing



Agency compliances

Emission

C-Tick; EN 61000-6-3; FCC Part 15,
Sub-part B, Class B

Immunity

EN 61000-6-2

Safety

UL 916 C-UL US Listed

Part numbers

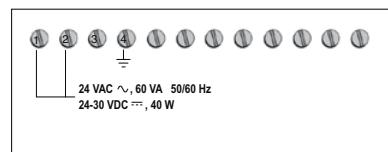
PS-24V, Power Supply 24 VAC/VDC

P/N: SXWPS24VX10001

TB-PS-W1, Terminal Base for Power Supply (Required for each power supply)

P/N: SXWTBPSW110001

Connectors



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Schneider Electric One High Street, North Andover, MA 01845 USA Telephone: +1 978 975 9600 Fax: +1 978 975 9698 www.schneider-electric.com/buildings
SDS-AS-POWERSUPPLY-A4.BU.N.EN.11.2012.0.00.CC

I/O Modules DO-FC-8 and DO-FC-8-H

8 channel Form C digital output



Introduction

The DO-FC-8 and DO-FC-8-H are digital output 8 channel I/O modules. The digital outputs support digital Form C point types. The Form C relays in the DO-FC-8 and DO-FC-8-H are designed for direct load applications.

Function

Modular and scalable

The I/O modules are part of a modular system that delivers power and communications on a common bus. Connecting modules is a one-step process: just slide the modules together using the built-in connectors.

Patented two-piece design

Each module can be separated from its terminal base to allow the site to be wired prior to the installation of the electronics. The patented locking mechanism serves as handles for removing the module from its base. All critical components have a protective cover that permits convection cooling to occur.

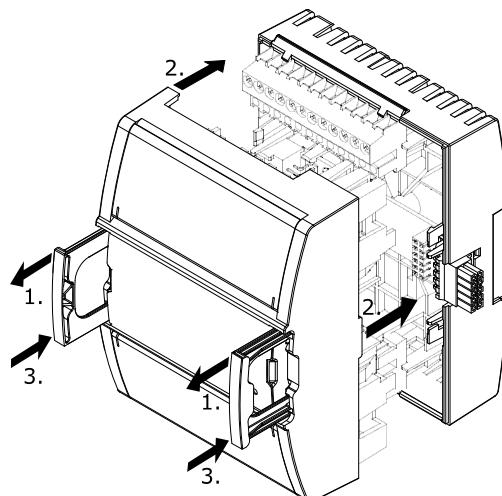


Figure: Two-piece design

Hot-connect and Hot-swap

Because critical applications require 24-hour operation, Schneider Electric designed the I/O modules for hot-connection of terminal bases and hot-swapping of the modules to their bases. This design ensures continuous power and communication during service operations.

Auto-addressing

The auto-addressing feature eliminates the need for setting DIP switches or pressing commission buttons. With the Automation Server family, each module automatically knows its order in the chain and assigns itself accordingly – significantly reducing engineering and maintenance time.

Simple DIN-rail installation

Fasteners easily snap into a locked position for panel installation. The fastener has a quick-release feature for easy DIN-rail removal.

Efficient terminal management

The I/O module terminals are clearly labelled and protected by transparent covers. The input and output terminals are at the top and bottom of each module and are accessible for maintenance without removing the module. The StruxureWare Building Operation WorkStation software can generate custom as-built labels for each module. Pre-perforated letter and A4 size label sheets are available as an accessory.

Accommodates multiple row panel installations

The Automation Server module family uses built-in connectors for single row connectivity, side by side. If a panel size requires multiple rows, extension cords are available.

LED status indicators

The I/O module has a status indicator that denotes the health and status of the module.

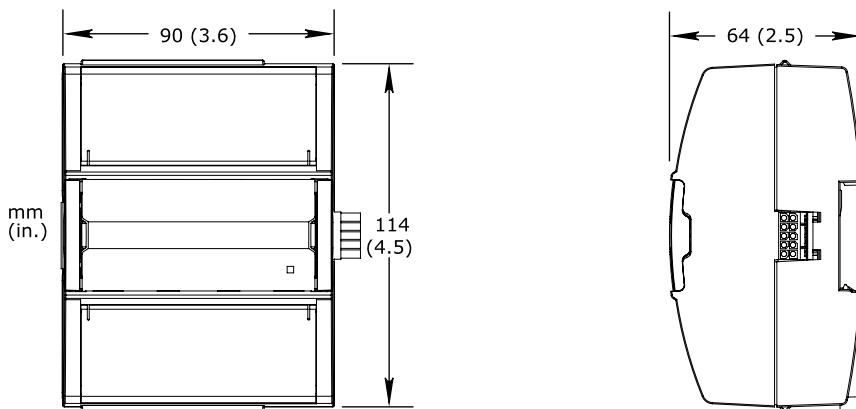
Each digital output channel has a dedicated status indicator using a green LED.

Hand/Off/Auto switches

The front panel of the DO-FC-8-H includes Hand/Off/Auto (HOA) switches to provide override control of the digital outputs. The position of the HOA switch is readable through user interfaces, such as the StruxureWare Building Operation WorkStation software, enabling more precise monitoring and control.

Specifications

| | |
|--|--|
| Output channels | 8 |
| DC input supply power | 2.2 W |
| DC input supply voltage | 24 VDC |
| Environment | |
| Ambient temperature, operating | 0 to 50 °C (32 to 122 °F) |
| Ambient temperature, storage | -20 to +70 °C (-4 to +158 °F) |
| Maximum humidity..... | 95 % RH non-condensing |
| Material | |
| Plastic rating..... | UL94-5VB |
| Enclosure..... | Eco Friendly ABS/PC |
| Enclosure rating..... | IP 20 |
| Mechanical | |
| Dimensions including terminal base | 90 W x 114 H x 64 D mm (3.6 W x 4.5 H x 2.5 D in.) |



Weight including terminal base 0.332 kg (0.73 lb)

Weight excluding terminal base 0.209 kg (0.46 lb)

Terminal base TB-IO-W1

Part numbers

DO-FC-8, I/O module

8 Form C digital outputs SXWDOC8XX10001 →

DO-FC-8-H, I/O module with HOA switches

8 Form C digital outputs with Hand/Off/Auto override switches SXWDOC8HX10001

TB-IO-W1, terminal base for I/O module

(Required for each I/O module) SXWTBIOW110001

Accessory part numbers

DIN-RAIL-CLIP, DIN-rail end clip

package of 25 pieces SXWDINEND10001

PRINTOUT-A4-W1, printout sheets for terminal labels

A4 sheet size, 100 sheets, 18 labels per sheet SXWTERLBL10011

PRINTOUT-LTR-W1, printout sheets for terminal labels

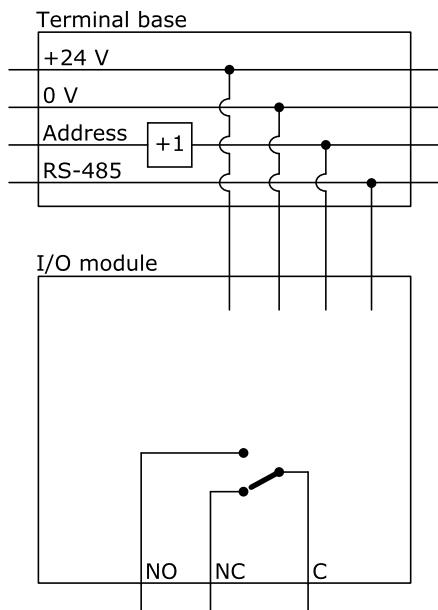
Letter sheet size, 100 sheets, 16 labels per sheet SXWTERLBL10012

S-CABLE-L, S-cable extension cord for Automation Server I/O bus L shaped connectors

1.5 m SXWSCABLE10002

Digital outputs

The Form C digital outputs of the DO-FC-8 and DO-FC-8-H I/O modules are switching contacts with one common terminal (C), one normally open terminal (NO), and one normally closed terminal (NC). The terminals are isolated from signal ground.

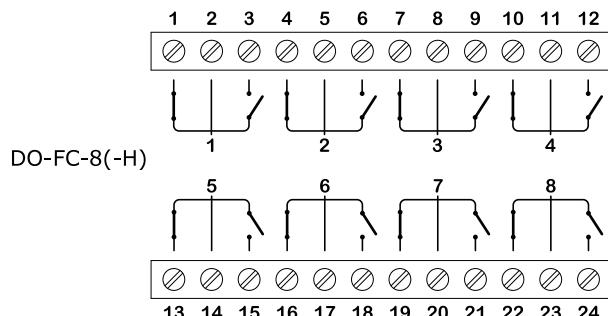


The I/O bus in the terminal base provides the I/O module with power and an address. The address value in the terminal base is increased by one for each terminal base. The I/O bus also enables RS-485 communication between the I/O module and the Automation Server.

Figure: Form C digital output internal configuration

Specifications

Digital outputs



Contact rating.....250 VAC/30 VDC, 3 A

Switch type.....Form C Relay

.....Single Pole Double Throw
.....Normally Open or Normally Closed

Minimum pulse width.....100 ms

Isolation contact to system ground.....5000 VAC

LED polarity energized relayOn

LED polarity non-energized relayOff

LED colorGreen

For protection from excess current that could be produced by field wiring, see Automation Server Family Hardware Guide.

Regulatory Notices



Federal Communications Commission

FCC Rules and Regulations CFR 47, Part 15, Class B

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference. (2) This device must accept any interference received, including interference that may cause undesired operation.

Industry Canada

ICES-003

This is a Class B digital device that meets all requirements of the Canadian Interference Causing Equipment Regulations.



N1831 C-Tick (Australian Communications Authority (ACA))

AS/NZS 3548

This equipment carries the C-Tick label and complies with EMC and radio communications regulations of the Australian Communications Authority (ACA), governing the Australian and New Zealand (AS/NZS) communities.



CE - Compliance to European Union (EU)

2004/108/EC Electromagnetic Compatibility Directive

This equipment complies with the rules, of the Official Journal of the European Union, for governing the Self Declaration of the CE Marking for the European Union as specified in the above directive(s) per the provisions of the following standards: IEC/EN 61326-1 Product Standard, IEC/EN 61010-1 Safety Standard.



WEEE - Directive of the European Union (EU)

This equipment and its packaging carry the waste of electrical and electronic equipment (WEEE) label, in compliance with European Union (EU) Directive 2002/96/EC, governing the disposal and recycling of electrical and electronic equipment in the European community.



LISTED

UL 916 Listed products for the United States and Canada, Open Class Energy Management Equipment.

Trademarks and registered trademarks are the property of their respective owners.

8 Channel Universal Inputs with 4 Channel Digital Outputs, Form-C (UI-8/DO-FC-4, UI-8/DO-FC-4-H)

Automation Server I/O Module



I/O Module
UI-8/DO-FC-4

The UI-8/DO-FC-4 and UI-8/DO-FC-4-H are combination I/O modules supporting 8 universal input channels and 4 digital output channels. These compact modules are ideal when an application requires a mix of point types.

Analog and digital applications

This module is ideal for any mix of temperature, pressure, flow, status points, and similar inputs in a building control system. The eight input channels supports a 12 bit A/D conversion.

Counter applications

The maximum counter frequency on all eight inputs with a minimum pulse width is 20 milliseconds. This input type is commonly used in energy metering applications.

Security applications

Supervised points are used for security applications where it is critical to know whether or not a wire has been cut or shorted. These events provide a separate indication of alarm and trouble conditions to the system.

Protection

28 V unipolar transient voltage suppressors on all inputs to protect against high voltage short duration transient events.

Status indicators and overrides

The front panel of the UI-8/AO-4 and UI-8/AO-4-H I/O modules includes a digital output indicator using a green LED. Additionally, the UI-8/AO-4-H module has Hand/Off/Auto (HOA) override switches with adjustable potentiometers for each output.

Direct load applications

The Form-C relays are designed for direct load applications for up to 3 A per output.



I/O Module
UI-8/DO-FC-4-H

UI-8/DO-FC-4

UI-8/DO-FC-4-H

Automation Server I/O Module Specifications

| | | |
|--|---|------------------------|
| DC input power | 12 bit | Output channels |
| 24 VDC, 1.9 W | | 4 |
| Input channels | Digital outputs | |
| 8 | | |
| Digital inputs | Form C relay | |
| Contact | Terminals | |
| Pulse width | Common (C), Normally Open (NO), Normally Closed (NC) | |
| 20 ms minimum | | |
| Range | Pulse Width | |
| Open collector/open drain, 24 V, 2.4 mA, dry contact switch closure | 100 ms minimum | |
| Counter | Isolation | |
| Range | 1500 VAC minimum, coil to contact | |
| Open collector/open drain, 24 V, 2.4 mA, dry contact switch closure | | |
| Pulse width | Internal pull-up resistor | |
| 20 ms minimum | 10 kohm thermistors | |
| LED polarity | 10 kohm to 5V | |
| Software selectable, if the LED is activated when the input is high or low | 1.0 (Balco) and 1.8 kohm thermistors | |
| LED color | 1.0 kohm to 1 V | |
| Red or green, software selectable | Mechanical | |
| Supervised | Weight including terminal base | |
| Detected resistor values | 0.304 kg (0.67 lb) | |
| Open circuit, short circuit, contact open, and contact closed | Weight excluding terminal base | |
| 5 V circuit, 1 or 2 resistors, monitored switch combinations | 0.181 kg (0.40 lb) | |
| Series only, parallel only, and series and parallel | Terminal base | |
| Resistor range | TB-IO-W1 | |
| 1 to 10 kohm. For a 2-resistor configuration, each resistor is assumed to have the same value. | Part numbers | |
| Analog inputs | UI-8/DO-FC-4, I/O Module | |
| Voltage | 8 universal inputs, 4 digital Form C outputs | |
| Range | P/N: SXWUI8D4X10001 | |
| 0 to 10 VDC | UI-8/DO-FC-4-H, I/O Module with HOA switches | |
| Resolution | 8 universal inputs, 4 digital Form C outputs with Hand/Off/Auto override switches | |
| | P/N: SXWUI8D4H10001 | |
| Connectors | TB-IO-W1, Terminal Base for I/O Module | |
| — Digital Outputs — | (Required for each I/O Module) | |
| — Universal Inputs — | P/N: SXWTB1OW110001 | |
| | Input Rating: 24 VDC ---, 2.4 mA | |

MP-C

SmartX IP Controller



Introduction

SmartX IP Controller – MP-C is a multi-purpose, fully programmable, IP based field controller. The MP-C models offer a flexible mix of I/O point types that suits a wide range of HVAC applications. MP-C can either be used as a standalone BACnet/IP field controller or as part of an EcoStruxure BMS with an EcoStruxure BMS server, such as a SmartX AS-P or AS-B server, or an Enterprise Server, as the parent server. The MP-C models support an optional display that provides insight and control of the inputs and outputs.

The MP-C features include:

- IP enabled with dual port Ethernet switch
- Versatile onboard I/O point mix
- High reliability
- Sensor bus for living space sensors
- Mobile commissioning application
- Full EcoStruxure Building Operation software support, providing efficient engineering tools

IP connectivity and flexible network topologies

The MP Series controllers are based on open protocols that simplify interoperability, IP configuration, and device management:

- IP addressing

- BACnet/IP communications
- DHCP for easy network configuration

The MP Series controllers have a dual-port Ethernet switch, which enables flexible network topologies:

- Star
- Daisy chain
- Rapid Spanning Tree Protocol (RSTP) ring

In a star topology, the controller and the parent EcoStruxure BMS server are individually connected to an Ethernet switch. You can reduce the installation time and cost by daisy-chaining multiple controllers together. You can use an RSTP ring topology when you want failures of a single controller to be detected and recovered fast and efficiently.

Models with a versatile mix of I/O points

MP-C comes in five models with different I/O point count and a versatile mix of I/O point types that match a wide variety of applications. Most of the I/O points are universal inputs/outputs, which are highly flexible and can be configured as either inputs or outputs.

MP-C

SmartX IP Controller

I/O Point Types by MP-C Models

| I/O Point Types | MP-C-15A | MP-C-18A | MP-C-18B | MP-C-24A | MP-C-36A |
|--------------------------|----------|----------|----------|----------|----------|
| Universal I/O | 8 | 10 | 10 | 16 | 20 |
| Type Ub | | | | | |
| Universal I/O | - | - | - | 4 | 8 |
| Type Uc | | | | | |
| Triac outputs | 6 | 4 | 8 | - | - |
| Relay outputs | - | 3 | - | 4 | 8 |
| High power relay outputs | 1 | 1 | - | - | - |

Configurations by I/O Point Types

| Configurations | Universal I/O Type Ub | Universal I/O Type Uc | Triac Outputs | Relay Outputs | High Power Relay Outputs |
|----------------------------|--------------------------|--------------------------|---------------|------------------|--------------------------|
| Digital inputs | yes | yes | - | - | - |
| Counter inputs | yes | yes | - | - | - |
| Supervised inputs | yes | yes | - | - | - |
| Voltage inputs (0–10 VDC) | yes | yes | - | - | - |
| Current inputs (0–20 mA) | yes | yes | - | - | - |
| Temperature inputs | yes | yes | - | - | - |
| Resistive inputs | yes | yes | - | - | - |
| 2-wire RTD temp. inputs | yes | yes | - | - | - |
| Voltage outputs (0–10 VDC) | yes | yes | - | - | - |
| Current outputs (0–20 mA) | - | yes | - | - | - |
| Digital outputs | - | - | yes | yes | yes |
| Digital pulsed outputs | - | - | yes | yes | yes |
| PWM outputs | - | - | yes | yes ^a | yes ^a |
| Tristate outputs | - | - | yes | yes | - |
| Tristate pulsed outputs | - | - | yes | yes | - |

a) Not suitable as PWM outputs.

MP-C

SmartX IP Controller

Universal inputs/outputs

The universal inputs/outputs are ideal for any mix of temperature, pressure, flow, status points, and similar point types in a building control system.

As counter inputs, the universal inputs/outputs are commonly used in energy metering applications. As RTD inputs, they are ideal for temperature points in a building control system. As supervised inputs, they are used for security applications where it is critical to know whether or not a wire has been cut or shorted. These events provide a separate indication of alarms and trouble conditions to the system.

The universal inputs/outputs can also be used as voltage outputs or current outputs (Uc only), without the need for external bias resistors. Therefore, the universal inputs/outputs support a wide range of devices, such as actuators.

Triac outputs

The triac outputs can be used in many applications to switch 24 VAC on or off for external loads such as actuators, relays, or indicators. The triac outputs are isolated from the controller. Triacs are silent and do not suffer from relay contact wear.

Relay outputs

The relay outputs support digital Form A point types. The Form A relays are designed for direct load applications.

High power relay output

MP-C-15A and MP-C-18A have a high power relay output, which is ideal for switching loads of up to 12 A, such as electrical heating elements.

High reliability

The MP Series controllers support local trends, schedules, and alarms, enabling local operation when the controller is offline or used in standalone applications.

The battery-free power backup of the memory and real-time clock prevents data loss and ensures seamless and quick recover after a power failure.

All MP-C models can be equipped with the MP-C Display add-on module, which features an LCD display and five keys. With this module you can manually override analog and digital outputs for testing, commissioning, and maintenance of equipment

connected to the outputs. The module's dedicated processing power ensures reliable override for maintenance applications. The override status is readable through EcoStruxure Building Operation WorkStation and WebStation, enabling precise monitoring and reliable control.



MP-C Display

WorkStation allows you to update the firmware of multiple MP Series controllers at the same time and with minimum down time. The EcoStruxure BMS server keeps track of the installed firmware to support backup, restore, and replacement of the controllers and sensors. The server can host controllers of different firmware versions.

Sensor bus for living space sensors

The MP Series controllers provide an interface designed for the SmartX Sensor family of living space sensors. The SmartX Sensors offer an efficient way to sense the temperature, humidity, CO₂, and occupancy in a room. The SmartX Sensors are available with different combinations of sensor types and various covers and user interface options, such as touchscreen, setpoint and override buttons, and blank covers.



SmartX Sensors

MP-C

SmartX IP Controller

The sensor bus provides both power and communications for up to four sensors that are daisy-chained using standard Cat 5 (or higher) cables. The maximum number of sensors that can be connected to a controller is variable depending on the sensor model and the combination of cover and sensor base type:

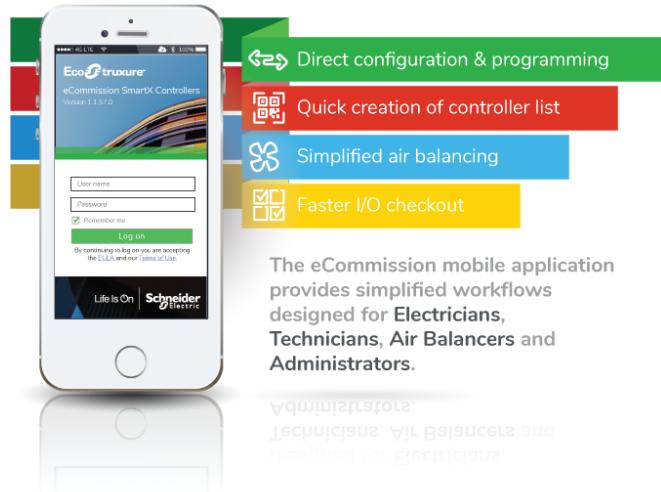
- Blank covers: Up to four sensors of any combination of sensor base types
- 3-button and touchscreen covers:
 - Up to two sensor bases with CO₂ option
 - Up to four sensor bases without CO₂ option
- SmartX LCD temperature sensors: Up to four sensors are supported

The maximum total length of the sensor bus is 61 m (200 ft). For more information, see the SmartX Living Space Sensors Specification Sheet.

Mobile commissioning application

The eCommission SmartX Controllers mobile application is designed for local configuration, field deployment, and commissioning of MP Series controllers. The mobile application reduces the commissioning time, allows flexibility in project execution, and eliminates dependencies on network infrastructure.

The mobile application is designed for use with Android, Apple (iOS), and Microsoft Windows 10 devices. For more information, see the eCommission SmartX Controllers Specification Sheet.



eCommission SmartX Controllers mobile application

The mobile device running eCommission SmartX Controllers can connect to a single MP Series controller via a SmartX Sensor with use of the eCommission Bluetooth Adapter, or connect to a network of MP Series controllers on the local IP network, using a wireless access point or a network switch.

Device configuration

With the eCommission SmartX Controllers mobile application you can easily discover MP Series controllers on the IP network and change each controller's configuration, including the BACnet and IP network settings, location, and parent server. You can save common device settings and then reuse them for controllers of the same model, thus saving engineering time.

Field deployment and I/O checkout

eCommission SmartX Controllers does not require an EcoStruxure BMS server or a network infrastructure to be in place. You can use the mobile application to load the application directly into the local MP Series controller and deploy the controller. The application can be created offline using Project Configuration Tool or WorkStation. You can also perform an I/O checkout to ensure that the controller's I/O points are configured, wired, and operating correctly.

Full EcoStruxure Building Operation software support

The power of the MP Series controllers is fully realized when as part of an EcoStruxure BMS, providing benefits such as:

- WorkStation/WebStation interface
- Script and Function Block programming options
- Device discovery
- Engineering efficiency

WorkStation/WebStation interface

WorkStation and WebStation provides a consistent user experience regardless of which EcoStruxure BMS server the user is logged on to. The user can log on to the parent EcoStruxure BMS server to engineer, commission, supervise, and monitor the MP Series controller and its I/O as well as its attached SmartX Sensors. For more information, see the WorkStation and WebStation specification sheets.

MP-C

SmartX IP Controller

Script and Function Block programming options

Unique to the industry, the MP Series controllers have both Script and Function Block programming options. This flexibility assures that the best programming method can be selected for the application. Existing programs can easily be reused between the EcoStruxure BMS server and the controller.

Device discovery

The enhanced Device Discovery in WorkStation enables you to easily identify MP Series controllers on a BACnet network and to associate the controllers with their parent server.

Engineering efficiency

The engineering and maintenance of MP Series controllers can be done very efficiently using the EcoStruxure Building Operation reusability features. With these features, you can create library items (Custom Types) that include a complete controller application, containing programs and all necessary objects such as trends, alarms, and schedules. The controller application in the Custom Types library is reusable across all controllers of the same model. You can use the controller application as a base for creating new controllers intended for similar applications. You can then edit the controller application, and the changes are automatically replicated to all controllers, while each controller keeps its local values.

WorkStation supports both online and offline engineering of MP Series controllers. You can choose to make the configuration changes online or use the database mode to make the changes offline. In the database mode, the changes are saved to the EcoStruxure Building Operation database so that you can apply the changes to the controllers at a later stage.

Project Configuration Tool enables you to perform all the engineering off site, without the need for physical hardware, which minimizes the time you need to spend on site. You can run the EcoStruxure BMS servers virtually, and engineer the MP Series controllers, before you deploy your applications to the servers and controllers on site.

In addition, you can use Automated Engineering Tool to facilitate your engineering process when using MP Series controllers. This tool provides access to a library of standard applications. These standards can be quickly configured and customized using the wizards and mass edit functions provided in the tool and then loaded into your target server. The tool also enables the quick creation of your own templates based on MP Series controller applications that you have developed. This facilitates a standard approach and drives the ability to easily reuse and duplicate common applications.

MP-C

SmartX IP Controller

Part Numbers

| Product | Part number |
|---|-----------------|
| MP-C-15A | SXWMPC15A10001 |
| MP-C-18A | SXWMPC18A10001 |
| MP-C-18B | SXWMPC18B10001 |
| MP-C-24A | SXWMPC24A10001 |
| MP-C-36A | SXWMPC36A10001 |
| MP-C DISPLAY (MP-C override display module) | SXWMPCDSP10001 |
| Spare terminal blocks for all MP-C models (4 x 3-pin, 1 x 4-pin, 7 x 6-pin, 2 x 8-pin terminal blocks) | SXWMPCCON10001 |
| DIN-RAIL-CLIP, DIN-rail end clip package of 25 pieces | SXWDINEND10001 |
| eCommission Bluetooth Adapter | SXWBTAECXX10001 |

Specifications

AC input

| | |
|--|-----------------------------------|
| Nominal voltage..... | 24 VAC |
| Operating voltage range | +/-20 % |
| Frequency | 50/60 Hz |
| Maximum power consumption (MP-C-15A, MP-C-18A, and MP-C-18B) | 22 VA |
| Maximum power consumption (MP-C-24A) | 28 VA |
| Maximum power consumption (MP-C-36A) | 33 VA |
| Power input protection..... | MOV suppression and internal fuse |

DC input

| | |
|---|-----------------------------------|
| Nominal voltage..... | 24 to 30 VDC |
| Operating voltage range | 21 to 33 VDC |
| Maximum power consumption (MP-C-15A, MP-C-18A, and MP-C-18B)..... | 12 W |
| Maximum power consumption (MP-C-24A)..... | 15 W |
| Maximum power consumption (MP-C-36A)..... | 18 W |
| Power input protection..... | MOV suppression and internal fuse |

Environment

| | |
|---|--|
| Ambient temperature, operating | 0 to 50 °C (32 to 122 °F) at normal operation ^a |
| | -40 to +60 °C (-40 to +140 °F) for rooftop applications, horizontal installation only ^a |
| a) MP-C Display has an operating temperature range of -30 to +60 °C (-22 to +140 °F). | |
| Ambient temperature, storage | -40 to +70 °C (-40 to +158 °F) |
| Maximum humidity..... | 95 % RH non-condensing |

MP-C

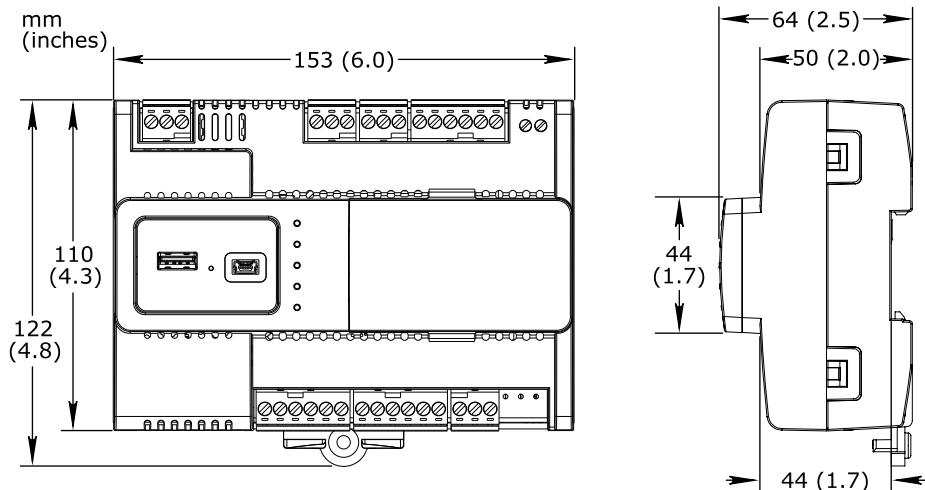
SmartX IP Controller

Material

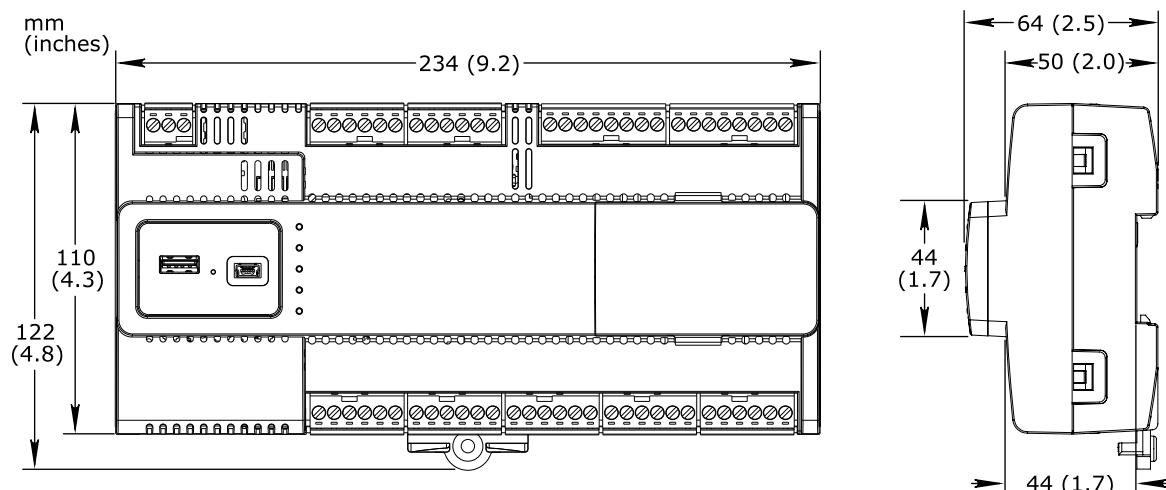
| | |
|---------------------------------|---------|
| Plastic flame rating | UL94-5V |
| Ingress protection rating | IP 20 |

Mechanical

Dimensions (MP-C-15A, MP-C-18A, and MP-C-18B) 153 W x 110 H x 64 D mm (6.0 W x 4.3 H x 2.5 D in.)



Dimensions (MP-C-24A and MP-C-36A) 234 W x 110 H x 64 D mm (9.2 W x 4.3 H x 2.5 D in.)



| | |
|---|---------------------|
| Weight, MP-C-15A Including terminal blocks | 0.358 kg (0.789 lb) |
| Weight, MP-C-18A Including terminal blocks | 0.371 kg (0.818 lb) |
| Weight, MP-C-18B Including terminal blocks | 0.361 kg (0.796 lb) |
| Weight, MP-C-24A Including terminal blocks | 0.495 kg (1.091 lb) |
| Weight, MP-C-36A Including terminal blocks | 0.547 kg (1.206 lb) |

MP-C

SmartX IP Controller

Installation DIN rail or wall

Terminal blocks Removable

Software compliance

EcoStruxure Building Operation software version 2.0 or later

Agency compliances

Emission RCM; EN 61000-6-3; EN 50491-5-2; FCC Part 15, Sub-part B, Class B

Immunity EN 61000-6-2; EN 50491-5-3

Safety EN 60730-1; EN 60730-2-11; EN 50491-3; UL 916 C-UL US Listed

Product EN 50491-1

Real-time clock

Accuracy, at 25 °C (77 °F) +/-1 minute per month

Backup time, at 25 °C (77 °F) 7 days minimum

Communication ports

Ethernet Dual 10/100BASE-TX RJ45

USB USB 2.0, 5 VDC, 2.5 W, 1 device port (mini-B) and 1 host port (type-A)

Sensor Bus 24 VDC, 2 W, proprietary RS-485 (RJ45)

Sensor Bus protection Transient voltage suppressors on communication and power signals

Communications

BACnet BACnet/IP, port configurable, default 47808

..... BTL B-AAC (BACnet Advanced Application Controller)^a

a) See the BTL Product Catalog for up-to-date details on BTL listed firmware revisions on BACnet International's home page.

CPU

Frequency 500 MHz

Type ARM Cortex-A7 dual-core

DDR3 SDRAM 128 MB

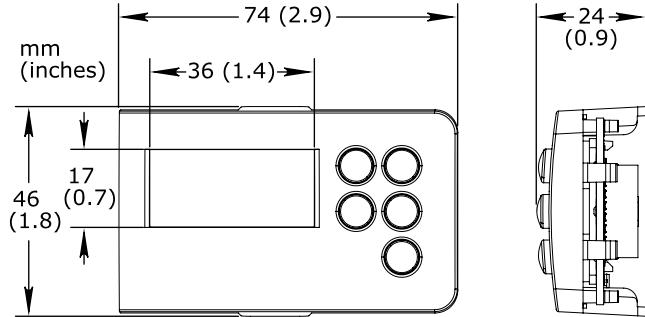
NOR flash memory 32 MB

Memory backup 128 kB, FRAM, non-volatile

MP-C Display (Optional)

Removable No

Dimensions (W x H x D) 74 x 46 x 24 mm (2.9 x 1.8 x 0.9 in.)



MP-C

SmartX IP Controller

| | |
|--|---|
| Display size | 36 W x 17 H mm (1.4 W x 0.7 H in.) |
| Display resolution | 128 x 64 pixels |
| Display type..... | FSTN monochrome LCD, white color transflective backlight |
| Power consumption | max. 0.15 W (45 mA at 3.3 V) |
| Ambient temperature, operating | -30 to +60 °C (-22 to +140 °F) |
| Ambient temperature, storage | -40 to +70 °C (-40 to +158 °F) |
| Maximum humidity..... | 95 % RH non-condensing |
| Weight | 0.035 kg (0.077 lb) |
| Compliance with standards | EN ISO 16484-2 |
| Universal inputs/outputs, Ub and Uc | |
| Channels, MP-C-15A..... | 8 Ub, Ub1–Ub8 |
| Channels, MP-C-18A..... | 10 Ub, Ub1–Ub10 |
| Channels, MP-C-18B | 10 Ub, Ub1–Ub10 |
| Channels, MP-C-24A..... | 16 Ub, Ub1–Ub16 4 Uc, Uc1–Uc4 |
| Channels, MP-C-36A..... | 20 Ub, Ub1–Ub20 8 Uc, Uc1–Uc8 |
| Absolute maximum ratings | -0.5 to +24 VDC |
| A/D converter resolution | 16 bits |
| Universal input/output protection..... | Transient voltage suppressor on each universal input/output |
| Digital inputs | |
| Range | Dry contact switch closure or open collector/open drain, 24 VDC, typical wetting current 2.4 mA |
| Minimum pulse width | 150 ms |
| Counter inputs | |
| Range | Dry contact switch closure or open collector/open drain, 24 VDC, typical wetting current 2.4 mA |
| Minimum pulse width | 20 ms |
| Maximum frequency..... | 25 Hz |
| Supervised inputs | |
| 5 V circuit, 1 or 2 resistors | |
| Monitored switch combinations | Series only, parallel only, and series and parallel |
| Resistor range | 1 to 10 kohm |
| For a 2-resistor configuration, each resistor must have the same value +/- 5 % | |
| Voltage inputs | |
| Range | 0 to 10 VDC |
| Accuracy..... | +/- (7 mV + 0.2 % of reading) |
| Resolution..... | 1.0 mV |
| Impedance..... | 100 kohm |
| Reliability check..... | Yes |

MP-C

SmartX IP Controller

Current inputs

| | |
|------------------------|----------------------------------|
| Range | 0 to 20 mA |
| Accuracy..... | +/- (0.01 mA + 0.4 % of reading) |
| Resolution..... | 1 µA |
| Impedance | 47 ohm |
| Reliability check..... | Yes |

Resistive inputs

| | |
|-----------------------------------|---|
| 10 ohm to 10 kohm accuracy | +/- (7 + 4 x 10 ⁻³ x R) ohm |
| R = Resistance in ohm | |
| 10 kohm to 60 kohm accuracy | +/- (4 x 10 ⁻³ x R + 7 x 10 ⁻⁸ x R ²) ohm |
| R = Resistance in ohm | |

Reliability check..... Yes

Temperature inputs (thermistors)

| | |
|------------------------|---------------------------------|
| Range | -50 to +150 °C (-58 to +302 °F) |
| Reliability check..... | Yes |

Supported thermistors

| | |
|--------------------------------|--------------------|
| Honeywell | 20 kohm |
| Type I (Continuum) | 10 kohm |
| Type II (I/NET) | 10 kohm |
| Type III (Satchwell) | 10 kohm |
| Type IV (FD) | 10 kohm |
| Type V (FD w/ 11k shunt) | Linearized 10 kohm |
| Satchwell D?T..... | Linearized 10 kohm |
| Johnson Controls | 2.2 kohm |
| Xenta..... | 1.8 kohm |
| Balco..... | 1 kohm |

Measurement accuracy

| | |
|--------------------------------------|---|
| 20 kohm | -50 to -30 °C: +/- 1.5 °C (-58 to -22 °F: +/- 2.7 °F) -30 to 0 °C: +/- 0.5 °C (-22 to +32 °F: +/- 0.9 °F) 0 to 100 °C: +/- 0.2 °C (32 to 212 °F: +/- 0.4 °F) 100 to 150 °C: +/- 0.5 °C (212 to 302 °F: +/- 0.9 °F) |
| 10 kohm, 2.2 kohm, and 1.8 kohm..... | -50 to -30 °C: +/- 0.75 °C (-58 to -22 °F: +/- 1.35 °F) -30 to +100 °C: +/- 0.2 °C (-22 to +212 °F: +/- 0.4 °F) 100 to 150 °C: +/- 0.5 °C (212 to 302 °F: +/- 0.9 °F) |
| Linearized 10 kohm | -50 to -30 °C: +/- 2.0 °C (-58 to -22 °F: +/- 3.6 °F) -30 to 0 °C: +/- 0.75 °C (-22 to +32 °F: +/- 1.35 °F) 0 to 100 °C: +/- 0.2 °C (32 to 212 °F: +/- 0.4 °F) 100 to 150 °C: +/- 0.5 °C (212 to 302 °F: +/- 0.9 °F) |
| 1 kohm | -50 to +150 °C: +/- 1.0 °C (-58 to +302 °F: +/- 1.8 °F) |

MP-C

SmartX IP Controller

<!!>TO BE CONFIRMED: RTD temperature input specifications below are not yet confirmed. Testing incomplete. Note that for MP-C ONLY, there may end up being two sets of UIO accuracy limits - one for 0-50C and another for -40 to +60C.</!!>

RTD temperature inputs

Reliability check.....Yes

Supported RTDs.....Pt1000

Pt1000

Range.....-50 to +150 °C (-58 to +302 °F)

Measurement accuracy-50 to +70 °C: +/-0.5 °C (-58 to +158 °F: +/-0.9 °F)
.....70 to 150 °C: +/-0.7 °C (158 to 302 °F: +/-1.3 °F)

RTD temperature wiring

Maximum wire resistance.....20 ohm/wire (40 ohm total)

Maximum wire capacitance.....60 nF

The wire resistance and capacitance typically corresponds to a 200 m wire.

Voltage outputs

Range0 to 10 VDC

Accuracy+/-60 mV

Resolution10 mV

Minimum load resistance5 kohm

Load range.....-1 to +2 mA

Current outputs (Uc only)

Range0 to 20 mA

Accuracy+/-0.2 mA

Resolution21 µA

Load range.....0 to 650 ohm

Relay outputs, DO

Channels, MP-C-15A0

Channels, MP-C-18A3, DO5–DO7

Channels, MP-C-18B0

Channels, MP-C-24A4, DO1–DO4

Channels, MP-C-36A8, DO1–DO8

Contact rating.....250 VAC/30 VDC, 2 A, Pilot Duty (C300)

Switch typeForm A Relay

.....Single Pole Single Throw
.....Normally Open

Isolation contact to system ground.....3000 VAC

Cycle life (Resistive load)At least 100,000 cycles

Minimum pulse width100 ms

High power relay outputs, DO

Channels, MP-C-15A1, DO7

MP-C

SmartX IP Controller

| | |
|---|--|
| Channels, MP-C-18A | 1, DO8 |
| Channels, MP-C-18B | 0 |
| Channels, MP-C-24A | 0 |
| Channels, MP-C-36A | 0 |
| Contact rating | 250 VAC/24 VDC, 12 A, Pilot Duty (B300) |
| Switch type | Form A Relay Single Pole Single Throw Normally Open |
| Isolation contact to system ground..... | 5000 VAC |
| Cycle life (Resistive load) | At least 100,000 cycles |
| Minimum pulse width | 100 ms |
| Triac outputs, DO | |
| Channels, MP-C-15A | 6, DO1–DO6 |
| Channels, MP-C-18A | 4, DO1–DO4 |
| Channels, MP-C-18B | 8, DO1–DO8 |
| Channels, MP-C-24A | 0 |
| Channels, MP-C-36A | 0 |
| Output rating (for each triac output) | Max. 0.5 A |
| Voltage | 24 VAC +/-20 % |
| Commons | COM1 for DO1 and DO2 (on MP-C-15A, MP-C-18A, and MP-C-18B) COM2 for DO3 and DO4 (on MP-C-15A, MP-C-18A, and MP-C-18B) COM3 for DO5 and DO6 (on MP-C-15A and MP-C-18B) COM4 for DO7 and DO8 (on MP-C-18B only) |
| The common terminals can be connected to 24 VAC or to ground. | |
| Common voltage, high side output..... | 24 VAC |
| Common voltage, low side output | 0 VAC (ground) |
| Minimum pulse width | 100 ms |
| Triac output protection..... | MOV and snubber across each triac output MOV from triac COM to ground |

Terminals

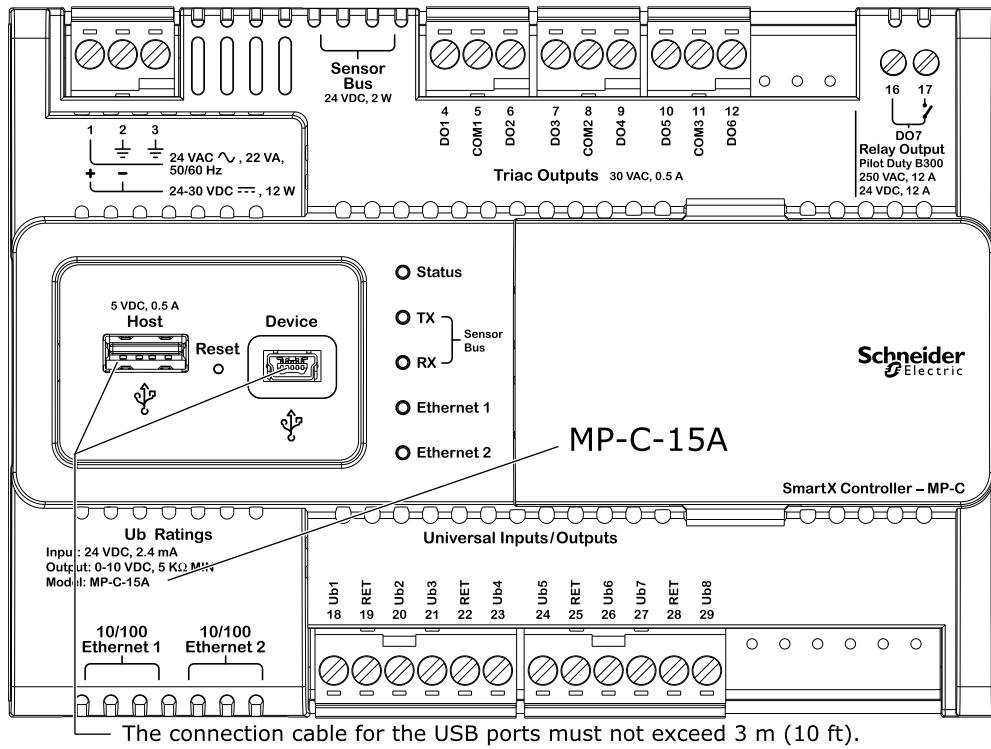
Be sure to follow proper installation wiring diagrams and instructions, including these instructions:

- All MP-C models have several RET terminals for connection of I/O returns, so a common chassis/signal ground rail is optional and may not be needed.

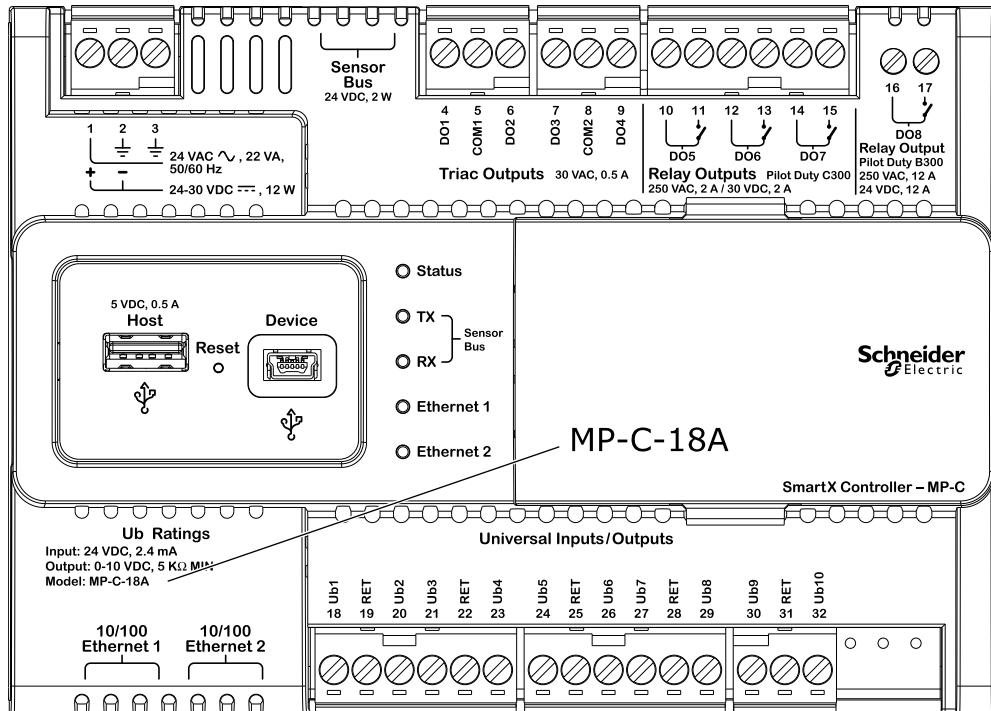
- Individual 24 VDC power sources to the field must be current limited to maximum 4 A for UL compliant installations, and maximum 6 A in other areas.
- For more information on wiring, see Hardware Reference Guide.

MP-C

SmartX IP Controller



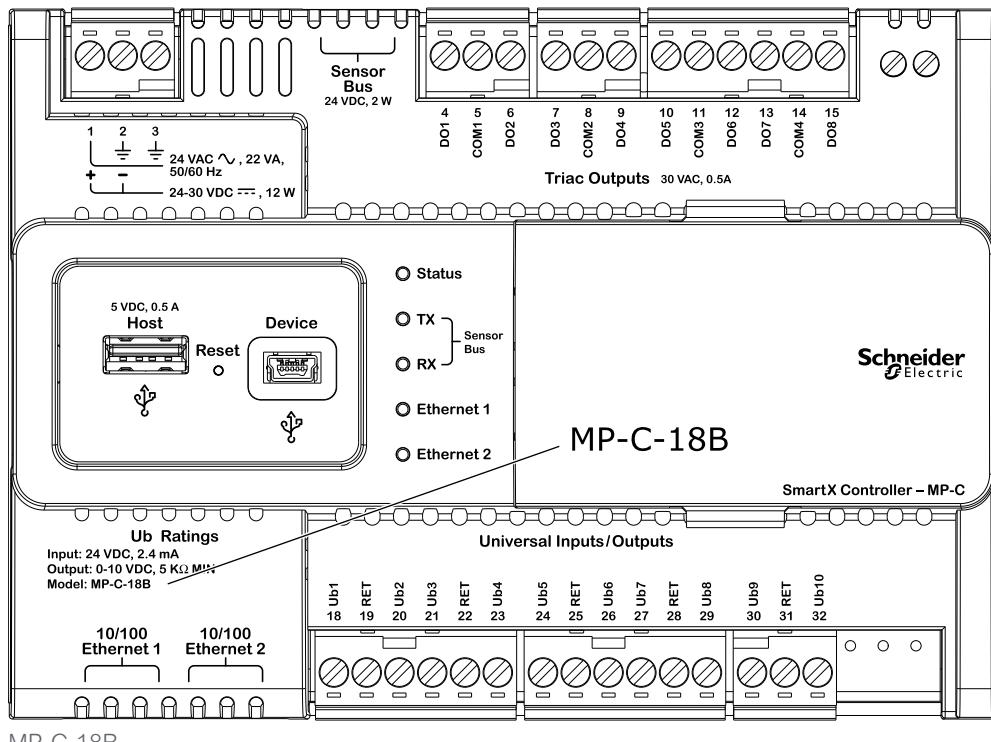
MP-C-15A



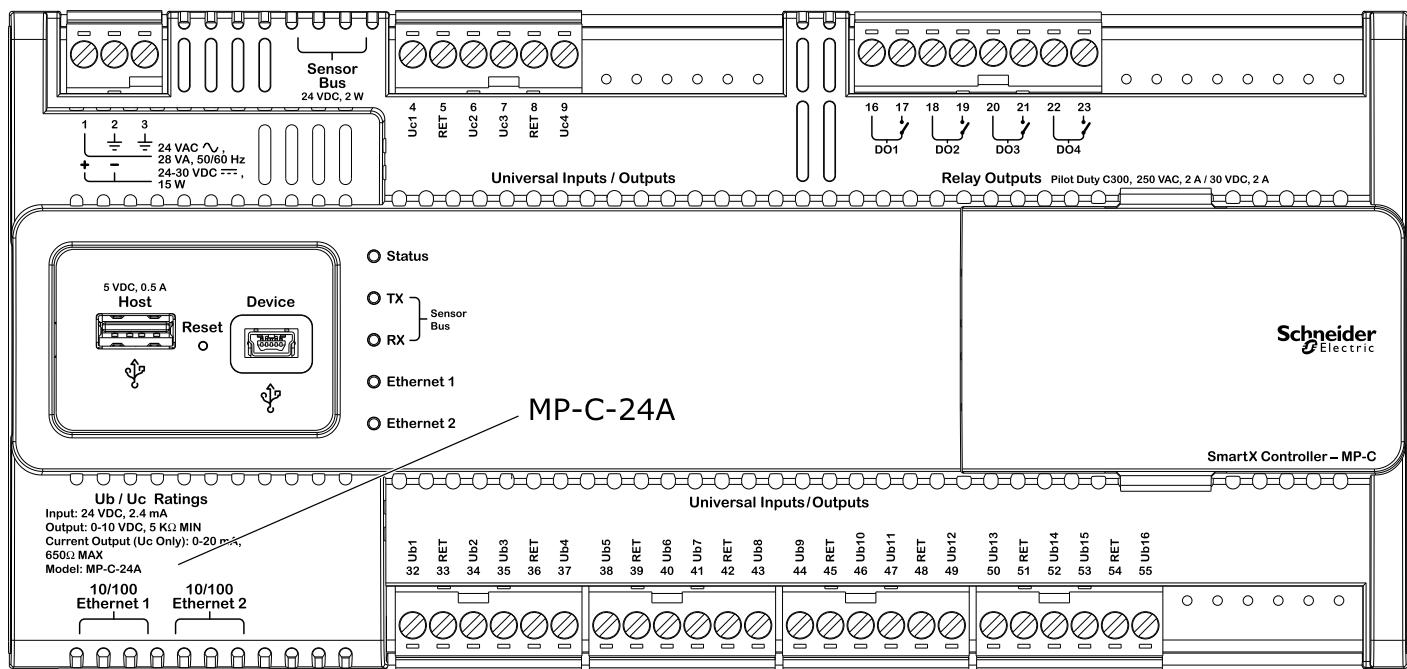
MP-C-18A

MP-C

SmartX IP Controller



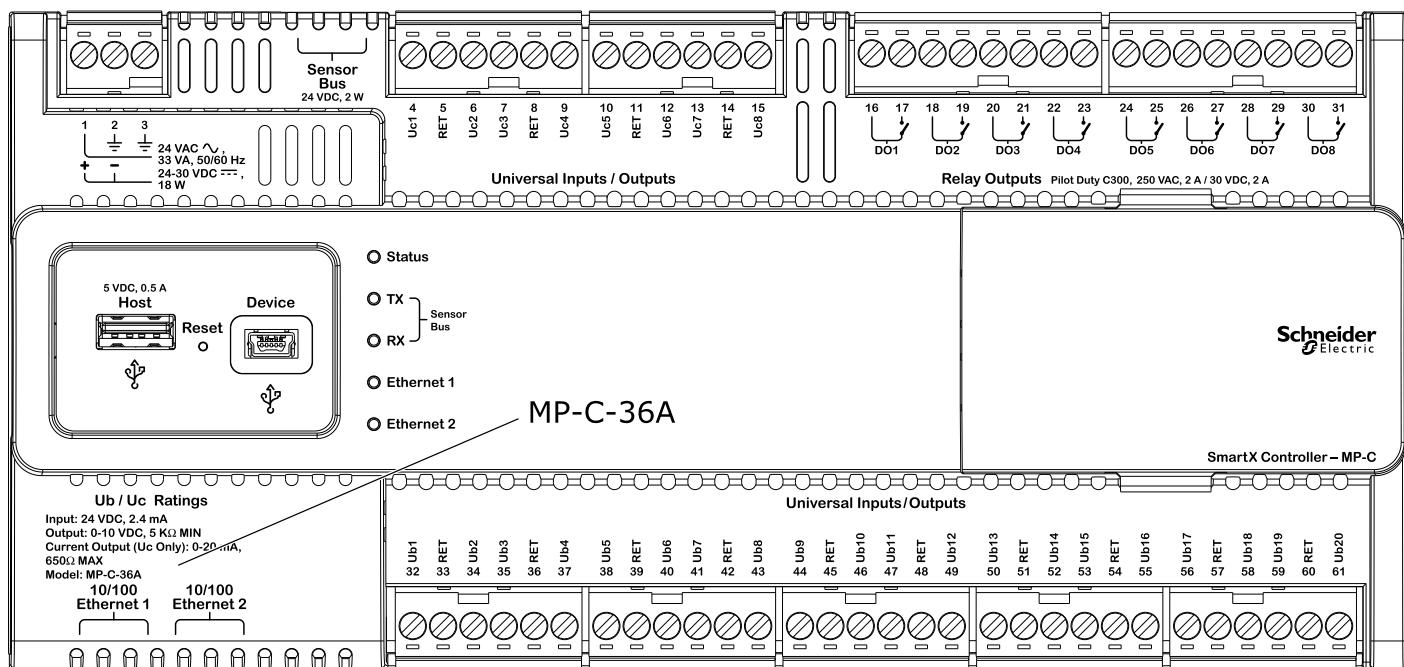
MP-C-18B



MP-C-24A

MP-C

SmartX IP Controller



MP-C-36A

Regulatory Notices

FCC Federal Communications Commission

FCC Rules and Regulations CFR 47, Part 15, Class B

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference. (2) This device must accept any interference received, including interference that may cause undesired operation.

Industry Canada

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

RCM - Australian Communications and Media Authority (ACMA)

This equipment complies with the requirements of the relevant ACMA standards made under the Radiocommunications Act 1992 and the Telecommunications Act 1997. These standards are referenced in notices made under section 182 of the Radiocommunications Act and 407 of the Telecommunications Act.

CE - Compliance to European Union (EU)

2014/30/EU Electromagnetic Compatibility Directive

2014/35/EU Low Voltage Directive

2011/65/EU Restriction of Hazardous Substances (RoHS) Directive

This equipment complies with the rules, of the Official Journal of the European Union, for governing the Self Declaration of the CE Marking for the European Union as specified in the above directive(s) per the provisions of the following standards: EN 50491-1 Product Standard; EN 60730-1, EN 60730-2-11, and EN 50491-3 Safety Standards.



WEEE - Directive of the European Union (EU)

This equipment and its packaging carry the waste of electrical and electronic equipment (WEEE) label, in compliance with European Union (EU) Directive 2012/19/EU, governing the disposal and recycling of electrical and electronic equipment in the European community.



UL LISTED UL 916 Listed products for the United States and Canada, Open Class Energy Management Equipment. UL file E80146.

5 & 8 Port, Ultra Compact Industrial Ethernet Switches

ESW105 & ESW108 Series



PRODUCT FEATURES

- Ultra compact design - less than 1 inch wide
- UL/cUL Class I/Division 2 Groups A,B,C, and D
- Designed to meet Level 3 (Heavy) industrial environments - EN61000-6-2 Certifications
- Shock, vibration, free fall tested
- LC single and multi mode fiber ports
- 10/100M, full/half duplex, MDI/MDI-X (Auto-negotiate)
- Supports IEEE 802.3, 802.3u, and 802.3x standards
- IP30 rated DIN rail case with 6 different panel mount options
- Dual power inputs, 12 to 36 VDC and 10 to 24 VAC
- 2K MAC addresses

Designed to fit many applications, the ESW105 and ESW108 series are more than just an Ethernet switch with low pricing. They are plug-and-play industrial Ethernet Switches with an ultra compact IP30 DIN rail case, 6 way mountable panel brackets, LEDs for Power, (Link / Speed / Activity for each port), 12 to 36 VDC and 10 to 24 VAC power inputs with removable terminal blocks. These switches are perfect for any applications that require special protection from harsh environments.

Choose a switch with five or eight copper ports, or a combination of copper and fiber ports. Multi-mode fiber models extend range up to 2 km. Single-mode fiber models extend range up to 20 km. All models require an external power supply (sold separately).

The switch ships with 4 panel mount clips giving the user 6 different ways to panel mount the unit.

ORDERING INFORMATION

| MODEL NUMBER | 10/100 COPPER | MULTI-MODE FIBER | SINGLE-MODE FIBER |
|--------------|---------------|------------------|-------------------|
| ESW105 | 5 | | |
| ESW105-ML | 4 | 1 (LC) | |
| ESW105-SL | 4 | | 1 (LC) |
| ESW108 | 8 | | |
| ESW108-ML | 7 | 1 (LC) | |
| ESW108-SL | 7 | | 1 (LC) |

ACCESSORIES

- DFMM-LCLC-3M - Multi-Mode Duplex Fiber Cable, LC to LC, 3 Meter
 MDR-20-24 - DIN rail mount power supply 24VDC, 1.0 A output power
 MDR-40-24 - DIN rail mount power supply 24VDC, 1.7 A output power
 EIRSP1 - Industrial DIN rail mount Ethernet Surge Suppressor

5 & 8 Port, Ultra Compact Industrial Ethernet Switches

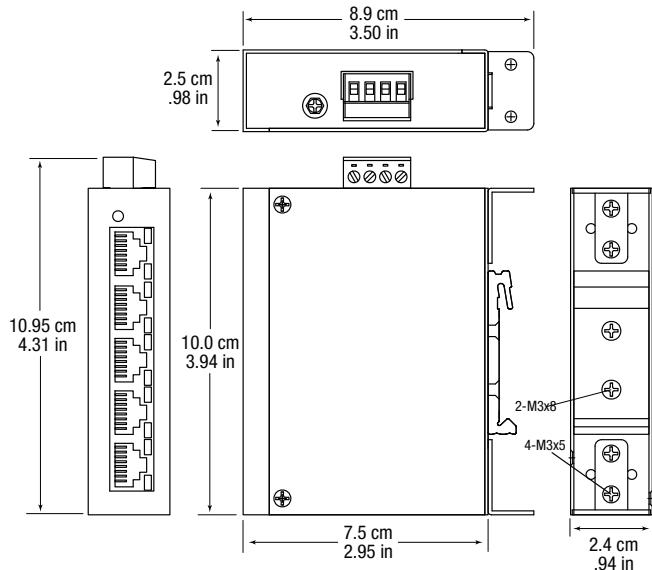
ESW105 & ESW108 Series



SPECIFICATIONS

| TECHNOLOGY | |
|-----------------------|--|
| Standards: | IEEE802.3, 802.3u, 802.3x |
| Processing Type: | Store and forward with IEEE802.3x full duplex, non-blocking flow control |
| Flow Control: | IEEE802.3x flow control, back pressure flow control |
| Packet Buffer Memory: | 64K bytes |
| Address Table Size | 2K MAC Addresses |
| INTERFACE | |
| RJ45 Ports: | 10/100BaseT(X) auto negation, Full/Half duplex, auto MDI/MD-X |
| Fiber Ports: | 100BaseFX, (multi-mode or single-mode with LC connectors) |
| LED Indicators: | Power, (Link / Speed / Activity for each port) |
| POWER | |
| Input Voltage | 12 to 36 VDC and 10 to 24 VAC |
| Power Consumption | 4.00 W Max |
| Input Connection | Removable Terminal Block |
| Protection | Reverse Polarity Protection |
| ENVIRONMENTAL | |
| Operating Temperature | -10 to 60°C (14 to 140°F) |
| Storage Temperature | -40 to 80°C (-40 to 176°F) |
| Humidity | 10 to 95% Non-condensing |
| MTBF | 200,000 hours |
| MTBF Calculation | Parts count reliability prediction |
| MECHANICAL | |
| Enclosure | IP30 DIN mount metal case |
| Dimensions (5 ports) | H 10.0 x W 2.5 x D 7.5 mm (3.94 x 0.98 x 2.95in) |
| Dimensions (8 ports) | H 145 x W 24 x D 75mm (5.71 X 0.94 x 2.95in) |
| Installation | 35 mm DIN or 6 way panel mount |

MECHANICAL DIAGRAM 5 PORT MODEL



FIBER OPTICS

| Fiber Type | Distance | Wavelength | Transmit Power | Receive Sensitivity |
|-------------|----------|------------|--------------------|---------------------|
| Multi-mode | 2 km | 1310 nm | -.23.5 to -.14 dBm | ≤ -.35 dBm |
| Single-mode | 20 km | 1310 nm | -.15 to -.8 dBm | ≤ -.35 dBm |

REGULATORY APPROVALS

CE, FCC, RoHS

HAZARDOUS LOCATIONS

UL/cUL Class I Div 2 Groups A,B,C, and D

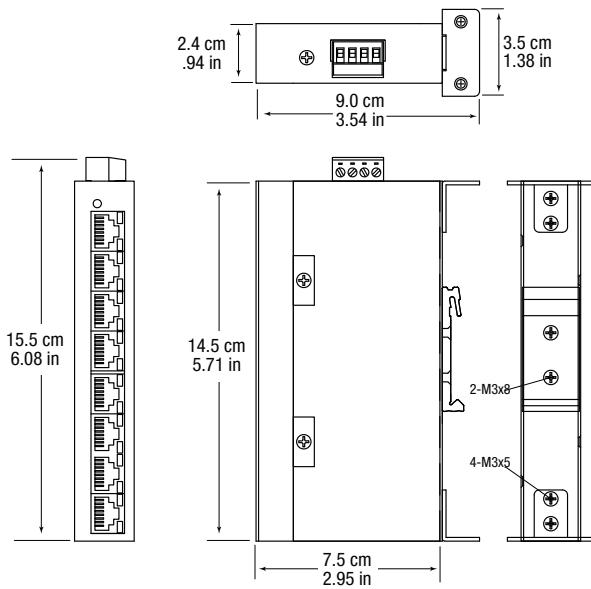
SPECIFICATIONS-LEVEL 3, EN 61000-6-2: 2006 GENERIC STANDARDS FOR (HEAVY) INDUSTRIAL ENVIRONMENTS

| Test | Description | Test Level | Level |
|--------------------------|--------------------------------|--|--------|
| EN 55022: 2006 + A1:2007 | Class B Emissions | | |
| EN 61000-4-2: 2009 | Electro-Static Discharge (ESD) | Enclosure Contact 6kV Enclosure Air 8kV | 3 3 |
| EN61000-4-3:2006+A1:2008 | Radiated Field Immunity (RFI) | Enclosure Ports 10V/m | 3 |
| EN61000-4-4:2004 | Burst (Fast Transient) | Signal Ports 1kV@2.5Khz DC Ports 2kV | 3 3 |
| EN61000-4-5:2006 | Surge | Signal Ports 1kV DC Power 2kV | 3 |
| EN61000-4-6: 2009 | Induced (Conductive) RFI | Signal Ports 10 V RMS DC Power Ports 10 V RMS | 3 3 |

ENVIRONMENTAL SPECIFICATIONS

| TEST | DESCRIPTION | TEST LEVEL | LEVEL |
|----------------|-------------|------------|-------|
| IEC60068-2-6 | Vibration | Test Fc | 2G |
| IEC60068-2-27 | Shock | Test Ea | 30G |
| IEC 60068-2-32 | Free Fall | | ----- |

MECHANICAL DIAGRAM 8 PORT MODEL



[Temperature Sensors]

ET Series



SPECIFICATIONS

| | | | |
|--------------------------------|--|---|-------------------------------|
| | For TAC Vista, I/NET, Continuum, and I/A | 1000 Ohm Platinum | 1000 Ohm BALCO |
| Output | 1.8K Ohms @ 77° F (25° C) Vista 10K Ohms @ 77° F (25° C) I/Net 10K Ohms @ 77° F (25° C) Continuum 10K Ohms @ 77° F (25° C) with 11K Ohms shunt resistor I/A | 1K Ohms @ 32°F (0°C) | 1000 Ohms @ 70°F (21°C) |
| Temperature Range | -40° to 302° F (-40° to 150° C) | -58° to 392°F (-50 to 200°C) -50° to 275°F (-45.5° to 134.8°C) | -40° to 240°F (-40° to 116°C) |
| Interchangeability | +/- 0.2 C (0° to 70° C) | | |
| Temperature Coefficient | | 0.00385 Ohm/Ohm/°C | 2.2 Ohms/°F |
| Dissipation Constant Stability | 3 mW / C | | |
| Accuracy | +/- 0.2° C (0° to 70° C) +/- 0.4° F (32° to 158° C) | +/- 0.06% @ 32°F (0°C) Single Point +/- 1.0 Ohm @ 70°F (Averaging) | +/- 0.1% |
| Operating Humidity | 0 to 90% RH non-condensing | | |

Application

Thermistors offer high accuracy and interchangeability over a wide temperature range. The ET series can be used in the following applications:

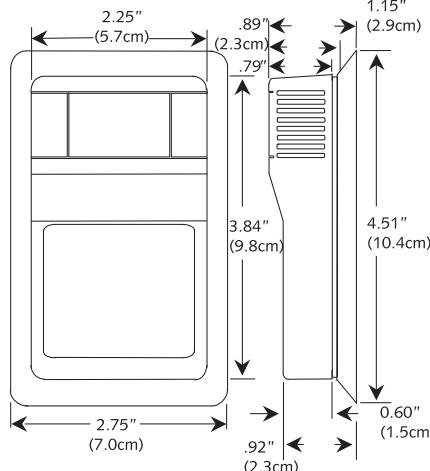
- Space
- Duct
- Immersion
- Averaging
- Strap-On
- Bead/Bullet
- Outdoor Air

Features

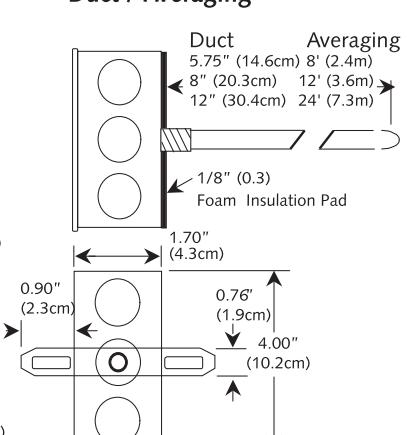
- Offer high accuracy and interchangeability over a wide temperature range.
- Non-polarity sensitive

DIMENSIONS

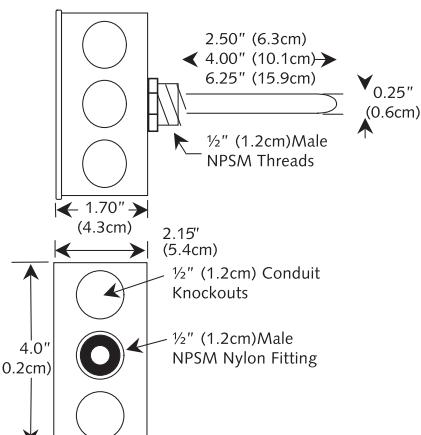
Room



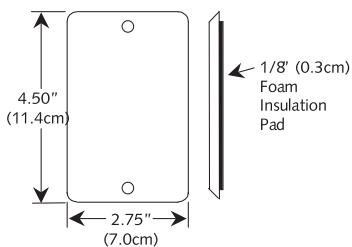
Duct / Averaging



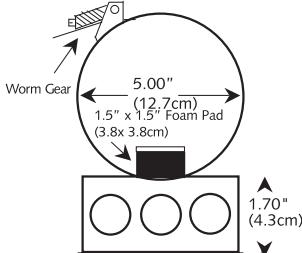
Immersion



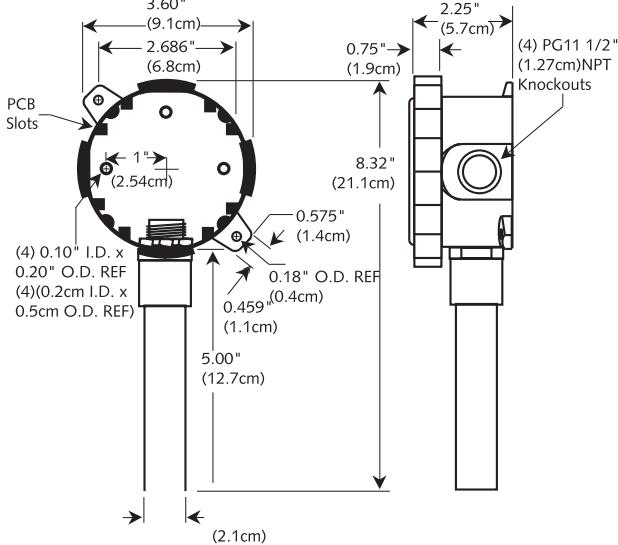
Stainless Plate



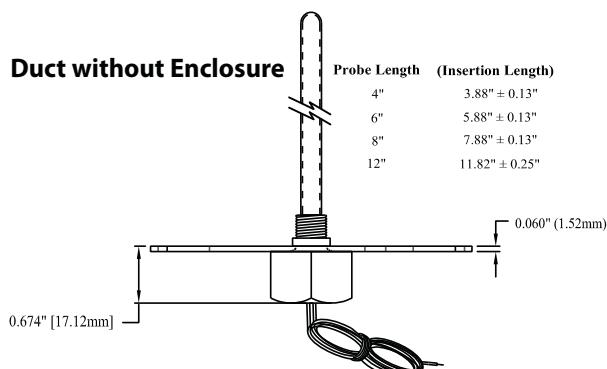
Strap-On



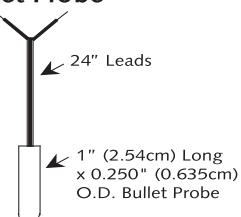
Outside Air



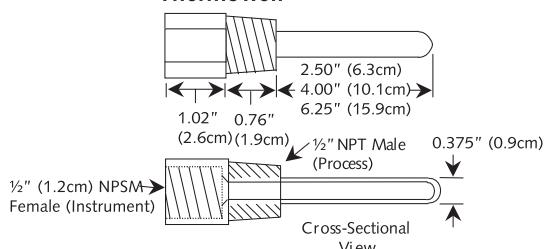
Duct without Enclosure



Bullet Probe



Thermowell



INSTALLATION

Room Temperature Sensors

This unit is suitable for either drywall mounting or junction box mounting. The room sensor is provided with screw terminal blocks for all connections. Remove the cover from the unit and mount the housing base to the wall using the (2) 6/32" x 1" machine screws. Replace the cover and tighten down, using the (2) 1/16" Allen Screws located on the bottom of the enclosure.

Duct and Duct Averaging Sensors

Duct temperature sensors - drill a 3/8" hole in the duct and insert the probe through the hole until the foam pad is tight to the duct. Now insert (2) screws through the mounting holes in flange and tighten them until the unit is held firmly to the duct. Duct Averaging sensors - Drill a 3/8" hole in the duct and insert the averaging element through the hole until the foam pad is tight to the duct. Now insert the (2) screws through the holes in the mounting flange and tighten until the unit is held firmly to the duct. The sensor should then be strung in a criss-cross pattern throughout the duct using the mounting clips provided, in a pattern that covers the greatest surface area of the duct, to insure that there is no stratification. When bending the copper tubing, be careful that you use a gradual bend and that you DO NOT kink the copper tubing.

Immersion Temperature Sensors

The Fluid Immersion-type sensors are provided with a 2 1/2", 4", or 6 1/4" insertion length, 304 series stainless steel thermowell. The thermowell has a 1/2" NPT external or process thread and a 1/2" NPS Female process thread. Heat transfer compound may be used but it is not necessary.

Strap-On Temperature Sensors

The TAC Strap-On sensors, are provided in a NEMA 1 rated junction box with an adjustable 2" to 5" pipe clamp. The unit should be mounted on the bottom side of the pipe to ensure proper heat transfer and a true temperature reading. Heat transfer compound and insulating the sensor will help the overall accuracy of the sensor. By ordering extra straps, and fastening them together, it is possible to make them fit larger pipes.

Outside Air Temperature Sensors

The TAC Outdoor Air temperature sensors are provided in a weatherproof enclosure. An optional weatherproof Aluminum Bell Box or NEMA 4X Polycarbonate enclosure is also available upon request for an additional charge. All of the mounting hardware is provided with the sensor. Be sure to mount the sensor out of direct sunlight, with the sensor probe pointing downward.

Stainless Plate Temperature Sensors

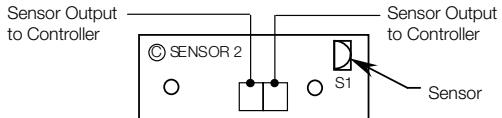
The TAC Stainless Plate temperature sensors are mounted on the back of a 1 Gang stainless steel plate. The foam pad will insulate the sensor from any drafts in the wall. (2) 6/32" x 1" machine screws are provided for junction box mounting. Be sure that the sensor is not mounted on an outside wall, due to the extreme temperature changes from either drafts or heat transfer.

WIRING

For wiring Information on room temperature sensors, please refer to the following documents:

| System | F-Number |
|-----------|----------|
| Vista | F-27616 |
| I/NET | F-27617 |
| Continuum | F-27618 |
| I/A | F-27619 |

Diagram for ET Sensors Except ETR



ORDERING INFORMATION

| Temperature Sensor Description | TAC Vista | I/NET | Continuum | I/A | 1000 Ohm Platinum | 1000 Ohm BALCO |
|---|--------------|--------------|--------------|--------------|-------------------|----------------|
| Room | ETR100 | ETR200 | ETR500 | ETR800 | - | - |
| Room with Setpoint | ETR101 | ETR201 | ETR501 | ETR801 | - | - |
| Room with Override Pushbutton | ETR102 | ETR202 | ETR502 | ETR802 | - | - |
| Room with Setpoint and Override Pushbutton | ETR103 | ETR203 | ETR503 | ETR803 | - | - |
| Wallplate (Stainless Steel) | ETP100 | ETP200 | ETP500 | ETP800 | | |
| 4" Duct (Galvanized Steel Enclosure) | ETD100-4 | ETD200-4 | ETD500-4 | ETD800-4 | ETDPK0-4 | ETDBK0-4 |
| 6" Duct Galvanized Steel Enclosure) | ETD100-6 | ETD200-6 | ETD500-6 | ETD800-6 | ETDPK0-6 | ETDBK0-6 |
| 8" Duct (Galvanized Steel Enclosure) | ETD100-8 | ETD200-8 | ETD500-8 | ETD800-8 | ETDPK0-8 | ETDBK0-8 |
| 12" Duct (Galvanized Steel Enclosure) | ETD100-12 | ETD200-12 | ETD500-12 | ETD800-12 | ETDPK0-12 | ETDBK0-12 |
| 4" Duct without Enclosure | ETD100-NE-4 | ETD200-NE-4 | ETD500-NE-4 | ETD800-NE-4 | ETDPK0-NE-4 | ETDBK0-NE-4 |
| 6" Duct without Enclosure | ETD100-NE-6 | ETD200-NE-6 | ETD500-NE-6 | ETD800-NE-6 | ETDPK0-NE-6 | ETDBK0-NE-6 |
| 8" Duct without Enclosure | ETD100-NE-8 | ETD200-NE-8 | ETD500-NE-8 | ETD800-NE-8 | ETDPK0-NE-8 | ETDBK0-NE-8 |
| 12" Duct without Enclosure | ETD100-NE-12 | ETD200-NE-12 | ETD500-NE-12 | ETD800-NE-12 | ETDPK0-NE-12 | ETDBK0-NE-12 |
| 2.5" Immersion (Galvanized Steel Enclosure)* | ETI100-2 | ETI200-2 | ETI500-2 | ETI800-2 | ETIPK0-2 | ETIBK0-2 |
| 4" Immersion (Galvanized Steel Enclosure)* | ETI100-4 | ETI200-4 | ETI500-4 | ETI800-4 | ETIPK0-4 | ETIBK0-4 |
| 6.25" Immersion (Galvanized Steel Enclosure)* | ETI100-6 | ETI200-6 | ETI500-6 | ETI800-6 | ETIPK0-6 | ETIBK0-6 |
| 8' Averaging (Flexible Copper) | ETA100-8 | ETA200-8 | ETA500-8 | ETA800-8 | - | - |
| 12' Averaging (Flexible Copper) | ETA100-12 | ETA200-12 | ETA500-12 | ETA800-12 | ETAPK0-12 | ETABK0-12 |
| 24' Averaging (Flexible Copper) | ETA100-24 | ETA200-24 | ETA500-24 | ETA800-24 | ETAPK0-24 | ETABK0-24 |
| Outside Air | ETO100 | ETO200 | ETO500 | ETO800 | - | - |
| Strap On | ETS100 | ETS200 | ETS500 | ETS800 | - | - |
| Bead / Bullet | ETB100 | ETB200 | ETB500 | ETB800 | - | - |

* Length indicates immersion depth.

| Miscellaneous Options | Code |
|---|--------|
| LCD Display in Fahrenheit (for room units only) | -LCD |
| LED Indicator* (for room units with override only) | -LED |
| Thermometer Indicator (for room units only) | -TI |
| RS232 Communication Jack (for use with I/NET systems only) | -RS232 |
| Four-Pin RJ11 Communication Jack (for use with TAC Vista and Continuum systems only) | -RJ4 |

| Well Type | Part Number |
|-----------------------------|-------------|
| 2.5" Stainless Steel Well* | ETI-WELL-2S |
| 4" Stainless Steel Well* | ETI-WELL-4S |
| 6.25" Stainless Steel Well* | ETI-WELL-6S |

* Length indicates immersion depth.

* Not available on I/A, 1000 Ohm Platinum, or 1000 Ohm BALCO.

Data Sheet
DESCRIPTION

The EH Series Room, Duct and Outside humidity sensors are a universal Relative Humidity transmitter that can be powered with either a +15 to 36 Vdc or 24 Vac supply voltage. The EH series sensors are designed with a field selectable 4-20 mA, 0-5 VDC, or 0-10 Vdc output signal that is equivalent to 0 to 100% RH. The EH Series is used in building automation systems, humidity chambers, and OEM applications and is compatible with Vista, Continuum, I/Net and I/A Systems.


EH Series
FEATURES

- Single point Field Calibration
- Field selectable output signals
- $\pm 2\%$ Accuracies
- Low Drift
- Highly Repeatable
- Integral Temperature Sensor

SPECIFICATIONS

| | |
|--|---|
| Supply Voltage | 250 Ohm Load: +15 to 36 Vdc / 21.6-26.4 Vac 0-5VDC: +15-36 Vdc / 21.6-26.4 Vac 500 Ohm Load: +18 to 36 Vdc / 21.6-26.4 Vac 0-10VDC: +18-36 Vdc / 21.6-26.4 Vac |
| Power Consumption | 1VA maximum |
| RH Measurement Range | 0 to 100% |
| RH Output | 2-wire, 4 to 20mA (Factory Standard) 3-wire, 0-5, 0-10 Vdc or 4 to 20mA |
| Accuracy at 77° F (25° C) | +/- 2 % from 20 to 95% |
| Long-term Stability | Less than 2% drift / 5 years |
| Hysteresis | Less than 0.4% RH |
| Repeatability | 0.5% RH |
| Sensitivity | 0.1 % RH |
| Response Time | 110 seconds for 63% Step |
| Storage Temperature Range | 41 to 95°F (5°C to 35°C) < 75% RH |
| Operating Temperature Range | -10 to 122°F (-23.3 to 50°C) |
| Operating Humidity Range | 0 to 95 % RH non-condensing |
| Saturation Response Time | 10 minutes for 63% Step |
| Temperature Sensor output at 77° F (25° C) | 1.8K ohm (Vista), 10K ohm Type II (I/Net), 10K ohm Type III (Continuum), 10K ohm with 11K ohm shunt (I/A) |

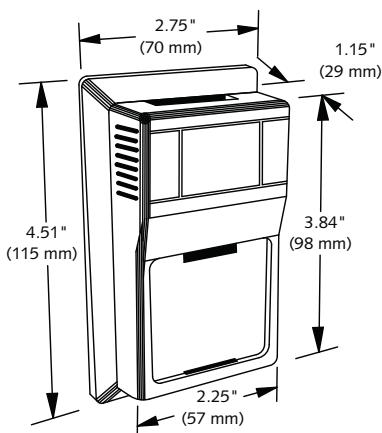
ORDERING INFORMATION

| Description | Vista | I/Net | Continuum | I/A |
|----------------------------------|------------|------------|------------|------------|
| Room-Humidity Only | | EHR110 | | |
| Room-Humidity and Temperature | EHR110-100 | EHR110-200 | EHR110-500 | EHR110-800 |
| Duct-Humidity Only | EHD110 | | | |
| Duct-Humidity and Temperature | EHD110-100 | EHD110-200 | EHD110-500 | EHD110-800 |
| Outdoor-Humidity Only | EOH110 | | | |
| Outdoor-Humidity and Temperature | EHO110-100 | EHO110-200 | EHO110-500 | EHO110-800 |

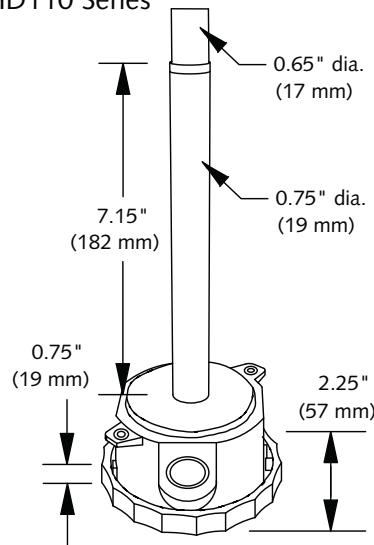
| Miscellaneous Option | Code |
|--|------|
| LCD Display (Room Units Only. LCD displays humidity value.) | -LCD |

DIMENSIONS

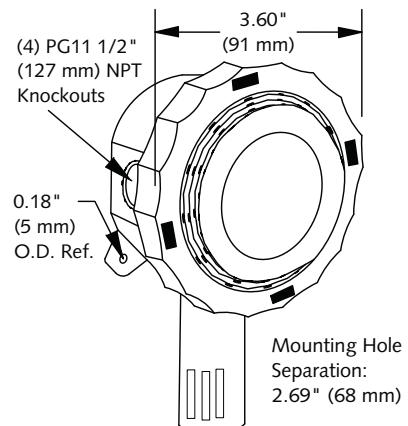
EHR110 Series



EHD110 Series



EHO110 Series



On October 1st, 2009, TAC became the Buildings business of its parent company Schneider Electric. This document reflects the visual identity of Schneider Electric, however there remains references to TAC as a corporate brand in the body copy. As each document is updated, the body copy will be changed to reflect appropriate corporate brand changes.

CDE & CWE SERIES

Field-selectable 4 to 20 mA / 0 to 10 Vdc Output



The CDE and CWE are non-dispersive infrared (NDIR) sensors designed for measuring environmental CO₂ concentration in ventilation systems and indoor living spaces. Their measurement range of 0 to 2000 ppm makes them compliant with ASHRAE and other standards for ventilation control.

The CWE/CDE Series provides a user-selectable 4 to 20 mA or 0 to 10 Vdc output for versatility. Microprocessor-based digital electronics and a unique self-calibration algorithm improves long-term stability and accuracy.

SPECIFICATIONS

| | |
|---|--|
| Input Power | Class 2; 20 to 30 Vdc/24 AC 50/60 Hz; 100 mA max. |
| Analog Output | 4 to 20 mA (clipped & capped)/0 to 10 Vdc (selectable) |
| Operating Temp. Range | 0 to 50 °C (32 to 122 °F) |
| Operating Humidity Range | 0 to 95% RH non-condensing |
| Housing Material | High impact ABS plastic |
| Terminal Block Torque: CDE CWE | 0.5 to 0.6 N·m (4.4 to 5.3 in-lbf) max. 0.2 N·m (2.0 in-lbf) max. |
| Terminal Block Wire Size: CDE CWE | 24 to 12 AWG (0.25 to 2.5mm ²) 28 to 20 AWG (0.08 to 0.5mm ²) |
| Sensor Type | Non-dispersive infrared, diffusion sampling |
| Output Range | 0 to 2000 ppm |
| Accuracy | ±30 ppm ±2% of measured value* |

Microprocessor based

Microprocessor-based design increases accuracy and reduces installation time

4 to 20 mA/ 0 to 10 Vdc

4 to 20 mA/0 to 10 Vdc output for flexible control system interface

Self-calibrating

Innovative self-calibration algorithm...easy to maintain.
5-year calibration interval (recommended)

Sensitivity

Low ambient sensitivity

APPLICATIONS

- Controlling ventilation in response to occupancy
- Facilitating compliance with ASHRAE 62.1 standard for air quality

- Office buildings, conference rooms, schools, retail stores, etc.

| | |
|---------------|---------------------------------|
| Repeatability | ±20 ppm ±1% of measured value |
| Response Time | <60 seconds for 90% step change |

WARRANTY

Limited Warranty 3 years

AGENCY APPROVALS



RTD/Termistors in wall housings are not compensated for internal heating of product. EMC Conformance: Low voltage directive 2014/35/EU and EMC directive 2014/30/EU. EMC Special Note: Connect this product to a DC distribution network or an AC/DC power adaptor with proper surge protection (EN 61000-6-1 specification requirements).

* Measured at NTP

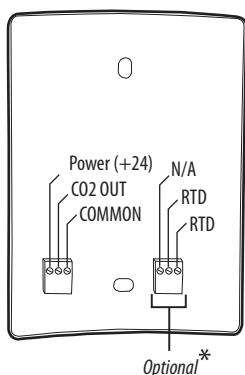
**The CE mark indicates RoHS2 compliance. Please refer to the CE Declaration of Conformity for additional details.

Note: Rough handling and transportation may cause a temporary reduction of CO₂ sensor accuracy. With time, the ABC function will tune the readings back to the correct accuracy range. The default tuning speed is limited to 30 ppm per week.



CWE WALL MOUNT

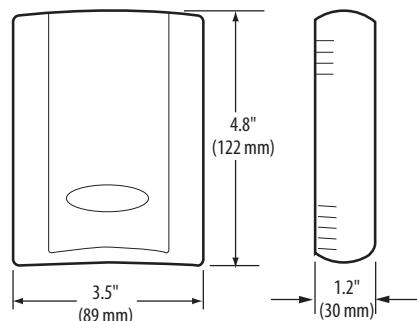
Wiring Diagram



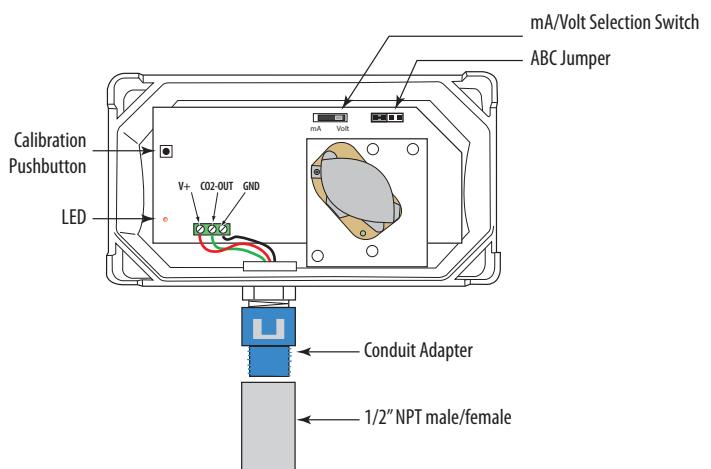
* Note: Connector blocks and headers for optional features are not included with non-option models.

CWE WALL MOUNT

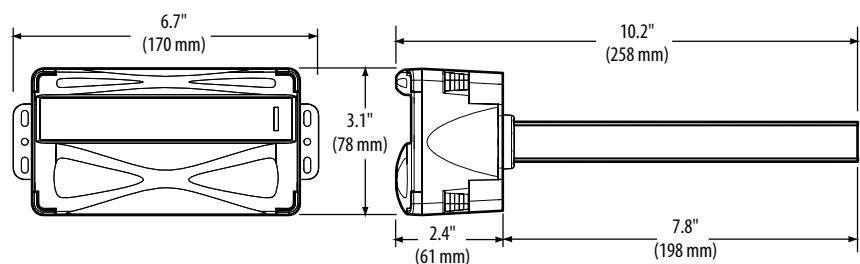
Dimensional Drawing

**CDE DUCT MOUNT**

Wiring Diagram

**CDE DUCT MOUNT**

Dimensional Drawing

**ORDERING INFORMATION**

| Duct Mount | Wall Mount, Temp. Option | Wall Mount, No Temp. Option |
|------------------|--|--|
| CDE (No Options) | <p>Sensor Type</p> <p>CWE <input type="checkbox"/></p> <p>Housing</p> <p>Blank = Cloud white B = Black</p> <p>Example: CWE <input type="checkbox"/> SH <input type="checkbox"/> B</p> <p>SB= 100R Platinum, RTD SC= 1k Platinum, RTD SD= 10k T2, RTD, Thermistor SE= 2.2k, Thermistor SF= 3k, Thermistor SG= 10k CPC, Thermistor SH= 10k T3, Thermistor SJ= 10k Dale, Thermistor SK= 10k with 11k shunt, Thermistor SM= 20k NTC, Thermistor SN= 1800 ohm, Thermistor SR= 10k US, Thermistor SS= 10k 3A221, Thermistor ST= 100k, Thermistor SU= 20k "D" Thermistor SW= 10k T2 high accuracy, Thermistor SY= 10k T3 high accuracy, Thermistor</p> | <p>Housing</p> <p>Blank = Cloud white B = Black</p> <p>Example: CWE <input type="checkbox"/> B</p> |

HX08 SERIES & H701

Detect Belt Loss, Coupling Shear, and Mechanical Failure



Hx08 Series and H701 adjustable current switches offer high performance, with a wide array of amperage range options. These products can accurately detect belt loss, coupling shear, or other mechanical failure on unit vents, exhaust fans, recirculation pumps, and other fixed loads down to as little as 1/5 HP.

SPECIFICATIONS

Hx08 Series & H701

| | |
|------------------------------|--|
| Sensor Power | Induced from monitored conductor |
| Insulation Class | 600 Vac RMS (UL), 300VAC RMS (CE*) |
| Frequency Range ² | 50/60 Hz, On/Off status for Variable Frequency Drive (VFD) outputs at 12 to 115 Hz |
| Temperature Range | -15 to 60 °C (5 to 140 °F) |
| Humidity Range | 10 to 90% RH non-condensing |
| Hysteresis | 10% (typical) |
| Terminal Block Wire Size | H308: 22-16 AWG (0.3 to 1.3 mm ²) Others: 24-14 AWG (0.2 to 2.1 mm ²) |
| Terminal Block Torque | H308: 3.5 to 7 in-lbs (0.8 N-m) Others: 3.5 to 4.4 in-lbs (0.4 to 0.5 N-m) |

WARRANTY

Limited Warranty 5 years

AGENCY APPROVALS

Agency Approvals UL 508 open device listing; CE: EN61010-1, CAT III, Pollution Degree 2, basic insulation



Retrofit or new construction

High performance devices in split- and solid-core housings

Adjustable trip point

Precise current trip point setting

Low setpoint

Minimum trip point as low as 0.5 A (H608)...no need for multiple wraps of the conductor through the sensor, even on loads as small as 1/5 HP

Small size

Fits easily inside small enclosures

Self-gripping iris

Self-gripping iris on split-core housings for easy installation

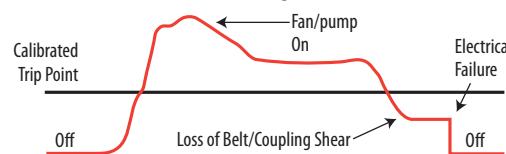
Status LEDs

Status LEDs available for easy setup and local indication

APPLICATIONS

- Detecting belt loss, coupling shear, and mechanical failure
- Verifying lighting circuit and other electrical service run times
- VFD output on/off status

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.

*The CE mark indicates RoHS2 compliance. Please refer to the CE Declaration of Conformity for additional details.

Notes: Do not use the LED status indicators as evidence of applied voltage.

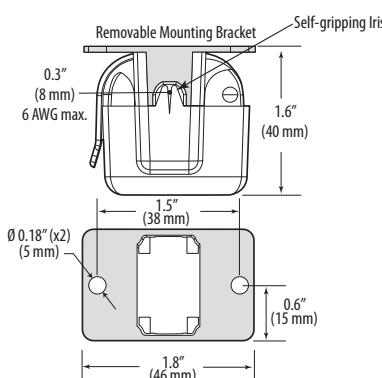
If using this switch in an application that includes an electronically commutated motor (ECM), see Veris Application Note VN61, at www.veris.com.

VFD systems generate fields that can disrupt electrical devices. Ensure that these fields are minimized and are not affecting the sensor.

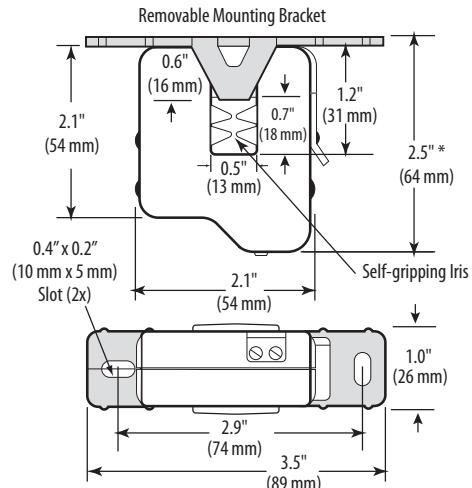


H308

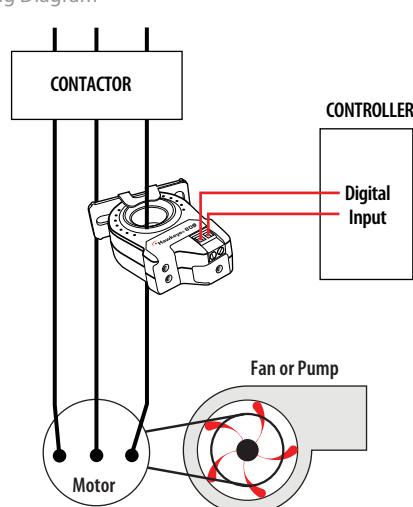
Dimensional Drawing

**H608**

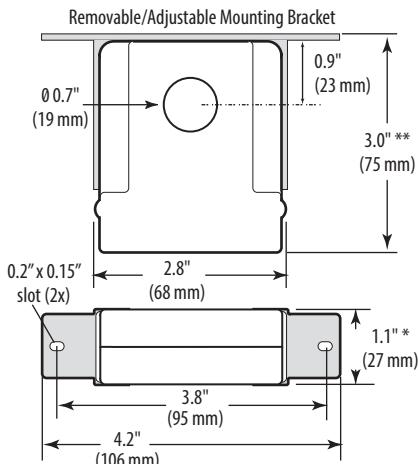
Dimensional Drawing

**MONITORING FAN /PUMP MOTORS FOR POSITIVE PROOF OF FLOW**

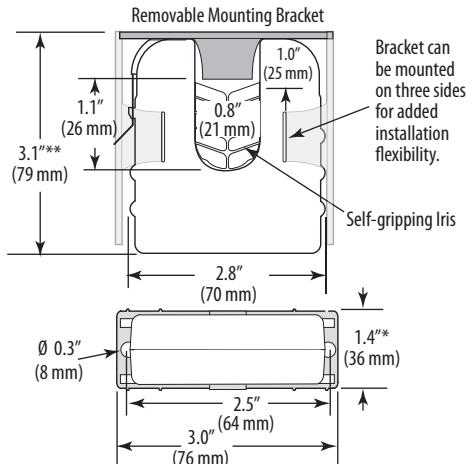
Wiring Diagram

**H708/701**

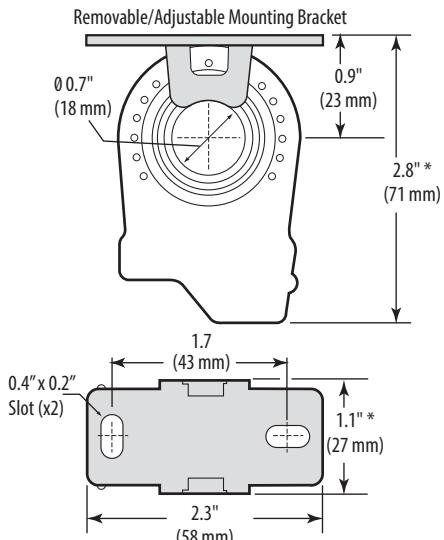
Dimensional Drawing

**H908**

Dimensional Drawing

**H808**

Dimensional Drawing



* Terminal block may extend up to 1/8" over the height dimensions shown.
** Slide switch may extend up to 1/4" over the height dimensions shown.

ORDERING INFORMATION

| MODEL | AMPERAGE RANGE @ 50/60 Hz ONLY | STATUS OUTPUT (MAX.) | MIN. TRIP POINT | HOUSING | STATUS LED | UL | CE |
|-------|--------------------------------|------------------------|-----------------|------------|------------|----------------|----|
| H308 | 0.75 to 50 A | N.O. 1.0 A @ 30 Vac/dc | 0.75 A or less | Split-Core | • | • ² | • |
| H608 | 0.5 to 175 A | | 0.5 A or less | Split-Core | • | • ¹ | • |
| H701 | 1 to 135 A | | 1.0 A or less | Solid-Core | | • | |
| H708 | 1 to 135 A | | 1.0 A or less | Solid-Core | • | • | |
| H808 | 0.75 to 50 A | | 0.75 A or less | Solid-Core | • | • | • |
| H908 | 2.5 to 135 A | | 2.5 A or less | Split-Core | • | • | • |

1. Listed for use on 75 °C insulated conductors.

2. Product provides functional insulation only.



Cleveland Controls

Division of UniControl Inc.

Model AFS-222

AIR PRESSURE SENSING SWITCH WITH ADJUSTABLE SET POINT RANGE

APPLICATION

Model AFS-222 Air Pressure Sensing Switch is a general purpose proving switch designed for HVAC and Energy Management applications. It may be used to sense positive, negative, or differential air pressure.

GENERAL DESCRIPTION & OPERATION

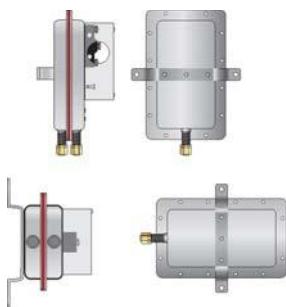
The plated housing contains a diaphragm, a calibration spring and a snap-acting SPDT switch. The sample connections located on each side of the diaphragm accept $\frac{1}{4}$ " OD metallic tubing via the integral compression ferrule and nut.

An enclosure cover guards against accidental contact with the live switch terminal screws and the set point adjusting screw. The enclosure cover will accept a $\frac{1}{2}$ " conduit connection.

MOUNTING (SEE FIGURE 1)

Select a mounting location which is free from vibration. The **AFS-222** must be mounted with the diaphragm in any vertical plane in order to obtain the lowest specified operating set point. Avoid mounting with the sample line connections in the "up" position. Surface mount via the two $\frac{3}{16}$ " diameter holes in the integral mounting bracket. The mounting holes are $3\frac{7}{8}$ " apart.

(Fig. 1)



AIR SAMPLING CONNECTION (SEE FIGURE 2)

The **AFS-222** is designed to accept firm-wall sample lines of $\frac{1}{4}$ " OD tubing by means of ferrule and nut compression connections. For sample lines of up to 10 feet, $\frac{1}{4}$ " OD tubing is acceptable. For lines up to 20 feet, use $\frac{1}{4}$ " ID tubing. For lines up to 60 feet, use $\frac{1}{2}$ " ID tubing. A $\frac{1}{4}$ " OD adapter, suitable for slip-on flexible tubing is available: order part number 18311.

Locate the sampling probe a minimum of 1.5 duct diameters downstream from the air source. Install the sampling probe as close to the center of the airstream as possible. Refer to Figure 2 to identify the high pressure inlet (H) and the low pressure inlet (L). Select one of the following five application options, and connect the sample lines as recommended.

POSITIVE PRESSURE ONLY: Connect the sample line to inlet H; inlet L remains open to the atmosphere.

NEGATIVE PRESSURE ONLY: Connect the sample line to inlet L; inlet H remains open to the atmosphere.

TWO NEGATIVE SAMPLES: Connect the higher negative sample to inlet L. Connect the lower negative sample to inlet H.

TWO POSITIVE SAMPLES: Connect the higher positive sample to inlet H. Connect the lower positive sample to inlet L.

ONE POSITIVE AND ONE NEGATIVE SAMPLE: Connect the positive sample to inlet H. Connect the negative sample to inlet L.

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Web page: <http://www.clevelandcontrols.com>

ELECTRICAL CONNECTIONS (SEE FIGURE 3)

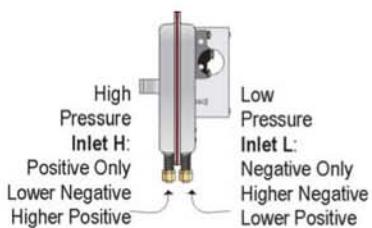
Before pressure is applied to the diaphragm, the switch contacts will be in the normally closed (NC) position. The snap switch has screw top terminals with cup washers. Wire alarm and control applications as shown in Figure 4.

FIELD ADJUSTMENT

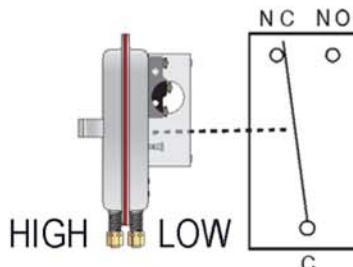
The adjustment range of an AFS-222 Air Switch is 0.05 ± 0.02 " w.c. to 12.0" w.c. To adjust the set point, turn the adjusting screw counterclockwise until motion has stopped. Next, turn the adjusting screw 4 complete turns in a clockwise direction to engage the spring. From this point, the next ten turns will be used for the actual calibration. **Each full turn represents approximately 1.2" w.c.**

Please note: To properly calibrate an air switch, a digital manometer or other measuring device should be used to confirm the actual set point.

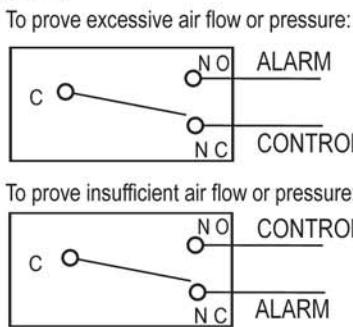
(Figure 2)



(Figure 3)



(Figure 4)



SPECIFICATIONS

MODEL AFS-222 AIR PRESSURE SENSING SWITCH WITH ADJUSTABLE SET POINT RANGE

Mounting Position:

Mount with the diaphragm in any vertical plane.

Set Point Range:

0.05 ± 0.02 " w.c. to 12.0" w.c.

Field Adjustable "Operate Range":
0.07" w.c. to 12.0" w.c.

Field Adjustable "Release Range":
0.04" w.c. to 11.2" w.c.

Approximate Switching Differential:
Progressive, increasing from 0.02 ± 0.01 " w.c. at minimum set point to approximately 0.8" w.c. at maximum set point.

Measured Media:

Air, or combustion by-products that will not degrade silicone.

Maximum Pressure:

$\frac{1}{2}$ psi (0.03 bar).

Operating Temperature Range:
-40F to 180F (-40 to 82C).

Life:

100,000 cycles minimum at $\frac{1}{2}$ psi maximum pressure each cycle and at maximum rated electrical load.

Electrical Rating:

300 VA pilot duty at 115 to 277 VAC, 15 amps noninductive to 277 VAC, 60Hz.

Contact Arrangement: SPDT.

Electrical Connections:

Screw-type terminals with cup washers.

Conduit Opening:

$\frac{7}{8}$ " diameter opening accepts $\frac{1}{2}$ " conduit.

Sample Line Connectors:

Male, externally threaded $\frac{1}{16}$ " -24 UNS 2A thread, complete with nuts and self-aligning ferrules.

Sample Line Connections:

Connectors will accept $\frac{1}{4}$ " OD rigid or semi-rigid tubing.

Approvals:

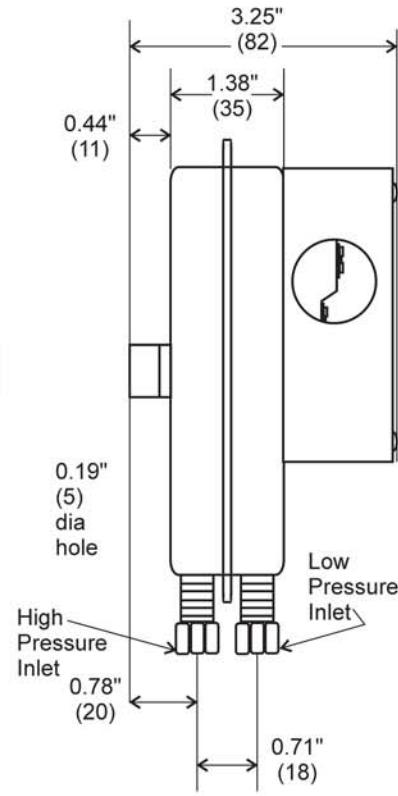
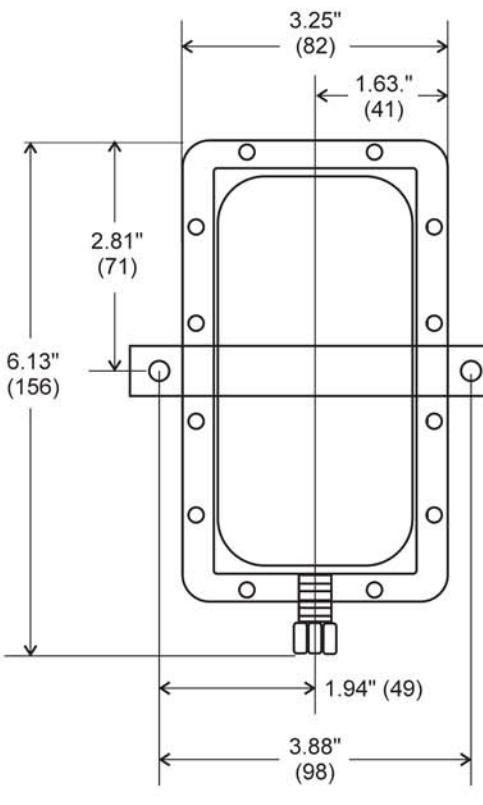
UL, FM, CSA.

Shipping Weight:

1.2 lbs.

Accessories:

- P/N 18311 Slip-on $\frac{1}{4}$ " OD Tubing Adapter, suitable for slipping on flexible plastic tubing.
- Sample line probes.
- Orifice plugs (pulsation dampers).



Nominal Dimensions in Inches (Millimeters)

VMD1B-C & VMD1B-F SERIES

Socket Relays in a Wide Range of Coil Voltages



The Veris VMD1B-C Series are SPDT blade-style relays for socket/DIN mounting. The DIN-rail compatible VBD1B-C sockets feature finger-safe terminals in a slim, attractive design.

The Veris VMD1B-F Series are full-featured SPDT blade style relays for socket/DIN mounting. The VMD1B-F Series are equipped with an LED for coil proof, a flag for contact proof, an override lever, and a push-to-test button for momentary contact control. The VMD1B-F allows for instant and conclusive troubleshooting. Never wonder if the relay, control system, or wiring is the cause of a problem. The DIN-rail-compatible VBD1B-F sockets feature a slim design with finger-safe terminals and a removable hold-down clip. Never struggle with wire clips again.

SPECIFICATIONS

| | |
|---------------------------------|--|
| Operating Temp. Range | -40 to 55 °C (-40 to 131 °F) |
| Coil Operating Range | 85% to 110% of rated voltage |
| Coil Drop-out Voltage Threshold | 15% of rated voltage |
| Expected Relay Life | Electrical (@ rated current) 100,000 cycles; Mechanical (unpowered) 10,000,000 cycles |
| Operating Time | 20 msec typical |
| Dielectric Strength | 1500 Vac RMS |

WARRANTY

| | |
|------------------|---------|
| Limited Warranty | 5 years |
|------------------|---------|

AGENCY APPROVALS



*The CE mark indicates RoHS2 compliance. Note: These relays are UL Listed when used with Veris sockets.

Color-coded pushbutton

Allows manual operation of relay,
AC coils red or DC coils blue
(-F Series only)

Override lever

When activated, locks push-
button and contacts in the
powered position
(-F Series only)

LED status lamp

Shows coil "ON" or "OFF" status
(-F Series only)

Flag indicator

Shows relay status in manual
or powered condition
(-F Series only)

2-way mounting

Side or DIN rail mounting
system...retrofits existing panel
mounting and 35 mm DIN rail

TYPICAL COIL PERFORMANCE

| Power Consumption | |
|-------------------|--------|
| AC Coils | 0.9 VA |
| DC Coils | 0.7 VA |

CONTACT RATINGS

Standard (F & C Series)

| | |
|-----------|----------------|
| Resistive | 15 A @ 120 Vac |
| | 15 A @ 277 Vac |

| |
|---------------|
| 15 A @ 28 Vdc |
|---------------|

| | |
|-------|---------------|
| Motor | 1/3 @ 120 Vac |
| | 3/4 @ 277 Vac |

| | |
|------------|------|
| Pilot Duty | B300 |
|------------|------|

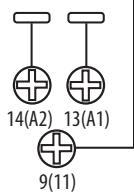
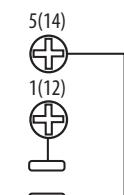


VBD1B SOCKET

Wiring Diagram

| Function | NEMA (IEC) Terminal |
|-----------|---------------------|
| Coil (+)* | 14 (A2) |
| Coil (-)* | 13 (A1) |
| COMM | 9 (11) |
| N.O. | 5 (14) |
| N.C. | 1 (12) |

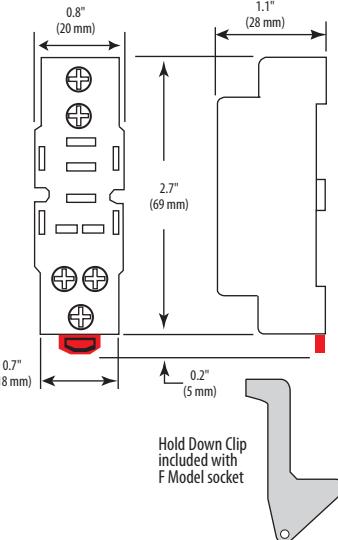
TOP VIEW



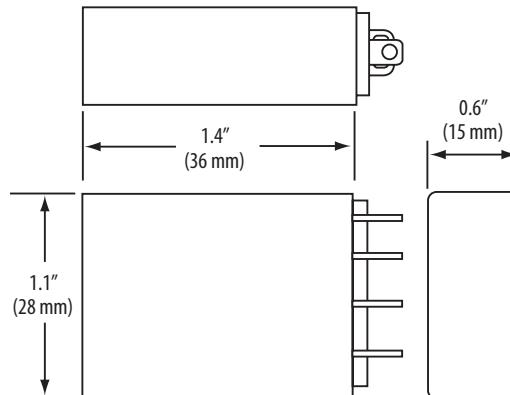
* NOTE: Observe polarity for relays with DC coil voltages only.

VMD1B SOCKET

Dimensional Drawing

**VMD1B RELAYS**

Dimensional Drawing

**ORDERING INFORMATION**

| MODEL | RELAY TYPE | AMPERAGE RATING | COIL VOLTAGE | MIN. SWITCHING CURRENT | FULL FEATURED | UL | CE |
|-------------|------------|-----------------|--------------|------------------------|---------------|----|----|
| VMD1B-C12D | SPDT | 15 A | 12 Vdc | 100 mA@5 Vdc | • | • | • |
| VMD1B-C24D | | 15 A | 24 Vdc | 100 mA@5 Vdc | | • | • |
| VMD1B-C24A | | 15 A | 24 Vac | 100 mA@5 Vdc | | • | • |
| VMD1B-C120A | | 15 A | 120 Vac | 100 mA@5 Vdc | | • | • |
| VMD1B-F12D | | 15 A | 12 Vdc | 100 mA@5 Vdc | | • | • |
| VMD1B-F24D | | 15 A | 24 Vdc | 100 mA@5 Vdc | | • | • |
| VMD1B-F24A | | 15 A | 24 Vac | 100 mA@5 Vdc | | • | • |
| VMD1B-F120A | | 15 A | 120 Vac | 100 mA@5 Vdc | | • | • |
| VMD1B-F240A | | 15 A | 240 Vac | 100 mA@5 Vdc | | • | • |

SOCKET ORDERING INFORMATION

| MODEL | AMPERAGE RATING | VOLTAGE RATING | FINGER SAFE | HOLD DOWN CLIP | UL | CE |
|---------|-----------------|----------------|-------------|----------------|----|----|
| VBD1B-C | 15 A | 300 V | • | • | • | • |
| | | | • | | • | • |

When relays and sockets are used together, amperage rating is the lesser of the two ratings.

AFB24-SR - Damper Actuator

Modulating, Spring Return, 24 VAC/DC, for 2 to 10 VDC or 4 to 20 mA Control Signal

**Technical Data**

| | |
|-----------------------------------|---|
| Power Supply | 24 VAC±20%, 50/60Hz, 24 VDC+20%/-10% |
| Power Consumption Running | 5.5 W |
| Power Consumption Holding | 3 W |
| Transformer Sizing | 8.5 VA (class 2 power source) |
| Shaft Diameter | 1/2" to 1.05" round, centers on 1/2" and 3/4" with insert, 1.05" without insert |
| Electrical Connection | 3 ft [1 m], 18 GA appliance cable with 1/2" conduit connector |
| Overload Protection | electronic throughout 0° to 95° rotation |
| Electrical Protection | actuators are double insulated |
| Operating Range Y | 2 to 10 VDC, 4 to 20 mA w/ ZG-R01 (500 Ω, 1/4 W resistor) |
| Input Impedance | 100 kΩ for 2 to 10 VDC (0.1 mA), 500 Ω for 4 to 20 mA |
| Feedback Output U | 2 to 10 VDC, 0.5 mA max |
| Angle of Rotation | 95° (adjustable with mechanical end stop, 35° to 95°) |
| Torque | 180 in-lbs [20 Nm] minimum |
| Direction of Rotation (Motor) | reversible with built-in switch |
| Direction of Rotation (Fail-Safe) | reversible with CW/CCW mounting |
| Position Indication | visual indicator, 0° to 95° (0° is full spring return position) |
| Manual Override | 5 mm hex crank (3/16" Allen), supplied |
| Running Time (Motor) | 95 sec |
| Running Time (Fail-Safe) | <20 sec @ -4°F to 122°F [-20°C to 50°C], < 60 sec @ -22°F [-30°C] |
| Humidity | max. 95% RH non-condensing |
| Ambient Temperature Range | -22°F to +122°F [-30°C to +50°C] |
| Storage Temperature Range | -40°F to +176°F [-40°C to +80°C] |
| Housing | NEMA 2, IP54, UL enclosure type 2 |
| Housing Material | zinc coated metal and plastic casing |
| Agency Listings† | cULus acc. to UL60730-1A-2-14, CAN/CSA E60730-1:02, CE acc. to 2004/108/EC |
| Noise Level (Motor) | ≤40 dB (A) |
| Noise Level (Fail-Safe) | <62 dB (A) |
| Servicing | maintenance free |
| Quality Standard | ISO 9001 |
| Weight | 4.6 lb [2.1 kg] |

†Rated Impulse Voltage 800V, Type of action 1.AA, Control Pollution Degree 3

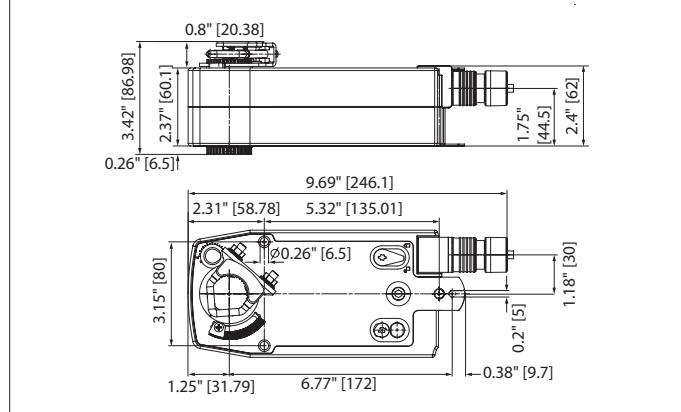
Torque min. 180 in-lb, Control 2 to 10 VDC, Feedback 2 to 10 VDC**Application**

For fail-safe, modulating control of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications. The actuator is mounted directly to a damper shaft up to 1.05" in diameter by means of its universal clamp. A crank arm and several mounting brackets are available for applications where the actuator cannot be direct coupled to the damper shaft. The actuator operates in response to a 2 to 10 VDC or, with the addition of a 500Ω resistor, a 4 to 20 mA control input from an electronic controller or positioner. A 2 to 10 VDC feedback signal is provided for position indication. Not to be used for a master-slave application.

Operation

The AF..24-SR series actuators provide true spring return operation for reliable fail-safe application and positive close off on air tight dampers. The spring return system provides constant torque to the damper with, and without, power applied to the actuator. The AF..24-SR series provides 95° of rotation and is provided with a graduated position indicator showing 0° to 95°. The AF..24-SR uses a brushless DC motor which is controlled by an Application Specific Integrated Circuit (ASIC) and a microprocessor. The microprocessor provides the intelligence to the ASIC to provide a constant rotation rate and to know the actuator's exact fail-safe position. The ASIC monitors and controls the brushless DC motor's rotation and provides a digital rotation sensing function to prevent damage to the actuator in a stall condition. The actuator may be stalled anywhere in its normal rotation without the need of mechanical end switches. The AF..24-SR actuator is shipped at +5° (5° from full fail-safe) to provide automatic compression against damper gaskets for tight shut-off.

ATTENTION: AF..24-SR cannot be tandem mounted on the same damper or valve shaft. Only On/Off and MFT AF.. models can be used for tandem mount applications.

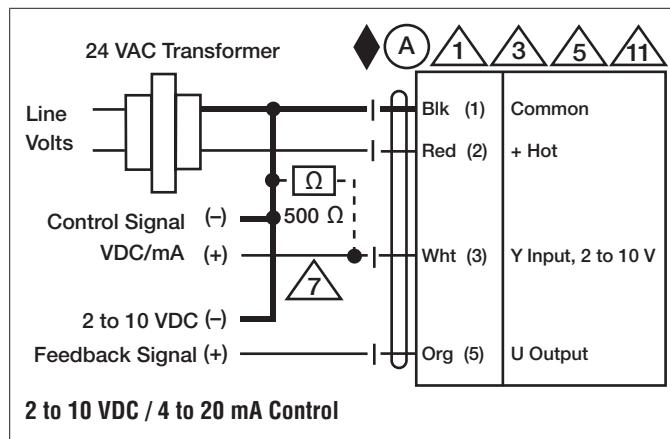
Dimensions (Inches[mm])

Accessories

| | |
|-----------|--|
| AF-P | Anti-rotation bracket AF/NF. |
| AV-8-25 | 9.8" shaft extension for 5/16" to 1" diameter shafts. |
| IND-AFB | AFB(X)/NFB(X) position indicator. |
| K7-2 | Standard AFB(X)/NFB(X) clamp (1/2" to 1.05"). |
| KG10A | Ball joint for 3/8" diameter rod, zinc plated. |
| KG8 | Ball joint for 5/16" diameter rod, 90°, galvanized steel. |
| KH10 | Univ. crankarm, slot 21/64" w, for 9/16" to 1" dia. shafts. |
| KH12 | Univ. crankarm, slot 21/64" w, for 3/4" to 1" dia. shafts. |
| KH8 | Univ. crankarm, slot 21/64" w, for 3/8" to 11/16" dia. shafts. |
| KH-AFB | AFB(X)/NFB(X) crankarm (with 3/4" dia. shaft pass through). |
| SH10 | Push rod for KG10A ball joint (36" L, 3/8" diameter). |
| SH8 | Push rod for KG6 & KG8 ball joints (36" L, 5/16" diameter). |
| Z-AF | Classic AF/NF to AFB(X)/NFB(X) retrofit mounting bracket. |
| ZG-100 | Univ. right angle bracket (17" H x 11-1/8" W x 6" base). |
| ZG-101 | Univ. right angle bracket (13" H x 11" W x 7-7/16" base). |
| ZG-109 | Right angle bracket for ZS-260. |
| ZG-110 | Stand-off bracket for ZS-260. |
| ZG-118 | AFB(X)/NFB(X) U bracket (5-7/8" H x 5-1/2" W x 2-19/32" D). |
| ZG-120 | Jackshaft mounting bracket. |
| ZG-AFB | AFB(X)/NFB(X) crankarm adaptor kit. |
| ZG-AFB118 | AFB(X)/NFB(X) crankarm adaptor kit. |
| ZG-DC1 | Damper clip for damper blade, 3.5" width. |
| ZG-DC2 | Damper clip for damper blade, 6" width. |
| ZG-JSA-1 | 1" diameter jackshaft adaptor (11" L). |
| ZG-JSA-2 | 1-5/16" diameter jackshaft adaptor (12" L). |
| ZG-JSA-3 | 1.05" diameter jackshaft adaptor (12" L). |
| ZS-100 | Weather shield - galvaneal (13" L x 8" W x 6" D). |
| ZS-101 | Base plate for ZS-100. |
| ZS-150 | Weather shield - PC w/ foam seal (16" L x 8-3/8" W x 4" D). |
| ZS-260 | Explosion proof housing. |
| ZS-300 | NEMA 4X, 304 stainless steel enclosure. |
| ZS-300-5 | NEMA 4X, 316L stainless steel enclosure. |
| ADS-100 | Analog to digital switch for modulating actuators. |
| IRM-100 | Input rescaling module for modulating actuators. |
| PS-100 | Actuator power supply and control simulator. |
| PTA-250 | Pulse width modulation interface for modulating actuators. |
| SGA24 | Positioner control for modulating actuators (surface mount). |
| SGF24 | Positioner control for modulating actuators (flush mount). |
| TF-CC US | Cable conduit connector, 1/2". |
| ZG-R01 | 4 to 20 mA adaptor, 500Ω, 1/4 W resistor w 6" pigtail wires. |
| ZG-SGF | Mounting plate for SGF. |
| ZG-X40 | 120 to 24 VAC, 40 VA transformer. |

Typical Specification

Spring return control damper actuators shall be direct coupled type which require no crank arm and linkage and be capable of direct mounting to a jackshaft up to a 1.05" diameter. The actuator must provide modulating damper control in response to a 2 to 10 VDC or, with the addition of a 500Ω resistor, a 4 to 20 mA control input from an electronic controller or positioner. The actuators must be designed so that they may be used for either clockwise or counter clockwise fail-safe operation. Actuators shall use a brushless DC motor controlled by a microprocessor and be protected from overload at all angles of rotation. Run time shall be constant, and independent of torque. A 2 to 10 VDC feedback signal shall be provided for position feedback. Actuators with auxiliary switches must be constructed to meet the requirements for Double Insulation so an electrical ground is not required to meet agency listings. Actuators shall be cULus listed and have a 5 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.



AFB24-SR - Damper Actuator

Modulating, Spring Return, 24 VAC/DC, for 2 to 10 VDC or 4 to 20 mA Control Signal

Wiring Diagrams

⚠ WARNING! LIVE ELECTRICAL COMPONENTS!

During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

- ◆ Meets cULus requirements without the need of an electrical ground connection.
- (A) Actuators with appliance cables are numbered.
- 1 Provide overload protection and disconnect as required.
- 3 Actuators may also be powered by 24 VDC.
- 5 Only connect common to negative (-) leg of control circuits.
- 7 A 500 Ω resistor (ZG-R01) converts the 4 to 20 mA control signal to 2 to 10 VDC.
- 11 Actuators may be connected in parallel if not mechanically linked. Power consumption and input impedance must be observed.

MINI FEED-THROUGH

15mm DIN Rail

For wire-to-wire connecting in control, automation, instrumentation and power distribution applications.

Altech "miniature" terminal blocks offer tremendous space advantage as demanded by certain wiring configurations.

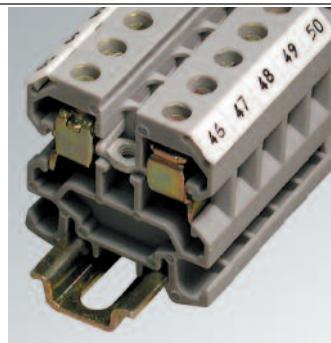
FUSE BLOCKS

Certain electrical and control systems require protection by fuses. The terminal has a hinged carrier that has a specially designed space for a cartridge type glass fuse of size Ø5 x 20 or Ø5 x 25 mm. The fuse can be engaged or disengaged by the movement of the carrier.

Altech fuse terminals are also available with light indication - CSFL 4U (L). A specially designed built-in circuit gives light indication in the event of fuse blow out.

T Fuses are sold separately

Altech, see page 34
for details.



CMT4



CE

CMT4S



CE

| | | | | | | |
|---------------------|---|--|-----------|-----------|----------------|-----------|
| Terminal Width | 6 mm | 6 mm | | | | |
| Height x Length | 29 x 27 mm | 29 x 46 mm | | | | |
| Stripping Length | 9 mm | 9 mm | | | | |
| Insulation Material | Polyamide 6.6 | Polyamide 6.6 | | | | |
| Type of Connection | 2 screw clamps & 1 tapped hole for cross connection | 2 screw clamps, 2 solder points and 1 tapped hole for cross connection | | | | |
| Type of Fuse Used | — | — | | | | |
| Approvals | US E220514 US | US E220514 US | | | | |
| Wire Range | 22-10 AWG | 0.5-4 sq.mm | 22-10 AWG | 22-12 AWG | Upto 1.5 sq.mm | 22-10 AWG |
| Voltage Rating | 300 V | 400 V | 300 V | 300 V | 160 V | 300 V |
| Current Rating | 35 A | 32 A | 35 A | 25 A | 15 A | 35 A |
| Torque | 6 lb-in | 0.5 Nm | 7 lb-in | 7 lb-in | 0.5 Nm | 7 lb-in |

| Terminal Block | Cat. No. | Std. Pk. | Terminal Block | Cat. No. | Std. Pk. |
|---------------------|----------|----------|---------------------|----------|----------|
| End Plate | EPCMT4 | 50 | End Plate | EPCMT4 | 50 |
| Isolation Partition | PPCMT4 | 50 | Isolation Partition | PPCMT4 | 50 |

DIN Rail
for ordering information
refer to page 62



| End Stop | for ordering information | refer to page 63 |
|----------|--------------------------|------------------|
| End Stop | CA602 | 100 |

CA602 50

| | | | | | | |
|-----------------|--|---------------------------------------|---|-----------------------|---|-----------------------|
| Internal Jumper | | 2 pole 3 pole 4 pole 10 pole | CA727/2 CA727/3 CA727/4 CA727/10 | 100 50 50 10 | CA727/2 CA727/3 CA727/4 CA727/10 | 100 50 50 10 |
|-----------------|--|---------------------------------------|---|-----------------------|---|-----------------------|

| | | | | | | |
|---------------------------|--|---------------------------------------|---|-----------------------|---|-----------------------|
| Insulated Internal Jumper | | 2 pole 3 pole 4 pole 10 pole | CA747/2 CA747/3 CA747/4 CA747/10 | 100 50 50 10 | CA747/2 CA747/3 CA747/4 CA747/10 | 100 50 50 10 |
|---------------------------|--|---------------------------------------|---|-----------------------|---|-----------------------|

| | | | | | | |
|--------------|--|--|--|---------------------------------------|--|---------------------------------------|
| Current Bars | | 2 pole 3 pole 4 pole 10 pole 10 pole (breakable) 100 pole | CA703/1 CA704/1 CA705/1 CA732/10 CA732/10-A CA732/100 | 100 100 100 100 100 10 | CA703/1 CA704/1 CA705/1 CA732/10 CA732/10-A CA732/100 | 100 100 100 100 100 10 |
|--------------|--|--|--|---------------------------------------|--|---------------------------------------|

| | | | | | | |
|-------------------------|--|--|-----------|-----|-----------|-----|
| Shorting Sleeve & Screw | | | CA607/S/Q | 100 | CA607/S/Q | 100 |
|-------------------------|--|--|-----------|-----|-----------|-----|

| | | | | | | |
|-----------------|--|---------------------------------------|---|------------------------|---|------------------------|
| External Jumper | | 2 pole 3 pole 4 pole 10 pole | CA714/2 CA714/3 CA714/4 CA714/10 | 100 100 50 25 | CA714/2 CA714/3 CA714/4 CA714/10 | 100 100 50 25 |
|-----------------|--|---------------------------------------|---|------------------------|---|------------------------|

| | | | | | | |
|------------------------|--|--------------------|-----|-----|-----|-----|
| Marking Tags (MT Type) | | (MT Type on Lever) | MT2 | 100 | MT2 | 100 |
|------------------------|--|--------------------|-----|-----|-----|-----|



COLOR BLOCKS (other than grey standard)

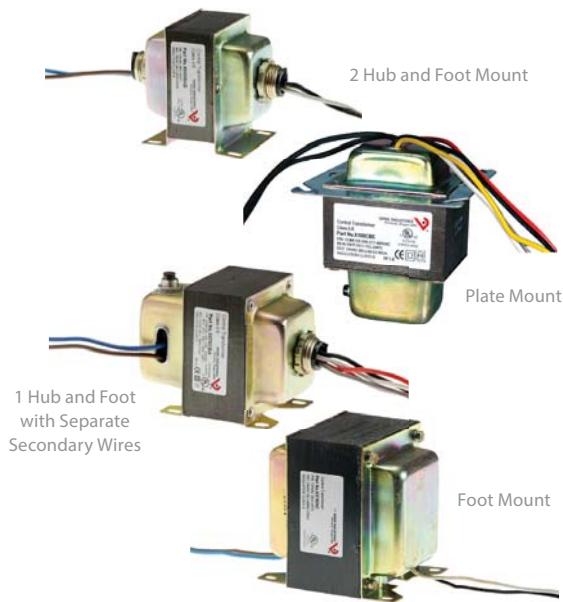
When ordering please add color suffix to Cat. No.

Example: CTS2.5U-N/R

| Color | Ordering Suffix |
|------------|-----------------|
| Red | R |
| Blue | BU |
| Black | BL |
| Orange | O |
| Green | G |
| Yellow | Y |
| White | W |
| Beige | BG |
| Dark Brown | DB |

* Add required voltage to part number as a suffix,
i.e. CSFL4U(L)/24 to 24V DC

X SERIES



Veris X Series Control Transformers are a convenient source of control power for HVAC control and building automation applications. A wide variety of UL-listed transformers are available with single and dual threaded hub mounting options. Multiple current limiting options are available, including a circuit breaker in some models. Save ordering time and purchase order costs when buying other Veris sensors by including transformers in your order.

SPECIFICATIONS

| | |
|-------------------------|------------------------------|
| Frequency | 50/60 Hz |
| Operating Temperature | -40 to 65 °C (-40 to 149 °F) |
| No Load Voltage | 27 to 28 Vac |
| Hub Style | Fits 1/2" electrical k.o. |
| Wire | UL 1015, 18 AWG* |
| Wire Length | 8 inches |
| WARRANTY | |
| Limited Warranty | 5 years |
| AGENCY APPROVALS | |



*X085AAA, X375DAC have 14 AWG secondary wires.

**The CE mark indicates RoHS2 compliance.

UL Listings

UL Listings for all models simplify panel building requirements

One-stop shopping

Save time by ordering along with other Veris products

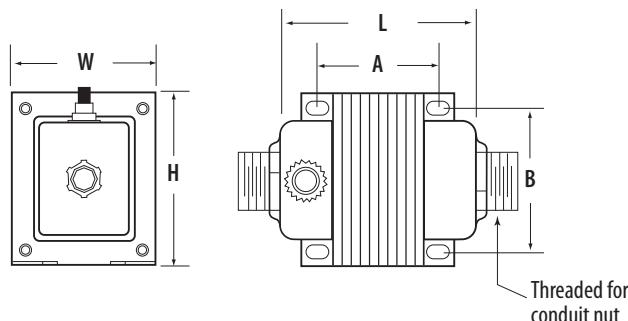
Threaded hub options

Threaded hub options maximize installation flexibility

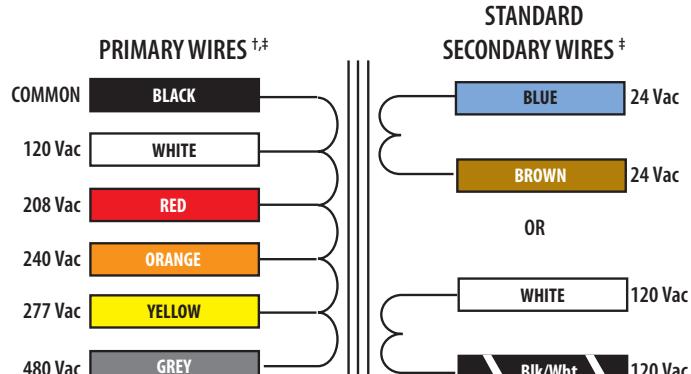
APPLICATIONS

- Controller power
- Driving relays and other digital I/O circuits
- Powering sensors

DIMENSIONAL DRAWING



WIRE COLORS



† Primary of 24 V isolation transformers = Red/Red

‡ Colors refer to the transformer wiring, not the external circuit.

CENTER TAP SECONDARY WIRES ‡



ORDERING INFORMATION

| MODEL | VA | PRIMARY VOLTAGE (VAC) | SECONDARY VOLTAGE (VAC) | CURRENT LIMITING METHOD | CLASS | MOUNTING | SEPARATED PRIMARY & SECONDARY WIRES | UL | CE | L | W | H | A | B |
|------------|-----|-----------------------|-------------------------|-------------------------|---------|----------------------|-------------------------------------|----|----|-----|-----|-----|------|------|
| STANDARD | | | | | | | | | | | | | | |
| X020AAA | 20 | 120 | 24 | Inherent | 2 | 1HUB+FT | | • | • | 2.3 | 1.9 | 2.6 | 1.59 | 1.69 |
| X020ACA | | 277 | | Inherent | 2 | 1HUB+FT | | • | • | 2.3 | 1.9 | 2.6 | 1.59 | 1.69 |
| X020ADA | | 24 | | Inherent | General | 1HUB+FT | | • | • | 2.3 | 1.9 | 2.6 | 1.59 | 1.69 |
| X040AAA | 40 | 120 | 24 | Inherent | 2 | 1HUB+FT | | • | • | 2.7 | 2.2 | 2.9 | 1.98 | 1.81 |
| X040AAB | | 120 | | Inherent | 2 | 2HUB+FT | • | • | • | 2.7 | 2.2 | 2.9 | 1.98 | 1.81 |
| X040ACA | | 277 | | Inherent | 2 | 1HUB+FT | | • | • | 2.7 | 2.2 | 2.9 | 1.98 | 1.81 |
| X040ADA | | 24 | | Inherent | 2 | 1HUB+FT | | • | • | 2.7 | 2.2 | 2.9 | 1.98 | 1.81 |
| X040AMB | | 120/208/240/277 | | Fuse | 2 | 2HUB+FT | • | • | • | 2.7 | 2.2 | 2.9 | 1.98 | 1.81 |
| X040BNA | | 120/208/240 | | Fuse | 2 | 1HUB+FT | | • | • | 2.7 | 2.2 | 2.9 | 1.98 | 1.81 |
| X040BPC | | 24 | | Fuse | 2 | Foot | • | • | • | 2.7 | 2.2 | 2.9 | 1.98 | 1.81 |
| X050BAA | | 120 | 24 | Fuse | 2 | 1HUB+FT | | • | • | 2.8 | 2.2 | 2.9 | 2.06 | 1.81 |
| X050BAB | | 120 | | Fuse | 2 | 2HUB+FT | • | • | • | 2.8 | 2.2 | 2.9 | 2.06 | 1.81 |
| X050BCA | | 277 | | Fuse | 2 | 1HUB+FT | | • | • | 2.8 | 2.2 | 2.9 | 2.06 | 1.81 |
| X050BGB | | 208/240 | | Fuse | 2 | 2HUB+FT | • | • | • | 2.8 | 2.2 | 2.9 | 2.06 | 1.81 |
| X050CAA | | 120 | | Circuit Breaker | 2 | 1HUB+FT | | • | • | 3.5 | 2.5 | 3.1 | 1.91 | 2.03 |
| X050CBA | | 120/240/277/480 | | Circuit Breaker | 2 | 1HUB+FT | | • | • | 3.5 | 2.5 | 3.1 | 1.91 | 2.03 |
| X050CBB | | 120/240/277/480 | | Circuit Breaker | 2 | 2HUB+FT | • | • | • | 3.5 | 2.5 | 3.1 | 1.91 | 2.03 |
| X050CCA | | 277 | | Circuit Breaker | 2 | 1HUB+FT | | • | • | 3.5 | 2.5 | 3.1 | 1.91 | 2.03 |
| X050CEB | 50 | 208/240/277/480 | 120 | Circuit Breaker | General | 2HUB+FT | • | • | • | 3.5 | 2.5 | 3.1 | 1.91 | 2.03 |
| X050CEG | | 208/240/277/480 | | Circuit Breaker | General | Plate, 90° Sec Elbow | • | • | • | 3.5 | 4.0 | 4.0 | 3.38 | 3.38 |
| X050CHA | | 120/208/240/480 | | Circuit Breaker | 2 | 1HUB+FT | | • | • | 3.5 | 2.5 | 3.1 | 1.91 | 2.03 |
| X050CHB | | 120/208/240/480 | | Circuit Breaker | 2 | 2HUB+FT | • | • | • | 3.5 | 2.5 | 3.1 | 1.91 | 2.03 |
| X050CNA | | 120/208/240 | | Circuit Breaker | 2 | 1HUB+FT | | • | • | 3.5 | 2.5 | 3.1 | 1.91 | 2.03 |
| X050CNB | | 120/208/240 | | Circuit Breaker | 2 | 2HUB+FT | • | • | • | 3.5 | 2.5 | 3.1 | 1.91 | 2.03 |
| X050COA | | 120/208/240/277/480 | | Circuit Breaker | 2 | 1HUB+FT | | • | • | 3.5 | 2.5 | 3.1 | 1.91 | 2.03 |
| X050COB | | 120/208/240/277/480 | | Circuit Breaker | 2 | 2HUB+FT | • | • | • | 4.3 | 2.5 | 3.1 | 2.70 | 2.00 |
| X050DLB | | 220 | 24 | None | 2 | 2HUB+FT | • | • | • | 2.8 | 2.2 | 2.9 | 2.06 | 1.81 |
| X075CAA | 75 | 120 | | Circuit Breaker | 2 | 1HUB+FT | | • | • | 3.9 | 2.5 | 3.1 | 2.31 | 2.03 |
| X075CAB | | 120 | | Circuit Breaker | 2 | 2HUB+FT | • | • | • | 3.9 | 2.5 | 3.1 | 2.31 | 2.03 |
| X075CBA | | 120/240/277/480 | | Circuit Breaker | 2 | 1HUB+FT | | • | • | 3.9 | 2.5 | 3.1 | 2.31 | 2.03 |
| X075CHA | | 120/208/240/480 | | Circuit Breaker | 2 | 1HUB+FT | | • | • | 3.9 | 2.5 | 3.1 | 2.31 | 2.03 |
| X085AAA | 99 | 120 | 120 | Inherent | General | 1HUB+FT | | • | • | 3.2 | 3.8 | 3.2 | 2.2 | 3.14 |
| X100CAA | | 120 | | Circuit Breaker | 2 | 1HUB+FT | | • | • | 4.1 | 2.5 | 3.1 | 2.51 | 2.03 |
| X100CAB | | 120 | | Circuit Breaker | 2 | 2HUB+FT | • | • | • | 4.1 | 2.5 | 3.1 | 2.51 | 2.03 |
| X100CBA | | 120/240/277/480 | | Circuit Breaker | 2 | 1HUB+FT | | • | • | 4.3 | 2.5 | 3.1 | 2.70 | 2.03 |
| X100CBB | | 120/240/277/480 | | Circuit Breaker | 2 | 2HUB+FT | • | • | • | 4.3 | 2.5 | 3.1 | 2.70 | 2.03 |
| X100CBE | | 120/208/277/480 | | Circuit Breaker | 2 | Plate | | • | • | 4.3 | 4.0 | 4.0 | 3.38 | 3.38 |
| X100CHB | | 120/208/240/480 | | Circuit Breaker | 2 | 2HUB+FT | • | • | • | 4.3 | 2.5 | 3.1 | 2.70 | 2.03 |
| X100CKB | | 480 | | Circuit Breaker | General | 2HUB+FT | • | • | • | 4.1 | 2.5 | 3.1 | 2.51 | 2.03 |
| X100CLB | | 220 | | Circuit Breaker | 2 | 2HUB+FT | • | • | • | 4.1 | 2.5 | 3.1 | 2.51 | 2.03 |
| X150CAA | 150 | 120 | | Circuit Breaker | General | 1HUB+FT | • | • | • | 3.5 | 3.8 | 3.2 | 2.08 | 3.26 |
| X175BAB | 175 | 120 | 24 | Fuse | General | 2HUB+FT | • | • | • | 4.1 | 3.8 | 3.2 | 3.19 | 3.14 |
| X175CAB | | 120 | | Circuit Breaker | General | 2HUB+FT | • | • | • | 4.1 | 3.8 | 3.2 | 3.19 | 3.14 |
| X240DAA | 240 | 120 | 120 | None | General | 1HUB+FT | • | • | • | 3.7 | 3.8 | 4.5 | 3.24 | 3.18 |
| X375DAC | 375 | 120 | | None | General | Foot | • | • | • | 4.3 | 3.8 | 4.5 | 3.83 | 3.18 |
| CENTER TAP | | | | | | | | | | | | | | |
| X020APC | 20 | 24 | 12/24 | Inherent | 2 | Foot | • | • | • | 2.3 | 1.9 | 2.6 | 1.59 | 1.69 |
| X040BQC | 40 | 120/208/240 | | Fuse | 2 | Foot | • | • | • | 2.7 | 2.2 | 2.9 | 1.98 | 1.81 |
| X100CRC | 100 | 120/240 | | Circuit Breaker | 2 | 1HUB+FT | • | • | • | 4.3 | 2.5 | 3.1 | 2.70 | 2.03 |



ENCLOSURES

KELE NEMA 1 ENCLOSURES RET SERIES

DESCRIPTION

The **Kele RET Series** includes attractive, economical NEMA 1 enclosures designed to house controls and instruments in areas which do not require oil-tight and dust-tight ratings. The **RET Series** enclosures are furnished with a perforated metal subpanel for easy mounting of components. No drilling or layout is needed. Simply set the control components on the panel and attach with #7 or #8 self-tapping screws in the prepunched holes. The **RET Series** is also available in a UL listed version.

5

FEATURES

- Low-cost NEMA 1 enclosure
- Mounted with door hinged on left or right side
- Removable door
- Attractive powder-coated finish
- Standard brown enclosure with brown door
- Optional colors available
- Key lock, two keys, and attractive gray powder-coated perf panel furnished
- Mounting components simplified with perf panel

ENCLOSURES

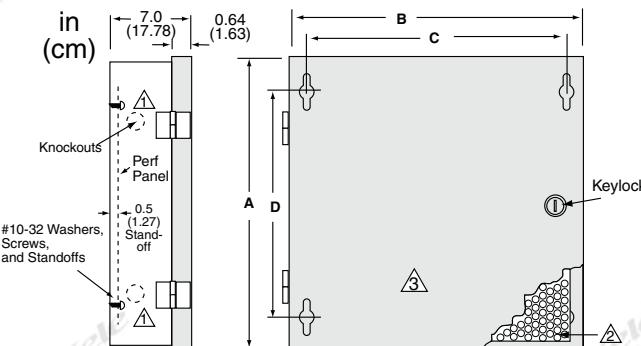
RET OPTIONAL COLOR CHART



Optional colors shown in approximate hue



DIMENSIONS



Knockouts are for 3/4" conduit, two knockouts on both sides, three knockouts top and bottom (except two on RET 1812).

Perf Panel is 16-ga powder-coated steel.

Standard color is brown enclosure with tan door.

ORDERING INFORMATION

| ENCLOSURE MODEL | DIMENSIONS in (cm) | | | | ENCLOSURE MATERIAL | PERF PANEL | WEIGHT lb (Kg) | PERF PANEL H x W in (cm) |
|-----------------|--------------------|---------|------------|------------|--------------------|------------|----------------|--------------------------|
| | A | B | C | D | | | | |
| RET2620† | 26 (66) | 20 (51) | 18.75 (47) | 17.75 (51) | 16-ga steel | Included | 36 (16.4) | 23.5 x 17.5 (60 x 44) |
| RET3826† | 38 (97) | 26 (66) | 24.75 (62) | 29.75 (81) | 16-ga steel | Included | 61 (27.8) | 35.5 x 23.5 (90 x 60) |
| RET4230† | 42 (107) | 30 (76) | 28.75 (66) | 33.75 (97) | 14-ga steel | Included | 83 (37.8) | 39.5 x 27.5 (100 x 70) |
| RET1812ULP† | 18 (46) | 12 (31) | 10.75 (28) | 9.75 (36) | 16-ga steel | Included | 16 (7.3) | 15.5 x 9.0 (39 x 23) |
| RET2018ULP† | 20 (51) | 18 (46) | 16.75 (42) | 11.75 (36) | 16-ga steel | Included | 27 (12.3) | 17.5 x 15.5 (44 x 39) |
| RET2620ULP† | 26 (66) | 20 (51) | 18.75 (47) | 17.75 (51) | 14-ga steel | Included | 41 (18.6) | 23.5 x 17.5 (60 x 44) |
| RET3626ULP† | 36 (91) | 26 (66) | 24.75 (62) | 27.75 (76) | 14-ga steel | Included | 69 (31.3) | 33.5 x 23.5 (85 x 60) |

† -DB: Dark Blue, -PB: Powder Blue, -OR: Orange, -GN: Green, -GY: Gray (Note: No suffix - Brown/Tan)

RET-KEY RET-LOCK

Replacement Key for Ret-Lock
Lock with key for RET enclosure

PANEL FABRICATION

PANEL RECEPTACLE AND DISCONNECT SWITCH ASSEMBLIES MODELS PDK, PRK, 51012218

DESCRIPTION

These **Panel Receptacle** and **Disconnect Switch Assemblies** combine convenience and function. **Models PRK-S, PRK-FS, and PRK-FLS** provide constant power to the receptacle and can be used to power down the rest of the panel with the toggle switch. **Models PRK-FS and PRK-FLS** include a fuse holder for circuit protection (fuse sold separately). **Models PDK** and **PRK** are standard single-gang configuration, and **Models PRK-FLS, PRK-FS, and PRK-S** are double-gang configuration. The **51012218** offers DIN rail mounting and convenient push-on wiring.

FEATURES

- *Prewired*
- *Handy box included*
- *Cost effective*
- *Always hot receptacle*
- *Panel disconnect switch*
- *Pilot light option to indicate closed switch*

CAUTION: Receptacle is always hot.



51012218

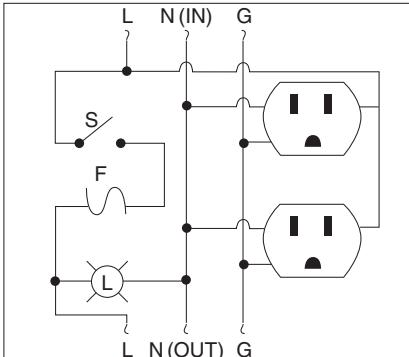
PRK-FLS

PDK-L

SPECIFICATIONS

| | |
|------------------------|--|
| Power Rating | 120 VAC |
| Receptacles | Non-GFI 20A @ 120 VAC GFI 15A @ 120 VAC 20A @ 120 VAC 25 mA @ 120 VAC 250V |
| Switch Light Fuse | 0.5-15A (ordered separately) 12 AWG (UL) MTW 600V |
| Wire Dimensions | PRK, PDK, 51012218, PRK-GFI 4.75" H x 2.75" W (12.07 x 6.99 cm) |
| PRK-S, PRK-FS, PRK-FLS | 4.50" H x 4.50" W (11.43 x 11.43 cm) |
| Warranty | 1 year |

WIRING



ORDERING INFORMATION

| MODEL | DESCRIPTION |
|----------|--|
| PDK | Panel disconnect switch assembly |
| PDK-L | Panel disconnect switch assembly with green light |
| PRK | Panel receptacle assembly |
| PRK-S | Panel switch and receptacle assembly |
| PRK-FS | Panel switch and receptacle assembly with fuse holder |
| PRK-FLS | Panel switch and receptacle assembly with fuse holder and green light |
| PRK-GFI | Panel receptacle assembly with GFI receptacle |
| 51012218 | DIN mount duplex receptacle with disconnect power input terminal block |

RELATED PRODUCTS
GF Series Fuses (fuses ordered separately)

POWER SUPPLIES

KELE DC POWER SUPPLY

DCP-1.5-W



Kele

DESCRIPTION

The Kele DCP-1.5-W is a regulated 1.5A power supply that accepts 24 VAC at the input and provides 24 VDC at the output. The DCP-1.5-W can be ordered with any output voltage from 1.5V to 27 VDC. Field voltage adjustments may also be made using only a screwdriver. The power supply is provided with a mounting track for easy field application. This low cost power supply features good regulation and has full overcurrent protection.

FEATURES

- **Low cost**
- **Regulated DC output**
- **Snap-track mounted**
- **Screw terminals with pressure plates**
- **Adjustable DC output**
- **Full-wave rectified**

APPLICATION

In general, the output current rating will be reduced by the ratio of the output voltage divided by the input voltage. For example, a 6 VDC supply powered by a 24 VAC transformer will have a reduced-rated output current of 375 mA. $(6/24) \times 1.5 = 0.375$

To obtain the full-rated output current at reduced output voltages, the standard power supply input voltage must be reduced. It is a good practice to maintain the same AC input voltage as the desired DC output voltage.

A grounded DC minus terminal and a grounded secondary 24 VAC input transformer will blow the unit's fuse. If this is a problem, there are three possible solutions:

Option 1: Remove the ground on the transformer secondary to float the voltage output, or use a separate ungrounded transformer.

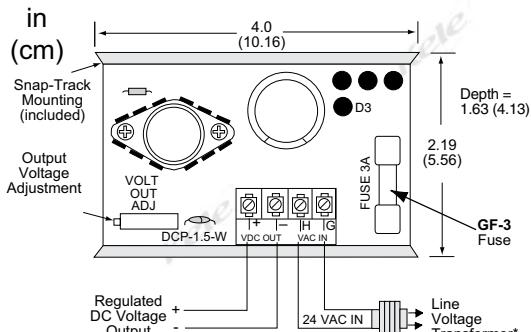
Option 2: Add a Model Y65G13-0 40 VA isolation transformer. This option reduces the power supply capacity to 920 mA.

Option 3: Remove diode D3 (marked on board). Jumper the VDC OUT (-) terminal to the VAC IN (G) terminal. The grounded side of the AC supply should be wired to the VAC IN (G) terminal. This option reduces the power supply capacity to 400 mA. (Sometimes call "1/2 wave" option)



DCP-1.5-W

DIMENSIONS / WIRING



* Input Transformer Required VA Rating @ 24 VAC = 43.2 x Desired DC Output Current
For full 1.5A capacity, use a 75 VA transformer.

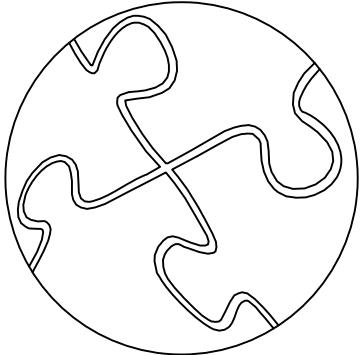
SPECIFICATIONS

| | |
|--------------------------------|---|
| Supply Voltage | 24 VAC |
| Output Voltage | 24 VDC (full wave rectified and regulated), Adjustable 1.5 - 27 VDC (full wave rectified and regulated) |
| Supply Frequency | 50/60 Hz |
| Regulation | 1.5% at full rated current |
| Output Current | 1.5A (with 75 VA transformer) |
| Over Current Protection | 3A fuse (GF-3) |
| Mounting | Snap track (included) |
| Temperature Stability | 1% |
| Operating Temperature | 32° to 130°F (0° to 55°C) |
| Operating Humidity | 95% RH non-condensing |
| Dimensions | 1.63"H x 2.19"W x 4.0"D (4.13 x 5.56 x 10.16 cm) |
| Weight | 0.4 lb (0.18 Kg) |
| Warranty | 1 year |

ORDERING INFORMATION

| MODEL |
|-------------|
| DCP-1.5-W |
| DCP-1.5-W-C |

| DESCRIPTION |
|--|
| Power supply, 24 VAC IN to 24 VDC OUT |
| Power supply, 24 VAC In to special DC output (Specify output voltage when ordering, 1.5-27 VDC) |



ROTH

S Q U A R E S T H E A S T

Automation • Energy Management • Lighting

OPERATIONAL STANDARDS:

1. CONDUIT FILL - CONDUIT FILL IS DONE ON A POINT SYSTEM. $\frac{1}{2}$ " CONDUIT IS RATED AT 12 POINTS AND $\frac{3}{4}$ " IS RATED AT 22. EACH CONDUCTOR 18 GAUGE OR SMALLER IS TO BE COUNTED AS A POINT. CAT5 CABLE IS COUNTED AS 4 POINTS. THE TOTAL NUMBER OF POINTS / CONDUCTORS SHALL NOT EXCEED THE MAXIMUM RATING OF THE CONDUIT.
 2. LOW VOLTAGE STRAPPING - WHEN A LOW VOLTAGE CABLE IS INSTALLED NOT IN A CONDUIT OR FREE WIRED, THEY SHOULD BE SUPPORTED EVERY 6'.
 3. ALL JUNCTION BOXES NEED TO BE ACCESSIBLE. ACCESSIBLE - CAPABLE OF BEING REMOVED OR EXPOSED WITHOUT DAMAGING THE BUILDING STRUCTURE OR FINISH OR NOT PERMANENTLY CLOSE IN THE STRUCTURE OR FINISH OF THE BUILDING. MUST ALSO HAVE 2' OF CLEARANCE IN FRONT OF THE BOX.
 4. GUTTERS - GUTTERS SHOULD BE INSTALLED WHERE MORE THAN 4 CONDUITS ENTER THE SAME SIDE ON THE ENCLOSURE. GUTTERS WILL BE INSTALLED WITH 2" CONDUIT NIPPLES BETWEEN GUTTER AND ENCLOSURE.
 5. ENCLOSURES - CONDUIT SHOULD ENTER IN THE TOP AND BOTTOM OF THE ENCLOSURE. ALL 120V POWER SHOULD ENTER IN THE BOTTOM RIGHT CORNER.
 6. LABELING - ALL WIRES ARE TO BE LABELED WITHIN 12" OF TERMINATION POINT WITH THE CORRECT ACRONYM.

WIRING COLOR STANDARDS:

| | | | |
|-------------------------------------|---|-----------------------|----------------------|
| ANALOG OUTPUTS WIRE COLOR - TAN |   | 3 WIRE ANALOG INPUT | N2 WIRE COLOR - BLUE |
| DIGITAL OUTPUTS WIRE COLOR - PURPLE |   | 2 WIRE DIGITAL OUTPUT | BACNET - GREEN |
| ANALOG INPUTS WIRE COLOR - YELLOW |   | 3 WIRE ANALOG OUTPUT | LON - PINK |
| DIGITAL INPUTS WIRE COLOR - ORANGE |   | 2 WIRE DIGITAL INPUT | MODBUS - GREY |

WHITE CABLE CAN BE USED IF CORRECT COLOR IS NOT AVAILABLE. THE WHITE CABLE NEEDS TO BE MARKED WITH CORRECT COLOR TAPE WITHIN 12" OF TERMINATION. ALL MULTI-CONDUCTORS MUST ALSO BE MARKED WITH COLORED TAPE FOR EACH INPUT OR OUTPUT THEY HAVE.

CONTACTS:

NEIL CAPORALE
ROTH SOUTHEAST
OPERATIONS MANAGER

PHONE:
954-423-6640 EXT 228

DALE CHUNG
ROTH SOUTHEAST
PROJECT MANAGER

PHONE:
954-423-6640 EXT 436

PROJECT SCOPE:

- (37) WSHP
 - (12) EXHAUST FANS

PROJECT TITLE:

NEW RIVER MIDDLE SCHOOL SMART RENOVATIONS

**3100 RIVERLAND ROAD
FORT LAUDERDALE, FL 33312**

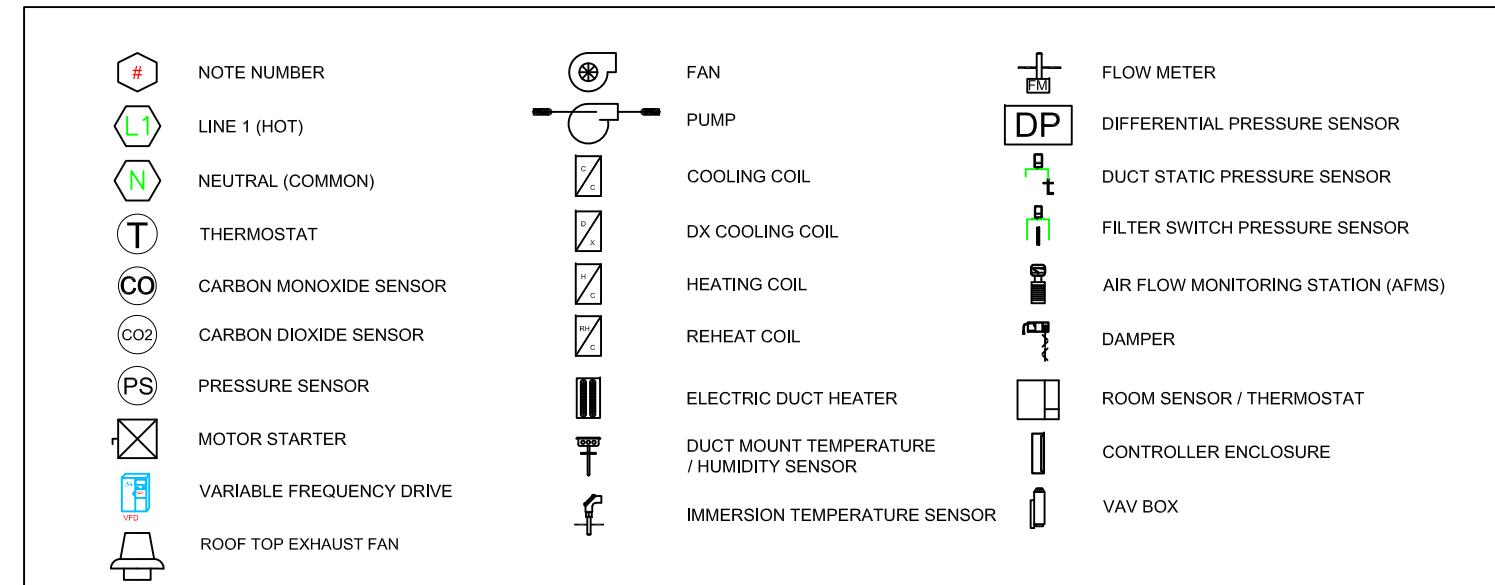
| DRAWING INDEX | |
|----------------------|-----------------------------------|
| NUMBER | TITLE |
| 0 | TITLE PAGE |
| 1 | DRAWING LEGENDS |
| 2 | RISER DIAGRAM |
| 3 | BLDG 1 PARTIAL 1ST FL PLAN |
| 4 | BLDG 1 PARTIAL 1ST FL PLAN |
| 5 | BLDG 1 PARTIAL 2ND FL PLAN |
| 6 | BLDG 1 PARTIAL 2ND FL PLAN |
| 7 | BLDG 1 ROOF PLAN |
| 8 | BLDG 2 PARTIAL 1ST FL PLAN |
| 9 | BLDG 2 PARTIAL 2ND FL PLAN |
| 10 | BLDG 3 PARTIAL 1ST FL PLAN |
| 11 | BLDG 3 PARTIAL 1ST FL PLAN |
| 12 | BLDG 3 PARTIAL 1ST FL PLAN |
| 13 | WSHP DIAGRAM |
| 14 | WSHP WIRING DIAGRAM |
| 15 | WSHP PARTS/SOP |
| 16 | OVERRIDE PANEL |

| DESCRIPTION | | TITLE PAGE | | DRAWING | |
|-------------|---------------------------|------------|----------|---------------------|-----------|
| EV | UPDATED PER DESIGN REVIEW | DATE | APPROVED | FILE: | |
| 1 | | 8/12/20 | | JOB/CONT # | |
| | | | | SALES PROJECT APPL. | DRWG # |
| | | | | ENGINEER MANAGER | REV. |
| | | | | MC DC DW | INIT DATE |
| | | | | J.S. | 6/1/2020 |

ACRONYM LEGEND:

| ACRONYM | MEANING | ACRONYM | MEANING |
|---------|----------------------------------|---------|--------------------------------|
| AC | AIR CONDITIONER | EPF | ELEVATOR PRESSURIZATION FAN |
| AFMS | AIR FLOW MEASURING STATION | ERU | ENERGY RECOVERY UNIT |
| AHU | AIR HANDLING UNIT | FA | FIRE ALARM |
| AI | ANALOG INPUT | FPB | FAN POWERED BOX |
| AO | ANALOG OUTPUT | FCU | FAN COIL UNIT |
| BMS | BUILDING MANAGEMENT SYSTEM | FD | FIRE DAMPER |
| BTU | BRITISH THERMAL UNIT | FM | FLOW METER |
| CFM | CUBIC FEET PER MINUTE | FSD | FIRE / SMOKE DAMPER |
| CH | CHILLER | GEF | GARAGE EXHAUST FAN |
| CHWP | CHILL WATER PUMP | GPM | LOADING DOCK EXHAUST FAN |
| CHWV | CHILL WATER VALVE | GSF | GARAGE SUPPLY FAN |
| CPF | CHILLER PLANT EXHAUST FAN | HP | HEAT PUMP |
| CV | CONSTANT VOLUME | HX | HEAT EXCHANGE |
| CS | CURRENT SWITCH | LEF | LOADING DOCK EXHAUST FAN |
| CT | COOLING TOWER | NTS | NOT TO SCALE |
| CWP | CONDENSER WATER PUMP | OA | OUTSIDE AIR |
| DDC | DIRECT DIGITAL CONTROLS | PSI | POUNDS PER SQUARE INCH |
| DI | DIGITAL INPUT | RA | RETURN AIR |
| DO | DIGITAL OUTPUT | RF | RETURN FAN |
| DP | DIFFERENTIAL PRESSURE | RTU | ROOF TOP UNIT |
| DPS | DIFFERENTIAL PRESSURE SWITCH | SA | SUPPLY AIR |
| DPT | DIFFERENTIAL PRESSURE TRANSDUCER | SCWP | SECONDARY CONDENSER WATER PUMP |
| EA | EXHAUST AIR | SF | SUPPLY FAN |
| EEP | EAST EJECTOR PUMP | SP | STATIC PRESSURE |
| EESC | EAST ESCALATOR PUMP | SPF | STAIRWELL PRESSURIZATION FAN |
| EESP | EAST ELEVATOR SUMP PUMP | TF | TRANSFER FAN |
| EFSP | EAST FIRE SUMP PUMP | TXF | TOILET EXHAUST FAN |
| EF | EXHAUST FAN | VAV | VARIABLE AIR VOLUME |
| EMS | ENERGY MANAGEMENT SYSTEM | VFD | VARIABLE FREQUENCY DRIVE |

SYMBOL LEGEND:



EXHAUST FAN INTERLOCK SCHEDULE

| UNIT NAME | ASSOCIATED UNIT |
|-----------|-----------------|
| EF-6 | |
| EF-8 | |
| EF-11 | |
| EF-34 | |
| EF-37 | |
| EF-38 | |
| EF-39 | |
| EF-41 | |
| EF-43 | |
| EF-46 | |
| EF-53 | |
| EF-54 | |

NOTES:

1 EXHAUST FAN INTERLOCKS TO BE FIELD VERIFIED.

| QTY | PART NUMBER | DESCRIPTION | MANUFACTURER |
|-----|-----------------|------------------------|-----------------|
| 1 | SXWAUTSVR100001 | AS CONTROLLER | SCHNEIDER |
| 1 | SXWTBASW100001 | AS TERMINAL BASE | SCHNEIDER |
| 1 | SXWPS24VX100001 | POWER SUPPLY | SCHNEIDER |
| 1 | SXWTBPSW100001 | POWER SUPPLY BASE | SCHNEIDER |
| 6 | ESW108 | 8-PORT ETHERNET SWITCH | B&B ELECTRONICS |
| 1 | ESW105 | 5-PORT ETHERNET SWITCH | B&B ELECTRONICS |

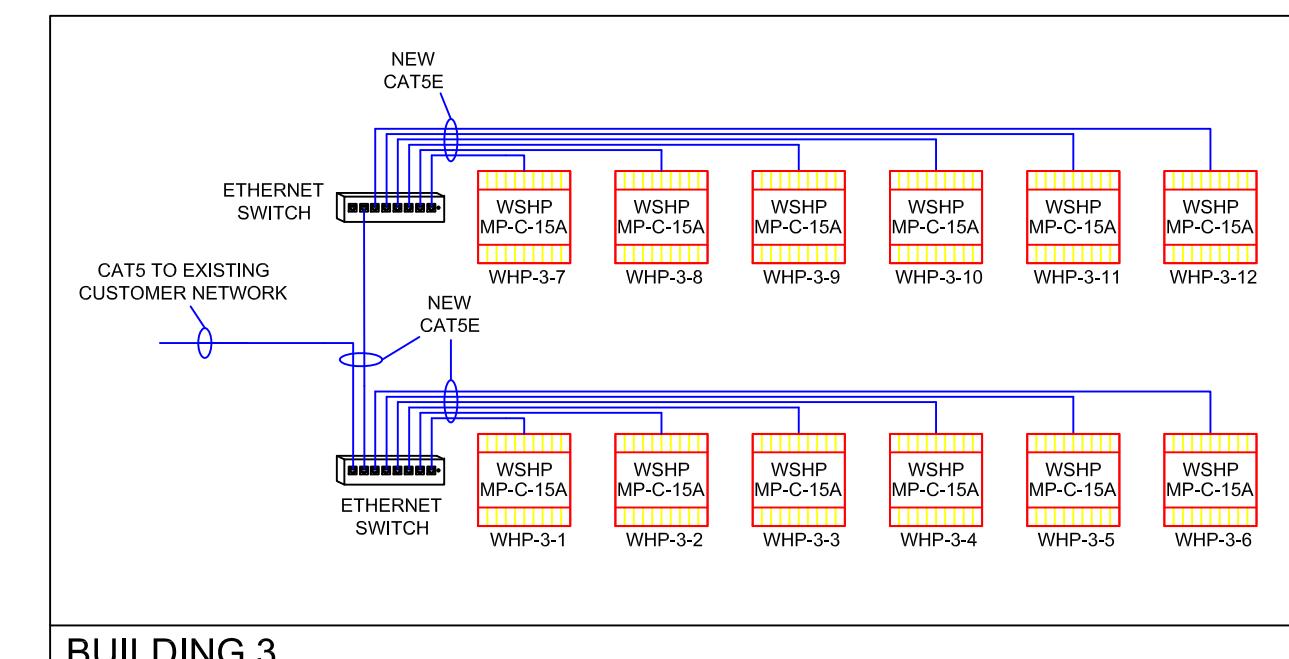
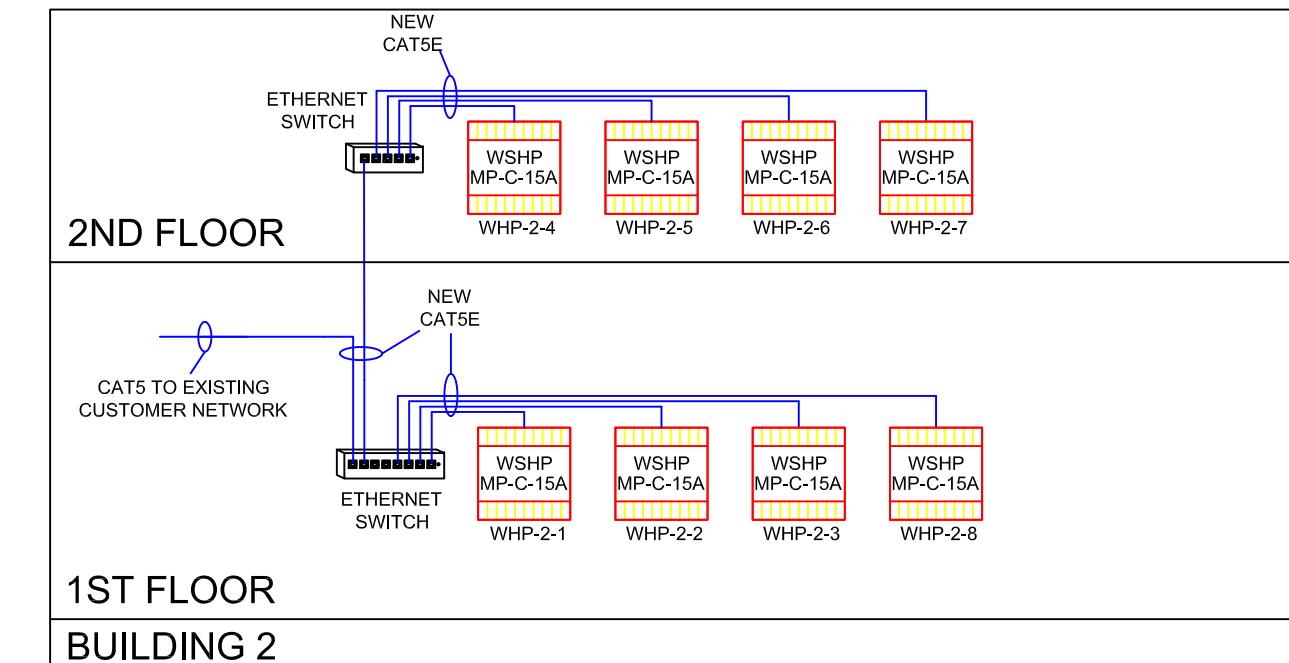
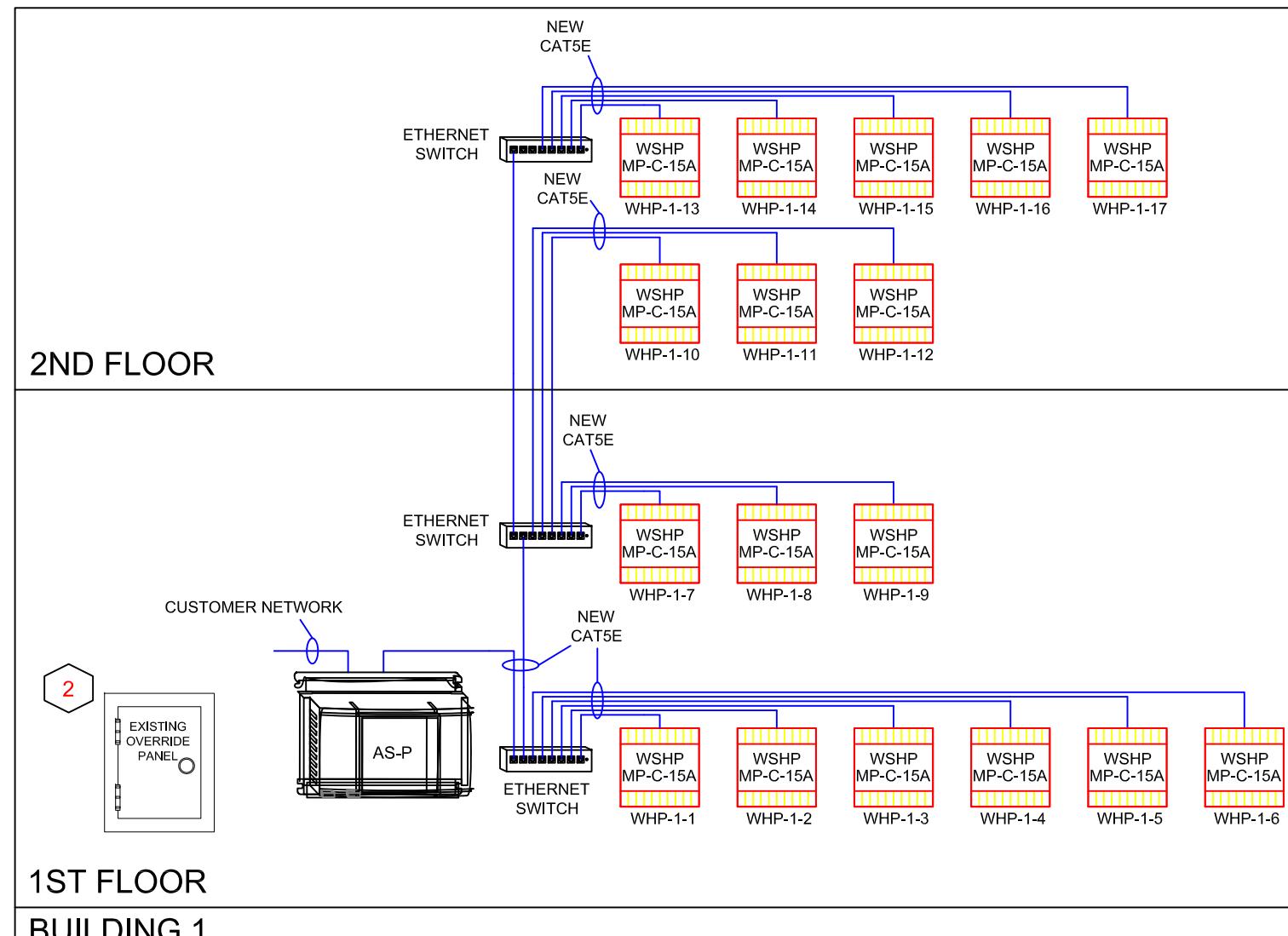
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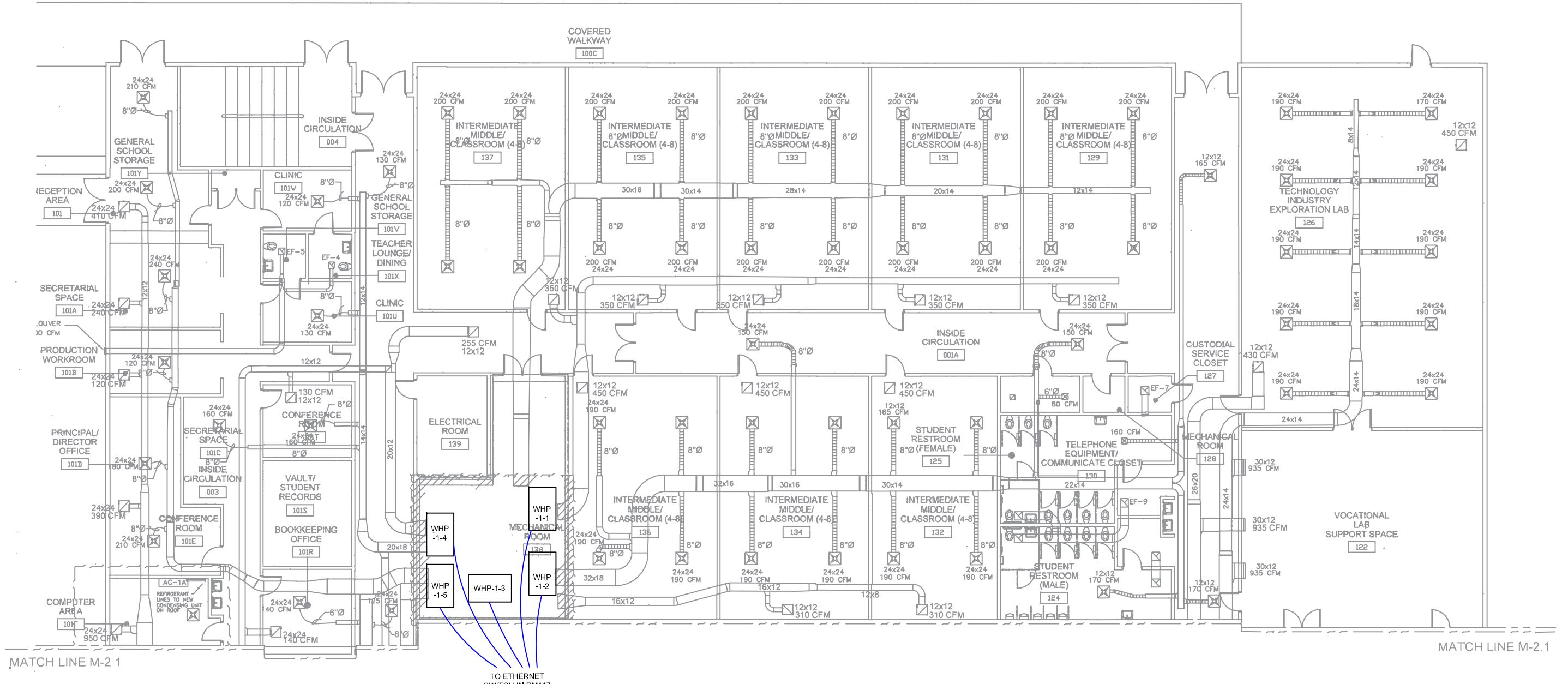
- 1 EXISTING CONTINUUM CONTROLS FOR SECURITY TO REMAIN IN PLACE.
- 2 EXISTING OVERRIDE PANEL TO BE UPGRADED FOR CONNECTION TO STRUXUREWARE.

| DRAWING | | DRAWING | |
|---------------------------|------------|---------------|-----------------|
| FILE: | JOB/CONT # | SALES PROJECT | APPL. DRAWN BY: |
| MC | DC | ENGINEER | DW |
| RENO | 2 | 0 | 6/1/2020 |
| NEW RIVER MIDDLE SCHOOL | | | |
| 3100 RIVERLAND ROAD | | | |
| FORT LAUDERDALE, FL 33312 | | | |

DRAWING LEGEND

ROTH
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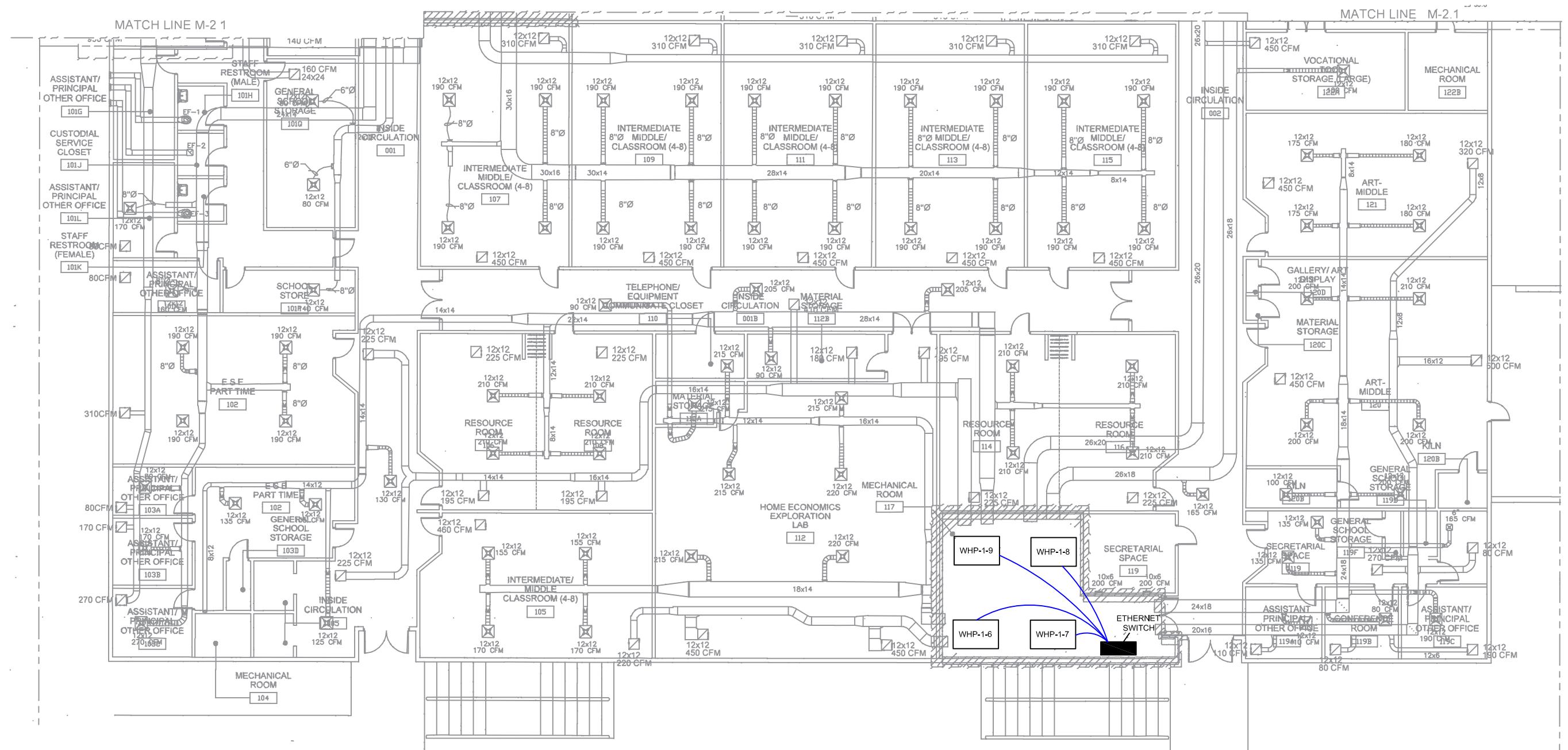




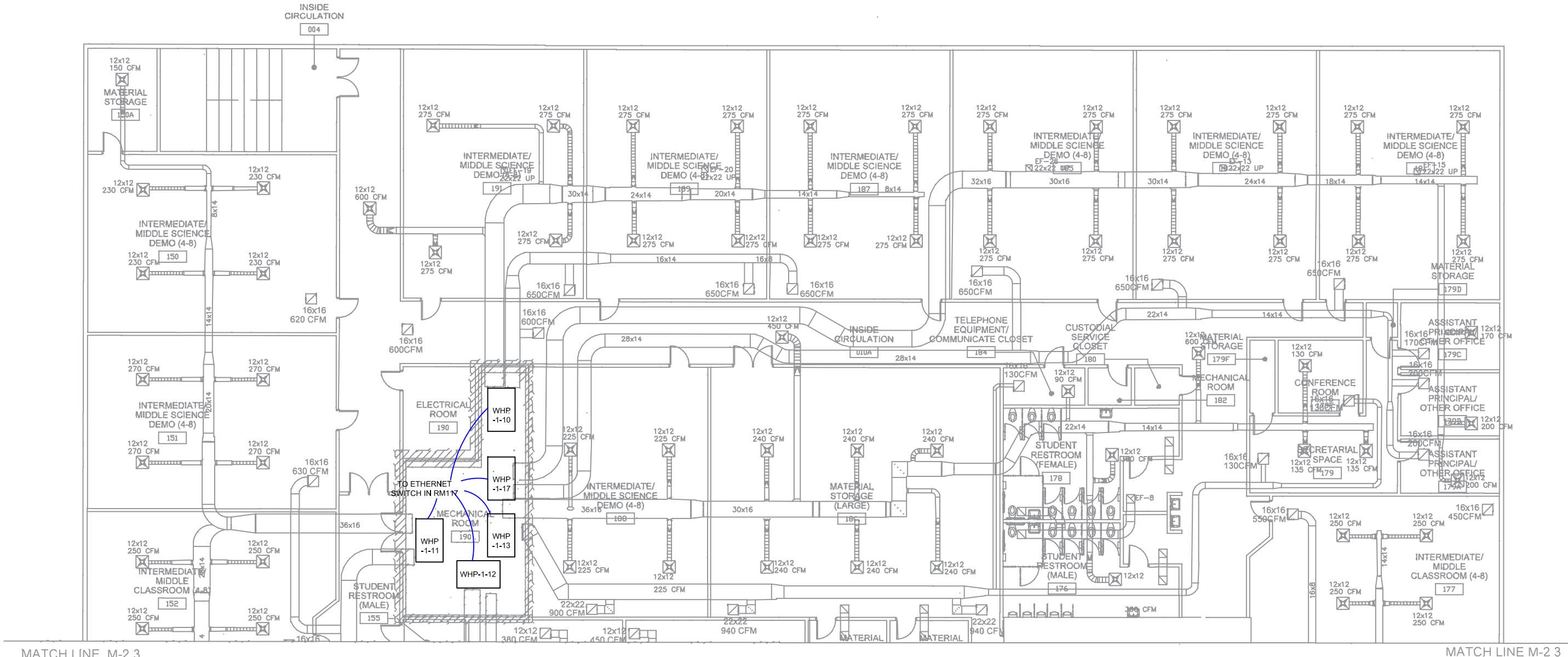
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| | | | | MC | DC | DW | JS | REV. | REV. | 0 |
| | | | | INIT DATE | | | | | INIT DATE | 6/1/2020 |
| ROTH | BLDG 1 PARTIAL 1ST FL PLAN | | | | | | | | | |
| ROTH | NEW RIVER MIDDLE SCHOOL SMART RENO | | | | | | | | | |
| 5 | ROTH | 3100 RIVERLAND ROAD | FORT LAUDERDALE, FL 33312 | | | | | | | |



Management Consulting



| BLDG 1 PARTIAL 1ST FL PLAN | | DRAWING | |
|--|----------|----------|------------|
| FILE: ROTH | | DRWG # | REV. |
| NEW RIVER MIDDLE SCHOOL SMART RENO 3100 RIVERLAND ROAD FORT LAUDERDALE, FL 33312 | | 0 | 0 |
| DESCRIPTION | DATE | APPROVED | INIT. DATE |
| S U L T H E A S T | 6/1/2020 | | |
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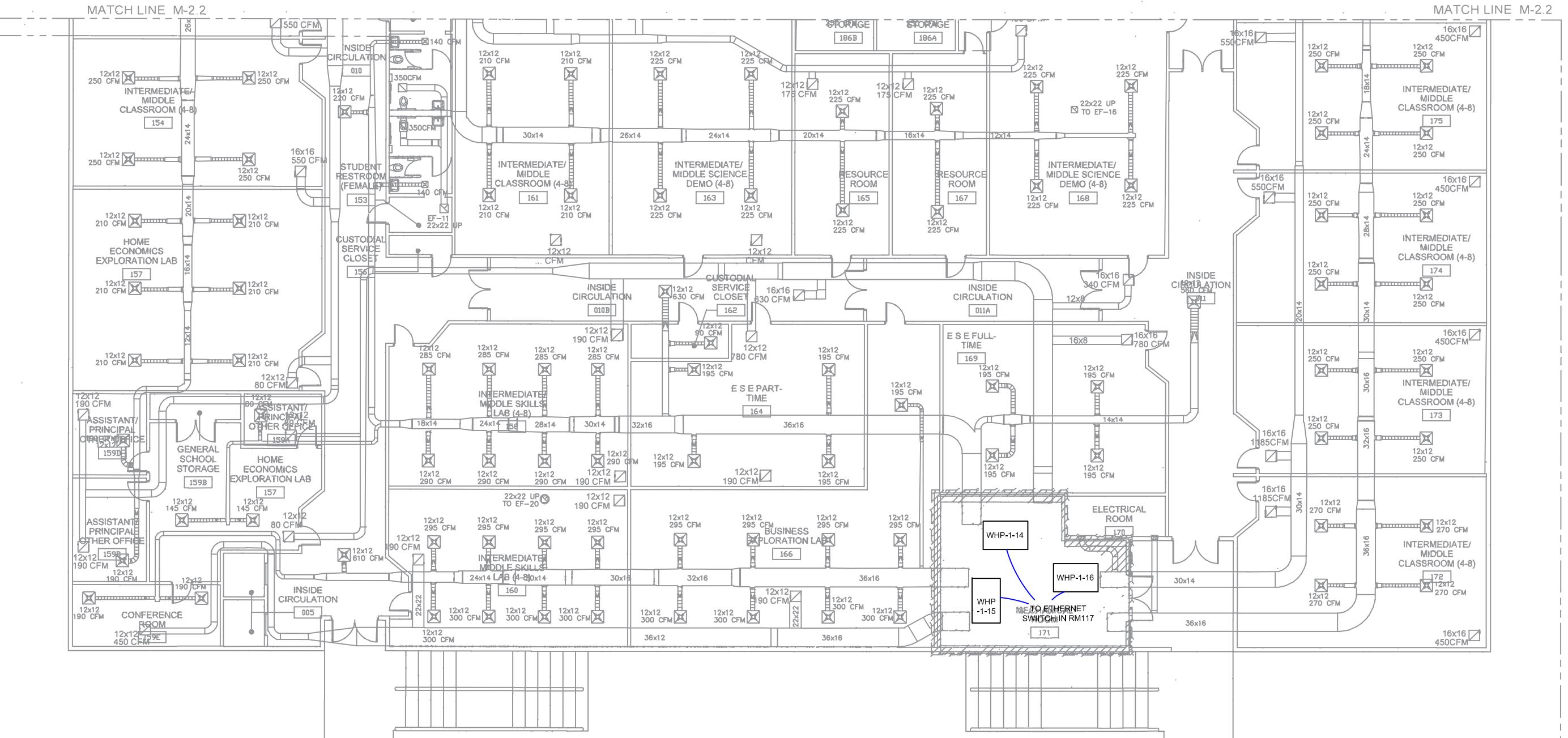


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| | | | | NEW RIVER MIDDLE SCHOOL SMART RENO | | | | | | 5 | | | |
| | | | | 3100 RIVERLAND ROAD | | | | | | 0 | | | |
| | | | | FORT LAUDERDALE, FL 33312 | | | | | | | | | |
| | | | | | MC | DC | DW | | | | | | |
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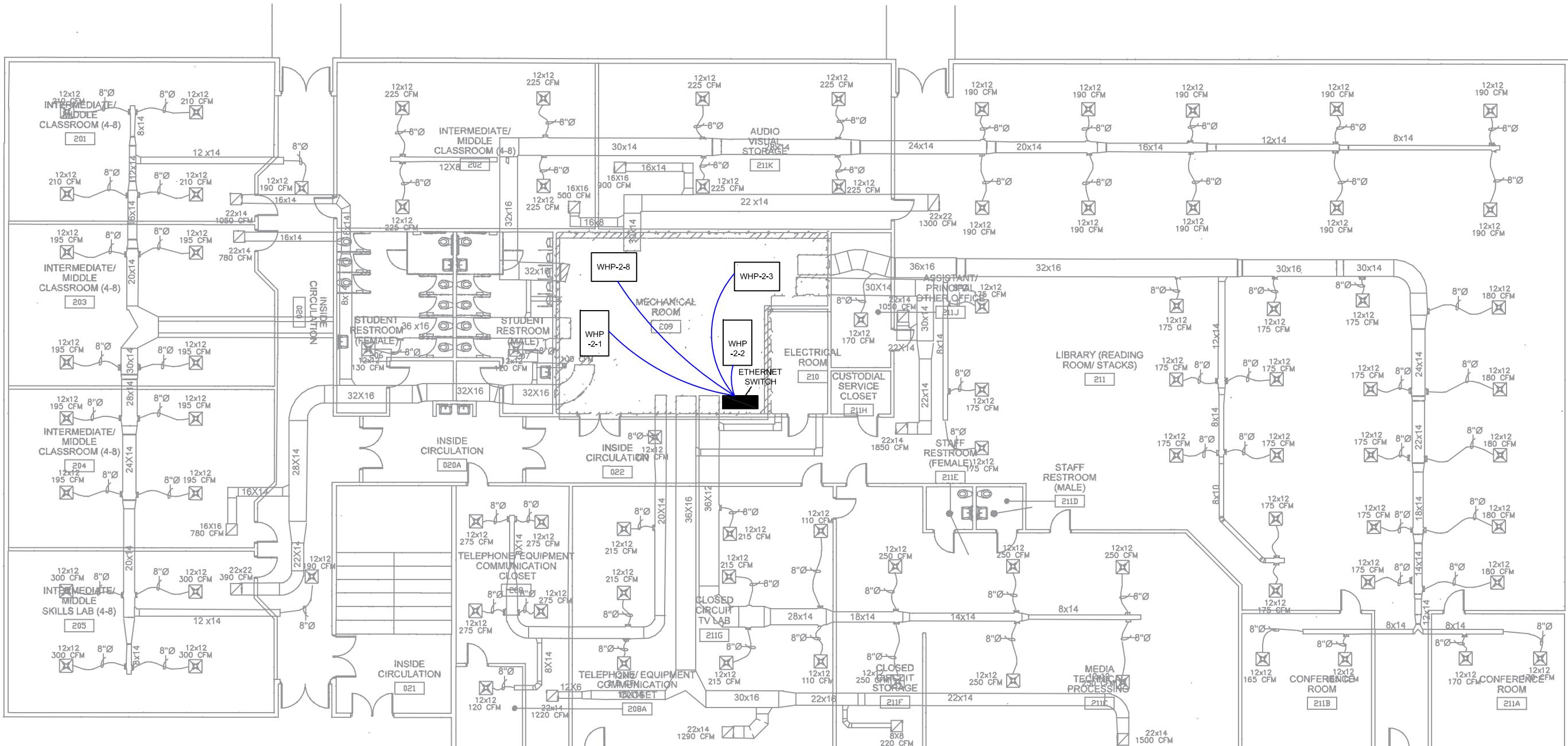


SOUTHEAST
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BLDG 1 PARTIAL 2ND FL PLAN
NEW RIVER MIDDLE SCHOOL SMART RENO
3100 RIVERLAND ROAD
FORT LAUDERDALE, FL 33312

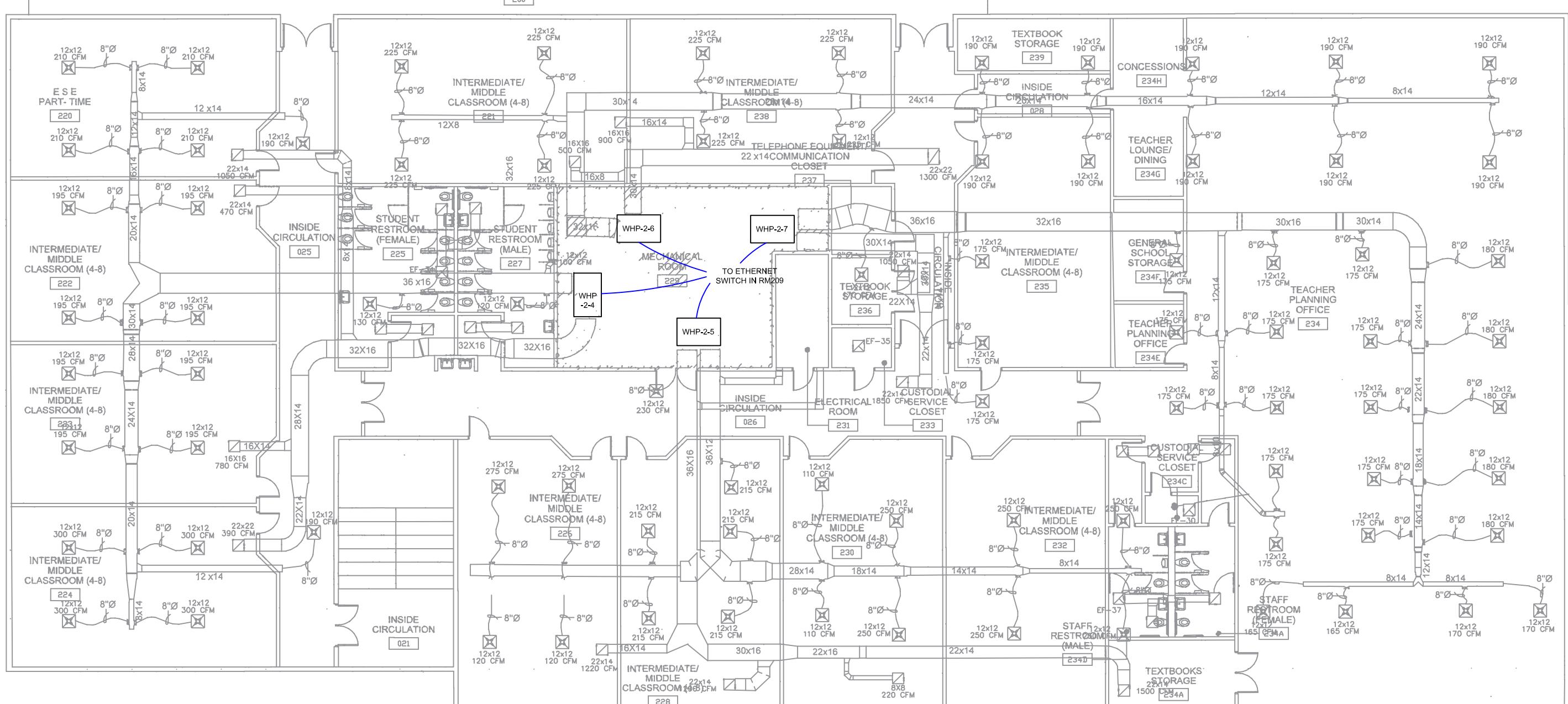
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| | | DATE | SALES PROJECT # | | APPL. ENGINEER | |
| MC | DC | DW | INIT. DATE | REV. | REV. | INIT. DATE |
| ROTH <small>Architecture • Engineering • Construction Management • Consulting</small> | S | 6 | 0 | 6 | 0 | 6/1/2020 |



| REV | DESCRIPTION | DATE | APPROVED | FILE: | JOB/CONT # | SALES PROJECT MANAGER | APPL. ENGINEER | DRAWN BY: | DRWG # | REV. | INIT. DATE | DRAWING |
|-----|-------------|------|----------|-------|------------|-----------------------|----------------|-----------|--------|------|------------|---------|
| | | | | | | | | | 8 | 0 | 6/1/2020 | ROTH |

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BLDG 2 1ST FL PLAN
NEW RIVER MIDDLE SCHOOL SMART RENO
3100 RIVERLAND ROAD
FORT LAUDERDALE, FL 33312



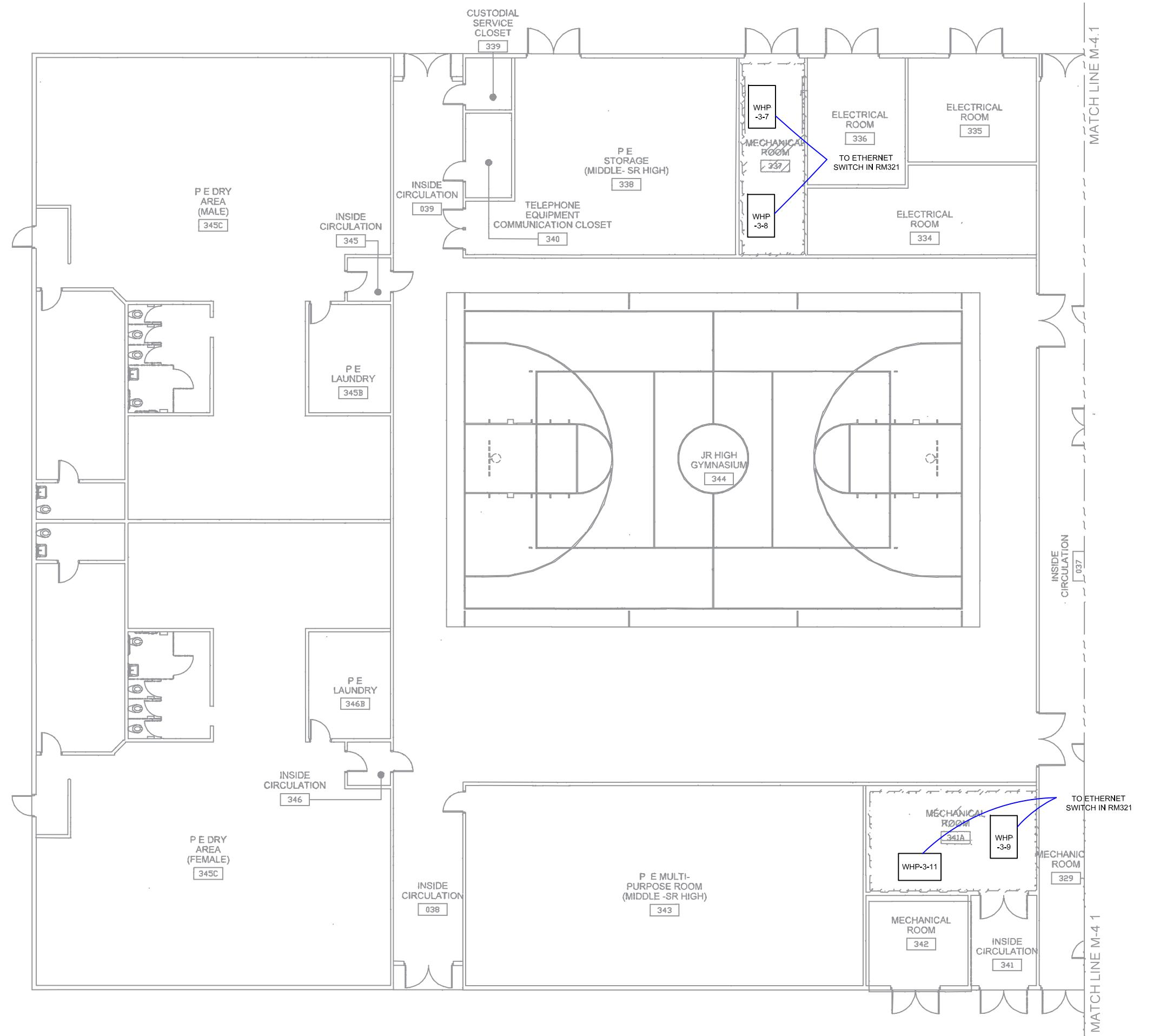
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| | | | | BLDG 2 2ND FL PLAN | | | | | 9 | 0 | 9 |

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| | | | 6/1/2020 |

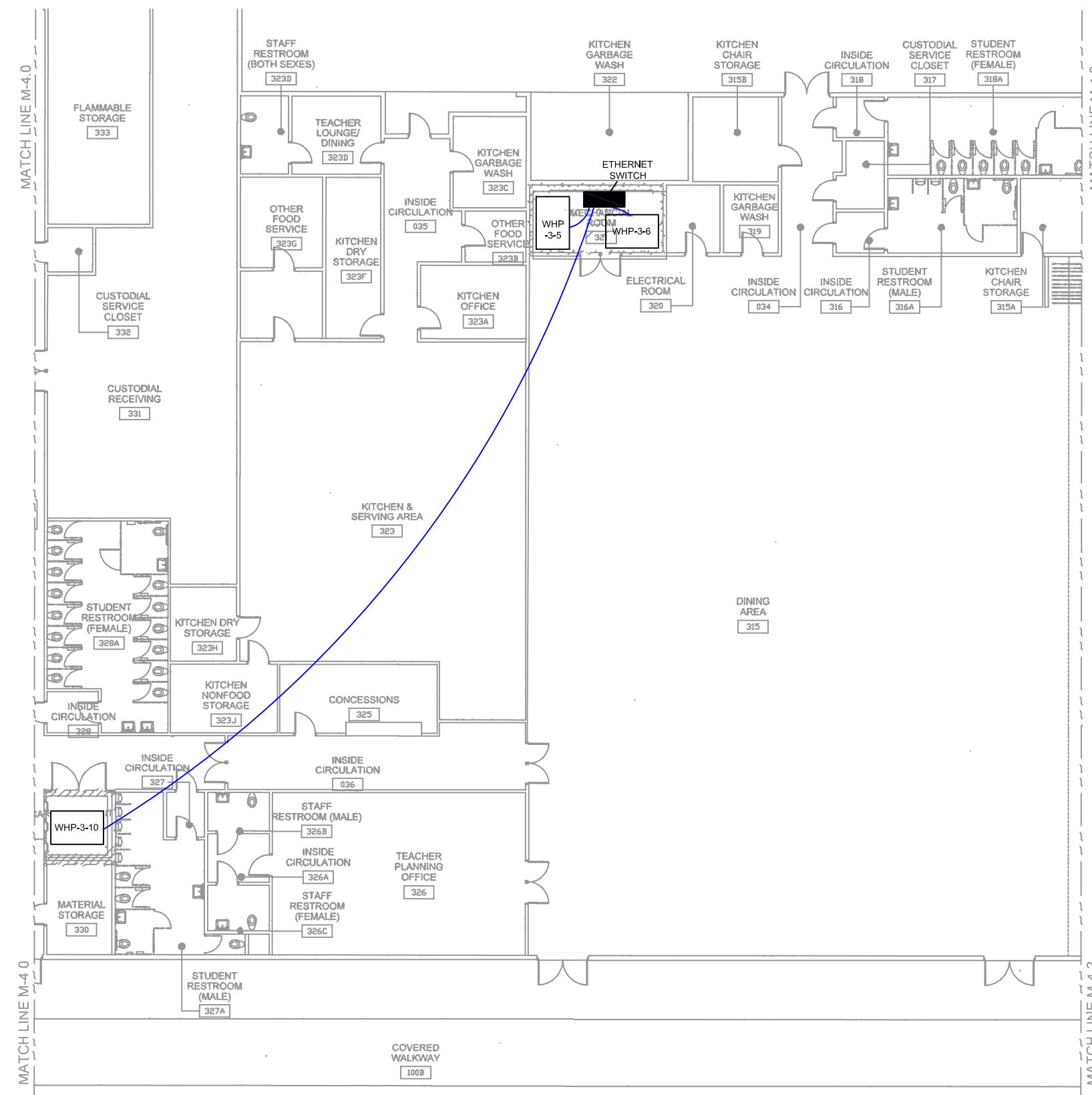


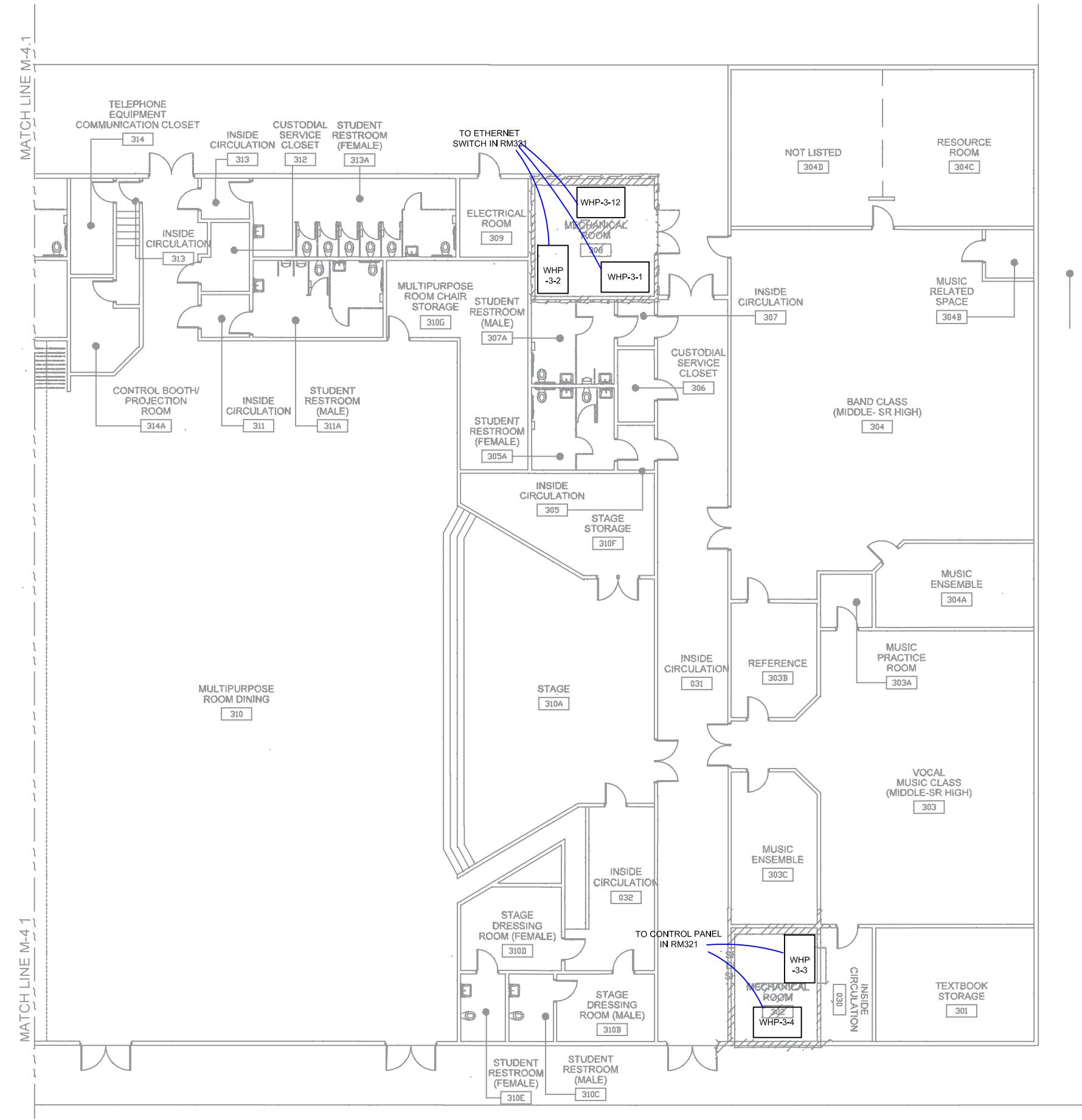
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REV



| S E C U R I T Y S Y S T E M | | J O B / C O N T # | | P R O J E C T | | A P P L . | | D R W G # | |
|-------------------------------|---|---------------------|---------------|------------------------------|-----|----------------------------------|-----|-------------------|----------|
| | | | | S A L E S E N G I N E E R | | M A N A G E R E N G I N E E R | | D R A W N B Y: | |
| | | | | M C | D C | D W | J S | R E V . | I N I T |
| S Q U T H E A S T | A u t o m a t i o n • E n e r g y M a n a g e m e n t • L o g i s t i c s | NEW RIVER | MIDDLE SCHOOL | SMART RENO | | | | | 10 |
| | | 3100 RIVERLAND ROAD | | | | | | | 0 |
| | | FORT LAUDERDALE, FL | 33312 | | | | | | 6/1/2020 |

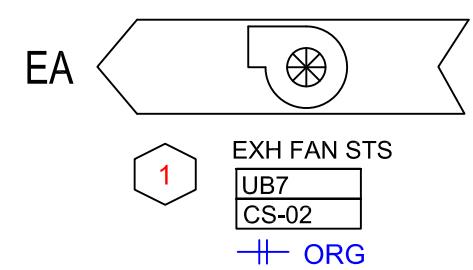
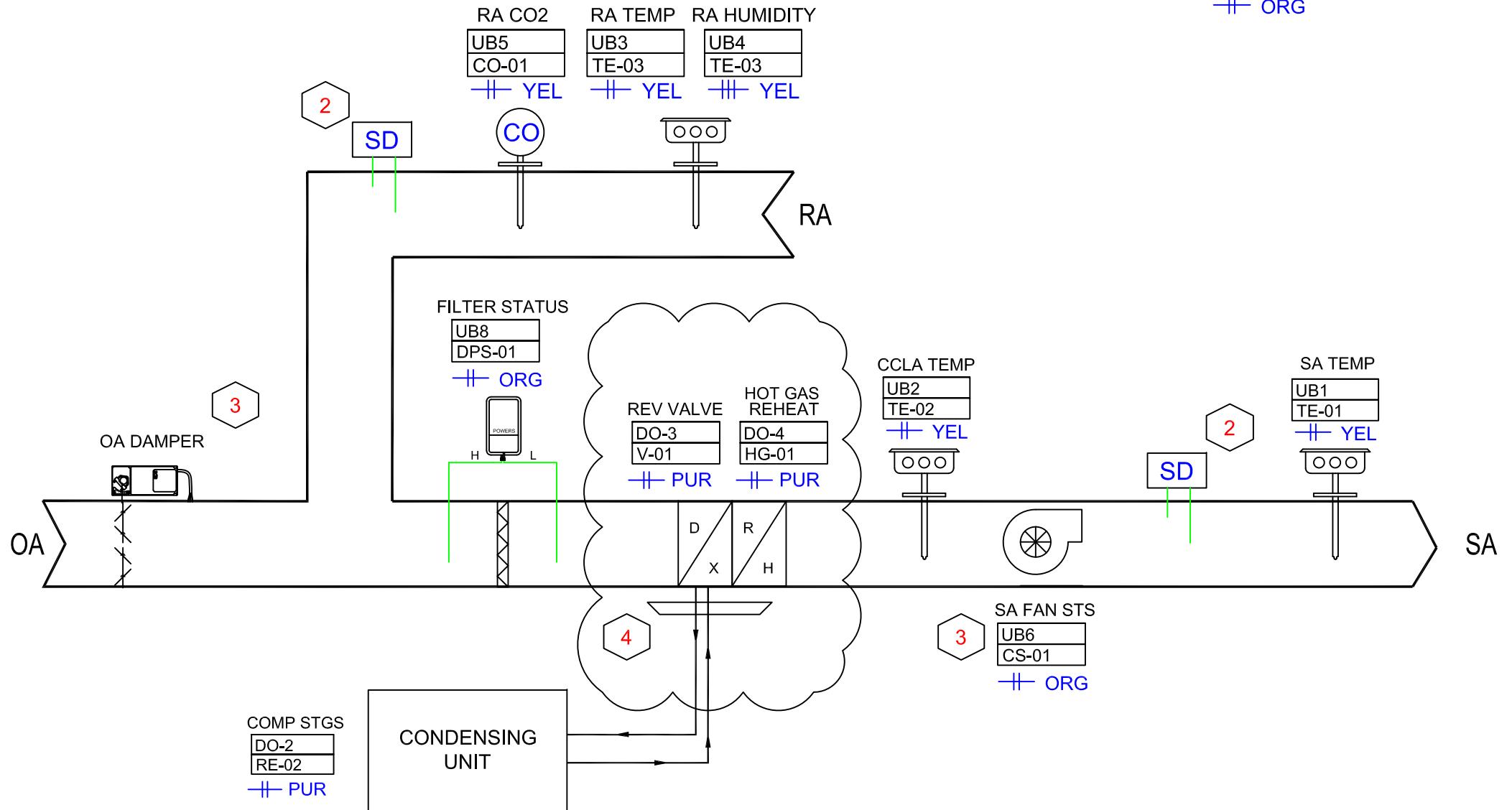




NOTES:

TYPICAL OF (37) WSHP

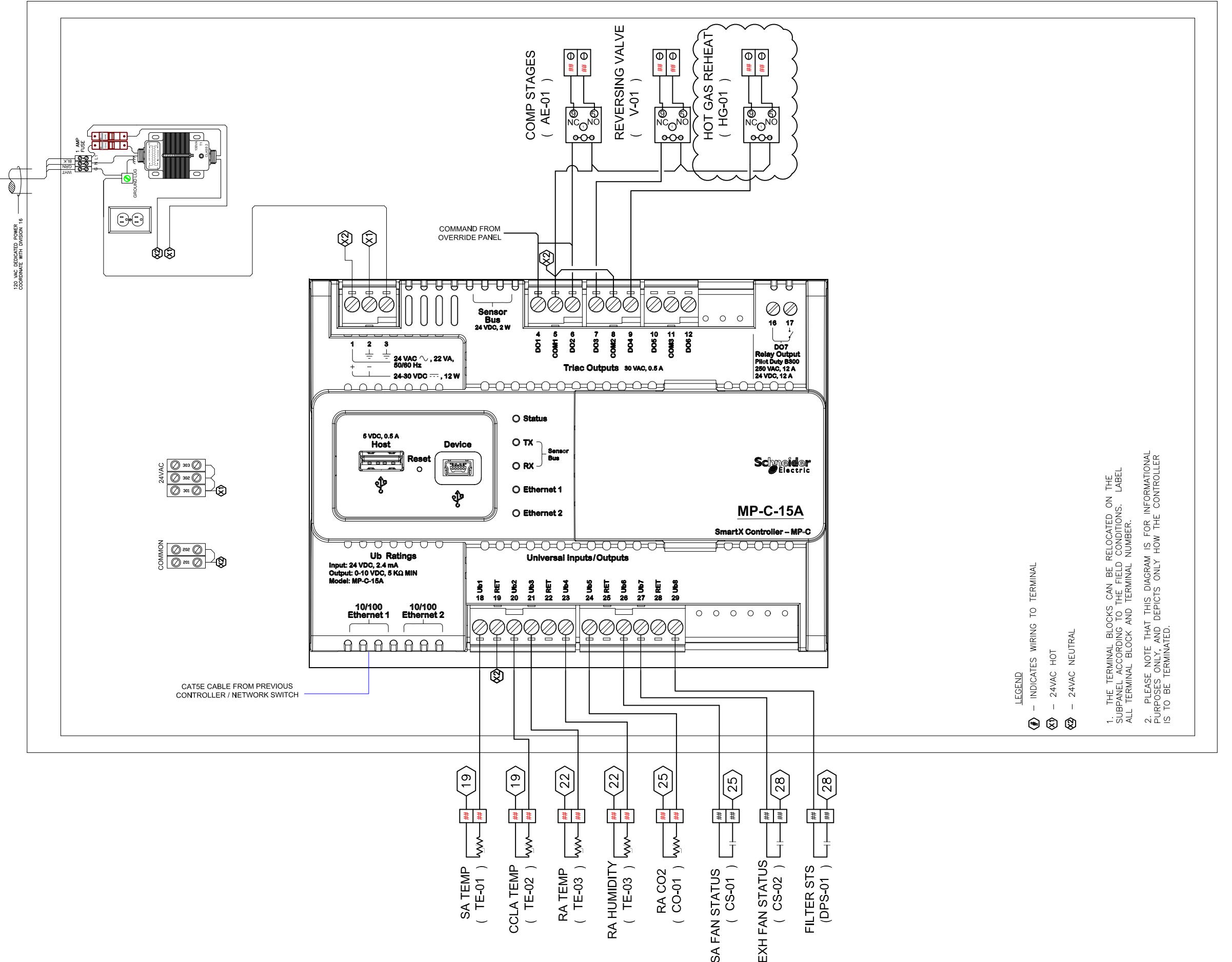
- 1 EXHAUST FAN INTERLOCKED WITH ASSOCIATED AHU OUTDOOR AIR DAMPER. REFER TO EXHAUST FAN SCHEDULE ON PAGE 1. EXHAUST FAN INTERLOCKS TO BE FIELD VERIFIED.
- 2 TERMINATED, WIRED AND PROVIDED BY OTHERS.
- 3 SUPPLY FAN AND OA DAMPER STARTED AND STOPPED FROM OVERRIDE PANEL.
- 4 CONDENSATE SWITCH PROVIDED, INSTALLED AND WIRED BY OTHERS.



POINT LIST

| POINT NAME | AI | DI | AO | DO | ALARM | TREND |
|--------------------|----|----|----|----|-------|-------|
| SA TEMP | X | | | | | X |
| RA TEMP | X | | | | X | X |
| RA HUMIDITY | X | | | | X | X |
| RA CO ₂ | X | | | | X | X |
| CCLA TEMP | X | | | | X | X |
| SA FAN STS | | X | | | X | X |
| EXH FAN STS | | X | | | X | X |
| FILTER STS | | X | | | X | X |
| REVERSING VALVE | | | | X | | X |
| OA DAMPER CMD | | | | | X | X |
| COMP STAGES | | | | X | | X |
| SA FAN S/S | | | X | | X | X |
| EXH FAN S/S | | | X | | X | X |
| HOT GAS REHEAT | | | X | | X | X |

| WSHP DIAGRAM | | FILE: 13 | DRAWING # 0 | DRWG # 6/1/2020 |
|---------------|--------------|--|---------------|-----------------|
| APPROVED | DATE 8/12/20 | JOB/CONT # | SALES PROJECT | APPL. DRAWN |
| DESIGN REVIEW | REV 1 | ENGINEER | MANAGER | ENGINEER |
| DESCRIPTION | REV 1 | MC | DC | DW |
| ROTH | | NEW RIVER MIDDLE SCHOOL SMART RENO 3100 RIVERLAND ROAD FORT LAUDERDALE, FL 33312 | | |
| | |  Information • Energy Management • Living S U T H E A S T | | |



1. THE TERMINAL BLOCKS CAN BE RELOCATED ON THE SUBPANEL ACCORDING TO THE FIELD CONDITIONS. LABEL ALL TERMINAL BLOCK AND TERMINAL NUMBER.
2. PLEASE NOTE THAT THIS DIAGRAM IS FOR INFORMATIONAL PURPOSES ONLY, AND DEPICTS ONLY HOW THE CONTROLLER IS TO BE TERMINATED.

| REV | DESCRIPTION | DATE | APPROVED | FILE: | DRAWING |
|-----|---------------------------|---------|----------|---------------------|------------|
| 1 | UPDATED PER DESIGN REVIEW | 8/12/20 | | WSHP WIRING DIAGRAM | 14 |
| | | | | SALES PROJECT | DRWG # |
| | | | | ENGINEER MANAGER | REV. |
| | | | | MC DC DW | INIT. DATE |
| | | | | JS | 6/1/2020 |



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NEW RIVER MIDDLE SCHOOL SMART RENO
3100 RIVERLAND ROAD
FORT LAUDERDALE, FL 33312

| SYMBOL | QTY | PART # | DESCRIPTION | MANU. | SIGNAL | RANGE |
|----------|-----|----------------|---------------------------------|--------------------|-------------|----------------|
| | 37 | MP-C-15A | IP CONTROLLER | SCHNEIDER | | |
| RE-01 | 37 | CKIT-VMD1B-F24 | RELAY KIT | VERIS | 24 VAC COIL | NORMALLY OPEN |
| CS-01-02 | 73 | H608 | CURRENT SWITCH | VERIS | DRY CONTACT | NORMALLY OPEN |
| TE-01-02 | 74 | ETD500-6 | DUCT MOUNT TEMP SENSOR | SCHNEIDER | 10K OHMS | -40°F TO 302°F |
| TE-03 | 37 | EHD110-500 | DUCT MOUNT TEMP/HUMIDITY SENSOR | SCHNEIDER | 10K OHMS | -40°F TO 302°F |
| DPS-01 | 37 | AFS-222 | DIFFERENTIAL PRESSURE SWITCH | CLEVELAND CONTROLS | DRY CONTACT | NORMALLY OPEN |
| AE-01 | 37 | AFB24-SR-S | DAMPER ACTUATOR | BELIMO | 2-10VDC | |
| | 37 | X100CAA | TRANSFORMER | VERIS | | |
| | 37 | RET2620 | ENCLOSURE | KELE | | |
| | 37 | CMT-4 | TERMINAL BLOCK | ALTEC | | |
| | 37 | 51012218 | POWER RECEPICAL | KELE | | |
| | 37 | DCP-1.5-W | 1.5A POWER SUPPLY | KELE | 24VAC | 1.5-27 VDC |

SEQUENCE OF OPERATION

BUILDING AUTOMATION SYSTEM INTERFACE: THE BUILDING AUTOMATION SYSTEM (BAS) SHALL SEND THE CONTROLLER OCCUPIED/UNOCCUPIED MODES. IF A BAS IS NOT PRESENT, OR COMMUNICATION IS LOST WITH THE BAS THE CONTROLLER SHALL OPERATE USING DEFAULT MODES AND SETPOINTS.

OCCUPIED MODE: DURING OCCUPIED PERIODS, THE SUPPLY FAN SHALL RUN CONTINUOUSLY AND THE OUTSIDE AIR DAMPER SHALL OPEN TO MAINTAIN MINIMUM VENTILATION REQUIREMENTS. COMPRESSORS SHALL STAGE TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT. THE DISCHARGE AIR TEMPERATURE SETPOINT SHALL BE DYNAMICALLY RESET BASED ON THE DEVIATION OF ACTUAL RA TEMPERATURE FROM THE ACTIVE RA TEMPERATURE SETPOINT. IF THE DISCHARGE AIR TEMPERATURE SENSOR FAILS THE COMPRESSOR SHALL STAGE TO MAINTAIN THE ACTIVE RA TEMPERATURE SETPOINT AND AN ALARM SHALL BE ANNUNCIATED AT THE BAS. IF THE DISCHARGE AIR TEMPERATURE SENSOR AND THE RA TEMPERATURE SENSOR FAIL THE COMPRESSOR SHALL BE DISABLED AND AN ALARM SHALL BE ANNUNCIATED AT THE BAS.

UNOCCUPIED MODE: UNIT SHALL BE OFF AND OA DAMPER SHALL CLOSE.

HEAT/COOL MODE: WHEN THE RA TEMPERATURE RISES ABOVE THE OCCUPIED COOLING SETPOINT THE MODE SHALL TRANSITION TO COOLING. WHEN THE RA TEMPERATURE FALLS BELOW THE OCCUPIED HEATING SETPOINT THE MODE SHALL TRANSITION TO HEATING. WHEN THE RA TEMPERATURE IS BELOW THE OCCUPIED COOLING SETPOINT AND ABOVE THE OCCUPIED HEATING SETPOINT THE MODE SHALL REMAIN IN ITS LAST STATE. IF THE RA TEMPERATURE SENSOR FAILS THE MODE SHALL REMAIN IN ITS LAST STATE AND AN ALARM SHALL BE ANNUNCIATED AT THE BAS. IF THE LOCAL AND COMMUNICATED SETPOINTS FAIL THE CONTROLLER SHALL DISABLE THE SUPPLY FAN AND AN ALARM SHALL BE ANNUNCIATED AT THE BAS.

HUMIDITY CONTROL: A HUMIDISTAT IN THE RETURN AIR SHALL ACTIVATE HOT GAS REHEAT IF THE RETURN AIR HUMIDITY EXCEEDS THE SETPOINT

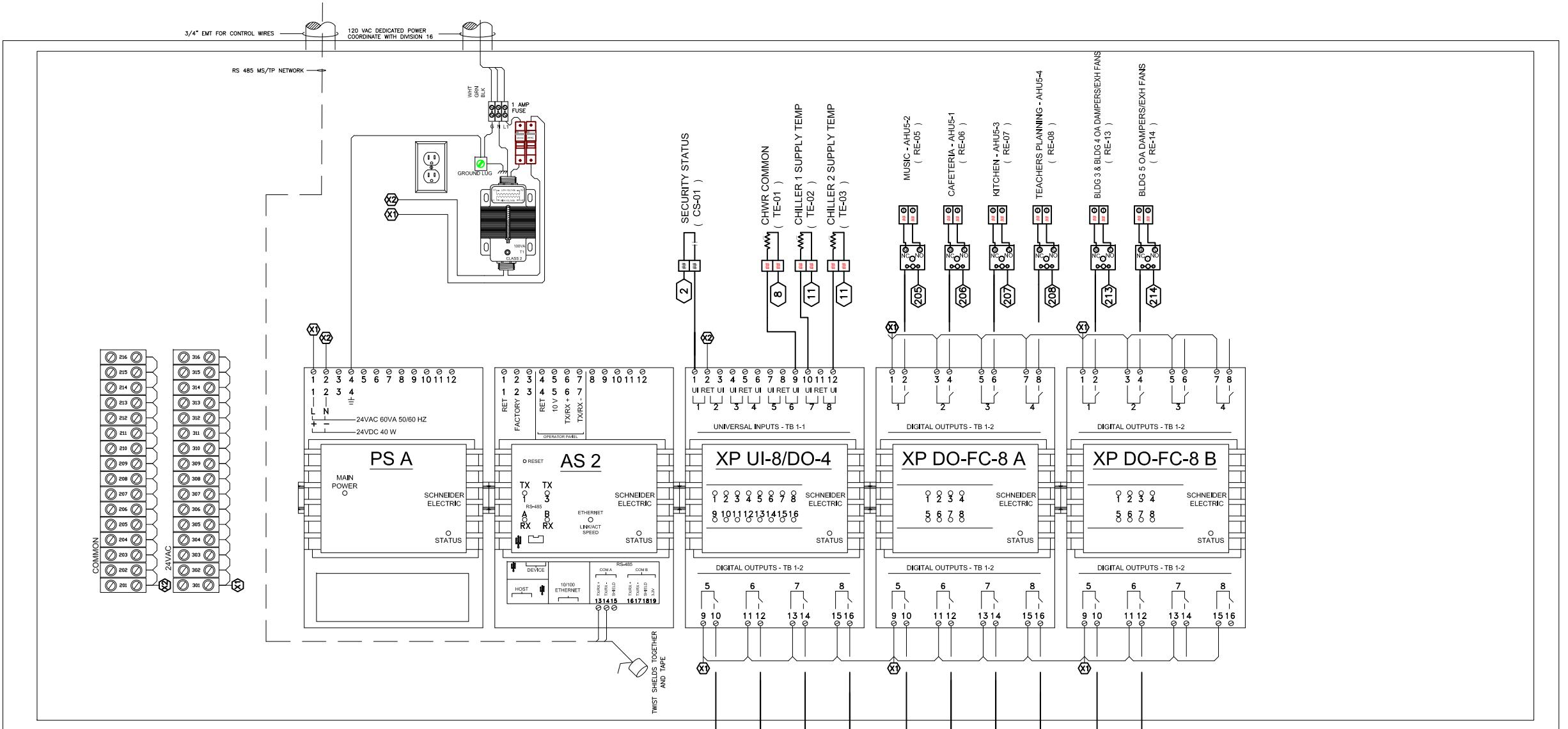
SMOKE DETECTOR SHUTDOWN (BY FIRE ALARM CONTRACTOR): THE UNIT SHALL SHUT DOWN IN RESPONSE TO A SIGNAL FROM THE SMOKE DETECTOR INDICATING THE PRESENCE OF SMOKE. THE SMOKE DETECTOR SHALL BE INTERLOCKED TO THE UNIT THROUGH THE DRY CONTACTS OF THE SMOKE DETECTOR. A MANUAL RESET OF THE SMOKE DETECTOR SHALL BE REQUIRED TO RESTART THE UNIT.

FILTER STATUS: A DIFFERENTIAL PRESSURE SWITCH SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE FILTER WHEN THE FAN IS RUNNING. IF THE SWITCH CLOSES DURING NORMAL OPERATION A DIRTY FILTER ALARM SHALL BE ANNOUNCED AT THE PAS.

RA CO₂ CONTROL: THE CONTROLLER SHALL MONITOR THE RETURN AIR CO₂ CONCENTRATION LEVEL AND MODULATE THE OA DAMPER OPEN ON RISING CO₂ CONCENTRATION LEVEL OVERRIDING NORMAL DAMPER OPERATION TO MAINTAIN RETURN AIR CO₂ CONCENTRATION LEVEL SETPOINT (750 PPM (AD.L)). AN ALARM SHALL BE SENT TO THE BAS WHEN THE RETURN AIR CO₂ CONCENTRATION LEVEL IS HIGHER THAN SETPOINT.

| WSHP PARTS/SOP | | DRAWING | |
|----------------|-------------|----------|------------------|
| REV | DESCRIPTION | APPROVED | FILE: |
| | | | JOB/CONT # |
| | | | SALES PROJECT |
| | | | ENGINEER MANAGER |
| | | | DRAWN BY: |
| | | | DRWG # |
| | | | REV. |
| | | | INIT DATE |

| SYMBOL | QTY | PART # | DESCRIPTION | MANU. | SIGNAL | RANGE |
|----------|-----|-----------------|-----------------------|-----------|-------------|----------------|
| | 1 | SXWAUTSVR10001 | AUTOMATION SERVER | SCHNEIDER | | |
| | 1 | SXWTBASW110001 | AS BASE | SCHNEIDER | | |
| | 1 | SXWPS24VX10001 | AS POWER SUPPLY | SCHNEIDER | | |
| | 1 | SXWTBPSW110001 | AS POWER SUPPLY BASE | SCHNEIDER | | |
| | 2 | SXWDODC8XX10001 | AS DO MODULE | SCHNEIDER | | |
| | 1 | SXWU8D4X10001 | AS UI/DO MODULE | SCHNEIDER | | |
| | 3 | SXWTBIOW110001 | AS IO MODULE BASE | SCHNEIDER | | |
| RE-01-16 | 16 | CKIT-VMD1B-F24 | RELAY KIT | VERIS | 24 VAC COIL | NORMALLY OPEN |
| CS-01 | 1 | H608 | CURRENT SWITCH | VERIS | DRY CONTACT | NORMALLY OPEN |
| TE-01-03 | 3 | ETI500-6 | IMMERSION TEMP SENSOR | SCHNEIDER | 10K OHMS | -40°F TO 302°F |
| TE-01-03 | 3 | ETI-WELL-6S | WELL | SCHNEIDER | | |



| REV | DESCRIPTION | DATE | APPROVED | ROTH | OVERRIDE PANEL | FILE: | DRAWING |
|-----|-------------|------|----------|------|----------------|------------------|----------------|
| | | | | | | JOB/CONT # | DRWG # |
| | | | | | | SALES PROJECT | DRAWN BY: |
| | | | | | | ENGINEER MANAGER | APPL. ENGINEER |
| | | | | | | MC | DC |
| | | | | | | DW | JS |
| | | | | | | INIT DATE | REV. |
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