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Date: 9/1/2025
Return Request: 9/15/2025
Project: Hot Springs National Park – Rehabilitate Bathhouses – Maurice Bathhouse
Supplier: Powers of Arkansas
Manufacturer: Siemens
Submittal: Controls
Submittal Number: 230900.001
Spec Section: 230900
Drawing # and Installation Location: ME8.0 through ME8.5

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Project: 25CNEB0017 25CNEB0017 Maurice Bathhouse Controls
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Hot Springs, Arkansas 71901

Submittal #1.0 - Submittal 25CNEB0017

Revision	0	**Submittal Manager**	Madison Hollingshead (POWERS OF ARKANSAS)
Status	Open	**Date Created**	Aug 20, 2025
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Responsible Contractor		**Received From**	
Received Date		**Submit By**	
Final Due Date	Oct 23, 2025	**Lead Time**	
		Type	Control Drawings

Submittal Package

Approvers Joel Dickinson (POWERS OF ARKANSAS), Madison Hollingshead (POWERS OF ARKANSAS)

Ball in Court Joel Dickinson (POWERS OF ARKANSAS), Madison Hollingshead (POWERS OF ARKANSAS)

Distribution

Description

Submittal Workflow

Name	Sent Date	Due Date	Returned Date	Response	Attachments
General Information Attachments					
Andy Chase	Aug 20, 2025	Sep 3, 2025		Pending	
Matt Conrad	Aug 20, 2025	Sep 3, 2025		Pending	
Danny James	Aug 20, 2025	Sep 3, 2025		Pending	
Mark Price	Aug 20, 2025	Sep 3, 2025	Oct 7, 2025	Submitted	25CNEB0017 REHABILITATE MAURICE BATHHOUSE SUBMITTALS.pdf (Current)
Comment	SUBMITTALS READY TO SEND OUT				
Joel Dickinson	Oct 9, 2025	Oct 23, 2025		Pending	
Madison Hollingshead	Oct 9, 2025	Oct 23, 2025		Pending	
Comment	Sent to Joe 10/9/25 via Email				

POWERS

BUILDING HVAC, CONTROLS, & SERVICE

Independent field office for
Siemens Building Technologies

PROJECT #25CNEB0017

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Submittal
For Control Systems For:

DIRECT DIGITAL CONTROL SYSTEM FOR HVAC

REHABILITATE MAURICE BATHHOUSE

HOT SPRINGS, AR

Mechanical Contractor:
COMFORT SYSTEMS USA

OCTOEBER 6, 2025

5440 Northshore Drive – North Little Rock, Arkansas 72118 – Tel: 501.374.5420 Fax: 501.370.9298

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I. TECHNICAL SPECIFICATION SHEETS

II. CONTROL DRAWINGS

Order Variance **Date:** 10/06/25

Job Name: MAURICE BATHHOUSE CONTROLS **Job Number:** 25CNEB0017 **Page:** 1

Product Number	Product Description	System Quantity	Order Quantity
134-1504	T'STAT, LOW TEMP,15/55,MANUAL	10	0
141-0574	AIR FLOW SWITCH .05-1.0 WC	2	0
141-0575	AIR FLOW SWITCH.05/12 MAN REST	4	0
171A-10300S	0.5" 2W 0.4CV SS BALL VLV+GDE131.1P	20	0
171A-10301S	0.5" 2W 0.63CV SS BALL VLV+GDE131.1P	10	0
171A-10302S	0.5" 2W 1CV SS BALL VLV+GDE131.1P	18	0
171A-10303S	0.5" 2W 1.6CV SS BALL VLV+GDE131.1P	9	0
171A-10304S	0.5" 2W 2.5CV SS BALL VLV+GDE131.1P	1	0
171C-10300S	0.5" 2W 0.4CV SS BALL VLV+GDE161.1P	1	0
274-03187	2WNC BZ =% OR FXF 1.50/25.00	1	0
274-03200	3WMX BZ =% OR FXF 0.50/2.50	2	0
274-03202	3WMX BZ =% OR FXF 0.75/6.30	1	0
274-03205	3WMX BZ =% OR FXF 1.50/25.00	1	0
291-05920	2.5"N.O,250,SS=%,OR,MM+SKB62U	1	0
291-06165	2.5"W.M,125,SS=%,OR,MM+SKB62U	1	0
3000543	AQUASWITCH WATER DETECTING SENSOR	17	0
536-811	DCT PT TMP, 100K OHM, 4", BRACKET MNT	34	0
544-339-18	DCT PT TEMP, PT 1K OHM (375), 18" RIGID	8	0
544-342-24	DUCT AV. TMP, 1K OHM, PT(375), 24', FLEX	6	0
544-577-25	IMMERSION TMP SNSR, PT 1K OHM(375) 2.5"	21	0
544-578	OUTDR TEMP SNSR, PT 1K OHM(375), METAL	1	0
547-100	RPM PRESSURE TAP PLATE	4	0
A-306	STATIC PRESSURE SENSOR OUTDOOR	1	0
A-491	6" straight static pressure tip w/flange	18	0
AQM2000	MOUNTING FLANGE FOR DUCT TEMP SENSOR	8	0
B203FC-HA126.530	B203FC-HA126.530 3 2W FC 24V 2P 530 NC	3	0
DELL LAPTOP PER QUOTE	DELL LAPTOP PER QUOTE	1	0
DPT 2500	DPT 2500 VELTRON - RANGE 0 - 2.0 "WG - N	1	0
DXR2.E12P-102B	DXR2.E12P Room Automation Station	18	0
DXR2.E18-101B	DXR2.E18 Room Automation Station	18	0
ELECTRA-FLO	THERMAL AIRFLOW AFS	9	0
ESP-PP0-BS	EMERG BLR SHUTDOWN	2	0
FKIT-VMD1B-F24A	SPDT -F w/-F Socket,24VAC	17	0
FT-3400	Insertion Electromagnetic Flow Meter	1	0
GCA121.1P	2 PT SR,24V,MED.PLNM	2	0
GCA161.1P	MOD(V) SR,24V, MED. PLNM	6	0
GDE131.1P	ACT NSR PLENUM 24/108L 5Nm	18	0
GMA121.1P	2PT SR 24V,62LBIN,PLM	1	0
H300	H300 MICRO-SPLITCORE GO/NO GO .15-60Amps	4	0
H608	CUR SW SPLTCOR-ADJ SETPT W/LED	3	0
H609	Current Switch,Split-Core,Adj,N.O.,120V	1	0
H6CPD002	0.5 HP, 208 V, 2.4 A 3PH	1	0
H6CPD003	0.75 HP, 208 V, 3.5 A, 3PH	1	0
H6CPD010	3 HP, 208 V, 10.6 A, 3PH Type 1	4	0
H6CPD016	5 HP, 208 V, 16.7 A, 3PH Type 1	3	0
H6CPD024	7.5 HP, 208 V, 24.2 A, 3PH Type 1	5	0
M-648-K	CAPILLARY MOUNTING CLIP-INDIVIDUAL PIECE	24	0
NC-9100	NC-9100 Core License - 100 Device	1	0
PK-1200	DAMPER END SW,BLADE ACTUATED	1	0

Order Variance **Date:** 10/06/25

Job Name: MAURICE BATHHOUSE CONTROLS **Job Number:** 25CNEB0017 **Page:** 2

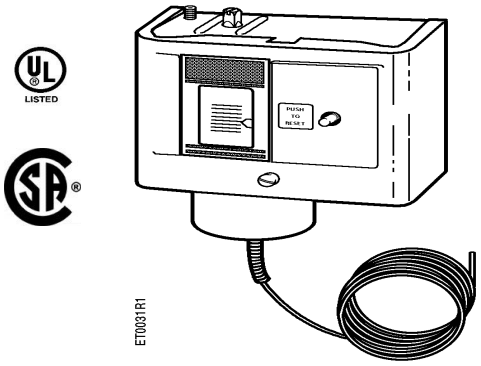
Product Number	Product Description	System Quantity	Order Quantity
PWLX04BP	Pressure,Wet,LCD,0-100PSID,BP	1	0
PX3ULX05	PX3ULX05,Pressure,Dry,Universal,LCD	11	0
PXA-ENC34	ENCLOSURE ASSY 34	4	0
PXA-SB115V192VA	SERVICE BOX 115V, 24VAC, 192VA	4	0
PXC100-E96.A	PXC MOD, BACNET, TX-I/O, 96 NODE, APOGEE	4	0
PXX-485.3	PXC MOD EXPANSION MODULE, 3 RS-485	4	0
QAA2212.FWSN	RTS, 1K OHM PT (385), FULL HMI	1	0
QFM3160	DUCT RH & TEMP SENSOR, 0-10V, 2%	6	0
QMX3.P34-1WSB	QMX3 ROOM TEMP WITH DISPLAY (COO=USA)	34	0
QMX3.P74-1WSB	QMX3 ROOM TMP, RH & CO2, DISP (COO=USA)	2	0
QPA2000	ROOM CO2 SENSOR, 0-10V	1	0
SC121206WW	ENCLOSURE,NEMA 1,16 GA W/COVER	2	0
SLX-9000	SLX-9000 Controller	1	0
SMA-9100-1YR	SMA-9100-1YR SW Maintenance	1	0
TROUGH	Custom made Siemens Panel trough	4	0
TS-470-2	DAMPER END SWITCH 2 SPDT	2	0
TXA1.K12	@ADDRESS KEY 1-12 + RESET KEY	4	0
TXM1.16D	16 DIGITAL INPUT MODULE	5	0
TXM1.6R	6 RELAY OUTPUT MODULE	2	0
TXM1.6R-M	6 RELAY OUTPUT MODULE W/OVD	5	0
TXM1.8U	8 UNIVERSAL I/O MODULE	10	0
TXM1.8X	8 UNIV I/O MODULE W/ 4-20MA	7	0
TXM1.8X-ML	8 UNIV I/O W/ 4-20MA, OVD&LCD	3	0
TXS1.12F4	24VDC SUPPLY 1200MA, 4 A FUSE	8	0
TXS1.EF4	BUS CONNECTION MODULE, 4A FUSE	4	0
V120	V120, SPDT ENCLOSED RELAY	18	0
V645	V645,24VAC/DC/120VAC,LED,SPDT RELAY	1	0
VOLU-FLO/OAM	Outside Air Monitor	3	0
X050CAA	XFrmr,050VA,120-24VAC,CB,Ft & Single Hub	2	0
X100CAA	XFrmr,100VA,120-24VAC,CB,Ft & Single Hub	4	0

SIEMENS

Technical Instructions
Document No. 155-016P25
ET 134-22
April 12, 2018

Powersä Controls

Low Temperature Detection Thermostat



Description

The electric Low Temperature Detection Cut-out and Alarm Thermostat is a remote bulb instrument which opens an electrical circuit to stop the supply fan motor and/or closes an outside air damper when the temperature at the sensing element falls below the setting of the instrument. Simultaneously, it closes a circuit to indicate an alarm condition.

Features

- Manual reset
- Easy temperature setting with adjusting screw on top of enclosure
- Mounting bracket and two screws included
- Main and separate reverse-acting auxiliary contacts

Product Number 134-1504

Warning/Caution Notations

WARNING	⚠	Personal injury or loss of life may occur if a procedure is not performed as specified.
CAUTION	⚠	Equipment damage or loss of data may occur if you do not follow a procedure as specified.

Application

This instrument should only be used on those applications where the ambient temperature to which the instrument case and bellows are exposed remains above the temperature setting of the thermostat. This thermostat should be used in areas protected from the weather.

Prerequisites

WARNING:

This low temperature detection thermostat is designed for use only as an operating control. Where an operating control failure would result in personal injury and/or loss of property, it is the installer's responsibility to add devices (safety, limit controls) or systems (alarm, supervisory systems) that protect against, or warn of control failure.



CAUTION:

The switch contact position (LINE-M2) may be in either an open or closed state upon receipt due to possible exposure to freezing temperatures during shipping. It is strongly recommended that the reset button be manually pressed down and released before initial use to restore the switch position to a normal operating state before proceeding to installation; otherwise, the unit could remain in the tripped state.

Specifications

Switch Action	Main (LINE-M2) contacts open on temperature drop, simultaneously auxiliary contacts close
Range	15 to 55°F (-9 to 13°C)
Maximum bulb temperature	400°F (204°C)
Minimum differential	5°F (2.8°C) Non-adjustable
Sensing element	Vapor filled
Bulb length	1/8-inch OD × 20 feet (6 m)
Reset action	Manual
Electrical rating	See Table 1
Weight	2.4 lb (1.1 kg)
Dimensions	See Figures 2 and 5
Approvals	UL file SA 10816 CSA file LR948

Operation

This thermostat incorporates a temperature sensing element of the vapor-filled type which actuates a heavy duty contact through a rugged link mechanism.

Any one-foot length of the element subjected to temperatures below the temperature setting of the thermostat will actuate the thermostat switch mechanism regardless of the temperature being sensed by the remainder of the element. This makes the thermostats ideal for protecting large coils where air stratification could cause freezing conditions in a localized area.

The thermostat has a main and auxiliary contact unit. The main load circuit (LINE-M2) opens on temperature drop and simultaneously, an auxiliary or alarm circuit (LINE-Ml) closes on temperature drop.

NOTE: The reset button must be manually pressed down and released to resume normal fan system operation.

Electrical Ratings

Table 1.

Pole Number	Line-M2 (Main)				Line-M1 (Auxiliary)			
Motor Rating	**120V**	**208V**	**240V**	**277V**	**120V**	**208V**	**240V**	**277 V**
AC Full Load Amps	16.0	9.2	8.0	¾	6.0	3.3	3.0	¾
AC Locked Rotor Amps	96.0	55.2	48.0	¾	36.0	19.8	18.0	¾
AC Non-Ind Amps	16.0	9.2	8.0	7.2	6.0	6.0	6.0	6.0
Pilot Duty-Both Poles	125 VA, 24 to 600 Vac 57.5 VA, 120 to 300 Vdc							

Mounting and Installation

General Guidelines

- Locate the sensing element in the downstream side of the coil.
- Locate the case and bellows where the ambient temperature is always warmer than the setpoint.
- Install the thermostat so that the reset button is readily accessible and the element bellows points down.
- Install as much of the bulb as possible in a horizontal plane. If too much of the bulb is vertical, it will not operate properly.
- Avoid sharp bends or kinks in the sensing element.

Large walk-in Ducts (Figure 1)

1. Attach the mounting bracket to the thermostat with the two round head screws provided.
2. Mount the two perforated steel strap hangers inside the duct with the wide part of the hanger strap parallel to the air flow.
3. Drill a hole in the side of the duct. With the bulb still coiled, thread the bulb through the hole using a rotary movement.
4. Mount the thermostat on the outside of the duct.
5. Carefully uncoil the bulb avoiding sharp bends or kinks in the sensing element.
6. Mount the bulb in a horizontal, serpentine manner, attaching the bulb to the strap as shown in detail in Figure 1.

The installation is complete.

NOTE: For an alternate method of mounting, use coil clips (Part Number 356-115) in the fins to hold the bulb in a horizontal, serpentine pattern.

Mounting and Installation, Continued

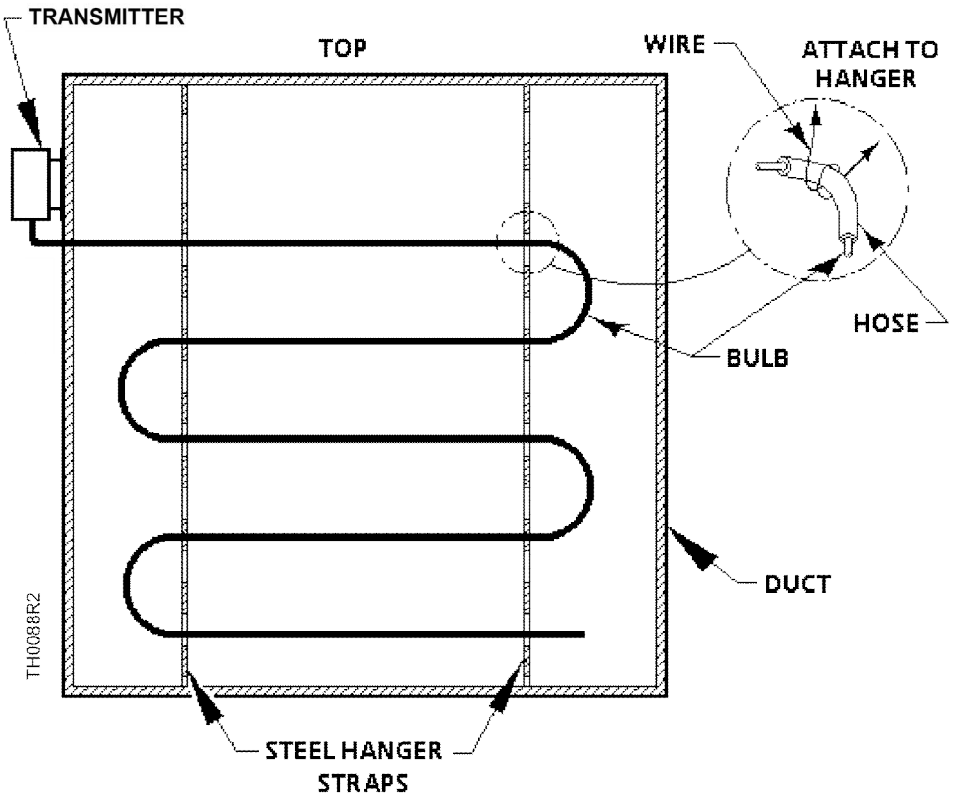


Figure 1. Typical Mounting in Walk-in Duct.

Limited Access Ducts
(Figure *2*)

1. Attach the mounting bracket to the thermostat with the two round head screws provided.
2. Attach a mounting flange (Part Number 808-412) on the opposite side of the duct (near the bottom) from where the thermostat will be mounted.
3. Mount a second flange on an 8-inch by 4-inch sheet metal plate. Cut an access opening for the bulb on the duct diagonally across from the duct-mounted flange. Drill mounting screw holes for the sheet metal plate.
4. Cut a length of copper tubing to fit diagonally across the duct. Stretch out the bulb and wrap it around the tubing. See Figure 2.
5. Insert the tubing and bulb through the access hole and into the duct-mounted flange. Fasten the 8-inch by 4-inch sheet metal plate to the duct.
6. Mount the thermostat on the outside of duct.

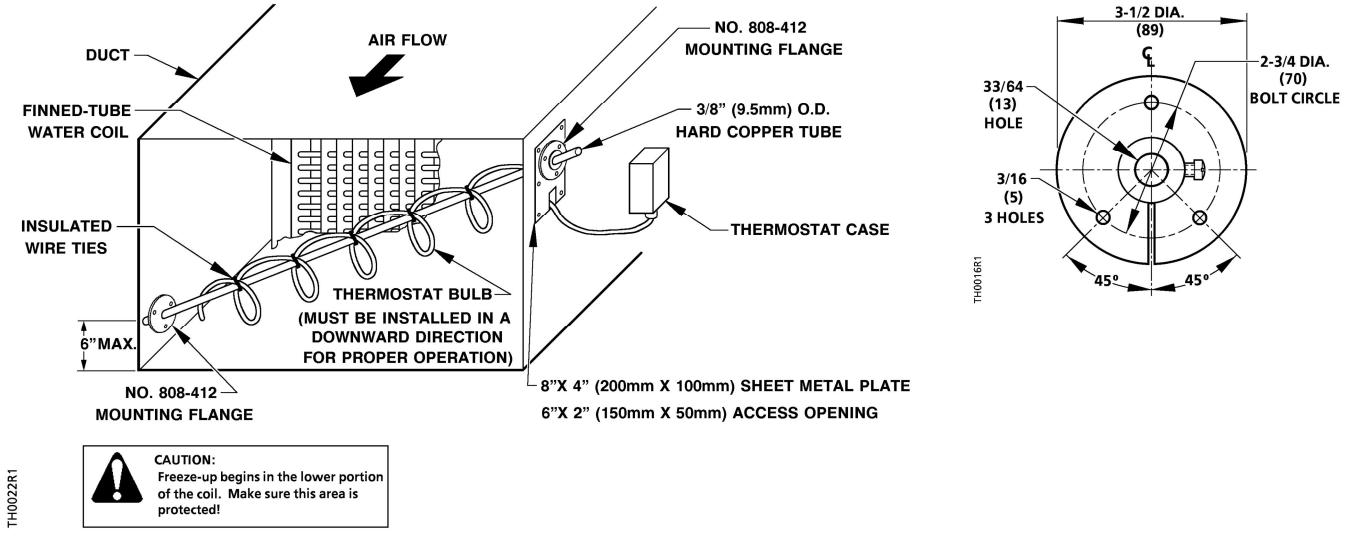


Figure 2. Bulb Mounting for Limited Access Ducts with 808-412 Mounting Flange.

Wiring

WARNING:

Disconnect the power supply before wiring connections are made to avoid possible electrical shock or damage to the equipment**.**

Make all wiring connections using copper conductors only and in accordance with the National Electrical Code and local regulations. Loads exceeding the rating of the thermostat should be handled by means of a relay or motor starter.

An opening for 1/2-inch conduit is provided in the bottom of the thermostat enclosure.

See Figure 3 for a typical wiring diagram.

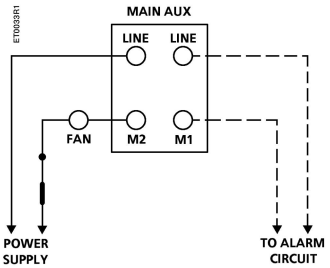


Figure 3. Typical Wiring Diagram.

CAUTION:

Use terminal screws furnished (#8-32 × 1/4-inch binder head screw). Longer terminal screws can interfere with switch mechanism and damage the switch.

Adjustment

After mounting the thermostat, adjust the temperature setting using the setpoint adjusting screw on the top of the enclosure. See Figure 4.

Observe a complete operating cycle to be sure that all components function correctly.

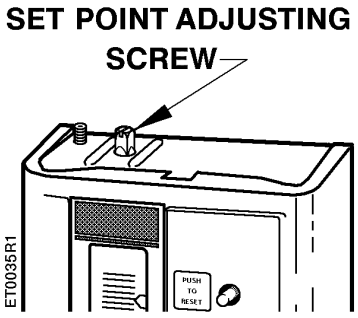


Figure 4. Setpoint Adjustment Screw.

Calibration

There is no field calibration required for the thermostat.

Troubleshooting

Observe a complete operating cycle to be sure that all components function correctly.

Service

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

Dimensions

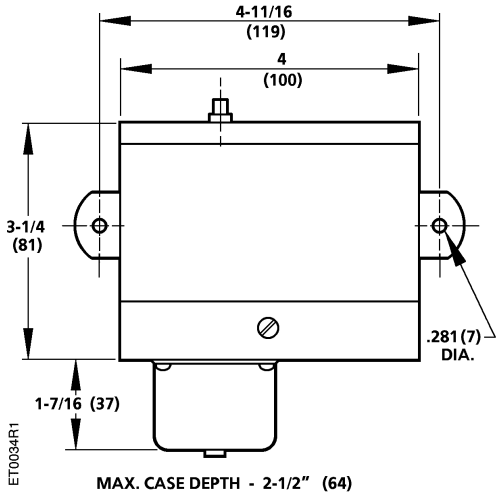


Figure 5. Dimensions in Inches (Millimeters).

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SIEMENS

Technical Instructions
Document No. 155-052P25
SW 141-1
June 17, 2010

Powers™ Controls

SW 141 Differential Static Airflow Switches



141-0518

Description

The SW 141 Airflow Switch senses static differential pressure and the diaphragm operated snap switches actuate electrical circuits. Auto reset and manual reset models are available.

Application

Auto reset switches (141-0518 and 141-0574) should be used for applications requiring positive proof of airflow (or fan operation) or to detect high differential pressures associated with dirty air filters or similar maintenance alarms not requiring safety lock-out (shut down) of the fan.

The manual reset switch (141-0575) should be used for applications requiring safety lock out (shut down) of the fan. The switch can be used on the fan discharge (positive pressure), fan inlet (negative pressure), or across the fan (differential pressure) to detect excessively high positive pressures or low negative pressures, and turn off the fan before damage occurs to ducts or dampers.

Product Numbers

Table 1.

Product Number	Setpoint Range (Field Adjustable)	Setpoint * Accuracy	Switching * Differential	Switching Action
141-0518	1” to 12” WC (250 Pa to 3000 Pa)	@ 12” ± 1.5” WC (3000 Pa ± **375** Pa)	Approx. 0.6” to 1.5” WC **(150 Pa to 375 Pa)**	SPDT/ Auto Reset
141-0575	1” to 12” WC (250 Pa to 3000 Pa)	@ 12” ± 1.5” WC (3000 Pa ± **375** Pa)	Not Applicable	SPST/ Manual Reset
141-0574	0.05” to 1.0” WC (12.5 Pa to 250 Pa)	@ 1”±0.2“ WC (250 Pa ± 50 Pa)	Approx. 0.06**"** to 0.6” WC **(15 Pa to 150 Pa)**	SPDT/ Auto Reset

***** Setpoint accuracy **tolerance** and switching differential decrease proportional to setpoint decrease.

Specifications

	Measured media	Air
	Switch action	
Operating	Auto reset Manual reset	See Table 1 Switch is Normally Closed (N.C.) and only opens on increasing pressure signal. Switch must be manually reset by operator
	Ambient temperature range	–40°F to 180°F (–40°C to 82°C)
	Maximum overpressure	0.5 psi (3.4 kPa)
	Mounting position	Diaphragm in any vertical plane
Physical	Electrical ratings	Non inductive - 15 amps @ 120-277 Vac Pilot Duty - 300 VA @ 120-277 Vac
	Conduit opening	One, conduit size 1/2-inch
	Sample line connectors	Two connectors, complete with nuts and ferrules, which accept 1/4-inch OD (6.4 mm) copper or poly tubing
	Material	Aluminized steel
	Agency certification	
	U.L. CSA	MFHX File MH9888 1811M25
	Weight	1 lb (0.45 kg)
	Dimensions	See Figure 9

Accessories

High accuracy static pressure sensor	269-062
Static pressure sensing kit	189-142

Operation

The diaphragm operates a spring lever to actuate the snap switch. The manual reset switch keeps the electrical contact open until pushed to reset. Turning the adjustment knob clockwise increases the setpoint.

Installation

Mount the unit with the diaphragm in any vertical plane. Connect the static pressure line(s) as shown in Figure 1.

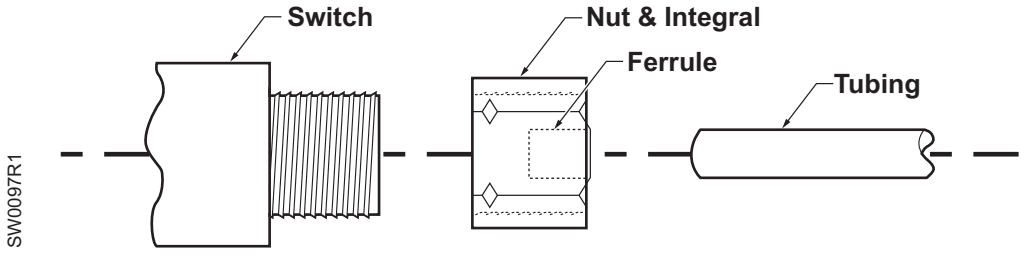


Figure 1. Connecting the Static Pressure Line.

Installation, Continued

For use as a negative pressure switch:

Connect the static pressure line to the low inlet (marked on the case and Figure 2) and leave the high inlet open to the atmosphere.

For use as a positive pressure switch:

Connect the static pressure line to the high inlet (marked on the case and Figure 2) and leave the low inlet open to the atmosphere.

For use as a differential pressure switch:

Connect the highest static pressure line to the high inlet and the lowest static pressure line to the low inlet (marked on the case and Figure 2.)

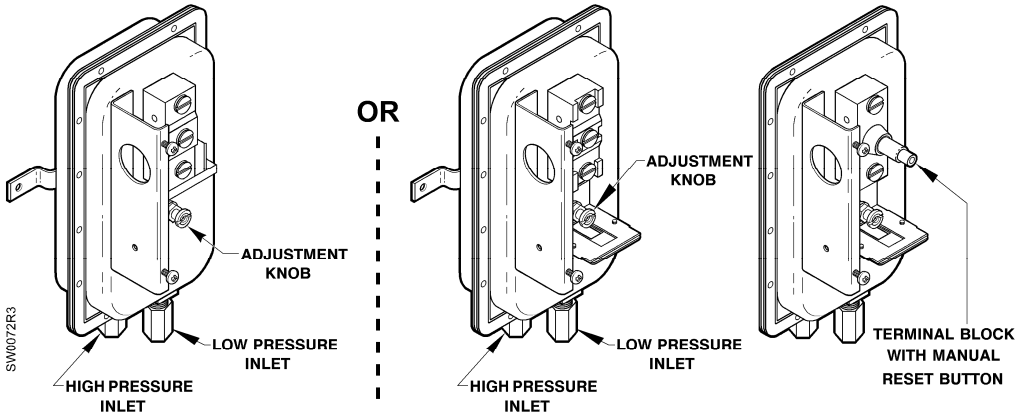


Figure 2. Switches with Covers Removed.

Setpoint Adjustment

Each switch is factory set at the minimum setpoint. See Table 1.

1. To increase the setpoint, turn the adjustment screw clockwise as shown in Figure 2 and Figure 3. From the lowest setpoint, several turns are necessary to engage the adjusting mechanism.

2. Adjust the setpoint until switching occurs at the required point.

3. Check the setpoint for accuracy with a magnahelic gauge.

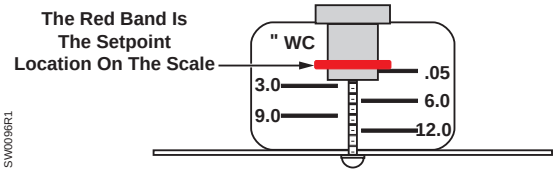


Figure 3. Adjusting the Setpoint.

Pressure Sensors

Pressure sensor selection is based on the medium to be measured, the measurement type (static or velocity), and the required range and accuracy.

Pressure sensors measure the difference between two sensing ports usually labeled high and low. This provides a pressure measurement against a reference. Measuring the pressure inside a pipe or duct and comparing it to the air outside (ambient) the pipe or duct is an example of static pressure measurement. A sensor measuring the pressure differential across a pump or chiller measures velocity pressure.

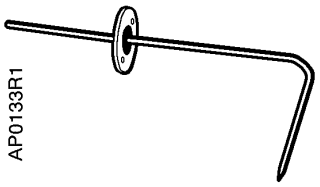


Figure 4. Pitot Tube (Part Number 269-062).

Wiring Diagrams

Before setpoint pressure is applied to the diaphragm, the switch contact is in a normally closed position as shown in Figures 5 and 6.

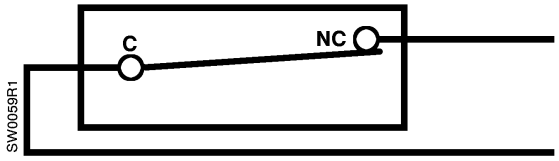


Figure 5. Manual Reset Switch 141-0575.

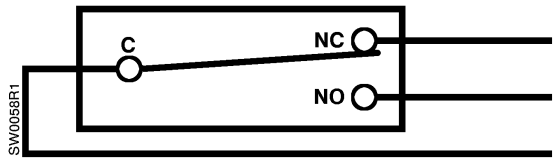


Figure 6. Auto Reset Switches 141-0518 and 141-0574.

SPDT terminals are marked Common (C), Normally Open (NO), and Normally Closed (NC).

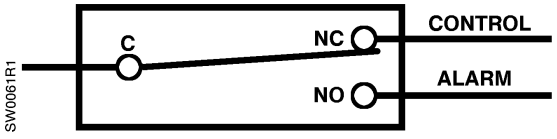


Figure 7. Auto Reset Switches to Prove Excessive Airflow or Pressure.

Wiring Diagrams, Continued

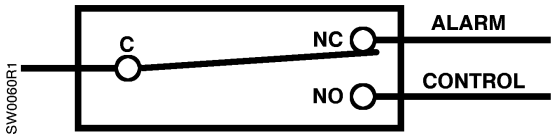


Figure 8. Auto Reset Switches to Prove Insufficient Airflow or Pressure.

Dimensions

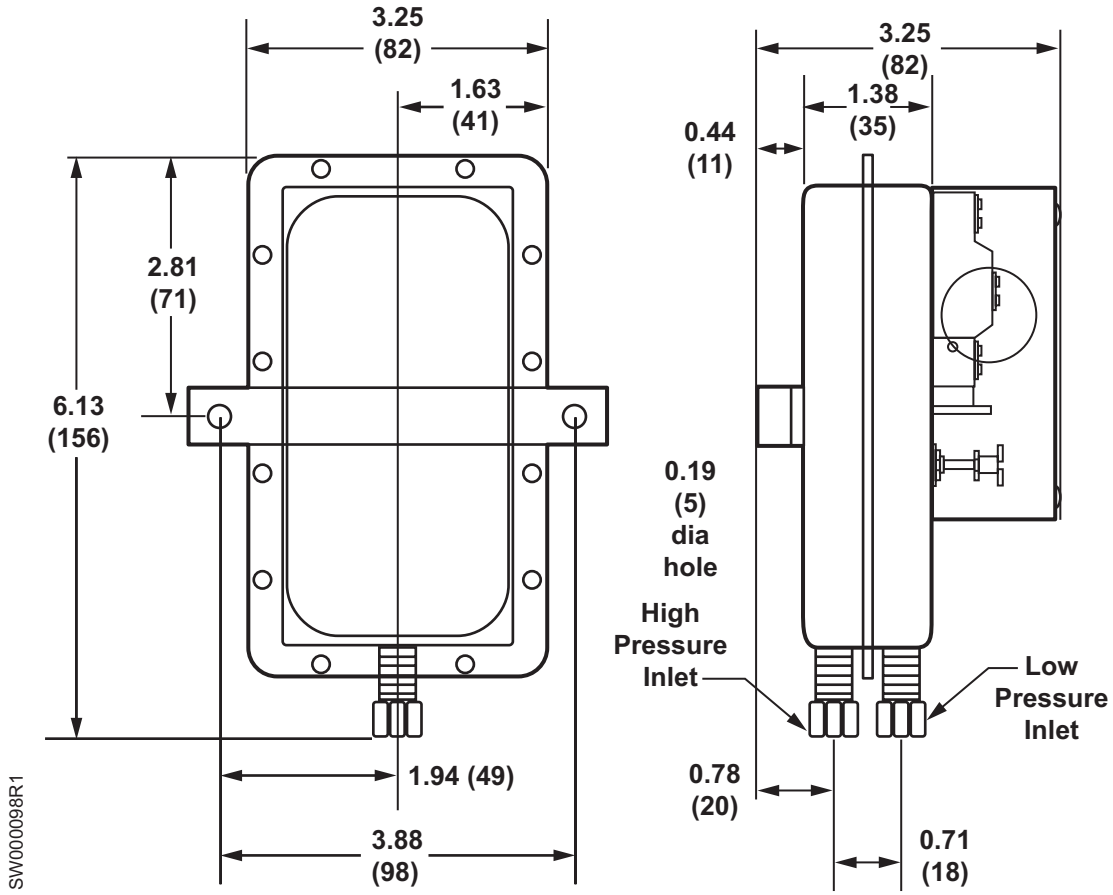


Figure 9. Dimensions in Inches (Millimeters).

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SIEMENS

Submittal Sheet
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599 Series 2-Way Ball Valves

Description

The 599 Series 2-Way Ball Valves are coupled with OpenAir® actuators to provide equal percentage flow control. The Ball Valves are 1/4-turn rotary control valves.

Product Numbers

Use the product numbers in Table 1 through Table 11 to order a valve and actuator assembly. The product number consists of a 4-character actuator prefix code, a hyphen, and a 5-digit valve body suffix code. Stainless steel product numbers have an “S” suffix in Table 6 through Table 11.

Features

- 200 psi close-off with ANSI Class IV leakage for all line sizes and actuators.
- Available with chrome-plated brass ball and brass stem or 316 stainless steel ball and stem.
- Blow-out proof stem withstands high pressure.
- Universal mounting plate.
- Actuator and plate can be rotated (90-degree increments).
- Standoffs provide a thermal barrier between the actuator and the mounting plate.
- Operating handle for manual operation.
- All ball valve actuators include integral conduit adapters.

Table 1. Fail-In-Place Assemblies: Chrome-Plated Ball with Brass Stem (1/2-Inch and 3/4-Inch)

Valve Body Product Number *	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-Off ΔP in psi (kPa)	Fail-in-Place	
					
				Floating	0 to 10 Vdc
				GDE 131.1P	GDE 161.1P
				Actuator Prefix Code	
				171A	171C
599-10300	1/2 (15)	0.4 (0.34)	200 (1379)	171A-10300	171C-10300
599-10301		0.63 (0.54)		171A-10301	171C-10301
599-10302		1.0 (0.9)		171A-10302	171C-10302
599-10303		1.6 (1.4)		171A-10303	171C-10303
599-10304		2.5 (2.2)		171A-10304	171C-10304
599-10305		4.0 (3.4)		171A-10305	171C-10305
599-10306		6.3 (5.4)		171A-10306	171C-10306
599-10307*		10 (8.6)		171A-10307*	171C-10307*
599-10308	3/4 (20)	6.3 (5.4)		171A-10308	171C-10308
599-10309		10 (8.6)		171A-10309	171C-10309
599-10310		16 (14)		171A-10310	171C-10310
599-10311*		25 (22)		171A-10311*	171C-10311*

*Denotes a full-port valve without flow characterizers insert.

Table 2. Fail-In-Place Assemblies: Chrome-Plated Ball with Brass Stem (1-Inch to 2-Inch)

Valve Body Product Number *	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-Off ΔP in psi (kPa)	Fail-in-Place			
							
				Floating		0 to 10 Vdc	
				GDE 131.1P	GLB 131.1P	GDE 161.1P	GLB 161.1P
				Actuator Prefix Code			
				171A	171B	171C	171D
599-10312	1 (25)	10 (9.0)	200 (1379)	171A-10312		171C-10312	
599-10313		16 (14)		171A-10313		171C-10313	
599-10314		25 (22)		171A-10314		171C-10314	
599-10315		40 (34)		171A-10315		171C-10315	
599-10316*		63 (54)		171A-10316*		171C-10316*	
599-10317	1 1/4 (32)	16 (14)		171A-10317		171C-10317	
599-10318		25 (22)		171A-10318		171C-10318	
599-10319		40 (34)		171A-10319		171C-10319	
599-10320		63 (54)		171A-10320		171C-10320	
599-10321*		100 (90)		171A-10321*		171C-10321*	
599-10322	1 1/2 (40)	25 (22)		171B-10322		171D-10322	
599-10323		40 (34)		171B-10323		171D-10323	
599-10324*		63 (54)		171B-10324*		171D-10324*	
599-10325		100 (90)		171B-10325		171D-10325	
599-10326*		160 (140)		171B-10326*		171D-10326*	
599-10327	2 (50)	40 (34)		171B-10327		171D-10327	
599-10328		63 (54)		171B-10328		171D-10328	
599-10329*		100 (90)		171B-10329*		171D-10329*	
599-10330		160 (140)		171B-10330		171D-10330	

***Denotes a full-port valve without flow characterizers insert.**

Table 3. Fail-Safe Assemblies: Chrome-Plated Ball with Brass Stem (1/2-Inch and 3/4-Inch).

Valve Body Product Number*	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-off ΔP in psi (kPa)	Fail-Safe					
									
				2-Position		Floating		2 to 10 Vdc	
				GQD121.1P		GQD131.1P		GQD151.1P	
				N.O.	N.C.	N.O.	N.C.	N.O.	N.C.
				Actuator Prefix Code					
				171H	172H	171J	172J	171K	172K
599-10300	1/2 (15)	0.4 (0.34)	200 (1379)	171H-10300	172H-10300	171J-10300	172J-10300	171K-10300	172K-10300
599-10301		0.63 (0.54)		171H-10301	172H-10301	171J-10301	172J-10301	171K-10301	172K-10301
599-10302		1.0 (0.9)		171H-10302	172H-10302	171J-10302	172J-10302	171K-10302	172K-10302
599-10303		1.6 (1.4)		171H-10303	172H-10303	171J-10303	172J-10303	171K-10303	172K-10303
599-10304		2.5 (2.2)		171H-10304	172H-10304	171J-10304	172J-10304	171K-10304	172K-10304
599-10305		4.0 (3.4)		171H-10305	172H-10305	171J-10305	172J-10305	171K-10305	172K-10305
599-10306		6.3 (5.4)		171H-10306	172H-10306	171J-10306	172J-10306	171K-10306	172K-10306
599-10307*		10 (8.6)		171H-10307*	172H-10307*	171J-10307*	172J-10307*	171K-10307*	172K-10307*
599-10308	3/4 (20)	6.3 (5.4)		171H-10308	172H-10308	171J-10308	172J-10308	171K-10308	172K-10308
599-10309		10 (8.6)		171H-10309	172H-10309	171J-10309	172J-10309	171K-10309	172K-10309
599-10310		16 (14)		171H-10310	172H-10310	171J-10310	172J-10310	171K-10310	172K-10310
599-10311*		25 (22)		171H-10311*	172H-10311*	171J-10311*	172J-10311*	171K-10311*	172K-10311*

*Denotes a full-port valve without flow characterizer insert.

Table 4. Fail-Safe Assemblies: Chrome-Plated Ball and Brass Stem (1-Inch to 2-Inch).

Valve Body Product Number *	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-ff ΔP in psi (kPa)	Fail-Safe					
									
				2-Position		Floating		0 to 10 Vdc	
				GMA121.1P		GMA131.1P		GMA161.1P	
				N.O.	N.C.	N.O.	N.C.	N.O.	N.C.
				Actuator Prefix Code					
				171E	172E	171F	172F	171G	172G
599-10312	1 (25)	10 (9.0)	200 (1379)	171E-10312	172E-10312	171F-10312	172F-10312	171G-10312	172G-10312
599-10313		16 (14)		171E-10313	172E-10313	171F-10313	172F-10313	171G-10313	172G-10313
599-10314		25 (22)		171E-10314	172E-10314	171F-10314	172F-10314	171G-10314	172G-10314
599-10315		40 (34)		171E-10315	172E-10315	171F-10315	172F-10315	171G-10315	172G-10315
599-10316*		63 (54)		171E-10316*	172E-10316*	171F-10316*	172F-10316*	171G-10316*	172G-10316*
599-10317	1 1/4 (32)	16 (14)		171E-10317	172E-10317	171F-10317	172F-10317	171G-10317	172G-10317
599-10318		25 (22)		171E-10318	172E-10318	171F-10318	172F-10318	171G-10318	172G-10318
599-10319		40 (34)		171E-10319	172E-10319	171F-10319	172F-10319	171G-10319	172G-10319
599-10320		63 (54)		171E-10320	172E-10320	171F-10320	172F-10320	171G-10320	172G-10320
599-10321*		100 (90)		171E-10321*	172E-10321*	171F-10321*	172F-10321*	171G-10321*	172G-10321*
599-10322	1 1/2 (40)	25 (22)		171E-10322	172E-10322	171F-10322	172F-10322	171G-10322	172G-10322
599-10323		40 (34)		171E-10323	172E-10323	171F-10323	172F-10323	171G-10323	172G-10323
599-10324*		63 (54)		171E-10324*	172E-10324*	171F-10324*	172F-10324*	171G-10324*	172G-10324*
599-10325		100 (90)		171E-10325	172E-10325	171F-10325	172F-10325	171G-10325	172G-10325
599-10326*		160 (140)		171E-10326*	172E-10326*	171F-10326*	172F-10326*	171G-10326*	172G-10326*
599-10327	2 (50)	40 (34)		171E-10327	172E-10327	171F-10327	172F-10327	171G-10327	172G-10327
599-10328		63 (54)		171E-10328	172E-10328	171F-10328	172F-10328	171G-10328	172G-10328
599-10329*		100 (90)		171E-10329*	172E-10329*	171F-10329*	172F-10329*	171G-10329*	172G-10329*
599-10330		160 (140)		171E-10330	172E-10330	171F-10330	172F-10330	171G-10330	172G-10330

* Denotes a full-port valve without flow characterizer insert.

Table 5. Fail-Safe Assemblies: Full-Port, Chrome-Plated Ball and Brass Stem, 120V.

Valve Body Product Number*	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-off ΔP in psi (kPa)	Fail-Safe, 120V			
							
				2-Position			
				GQD221.1U		GMA221.1U	
				N.O.	N.C.	N.O.	N.C.
				Actuator Prefix Code			
				171L	172L	171M	172M
599-10307*	1/2 (15)	10 (9)	200 (1379)	171L-10307*	172L-10307*	—	—
599-10311*	3/4 (20)	25 (22)		171L-10311*	172L-10311*	—	—
599-10316*	1 (25)	63 (54)		—	—	171M-10316*	172M-10316*
599-10321*	1-/14 (32)	100 (90)		—	—	171M-10321*	172M-10321*
599-10326*	1-1/2 (40)	160 (140)		—	—	171M-10326*	172M-10326*
599-10330	2 (50)			—	—	171M-10330	172M-10330

* Denotes a full-port valve without flow characterizers insert.

Table 6. Fail-In-Place Assemblies: Stainless Steel Ball and Stem (1/2-Inch and 3/4-Inch).

Valve Body Product Number *	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-Off ΔP in psi (kPa)	Fail-in-Place	
					
				Floating	0 to 10 Vdc
				GDE 131.1P	GDE 161.1P
				Actuator Prefix Code	
				171A	171C
599-10300S	1/2 (15)	0.4 (0.34)	200 (1379)	171A-10300S	171C-10300S
599-10301S		0.63 (0.54)		171A-10301S	171C-10301S
599-10302S		1.0 (0.9)		171A-10302S	171C-10302S
599-10303S		1.6 (1.4)		171A-10303S	171C-10303S
599-10304S		2.5 (2.2)		171A-10304S	171C-10304S
599-10305S		4.0 (3.4)		171A-10305S	171C-10305S
599-10306S		6.3 (5.4)		171A-10306S	171C-10306S
599-10307S*		10 (8.6)		171A-10307S*	171C-10307S*
599-10308S	3/4 (20)	6.3 (5.4)		171A-10308S	171C-10308S
599-10309S		10 (8.6)		171A-10309S	171C-10309S
599-10310S		16 (14)		171A-10310S	171C-10310S
599-10311S*		25 (22)		171A-10311S*	171C-10311S*

*Denotes a full-port valve without flow characterizer insert.

Table 7. Fail-In-Place Assemblies: Stainless Steel Ball and Stem (1-Inch to 2-Inch).

Valve Body Product Number *	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-Off ΔP in psi (kPa)	Fail-in-Place			
							
				Floating		0 to 10 Vdc	
				GDE 131.1P	GLB 131.1P	GDE 161.1P	GLB 161.1P
				Actuator Prefix Code			
				171A	171B	171C	171D
599-10312S	1 (25)	10 (9.0)	200 (1379)	171A-10312S		171C-10312S	
599-10313S		16 (14)		171A-10313S		171C-10313S	
599-10314S		25 (22)		171A-10314S		171C-10314S	
599-10315S		40 (34)		171A-10315S		171C-10315S	
599-10316S*		63 (54)		171A-10316S*		171C-10316S*	
599-10317S	1-1/4 (32)	16 (14)		171A-10317S		171C-10317S	
599-10318S		25 (22)		171A-10318S		171C-10318S	
599-10319S		40 (34)		171A-10319S		171C-10319S	
599-10320S		63 (54)		171A-10320S		171C-10320S	
599-10321S*		100 (90)		171A-10321S*		171C-10321S*	
599-10322S	1-1/2 (40)	25 (22)			171B-10322S		171D-10322S
599-10323S		40 (34)			171B-10323S		171D-10323S
599-10324S*		63 (54)			171B-10324S*		171D-10324S*
599-10325S		100 (90)			171B-10325S		171D-10325S
599-10326S*		160 (140)			171B-10326S*		171D-10326S*
599-10327S	2 (50)	40 (34)			171B-10327S		171D-10327S
599-10328S		63 (54)			171B-10328S		171D-10328S
599-10329S*		100 (90)			171B-10329S*		171D-10329S*
599-10330S		160 (140)			171B-10330S		171D-10330S

*Denotes a full-port valve without flow characterizer insert.

Table 8. Fail-Safe Assemblies: Stainless Steel Ball and Stem (1/2-Inch and 3/4-Inch).

Valve Body Product Number*	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-off ΔP in psi (kPa)	Fail-Safe					
									
				2-Position		Floating		2 to 10 Vdc	
				GQD121.1P		GQD131.1P		GQD151.1P	
				N.O.	N.C.	N.O.	N.C.	N.O.	N.C.
				Actuator Prefix Code					
				171H	172H	171J	172J	171K	172K
599-10300S	1/2 (15)	0.4 (0.34)	200 (1379)	171H-10300S	172H-10300S	171J-10300S	172J-10300S	171K-10300S	172K-10300S
599-10301S		0.63 (0.54)		171H-10301S	172H-10301S	171J-10301S	172J-10301S	171K-10301S	172K-10301S
599-10302S		1.0 (0.9)		171H-10302S	172H-10302S	171J-10302S	172J-10302S	171K-10302S	172K-10302S
599-10303S		1.6 (1.4)		171H-10303S	172H-10303S	171J-10303S	172J-10303S	171K-10303S	172K-10303S
599-10304S		2.5 (2.2)		171H-10304S	172H-10304S	171J-10304S	172J-10304S	171K-10304S	172K-10304S
599-10305S		4.0 (3.4)		171H-10305S	172H-10305S	171J-10305S	172J-10305S	171K-10305S	172K-10305S
599-10306S		6.3 (5.4)		171H-10306S	172H-10306S	171J-10306S	172J-10306S	171K-10306S	172K-10306S
599-10307S*		10 (8.6)		171H-10307S*	172H-10307S*	171J-10307S*	172J-10307S*	171K-10307S*	172K-10307S*
599-10308S	3/4 (20)	6.3 (5.4)		171H-10308S	172H-10308S	171J-10308S	172J-10308S	171K-10308S	172K-10308S
599-10309S		10 (8.6)		171H-10309S	172H-10309S	171J-10309S	172J-10309S	171K-10309S	172K-10309S
599-10310S		16 (14)		171H-10310S	172H-10310S	171J-10310S	172J-10310S	171K-10310S	172K-10310S
599-10311S*		25 (22)		171H-10311S*	172H-10311S*	171J-10311S*	172J-10311S*	171K-10311S*	172K-10311S*

*Denotes a full-port valve without flow characterizer insert.

Table 9. Fail-Safe Assemblies: Stainless Steel Ball and Stem (1-Inch to 2-Inch).

Valve Body Product Number *	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-off ΔPin psi (kPa)	Fail-Safe					
									
				2-Position		Floating		0 to 10 Vdc	
				GMA121.1P		GMA131.1P		GMA161.1P	
				N.O.	N.C.	N.O.	N.C.	N.O.	N.C.
				Actuator Prefix Code					
				171E	172E	171F	172F	171G	172G
599-10312S	1 (25)	10 (9.0)	200 (1379)	171E-10312S	172E-10312S	171F-10312S	172F-10312S	171G-10312S	172G-10312S
599-10313S		16 (14)		171E-10313S	172E-10313S	171F-10313S	172F-10313S	171G-10313S	172G-10313S
599-10314S		25 (22)		171E-10314S	172E-10314S	171F-10314S	172F-10314S	171G--0314S	172G-10314S
599-10315S		40 (34)		171E-10315S	172E-10315S	171F-10315S	172F-10315S	171G-10315S	172G-10315S
599-10316S*		63 (54)		171E-10316S*	172E-10316S*	171F-10316S*	172F-10316S*	171G-10316S*	172G-10316S*
599-10317S	1-1/4 (32)	16 (14)		171E-10317S	172E-10317S	171F-10317S	172F-10317S	171G-10317S	172G-10317S
599-10318S		25 (22)		171E-10318S	172E-10318S	171F-10318S	172F-10318S	171G-10318S	172G-10318S
599-10319S		40 (34)		171E-10319S	172E-10319S	171F-10319S	172F-10319S	171G-10319S	172G-10319S
599-10320S		63 (54)		171E-10320S	172E-10320S	171F-10320S	172F-10320S	171G-10320S	172G-10320S
599-10321S*		100 (90)		171E-10321S*	172E-10321S*	171F-10321S*	172F-10321S*	171G-10321S*	172G-10321S*
599-10322S	1-1/2 (40)	25 (22)		171E-10322S	172E-10322S	171F-10322S	172F-10322S	171G-10322S	172G-10322S
599-10323S		40 (34)		171E-10323S	172E-10323S	171F-10323S	172F-10323S	171G-10323S	172G-10323S
599-10324S*		63 (54)		171E-10324S*	172E-10324S*	171F-10324S*	172F-10324S*	171G-10324S*	172G-10324S*
599-10325S		100 (90)		171E-10325S	172E-10325S	171F-10325S	172F-10325S	171G-10325S	172G-10325S
599-10326S*		160 (140)		171E-10326S*	172E-10326S*	171F-10326S*	172F-10326S*	171G-10326S*	172G-10326S*
599-10327S	2 (50)	40 (34)		171E-10327S	172E-10327S	171F-10327S	172F-10327S	171G-10327S	172G-10327S
599-10328S		63 (54)		171E-10328S	172E-10328S	171F-10328S	172F-10328S	171G-10328S	172G-10328S
599-10329S*		100 (90)		171E-10329S*	172E-10329S*	171F-10329S*	172F-10329S*	171G-10329S*	172G-10329S*
599-10330S		160 (140)		171E-10330S	172E-10330S	171F-10330S	172F-10330S	171G-10330S	172G-10330S

* Denotes a full-port valve without flow characterizer insert.

Table 10. Fail-Safe Assemblies: Full-Port, Stainless Steel Ball and Stem, 120V.

Valve Body Product Number*	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-off ΔP in psi (kPa)	Fail-Safe, 120V			
							
				2-Position			
				GQD221.1U		GMA221.1U	
				N.O.	N.C.	N.O.	N.C.
				Actuator Prefix Code			
				171L	172L	171M	172M
599-10307S*	1/2 (15)	10 (9)	200 (1379)	171L-10307S*	172L-10307S*	—	—
599-10311S*	3/4 (20)	25 (22)		171L-10311S*	172L-10311S*	—	—
599-10316S*	1 (25)	63 (54)		—	—	171M-10316S*	172M-10316S*
599-10321S*	1-/14 (32)	100 (90)		—	—	171M-10321S*	172M-10321S*
599-10326S*	1-1/2 (40)	160 (140)		—	—	171M-10326S*	172M-10326S*
599-10330S	2 (50)			—	—	171M-10330S	172M-10330S

* Denotes a full-port valve without flow characterizer insert.

Table 11. Fail-Safe Assemblies: Full-Port, Stainless Steel Ball and Stem, 24V with Dual Auxiliary Switches.

Valve Body Product Number*	Valve Size Inches (mm)	Flow Rate Cv (Kvs)	Close-off ΔP in psi (kPa)	Fail-Safe, 24V			
							
				2-Position			
				GQD126.1P		GMA126.1P	
				N.O.	N.C.	N.O.	N.C.
				Actuator Prefix Code			
				171N	172N	171P	172P
599-10307S*	1/2 (15)	10 (9)	200 (1379)	171N-10307S*	172N-10307S*	—	—
599-10311S*	3/4 (20)	25 (22)		171N-10311S*	172N-10311S*	—	—
599-10316S*	1 (25)	63 (54)		—	—	171P-10316S*	172P-10316S*
599-10321S*	1-/14 (32)	100 (90)		—	—	171P-10321S*	172P-10321S*
599-10326S*	1-1/2 (40)	160 (140)		—	—	171P-10326S*	172P-10326S*
599-10330S	2 (50)			—	—	171P-10330S	172P-10330S

* Denotes a full-port valve without flow characterizer insert.

Typical Specifications

Ball valves shall have female NPT type fittings and shall be 1/2-inch to 2-inch (15 mm to 50 mm) line and ball sizes. The valves shall have a forged brass body; chrome-plated brass ball with brass stem or 316 stainless steel ball and stem; and EPDM O-ring seals. Valves shall contain glass-filled PTFE ball valve seals or integral seals and flow characterizers to provide an equal percentage control characteristic where required. Ball valves shall utilize a 90-degree rotation for control. They shall provide automated flow control of hot or chilled water and up to 50% water-glycol solution for HVAC control applications.

Technical Data

Pressure Rating	600 WOG/ANSI 250	**Ball Seals**	Glass-filled PTFE with EPDM O-rings
Media Temperature	0°F to 250°F (-18°C to 121°C)	**End Connections**	Female NPT
Controlled Medium	Water, 50% water-glycol solution	**Stem**	Brass or 316 stainless steel
Body	Brass: ASTM B283, C37700	**Stem Seals**	EPDM O-rings
Ball	Chrome-plated brass or 316 stainless steel	**Angle of Rotation**	0° to 90°
Flow Characterizer	Glass-filled PTFE		

Table 12. Full-Port (No Flow Characterizer) Ball Valve Product Numbers and Flow Coefficients.

Valve Product Number	Valve Line Size in Inches (mm)	Effective (Installed) Cv (Kvs)										
		Supply Line Size in Inches (mm)										
		1/2 (13)	3/4 (20)	1 (25)	1-1/4 (32)	1-1/2 (38)	2 (51)	2-1/2 (63)	3 (76)	4 (102)	5 (127)	6 (152)
599-10307 or 599-10307S	1/2 (15)	**10.00 (8.62)**	**6.94 (5.93)**	**6.19 (5.29)**	—	—	—	—	—	—	—	—
599-10311 or 599-10311S	3/4 (20)	—	**25.00 (21.55)**	**18.66 (15.95)**	**15.35 (13.12)**	—	—	—	—	—	—	—
599-10316 or 599-10316S	1 (25)	—	—	**63.00 (54.31)**	**39.78 (34.00)**	**33.56 (28.69)**	—	—	—	—	—	—
599-10321 or 599-10321S	1-1/4 (32)	—	—	—	**100.00 (86.21)**	**69.19 (59.13)**	**51.45 (43.98)**	—	—	—	—	—
599-10324 or 599-10324S	1-1/2 (40)	—	—	—	—	**63.00 (54.31)**	**55.34 (47.30)**	**51.00 (43.59)**	—	—	—	—
599-10326 or 599-10326S		—	—	—	—	**160.00 (137.93)**	**93.80 (80.17)**	**76.34 (65.25)**	—	—	—	—
599-10329 or 599-10329S	2 (50)	—	—	—	—	—	**100.00 (86.21)**	**94.30 (80.60)**	**86.12 (73.61)**	—	—	—

= Valve may be oversized. = Optimal valve size. = Valve may be undersized

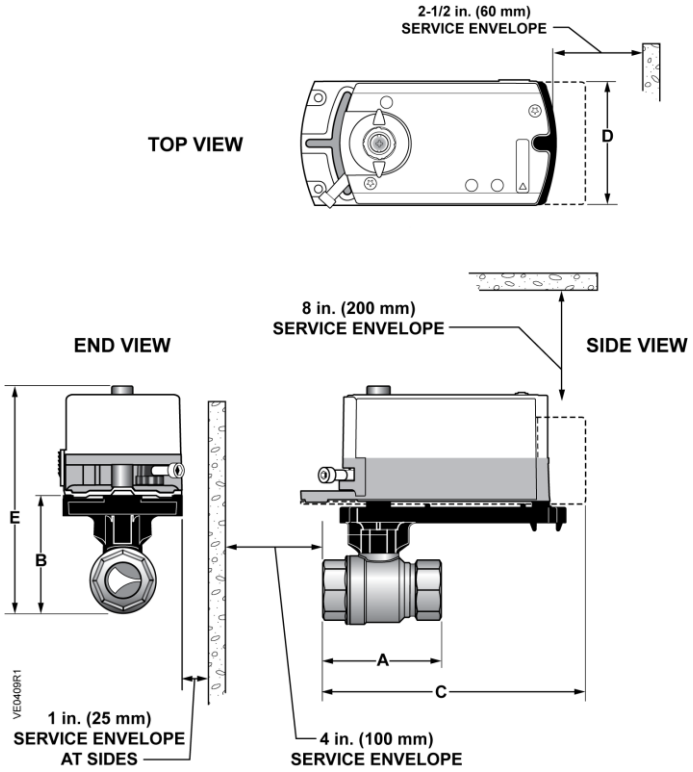


Figure 1. Two-Way Ball Valve and Low Profile Bracket with Actuator Dimensions in Inches (Millimeters).

Line Size Inches (mm)	Cv Range	A Length	B Height	C Length Actuator Codes		D Width	E Height	Valve and Bracket Weight lbs (kg)
				GDE	GQD			
				171A-D	171H, J, K, L, N			
1/2 (15)	0.4 to 10	2-7/16 (61)	2-1/4 (57)	5-1/4 (133)	5-1/4 (133)	2-3/4 (70)	4-13/16 (123)	1 (0.45)
3/4 (20)	6.3 to 25	2-3/4 (70)	2-5/8 67)	5-3/8 (136)	5-3/8 (136)		5-1/4 (133)	1.3 (0.60)

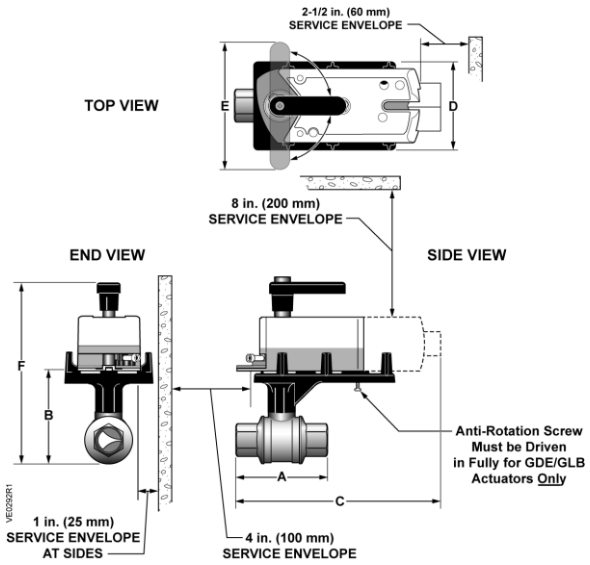


Figure 2. 2-Way Ball Valves.

- All dimensions are in inches (mm).
- Dimension “D”, Depth, is 3.7 inches (94.5) “E”, Handle, is 5.3 inches (135.9).
- Dimension weights are in pounds (kg).

Table 13. Two-Way Ball Valve and Bracket with Actuator Dimensions in Inches (Millimeters).

Line Size Inch (mm)	Cv Range	A Length	C Length * Actuator Codes 171A-D, GDE/GLB	C Length * Actuator Codes 171H,J,K GQD	C Length* Actuator Codes 171E,F 172E,F Fail Safe GMA	F Height	Valve and Bracket Weight lbs (kg)
1 (25)	10	3 (77)	6-11/16 (170)	—	8 (203)	8 (203)	1.6 (0.73)
	16, 40, 63	3-1/4 (82)		—	8-3/8 (213)	8-5/16 (212)	1.8 (0.82)
	25	3-7/8 (98)	7 (178)	—	8-11/16 (221)	8-13/16 (223)	
1-1/4 (32)	16	3-3/8(86)	6-11/16 (170)	—	8-7/16 (214)	8-3/8 (213)	2.0 (0.91)
	25 to 100	3-11/16 (94)	6-15/16 (176)	—	8-11/16 (221)	8-13/16 (223)	2.5 (1.1)
1-1/2 (40)	25, 63	3-5/8 (92)		—	8-7/16 (214)	8-13/16 (223)	1.8 (0.82)
	40, 100, 160	3-15/16 (100)	7-1/16 (180)	—	8-3/4 (223)	9-1/4 (235)	3.3 (1.50)
2 (50)	40, 100	4 (102)		—		9-3/8 (238)	3.1 (1.41)
	63	4-5/8 (118)	7-1/2 (190)	—	9-1/8 (223)	10-1/16 (255)	5.25 (2.38)
	160			—			5.3 (2.40)

*Dimension C is the maximum length, measured from actuator, end fitting, or mounting plate, whichever extends the furthest.

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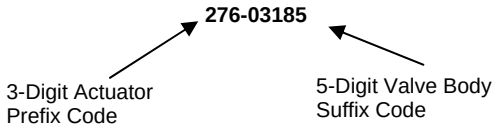
Flowrite™ 599 Series, 2-Way Valves, 1/2 to 2-Inch, Threaded, ANSI Class 250, Bronze Body

Description

The Flowrite 599 Series two-way valve bodies, ANSI 250, work with a Flowrite series actuator with a 3/4-inch (20 mm) stroke. Typical applications include control of hot or chilled water, 50% water-glycol solutions, or steam.

Product Numbers

Use the product numbers in the tables to order the valve and actuator assembled together. The product number consists of a 3-digit prefix code, a hyphen, and a 5-digit suffix code. The prefix specifies an actuator. The suffix specifies the valve body.



Features

- ANSI Leakage Class IV (0.01% of Cv).
- Normally-open and normally-closed configurations.
- Cartridge-type packing.
- Equal percentage flow characteristics with either brass or stainless steel trim.
- Linear flow characteristic with stainless steel trim.
- High temperature packing available on linear valves.
- Direct-coupled universal bonnet.
- UF×UF and F×UM connections available.

Typical Specifications

Automatic control valves shall have NPT threaded type fittings, 1/2 through 2 inch (15 through 50 mm) sizes, and shall be ANSI 250 rated to withstand the pressures and temperatures encountered.

Valves shall have metal-to-metal seats, stainless steel stems, and ethylene propylene O-ring packing.
Valves shall be ANSI Leakage Class IV (0.01% of Cv).
Valves shall have a 100:1 rangeability or better.

Technical Data

Valve Size	1/2-in. to 2-in. (15 mm to 50 mm)
Body	Globe style, UNS CA 844 bronze, ANSI Class 250
Trim	Brass or stainless steel
Stem	Stainless steel ASTM A582 Type 303, 3/4-inch (20-mm) stroke
Seat	Single seat, metal-to-metal
Packing:	
Normal duty	EPDM O-ring
Steam packing	Teflon® V-ring/EDPM O-ring
Close-off Ratings	According to ANSI/FCI 70-2 See Tables 3 and 5
Controlled Medium	Water, steam, 50% water-glycol solutions
Medium Temperature:	
Normal Duty	20°F to 250°F (-7°C to 120°C)
Steam Packing	337°F (170°C)

Maximum Recommended Differential Pressure for Modulating Service:

Media	Bronze Trim	Stainless Steel Trim
Liquid	25 psi (173 kPa)	50 psi (345 kPa)
Steam	15 psi (103 kPa)	50 psi (345 kPa)

Rangeability	>100:1
Leakage Rate	Class IV (0.01% of Cv)
Flow Characteristics	Equal Percentage or Linear
Mounting	NEMA 1 (interior only)

NOTE: To keep this document short, only valves with equal percentage flow characteristics, brass trim, with standard duty packing and female NPT connections are shown.

For complete selection tables, see Flowrite™ 599 Series 1/2- to 2-Inch Valve (2-Way & 3-Way) and Actuator Assembly Selection TB 255 (155-772).

Table 1. Electro-Hydraulic Actuator and Valve Assemblies.

Action	 Valve Body	Flow Rate, Cv (Kvs)	Valve Size, Inches (mm)	NSR	Spring Return		
							
				Floating		0 to 10 Vdc, 4 to 20 mA	
				SKD82.50U	SKD82.51U	SKD62U	SKB62U
				Actuator Prefix Codes			
				275	276	274	291
Normally Open	599-03162	1 (0.85)	1/2 (15)	275-03162	276-03162	274-03162	—
	599-03163	1.6 (1.4)	1/2 (15)	275-03163	276-03163	274-03163	—
	599-03164	2.5 (2.2)	1/2 (15)	275-03164	276-03164	274-03164	—
	599-03165	4 (3.4)	1/2 (15)	275-03165	276-03165	274-03165	—
	599-03166	6.5 (5.4)	3/4 (20)	275-03166	276-03166	274-03166	—
	599-03167	10 (8.6)	1 (25)	275-03167	276-03167	274-03167	291-03167
	599-03168	16 (14)	1-1/4 (32)	275-03168	276-03168	274-03168	291-03168
	599-03169	25 (22)	1-1/2 (40)	275-03169	276-03169	274-03169	291-03169
	599-03170	40 (34)	2 (50)	275-03170	276-03170	274-03170	291-03170
Normally Closed	599-03180	1 (0.85)	1/2 (15)	275-03180	276-03180	274-03180	—
	599-03181	1.6 (1.4)	1/2 (15)	275-03181	276-03181	274-03181	—
	599-03182	2.5 (2.2)	1/2 (15)	275-03182	276-03182	274-03182	—
	599-03183	4 (3.4)	1/2 (15)	275-03183	276-03183	274-03183	—
	599-03184	6.3 (5.4)	3/4 (20)	275-03184	276-03184	274-03184	—
	599-03185	10 (8.6)	1 (25)	275-03185	276-03185	274-03185	291-03185
	599-03186	16 (14)	1-1/4 (32)	275-03186	276-03186	274-03186	291-03186
	599-03187	25 (22)	1-1/2(40)	275-03187	276-03187	274-03187	291-03187
	599-03188	40 (34)	2 (50)	275-03188	276-03188	274-03188	291-03188

Table 2. Electro-Mechanical Actuator and Valve Assemblies.

Action	 Valve Body	Flow Rate, Cv (Kvs)	Valve Size, Inch (mm)	Non-Spring Return					Spring Return	
										
				Floating		0 to 10 Vdc, 4 to 20 mA	Floating	0 to 10 Vdc, 4 to 20 mA	2-Position	0 to 10 Vdc
				120 second	30 second	30 second	30 second	30 second		
				SQX82.00U	SQX82.03U	SQX62U	SAX81.03U	SAX61.03U	599-03611	599-03609
				Actuator Prefix Codes						
				272	273	271	373	371	299	298
Normally Open	599-03162	1 (0.85)	1/2 (15)	272-03162	273-03162	271-03162	373-03162	371-03162	299-03162	298-03162
	599-03163	1.6 (1.4)	1/2 (15)	272-03163	273-03163	271-03163	373-03163	371-03163	299-03163	298-03163
	599-03164	2.5 (2.2)	1/2 (15)	272-03164	273-03164	271-03164	373-03164	371-03164	299-03164	298-03164
	599-03165	4 (3.4)	1/2 (15)	272-03165	273-03165	271-03165	373-03165	371-03165	299-03165	298-03165
	599-03166	6.5 (5.4)	3/4 (20)	272-03166	273-03166	271-03166	373-03166	371-03166	299-03166	298-03166
	599-03167	10 (8.6)	1 (25)	272-03167	273-03167	271-03167	373-03167	371-03167	299-03167	298-03167
	599-03168	16 (14)	1-1/4(32)	272-03168	273-03168	271-03168	373-03168	371-03168	299-03168	298-03168
	599-03169	25 (22)	1-1/2 (40)	272-03169	273-03169	271-03169	373-03169	371-03169	299-03169	298-03169
	599-03170	40 (34)	2 (50)	272-03170	273-03170	271-03170	373-03170	371-03170	299-03170	298-03170
Normally Closed	599-03180	1 (0.85)	1/2 (15)	272-03180	273-03180	271-03180	373-03180	371-03180	299-03180	298-03180
	599-03181	1.6 (1.4)	1/2 (15)	272-03181	273-03181	271-03181	373-03181	371-03181	299-03181	298-03181
	599-03182	2.5 (2.2)	1/2 (15)	272-03182	273-03182	271-03182	373-03182	371-03182	299-03182	298-03182
	599-03183	4 (3.4)	1/2 (15)	272-03183	273-03183	271-03183	373-03183	371-03183	299-03183	298-03183
	599-03184	6.5 (5.4)	3/4 (20)	272-03184	273-03184	271-03184	373-03184	371-03184	299-03184	298-03184
	599-03185	10 (8.6)	1 (25)	272-03185	273-03185	271-03185	373-03185	371-03185	299-03185	298-03185
	599-03186	16 (14)	1-1/4(32)	272-03186	273-03186	271-03186	373-03186	371-03186	299-03186	298-03186
	599-03187	25 (22)	1-1/2 (40)	272-03187	273-03187	271-03187	373-03187	371-03817	299-03187	298-03187
	599-03188	40 (34)	2 (50)	272-03188	273-03188	271-03188	373-03188	371-03188	299-03188	298-03188

Table 3. PSI (kPa) Close-Off Ratings for Electronic Assemblies, Equal Percentage.

Action	Valve Size, Inches (mm)	Electro-Hydraulic		Electro-Mechanical		
		SKB	SKD	SQX	SAX (NSR)	599-03609 599-03611
Normally Open	1/2 (15)	250 (1724)	250 (1724)	250 (1724)	250 (1724)	250 (1724)
	3/4 (20)	250 (1724)	250 (1724)	173 (1193)	211 (1456)	231 (1593)
	1 (25)	250 (1724)	201 (1386)	112 (772)	137 (945)	149 (1028)
	1-1/4 (32)	250 (1724)	124 (855)	69 (476)	85 (586)	92 (634)
	1-1/2 (40)	250 (1724)	80 (552)	44 (303)	55 (379)	59 (407)
	2 (50)	201 (1386	49 (338)	27 (186)	34 (235)	36 (248)
Normally Closed	1/2 (15)	250 (1724)	250 (1724)	250 (1724)	250 (1724)	250 (1724)
	3/4 (20)	250 (1724)	250 (1724)	221 (1524)	250 (1724)	250 (1724)
	1 (25)	250 (1724)	203 (1400)	130 (896)	159 (1097)	173 (1193)
	1-1/4 (32)	250 (1724)	117 (807)	75 (517)	92 (634)	100 (690)
	1-1/2 (40	208 (1334)	73 (503)	46 (317)	57 (393)	61 (421)
	2 (50)	126 (869)	44 (303)	28 (193)	35 (241)	37 (255)

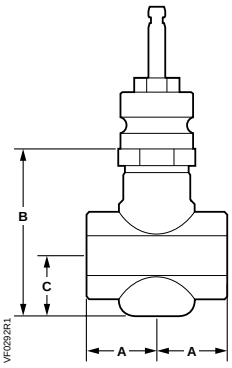
Table 4. Pneumatic Actuator and Valve Assemblies.

Action	 Valve Body	Flow Rate, Cv (Kvs)	Valve Size, Inches (mm)	4-Inch 		8-Inch 	
				Spring Range		W/O Positioner	With Positioner
				3-8 PSI	10-15 PSI		
				599-01081	599-01083	599-01050	599-01050 & 599-00426
				Actuator Prefix Codes			
				268	270	277	283
Normally Open	599-03162	1 (0.85)	1/2 (15)	268-03162	—	277-03162	283-03162
	599-03163	1.6 (1.4)	1/2 (15)	268-03163	—	277-03163	283-03163
	599-03164	2.5 (2.2)	1/2 (15)	268-03164	—	277-03164	283-03164
	599-03165	4 (3.4)	1/2 (15)	268-03165	—	277-03165	283-03165
	599-03166	6.3 (5.4)	3/4 (20)	268-03166	—	277-03166	283-03166
	599-03167	10 (8.6)	1 (25)	268-03167	—	277-03167	283-03167
	599-03168	16 (14)	1-1/4 (32)	268-03168	—	277-03168	283-03168
	599-03169	25 (22)	1-1/2 (40)	268-03169	—	277-03169	283-03169
	599-03170	40 (34)	2 (50)	268-03170	—	277-03170	283-03170
Normally Closed	599-03180	1 (0.85)	1/2 (15)	—	270-03180	277-03180	283-03180
	599-03181	1.6 (1.4)	1/2 (15)	—	270-03181	277-03181	283-03181
	599-03182	2.5 (2.2)	1/2 (15)	—	270-03182	277-03182	283-03182
	599-03183	4 (3.4)	1/2 (15)	—	270-03183	277-03183	283-03183
	599-03184	6.3 (5.4)	3/4 (20)	—	270-03184	277-03184	283-03184
	599-03185	10 (8.6)	1 (25)	—	270-03185	277-03185	283-03185
	599-03186	16 (14)	1-1/4 (32)	—	270-03186	277-03186	283-03186
	599-03187	25 (22)	1-1/2(40)	—	270-03187	277-03187	283-03187
	599-03188	40 (34)	2 (50)	—	270-03188	277-03188	283-03188

Table 5. PSI (kPa) Close-Off Ratings for Pneumatic Valve Assemblies, Equal Percentage.

Action	Valve Size, Inches (mm)	Spring Range				
		3 to 8 psi (21 to 55 kPa)			10 to 15 psi (69 to 103 kPa)	
		4" Actuator	8"Actuator		4" Actuator	8" Actuator
		15 psi (103 kPa)		30 psi (207 kPa)	0 psi (0 kPa)	
Normally Open	1/2 (15)	142 (979)	250 (1724)	250 (1724)	—	—
	3/4 (20)	80 (552)	231 (1593)	250 (1724)	—	—
	1 (25)	52 (359)	150 (1034)	250 (1724)	—	—
	1-1/4 (32)	32 (221)	93 (641)	250 (1724)	—	—
	1-1/2 (40)	20 (138)	60 (414)	198 (1365)	—	—
	2 (50)	12 (83)	37 (255)	123 (848)	—	—
Normally Closed	1/2 (15)	—	—	—	236 (1627	250 (1724)
	3/4 (20)	—	—	—	155 (1069)	250 (1724)
	1 (25)	—	—	—	91 (627)	250 (1724)
	1-1/4 (32)	—	—	—	52 (359)	148 (1020)
	1-1/2 (40)	—	—	—	32 (331)	92 (634)
	2 (50)	—	—	—	20 (138)	55 (379)

Table 6. Valve Dimensions.



Action	Valve Size Inches (mm)	A	B	C	Weight lbs. (kg)
Normally Open	1/2 (15)	1-7/16 (36)	2-15/16 (74)	1-1/4 (32)	3 (1.4)
	3/4 (20)	1-11/16 (43)	3-15/16 (99)	1-7/16 (36)	4 (1.8)
	1 (25)	2 (50)	3-3/4 (96)	1-1/4 (32)	5 (2.3)
	1-1/4 (32)	2-1/2 (62)	4-1/4 (109)	2 (50)	7 (3.2)
	1-1/2 (40)	2-9/16 (65)	4-1/4 (109)	2 (50)	8 (3.6)
	2 (50)	3-1/8 (79)	4-9/16 (116)	2-1/4 (57)	16 (7.3)
Normally Closed	1/2 (15)	1-7/16 (36)	3-13/16 (97)	2-13/16 (55)	3 (1.4)
	3/4 (20)	1-11/16 (43)	3-13/16 (97)	2-13/16 (55)	4)1.8)
	1 (25)	2 (50)	3-13/16 (97)	2-13/16 (55)	5 (2.3)
	1-1/4 (32)	2-1/2 (62)	3-13/16 (97)	2-13/16 (55)	7 (3.2)
	1-1/2 (40)	2-9/16 (65)	3-7/8 (99)	2-1/4 (58)	8 (3.6)
	2 (50)	3-1/8 (79)	4-1/2 (114)	2-9/16 (65)	16 (7.3)

NOTE: For complete technical details on valves with linear characteristics, stainless steel trim, or union female, angle female, or union male end connections, see *Flowrite™ 599 Series Two-way Valves Technical Instructions*, (155-184P25).

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Submittal Sheet
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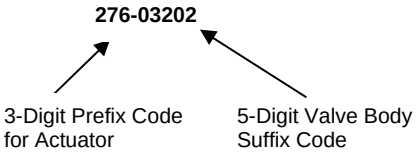
Flowrite™ 599 Series, 3-Way Valves, 1/2 to 2-Inch Threaded, ANSI Class 250, Bronze Body

Description

The Flowrite 599 Series 3-Way Valve bodies, ANSI 250, work with a Flowrite Series actuator with a 3/4-inch (20 mm) stroke. Typical applications include mixing of hot or chilled water and the control of 50% water-glycol solutions.

Product Numbers

Use the product numbers in the tables to order the valve and the actuator assembled together. The product number consists of a 3-digit prefix code, a hyphen, and a 5-digit suffix code. The prefix specifies an actuator. The suffix specifies the valve body.



Features

- ANSI Leakage Class IV (0.01% of Cv)
- Cartridge-type packing
- Brass or stainless steel trim
- Direct-coupled universal bonnet

Typical Specifications

Automatic control valves shall have NPT threaded type fittings, 1/2 through 2-inch (15 through 50 mm) sizes, and shall be ANSI Rated to withstand the pressures and temperatures encountered.

Valves shall have metal-to-metal seats, stainless steel stems, and Ethylene propylene O-ring packing.
Valves shall be ANSI Leakage Class IV (0.01% of Cv).
Valves shall have a 100:1 rangeability or better.

Technical Data

Line Size	1/2 to 2-inch (15 to 50 mm)
Body	Globe style, UNS CA 844 bronze, ANSI Class 250
Trim	Brass or stainless steel
Stem	Stainless steel ASTM A582 Type 303, 3/4-inch (20-mm) stroke
Seat	Single seat, metal-to-metal
Packing	EPDM O-ring
Close-off Ratings	According to ANSI/FCI 70-2 See Tables 3 and 5.
Controlled Media	Water, 50% water-glycol solutions
Media Temperature	20 to 250°F (-7 to 120°C)

Maximum Recommended Differential Pressure for Modulating Service

Media	Brass Trim	SS Trim
Liquid	25 psi (173 kPa)	50 psi (345 kPa)

Rangeability	>100:1
Leakage Rate	Class IV (0.01% of Cv)
Flow Characteristics	Equal Percentage for upper port Linear for lower port
Mounting	NEMA 1 (interior only)

NOTE: To keep the document short, only valves with brass trim and female NPT connections are shown.

For complete selections tables, see *Flowrite™ 599 Series 1/2 to 2-Inch Valve (2-Way & 3-Way) and Actuator Assembly Selection* TB 255 (155-772).

Table 1. Three-way, Equal Percentage Valve and Actuator Assemblies with Brass Trim, Normal Duty Packing and Female NPT Connections.

Valve Body	Flow Rate, Cv (Kvs)	Valve Size, Inches (mm)	Electro- Hydraulic 24 Vac				
			NSR	Spring Return	NSR	Spring Return	
							
			Floating		0 to 10 Vdc, 4 to 20 mA		
			SKD82.50U	SKD82.51U	SKD60U	SKD62U	SKB62U
			Actuator Prefix Codes				
			275	276	267	274	291
599-03198	1 (0.85)	1/2 (15)	275-03198	276-03198	267-03198	274-03198	—
599-03199	1.6 (1.4)	1/2 (15)	275-03199	276-03199	267-03199	274-03199	—
599-03200	2.5 (2.2)	1/2 (15)	275-03200	276-03200	267-03200	274-03200	—
599-03201	4 (3.4)	1/2 (15)	275-03201	276-03201	267-03201	274-03201	—
599-03202	6.3 (5.4)	3/4 (20)	275-03202	276-03202	267-03202	274-03202	—
599-03203	10 (8.6)	1 (25)	275-03203	276-03203	267-03203	274-03203	291-03203
599-03204	16 (14)	1-1/4 (32)	275-03204	276-03204	267-03204	274-03204	291-03204
599-03205	25 (22)	1-1/2 (40)	275-03205	276-03205	267-03205	274-03205	291-03205
599-03206	40 (34)	2 (50)	275-03206	276-03206	267-03206	274-03206	291-03206

Table 2. Three-way, Equal Percentage Valve and Actuator Assemblies with Brass Trim, Normal Duty Packing and Female NPT Connections.

Valve Body	Flow Rate, Cv (Kvs)	Valve Size, Inches (mm)	Electro-Mechanical			
			Non-Spring Return		Spring Return	
						
			Floating	0 to 10V, 4 to 20 mA	2-Position	0 to 10 Vdc
			SAX81.03U	SAX61.03U	599-03611	599-03609
			Actuator Prefix Codes			
			373	371	299	298
599-03198	1 (0.85)	1/2 (15)	373-03198	371-03198	299-03198	298-03198
599-03199	1.6 (1.4)	1/2 (15)	373-03199	371-03199	299-03199	298-03199
599-03200	2.5 (2.2)	1/2 (15)	373-03200	371-03200	299-03200	298-03200
599-03201	4 (3.4)	1/2 (15)	373-03201	371-03201	299-03201	298-03201
599-03202	6.3 (5.4)	3/4 (20)	373-03202	371-03202	299-03202	298-03202
599-03203	10 (8.6)	1 (25)	373-03203	371-03203	299-03203	298-03203
599-03204	16 (14)	1-1/4 (32)	373-03204	371-03204	299-03204	298-03204
599-03205	25 (22)	1-1/2 (40)	373-03205	371-03205	299-03205	298-03205
599-03206	40 (34)	2 (50)	373-03206	371-03206	299-03206	298-03206

Table 3. PSI (kPa) Close-Off Ratings for Electronic Assemblies, Equal Percentage.

Action	Valve Size, Inches (mm)	Electro-Hydraulic			
		SKB	SKD	SAX (NSR)	599-03609 599-03611
Normally Open (Lower Port)	1/2 (15)	250 (1724)	250 (1724)	250 (1724)	250 (1724)
	3/4 (20)	250 (1724)	250 (1724)	211 (1456)	231 (1593)
	1 (25)	250 (1724)	201 (1386)	137 (945)	149 (1028)
	1-1/4 (32)	250 (1724)	124 (855)	85 (586)	92 (634)
	1-1/2 (40)	250 (1724)	80 (552)	55 (379)	59 (407)
	2 (50)	201 (1386)	49 (338)	34 (235)	36 (248)
Normally Closed (Upper Port)	1/2 (15)	250 (1724)	250 (1724)	250 (1724)	250 (1724)
	3/4 (20)	250 (1724)	250 (1724)	250 (1724)	250 (1724)
	1 (25)	250 (1724)	203 (1400)	159 (1097)	173 (1193)
	1-1/4 (32)	250 (1724)	117 (807)	92 (634)	100 (690)
	1-1/2 (40	208 (1334)	73 (503)	57 (393)	61 (421)
	2 (50)	126 (869)	44 (303)	35 (241)	37 (255)

Table 4. Three-way, Equal Percentage Valve and Actuator Assemblies with Brass Trim, Normal Duty Packing and Female NPT Connections.

Valve Body	Flow Rate, Cv (Kvs)	Valve Size, Inches (mm)	Pneumatic Actuators – 24 Vac				
			4-Inch			8-Inch	
							
			3 to 8 psi	5 to 10 psi	10 to 15 psi	599-01050	w/Position Relay
			599-01081	599-01081	599-01083		599-01050
			Actuator Prefix Codes				
			268	269	270	277	283
599-03198	1 (0.85)	1/2 (15)	268-03198	269-03198	270-03198	277-03198	283-03198
599-03199	1.6 (1.4)	1/2 (15)	268-03199	269-03199	270-03199	277-03199	283-03199
599-03200	2.5 (2.2)	1/2 (15)	268-03200	269-03200	270-03200	277-03200	283-03200
599-03201	4 (3.4)	1/2 (15)	268-03201	269-03201	270-03201	277-03201	283-03201
599-03202	6.3 (5.4)	3/4 (20)	268-03202	269-03202	270-03202	277-03202	283-03202
599-03203	10 (8.6)	1 (25)	268-03203	269-03203	270-03203	277-03203	283-03203
599-03204	16 (14)	1-1/4 (32)	268-03204	269-03204	270-03204	277-03204	283-03204
599-03205	25 (22)	1-1/2 (40)	268-03205	269-03205	270-03205	277-03205	283-03205
599-03206	40 (34)	2 (50)	268-03206	269-03206	270-03206	277-03206	283-03206

Table 5. PSI (kPa) Close-Off Ratings for Pneumatic Valve Assemblies, Equal Percentage.

Action	Valve Size, Inches (mm)	Spring Range				
		3 to 8 psi (21 to 55 kPa)			10 to 15 psi (69 to 103 kPa)	
		4-inch Actuator	8-inch Actuator		4-inch Actuator	8-inch Actuator
		15 psi (103 kPa)		30 psi (207 kPa)	0 psi (0 kPa)	
Normally Open (Lower Port)	1/2 (15)	142 (979)	250 (1724)	250 (1724)	—	—
	3/4 (20)	80 (552)	231 (1593)	250 (1724)	—	—
	1 (25)	52 (359)	150 (1034)	250 (1724)	—	—
	1-1/4 (32)	32 (221)	150 (1034)	250 (1724)	—	—
	1-1/2 (40)	20 (138)	93 (641)	198 (1365)	—	—
	2 (50)	12 (83)	60 (414)	123 (848)	—	—
Normally Closed (Upper Port)	1/2 (15)	—	—	—	236 (1627)	250 (1724)
	3/4 (20)	—	—	—	155 (1069)	250 (1724)
	1 (25)	—	—	—	91 (627)	250 (1724)
	1-1/4 (32)	—	—	—	52 (359)	148 (1020)
	1-1/2 (40)	—	—	—	32 (331)	92 (634)
	2 (50)	—	—	—	20 (138)	55 (379)

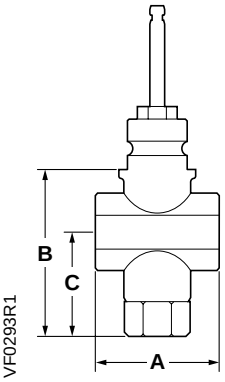


Table 6. Valve Dimensions.

Valve Size Inches (mm)	A	B	C	Weight lbs. (kg)
1/2 (15)	2-7/8 (72)	4-5/16 (110)	2-11/16 (68)	3 (1.4)
3/4 (20)	3-3/8 (85)	4-5/16 (110)	2-3/4 (69)	4 (1.8)
1 (25)	3-15/16 (100)	4-1/2 (114)	2-7/8 (72)	5 (2.3)
1-1/4 (32)	4-15/16 (125)	4-5/8 (116)	2-15/16 (74)	7 (3.2)
1-1/2 (40)	5-1/8 (130)	4-5/8 (116)	3 (76)	9 (4.1)
2 (50)	6-1/4 (158)	4-3/4 (121)	3-3/16 (81)	13 (5.9)

For complete technical details on valves with stainless steel trim, or union female, angle female, or union male end connections, see T*echnical Instructions Flowrite™ 599 Series, Three-way Valves.* (155-185P25)

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SIEMENS

Technical Bulletin
Document No. 155-304P25
TB 249
May 21, 2008

Flowrite™ 599 Series

Valve and Actuator Assembly Selection

Description

This Technical Bulletin will aid in the selection of a Flowrite 599 Series valve and actuator assembly. Begin with the graph of water capacity and the chart of close-off pressures to select a valve and actuator according to specifications. Use Tables 1 through 7 to identify product numbers.

These tables show all the possible combinations of the Flowrite 599 Series valves and compatible actuators that can be ordered as complete valve assemblies from the factory.

The dimensions of all valves and the service envelope required for each actuator are included in Tables 8 through 12.

How to Use the Selection Graphs

Use Figure 1, the water capacity graph, to select a valve. Locate the specified flow rate on the vertical axis. Follow across on the horizontal line to the point of intersection with the specified pressure drop. Choose the valve size from the heavy diagonal lines across the graph.

Use Figures 2 and 3, the close-off pressure graphs, to select an actuator. First locate the graph for the valve action and actuator power source specified. Locate the bar that represents the valve line size. The top of the bar indicates the maximum close-off pressure for tight close-off. Use the legend at the bottom of the graph to identify the actuator.

How To Use The Valve Tables

Tables have been organized to help select a valve and actuator combination using additional specifications.

Moving from left to right, identify the valve assembly needed. Continue to the right to match the valve to a desired actuator.

A valve and actuator assembly part number is determined by combining the actuator prefix code with the suffix of the valve product number.

NOTES:

1. No valve will combine with all actuators.
2. The symbol “—” indicates a combination that is a special order.
3. A shaded space with the symbol “X” indicates an inappropriate combination.

Valve Tables

1/2 to 2-inch Valves

Two-Way, NC, Linear characteristic	Table 1
Two-Way, NC, Equal % characteristic	Table 2
Two-Way, NO, Linear characteristic	Table 3
Two-Way, NO, Equal % characteristic	Table 4
Three-Way, Mixing, Equal % characteristic	Table 5

2-1/2 to 6-inch Valves

ANSI 125, Two-Way and Three-Way	Table 6
ANSI 250, Two-Way and Three-Way	Table 7

Selection Example

Specification

Select a two-way normally closed valve and actuator assembly for an ANSI 125 piping system that will deliver 500 gpm (113 $m^{3/}$h) chilled water with an equal percentage flow characteristic with no more than 5 psi (35 kPa) pressure drop across the fully open valve.

The valve shall be operated by a 24 Vac powered, 0 to 10 Vdc control signal, spring return electronic actuator, and must close off tightly against a pump head pressure of 15 psi (1 bar).

Valve Sizing

Use Figure 1, the water capacity graph, to begin valve sizing.

1. Locate 500 gpm (113 m^3/h) on the vertical axis to find the required flow.
2. Read across the horizontal axis to find 5 psi (35 kPa), the maximum allowable pressure drop across the open valve.
3. Select a 5-inch (125 mm) 250 Cv (214 Kvs) line size valve because the point of intersection falls close to the 5-inch line.

Actuator selection

Use Figures 2 and 3, the close-off pressure graphs, to choose an actuator.

1. Locate the graph for electronic actuators for NC valves in the upper left side of the figure.
2. Locate the bar for 5-inch valves. The black bar represents an SKB/C actuator.
3. Notice that the SKB/C has the sufficient force to provide tight close-off against more than 20 psi (1.4 bar) differential. For a 5-inch valve, select a SKC actuator with a 40 mm stroke.

Product Number Selection

Use Table 6 for ANSI Class 125 valves. Begin at the left and select the specifications necessary.

1. Select a two-way, normally closed, equal percentage flow characteristic according to the specifications.

Selection Example, Continued

2. Select bronze trim for the low pressure water application and standard packing for chilled water.

3. Select the 5-inch line size determined from the sizing example above. Note the 40 mm stroke of the valve. The valve part number is 599-05993.

4. Read across the top of the table to Electronic-hydraulic, 40 mm, and 24 Vac, 0-10 Vdc control signal.
   The actuator part number is SKC62.
   The actuator code number is 294.

5. Read down the column to determine the valve and actuator assembly product number is 294-05993.

NOTE: The valve and actuator can be ordered separately by using the part numbers from Steps 3 and 4.

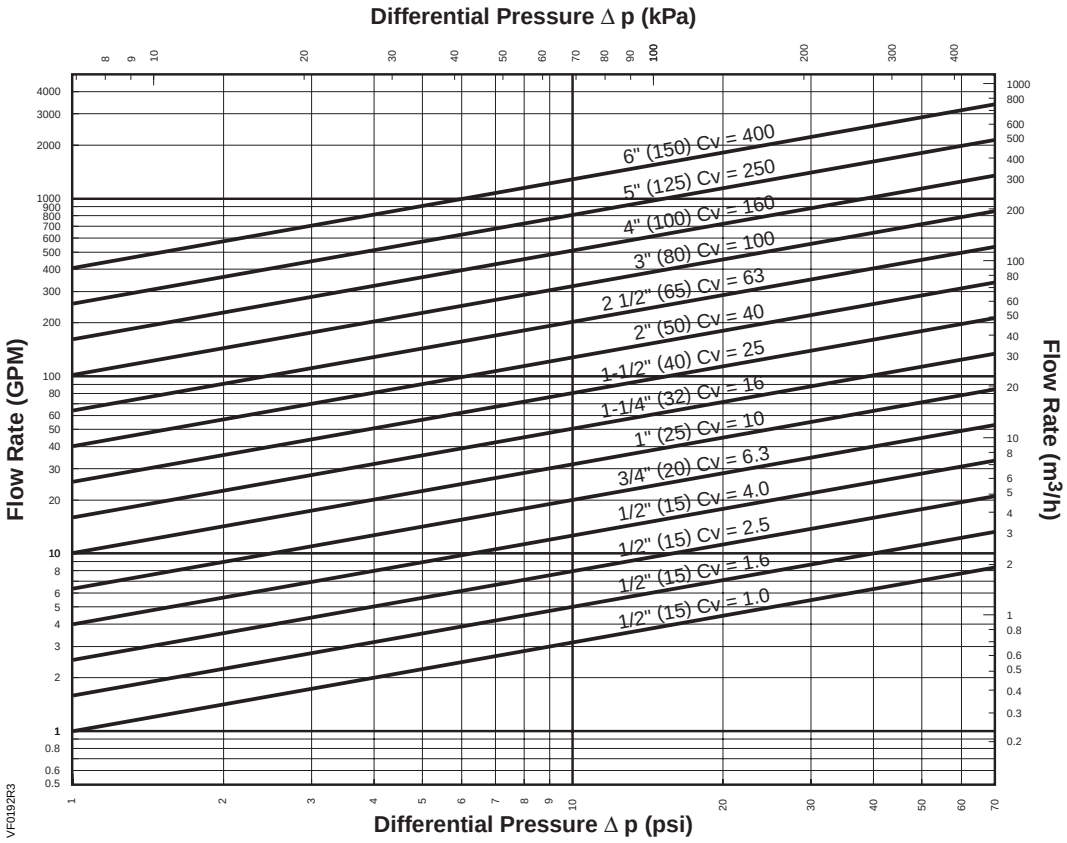


Figure 1. Water Capacity Graph.

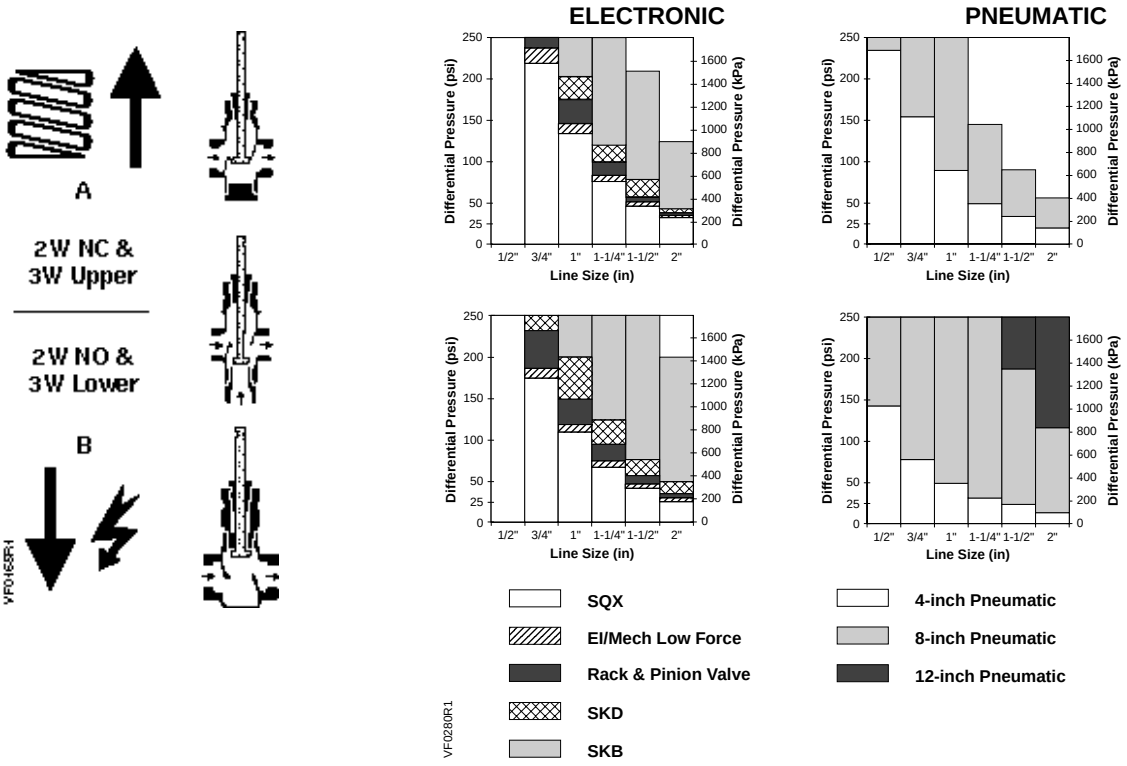


Figure 2. Close-off Pressures for 1/2 through 2-Inch Valves.

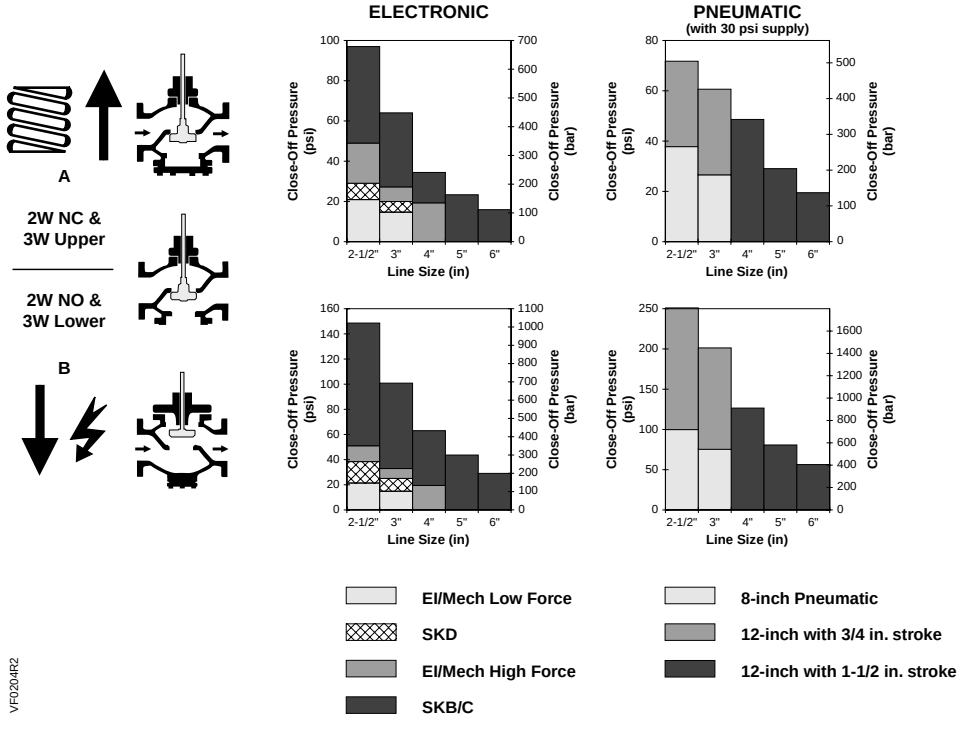


Figure 3. Close-off Pressures for 2-1/2 through 6-Inch Valves.

Table 1. 1/2 to 2-Inch, Two-Way, Normally Closed (NC), Linear Valves (Technical Instructions 155-184P25).

Trim	Packing	Connection *	Flow Rate		Line Size		Stroke	Type	Pneumatic						Pneumatic with Factory Mounted Position Relay		
								Description	4-inch 3-8 psi (21-55 kPa)	4-inch 5-10 psi (34-69 kPa)	4-inch 10-15 psi (69-103 kPa)	8-inch	8-inch Hi-Temp	12-inch	8-inch	8-inch Hi-Temp	12-inch with Positioner
								Technical Instructions	155-183P25	155-183P25	155-183P25	155-161P25	155-161P25	155-162P25	155-161P25	155-161P25	155-162P25
								Actuator Assembly	599-01081	599-01082	599-01083	599-01050	599-01051	599-01010	599-01050	599-01051	599-01010
			Cv	Kvs	In	mm		Valve Assembly	Actuator Code 268	Actuator Code 269	Actuator Code 270	Actuator Code 277	Actuator Code 278	Actuator Code 279	Actuator Code 283	Actuator Code 284	Actuator Code 285
Stainless Steel	Standard	FxF	1	0.9	0.5	15	20	599-03018	—	—	270-03018	277-03018	—	—	283-03018	—	—
			1.6	1.4	0.5	15	20	599-03019	—	—	270-03019	277-03019	—	—	283-03019	—	—
			2.5	2.2	0.5	15	20	599-03020	—	—	270-03020	277-03020	—	—	283-03020	—	—
			4	3.4	0.5	15	20	599-03021	—	—	270-03021	277-03021	—	—	283-03021	—	—
			6.3	5.4	0.75	20	20	599-03022	—	—	270-03022	277-03022	—	—	283-03022	—	—
			10	8.6	1	25	20	599-03023	—	—	270-03023	277-03023	—	279-03023	283-03023	—	285-03023
			16	14	1.25	32	20	599-03024	—	—	270-03024	277-03024	—	279-03024	283-03024	—	285-03024
			25	22	1.5	40	20	599-03025	—	—	270-03025	277-03025	—	279-03025	283-03025	—	285-03025
			40	34	2	50	20	599-03026	—	—	270-03026	277-03026	—	279-03026	283-03026	—	285-03026
		FxUF	1	0.9	0.5	15	20	599-03027	—	—	270-03027	277-03027	—	—	283-03027	—	—
			1.6	1.4	0.5	15	20	599-03028	—	—	270-03028	277-03028	—	—	283-03028	—	—
			2.5	2.2	0.5	15	20	599-03029	—	—	270-03029	277-03029	—	—	283-03029	—	—
			4	3.4	0.5	15	20	599-03030	—	—	270-03030	277-03030	—	—	283-03030	—	—
			6.3	5.4	0.75	20	20	599-03031	—	—	270-03031	277-03031	—	—	283-03031	—	—
			10	8.6	1	25	20	599-03032	—	—	270-03032	277-03032	—	279-03032	283-03032	—	285-03032
		FxUM	1	0.9	0.5	15	20	599-03225	—	—	270-03225	277-03225	—	—	283-03225	—	—
			1.6	1.4	0.5	15	20	599-03226	—	—	270-03226	277-03226	—	—	283-03226	—	—
			2.5	2.2	0.5	15	20	599-03227	—	—	270-03227	277-03227	—	—	283-03227	—	—
			4	3.4	0.5	15	20	599-03228	—	—	270-03228	277-03228	—	—	283-03228	—	—
			6.3	5.4	0.75	20	20	599-03229	—	—	270-03229	277-03229	—	—	283-03229	—	—
			10	8.6	1	25	20	599-03230	—	—	270-03230	277-03230	—	279-03230	283-03230	—	285-03230
		UFxUF	16	14	1.25	32	20	599-03033	—	—	270-03033	277-03033	—	279-03033	283-03033	—	285-03033
			25	22	1.5	40	20	599-03034	—	—	270-03034	277-03034	—	279-03034	283-03034	—	285-03034
			40	34	2	50	20	599-03035	—	—	270-03035	277-03035	—	279-03035	283-03035	—	285-03035
	Hi-Temp	FxF	1	0.9	0.5	15	20	599-03072	—	—	270-03072	277-03072	278-03072	—	283-03072	284-03072	—
			1.6	1.4	0.5	15	20	599-03073	—	—	270-03073	277-03073	278-03073	—	283-03073	284-03073	—
			2.5	2.2	0.5	15	20	599-03074	—	—	270-03074	277-03074	278-03074	—	283-03074	284-03074	—
			4	3.4	0.5	15	20	599-03075	—	—	270-03075	277-03075	278-03075	—	283-03075	284-03075	—
			6.3	5.4	0.75	20	20	599-03076	—	—	270-03076	277-03076	278-03076	—	283-03076	284-03076	—
			10	8.6	1	25	20	599-03077	—	—	270-03077	277-03077	278-03077	279-03077	283-03077	284-03077	285-03077
			16	14	1.25	32	20	599-03078	—	—	270-03078	277-03078	278-03078	279-03078	283-03078	284-03078	285-03078
			25	22	1.5	40	20	599-03079	—	—	270-03079	277-03079	278-03079	279-03079	283-03079	284-03079	285-03079
			40	34	2	50	20	599-03080	—	—	270-03080	277-03080	278-03080	279-03080	283-03080	284-03080	285-03080
		FxUF	1	0.9	0.5	15	20	599-03081	—	—	270-03081	277-03081	278-03081	—	283-03081	284-03081	—
			1.6	1.4	0.5	15	20	599-03082	—	—	270-03082	277-03082	278-03082	—	283-03082	284-03082	—
			2.5	2.2	0.5	15	20	599-03083	—	—	270-03083	277-03083	278-03083	—	283-03083	284-03083	—
			4	3.4	0.5	15	20	599-03084	—	—	270-03084	277-03084	278-03084	—	283-03084	284-03084	—
			6.3	5.4	0.75	20	20	599-03085	—	—	270-03085	277-03085	278-03085	—	283-03085	284-03085	—
			10	8.6	1	25	20	599-03086	—	—	270-03086	277-03086	278-03086	279-03086	283-03086	284-03086	285-03086
		FxsUM	1	0.9	0.5	15	20	599-03243	—	—	270-03243	277-03243	278-03243	—	283-03243	284-03243	—
			1.6	1.4	0.5	15	20	599-03244	—	—	270-03244	277-03244	278-03244	—	283-03244	284-03244	—
			2.5	2.2	0.5	15	20	599-03245	—	—	270-03245	277-03245	278-03245	—	283-03245	284-03245	—
			4	3.4	0.5	15	20	599-03246	—	—	270-03246	277-03246	278-03246	—	283-03246	284-03246	—
			6.3	5.4	0.75	20	20	599-03247	—	—	270-03247	277-03247	278-03247	—	283-03247	284-03247	—
			10	8.6	1	25	20	599-03248	—	—	270-03248	277-03248	278-03248	279-03248	283-03248	284-03248	285-03248
		UFxUF	16	14	1.25	32	20	599-03087	—	—	270-03087	277-03087	278-03087	279-03087	283-03087	284-03087	285-03087
			25	22	1.5	40	20	599-03088	—	—	270-03088	277-03088	278-03088	279-03088	283-03088	284-03088	285-03088
			40	34	2	50	20	599-03089	—	—	270-03089	277-03089	278-03089	279-03089	283-03089	284-03089	285-03089

* F = Female NPT, UF = Union Female, UM = Union Male connection, — = Special Order, X = Inappropriate combination.

Table 1a. 1/2 to 2-Inch, Two-Way, Normally Closed (NC), Linear Valves (Technical Instructions 155-184P25), Continued.

Trim	Packing	Connection *	Flow Rate		Line Size		Stroke	Type	Electro-Hydraulic					
									24 Vac					
								Description	0-10V 4-20mA SR	3-Pos NSR	3-Pos SR	3-Pos SR	3-Pos SR	0-10V 4-20mA SR
								Technical Instructions	155-180P25	155-181P25	155-181P25	155-171P25	155-171P25	155-163P25
								Actuator Assembly	SKD62U	SKD82.50U	SKD82.51U	SKB82.51U	SKB82.50U	SKB62U
			Cv	Kvs	In	mm		Valve Assembly	Actuator Code 274	Actuator Code 275	Actuator Code 276	Actuator Code 289	Actuator Code 290	Actuator Code 291
Stainless Steel	Standard	FxF	1	0.9	0.5	15	20	599-03018	274-03018	275-03018	276-03018	—	—	—
			1.6	1.4	0.5	15	20	599-03019	274-03019	275-03019	276-03019	—	—	—
			2.5	2.2	0.5	15	20	599-03020	274-03020	275-03020	276-03020	—	—	—
			4	3.4	0.5	15	20	599-03021	274-03021	275-03021	276-03021	—	—	—
			6.3	5.4	0.75	20	20	599-03022	274-03022	275-03022	276-03022	—	—	—
			10	8.6	1	25	20	599-03023	274-03023	275-03023	276-03023	289-03023	290-03023	291-03023
			16	14	1.25	32	20	599-03024	274-03024	275-03024	276-03024	289-03024	290-03024	291-03024
			25	22	1.5	40	20	599-03025	274-03025	275-03025	276-03025	289-03025	290-03025	2903025
			40	34	2	50	20	599-03026	274-03026	275-03026	276-03026	290-03026	290-03026	291-03026
		FxUF	1	0.9	0.5	15	20	599-03027	274-03027	275-03027	276-03027	—	—	—
			1.6	1.4	0.5	15	20	599-03028	274-03028	275-03028	276-03028	—	—	—
			2.5	2.2	0.5	15	20	599-03029	274-03029	275-03029	276-03029	—	—	—
			4	3.4	0.5	15	20	599-03030	274-03030	275-03030	276-03030	—	—	—
			6.3	5.4	0.75	20	20	599-03031	274-03031	275-03031	276-03031	—	—	—
			10	8.6	1	25	20	599-03032	274-03032	275-03032	276-03032	289-03032	290-03032	291-03032
		FxUM	1	0.9	0.5	15	20	599-03225	274-03225	275-03225	276-03225	—	—	—
			1.6	1.4	0.5	15	20	599-03226	274-03226	275-03226	276-03226	—	—	—
			2.5	2.2	0.5	15	20	599-03227	274-03227	275-03227	276-03227	—	—	—
			4	3.4	0.5	15	20	599-03228	274-03228	275-03228	276-03228	—	—	—
			6.3	5.4	0.75	20	20	599-03229	274-03229	275-03229	276-03229	—	—	—
			10	8.6	1	25	20	599-03230	274-03230	275-03230	276-03230	289-03230	290-03230	291-03230
		UFxUF	16	14	1.25	32	20	599-03033	274-03033	275-03033	276-03033	289-03033	290-03033	291-03033
			25	22	1.5	40	20	599-03034	274-03034	275-03034	276-03034	289-03034	290-03034	291-03034
			40	34	2	50	20	599-03035	274-03035	275-03035	276-03035	289-03035	290-03035	291-03035
	Hi-Temp	FxF	1	0.9	0.5	15	20	599-03072	274-03072	275-03072	276-03072	—	—	—
			1.6	1.4	0.5	15	20	599-03073	274-03073	275-03073	276-03073	—	—	—
			2.5	2.2	0.5	15	20	599-03074	274-03074	275-03074	276-03074	—	—	—
			4	3.4	0.5	15	20	599-03075	274-03075	275-03075	276-03075	—	—	—
			6.3	5.4	0.75	20	20	599-03076	274-03076	275-03076	276-03076	—	—	—
			10	8.6	1	25	20	599-03077	274-03077	275-03077	276-03077	289-03077	290-03077	291-03077
			16	14	1.25	32	20	599-03078	274-03078	275-03078	276-03078	289-03078	290-03078	291-03078
			25	22	1.5	40	20	599-03079	274-03079	275-03079	276-03079	298-03079	290-03079	291-03079
			40	34	2	50	20	599-03080	274-03080	275-03080	276-03080	298-03080	290-03080	291-03080
		FxUF	1	0.9	0.5	15	20	599-03081	274-03081	275-03081	276-03081	—	—	—
			1.6	1.4	0.5	15	20	599-03082	274-03082	275-03082	276-03082	—	—	—
			2.5	2.2	0.5	15	20	599-03083	274-03083	275-03083	276-03083	—	—	—
			4	3.4	0.5	15	20	599-03084	274-03084	275-03084	276-03084	—	—	—
			6.3	5.4	0.75	20	20	599-03085	274-03085	275-03085	276-03085	—	—	—
			10	8.6	1	25	20	599-03086	274-03086	275-03086	276-03086	289-03086	290-03086	291-03086
		FxsUM	1	0.9	0.5	15	20	599-03243	274-03243	275-03243	276-03243	—	—	—
			1.6	1.4	0.5	15	20	599-03244	274-03244	275-03244	276-03244	—	—	—
			2.5	2.2	0.5	15	20	599-03245	274-03245	275-03245	276-03245	—	—	—
			4	3.4	0.5	15	20	599-03246	274-03246	275-03246	276-03246	—	—	—
			6.3	5.4	0.75	20	20	599-03247	274-03247	275-03247	276-03247	—	—	—
			10	8.6	1	25	20	599-03248	274-03248	275-03248	276-03248	289-03248	290-03248	291-03248
		UFxUF	16	14	1.25	32	20	599-03087	274-03087	275-03087	276-03087	289-03087	290-03087	291-03087
			25	22	1.5	40	20	599-03088	274-03088	275-03088	276-03088	289-03088	290-03088	291-03088
			40	34	2	50	20	599-03089	274-03089	275-03089	276-03089	289-03089	290-03089	291-03089

* F = Female NPT, UF = Union Female, UM = Union Male connection, — = Special Order, X = Inappropriate combination.

Table 1b. 1/2 to 2-Inch, Two-Way, Normally Closed (NC), Linear Valves (Technical Instructions 155-184P25), Continued.

Trim	Packing	Connection *	Flow Rate		Line Size		Stroke	Type	Electro-Mechanical						
									24 Vac						
								Description	0-10V 4-20 mA NSR	3-Pos, 120 sec, NSR	3-Pos, 30 sec, NSR	0-10V, Lo, NSR	0-10V, Lo, SR	0-10V, SR	2-Pos, SR
								Technical Instructions	155-182P25	155-186P25	155-186P25	155-172P25	155-172P25	155-541P25	155-541P25
								Actuator Assembly	SQX62U	SQX82.00U	SQX82.03U	599-10021	599-10022	599-03609	599-03611
			Cv	Kvs	In	mm		Valve Assembly	Actuator Code 271	Actuator Code 272	Actuator Code 273	Actuator Code 295	Actuator Code 296	Actuator Code 298	Actuator Code 299
Stainless Steel	Standard	FxF	1	0.9	0.5	15	20	599-03018	271-03018	272-03018	273-03018	295-03018	296-03018	298-03018	299-03018
			1.6	1.4	0.5	15	20	599-03019	271-03019	272-03019	273-03019	295-03019	296-03019	298-03019	299-03019
			2.5	2.2	0.5	15	20	599-03020	271-03020	272-03020	273-03020	295-03020	296-03020	298-03020	299-03020
			4	3.4	0.5	15	20	599-03021	271-03021	272-03021	273-03021	295-03021	296-03021	298-03021	299-03021
			6.3	5.4	0.75	20	20	599-03022	271-03022	272-03022	273-03022	295-03022	296-03022	298-03022	299-03022
			10	8.6	1	25	20	599-03023	271-03023	272-03023	273-03023	295-03023	296-03023	298-03023	299-03023
			16	14	1.25	32	20	599-03024	271-03024	272-03024	273-03024	295-03024	296-03024	298-03024	299-03024
			25	22	1.5	40	20	599-03025	271-03025	272-03025	273-03025	295-03025	296-03025	298-03025	299-03025
			40	34	2	50	20	599-03026	271-03026	272-03026	273-03026	295-03026	296-03026	298-03026	299-03026
		FxUF	1	0.9	0.5	15	20	599-03027	271-03027	272-03027	273-03027	295-03027	296-03027	298-03027	299-03027
			1.6	1.4	0.5	15	20	599-03028	271-03028	272-03028	273-03028	295-03028	296-03028	298-03028	299-03028
			2.5	2.2	0.5	15	20	599-03029	271-03029	272-03029	273-03029	295-03029	296-03029	298-03029	299-03029
			4	3.4	0.5	15	20	599-03030	271-03030	272-03030	273-03030	295-03030	296-03030	298-03030	299-03030
			6.3	5.4	0.75	20	20	599-03031	271-03031	272-03031	273-03031	295-03031	296-03031	298-03031	299-03031
			10	8.6	1	25	20	599-03032	271-03032	272-03032	273-03032	295-03032	296-03032	298-03032	299-03032
		FxUM	1	0.9	0.5	15	20	599-03225	271-03225	272-03225	273-03225	295-03225	296-03225	298-03225	299-03225
			1.6	1.4	0.5	15	20	599-03226	271-03226	272-03226	273-03226	295-03226	296-03226	298-03226	299-03226
			2.5	2.2	0.5	15	20	599-03227	271-03227	272-03227	273-03227	295-03227	296-03227	298-03227	299-03227
			4	3.4	0.5	15	20	599-03228	271-03228	272-03228	273-03228	295-03228	296-03228	298-03228	299-03228
			6.3	5.4	0.75	20	20	599-03229	271-03229	272-03229	273-03229	295-03229	296-03229	298-03229	299-03229
			10	8.6	1	25	20	599-03230	271-03230	272-03230	273-03230	295-03230	296-03230	298-03230	299-03230
		UFxUF	16	14	1.25	32	20	599-03033	271-03033	272-03033	273-03033	295-03033	296-03033	298-03033	299-03033
			25	22	1.5	40	20	599-03034	271-03034	272-03034	273-03034	295-03034	296-03034	298-03034	299-03034
			40	34	2	50	20	599-03035	271-03035	272-03035	273-03035	295-03035	296-03035	298-03035	299-03035
	Hi-Temp	FxF	1	0.9	0.5	15	20	599-03072	271-03072	272-03072	273-03072	295-03072	296-03072	298-03072	299-03072
			1.6	1.4	0.5	15	20	599-03073	271-03073	272-03073	273-03073	295-03073	296-03073	298-03073	299-03073
			2.5	2.2	0.5	15	20	599-03074	271-03074	272-03074	273-03074	295-03074	296-03074	298-03074	299-03074
			4	3.4	0.5	15	20	599-03075	271-03075	272-03075	273-03075	295-03075	296-03075	298-03075	299-03075
			6.3	5.4	0.75	20	20	599-03076	271-03076	272-03076	273-03076	295-03076	296-03076	298-03076	299-03076
			10	8.6	1	25	20	599-03077	271-03077	272-03077	273-03077	295-03077	296-03077	298-03077	299-03077
			16	14	1.25	32	20	599-03078	271-03078	272-03078	273-03078	295-03078	296-03078	298-03078	299-03078
			25	22	1.5	40	20	599-03079	271-03079	272-03079	273-03079	295-03079	296-03079	298-03079	299-03079
			40	34	2	50	20	599-03080	271-03080	272-03080	273-03080	295-03080	296-03080	298-03080	299-03080
		FxUF	1	0.9	0.5	15	20	599-03081	271-03081	272-03081	273-03081	295-03081	296-03081	298-03081	299-03081
			1.6	1.4	0.5	15	20	599-03082	271-03082	272-03082	273-03082	295-03082	296-03082	298-03082	299-03082
			2.5	2.2	0.5	15	20	599-03083	271-03083	272-03083	273-03083	295-03083	296-03083	298-03083	299-03083
			4	3.4	0.5	15	20	599-03084	271-03084	272-03084	273-03084	295-03084	296-03084	298-03084	299-03084
			6.3	5.4	0.75	20	20	599-03085	271-03085	272-03085	273-03085	295-03085	296-03085	298-03085	299-03085
			10	8.6	1	25	20	599-03086	271-03086	272-03086	273-03086	295-03086	296-03086	298-03086	299-03086
		FxsUM	1	0.9	0.5	15	20	599-03243	271-03243	272-03243	273-03243	295-03243	296-03243	298-03243	299-03243
			1.6	1.4	0.5	15	20	599-03244	271-03244	272-03244	273-03244	295-03244	296-03244	298-03244	299-03244
			2.5	2.2	0.5	15	20	599-03245	271-03245	272-03245	273-03245	295-03245	296-03245	298-03245	299-03245
			4	3.4	0.5	15	20	599-03246	271-03246	272-03246	273-03246	295-03246	296-03246	298-03246	299-03246
			6.3	5.4	0.75	20	20	599-03247	271-03247	272-03247	273-03247	295-03247	296-03247	298-03247	299-03247
			10	8.6	1	25	20	599-03248	271-03248	272-03248	273-03248	295-03248	296-03248	298-03248	299-03248
		UFxUF	16	14	1.25	32	20	599-03087	271-03087	272-03087	273-03087	295-03087	296-03087	298-03087	299-03087
			25	22	1.5	40	20	599-03088	271-03088	272-03088	273-03088	295-03088	296-03088	298-03088	299-03088
			40	34	2	50	20	599-03089	271-03089	272-03089	273-03089	295-03089	296-03089	298-03089	299-03089

* F = Female NPT, UF = Union Female, UM = Union Male connection, — = Special Order, X = Inappropriate combination.

Table 2. 1/2 to 2-Inch, Two-Way, Normally Closed (NC), Equal Percentage Valves (Technical Instructions 155-184P25).

Trim	Packing	Connection *	Flow Rate		Line Size		Stroke	Type	Pneumatic						Pneumatic with Factory Mounted Position Relay		
								Description	4-inch 3-8 psi (21-55 kPa)	4-inch 5-10 psi (34-69 kPa)	4-inch 10-15 psi (69-103 kPa)	8-inch	8-inch Hi-Temp	12-inch	8-inch	8-inch Hi-Temp	12-inch with Positioner
								Technical Instructions	155-183P25			155-161P25		155-162P25	155-161P25		155-162P25
								Actuator Assembly	599-01081	599-01082	599-01083	599-01050	599-01051	599-01010	599-01050	599-01051	599-01010
			Cv	Kvs	In	mm		Valve Assembly	Actuator Code 268	Actuator Code 269	Actuator Code 270	Actuator Code 277	Actuator Code 278	Actuator Code 279	Actuator Code 283	Actuator Code 284	Actuator Code 285
Bronze	Standard	FxF	1	0.9	0.5	15	20	599-03180	—	—	270-03180	277-03180	—		283-03180	—	
			1.6	1.4	0.5	15	20	599-03181	—	—	270-03181	277-03181	—		283-03181	—	
			2.5	2.2	0.5	15	20	599-03182	—	—	270-03182	277-03182	—		283-03182	—	
			4	3.4	0.5	15	20	599-03183	—	—	270-03183	277-03183	—		283-03183	—	
			6.3	5.4	0.75	20	20	599-03184	—	—	270-03184	277-03184	—		283-03184	—	
			10	8.6	1	25	20	599-03185	—	—	270-03185	277-03185	—	279-03185	283-03185	—	285-03185
			16	14	1.25	32	20	599-03186	—	—	270-03186	277-03186	—	279-03186	283-03186	—	285-03186
			25	22	1.5	40	20	599-03187	—	—	270-03187	277-03187	—	279-03187	283-03187	—	285-03187
			40	34	2	50	20	599-03188	—	—	270-03188	277-03188	—	279-03188	283-03188	—	285-03188
		FxUF	1	0.9	0.5	15	20	599-03189	—	—	270-03189	277-03189	—		283-03189	—	
			1.6	1.4	0.5	15	20	599-03190	—	—	270-03190	277-03190	—		283-03190	—	
			2.5	2.2	0.5	15	20	599-03191	—	—	270-03191	277-03191	—		283-03191	—	
			4	3.4	0.5	15	20	599-03192	—	—	270-03192	277-03192	—		283-03192	—	
			6.3	5.4	0.75	20	20	599-03193	—	—	270-03193	277-03193	—		283-03193	—	
			10	8.6	1	25	20	599-03194	—	—	270-03194	277-03194	—	279-03194	283-03194	—	285-03194
		FxUM	1	0.9	0.5	15	20	599-03279	—	—	270-03279	277-03279	—		283-03279	—	
			1.6	1.4	0.5	15	20	599-03280	—	—	270-03280	277-03280	—		283-03280	—	
			2.5	2.2	0.5	15	20	599-03281	—	—	270-03281	277-03281	—		283-03281	—	
			4	3.4	0.5	15	20	599-03282	—	—	270-03282	277-03282	—		283-03282	—	
			6.3	5.4	0.75	20	20	599-03283	—	—	270-03283	277-03283	—		283-03283	—	
			10	8.6	1	25	20	599-03284	—	—	270-03284	277-03284	—	279-03284	283-03284	—	285-03284
		UFxUF	16	14	1.25	32	20	599-03195	—	—	270-03195	277-03195	—	279-03195	283-03195	—	285-03195
			25	22	1.5	40	20	599-03196	—	—	270-03196	277-03196	—	279-03196	283-03196	—	285-03196
			40	34	2	50	20	599-03197	—	—	270-03197	277-03197	—	279-03197	283-03197	—	285-03197
Stainless Steel		FxF	1	0.9	0.5	15	20	599-03126	—	—	270-03126	277-03126	—		283-03126	—	
			1.6	1.4	0.5	15	20	599-03127	—	—	270-03127	277-03127	—		283-03127	—	
			2.5	2.2	0.5	15	20	599-03128	—	—	270-03128	277-03128	—		283-03128	—	
			4	3.4	0.5	15	20	599-03129	—	—	270-03129	277-03129	—		283-03129	—	
			6.3	5.4	0.75	20	20	599-03130	—	—	270-03130	277-03130	—		283-03130	—	
			10	8.6	1	25	20	599-03131	—	—	270-03131	277-03131	—	279-03131	283-03131	—	285-03131
			16	14	1.25	32	20	599-03132	—	—	270-03132	277-03132	—	279-03132	283-03132	—	285-03132
			25	22	1.5	40	20	599-03133	—	—	270-03133	277-03133	—	279-03133	283-03133	—	285-03133
			40	34	2	50	20	599-03134	—	—	270-03134	277-03134	—	279-03134	283-03134	—	283-03134
		FxUF	1	0.9	0.5	15	20	599-03135	—	—	270-03135	277-03135	—		283-03135	—	
			1.6	1.4	0.5	15	20	599-03136	—	—	270-03136	277-03136	—		283-03136	—	
			2.5	2.2	0.5	15	20	599-03137	—	—	270-03137	277-03137	—		283-03137	—	
			4	3.4	0.5	15	20	599-03138	—	—	270-03138	277-03138	—		283-03138	—	
			6.3	5.4	0.75	20	20	599-03139	—	—	270-03139	277-03139	—		283-03139	—	
			10	8.6	1	25	20	599-03140	—	—	270-03140	277-03140	—	279-03140	283-03140	—	285-03140
		FxsUM	1	0.9	0.5	15	20	599-03261	—	—	270-03261	277-03261	—		283-03261	—	
			1.6	1.4	0.5	15	20	599-03262	—	—	270-03262	277-03262	—		283-03262	—	
			2.5	2.2	0.5	15	20	599-03263	—	—	270-03263	277-03263	—		283-03263	—	
			4	3.4	0.5	15	20	599-03264	—	—	270-03264	277-03264	—		283-03264	—	
			6.3	5.4	0.75	20	20	599-03265	—	—	270-03265	277-03265	—		283-03265	—	
			10	8.6	1	25	20	599-03266	—	—	270-03266	277-03266	—	279-03266	283-03266	—	285-03266
		UFxUF	16	14	1.25	32	20	599-03141	—	—	270-03141	277-03141	—	279-03141	283-03141	—	285-03141
			25	22	1.5	40	20	599-03142	—	—	270-03142	277-03142	—	279-03142	283-03142	—	283-03142
			40	34	2	50	20	599-03143	—	—	270-03143	277-03143	—	279-03143	283-03143	—	285-03143

* F = Female NPT, UF = Union Female, UM = Union Male connection, — = Special Order, X = Inappropriate combination.

Table 2a. 1/2 to 2-Inch, Two-Way, Normally Closed (NC), Equal Percentage Valves (Technical Instructions 155-184P25), Continued.

Trim	Packing	Connection *	Flow Rate Cv	Flow Rate Kvs	Line Size In	Line Size mm	Stroke	Type	Electro-Hydraulic 24 Vac					
								Description	0-10V 4-20 mA SR	3-Pos NSR	3-Pos, SR	3-Pos SR	3-Pos SR	0-10V 4-20 mA SR
								Technical Instructions	155-180P25	155-181P25	155-181P25	155-171P25	155-171P25	155-163P25
								Actuator Assembly	SKD62U	SKD82.50 U	SKD82.51 U	SKB82.51 U	SKB82.50 U	SKB62U
								Valve Assembly	Actuator Code 274	Actuator Code 275	Actuator Code 276	289	290	291
Bronze	Standard	FxF	1	0.9	0.5	15	20	599-03180	274-03180	275-03180	276-03180	—	—	—
			1.6	1.4	0.5	15	20	599-03181	274-03181	275-03181	276-03181	—	—	—
			2.5	2.2	0.5	15	20	599-03182	274-03182	275-03182	276-03182	—	—	—
			4	3.4	0.5	15	20	599-03183	274-03183	275-03183	276-03183	—	—	—
			6.3	5.4	0.75	20	20	599-03184	274-03184	275-03184	276-03184	—	—	—
			10	8.6	1	25	20	599-03185	274-03185	275-03185	276-03185	289-03185	290-03185	291-03185
			16	14	1.25	32	20	599-03186	274-03186	275-03186	276-03186	289-03186	290-03186	291-03186
			25	22	1.5	40	20	599-03187	274-03187	275-03187	276-03187	289-03187	290-03187	291-03187
			40	34	2	50	20	599-03188	274-03188	275-03188	276-03188	289-03188	290-03188	291-03188
		FxUF	1	0.9	0.5	15	20	599-03189	274-03189	275-03189	276-03189	—	—	—
			1.6	1.4	0.5	15	20	599-03190	274-03190	275-03190	276-03190	—	—	—
			2.5	2.2	0.5	15	20	599-03191	274-03191	275-03191	276-03191	—	—	—
			4	3.4	0.5	15	20	599-03192	274-03192	275-03192	276-03192	—	—	—
			6.3	5.4	0.75	20	20	599-03193	274-03193	275-03193	276-03193	—	—	—
			10	8.6	1	25	20	599-03194	274-03194	275-03194	276-03194	289-03194	290-03194	291-03194
		FxUM	1	0.9	0.5	15	20	599-03279	274-03279	275-03279	276-03279	—	—	—
			1.6	1.4	0.5	15	20	599-03280	274-03280	275-03280	276-03280	—	—	—
			2.5	2.2	0.5	15	20	599-03281	274-03281	275-03281	276-03281	—	—	—
			4	3.4	0.5	15	20	599-03282	274-03282	275-03282	276-03282	—	—	—
			6.3	5.4	0.75	20	20	599-03283	274-03283	275-03283	276-03283	—	—	—
			10	8.6	1	25	20	599-03284	274-03284	275-03284	276-03284	289-03284	290-03284	291-03284
		UFxUF	16	14	1.25	32	20	599-03195	274-03195	275-03195	276-03195	289-03195	290-03195	291-03195
			25	22	1.5	40	20	599-03196	274-03196	275-03196	276-03196	289-03196	290-03196	291-03196
			40	34	2	50	20	599-03197	274-03197	275-03197	276-03197	289-03197	290-03197	291-03197
Stainless Steel		FxF	1	0.9	0.5	15	20	599-03126	274-03126	275-03126	276-03126	—	—	—
			1.6	1.4	0.5	15	20	599-03127	274-03127	275-03127	276-03127	—	—	—
			2.5	2.2	0.5	15	20	599-03128	274-03128	275-03128	276-03128	—	—	—
			4	3.4	0.5	15	20	599-03129	274-03129	275-03129	276-03129	—	—	—
			6.3	5.4	0.75	20	20	599-03130	274-03130	275-03130	276-03130	—	—	—
			10	8.6	1	25	20	599-03131	274-03131	275-03131	276-03131	289-03131	290-03131	291-03131
			16	14	1.25	32	20	599-03132	274-03132	275-03132	276-03132	289-03132	290-03132	291-03132
			25	22	1.5	40	20	599-03133	274-03133	275-03133	276-03133	289-03133	290-03133	291-03133
			40	34	2	50	20	599-03134	274-03134	275-03134	276-03134	289-03134	290-03134	291-03134
		FxUF	1	0.9	0.5	15	20	599-03135	276-03135	275-03135	276-03135	—	—	—
			1.6	1.4	0.5	15	20	599-03136	276-03136	275-03136	276-03136	—	—	—
			2.5	2.2	0.5	15	20	599-03137	276-03137	275-03137	276-03137	—	—	—
			4	3.4	0.5	15	20	599-03138	276-03138	275-03138	276-03138	—	—	—
			6.3	5.4	0.75	20	20	599-03139	276-03139	275-03139	276-03139	—	—	—
			10	8.6	1	25	20	599-03140	276-03140	275-03140	276-03140	289-03140	290-03140	291-03140
		FxUM	1	0.9	0.5	15	20	599-03261	276-03261	275-03261	276-03261	—	—	—
			1.6	1.4	0.5	15	20	599-03262	276-03262	275-03262	276-03262	—	—	—
			2.5	2.2	0.5	15	20	599-03263	276-03263	275-03263	276-03263	—	—	—
			4	3.4	0.5	15	20	599-03264	276-03264	275-03264	276-03264	—	—	—
			6.3	5.4	0.75	20	20	599-03265	276-03265	275-03265	276-03265	—	—	—
			10	8.6	1	25	20	599-03266	276-03266	275-03266	276-03266	289-03266	290-03266	291-03266
		UFxU	16	14	1.25	32	20	599-03141	276-03141	275-03141	276-03141	289-03141	290-03141	291-03141
			25	22	1.5	40	20	599-03142	276-03142	275-03142	276-03142	289-03142	290-03142	291-03142
			40	34	2	50	20	599-03143	276-03143	275-03143	276-03143	289-03143	290-03143	291-03143

* F = Female NPT, UF = Union Female, UM = Union Male connection. — = Special Order, X = Inappropriate combination.

Table 2b. 1/2 to 2-Inch, Two-Way, Normally Closed (NC), Equal Percentage Valves (Technical Instructions 155-184P25), Continued.

Trim	Packing	Connection *	Flow Rate		Line Size		Stroke	Type	Electro-Mechanical						
									24 Vac						
								Description	0-10V 4-20 mA NSR	3-Pos, 120 sec, NSR	3-Pos, 30 sec, NSR	0-10V, Lo, NSR	0-10V, Lo, SR	0-10V, SR	2 2P, SR
								Technical Instructions	155-182P25	155-186P25	155-186P25	155-172P25	155-172P25	155-541P25	155-541P25
								Actuator Assembly	SQX62U	SQX82.00U	SQX82.03U	599-10021	599-10022	599-03609	599--03611
			Cv	Kvs	In	mm		Valve Assembly	Actuator Code 271	Actuator Code 272	Actuator Code 273	Actuator Code 295	Actuator Code 296	Actuator Code 298	Actuator Code 299
Bronze	Standard	FxF	1	0.9	0.5	15	20	599-03180	271-03180	272-03180	273-03180	295-03180	296-03180	298-03180	299-03180
			1.6	1.4	0.5	15	20	599-03181	271-03181	272-03181	273-03181	295-03181	296-03181	298-03181	299-03181
			2.5	2.2	0.5	15	20	599-03182	271-03182	272-03182	273-03182	295-03182	296-03182	298-03182	299-03182
			4	3.4	0.5	15	20	599-03183	271-03183	272-03183	273-03183	295-03183	296-03183	298-03183	299-03183
			6.3	5.4	0.75	20	20	599-03184	271-03184	272-03184	273-03184	295-03184	296-03184	298-03184	299-03184
			10	8.6	1	25	20	599-03185	271-03185	272-03185	273-03185	295-03185	296-03185	298-03185	299-03185
			16	14	1.25	32	20	599-03186	271-03186	272-03186	273-03186	295-03186	296-03186	298-03186	299-03186
			25	22	1.5	40	20	599-03187	271-03187	272-03187	273-03187	295-03187	296-03187	298-03187	299-03187
			40	34	2	50	20	599-03188	271-03188	272-03188	273-03188	295-03188	296-03188	298-03188	299-03188
		FxUF	1	0.9	0.5	15	20	599-03189	271-03189	272-03189	273-03189	295-03189	296-03189	298-03189	299-03189
			1.6	1.4	0.5	15	20	599-03190	271-03190	272-03190	273-03190	295-03190	296-03190	298-03190	299-03190
			2.5	2.2	0.5	15	20	599-03191	271-03191	272-03191	273-03191	295-03191	296-03191	298-03191	299-03191
			4	3.4	0.5	15	20	599-03192	271-03192	272-03192	273-03192	295-03192	296-03192	298-03192	299-03192
			6.3	5.4	0.75	20	20	599-03193	271-03193	272-03193	273-03193	295-03193	296-03193	298-03193	299-03193
			10	8.6	1	25	20	599-03194	271-03194	272-03194	273-03194	295-03194	296-03194	298-03194	299-03194
		FxUM	1	0.9	0.5	15	20	599-03279	271-03279	272-03279	273-03279	295-03279	296-03279	298-03279	299-03279
			1.6	1.4	0.5	15	20	599-03280	271-03280	272-03280	273-03280	295-03280	296-03280	298-03280	299-03280
			2.5	2.2	0.5	15	20	599-03281	271-03281	272-03281	273-03281	295-03281	296-03281	298-03281	299-03281
			4	3.4	0.5	15	20	599-03282	271-03282	272-03282	273-03282	295-03282	296-03282	298-03282	299-03282
			6.3	5.4	0.75	20	20	599-03283	271-03283	272-03283	273-03283	295-03283	296-03283	298-03283	299-03283
			10	8.6	1	25	20	599-03284	271-03284	272-03284	273-03284	295-03284	296-03284	298-03284	299-03284
		UFxUF	16	14	1.25	32	20	599-03195	271-03195	272-03195	273-03195	295-03195	296-03195	298-03195	299-03195
			25	22	1.5	40	20	599-03196	271-03196	272-03196	273-03196	295-03196	296-03196	298-03196	299-03196
			40	34	2	50	20	599-03197	271-03197	272-03197	273-03197	295-03197	296-03197	298-03197	299-03197
Stainless Steel		FxF	1	0.9	0.5	15	20	599-03126	271-03126	272-03126	273-03126	295-03126	296-03126	298-03126	299-03126
			1.6	1.4	0.5	15	20	599-03127	271-03127	272-03127	273-03127	295-03127	296-03127	298-03127	299-03127
			2.5	2.2	0.5	15	20	599-03128	271-03128	272-03128	273-03128	295-03128	296-03128	298-03128	299-03128
			4	3.4	0.5	15	20	599-03129	271-03129	272-03129	273-03129	295-03129	296-03129	298-03129	299-03129
			6.3	5.4	0.75	20	20	599-03130	271-03130	272-03130	273-03130	295-03130	296-03130	298-03130	299-03130
			10	8.6	1	25	20	599-03131	271-03131	272-03131	273-03131	295-03131	296-03131	298-03131	299-03131
			16	14	1.25	32	20	599-03132	271-03132	272-03132	273-03132	295-03132	296-03132	298-03132	299-03132
			25	22	1.5	40	20	599-03133	271-03133	272-03133	273-03133	295-03133	296-03133	298-03133	299-03133
			40	34	2	50	20	599-03134	271-03134	272-03134	273-03134	295-03134	296-03134	298-03134	299-03134
		FxUF	1	0.9	0.5	15	20	599-03135	271-03135	272-03135	273-03135	295-03135	296-03135	298-03135	299-03135
			1.6	1.4	0.5	15	20	599-03136	271-03136	272-03136	273-03136	295-03136	296-03136	298-03136	299-03136
			2.5	2.2	0.5	15	20	599-03137	271-03137	272-03137	273-03137	295-03137	296-03137	298-03137	299-03137
			4	3.4	0.5	15	20	599-03138	271-03138	272-03138	273-03138	295-03138	296-03138	298-03138	299-03138
			6.3	5.4	0.75	20	20	599-03139	271-03139	272-03139	273-03139	295-03139	296-03139	298-03139	299-03139
			10	8.6	1	25	20	599-03140	271-03140	272-03140	273-03140	295-03140	296-03140	298-03140	299-03140
		FxsUM	1	0.9	0.5	15	20	599-03261	271-03261	272-03261	273-03261	295-03261	296-03261	298-03261	299-03261
			1.6	1.4	0.5	15	20	599-03262	271-03262	272-03262	273-03262	295-03262	296-03262	298-03262	299-03262
			2.5	2.2	0.5	15	20	599-03263	271-03263	272-03263	273-03263	295-03263	296-03263	298-03263	299-03263
			4	3.4	0.5	15	20	599-03264	271-03264	272-03264	273-03264	295-03264	296-03264	298-03264	299-03264
			6.3	5.4	0.75	20	20	599-03265	271-03265	272-03265	273-03265	295-03265	296-03265	298-03265	299-03265
			10	8.6	1	25	20	599-03266	271-03266	272-03266	273-03266	295-03266	296-03266	298-03266	299-03266
		UFxU	16	14	1.25	32	20	599-03141	271-03141	272-03141	273-03141	295-03141	296-03141	298-03141	299-03141
			25	22	1.5	40	20	599-03142	271-03142	272-03142	273-03142	295-03142	296-03142	298-03142	299-03142
			40	34	2	50	20	599-03143	271-03143	272-03143	273-03143	295-03143	296-03143	298-03143	299-03143

* F = Female NPT, UF = Union Female, UM = Union Male connection. — = Special Order, X = Inappropriate combination.

Table 3. 1/2 to 2-Inch, Two-Way, Normally Open (NO), Linear Valves (Technical Instructions 155-184P25).

Trim	Packing	Connection *	Flow Rate		Line Size		Stroke	Type	Pneumatic						Pneumatic with Factory Mounted Position Relay		
									4-Inch			8-Inch					
								Description	3-8 psi (21-55 kPa)	5-10 psi (34-69 kPa)	10-15 psi (69-103 kPa)	Standard	8-inch Hi-Temp	12-Inch	8-inch	8-inch Hi-Temp	12-inch with Positioner
								Technical Instructions	155-183P25	155-183P25	155-183P25	155-161P25	155-161P25	155-162P25	155-161P25	155-161P25	155-162P25
								Actuator Assembly	599-01081	599-01082	599-01083	599-01050	599-01051	599-01010	599-01050 and 599-00426	599-01051 and 599-00426	599-01010
			Cv	Kvs	In	mm		Valve Assembly	Actuator Code 268	Actuator Code 269	Actuator Code 270	Actuator Code 277	Actuator Code 278	Actuator Code 279	Actuator Code 283	Actuator Code 284	Actuator Code 285
Stainless Steel	Standard	FxF	1	0.9	0.5	15	20	599-03000	268-03000	—	—	277-03000	—	—	283-03000	—	—
			1.6	1.4	0.5	15	20	599-03001	268-03001	—	—	277-03001	—	—	283-03001	—	—
			2.5	2.2	0.5	15	20	599-03002	268-03002	—	—	277-03002	—	—	283-03002	—	—
			4	3.4	0.5	15	20	599-03003	268-03003	—	—	277-03003	—	—	283-03003	—	—
			6.3	5.4	0.75	20	20	599-03004	268-03004	—	—	277-03004	—	—	283-03004	—	—
			10	8.6	1	25	20	599-03005	268-03005	—	—	277-03005	—	279-03005	283-03005	—	285-03005
			16	14	1.25	32	20	599-03006	268-03006	—	—	277-03006	—	279-03006	283-03006	—	285-03006
			25	22	1.5	40	20	599-03007	268-03007	—	—	277-03007	—	279-03007	283-03007	—	285-03007
			40	34	2	50	20	599-03008	268-03008	—	—	277-03008	—	279-03008	283-03008	—	285-03008
		FxUF	1	0.9	0.5	15	20	599-03009	268-03009	—	—	277-03009	—	—	283-03009	—	—
			1.6	1.4	0.5	15	20	599-03010	268-03010	—	—	277-03010	—	—	283-03010	—	—
			2.5	2.2	0.5	15	20	599-03011	268-03011	—	—	277-03011	—	—	283-03011	—	—
			4	3.4	0.5	15	20	599-03012	268-03012	—	—	277-03012	—	—	283-03012	—	—
			6.3	5.4	0.75	20	20	599-03013	268-03013	—	—	277-03013	—	—	283-03013	—	—
			10	8.6	1	25	20	599-03014	268-03014	—	—	277-03014	—	279-03014	283-03014	—	285-03014
		FxUM	1	0.9	0.5	15	20	599-03216	268-03216	—	—	277-03216	—	—	283-03216	—	—
			1.6	1.4	0.5	15	20	599-03217	268-03217	—	—	277-03217	—	—	283-03217	—	—
			2.5	2.2	0.5	15	20	599-03218	268-03218	—	—	277-03218	—	—	283-03218	—	—
			4	3.4	0.5	15	20	599-03219	268-03219	—	—	277-03219	—	—	283-03219	—	—
			6.3	5.4	0.75	20	20	599-03220	268-03220	—	—	277-03220	—	—	283-03220	—	—
			10	8.6	1	25	20	599-03221	268-03221	—	—	277-03221	—	279-03221	283-03221	—	285-03221
		UFxUF	16	14	1.25	32	20	599-03015	268-03015	—	—	277-03015	—	279-03015	283-03015	—	285-3015
			25	22	1.5	40	20	599-03016	268-03016	—	—	277-03016	—	279-03016	283-03016	—	285-03016
			40	34	2	50	20	599-03017	268-03017	—	—	277-03017	—	279-03017	283-03017	—	285-03017
	Hi-Temp	FxF	1	0.9	0.5	15	20	599-03054	268-03054	—	—	277-03054	278-03054	—	283-03054	284-03054	—
			1.6	1.4	0.5	15	20	599-03055	268-03055	—	—	277-03055	278-03055	—	283-03055	284-03055	—
			2.5	2.2	0.5	15	20	599-03056	268-03056	—	—	277-03056	278-03056	—	283-03056	284-03056	—
			4	3.4	0.5	15	20	599-03057	268-03057	—	—	277-03057	278-03057	—	283-03057	284-03057	—
			6.3	5.4	0.75	20	20	599-03058	268-03058	—	—	277-03058	278-03058	—	283-03058	284-03058	—
			10	8.6	1	25	20	599-03059	268-03059	—	—	277-03059	278-03059	279-03059	283-03059	284-03059	285-03059
			16	14	1.25	32	20	599-03060	268-03060	—	—	277-03060	278-03060	279-03060	283-03060	284-03060	285-03060
			25	22	1.5	40	20	599-03061	268-03061	—	—	277-03061	278-03061	279-03061	283-03061	284-03061	285-03061
			40	34	2	50	20	599-03062	268-03062	—	—	277-03062	278-03062	279-03062	283-03062	284-03062	285-03062
		FxUF	1	0.9	0.5	15	20	599-03063	268-03063	—	—	277-03063	278-03063	—	283-03063	284-03063	—
			1.6	1.4	0.5	15	20	599-03064	268-03064	—	—	277-03064	278-03064	—	283-03064	284-03064	—
			2.5	2.2	0.5	15	20	599-03065	268-03065	—	—	277-03065	278-03065	—	283-03065	284-03065	—
			4	3.4	0.5	15	20	599-03066	268-03066	—	—	277-03066	278-03066	—	283-03066	284-03066	—
			6.3	5.4	0.75	20	20	599-03067	268-03067	—	—	277-03067	278-03067	—	283-03067	284-03067	—
			10	8.6	1	25	20	599-03068	268-03068	—	—	277-03068	278-03068	279-03068	283-03068	284-03068	285-03068
		FxsUM	1	0.9	0.5	15	20	599-03234	268-03234	—	—	277-03234	278-03234	—	283-03234	284-03234	—
			1.6	1.4	0.5	15	20	599-03235	268-03235	—	—	277-03235	278-03235	—	283-03235	284-03235	—
			2.5	2.2	0.5	15	20	599-03236	268-03236	—	—	277-03236	278-03236	—	283-03236	284-03236	—
			4	3.4	0.5	15	20	599-03237	268-03237	—	—	277-03237	278-03237	—	283-03237	284-03237	—
			6.3	5.4	0.75	20	20	599-03238	268-03238	—	—	277-03238	278-03238	—	283-03238	284-03238	—
			10	8.6	1	25	20	599-03239	268-03239	—	—	277-03239	278-03239	279-03239	283-03239	284-03239	285-03239
		UFxUF	16	14	1.25	32	20	599-03069	268-03069	—	—	277-03069	278-03069	279-03069	283-03069	284-03069	285-03069
			25	22	1.5	40	20	599-03070	268-03070	—	—	277-03070	278-03070	279-03070	283-03070	284-03070	285-03070
			40	34	2	50	20	599-03071	268-03071	—	—	277-03071	278-03071	279-03071	283-03071	284-03071	285-03071

* F = Female NPT, UF = Union Female, UM = Union Male connection. = Special Order, X = Inappropriate combination.

Table 3a. 1/2 to 2-Inch, Two-Way, Normally Open (NO), Linear Valves (Technical Instructions 155-184P25), Continued.

Trim	Packing	Connection *	Flow Rate		Line Size		Stroke	Type	Electro-Hydraulic					
									24 Vac					
								Description	0-10V 4-20 mA SR	3-Pos NSR	3-Pos, SR	3-Pos, SR	3-Pos SR	0-10V 4-20 mA SR
								Technical Instructions	155-180P25	155-181P25	155-181P25	155--171P25	155-171P25	155-163P25
								Actuator Assembly	SKD62U	SKD82.50 U	SKD82.51 U	SKB82.51U	SKB82.50U	SKB62U
			Cv	Kvs	In	mm		Valve Assembly	Actuator Code 274	Actuator Code 275	Actuator Code 276	Actuator Code 289	Actuator Code 290	Actuator 291
Stainles Steel	Standard	FxF	1	0.9	0.5	15	20	599-03000	274-03000	275-03000	276-03000	—	—	—
			1.6	1.4	0.5	15	20	599-03001	274-03001	275-03001	276-03001	—	—	—
			2.5	2.2	0.5	15	20	599-03002	274-03002	275-03002	276-03002	—	—	—
			4	3.4	0.5	15	20	599-03003	274-03003	275-03003	276-03003	—	—	—
			6.3	5.4	0.75	20	20	599-03004	274-03004	275-03004	276-03004	—	—	—
			10	8.6	1	25	20	599-03005	274-03005	275-03005	276-03005	289-03005	290-03005	291-03005
			16	14	1.25	32	20	599-03006	274-03006	275-03006	276-03006	289-03006	290-03005	291-03005
			25	22	1.5	40	20	599-03007	274-03007	275-03007	276-03007	289-03007	290-03007	291-03007
			40	34	2	50	20	599-03008	274-03008	275-03008	276-03008	289-03008	290-03008	291-03008
		FxUF	1	0.9	0.5	15	20	599-03009	274-03009	275-03009	276-03009	—	—	—
			1.6	1.4	0.5	15	20	599-03010	274-03010	275-03010	276-03010	—	—	—
			2.5	2.2	0.5	15	20	599-03011	274-03011	275-03011	276-03011	—	—	—
			4	3.4	0.5	15	20	599-03012	274-03012	275-03012	276-03012	—	—	—
			6.3	5.4	0.75	20	20	599-03013	274-03013	275-03013	276-03013	—	—	—
			10	8.6	1	25	20	599-03014	274-03014	275-03014	276-03014	289-03014	290-03014	290-03014
		FxUM	1	0.9	0.5	15	20	599-03216	274-03216	275-03216	276-03216	—	—	—
			1.6	1.4	0.5	15	20	599-03217	274-03217	275-03217	276-03217	—	—	—
			2.5	2.2	0.5	15	20	599-03218	274-03218	275-03218	276-03218	—	—	—
			4	3.4	0.5	15	20	599-03219	274-03219	275-03219	276-03219	—	—	—
			6.3	5.4	0.75	20	20	599-03220	274-03220	275-03220	276-03220	—	—	—
			10	8.6	1	25	20	599-03221	274-03221	275-03221	276-03221	289-03221	290-03221	291-03221
		UFxUF	16	14	1.25	32	20	599-03015	274-03015	275-03015	276-03015	289-03015	290-03015	291-03015
			25	22	1.5	40	20	599-03016	274-03016	275-03016	276-03016	289-03016	290-03016	291-03016
			40	34	2	50	20	599-03017	274-03017	275-03017	276-03017	289-03017	290-03017	291-03017
	Hi-Temp	FxF	1	0.9	0.5	15	20	599-03054	274-03054	275-03054	276-03054	—	—	—
			1.6	1.4	0.5	15	20	599-03055	274-03055	275-03055	276-03055	—	—	—
			2.5	2.2	0.5	15	20	599-03056	274-03056	275-03056	276-03056	—	—	—
			4	3.4	0.5	15	20	599-03057	274-03057	275-03057	276-03057	—	—	—
			6.3	5.4	0.75	20	20	599-03058	274-03058	275-03058	276-03058	—	—	—
			10	8.6	1	25	20	599-03059	274-03059	275-03059	276-03059	289-03059	290-03059	291-03059
			16	14	1.25	32	20	599-03060	274-03060	275-03060	276-03060	289-03060	290-03060	291-03060
			25	22	1.5	40	20	599-03061	274-03061	275-03061	276-03061	289-03061	290-03061	291-03061
			40	34	2	50	20	599-03062	274-03062	275-03062	276-03062	289-06062	290-03062	291-03062
		FxUF	1	0.9	0.5	15	20	599-03063	274-03063	275-03063	276-03063	—	—	—
			1.6	1.4	0.5	15	20	599-03064	274-03064	275-03064	276-03064	—	—	—
			2.5	2.2	0.5	15	20	599-03065	274-03065	275-03065	276-03065	—	—	—
			4	3.4	0.5	15	20	599-03066	274-03066	275-03066	276-03066	—	—	—
			6.3	5.4	0.75	20	20	599-03067	274-03067	275-03067	276-03067	—	—	—
			10	8.6	1	25	20	599-03068	274-03068	275-03068	276-03068	289-03068	290-03068	291-03068
		FxSUM	1	0.9	0.5	15	20	599-03234	274-03234	275-03234	276-03234	—	—	—
			1.6	1.4	0.5	15	20	599-03235	274-03235	275-03235	276-03235	—	—	—
			2.5	2.2	0.5	15	20	599-03236	274-03236	275-03236	276-03236	—	—	—
			4	3.4	0.5	15	20	599-03237	274-03237	275-03237	276-03237	—	—	—
			6.3	5.4	0.75	20	20	599-03238	274-03238	275-03238	276-03238	—	—	—
			10	8.6	1	25	20	599-03239	274-03239	275-03239	276-03239	289-03239	290-03239	291-03239
		UFxU	16	14	1.25	32	20	599-03069	274-03069	275-03069	276-03069	289-03069	290-03069	291-03069
			25	22	1.5	40	20	599-03070	274-03070	275-03070	276-03070	289-03070	290-03070	291-03070
			40	34	2	50	20	599-03071	274-03071	275-03071	276-03071	289-03070	290-03070	291-03070

* F = Female NPT, UF = Union Female, UM = Union Male connection. — = Special Order, X = Inappropriate combination.

Table 3b. 1/2 to 2-Inch, Two-Way, Normally Open (NO), Linear Valves (Technical Instructions 155-184P25), Continued.

Trim	Packing	Connection *	Flow Rate		Line Size		Stroke	Type	Electro-Mechanical						
									24 Vac						
								Description	0-10V 4-20 mA NSR	3-Pos, 120 sec, NSR	3-Pos, 30 sec, NSR	0-10V, Lo, NSR	0-10V, Lo, SR	0-10V, SR	2-Pos, SR
								Technical Instructions	155-182P25	155-186P25	155-186P25	155-172P25	155-172P25	155-541P25	155-541P25
								Actuator Assembly	SQX62U	SQX82.00U	SQX82.03U	599-10021	599-10022	599-03609	599--03611
			Cv	Kvs	In	mm		Valve Assembly	Actuator Code 271	Actuator Code 272	Actuator Code 273	Actuator Code 295	Actuator Code 296	Actuator Code 298	Actuator Code 299
Stainless Steel	Standard	FxF	1	0.9	0.5	15	20	599-03000	271-03000	272-03000	273-03000	295-03000	296-03000	298-03000	299-03000
			1.6	1.4	0.5	15	20	599-03001	271-03001	272-03001	273-03001	295-03001	296-03001	298-03001	299-03001
			2.5	2.2	0.5	15	20	599-03002	271-03002	272-03002	273-03002	295-03002	296-03002	298-03002	299-03002
			4	3.4	0.5	15	20	599-03003	271-03003	272-03003	273-03003	295-03003	296-03003	298-03003	299-03003
			6.3	5.4	0.75	20	20	599-03004	271-03004	272-03004	273-03004	295-03004	296-03004	298-03004	299-03004
			10	8.6	1	25	20	599-03005	271-03005	272-03005	273-03005	295-03005	296-03005	298-03005	299-03005
			16	14	1.25	32	20	599-03006	271-03006	272-03006	273-03006	295-03006	296-03006	298-03006	299-03006
			25	22	1.5	40	20	599-03007	271-03007	272-03007	273-03007	295-03007	296-03007	298-03007	299-03007
			40	34	2	50	20	599-03008	271-03008	272-03008	273-03008	295-03008	296-03008	298-03008	299-03008
		FxUF	1	0.9	0.5	15	20	599-03009	271-03009	272-03009	273-03009	295-03009	296-03009	298-03009	299-03009
			1.6	1.4	0.5	15	20	599-03010	271-03010	272-03010	273-03010	295-03010	296-03010	298-03010	299-03010
			2.5	2.2	0.5	15	20	599-03011	271-03011	272-03011	273-03011	295-03011	296-03011	298-03011	299-03011
			4	3.4	0.5	15	20	599-03012	271-03012	272-03012	273-03012	295-03012	296-03012	298-03012	299-03012
			6.3	5.4	0.75	20	20	599-03013	271-03013	272-03013	273-03013	295-03013	296-03013	298-03013	299-03013
			10	8.6	1	25	20	599-03014	271-03014	272-03014	273-03014	295-03014	296-03014	298-03014	299-03014
		FxUM	1	0.9	0.5	15	20	599-03216	271-03216	272-03216	273-03216	295-03216	296-03216	298-03216	299-03216
			1.6	1.4	0.5	15	20	599-03217	271-03217	272-03217	273-03217	295-03217	296-03217	298-03217	299-03217
			2.5	2.2	0.5	15	20	599-03218	271-03218	272-03218	273-03218	295-03218	296-03218	298-03218	299-03218
			4	3.4	0.5	15	20	599-03219	271-03219	272-03219	273-03219	295-03219	296-03219	298-03219	299-03219
			6.3	5.4	0.75	20	20	599-03220	271-03220	272-03220	273-03220	295-03220	296-03220	298-03220	299-03220
			10	8.6	1	25	20	599-03221	271-03221	272-03221	273-03221	295-03221	296-03221	298-03221	299-03221
		UFxUF	16	14	1.25	32	20	599-03015	271-03015	272-03015	273-03015	295-03015	296-03015	298-03015	299-03015
			25	22	1.5	40	20	599-03016	271-03016	272-03016	273-03016	295-03016	296-03016	298-03016	299-03016
			40	34	2	50	20	599-03017	271-03017	272-03017	273-03017	295-03017	296-03017	298-03017	299-03017
	Hi-Temp	FxF	1	0.9	0.5	15	20	599-03054	271-03054	272-03054	273-03054	295-03054	296-03054	298-03054	299-03054
			1.6	1.4	0.5	15	20	599-03055	271-03055	272-03055	273-03055	295-03055	296-03055	298-03055	299-03055
			2.5	2.2	0.5	15	20	599-03056	271-03056	272-03056	273-03056	295-03056	296-03056	298-03056	299-03056
			4	3.4	0.5	15	20	599-03057	271-03057	272-03057	273-03057	295-03057	296-03057	298-03057	299-03057
			6.3	5.4	0.75	20	20	599-03058	271-03058	272-03058	273-03058	295-03058	296-03058	298-03058	299-03058
			10	8.6	1	25	20	599-03059	271-03059	272-03059	273-03059	295-03059	296-03059	298-03059	299-03059
			16	14	1.25	32	20	599-03060	271-03060	272-03060	273-03060	295-03060	296-03060	298-03060	299-03060
			25	22	1.5	40	20	599-03061	271-03061	272-03061	273-03061	295-03061	296-03061	298-03061	299-03061
			40	34	2	50	20	599-03062	271-03062	272-03062	273-03062	295-03062	296-03062	298-03062	299-03062
		FxUF	1	0.9	0.5	15	20	599-03063	271-03063	272-03063	273-03063	295-03063	296-03063	298-03063	299-03063
			1.6	1.4	0.5	15	20	599-03064	271-03064	272-03064	273-03064	295-03064	296-03064	298-03064	299-03064
			2.5	2.2	0.5	15	20	599-03065	271-03065	272-03065	273-03065	295-03065	296-03065	298-03065	299-03065
			4	3.4	0.5	15	20	599-03066	271-03066	272-03066	273-03066	295-03066	296-03066	298-03066	299-03066
			6.3	5.4	0.75	20	20	599-03067	271-03067	272-03067	273-03067	295-03067	296-03067	298-03067	299-03067
			10	8.6	1	25	20	599-03068	271-03068	272-03068	273-03068	295-03068	296-03068	298-03068	299-03068
		FxsUM	1	0.9	0.5	15	20	599-03234	271-03234	272-03234	273-03234	295-03234	296-03234	298-03234	299-03234
			1.6	1.4	0.5	15	20	599-03235	271-03235	272-03235	273-03235	295-03235	296-03235	298-03235	299-03235
			2.5	2.2	0.5	15	20	599-03236	271-03236	272-03236	273-03236	295-03236	296-03236	298-03236	299-03236
			4	3.4	0.5	15	20	599-03237	271-03237	272-03237	273-03237	295-03237	296-03237	298-03237	299-03237
			6.3	5.4	0.75	20	20	599-03238	271-03238	272-03238	273-03238	295-03238	296-03238	298-03238	299-03238
			10	8.6	1	25	20	599-03239	271-03239	272-03239	273-03239	295-03239	296-03239	298-03239	299-03239
		UFxU	16	14	1.25	32	20	599-03069	271-03069	272-03069	273-03069	295-03069	296-03069	298-03069	299-03069
			25	22	1.5	40	20	599-03070	271-03070	272-03070	273-03070	295-03070	296-03070	298-03070	299-03070
			40	34	2	50	20	599-03071	271-03071	272-03071	273-03071	295-03071	296-03071	298-03071	299-03071

* F = Female NPT, UF = Union Female, UM = Union Male connection. — = Special Order, X = Inappropriate combination.

Table 4. 1/2 to 2-Inch, Two-Way, Normally Open (NO), Equal Percentage Valves (Technical Instructions 155-184P25).

Trim	Packing	Connection *	Flow Rate		Line Size		Stroke	Type	Pneumatic						Pneumatic with Factory Mounted Position Relay		
								Description	4-inch 3-8 psi (21-55 kPa)	4-inch 5-10 psi (34-69 kPa)	4-inch 10-15 psi (69-103 kPa)	8-inch	8-inch Hi-Temp	12-inch	8-inch	8-inch Hi-Temp	12-inch with Positioner
								Technical Instructions	155-183P25	155-183P25	155-183P25	155-161P25	155-161P25	144-162P25	155-161P25	155-161P25	155-162P25
								Actuator Assembly	599-01081	599-01082	599-01083	599-01050	599-01051	599-01010	599-01050	599-01051	599-01010
			Cv	Kvs	In	mm		Valve Assembly	Actuator Code 268	Actuator Code 269	Actuator Code 270	Actuator Code 277	Actuator Code 278	Actuator Code 279	Actuator Code 283	Actuator Code 284	Actuator Code 285
Bronze	Standard	FxF	1	0.9	0.5	15	20	599-03162	268-03162	—	—	277-03162	—		—	283-03162	—
			1.6	1.4	0.5	15	20	599-03163	268-03163	—	—	277-03163	—		—	283-03163	—
			2.5	2.2	0.5	15	20	599-03164	268-03164	—	—	277-03164	—		—	283-03164	—
			4	3.4	0.5	15	20	599-03165	268-03165	—	—	277-03165	—		—	283-03165	—
			6.3	5.4	0.75	20	20	599-03166	268-03166	—	—	277-03166	—		—	283-03166	—
			10	8.6	1	25	20	599-03167	268-03167	—	—	277-03167	—	279-03167	—	283-03167	285-03167
			16	14	1.25	32	20	599-03168	268-03168	—	—	277-03168	—	279-03168	—	283-03168	285-03168
			25	22	1.5	40	20	599-03169	268-03169	—	—	277-03169	—	279-03169	—	283-03169	285-03169
			40	34	2	50	20	599-03170	268-03170	—	—	277-03170	—	279-03170	—	283-03170	285-03170
		FxUF	1	0.9	0.5	15	20	599-03171	268-03171	—	—	277-03171	—	—	—	283-03171	—
			1.6	1.4	0.5	15	20	599-03172	268-03172	—	—	277-03172	—	—	—	283-03172	—
			2.5	2.2	0.5	15	20	599-03173	268-03173	—	—	277-03173	—	—	—	283-03173	—
			4	3.4	0.5	15	20	599-03174	268-03174	—	—	277-03174	—	—	—	283-03174	—
			6.3	5.4	0.75	20	20	599-03175	268-03175	—	—	277-03175	—	—	—	283-03175	—
			10	8.6	1	25	20	599-03176	268-03176	—	—	277-03176	—	279-03176	—	283-03176	285-03176
		FxUM	1	0.9	0.5	15	20	599-03270	268-03270	—	—	277-03270	—	—	—	283-03270	—
			1.6	1.4	0.5	15	20	599-03271	268-03271	—	—	277-03271	—	—	—	283-03271	—
			2.5	2.2	0.5	15	20	599-03272	268-03272	—	—	277-03272	—	—	—	283-03272	—
			4	3.4	0.5	15	20	599-03273	268-03273	—	—	277-03273	—	—	—	283-03273	—
			6.3	5.4	0.75	20	20	599-03274	268-03274	—	—	277-03274	—	—	—	283-03274	—
			10	8.6	1	25	20	599-03275	268-03275	—	—	277-03275	—	279-03275	—	283-03275	285-03275
			16	13.8	1.25	32	20	599-03276	268-03276	—	—	277-03276	—	279-03276	—	283-03276	285-03276
		UFxU [L]	16	14	1.25	32	20	599-03177	268-03177	—	—	277-03177	—	279-03177	—	283-03177	285-03177
			25	22	1.5	40	20	599-03178	268-03178	—	—	277-03178	—	279-03178	—	283-03178	285-03178
			40	34	2	50	20	599-03179	268-03179	—	—	277-03179	—	279-03179	—	283-03179	285-03179
Stainless Steel		FxF	1	0.9	0.5	15	20	599-03108	268-03108	—	—	277-03108	—	—	—	283-03108	—
			1.6	1.4	0.5	15	20	599-03109	268-03109	—	—	277-03109	—	—	—	283-03109	—
			2.5	2.2	0.5	15	20	599-03110	268-03110	—	—	277-03110	—	—	—	283-03110	—
			4	3.4	0.5	15	20	599-03111	268-03111	—	—	277-03111	—	—	—	283-03111	—
			6.3	5.4	0.75	20	20	599-03112	268-03112	—	—	277-03112	—	—	—	283-03112	—
			10	8.6	1	25	20	599-03113	268-03113	—	—	277-03113	—	279-03113	—	283-03113	285-03113
			16	14	1.25	32	20	599-03114	268-03114	—	—	277-03114	—	279-03114	—	283-03114	285-03114
			25	22	1.5	40	20	599-03115	268-03115	—	—	277-03115	—	279-03115	—	283-03115	285-03115
			40	34	2	50	20	599-03116	268-03116	—	—	277-03116	—	279-03116	—	283-03116	285-03116
		FxUF	1	0.9	0.5	15	20	599-03117	268-03117	—	—	277-03117	—	—	—	283-03117	—
			1.6	1.4	0.5	15	20	599-03118	268-03118	—	—	277-03118	—	—	—	283-03118	—
			2.5	2.2	0.5	15	20	599-03119	268-03119	—	—	277-03119	—	—	—	283-03119	—
			4	3.4	0.5	15	20	599-03120	268-03120	—	—	277-03120	—	—	—	283-03120	—
			6.3	5.4	0.75	20	20	599-03121	268-03121	—	—	277-03121	—	—	—	283-03121	—
			10	8.6	1	25	20	599-03122	268-03122	—	—	277-03122	—	279-03122	—	283-03122	285-03122
		FxsUM	1	0.9	0.5	15	20	599-03252	268-03252	—	—	277-03252	—	—	—	283-03252	—
			1.6	1.4	0.5	15	20	599-03253	268-03253	—	—	277-03253	—	—	—	283-03253	—
			2.5	2.2	0.5	15	20	599-03254	268-03254	—	—	277-03254	—	—	—	283-03254	—
			4	3.4	0.5	15	20	599-03255	268-03255	—	—	277-03255	—	—	—	283-03255	—
			6.3	5.4	0.75	20	20	599-03256	268-03256	—	—	277-03256	—	—	—	283-03256	—
			10	8.6	1	25	20	599-03257	268-03257	—	—	277-03257	—	279-03257	—	283-03257	285-03257
		UFxU [L]	16	14	1.25	32	20	599-03123	268-03123	—	—	277-03123	—	279-03123	—	283-03123	285-03123
			25	22	1.5	40	20	599-03124	268-03124	—	—	277-03124	—	279-03124	—	283-03124	285-03124
			40	34	2	50	20	599-03125	268-03125	—	—	277-03125	—	279-03125	—	283-03125	285-03125

* F = Female NPT, UF = Union Female, UM = Union Male connection. — = Special Order, X = Inappropriate combination.

Table 4a. 1/2 to 2-Inch, Two-Way, Normally Open (NO), Equal Percentage Valves (Technical Instructions 155-184P25), Continued. **Bronze Stainless**

Packing	Connection *	Flow Rate		Line Size		Stroke	Type	Electro-Hydraulic			Electro-Mechanical						
							Description	24V, 0-10V 4-20 mA SR	24V, 3P NSR	24V, 3P, SR	24V, 0-10V 4-20mA NSR	24V, 3P, 120 sec., NSR	24V, 3P, 30 sec, NSR	24V, 0-10V, Lo, NSR	24V, 0-10V, Lo, SR	24V, 0-10V, SR	24V, 2P, SR
							Technical Instructions	155-180P25	155-181P25	155-181P25	155-182P25	155-186P25	155-186P25	155-172P25	155-172P25	155-541P25	155-541P25
							Actuator Assembly	SKD62U	SKD82.50 U	SKD82.51 U	SQX62U	SQX82.00U	SQX82.03U	599-10021	599-10022	599-03609	599--03611
		Cv	Kvs	In	mm		Valve Assembly	Actuator Code 274	Actuator Code 275	Actuator Code 276	Actuator Code 271	Actuator Code 272	Actuator Code 273	Actuator Code 295	Actuator Code 296	Actuator Code 298	Actuator Code 299
Standard	FxF	1	0.9	0.5	15	20	599-03162	274-03162	275-03162	276-03162	271-03162	272-03162	273-03162	295-03162	296-03162	298-03162	299-03162
		1.6	1.4	0.5	15	20	599-03163	274-03163	275-03163	276-03163	271-03163	272-03163	273-03163	295-03163	296-03163	298-03163	299-03163
		2.5	2.2	0.5	15	20	599-03164	274-03164	275-03164	276-03164	271-03164	272-03164	273-03164	295-03164	296-03164	298-03164	299-03164
		4	3.4	0.5	15	20	599-03165	274-03165	275-03165	276-03165	271-03165	272-03165	273-03165	295-03165	296-03165	298-03165	299-03165
		6.3	5.4	0.75	20	20	599-03166	274-03166	275-03166	276-03166	271-03166	272-03166	273-03166	295-03166	296-03166	298-03166	299-03166
		10	8.6	1	25	20	599-03167	274-03167	275-03167	276-03167	271-03167	272-03167	273-03167	295-03167	296-03167	298-03167	299-03167
		16	14	1.25	32	20	599-03168	274-03168	275-03168	276-03168	271-03168	272-03168	273-03168	295-03168	296-03168	298-03168	299-03168
		25	22	1.5	40	20	599-03169	274-03169	275-03169	276-03169	271-03169	272-03169	273-03169	295-03169	296-03169	298-03169	299-03169
		40	34	2	50	20	599-03170	274-03170	275-03170	276-03170	271-03170	272-03170	273-03170	295-03170	296-03170	298-03170	299-03170
	FxUF	1	0.9	0.5	15	20	599-03171	274-03171	275-03171	276-03171	271-03171	272-03171	273-03171	295-03171	296-03171	298-03171	299-03171
		1.6	1.4	0.5	15	20	599-03172	274-03172	275-03172	276-03172	271-03172	272-03172	273-03172	295-03172	296-03172	298-03172	299-03172
		2.5	2.2	0.5	15	20	599-03173	274-03173	275-03173	276-03173	271-03173	272-03173	273-03173	295-03173	296-03173	298-03173	299-03173
		4	3.4	0.5	15	20	599-03174	274-03174	275-03174	276-03174	271-03174	272-03174	273-03174	295-03174	296-03174	298-03174	299-03174
		6.3	5.4	0.75	20	20	599-03175	274-03175	275-03175	276-03175	271-03175	272-03175	273-03175	295-03175	296-03175	298-03175	299-03175
		10	8.6	1	25	20	599-03176	274-03176	275-03176	276-03176	271-03176	272-03176	273-03176	295-03176	296-03176	298-03176	299-03176
	FxUM	1	0.9	0.5	15	20	599-03270	274-03270	275-03270	276-03270	271-03270	272-03270	273-03270	295-03270	296-03270	298-03270	299-03270
		1.6	1.4	0.5	15	20	599-03271	274-03271	275-03271	276-03271	271-03271	272-03271	273-03271	295-03271	296-03271	298-03271	299-03271
		2.5	2.2	0.5	15	20	599-03272	274-03272	275-03272	276-03272	271-03272	272-03272	273-03272	295-03272	296-03272	298-03272	299-03272
		4	3.4	0.5	15	20	599-03273	274-03273	275-03273	276-03273	271-03273	272-03273	273-03273	295-03273	296-03273	298-03273	299-03273
		6.3	5.4	0.75	20	20	599-03274	274-03274	275-03274	276-03274	271-03274	272-03274	273-03274	295-03274	296-03274	298-03274	299-03274
		10	8.6	1	25	20	599-03275	274-03275	275-03275	276-03275	271-03275	272-03275	273-03275	295-03275	296-03275	298-03275	299-03275
		16	13.8	1.25	32	20	599-03276	274-03276	275-03276	276-03276	271-03276	272-03276	273-03276	295-03276	296-03276	298-03276	299-03276
	UFxUF	16	14	1.25	32	20	599-03177	274-03177	275-03177	276-03177	271-03177	272-03177	273-03177	295-03177	296-03177	298-03177	299-03177
		25	22	1.5	40	20	599-03178	274-03178	275-03178	276-03178	271-03178	272-03178	273-03178	295-03178	296-03178	298-03178	299-03178
		40	34	2	50	20	599-03179	274-03179	275-03179	276-03179	271-03179	272-03179	273-03179	295-03179	296-03179	298-03179	299-03179
	FxF	1	0.9	0.5	15	20	599-03108	274-03108	275-03108	276-03108	271-03108	272-03108	273-03108	295-03108	296-03108	298-03108	299-03108
		1.6	1.4	0.5	15	20	599-03109	274-03109	275-03109	276-03109	271-03109	272-03109	273-03109	295-03109	296-03109	298-03109	299-03109
		2.5	2.2	0.5	15	20	599-03110	274-03110	275-03110	276-03110	271-03110	272-03110	273-03110	295-03110	296-03110	298-03110	299-03110
		4	3.4	0.5	15	20	599-03111	274-03111	275-03111	276-03111	271-03111	272-03111	273-03111	295-03111	296-03111	298-03111	299-03111
		6.3	5.4	0.75	20	20	599-03112	274-03112	275-03112	276-03112	271-03112	272-03112	273-03112	295-03112	296-03112	298-03112	299-03112
		10	8.6	1	25	20	599-03113	274-03113	275-03113	276-03113	271-03113	272-03113	273-03113	295-03113	296-03113	298-03113	299-03113
		16	14	1.25	32	20	599-03114	274-03114	275-03114	276-03114	271-03114	272-03114	273-03114	295-03114	296-03114	298-03114	299-03114
		25	22	1.5	40	20	599-03115	274-03115	275-03115	276-03115	271-03115	272-03115	273-03115	295-03115	296-03115	298-03115	299-03115
		40	34	2	50	20	599-03116	274-03116	275-03116	276-03116	271-03116	272-03116	273-03116	295-03116	296-03116	298-03116	299-03116
	FxUF	1	0.9	0.5	15	20	599-03117	274-03117	275-03117	276-03117	271-03117	272-03117	273-03117	295-03117	296-03117	298-03117	299-03117
		1.6	1.4	0.5	15	20	599-03118	274-03118	275-03118	276-03118	271-03118	272-03118	273-03118	295-03118	296-03118	298-03118	299-03118
		2.5	2.2	0.5	15	20	599-03119	274-03119	275-03119	276-03119	271-03119	272-03119	273-03119	295-03119	296-03119	298-03119	299-03119
		4	3.4	0.5	15	20	599-03120	274-03120	275-03120	276-03120	271-03120	272-03120	273-03120	295-03120	296-03120	298-03120	299-03120
		6.3	5.4	0.75	20	20	599-03121	274-03121	275-03121	276-03121	271-03121	272-03121	273-03121	295-03121	296-03121	298-03121	299-03121
		10	8.6	1	25	20	599-03122	274-03122	275-03122	276-03122	271-03122	272-03122	273-03122	295-03122	296-03122	298-03122	299-03122
	FxsUM	1	0.9	0.5	15	20	599-03252	274-03252	275-03252	276-03252	271-03252	272-03252	273-03252	295-03252	296-03252	298-03252	299-03252
		1.6	1.4	0.5	15	20	599-03253	274-03253	275-03253	276-03253	271-03253	272-03253	273-03253	295-03253	296-03253	298-03253	299-03253
		2.5	2.2	0.5	15	20	599-03254	274-03254	275-03254	276-03254	271-03254	272-03254	273-03254	295-03254	296-03254	298-03254	299-03254
		4	3.4	0.5	15	20	599-03255	274-03255	275-03255	276-03255	271-03255	272-03255	273-03255	295-03255	296-03255	298-03255	299-03255
		6.3	5.4	0.75	20	20	599-03256	274-03256	275-03256	276-03256	271-03256	272-03256	273-03256	295-03256	296-03256	298-03256	299-03256
		10	8.6	1	25	20	599-03257	274-03257	275-03257	276-03257	271-03257	272-03257	273-03257	295-03257	296-03257	298-03257	299-03257
	UFxUF	16	14	1.25	32	20	599-03123	274-03123	275-03123	276-03123	271-03123	272-03123	273-03123	295-03123	296-03123	298-03123	299-03123
		25	22	1.5	40	20	599-03124	274-03124	275-03124	276-03124	271-03124	272-03124	273-03124	295-03124	296-03124	298-03124	299-03124
		40	34	2	50	20	599-03125	274-03125	275-03125	276-03125	271-03125	272-03125	273-03125	295-03125	296-03125	298-03125	299-03125

* F = Female NPT, UF = Union Female, UM = Union Male connection. — = Special Order, X = Inappropriate combination.

Table 5. 1/2 to 2-Inch Three-Way Valves (Equal Percentage NC/Linear NO) (Technical Instructions 155-185P25).

Trim	Packing	Connection *	Flow Rate		Line Size		Stroke	Type	Pneumatic					Pneumatic with Factory Mounted Position Relay	
								Description	4-inch 3-8 psi (21-55 kPa)	4-inch 5-10 psi (34-69 kPa)	4-inch 10-15 psi (69-103 kPa)	8-inch	8-inch Hi-Temp	8-inch	8-inch Hi-Temp
								Technical Instructions	155-183P25	155-183P25	155-183P25	155-161P25	155-161P25	155-161P25	155-161P25
								Actuator Assembly	599-01081	599-01082	599-01083	599-01050	599-01051	599-01050	599-01051
			Cv	Kvs	In	mm		Valve Assembly	Actuator Code 268	Actuator Code 269	Actuator Code 270	Actuator Code 277	Actuator Code 278	Actuator Code 283	Actuator Code 284
Bronze	Standard	FxF	1	0.9	0.5	15	20	599-03198	268-03198	269-03198	270-03198	277-03198	—	283-03198	—
			1.6	1.4	0.5	15	20	599-03199	268-03199	269-03199	270-03199	277-03199	—	283-03199	—
			2.5	2.2	0.5	15	20	599-03200	268-03200	269-03200	270-03200	277-03200	—	283-03200	—
			4	3.4	0.5	15	20	599-03201	268-03201	269-03201	270-03201	277-03201	—	283-03201	—
			6.3	5.4	0.75	20	20	599-03202	268-03202	269-03202	270-03202	277-03202	—	283-03202	—
			10	8.6	1	25	20	599-03203	268-03203	269-03203	270-03203	277-03203	—	283-03203	—
			16	14	1.25	32	20	599-03204	268-03204	269-03204	270-03204	277-03204	—	283-03204	—
			25	22	1.5	40	20	599-03205	268-03205	269-03205	270-03205	277-03205	—	283-03205	—
			40	34	2	50	20	599-03206	268-03206	269-03206	270-03206	277-03206	—	283-03206	—
		UFxUF	1	0.9	0.5	15	20	599-03207	268-03207	269-03207	270-03207	277-03207	—	283-03207	—
			1.6	1.4	0.5	15	20	599-03208	268-03208	269-03208	270-03208	277-03208	—	283-03208	—
			2.5	2.2	0.5	15	20	599-03209	268-03209	269-03209	270-03209	277-03209	—	283-03209	—
			4	3.4	0.5	15	20	599-03210	268-03210	269-03210	270-03210	277-03210	—	283-03210	—
			6.3	5.4	0.75	20	20	599-03211	268-03211	269-03211	270-03211	277-03211	—	283-03211	—
			10	8.6	1	25	20	599-03212	268-03212	269-03212	270-03212	277-03212	—	283-03212	—
			16	14	1.25	32	20	599-03213	268-03213	269-03213	270-03213	277-03213	—	283-03213	—
			25	22	1.5	40	20	599-03214	268-03214	269-03214	270-03214	277-03214	—	283-03214	—
			40	34	2	50	20	599-03215	268-03215	269-03215	270-03215	277-03215	—	283-03215	—
Stainless Steel		FxF	1	0.9	0.5	15	20	599-03144	268-03144	269-03144	270-03144	277-03144	—	283-03144	—
			1.6	1.4	0.5	15	20	599-03145	268-03145	269-03145	270-03145	277-03145	—	283-03145	—
			2.5	2.2	0.5	15	20	599-03146	268-03146	269-03146	270-03146	277-03146	—	283-03146	—
			4	3.4	0.5	15	20	599-03147	268-03147	269-03147	270-03147	277-03147	—	283-03147	—
			6.3	5.4	0.75	20	20	599-03148	268-03148	269-03148	270-03148	277-03148	—	283-03148	—
			10	8.6	1	25	20	599-03149	268-03149	269-03149	270-03149	277-03149	—	283-03149	—
			16	14	1.25	32	20	599-03150	268-03150	269-03150	270-03150	277-03150	—	283-03150	—
			25	22	1.5	40	20	599-03151	268-03151	269-03151	270-03151	277-03151	—	283-03151	—
			40	34	2	50	20	599-03152	268-03152	269-03152	270-03152	277-03152	—	283-03152	—
		UFxUF	1	0.9	0.5	15	20	599-03153	268-03153	269-03153	270-03153	277-03153	—	283-03153	—
			1.6	1.4	0.5	15	20	599-03154	268-03154	269-03154	270-03154	277-03154	—	283-03154	—
			2.5	2.2	0.5	15	20	599-03155	268-03155	269-03155	270-03155	277-03155	—	283-03155	—
			4	3.4	0.5	15	20	599-03156	268-03156	269-03156	270-03156	277-03156	—	283-03156	—
			6.3	5.4	0.75	20	20	599-03157	268-03157	269-03157	270-03157	277-03157	—	283-03157	—
			10	8.6	1	25	20	599-03158	268-03158	269-03158	270-03158	277-03158	—	283-03158	—
			16	14	1.25	32	20	599-03159	268-03159	269-03159	270-03159	277-03159	—	283-03159	—
			25	22	1.5	40	20	599-03160	268-03160	269-03160	270-03160	277-03160	—	283-03160	—
			40	34	2	50	20	599-03161	268-03161	269-03161	270-03161	277-03161	—	283-03161	—

* F = Female NPT, UF = Union Female, UM = Union Male connection, — = Special Order, X = Inappropriate combination.

Table 5a. 1/2 to 2-Inch Three-Way Valves (Equal Percentage NC/Linear NO) (Technical Instructions 155-185P25), Continued.

Trim	Packing	Connection *	Flow Rate		Line Size		Stroke	Type	Electro-Hydraulic			Electro-Mechanical						
								Description	24V, 0-10V 4-20mA SR	24V, 3P NSR	24V, 3P, SR	24V, 0-10V 4-20mA NSR	24V, 3P, 120 sec., NSR	24V, 3P, 30 sec, NSR	24V, 0-10V, Lo, NSR	24V, 0-10V, Lo, SR	24V, 0-10V, SR	24V, 2P, SR
								Technical Instructions	155-180P25	155-181P25	155-181P25	155-182P25	155-186P25	155-186P25	155-172P25	155-172P25	155-541P25	155-541P25
								Actuator Assembly	SKD62U	SKD82.50 U	SKD82.51 U	SQX62U	SQX82.00U	SQX82.03U	599-10021	599-10022	599-03609	599--03611
			Cv	Kvs	In	mm		Valve Assembly	Actuator Code 274	Actuator Code 275	Actuator Code 276	Actuator Code 271	Actuator Code 272	Actuator Code 273	Actuator Code 295	Actuator Code 296	Actuator Code 298	Actuator Code 299
Bronze	Standard	FxF	1	0.9	0.5	15	20	599-03198	274-03198	275-03198	276-03198	271-03198	272-03198	273-03198	295-03198	296-03198	298-03198	299-03198
			1.6	1.4	0.5	15	20	599-03199	274-03199	275-03199	276-03199	271-03199	272-03199	273-03199	295-03199	296-03199	298-03199	299-03199
			2.5	2.2	0.5	15	20	599-03200	274-03200	275-03200	276-03200	271-03200	272-03200	273-03200	295-03200	296-03200	298-03200	299-03200
			4	3.4	0.5	15	20	599-03201	274-03201	275-03201	276-03201	271-03201	272-03201	273-03201	295-03201	296-03201	298-03201	299-03201
			6.3	5.4	0.75	20	20	599-03202	274-03202	275-03202	276-03202	271-03202	272-03202	273-03202	295-03202	296-03202	298-03202	299-03202
			10	8.6	1	25	20	599-03203	274-03203	275-03203	276-03203	271-03203	272-03203	273-03203	295-03203	296-03203	298-03203	299-03203
			16	14	1.25	32	20	599-03204	274-03204	275-03204	276-03204	271-03204	272-03204	273-03204	295-03204	296-03204	298-03204	299-03204
			25	22	1.5	40	20	599-03205	274-03205	275-03205	276-03205	271-03205	272-03205	273-03205	295-03205	296-03205	298-03205	299-03205
			40	34	2	50	20	599-03206	274-03206	275-03206	276-03206	271-03206	272-03206	273-03206	295-03206	296-03206	298-03206	299-03206
		UFxUF	1	0.9	0.5	15	20	599-03207	274-03207	275-03207	276-03207	271-03207	272-03207	273-03207	295-03207	296-03207	298-03207	299-03207
			1.6	1.4	0.5	15	20	599-03208	274-03208	275-03208	276-03208	271-03208	272-03208	273-03208	295-03208	296-03208	298-03208	299-03208
			2.5	2.2	0.5	15	20	599-03209	274-03209	275-03209	276-03209	271-03209	272-03209	273-03209	295-03209	296-03209	298-03209	299-03209
			4	3.4	0.5	15	20	599-03210	274-03210	275-03210	276-03210	271-03210	272-03210	273-03210	295-03210	296-03210	298-03210	299-03210
			6.3	5.4	0.75	20	20	599-03211	274-03211	275-03211	276-03211	271-03211	272-03211	273-03211	295-03211	296-03211	298-03211	299-03211
			10	8.6	1	25	20	599-03212	274-03212	275-03212	276-03212	271-03212	272-03212	273-03212	295-03212	296-03212	298-03212	299-03212
			16	14	1.25	32	20	599-03213	274-03213	275-03213	276-03213	271-03213	272-03213	273-03213	295-03213	296-03213	298-03213	299-03213
			25	22	1.5	40	20	599-03214	274-03214	275-03214	276-03214	271-03214	272-03214	273-03214	295-03214	296-03214	298-03214	299-03214
			40	34	2	50	20	599-03215	274-03215	275-03215	276-03215	271-03215	272-03215	273-03215	295-03215	296-03215	298-03215	299-03215
Stainless Steel		FxF	1	0.9	0.5	15	20	599-03144	274-03144	275-03144	276-03144	271-03144	272-03144	273-03144	295-03144	296-03144	298-03144	299-03144
			1.6	1.4	0.5	15	20	599-03145	274-03145	275-03145	276-03145	271-03145	272-03145	273-03145	295-03145	296-03145	298-03145	299-03145
			2.5	2.2	0.5	15	20	599-03146	274-03146	275-03146	276-03146	271-03146	272-03146	273-03146	295-03146	296-03146	298-03146	299-03146
			4	3.4	0.5	15	20	599-03147	274-03147	275-03147	276-03147	271-03147	272-03147	273-03147	295-03147	296-03147	298-03147	299-03147
			6.3	5.4	0.75	20	20	599-03148	274-03148	275-03148	276-03148	271-03148	272-03148	273-03148	295-03148	296-03148	298-03148	299-03148
			10	8.6	1	25	20	599-03149	274-03149	275-03149	276-03149	271-03149	272-03149	273-03149	295-03149	296-03149	298-03149	299-03149
			16	14	1.25	32	20	599-03150	274-03150	275-03150	276-03150	271-03150	272-03150	273-03150	295-03150	296-03150	298-03150	299-03150
			25	22	1.5	40	20	599-03151	274-03151	275-03151	276-03151	271-03151	272-03151	273-03151	295-03151	296-03151	298-03151	299-03151
			40	34	2	50	20	599-03152	274-03152	275-03152	276-03152	271-03152	272-03152	273-03152	295-03152	296-03152	298-03152	299-03152
		UFxUF	1	0.9	0.5	15	20	599-03153	274-03153	275-03153	276-03153	271-03153	272-03153	273-03153	295-03153	296-03153	298-03153	299-03153
			1.6	1.4	0.5	15	20	599-03154	274-03154	275-03154	276-03154	271-03154	272-03154	273-03154	295-03154	296-03154	298-03154	299-03154
			2.5	2.2	0.5	15	20	599-03155	274-03155	275-03155	276-03155	271-03155	272-03155	273-03155	295-03155	296-03155	298-03155	299-03155
			4	3.4	0.5	15	20	599-03156	274-03156	275-03156	276-03156	271-03156	272-03156	273-03156	295-03156	296-03156	298-03156	299-03156
			6.3	5.4	0.75	20	20	599-03157	274-03157	275-03157	276-03157	271-03157	272-03157	273-03157	295-03157	296-03157	298-03157	299-03157
			10	8.6	1	25	20	599-03158	274-03158	275-03158	276-03158	271-03158	272-03158	273-03158	295-03158	296-03158	298-03158	299-03158
			16	14	1.25	32	20	599-03159	274-03159	275-03159	276-03159	271-03159	272-03159	273-03159	295-03159	296-03159	298-03159	299-03159
			25	22	1.5	40	20	599-03160	274-03160	275-03160	276-03160	271-03160	272-03160	273-03160	295-03160	296-03160	298-03160	299-03160
			40	34	2	50	20	599-03161	274-03161	275-03161	276-03161	271-03161	272-03161	273-03161	295-03161	296-03161	298-03161	299-03161

* F = Female NPT, UF = Union Female, UM = Union Male connection, — = Special Order, X = Inappropriate combination.

Table 6. 2-1/2 to 6-Inch Flanged Valves, ANSI Class 125.

Port	Action	Characteristic	Trim	Packing	Flow Rate Cv	Flow Rate Kvs	Line Size In	Line Size mm	Stroke	Type	Pneumatic				Pneumatic with Factory Mounted Position Relay			
										Stroke	20 mm			40 mm	20 mm			40 mm
										Description	8-inch	8-inch Hi-Temp	12-inch	12-inch	8-inch	8-inch Hi-Temp	12-inch	12-inch
										Technical Instructions	155-161P25	155-161P25	155-162P25	155-162P25	155-161P25	155-161P25	155-162P25	155-162P25
										Actuator Assembly	599-01050	599-01051	599-01010	599-01000	599-01050 and 599-00426	599-01051 and 599-00425	599-01010 and 599-00423	599-01000 and 599-00423
										Valve Assembly	Actuator Code 277	Actuator Code 278	Actuator Code 279	Actuator Code 281	Actuator Code 283	Actuator Code 284	Actuator Code 285	Actuator Code 287
2-Way Tech. Instr. 155-159P25	Normally Closed (NC)	Equal Percentage	Stainless Steel	Standard	63	54	2.5	65	20	599-05970	277-05970	—	279-05970	X	283-05970	—	285-05970	X
					100	86	3	80	20	599-05971	277-05971	—	279-05971	X	283-05971	—	285-05971	X
					160	140	4	100	40	599-05972	X	X	X	281-05972	X	X	X	287-05972
					250	215	5	125	40	599-05973	X	X	X	281-05973	X	X	X	287-05973
					400	340	6	150	40	599-05974	X	X	X	281-05974	X	X	X	287-05974
			Bronze		63	54	2.5	65	20	599-05990	277-05990	—	279-05990	X	283-05990	—	285-05990	X
					100	86	3	80	20	599-05991	277-05991	—	279-05991	X	283-05991	—	285-05991	X
					160	140	4	100	40	599-05992	X	X	X	281-05992	X	X	X	287-05992
					250	215	5	125	40	599-05993	X	X	X	281-05993	X	X	X	287-05993
					400	340	6	150	40	599-05994	X	X	X	281-05994	X	X	X	287-05994
		Linear	Stainless Steel		63	54	2.5	65	20	599-06070	277-06070	—	279-06070	X	283-06070	—	285-06070	X
					100	86	3	80	20	599-06071	277-06071	—	279-06071	X	283-06071	—	285-06071	X
					160	140	4	100	40	599-06072	X	X	X	281-06072	X	X	X	287-06072
					250	215	5	125	40	599-06073	X	X	X	281-06073	X	X	X	287-06073
					400	340	6	150	40	599-06074	X	X	X	281-06074	X	X	X	287-06074
				Hi-Temp	63	54	2.5	65	20	599-06050	277-06050	278-06050	279-06050	X	283-06050	284-06050	285-06050	X
					100	86	3	80	20	599-06051	277-06051	278-06051	279-06051	X	283-06051	284-06051	285-06051	X
					160	140	4	100	40	599-06052	X	X	X	281-06052	X	X	X	287-06052
					250	215	5	125	40	599-06053	X	X	X	281-06053	X	X	X	287-06053
					400	340	6	150	40	599-06054	X	X	X	281-06054	X	X	X	287-06054
	Normally Open (NO)	Equal Percentage	Stainless Steel	Standard	63	54	2.5	65	20	599-05960	277-05960	—	279-05960	X	283-05960	—	285-05960	X
					100	86	3	80	20	599-05961	277-05961	—	279-05961	X	283-05961	—	285-05961	X
					160	140	4	100	40	599-05962	X	X	X	281-05962	X	X	X	287-05962
					250	215	5	125	40	599-05963	X	X	X	281-05963	X	X	X	287-05963
					400	340	6	150	40	599-05964	X	X	X	281-05964	X	X	X	287-05964
			Bronze		63	54	2.5	65	20	599-05980	277-05980	—	279-05980	X	283-05980	—	285-05980	X
					100	86	3	80	20	599-05981	277-05981	—	279-05981	X	283-05981	—	285-05981	X
					160	140	4	100	40	599-05982	X	X	X	281-05982	X	X	X	287-05982
					250	215	5	125	40	599-05983	X	X	X	281-05983	X	X	X	287-05983
					400	340	6	150	40	599-05984	X	X	X	281-05984	X	X	X	287-05984
		Linear	Stainless		63	54	2.5	65	20	599-06060	277-06060	—	279-06060	X	283-06060	—	285-06060	X
					100	86	3	80	20	599-06061	277-06061	—	279-06061	X	283-06061	—	285-06061	X
					160	140	4	100	40	599-06062	X	X	X	281-06062	X	X	X	287-06062
					250	215	5	125	40	599-06063	X	X	X	281-06063	X	X	X	287-06063
					400	340	6	150	40	599-06064	X	X	X	281-06064	X	X	X	287-06064
				Hi-Temp	63	54	2.5	65	20	599-06040	277-06040	278-06040	279-06040	X	283-06040	284-06040	285-06040	X
					100	86	3	80	20	599-06041	277-06041	278-06041	279-06041	X	283-06041	284-06041	285-06041	X
					160	140	4	100	40	599-06042	X	X	X	281-06042	X	X	X	287-06042
					250	215	5	125	40	599-06043	X	X	X	281-06043	X	X	X	287-06043
					400	340	6	150	40	599-06044	X	X	X	281-06044	X	X	X	287-06044
3-Way Tech. Instr. 155-160P25	Mixing	Linear	Stainless Steel	Standard	63	54	2.5	65	20	599-06165	277-06165	—	279-06165	X	283-06165	—	285-06165	X
					100	86	3	80	20	599-06166	277-06166	—	279-06166	X	283-06166	—	285-06166	X
					160	140	4	100	40	599-06167	X	X	X	281-06167	X	X	X	287-06167
					250	215	5	125	40	599-06168	X	X	X	281-06168	X	X	X	287-06168
					400	340	6	150	40	599-06169	X	X	X	281-06169	X	X	X	287-06169
			Bronze		63	54	2.5	65	20	599-06160	277-06160	—	279-06160	X	283-06160	—	285-06160	X
					100	86	3	80	20	599-06161	277-06161	—	279-06161	X	283-06161	—	285-06161	X
					160	140	4	100	40	599-06162	X	X	X	281-06162	X	X	X	287-06162
					250	215	5	125	40	599-06163	X	X	X	281-06163	X	X	X	287-06163
					400	340	6	150	40	599-06164	X	X	X	281-06164	X	X	X	287-06164

Spring start point for valve assemblies with pneumatic actuators: NO = 3 to 8 psi (21 to 55 kPa), NC = 10 to 15 psi (69 to 103 kPa), 3-Way = 8 to 13 psi (55 to 90 kPa), — = Special Order, X = Inappropriate combination.

Table 6a. 2-1/2 to 6-Inch Flanged Valves, ANSI Class 125, Continued.

Port	Action	Characteristic	Trim	Packing	Flow aRate		Line Size		Stroke	Type	Electronic-Hydraulic					
										Stroke	20 mm					
										Description	24V, 3-Pos, SR	24V, 3-Pos, NSR	24V, 0-10V, 4-20mA, SR	24V, 3-Pos, SR	24V, 3-Pos, NSR	24V, 0-10V, 4-20mA, SR
										Technical Instructions	155-181P25	155-181P25	155-180P25	155-171P25	155-171P25	155-16325
										Actuator Assembly	SKD82.51U	SKD82.50U	SKD62U	SKB82.51U	SKB82.50U	SKB62U
					Cv	Kvs	In	mm		Valve Assembly	Actuator Code 276	Actuator Code 275	Actuator Code 274	Actuator Code 289	Actuator Code 290	Actuator Code 291
2-Way Tech. Instr. 155-159P25	Normally Closed (NC)	Equal Percentage	Stainless Steel	Standard	63	54	2.5	65	20	599-05970	276-05970	275-05970	274-05970	289-05970	290-05970	291-05970
					100	86	3	80	20	599-05971	276-05971	275-05971	274-05971	289-05971	290-05971	291-05971
					160	140	4	100	40	599-05972	X	X	X	X	X	X
					250	215	5	125	40	599-05973	X	X	X	X	X	X
					400	340	6	150	40	599-05974	X	X	X	X	X	X
			Bronze		63	54	2.5	65	20	599-05990	276-05990	275-05990	274-05990	289-05990	290-05990	291-05990
					100	86	3	80	20	599-05991	276-05991	275-05991	274-05991	289-05991	290-05991	291-05991
					160	140	4	100	40	599-05992	X	X	X	X	X	X
					250	215	5	125	40	599-05993	X	X	X	X	X	X
					400	340	6	150	40	599-05994	X	X	X	X	X	X
		Linear	Stainless Steel		63	54	2.5	65	20	599-06070	276-06070	275-06070	274-06070	289-06070	290-06070	291-06070
					100	86	3	80	20	599-06071	276-06071	275-06071	274-06071	289-06071	290-06071	291-06071
					160	140	4	100	40	599-06072	X	X	X	X	X	X
					250	215	5	125	40	599-06073	X	X	X	X	X	X
					400	340	6	150	40	599-06074	X	X	X	X	X	X
				Hi-Temp	63	54	2.5	65	20	599-06050	276-06050	275-06050	274-06050	289-06050	290-06050	291-06050
					100	86	3	80	20	599-06051	276-06051	275-06051	274-06051	289-06051	290-06051	291-06051
					160	140	4	100	40	599-06052	X	X	X	X	X	X
					250	215	5	125	40	599-06053	X	X	X	X	X	X
					400	340	6	150	40	599-06054	X	X	X	X	X	X
	Normally Open (NO)	Equal Percentage	Stainless Steel	Standard	63	54	2.5	65	20	599-05960	276-05960	275-05960	274-05960	289-05960	290-05960	291-05960
					100	86	3	80	20	599-05961	276-05961	275-05961	274-05961	289-05961	290-05961	291-05961
					160	140	4	100	40	599-05962	X	X	X	X	X	X
					250	215	5	125	40	599-05963	X	X	X	X	X	X
					400	340	6	150	40	599-05964	X	X	X	X	X	X
			Bronze		63	54	2.5	65	20	599-05980	276-05980	275-05980	274-05980	289-05980	290-05980	291-05980
					100	86	3	80	20	599-05981	276-05981	275-05981	274-05981	289-05981	290-05981	291-05981
					160	140	4	100	40	599-05982	X	X	X	X	X	X
					250	215	5	125	40	599-05983	X	X	X	X	X	X
					400	340	6	150	40	599-05984	X	X	X	X	X	X
		Linear	Stainless		63	54	2.5	65	20	599-06060	276-06060	275-06060	274-06060	289-06060	290-06060	291-06060
					100	86	3	80	20	599-06061	276-06061	275-06061	274-06061	289-06061	290-06061	291-06061
					160	140	4	100	40	599-06062	X	X	X	X	X	X
					250	215	5	125	40	599-06063	X	X	X	X	X	X
					400	340	6	150	40	599-06064	X	X	X	X	X	X
				Hi-Temp	63	54	2.5	65	20	599-06040	276-06040	275-06040	274-06040	289-06040	290-06040	291-06040
					100	86	3	80	20	599-06041	276-06041	275-06041	274-06041	289-06041	290-06041	291-06041
					160	140	4	100	40	599-06042	X	X	X	X	X	X
					250	215	5	125	40	599-06043	X	X	X	X	X	X
					400	340	6	150	40	599-06044	X	X	X	X	X	X
3-Way Tech. Instr. 155-160P25	Mixing	Linear	Stainless	Standard	63	54	2.5	65	20	599-06165	276-06165	275-06165	274-06165	289-06165	290-06165	291-06165
					100	86	3	80	20	599-06166	276-06166	275-06166	274-06166	289-06166	290-06166	291-06166
					160	140	4	100	40	599-06167	X	X	X	X	X	X
					250	215	5	125	40	599-06168	X	X	X	X	X	X
					400	340	6	150	40	599-06169	X	X	X	X	X	X
			Bronze		63	54	2.5	65	20	599-06160	276-06160	275-06160	274-06160	289-06160	290-06160	291-06160
					100	86	3	80	20	599-06161	276-06161	275-06161	274-06161	289-06161	290-06161	291-06161
					160	140	4	100	40	599-06162	X	X	X	X	X	X
					250	215	5	125	40	599-06163	X	X	X	X	X	X
					400	340	6	150	40	599-06164	X	X	X	X	X	X

— = Special Order, X = Inappropriate combination.

Table 6b. 2-1/2 to 6-Inch Flanged Valves, ANSI Class 125, Continued.

Port	Action	Characteristic	Trim	Packing	Flow Rate		Line Size		Stroke	Type	Electronic-Hydraulic			Electronic-Mechanical		
										Stroke	40 mm			20 mm		40 mm
										Description	24V, 3-Pos, SR	24V, 3-Pos, NSR	24V, 0-10V, 4-20mA, SR	24V, 0-10V	24V, 0-10V	24V, 0-10V
										Technical Instructions	155-171P25	155-171P25	155-163P25	155-172P25	155-172P25	155-172P25
										Actuator Assembly	SKC82.61U	SKC82.60U	SKC62U	Lo NSR 599-10021	Lo NSR 599-10022	Hi NSR 599-10023
					Cv	Kvs	In	mm		Valve Assembly	Actuator Code 292	Actuator Code 293	Actuator Code 294	Actuator Code 295	Actuator Code 296	Actuator Code 297
2-Way Tech. Instr. 155-159P25	Normally Closed (NC)	Equal Percentage	Stainless Steel	Standard	63	54	2.5	65	20	599-05970	X	X	X	295-05970	296-05970	X
					100	86	3	80	20	599-05971	X	X	X	295-05971	296-05971	X
					160	140	4	100	40	599-05972	292-05972	293-05972	294-05972	X	X	297-05972
					250	215	5	125	40	599-05973	292-05973	293-05973	294-05973	X	X	X
					400	340	6	150	40	599-05974	292-05974	293-05974	294-05974	X	X	X
			Bronze		63	54	2.5	65	20	599-05990	X	X	X	295-05990	296-05990	X
					100	86	3	80	20	599-05991	X	X	X	295-05991	296-05991	X
					160	140	4	100	40	599-05992	292-05992	293-05992	294-05992	X	X	297-05992
					250	215	5	125	40	599-05993	292-05993	293-05993	294-05993	X	X	X
					400	340	6	150	40	599-05994	292-05994	293-05994	294-05994	X	X	X
		Linear	Stainless Steel		63	54	2.5	65	20	599-06070	X	X	X	295-06070	296-06070	X
					100	86	3	80	20	599-06071	X	X	X	295-06071	296-06071	X
					160	140	4	100	40	599-06072	292-06072	293-06072	294-06072	X	X	297-06072
					250	215	5	125	40	599-06073	292-06073	293-06073	294-06073	X	X	X
					400	340	6	150	40	599-06074	292-06074	293-06074	294-06074	X	X	X
				Hi-Temp	63	54	2.5	65	20	599-06050	X	X	X	295-06050	296-06050	X
					100	86	3	80	20	599-06051	X	X	X	295-06051	296-06051	X
					160	140	4	100	40	599-06052	292-06052	293-06052	294-06052	X	X	297-06052
					250	215	5	125	40	599-06053	292-06053	293-06053	294-06053	X	X	X
					400	340	6	150	40	599-06054	292-06054	293-06054	294-06054	X	X	X
	Normally Open (NO)	Equal Percentage	Stainless Steel	Standard	63	54	2.5	65	20	599-05960	X	X	X	295-05960	296-05960	X
					100	86	3	80	20	599-05961	X	X	X	295-05961	296-05961	X
					160	140	4	100	40	599-05962	292-05962	293-05962	294-05962	X	X	297-05962
					250	215	5	125	40	599-05963	292-05963	293-05963	294-05963	X	X	X
					400	340	6	150	40	599-05964	292-05964	293-05964	294-05964	X	X	X
			Bronze		63	54	2.5	65	20	599-05980	X	X	X	295-05980	296-05980	X
					100	86	3	80	20	599-05981	X	X	X	295-05981	296-05981	X
					160	140	4	100	40	599-05982	292-05982	293-05982	294-05982	X	X	297-05982
					250	215	5	125	40	599-05983	292-05983	293-05983	294-05983	X	X	X
					400	340	6	150	40	599-05984	292-05984	293-05984	294-05984	X	X	X
		Linear	Stainless		63	54	2.5	65	20	599-06060	X	X	X	295-06060	296-06060	X
					100	86	3	80	20	599-06061	X	X	X	295-06061	296-06061	X
					160	140	4	100	40	599-06062	292-06062	293-06062	294-06062	X	X	297-06062
					250	215	5	125	40	599-06063	292-06063	293-06063	294-06063	X	X	X
					400	340	6	150	40	599-06064	292-06064	293-06064	294-06064	X	X	X
				Hi-Temp	63	54	2.5	65	20	599-06040	X	X	X	295-06040	296-06040	X
					100	86	3	80	20	599-06041	X	X	X	295-06041	296-06041	X
					160	140	4	100	40	599-06042	292-06042	293-06042	294-06042	X	X	297-06042
					250	215	5	125	40	599-06043	292-06043	293-06043	294-06043	X	X	X
					400	340	6	150	40	599-06044	292-06044	293-06044	294-06044	X	X	X
3-Way Tech. Instr. 155-160P25	Mixing	Linear	Stainless	Standard	63	54	2.5	65	20	599-06165	X	X	X	295-06165	296-06165	X
					100	86	3	80	20	599-06166	X	X	X	295-06166	296-06166	X
					160	140	4	100	40	599-06167	292-06167	293-06167	294-06167	X	X	297-06167
					250	215	5	125	40	599-06168	292-06168	293-06168	294-06168	X	X	X
					400	340	6	150	40	599-06169	292-06169	293-06169	294-06169	X	X	X
			Bronze		63	54	2.5	65	20	599-06160	X	X	X	295-06160	296-06160	X
					100	86	3	80	20	599-06161	X	X	X	295-06161	296-06161	X
					160	140	4	100	40	599-06162	292-06162	293-06162	294-06162	X	X	297-06162
					250	215	5	125	40	599-06163	292-06163	293-06163	294-06163	X	X	X
					400	340	6	150	40	599-06164	292-06164	293-06164	294-06164	X	X	X

— = Special Order, X = Inappropriate combination.

Table 7. 2-1/2 to 6-Inch Flanged Valves, ANSI Class 250.

Port	Action	Characteristic	Trim	Packing	Flow Rate		Line Size		Stroke	Type	Pneumatic				Pneumatic with Factory Mounted Position Relay			
										Stroke	20 mm			40 mm	20 mm			40 mm
										Description	8-inch	8-inch Hi-Temp	12-inch	12-inch	8-inch	8-inch Hi-Temp	12-inch	12-inch
										Technical Instructions	155-161P25	155-161P25	155-162P25	155-162P25	155-161P25	155-161P25	155-162P25	155-162P25
										Actuator Assembly	599-01050	599-01051	599-01010	599-01000	599-01050 & 599-00426	599-01051 & 599-00425	599-01010 & 599-00423	599-01000 & 599-00423
					Cv	Kvs	In	mm		Valve Assembly	Actuator Code 277	Actuator Code 278	Actuator Code 279	Actuator Code 281	Actuator Code 283	Actuator Code 284	Actuator Code 285	Actuator Code 287
2-Way Tech. Instr. 155-159P25	Normally Closed (NC)	Equal Percentage	Stainless Steel	Standard	63	54	2.5	65	20	599-05930	277-05930	—	279-05930	X	283-05930	—	285-05930	X
					100	86	3	80	20	599-05931	277-05931	—	279-05931	X	283-05931	—	285-05931	X
					160	140	4	100	40	599-05932	X	X	X	281-05932	X	X	X	287-05932
					250	215	5	125	40	599-05933	X	X	X	281-05933	X	X	X	287-05933
					400	340	6	150	40	599-05934	X	X	X	281-05934	X	X	X	287-05934
			Bronze		63	54	2.5	65	20	599-05950	277-05950	—	279-05950	X	283-05950	—	285-05950	X
					100	86	3	80	20	599-05951	277-05951	—	279-05951	X	283-05951	—	285-05951	X
					160	140	4	100	40	599-05952	X	X	X	281-05952	X	X	X	287-05952
					250	215	5	125	40	599-05953	X	X	X	281-05953	X	X	X	287-05953
					400	340	6	150	40	599-05954	X	X	X	281-05954	X	X	X	287-05954
		Linear	Stainless Steel		63	54	2.5	65	20	599-06150	277-06150	—	279-06150	X	283-06150	—	285-06150	X
					100	86	3	80	20	599-06151	277-06151	—	279-06151	X	283-06151	—	285-06151	X
					160	140	4	100	40	599-06152	X	X	X	281-06152	X	X	X	287-06152
					250	215	5	125	40	599-06153	X	X	X	281-06153	X	X	X	287-06153
					400	340	6	150	40	599-06154	X	X	X	281-06154	X	X	X	287-06154
				Hi-Temp	63	54	2.5	65	20	599-06130	277-06130	278-06130	279-06130	X	283-06130	284-06130	285-06130	X
					100	86	3	80	20	599-06131	277-06131	278-06131	279-06131	X	283-06131	284-06131	285-06131	X
					160	140	4	100	40	599-06132	X	X	X	281-06132	X	X	X	287-06132
					250	215	5	125	40	599-06133	X	X	X	281-06133	X	X	X	287-06133
					400	340	6	150	40	599-06134	X	X	X	281-06134	X	X	X	287-06134
	Normally Open (NO)	Equal Percentage	Stainless Steel	Standard	63	54	2.5	65	20	599-05920	277-05920	—	279-05920	X	283-05920	—	285-05920	X
					100	86	3	80	20	599-05921	277-05921	—	279-05921	X	283-05921	—	285-05921	X
					160	140	4	100	40	599-05922	X	X	X	281-05922	X	X	X	287-05922
					250	215	5	125	40	599-05923	X	X	X	281-05923	X	X	X	287-05923
					400	340	6	150	40	599-05924	X	X	X	281-05924	X	X	X	287-05924
			Bronze		63	54	2.5	65	20	599-05940	277-05940	—	279-05940	X	283-05940	—	285-05940	X
					100	86	3	80	20	599-05941	277-05941	—	279-05941	X	283-05941	—	285-05941	X
					160	140	4	100	40	599-05942	X	X	X	281-05942	X	X	X	287-05942
					250	215	5	125	40	599-05943	X	X	X	281-05943	X	X	X	287-05943
					400	340	6	150	40	599-05944	X	X	X	281-05944	X	X	X	287-05944
		Linear	Stainless		63	54	2.5	65	20	599-06140	277-06140	—	279-06140	X	283-06140	—	285-06140	X
					100	86	3	80	20	599-06141	277-06141	—	279-06141	X	283-06141	—	285-06141	X
					160	140	4	100	40	599-06142	X	X	X	281-06142	X	X	X	287-06142
					250	215	5	125	40	599-06143	X	X	X	281-06143	X	X	X	287-06143
					400	340	6	150	40	599-06144	X	X	X	281-06144	X	X	X	287-06144
				Hi-Temp	63	54	2.5	65	20	599-06120	277-06120	278-06120	279-06120	X	283-06120	284-06120	285-06120	X
					100	86	3	80	20	599-06121	277-06121	278-06121	279-06121	X	283-06121	284-06121	285-06121	X
					160	140	4	100	40	599-06122	X	X	X	281-06122	X	X	X	287-06122
					250	215	5	125	40	599-06123	X	X	X	281-06123	X	X	X	287-06123
					400	340	6	150	40	599-06124	X	X	X	281-06124	X	X	X	287-06124
3-Way Tech. Instr. 155-160P25	Mixing	Linear	Stainless	Standard	63	54	2.5	65	20	599-06175	277-06175	—	279-06175	X	283-06175	—	285-06175	X
					100	86	3	80	20	599-06176	277-06176	—	279-06176	X	283-06176	—	285-06176	X
					160	140	4	100	40	599-06177	X	X	X	281-06177	X	X	X	287-06177
					250	215	5	125	40	599-06178	X	X	X	281-06178	X	X	X	287-06178
					400	340	6	150	40	599-06179	X	X	X	281-06179	X	X	X	287-06179
			Bronze		63	54	2.5	65	20	599-06170	277-06170	—	279-06170	X	283-06170	—	285-06170	X
					100	86	3	80	20	599-06171	277-06171	—	279-06171	X	283-06171	—	285-06171	X
					160	140	4	100	40	599-06172	X	X	X	281-06172	X	X	X	287-06172
					250	215	5	125	40	599-06173	X	X	X	281-06173	X	X	X	287-06173
					400	340	6	150	40	599-06174	X	X	X	281-06174	X	X	X	287-06174

Spring start point for valve assemblies with pneumatic actuators: NO = 3 to 8 psi (21 to 55 kPa), NC = 10 to 15 psi (69 to 103 kPa), 3-Way = 8 to 13 psi (55 to 90 kPa), — = Special Order, X = Inappropriate combination.

Table 7a. 2-1/2 to 6-Inch Flanged Valves, ANSI Class 250, Continued.

Port	Action	Characteristic	Trim	Packing	Flow Rate		Line Size		Stroke	Type	Electronic-Hydraulic					
										Stroke	20 mm					
										Description	24V, 3-Pos, SR	24V, 3-Pos, NSR	24V, 0-10V, 4-20 mA, SR	24V, 3-Pos, SR	24V, 3-Pos, NSR	24V, 0-10V, 4-20 mA, SR
										Technical Instructions	155-181P25	155-181P25	155-180P25	155-171P25	155-171P25	155-16325
										Actuator Assembly	SKD82.51U	SKD82.50U	SKD62U	SKB82.51U	SKB82.50U	SKB62U
					Cv	Kvs	In	mm		Valve Assembly	Actuator Code 276	Actuator Code 275	Actuator Code 274	Actuator Code 289	Actuator Code 290	Actuator Code 291
2-Way Tech. Instr. 155-159P25	Normally Closed (NC)	Equal Percentage	Stainless Steel	Standard	63	54	2.5	65	20	599-05930	276-05930	275-05930	274-05930	289-05930	290-05930	291-05930
					100	86	3	80	20	599-05931	276-05931	275-05931	274-05931	289-05931	290-05931	291-05931
					160	140	4	100	40	599-05932	X	X	X	X	X	X
					250	215	5	125	40	599-05933	X	X	X	X	X	X
					400	340	6	150	40	599-05934	X	X	X	X	X	X
			Bronze		63	54	2.5	65	20	599-05950	276-05950	275-05950	274-05950	289-05950	290-05950	291-05950
					100	86	3	80	20	599-05951	276-05951	275-05951	274-05951	289-05951	290-05951	291-05951
					160	140	4	100	40	599-05952	X	X	X	X	X	X
					250	215	5	125	40	599-05953	X	X	X	X	X	X
					400	340	6	150	40	599-05954	X	X	X	X	X	X
		Linear	Stainless Steel		63	54	2.5	65	20	599-06150	276-06150	275-06150	274-06150	289-06150	290-06150	291-06150
					100	86	3	80	20	599-06151	276-06151	275-06151	274-06151	289-06151	290-06151	291-06151
					160	140	4	100	40	599-06152	X	X	X	X	X	X
					250	215	5	125	40	599-06153	X	X	X	X	X	X
					400	340	6	150	40	599-06154	X	X	X	X	X	X
				Hi-Temp	63	54	2.5	65	20	599-06130	276-06130	275-06130	274-06130	289-06130	290-06130	291-06130
					100	86	3	80	20	599-06131	276-06131	275-06131	274-06131	289-06131	290-06131	291-06131
					160	140	4	100	40	599-06132	X	X	X	X	X	X
					250	215	5	125	40	599-06133	X	X	X	X	X	X
					400	340	6	150	40	599-06134	X	X	X	X	X	X
	Normally Open (NO)	Equal Percentage	Stainless Steel	Standard	63	54	2.5	65	20	599-05920	276-05920	275-05920	274-05920	289-05920	290-05920	291-05920
					100	86	3	80	20	599-05921	276-05921	275-05921	274-05921	289-05921	290-05921	291-05921
					160	140	4	100	40	599-05922	X	X	X	X	X	X
					250	215	5	125	40	599-05923	X	X	X	X	X	X
					400	340	6	150	40	599-05924	X	X	X	X	X	X
			Bronze		63	54	2.5	65	20	599-05940	276-05940	275-05940	274-05940	289-05940	290-05940	291-05940
					100	86	3	80	20	599-05941	276-05941	275-05941	274-05941	289-05941	290-05941	291-05941
					160	140	4	100	40	599-05942	X	X	X	X	X	X
					250	215	5	125	40	599-05943	X	X	X	X	X	X
					400	340	6	150	40	599-05944	X	X	X	X	X	X
		Linear	Stainless		63	54	2.5	65	20	599-06140	276-06140	275-06140	274-06140	289-06140	290-06140	291-06140
					100	86	3	80	20	599-06141	276-06141	275-06141	274-06141	289-06141	290-06141	291-06141
					160	140	4	100	40	599-06142	X	X	X	X	X	X
					250	215	5	125	40	599-06143	X	X	X	X	X	X
					400	340	6	150	40	599-06144	X	X	X	X	X	X
				Hi-Temp	63	54	2.5	65	20	599-06120	276-06120	275-06120	274-06120	289-06120	290-06120	291-06120
					100	86	3	80	20	599-06121	276-06121	275-06121	274-06121	289-06121	290-06121	291-06121
					160	140	4	100	40	599-06122	X	X	X	X	X	X
					250	215	5	125	40	599-06123	X	X	X	X	X	X
					400	340	6	150	40	599-06124	X	X	X	X	X	X
3-Way Tech. Instr. 155-160P25	Mixing	Linear	Stainless	Standard	63	54	2.5	65	20	599-06175	276-06175	275-06175	274-06175	289-06175	290-06175	291-06175
					100	86	3	80	20	599-06176	276-06176	275-06176	274-06176	289-06176	290-06176	291-06176
					160	140	4	100	40	599-06177	X	X	X	X	X	X
					250	215	5	125	40	599-06178	X	X	X	X	X	X
					400	340	6	150	40	599-06179	X	X	X	X	X	X
			Bronze		63	54	2.5	65	20	599-06170	276-06170	275-06170	274-06170	289-06170	290-06170	291-06170
					100	86	3	80	20	599-06171	276-06171	275-06171	274-06171	289-06171	290-06171	291-06171
					160	140	4	100	40	599-06172	X	X	X	X	X	X
					250	215	5	125	40	599-06173	X	X	X	X	X	X
					400	340	6	150	40	599-06174	X	X	X	X	X	X

— = Special Order, X = Inappropriate combination.

Table 7b. 2-1/2 to 6-Inch Flanged Valves, ANSI Class 250, Continued.

Port	Action	Characteristic	Trim	Packing	Flow Rate		Line Size		Stroke	Type	Electronic-Hydraulic			Electronic-Mechanical		
										Stroke	40 mm			20 mm		40 mm
										Description	24V, 3-Pos, SR	24V, 3-Pos, NSR	24V, 0-10V, 4-20 mA, SR	24V, 0-10V	24V, 0-10V	24V, 0-10V
										Technical Instructions	155-171P25	155-171P25	155-163P25	155-172P25	155-172P25	155-172P25
										Actuator Assembly	SKC82.61U	SKC82.60U	SKC62U	Lo NSR 599-10021	Lo NSR 599-10022	Hi NSR 599-10023
					Cv	Kvs	In	mm		Valve Assembly	Actuator Code 292	Actuator Code 293	Actuator Code 294	Actuator Code 295	Actuator Code 296	Actuator Code 297
2-Way Tech. Instr. 155-159P25	Normally Closed (NC)	Equal Percentage	Stainless Steel	Standard	63	54	2.5	65	20	599-05930	X	X	X	295-05930	296-05930	X
					100	86	3	80	20	599-05931	X	X	X	295-05931	296-05931	X
					160	140	4	100	40	599-05932	292-05932	293-05932	294-05932	X	X	297-05932
					250	215	5	125	40	599-05933	292-05933	293-05933	294-05933	X	X	X
					400	340	6	150	40	599-05934	292-05934	293-05934	294-05934	X	X	X
			Bronze		63	54	2.5	65	20	599-05950	X	X	X	295-05950	296-05950	X
					100	86	3	80	20	599-05951	X	X	X	295-05951	296-05951	X
					160	140	4	100	40	599-05952	292-05952	293-05952	294-05952	X	X	297-05952
					250	215	5	125	40	599-05953	292-05953	293-05953	294-05953	X	X	X
					400	340	6	150	40	599-05954	292-05954	293-05954	294-05954	X	X	X
		Linear	Stainless Steel		63	54	2.5	65	20	599-06150	X	X	X	295-06150	296-06150	X
					100	86	3	80	20	599-06151	X	X	X	295-06151	296-06151	X
					160	140	4	100	40	599-06152	292-06152	293-06152	294-06152	X	X	297-06152
					250	215	5	125	40	599-06153	292-06153	293-06153	294-06153	X	X	X
					400	340	6	150	40	599-06154	292-06154	293-06154	294-06154	X	X	X
				Hi-Temp	63	54	2.5	65	20	599-06130	X	X	X	295-06130	296-06130	X
					100	86	3	80	20	599-06131	X	X	X	295-06131	296-06131	X
					160	140	4	100	40	599-06132	292-06132	293-06132	294-06132	X	X	297-06132
					250	215	5	125	40	599-06133	292-06133	293-06133	294-06133	X	X	X
					400	340	6	150	40	599-06134	292-06134	293-06134	294-06134	X	X	X
	Normally Open (NO)	Equal Percentage	Stainless Steel	Standard	63	54	2.5	65	20	599-05920	X	X	X	295-05920	296-05920	X
					100	86	3	80	20	599-05921	X	X	X	295-05921	296-05921	X
					160	140	4	100	40	599-05922	292-05922	293-05922	294-05922	X	X	297-05922
					250	215	5	125	40	599-05923	292-05923	293-05923	294-05923	X	X	X
					400	340	6	150	40	599-05924	292-05924	293-05924	294-05924	X	X	X
			Bronze		63	54	2.5	65	20	599-05940	X	X	X	295-05940	296-05940	X
					100	86	3	80	20	599-05941	X	X	X	295-05941	296-05941	X
					160	140	4	100	40	599-05942	292-05942	293-05942	294-05942	X	X	297-05942
					250	215	5	125	40	599-05943	292-05943	293-05943	294-05943	X	X	X
					400	340	6	150	40	599-05944	292-05944	293-05944	294-05944	X	X	X
		Linear	Stainless		63	54	2.5	65	20	599-06140	X	X	X	295-06140	296-06140	X
					100	86	3	80	20	599-06141	X	X	X	295-06141	296-06141	X
					160	140	4	100	40	599-06142	292-06142	293-06142	294-06142	X	X	297-06142
					250	215	5	125	40	599-06143	292-06143	293-06143	294-06143	X	X	X
					400	340	6	150	40	599-06144	292-06144	293-06144	294-06144	X	X	X
				Hi-Temp	63	54	2.5	65	20	599-06120	X	X	X	295-06120	296-06120	X
					100	86	3	80	20	599-06121	X	X	X	295-06121	296-06121	X
					160	140	4	100	40	599-06122	292-06122	293-06122	294-06122	X	X	297-06122
					250	215	5	125	40	599-06123	292-06123	293-06123	294-06123	X	X	X
					400	340	6	150	40	599-06124	292-06124	293-06124	294-06124	X	X	X
3-Way Tech. Instr. 155-160P25	Mixing	Linear	Stainless	Standard	63	54	2.5	65	20	599-06175	X	X	X	295-06175	296-06175	X
					100	86	3	80	20	599-06176	X	X	X	295-06176	296-06176	X
					160	140	4	100	40	599-06177	292-06177	293-06177	294-06177	X	X	297-06177
					250	215	5	125	40	599-06178	292-06178	293-06178	294-06178	X	X	X
					400	340	6	150	40	599-06179	292-06179	293-06179	294-06179	X	X	X
			Bronze		63	54	2.5	65	20	599-06170	X	X	X	295-06170	296-06170	X
					100	86	3	80	20	599-06171	X	X	X	295-06171	296-06171	X
					160	140	4	100	40	599-06172	292-06172	293-06172	294-06172	X	X	297-06172
					250	215	5	125	40	599-06173	292-06173	293-06173	294-06173	X	X	X
					400	340	6	150	40	599-06174	292-06174	293-06174	294-06174	X	X	X

— = Special Order, X = Inappropriate combination.

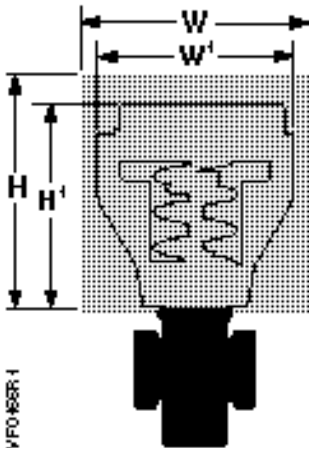
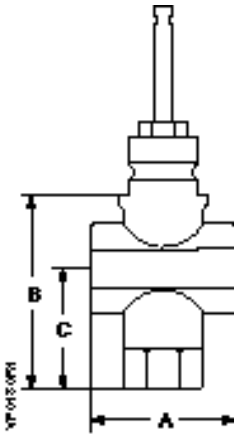


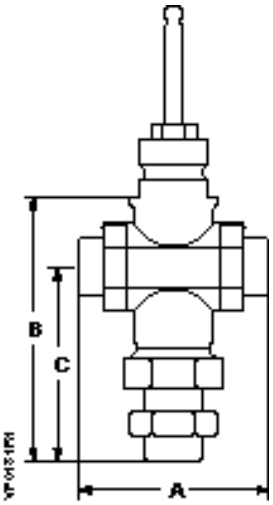
Figure 4. Actuator Dimensions. See Table 8.

Table 8. Dimensions of the Actuator and Recommended Service Envelope. Dimensions in Inches (Millimeters).

Actuator	Actuator Prefix Code	Actual Height of Actuator H1	Service Height H	Actual Width or Diameter of Actuator W1	Service Width W
4-inch Pneumatic	268, 269, 270	5-3/4 (146)	14 (350)	5-1/2 (137) diameter	18 (450)
8-inch' Pneumatic	277, 278, 283, 284	14-1/8 (359)	26 (660)	8-3/4 (222) diameter	21 (533)
12-inch Pneumatic	279, 281, 285, 287	17-7/8 (454)	30 (762)	15-1/8 (384) diameter	27 (686)
SKB/C with handle closed	289, 290, 291, 292, 293, 294	14-3/4 (375)	22-3/4 (578)	7 (178) width × 8-15/16 (226) depth	25 (635)
SKD	274, 275, 276	11-13/16 (300)	19-3/4 (500)	5 (127) width × 6-5/8 (169) depth	14-1/2 (360)
SQX	271, 272, 273	8-7/8 (226)	17 (430)	5-17/32 (140) width × 4-3/8 (111) depth	13-1/2 (340)
El/Mech with linkage	295, 296, 297	11 (280)	22 (559)	5-3/4 (144) width × 8-7/8 (225) depth	25-3/4 (654)



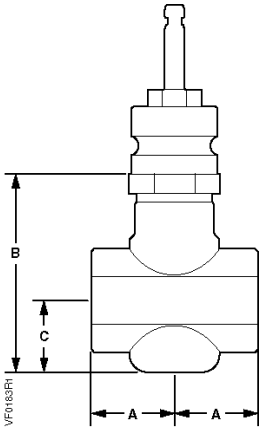
F×F
Female NPT × Female NPT



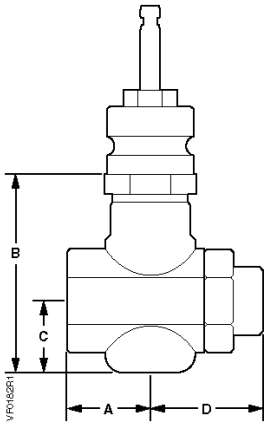
UF×UF
Union Female × Union Female

Table 9. 1/2 to 2-Inch Three-Way Valve Dimensions.

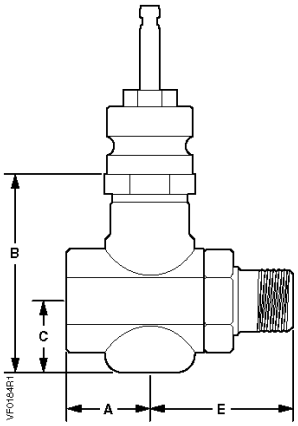
Valve	Valve Size Inches (mm)	Dimensions in Inches (mm)						Weight lb (kg)	
		F×F NPT × NPT			UF×UF Female Union × Female Union				
		A	B	C	A	B	C	F×F	UF×UF
3-Way	1/2 (15)	2-7/8 (72)	4-5/16 (110)	2-11/16 (68)	4-11/16 (119)	6-1/4 (159)	4-5/8 (117)	3 (1.4)	4 (1.8)
	3/4 (20)	3-3/8 (85)	4-5/16 (110)	2-3/4 (69)	6-3/8 (163)	6-15/16 (176)	5-1/4 (134)	4 (1.8)	6 (2.7)
	1 (25)	3-15/16 (100)	4-1/2 (114)	2-7/8 (72)	7-1/16 (180)	7 (178)	5-3/8 (136)	5 (2.3)	7 (3.2)
	1-1/4 (32)	4-15/16 (125)	4-5/8 (116)	2-15/16 (74)	7-1/2 (190)	6-3/4 (170)	5-1/16 (129)	7 (3.2)	11 (5)
	1-1/2 (40)	5-1/8 (130)	4-5/8 (117)	3 (76)	7-13/16 (199)	6-15/16 (176)	5-5/16 (135)	9 (4.1)	13 (5.9)
	2 (50)	6-1/4 (158)	4-3/4 (121)	3-3/16 (81)	9-1/16 (231)	7-3/16 (182)	5-9/16 (141)	13 (5.9)	19 (8.6)



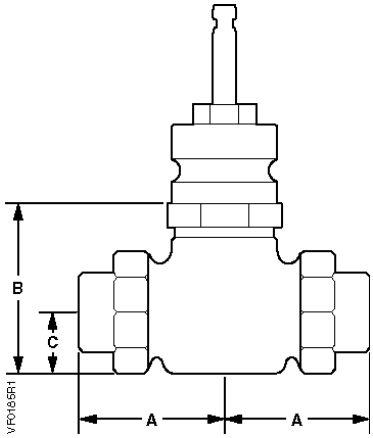
F×F
Female NPT × Female NPT



F×UF
Female NPT × Union Female



F×UM
Female NPT × Union Male



UF×UF
Union Female × Union Female

Table 10. 1/2 to 2-Inch Two-Way Valve Dimensions.

Valve Action	Valve Size inch (mm)	A		B	C	D	E	Weight lb (kg)			
		F×F, F×UF, and F×UM	UF×UF			F×UF	F×UM	F×F	F×UF	F×UM	UF×UF
Normally Closed	1/2 (15)	1-7/16 (36)	— —	3-13/16 (97)	2-3/16 (55)	2-5/16 (59)	2-7/8 (73)	3 (1.4)	4 (1.8)	4 (1.8)	— —
	3/4 (20)	1-11/16 (43)	— —	3-13/16 (97)	2-3/16 (55)	2-5/8 (67)	3-3/16 (81)	4 (1.8)	4 (1.8)	5 (2.3)	— —
	1 (25)	2 (50)	— —	3-13/16 (97)	2-3/16 (55)	3 (76)	3-1/2 (89)	5 (2.3)	5 (2.3)	5 (2.3)	— —
	1-1/4 (32)	2-1/2 (62)	3-3/4 (95)	3-13/16 (97)	2-3/16 (55)	— —	— —	7 (3.2)	— —	— —	9 (4.1)
	1-1/2 (40)	2-9/16 (65)	3-15/16 (99)	3-7/8 (99)	2-1/4 (58)	— —	— —	8 (3.6)	— —	— —	11 (5)
	2 (50)	3-1/8 (79)	4-9/16 (115)	4-3/16 (106)	2-9/16 (65)	— —	— —	16 (7.3)	— —	— —	16 (7.3)
Normally Open	1/2 (15)	1-1/16 (36)	— —	2-15/16 (74)	1-1/4 (31)	2-5/16 (59)	2-7/8 (73)	3 (1.4)	3 (1.4)	3 (1.4)	— —
	3/4 (20)	1-11/16 (43)	— —	3-15/16 (99)	1-7/16 (36)	2-5/8 (67)	3-3/16 (81)	4 (1.8)	4 (1.8)	5 (2.3)	— —
	1 (25)	2 (50)	— —	3-3/4 (96)	1-1/4 (32)	3 (76)	3-1/2 (89)	5 (2.3)	6 (2.7)	6 (2.7)	— —
	1-1/4 (32)	2-1/2 (62)	3-3/4 (95)	4-1/8 * (104)	1-5/8* (40)	— —	4-3/8 (111)	7 (3.2)	— —	8 (3.6)	9 (4.1)
	1-1/2 (40)	2-9/16 (65)	3-15/16 (99)	4-1/4* (109)*	1-3/4* (44)*	— —	— —	9 (4.1)	— —	— —	11 (5)
	2 (50)	3-1/8 (79)	4-9/16 (115)	4-9/16* (116)*	2* (51)*	— —	— —	13 (5.9)	— —	— —	16 (7.3)

* This dimension is determined by the union nut.

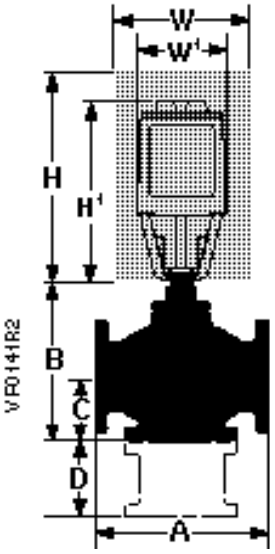


Figure 5. 2-1/2 through 6-inch Dimensions. See Tables 8, 11, and 12.

Table 11. 2-1/2 through 6-Inch Three-Way Valve Dimensions.

Nominal Valve Size Inches (mm)	Dimensions in Inches (Millimeters)					Weight lb (kg)	
	A		B	C	D		
	ANSI Class 125	ANSI Class 250			Service Flange	ANSI Class 125	ANSI Class 250
2-1/2 (65)	10-7/8 (276.4)	11-1/2 (292)	9-3/8 (239.2)	3-3/4 (95)	6-1/2 (165)	104 (47)	117 (53)
3 (80)	11-3/4 (298.5)	12-1/2 (318)	10-3/4 (272)	4-3/8 (111)	7 (178)	114 (52)	132 (60)
4 (100)	13-7/8 (352.4)	14-1/2 (368)	12-1/2 (317.6)	5-1/8 (131.6)	7-1/2 (191)	146 (66)	174 (79)
5 (125)	15-3/4 (400)	16-5/8 (422)	13-3/4 (349.2)	5-3/4 (146.2)	8-1/2 (216)	170 (77)	215 (99)
6 (150)	17-3/4 (451)	18-5/8 (473)	15-1/2 (393)	6-5/8 (167)	9-1/2 (241)	199 (90)	261 (119)

Table 12. 2-1/2 through 6-Inch Two-Way Valve Dimensions.

Valve Action	Nominal Valve Size Inches (mm)	ANSI Class 125				ANSI Class 250			
		Dimensions in Inches (mm)			Weight lb (kg)	Dimensions in Inches (mm)			Weight lb (kg)
		A	B	C		A	B	C	
Normally Closed	2-1/2 (65)	10-7/8 (276)	10-5/8 (269)	4-7/8 (125)	107 (48)	11-1/2 (292)	11 (279)	5-3/8 (135)	120 (55)
	3 (80)	11-3/4 (299)	11-15/16 (303)	5-5/8 (142)	117 (53)	12-1/2 (318)	12-7/16 (315)	6 (154)	136 (62)
	4 (100)	13-7/8 (352)	13-15/16 (354)	6-5/8 (168)	154 (70)	14-1/2 (368)	14-3/8 (364)	7 (178)	184 (84)
	5 (125)	15-3/4 (400)	15-1/4 (388)	7-1/2 (185)	175 (79)	16-5/8 (422)	15-3/4 (399)	7-3/4 (196)	221 (101)
	6 (150)	17-3/4 (451)	171/16 (433)	8-3/16 (207)	210 (95)	18-5/8 (473)	17-1/2 (444)	8-5/8 (218)	275 (125)
Normally Open	2-1/2 (65)	10-7/8 (276)	11 (281)	4-7/8 (123)	107 (49)	11-1/2 (292)	11 (281)	4-7/8 (123)	121 (55)
	3 (80)	11-3/4 (299)	12-1/4 (312)	5-5/16 (135)	118 (53)	12-1/2 (318)	12-1/4 (312)	5-5/16 (135)	139 (63)
	4 (100)	13-7/8 (352)	13-9/16 (345)	6-5/16 (160)	153 (70)	14-1/2 (368)	13-5/8 (344.7)	6-5/16 (160)	183 (83)
	5 (125)	15-3/4 (400)	15-3/16 (385)	7 (177)	176 (80)	16-5/8 (422)	15-3/16 (385)	7 (177)	222 (101)
	6 (150)	17-3/4 (451)	16-3/4 (426)	7-7/8 (200)	211 (96)	18-5/8 (473)	16-3/4 (426)	7-7/8 (200)	277 (126)

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WATER SENSOR / SWITCH
AQUASWITCH

DESCRIPTION

The **AquaSwitch** is a rising water liquid level detector. Its solid state electronic sensing is not affected by oil film, metal trays, or by being slightly off the vertical mounting position. The small footprint (4 x 5 cm) and the low switching level means that the **AquaSwitch** may be mounted in the smallest of reservoirs. The built-in isolated relay switches loads up to 1250VA. This allows the user to select the **AquaSwitch** to directly switch pumps and solenoids or interface into other circuit controls. The built-in delay to off timer may be used to allow water being drained or pumped to be fully vacated or just to prevent nuisance switching.

The relay is normally energized when the power supply is switched on and no water is present. When water rises up the side of the box to reach the switching level, the relay drops out. This sequence is failsafe, allowing each model to be used as a water spillage alarm switch or to turn off a valve or an air conditioning unit before the water overflows its containment. No moving parts, switching capacity 250V, 5 Amps.



AquaSwitch

FEATURES

- ***IPX7 Occasional submersion. Max immersion for less than 30 minutes and at a depth of less than 1 meter.***
- ***Switching capability 5A at 240 VAC***

WARNING: Although the AquaSwitch is totally encapsulated and resistant to water ingress when used as intended (to detect rising water levels), it should not be installed where the encapsulated surface is permanently under water.

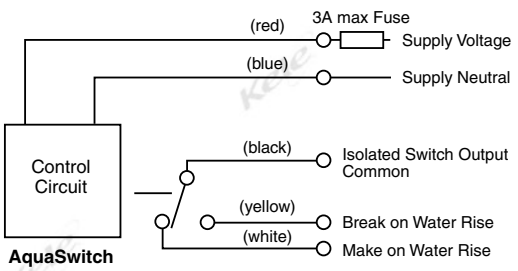
SPECIFICATIONS

Supply Voltage	
3001523	95-254V 50/60 Hz, 2W
3001525	24 VAC/VDC 50/60 Hz
3000542	24 VAC/VDC 50/60 Hz
3000543	24 VAC/VDC 50/60 Hz
3000535	98-254 VAC
Replay Type	SPDT
Relay Rating	240 VAC 50/60 Hz, 5A; 24 VDC, 2.5A
Switch Off Level	0.32" (0.8 cm) nominal
Switch On Level	0.40" (1 cm) nominal
Cable Length	
3001523/3001525	1.5 ft (0.43 m)
3000535/3000542	10 ft (3.0 m)
3000543	5 ft (1.5 m)
Operating Temperature	32° to 158°F (0° to 70°C)
Enclosure Rating	IPX7
Wiring	5 wire
Mounting	screw slots or double stick tape
Dimensions	1.57"H x 1.96"W x 1.25"L (4.0 x 5.0 x 3.1 cm)
Weight	
AQS	0.37 lb (0.17 Kg)
LDI	0.1 lb (0.05 Kg)
Approvals	CE
Warranty	2 years

INSTALLATION

A piece of double-sided tape is fitted to the base of each model and can be used to fix it to the surface being protected. Clean the mounting surface thoroughly to ensure good adhesion. Pull off the protective paper covering and press the models down into position. The AquaSwitch models also have slots for mounting with #4 self-tapping screws.

WIRING



Note: Relay is energized to make black and yellow when powered-up and dry.

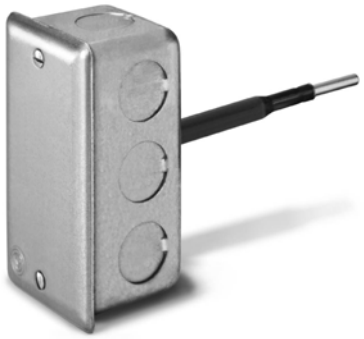
ORDERING INFORMATION

MODEL	DESCRIPTION
3001523	Water sensor block, 90-254 VAC, 1.5 ft lead
3001525	Warer sensor block, 24 VAC, 1.5 ft lead
3000535	Water sensor block, 95-254 VAC, 10 ft lead
3000542	Water sensor block, 24 VAC, 10 ft lead
3000543	Water sensor block, 24 VAC, 5 ft lead

SIEMENS

Technical Specification Sheet
Document Number 149-134P25
July 21, 2009

Duct Point Temperature Sensors



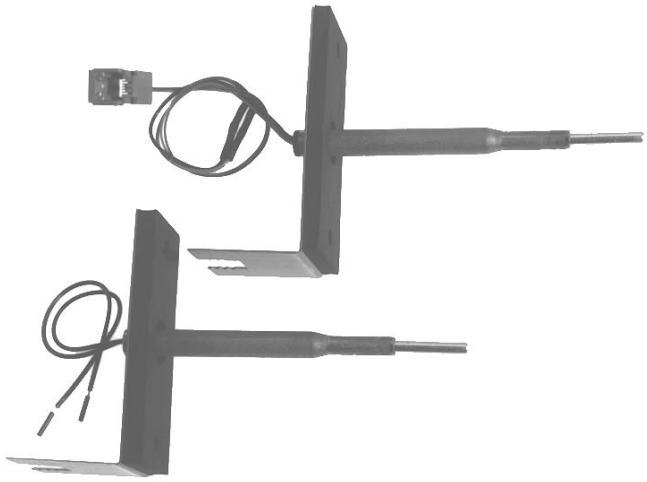
Applications

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

Description

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

NOTE: The 10K ohm thermistor sensors with RJ-11 male connections only work when substituted for the room temperature sensor that is normally connected to the Siemens APOGEE P1 TEC or BACnet TEC controller at the RJ-11 communication port.



Specifications

Temperature Monitoring Range	
10,000 ohms (RJ-11 types only)	55°F to 95°F (13°C to 35°C)
10,000 ohms (Free-wire types)	-40°F to 240°F (-40°C to 116°C)
100,000 ohms	-35°F to 240°F (-37°C to 116°C)
Sensor elements	Thermistor
Output signal	Changing resistance
Installation adjustment	None required
Calibration adjustment	None required
Factory calibration point	77°F (25°C)
Mid-Range Accuracy	
10,000 ohms	± .5°F (± .3°C)
100,000 ohms	± 1.1°F (± .6°C)
Thermistor resistance @ calibration point	10,000 ohms or 100,000 ohms
Installation (maximum cable length shared in conduit with other NEC Class 2 wiring)	100 feet (30.48 m)
Dimensions	
Probe length	3 inches (76.2 mm) or 18 inches (457 mm)
Mounting plate	1-1/2” W × 3-1/2” H (37.6 mm × 89 mm)

Ordering Information

Duct Temperature Sensor	
10,000 ohms (Wire into TEC RJ-11 port [replaces room sensor])	
Mounting flange with 4” probe	540-128
2 × 4 box with 4” probe	538-871
2 × 4 box with 18” probe	540-739
10,000 ohms (Wire into BACnet TEC AI3 Aux port)	
2 × 4 box with 4” probe	QAM2030.010
2 × 4 box with 8” probe	QAM2030.020
2 × 4 box with 18” probe	QAM2030.045
100,000 ohms (Wire into P1 TEC AI3 Auxilliary port)	
Mounting flange	536-811
Accessory	
TEC Duct Point Sensor Setpoint Adapter	540-656

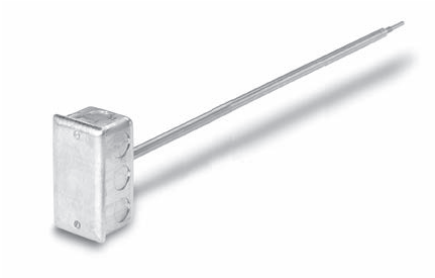
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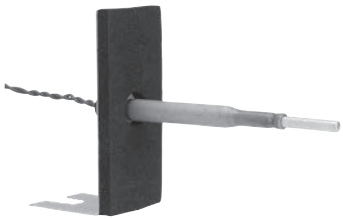
Duct Temperature Sensors – Various Outputs



Duct Sensor
with Rigid Probe



Duct Sensor
with Flexible Probe



536-811 Bracket Mounted
Duct Sensor

Description

Siemens Duct Temperature Sensors are available in lengths from 4 inches to 24 feet. A variety of output signals is available to ensure compatibility with any HVAC control system.

Features

- Wide variety of output signals available
- Wide operating range makes them suitable for use throughout the HVAC system
- Units for large ducts feature flexible probes and probe mounting clips for easy installation

Specifications

Operating Range ..... 0° to 250°F (-18° to 120°C)

Accuracy

1k Ω Pt RTD (385a)	±0.54°F @ 32°F (±0.3°C @ 0°C)
1k Ω Pt RTD (375a)	±0.54°F @ 32°F (±0.3°C @ 0°C)
1k Ω Ni @ 32F RTD	±0.72°F @ 32°F (±0.4°C @ 0°C)
1k Ω Ni @ 70F RTD	±0.75°F @ 75°F (±0.4°C @ 24°C)
10k Ω Type 2 Thermistor	±0.4°F @ 77°F (±0.2°C @ 25°C)
10k Ω Type 3 Thermistor	±0.4°F @ 77°F (±0.2°C @ 25°C)
100k Ω Thermistor	±0.36°F @ 77°F (±0.2°C @ 25°C)
4-20mA	±0.54°F @ 32°F (±0.3°C @ 0°C)

Siemens offers a 5-year warranty on sensors.*

* Not applicable to PL-link devices, IAQ multi-sensor or Series 2200/3200 units with display.

Product Ordering

Output Signal	Sensing Type	Probe Length	Primary MV Range	Part Number
100k Ω Thermistor	Point	4 inches (rigid)	-40° to 180°F (-40° to 82°C)	535-741-4
	Point (Bracket Mount)	4 inches (rigid)		536-811
	Point	8 inches (rigid)		535-741-8
		18 inches (rigid)		535-741-18
	Averaging	18 inches (rigid)		540-244-18
		3 feet (flexible)		540-245-36
		6 feet (flexible)		540-246-72
10k Ω Type II Thermistor	Point	4 inches (rigid)		QAM2030.010
	Point (Bracket Mount)	4 inches (rigid)		QAM2030.010-BR
	Point	8 inches (rigid)		QAM2030.020
		18 inches (rigid)		QAM2030.045
	Averaging	8 feet (flexible)		QAM2030.250
		16 feet (flexible)		QAM2030.500
		24 feet (flexible)		QAM2030.750
1k Ω Ni @ 32F RTD	Point	4 inches (rigid)		QAM2020.010
		8 inches (rigid)		QAM2020.020
		18 inches (rigid)		QAM2020.045
	Averaging	16 feet (flexible)		QAM2020.500
		24 feet (flexible)		QAM2020.750
1k Ω Pt (375a) RTD	Point	4 inches (rigid)		544-339-4
		8 inches (rigid)		544-339-8
		18 inches (rigid)		544-339-18
	Averaging	18 inches (rigid)		544-343-18
		2 feet (rigid)		544-343-24
		3 feet (rigid)		544-343-36
		4 feet (rigid)		544-343-48
		8 feet (flexible)		544-342-8
		16 feet (flexible)		544-342-16
		24 feet (flexible)		544-342-24
1k Ω Pt (385a) RTD	Point	4 inches (rigid)		QAM2012.010
		8 inches (rigid)		QAM2012.020
		18 inches (rigid)		QAM2012.045
	Averaging	8 feet (flexible)		QAM2012.250
		16 feet (flexible)		QAM2012.500
		24 feet (flexible)		QAM2012.750
4-20 mA	Point	4 inches (rigid)	20° to 120°F (-7° to 49°C)	533-376-4
		8 inches (rigid)		533-376-8
		18 inches (rigid)		533-376-18
	Averaging	18 inches (rigid)	20° to 120°F (-7° to 49°C)	535-490-18
		2 feet (rigid)		535-490-24
		3 feet (rigid)		535-490-36
		4 feet (rigid)		535-490-48
		8 feet (flexible)		533-380-8
		16 feet (flexible)		533-380-16
		24 feet (flexible)		533-380-24
	Point	4 inches (rigid)	30° to 250°F (-1° to 121°C)	533-377-4
		8 inches (rigid)	30° to 250°F (-1° to 121°C)	533-377-8
		18 inches (rigid)	30° to 250°F (-1° to 121°C)	533-377-18
		4 inches (rigid)	-4° to 122°F (-20° to 50°C)	544-560-4
		8 inches (rigid)	-4° to 122°F (-20° to 50°C)	544-560-8
		18 inches (rigid)	-4° to 122°F (-20° to 50°C)	544-560-18

SIEMENS

Technical Specification Sheet
Document No. 149-919
March 25, 2022

Immersion Well Temperature Sensors



Thermistor/RTD



4 to 20 mA

Description

Siemens Immersion Well Temperature Sensors monitor and transmit changes in liquid temperature to the HVAC control system. The sensor resistance varies proportionally to the actual temperature being measured.

All sensors are fully assembled with stainless steel thermowells, and are available in 2.5-inch, 4-inch and 6-inch insertion depths.

Multiple output signals are available to ensure compatibility with most common HVAC control systems.

Features

- Variety of sensing elements.
- Suitable for hot or chilled fluids.
- Responsive to temperature changes.
- Accurate and reliable indication of temperature.
- Familiar installation requires no special tools.

Specifications

Output Signals	100k Ω Thermistor 10k Ω Type 2 Thermistor 1k Ω @ 32°F Ni RTD 1k Ω Pt RTD (375a) 1k Ω Pt RTD (385a) 4 to 20 mA • 20°F to 70°F • 30°F to 250°F • 32°F to 212°F
Well Material	300 Series Stainless Steel Lead-free
External Connection Threads	1/2-inch – 14 NPT
Conduit Connection Threads	1/2-inch – 14 NPSMI

NOTE: Not for use in potable water systems.

Table 1. Product Ordering Information.

Output Signal	Insertion Depth	Measuring Range	Accuracy	Product Number
100K Ω Thermistor	2.5 inches	0°F to 250°F (-18°C to 121°C)	±0.50°F (±0.28°C) @ 77°F (25°C)	536-777-25
	4 inches			536-777-40
	6 inches			536-777-60
10K Ω Type II Thermistor	2.5 inches		±0.4°F (±0.22°C) @ 77°F (25°C)	QAE2030.005
	4 inches			QAE2030.010
	6 inches			QAE2030.015
1K Ω @ 32°F Ni RTD	2.5 inches		±0.72°F (±0.4°C) @ 32°F (0°C)	QAE2020.005
	4 inches			QAE2020.010
	6 inches			QAE2020.015
1K Ω Pt RTD (375a)	2.5 inches		±0.54°F (±0.3°C) @ 32°F (0°C)	544-577-25
	4 inches			544-577-40
	6 inches			544-577-60
1K Ω Pt RTD (385a)	2.5 inches			QAE2012.005
	4 inches			QAE2012.010
	6 inches			QAE2012.015
4 to 20 mA	2.5 inches	20°F to 70°F (-7° to 21°C)		536-774-25
	4 inches			536-774-40
	6 inches			536-774-60
	2.5 inches	30°F to 250°F (-1°C to 121°C)		536-767-25
	4 inches			536-767-40
	6 inches			536-767-60
	2.5 inches	32°F to 212°F (0°C to 100°C)		544-562-25
	4 inches			544-562-40
	6 inches			544-562-60

Table 2. Accessories Information.

Description		Part Number
Repair Kits*	Repair Kit, 4 to 20 mA, 30°F to 250°F	536-767-RK
	Repair Kit, 4 to 20m A, 20°F to 70°F	536-774-RK
	Repair Kit, 100k ohm Thermistor	536-777-RK
	Repair Kit, 4 to 20 mA, 32°F to 212°F	544-562-RK
	Repair Kit, PT 1k Ohm RTD (375)	544-577-RK
	Repair Kit, PT 1k Ohm RTD (385)	AQE2012
	Repair Kit, NI 1k Ohm @ 32°F RTD	AQE2020
	Repair Kit, 10k Ohm Type 2 Thermistor	AQE2030
Thermowells	Immersion Well, 2.5-inch	AQE2000.005
	Immersion Well, 4-inch	AQE2000.010
	Immersion Well, 6-inch	AQE2000.015

* Repair kits include replacement sensing element, temperature transmitter (4 to 20 mA models only), and related hardware.

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SIEMENS

Technical Specification Sheet
Document No. 149-920
March 25, 2022

Outdoor Temperature Sensors



Metal



Plastic (RTD/Thermistor)



Plastic (0 to 10V/4 to 20 mA)

Description

Siemens Outdoor Temperature Sensors monitor and transmit changes in temperature to the HVAC control system. The sensor resistance varies proportionally to the actual temperature being measured.

Units are offered in traditional metal housing as well as modern and aesthetically pleasing polycarbonate housings that blend into today's architectural trends. All are ruggedly designed and built for years of weatherproof, outdoor service.

Multiple output signals are available to ensure compatibility with most common HVAC control systems.

Features

- Variety of sensing elements.
- Responsive to temperature changes.
- Accurate and reliable indication of temperature.
- Easy installation requires no special tools.

Specifications

Output Signals	100K Ω Thermistor 10K Ω Type 2 Thermistor 1K Ω @ 32°F Ni RTD 1K Ω Pt RTD (375a) 1K Ω Pt RTD (385a) 4 to 20 mA
Accuracy	See Table 1.

Table 1. Product Ordering Information.

Housing Material	Output Signal	Measuring Range	Accuracy	Product Number
Metal	100K Ω Thermistor	-40°F to 150°F (-40°C to 65°C)	±0.50°F (±0.28°C) @ 77°F (25°C)	536-778
	10K Ω Type II Thermistor		±0.4°F (±0.2°C) @ 77°F (25°C)	QAC2030U
	1K Ω @ 32°F Ni RTD		±0.72°F (±0.4°C) @ 32°F (0°C)	QAC2020U
	1K Ω Pt RTD (375a)		±0.54°F (±0.3°C) @ 32°F (0°C)	544-578
	1K Ω Pt RTD (385a)			QAC2012U
	4 to 20 mA	-58°F to 122°F (-50°C to 50°C)		536-768
Polycarbonate	0 to 10V		±1.6°F (±0.89°C)	QAC3161
	10K Ω Type II Thermistor	−40°F to 158°F (−40 to 70°C)	± 0.81°F (±0.45°C) @ 77°F (25°C)	QAC2030
	1K Ω @ 32°F Ni RTD	–58°F to 158°F (–50°C to 70°C)	± 0.36°F (±0.2°C) @ 32°F (0°C)	QAC22
	1K Ω Pt RTD (385a)	−40 to 158°F (−40 to 70°C)	± 0.54°F (0.3°C) @ 32°F (0°C)	QAC2012
	4 to 20 mA	-58° to 122°F (-50° to 50°C)	±1.6°F (±0.9°C)	QAC3171

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Specifications, Continued

Weight (approx.)	1.5 lbs (680 g)
Mounting	4 × 4 plaster ring (mounts to double gang electrical box)

Communications Option

BACnet	MS/TP ASC
P1	FLN trunk

Display

LCD	128 × 128 RGB backlit
Status indicators	Green LED – Normal Red LED – Alarm Backlit LCD

Electrical Data (Voltage)

Circuit	3-wire (Exc, Out, Com)
Output *	0 to 5 Vdc 0 to 10 Vdc
Excitation	18 to 32 Vac, 50 to 60 Hz
Power consumption	5 W
Alarm output	SPDT relay 1A @ 24 Vdc

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

Electrical Data (Current)

Circuit	2-wire
Output	4 to 20 mA
External load	0 to 510 ohms
Excitation	18 to 32 Vac, 50 to 60 Hz

Pressure Media

Air or non-conductive, non-explosive gases.

Certifications

CSA Standard C22.2 No. 0-M91	General Requirements Canadian Electrical, Part 1
CAN/CSA C22.2 N9. 0.4-04	Bonding of Electrical Equipment
CAN/CSA-C22.2 No. 61010-1-04	Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use Part 1: General Requirements
ANSI/UL61010-1 (2nd Edition)	Safety Requirements for Electrical Equipment for Measurement, Control

Accessories



547-100 Pressure Tap Plate

Ordering Information

Product Number	WC	Protocol	FS
547-101A	+/- 0.05" WC (12.5 Pa)	P1	0.5%
547-102A	+/- 0.1" WC (25 Pa)	P1	0.5%
547-103A	+/- 0.25" WC (62.5 Pa)	P1	0.5%
547-104A	+/- 0.50" WC (12 5Pa)	P1	0.5%
547-105A	+/- 1.0" WC (250 Pa)	P1	0.5%
547-106A	+/- 2.55" WC (625 Pa)	P1	0.5%
547-107A	+/- 5.0" WC (1250 Pa)	P1	0.5%
547-101B	+/- 0.05" WC (12.5 Pa)	P1	0.25%
547-102B	+/- 0.1" WC (25 Pa)	P1	0.25%
547-103B	+/- 0.25" WC (62.5 Pa)	P1	0.25%
547-104B	+/- 0.50" WC (12 5Pa)	P1	0.25%
547-105B	+/- 1.0" WC (250 Pa)	P1	0.25%
547-106B	+/- 2.55" WC (625 Pa)	P1	0.25%
547-107B	+/- 5.0" WC (1250 Pa)	P1	0.25%
547-201A	+/- 0.05" WC (12.5 Pa)	BACnet	0.5%
547-202A	+/- 0.1" WC (25 Pa)	BACnet	0.5%
547-203A	+/- 0.25" WC (62.5 Pa)	BACnet	0.5%
547-204A	+/- 0.50" WC (12 5Pa)	BACnet	0.5%
547-205A	+/- 1.0" WC (250 Pa)	BACnet	0.5%
547-206A	+/- 2.55" WC (625 Pa)	BACnet	0.5%
547-207A	+/- 5.0" WC (1250 Pa)	BACnet	0.5%
547-201B	+/- 0.05" WC (12.5 Pa)	BACnet	0.25%
547-202B	+/- 0.1" WC (25 Pa)	BACnet	0.25%
547-203B	+/- 0.25" WC (62.5 Pa)	BACnet	0.25%
547-204B	+/- 0.50" WC (12 5Pa)	BACnet	0.25%
547-205B	+/- 1.0" WC (250 Pa)	BACnet	0.25%
547-206B	+/- 2.55" WC (625 Pa)	BACnet	0.25%
547-207B	+/- 5.0" WC (1250 Pa)	BACnet	0.25%

Dimensions

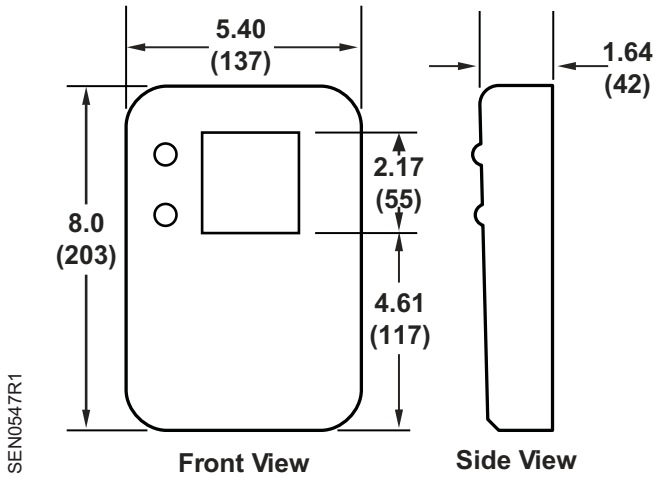


Figure 1. Dimensions in Inches (Millimeters).

AIR PRESSURE SENSORS, SURGE DAMPENERS

A-300 SERIES, RPS, 21121, SD-01

DESCRIPTION

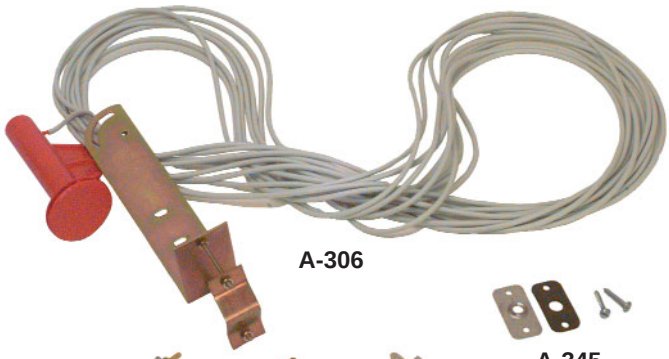
Static Pressure Sensors
A-300 Series Sensors are used with pressure transmitters and pressure switches to sense duct pressures. Two sensors are required to monitor pressure across coils, filters, and blowers. **A-301** and **A-302** have four radial sensing holes and a 4" (10.2 cm) insertion depth. The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

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

Room Static Pressure Sensors
Model RPS is a stainless steel room static pressure sensor. It mounts directly to the wall or to a ceiling using a standard electrical box. **Model RPS-W** is the same as the **RPS** except with a white plastic wall plate. **RPS-I** (ivory) is also available.

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

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


A-306

A-345


A-302

A-301


21121


A-308


RPS-W


RPS



SD-01

ORDERING INFORMATION

MODEL	DUCT STATIC PRESSURE SENSORS
A-301	Static pressure tip, 1/4" compression
A-302	Static pressure tip, 1/4" barb
A-308	Static pressure fitting, 1/4" barb
A-345	Flange mounting kit
	OUTDOOR STATIC PRESSURE SENSOR
A-306	Outdoor air static pressure kit
	DUCT TOTAL PRESSURE SENSOR
21121	4" aluminum impact tube for 3/8" OD plastic tubing
B-137	1/4" barb adapter for #21121 (standard pack-100)
	ROOM STATIC PRESSURE SENSOR
RPS	Stainless steel room pressure sensor, 1/4" barb
RPS-W	White plastic room pressure sensor, 1/4" barb
RPS-I	Ivory plastic room pressure sensor, 1/4" barb
	SURGE DAMPENERS
SD-01	Surge dampener
	FILTER KIT
A-605	Mounting kit for air filter applications

Series A-2000

Stainless Steel Fittings



Series A-2025 Street Elbow: Female Pipe Thread by Male Pipe Thread

Model	Female NPT x Male NPT	Price
A-2025-1	1/8″ x 1/8″	$3.30Ⓑ
A-2025-2	1/4″ x 1/4″	3.50Ⓑ
A-2025-3	3/8″ x 3/8″	3.90Ⓑ
A-2025-4	1/2″ x 1/2″	5.70Ⓑ
A-2025-5	3/4″ x 3/4″	8.90Ⓑ
A-2025-6	1″ x 1″	14.75Ⓑ
A-2025-7	1-1/4″ x 1-1/4″	23.00Ⓑ
A-2025-8	1-1/2″ x 1-1/2″	29.75Ⓑ
A-2025-9	2″ x 2″	46.00Ⓑ
A-2025-10	3″ x 3″	109.00Ⓑ

Series A-2026 Tee: Female Pipe Thread

Model	Female NPT	Price
A-2026-1	1/8″	$5.20Ⓑ
A-2026-2	1/4″	5.50Ⓑ
A-2026-3	3/8″	6.10Ⓑ
A-2026-4	1/2″	9.10Ⓑ
A-2026-5	3/4″	14.75Ⓑ
A-2026-6	1″	21.75Ⓑ
A-2026-7	1-1/4″	33.75Ⓑ
A-2026-8	1-1/2″	42.75Ⓑ
A-2026-9	2″	67.50Ⓑ
A-2026-10	3″	145.00Ⓑ

Series A-2027 Union: Female Pipe Thread

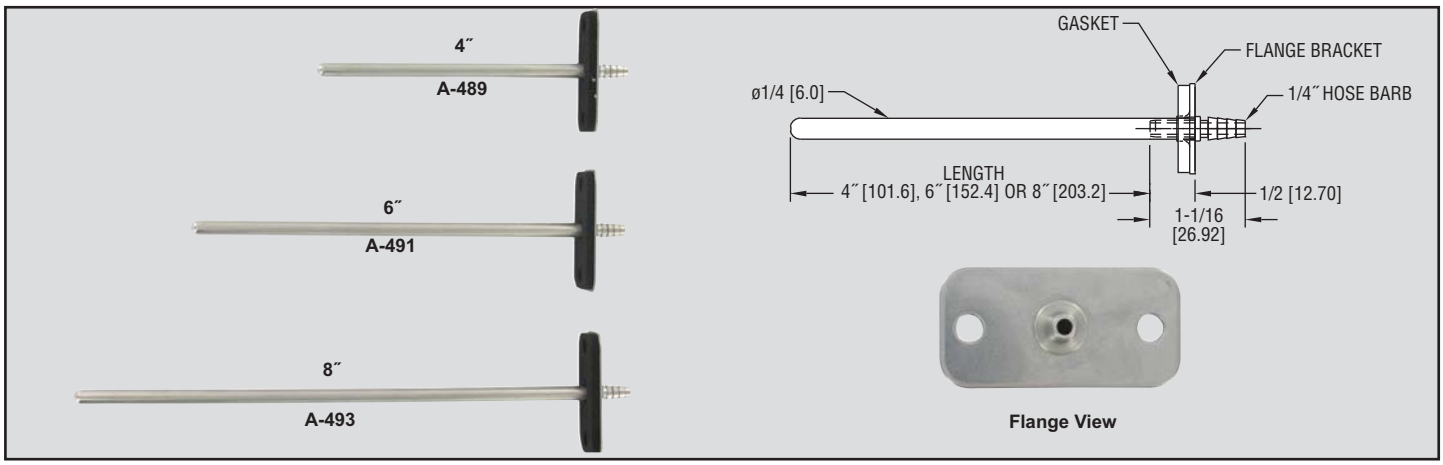
Model	Female NPT	Price
A-2027-1	1/8″	$10.25Ⓑ
A-2027-2	1/4″	9.40Ⓑ
A-2027-3	3/8″	10.00Ⓑ
A-2027-4	1/2″	12.25Ⓑ
A-2027-5	3/4″	17.00Ⓑ
A-2027-6	1″	25.50Ⓑ
A-2027-7	1-1/4″	34.00Ⓑ
A-2027-8	1-1/2″	45.75Ⓑ
A-2027-9	2″	65.50Ⓑ
A-2027-10	3″	137.00Ⓑ

Series A-2028 Nipple: Male Pipe Thread

Model	Male NPT x Length	Price	Model	Male NPT x Length	Price
A-2028-1	1/8″ x 3/4″	$1.70Ⓑ	A-2028-15	3/4″ x 2″	$6.00Ⓑ
A-2028-2	1/8″ x 1-1/2″	2.10Ⓑ	A-2028-16	1″ x 1-1/2″	6.40Ⓑ
A-2028-3	1/8″ x 2″	2.30Ⓑ	A-2028-17	1″ x 2″	7.40Ⓑ
A-2028-4	1/4″ x 7/8″	2.10Ⓑ	A-2028-18	1-1/4″ x 1-5/8″	8.10Ⓑ
A-2028-5	1/4″ x 1-1/2″	2.60Ⓑ	A-2028-19	1-1/4″ x 2″	9.10Ⓑ
A-2028-6	1/4″ x 2″	3.00Ⓑ	A-2028-20	1-1/2″ x 1-3/4″	11.00Ⓑ
A-2028-7	3/8″ x 1″	2.70Ⓑ	A-2028-21	1-1/2″ x 2″	11.75Ⓑ
A-2028-8	3/8″ x 1-1/2″	3.20Ⓑ	A-2028-22	2″ x 2″	15.50Ⓑ
A-2028-9	3/8″ x 2″	3.80Ⓑ	A-2028-23	2″ x 2-1/2″	17.50Ⓑ
A-2028-10	1/2″ x 1-1/8″	3.60Ⓑ	A-2028-24	3″ x 2-5/8″	35.50Ⓑ
A-2028-11	1/2″ x 1-1/2″	4.10Ⓑ	A-2028-25	3″ x 3″	39.25Ⓑ
A-2028-12	1/2″ x 2″	4.90Ⓑ	A-2028-26	4″ x 2-7/8″	51.50Ⓑ
A-2028-13	3/4″ x 1-3/8″	4.80Ⓑ	A-2028-27	4″ x 4″	68.50Ⓑ
A-2028-14	3/4″ x 1-1/2″	5.10Ⓑ			

Ⓑ Items are subject to Schedule B discounts.

Stainless Steel Static Pressure Tips



The Stainless Steel Static Pressure Tips are used to measure static pressures in ducts or rooms. They are to be connected to differential pressure switches and transmitters. Two static sensors are used in applications where differential pressure is required across a filter or coil. These sensors include a mounting flange with integral rubber gasket and two screws for simplifying mounting on a duct.

SPECIFICATIONS
Sizes: 4″ (101 mm), 6″ (152 mm), 8″ (203 mm).
Materials: 304 SS sensor tube, 303 SS hose barb, 430 SS flange.
Connection: Barb connection for use with 3/16″ I.D. tubing.

A-489, 4″ Straight Static Pressure Tip with Flange
A-491, 6″ Straight Static Pressure Tip with Flange
A-493, 8″ Straight Static Pressure Tip with Flange

SIEMENS

Installation Instructions
Document No. 129-499
October 6, 2009

Duct Point Sensor Mounting Flange Kit

Product Description

Duct Point Temperature Sensor Mounting Flange Kit.

Product Number

AQM2000

Required Tools

- Drill with 13/32-inch (10.3 mm) bit and No. 27 bit
- Power screwdriver with standard screw chuck or medium flat-blade screwdriver
- Wire cutter/stripper
- Three No. 10 sheet metal screws

Expected Installation Time

20 minutes

Prerequisites

- Review the instructions before beginning.
- Duct point sensor to be mounted must be installed and wired near the mounting site with enough flexible conduit to allow for insertion into the flange after it is mounted to the ductwork.

Installation

1. Drill a 13/32-inch (10.3 mm) hole into the duct at the desired location of the sensor. See Figure 1.
2. Using the duct mounting flange as a template, drill three holes with a No. 27 bit for the sheet metal screws.
3. Place the neoprene gasket against the duct, and align the three small holes in the duct with the holes in the gasket and duct mounting flange.

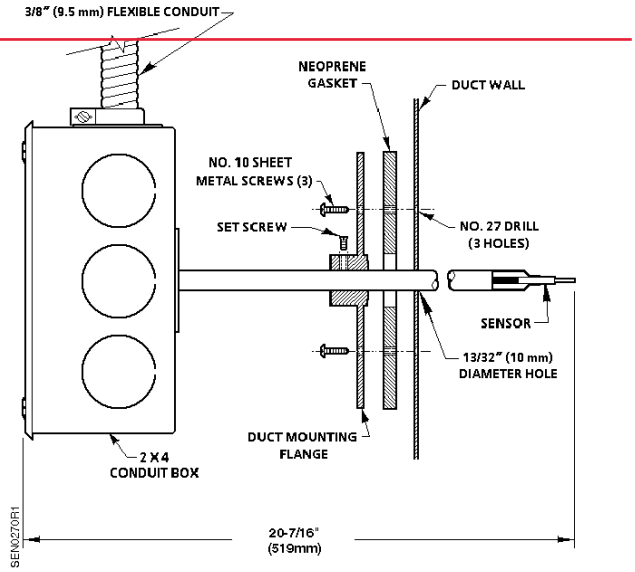


Figure 1. Duct Point Sensor Installation.

4. Use the three No. 10 sheet metal screws to fasten the gasket and duct mounting flange to the duct.
5. Loosen the set screws in the hub of the duct mounting flange and insert the sensor through the flange into the duct.

   NOTE: The sensor tip should protrude into the duct about 1/4 or 3/4 of the duct's diameter. These are the points of average airflow and average air temperature. The air velocity is high enough that the sensor response time is not a problem.

6. Tighten the set screw.

The installation is now complete.

Information in this publication is based on current specifications. The company reserves the right to make changes in specifications and models as design improvements are introduced. Other product or company names mentioned herein may be the trademarks of their respective owners. © 2009 Siemens Industry, Inc.

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Dell Latitude E6540

The most secure and manageable laptop is also the most powerful Latitude. You can count on the Latitude E6540 outstanding reliability for your workforce productivity.

Most secure laptop

Data is your most valuable asset. Protect it with the most secure business laptop on the market. Latitude E6540 guards your data with industry-leading endpoint security solutions that include the most comprehensive encryption, strong authentication and leading-edge malware protection.

Protect data on any device, across external media and in the cloud with Dell Data Protection | Encryption. This comprehensive encryption solution suite enables centralized, remote management of endpoint security. Flexible encryption options range from simplified BitLocker management to the highest level of FIPS 140-2 protection commercially available for system disks with the optional DDP | Hardware Crypto Accelerator. Easily deploy encryption right out of the box with factory installation and simplify compliance with one-touch preset compliance templates.

Ensure only authorized users have access to your data with advanced authentication options including FIPS 201-certified smart card and fingerprint readers and RSA SecurID. Dell Data Protection | Security Tools enables multifactor, single sign-on and preboot authentication along with integrated management with your encryption policies. Only Dell Latitude E6540 provides a FIPS 140-2-certified TPM[1,2] for secure credential storage. Dell ControlVault adds another layer of hardware security by isolating user passwords and credentials on a separately controlled hardware chip for stronger protection from potentially unsecured operating systems and physical hard drives.

Stop advanced malware in its tracks with Dell Data Protection | Protected Workspace, a proactive approach to malware protection that automatically detects and blocks all malicious behavior in real time — even zero-day attacks. The software is completely unobtrusive to users so employee workflow is uninterrupted.

Most manageable laptop

Easily manage your Latitude fleet with exceptional integrated management capabilities that include Intel® vPro™ technology and exclusive automated tools that plug into Microsoft System Center and Dell KACE.

Remotely manage your Latitude laptops with next-generation Intel® vPro™ technology[1] and update once and everywhere with Dell-unique Intel vPro extensions for remote BIOS management and hard drive wipe, even when systems are powered off.

Save time and eliminate guesswork with Dell automated tools and utilities for deploying, monitoring and updating systems. Collect inventory data, enforce policies, and maintain system health for the lifetime of your Dell Latitude laptops. Integration into Microsoft System Center and Dell KACE appliances offer efficient, centralized and automated management to help you save time and money.

Create a standardized environment and simplify deployments with long lifecycles, Dell ProSupport[3],Dell Configuration and Deployment Services, and Dell Imaging Services.

Outstanding reliability and performance

Get more done each day with a high-performance laptop designed to work fast and reliably. From its beefy Intel® Core™ i7 quad-core processor option to its 128-bit graphics processing option and fast boot with performance solid-state hybrid drive (SSHD) or solid-state drive (SSD) options, Latitude E6540 is designed to keep pace with your busy day. Dell also offers essential accessories recommended specifically for your Latitude E6540 to improve productivity whether in the office or on the go.

Swappable batteries enable long periods of productivity away from an outlet. Desk productivity is ensured with existing Latitude E-family docking solutions combined with Dell's UltraSharp monitors, wireless keyboard an mouse.

Connect and collaborate in innovative ways with Dell WiGig wireless docking solution, Bluetooth® 4.0, integrated HD webcam and mobile broadband[4] options.

Travel and work with confidence knowing your Latitude E6540 features a business-rugged design. Its MIL-STD-810G-tested Tri-metal™ chassis, anodized-aluminum exterior and powder-coated base combine for exceptional strength and lasting good looks. Dell Fast Response Free-fall sensor and rubber hard drive isolation help protect data from shocks and vibration. For added comfort and mobility choose Dell's Professional carrying case.

This 15.6" Latitude is small, lightweight (starting at 5.26 lbs.)[5] in its class and offers your choice of an anti-glare HD or Full-HD display. A backlit keyboard option enables productivity in low-light environments.

Feature	Technical Specification
Processor Options	4th Generation Intel® CoreTM up to i7 processors
Operating System Options	Microsoft® Windows® 7 Home Premium 32/64 bit Microsoft® Windows® 7 Professional 32/64 bit Microsoft® Windows® 7 Ultimate 32/64 bit Linux Ubuntu 12.04
Memory[7,9] Options	DDR3L SDRAM 1600MHz; 2 slots supporting up to 16GB
Chipset and Intel Responsiveness Technologies	Mobile Intel® QM87 Express Chipset Optional Intel® Rapid Start Technology[6] Optional Intel® Smart Response Technology[1,12] Optional Intel® Smart Connect Technology[13]
Graphics[8] Options	Intel® Integrated HD Graphics 4600 Optional 128-bit Discrete Graphics with 2GB memory
Display Options	15.6" HD (1366x768) Anti-Glare LED 15.6" FHD (1920x1080) Anti-Glare LED
Storage[9] Options	Standard 320GB Hard Disk Drive Up to 1TB Solid State Hybrid drive 500GB FIPS Self-Encrypting Drive[1] Solid State Drives up to 256GB Encrypted Solid State Drive Dell Fast Response Free Fall Sensor and HDD Isolation (standard on the motherboard)
Optical Drive Options	DVD-ROM, DVD+/-RW
Multimedia Options	High Quality Speakers, stereo global headset jack, integrated noise reducing array microphones Integrated HD video webcam and Dell Webcam Central software
Battery Options	6-cell (60Wh) Lithium Ion battery with ExpressCharge™ 9-cell (97Wh) Lithium Ion battery with ExpressCharge™ 9-cell (87Wh) 3 Year Limited Hardware Warranty[10] Lithium Ion battery
Power Options	65[1], 90[1] or 130 Watt AC Adapter options 90W Auto/Air DC adapter (optional)
Connectivity	10/100/1000 Gigabit Ethernet **Wireless LAN and WiMAX Options:** Intel® Centrino® Advanced-N 6235 + Bluetooth® 4.0 Intel® Centrino® Ultimate-N 6300 Dell Wireless 1506 (802.11g/n 1x1) **Mobile Broadband[11] & GPS Options:** Dell Wireless™ 5570[11] HSPA+ (42Mbps) Mini Card
Ports, Slots & Chassis	Stereo global headset jack, Memory card reader, Docking connector, VGA, HDMI, USB3.0 (4) Network connector (RJ-45), SIM card connector, 1 full (WWAN) and two half (WLAN, DDPE[1]) card slots Optional[1] SmartCard Reader/Contactless Smartcard Reader/Fingerprint Reader with 54mm Express Card Optional[1] SmartCard Reader/Contactless Smartcard Reader/FIPS certified Fingerprint Reader with 54mm Express Card Kensington slot
Input Device Options	Dual pointing keyboard: standard or backlit, Multi-touch Touchpad
Dimensions & Weight[5]	Width: 379.00 mm (14.92 inches) Height: 33.4mm (1.31 inches) Depth: 250.50 mm (9.86 inches) Starting weight: 5.2lbs / 2.36kg
Recommended Accessories	In the office: Dell UltraSharp monitors; MDS14 Dual monitor Stand Keyboard: Dell KM632 wireless keyboard & mouse combo; Dell KB813 Smartcard keyboard On the go: Dell Professional carrying case; Dell WM514 wireless mouse
Regulatory and Environmental Compliance	Regulatory Model: P29F, Regulatory Type: P29F001 ENERGY STAR 5.2 (Windows OS) EPEAT Registered. For specific country participation and rating, please see www.epeat.net BFR/PVC free[15]
Systems Management	Intel® vPro™ Technology's advanced management features (optional, requires Intel WiFi® Link WLAN)
Warranty & Support Services	Limited Hardware Warranty[10]; Standard 3-year On Site Service after Remote Diagnosis[14]. Optional 3 year Dell ProSupport offers premium support from expert technicians and 24x7 global availability[14]. 4 year and 5 year service and support options[3].
Configuration Services[3]	Factory Image load. BIOS Customization. Hardware Customization, Asset Tagging and Reporting.

Discover lthe most secure and manageable laptop at Dell.com/Latitude

1. Some items will be available post-RTS. Offering may also vary by country and by configuration. For complete details, refer to the Technical Guidebook available on dell.com.
2. Offering not available in select countries, in particular: China or Russia. WiFi enabled connection required. System must be on or in sleep mode with application running to update.
3. Availability and terms of Dell Services vary by region. For more information, visit www.dell.com/servicedescriptions.
4. Offering available in select countries.
5. Based on preliminary Dell lab testing. Weights vary depending on configuration and manufacturing variability.
6. Intel Rapid Start requires a Solid-State Drive (SSD) or properly configured HDD + SSD
7. A 64-bit operating system is required to support 4GB or more of system memory.
8. Significant system memory may be used to support graphics, depending on system memory size and other factors
9. GB means 1 billion bytes and TB equals 1 trillion bytes; actual capacity varies with preloaded material and operating environment and will be less.
10. Limited Hardware Warranty: For copy of Ltd Hardware Warranty, write Dell USA LP, Attn: Warranties, One Dell Way, Round Rock, TX 78682 or see www.dell.com/warranty.
11. Mobile Broadband: Subject to wireless provider's broadband subscription and coverage area; additional charges apply.
12. Intel Smart Response Technology requires a 32GB SSD setup as secondary storage device.
13. Intel Smart Connect requires an SSD or mSATA drive and either Intel WLAN or DW1550 WLAN. System must be on or in sleep mode with application running to update.
14. Onsite Service after Remote Diagnosis: Remote Diagnosis is determination by online/phone technician of cause of issue; may involve customer access to inside of system and multiple or extended sessions. If issue is covered by Limited Hardware Warranty (www.dell.com/warranty) and not resolved remotely, technician and/or part will be dispatched, usually within 1 business day following completion of Remote Diagnosis. Availability varies. Other conditions apply.
15. Dell Latitude laptops are brominated flame retardant free (BFR-free) and polyvinyl chloride free (PVC-free); meeting the definition of BFR-/PVC-free as set forth in the iNEMI Position Statement on the 'Definition of Low-Halogen Electronics (BFR-/CFR-/PVC-free)'. Plastic parts contain less than 1,000 ppm (0.1%) of bromine (if the Br source is from BFRs) and less than 1,000 ppm (0.1%) of chlorine (if the Cl source is from CFRs or PVC or PVC copolymers). All printed circuit board (PCB) and substrate laminates contain bromine/chlorine total less than 1,500 ppm (0.15%) with a maximum chlorine of 900 ppm (0.09%) and maximum bromine being 900 ppm (0.09%).

VELTRON DPT 2500

Ultra-Low Differential Pressure and Flow Transmitter

The VELTRON DPT 2500 is both a differential pressure and flow transmitter. As a differential pressure transmitter, the VELTRON DPT 2500 converts static or differential pressure signals into a 4-20mADC output linear to the sensed pressure. By means of a user selectable integral square root function, the VELTRON DPT 2500 converts the total and static pressure signals from a flow element into a 4-20mADC output linear to airflow velocity or volume.

Performance Specifications

- Accuracy. ±0.5% of Natural Span, including non-linearity, hysteresis, and non-repeatability.
- Ranges.

Natural Spans	Bi-Polar Natural Spans
0 to 10.00 IN w.c.	–10.00 to 10.00 IN w.c.
0 to 5.00 IN w.c.	– 5.00 to 5.00 IN w.c.
0 to 2.00 IN w.c.	– 2.00 to 2.00 IN w.c.
0 to 1.00 IN w.c.	– 1.00 to 1.00 IN w.c.
0 to 0.50 IN w.c.	– 0.50 to 0.50 IN w.c.
0 to 0.25 IN w.c.	– 0.25 to 0.25 IN w.c.
0 to 0.10 IN w.c.	– 0.10 to 0.10 IN w.c.

- Temperature Effect. Zero: 0.015% of Natural Span/ºF
  Span: 0.015% of Natural Span/ºF
- Power Supply. 14-40VDC.
- Power Consumption. 0.5 watts at 24VDC.
- Output Signal. 4-20mADC, 2-wire configuration.
- Maximum Overpressurization. 25 psig.
- Temperature Limits. +40ºF to 120ºF Operating.



Features

Custom Calibrated Spans. The VELTRON DPT 2500 has built-in span adjustment capability to permit matching the transmitter's calibrated span to the process maximum operating condition. The transmitter can be Factory or field calibrated as low as 40% of its Natural Span.

Accuracy. The VELTRON DPT 2500 is capable of maintaining an accuracy of 0.5% of Natural Span. For a span of 0 to 0.10 IN w.c., this is equivalent to an output accuracy of ±0.0005 IN w.c. differential pressure or ±6.33 FPM velocity.

Primary Signal Noise Filter. To eliminate background noise and pulsations from the flow signal, the VELTRON DPT 2500 is equipped with a user selectable low pass filter.

Integral Zeroing Means. Each VELTRON DPT 2500 is furnished with a built-in 3-way zeroing valve, permitting the transmitter to be zeroed by simply positioning the valve switch, eliminating the potential of transmitter damage that can occur during disconnecting and reconnecting input signal lines.

Continuous Display of Process (optional). The VELTRON DPT 2500 can be equipped with a 3½ digit Liquid Crystal Display (LCD) to provide a continuous readout of the measured process in engineering units (Inches w.c., SCFM, lbs/hr, etc.).

Linear-to-Flow (Velocity and Volume) Output Signal. The VELTRON DPT 2500 incorporates a user selectable integral square root extractor capable of automatically using the square root of the differential pressure signal from a flow station or probe array to produce an output signal linear to flow (velocity). In addition, an integral multiplier circuit permits scaling of the output signal magnitude to produce a signal linear and scaled to air volume.

NEMA 12 Enclosure for Harsh Environments. The VELTRON DPT 2500I is furnished with a NEMA 12 steel enclosure with bulkhead signal connection fittings, quick release latch, conduit connection port, and internal tubing, wiring, and terminal strip. Enclosure is also furnished with oil-resistant gasket and integral mounting plate. Contact Factory for other enclosure options.

Accurate airflow measurement for demanding applications

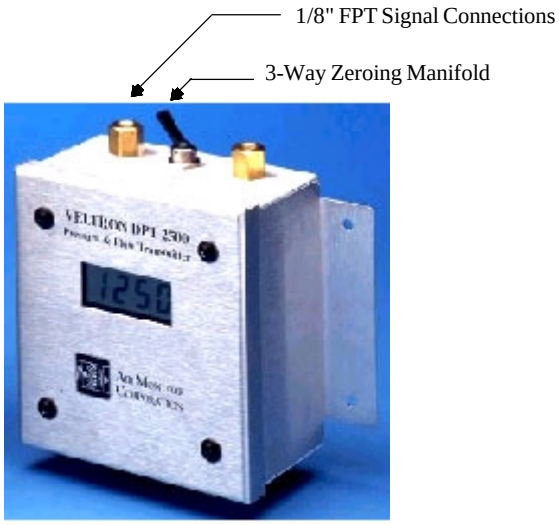
AIR MONITOR CORPORATION

VELTRON DPT 2500

Construction Features

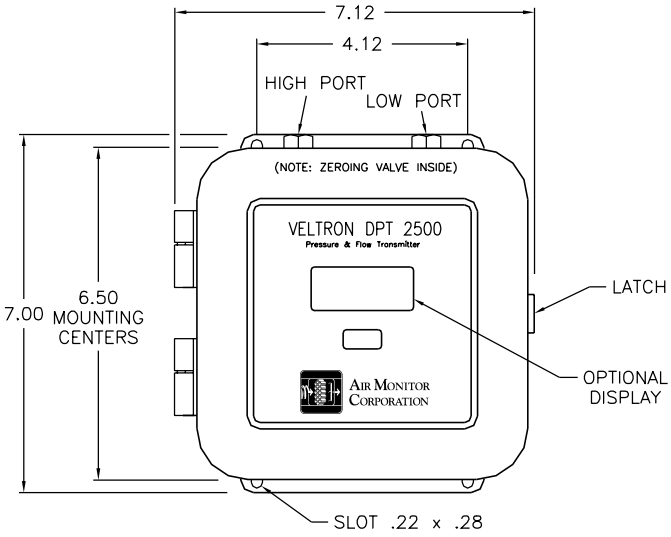


VELTRON DPT 2500I–D

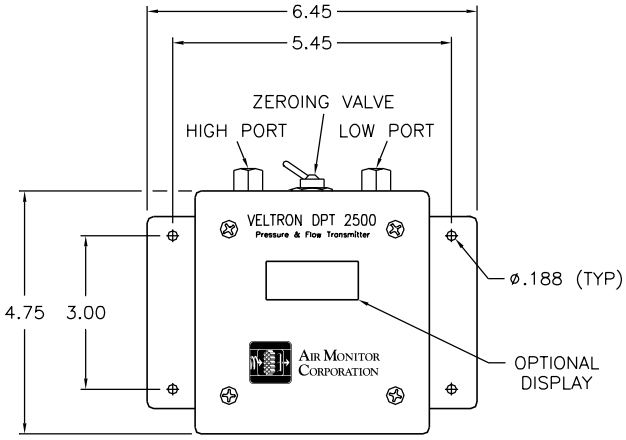


VELTRON DPT 2500–D

Dimensional Specifications



VELTRON DPT 2500I



VELTRON DPT 2500

Suggested Specification

The transmitter shall have an accuracy of ±0.5% of Natural Span and be furnished with a built-in 3-way zeroing valve, user selectable square root function, and integral 3½ digit scalable LCD for display of measured process. The transmitter shall be housed in a NEMA 1 aluminum [NEMA 12 steel] enclosure with universal ⅛" FPT signal connection ports.

The transmitter shall be the VELTRON DPT 2500 [2500I] as manufactured by Air Monitor Corporation, Santa Rosa, California.

P.O. Box 6358 • Santa Rosa, CA 95406 • Tel 800-Airflow • Fax 707-526-9970 • www.airmonitor.com

Air Monitor Corporation

125-190 (7/01)

SIEMENS

Desigo® DXR

Room Automation Stations

DXR2.E12P



Automation station with increased functionality and flexibility to support the demands for standard control of terminal HVAC equipment and Total Room Automation (TRA) applications. TRA offers the highest level of flexibility for energy-optimized solutions without sacrificing comfort.

- Compact, programmable room automation stations for HVAC, lighting, and shading.
- BACnet IP Ethernet Communication (BTL certified).
- 2 port Ethernet switch.
- KNX PL-Link bus to connect sensors, actuators, and operator units (including bus power).
- USB interface.
- Operating voltage AC 24V.
- Internal 0…500 Pa (0…2 in WC) differential pressure sensor
- Mounted on standard DIN rails or on the wall.
- Plug-in terminal blocks.

Features

- Total Room Automation applications combining multiple disciplines (HVAC, lighting, blinds/shading) into one comprehensive solution.
- BTL Listed as a BACnet Advanced Application Controller (B-AAC) device.
- Fully programmable using block programming.
- Proven, pre-loaded applications.
- Operational modes (Comfort, Standby, Economy, Protection, and so on).

Preconfigured applications

Variable Air Volume (VAV) or Constant Volume (CV)

- VAV Cooling Only
- VAV with staged Electric Heat
- VAV with Hot Water
- VAV with Hot Water and Supply Temp Control

Dual Duct Variable Air Volume (VAV)

- VAV Dual duct – Cold duct and Hot duct with configurable ventilation delivery with hot water or electric heating coils and radiator
- VAV Dual duct – Cold duct and dedicated ventilation duct with DCV with hot water or electric heating coils and radiator

VAV with Fan Powered Boxes (FPB)

- VAV Series FPB with staged Electric Heat
- VAV Series FPB with Hot Water
- VAV Series FPB with Hot Water and Supply Temp Control
- VAV Parallel FPB with staged Electric Heat
- VAV Parallel FPB and Hot Water
- VAV Parallel FPB with Hot Water and Supply Temp Control

Chilled Beam

- Chilled Beam Passive Heating and Cooling with Hot Water Radiator
- Chilled Beam Active Heating and Cooling VAV with Hot Water Radiator
- Chilled Beam Active Heating and Cooling VAV with Electric 1-Stage Radiator

Additional Applications

- Electrical terminal heating coils, PWM, 1…3 stages or analog
- Series or Parallel fans, 1…3 stages or analog
- Chill water coils and heating/cooling coils (2-pipe or 4-pipe)
- Supply/Extract (Exhaust) airflow tracking and control
- Radiant ceiling including Chilled beams, cooling, heating and heating/cooling (2-pipe or 4-pipe) control
- Radiator/Baseboard: hot water, steam or electric
- Lighting – up to four separated or overlapping zones
  - Manual switching and dimming
  - Occupancy control and Vacancy control
  - Automatic Daylight Harvesting - step or constant level control
  - Stairwell lighting
  - Scene control

- Blinds – one or two separate zones
  - Manual control: Up, Down, Predefined positions
  - Occupancy control and Vacancy control
  - Glare Protection
  - Energy efficiency functions including solar radiation optimization
  - Slat angle
  - Scene control

Pre-loaded Application Options

- Separate maximum and minimum flow setpoints for both heating and cooling control.
- Separate minimum ventilation flow setpoints for each occupancy mode.
- CO2 sensor and Demand control ventilation with maximum ventilation flow setpoint.
- Flexible occupancy modes: Comfort, Pre-Comfort, Economy and Protection.
- Supply (discharge) air temperature control for modulating heating or cooling coils.
- Configurable occupancy sensor control.
- Relative humidity sensor and room dew point calculation.
- Greenleaf energy efficiency determination and display.
- Configurable plant operating modes (heating, cooling, warm up, cool down, flush/purge, and so on).

Functions

The selected application and its parameters as well as input and output configuration determine the room automation station's functionality.

A detailed description of functionality is available in the ABT (Automation Building Tool) online help.

Communication

- 2-Port Ethernet switch for cost-effective cabling via line topology.
- USB connection for service and commissioning, firmware download, and LAN access.
- The following functions are available with the KNX PL-Link bus:
  - Communication with room operator units, switches, sensors, actuators, and luminaires.
  - Plug-and-play connection of Siemens field devices with KNX PL-Link.
  - Integration of common devices using KNX S-Mode (ETS engineering required).

Type summary

Product Number	SSN	Description	Inputs	Outputs
DXR2.E12P-102B (Version with 30 data points)	S55376-C126	DXR2.E12P Room Automation Station	1 DI, 2 UI, 1 ΔP sensor	6 DO Triacs, 2 AO 0 to 10V
DXR2.E12P-102K (Version with 30 data points)	S55376-C156	Smoke Control DXR2.E12P Room Automation Station	1 DI, 2 UI, 1 ΔP sensor	6 DO Triacs, 2 AO 0 to 10V
DXR2.E12PX-102B (Version with 60 data points*)	S55374-C252	DXR2.E12PX Room Automation Station	1 DI, 2 UI, ΔP sensor	6 DO Triacs, 2 AO 0 to 10V
DXR2.E12PX-102K (Version with 60 data points*)	S55376-C157	Smoke Control DXR2.E12PX Room Automation Station	1 DI, 2 UI, ΔP sensor	6 DO Triacs, 2 AO 0 to 10V

* 60 data point DXRs are typically used for Desigo Total Room Automation projects.

Accessories

Product Number	Designation
985-124	499 ohm Resistor Kit

Product Documentation

Topic	Title	Document ID
Installation and mounting	DXR Installation Instructions	A6V10550039
Global datasheet*	DXR2 24V IP DXR2 24V MS/TP	N9205 N9207
Setup and commissioning	DXR VAV Start-up Procedures DXR FPB Start-up Procedures DXR FCU Start-up Procedures Balancing Procedures	A6V10665935 A6V10665938 A6V10665941 A6V10665943
Room Unit Datasheet	Wall mounted	A6V10394781
BTL listing	DXR PIC Statement	A6V10665948

* Please see the Global datasheets for additional information not found in this submittal sheet.

Technical data

Housing

Color	RAL 7035 (light-gray)
Dimensions	180 mm (7.09 in) x 104.5 mm (4.11 in) x 59.5 mm (2.34 in)
Weight Packaging	ca. 340 g (11.99 oz) ca. 40 g (1.41 oz)

Function data

Communication	
A/D Resolution (analog in) D/A Resolution (analog out)	14 Bits 12 Bits

Power data

Power supply	
Operating voltage	AC 24V -15%/+20%
Frequency	50/60 Hz
Internal fuse	4 A irreversible
Transformer with secondary current limitation of max. 10 A or external secondary current fuse Non-renewable fuse Circuit breakers	 Max. 10 A, slow Max. 13 A, characteristic B, C, D as per EN 60898

Apparent power (VA) for transformer design						
Base Model	**Base load**	**Max. load Triac output AC 24V~ 0.25 A each**	**Max. load all Aux. outputs AC 24V~**	**Max. load KNX PL-Link (at 50 mA)**	**Max. load DC 24V+ (2.4 W)1)**	**Max. Allowed Power consumption including connected field devices**
DXR2.E12P	8	6 x 6 = 36	12	4	-	60

NOTE:
To calculate the total VA, add the Base Load + the number of Triacs + field supplies+ KNX PL-Link devices.
This cannot exceed the maximum power consumption. See the *Wiring Guidelines* for more information.

Inputs

Analog Inputs		
Resistance sensor	**Temperature measurement**	**Voltage measurement**
AI 1000 Ω	AI PT1K 375 (NA)*)	AI 0 to 10V
AI 2500 Ω	AI PT1K 385 (EU)*)	AI 0 to 10V (0 to 100%)
AI 10 KΩ	AI (LG-)Ni1000*)	
AI 100 KΩ	AI Ni1000 DIN*)	
	AI T1 (PTC)*)	
	AI NTC10K (Type II)**)	
	AI NTC100K**)	

* A fixed value of 1 Ω is calibrated to correct line resistance.

** Configurable default.

Digital Inputs	
Contact voltage	Universal input: 18V Digital input: 21V
Contact current	Universal input: 1.2 mA; 7.4 mA initial current Digital input: 1.6 mA; 9.4 mA initial current
Contact resistance for closed contacts	Max. 100 Ω
Contact resistance for open contacts	Min. 50 kΩ

Differential pressure sensor (inputs P1+, P1-)	
Connections (nipple diameter)	Dia. 5.2 mm (0.20 in)
Measuring range	0 to 500 Pa (0 - 2.01 in WC)
Overload range	0 to 100 kPa (0 - 402 in WC)
Measuring range accuracy Zero point accuracy Resolution	4.5% 0.2 Pa 12 bit

Outputs

Analog Outputs	
0 to 10V	Max. 1 mA

Digital Outputs	
Type (Switching outputs triacs)	High side The Triac closes the contact to AC 24V
Switching voltage	AC 24V
Permissible load	250 mA/6 VA per output (cos phi 0.35) (500 mA/12 VA per output with PWM*)
Protection	Short-circuit proof

Connections

Interfaces	
Ethernet	Plugs: 2 x RJ45, screened Interface type: 10Base-T/100BASE-TX, IEEE 802.3 compatible Bitrates: 10/100 Mbps, autosensing Protocol: BACnet over UDP/IP
USB (2.0)	Plug: Type B Data rate: 12 Mbps
KNX	Type: KNX TP1 PL-Link, galvanic isolation Baud rate: 9.6 Kbps Bus power: 50 mA Short-circuit proof Protection against faulty wiring at max. AC 24V

Wiring connections	
Pluggable screw terminals	Copper wire or copper strands with ferrules 1 x 0.6 mm dia. to 2.5 mm^2 (22 to 14 AWG) or 2 x 0.5 mm dia. to 1 mm^2 (24 to 18 AWG) Copper strands without ferrules 1 x 0.6 mm dia. to 2.5 mm^2 (22 to 14 AWG) or 2 x 0.5 mm dia. to 1.5 mm^2 (24 to 16 AWG)
Slotted screws	Small 1/8” blade, tightening torque 0.6 Nm (0.44 lb-ft)
Wiring lengths for signals	KNX PL-Link 80 m (260 ft) with internal bus power or 300 m (990 ft) with external power supply Ethernet 100 m (330 ft) Signal lines 80 m (260 ft) For inputs AI 100 KΩ, AI NTC10K, AI NTC100K: 30 m (100 ft) or 80 m (260 ft), if shielded.

KNX/PL-Link Network and Power Wriring.*	
Cable configuration	1 or 2 twisted pair - Pair 1 red/black - Pair 2 yellow/white
Gauge	20 AWG (solid copper)
Twists per foot	4 Minimum
Capacitance	30 pF/foot or less
Shields	100% foil with drain wire
UL type	300Vrms, CMP (75 °C or higher)
CSA type	300Vrms, FT6 (75 °C or higher)

* Alternative 18 AWG STP CMP (Belden 6320FE 8771000)

Conformity



⚠ CAUTION

National safety regulations

Failure to comply with national safety regulations may result in personal injury and property damage.
Observe national provisions and comply with the appropriate safety regulations.

Ambient Conditions and Protection classification	
Climatic ambient conditions	
• Transport and storage	• Temperature -25 to 70°C (-13 to 158°F) Air humidity 5 to 95% rh.
• Operation	• Temperature -5 to 45°C (23 to 113°F)/ -5 to 50°C (23 to 122°F) Air humidity 5 to 95% rh.

Standards, Directives and Approvals	
UL Listing	UL916; UL864 (Smoke Control 'K' variant only)
Suitable for plenum area installation	UL1995
Federal Communications Commission	FCC CFR 47 Part 15 Class B
CSA Compliance and cUL certification	C22.2 No. 205
Environmental compatibility - RoHS Compliant	The product environmental declaration contains data on environmentally compatible product design and assessments (composition, packaging, environmental benefit, and disposal).
BACnet BTL Listing	BTL-AAC
CEC Title 24 Supported	—
ASHRAE 90.1 Supported	—
Quality	ISO 9001 (Quality)

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SIEMENS

Desigo® DXR

Room Automation Stations

DXR2.E18



Automation station with increased functionality and flexibility to support the demands for standard control of terminal HVAC equipment and Total Room Automation (TRA) applications. TRA offers the highest level of flexibility for energy-optimized solutions without sacrificing comfort.

- Compact, programmable room automation stations for HVAC, lighting, and shading.
- BACnet IP Ethernet Communication (BTL certified).
- 2 port Ethernet switch.
- KNX PL-Link bus to connect sensors, actuators, and operator units (including bus power).
- USB interface.
- Operating voltage AC 24V.
- Mounted on standard DIN rails or on the wall.
- Plug-in terminal blocks.

Features

- Total Room Automation applications combining multiple disciplines (HVAC, lighting, blinds/shading) into one comprehensive solution.
- BTL Listed as a BACnet Advanced Application Controller (B-AAC) device.
- Fully programmable using block programming.
- Proven, pre-loaded applications.
- Operational modes (Comfort, Standby, Economy, Protection, and so on).

Preconfigured applications

Fan Coil Unit (FCU)

- FAN COIL 2-Pipe CW/HW and HW Valves
- FAN COIL 4-Pipe CW and HW Valves
- FAN COIL staged DX Cooling and staged Heating
- FAN COIL with CW and staged Electric Heat
- FAN COIL–UNIT VENT with CW, HW and Outside Air Damper (OAD) control
- FAN COIL–UNIT VENT with CW, ELEC and OAD control
- FAN-COIL-UNIT VENT with DX, HW and OAD control
- FAN COIL-UNIT VENT with DX, ELEC and OAD control

Chilled Beam

- Chilled Beam Passive 2 Pipe Heating/Cooling and Radiator 1-Stage Electric

Heat Pump

- HP Variable Speed, Two Stage Elec Heat and One Stage Elec Rad with OAD
- HP Variable Speed, Water Source, HW Heat and Modulating Elec Rad with OAD
- HP Single Stage, One Stage Elec Heat and HW Rad with OAD
- HP Multi Stage, Two Stage Elec Heat and HW Rad with OAD
- HP Multi Stage, Hot Gas Reheat, One Stage Elec Heat and HW Rad with OAD
- HP Multi Stage, Ground Source, Hot Gas Reheat, One Stage Elec Heat and HW Rad with OAD

Additional Applications

- Electrical terminal heating coils, PWM, single, multi-stage or analog
- Terminal fans, single, multi-stage or analog
- Chill water, DX or hot water coils and heating/cooling coils (2-pipe or 4-pipe)
- Variable Air Volume (VAV), Dual Duct and Fan Powered VAV (FPB)
- Radiant ceiling including Chilled beams, cooling, heating and heating/cooling (2-pipe or 4-pipe) control
- Radiator/Baseboard: hot water, steam or electric
- Lighting – up to four separated or overlapping zones
  - Manual switching and dimming
  - Occupancy control and Vacancy control
  - Automatic Daylight Harvesting - step or constant level control
  - Stairwell lighting
  - Scene control

- Blinds – one or two separate zones
  - Manual control: Up, Down, Predefined positions
  - Occupancy control and Vacancy control
  - Glare Protection
  - Energy efficiency functions including solar radiation optimization
  - Slat angle
  - Scene control

Pre-loaded Application Options

Fan coil unit

- Single, multiple or variable speed fan control.
- Outside air damper control with economizer.
- Ventilation Control or Demand Control Ventilation (DCV) with separate outside air damper (OAD) setpoints for each operational mode.
- Supply (discharge) air temperature control for modulation heating or cooling coils.
- Dehumidification control.
- Terminal coils: heating (hot water or electric), cooling (chilled water or DX) and heating/cooling coil (2-pipe or 4-pipe).
- Radiant ceiling including Chilled beams and Radiator control.

Heat pump

- Heat Pump compressors: Single, multiple or variable speed.
- Air-to-air, water loop or ground water configurations.
- Single, multiple or variable speed fan control.
- Outside air damper control with economizer.
- Dehumidification control.
- Ventilation Control or Demand Control Ventilation (DCV) with separate outside air damper (OAD) setpoints for each operational mode.
- Terminal heating coil (hot water or electric) or hot gas coil.
- Radiant ceiling including Chilled beams and Radiator control.
- Greenleaf energy efficiency determination and display.
- Configurable plant operating modes (heating, cooling, warm up, cool down, flush/purge, and so on).

Functions

The selected application and its parameters as well as input and output configuration determine the room automation station's functionality.

A detailed description of functionality is available in the ABT (Automation Building Tool) online help.

Communication

- 2-Port Ethernet switch for cost-effective cabling via line topology.
- USB connection for service and commissioning, firmware download, and LAN access.
- The following functions are available with the KNX PL-Link bus:
  - Communication with room operator units, switches, sensors, actuators, and luminaires.
  - Plug-and-play connection of Siemens field devices with KNX PL-Link.
  - Integration of common devices using KNX S-Mode (ETS engineering required).

Type summary

Product Number	SSN	Description	Inputs	Outputs
DXR2.E18-101B (Version with 60 data points*)	S55376-C125	DXR2.E18 Room Automation Station	2 DI, 4 UI	8 DO Triacs, 4 AO 0 to 10V
DXR2.E18-101K (Version with 60 data points)	S55376-C155	Smoke Control DXR2.E18 Room Automation Station	2 DI, 4 UI	8 DO Triacs, 4 AO 0 to 10V

* 60 data point DXRs are typically used for Desigo Total Room Automation projects.

Accessories

Product Number	Designation
985-124	499 ohm Resistor Kit

Product Documentation

Topic	Title	Document ID
Installation and mounting	DXR Installation Instructions	A6V10550039
Global datasheet*	DXR2 24V IP DXR2 24V MS/TP	N9205 N9207
Setup and commissioning	DXR VAV Start-up Procedures DXR FPB Start-up Procedures DXR FCU Start-up Procedures Balancing Procedures	A6V10665935 A6V10665938 A6V10665941 A6V10665943
Room Unit Datasheet	Wall mounted	A6V10394781
BTL listing	DXR PIC Statement	A6V10665948

* Please see the Global datasheets for additional information not found in this submittal sheet.

Technical data

Housing

Color	RAL 7035 (light-gray)
Dimensions	180 mm (7.09 in) x 104.5 mm (4.11 in) x 59.5 mm (2.34 in)
Weight Packaging	ca. 360 g (12.69 oz) ca. 40 g (1.41 oz)

Function data

Communication	
A/D Resolution (analog in) D/A Resolution (analog out)	14 Bits 12 Bits

Power data

Power supply	
Operating voltage	AC 24V -15%/+20%
Frequency	50/60 Hz
Internal fuse	4 A irreversible
Transformer with secondary current limitation of max. 10 A or external secondary current fuse Non-renewable fuse Circuit breakers	 Max. 10 A, slow Max. 13 A, characteristic B, C, D as per EN 60898

Apparent power (VA) for transformer design						
Base Model	**Base load**	**Max. load Triac output AC 24V~ 0.25 A each**	**Max. load all Aux. outputs AC 24V~**	**Max. load KNX PL-Link (at 50 mA)**	**Max. load DC 24V+ (2.4 W)1)**	**Max. Allowed Power consumption including connected field devices**
DXR2.E18	8	8 x 6 = 48	18	4	6	72

Power for the Triac outputs must be reduced if the maximum load of 18 VA is required for AC 24V field supply on the DXR2.x18...

NOTE:
To calculate the total VA, add the Base Load + the number of Triacs + field supplies+ KNX PL-Link devices.
This cannot exceed the maximum power consumption. See the *Wiring Guidelines* for more information.

Inputs

Analog Inputs		
Resistance sensor	**Temperature measurement**	**Voltage measurement**
AI 1000 Ω	AI PT1K 375 (NA)*)	AI 0 to 10V
AI 2500 Ω	AI PT1K 385 (EU)*)	AI 0 to 10V (0 to 100%)
AI 10 KΩ	AI (LG-)Ni1000*)	
AI 100 KΩ	AI Ni1000 DIN*)	
	AI T1 (PTC)*)	
	AI NTC10K (Type II)**)	
	AI NTC100K**)	

* A fixed value of 1 Ω is calibrated to correct line resistance.

** Configurable default.

Digital Inputs	
Contact voltage	Universal input: 18V Digital input: 21V
Contact current	Universal input: 1.2 mA; 7.4 mA initial current Digital input: 1.6 mA; 9.4 mA initial current
Contact resistance for closed contacts	Max. 100 Ω
Contact resistance for open contacts	Min. 50 kΩ

Outputs

Analog Outputs	
0 to 10V	Max. 1 mA

Digital Outputs	
Type (Switching outputs triacs)	High side The Triac closes the contact to AC 24V
Switching voltage	AC 24V
Permissible load	250 mA/6 VA per output (cos phi 0.35) (500 mA/12 VA per output with PWM*)
Protection	Short-circuit proof

DC 24V output for field devices (1: V+)	
Output voltage	DC 24V
Permissible load	100 mA/2.4 W
Protection against overload	Short-circuit proof

Connections

Interfaces	
Ethernet	Plugs: 2 x RJ45, screened Interface type: 10Base-T/100BASE-TX, IEEE 802.3 compatible Bitrates: 10/100 Mbps, autosensing Protocol: BACnet over UDP/IP
USB (2.0)	Plug: Type B Data rate: 12 Mbps
KNX	Type: KNX TP1 PL-Link, galvanic isolation Baud rate: 9.6 Kbps Bus power: 50 mA Short-circuit proof Protection against faulty wiring at max. AC 24V

Wiring connections	
Pluggable screw terminals	Copper wire or copper strands with ferrules 1 x 0.6 mm dia. to 2.5 mm^2 (22 to 14 AWG) or 2 x 0.5 mm dia. to 1 mm^2 (24 to 18 AWG) Copper strands without ferrules 1 x 0.6 mm dia. to 2.5 mm^2 (22 to 14 AWG) or 2 x 0.5 mm dia. to 1.5 mm^2 (24 to 16 AWG)
Slotted screws	Small 1/8” blade, tightening torque 0.6 Nm (0.44 lb-ft)
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KNX/PL-Link Network and Power Wriring.*	
Cable configuration	1 or 2 twisted pair - Pair 1 red/black - Pair 2 yellow/white
Gauge	20 AWG (solid copper)
Twists per foot	4 Minimum
Capacitance	30 pF/foot or less
Shields	100% foil with drain wire
UL type	300Vrms, CMP (75 °C or higher)
CSA type	300Vrms, FT6 (75 °C or higher)

* Alternative 18 AWG STP CMP (Belden 6320FE 8771000)

Conformity



⚠ CAUTION

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Ambient Conditions and Protection classification	
Climatic ambient conditions	
• Transport and storage	• Temperature -25 to 70°C (-13 to 158°F) Air humidity 5 to 95% rh.
• Operation	• Temperature -5 to 45°C (23 to 113°F)/ -5 to 50°C (23 to 122°F) Air humidity 5 to 95% rh.

Standards, Directives and Approvals	
UL Listing	UL916; UL864 (Smoke Control 'K' variant only)
Suitable for plenum area installation	UL1995
Federal Communications Commission	FCC CFR 47 Part 15 Class B
CSA Compliance and cUL certification	C22.2 No. 205
Environmental compatibility - RoHS Compliant	The product environmental declaration contains data on environmentally compatible product design and assessments (composition, packaging, environmental benefit, and disposal).
BACnet BTL Listing	BTL-AAC
CEC Title 24 Supported	—
ASHRAE 90.1 Supported	—
Quality	ISO 9001 (Quality)

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ELECTRA-FLO

ELECTRA-flo Series

Thermal Dispersion Airflow Measurement



1050 Hopper Ave, Santa Rosa, CA 95403 • USA • Tel +1 800-AIRFLOW • Fax +1 707-526-9970
www.airmonitor.com • hvacsales@airmonitor.com

• ELECTRA-flo™ SERIES •
THERMAL DISPERSION MEASUREMENT SYSTEM



DESCRIPTION

Air Monitor's ELECTRA-flo series of thermal dispersion airflow measurement instruments accurately measures airflow in a wide variety of commercial HVAC applications and installations.

At the heart of each ELECTRA-flo airflow measurement system is a pair of precision matched thermistors which are installed in an aerodynamic sensor aperture. This aperture assembly is specifically designed to reduce the affects of angular flow distortions found within ducted air distribution systems. The design, construction, and calibration of each thermistor sensor pair ensures the accuracy and long term reliability of the ELECTRA-flo measurement system.

APPLICATIONS

Permanently installed airflow measurement systems provide the real time, actionable information required for the safe, code compliant and efficient operation of today's high performance buildings.

Building Airflow Distribution Systems - Including supply, return, exhaust, relief and dedicated outdoor airflow monitoring installations

Fan Inlet Airflow Measurement - Single inlet, dual inlet or fan wall installations

CALIBRATION

Individual Sensors receive a multi-point, NIST* traceable calibration of air velocity and temperature across the entire operating range.

* National Institute of Standards and Technology

FEATURES AND BENEFITS

Accommodates the Highest Number (32) of Thermal Sensing Points Per Array in the Industry - More sensing points means more accurate measurements in challenging "real world" duct configurations.

Serial Communication Bus Between Individual Sensors and Transmitter - Allows individual probes to be daisy chained together in the field - Saves time and money by simplifying the installation!

Ruggedized, Hermetically Sealed Sensors - Precision thermistors and heating circuit are fully encapsulated - Provides a high degree of protection from the environment and allows the sensor assembly to be cleaned without damage.

Dedicated ELECTRA-flo G5 Transmitter with Display - Each airflow measurement system comes complete with a transmitter that is factory matched and configured, guaranteeing system performance.

Optional True Dual Channel Version - The ELECTRA-flo G5 Dual Transmitter provides two separate airflow measurements in one transmitter. Duct size and sensor allocation is set independently for each channel.



GENERAL SPECIFICATIONS

ACCURACY
- ±2-3% of system airflow from 0 to 5000 FPM
- ±0.1°F of air temperature from -20°F to 140°F

SENSING METHOD
- Thermal dispersion utilizing a pair of precision matched thermistors and dedicated processor per sensor pair

MOUNTING CONFIGURATIONS
- Individual probe mounting for field installation in ducted systems
- Factory mounted probe arrays in airflow stations or fan inlet installations utilizing single or multiple sensor arrays connected to a single transmitter

INPUT POWER OPTIONS
- 24 VDC or 24 VAC

OUTPUT / COMMUNICATIONS
- Dual analog outputs, serial communications, and user defined alarm output

1050 Hopper Ave, Santa Rosa, CA 95403 • USA • Tel +1 800-AIRFLOW • Fax +1 707-526-9970
www.airmonitor.com • hvacsales@airmonitor.com

PROBE ASSEMBLY

INDIVIDUAL SENSOR ACCURACY
- Velocity: ±2% of reading from 0-5000 FPM
- Temperature: ±0.1°F
- Multi-point NIST traceable calibration of both temperature and velocity

SENSOR TYPE
- Hermetically sealed, matched thermistors with laser trimmed resistive heating element mounted in flow conditioning aperture
- Maximum number of sensors per probe: 8

SENSOR SIGNAL PROCESSING
- Dedicated microprocessor per each sensor node; all calibration data is stored in non-volatile memory

MOUNTING CONFIGURATIONS
- Individual probe mounting via 4" x 4" aluminum plate, 0.25" closed cell neoprene gasket and end support stud for probes longer than 18"
  Optional: Internal mounting configuration available
- Complete airflow station array consisting of individual probes factory mounted in 14 gauge (minimum) sheet metal casing
- Sensor pattern is based on equal area distribution
  Optional: Log-Tchebycheff sensor distribution pattern
- Fan inlet mounting consisting of adjustable stainless steel brackets

CONSTRUCTION MATERIALS
- 1.125" diameter anodized aluminum probe with aluminum probe connection box
  Optional: Stainless Steel probe with stainless steel or polycarbonate connection box
- Probe to transmitter connection via a single, shielded plenum rated cable with mini-DIN snap & lock connector
- Cable length: standard 10'
  Optional: Cable lengths up to 100'

RECTANGULAR DUCT SIZE RANGE
- 8"-120" typical, 144" maximum long dimension length



ELECTRA-flo G5 TRANSMITTER SERIES

NUMBER OF SENSORS PER TRANSMITTER
- Maximum number of sensors per transmitter: 32, shared between both channels for true dual transmitters

DISPLAY
- Backlit ¼ VGA color TFT LCD, 2.75" x 2.0"
- **Configuration Access:**
  Field programmable menu driven user interface accessed via four-button keypad
  Field selectable in U.S. or S.I. units for velocity/flow and temperature

POWER SUPPLY
- 24 VAC (20-28 VAC) or 24 VDC (20-40 VDC), isolated and fused with reverse polarity protection
- 16-90 VA, varies based on the quantity of sensors (1-32) in the probe array or station

OUTPUT SIGNALS PROVIDED
- Dual analog outputs, field selectable via menu for 0-5 VDC, 0-10 VDC, or 4-20 mA DC
- Field adjustable scaling of airflow velocity and temperature
  Velocity range:
  0 to 5,000 FPM in ducted applications
  0 to 10,000 FPM in fan inlet applications
  Temperature range: -20°F to 140°F
- Network Output Communication
  BACnet® MS/TP or MODBUS® RTU

AMBIENT CONDITIONS
- Temperature limits: -20°F to 180°F storage, -20°F to 140°F operating
- Humidity: 0 to 99.5% RH, non-condensing

ENCLOSURE
- NEMA 1 aluminum with hinged cover
  Optional: NEMA 4 or NEMA 4X

APPROVALS
- UL 60730
- BTL Certified to ANSI/ASHRAE 135.1-2013
- FCC Par 15 Subpart B, Class A Device

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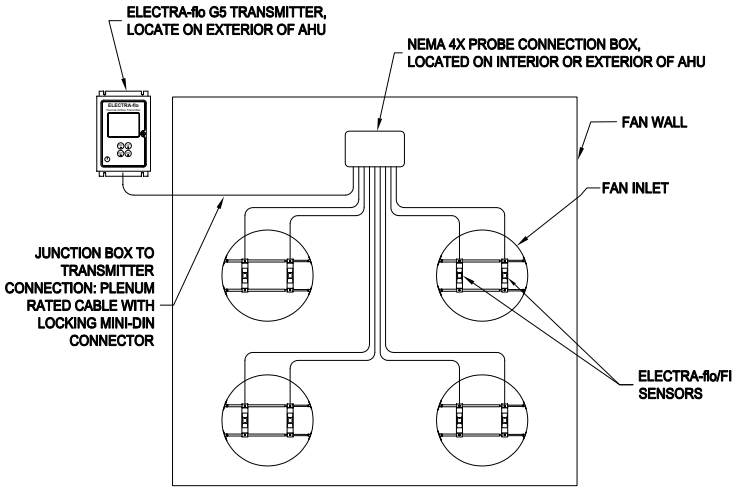
ELECTRA-flo/FI PROBE ARRAY for FAN INLET INSTALLATIONS

The ELECTRA-flo family also includes the ELECTRA-flo/FI, a system of thermal probes and the associated hardware specifically designed for use in both single and dual inlet fan applications. The adjustable mounting brackets allow for easy installation of the sensors, and the transmitter interface provides a simple field characterization routine, allowing quick system set up in the field.



ELECTRA-flo/FI PROBE ARRAY for FAN WALL (ARRAY) INSTALLATIONS

The ELECTRA-flo/FI is designed to be installed in the environment found within the AHU itself, allowing for an easy and clean installation in fan wall (array) applications. Due to the ELECTRA-flo/FI's sensor architecture, up to 32 individual fans can be measured by simply daisy chaining all of the fan inlet sensors back to a single transmitter. Utilizing the native BACnet serial communication capability found in the ELECTRA-flo G5 Transmitter, individual fan performance information can be brought back to the BMS.

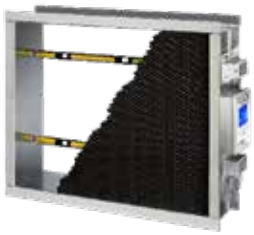


Additional Products in the ELECTRA-flo Family:



ELECTRA-flo/SD - Thermal Dispersion airflow measurement for use in small duct applications, from 4" to 16"

ELECTRA-flo/CM - Air Monitor can also provide a complete, pre-fabricated airflow measurement station. Utilizing a flow conditioning station in conjunction with a thermal probe array will reduce the required straight run requirements.





VOLU-trol/E Thermal Measurement and Control Station - Utilizes ELECTRA-flo Thermal Dispersion sensing technology with an integrated damper to continuously measure and control ducted airflow. The VOLU-trol/E is well suited for many VAV applications.

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ALARMS & INDICATION

EMERGENCY OPERATOR STATIONS
ESP SERIES

DESCRIPTION

The **E-Stop ESP Series emergency operator stations** offer a highly visible method to shut down equipment, initiate alarms, or give a controller input during emergency conditions. The **ESP Series** consists of a stainless steel plate with a 40mm mushroom head push-button. The button may be reset with a pull or twist of the mushroom head, depending on the button style.



ESP-PK0-SO



ESP-PP0-HS

FEATURES

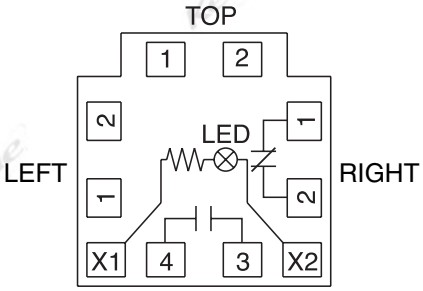
- ***Stainless steel plate mounted***
- ***Highly visible yellow/black backGround***
- ***UL listed for Category NISD Emergency Stop Devices, File #E348889***
- ***40mm Red Mushroom Operators***
- ***1 N.O. and 1 N.C. contact included***

SPECIFICATIONS

Contact Rating	
ES-NO	10A, 600 VAC
ES-NC	2.5A, 600 VDC
Standard Contacts	1 N.O. and 1 N.C. (Included)
Added Contacts	4 maintained total or 6 momentary total
Mechanical Life	Contact 10 million operations
Contact Type	Self-cleaning silver contacts
Contact Resistance	<25 milli-ohms closed
Operating Temperature	-13° to 158°F (-25° to 70°C)
Enclosure Rating	NEMA 1, 3R, 4, 4X, 12, 13
Dimensions	4.5"H X 2.75"W X 0.63"D (11.4 X 7 X 1.6 cm)
Weight	0.58 lbs (0.26 Kg)
Approvals	UL Listed NISD File# E348889
Warranty	1 year

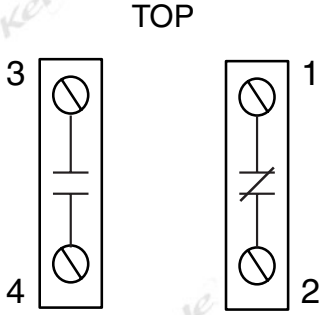
WIRING

PTL24



1 NO-1 NC
Note: Standard contact arrangement

PP0, PT0, PK



1 NO-1 NC
Note: Standard contact arrangement
(4 momentary or 6 maintained total maximum)

ORDERING INFORMATION

Model	Description	
ESP	Plate-mounted Emergency Operator Station (UL NISD) (1-N.O. & 1-N.C. Contacts Included)	
	Button Style	
	PP0	Red maintained 40mm mushroom (push-pull)
	PT0	Red maintained 40mm mushroom (push-twist)
	PTL24	Illuminated 24V Red maintained 40mm mushroom (push-twist, lamp included)
	PK0	Red maintained 40mm mushroom (push- key release)
		Legend
		BS Emergency - Boiler Shut-down
		CS Emergency - Chiller Stop
		FN Emergency - Exhaust Fan
		HS Emergency- HVAC Shut-down
		PO Emergency - Power Off
		RP Emergency - Refrigerant Purge
		SD Emergency - Shut Down
		SO Emergency - Shut Off
		ST Emergency - Stop
		VP Emergency - Ventilation Stop
		VT Emergency - Ventilation Start

ESP - **PP0** - **CS**

*18 character max, no color changes, no font changes, no company logos.

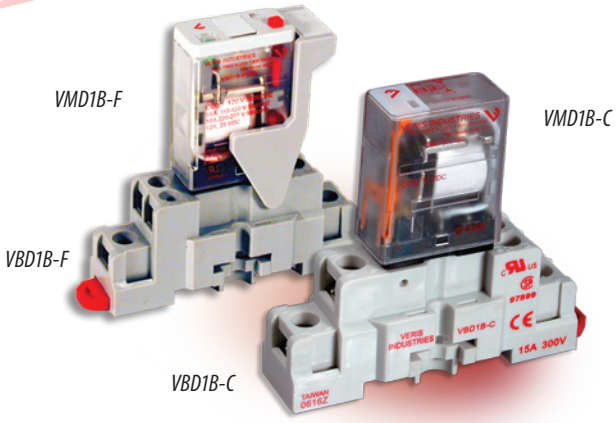
Example: **ESP-PP0-CS** Plate mounted Emergency Operator Station. Red Maintained Push-Pull button labeled as "Chiller Stop".

ACCESSORIES

ES-KEY	Replacement Key for PK0 option, ESM and ESP series
ES-NC	Normally Closed Contact Block for Non-illuminated ESM, ESB, and ESP Emergency Operator Stations
ES-NO	Normally Open Contact Block for Non-illuminated ESM, ESB, and ESP Emergency Operator Stations

Socket SPDT Relays

Power Relays In A Wide Range Of Coil Voltages



5 Year Warranty

FEATURES

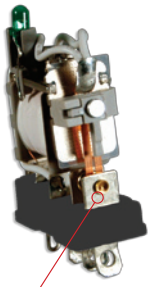
Benefits of full featured model

- Color-coded push button...allows manual operation of relay. AC coils red or DC coils blue
- Removable override lever...when activated, locks push button and contacts in the powered position
- Flag indicator...shows relay status in manual or powered condition
- LED status lamp...shows coil "ON" or "OFF" status
- I.D. tag/write-on plastic label...used for identification of relays in multi-relay circuits
- 2-Way side or DIN rail mounting system...retrofits existing panel mounting and 35mm DIN rail

Benefits of new low current bifurcated model

- All of the above full-featured benefits
- Bifurcated contacts for high reliability at extremely low current levels
- Perfect for HVAC applications when you need to switch and hold low loads for long periods of time

VMD1B-S with bifurcated contacts - perfect for low current applications!



3mA - 3 Amps
Dual (bifurcated) contacts for optimum wiping & contact performance.

DESCRIPTION

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.

TYPICAL COIL PERFORMANCE

	Power Consumption
AC Coils	0.9VA
DC Coils	0.7W

CONTACT RATINGS

Standard (F & C Series)	
Resistive	20A@120VAC
	20A@277VAC
	20A@28VDC
Motor	1/2@120VAC
	1@277VAC
Pilot Duty	B300
Low Level (S Series)	
Resistive	3A@240VAC

SPECIFICATIONS

Operating Range	85% to 110% of rated voltage
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	1500VAC (RMS)
Operating Temperature	-40° to 55°C (-40° to 131°F)

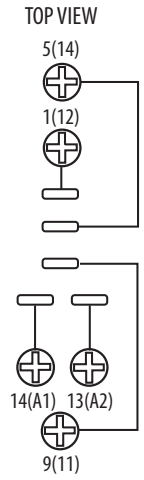
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APPLICATION/WIRING EXAMPLE

VBD1B Sockets

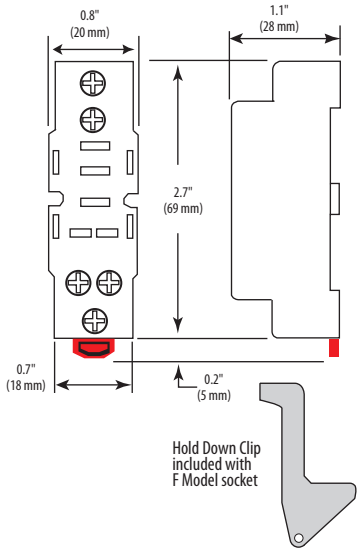
Function	NEMA (IEC)* Terminal
Coil (+)**	14 (A1)
Coil (-)**	13 (A2)
COMM	9 (11)
N.O.	5 (14)
N.C.	1 (12)

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

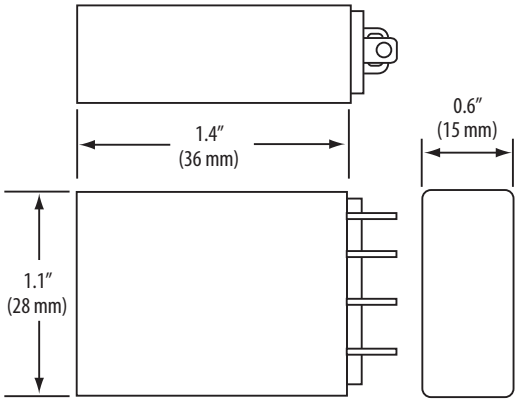


DIMENSIONAL DRAWINGS

VMD1B Sockets



VMD1B Relays



ORDERING INFORMATION

E198454

RoHS Compliant

MODEL	RELAY TYPE	AMPERAGE RATING	COIL VOLTAGE	MIN. SWITCHING CURRENT	FULL FEATURED	UL	CE
VMD1B-C12D	SPDT	20A	12VDC	100mA@5VDC		●	●
VMD1B-C24D		20A	24VDC	100mA@5VDC		●	●
VMD1B-C24A		20A	24VAC	100mA@5VDC		●	●
VMD1B-C120A		20A	120VAC	100mA@5VDC		●	●
VMD1B-F12D		20A	12VDC	100mA@5VDC	●	●	●
VMD1B-F24D		20A	24VDC	100mA@5VDC	●	●	●
VMD1B-F24A		20A	24VAC	100mA@5VDC	●	●	●
VMD1B-F120A		20A	120VAC	100mA@5VDC	●	●	●
VMD1B-F240A		20A	240VAC	100mA@5VDC	●	●	●
VMD1B-24SVAC		3A	24VAC	3mA@17VDC	●	●	●
VMD1B-120SVAC		3A	120VAC	3mA@17VDC	●	●	●

These relays are UL Listed when used with the Veris sockets.

SOCKET ORDERING INFORMATION

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

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

ACCESSORIES

DIN Rail, DIN Stop Clip (AV01, AV02)

RELAYS

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FT-3400 SUBMITTAL AND DATA SHEET



DESCRIPTION

ONICON's FT-3400 series insertion electromagnetic flow meters are suitable for measuring electrically conductive liquids in a wide variety of applications. Each FT-3400 provides current and voltage analog output for flow rate, a high-resolution frequency output to drive peripheral devices, a scalable pulse output for totalization, and a master alarm signal. The FT-3400 provides a contact closure signal for bidirectional applications for flow direction.

APPLICATIONS

- HVAC hydronic applications including chilled water, heating hot water and condenser water
- Bi-directional flow for primary/secondary bypass and thermal storage applications
- Domestic cold and hot water applications
- Clean process flow applications with conductivities greater than 25 µS/cm

CALIBRATION

All FT-3400 flow meters are wet calibrated in a flow laboratory against standards that are directly traceable to National Institute of Standards and Technology (N.I.S.T.). A certificate of calibration accompanies every meter

GENERAL SPECIFICATIONS

PERFORMANCE	ACCURACY	±1.0% of reading from 2 - 20 ft/s ±0.02 ft/s below 2 ft/s
	MINIMUM CONDUCTIVITY	25 µS/cm
INPUT POWER	20 - 28 VDC, 400 mA at 24 VDC 20 - 28 VAC, 60 Hz, 10 VA	
I/O SIGNAL	ANALOG OUTPUT (ISOLATED)	One (1) 4-20 mA analog output, and one (1) 0-10 V or 0-5 V analog output
	FREQUENCY OUTPUT	0-15 V peak pulse, 0-500 Hz
	SCALABLE PULSE OUTPUT	Isolated solid state dry contact Contact rating: 30 V, 1.2A Pulse Duration: 0.5, 1, 2 or 6 seconds
ELECTRONICS ENCLOSURE	Weathertight NEMA 4 aluminum enclosure	
ELECTRICAL CONNECTIONS	10' or 20' of PVC jacketed cable with ½" NPT conduit connection	
FLOW RANGE	0.1 ft/s to 20 ft/s (200:1 turndown)	
SENSING METHOD	Electromagnetic sensing (no moving parts)	
PIPE SIZE RANGE	AVAILABLE OPTIONS	Standard Configuration: 3 - 72" nominal diameter (1.25" - 2.5" Coming in Q2 2024)
LIQUID TEMPERATURE RANGE	15°F to 250°F	
AMBIENT TEMPERATURE RANGE	-20°F to 150°F	
OPERATING PRESSURE	400 psi maximum	
PRESSURE DROP	0.1 psi at 12 ft/s in 3" pipe, decreasing as line size increases	

GENERAL SPECIFICATIONS (continued)

MATERIAL	Wetted metal components: 316 Stainless Steel Sensor head: XAREC Optional: NSF/ANSI 61/372 version	
APPROVAL	UL	UL ANSI/NSF 61 & 372 Drinking Water Safety UL 50 Standard for Enclosures for Electrical Equipment UL 61010-1 Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use
	CE	IEC 61000-6-2 Power-Frequency Magnetic Field, Radiated Immunity and Electrostatic Discharge. IEC 61000-6-4 Radiated Emissions EN 301 489-17 Radiated Emissions, RF Immunity, and Electrostatic Discharge EN 301 328 Wideband transmission systems
	FCC: Part 15, Subpart B	

OPERATING RANGE FOR COMMON PIPE SIZES

OPERATING RANGE FOR COMMON PIPE SIZES*					
PIPE SIZE (inches)	**FLOW RATE (GPM) (0.1 ft/s to 20 ft/s)**	**PIPE SIZE (inches)**	**FLOW RATE (GPM) (0.1 ft/s to 20 ft/s)**	**PIPE SIZE (inches)**	**FLOW RATE (GPM) (0.1 ft/s to 20 ft/s)**
1¼	0.4 - 95	6	9 - 1,800	18	70 - 14,600
1½	0.6 - 130	8	16 - 3,100	20	86 - 18,100
2	1.0 - 200	10	24 - 4,900	24	125 - 26,500
2½	1.1 - 230	12	35 - 7,050	30	223 - 41,900
3	2.4 - 460	14	42 - 8,600	36	304 - 60,900
4	4 - 800	16	55 - 11,400		

*1.25” to 2.5” coming in Q2 2024

METER ORDERING INFORMATION

Model FT-3400- **A** **B** **C** - **D** **EE** **F**

Meter Configuration & I/O
1 = Frequency, Pulse, Iso Analog, 24V AC/DC
2 = Frequency, Pulse, Iso Analog, **Dir Contact**, 24V AC/DC

B = Network Communications
0 = No Communications module

C = Reserved for Bluetooth

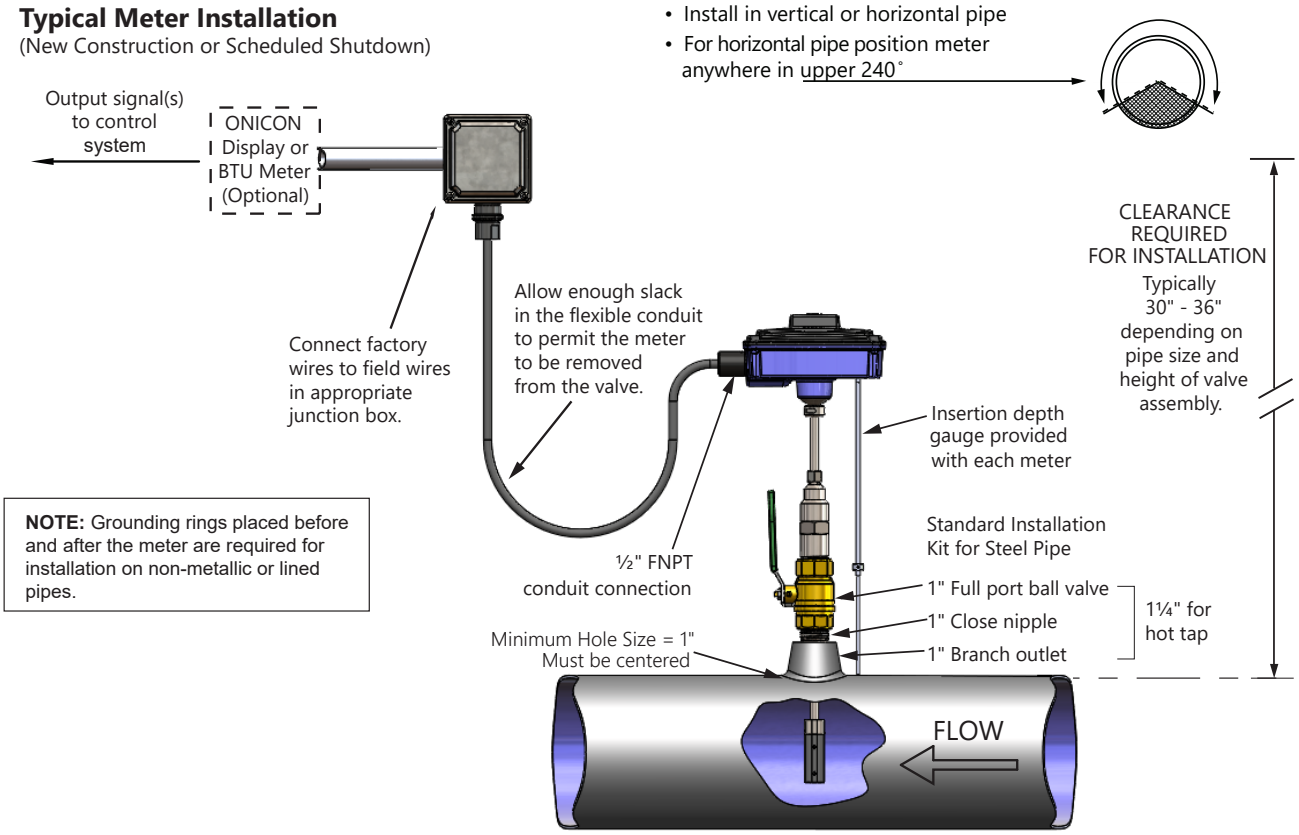
D = Enclosure Type and Process Connection
1 = NEMA 4 Enclosure with 10' PVC Cable
2 = NEMA 4 Enclosure with 25' PVC Cable

EE = Pipe Size Range and Meter Length	
A1 for pipes 1.25 - 2.5" (Coming in Q2 2024)	F7 for pipes 3 - 72" (26" stem)
C3 for pipes 3 - 10" (18" stem)	F8 for pipes 3 - 72" (28" stem)
D4 for pipes 3 - 16" (20" stem)	G1 for pipes 12 - 72" (30" stem)
E5 for pipes 3 - 22" (22" stem)	G2 for pipes 12 - 72" (34" stem)
F6 for pipes 3 - 72" (24" stem)	

F = Wetted Material
1 = **Temp < 150°F,** 316 SS, XAREC, Viton
2 = **Temp ≤ 250°F,** 316 SS, XAREC, FKM, Viton
3 = **Temp < 180°F**, 316 SS, XAREC, EPDM, **NSF rated**

INSTALLATION DETAILS

Typical Meter Installation
(New Construction or Scheduled Shutdown)



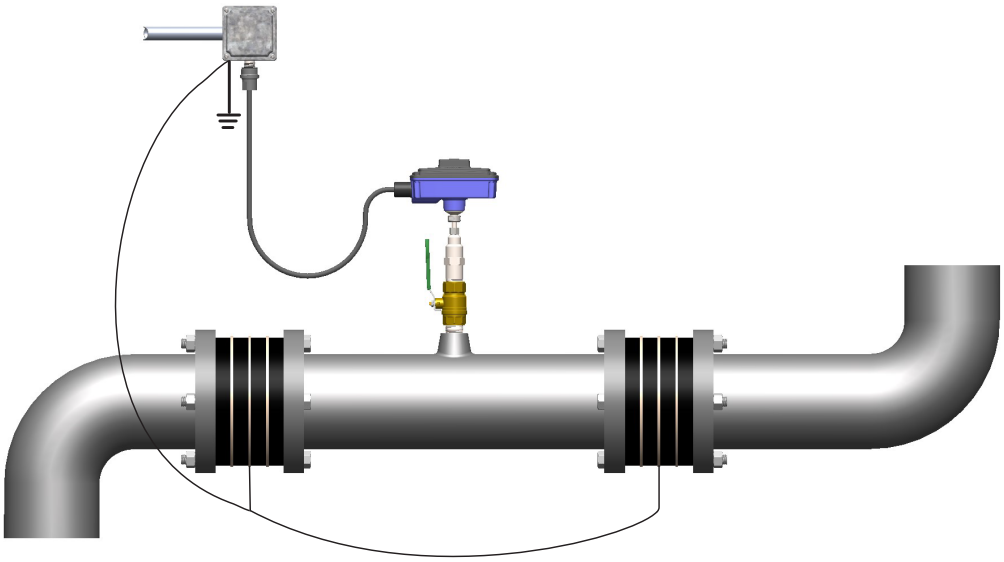
NOTE: Grounding rings placed before and after the meter are required for installation on non-metallic or lined pipes.

Note: Installation kits vary based on pipe material and application. For installations in pressurized (live) systems, use "Hot tap" 1¼ inch installation kit and drill hole using a 1 inch wet tap drill.

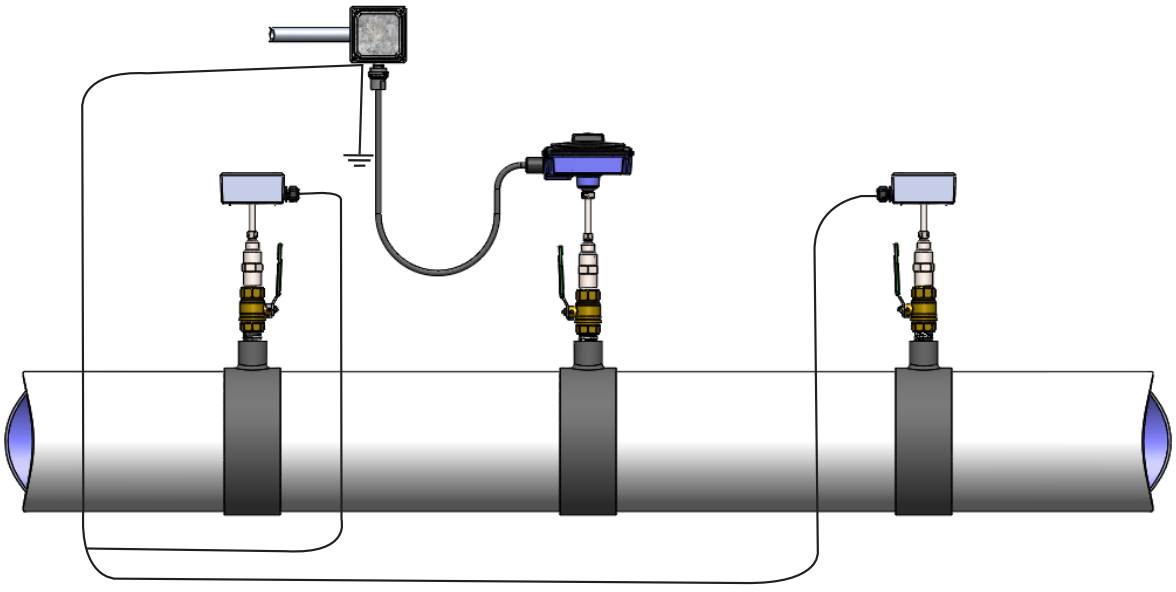
Optional Grounding Rings or Probes Accessory in Non-Conductive Pipe

Grounding rings or probes are required whenever meters are installed in non-metallic or lined pipes. Grounding rings or probes placed before and after the meter eliminate electrical noise that will interfere with the proper operation of the meter. ONICON provides grounding rings or probes as an optional accessory.

Grounding Rings Installation



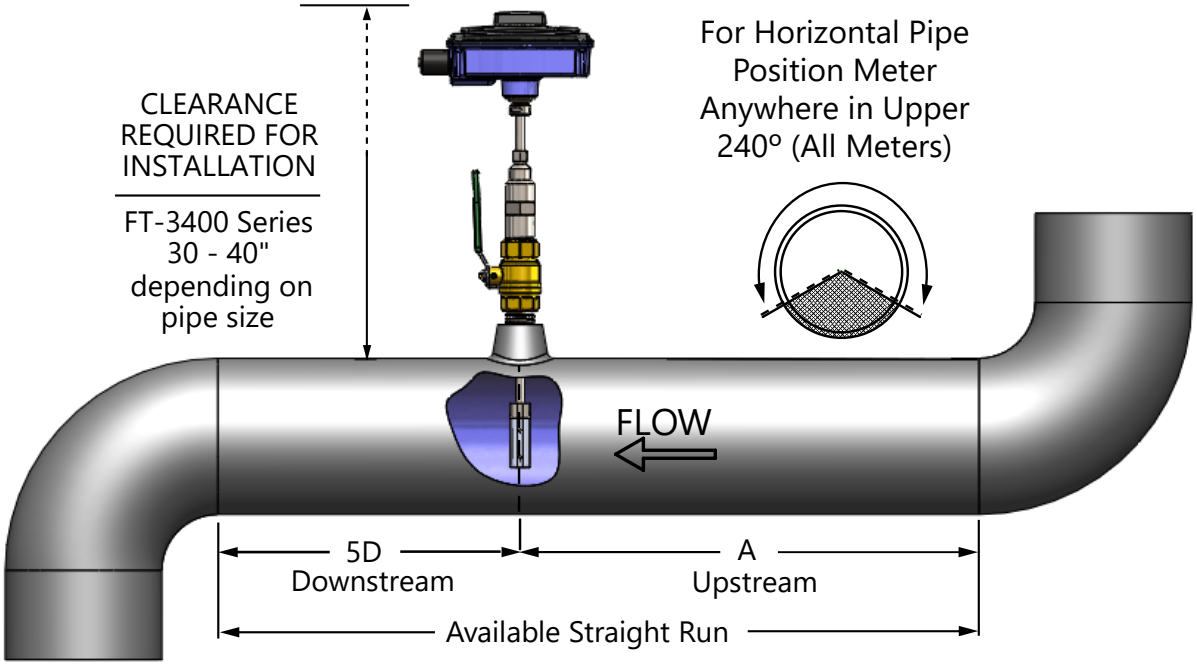
Grounding Probes Installation



*** Additional straight run may be required upstream of the upstream grounding ring/probe based on the nature of the upstream obstruction. Refer to the chart on the next page to determine how much straight run is required.**

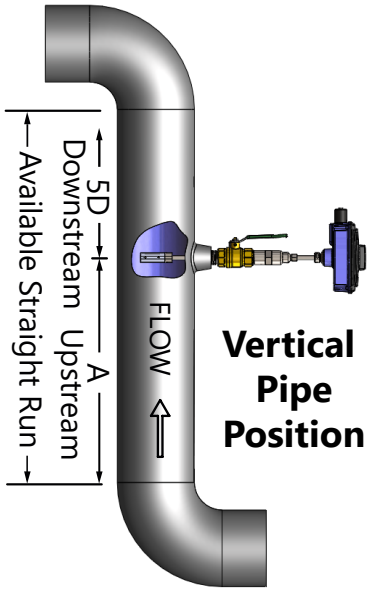
MINIMUM STRAIGHT RUN REQUIREMENT

The straight run requirements presented below represent the minimum requirements for accurate flow measurement. For optimum performance, provide as much additional straight run as possible.



For 3" and larger pipe diameters

Upstream obstruction	(A) Minimum straight run required upstream of meter location
Single bend preceded by ≥ 9 diameters of straight pipe	10 Diameters
Pipe size reduction / expansion in straight pipe run	10 Diameters
Single bend preceded by ≤ 9 diameters of straight pipe	15 Diameters
Outflowing tee / Pump outflow	20 Diameters
Multiple bends out of plane	30 Diameters
Inflowing tee	30 Diameters
Control / Modulating valve	30 Diameters



WIRING CONNECTIONS

	Wire Color	Description	Notes
POWER / GROUND	Red	(+) 24V Supply voltage	Connect to power supply (+): DC (+) or AC (line) 22-26VDC, 1.2A, 25Watts or 20-28VAC, 30VA, 60hz
	Black	(-) Isolated supply voltage common	
	Green / Yellow	Earth ground connection	Required for meter operation
FREQUENCY OUT	Green	(+) Isolated frequency output	Required when connecting to ONICON display or BTU meter
	Yellow	(-) Frequency output common	
ANALOG OUT	Blue	(+) Isolated 4-20mA analog output	2mA = Master Alarm
	White	(+) Isolated 2-10V or 1-5V analog output	Configurable via PC app 1V = Master Alarm for 2-10V or 0.5V = Master Alarm for 1-5V
	Brown	(-) Isolated analog output common	
DRY CONTACT (Scaled Pulse or Alarm)	Orange / Black	Dry Contact 1	Pulse scaled output for totalization. Example: 1 pulse per 10 gal / 1 pulse per 100 gal
	White / Black		
	Gray / Black	Dry Contact 2	Master Alarm Contact
	Violet / Black		
	Gray	Dry Contact 3	Bidirectional Contact (only available on the FT-3400-2)
	Violet		

ITEM	TAG/QTY	APPLICATION	LIQUID TYPE	DESIGN FLOW	METER MODEL SELECTION	GROUNDING RINGS	REFERENCE SHEET	ASSOCIATED PERIPHERAL	NOTES
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

FT-3400 SUBMITTAL AND DATA SHEET

TO: DATE:

PROJECT NAME:
CONTRACTOR:
ENGINEER:
ONICON REP:

SUBMITTAL FOR:

RECORD
APPROVAL

APPROVED BY:

RELEASED FOR:

MANUFACTURING AND SHIPMENT
HOLD FOR RELEASE
APPROVED
APPROVED AS NOTED
DISAPPROVED

EXPLANATION:

PLEASE RETURN APPROVED DRAWINGS TO:

ATTENTION:

SUBMITTED BY:

ONICON
Flow and Energy Measurement

11451 Belcher Road South • Largo, FL 33773 • USA • +1 (727) 447-6140
www.onicon.com • sales@onicon.com

SIEMENS

Submittal Sheet
Document No. 154-001P25
August 28, 2012

OpenAir™ GCA Series, Spring Return,160 lb-in, Electronic Damper Actuators

Description

The OpenAir GCA Series spring return, 160 lb-in (18 Nm) electronic damper actuators provide modulating, two-position and floating control of building HVAC dampers.

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



Features

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

.

Technical Data

24 Vac, 120 Vac Torque:	160 lb-in (18 Nm) running and spring return <360 lb-in (40 Nm) maximum

NOTE: At -25°F, spring return is 142 lb-in (16 Nm)

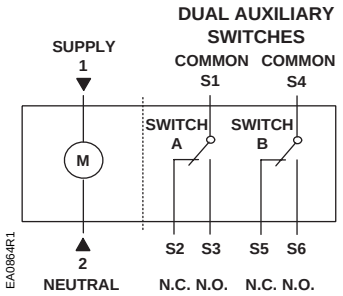
Runtime for 90°:	90 sec. operating, 15 sec. typical (30 sec. max.) closing on power loss
Frequency:	50/60 Hz
Power consumption: Running:	7 VA/5W (24 Vac/dc; GCA12x, GCA13x) 7 VA/5W (24 Vac/dc, GCA15x) 7 VA/5W (24 Vac/dc GCA16x) 8 VA (120 Vac GCA22x)
Power consumption: Holding	5 VA/3W (24 Vac/dc, GCA12x) 5 VA/3W (24 Vac/dc, GCA13x, GCA15x) 5 VA (24 Vac/dc, GCA16x) 6 VA (120 Vac, GCA22x)
Equipment rating (24V):	Class 2 per UL/CSA
Noise level:	<45 dBA (running)
Angle of rotation:	90° nominal, 95° max.
Shaft dimensions:	3/8-in to 1-in (8 to 25.6 mm) dia. 1/4-in to 3/4-in (6 to 18 mm) sq. 3/4-in (20 mm) min. length
Operating temperature:	-25°F to 130°F (-32°C to 55°C)
Storage temperature:	-40°F to 158°F (-40°C to 70°C)
Ambient humidity:	95% rh (non-condensing)
Pre-cabled connection:	18 AWG, 3 ft (0.9 m) long
Enclosure:	NEMA 2, IP54 per EN 60 529
Material:	Die cast aluminum alloy
Agency listings:	CE, UL60730, cUL C22.2 No. 24-93
Gear Lubrication:	Silicone-free
Weight:	4.85 lb (2.2 kg)
Dimensions:	11-13/16 in (300 mm) H 4-3/4 in (120 mm) W 2-7/8 in (72 mm) D

Typical Specifications

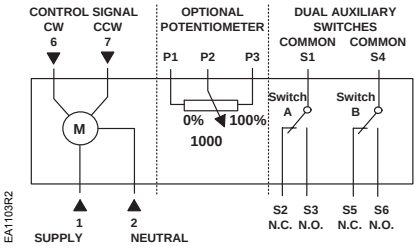
Spring return damper actuators shall be the type that requires no connecting linkages. The spring return actuators shall have a self-centering damper shaft coupling that assures concentric alignment of the actuator's output coupling with the damper shaft and be capable of direct mounting to a shaft up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

Wiring Diagrams

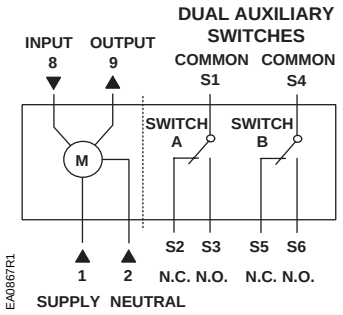
2-Position, 24 Vac/dc:



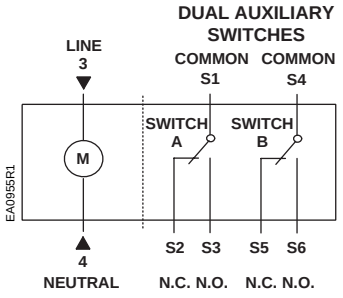
Floating, 24 Vac/dc:



0 to 10 Vdc, GCA16x, 24 Vac/dc;
2 to 10 Vdc, GCA15x, 24 Vac/dc:



2-Position, 120 Vac:



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Your feedback is important to us. If you have comments about this document, please send them to
sbt_technical.editor.us.sbt@siemens.com

SIEMENS

Submittal Sheet
Document No. 154-011P25
January 25, 2011

OpenAir™ GDE Series, Non-spring Return, 24 Vac, 44 lb-in, Direct Coupled, Electronic Damper Actuator

Product Number	Operating Voltage	Control		Pre-Cabled			No Cables		Built-in Control Options				Bulk Pack	
	24 Vac +20%, -15%	0 to 10 Vdc	Floating Control	Standard	Plenum, 18 AWG, 3 ft (0.9m)	Plenum, 18 AWG, 6 ft (1.8 m)	Terminal Strip	Post Header	Feedback	Potentiometer	Dual Auxiliary Switches	Slope and Offset	24 pieces	12 pieces
GDE131.1U	●		●	●										
GDE131.1U/B	●		●	●									●	
GDE131.1N	●		●					●						
GDE131.1N/B	●		●					●					●	
GDE131.1P	●		●		●									
GDE131.1P/B	●		●		●								●	
GDE131.1Q	●		●			●								
GDE131.1Q/B	●		●			●								●
GDE131.1T	●		●				●							
GDE131.1T/B	●		●				●						●	
GDE132.1P	●		●		●					●				
GDE136.1P	●		●		●						●			
GDE161.1N	●	●						●						
GDE161.1N/B	●	●						●					●	
GDE161.1P	●	●			●				●					
GDE161.1P/B	●	●			●				●				●	
GDE161.1Q	●	●				●			●					
GDE161.1T	●	●					●							
GDE161.1T/B	●	●					●						●	
GDE163.1P	●	●			●				●			●		
GDE164.1P	●	●			●				●		●	●		
GDE166.1P	●	●			●				●		●			

Description

The OpenAir, non-spring return, direct-coupled, electronic damper actuators provide modulating and floating control of building HVAC dampers.



c UL us LISTED CE

Features

- Compact, lightweight design
- Models available with dual independently adjustable auxiliary switches
- Modulating models available with built-in feedback (Exception: GDE161.1N and GDE161.1T do not provide feedback)
- Floating control models available with feedback potentiometer
- Manual override
- Mechanical range adjustment capability
- Easily visible position indicator
- Precabled 18 AWG, 3 ft (0.9 m), or 6 ft (1.8 m) long
- Synchronous motor technology
- UL873 and cUL (C22.2 No. 24-93) listed
- CE certified plenum only
- Connection cables for GDExx.1N models sold separately.

Technical Data

Torque:	44 lb-in (5 Nm)
Runtime for 90°:	90 seconds at 60 Hz opening and closing 108 seconds at 50 Hz opening and closing
Frequency:	50/60 Hz
Power consumption:	3.3 VA (modulating), 2.3 VA (three-position)
Equipment rating (24 Vac):	Class 2 per UL/CSA
Noise level:	<35 dBA (running)
Angle of rotation:	90° nominal, 95° maximum
Shaft dimensions:	3/8 to 5/8 in. (8 to 16 mm) dia., 3/4 in. (20 mm) min. length
Operating temperature:	-22°F to 130°F (-30°C to 55°C)
Storage temperature:	-40°F to 158°F (-40°C to 70°C)
Ambient humidity:	95% RH (non-condensing)
Enclosure:	NEMA 2, IP54 per EN60529
GDExxx.1N and GDExxx.1T:	NEMA 1
Material:	Durable plastic
Agency listings:	UL873, cUL C22.2 No. 24-93
CE Conformity:	Plenum only
Electromagnetic compatibility (EMC)	2004/108/EC
Emissions Standards	EN61000-6-3
Immunity standards	EN61000-6-2
Gear Lubrication:	Silicone-free
Weight	1.06 lb (0.48 kg)
Country of Origin	USA

Typical Specifications

Non-spring return damper actuators shall be the direct-coupled type that requires no connecting linkages. The non-spring return actuators under 100 lb-in shall be capable of direct-mounting to a shaft up to a 5/8-inch diameter. Actuators shall provide stall protection throughout the full range of rotation. All non-spring return actuators shall be capable of both clockwise and counterclockwise operation. All non-spring return actuators shall hold position in the event of a power failure. All modulating actuators shall return to the 0 position in the event only the control signal is lost. All actuators shall provide a means of manually positioning the output coupling in the absence of power. Dual independently adjustable auxiliary switches must be integral to the actuator. All actuators must provide an easily readable high contrast yellow on black position indicator. All actuators shall be UL873 and CSA22.2 listed, CE certified, and manufactured under ISO 9002 and ISO 14000 procedures. Actuators shall be designed for a minimum of 60,000 full stroke cycles at the actuators rated torque and temperatures. Actuators shall be as manufactured by Siemens Industry, Inc.

Dimensions

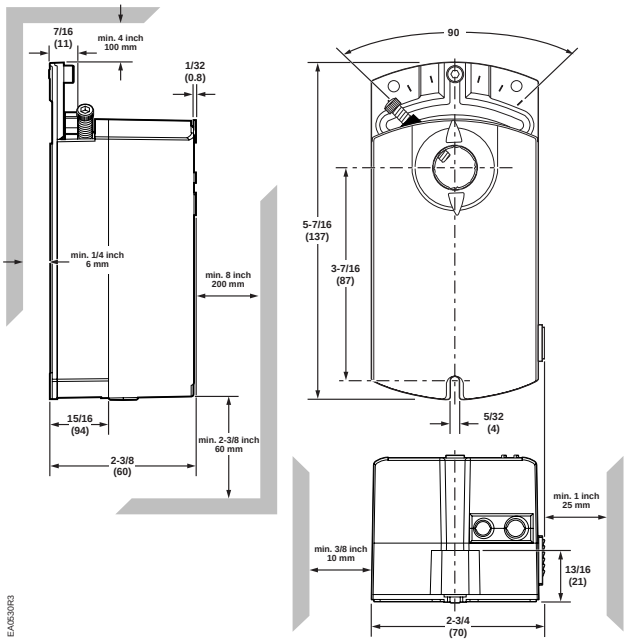
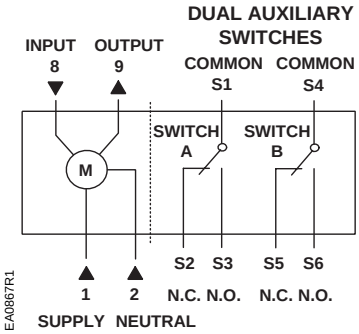


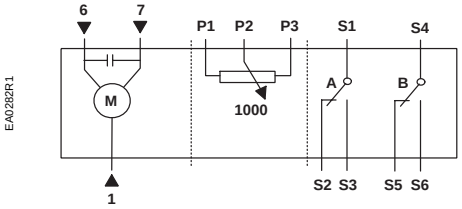
Figure 1. GDE/GLB Dimensions in Inches (mm).

Wiring Diagrams

0 to 10 Vdc Modulating, 24 Vac:



Floating, 24 Vac:



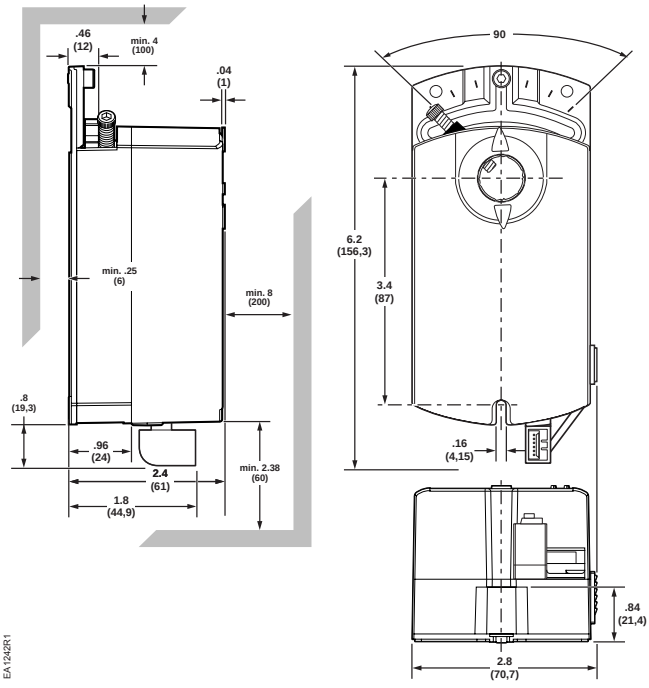


Figure 2. GDE Terminal Strip Model/Post Header AMP Model in Inches (mm).

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Your feedback is important to us. If you have comments about this document, please send them to sbt_technical.editor.us.sbt@siemens.com

SIEMENS

Submittal Sheet
Document No. 154-004P25
January 25, 2011

OpenAir™ GMA Series, Spring Return, 24 Vac/dc and 120 Vac, 62 lb-in, Direct-Coupled Electronic Damper Actuators

Product Number	Operating Voltage		Control				Cables		Built-In Control Options				
	24 Vac ±20% 24 Vdc ±15%	120 Vac ±10%	Modulating 0 to 10 Vdc	Modulating 2 to 10 Vdc	Floating	2-position	Standard	Plenum	Position Feedback	Dual Auxiliary Switches	Offset 0 to 5 Vdc Span 2 to 30 Vdc	Input Signal Inversion (Direct or Inverse Acting)	Feedback Signal Inversion
GMA121.1U	•					•	•						
GMA121.1P/B	•					•		•					
GMA121.1P	•					•		•					
GMA126.1U	•					•	•			•			
GMA126.1P	•					•		•		•			
GMA221.1U		•				•	•						
GMA226.1U		•				•	•			•			
GMA131.1U	•				•		•						
GMA131.1P	•				•			•					
GMA132.1U	•				•		•		•				
GMA136.1U	•				•		•			•			
GMA151.1U	•			•			•		•			•	•
GMA151.1P	•			•				•	•			•	•
GMA156.1U	•			•			•		•	•		•	•
GMA156.1P	•			•				•	•	•		•	•
GMA161.1U	•		•				•		•				
GMA161.1P	•		•					•	•				
GMA163.1U	•		•				•		•		•		
GMA163.1P	•		•					•	•		•		
GMA164.1U	•		•				•		•	•	•		
GMA166.1U	•		•				•		•	•			
GMA166.1P	•		•					•	•	•			

Technical Data

Runtime for 90°:	90 sec. operating
Spring Return:	15 sec. typical (<60 seconds max. at –25°F (–32°C))
Frequency:	50/60 Hz
Power consumption: 24 Vac/dc	
Running:	5 VA/3.5W
Holding:	4 VA/3W
Power Consumption: 120 Vac	
Running and holding:	≤7 VA/5W
Equipment rating (24V):	Class 2 per UL/CSA
Angle of rotation:	90° nominal, 95° max.
Shaft dimensions:	1/4 to 3/4-in. (6.4 to 20.5 mm) dia., 1/4 to 1/2-in. (6.4 to 13 mm) sq., 1-in. (25.4 mm) min. length
Operating temperature:	-25°F to 130°F (-32°C to 55°C)
Storage temperature:	-40°F to 158°F (-40°C to 70°C)
Ambient humidity:	95% rh (non-condensing)

Description

The OpenAir direct-coupled, spring return electronic damper actuators provide modulating, two-position and three-position control of building HVAC dampers.



Features

- Brushless motor technology
- Bi-directional fail-safe spring return
- Unique self-centering shaft coupling
- Models available with dual, independently adjustable auxiliary switches
- Floating control models available with feedback potentiometer
- All modulating control types include built-in feedback capability
- All metal housing
- Manual override
- Mechanical range adjustment capability
- Easily visible position indicator
- Precabled
- UL60730 (to replace UL873) and cUL (C22.2 No. 24-93) listed CE conformance
- Small actuator footprint with 62 lb-in of torque
- 24 Vac/dc compatible

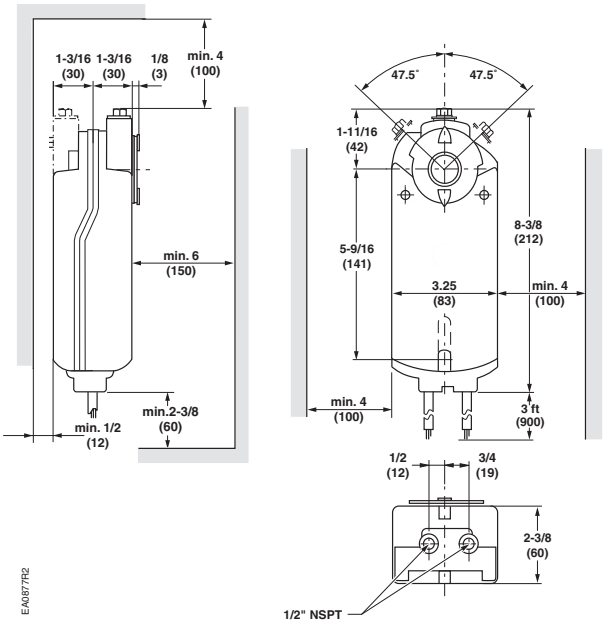
Technical Data, continued

Enclosure:	NEMA 1
Precabled connection:	18 AWG, 3 ft (0.9 m) long
Agency listings:	UL60730 (to replace UL873) C-UL C22.2 No. 24-93
Material:	Die cast aluminum alloy
Gear lubrication:	Silicone free
Dimensions:	8-3/8" H × 3-1/4" W × 2-2/3" D (212 mm H x 83 mm W x 68 mm D)
Weight:	2.9 lb (1.3 kg)
Country of Origin	USA

Typical Specifications

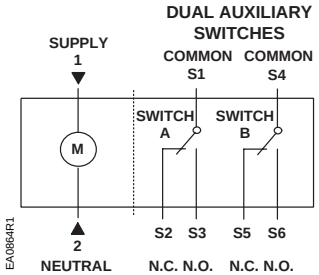
Spring-return damper actuators shall be the direct-coupled type that requires no connecting linkages. These spring return actuators shall have a self-centering damper shaft coupling that assures concentric alignment of the actuator's output coupling with the damper shaft for <60 lb-in torque and be capable of direct mounting to a shaft up to a 3/4-inch in diameter. Actuators shall provide stall protection throughout the full range of rotation. All spring return actuators shall be capable of both clockwise and counterclockwise spring return fail-safe operation using a continuously engaged mechanical return spring that returns the actuator to a fail-safe position in <15 seconds in response to a loss of power. All actuators shall provide a means of manually positioning the output coupling in the absence of power. Dual, independently adjustable auxiliary switches are available for these actuators. All actuators must be precabled and provide an easily readable high contrast yellow on black position indicator. All actuators shall be CE conforming; UL60730 (to replace UL873) and CSA22.2 listed and manufactured under ISO 9002 and ISO 14000 procedures. Actuators shall be as manufactured by Siemens Industry, Inc.

Dimensions in Inches (Millimeters)

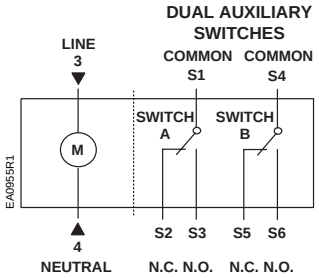


Wiring Diagrams

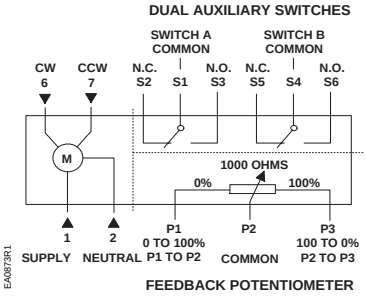
GMA12x, 2-Position, 24 Vac/dc:



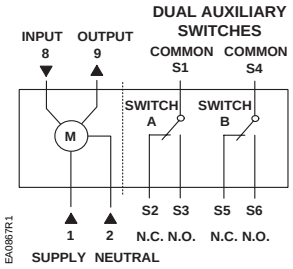
GMA22x, 2-Position, 120 Vac:



GMA13x, Floating, 24 Vac/dc:



GMA16x, GMA15x; Modulating; 24 Vac/dc:



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Current Switches: Fixed Trip Point

Split-Core & Solid-Core Go/No Go Current Switches



US Patent No. 7,193,428

0.15 A TURN-ON!

5 Year Warranty

APPLICATIONS

- Monitoring status of electrical loads
- Monitoring direct-drive units, exhaust fans, and other fixed loads
- Verifying lighting run times

FEATURES

On/off status for direct-drive fans, pumps, and process motors

- More reliable for status than relays across auxiliary contacts
- Ideal for direct-drive units, unit vents, fan coil units, exhaust fans, and other fixed loads
- Great for lighting status–less expensive than 277V relays
- Low 0.15A turn-on (H300 and H600)...ideal for small exhaust fans (not intended to detect belt loss)
- Removable mounting bracket provides installation flexibility
- Bracket on H900 can be installed in three different configurations...installer convenience

Monitor status of fans, pumps, motors & other electrical loads

- Split-core H300, H600, and H900 for fast retrofit installation
- Mini solid-core H800 and micro split-core H300 fit in tight enclosures...saves valuable panel space
- 100% solid-state, no moving parts to fail
- Polarity insensitive output
- 5-year limited warranty

DESCRIPTION

Hawkeye x00 go/no go current switches provide a cost-effective solution for monitoring status on unit vents, exhaust fans, recirculation pumps, and other fixed loads where belt loss is not a concern.

Veris has applied new technology to the H300, H600, and H800 models to achieve impressive improvement in turn-on levels. The Hawkeye H300 and H600 now have the lowest turn-on current in the industry at a mere 150mA!

CURRENT SENSING THE ULTIMATE PROOF OF FLOW

Maximize Reliability
Minimize Installed Cost

SPECIFICATIONS

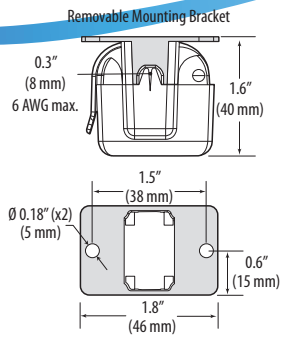
Sensor Power (N.O. Models)	Induced from monitored current
Insulation Class	600VAC RMS (UL), 300VAC RMS (CE)
Frequency Range	50/60 Hz
Temperature Range	**H800, H800NC, H300, H900:** -15° to 60°C (5° to 140°F) **H600:** -15° to 40°C (5° to 104°F) (to 200A); -15° to 60°C (5° to 140°F) (to 150A) **H800HV:** -40° to 50°C (-40° to 122°F) (to 200A); -40° to 75°C (-40° to 167°F) (to 100A, & 0.25A output)
Humidity Range	10-90% RH, non-condensing
Sensor Power (N.C. Models)	5-30VDC, permanently connected
Off State Leakage (N.C. Models)	34µA@5VDC, 200µA@30VDC
On State Voltage Drop (N.C. Models)	1.9VDC (max.) @0.1A
Terminal Block Maximum Wire Size	14 AWG (16 AWG for H300)
Terminal Block Torque (nominal)	4 in-lbs (7 in-lbs for H300)
Agency Approvals	UL 508 open device listing; CE:EN61010-1:2001-02, CAT III, deg. 2, basic insulation

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

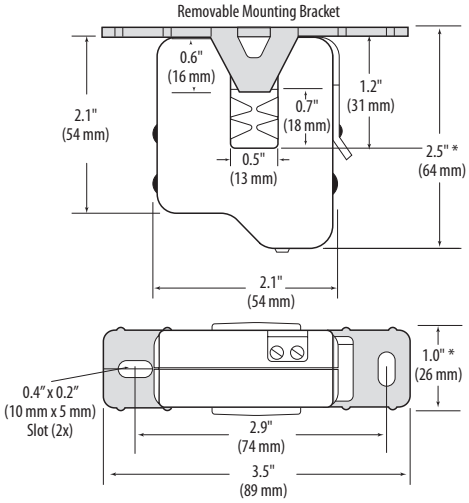
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DIMENSIONAL DRAWINGS

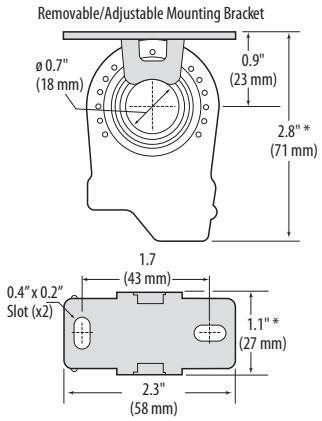
H300



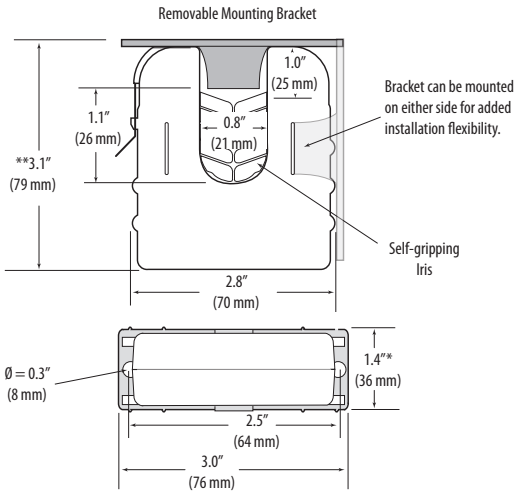
H600



H800, H800HV, H800NC



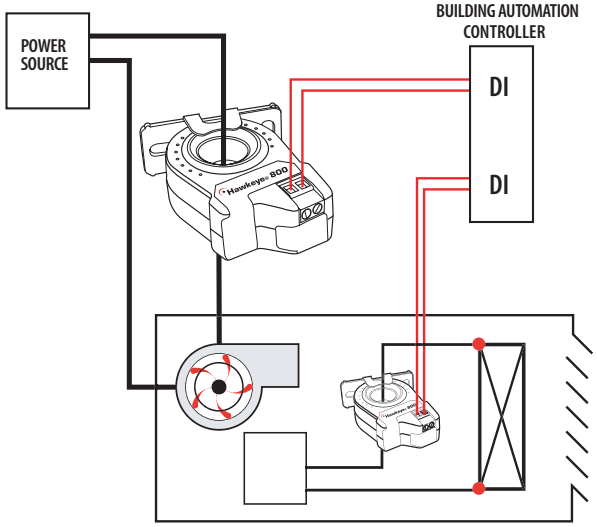
H900



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

APPLICATION/WIRING DIAGRAM

Unit Vent Heater Control



ORDERING INFORMATION

MODEL	AMPERAGE RANGE	STATUS OUTPUT (max.)	TRIP POINT	HOUSING	UL	CE	RoHS
H300	0.15 - 60A	N.O. 1.0A@30VAC/DC	0.15A or less	Split-core	●	● [2]	●
H600	0.15 - 200A	N.O. 1.0A@30VAC/DC	0.15A or less	Split-core	● [1]	●	●
H800	0.25 -200A	N.O. 1.0A@30VAC/DC	0.25A or less	Solid-core	● [1]	●	●
H800NC	0.5 - 200A	N.C. 0.1A@30VDC	0.5A or less	Solid-core	● [1]		●
H800HV	0.75 - 200A	N.O. 0.5A@250VAC/DC	0.75A or less	Solid-core	● [3]		
H900	1.5 - 200A	N.O. 1.0A@30VAC/DC	1.5A or less	Split-core	●	●	

[1] *Listed for use on 75°C insulated conductors.*
[2] *Product provides functional insulation only.*
[3] *Listed for use on 90°C insulated conductors.*

ACCESSORIES

DIN Rail Clip Set (AH01, AH27)
DIN Rail (AV01) and DIN Stop Clip (AV02)

CURRENT MONITORING

©2010 Veris Industries

HX08 SERIES & H701

Detect Belt Loss, Coupling Shear, and Mechanical Failure


H908


H708


H608


H808

CURRENT SENSING THE ULTIMATE PROOF OF FLOW

Maximize Reliability Minimize Installed Cost


H308

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.

Retrofit or new construction

High performance devices in split- and solid-core housings

Small size

Fits easily inside small enclosures

Adjustable trip point

Precise current trip point setting

Self-gripping iris

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

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

Status LEDs

Status LEDs available for easy setup and local indication

APPLICATIONS

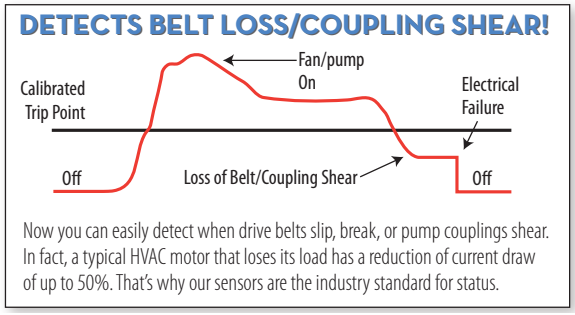
- Detecting belt loss, coupling shear, and mechanical failure
- Verifying lighting circuit and other electrical service run times
- Monitoring status of industrial process equipment
- Monitoring status of critical motors (compressor, fuel, etc.)
- VFD output on/off status

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 mm²) Others: 24-14 AWG (0.2 to 2.1 mm²)
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

CE c UL us LISTED E150462



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.

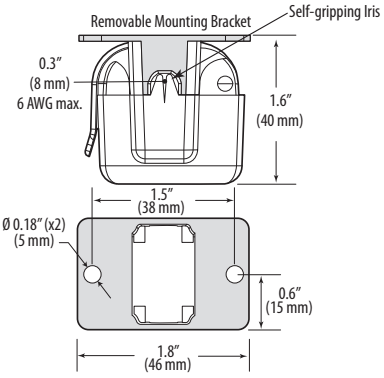
*The CE mark indicates RoHS2 compliance. Please refer to the CE Declaration of Conformity for additional details.

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

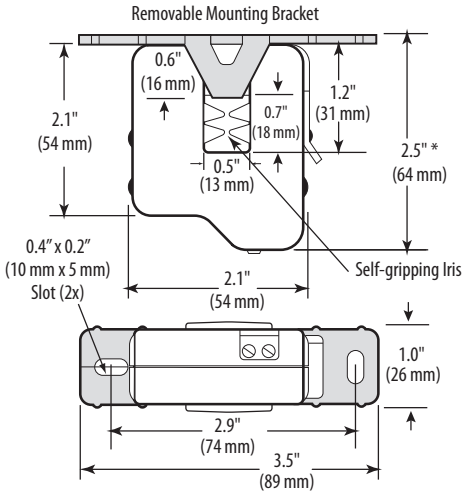
If using this switch in an application that includes an electronically commutated motor (ECM), see Veris Application Note VN61, at www.veris.com.

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

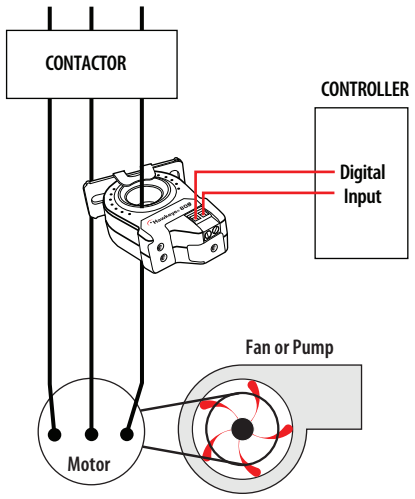
H308
Dimensional Drawing



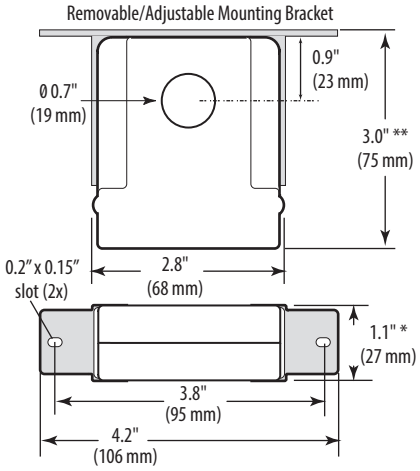
H608
Dimensional Drawing



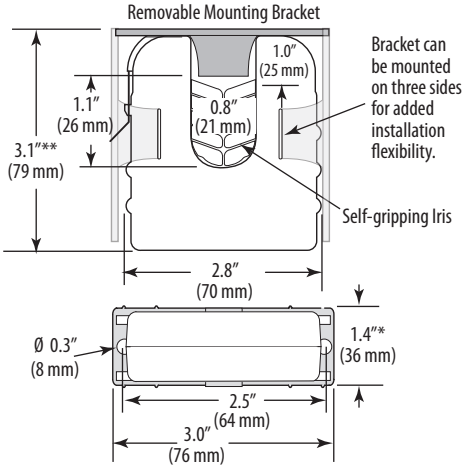
MONITORING FAN /PUMP MOTORS FOR POSITIVE PROOF OF FLOW
Wiring Diagram



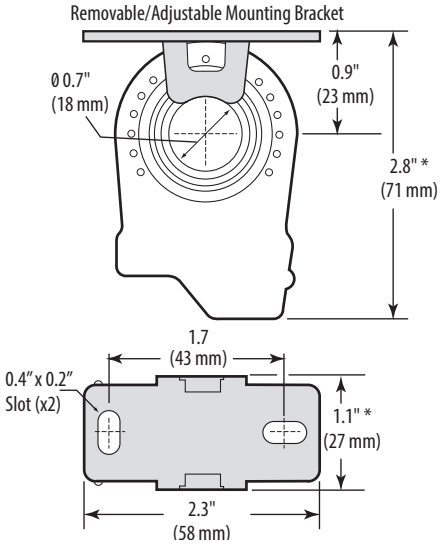
H708/701
Dimensional Drawing



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.

800.354.8556 | +1 503.598.4564 | sales@veris.com | intl@veris.com | www.veris.com


H608

Hawkeye® 608 Series

Mini Split-Core Adjustable Setpoint Digital Output Current Switches

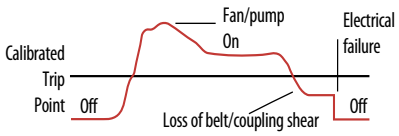
5 Year Warranty

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

APPLICATIONS

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

Detects belt loss/coupling shear!



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

High performance miniature split-core

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

Monitor status of fans, pumps & electrical loads

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

CURRENT SENSING THE ULTIMATE PROOF OF FLOW

Maximize Reliability
Minimize Installed Cost

ORDERING INFORMATION

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

**Hx06 Models require a constant source of 5-30VDC power to the status contacts*
***CE not currently available on this product*

CE

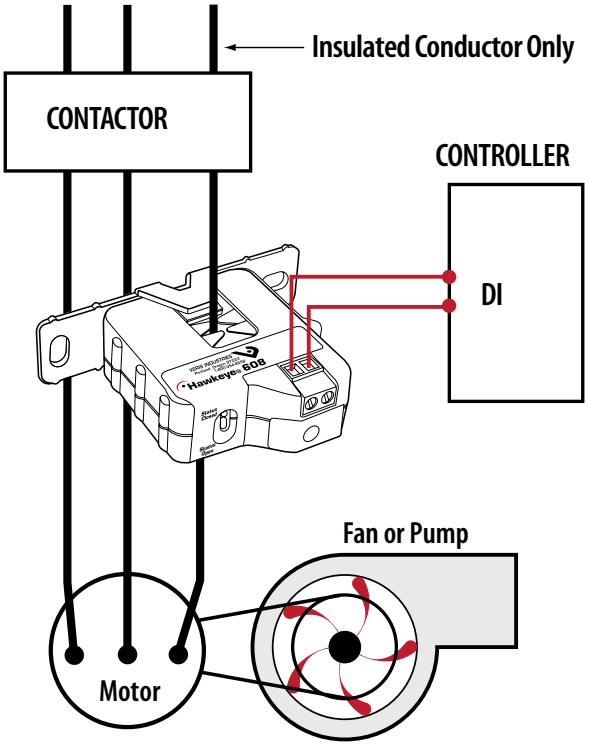
cULus LISTED 3T60 UL 508 E150462

ACCESSORIES

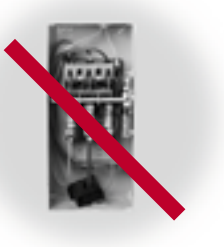
DIN Rail Clip Set...See page 234

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APPLICATIONS/WIRING EXAMPLE



NO !



YES !



The H608 Won't Hang At the Bottom of the Box.

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

NO !



YES !



The H608 Eliminates Extra Enclosures.

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

NO !



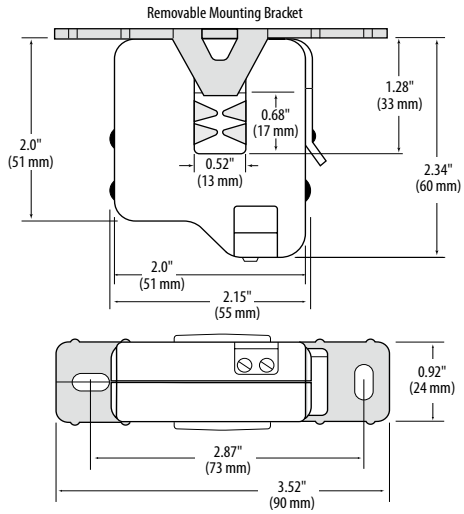
YES !



The H608 Does Not Require Extra Wraps.

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

DIMENSIONAL DRAWINGS



SPECIFICATIONS

Amperage Range	1.25 to 50A
Sensor Power	Induced
Output	Digital switch (see ordering table)
Insulation Class	600VAC rms (UL), 300VAC rms (CE)
Frequency Range	50/60 Hz.
Temperature Range	-15° to 60°C
Humidity Range	10 - 90% RH non-condensing
Hysteresis	10% (typical)
Trip Setpoint	Adjustable 1.25 to 50A
Dimensions…(L x W x H)	2.34" (60mm) x 2.15"(55mm) x .92"(24mm)
Sensor Opening Size…(L x W)	0.52" (13mm) x 0.68" (17mm)
Status Contacts (Hx06 Models):	
Supply Voltage	5-30VDC, permanently connected
Off-state Leakage (max.)	24µA@30VDC
On-state Voltage Drop (606)	1.7VDC (max.)@0.1A@25°C

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

Specification Note: For CE compliance, conductor shall be insulated according to IEC 61010-1:2001, Installation Category III or equivalent. The unit design provides for basic insulation only. For applications requiring double or reinforced insulation, please contact the factory.

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THERMOSTAT REMOTE SENSOR ACCESSORIES

10-531, 65345, 50002883-001, APB-28, BA/ADP, CC-1G-K, M648-K, PN-46, TE6001-1, TE6008-8

DESCRIPTION

The **Johnson Controls Models TE6001, CG-1G-K, M-648-K, 356-90K, APB-28**, and **PN-46** are all sensor mounting brackets for averaging, duct, and outside air probe applications. They have a 1/4" clip or guide to firmly hold a temperature sensor for the application.

TE6001-1 Duct temperature element holder with box
Dimensions: 2.19"W x 4.19"H x 9.19"L (5.5 x 10.6 x 23.3 cm)



TE6001-8 Duct temperature element holder without box
Dimensions: 7.19"W x 4.34"H



M-648-K Copper-clad capillary and sensor holder mounting clip



CC-1G-K Plastic capillary and sensor holder mounting clip



APB-28 Adjustable pipe bracket 2"-8" diameter



PN-46 Aluminum sensor holder with adhesive backing



DESCRIPTION

Wall adaptor plates (goof plates) offer concealment of plaster irregularities, and are ideal to cover up old thermostat mounting holes or paint ridges. Foam backing pads offer wall insulation for better temperature readings. Switch plate displays offer readouts for temperature at every light switch.

10-531 White adapter plate 7" x 5.25" (KTR, KHR)
Hole Dimensions: 2" x 1.5"

50002883-001 White wall plate 6" x 8.3" (TH5000, TH6000)
Hole Dimensions: 2.25" x 2"



65345 White wall plate 4" x 4" (PECO)
Hole Diameter: 1.5"



BA/ADP-525-7-WMW Warm white adaptor plate 7" x 5.25"
BA/ADP-525-7-OFW Off white adaptor plate 7" x 5.25"
BA/ADP-525-7-CPW Copla white adaptor plate 7" x 5.25"
BA/FOAMBACK foam back insulator, 4.4" x 2.6"

Hole Diameter: 1.65"



PW SERIES

DIP Switch Selectable Port Swap Feature



PWxxxS



PWxxxBP

The PW Series wet pressure transducers incorporate microprocessor profiled sensors for exceptional accuracy and reliability. Easy to use and designed to provide exceptional installation savings, the PW Series is ideal for measuring pressure across pumps, filters, heat exchangers, compressors, and other non-corrosive wet media applications.

The DIP switch selectable port swap feature eliminates costly replumbing when the high and low ports are improperly plumbed, allowing the DIP switch position to be changed from normal to swap.

The optional pre-assembled bypass valve is designed for easy maintenance and one-step installation.

Flexible

The DIP switch selectable output switch for normal (4 to 20 mA) or reverse (20 to 4 mA) operation provides application flexibility

Switch-selectable

Switch-selectable pressure ranges…fewer models to order and stock

Rugged

Rugged, die-cast enclosure provides NEMA 4 sealing

High stability

DIP switch controlled electronic surge dampening

Zero calibration

Pushbutton and remote zero adjustment…maintain accuracy and reduce callbacks with automatic zero calibration

APPLICATIONS

- Monitoring and controlling pump differential pressure
- Chiller/boiler differential pressure drop
- CW/HW system differential pressure

SPECIFICATIONS

GENERAL

Input Power	Class 2; 15 to 30 Vdc, 24 Vac nom. 50/60 Hz*
Max. Current Draw	DC: 125 mA; AC: 280 mA
Output	3-wire transmitter; user selectable 4 to 20 mA (clipped & capped)/0-5 V/0-10 V*
Surge Damping	Electronic; 1 or 5 second averaging
Test Mode	Overrides output to full-scale (20 mA, 5 V, 10 V)
Zero Adjust	Pushbutton auto-zero & digital input (2-pos terminal block)
Status Indication	Dual-color LED: Green = Normal, Green Blinking = Low > High Red = Overrange, Red Blinking = Overpressure Green/Red Blinking = Underpressure
Zero Offset (Bidirectional and Port Swap modes only)	0.5%
Housing Material	White powder-coated aluminum NEMA 4, IP65
Fittings	1/8" NPT female thread, 17 to 4 PH stainless steel

PRESSURE RANGES (SELECTABLE)

0 to 50 psig (Gauge)	0 to 5/10/25/50 psid (Differential)
0 to 100 psig (Gauge)	0 to 10/20/50/100 psid (Differential)
0 to 250 psig (Gauge)	0 to 25/50/125/250 psid (Differential)

SENSOR

Accuracy @ 25 °C**	Ranges A and B: ±1% F.S. typical***; Range C: ±1.5% F.S. typical***; Range D: ±2% F.S. typical***
Long Term Stability	±0.25% per year
Media Compatibility	Media compatible with 17 to 4 PH stainless steel
Proof Pressure	2x max. F.S. range***
Burst Pressure	5x max. F.S. range***
Temperature Compensated Range	0 to 50 °C (32 to 122 °F); TC Zero <±1.5% of product F.S.*** per sensor ; TC Span<±1.5% of product F.S.*** per sensor, (2 sensors per unit)
Media Temp. Limits	-20 to 85 °C (-4 to 185 °F); 0 to 90% RH non-condensing
Operating Environment	-10 to 50 °C (14 to 122 °F); 10 to 90% RH non-condensing

WARRANTY

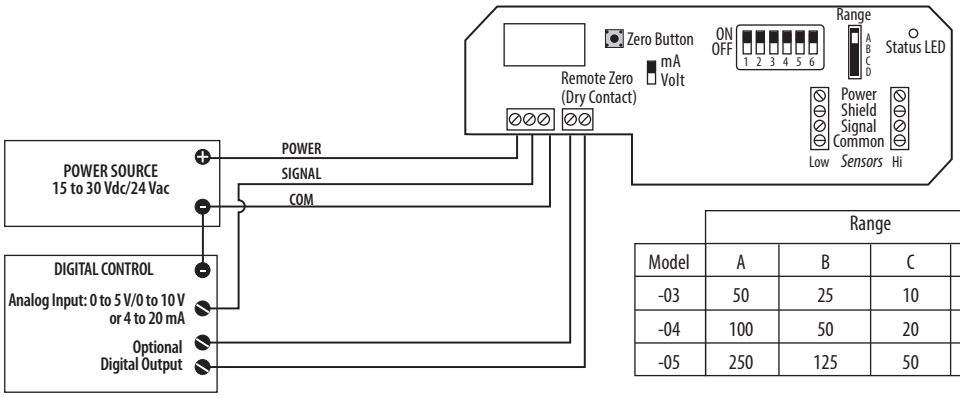
Limited Warranty	5 years

AGENCY APPROVALS

CE

*VFD systems and system wiring generate fields that can disrupt electrical devices. Ensure that these fields are minimized and are not affecting the sensor or sensor wiring.
**Accuracy combines linearity, hysteresis, and repeatability.
*** FS is defined as full span of selected range in bi-directional mode.
EMC Conformance - Low voltage directive 2014/35/EU; 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).

WIRING DIAGRAM



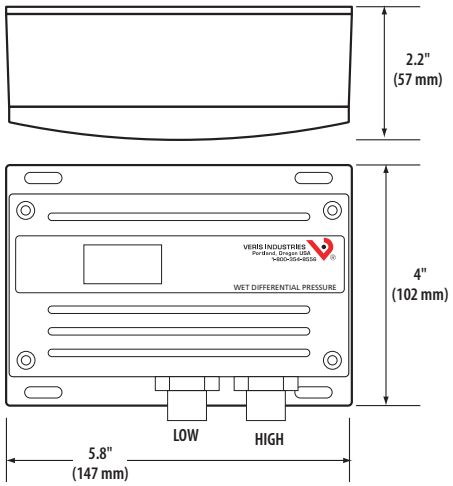
	Range			
Model	A	B	C	D
-03	50	25	10	5
-04	100	50	20	10
-05	250	125	50	25

DIP Switches		
Num	Function	Off/On[1]
1	Damping	Fast/Slow
2	Test	Operate/Test
3	Mode	Normal/Bidirec.
4	Analog	Normal/Reverse
5	Port	Normal/Swap
6	Voltage Out[2]	0 to 10 V/0 to 5 V

1. "Off" position is the default setting for all DIP switches.
2. Ignored in mA mode.

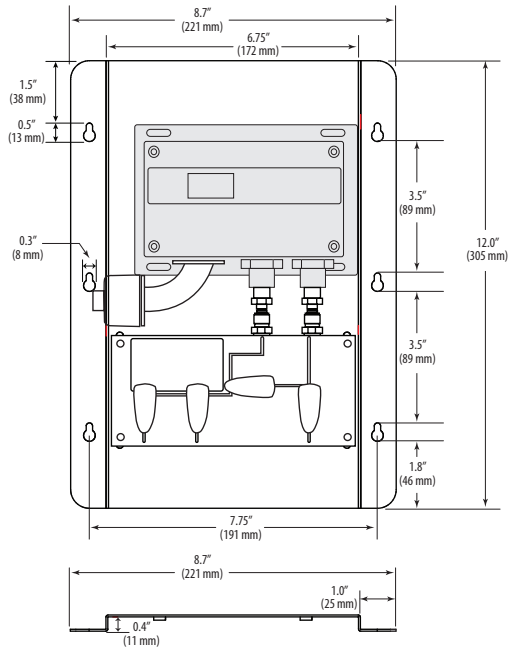
DIMENSIONAL DRAWING

PW Series (PWxxxS)



DIMENSIONAL DRAWING

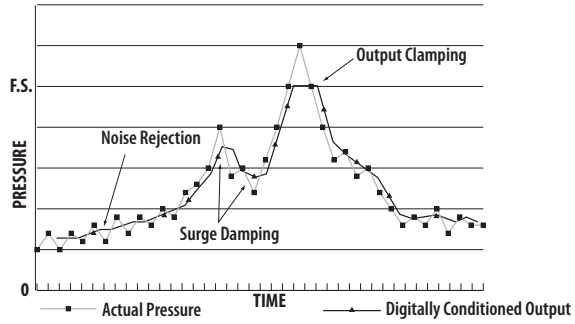
PW Series with Optional Mounted Bypass Assembly (PWxxxBP)



PWLX04BP

MICROPROCESSOR PROVIDES DIGITAL SIGNAL CONDITIONING

- Noise rejection reduces fluctuating readings due to noise or turbulence
- Surge damping prevents false alarms by averaging fast peaks



ORDERING INFORMATION

Local Display	NIST	Operational Range*	Options
PW ☐	☐	☐	☐
L = LCD display X = No display	N = NIST X = None	03 = 0-50 psig 04 = 0-100 psig 05 = 0-250 psig	S = Standard BP = With mounted bypass assembly

Example:

PW	L	X	04	S

* Select operational range according to maximum gauge pressure, NOT differential pressure.
Example: High gauge pressure=90 psig, Select 100 psig model (04).

PX3 SERIES

Differential Pressure/Air Velocity Transducer



PX3

The PX3 transducer can measure either air pressure or velocity with the flip of a switch. The PX3 is available in three installation configurations: duct, panel or universal. Duct and panel models have two pressure and velocity options: 0-1" WC / 0-3,000 ft/min or 1-10" WC / 3,000-6,000 ft/min with four field-selectable sub-ranges. The universal model comes in one pressure/velocity range: 0-10" WC / 0-7,000 ft/min with seven field-selectable sub-ranges for pressure and eight for velocity. All variants are available with and without display. The PX3 has an IP65/NEMA 4 environmental rating and a 5-year limited warranty.

Reduce field failures

Excellent tolerance to overpressure & vibration reduces field failures

Reduce setup

Selectable ranges and scales reduce setup time and number of models to stock

High accuracy

High accuracy digital sensor with seven selectable pressure and eight velocity sub-ranges, maintains calibration and reduces callbacks

Water-resistant housing

IP65/NEMA 4 housing allows for mounting in wash-down locations

Maintenance free

High reliability sensor technology for long-term, maintenance-free operation

Circuit protection

Circuit protection avoids damage due to incorrect input wiring

APPLICATIONS

- Duct static pressure (Pressure mode)
- Building or room pressure (Pressure mode)
- Filter status (Pressure mode)
- Air flow measurement (Velocity mode)

SPECIFICATIONS

GENERAL	
Media Compatibility	Dry air or inert gas
Input Power	Three-wire Volt mode: 24 Vac or 12-30 Vdc* Two-wire mA mode: 12-30 Vdc*
Output Power	Field-selectable: 2-wire, loop-powered 4-20 mA** (DC only, clipped and capped), 24 Vac/dc or 3-wire 0-5V/0-10V***
PRESSURE RANGES	
01 Pressure Range	Pressure Mode: Unidirectional: 0.1/0.25/0.5/1.0 in. WC FS, switch selectable Bidirectional: ±0.1/±0.25/±0.5/±1.0 in. WC FS, switch selectable Unidirectional: 25 Pa/50 Pa/100 Pa/250 Pa, FS, switch selectable Bidirectional: ±25 Pa/±50 Pa/±100 Pa/±250 Pa, FS, switch selectable Velocity Mode: 500/1,000/2,000/3,000 ft/min 2.5/5/10/15 m/s
02 Pressure Range	Pressure Mode: Unidirectional: 1.0/2.5/5.0/10 in. WC FS, switch selectable Bidirectional: ±1.0/±2.5/±5.0/±10 in. WC FS, switch selectable Unidirectional: 0.250 kPa/0.500 kPa/1.000 kPa/2.500 kPa, FS, switch selectable Bidirectional: ±0.250 kPa/±0.500kPa/±1.000 kPa/±2.500 kPa, FS, switch selectable Velocity Mode: 3,000/4,000/5,000/6,000 ft/min 15/20/25/30 m/s
05 Pressure Range	Pressure Mode: Unidirectional: 0.1/0.25/0.5/1.0/2.5/5/10 in. WC FS, switch selectable Bidirectional: ±0.1/0.25/0.5/1.0/2.5/5/10 in. WC FS, switch selectable Unidirectional: 25Pa/50Pa/100Pa/250Pa/0.5kPa/1kPa/2.5kPa FS, switch selectable Bidirectional: ±25Pa/50Pa/100Pa/250Pa/0.5kPa/1kPa/2.5kPa FS, switch selectable Velocity Mode: 500/1000/2000/3000/4000/5000/6000/7000 ft/min 2.5/5/10/15/20/25/30/35 m/s
SENSOR	
Response Time	Standard: T95 in 20 sec, Fast: T95 in 2 sec, DIP switch selectable
Mode	Unidirectional or bidirectional, DIP switch selectable
Display (option)	Pressure mode: Signed 3-1/2 digit LCD, indicates pressure, overrange indicator Velocity mode: Signed 4-1/2 digit LCD, indicates velocity, overrange indicator
Proof Pressure	3 psid (20.6 kPa)
Burst Pressure	5 psid (34.5 kPa)
Pressure Mode Accuracy	±1% FS (combined linearity and hysteresis)
Velocity Mode Accuracy	±90 ft/min (±0.45 m/s) plus 5% of measured value****
Temperature Effect	1" (250 Pa) models: 0.05%/°C; 10" (2.5 kPa) models: 0.01%/°C (Relative to 25 °C) 0 to 50 °C (32 to 122 °F)
Zero Drift (1-year)	1" (250 Pa) models: 2.0% max.; 10" (2.5 kPa) models: 0.5% max.

SPECIFICATIONS (CONT.)

Zero Adjust	Pushbutton auto-zero and digital input (2-pos terminal block)
Operating Environment	0 to 60 °C (32 to 140 °F)
Altitude of Operation	0 to 3000 m
Pollution Deg.	2
Humidity Range	100% RH, non-condensing
Mounting Location	For indoor use only.
Fittings	Brass barb; 0.24" (6.1 mm) o.d.
Environmental Rating	IP65, NEMA 4
Flammability Rating	UL 94 5VA fire retardant ABS, plenum rated
WARRANTY	
Limited Warranty	5 years

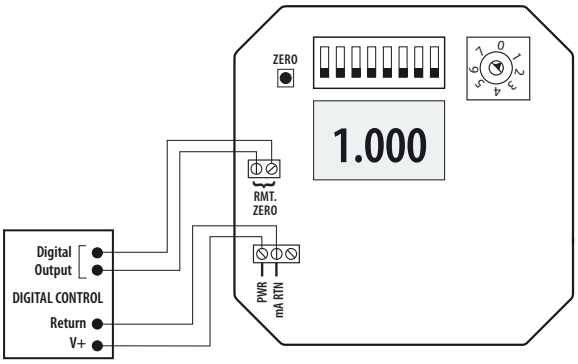
AGENCY APPROVALS

CE

EMC Conformance: EN 61000-6-3 and A1 Class B, EN 61000-6-1.
* Class 2/II power source.
** Minimum input voltage for 4 to 20 mA operation: 250 Ω loop = 12 Vdc; 500 Ω loop = 19 Vdc.
*** Minimum load resistance for Volt operation: 5 kΩ.
**** For measured values between 200 and 7000 ft/min (1 and 35 m/s).

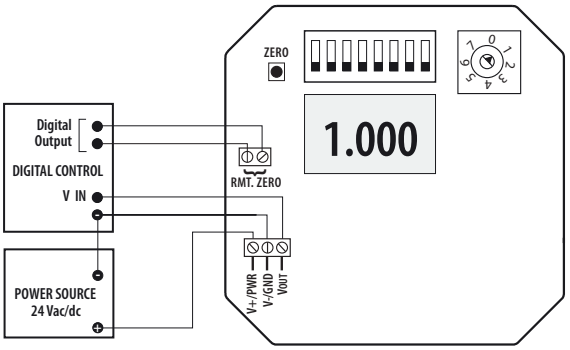
WIRING DIAGRAM

2-wire, 4-20 mA Current Loop Output



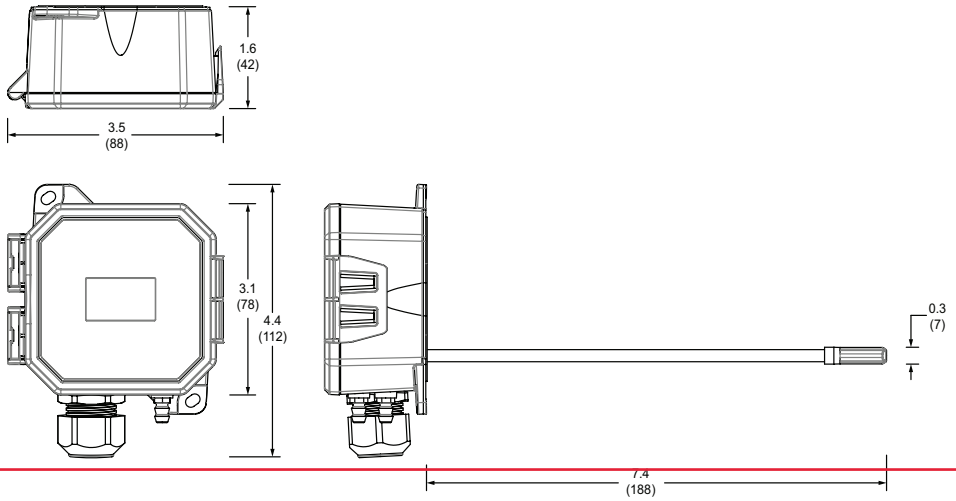
WIRING DIAGRAM

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



DIMENSIONAL DRAWING

in. (mm)



PX3PLX01

ORDERING INFORMATION

	Enclosure	Local Display	NIST Certificate	Range
PX3	□	□	□	□
	D = Duct P = Panel	L = LCD Display X = No Display	N = NIST X = None	01 = Pressure: 0 to 1 in. WC / 0 to 250 Pa Velocity: 0 to 3000 ft/min / 0 to 15 m/s 02 = Pressure: 0 to 10 in. WC/0 to 2500 Pa Velocity: 0 to 6000 ft/min / 0 to 30 m/s

Example:

PX3	D	L	X	01

	Local Display	NIST Certificate	Range
PX3U	□	□	□
	L = LCD Display X = No Display	N = NIST X = None	05 = Pressure: 0 to 10 in. WC / 0 to 2500 Pa Velocity: 0 to 7000 ft/min / 0 to 35 m/s

Example:

PX3U	L	X	05

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SIEMENS

Technical Specification Sheet
Document No. 149-475
February 2009

PX Series Enclosures and Accessories



Figure 1. New PX Series Enclosures.

Enclosures

Description

PX series enclosures house both electronic and pneumatic components. The enclosures include a perforated backplane for mounting of the PXC series controllers, Power Modular Equipment Controllers, Point Expansion Modules or other electronic or pneumatic components.

Features

- Three sizes available to match installation needs.
- Sturdy construction accommodates secure conduit fittings and protects components against incidental contact and falling dirt.
- Multiple knockouts along top, sides and bottom.
- Perforated backplane extends wall-to-wall for mounting of additional equipment.
- DIN rail(s) for mounting of components.
- Spacious interior for easy routing and termination of wiring.
- Hinged door, key lock, wire tie bars, PXA series service boxes
- UL Smoke Control Listing is available on the 19” and 34” models.
- UL 916 rating is available on the 18’ enclosure
- 18” enclosure pull-box type, utility cabinet for low cost installations (see Figure 2).



Figure 2. Complete 18” Enclosure Assembly.

Accessories

Service Boxes

Description

PXA series service boxes include all of the parts necessary for installation inside a 19 inch or 34 inch PX Series Enclosure Assemblies. The 192VA service box can also be used within existing MEC enclosures. The 384VA service box may only be installed in the 34 inch PX Series Enclosure.



Figure 3. SB115V384VA service box .

Features

- Four service boxes are available to step-down line voltage to 24Vac for use by electronic components.
- Service boxes are sized for:
  - 115V to 24V at 192VA
  - 115V to 24V at 384VA
  - 230V to 24V at 192VA
  - 230V to 24V at 384VA
- 384VA models mount inside the 34” enclosures.
- 192VA models mount inside the 19” and 34” enclosures.
- Two sidewall kits cover exposed circuits for use in other NEMA Type 1 enclosures such as motor control cabinets.
- Each service box includes an on/off circuit breaker for the transformer, transient protection on both primary and secondary sides, two NEC Class 1 power limited terminations for components inside the enclosure and one NEC Class 2 termination for external components such as TX-I/O Bus expansion or actuators.
- The 115V models provide an un-switched duplex outlet to power peripheral devices such as modems, trunk interfaces and Portable Operator’s Terminals.
- UL864 Smoke Control rated when used in PXA Series Enclosure 19” or 34” or within existing MEC enclosures.

DIN Replacement Kit (PXA-DIN16KIT)

The DIN Replacement Kit can be used when additional 16” DIN rail is required.

This kit contains:

- Four 16” (406 mm) DIN rails for use when extra rails are needed
- Twelve Screws

Wire Tie Bar Kit (PXA-TIEBARKIT)

The Wire Tie Bar kit can be used when addition tie bars are needed to secure wiring within the enclosure.

This kit contains:

- Four 4.5” (114 mm) tie bars
- Four 9.5” (241 mm) tie bars
- Screws and cable ties

USB Modem Kit (PXA-USBMODEMKIT)

USB Modem kit contains everything needed for dial up modem connection using the USB Host port of the PXC Modular controller.

This kit contains:

- Sportsters Modem 56k BPS Dialup
- USB to RS232 Adapter
- Surge Suppressor Analog Telephone Line
- DB25M/F Right-Angle Adapter
- IBM 6’ PC Cable DB9F to DB25M

USB to RS232 Adapter (PXA-USBADAPTER)

USB to RS232 Adapter converts USB Host signals (Type A male connector) to RS232 signals (DB9 male connector).

This adapter may be used for connection to a RS232 printer. It is part of the PXA-USBMODEMKIT.

Specifications

Specifications	PXA-ENC18	PXA-ENC19	PXA-ENC34
UL Listed NEMA Type 1 Enclosure	X	X	X
Pull-box style	X		
Hinged Door with lock		X	X

Ambient Operating Environment			
+32°F to +120°F (0°C to +49°C) 93% RH (Non-condensing)	X	X	X

Agency Listing			
UL864 UUKL		X	X
ULC-C100 UUKL7		X	X
UL 916 PAZX		X	X
UL 508A	X		

Agency Compliance			
FCC Compliance	X	X	X
Australian EMC Framework	X	X	X
European EMC Directive (CE)	X	X	X
European Low Voltage Directive (LVD)	X	X	X
Dimensions	18”H × 14”W × 6”D (457.2 mm × 355.6 mm × 152.4 mm)	19”H × 22”W × 5.75”D (482.6 mm × 558.8 mm × 146.05 mm)	34”H × 22”W × 5.75”D (863.6 mm ×558.8 mm × 146.05 mm)

Mounting Surface			
Building Wall	X	X	X
Structural Member	X	X	X

Input Power Requirement	**115V Service Boxes**	**230V Service Boxes**
Voltage	115Vac +/- 15% @ 60 Hz +/- 5%, from 15 or 20A circuit breaker	230Vac +/- 15% @ 50/60 Hz +/- 5%, from 10A circuit breaker
Current	2A for 192VA, 4A for 384VA, 2A for 115Vac Service Outlets	1A for 192VA, 2A for 384VA

Ordering Information

Enclosure Range

Description	Product Number
18” PX Series Enclosure	PXA-ENC18
19” PX Series Enclosure	PXA-ENC19
34” PX Series Enclosure	PXA-ENC34

Accessories

Service Box 115V, 24 Vac, 192 VA	PXA-SB115V192VA
Service Box 230V, 24 Vac, 192 VA	PXA-SB230V192VA
Service Box 115V, 24 Vac, 384 VA	PXA-SB115V384VA
Service Box 230V, 24 Vac, 384 VA	PXA-SB230V384VA
Service Box Sidewall Kit, 192 VA	PXA-SW192VA
Service Box Sidewall Kit, 384 VA	PXA-SW384VA
Replacement door for 19” PX series enclosure	PXA-ENC19.REPL.DR
Replacement door for 34” PX series enclosure	PXA-ENC34.REPL.DR

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SIEMENS

Installation Instructions
Document No. 553-131
February 16, 2009

PX Series
Service Box Assemblies

Product Description

The PX Series Service Box Assemblies transform 115 Vac or 230 Vac to 24 Vac that power HVAC control components. The 192 VA service boxes mount directly inside a 19 inch or 34 inch PX Series Enclosure or as a replacement in older MEC Enclosures. The 384 VA service boxes provide additional power for larger systems and mount only in the 34 inch PX Series Enclosure. The service boxes are Smoke Control and Energy Management listed when installed per this instruction.

The service box assemblies consist of:

- Chassis for mounting inside enclosure
- Transformer for converting either 115 Vac or 230 Vac to 24 Vac sized for either 192 VA or 384 VA
- ON/OFF Circuit breaker for transformer
- Two Class 1 power limited 24 Vac outputs including one terminal for earth ground for use inside enclosure only
- One Class 2 output with circuit breaker to distribute up to 96 VA for use outside the enclosure
- Duplex Service Outlet (115 Vac models only)
- Wire cover for field connections

Product Numbers

PXA-SB115V192VA	Service Box 115V, 24 Vac, 50/60 Hz, 192 VA
PXA-SB115V384VA	Service Box 115V, 24 Vac, 50/60 Hz, 384 VA
PXA-SB230V192VA	Service Box 230V, 24 Vac, 50/60 Hz, 192 VA
PXA-SB230V384VA	Service Box 230V, 24 Vac, 50/60 Hz, 384 VA

Warning/Caution Notations

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

Required Tools and Materials

- Medium Phillips screwdriver
- 11/32-inch nut driver
- 7/16-inch nut driver

Expected Installation Time

15 Minutes

Prerequisites

- Enclosure(s) installed.
- AC power brought to enclosure(s) and power turned OFF at the circuit breaker.
- If using optional TX-I/O Bus (not available on all hardware), it is pulled between enclosures using single 2 twisted pair (TP) or two 1 TP wire tied together. See TX-I/O Bus steps for maximum length by wire gauge.

Smoke Control Application Requirements

UL864 and NFPA92A compliant installations require the 115V or 230V PX Series Service Box Assembly installed inside the 19 inch or 34 inch PX Series Enclosure Assembly (PXA-ENC19 or PXA-ENC34). For more information, see *PX Series Enclosure Assemblies Installation Instructions* (553-130).

For smoke control installations, the 24 Vac Actuator Output is a supplementary circuit intended for general HVAC equipment only. It can not power smoke control devices.

Optional: See the Field Purchasing Guide for ordering the relay required for Smoke Control listing if a TX-I/O Bus is powered from multiple service boxes. (TX-I/O Bus not available on all hardware.)

RIB2401C UL864 Listed Relay, SPDT 24 Vac 10A

Energy Management Applications

For energy management installations the service box may be installed in any NEMA Type 1 enclosure if the optional side wall kit is installed (PXA-SW192VA or PXA-SW384VA). For more information, see *PX Series Service Box Sidewall Kit Installation Instructions* (553-135).

Optional: for TX-I/O Bus powered from multiple service boxes, use UL Listed relay RIB2401C. For more information, see manufacturer installation instructions.

Instructions

WARNING:

This installation should only be done by a qualified electrician.

WARNING:

Turn off AC power to the MEC enclosure at a circuit breaker panel.

1. Be sure the AC power to the enclosure is OFF at the circuit breaker panel.
2. Place the service box in the right side of the enclosure. See Figure 1 and Figure 3.
3. Fasten the service box inside the enclosure with the three locknuts (two on top and one on the bottom).
4. Connect the green/yellow wire at the marked earth ground lug on the enclosure.

CAUTION:

The green wire grounds the transformer secondary neutral. This is required whenever the primary side is greater than 150 Vac, required by local code or if used to power TX-I/O Modules.

5. If required connect the green wire at the marked earth ground lug on the enclosure. Otherwise tape back the green wire terminal.
6. Do one of the following:
   - **115 Vac models:** Connect the AC hot (black wire) and AC neutral (white wire) with wire nuts.
   - **230 Vac models:** Screw the AC hot (black wire) and AC neutral (white wire) to the terminal block.
7. Fasten wire cover to the top of the service box.

For hardware without a TX-I/O Bus or TX-I/O Bus not extending between enclosures, skip to step 8, otherwise choose Option 1 or Option 2 below:

Option 1: If powering both enclosures from a single service box, continue with the following:

a. Connect a twisted pair of TX-I/O Bus cable from the service box 24 Vac (~) and (⊥) terminals of the Class 2 output connector to the corresponding pins of TXS1.12F4, TXB1.P1, or TXS1.EF4 in the other enclosure.

b. Connect the second twisted pair between the CS and CD terminals of the TXS1.12F4, TXB1.P1, or TXS1.EF4 in each enclosure.

Option 2: If using multiple service boxes to power a TX-I/O Bus, continue with the following:

CAUTION:

DO NOT connect the 24 Vac (~) terminals between the multiple service boxes.

a. Do the steps for a single service box except do not connect the 24 Vac (~) wire and CS wire.

b. Screw relay onto the enclosure backplane.

c. Connect the relay coil 24 Vac terminal to the service box 24 Vac (~) terminal.

d. Connect the relay coil neutral terminal to the service box neutral (⊥) terminal.

e. Connect the CS wire entering and/or leaving enclosure to the relay contact common terminal.

f. Connect the CS wire inside enclosure to the relay contact normally open terminal (NO).

8. If present, fasten wires from the component power connectors to connectors on the side of the service box. See Figure 2 and Figure 4.
9. Restore power to the enclosure at the circuit breaker panel.

The installation is now complete.

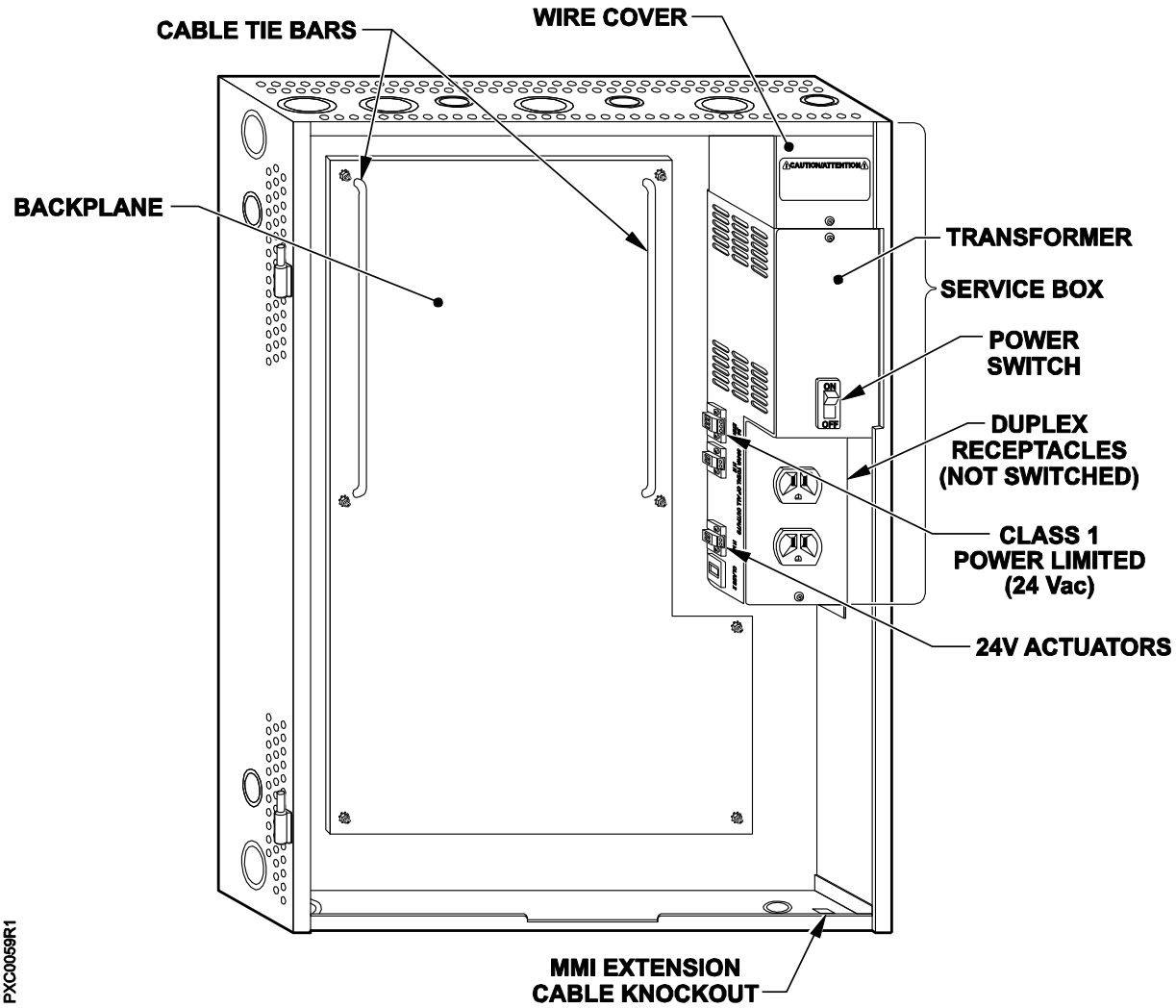


Figure 1. Placement of the 384 VA Service Box in a 34 inch PX Series Enclosure.

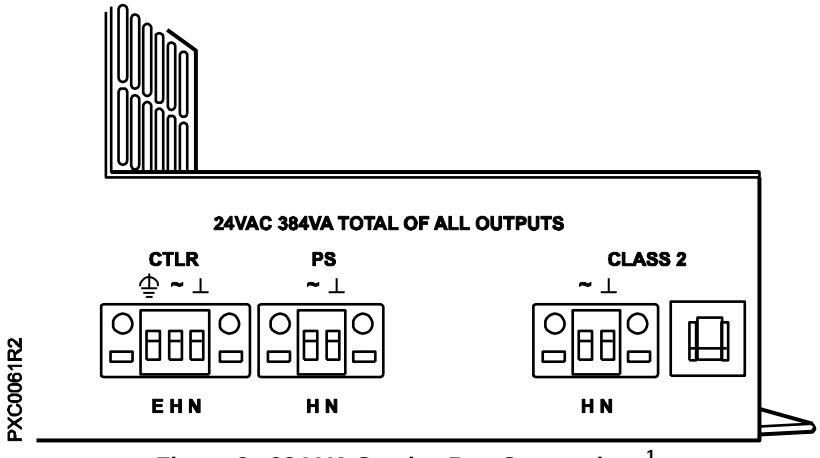


Figure 2. 384 VA Service Box Connections[1].

1. 384VA model connectors will fit one 12 gauge and one 14 gauge wire or three 14 gauge or smaller wires.

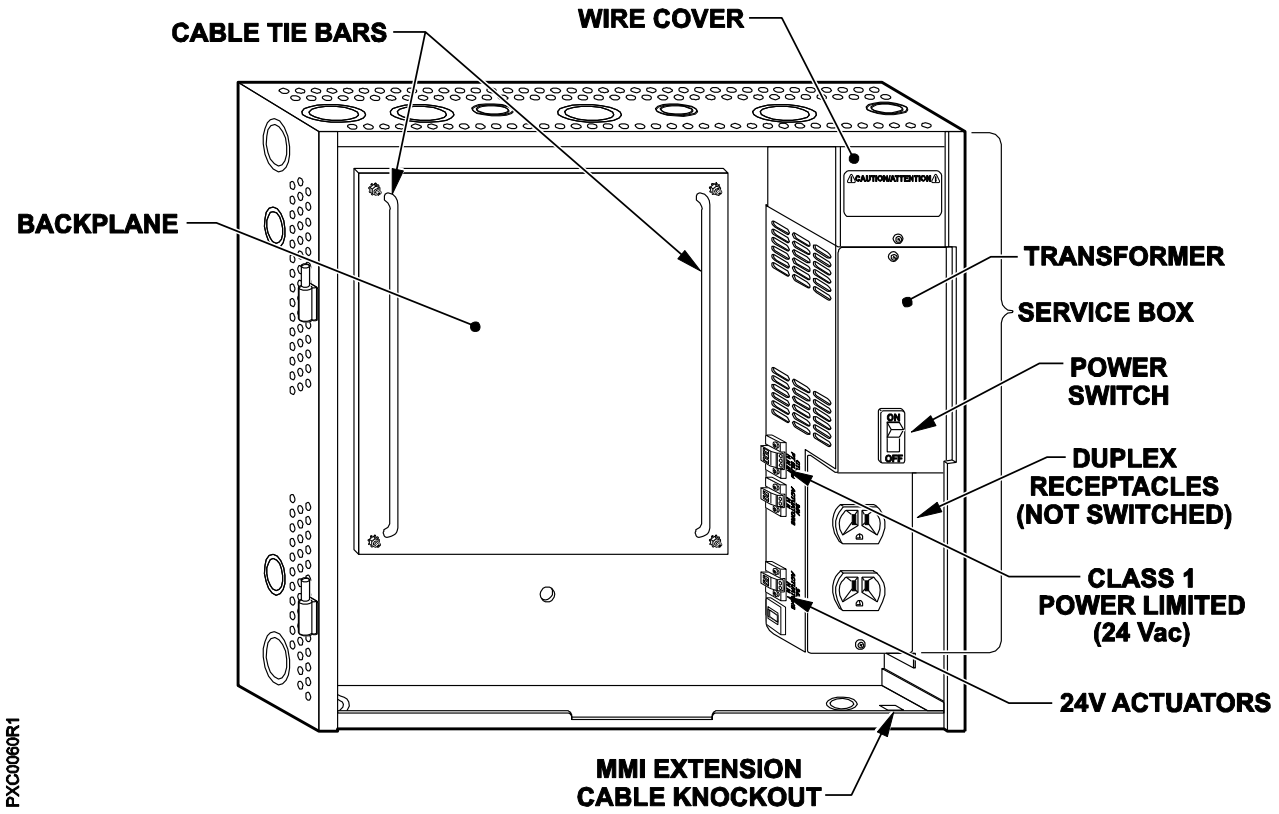


Figure 3. Placement of the 192 VA Service Box in a 19 inch PX Series Enclosure.

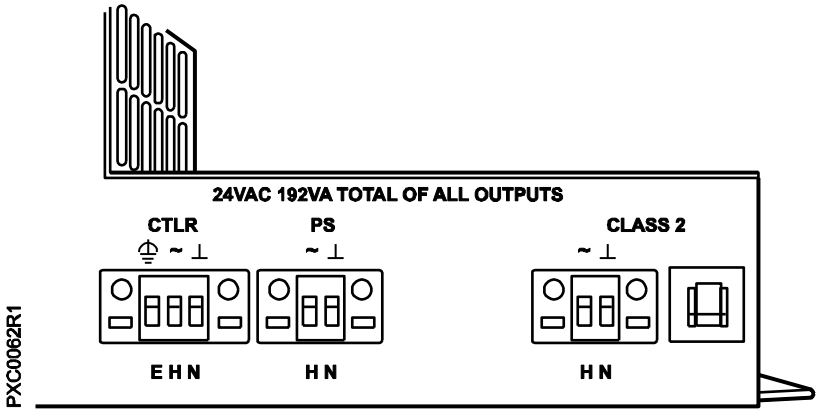


Figure 4. 192 VA Service Box Connections[2].

2. 192VA model connectors will fit one 12 gauge wire, one 14 and one 16 gauge wire or three 16 gauge or smaller wires.

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SIEMENS

Technical Specification Sheet
Document No. 149-487
October 1, 2018

PXC Modular Series for BACnet Networks



Figure 1. PXC Modular.

Description

The PXC Modular Series for BACnet networks is a high-performance modular Direct Digital Control (DDC) supervisory equipment controller, which is an integral part of the APOGEE Automation System. It is classified as a BACnet Building Controller (B-BC) and supports BACnet/IP and BACnet MS/TP protocols.

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

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

> See the APOGEE Wiring Guidelines for Field Panels and Equipment Controllers (125-3002) for information on setting up this configuration.

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

Features

- BACnet Testing Laboratories (BTL) certified Classified as BACnet Building Controllers (B-BC) using the BACnet/IP protocol and/or BACnet MS/TP, or BACnet Advanced Application Controllers (B-AAC) using the BACnet MS/TP protocol for specific models.
- Modular hardware components match initial control requirements while providing for future expansion.
- DIN rail mounted device with removable terminal blocks simplifies installation and servicing.
- Proven program sequences to match equipment control applications.
- Built-in energy management applications and DDC programs for complete facility management.
- Comprehensive alarm management, historical data trend collection, operator control, and monitoring functions.

- Sophisticated Adaptive Control, a closed loop control algorithm that auto-adjusts to compensate for load/seasonal changes (License required with Firmware revision 3.5.1 and higher).
- HMI RS-232 and USB ports, which provide laptop connectivity for local operation and engineering.
- Extended battery backup of Real Time Clock.
- Back-up battery protection eliminating the need for time-consuming program and database re-entry in the event of an extended power failure.
- The PXC Modular illuminates a “battery low” status LED and can send an alarm message to selected printers or terminals.
- Optional P1 Wireless FLN support.
- Auto Save
- Persistent database backup and restore within the controller.
- PXM10T and PXM10S support: Optional LCD Local user interface with HOA (Hand-off-auto) capability and point commanding and monitoring features.
- MS/TP Point Pickup Module (PPM) support: Universal Inputs can be configured for analog or digital input. Input/Output type is configured by writing to BACnet object properties.
- BACnet Field Panel Web Server support: Web-based Graphical User Interface (GUI) compatible with BACnet® networks. Ideal for small or remote facilities to monitor and control the Building Automation System.
- The Simple Network Management Protocol (SNMP) Agent allows points in the field panel to communicate with an SNMP manager over Ethernet.

Hardware

PXC Modular

- The PXC Modular is a microprocessor-based multi-tasking platform for program execution and communication with other field panels. It scans field data, optimizes control parameters, and manages operator requests for data in seconds.
- The program and database information stored in the PXC Modular memory is protected with a battery backup. This eliminates the need for time-consuming program and database re-entry in the event of an extended power failure. When battery replacement is necessary, the PXC Modular illuminates a “battery low” status LED and can send an alarm message to selected printers or terminals.
- The PXC Modular firmware, including the operating system, is stored in non-volatile flash memory.
- The PXC Modular provides both an Ethernet port as well as an RS-485 port for communication on Automation Level Networks supporting either BACnet/IP or BACnet MS/TP.
- LEDs provide instant visual indication of overall operation, network communication, and battery status.
- Two self-forming buses are an integral part of the flexibility of the PXC Modular. A self-forming bus to the right of the controller (see Figure 3) supports up to 500 points through TX-I/O™ modules. Another self-forming bus to the left of the controller (see Figure 5) supports hardware connection to subsystems through Expansion Modules.

TX-I/O Modules

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

TX-I/O Power Supply

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

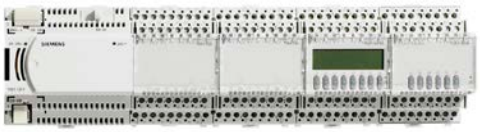


Figure 2. TX-I/O Power Supply and TX-I/O Modules.



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

PXC Modular Expansion Module

The PXC Modular Expansion Module (see Figure 4) provides the hardware connection for Field Level Network (FLN) devices.

Using the Triple RS-485 Expansion Module, the PXC Modular supports up to three RS-485 networks of P1 Field Level Network devices, or one RS-485 network of BACnet MS/TP devices (see Figure 5). With the Expansion Module the PXC Modular can also provide wireless FLN support.



Figure 4. RS-485 Expansion Module.



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

Modular Control Panels with Application Flexibility

The PXC Modular is a high performance controller with extensive flexibility. It can be customized with the exact hardware and program for the application. As a result, the user only purchases what is needed.

For example, in monitoring applications, the control panel can be customized with the number and type of points to match the sensor devices. For monitoring and controlling a large number of (on-off) fans or motors, more digital points can be added (see Figure 6).



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

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



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

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



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

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

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

Global Information Access

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

Multiple Operator Access

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

Menu Prompted, English Language Operator Interface

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

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

Built-in Direct Digital Control Routines

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

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

Built-in Energy Management Applications

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

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

Web Server and Web Services

Web Server and Web Services

Web Services is a standard option on Ethernet based PXC Modular controllers.

The PXC Modular Series supports Web Server and Web Services functionality. The Web Server provides an HTML Web-based user interface for your APOGEE Building Automation System. It is an ideal solution for small or remote facilities with field panels on a BACnet/IP Automation Level Network (ALN) and as a user friendly and intuitive interface to the controller during commissioning, service and operation of the building automation system.

This solution provides the user the following features: Adobe Flash based graphics and user interface; command, monitor, alarm, trend and generate reports on BACnet objects within the controller database including supervised FLN device information, schedule BACnet objects within the controller database including supervised FLN devices, and remote notification.

Modular Series Specifications

Dimensions (L × W × D)	
PXC Modular	7.56" × 3.54" × 2.76"(192 mm × 90 mm × 70 mm)
FLN Expansion Module	1.26" × 3.54" × 2.76" (32 mm × 90 mm × 70 mm)
DIN rail (EN 60715 TH 35-7.5, steel)	1.38" × 0.30" × 0.04" (35 mm × 7.5 mm × 1 mm)

Processor, Battery, and Memory	
Processor	MPC885 (PowerPC)
Processor Clock Speed	133 MHz
Memory	80 MB (64 MB SDRAM, 16 MB Flash ROM)
Serial EEPROM	4 KB
Secure Digital (SD) memory card (for future use)	Expandable or removable non-volatile memory
Battery backup of SDRAM	30 days (accumulated), AA (LR6) 1.5 Volt Alkaline (non-rechargeable)
Battery backup of Real Time Clock	12 months (accumulated), Coin cell (BR2032) 3 Volt lithium
Real Time Clock Initial Accuracy	±30 seconds/month typical @ 77°F (25°C)

Communication	
BACnet/IP and Web Services Automation Level Network (ALN)	10Base-T or 100Base-TX compliant
BACnet MS/TP Automation Level Network (ALN)	RS-485, 9600 bps to 115.2 Kbps
BACnet MS/TP Field Level Network (FLN)	RS-485, 9600 bps to 76.8 Kbps
TX-I/O self-forming bus connection	115.2 Kbps, 5 pin connector (middle pin is not connected)
Human-Machine Interface (HMI) Advanced User Mode	RS-232 compliant, 1200 bps to 115.2 Kbps
USB Device port (for non-smoke control applications only)	Standard 1.1 and 2.0 USB device port, Type B female connector
USB Host port on selected models (for ancillary smoke control applications only).	Standard 1.1 and 2.0 USB host port, Type A female connector
	Factory-set HMI Communication Speed: 115.2 Kbps.

FLN devices on the Expansion Module

Electrical Rating	
Power Requirements	24 Vac +/-20% input @ 50/60 Hz
Power Consumption (Maximum)	24 VA @ 24 Vac
AC Power	NEC Class 2
Communication	NEC Class 2

Operating Environment	
Ambient operating environment	Operate in a dry location, which is protected from exposure to salt spray or other corrosive elements. Exposure to flammable or explosive vapors must be prevented.
Shipping and storage environment	-13°F to 158°F (-25°C to 70°C)
Relative Humidity	5% to 95% rh, non-condensing
Mounting Surface	Building wall or structural member (Do not mount on HVAC components or any other vibrating surface.)
	CE Compliance
	Requires installation inside a metal enclosure rated at IP30 minimum.
	Smoke Control Applications
	Requires installation inside a PX series enclosure
Vibration	Compliance to IEC 60721, 3M2, and 2M2
Protection to EN60529	IP 20

Agency Listings	
UL	UL 864 UUKL Smoke Control Equipment
	UL 864 UUKL7 Smoke Control Equipment
	CAN/ULC-S527-M8
	UL 916 PAZX
	UL 916 PAZX7
Agency Compliance	CFR47 Part 15, Class A; CFR47 Part 15, Class B - with metal enclosure, maximum opening
	Australian EMC Framework - with metal enclosure, maximum opening size is 34"
	European EMC Directive (CE) - with metal enclosure, maximum opening size is 34"
	RoHS Compliant
OSHPD Seismic Certification	Product meets OSHPD Special Seismic Preapproval certification (OSH-0217-10) under California Building Code 2010 (CBC2010) and International Building Code 2009 (IBC2009) when installed within the following Siemens enclosure part numbers: PXA-ENC18, PXA-ENC19, or PXA-ENC34.
BTL	BACnet Testing Laboratories (BTL) Certified, Firmware Revision 3.0 and later

Electrical Disturbance Testing	
Dips and Interrupts	per EN 61000-4-11
Electrical Fast Transients (EPT)	per EN 61000-4-4, 1 kV signal, 2 kV AC power
Electrical Surge Immunity	per EN 61000-4-5
	AC power: 2 kV common mode, 1 kV differential mode
	Signal lines: 1 kV CM, 5 kV DM
Electrostatic Discharge (ESD)	per EN 61000-4-2, 4 kV contact, 8 kV air discharge
RF Conducted Immunity	per EN 61000-4-6 @ 10V
RF Radiated Immunity	per EN 61000-4-3 @ 10V/m

Ordering Information

PXC Modular Series

Product Number	Description
PXC00-E96.A	PXC Modular, BACnet/IP or MS/TP ALN, P1 or MS/TP FLN. PXX-485.3 is also required as the connection to the FLN devices.
PXC100-E96.A	PXC Modular, BACnet/IP or MS/TP ALN, P1 or MS/TP FLN, self-forming TX-I/O Island Bus. PXX-485.3 is also required as the connection to the FLN devices.
PXX-485.3	Provides FLN support for the PXC Modular. Includes three RS-485 P1 FLN connections or one MS/TP FLN connection; maximum of 96 devices supported.

Optional Licenses

Product Number	Description
PXF-TXIO.A	License to enable the Island Bus on PXC00-E96.A and PXC00-PE96.A.
LSM-SNMP	License to enable SNMP Agent on Siemens Modular or Compact hardware with BACnet Firmware Revision 3.2.3
LSM-FPWEBPL	License to enable any Siemens ALN controller to supply the host controller with data for FIN Builder graphics (Option enables HTTP Change of Value needed for field panel hosted graphics)
LSM-FPWEBPLHST	License to enable a PXC Modular or PXC-36 to host FIN Builder graphics
LSM-ADAPT	License to use the Adaptive Control added in FW 3.5.1 and later

Accessories

Product Number	Description
PXM10S	Controller mounted Operator Display module with point monitor and optional blue backlight
PXM10T	Controller mounted Operator Display module
PXA-HMI.CABLEP5	Serial cable required for PXM10T/S connection to PXC Series controllers

Service Boxes and Enclosures

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

Documentation

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

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SIEMENS

Technical Specification Sheet
Document No. 149-714
March 25, 2022

Series QAA2200 Room Temperature Sensors & Series QFA3200 Room Humidity Sensors



QxAx2xx.EWSN
Sensing Only



QxAx2xx.FWSN
Full HMI

Description

Series QAA2200 Room Temperature and Series QFA3200 Room Humidity + Temperature sensors are engineered to enable accurate and efficient control of room comfort. A wide variety of output signals is available for compatibly with nearly any control system. The patented housing design seamlessly blends into any décor and features strategically placed ventilation slots to maximize airflow and optimize accuracy.

The QFA3200 units combine a temperature sensor with a relative humidity sensor in a single housing to reduce installation time and improve overall room aesthetics.

Installation is quick and straightforward with all hardware included for mounting on a standard 2” × 4” electrical box. Screws and anchors are provided for mounting the sensor directly to a wall. Matching gaskets and trim rings are also available.

The “E” versions have a blank front to prevent unauthorized adjustments and are ideal for high traffic areas or remote spaces that are not supervised.

The “F” versions feature a full HMI that can display room conditions and temperature setpoint. The display is easily configured to limit the information that is available to the occupant. Temperature setpoint can be adjusted using soft touch plus (+) and minus (-) keys, and an override key enables the user to manually signal to the controller that the space is occupied.

Specifications

Temperature	
Measuring range	32°F to 122°F (0°C to 50°C)
Accuracy	
1K Ω Pt	± 0.54°F (0.3°C) @ 32°F (0°C)
1K Ω (32°F) Ni	± 0.72°F (0.4°C) @ 32°F (0°C)
10K Ω Type II	± 0.4°F (0.22°C) @ 77°F (25°C)
100K Ω Type II	± 0.36°F (0.2°C) @ 77°F (25°C)
4 to 20 mA/0 to 10V	± 0.9°F (0.5°C)
Humidity (QFA32xx only)	
Measuring Range	0 to 100% rh
Accuracy	± 2% between 10 to 90%
Long-Term Stability	<0.5% rh/year
Resolution	0.03% rh
Repeatability	+/-0.1% rh
Setpoint/Override (“F” versions only)	
Setpoint Signal	
QxAx2**SS**.FWSN	4 to 20 mA or 0 to 10V/0 to 5V
All others	0 to 10V/0 to 5V
Setpoint Range	55°F to 95°F (13°C to 35°C)
Override Contact	Momentary, 1A @ 24 Vac max.
Input Power	18 to 36 Vdc or 24 Vac ± 20%
VA Rating	1.5 VA, max.
Agency Listing	UL 916
Color	White
Dimensions	4.5” × 2.75” × 1.18” (115 mm × 70 mm × 30 mm)
Shipping Weight	6 oz. (170 g)

Product Ordering Information

Part Number[1]	Temperature Output	Humidity Output	Display	Setpoint Adjustment
QAA2212.EWSN	Pt 1K Ω (385a) RTD	—	—	—
QAA2212.FWSN			•	•
QAA2220.EWSN	Ni 1K Ω @ 32°F RTD		—	—
QAA2220.FWSN			•	•
QAA2230.EWSC[2]	10K Ω Type II Thermistor		—	—
QAA2230.EWSN				
QAA2230.FWSC[2]			•	•
QAA2230.FWSN				
QAA2235.EWSN	100K Ω Type 2 Thermistor		—	—
QAA22SS.EWSN	0 to 10V/4 to 20 mA (Selectable)			
QAA22SS.FWSN			•	•
QFA3212.EWSN	Pt 1K Ω (385a) RTD	4 - 20 mA or 0 - 10V/ 0 - 5V (Selectable)	—	—
QFA3212.FWSN			•	•
QFA3230.FWSN	10K Ω Type II Thermistor			
QFA32SS.EWSN	0 to 10V/4 to 20mA		—	—
QFA32SS.FWSN			•	•

[1]For no-logo version, change "S" to "N" in Part Number position 10.

[2]For use with TALON® LON controllers.

Accessories Ordering Information

Description	Part Number
Room Unit Back Plate (10-pack)*	AQA2200-INTL
Room Unit Back Plate (Single)*	AQA2200-2X4
Room Sensor Insulating Gasket (10-pack) (Recommended for hollow wall installations.)	563-102 GSKT KIT

***** For use when installing Series 2200/3200 Sensors on conduit boxes other than U.S. style 2” × 4”. Back plate measures 3-1/4” × 5” (82.55 mm × 127 mm).

Disposal



The devices are considered electrical and electronic equipment for disposal in terms of the applicable European Directive and may not be disposed of as domestic garbage.

- Dispose of the devices through channels provided for this purpose.
- Comply with all local and currently applicable laws and regulations.

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SIEMENS

Technical Specification Sheet
Document No. 149-991
August 26, 2009

Q-Series Duct Relative Humidity and Relative Humidity & Temperature Sensors



Figure 1. Q-Series Duct Relative Humidity and Relative Humidity & Temperature Sensor.



Figure 2. Q-Series Duct Relative Humidity and Relative Humidity & Temperature Sensor with Display.



Figure 3. Q-Series Relative Humidity Removable Sensing Tip.

Description

The Q-Series Duct Relative Humidity and Relative Humidity & Temperature Sensors monitor and transmit changes in humidity and temperature to the building control systems. These units are especially suited for applications where precise, stable humidity sensing is required. Certified units are also available where certification is required. Several models are available — for humidity only (in 5%, 2% and certified) or for humidity and temperature sensing (also in 5%, 2%, certified), and display versions. The humidity only units are available in either 4 to 20 mA or 0 to 10 Volt signal versions. Combination humidity and temperature units are also available in either dual current or voltage versions, transmitting proportional signals back to the controller. Nickel 1000 ohm or Platinum 1000 ohm RTD temperature outputs on combination versions are also offered.

2% and certified versions are equipped with a removable, replaceable sensing tip. The removable sensing tips have a Lumberg connection that allows the user to screw off the tip without disrupting the installation or wiring. Siemens sensors with replaceable tips are ideal for applications where measurement accuracy is critical and sensor replacement is not an option. Replaceable sensing tips eliminate the need for accuracy adjustment.

All certified sensors include a certificate of calibration. Humidity calibration and certification is based on a three-point process at 20, 50, and 85% rh @ 23°C.

Specifications – Humidity Element

Measurement range	0 to 100% rh
Accuracy at room temperature of 73°F (20°C)	QFM2xxx types: ±5% rh, 0 to 95% rh (±3% rh, 30 to 70% rh) QFM3xxx types: ±2% rh, 0 to 95% rh
Temperature effect	Less than 0.1% per degree C
Sensing element	Capacitive humidity sensing element
Output signal-rh only units	4 to 20 mA or 0 to 10 Vdc, 0 to 100% linear, proportional
Output signal-rh/T units	0 to 10 Vdc or 4 to 20mA (both outputs), 0 to 100% linear, proportional
Polarity protection	Yes
Calibration	None
Time constant	Approximately 20 seconds in moving air

Specifications–Temperature Element (for combination RH/T units only)

	QFM2110 (Platinum) **QFM2120 (Nickel)**	**QFM2160** **QFM31xx** **QFM2171** **QFM41xx**
Accuracy:	± 1.4°F: 59°F to 95°F (± 0.8°C): (15°C to 35°C) ± 1.8°F: -31°F to 59°F and 95°F to 158°F (± 1.0°C): (-35°C to 15°C and 35°C to 60°C)	± 1.4°F: 59°F to 95°F (± 0.8°C): (15°C to 35°C) ± 1.8°F: -40°F to 59°F and 95°F to 158°F (± 1.0°C): (-40°C to 15°C and 35°C to 60°C)
Output signal	Platinum 1K ohm RTD (385α) Nickel 1K ohm RTD (Siemens)	0 to 10 Vdc (QFMx160) 4 to 20 mA (QFMx171)

General Specifications

Operating conditions	
Relative humidity	0 to 100%
Temperature range:	
QFM2110, QFM2120	-31°F to 140°F (-35°C to 60°C)
QFM2160, QFM2171, QFM31xx, QFM41xx	-40°F to 158°F (-40°C to 70°C)
Installation	18 AWG cable length shared in conduit with other sensor wiring 750 ft (229 m) max
Connections	Screw terminals
Dimensions	Probe: .6" OD × 7.2" L (15 mm × 183 mm) Housing: 3.1" L × 2.3" W × 1.5" D (80 mm × 60 mm × 40 mm)
Environmental conditions	
LCD display readable	-13°F to 158°F (-25°C to 70°C)
Voltage requirement	13.5 to 35 Vdc
Input impedance (4 to 20 mA versions only)	Less than 500 ohms
Housing material type	Polycarbonate plastic, UL 94-5VB rated, suitable for plenum installations
Housing protection class	IP 65 (QFM3xxx, QFM4xxx types), IP54 (QFM2xxx types), NEMA 1 (all types)
Filter material and specification	Teflon™, 10 micron filter

Agency certification	UL listed to UL 873 for Temperature Indicating and Regulating Equipment
CE conformance	EMC directive 2004/108/EC
Weight	
Without LCD display	7.34 ounces (0.208 kg)
With LCD display	23.49 ounces (0.666 kg)

Ordering Information

Part Number	Description
QFM2100	Duct humidity sensor, (5%) 0 to 10 Vdc
QFM2101	Duct humidity sensor, (5%) 4 to 20 mA
QFM2110	Duct humidity sensor, (5%) 0 to 10 Vdc/Temp 1K ohm Platinum RTD (385 Alpha)
QFM2140	Duct humidity sensor, (5%) 0 to 10 Vdc/Temp T1
QFM2160	Duct humidity sensor, (5%) 0 to 10 Vdc/Temp 0 to 10 Vdc
QFM2171	Duct humidity sensor, (5%) 4 to 20 mA/Temp 4 to 20 mA
QFM3100	Duct humidity sensor, (2%) 0 to 10 Vdc
QFM3101	Duct humidity sensor, (2%) 4 to 20 mA
QFM3160	Duct humidity sensor, (2%) 0 to 10 Vdc/Temp 0 to 10 Vdc
QFM3160D	Duct humidity sensor, (2%) 0 to 10 Vdc/Temp 0 to 10 Vdc, with display
QFM3171	Duct humidity sensor, (2%) 4 to 20 mA/Temp 4 to 20 mA
QFM3171D	Duct humidity sensor, (2%) 4 to 20 mA/Temp 4 to 20 mA, with display
QFM4101	Duct humidity sensor, 4 to 20 mA (certified)
QFM4160	Duct humidity sensor, 0 to 10 Vdc/Temp 0 to 10 Vdc (certified)
QFM4171	Duct humidity sensor, 4 to 20 mA/Temp 4 to 20 mA (certified)
Accessories	
AQF3101	Sensor filter cap
AQF3150	Replaceable 2% sensor tip
AQF4150	Replaceable 2% certified sensor tip
74 662 0104 0	US 1/2-inch rigid conduit adapter
74 662 0068 0	Replacement flange kit

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SIEMENS

Technical Specification Sheet
Document No. 149-151
October 16, 2023

QMX3 Room Sensors for Siemens DXR Series Controllers



QMX3.P30/P40/P70
Sensing Only



QMX3.P02
Sensor/Room Operator



QMX3.P34/P44/P74
Sensor with Full Display



QMX3.P37
Room Sensor/Operator with Display

Description

The QMX3 Series includes sensors, switches and room operator units exclusively for use with Siemens DXR Series Controllers. The devices communicate with the controller using PL-Link protocols. All units can be installed on a standard 2” × 4” electrical box with no additional back plates required. No-logo versions are available for some units.

QMX3.P02
- Temperature sensor.
- Configurable touch keys for light and shade control.

QMX3.P30
- Temperature sensor.

QMX3.P34
- Temperature sensor.
- Backlit LCD display and touch keys for HVAC control.
- Green Leaf active energy management.

QMX3.P37
- Temperature sensor.
- Backlit LCD display and configurable touch keys for light and shade control.
- Green Leaf active energy management.

QMX3.P40
- Temperature and humidity sensor

QMX3.P44
- Temperature and humidity sensor
- Backlit LCD display and touch keys for HVAC control

QMX3.P70
- Temperature, humidity and air quality sensor.
- LED air quality indicator.

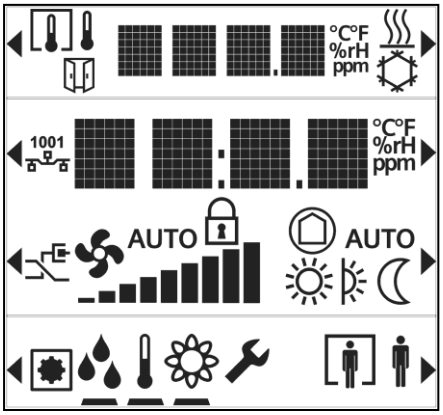
QMX3.P74
- Temperature, humidity and CO_2 sensor.
- Backlit LCD HMI and touch keys for HVAC control.
- Green Leaf active energy management.

Specifications*

Temperature	
Measuring range	32°F to 122°F (0°C to 50°C)
Accuracy	± 0.36°F @ 77°F (0.2°C @ 25°C)
Humidity (P4x and P7x)	
Measuring Range	0 to 95% rh
Accuracy	± 4% (20 to 80% rh)
CO_2 (P70 and P74)	
Measuring Range	400 to 10,000 PPM
Accuracy < 2K ppm	± (30 ppm +4% measured CO_2) @ 73°F (23°C) and 101.3 kPa
Temp. dependency	± 2 ppm/°C typical
Pressure dependency	0.14% of value/hPa
Long-term drift	± 20 ppm per year
Calibration	Not required
Operating voltage range	PL-Link DC 21 to 30V Max.
Power consumption	15 mA at 24 Vdc
Agency Listings	UL 916 FCC Part 15 CSA C22.2 #0 and #205
Color	White or black
Dimensions	5.25” × 3.5” × 0.71” (133.4 mm × 88.4 mm × 18 mm)
Shipping Weight	7.6 oz. (216 g)

*Accuracies shown are for sensing elements; actual system accuracy may vary.

Display (QMX3.P34 and QMX3.P74 Only)



	Current Room Temperature/Humidity/Air Quality
	Indicates indoor or outdoor temperature (User-selectable).
	Indicates that a window is open.
	Heating/cooling mode indicator
	Green leaf indicates optimum settings are active. (One-touch resets to optimum setpoints.)
	Displays temperature setpoint (User-adjustable)
	Displays current fan speed (User-adjustable)
	Displays current room operating mode (User-selectable)
	Displayed value selector (RH/Temp/Air Quality) (User-selectable)
	Room occupancy indicator
	Start-up/commissioning mode indicators (See start-up and commissioning documents)
	Indicates parameters are locked

NOTES:

- User-accessible values and settings will vary based on overall system configuration.
- Some values (for example, open window indicator, and outdoor air temperature) require additional sensors.

Product Ordering Information

Category	Model Number	Orderable Part Number	Temperature Sensor	Humidity Sensor	CO2 Sensor	Air Quality Indicator LED	Backlit Display and Touch Keys	Green Leaf LED	Configurable Touch Keys	Window for Labels	Country of Origin	Color
Sensors	QMX3.P30	S55624-H103-A	•	–	–	–	–	–	–	–	CN	White
	QMX3.P30-1WSB	S55624-H103-1WSB	•	–	–	–	–	–	–	–	US	White
	QMX3.P30-1WNB	QMX3.P30-1WNB	•	–	–	–	–	–	–	–	US	White (no logo)
	QMX3.P30-1BSC	S55624-H123	•	–	–	–	–	–	–	–	CN	Black
	QMX3.P40	S55624-H116	•	•	-	-	-	-	-	-	CN	White
	QMX3.P40-1BSC	S55624-H124	•	•	-	-	-	-	-	-	CN	Black
	QMX3.P70	S55624-H104-A	•	•	•	•	–	–	–	–	CN	White
	QMX3.P70-1BSC	S55624-H125	•	•	•	•	–	–	–	–	CN	Black
Room Operator Units	QMX3.P02	QMX3.P02	•	–	–	–	–	–	•	•	CN	White
	QMX3.P02-1BSC	S55624-H128	•	–	–	–	–	–	•	•	CN	Black
	QMX3.P34	S55624-H105-A	•	–	–	–	•	•	–	–	CN	White
	QMX3.P34-1WSB	S55624-H105-1WSB	•	–	–	–	•	•	–	–	US	White
	QMX3.P34-1WNB	QMX3.P34-1WNB	•	–	–	–	•	•	–	–	US	White (no logo)
	QMX3.P34-1BSC	S55624-H126	•	–	–	–	•	•	–	–	CN	Black
	QMX3.P44	S55624-H143-A	•	•	–	–	•	•	–	–	CN	White
	QMX3.P44-1BSC	S55624-H144	•	•	–	–	•	•	–	–	CN	Black
	QMX3.P74	S55624-H106-A	•	•	•	–	•	•	–	–	CN	White
	QMX3.P74-1WSB	S55624-H106-1WSB	•	•	•	–	•	•	–	–	US	White
	QMX3.P74-1WNB	QMX3.P74-1WNB	•	•	•	–	•	•	–	–	US	White (no logo)
	QMX3.P74-1BSC	S55624-H127	•	•	•	–	•	•	–	–	CN	Black
	QMX3.P37	QMX3.P37	•	–	–	–	•	•	•	•	CN	White
	QMX3.P37-1BSC	S55624-H129	•	–	–	–	•	•	•	•	CN	Black
Accessories	QMX3-GSKT	QMX3-GSKT	QMX3 Insulating Gasket (10-pack). For installing sensors on a hollow wall.									
	OCI702	S55800-Y101	USB to PL-LINK Interface with Power Supply (Required for commissioning)									
	QMX3-BP	QMX3-BP	QMX3 Replacement Back Plates (12-pack)									
	5WG11938AB01	5WG11938AB01	KNX/PL-Link Bus Connector (25-pack)									

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SIEMENS

Technical Specification Sheet
Document No. 149-910
July 26, 2019

QPA20xx Series Indoor Air Quality Room Sensors

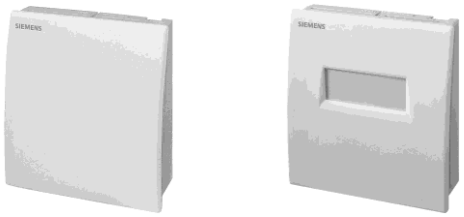
Description

The QPA20xx Series Indoor Air Quality Sensors optimize room comfort by enabling demand-controlled ventilation. Models are available that measure CO_2, CO_2 and temperature, or CO_2, temperature and relative humidity.

For models with humidity, a capacitive humidity sensing element changes capacitance as a function of the relative humidity. An electronic measuring circuit converts the humidity signal to a voltage or current (field-selectable) signal that corresponds to a relative humidity range of 0 to 100%. For models with temperature, the sensor acquires room temperature with a sensing element that changes electrical resistance as a function of the temperature. The resistance is converted to a voltage or current output signal that corresponds to a temperature range of 32°F to 122°F (0°C to 50°C) or -31°F to 95°F (-35°C to 35°C).

The QPA2002 models measure both CO_2 and volatile organic compounds (VOC) for optimized indoor air quality. A single output signal is automatically adjusted to reflect the higher of the two values. A secondary output provides CO_2 data. This enables the combination CO_2 + VOC sensor to be easily substituted for a CO_2 sensor in any demand control ventilation control system.

These wall-mounted sensors are designed for use with all systems and devices capable of acquiring and handling a 0 to 10 Vdc or 0 to 5 Vdc output signal.



QPA20xx Series Room Indoor Air Quality Room Sensor and QPA20xxD Series Room Indoor Air Quality Room Sensor with Display.

Features

- Non-Dispersive Infrared (NDIR) CO_2 sensing technology is ideal for use in facilities that are occupied 24/7.
- Combination units enable a single sensor to take the place of up to three individual sensors.
- Maintenance-free infrared CO_2 sensing element never requires re-calibration.
- Field-selectable output provides 0 to 10V, 0 to 5V, or 4 to 20 mA signal(s).

Ordering Information

Part Number	Description
QPA2000	Room CO_2 Sensor
QPA2002	Room CO_2 + VOC Sensor*
QPA2002D	Room CO_2 + VOC Sensor w/Display*
QPA2060	Room CO_2 + Temperature Sensor
QPA2060D	Room CO_2 + Temperature Sensor w/Display
QPA2062	Room CO_2 + Temperature + RH Sensor
QPA2062D	Room CO_2 + Temperature + RH Sensor w/Display
ARG70	Mounting Plate (Required for installation on 2” × 4” electrical box.)

* Siemens CO_2 + VOC sensors are designed to help maximize occupant comfort and are not suitable for use in life safety applications

General Specifications

Output Signal:
0-10V, 0-5V, or 4-20 mA, selectable, linear

CO_2 Measuring:
Range: 0-2000 ppm
Accuracy: ≤ (±50 ppm +2% of measured value)*
Temperature dependency: ±2 ppm/°C (typical)
Long term drift: ≤ ±5% measuring range/5 yrs
* Allow up to 96 hours for unit to reach published accuracy.

Temperature Measuring:
Range: - 31°F to 113°F (-35°C to 45°C)
Accuracy: ± 1.4°F (± 0.8°C)

Humidity Measuring
Range: 0 to 100% rh
Accuracy: ± 3% rh (typical 30 to 70% rh)

Power Supply:
Operating voltage (SELV): 24 Vac or 15 to 35 Vdc ±20%
Frequency: 50/60 Hz
Power consumption: ≤2 VA

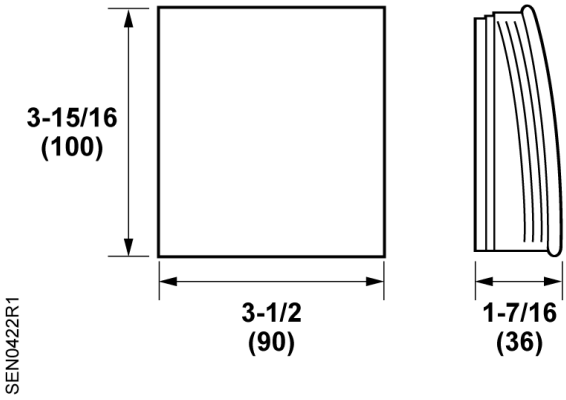
Electrical:
Screw terminals: 2 × 16 AWG or 1 × 14 AWG

Environmental:
Transport:
Temperature: -13°F to 158°F (-25°C to 70°C)
Humidity: < 95% rh

Physical:
Weight (including packaging): 0.60 lb (0.272 kg)

Miscellaneous:
No calibration required for 8 years.

Dimensions



Dimensions in Inches (mm).

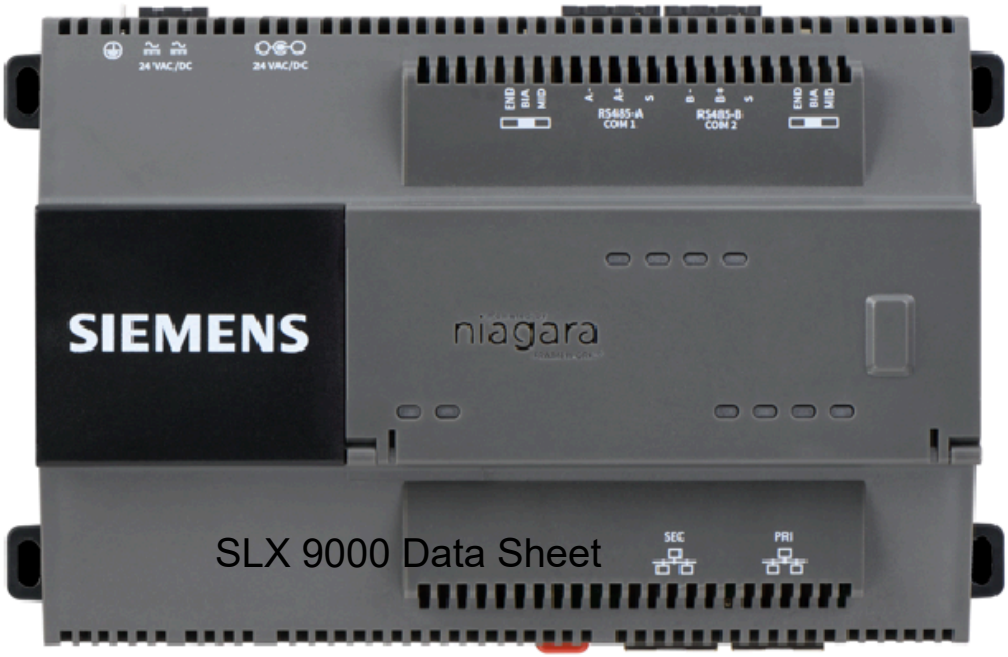
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SLX 9000 Data Sheet

1 | Title Page



SLX 9000 is the evolution of the SLX controller platform, innovating on the SLX 8000's global design and extending its ability to flex and scale with current and future needs of smart building/smart industrial process deployments. The SLX 9000 controller operates with Niagara 4.1.3, the latest version of the Niagara Framework®.

- Runs Niagara 4.13 and later
- Quad Core processor
- Global Capacity Licensing and Upgrade Capability
- Double amount of RAM and storage
- Faster start up and station load time
- Responsive UI

2 | Features

With improved performance, the SLX 9000 introduces onboard storage and microSD backup, eliminating the need for a backup port. Additionally, this new device provides the following features:

Expandability with Modular Hardware Design

The SLX 9000 Controller and optional modules are designed for easy mounting on a 35mm-wide DIN rail.

Up to four optional modules directly attach to the controller for additional communications ports, including types for LonWorks®, IO R modules, RS232 and RS485 networks.

The modular design of the SLX 9000 controller makes it easy to install, integrate and deploy. Tool-less installation with expansion capability reduces installation complexity and improves flexibility. Systems integrators can focus on engineering solutions, not assembling components.

Connectivity Profiles with Encryption

The SLX 9000 is available in both wired and wireless models, supporting open protocol communication through wired or wireless modes. By default, the SLX 9000 is equipped with a wireless interface featuring a configurable radio that can be set as an access point or client and a 1x1 antenna supporting a/b/g/n/ac Wi-Fi standards. The wired model, available upon request, uses an Ethernet connection for data transfer. The wireless model ensures secure data transmission over Wi-Fi, with optional WPAPSK or WPA2PSK encryption for enhanced security.

3 | Functions

3.1 | Product Definition

The SLX® 9000 is a compact, embedded IoT (Internet of Things) controller and server platform for connecting multiple and diverse devices and sub-systems. With internet connectivity and web-serving capability, the SLX 9000 controller provides integrated control, supervision, data logging, alarming, scheduling and network management. It streams data and rich graphical displays to a standard web browser via an Ethernet or wireless LAN, as well as remotely over the internet.

The licensing model for the SLX 9000 controller is simplified and features standard drivers, along with optional IO and field bus expansion modules for ultimate flexibility and expandability. The SLX 9000 controller operates with Niagara 4, the latest version of the Niagara Framework®, for optimum performance. Released in tandem, the new SLX 9000 controller supports Niagara 4.13 and later versions; the SLX 9000 will not run any previous releases of N4.

In larger facilities, multi-building applications and large-scale control system integrations, Niagara 4 Supervisors can be used with SLX controllers to aggregate information, including alarms, and historical and real-time data, to create a single, unified application.

4 | Technical data

4.1 | Hardware Specifications

Hardware Aspect	Specification
Mounting	DIN rail-mount
Power	Requires 24VAC rated at 24VA minimum or 24VDC rated at 1A (24W) minimum
Processor	Quad Core 1.6Ghz NXP iMX8M+
Operating System	Ubuntu Core 20 Linux
Memory	2GB LPDDR4 SDRAM 4Mbit FRAM
Storage	8GB (eMMC) 8GB removable microSD (optional)

SLX 9000 Hardware Technical Specifications

4.2 | Conformance

Standards, directives and approvals	
Product standards	EN 60730-1 and EN 62368-1; CCC; SRRC
EU conformity (CE)	CE EN 61326-1; 1999/5/EC R&TTE Directive
Electromagnetic compatibility (EMC)	RCM; FCC Part 15 Subpart B, Class B; FCC Part 15 Subpart C;
UL/cUL approbation (US / Canada)	UL 916
CSA certification	C-UL listed to Canadian Standards Association (CSA) C22.2 No. 205-M1983 “Signal Equipment”
Environmental compatibility	RoHS
Encryption	FIPS 140-2

4.3 | Environmental compatibility

CAUTION! Ambient conditions must be within these ranges:

Ambient Conditions	
Operating Temperature	-20°C to 60°C (-4°F to 140°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Relative Humidity Range	5% to 95% non-condensing.
Pollution Degree	2
Shipping and vibration:	ASTM D4169, Assurance Level II
MTTF	10 years+
Supply (mains) voltage allowable voltage fluctuation	+/- 10%

4.4 | Connectivity Profiles

- Native Wi-Fi capability (WAP or Client) A, B, G or N networks
- Two 10/100/1000 Mb Ethernet ports
- Two isolated RS485 ports
- Optional LON FTT10, RS485 & RS232 expansion

	SLX 9000 non-wireless	**SLX 9000 wireless model**
Accessories	(2) electrically isolated RS-485 ports 485 with selectable bias and termination.	(2) electrically isolated RS-485 ports 485 with selectable bias and termination.
	Optional LON FTT10, RS485 & RS232 expansion.	Optional LON FTT10, RS485 & RS232 expansion
Direct Data Access	1 USB type C (Serial Shell)	1 USB type C (Serial Shell)
Networking	(2)10/100/1000 Ethernet Ports	(2)10/100/1000 Ethernet Ports
		Radio Configuration: Configurable as Off, WAP, or Client Wi-Fi Standards: Dual-band 802.11ac (Wi-Fi 5), 802.11ax (Wi-Fi 6) Antenna: 1x1 802.11 a/b/g/n/ac Security: WPA-PSK, WPA2-PSK NOTICE! For wireless model only.

SLX 9000 Connectivity Table

4.5 | Encryption

- All communications encrypted by default.
- Meets the FIPS 140-2 federal standard.
- Supports TLS 1.3.
- Sensitive data is encrypted on disk at rest.
- Optional WPAPSK/WPA2PSK encryption.

5 | Product documentation

Title	Document ID:
SLX 9000 Mounting and Wiring Installation Guide	A6V15372358_en_a
SLX 9000 User Guide	A6V15372363_en_a

6 | Ordering Information for SLX 9000 and related accessories

Orderable Part Number	Product Description	SSN (Siemens serial number for product)
SLX-9000	Individual SLX 9000 Controller, microSD card, two 10/100/1000 Mb Ethernet ports, two isolated RS-485 serial ports. Requires NC-9XXX core software and SMA-9XXX software maintenance.	S55374-C310
SLX-9000-Demo	SLX-9000 controller, with Demo 500 device license microSD card, two 10/100/1000 Mb Ethernet ports, two RS-485 serial port and all available Tridium drivers. License will renew annually with the receipt of the annual support fee. Requires Niagara 4 release 4.13 or higher. Hardware Accessories are not included. See Hardware Options for Wall Power supply and expansion modules.	S55374-C312
NC-9005	SLX 9000 5 Device Core Software Only & 250 Points. Includes standard open drivers. Supports up to 5 devices or 250 points. Requires Niagara 4.13 or higher.	P55374-C212
NC-9010	SLX 9000 10 Device Core Software Only & 500 Points. Includes standard open drivers. Supports up to 10 devices or 500 points. Requires Niagara 4.13 or higher.	P55374-C213
NC-9025	SLX 9000 25 Device Core Software Only & 1250 Points. Includes standard open drivers. Supports up to 25 devices or 1250 points. Requires Niagara 4.13 or higher.	P55374-C214
NC-9100	SLX 9000 100 Device Core Software Only & 5000 Points. Includes standard open drivers. Supports up to 100 devices or 5000	P55374-C215

	points. Requires Niagara 4.13 or higher.	
NC-9200	SLX 9000 200 Device Core Software Only & 10000 Points. Includes standard open drivers. Supports up to 200 devices or 10000 points. Requires Niagara 4.13 or higher.	P55374-C216
NC-9XXX-DEMO	SLX 9000 Demo with 500 Device Core. Includes all available Tridium drivers. Requires Niagara 4.13 or higher. License will renew annually with the receipt of the annual support fee.	P55374-C217
SMA-9005-1YR	SLX 9005 - 1 year maintenance	P55374-C218
SMA-9005-1YR-INIT	SLX 9005 - Initial 18-month maintenance must be purchased in conjunction with initial Core software. Optional 3- or 5-year maintenance may be substituted.	P55374-C219
SMA-9005-3YR	SLX 9005 - 3 year maintenance	P55374-C220
SMA-9005-5YR	SLX 9005 - 5 year maintenance	P55374-C221
SMA-9010-1YR	SLX 9010 - 1 year maintenance	P55374-C222
SMA-9010-1YR-INIT	SLX 9010 - Initial 18-month maintenance must be purchased in conjunction with initial Core software. Optional 3- or 5-year maintenance may be substituted.	P55374-C223
SMA-9010-3YR	SLX 9010 - 3 year maintenance	P55374-C224
SMA-9010-5YR	SLX 9010 - 5 year maintenance	P55374-C225
SMA-9025-1YR	SLX 9025 - 1 year maintenance	P55374-C226
SMA-9025-1YR-INIT	SLX 9025 - Initial 18-month maintenance must be purchased in conjunction with initial Core software. Optional 3- or 5-year maintenance may be substituted.	P55374-C227
SMA-9025-3YR	SLX 9025 - 3 year maintenance	P55374-C228
SMA-9025-5YR	SLX 9025 - 5 year maintenance	P55374-C229
SMA-9100-1YR	SLX 9100 - 1 year maintenance	P55374-C230

SMA-9100-1YR-INIT	SLX 9100 - Initial 18-month maintenance must be purchased in conjunction with initial Core software. Optional 3- or 5-year maintenance may be substituted.	P55374-C231
SMA-9100-3YR	SLX 9100 - 3 year maintenance	P55374-C232
SMA-9100-5YR	SLX 9100 - 5 year maintenance	P55374-C233
SMA-9200-1YR	SLX 9200 - 1 year maintenance	P55374-C234
SMA-9200-1YR-INIT	SLX 9200 - Initial 18-month maintenance must be purchased in conjunction with initial Core software. Optional 3- or 5-year maintenance may be substituted.	P55374-C235
SMA-9200-3YR	SLX 9200 - 3 year maintenance	P55374-C236
SMA-9200-5YR	SLX 9200 - 5 year maintenance	P55374-C237
DEVICE-10	Up to 10 devices/500 point upgrade (can be purchased during initial licensing)	P55374-C111
DEVICE-25	Up to 25 devices/1,250 point upgrade (can be purchased during initial licensing)	P55374-C112
DEVICE-50	Up to 50 devices/2,500 point upgrade (can be purchased during initial licensing)	P55374-C113
IO-R-16	Optional 16 point IO RS485 module designed for use with the SLX 8000 & 9000. Includes 8 Universal Inputs, 4 Form A Relay Outputs and 4 0-10 VDC Analog Outputs	S55374-C265
IO-R-34	Optional 34 point IO RS485 module designed for use with the SLX 8000 & 9000. Includes 16 Universal Inputs, 10 Form A Relay Outputs and 8 0-10 VDC Analog Outputs	S55374-C266
NPB-8000-2X-485	SLX 8000 & 9000 controllers — add on dual port RS-485 module	S55374-C242
NPB-8000-LON	SLX 8000 & 9000 controllers — add on single port LON FTT10A module	S55374-C241

NPB-8000-232	SLX 8000 & 9000 controllers — add on single port RS-232 module	S55374-C243
WPM-8000	Universal power supply for SLX 8000 & 9000 controllers	S55841-T102

SLX 9000 ordering information

6.1 | Software Ordering and Maintenance Information

Every SLX 9000 is available with a Niagara 4.13 or higher software license and Tridium's standard drivers. Purchase of a software maintenance agreement (SMA) is required with initial SLX 9000 licensing. The initial SMA is for 18 months, with extended agreements of 3 years and 5 years available.

NOTICE! If a Software Maintenance Agreement is not in effect for any period, the price of maintenance for the next period for which it is purchased will be priced at a cost equal to the maintenance fee for the period(s) for which maintenance was not purchased, up to a maximum of 5 years, plus the maintenance fee for the next year.

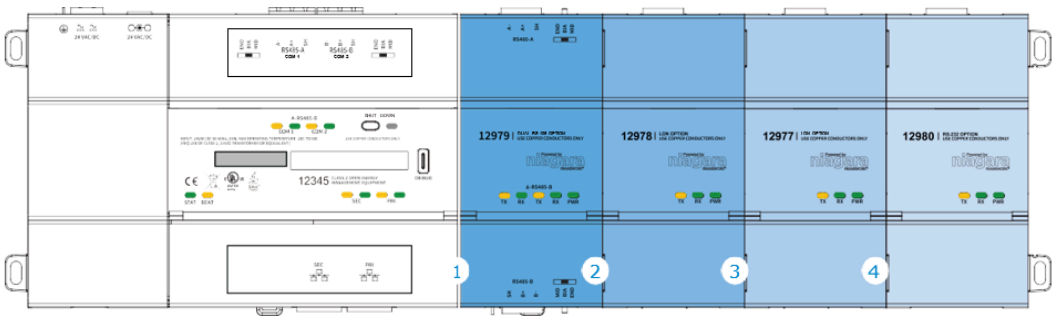
NOTICE! Please use the Orderable Part Number for ordering through Customer Service or SAP. Include SSN number to help identify the product.

6.2 | Expansion Module and IO Configurations

Expandability is dependent on the type of expansion module used.

MAXIMUM EXPANSION (MODULES SUPPORTED)	MAXIMUM IO (MODULES SUPPORTED)*	MAXIMUM NIAGARA ENTERPRISE SECURITY (MODULES SUPPORTED)*
NPB-8000-LON (4)	IO-R-16 (16)*	T-SEC-R2R*
NPB-8000-232 (4)	IO-R-34 (8)*	T-SEC-RIO*
NPB-8000-2X-485 (2)		

**16 total each or combined*



Max IO Modules

Maximum Combinations

		232 or LON	232 or LON	EXPANSION 4
	232 or LON	232 or LON	232 or LON	EXPANSION 3
485 485	485 485	232 or LON	232 or LON	EXPANSION 2
485 485	485 485	485 485	232 or LON	EXPANSION 1
Baseboard: 485 485				

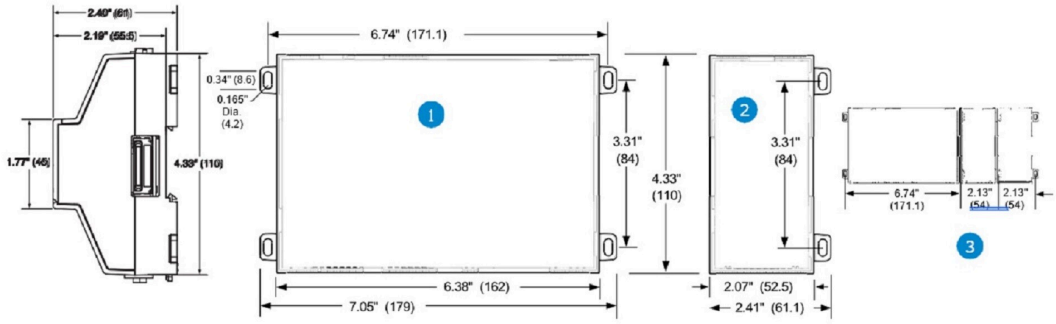
Expansion modules SLX 9000



7 | Dimensions

7.1 | SLX® 9000 CONTROLLER MOUNTING & DIMENSIONS

1. For the SLX 9000 controller, allow at least 1.5" (38mm) clearance around all sides and minimum 3" (76mm) at bottom for optional Wi-Fi antenna.
2. Regarding expansion modules, up to four (4) may be used. See "Expansion Module and IO Configurations".
3. Distances between center of tabs from one unit to another unit.



SLX 9000 mounting and dimensions

Compatible with (DIN43880) enclosures

Suitable for mounting to a panel or to an EN50022 standard 35mm rail

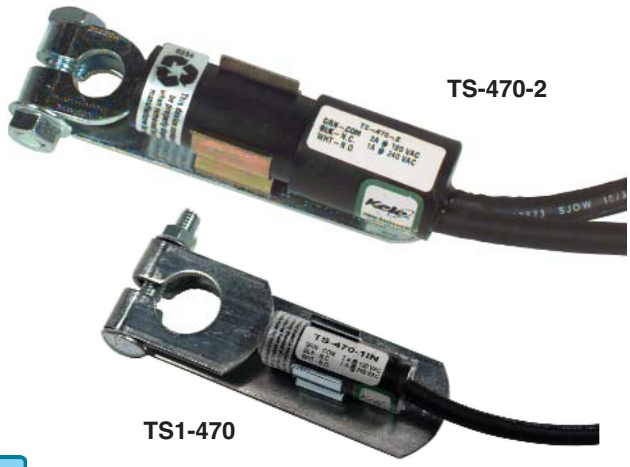
Vizio stencils available upon request

DAMPER POSITION SWITCHES

TS-470 SERIES

DESCRIPTION

The **TS-470 Series Damper Position Switches** consist of an encapsulated mercury switch mounted on a 1/2" (1.27 cm) damper crank arm. The **TS1-470 Series** includes the same switch with a 1" (2.54 cm) damper crank arm. They can be mounted on a damper control shaft to give an indication of opened or closed damper position. The **TS-470 Series** switch contacts are normal when the cable end of the switch is horizontal or above. The switches make when the cable end drops more than 15 degrees below horizontal. The **TS-470-2** has two SPDT switches, and the **TS-470-P** has plenum-rated cable and stainless steel housing.



TS-470-2

TS1-470

VIDEO Go to kele.com/ts-470-series to view product video.

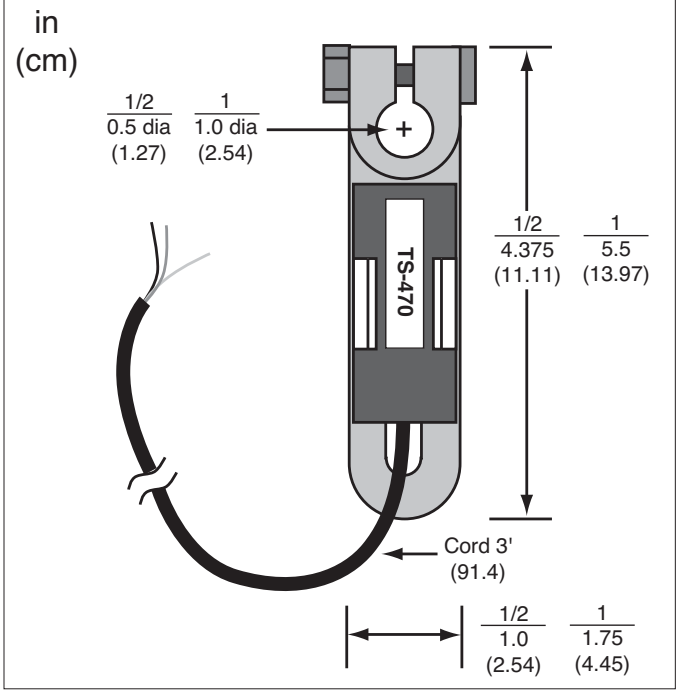
FEATURES

- ***1/2" (1.27 cm) or 1" (2.54 cm) crank arms***
- ***Easy to install***
- ***Easily adjustable***
- ***3' (0.91m) 18/3 cable***

SPECIFICATIONS

Switch type	Encapsulated mercury switch SPDT
Switch rating	
TS-470, TS-470-2	2A @ 120 VAC 1A @ 240 VAC
TS-470-P	1A @ 120 VAC, 24 VAC/VDC
Switch angle	Switch makes at 15 degrees below horizontal
Mounting	1/2" (1.27 cm), or 1" (2.54 cm) damper crank arm
Operating temp	-30° to 130°F (-34° to 54°C)
Wiring	
TS-470, TS-470-2	Green - common Black - normally closed White - normally open
TS-470-P	Black - common Blue - normally closed Red - normally open
Mercury content	0.03 cc
Warranty	1 year

WIRING / DIMENSIONS



ORDERING INFORMATION

MODEL 1/2" (1.27 cm)	MODEL 1" (2.54 cm)	DESCRIPTION
TS-470	TS1-470	Damper position switch with SPDT switch
TS-470-2	TS1-470-2	Damper position switch with two SPDT switches
TS-470-P	TS1-470-P	Damper position switch with SPDT switch, stainless steel housing, and plenum-rated cable

RELATED PRODUCTS

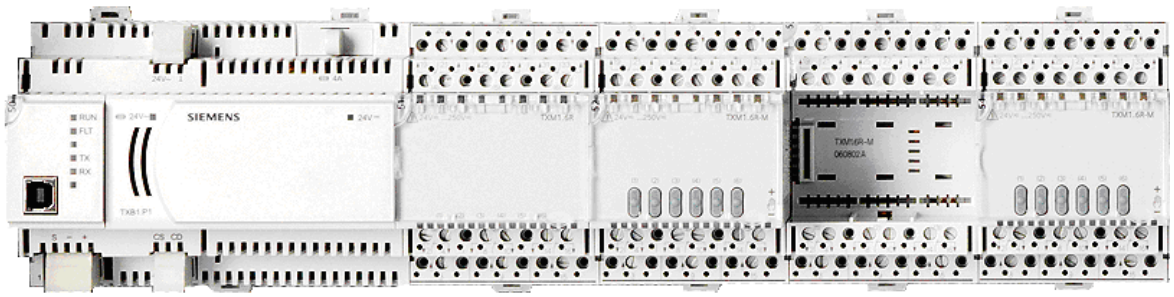
TS-475, TS1-475	Non-mercury damper position switch
LS45M91B11	Whisker-style metal limit switch

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SIEMENS

Technical Specification Sheet
Document No. 149-476
July 18, 2013

TX-I/O Product Range



Description

TX-I/O™ is a range of I/O modules, with associated power and communication modules, for use within the APOGEE Automation System. The TX-I/O product range includes the following:

- Eight types of I/O modules, which act as signal converters. The I/O modules communicate between the PXC Modular or the PXC-36 and the related devices in the building services plant.
- TX-I/O Power Supply for the TX-I/O modules.
- TX-I/O Bus Connection Module, which bridges communication and power from one DIN rail to another.
- TX-I/O Island Bus Expansion (IBE) module, which bridges communication between the primary field panel and expansion field panels.
- P1 Bus Interface Module (BIM), which connects TX-I/O modules to the P1 FLN. The P1 BIM provides power for TX-I/O modules, but it does not contain applications or perform control; the control database for the TX-I/O points resides in a field panel.

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

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

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

Features

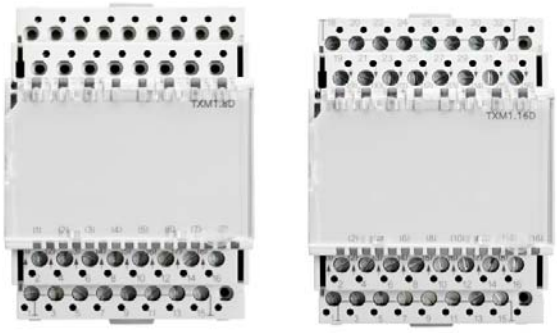
- The *self-forming TX-I/O island bus* transmits power as well as communication signals.
  - The TX-I/O island bus can be extended a maximum of 164 feet (50 meters).
  - Adding an Island Bus Expansion (IBE) module expands communication data up to an additional maximum of 200 feet (61 m) in two directions.
- *Hot-swappable electronic components* allow powered electronics to be disconnected and replaced without removing terminal wiring or disturbing the self-forming bus.

All TX-I/O modules include the following features:

- DIN rail mounting.
- High density (point count to physical dimensions).
- Hardware addressed with address keys.
- Removable label holder that allows for customized point labels.
- LEDs that provide status indication and diagnostic information for the I/O module, as well as for each point on the module.
- Separable into terminal base and plug-in I/O module electronics for:
  - Improved installation workflow, allowing field wiring to be terminated prior to installation of electronics.
  - Optimum diagnostics—connected peripheral devices can be measured without affecting or being affected by the I/O module.
  - Quick replacement of electronics for service.

Module Introduction

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



The TXM1.8D and TXM1.16D are dedicated to monitoring, respectively, 8 and 16 digital input points.

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

NOTE: No potential (dry contact) for all points.

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



The TXM1.6R and TXM1.6R-M Digital Output Modules provide six NO or NC (form C), maintained or pulsed, voltage free/dry contacts.

- The contacts are rated for a maximum of 250 Vac at 4A.
- Each I/O point has a green LED for status indication.
- The TXM1.6R-M module is also equipped with manual override switches. An orange LED per override switch indicates override status individually per point.

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



The TXM1.8U and TXM1.8U-ML Universal I/O modules provide 8 points, which can be individually software configured as digital input, analog input, or analog output to best meet the specific application needs.

All Universal I/O modules provide:

- Class 2 AC distribution voltage for peripheral devices, such as valves and actuators.

- Green LED status per I/O point that varies in intensity according to the voltage and current (directly proportional).

Digital input support includes:

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

Analog input sensor support includes:

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

Active input and output support includes:

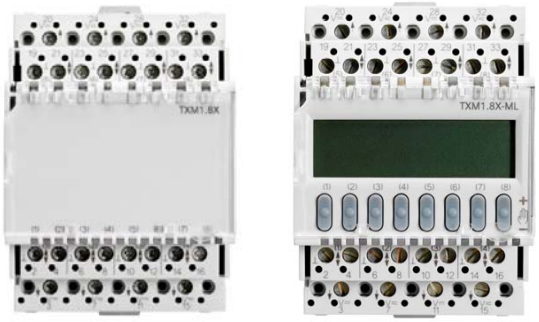
- Analog input voltage 0-10 Vdc
- Analog output voltage 0-10 Vdc

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

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

Orange LEDs indicate override status individually per point.

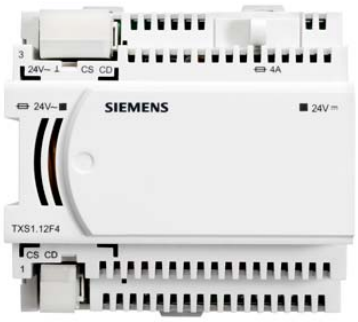
Super Universal Modules (TXM1.8X and TXM1.8X-ML)



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

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

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



The TX-I/O Power Supply generates 24 Vdc at 1.2A to power TX-I/O modules and peripheral devices.

- Up to 4 TX-I/O Power Supplies can be operated in parallel, with a maximum of two per DIN rail.
- It can be located within a row of TX-I/O modules or at the beginning of a new DIN rail.

The TX-I/O Power Supply performs the following functions:

- Transfers 24 Vac at 4A to power TX-I/O modules and peripheral devices.
- Routes CS (+24 Vdc Communication Supply) and CD (Communication Data signal) between DIN rails.
- Provides an input point for 24 Vac to power additional peripheral devices.
- Isolates the 24 Vac peripheral device supply in case of overload or short-circuit with Class 2 distribution. The replaceable AC fuse can be accessed from an installed module.
- Indicates the AC fuse status (via LED) for easy diagnostics.

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



The Bus Connection Module transfers DC power for TX-I/O modules and peripheral devices and transfers AC power for peripheral devices.

- It can be located within a row of TX-I/O modules or at the beginning of a new DIN rail.

The TX-I/O Bus Connection Module performs the following functions:

- Routes CS (+24 Vdc Communication Supply) and CD (Communication Data Signal) between DIN rails.
- Provides an input point for 24 Vac to power additional peripheral devices.
- Isolates the 24 Vac peripheral device supply in case of overload or short-circuit with Class 2 distribution. The replaceable AC fuse can be accessed from an installed module.
- Indicates the AC fuse status (via LED) for easy diagnostics.

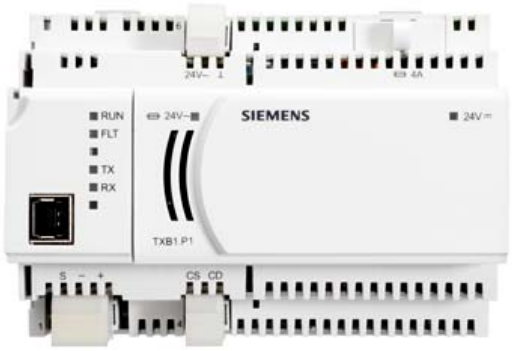
TX-I/O Island Bus Expansion Module (TXA1.IBE)



The TX-I/O Island Bus Expansion (IBE) module increases the distance between the primary field panel and expansion field panels without affecting the TX-I/O island bus maximum distance.

- An LED provides an indication of island bus communication.
- The IBE converts the TX-I/O island bus signal on the self-forming rail to an RS-485 signal level on the connector.
  - Each IBE module supports a maximum of two RS-485 segments.
  - Each segment may extend up to 200 ft (61 m) from the primary enclosure.
  - The island bus length extended from the primary field panel is added to island bus length extended from any expansion panel. RS-485 segment length between the IBEs does not add to the island bus length.
- The IBE does not transfer power over the RS-485 segment.
- Switches set the IBE as the TX-I/O island bus master (BM) or an RS-485 end-of-line terminator.
- A programming tool is not required.
- A maximum of 5 IBEs may be installed on the island bus: one IBE in the primary enclosure plus one in each expansion enclosure (maximum of 4).
- Only one Island Bus Expansion (IBE) module per enclosure is permitted.
- Expansion enclosures must be supplied using a separate TX-I/O Power Supply. Loss of this power does not affect the primary enclosure.

P1 Bus Interface Module (TXB1.P1 and TXB1.P1-4)



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

The P1 BIM provides the following features:

- Communication on the P1 FLN or MEC Expansion Bus.
- 24 Vac input.
- Generation of 24 Vdc at 600 mA to power TX-I/O modules and peripheral devices.
- Plug-in screw terminals.
- Isolates the peripheral device supply in case of overload or short-circuit with Class 2 distribution. The replaceable AC fuse can be accessed from an installed module.
- Separate LEDs for module operation, FLN communication activity, 24 Vdc present on the TX-I/O island bus, and monitoring of the 24 Vac fuse.

TXB1.P1

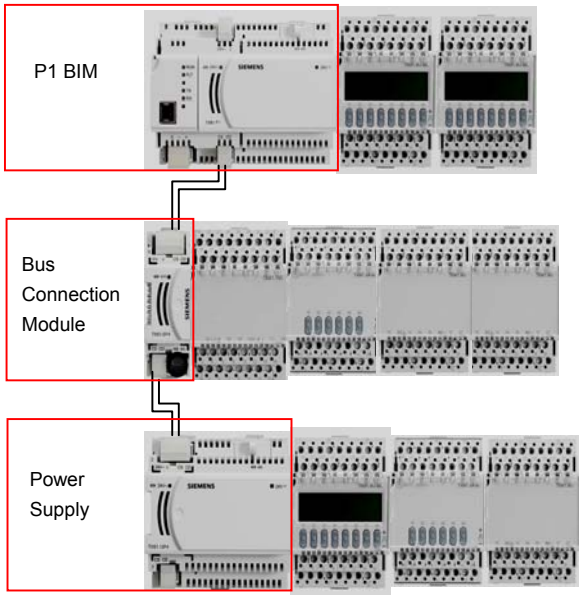
- Support for 80 TX-I/O points.
- Support for up to 10 I/O modules.
- Transfer of 24 Vac at a maximum of 4A to power peripheral devices.
- Up to three TX-I/O Power Supplies can be operated in parallel, max of 2 per DIN.

TXB1.P1-4

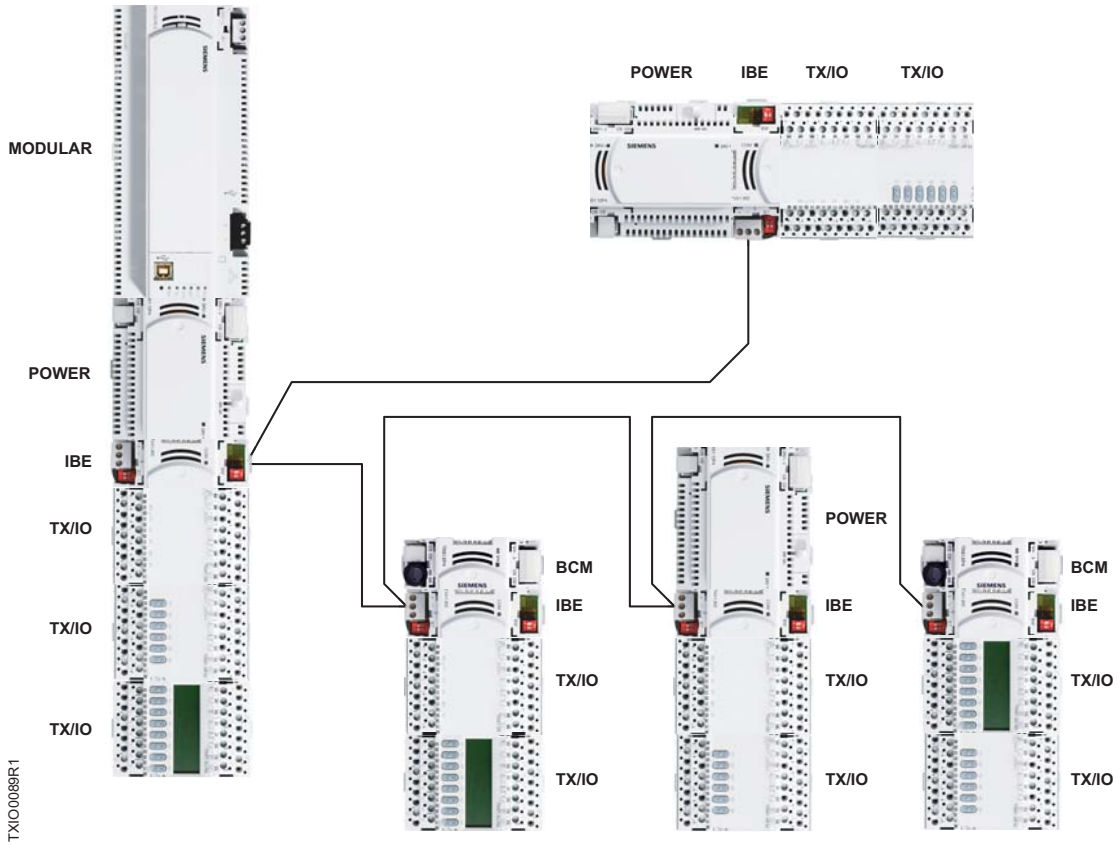
- Support for 64 TX-I/O points.
- Support for up to 4 I/O modules.

TX-I/O island bus Extension

The following picture shows the TX-I/O island bus extended using a Bus Connection Module and TX-I/O Power Supply. This configuration allows the TX-I/O island bus to extend a maximum of 164 feet (50 meters), and may extend outside an enclosure.



The following picture shows the TX-I/O island bus expanded using five Island Bus Expansion modules.



I/O Functions by Module

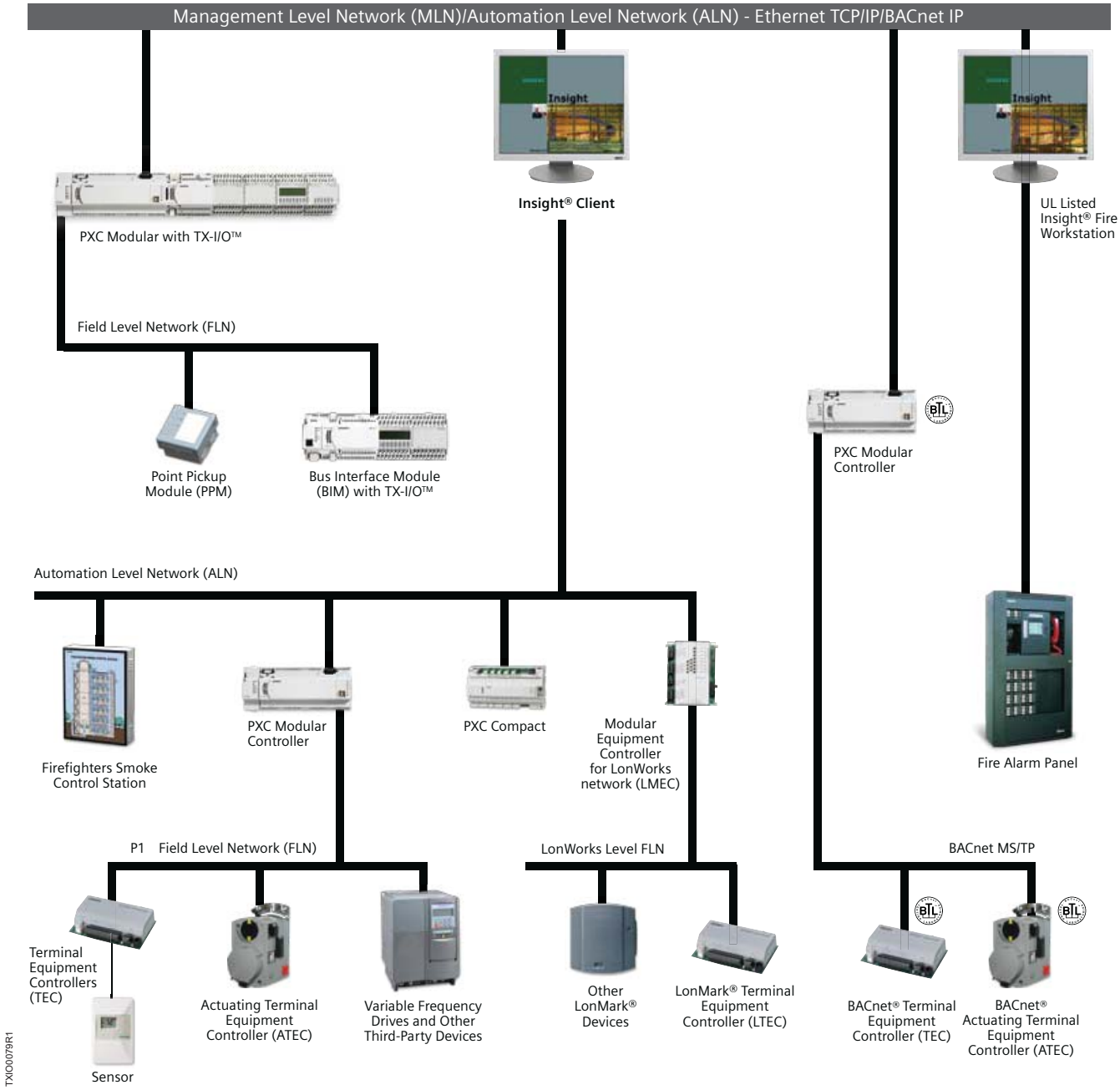
TX-I/O™ function	Description	Module type: TXM1.8D	TXM1.16D	TXM1.8U	TXM1.8U-ML	TXM1.8X	TXM1.8X-ML	TXM1.6R	TXM1.6R-M
		Maximum number of functions per module							
Digital inputs									
Binary Input	Status indication, voltage-free/dry contact	8	16	8	8	8	8		
Counter	Count/accumulator, voltage-free/dry pulse contact	8	8	8	8	8	8		
Analog Inputs									
	Temperature LG-Ni1000			8	8	8	8		
	Temperature Pt 1000 375			8	8	8	8		
	Temperature Pt 1000 385			8	8	8	8		
	Temperature (NTC) 10 K			8	8	8	8		
	Temperature (NTC) 100 K			8	8	8	8		
	Voltage, DC 0, 10V *			8	8	8	8		
	Current DC 4, 20 mA *					8	8		
Digital outputs									
BO OnOff	Latched contact, AC/DC 250V, 4A							6	6
BO Pulse	Pulse							6	6
Analog Outputs									
	DC 0..10 V *			8	8	8	8		
	DC 4 ... 20 mA *					4	4		

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

TX-I/O Network Architecture Example

The following architecture picture shows TX-I/O modules connected to:

- A P1 BIM located on the Field Level Network.
- A PXC Modular on Ethernet TCP/IP.



Specifications:

Dimensions (L × W × D)	
TX-I/O Modules	2.52” × 3.54” × 2.75” (64 mm × 90 mm × 70 mm)
TX-I/O P1 BIM	5” × 3.54” × 2.75” (128 mm × 90 mm × 70 mm)
TX-I/O Power Supply	3.78” × 3.54” × 2.75” (96 mm × 90 mm × 70 mm)
TX-I/O Bus Connection Module	1.26” × 3.54” × 2.75” (32 mm × 90 mm × 70 mm)
TX-I/O Island Bus Expansion (IBE) Module	1.26” × 3.54” × 2.75” (32 mm × 90 mm × 70 mm)
Electrical	
Power Requirements	24 Vac +/-20% input @ 50 or 60 Hz
Power Consumption	
Power Supply	35 VA with 96 VA pass-thru
Bus Connection Module	0 VA with 96 VA pass-thru
TX-I/O P1 BIM	20 VA with 96 VA pass-thru
With the above power consumption, the Power Supply produces 28.8 W (1.2A at 24 Vdc) and the P1 BIM provides 14.4 W (0.6A at 24 Vdc) to be used by the following:	
TXM1.8D	1.1 W
TXM1.16D	1.4 W
TXM1.8U	1.5 W
TXM1.8U-ML	1.8 W
TXM1.8X	2.2 W
TXM1.8X-ML	2.3 W
TXM1.6R	1.7 W
TXM1.6R-M	1.9 W
Island Bus Expansion Module	1.2 W
Terminations	
I/O Terminals	20-12 AWG Solid 20-14 AWG Stranded
Power Supply, BCM, P1 BIM, and IBE	2-, 3-, or 4-position screw terminal pluggable blocks
Operating Environment	32°F to 122°F (0°C to 50°C), 5 to 95% rh, non-condensing
Agency Listings	UL 864 UUKL Smoke Control Equipment ULC/ORD-C100-1992 UUKL7 Smoke Control Equipment UL 916 PAZX CSA 22.2 No. 205 PAZX7
Agency Compliance	FCC Compliance Australian EMC Framework (C-Tick) European EMC Directive (CE) European Low Voltage Directive (LVD)

Ordering Information

TX-I/O I/O Modules

Product Number	Description
TXM1.8D	TX-I/O Module, 8 DI points
TXM1.16D	TX-I/O Module, 16 DI points
TXM1.8U	TX-I/O Module, 8 Universal points
TXM1.8U-ML	TX-I/O Module, 8 Universal points with LOID
TXM1.8X	TX-I/O Module, 8 Super Universal points
TXM1.8X-ML	TX-I/O Module, 8 Super Universal points with LOID
TXM1.6R	TX-I/O Module, 6 DO with Relay points
TXM1.6R-M	TX-I/O Module, 6 DO with Relay points with manual override

TX-I/O Power Supply and Bus Modules

Product Number	Description
TXS1.12F4	TX-I/O Power Supply, 1.2 A, 4A Fuse
TXS1.EF4	TX-I/O Bus Connection Module, 4A Fuse
TXA1.IBE	TX-I/O Island Bus Expansion Module with RS-485 connection.
TXB1.P1	TX-I/O Bus Interface Module, P1, 10-module
TXB1.P1-4	TX-I/O Bus Interface Module, P1, 4-module

Accessories

Product Number	Description
TXA1.K12	One set of address keys, numbers 1-12
TXA1.K24	One set of address keys, numbers 1-24
TXA1.K-48	One set of address keys, numbers 25-48
TXA1.K-72	One set of address keys, numbers 49-72
TXA1.LLT-P100	Labels for TX-I/O 100 sheets/pack Letter format
TXA1.LH	Replacement label holders

Regions where this Product is Sold

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

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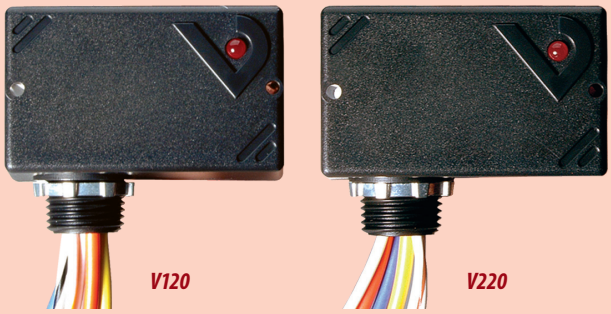
Siemens Industry, Inc.
Building Technologies Division
1000 Deerfield Parkway
Buffalo Grove, IL 60089-4513
USA
+ 1 847-215-1000

Your feedback is important to us. If you have comments about this document, please send them to SBT_technical.editor.us.sbt@siemens.com.

Document No. 149-476
Printed in the USA

Enclosed Victory Relays: 20A SPDT

Great For External Mount Applications



DESCRIPTION

The **Victory 120 and 220** 20A SPDT enclosed relays combine a power duty relay with a high level of field-selectability and versatility. The device is quick and easy to install using the threaded nipple mount. With no need for a dedicated field enclosure, this series is ideal for retrofit projects.

APPLICATIONS

- Command contactors
- Control motors
- Isolation
- Device interlocking
- Relay logic
- Sense voltages for alarm conditions

FEATURES

- Sleek field enclosure reduces the need for panel space
- The nipple mount feature allows the V120/220 Series to be mounted to any electrical enclosure
- HP Ratings make the V120/V220 ideal for control of fractional HP motors
- Flexible tinned stranded wire...fits easily in tight spaces and provides secure connections to wire nuts
- UL508 Listed...designed and listed for field installation...makes electrical inspection a snap

TYPICAL COIL PERFORMANCE

Voltage	Coil Current	
	AC	DC
24V	75mA	32mA
120V	42mA	-
208V	36mA	-
277V	49mA	-

CONTACT RATINGS

Resistive	20A@277VAC, 28VDC
Motor	120VAC, 1HP
	277VAC, 2HP
Pilot Duty	A300
Ballast	277VAC, 20A N.O.
	277VAC, 10A N.C.
Tungsten	120VAC, 10A N.O.
	120VAC, 2A N.C.

RELAYS

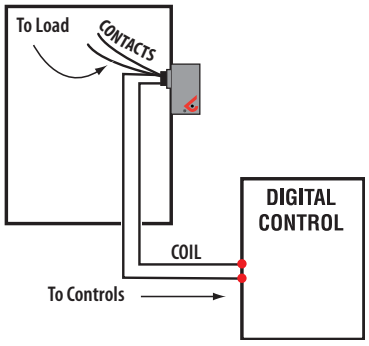
SPECIFICATIONS

5 Year Warranty

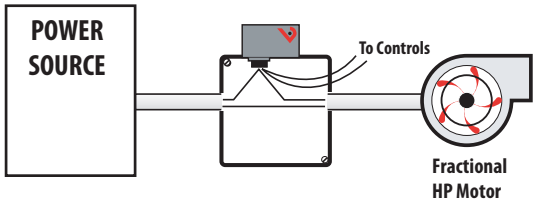
Operating Temperature Range	-34° to 55°C (-29° to 131°F)
Operating Humidity Range	10-90% RH non-condensing
Expected Relay Life	Electrical (@ rated current) 100,000 cycles; Mechanical (unpowered) 10,000,000 cycles
Relay Status	LED ON=energized
Wire Specifications:	
Lead Length	14" (356 mm) min.
Gauge	UL1015; Coil: 18 AWG; Contacts: 12 AWG
Insulation Class	600VAC RMS
Agency Approvals	UL 508

APPLICATION/WIRING EXAMPLES

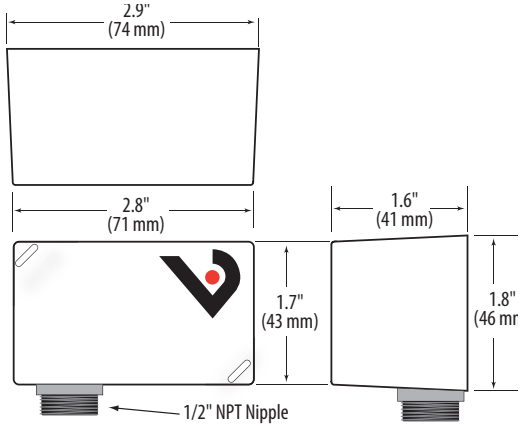
Nipple mount directly to a panel



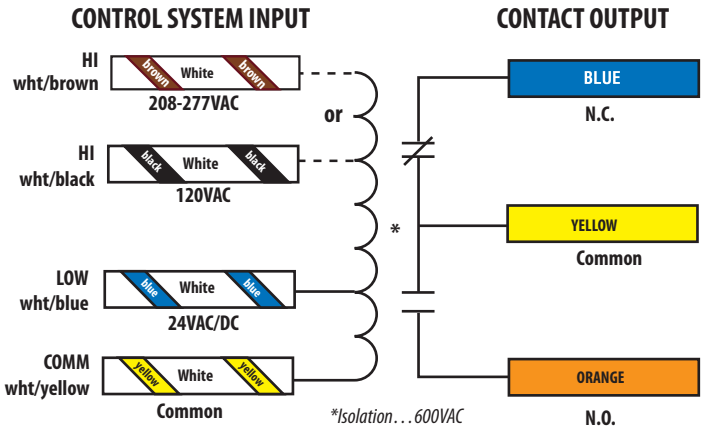
Nipple mount to 4x electrical box



DIMENSIONAL DRAWING



WIRE COLOR CODES



ORDERING INFORMATION

c UL us LISTED
E150462

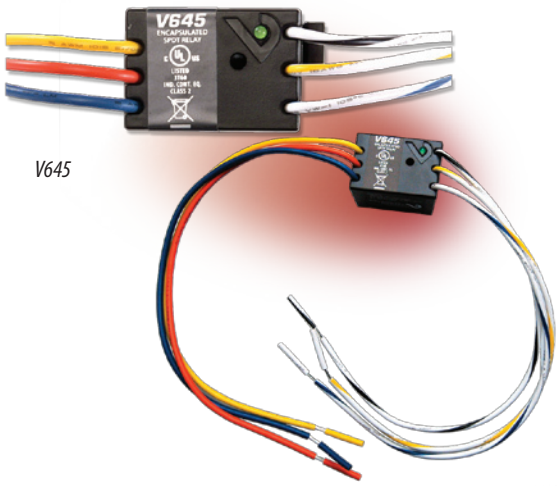
MODEL	RELAY	COIL	AMPERAGE RATING	RELAY POWER LED	UL
V120	SPDT	24VAC/DC, 120VAC	20A	●	●
V220		24VAC/DC, 208-277VAC		●	●

Some devices are plenum rated per UL 1995...see White Paper VWP01 at veris.com for details

RELAYS

Mini Command Victory Relay: 10A SPDT

10A Relay In A Small Package For Tight Spaces



V645

5 Year Warranty

APPLICATIONS

- Sense voltages for alarm conditions
- Relay logic
- Isolation
- Device interlocking

FEATURES

Victory 645...economical multi-voltage relay

- 24-30VAC/DC or 120VAC coil input
- Status LED for visual indication
- For start/stop of small motors & contactors
- Switch up to 10A@250VAC
- Multiple mounting options for versatility...ships with foam tape, mounting screw, and DIN Rail clip

DESCRIPTION

The **Victory 645** is an economical, multi-purpose relay designed for control of loads up to 10A. Its small size allows for space saving utility in panels and field enclosures.

TYPICAL COIL PERFORMANCE

Voltage	Coil Current	
	AC	DC
24-30V.....	32mA	13mA
120V.....	17mA	—

CONTACT RATINGS

Resistive.....	10A@250VAC, N.O.
	7A@250VAC, N.C.
	6A@277VAC
	7A@30VDC
Motor.....	125VAC, 1/4 HP, N.O.

RELAYS

SPECIFICATIONS

Temperature Range	0° to 60° C (32° to 140°F)
Operating Humidity	10% - 90% RH, non-condensing
Expected Relay Life	Electrical (@ rated current) 100,000 cycles; Mechanical (unpowered) 10,000,000 cycles
Relay Status	LED ON = Energized
Dielectric Strength	1500VAC RMS

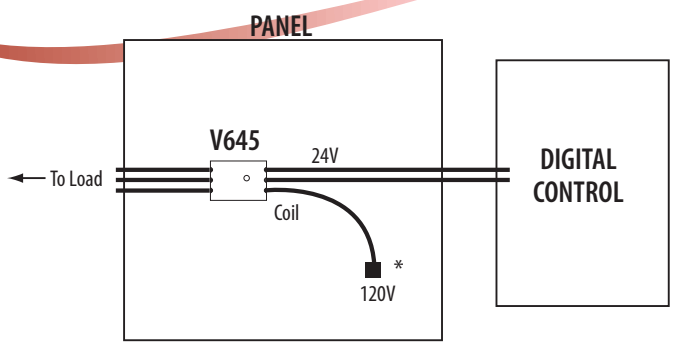
Wire Specifications:

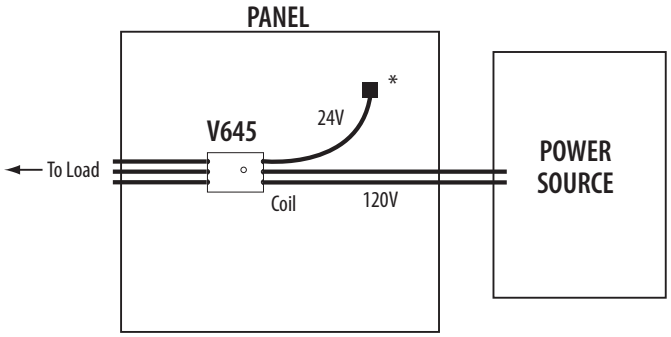
Lead Length	10"(254mm) min.
Gauge	UL1015; Coil: 18AWG; Contacts: 16AWG

UL 508 enclosed device listing

©2010 Veris Industries

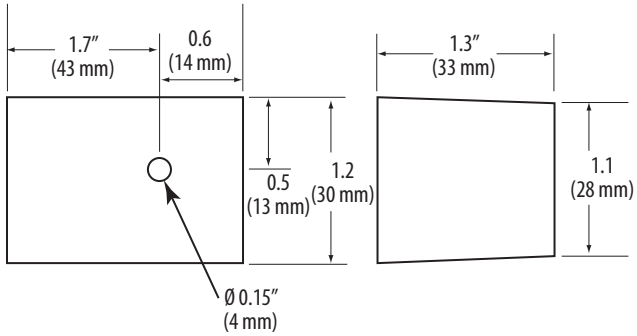
APPLICATION/ WIRING EXAMPLES



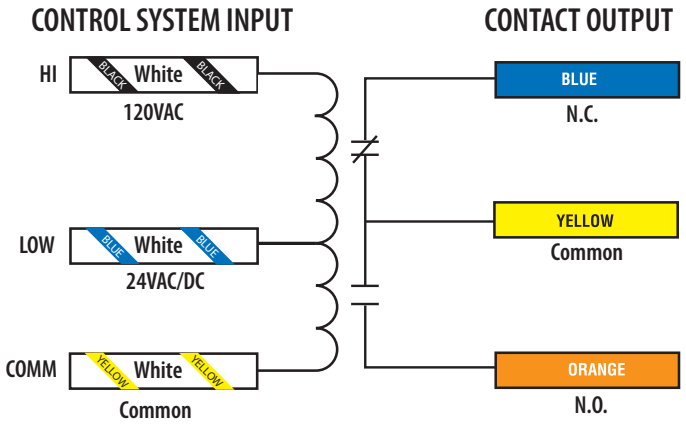


** Wire is capped on unused option.*

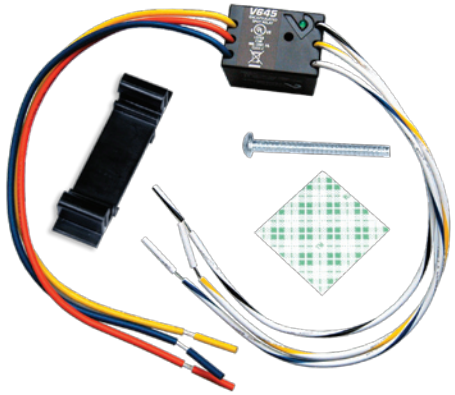
DIMENSIONAL DRAWING



WIRE COLOR CODES



APPLICATION/MOUNTING METHOD



The **V645** comes with a DIN rail clip, screw, and foam tape for a variety of mounting methods.

ORDERING INFORMATION

LISTED 3T60 UL 508 E150462

MODEL	RELAY	COIL	AMPERAGE RATING	RELAY POWER LED	UL
V645	SPDT	24-30VAC/DC, 120VAC	10A	●	●

ACCESSORIES

DIN Rail, DIN Stop Clip (AV01, AV02)

RELAYS

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VOLU-FLO/OAM

VOLU-flo / OAM

Outside Air Monitor



Accurate airflow measurement for demanding applications

Air Monitor Corporation

VOLU-flo / OAM

How It Works

The measurement of Outside Air presents a variety of challenges that cannot be overcome utilizing the standard Pitot and thermal technologies. Among these challenges are:

- The total absence of any upstream/downstream straight duct run to obtain accurate and/or repeatable measurement.
- The potential for outside air temperature variances of 150+ ºF in certain climatic zones and installed locations ranging from sea level to 5,000+ feet elevation make a temperature and altitude air density compensating system necessary.
- Airborne particulate and condensing moisture transported by outside air will impair the functionality and accuracy of both thermal and standard Pitot based technologies.
- Varying directional wind loads and gusts cause fluctuating airflow measurements.
- Airflow velocities often down to 150 FPM are below the recommended operating range of standard Pitot technologies.

The VOLU-flo/OAM has been specifically designed to measure the airflow rate within ±5% of actual airflow in all of these challenging conditions by measuring the *pressure drop* across a fixed inlet resistance device, such as a louver, layer of expanded metal, etc.

The VOLU-flo/OAM consists of an Outside Reference Sensor and an Inlet Airflow Sensor, both specially designed to be unaffected by dirt or moisture, plus a temperature sensor and a microprocessor-based Monitor/Controller which converts the measured pressure drop and temperature to actual airflow utilizing proprietary algorithms, density compensation, and signal conditioning.

Components and Features



Monitor/Controller Module

Standard and Expanded Ranges. With its 4:1 range of measurement, the Standard VOLU-flo/OAM is ideally suited for *minimum outside air* applications, while the Expanded VOLU-flo/OAM's 16:1 range of measurement will cover the full range of outside air, from the *minimum set-point* to design *maximum*.

Microprocessor Based Functionality. All functions of monitor configuration, output and display scaling, calibration, and controller tuning are performed by the VOLU-flo/OAM's on-board microprocessor. All input to the microprocessor is via four pushbuttons and menu selections.

Air Density Correction. The VOLU-flo/OAM corrects measured inlet airflow for ambient temperature variances by means of an integral 100 ohm platinum RTD temperature sensor and corrects for atmospheric pressure by entering site altitude into the microprocessor during initial system start-up.

Continuous Display of Process. A standard 2x20 liquid crystal display (LCD) is used during the configuration and calibration of the VOLU-flo/OAM, and provides a means to display two measured processes (volume, velocity, temperature) during normal operation.

BAS Interface. While the VOLU-flo/OAM is capable of operating as a stand-alone monitor/controller, a wide variety of inputs and outputs were designed into the Monitor/Controller Module to facilitate coordinated operation with a facility building automation system (BAS). Interfaces with the BAS include:

- Digital inputs for fan system start status, switching to economizer setpoint, or to use the BAS provided adjustable operating setpoint.
- Digital outputs for high and low alarms, triggered when the measured airflow falls outside of a user selectable deadband around the control setpoint.
- Dual analog output; a 4-20mADC output corresponding to measured inlet airflow, and a damper controller output field configurable for 0-5VDC, 0-10VDC, or 4-20mADC via jumpers.
- An analog input, field selectable for 0-5VDC, 0-10VDC, or 4-20mADC via jumper, that is used as the controller setpoint.

Enclosures. The VOLU-flo/OAM is offered in four different enclosure packages to fit any application and installation:

- NEMA 1 rated, painted carbon steel enclosure designed to be located indoors or inside the air handler.
- NEMA 4 rated, painted carbon steel enclosure designed for outdoor locations where the ambient temperature is consistently at 32°F and above.
- NEMA 4 rated and insulated enclosure which includes a thermostatically controlled enclosure heater. For outdoor locations where the ambient temperatures may go as low as –40°F.
- OEM mounting arrangement that permits the Monitor/Controller Module to be mounted into an existing OEM enclosure.

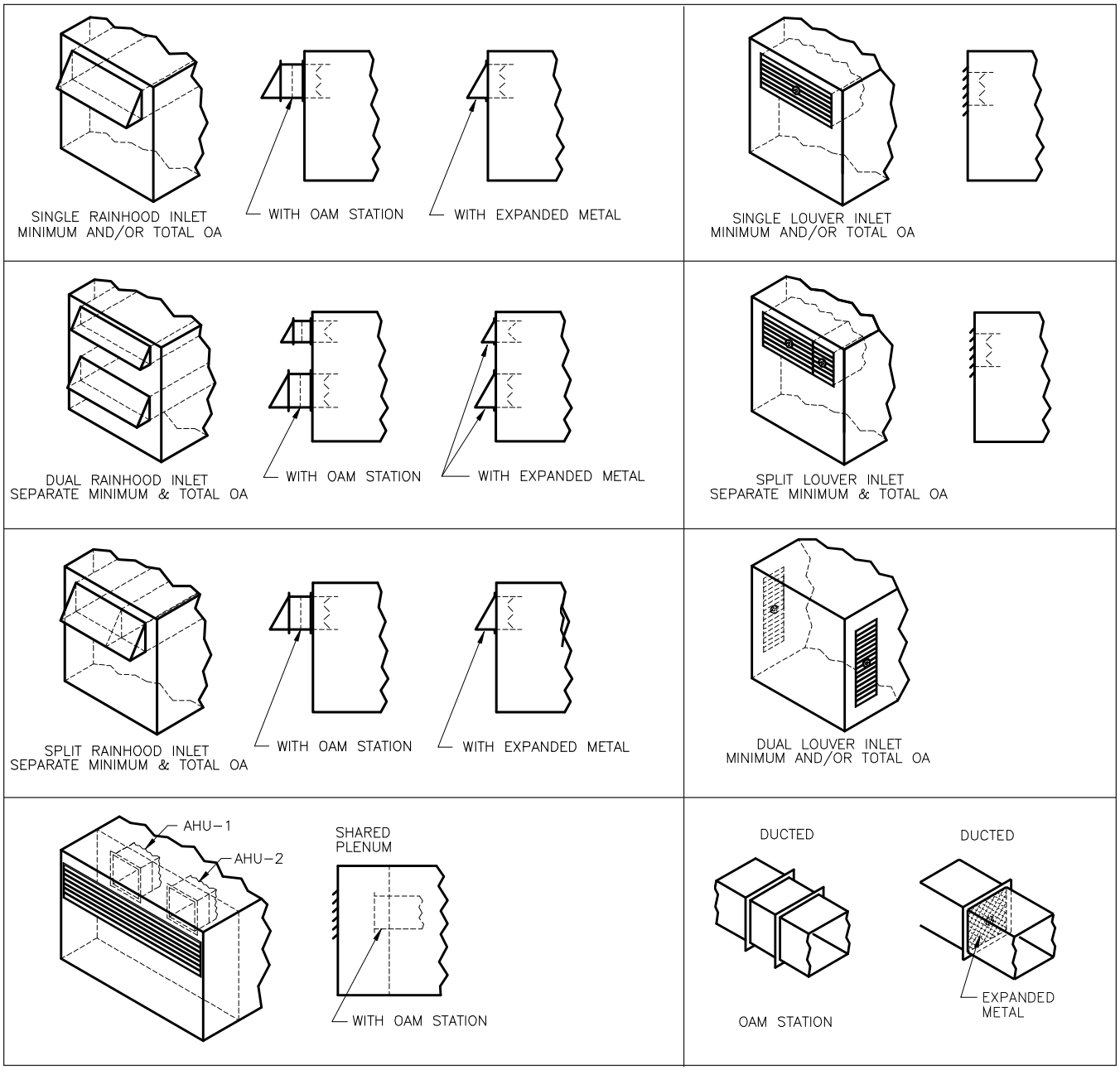


NEMA 1 Enclosure

Outside Air Monitor

Typical Application Guide

The VOLU-flo/OAM Monitor/Controller can be applied to most single, dual, and split inlets found on air handlers and built-up systems. Depicted below are the most commonly encountered inlet configurations. Contact the Factory with any unique configuration or those that do not meet the stated Minimum Installation Requirements.



Minimum Installation Requirements

The VOLU-flo/OAM was designed for installation on packaged air handlers and built-up systems where the outside air intake is outfitted with an OAM Station, inlet louver or some fixed resistance device that produces at least 0.06" w.c. pressure drop at 600 FPM. For systems not so equipped, contact the Factory for application suitability.

- The Outside Reference Sensor is to be located upstream of, and mounted in the center of the louver or fixed resistance device.
- The Inlet Airflow Sensor must be located downstream of any inlet louver or fixed resistance device, and upstream of the outside air intake control damper.
- The OAM Station must be positioned upstream of the outside air intake control damper.

VOLU-flo / OAM

Sensors

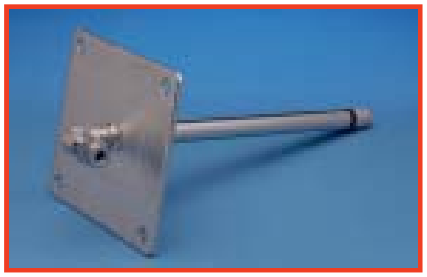
Outside Reference Sensor. The patented design of the Outside Reference Sensor is unaffected by wind gusts or directionality, thus providing an accurate point of reference for measuring the differential pressure created by the airflow entering the inlet.



Outside Reference Sensor

Unaffected by Dirt and Moisture. The VOLU-flo/ OAM does not utilize heated thermal sensors or pressure measuring ports that face into the airstream, thereby avoiding measurement instability caused by the variable presence of moisture, and measurement accuracy degradation due to dirt build-up around pressure sensor ports or on thermal sensor surfaces.

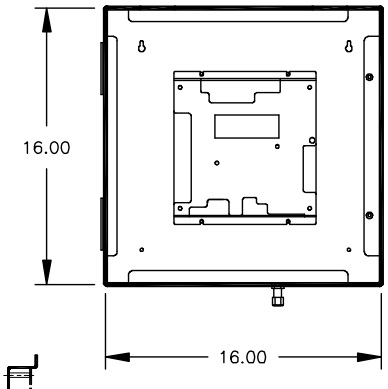
Stainless Steel Construction. The Outside Reference Sensor and Inlet Airflow Sensor are both constructed of Type 316 stainless steel materials to resist corrosion due to the presence of salt or chemicals in the air. In addition, the signal connections on these two sensors and those on the NEMA enclosure are stainless steel, as is the exterior of the platinum RTD.

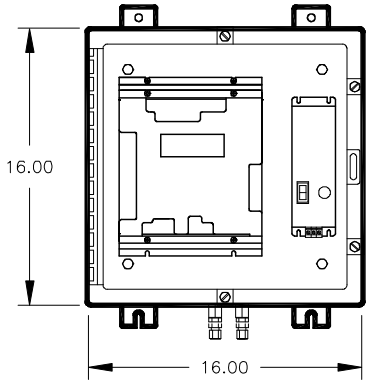


Inlet Airflow Sensor

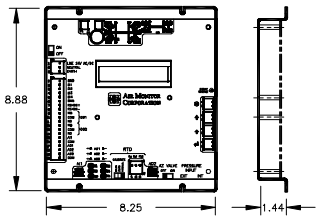
Dimensional Specifications

NEMA 1 Enclosure

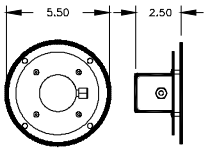




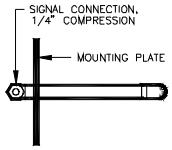
NEMA 4 Enclosure shown with optional Heater



Monitor/Controller Module



Outside Reference Sensor



Inlet Airflow Sensor

Suggested Specification

The monitor/controller shall be capable of direct measurement of airflow through an outside air inlet and produce dual outputs; one representing the measured airflow, and the other to control the inlet damper.

The monitor/controller shall contain an integral multi-line liquid crystal display for use during the configuration and calibration processes, and to display two measured processes (volume, velocity, temperature) during normal operation. All configuration, output scaling, calibration, and controller tuning will be performed digitally in the on-board microprocessor via input pushbuttons.

The monitor/controller shall measure inlet airflow with an accuracy of ±5% of reading over a range of 150-600 FPM, 250-1,000 FPM, 500-2,000 FPM, and 150-2,000 FPM and not have its reading affected by the presence of directional or gusting wind. Measured airflow shall be density corrected for ambient temperature variances, and atmospheric pressure due to site altitude.

The monitor/controller shall interface with existing building automation systems (BAS), accepting inputs for fan system start, economizer mode operation, and an external controller setpoint, and provide flow deviation alarm outputs.

The sensors shall be constructed of materials that resist corrosion due to the presence of salt or chemicals in the air; all non-painted surfaces shall be constructed of stainless steel. The electronics enclosure shall be NEMA 1 [NEMA 4; NEMA 4 with enclosure heater and insulation].

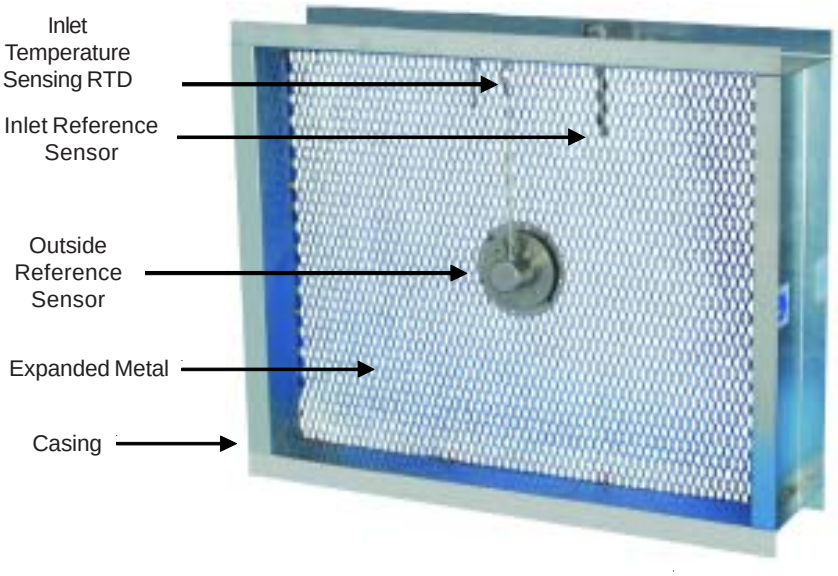
The monitor/controller shall be the VOLU-flo/OAM as manufactured by Air Monitor Corporation, Santa Rosa, California.

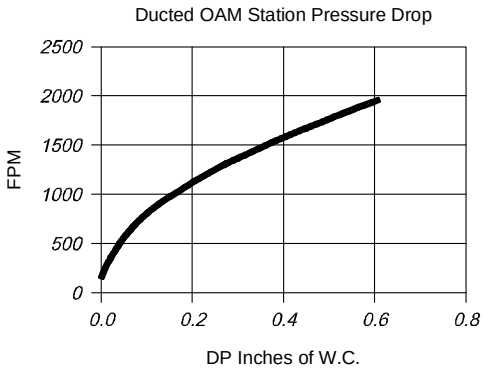
Outside Air Monitor

VOLU-flo/OAM Station

The VOLU-flo/OAM Station has been designed for ease of installation and commissioning by Factory mounting its sensors onto a layer of expanded metal of known fixed resistance welded into a galvanized sheet metal casing. In selected applications, the known fixed resistance of the VOLU-flo/OAM Station allows the overall System to be pre-calibrated at the Factory for plug-n-play operation.

Construction Features





Performance Specifications

Monitor

Accuracy. ±5% of actual airflow for velocities above 150 FPM.

Range.
Standard: Provides 4:1 range of measurement.
Expanded: Provides 16:1 range of measurement

Temperature Limits.
–20 to 180ºF Storage.
+32 to 120ºF Operating, standard.
–40 to 120ºF Operating, with optional enclosure heater.

Signal Connections. 1/4" compression type, stainless steel.

Analog Input/Outputs

Analog Input. A single input is field configurable via jumper for 0-5VDC, 0-10VDC or 4-20mADC. For use as the external controller setpoint.

Analog Outputs. Dual outputs; one 4-20mADC and the other configurable via jumper for 0-5VDC, 0-10VDC, or 4-20mADC. For measured airflow and damper controller outputs.

Digital Inputs/Outputs

Digital Inputs. Three dry contact inputs; fan system status, economizer mode, and external controller setpoint.

Digital Outputs. Dual Form C dry contacts rated for 3 amps at 24VDC for alarm outputs to the BAS.

Indication

Display. Standard 2x20 character LCD provides two lines of data display.

Power

Power Supply.
Standard: 24VAC (20-28VAC) or 24VDC (20-40VDC).
Optional: 120VAC (100-132VAC), with enclosure heater.

Power Consumption.
Standard: 18VA @ 24VAC; 13VA at 24VDC.
Optional: 336VA @ 120VAC, includes enclosure heater.

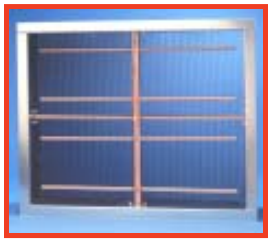
Circuit Protection. Power input is isolated, fused, and reverse polarity protected.

Model Selection Guide

VOLU-flo OAM – [ ] — [ ] — [ ]

S – Single Inlet	**O** – For mounting in OEM cabinet	**S** – Standard 4:1 Range
D – Dual Inlet	**1** – NEMA 1	**E** – Expanded 16:1 Range
	4 – NEMA 4	
	H – NEMA 4 with heater	

Air Monitor's Product Families of Flow Measurement and Pressure Sensors



FAN-E AIRFLOW MEASURING STATION.

Multi-point, self-averaging, Pitot traverse station with integral air straightener-equalizer honeycomb cell. Capable of continuously measuring fan discharges or ducted airflow with an accuracy of 2% or better.

AMCA CERTIFIED in accordance with Standard 610 for airflow measurement station performance.



VOLU-PROBE /1, 2, 3, 4 AIRFLOW TRAVERSE PROBES & STATIONS.

Multi-point, self-averaging, Pitot Fechheimer airflow traverse probes and stations with integral airflow direction correcting design ensures accurate measurement. Various mounting configurations to fit every application.

AMCA CERTIFIED in accordance with Standard 610 for airflow measurement station performance.



VOLU-PROBE/FI FAN INLET AIRFLOW PROBES.

Multi-point, self-averaging, Pitot Fechheimer airflow probes with integral airflow direction correcting design.

For mounting directly in the inlet cones or bellmouth of centrifugal or vane-axial fans to measure fan capacities within 3% of actual flow.



VELTRON DPT 2500-plus TRANSMITTERS.

Microprocessor based differential pressure and flow transmitters offering high accuracy (±0.25% F.S.) and ultra-low ranges (0-0.05 IN w.c.).

Standard features include backlit graphical LCD, AUTO-zero, and electronic re-spanning.



S.A.P. /B, P, S, R STATIC PRESSURE SENSORS.

Available in four separate mounting configurations, the S.A.P. family of static pressure sensors generate a steady, non-pulsating output of room, space or plenum pressure.

S.A.P. sensors are available in aluminum or stainless steel construction.



ELECTRA-flo THERMAL AIRFLOW MEASUREMENT SYSTEM.

Multi-point thermal dispersion airflow measurement probes, stations, and stations with integral air straightening honeycomb cell.

Capable of measuring fan and ducted airflow and temperature with an accuracy of 2-3% or better.

P.O. Box 6358 • Santa Rosa, CA 95406 • P: 800-AIRFLOW • F: 707-526-9970
www.airmonitor.com • amcsales@airmonitor.com

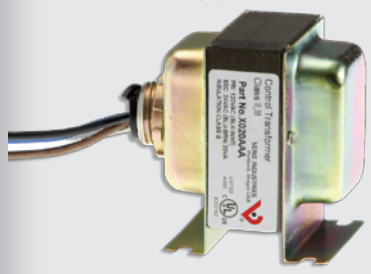
AIR MONITOR CORPORATION

125-200 (10/09)

Control Transformers

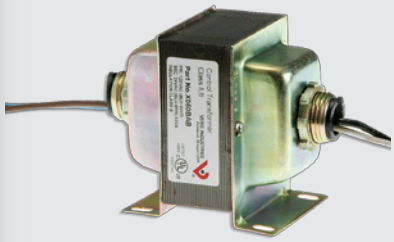
5 Year Warranty

X020AAA



1 Hub and Foot Mount

X050BAB



2 Hub and Foot Mount

X100CBE



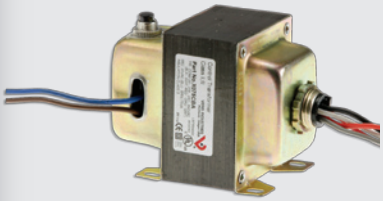
Plate Mount

X375DAC



Foot Mount

X075CBA



1 Hub and Foot Mount with Separated Secondary Wires

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.

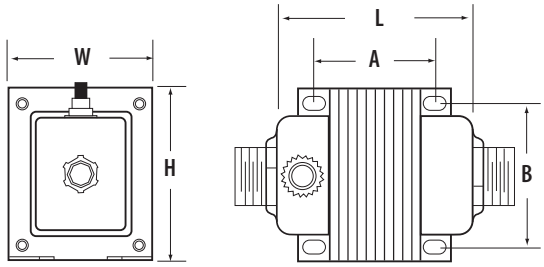
Versatile UL Listed transformers...simplify product selection and installation

- UL Listings for all models simplify panel building requirements
- Threaded hub options maximize installation flexibility
- One stop shopping...save time by ordering along with other Veris products

APPLICATIONS

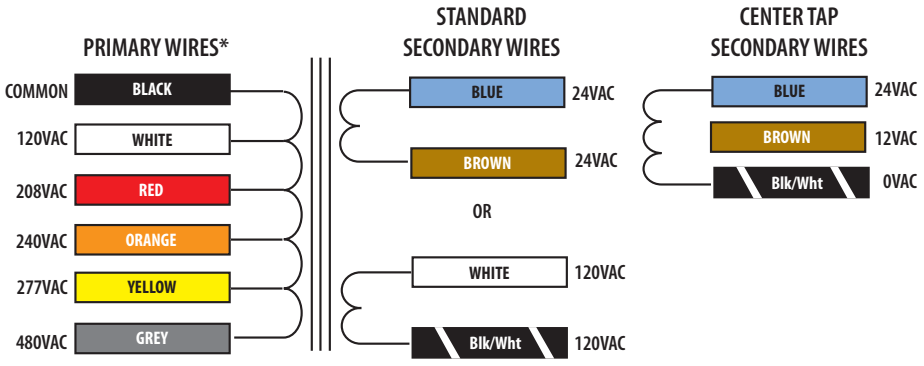
- Controller power
- Switching relays and other digital I/O circuits
- Powering sensors

DIMENSIONAL DRAWINGS



** See ordering table for dimensions.*

WIRE COLORS



**Primary of 24V isolation transformers= Red/Red*

SPECIFICATIONS

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

**X085AAA, X375DAC have 14AWG, Secondary wires*

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ORDERING INFORMATION

DIMENSIONS (inches)

MODEL	VA	PRIMARY VOLTAGE (VAC)	SECONDARY VOLTAGE (VAC)	CURRENT LIMITING METHOD	CLASS	MOUNTING	SEPARATED PRIMARY & SECONDARY WIRES	UL	CE	SPECIAL ORDER ONLY *	L	W	H	A	B
STANDARD															
X020AAA	20	120		Inherent	II, III	1HUB+FT		●	●		2.3	1.9	2.6	1.59	1.69
X020ACA		277		Inherent	II, III	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
X020ADB		24		Inherent	General	2HUB+FT	●	●	●		2.3	1.9	2.6	1.59	1.69
X040AAA	40	120		Inherent	II, III	1HUB+FT		●	●		2.7	2.2	2.9	1.98	1.81
X040AAB		120		Inherent	II, III	2HUB+FT	●	●	●		2.7	2.2	2.9	1.98	1.81
X040ACA		277		Inherent	II, III	1HUB+FT		●	●	●	2.7	2.2	2.9	1.98	1.81
X040ADA		24		Inherent	II, III	1HUB+FT		●	●		2.7	2.2	2.9	1.98	1.81
X040AMB		120/208/240/277		Fuse	II, III	2HUB+FT	●	●	●	●	2.7	2.2	2.9	1.98	1.81
X040BNA		120/208/240	24	Fuse	II, III	1HUB+FT		●	●	●	2.7	2.2	2.9	1.98	1.81
X050BAA	50	120		Fuse	II, III	1HUB+FT		●	●		2.8	2.2	2.9	2.06	1.81
X050BAB		120		Fuse	II, III	2HUB+FT	●	●	●		2.8	2.2	2.9	2.06	1.81
X050BCA		277		Fuse	II, III	1HUB+FT		●	●		2.8	2.2	2.9	2.06	1.81
X050BCB		277		Fuse	II, III	2HUB+FT	●	●	●		2.8	2.2	2.9	2.06	1.81
X050BGB		208/240		Fuse	II, III	2HUB+FT	●	●	●	●	2.8	2.2	2.9	2.06	1.81
X050CAA		120		Circuit Breaker	II, III	1HUB+FT		●	●		3.5	2.5	3.1	1.91	2.03
X050CBA		120/240/277/480		Circuit Breaker	II, III	1HUB+FT		●	●		3.5	2.5	3.1	1.91	2.03
X050CBB		120/240/277/480		Circuit Breaker	II, III	2HUB+FT	●	●	●		3.5	2.5	3.1	1.91	2.03
X050CCA		277		Circuit Breaker	II, III	1HUB+FT		●	●	●	3.5	2.5	3.1	1.91	2.03
X050CEB		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	●	●	●	●	3.5	4.0	4.0	3.38	3.38
X050CGG		208/240	24	Circuit Breaker	II, III	Plate, 90° Sec	●	●	●	●	4.0	4.0	4.0	3.38	3.38
X050CHA		120/208/240/480		Circuit Breaker	II, III	1HUB+FT		●	●	●	3.5	2.5	3.1	1.91	2.03
X050CHB		120/208/240/480		Circuit Breaker	II, III	2HUB+FT	●	●	●	●	3.5	2.5	3.1	1.91	2.03
X050CNA		120/208/240		Circuit Breaker	II, III	1HUB+FT		●	●	●	3.5	2.5	3.1	1.91	2.03
X050CNB		120/208/240		Circuit Breaker	II, III	2HUB+FT	●	●	●	●	3.5	2.5	3.1	1.91	2.03
X050COA		120/208/240/277/480		Circuit Breaker	II, III	1HUB+FT		●	●	●	3.5	2.5	3.1	1.91	2.03
X050DLB		220		None	II, III	2HUB+FT	●	●	●	●	2.8	2.2	2.9	2.06	1.81
X075CAA	75	120		Circuit Breaker	II, III	1HUB+FT		●	●		3.9	2.5	3.1	2.31	2.03
X075CAB		120		Circuit Breaker	II, III	2HUB+FT	●	●	●		3.9	2.5	3.1	2.31	2.03
X075CBA		120/208/240/480		Circuit Breaker	II, III	1HUB+FT	●	●	●		3.9	2.5	3.1	2.31	2.03
X075CCA		277		Circuit Breaker	II, III	1HUB+FT		●	●		3.9	2.5	3.1	2.31	2.03
X075CHA		120/208/240/480		Circuit Breaker	II, III	1HUB+FT		●	●	●	3.9	2.5	3.1	2.31	2.03
X085AAA	85	120		Inherent	General	1HUB+FT		●	●		3.2	3.8	3.2	2.2	3.14
X100CAA	99	120		Circuit Breaker	II, III	1HUB+FT		●	●		4.1	2.5	3.1	2.51	2.03
X100CAB		120		Circuit Breaker	II, III	2HUB+FT	●	●	●		4.1	2.5	3.1	2.51	2.03
X100CBA		120/240/277/480		Circuit Breaker	II, III	1HUB+FT		●	●		4.3	2.5	3.1	2.70	2.03
X100CBB		120/240/277/480		Circuit Breaker	II, III	2HUB+FT	●	●	●		4.3	2.5	3.1	2.70	2.03
X100CBE		120/208/277/480		Circuit Breaker	II, III	Plate		●	●	●	4.3	4.0	4.0	3.38	3.38
X100CHB		120/208/240/480		Circuit Breaker	II, III	2HUB+FT	●	●	●	●	4.3	2.5	3.1	2.70	2.03
X100CKB		480	120	Circuit Breaker	General	2HUB+FT	●	●	●	●	4.1	2.5	3.1	2.51	2.03
X100CLB		220	24	Circuit Breaker	II, III	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
X175CAB	175	120		None	General	2HUB+FT	●	●	●		4.1	3.8	3.2	3.19	3.14
X175CLB		220		None	General	Foot	●	●	●	●	3.8	3.8	3.2	3.05	3.14
X175DGC		208/240		None	General	Foot	●	●	●		4.1	3.8	3.2	3.19	3.14
X240DAA	240	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	II, III	Foot	●	●	●	●	2.3	1.9	2.6	1.59	1.69
X020AQC		120/208/240		Inherent	II, III	Foot	●	●	●	●	2.3	1.9	2.6	1.59	1.69
X040BPC	40	24		Fuse	II, III	Foot	●	●	●	●	2.7	2.2	2.9	1.98	1.81
X040BQC		120/208/240		Fuse	II, III	Foot	●	●	●	●	2.7	2.2	2.9	1.98	1.81
X050CIA	50	120		Circuit Breaker	II, III	1HUB+FT	●	●	●	●	2.8	2.2	2.9	2.06	1.81
X100CRC	100	120/240		Circuit Breaker	II, III	1HUB+FT	●	●	●	●	4.3	2.5	3.1	2.70	2.03

** Special orders are not kept in stock, and may require some additional lead time. Call the factory for more details.*

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POWERS

BUILDING HVAC, CONTROLS, & SERVICE

Independent field office for
Siemens Building Technologies

PROJECT #25CNEB0017

For information contact:
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VFD Submittal
For Control Systems For:

DIRECT DIGITAL CONTROL SYSTEM FOR HVAC

REHABILITATE MAURICE BATHHOUSE

HOT SPRINGS, AR

Mechanical Contractor:
COMFORT SYSTEMS USA

OCTOEBER 6, 2025

5440 Northshore Drive – North Little Rock, Arkansas 72118 – Tel: 501.374.5420 Fax: 501.370.9298

YASKAWA

Submittal Schedule Details

Details, Features and Reference Drawings	H6CPD024	H6CPD016	H6CPD010	H6CPD003
TAG(s)	CWP-1,AHU-1M SF1, AHU-1M SF2,AHU-1M SF3, AHU-1M SF4	HWP-1,HWP-2,AHU-3M	AHU-2M SF1,AHU-2M SF2, AHU-2M SF3,AHU-2M SF4	RF-M1
Horsepower (HP)	7.5	5.0	3.0	0.75
Voltage (V)	208	208	208	208
Amperage (A)	24.2	16.7	10.6	3.5
Quantity	5	3	4	1
Enclosure	UL Type 1	UL Type 1	UL Type 1	UL Type 1
Input Impedance (%)	5	5	5	5
Input Disconnect Switch	✔	✔	✔	✔
SCCR (kA)	100*	100*	100*	100*
Dimensions (H" x W" x D")	36.60 x 6.30 x 13.90	33.00 x 6.30 x 13.90	33.00 x 6.30 x 13.90	33.00 x 6.30 x 13.90
Weight (lbs)	47.0	41.0	41.0	41.0
Specification	**SG.H6CPQW.10**	**SG.H6CPQW.10**	**SG.H6CPQW.10**	**SG.H6CPQW.10**
Print Size	8.5" x 11.0"	8.5" x 11.0"	8.5" x 11.0"	8.5" x 11.0"
Submittal Page	5	5	5	5
Electrical Schematic	**DS.H6CP.01**	**DS.H6CP.01**	**DS.H6CP.01**	**DS.H6CP.01**
Print Size	17.0" x 11.0"	17.0" x 11.0"	17.0" x 11.0"	17.0" x 11.0"
Submittal Page	12	12	12	12
Wiring Requirements	**UDE00573**	**UDE00573**	**UDE00573**	**UDE00573**
Print Size	11.0" x 17.0"	11.0" x 17.0"	11.0" x 17.0"	11.0" x 17.0"
Submittal Page	13	13	13	13
Outline Drawing	**DD.HC.1.W2.01**	**DD.HC.1.W1.01**	**DD.HC.1.W1.01**	**DD.HC.1.W1.01**
Print Size	8.5" x 11.0"	8.5" x 11.0"	8.5" x 11.0"	8.5" x 11.0"
Submittal Page	14	15	15	15

*** Capable of the specified symmetrical amperes shown in the SCCR field with sufficient branch circuit short circuit protection installed as specified by applicable codes.**

YASKAWA

Submittal Schedule Details

Details, Features and Reference Drawings	H6CPD002
TAG(s)	RF-M2
Horsepower (HP)	0.50
Voltage (V)	208
Amperage (A)	2.4
Quantity	1
Enclosure	UL Type 1
Input Impedance (%)	5
Input Disconnect Switch	✔
SCCR (kA)	100*
Dimensions (H" x W" x D")	33.00 x 6.30 x 13.90
Weight (lbs)	41.0
Specification	**SG.H6CPQW.10**
Print Size	8.5" x 11.0"
Submittal Page	5
Electrical Schematic	**DS.H6CP.01**
Print Size	17.0" x 11.0"
Submittal Page	12
Wiring Requirements	**UDE00573**
Print Size	11.0" x 17.0"
Submittal Page	13
Outline Drawing	**DD.HC.1.W1.01**
Print Size	8.5" x 11.0"
Submittal Page	15

*** Capable of the specified symmetrical amperes shown in the SCCR field with sufficient branch circuit short circuit protection installed as specified by applicable codes.**

YASKAWA

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Outline Drawing: DD.HC.1.W1.01 _____ Page 15

Variable Frequency Drive (VFD)

HV600 Mechanical Specification Submittal

For Narrow Configured UL Type 1 Rated (H6CP) Packages

GENERAL

The HV600 is a high performance PWM (pulse-width-modulated) AC drive. Three-phase input line power is converted to a sine-coded, variable frequency output, which provides optimum speed control of any conventional squirrel cage induction motor. The use of IGBTs (Insulated Gate Bipolar Transistors), with a carrier frequency range of 2 kHz to 12.5 kHz, permits quiet motor operation.

This drive has one control logic board for all horsepower ratings. Printed circuit boards employ surface-mount technology, providing both high reliability, and small physical size of the printed circuit assemblies. The microprocessor delivers the computing power necessary for complete three-phase motor control in building automation systems.

Operating Principle: Input three-phase AC line voltage is first rectified to a fixed DC voltage. Using pulse width modulation (PWM) inverter technology, the DC voltage is processed to produce an output waveform in a series of variable-width pulses. Unique firmware algorithms optimize motor magnetization through control of voltage, current, and frequency applied to generate a nearly sinusoidal output waveform.

STANDARDS

UL 508A (Industrial Control Panels)
BTL Listed
UL, cUL listed
CBC, IBC, ASCE7, ICC-ES 156
HCAI (OSHPD)

ENVIRONMENTAL & SERVICE CONDITIONS

Ambient service temperature: Narrow Configured UL Type 1: -10°C to 40°C

Ambient storage temperature: Narrow Configured UL Type 1: -20°C to 70°C

Humidity: 0% to 95%, non-condensing

Altitude: to 1,000 meters (3,300 feet); higher by derating

Service factor: 1.0

RoHS 2 Compliant

QUALITY ASSURANCE

In-circuit testing of all printed circuit boards is conducted to ensure proper manufacturing.

Final printed circuit board assemblies are functionally tested via computerized test equipment.

All fully assembled controls are computer tested with induction motor loads to assure unit specifications are met.

The average MTBF (Mean Time Between Failure) is 28 years.

CONSTRUCTION

VFD power input stage converts three-phase AC line power into a fixed DC voltage via a solid-state full-wave diode rectifier with MOV (Metal Oxide Varistor) surge protection. An internal 5% split choke built in both positive and negative DC bus reduces harmonics for cleaner power.

Intermediate Section of the VFD - DC bus maintains a fixed DC voltage with filtering and short circuit protection as a DC supply to the VFD output section. It is interfaced with the VFD diagnostic logic circuit to continuously monitor and protect the power components.

Output Section of the VFD - Insulated Gate Bipolar Transistors (IGBTs) convert DC bus voltage to a variable frequency and voltage, utilizing a PWM sine-coded output to the motor. Motor noise at 60 Hz is less than 2 dB above the motor noise from across-the-line operation when measured at a distance of one meter.

POWER AND CONTROL ELECTRONIC HOUSINGS

UL Type 1 Narrow Configured enclosure: 208 V, 0.5 thru 40 HP; 480 V, 0.75 thru 75 HP

Microprocessor-based control circuit

Non-volatile memory (EEPROM); all programming memory is saved when the VFD is disconnected from power.

Digital operator keypad and display provide local control and readout capability:

- Hand/Off/Auto commands
- Speed Reference command
- Reset command

Easy to remove heat sink cooling fan with programmable on/off control

USB mini-B port for quick and easy PC connection

PROTECTION

Output current overload rating of 110% for 60 seconds, 140% for 2 seconds, 175% instantaneous

Output short circuit protection

Current limited stall prevention (overload trip prevention) during acceleration, deceleration, and run conditions

Optically isolated operator controls

Fault display

“Hunting” prevention logic

Electronic ground fault protection

Electronic motor overload relay protects the motor while in operation

Motor current display as well as verification that the motor is running

Proof of flow/loss of flow detection

DC bus charge indication

Heatsink overtemperature protection

Cooling fan operating hours recorded

Input/output phase loss protection

Line voltage sensors to monitor for brownout and blackout conditions with adjustable fault levels to ensure the proper settings pursuant to each application.

Reverse prohibit selectability

Short circuit withstand rating of 100 kA RMS with customer provided branch circuit protection.

Two emergency override modes (across-the-line or speed selectable via the drive)

OPERATION

Output frequency and speed display can be programmed for other speed-related and control indications, including: RPM, CFM, GPM, PSI, in WC, % of maximum RPM, or custom.

Power loss ride-through (2 seconds capable)

Time delay on start; peak avoidance for smooth generator switchover

VFD accepts either a direct acting or a reverse acting speed command signal.

Bi-directional “Speed Search” capability to start into a rotating load. Two types: current detection and residual voltage detection

DC injection braking, to prevent fan “windmilling”

Remote Run/Stop command input

Eight programmable HVAC specific application presets

Over 100 programmable functions, resettable to factory HVAC presets

User parameter initialization to re-establish project specific parameters

Ramp-to-stop or coast-to-stop selection

Auto restart capability: 0 to 10 attempts with adjustable delay time between attempts

One custom selectable Volts/Hertz pattern and multiple preset Volts/Hertz patterns

Auto speed reference input signal, adjustable for bias and gain

While the VFD is running, operational changes in control and display functions are possible, including:

Acceleration time (0 to 6000 seconds)
Deceleration time (0 to 6000 seconds)
Frequency reference command
Hand/Off/Auto commands
Monitor display
Removable digital operator

Automatic energy saving, reduced voltage operation

PRODUCT FEATURES

Displacement power factor of .98 throughout the motor speed range

Internal EMI/RFI filter complies with EN 61800-3

Built-In real time clock for time and date stamping events along with timer functions for starting, stopping and speed changes without the need for external controls

Voltmeter, ammeter, kilowatt meter, elapsed run time meter, and heatsink temperature monitoring functions

Two internal (PI) controls

Drive internal PI closed-loop control with selectable engineering units

Independent PI control for use with external device

Differential PID feedback feature

Sleep function in both closed loop and open loop control

Feedback signal low pass filter

Feedback signal loss detection and selectable response strategy

Feedback signal inverse and square root capability

24 VDC, 150 mA transmitter power supply

Seven programmable multi-function input terminals (24 VDC) providing 60+ programmable features, including:

Customer Safeties
BAS / Damper Interlock
Emergency Override – BAS interlock mode, min/max
speed setting, 16 preset speeds, and more
Preset Speed
PI control enable / disable

One Dedicated Fault Form C relay (30 VDC/250 VAC, 2 Amp), and 3 programmable Form A relays for: “Motor Run,” “Damper Actuator,” “Auto Transfer,” “Drive Run,” “Hand Mode,” “Auto Mode,” “System Fault,” ”Serial Com Run,” and numerous other options.

Two programmable 0 to 10 VDC or 4-20 ma analog outputs, proportional to drive monitor functions including output frequency, output current, output power, PI feedback, output voltage and others

Remote speed reference (speed command) signal:

0 to 10 VDC (20 kΩ)
4 to 20 mA DC (250 Ω)

Nine preset speeds

Input and output terminal status indication

Diagnostic fault indication

VFD efficiency: 96% at half-speed; 98% at full-speed

“S-curve” soft start / soft stop capability

Run/Fault output contacts

Serial communication loss detection and selectable response strategy

“Up/Down” floating point control capability

Output Frequency 0 to 400 Hz

Controlled speed range of 40:1

Critical frequency rejection capability: three selectable, adjustable bandwidths

140% starting torque capability, available from 3 Hz to 60 Hz

Adjustable carrier frequency, from 2 kHz to 12.5 kHz

Analog/Digital Virtual I/O – internally sends an output to an input (no wiring needed)

Dynamic noise control for quiet motor operation

Programmable security code

Cloud service (Yaskawa Drive Cloud) for product registration and parameter storage

Store up to four additional parameter sets in keypad

Integrated PLC (DriveWorks EZ)

Rotational as well as Stationary motor auto-tuning

“Kinetic Energy Braking” (KEB) function stops the motor in up to half the time it would take without this function.

Control Methods Include:
- V/F Control
- Enhanced PM Motor control
- SynRM Motor Control

Motor Types:
- Induction
- Permanent Magnet
- Synchronous Reluctance

Temperature controlled fan

LCD keypad with Hand/Off/Auto and Copy keypad functions.

Motor preheat function

Self-regulating lead/lag control for multiple drives (up to 4)

Drive/motor alternation control (share motor run time for lead drive/motor)

Up to four PID setpoints

Draw down level selection for PID setpoint

Anti-no-flow control for deadhead protection

Pre-charge pump functionality

Low city alarm digital input

State/de-state control – add/remove drive based on feedback or output frequency

Single phase foldback

Flash upgradeable firmware

Heatsink overtemperature speed fold-back feature

“Bumpless” transfer between Hand and Auto modes

Emergency override can be used as “smoke purge” function

Fan failure detection and selectable drive action

Programming and firmware upgrade without three-phase main power DriveWizard Mobile

Programming Application

LED Status Ring

Conformal coating (IEC 60721-3-3, UL TYPE 1: 3C2, 3S2)

Complete narrow configured package is factory assembled.

Input disconnect switch with a lockable, through-the-door operating mechanism

BACnet, Siemens APOGEE FLN, Metasys N2, and Modbus RTU communication protocols as standard, with the ability to configure controller parameters, view controller monitors, control I/O, clear faults, and view controller status. EtherNet/IP, Modbus TCP/IP and LonWorks are optionally available.

BACnet Health monitors including Net Health, Tokens Received/Transmitted, Messages Received/Transmitted, Next/Previous Node Address, Max/Min Master Found, number of Nodes on Network, COV, MSTP Loop Time, CRC Errors, MSTP Tokens Lost/Retry, Deadtime Average.

Door mounted control keypad with LCD display for “Control Power,” “Drive Ready,” “Drive Run,” “Drive Selected,” “Drive Fault,” “Drive Test,” “Motor OL”, ”Safety Open” “BAS Interlock,” “Auto Run”, Auto Transfer,” “Emergency Override,” “Hand Mode,” “Off Mode”, and “Auto Mode.”

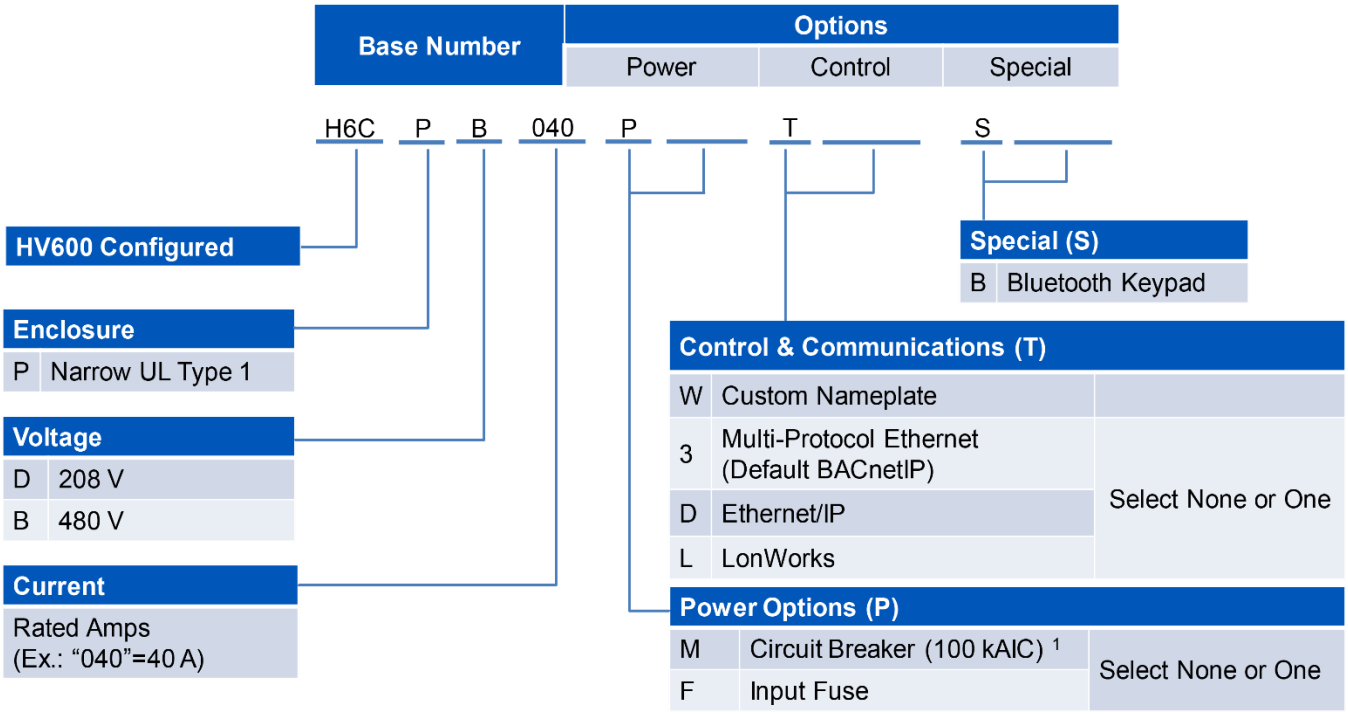
Damper control circuit with end-of-travel feedback capability including two adjustable wait time functions. One is a run delay time, where the drive will operate at a preset speed before the damper opens to pressurize the system. The other time function is an interlock wait time, so if the damper has not fully opened within the specified time, a fault will be declared.

Selectable energy savings and harmonic reduction mode.

Model Number Configuration (H6CP)

Step 1. Complete the Base Number for the voltage and current rating.

Step 2. Add the Option Code letter for each required option. If an option is not wanted, no character is inserted in that position.



ENCLOSURE TYPE

[P] UL Type 1 Narrow Configured Enclosure

VOLTAGE

[D] 208 volt model for nominal, 200 or 208 VAC (+10/-15%); 60 or 50 Hz (+/-5%) systems

[B] 480 volt model for nominal, 380, 400, 415, 440, 460 or 480 VAC (+10/-15 %); 60 or 50 Hz (+/-5%) systems

[P] POWER OPTIONS

MAIN INPUT DISCONNECT *(Default)*

Input disconnect switch with a lockable, through-the-door operating mechanism, no branch short circuit protection.

[P] POWER OPTIONS (Continued)

[M] Circuit Breaker Option is a 100 kAIC rated circuit breaker with fuses. When option (M) is specified, the configured drive package will be rated at 100 kAIC. *(Replaces default input disconnect)*

[F] Drive Input fusing is available as a selection when the Circuit Breaker option is not already being used. Use this selection when drive input fusing is desired with the default input disconnect switch.

[T] CONTROL & COMMUNICATION OPTIONS

[W] Engraved nameplate

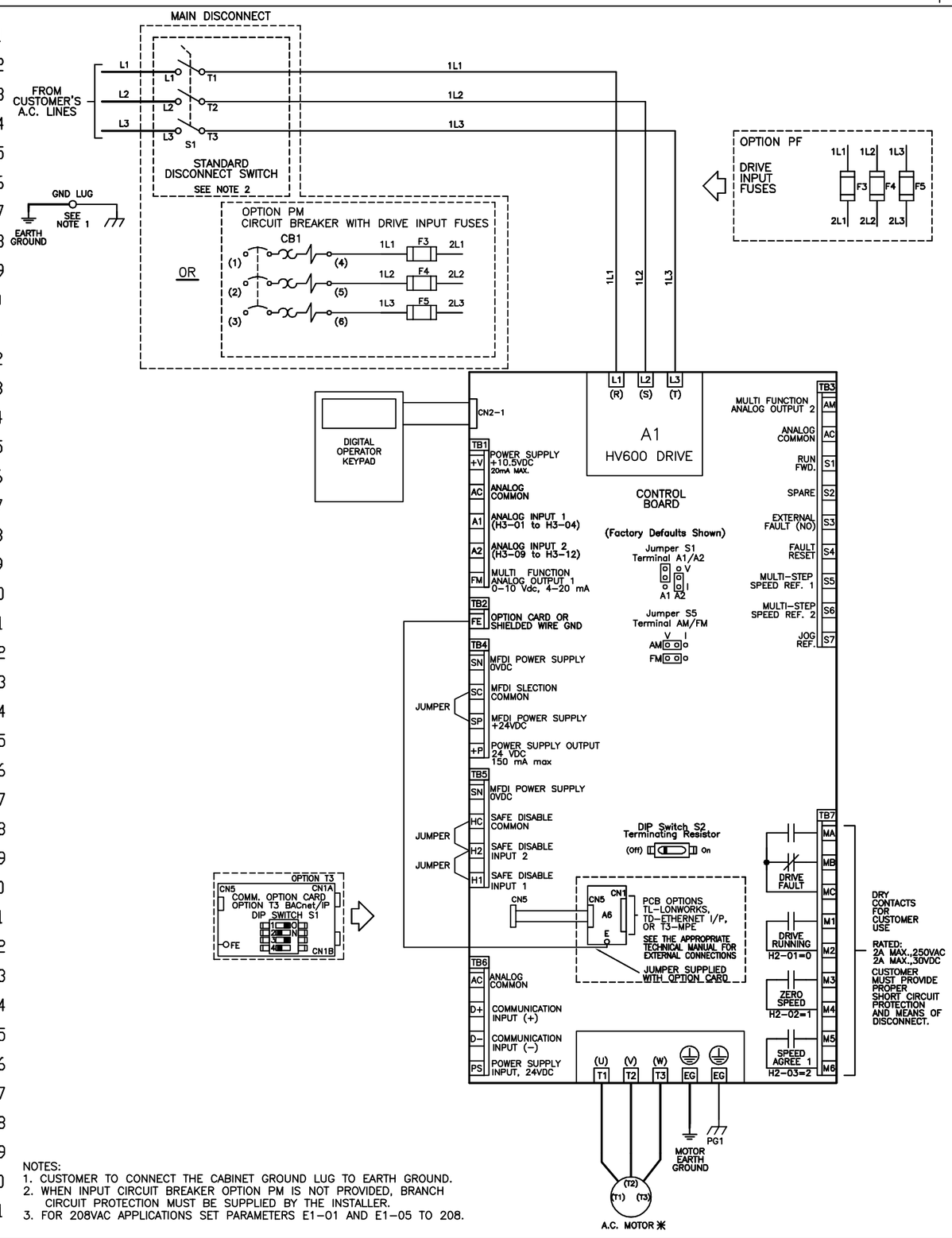
[3] Multi-Protocol Ethernet (Default BACnetIP)

[D] Ethernet/IP

[L] LonWorks

[S] Special

[B] Bluetooth Keypad



NOTES:
1. CUSTOMER TO CONNECT THE CABINET GROUND LUG TO EARTH GROUND.
2. WHEN INPUT CIRCUIT BREAKER OPTION PM IS NOT PROVIDED, BRANCH CIRCUIT PROTECTION MUST BE SUPPLIED BY THE INSTALLER.
3. FOR 208VAC APPLICATIONS SET PARAMETERS E1-01 AND E1-05 TO 208.

✳ – INDICATES COMPONENTS NOT SUPPLIED BY YASKAWA.
—— – INDICATES CUSTOMER WIRING.
SEE DRAWING UDE00573 FOR CUSTOMER CONNECTION TABLES.

REVISIONS				
REV.	DESCRIPTION	ECO #	DRAWN BY	DATE
02	ADDED T3 OPTION	12564	RJJ	9/2/22
01	CHANGED CN2-2 TO CN2-1 ON A1 CONTROL BOARD	10374	EAA	3/9/20

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DRAWN BY:	E. ACKERMAN	DATE	5/29/18
CHECKED:	R. JENSEN	DATE	1/27/20
TECH:		DATE	
APPROVED:	R. JENSEN	DATE	1/27/20
ORIGINAL DESIGN:	E. ACKERMAN	DATE	5/29/18

TITLE: SCHEMATIC DIAGRAM HV600 NARROW CONFIGURED

SIZE	REVISION	PAGE
D	02	1 of 1

DRAWING #: DS.H6CP.01

CUSTOMER WIRING REQUIREMENTS

• FOR 0 TO 100 AMPS, USE A MINIMUM OF 60 °C - 75 °C COPPER WIRE. (USE COPPER CONDUCTORS ONLY)

• FOR ABOVE 100 AMPS, USE A MINIMUM OF 75 °C COPPER WIRE. (USE COPPER CONDUCTORS ONLY)

TABLE 1		A.C. LINE WIRING							
HV600 NARROW CONFIGURED MODEL NO. BASE NUMBER H6CPXXXX		WITH OPTION PM CIRCUIT BREAKER CB1				STANDARD NON-FUSED INPUT DISCONNECT SWITCH S1			
208V	480V	MFG. PART NUMBER	CURRENT RATING (AMPS)	WIRE SIZE RANGE (AWG)	TIGHTENING TORQUE (LB.-IN.)	MFG. PART NUMBER	CURRENT RATING (AMPS)	WIRE SIZE RANGE (AWG)	TIGHTENING TORQUE (LB.-IN.)
D002	B001	HLL36015	15	14 - 10 OR 8 - 3/0	50 OR 120	OT30F3	30	14 - 4	55
D003	B002								
D004	B003								
D006	B004								
D007	B007								
	B011								
D010		HLL36020	20						
D016	B014	HLL36025	25						
D024	B021	HLL36030	30						
	B027	HLL36040	40			OT60F3	60		
D030	B034	HLL36050	50						
D046	B040								
	B052	HLL36080	80			OT100F3	100	8 - 1/0	55
D059	B065	HLL36110	110						
D074	B077								
D088		HLL36150	150						
	B096					OT200U12	200	4 - 300	275
D114									

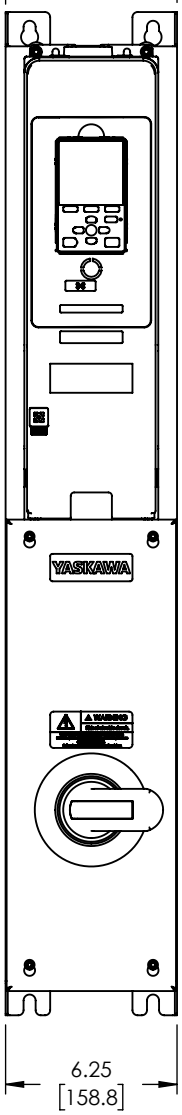
TABLE 2		A.C. MOTOR WIRING				EARTH GROUND WIRING		CONTROL WIRING			
HV600 NARROW CONFIGURED MODEL NO. BASE NUMBER H6CPXXXX		A1 DRIVE TERMINALS (T1,T2,T3)		A1 DRIVE TERMINALS (GND)		GROUND LUG		A1 TERMINAL BLOCKS TB1,TB3-TB7		A1 TERMINAL BLOCK TB2 (FE)	
208V	480V	WIRE SIZE RANGE (AWG)	TIGHTENING TORQUE (LB.-IN.)	WIRE SIZE RANGE (AWG)	TIGHTENING TORQUE (LB.-IN.)	WIRE SIZE RANGE (AWG)	TIGHTENING TORQUE (LB.-IN.)	WIRE SIZE RANGE (AWG)	TIGHTENING TORQUE (LB.-IN.)	WIRE SIZE RANGE (AWG)	TIGHTENING TORQUE (LB.-IN.)
D002	B001	CUSTOMER TO WIRE PER THE AC DRIVE TECHNICAL MANUAL. USE 75 °C COPPER WIRE ONLY		CUSTOMER TO SUPPLY A UL LISTED CLOSED-LOOP CONNECTOR, PER THE AC DRIVE TECHNICAL MANUAL USE 75 °C COPPER WIRE ONLY		14 - 10 OR 8 OR 6 - 4 OR 2	35 OR 40 OR 45 OR 50	24 - 16	4.4 - 5.3	24 - 16	8.85 - 10.62
D003	B002										
D004	B003										
D006	B004										
D007	B007										
D010	B011										
D016	B014										
D024	B021										
D030	B027										
D046	B034										
D059	B040										
	B052										
	B065										
D074	B077	CUSTOMER TO SUPPLY A UL LISTED CLOSED-LOOP CONNECTOR, PER THE AC DRIVE TECHNICAL MANUAL USE 75 °C COPPER WIRE ONLY									
D088											
	B096										
D114											

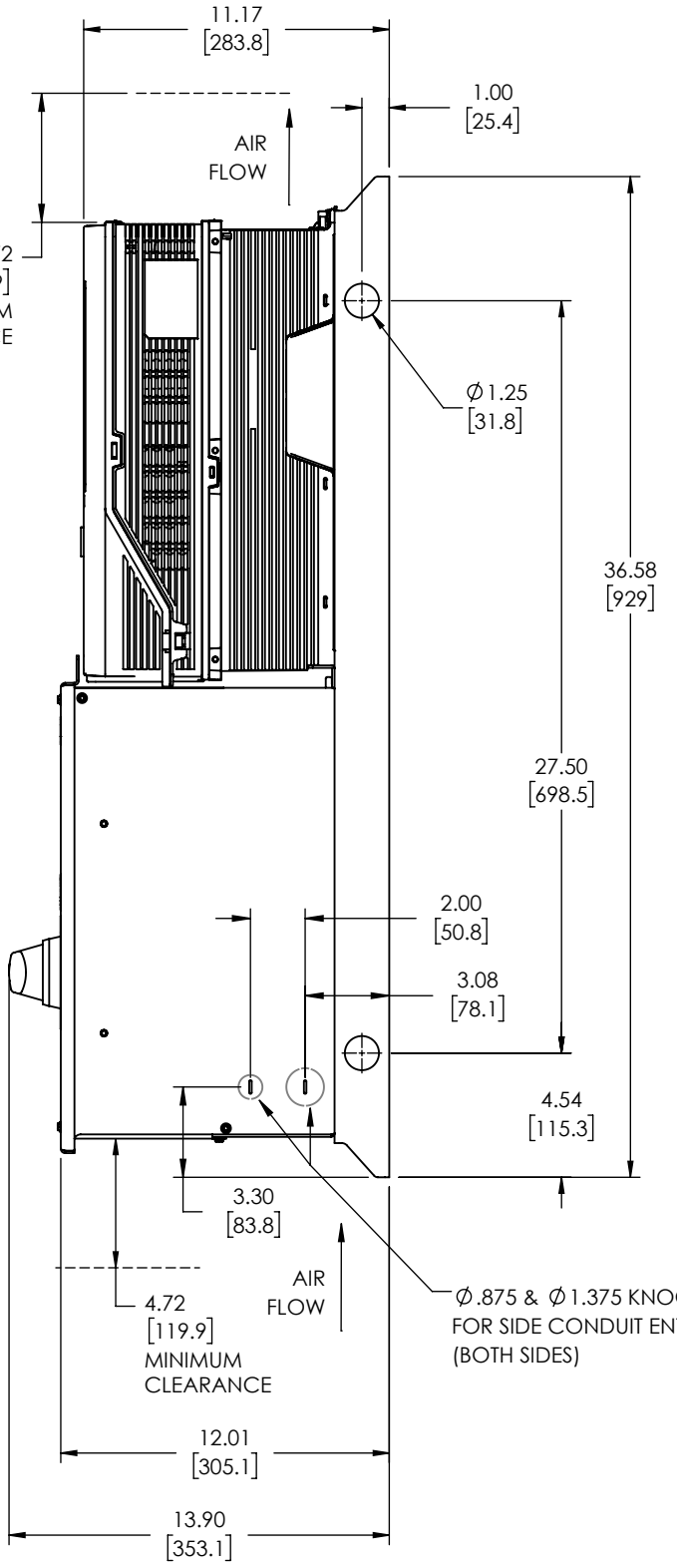
REVISIONS				
REV.	DESCRIPTION	ECO #	DRAWN BY	DATE
00	INITIAL RELEASE	-	EAA	02/03/20

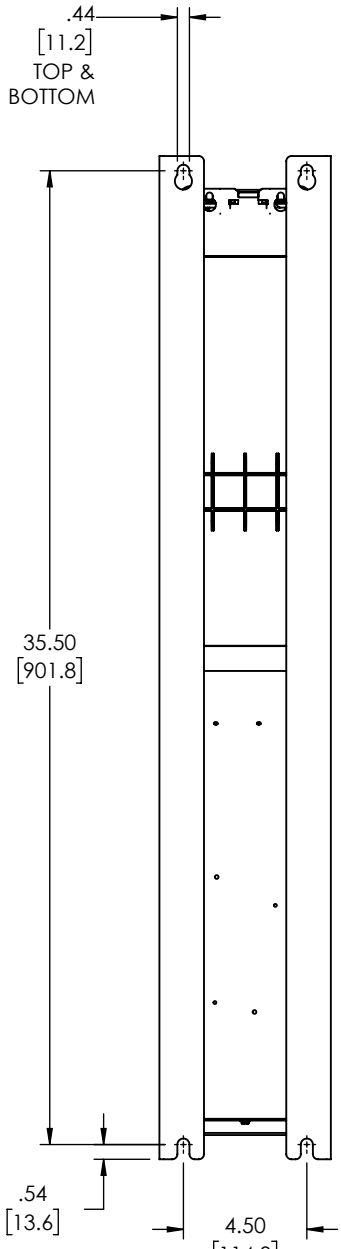
YASKAWA

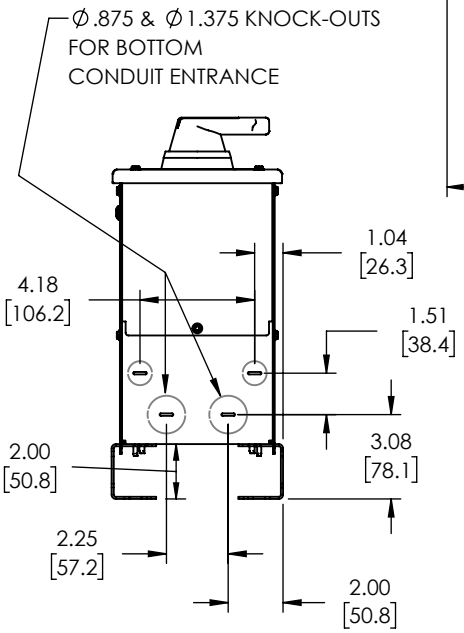
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DRAWN BY: E. ACKERMAN	DATE: 5/13/18	TITLE: CUSTOMER CONNECTION HV600 CONFIGURED NARROW TYPE 1
CHECKED: R. JENSEN	DATE: 2/3/20	
TECH:	DATE:	
APPROVED: R. JENSEN	DATE: 2/3/20	SIZE: C / REVISION: 00 / PAGE: 1 of 1
ORIGINAL DESIGN: E. ACKERMAN	DATE: 5/13/18	DRAWING #: UDE00573









NOTES:

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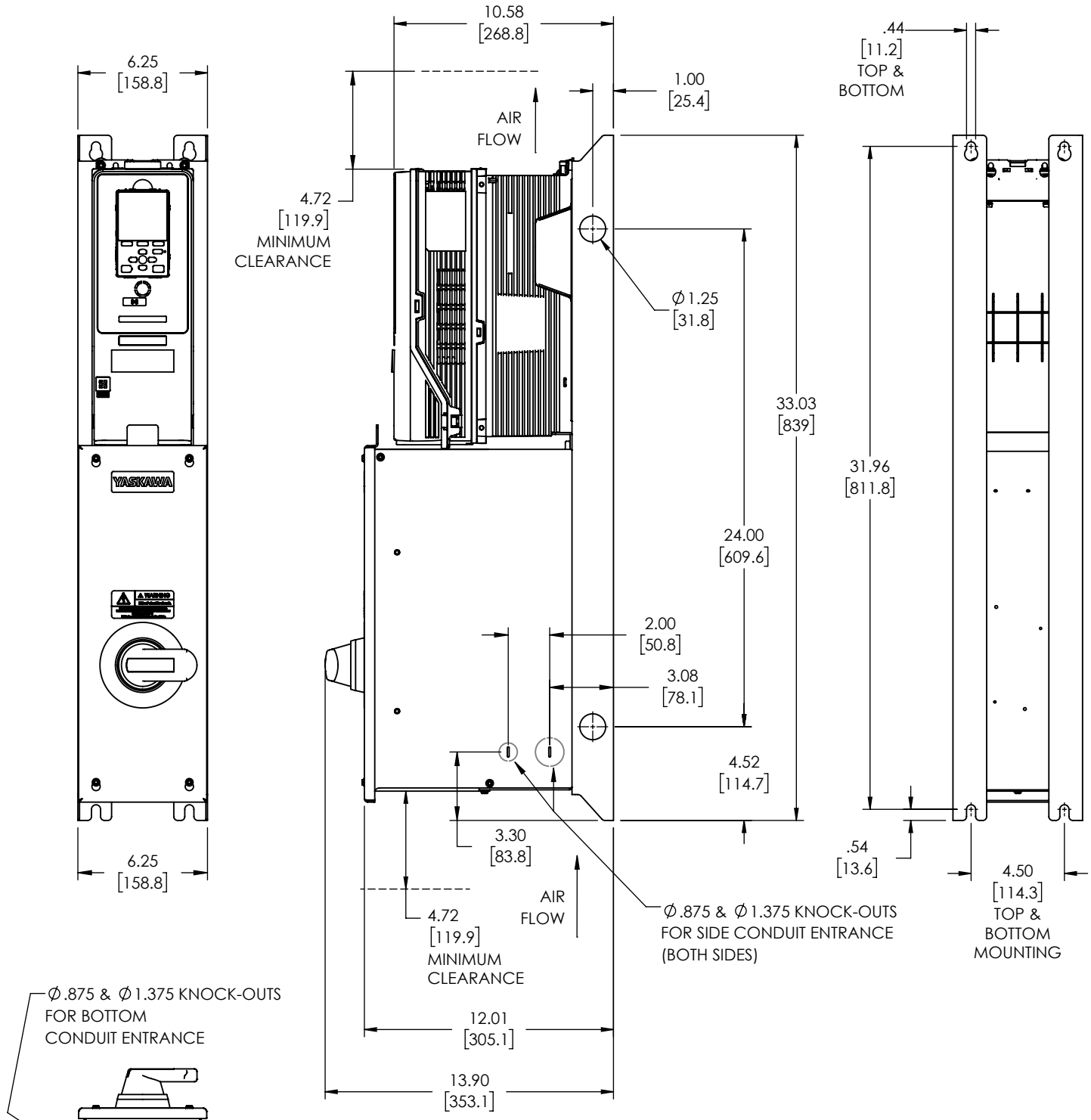
B. DIMENSIONS ARE IN INCHES[MILLIMETERS].

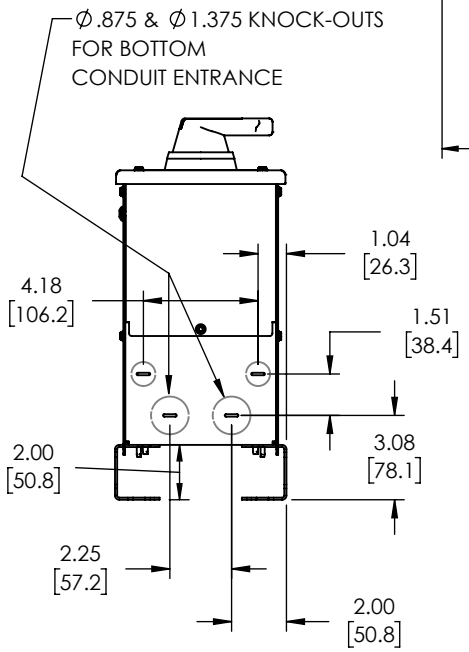
C. USE APPROPRIATE TYPE RATED HUBS OR FITTINGS TO MAINTAIN ENCLOSURE RATING.

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ORIGINAL DESIGN: **D. Dahlman**	DATE: **08/21/2018**	TITLE: **DIMENSION DRAWING, HV600, O/U, CONFIG, W2**	
DRAWN: **D. Dahlman**	DATE: **01/22/2020**		
CHECKED: **D. Guckenberger**	DATE: **01/23/2020**	SIZE: **A**	REVISION: **00** / PAGE: **1** OF **1**
APPROVED: **K. Flierl**	DATE: **01/30/2020**	DRAWING #: **DD.HC.1.W2.01**	
UNITS: **INCHES**	SCALE: **NONE**		





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ORIGINAL DESIGN: **D. Dahlman**	DATE: **08/21/2018**	TITLE: **DIMENSION DRAWING, HV600, O/U, CONFIG, W1**	
DRAWN: **D. Dahlman**	DATE: **01/22/2020**		
CHECKED: **D. Guckenberger**	DATE: **01/23/2020**	SIZE: **A**	REVISION: **00** / PAGE: **1** OF **1**
APPROVED: **K. Flierl**	DATE: **01/30/2020**	DRAWING #: **DD.HC.1.W1.01**	
UNITS: **INCHES**	SCALE: **NONE**		

MAURICE BATHHOUSE CONTROLS

HOT SPRINGS, AR

ENGINEERING FIRM:
IMEG CORP

MECHANICAL CONTRACTOR:
COMFORT SYSTEMS USA

POWERS
BUILDING HVAC, CONTROLS, & SERVICE

REVISION HISTORY

1	10/6/2025	MAP	SUBMITTAL

SIEMENS

POWERS OF ARKANSAS

5440 NORTHSHORE DR
N. LITTLE ROCK, AR 72118

PHONE:
FAX:

MAURICE BATHHOUSE CONTROLS
HOT SPRINGS, AR

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
MAP	MAP	JAD	10/03/25	10/06/25

Cover Sheet

25CNEB0017
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DWG	DESCRIPTION
	GENERAL
	Cover Sheet
000	Riser Diagram
LEG	Legend & Abbreviations
	VALVE SUBMITTAL
	Valve Submittal
	VFD SUBMITTAL
	VFD Submittal
	CONTROL DRAWINGS
001	CHILL WATER SYSTEM
003	HOT WATER SYSTEM
006	CHW & HW PANEL
011	AHU-M1 & M2 SYSTEM
014	AHU-M1 & M2 SYSTEM SAFETY
015	AHU-M1&M2 PANELS
024	AHU-M3 SYSTEM
027	AHU-M3 PANEL
028	AHU-M3 SYSTEM SAFETY
032	VAV HW RH VAV
034	VAV HW RH VAV + RAD HT & CO2
036	VAV HW RH VAV + OCC

DWG	DESCRIPTION
	CONTROL DRAWINGS
038	FAN COIL UNITS SYSTEM
040	DEHUM UNITS SYSTEM
041	UNIT HEATERS
043	EXHAUST FANS
045	GLYCOL SYSTEM
	DDC PANEL LAYOUTS
007	CHW HW PXM
008	CHW-HW.PXMp002
009	CHW-HW.PXMp003
010	CHW-HW.PXMp004
016	BLN Device1
017	AHU-1M.PXMp002
018	AHU-1M.PXMp003
019	AHU-1M.PXMp004
020	AHU-2M
021	AHU-2M.PXMp002
022	AHU-2M.PXMp003
023	AHU-2M.PXMp004
029	AHU-3M PXM
030	AHU-3M.PXMp002
031	AHU-3M.PXMp003

REVISION HISTORY

SIEMENS

POWERS OF ARKANSAS

5440 NORTHSHORE DR
N. LITTLE ROCK, AR 72118

PHONE:
FAX:

MAURICE BATHHOUSE CONTROLS
HOT SPRINGS, AR

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
MAP	MAP	JAD		10/06/25

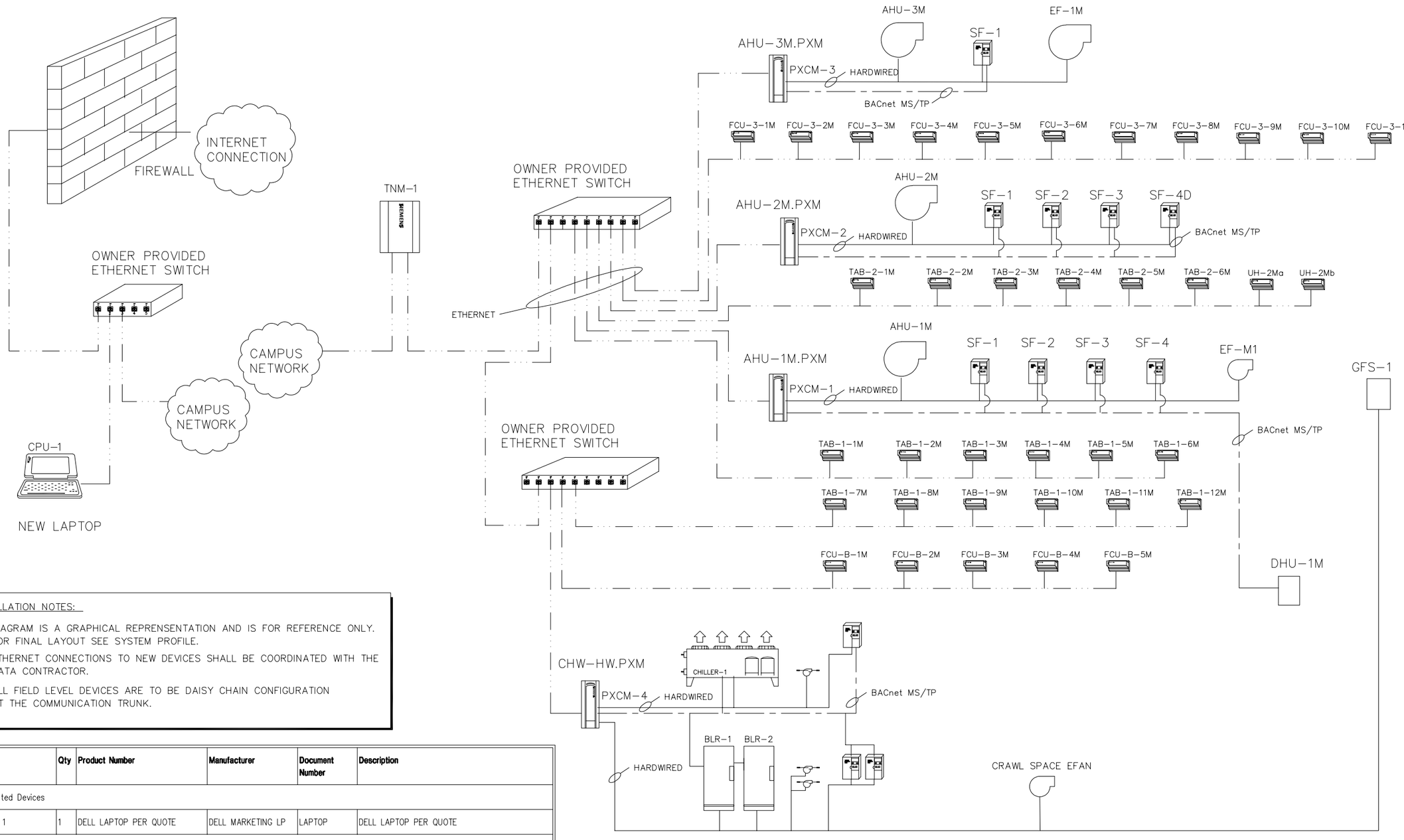
Table of Contents

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TOCA

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INSTALLATION NOTES:

1. DIAGRAM IS A GRAPHICAL REPRENSENTATION AND IS FOR REFERENCE ONLY. FOR FINAL LAYOUT SEE SYSTEM PROFILE.
2. ETHERNET CONNECTIONS TO NEW DEVICES SHALL BE COORDINATED WITH THE DATA CONTRACTOR.
3. ALL FIELD LEVEL DEVICES ARE TO BE DAISY CHAIN CONFIGURATION AT THE COMMUNICATION TRUNK.

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
CPU 1	1	DELL LAPTOP PER QUOTE	DELL MARKETING LP	LAPTOP	DELL LAPTOP PER QUOTE
Panel Mounted Devices					
TNM 1	1	SLX–9000	SIEMENS INDUSTRY, IN	SLX9000	SLX–9000 Controller
	1	SMA–9100–1YR	SIEMENS INDUSTRY, IN	N/A	SMA–9100–1YR SW Maintenance
	1	NC–9100	SIEMENS INDUSTRY, IN	N/A	NC–9100 Core License – 100 Device

1
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RISER DIAGRAM

REVISION HISTORY

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POWERS OF ARKANSAS

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N. LITTLE ROCK, AR 72118

PHONE:
FAX:

MAURICE BATHHOUSE CONTROLS
HOT SPRINGS, AR

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
MAP	MAP	JAD	10/03/25	10/06/25

Riser Diagram

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CONTROL SYMBOL	CONTROL SYMBOL DESCRIPTION
AC	AIR COMPRESSOR
AD	AIR DRYER
ADXR	ACTUATOR DXR
AE	ACTUATOR ELECTRIC
AEM	APOGEE ETHERNET MICROSERVER
AF	AIR FILTER
AFS	AIR FLOW STATION
AOP	ANALOG OUTPUT, PNEUMATIC
AP	ACTUATOR PNEUMATIC
APS	AUX. POWER SUPPLY
AT	AUTOMATIC TRAP
ATD	AUTO TANK DRAIN
ATEC	ACTUATOR TEC
AZM	AUTOZERO MODULE
BCU	BUS COUPLING UNIT
BELL	BELL
BIM	BUS INTERFACE MODULE
BOIL	BOILER
BRT	BRIGHTNESS
BRTT	BRIGHTNESS AND TEMPERATURE
BTN	BUTTON
CBL	CABLES
CKV	CHECK VALVE
CM	CONSTRUCTION MATERIALS
CP	COMPONENT PANEL
CPU	CENTRAL PROCESSING UNIT
CRT	CATHODE RAY TUBE
CS	CURRENT SWITCH
CT	CURRENT TRANSDUCER
CTTE	CO2 TEMP TRANSMITTER ELEC
CVC	CONSTANT VOLUME CONTROLLER
D	DAMPER
DDC	DUAL DUCT CONTROLLER
DEM	DEMAND ENERGY MONITOR
DP	DEW POINT TRANSMITTER
DPR	DIFFERENTIAL PRESS. REGULATOR
DPS	DIFFERENTIAL PRESSURE SWITCH
DPTE	DIFF. PRESS. TRANSMITTER ELEC.
DPTP	DIFFERENTIAL PRESSURE PNEUMATIC
DPU	DIGITAL POINT UNIT
DXR	TERMINAL EQUIPMENT CONTROLLER
EC	ENTHALPY COMPARITOR
EP	ELECTRO-PNEUMATIC VALVE
ES	END SWITCH
ET	ENTHALPY TRANSMITTER
EXP	EXPANSION PANEL
FAN	FAN
FHC	FUME HOOD CONTROLLER
FM	FLOW MTR. (FLOW METER STATION)
FMS	FIRE MGMT. SYSTEM
FS	FLOW SWITCH
FTP	FLOW TRANSMITTER PNEU.
G	GAUGE
GD	GAS DETECTOR
H	HYGROSTATS
HE	HUMIDIFIER ELECTRIC

CONTROL SYMBOL	CONTROL SYMBOL DESCRIPTION
HHC	HAND-HELD OPERATOR'S TERMINAL
HL	HIGH LIMIT
HMI	GAMMA TOUCH PANEL
HOA	HAND-OFF-AUTO SWITCH
HORN	HORN
HPC	HEAT PUMP CONTROLLER
HTD	HIGH TEMPERATURE DETECTOR
HTE	HUMIDITY TRANSMITTER ELECTRIC
HTP	HUMIDITY TRANSMITTER PNEUMATIC
INT	INTERCOM
KWM	ELECTRIC KILOWATT METER
LA	LIGHT ACTUATOR
LC	LIMIT CONTROLLER (LIMITEM)
LLS	LIQUID LEVEL SWITCH
LLT	LIQUID LEVEL TRANS.
LPR	POWER SUPPLY 24VAC/24VDC
LTDE	LOW TEMP. DETECTOR ELECTRIC
LTDP	LOW TEMP. DETECTOR PNEUMATIC
LUI	LOCAL USER INTERFACE
MBC	MODULAR BUILDING CONTROLLER
MDM	MODEM
ME	ELECTRONIC ACTUATOR
MEC	MODULAR EQUIPMENT CONTROLLER
MG	MAGNEHELIC GAUGE
MPU	MULTI-POINT UNIT
MS	MOTOR STARTER
OCC	OCCUPANCY
OCCB	OCCUPANCY AND BRIGHTNESS
OBS	OBSOLETE
ODP	OPERATOR DATA PANEL
P	PUMP
PA	PULSE ACCUMULATOR
PCT	PROGRAMMABLE CLOCK TIMER
PE	PRESSURE ELECTRIC SWITCH
PL	PILOT LIGHT
PM	POWER MONITOR
PNL	PANEL
PPM	POINT PICKUP MODULE
PRC	PRESSURE REG. CONTROLLER
PRV	PRESSURE REDUCING VALVE
PS	POSITIONING SWITCH
PSE	POSITION SENSOR ELECTRIC
PST	PULL STATION
PT	PITOT TUBE
PTE	PRESSURE TRANSMITTER ELECTRIC
PTP	PRESSURE TRANSMITTER PNEUMATIC
PTR	PRINTER
PV	PILOT VALVE
PXCC	PX COMPACT CONTROLLER
PXCM	PXC-MODULAR CONTROLLER
PXG3	BACNET ROUTER ETHERNETIP-MS/TP
RBC	REMOTE BUILDING CONTROLLER
RC	RECEIVER CONTROLLER

CONTROL SYMBOL	CONTROL SYMBOL DESCRIPTION
RCU	REMOTE CONTROL UNIT
RE	RELAY ELECTRIC
RP	RELAY PNEUMATIC
RS	RESTRICTOR
RV	RELIEF VALVE
S/W	SOFTWARE
SA	SHADE ACTUATOR
SC	STEP CONTROLLER
SCU	STAND ALONE CONTROL UNIT
SD	SMOKE DETECTOR
SE	SWITCH ELECTRIC
SIO	SLX IO MODULES
SLX	APOGEE SLX CONTROLLER
SPKR	SPEAKER
SPP	STATIC PRESSURE PROBE
SPR	STATIC PRESSURE REGULATOR
SV	SOLENOID VALVE
SW	SWITCH PNEUMATIC
T	ROOM THERMOSTAT, PNEUMATIC
TBC	TERMINAL BOX CONTROLLER
TC	TEMPERATURE CONTROLLER(S200)
TCU	TERMINAL CONTROL UNIT
TDR	TIME DELAY RELAY
TE	THERMOSTAT, ELECTRIC
TEC	TERMINAL EQUIPMENT CONTROLLER
TH	THERMOMETER
TI	TRUNK INTERFACE
TIE	TRUNK ISOLATOR EXTENDER
TIU	TELCOM INTERFACE UNIT
TMR	TIMER, TIME CLOCK
TTE	TEMPERATURE TRANSMITTER ELECTRIC
TTP	TEMPERATURE TRANSMITTER PNEUMATIC
TXIO	TX-I/O FAMILY CONTROLLER MODULES
UC	UNITARY CONTROLLER
UCC	UNIT CONDITIONER CONTROLLER
UVC	UNIT VENT CONTROLLER
V	VALVE
V*	VALVE SERVICE PARTS
VA	TEC VALVE ACTUATOR
VAC	VARIABLE AIR VOLUME CONTROLLER
VB	VIBRATION ISOLATOR
VTE	VELOCITY TRANSMITTER ELECTRICAL
W	WELL
WST	WEATHER STATION
XDR	TRANSDUCER
XFMR	TRANSFORMER

APOGEE: PII – EXAMPLE

LOGICAL POINT NAME – AH1LTD
0.10.3.10.27
DETAIL 5A ← READ AS " SEE PAGE 5A FOR MORE DETAIL "
DETAIL MC ← DIGITAL INPUT

BLN NUMBER
CABINET NUMBER
FLN TRUNK
DROP NUMBER
POINT NUMBER

DDC ELECTRICAL POINT

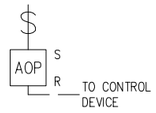
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TRUNK NUMBER
CABINET NUMBER
LAN TRUNK
DROP NUMBER
POINT NUMBER

DDC PNEUMATIC POINT

PTNAME 0 0 0 0 0 0 0

TRUNK NUMBER
CABINET NUMBER
LAN TRUNK
DROP NUMBER
POINT NUMBER



DETAILS

ELECTRICAL TERMINATION

PNEUMATIC TERMINATION

DETAIL XX — STANDARD DDC TERMINATION

NOTE OR REVISION

DETAIL XX — PAGE REFERENCE

APOGEE: ETHERNET – EXAMPLE

LOGICAL POINT NAME – AH1LTD
0001: 3.10.27
DETAIL 5A ← READ AS " SEE PAGE 5A FOR MORE DETAIL "
DETAIL MC ← DIGITAL INPUT

REFERENCE NUMBER
NODE NUMBER
FLN TRUNK
DROP NUMBER
POINT NUMBER

REVISION HISTORY

SIEMENS

POWERS OF ARKANSAS

5440 NORTHSHORE DR
N. LITTLE ROCK, AR 72118

PHONE:
FAX:

MAURICE BATHHOUSE CONTROLS
HOT SPRINGS, AR

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
MAP	MAP	JAD	10/03/25	10/06/25

Legend & Abbreviations

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POWERS OF ARKANSAS **Valve Submittal - Water**

LOCATION: HOT SPRINGS , AR **PROJECT NAME:** MAURICE BATHHOUSE CONTROLS **DATE:** 10/06/25
JOB NO: 25CNEB0017 **PAGE:** 1
ENGR: MAP **REV:**

GENERAL NOTES:
1. All valves 2-1/2" and larger have flanged ends, 2" and smaller have screwed ends.
2. All control valves and wells shall be installed by the mechanical contractor.
3. Standard abbreviations used on control valves are:

BODY TYPES: 3W - Three way; 2W - Two way; A - Angle; N.C. - Normally Closed; N.O. - Normally Open; NOC - Ball Valve can be N.O. or N.C.; BF - Butterfly Valve; DS - Double Seated;

UNITS:
Steam inlet pressure, actual pressure drop, and shut off pressure indicated in PSIG.

ACTUATOR TYPES: SR - Spring Return; NSR - No Spring Return CR - Capacitor Driven Return; DA - Double Acting

Valve ID/ Location	Qty	Product Number	Valve Size	Body Type	Body Style	Actual Cv	Actuator Type	Design P. Drop (psi)	Required Flow (gpm)	Min (gpm)	Max (gpm)	Preset (gpm)	Steam Inlet	Press Drop (psi)	Valve Spec Sheet	Shut Off	ANSI Class	Comment
Mechanical System:		**AHU-M1 & M2 SYSTEM**							**AHU-M1 & M2 SYSTEM**									
V-1	1	274-03202	0.75	3W	Globe	6.30	SR	5	6.80	N/A	N/A	N/A	--	1.165	154 023	250	250	AHU-M1 PHV
V-2	1	291-06165	2.50	3W	Globe	63.00	SR	5	98.60	N/A	N/A	N/A	--	2.4495	155 304	97	125	AHU-M1 CWV
V-3	1	274-03200	0.50	3W	Globe	2.50	SR	5	4.50	N/A	N/A	N/A	--	3.24	154 023	250	250	AHU-M2 PHV
V-4	1	274-03205	1.50	3W	Globe	25.00	SR	5	40.70	N/A	N/A	N/A	--	2.6504	154 023	73	250	AHU-M2 CWV
Mechanical System:		**AHU-M3 SYSTEM**							**AHU-M3 SYSTEM**									
V-1	1	274-03200	0.50	3W	Globe	2.50	SR	5	5.60	N/A	N/A	N/A	--	5.0176	154 023	250	250	AHU-M3 PHV
V-2	1	274-03187	1.50	2W	Globe	25.00	NC-SR	5	51.80	N/A	N/A	N/A	--	4.2932	154 006	73	250	AHU-M3 CWV
V-3	1	171C-10300S	0.50	2W	Ball	0.40	NO-NSR	5	0.50	N/A	N/A	N/A	--	1.5625	154038	200	250	RAD-3-1M
Mechanical System:		**FAN COIL UNITS SYSTEM**							**FAN COIL UNITS SYSTEM**									
V-1	1	171A-10303S	0.50	2W	Ball	1.60	NO-NSR	5	2.90	N/A	N/A	N/A	--	3.2852	154038	200	250	FCU-B-1M CWV
V-2	1	171A-10300S	0.50	2W	Ball	0.40	NO-NSR	5	0.70	N/A	N/A	N/A	--	3.0625	154038	200	250	FCU-B-1M HWV
V-3	1	171A-10303S	0.50	2W	Ball	1.60	NO-NSR	5	2.90	N/A	N/A	N/A	--	3.2852	154038	200	250	FCU-B-2M CWV
V-4	1	171A-10300S	0.50	2W	Ball	0.40	NO-NSR	5	0.80	N/A	N/A	N/A	--	4	154038	200	250	FCU-B-2M HWV

NOTES: All control valves and wells shall be installed by the heating contractor.

POWERS OF ARKANSAS **Valve Submittal - Water**

LOCATION:	HOT SPRINGS , AR	**PROJECT NAME:**	MAURICE BATHHOUSE CONTROLS	**DATE:**	10/06/25
JOB NO:	25CNEB0017			**PAGE:**	2
ENGR:	MAP			**REV:**	

GENERAL NOTES:

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UNITS:

Steam inlet pressure, actual pressure drop, and shut off pressure indicated in PSIG.

ACTUATOR TYPES: SR - Spring Return; NSR - No Spring Return CR - Capacitor Driven Return; DA - Double Acting

Valve ID/ Location	Qty	Product Number	Valve Size	Body Type	Body Style	Actual Cv	Actuator Type	Design P. Drop (psi)	Required Flow (gpm)	Min (gpm)	Max (gpm)	Preset (gpm)	Steam Inlet	Press Drop (psi)	Valve Spec Sheet	Shut Off	ANSI Class	Comment
Mechanical System:		**FAN COIL UNITS SYSTEM**																**FAN COIL UNITS SYSTEM**
V-5	1	171A-10301S	0.50	2W	Ball	0.63	NO-NSR	5	1.40	N/A	N/A	N/A	--	4.9383	154038	200	250	FCU-B-3M CWV
V-6	1	171A-10300S	0.50	2W	Ball	0.40	NO-NSR	5	0.50	N/A	N/A	N/A	--	1.5625	154038	200	250	FCU-B-3M HWV
V-7	1	171A-10302S	0.50	2W	Ball	1.00	NO-NSR	5	2.10	N/A	N/A	N/A	--	4.41	154038	200	250	FCU-B-4M CWV
V-8	1	171A-10300S	0.50	2W	Ball	0.40	NO-NSR	5	0.50	N/A	N/A	N/A	--	1.5625	154038	200	250	FCU-B-4M HWV
V-9	1	171A-10303S	0.50	2W	Ball	1.60	NO-NSR	5	3.00	N/A	N/A	N/A	--	3.5156	154038	200	250	FCU-B-5M CWV
V-10	1	171A-10300S	0.50	2W	Ball	0.40	NO-NSR	5	0.70	N/A	N/A	N/A	--	3.0625	154038	200	250	FCU-B-5M HWV
V-11	1	171A-10303S	0.50	2W	Ball	1.60	NO-NSR	5	3.50	N/A	N/A	N/A	--	4.7852	154038	200	250	FCU-1-1M CWV
V-12	1	171A-10300S	0.50	2W	Ball	0.40	NO-NSR	5	0.70	N/A	N/A	N/A	--	3.0625	154038	200	250	FCU-1-1M HWV
V-13	1	171A-10300S	0.50	2W	Ball	0.40	NO-NSR	5	0.50	N/A	N/A	N/A	--	1.5625	154038	200	250	FCU-3-1M CWV
V-14	1	171A-10300S	0.50	2W	Ball	0.40	NO-NSR	5	0.40	N/A	N/A	N/A	--	1	154038	200	250	FCU-3-1M HWV
V-15	1	171A-10303S	0.50	2W	Ball	1.60	NO-NSR	5	2.80	N/A	N/A	N/A	--	3.0625	154038	200	250	FCU-3-2M CWV
V-16	1	171A-10301S	0.50	2W	Ball	0.63	NO-NSR	5	1.10	N/A	N/A	N/A	--	3.0486	154038	200	250	FCU-3-2M HWV

NOTES: All control valves and wells shall be installed by the heating contractor.

POWERS OF ARKANSAS **Valve Submittal - Water**

LOCATION:	HOT SPRINGS , AR	**PROJECT NAME:**	MAURICE BATHHOUSE CONTROLS	**DATE:**	10/06/25
JOB NO:	25CNEB0017			**PAGE:**	3
ENGR:	MAP			**REV:**	

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Valve ID/ Location	Qty	Product Number	Valve Size	Body Type	Body Style	Actual Cv	Actuator Type	Design P. Drop (psi)	Required Flow (gpm)	Min (gpm)	Max (gpm)	Preset (gpm)	Steam Inlet	Press Drop (psi)	Valve Spec Sheet	Shut Off	ANSI Class	Comment
Mechanical System:		**FAN COIL UNITS SYSTEM**																**FAN COIL UNITS SYSTEM**
V-17	1	171A-10302S	0.50	2W	Ball	1.00	NO-NSR	5	1.90	N/A	N/A	N/A	--	3.61	154038	200	250	FCU-3-3M CWV
V-18	1	171A-10300S	0.50	2W	Ball	0.40	NO-NSR	5	0.90	N/A	N/A	N/A	--	5.0625	154038	200	250	FCU-3-3M HWV
V-19	1	171A-10302S	0.50	2W	Ball	1.00	NO-NSR	5	2.30	N/A	N/A	N/A	--	5.29	154038	200	250	FCU-3-4M CWV
V-20	1	171A-10301S	0.50	2W	Ball	0.63	NO-NSR	5	1.10	N/A	N/A	N/A	--	3.0486	154038	200	250	FCU-3-4M HWV
V-21	1	171A-10302S	0.50	2W	Ball	1.00	NO-NSR	5	1.80	N/A	N/A	N/A	--	3.24	154038	200	250	FCU-3-5M CWV
V-22	1	171A-10300S	0.50	2W	Ball	0.40	NO-NSR	5	0.90	N/A	N/A	N/A	--	5.0625	154038	200	250	FCU-3-5M HWV
V-23	1	171A-10303S	0.50	2W	Ball	1.60	NO-NSR	5	2.70	N/A	N/A	N/A	--	2.8477	154038	200	250	FCU-3-6M CWV
V-24	1	171A-10302S	0.50	2W	Ball	1.00	NO-NSR	5	1.60	N/A	N/A	N/A	--	2.56	154038	200	250	FCU-3-6M HWV
V-25	1	171A-10302S	0.50	2W	Ball	1.00	NO-NSR	5	1.80	N/A	N/A	N/A	--	3.24	154038	200	250	FCU-3-7M CWV
V-26	1	171A-10300S	0.50	2W	Ball	0.40	NO-NSR	5	0.90	N/A	N/A	N/A	--	5.0625	154038	200	250	FCU-3-7M HWV
V-27	1	171A-10302S	0.50	2W	Ball	1.00	NO-NSR	5	2.40	N/A	N/A	N/A	--	5.76	154038	200	250	FCU-3-8M CWV
V-28	1	171A-10301S	0.50	2W	Ball	0.63	NO-NSR	5	1.20	N/A	N/A	N/A	--	3.6281	154038	200	250	FCU-3-8M HWV

NOTES: All control valves and wells shall be installed by the heating contractor.

POWERS OF ARKANSAS **Valve Submittal - Water**

LOCATION:	HOT SPRINGS , AR	**PROJECT NAME:**	MAURICE BATHHOUSE CONTROLS	**DATE:**	10/06/25
JOB NO:	25CNEB0017			**PAGE:**	4
ENGR:	MAP			**REV:**	

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Valve ID/ Location	Qty	Product Number	Valve Size	Body Type	Body Style	Actual Cv	Actuator Type	Design P. Drop (psi)	Required Flow (gpm)	Min (gpm)	Max (gpm)	Preset (gpm)	Steam Inlet	Press Drop (psi)	Valve Spec Sheet	Shut Off	ANSI Class	Comment
Mechanical System:		**FAN COIL UNITS SYSTEM**							**FAN COIL UNITS SYSTEM**									
V-29	1	171A-10302S	0.50	2W	Ball	1.00	NO-NSR	5	1.90	N/A	N/A	N/A	--	3.61	154038	200	250	FCU-3-9M CWV
V-30	1	171A-10300S	0.50	2W	Ball	0.40	NO-NSR	5	0.80	N/A	N/A	N/A	--	4	154038	200	250	FCU-3-9M HWV
V-31	1	171A-10302S	0.50	2W	Ball	1.00	NO-NSR	5	1.80	N/A	N/A	N/A	--	3.24	154038	200	250	FCU-3-10M CWV
V-32	1	171A-10300S	0.50	2W	Ball	0.40	NO-NSR	5	0.70	N/A	N/A	N/A	--	3.0625	154038	200	250	FCU-3-10M HWV
V-33	1	171A-10302S	0.50	2W	Ball	1.00	NO-NSR	5	1.80	N/A	N/A	N/A	--	3.24	154038	200	250	FCU-3-11M CWV
V-34	1	171A-10300S	0.50	2W	Ball	0.40	NO-NSR	5	0.90	N/A	N/A	N/A	--	5.0625	154038	200	250	FCU-3-11M HWV
Mechanical System:		**HOT WATER SYSTEM**							**HOT WATER SYSTEM**									
V-1	1	291-05920	2.50	2W	Globe	63.00	NO-SR	5	85.00	N/A	N/A	N/A	--	1.8204	155 304	153	250	HX-M1 VLV
V-2	1	B203FC-HA126.530	3.00	2W	BF	461.00	NSR	0	0.00	0	662	N/A	--	0	A6V12069976	175	250	BOILER BYPASS VLV
V-3	1	B203FC-HA126.530	3.00	2W	BF	461.00	NSR	0	0.00	0	662	N/A	--	0	A6V12069976	175	250	BOILER BYPASS VLV
V-4	1	B203FC-HA126.530	3.00	2W	BF	461.00	NSR	0	0.00	0	662	N/A	--	0	A6V12069976	175	250	BOILER BYPASS VLV
Mechanical System:		**UNIT HEATERS**							**UNIT HEATERS**									
V-1	1	171A-10301S	0.50	2W	Ball	0.63	NO-NSR	5	1.30	N/A	N/A	N/A	--	4.258	154038	200	250	UH-1M

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POWERS OF ARKANSAS **Valve Submittal - Water**

LOCATION:	HOT SPRINGS , AR	**PROJECT NAME:**	MAURICE BATHHOUSE CONTROLS	**DATE:**	10/06/25
JOB NO:	25CNEB0017			**PAGE:**	5
ENGR:	MAP			**REV:**	

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Mechanical System:		**UNIT HEATERS**							**UNIT HEATERS**									
V-2	1	171A-10303S	0.50	2W	Ball	1.60	NO-NSR	5	2.70	N/A	N/A	N/A	--	2.8477	154038	200	250	UH-2M
Mechanical System:		**VAV HW RH VAV**							**VAV HW RH VAV**									
V-1	1	171A-10300S	0.50	2W	Ball	0.40	NO-NSR	5	2.00	N/A	N/A	N/A	--	25	154038	200	250	TAB-1-1M
V-2	1	171A-10301S	0.50	2W	Ball	0.63	NO-NSR	5	1.30	N/A	N/A	N/A	--	4.258	154038	200	250	TAB-1-4M
V-3	1	171A-10303S	0.50	2W	Ball	1.60	NO-NSR	5	2.80	N/A	N/A	N/A	--	3.0625	154038	200	250	TAB-1-5M
V-4	1	171A-10304S	0.50	2W	Ball	2.50	NO-NSR	2	3.60	N/A	N/A	N/A	--	2.0736	154038	200	250	TAB-1-6M
V-5	1	171A-10303S	0.50	2W	Ball	1.60	NO-NSR	5	3.00	N/A	N/A	N/A	--	3.5156	154038	200	250	TAB-1-7M
V-6	1	171A-10301S	0.50	2W	Ball	0.63	NO-NSR	5	1.40	N/A	N/A	N/A	--	4.9383	154038	200	250	TAB-1-8M
V-7	1	171A-10301S	0.50	2W	Ball	0.63	NO-NSR	5	1.30	N/A	N/A	N/A	--	4.258	154038	200	250	TAB-1-9M
V-8	1	171A-10302S	0.50	2W	Ball	1.00	NO-NSR	5	2.10	N/A	N/A	N/A	--	4.41	154038	200	250	TAB-1-10M
V-9	1	171A-10300S	0.50	2W	Ball	0.40	NO-NSR	5	0.50	N/A	N/A	N/A	--	1.5625	154038	200	250	TAB-1-11M
V-10	1	171A-10302S	0.50	2W	Ball	1.00	NO-NSR	5	2.20	N/A	N/A	N/A	--	4.84	154038	200	250	TAB-1-12M
V-11	1	171A-10302S	0.50	2W	Ball	1.00	NO-NSR	5	1.80	N/A	N/A	N/A	--	3.24	154038	200	250	TAB-2-1M

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POWERS OF ARKANSAS **Valve Submittal - Water**

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JOB NO:	25CNEB0017			**PAGE:**	6
ENGR:	MAP			**REV:**	

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Mechanical System:		**VAV HW RH VAV**							**VAV HW RH VAV**									
V-12	1	171A-10302S	0.50	2W	Ball	1.00	NO-NSR	5	2.40	N/A	N/A	N/A	--	5.76	154038	200	250	TAB-2-2M
V-13	1	171A-10301S	0.50	2W	Ball	0.63	NO-NSR	5	1.40	N/A	N/A	N/A	--	4.9383	154038	200	250	TAB-2-3M
V-14	1	171A-10302S	0.50	2W	Ball	1.00	NO-NSR	5	1.80	N/A	N/A	N/A	--	3.24	154038	200	250	TAB-2-4M
V-15	1	171A-10301S	0.50	2W	Ball	0.63	NO-NSR	5	1.00	N/A	N/A	N/A	--	2.5195	154038	200	250	TAB-2-5M
V-16	1	171A-10302S	0.50	2W	Ball	1.00	NO-NSR	5	2.40	N/A	N/A	N/A	--	5.76	154038	200	250	TAB-2-6M
Mechanical System:		**VAV HW RH VAV + OCC**							**VAV HW RH VAV + OCC**									
V-1	1	171A-10300S	0.50	2W	Ball	0.40	NO-NSR	3	0.50	N/A	N/A	N/A	--	1.5625	154038	200	250	TAB-1-2M
V-2	1	171A-10300S	0.50	2W	Ball	0.40	NO-NSR	3	0.50	N/A	N/A	N/A	--	1.5625	154038	200	250	TAB-1-11M
Mechanical System:		**VAV HW RH VAV + RAD HT & CO2**							**VAV HW RH VAV + RAD HT & CO2**									
V-1	1	171A-10302S	0.50	2W	Ball	1.00	NO-NSR	5	2.20	N/A	N/A	N/A	--	4.84	154038	200	250	TAB-1-3M
V-2	1	171A-10300S	0.50	2W	Ball	0.40	NO-NSR	5	0.20	N/A	N/A	N/A	--	0.25	154038	200	250	RAD-1-1M
V-3	1	171A-10302S	0.50	2W	Ball	1.00	NO-NSR	5	2.20	N/A	N/A	N/A	--	4.84	154038	200	250	TAB-1-12M
V-4	1	171A-10300S	0.50	2W	Ball	0.40	NO-NSR	5	0.40	N/A	N/A	N/A	--	1	154038	200	250	RAD-1-2M

NOTES: All control valves and wells shall be installed by the heating contractor.

9/30/2025

MAURICE BATHHOUSE CONTROLS

HOT SPRINGS, AR

ALL Drives Schedule

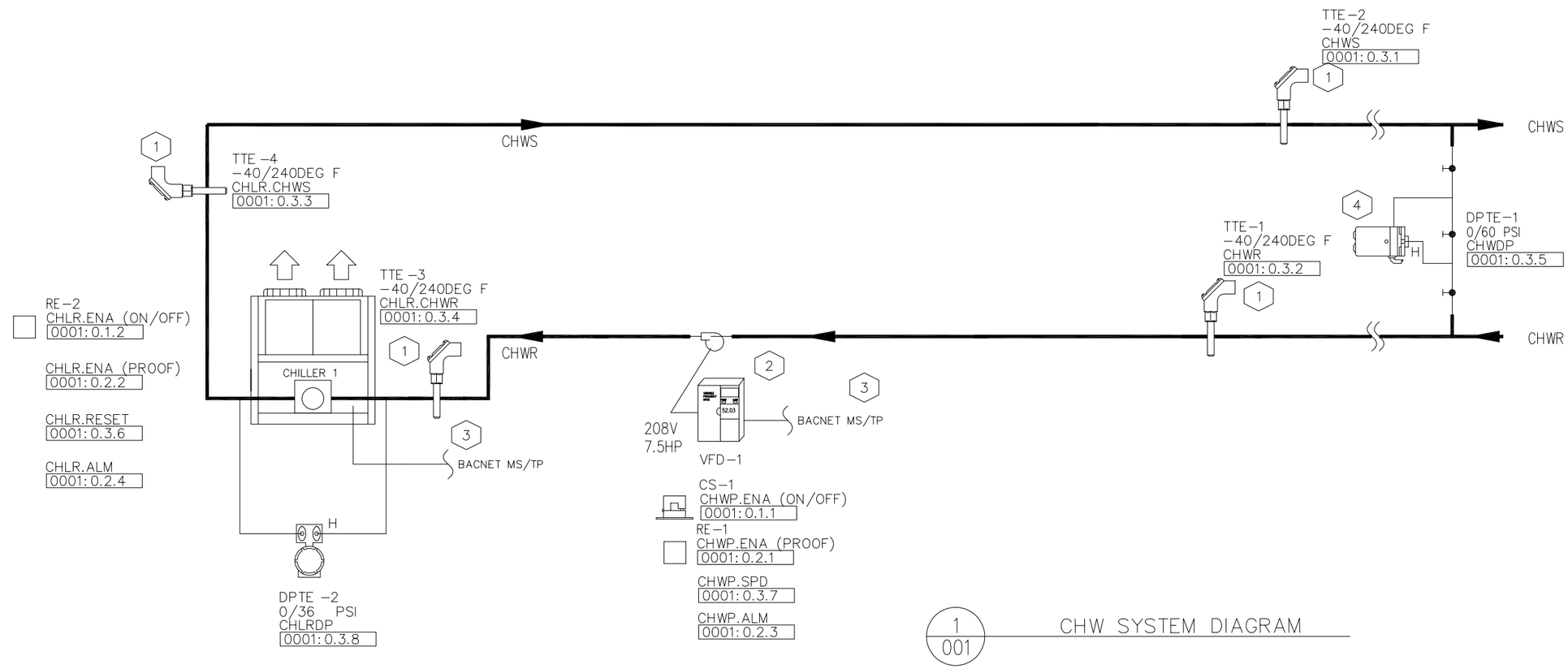
		PER FAN		TOTAL	ACTUAL VFD	RATED							YASKAWA
Item #	Equip. ID	HP/FLA	# of MTRs	FLA AMPS	HP	AMPS	PHASE	Voltage	LOCATION	SERVES	TYPE	BYPASS	Model
1	CWP-1				7.50	24.2	3	208V	2ND FLR MECH ROOM	CHILL WATER	PWM	w/DISCONNECT	H6CPD024
2	HWP-1				5.00	16.7	3	208V	1ST FLR MECH RM	HOT WATER	PWM	w/DISCONNECT	H6CPD016
3	HWP-2				5.00	16.7	3	208V	1ST FLR MECH RM	HOT WATER	PWM	w/DISCONNECT	H6CPD016
4	AHU-1M SF-1				7.50	24.2	3	208V	1ST FLR MECH RM	AHU-1M SFAN	PWM	w/DISCONNECT	H6CPD024
5	AHU-1M SF-2				7.50	24.2	3	208V	1ST FLR MECH RM	AHU-1M SFAN	PWM	w/DISCONNECT	H6CPD024
6	AHU-1M SF-3				7.50	24.2	3	208V	1ST FLR MECH RM	AHU-1M SFAN	PWM	w/DISCONNECT	H6CPD024
7	AHU-1M SF-4				7.50	24.2	3	208V	1ST FLR MECH RM	AHU-1M SFAN	PWM	w/DISCONNECT	H6CPD024
8	AHU-2M SF-1				3.00	10.6	3	208V	2nd FLR MECH RM	AHU-2M SFAN	PWM	w/DISCONNECT	H6CPD010
9	AHU-2M SF-2				3.00	10.6	3	208V	2nd FLR MECH RM	AHU-2M SFAN	PWM	w/DISCONNECT	H6CPD010
10	AHU-2M SF-3				3.00	10.6	3	208V	2nd FLR MECH RM	AHU-2M SFAN	PWM	w/DISCONNECT	H6CPD010
11	AHU-2M SF-4				3.00	10.6	3	208V	2nd FLR MECH RM	AHU-2M SFAN	PWM	w/DISCONNECT	H6CPD010
12	AHU-3M				5.00	16.7	3	208V	2nd FLR MECH RM	AHU-3M SFAN	PWM	w/DISCONNECT	H6CPD016
13	RF-M1				0.75	3.5	3	208V	1ST FLR MECH RM	AHU-1M RFAN	PWM	w/DISCONNECT	H6CPD003
14	RF-M2				0.50	2.4	3	208V	2nd FLR MECH RM	AHU-RM RFAN	PWM	w/DISCONNECT	H6CPD002

INTEGRATED POINTS

PUMP REQUIRED (DIGITAL)
CHILLER STATUS (DIGITAL)
GENERAL ALARM (DIGITAL)
CHILLER START/STOP (DIGITAL)
CHILLER DP [W.C.] (ANALOG)
CHILLED WATER SUPPLY TEMP [DEG F] (ANALOG)
CHILLED WATER RETURN TEMP [DEG F] (ANALOG)
HEAT TRACING (HT) START/STOP (DIGITAL)

INSTALLATION NOTES:

1. SENSORS FURNISHED, INSTALLED AND WIRED BY CONTROL CONTRACTOR. DEVICES INSTALLED IN PIPE BY MECHANICAL CONTRACTOR.
2. VFD FURNISHED AND LOW VOLTAGE WIRING BY CONTROL CONTRACTOR. VFD INSTALLED AND POWER WIRING BY ELECTRICAL CONTRACTOR.
3. BACNET/MSTP FURNISHED AND INSTALLED BY CONTROLS CONTRACTOR.
4. DP FURNISHED AND CONTROL WIRING BY CONTROL CONTRACTOR. DP INSTALLED IN PIPE BY MECHANICAL CONTRACTOR.



1 / 001 CHW SYSTEM DIAGRAM

REF#	FIELD PANEL NAME	FIELD PANEL NODE NAME
0001	CHW-HW.PXM	MARCHWHWPXM

REVISION HISTORY

SIEMENS

POWERS OF ARKANSAS

5440 NORTHSHORE DR
N. LITTLE ROCK, AR 72118

PHONE:
FAX:

MAURICE BATHHOUSE CONTROLS
HOT SPRINGS, AR

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
MAP	MAP	JAD	10/03/25	10/06/25

CHILL WATER SYSTEM

25CNEB0017
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Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
CS 1	1	H609	VERIS	H609	Current Switch,Split-Core,Adj,N.O.,120V
DPTE 1-2	2	PX3ULX05	VERIS INDU	px3_d0118	PX3ULX05,Pressure,Dry,Universal,LCD
RE 1-2	2	V120	VERIS	V120	V120, SPDT ENCLOSED RELAY
TTE 1-4	4	544-577-25	SIEMENS	149919	IMMERSION TMP SNSR, PT 1K OHM(375) 2.5"
VFD 1	1	H6CPD024	YASKAWA		7.5 HP, 208 V, 24.2 A, 3PH Type 1

CONTRACTOR SHALL COORDINATE ALL SAFETY AND INTERLOCK REQUIREMENTS WITH CHILLER MANUFACTURER. TCC SHALL PROVIDE THE INSTALLATION AND WIRING OF CHILLED WATER FLOW SWITCHES, AND OTHER COMPONENTS PROVIDED WITH CHILLER AS REQUIRED FOR PROPER OPERATION.

ALARMS, INTERLOCKS AND SAFETIES:

AN ALARM SHALL BE INDICATED AT THE FMCS WHEN THE FOLLOWING OCCUR:

- AN ALARM IS INDICATED AT THE CHILLER CONTROL PANEL
- IF CHILLED WATER SUPPLY TEMPERATURE IS MORE THAN 5 DEG F (ADJ.) ABOVE OR BELOW SETPOINT FOR MORE THAN 10 MINUTES (ADJ.).
- SHOULD THE FMCS COMMAND THE PUMP TO OPERATE AND THE PUMP FAILS TO DO SO AS DETERMINED BY THE VFD STATUS, AN ALARM SHALL BE INDICATED AT THE FMCS OPERATOR WORKSTATION AND THE FMCS SHALL START THE LAG PUMP.
- AN ALARM CONDITION OCCURS AT ANY VFD.
- IF SYSTEM DIFFERENTIAL PRESSURE IS NOT MAINTAINED FOR MORE THAN 15 MINUTES (ADJ.).
- AN ALARM IS INDICATED IF THE HEAT TRACE SYSTEM FAILS. THE LEAD CHILLED WATER PUMP SHALL RUN IF HEAT TRACE FAILS, FAULTS, OR GOES INTO ALARM.

SEQUENCE OF OPERATION

THE CHILLER MANUFACTURER SHALL PROVIDE A FACTORY MOUNTED CHILLER CONTROL PANEL. ALL AVAILABLE DATA PROVIDED/MONITORED BY THE CHILLER CONTROL PANEL SHALL BE AVAILABLE TO AND MONITORED BY THE FMCS SYSTEM.

CHILLER OPERATION SHALL BE CONTROLLED BY THE CHILLER CONTROL PANEL AND SHALL BE ENABLED WHEN THE OUTSIDE AIR TEMPERATURE RISES ABOVE DEG F (ADJ.) FOR 15 MINUTES (ADJ.). WHEN OUTSIDE AIR TEMPERATURE DROPS BELOW DEG F (ADJ.) FOR 15 MINUTES (ADJ.) CHILLER OPERATION SHALL BE DISABLED. CHILLER SHALL NOT OPERATE UNTIL A CHILLED WATER VALVE IN THE SYSTEM HAS A CALL FOR COOLING AND BEGINS TO OPEN. ONCE VALVE STARTS TO OPEN THE FMCS SHALL ENERGIZE THE LEAD PUMP.

CHILLER STARTING:

WHEN THE FMCS INDEXES A CHILLER TO RUN THE FOLLOWING SHALL OCCUR:

- THE FMCS SHALL TURN ON THE CHILLED WATER PUMP.
- UPON PROOF OF FLOW IN THE EVAPORATOR BARREL THE CHILLER CONTROL PANEL SHALL INDEX CHILLER TO START.
- CHILLER SHALL START AFTER ALL INTERNAL SAFETIES ARE SATISFIED AND SHALL MAINTAIN CHILLED WATER SUPPLY TEMPERATURE OF 42 DEG F (ADJ.) VIA INTERNAL CONTROLS.

CHILLER STOPPING:

WHEN THE FMCS INDEXES THE CHILLER TO STOP THE FOLLOWING SHALL OCCUR:

- THE CHILLER CONTROL PANEL SHALL INDEX CHILLER TO STOP.
- THE CHILLER CONTROL PANEL SHALL SEND A SIGNAL TO THE FMCS TO SHUTDOWN THE CHILLED WATER PUMP.

CHILLED WATER PUMP CONTROL:

THE FMCS SHALL MODULATE OUTPUT TO THE PUMP VFD AS REQUIRED TO MAINTAIN DP SETPOINT AT THE LOCATION OF THE DP TRANSMITTER. DP TRANSMITTER SIGNAL SHALL BE WIRED DIRECTLY TO THE CONTROLLER SERVING PUMP VFD (SIGNAL SHALL NOT BE TRANSMITTED ACROSS THE FMCS NETWORK). FMCS SHALL RESET THE DP SETPOINT UNTIL ONE MODULATING CONTROL VALVE IS 95% OPEN AS DETERMINED BY THE VALVE FEEDBACK. IN NO CASE SHALL DP SETPOINT EXCEED 10 PSID (ADJ.) OR DROP BELOW 2 PSID (ADJ.).

FREEZE PROTECTION:

WHEN THE OUTSIDE AIR TEMPERATURE DROPS BELOW DEG F (ADJ.) THE MINIMUM FLOW BYPASS CONTROL VALVES SHALL BE OPENED AND THE CHILLED WATER PUMP SHALL BE STARTED IF NOT ALREADY RUNNING. WHEN OUTSIDE AIR TEMPERATURE IS ABOVE 36?F (ADJ.) THE CHILLED WATER SYSTEM SHALL RETURN TO NORMAL OPERATION.

CHILLER SAFETIES:

REVISION HISTORY

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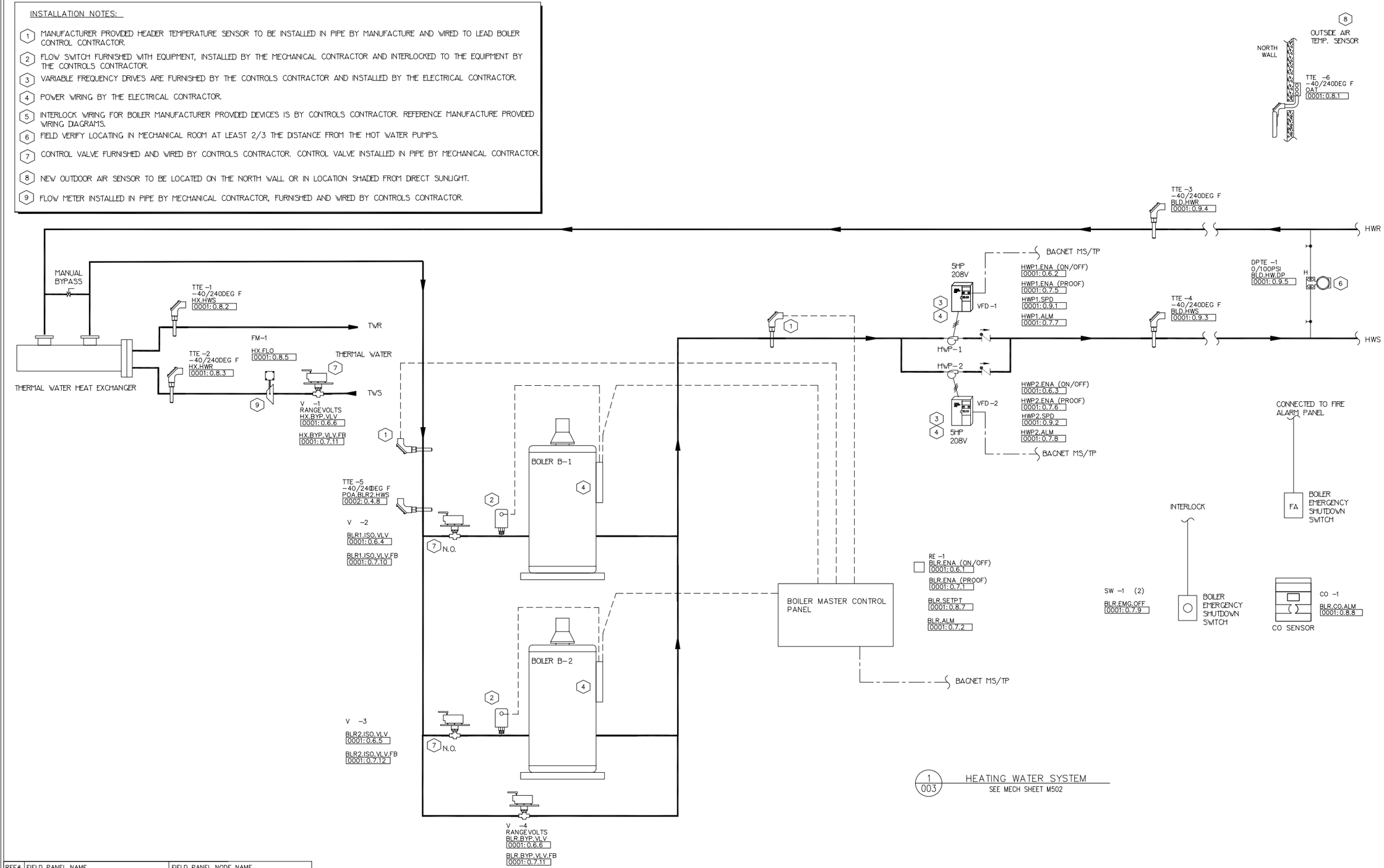
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INSTALLATION NOTES:

1. MANUFACTURER PROVIDED HEADER TEMPERATURE SENSOR TO BE INSTALLED IN PIPE BY MANUFACTURE AND WIRED TO LEAD BOILER CONTROL CONTRACTOR.
2. FLOW SWITCH FURNISHED WITH EQUIPMENT, INSTALLED BY THE MECHANICAL CONTRACTOR AND INTERLOCKED TO THE EQUIPMENT BY THE CONTROLS CONTRACTOR.
3. VARIABLE FREQUENCY DRIVES ARE FURNISHED BY THE CONTROLS CONTRACTOR AND INSTALLED BY THE ELECTRICAL CONTRACTOR.
4. POWER WIRING BY THE ELECTRICAL CONTRACTOR.
5. INTERLOCK WIRING FOR BOILER MANUFACTURER PROVIDED DEVICES IS BY CONTROLS CONTRACTOR. REFERENCE MANUFACTURE PROVIDED WIRING DIAGRAMS.
6. FIELD VERIFY LOCATING IN MECHANICAL ROOM AT LEAST 2/3 THE DISTANCE FROM THE HOT WATER PUMPS.
7. CONTROL VALVE FURNISHED AND WIRED BY CONTROLS CONTRACTOR. CONTROL VALVE INSTALLED IN PIPE BY MECHANICAL CONTRACTOR.
8. NEW OUTDOOR AIR SENSOR TO BE LOCATED ON THE NORTH WALL OR IN LOCATION SHADED FROM DIRECT SUNLIGHT.
9. FLOW METER INSTALLED IN PIPE BY MECHANICAL CONTRACTOR, FURNISHED AND WIRED BY CONTROLS CONTRACTOR.



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Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
DPTE 1	1	PWLX04BP	VERIS	PW	Pressure,Wet,LCD,0-100PSID,BP
FM 1	1	FT-3400	Onicon	FT-3400	Insertion Electromagnetic Flow Meter
RE 1	1	V645	VERIS	V645	V645,24VAC/DC/120VAC,LED,SPDT RELAY
SW 1	2	ESP-PP0-BS	KELE	ESP	EMERG BLR SHUTDOWN
TTE 1-5	5	544-577-25	SIEMENS	149919	IMMERSION TMP SNSR, PT 1K OHM(375) 2.5"
TTE 6	1	544-578	SIEMENS	149920	OUTDR TEMP SNSR, PT 1K OHM(375), METAL
V					SEE VALVE SUBMITTAL
VFD 1-2	2	H6CPD016	YASKAWA		5 HP, 208 V, 16.7 A, 3PH Type 1

SEQUENCE OF OPERATION:

THE THERMAL WATER HEAT EXCHANGER AND HEATING WATER BOILERS WILL BE SEQUENCED IN ORDER TO MAINTAIN THE HEATING WATER SUPPLY TEMPERATURE SET POINT.

HEATING WATER BOILERS SHALL HAVE UNIT MOUNTED CONTROLS PROVIDED BY THE BOILER MANUFACTURER. TCC SHALL INTERFACE WITH BOILER MANUFACTURER CONTROLS AS DESCRIBED IN THIS SEQUENCE OF OPERATION.

THERMAL WATER HEAT EXCHANGER SEQUENCE OF OPERATION:

ON A CALL FOR HEATING, AS DETERMINAED BY THE FMCS, THE THERMAL WATER SUPPLY VALVE WILL BE MODULATED OPEN TO MAINTAIN THE HEATING WATER SUPPLY TEMPERATURE SETPOINT. THE BOILER BYPASS VALVE WILL BE COMMANDED OPEN AND THE LEAD HEATING WATER PUMP WILL BE STARTED ONCE PROVEN OPEN.

IF THE HEATING WATER SETPOINT CAN NOT BE MAINTAINED AFTER A 10 MINUTE (ADJ.) TIME DELAY, THE FMCS WILL ENABLE THE BOILER PARENT CONTROLLER AND THE THERMAL WATER SUPPLY VALVE WILL REMAIN OPEN. IF THE THERMAL WATER SUPPLY TEMPERATURE IS LESS THAN THE HEATING WATER RETURN TEMPERATURE, THE THERMAL WATER CONTROL VALVE SHALL BE CLOSED.

WHEN THERE IS NO CALL FOR HEAT, THE THERMAL WATER SUPPLY VALVE SHALL CLOSE.

THERMAL WATER FLOW INFORMATION IN GPM AND GALLONS WILL ALSO NEED TO BE TRANMITTED TO THE THERMAL SPRINGS MONITORING SYSTEM AT: 101 RESERVE STREET, HOT SPRINGS, AR 71901

BOILER CONTROL PANEL SEQUENCE OF OPERATION:

WHEN THE FMCS ENABLES THE BOILER PARENT CONTROLLER TO RUN, THE BOILER PARENT CONTROLLER SHALL ENABLE THE LEAD BOILER, OPEN THE ASSOCIATED TWO-POSITION ISOLATION VALVE, AND ENERGIZE THE LEAD PUMP IF NOT ALREADY RUNNING AND SLOWLY CLOSE THE BOILER BYPASS VALVE.

THE ON BOARD BOILER SEQUENCING CONTROLLER SHALL STAGE AND MODULATE THE BOILER PLANT TO MAINTAIN THE HIGHEST PLANT EFFICIENCY THAT WILL PROVIDE THE REQUIRED SUPPLY WATER TEMPERATURE. THE ON BOARD BOILER SEQUENCING CONTROLLER SHALL OPEN AND CLOSE BOILER ISOLATION VALVES IN SUCH A WAY AS TO PROVIDE PRE AND POST FLOW. THE ON BOARD BOILER SEQUENCING CONTROLLER SHALL VERIFY PROOF OF WATER FLOW BEFORE FIRING BOILERS. THE BOILER SEQUENCING CONTROLLER CAN STAGE ON MULTIPLE BOILERS AT PART LOAD TO INCREASE THE EFFICIENCY OF THE PLANT. BOILER SEQUENCING CONTROLLERL PANEL SHALL START/STOP BOILERS ON A FIRST ON/FIRST OFF BASIS TO EQUALIZE RUN TIME BETWEEN BOILERS. TWO-POSITION ISOLATION VALVE OPERATION SHALL BE CONTROLLED BY THE BOILER CONTROL PANEL OF THE RESPECTIVE BOILER THEY SERVE. BOILERS SHALL BE CYCLED OFF WHEN HEAT EXCHANGER HWS TEMPERATURE IS EQUAL TO THE BUILDING SYSTEM HEATING WATER SUPPLY SETPOINT TEMPERATURE.

WHEN THE HEAT EXCHANGER HWS DISCHARGE TEMPERATURE IS AT OR HIGHER THAN THE SYSTEM HEATING WATER SUPPLY SETPOINT, THE BOILER BYPASS VALVE SHALL OPEN AND ONCE PROVEN OPEN THE OPERATING BOILER ISOLATION VALVE SHALL CLOSE.

THE FOLLOWING BOILER SEQUENCING CONTROLLER POINTS (TO INCLUDE BUT NOT LIMITED TO) SHALL BE CONTROLLED BY THE FMCS AND DISPLAYED ON THE OPERATOR WORKSTATION GRAPHICAL SCREEN:

- BOILER SYSTEM STATUS: ENABLE/DISABLE
- BOILER OUTLET WATER TEMPERATURE SETPOINT: [DEG F]

THE FOLLOWING BOILER SEQUENCING CONTROLLER POINTS (TO INCLUDE BUT NOT LIMITED TO) SHALL BE MONITORED BY THE FMCS AND DISPLAYED ON THE OPERATOR WORKSTATION GRAPHICAL SCREEN:

- BOILER STATUS: DISABLED/STANDBY/MANUAL OPERATION/REMOTE OPERATION/AUTO/FAULT
- FIRING RATE INPUT: [0 – 100%]
- FIRING RATE OUTPUT: [0 – 100%]
- ACTIVE SETPOINT: [DEG F]
- SYSTEM HWR TEMP: [DEG F]
- SYSTEM HWS TEMP: [DEG F]
- FAULT MESSAGE DISPLAY CODE: [NUMERICAL]
- RUN CYCLES: [NUMERICAL]
- RUN HOURS: [NUMERICAL]

ALARMS, INTERLOCKS & SAFETIES:
BOILER CONTROLS SHALL BE PROGRAMMED TO MAINTAIN CONSTANT SETPOINT (LAST KNOWN VALUE) IN THE EVENT THE FMCS NETWORK COMMUNICATION SIGNAL IS LOST.

HEATING WATER SYSTEM SEQUENCE OF OPERATION:

FMCS SHALL OPERATE HEATING WATER SYSTEM 24 HOURS/DAY, 365 DAYS/YEAR.

ON A CALL FOR HEATING THE LEAD PUMP WILL BE STARTED. FMCS SHALL AUTOMATICALLY ROTATE THE LEAD HEATING WATER PUMP ONCE/WEEK (10:00 AM EACH TUESDAY, ADJ.) TO EQUALIZE RUN TIME BETWEEN PUMPS. PROVIDE GRAPHICAL BUTTON ON OPERATOR
WORKSTATION GRAPHICAL SCREEN TO ALLOW FMCS OPERATOR TO SWITCH LEAD PUMP TO NEXT ROTATION IN THE EVENT THE CURRENT LEAD PUMP REQUIRES MAINTENANCE.

FMCS SHALL MODULATE SIGNAL TO LEAD PUMP VFD AS REQUIRED TO MAINTAIN HEATING WATER DIFFERENTIAL PRESSURE (DP) SETPOINT. IF THE LEAD PUMP VFD REACHES 90% SPEED FOR 10 MINUTES (ADJ.) AND THE HEATING WATER DIFFERENTIAL IS BELOW SETPOINT, THE SECOND HEATING WATER PUMP WILL BE STARTED AND SHALL HAVE A MINIMUM RAMP SPEED OF 60 SECONDS (ADJ.). THE TWO PUMPS WILL RAMP TOGETHER USING THE SAME RAMP INPUT SIGNAL. THE SECOND CHILLED WATER PUMP WILL BE STAGED OFF IF THE SPEED OF BOTH PUMPS VFD'S DROP BELOW 40% FOR 10 MINUTES (ADJ.). FMCS SHALL RESET HEATING WATER DIFFERENTIAL PRESSURE (DP) SETPOINT AS REQUIRED TO MAINTAIN AT LEAST ONE HEATING WATER VALVE 95% (ADJ.) OPEN. FMCS SHALL UTILIZE COMMAND TO ALL HEATING WATER VALVE POSITIONS TO RESET THE HEATING WATER DIFFERENTIAL PRESSURE. IN NO EVENT SHALL THE FMCS DECREASE THE HEATING WATER (DP) SETPOINT BELOW 4 PSI (ADJ.) OR ABOVE 10 PSI (ADJ.).

ALL CONTROLLED AND MONITORED POINTS LISTED IN THE BOILER CONTROL PANEL SEQUENCE ABOVE SHALL BE DISPLAYED ON THE OPERATOR WORKSTATION GRAPHICAL SCREEN.

ALARMS, INTERLOCKS & SAFETIES:

REVISION HISTORY

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HOT SPRINGS, AR

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TCC SHALL COORDINATE ALL SAFETY AND INTERLOCK REQUIREMENTS WITH BOILER MANUFACTURER. CONTRACTOR SHALL COORDINATE AND PROVIDE THE INSTALLATION AND WIRING OF BOILER WATER DIFFERENTIAL PRESSURE/FLOW SWITCHES AND OTHER COMPONENTS PROVIDED WITH THE BOILER AS REQUIRED FOR PROPER OPERATION. CONTRACTOR SHALL PROVIDE AND TERMINATE ALL SAFETY AND INTERLOCK WIRING WITH BOILER CONTROL PANELS AS REQUIRED.

FMCS SHALL AUTOMATICALLY ENABLE THE LAG HEATING WATER PUMP TO RUN IN THE EVENT THE LEAD HEATING WATER PUMP FAILS TO OPERATE.

CONTRACTOR SHALL VERIFY THE ACCEPTABLE TEMPERATURE RANGES THE BOILERS ARE APPROVED TO OPERATE AT AS PUBLISHED IN THE BOILER MANUFACTURER'S LITERATURE. IF THE TEMPERATURE RANGES LISTED IN THE MANUFACTURER'S LITERATURE DIFFER FROM THOSE IN THIS SEQUENCE OF OPERATION, CONTACT CONTRACTING OFFICER FOR DIRECTION.

AN ALARM SHALL BE INDICATED TO THE FMCS OPERATOR WORKSTATION IN THE EVENT ANY OF THE FOLLOWING OCCUR:

- HWR TEMPERATURE DROPS BELOW 50 DEG F (ADJ.) FOR 5 MINUTES (ADJ.) (AUTO RESET).
- HWS TEMPERATURE RISES MORE THAN 10 DEG F (ADJ.) ABOVE SETPOINT (AUTO RESET).
- HWS TEMPERATURE DROPS MORE THAN 10 DEG F (ADJ.) BELOW SETPOINT (AUTO RESET).
- AN ALARM IS INDICATED AT ANY BOILER ALARM PANEL.
- AN ALARM IS INDICATED AT ANY PUMP VFD
- SHOULD THE FMCS COMMAND THE LEAD HEATING WATER PUMP TO OPERATE AND THE PUMP FAILS TO DO SO AS DETERMINED BY THE VFD STATUS, AN ALARM SHALL BE INDICATED AT THE FMCS OPERATOR WORKSTATION AND THE LAG HW PUMP SHALL AUTOMATICALLY START.

REVISION HISTORY

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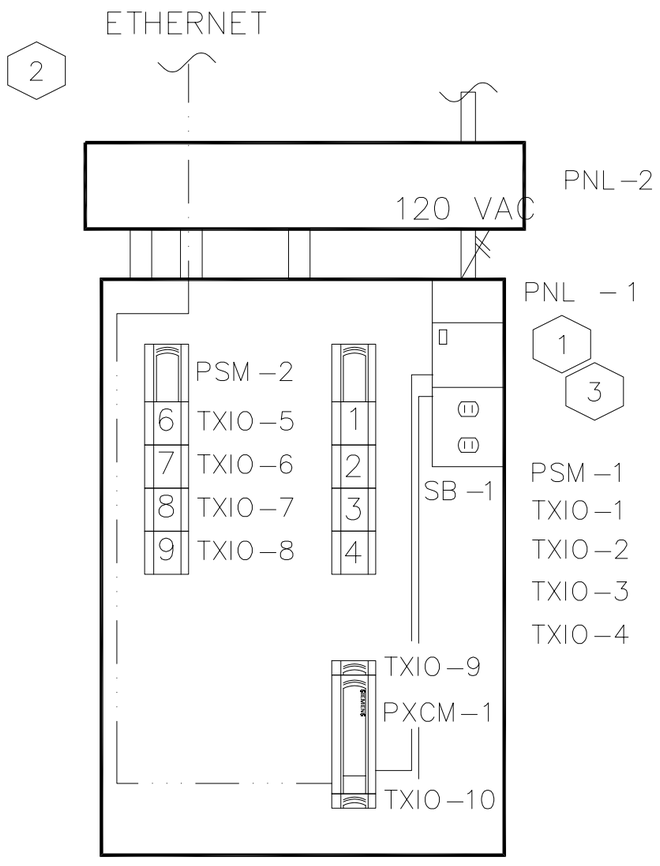
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AK –1
ADDRESS KEYS

INSTALLATION NOTES:

1. COORDINATE WITH ELECTRICAL CONTRACTOR FOR 120VAC POWERS TO PANEL.
2. COORDINATE WITH THE DATA CONTRACTOR FOR NUMBER OF ETHERNET DROPS REQUIRED. DATA CABLING IS PROVIDED AND INSTALLED BY OTHERS.
3. SERVICE BOX CONTROL TRANSFORMER USED TO POWER DDC CONTROLER AND ASSOCIATED CONTROL DEVICES.

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AK 1	1	TXA1.K12	SIEMENS	149476	@ADDRESS KEY 1–12 + RESET KEY
PNL 1	1	PXA–ENC34	SIEMENS	149475	ENCLOSURE ASSY 34
PNL 2	1	TROUGH	N/A	N/A	Custom made Siemens Panel trough
PSM 1–2	2	TXS1.12F4	SIEMENS	149476	24VDC SUPPLY 1200MA, 4 A FUSE
PXCM 1	1	PXC100–E96.A	SIEMENS	149487	PXC MOD, BACNET, TX–I/O, 96 NODE, APOGEE
SB 1	1	PXA–SB115V192VA	SIEMENS	553131	SERVICE BOX 115V, 24VAC, 192VA
TXIO 1	1	TXM1.6R–M	SIEMENS	149476	6 RELAY OUTPUT MODULE W/OVD
TXIO 2	1	TXM1.16D	SIEMENS	149476	16 DIGITAL INPUT MODULE
TXIO 3–4	2	TXM1.8X	SIEMENS	149476	8 UNIV I/O MODULE W/ 4–20MA
TXIO 5	1	TXM1.6R–M	SIEMENS	149476	6 RELAY OUTPUT MODULE W/OVD
TXIO 6	1	TXM1.16D	SIEMENS	149476	16 DIGITAL INPUT MODULE
TXIO 7–8	2	TXM1.8X	SIEMENS	149476	8 UNIV I/O MODULE W/ 4–20MA
TXIO 9	1	PXX–485.3	SIEMENS	149478	PXC MOD EXPANSION MODULE, 3 RS–485
TXIO 10	1	TXS1.EF4	SIEMENS	149476	BUS CONNECTION MODULE, 4A FUSE

1/006 CHW & HW CONTROL PANEL
NOT TO SCALE

REVISION HISTORY

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PXCM - 00000 PXC100-E96.A

PXC MODULAR

Module: 1 / Rail: 1

TXIO - 0000X TXS1.12F4

POWER SUPPLY 24 Vdd 4A

Module: 2 / Rail: 1

TXIO- 00001 TXM1.6R-M

1

19 20 21 | 25 26 27 | 31 32 33

RE 2 EXHAUST FANS

EXHAUST FANS

(4) (5) (6)

CRAWL.SPC.FAN.ENA 0.1.4 L2SL CRAWL.SPC.FAN ENA

CRAWL.SPC.DMPR 0.1.5 LDO CRAWL SPACE DAMPER

0.1.6 LDO

Module: 3 / Rail:1

TXIO- 00002 TXM1.16D

2

18 19 | 20 21 | 22 23 | 24 25 | 26 27 | 28 29 | 30 31 | 32 33

(9) (10) (11) (12) (13) (14) (15) (16)

0.2.9 LDI

0.2.10 LDI

0.2.11 LDI

0.2.12 LDI

0.2.13 LDI

0.2.14 LDI

0.2.15 LDI

0.2.16 LDI

Module: 4 / Rail:1

CHWP.ENA 0.1.1 L2SL PMP ENA ON/OFF

CHLR.ENA 0.1.2 L2SL PMP ENA ON/OFF

GLYCOL.ENA 0.1.3 LDO GLYCOL ENABLE ON/OFF

2 3 4 | 8 9 10 | 14 15 16

(1) (2) (3)

CS 1 CHILL WATER SYSTEM

RE 2 CHILL WATER SYSTEM

GLYCOL SYSTEM

CHWP.ENA 0.2.1 L2SL PMP ENA PROOF

CHLR.ENA 0.2.2 L2SL PMP ENA PROOF

CHWP.ALM 0.2.3 LDI CHILL WATER PMP ALARM STATUS

CHLR.ALM 0.2.4 LDI CHILL WATER PMP ALARM STATUS

1 2 | 3 4 | 5 6 | 7 8

(1) (2) (3) (4)

RE 1 CHILL WATER SYSTEM

CHW & HW SYSTEM PANEL

CHW & HW SYSTEM PANEL

CHW & HW SYSTEM PANEL

LOW GLYCOL.ALM 0.2.5 LDI LOW GLYCOL ALARM STATUS

CRAWL.SPC.FAN.ENA 0.2.6 L2SL CRAWL.SPC FAN ENA PROOF

CRAWL.SPC.DMPR.STS 0.2.7 LDI CRAWL SPC DMPR STS STATUS

0.2.8 LDI

9 10 | 11 12 | 13 14 | 15 16

(5) (6) (7) (8)

GLYCOL SYSTEM

CS 2 EXHAUST FANS

EXHAUST FANS

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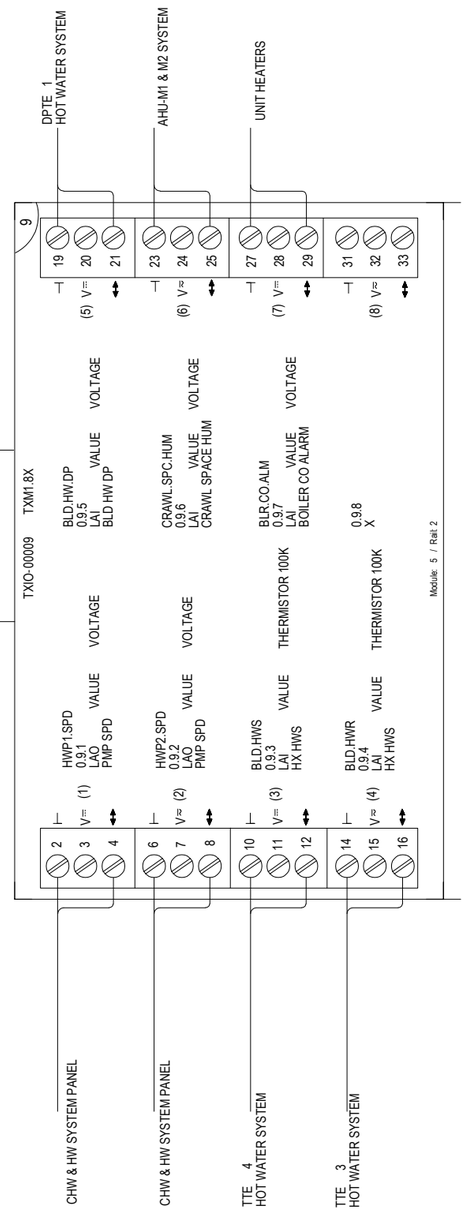
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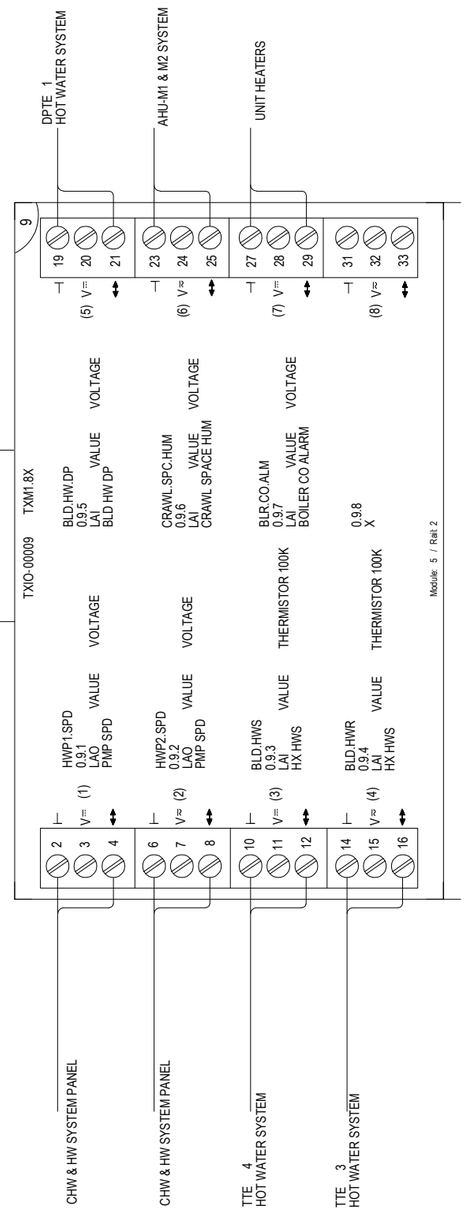
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MAURICE BATHHOUSE CONTROLS
HOT SPRINGS, AR

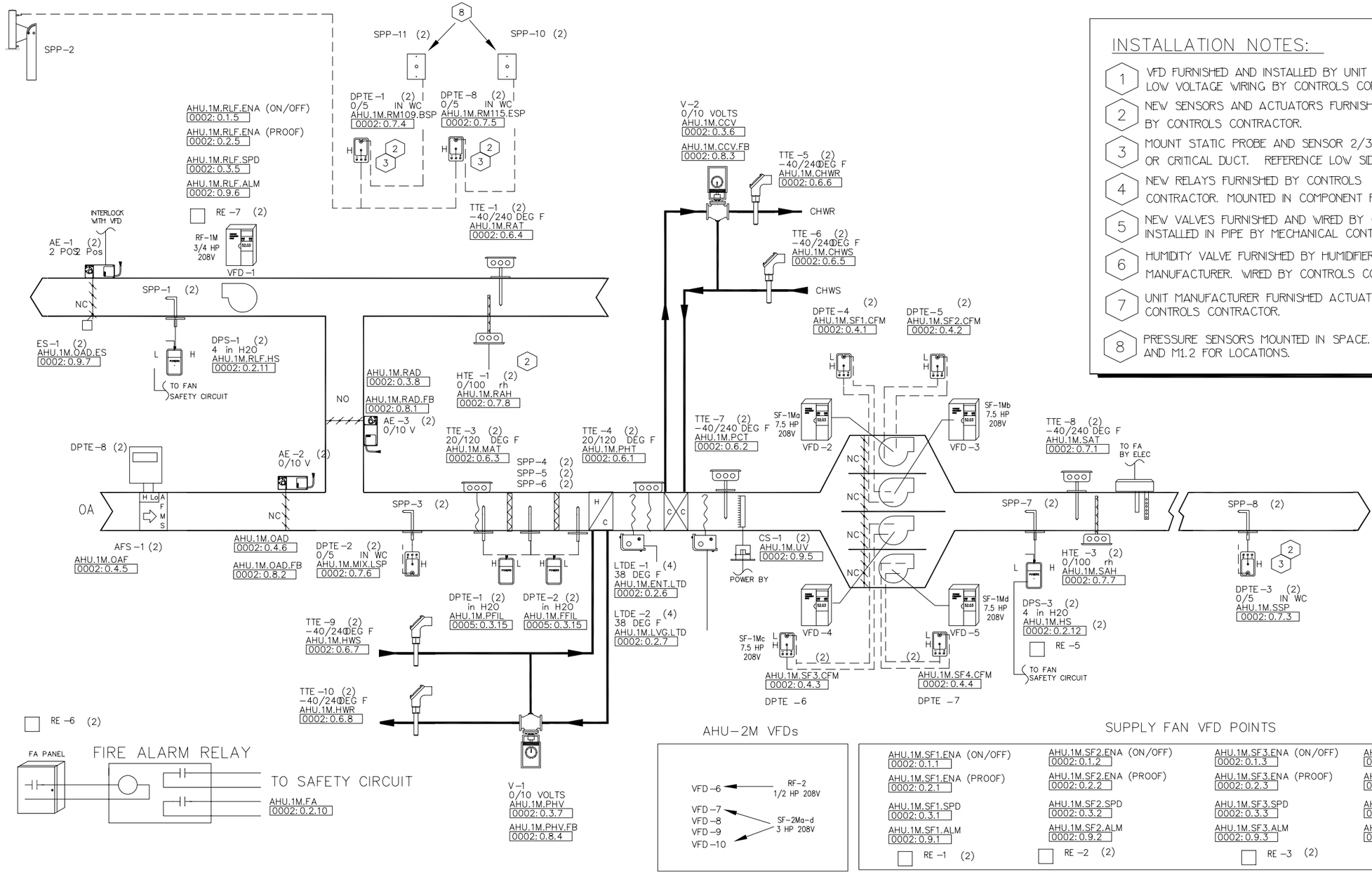
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INSTALLATION NOTES:

1. VFD FURNISHED AND INSTALLED BY UNIT MANUFACTURER. LOW VOLTAGE WIRING BY CONTROLS CONTRACTOR.
2. NEW SENSORS AND ACTUATORS FURNISHED AND INSTALLED BY CONTROLS CONTRACTOR.
3. MOUNT STATIC PROBE AND SENSOR 2/3 DOWN LONGEST OR CRITICAL DUCT. REFERENCE LOW SIDE TO SPACE.
4. NEW RELAYS FURNISHED BY CONTROLS CONTRACTOR. MOUNTED IN COMPONENT PANEL.
5. NEW VALVES FURNISHED AND WIRED BY CONTROLS CONTRACTOR. INSTALLED IN PIPE BY MECHANICAL CONTRACTOR.
6. HUMIDITY VALVE FURNISHED BY HUMIDIFIER MANUFACTURER. WIRED BY CONTROLS CONTRACTOR.
7. UNIT MANUFACTURER FURNISHED ACTUATOR. INSTALLED BY CONTROLS CONTRACTOR.
8. PRESSURE SENSORS MOUNTED IN SPACE. REFER TO SHEETS M1.1 AND M1.2 FOR LOCATIONS.

AHU-2M VFDs

SUPPLY FAN VFD POINTS

AHU.1M.SF1.ENA (ON/OFF) 0002: 0.1.1	AHU.1M.SF2.ENA (ON/OFF) 0002: 0.1.2	AHU.1M.SF3.ENA (ON/OFF) 0002: 0.1.3	AHU.1M.SF4.ENA (ON/OFF) 0002: 0.1.4
AHU.1M.SF1.ENA (PROOF) 0002: 0.2.1	AHU.1M.SF2.ENA (PROOF) 0002: 0.2.2	AHU.1M.SF3.ENA (PROOF) 0002: 0.2.3	AHU.1M.SF4.ENA (PROOF) 0002: 0.2.4
AHU.1M.SF1.SPD 0002: 0.3.1	AHU.1M.SF2.SPD 0002: 0.3.2	AHU.1M.SF3.SPD 0002: 0.3.3	AHU.1M.SF4.SPD 0002: 0.3.4
AHU.1M.SF1.ALM 0002: 0.9.1	AHU.1M.SF2.ALM 0002: 0.9.2	AHU.1M.SF3.ALM 0002: 0.9.3	AHU.1M.SF4.ALM 0002: 0.9.4
RE-1 (2)	RE-2 (2)	RE-3 (2)	RE-4 (2)

1 / 011 AHU.1M & M2 FLOW DIAGRAM
LOCATION: NORTH MECHANICAL ROOM

REF#	FIELD PANEL NAME	FIELD PANEL NODE NAME
0002	AHU-1M.PXM	AHU-1MPXM

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AHU-M1 & M2 SYSTEM

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Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AE 1	2	GCA121.1P	SIEMENS	154001	2 PT SR,24V,MED.PLNM
AE 2-3	4	GCA161.1P	SIEMENS	154001	MOD(V) SR,24V, MED. PLNM
AFS 1	2	VOLU-FLO/OAM	AIR MONITOR CORP	VOLUFLOOAM	Outside Air Monitor
CS 1	2	H608	VERIS	H608	CUR SW SPLTCOR-ADJ SETPT W/LED
DPS 1	2	141-0575	SIEMENS	155 052	AIR FLOW SWITCH.05/12 MAN REST
DPS 3	2	141-0575	SIEMENS	155 052	AIR FLOW SWITCH.05/12 MAN REST
DPTE 1-3	6	PX3ULX05	VERIS INDU	px3_d0118	PX3ULX05,Pressure,Dry,Universal,LCD
DPTE 4-7	8	ELECTRA-FLO	AIR MONITOR	ELECTRAFLO	THERMAL AIRFLOW AFS
DPTE 8	2	PX3ULX05	VERIS INDU	px3_d0118	PX3ULX05,Pressure,Dry,Universal,LCD
ES 1	2	TS-470-2	KELE INC	ts470	DAMPER END SWITCH 2 SPDT
HTE 1-3	6	QFM3160	SIEMENS	149991	DUCT RH & TEMP SENSOR, 0-10V, 2%
LTDE 1	4	134-1504	SIEMENS	155 016	T'STAT, LOW TEMP,15/55,MANUAL
	8	M-648-K	KELE INC	M648K	CAPILLARY MOUNTING CLIP-INDIVIDUAL PIECE
LTDE 2	4	134-1504	SIEMENS	155 016	T'STAT, LOW TEMP,15/55,MANUAL
	8	M-648-K	KELE INC	M648K	CAPILLARY MOUNTING CLIP-INDIVIDUAL PIECE
RE 1-4	8	V120	VERIS	V120	V120, SPDT ENCLOSED RELAY
RE 5-11	14	FKIT-VMD1B-F24A	VERIS	vmd1b	SPDT -F w/-F Socket,24VAC
SPP 1-9	18	A-491	DWYER INST	A-491	6" straight static pressure tip w/flange
SPP 10-11	4	547-100	SIEMENS	rpm	RPM PRESSURE TAP PLATE
TTE 1	2	544-339-18	SIEMENS	149915	DCT PT TEMP, PT 1K OHM (375), 18" RIGID
	2	AQM2000	SIEMENS	129499	MOUNTING FLANGE FOR DUCT TEMP SENSOR
TTE 2	2	544-339-18	SIEMENS	149915	DCT PT TEMP, PT 1K OHM (375), 18" RIGID
	2	AQM2000	SIEMENS	129499	MOUNTING FLANGE FOR DUCT TEMP SENSOR
TTE 3-4	4	544-342-24	SIEMENS	149915	DUCT AV. TMP, 1K OHM, PT(375), 24', FLEX
TTE 5-6	4	544-577-25	SIEMENS	149919	IMMERSION TMP SNSR, PT 1K OHM(375) 2.5"
TTE 7	2	544-339-18	SIEMENS	149915	DCT PT TEMP, PT 1K OHM (375), 18" RIGID
	2	AQM2000	SIEMENS	129499	MOUNTING FLANGE FOR DUCT TEMP SENSOR
TTE 8	2	544-339-18	SIEMENS	149915	DCT PT TEMP, PT 1K OHM (375), 18" RIGID
	2	AQM2000	SIEMENS	129499	MOUNTING FLANGE FOR DUCT TEMP SENSOR
TTE 9-10	4	544-577-25	SIEMENS	149919	IMMERSION TMP SNSR, PT 1K OHM(375) 2.5"
V					SEE VALVE SUBMITTAL
VFD 1	1	H6CPD003	YASKAWA		0.75 HP, 208 V, 3.5 A, 3PH
VFD 2-5	4	H6CPD024	YASKAWA		7.5 HP, 208 V, 24.2 A, 3PH Type 1
VFD 6	1	H6CPD002	YASKAWA		0.5 HP, 208 V, 2.4 A 3PH
VFD 7-10	4	H6CPD010	YASKAWA		3 HP, 208 V, 10.6 A, 3PH Type 1

SEQUENCE OF OPERATION:

WHEN AHU IS INDEXED TO RUN, THE FOLLOWING SHALL OCCUR:

- SUPPLY FANS SHALL BE ENABLED TO RUN.
- WHEN THE SUPPLY FANS HAVE STARTED THE RELIEF FAN SHALL BE ENABLED TO RUN.

SUPPLY FAN OPERATION:

BAS SHALL MODULATE SIGNAL TO SUPPLY FAN VFD'S TO MAINTAIN DUCT STATIC PRESSURE AS MEASURED BY STATIC PRESSURE TRANSMITTER NEAR THE END OF THE CRITICAL DUCT BRANCH.

RELIEF FAN OPERATION:

RETURN FAN SHALL BE ENABLED TO RUN WHENEVER THE SUPPLY FAN IS INDEXED TO RUN. BAS SHALL MODULATE SIGNAL TO RELIEF FAN VFD AS REQUIRED TO MAINTAIN THE BUILDING STATIC PRESSURE AT +0.02" WC (ADJ.). WHEN THE RELIEF FAN IS INDEXED TO RUN THE FAN SHALL NOT START UNTIL THE DAMPER END SWITCH IS PROVEN. WHEN FAN IS INDEXED OFF THE RELIEF DAMPER SHALL CLOSE AND THERE SHALL BE A 30 SECOND DELAY BEFORE THE FAN IS SHUT DOWN.

STATIC PRESSURE RESET:

BAS SHALL RESET SUPPLY DUCT STATIC PRESSURE SETPOINT BELOW THE MAXIMUM SETPOINT AS REQUIRED TO MAINTAIN AT LEAST ONE SUPPLY TAB DAMPER 90% (ADJ.) OPEN. BAS SHALL MONITOR ALL SUPPLY TERMINAL AIR BOX POSITIONS TO RESET THE SUPPLY DUCT DIFFERENTIAL STATIC PRESSURE.

DISCHARGE AIR TEMPERATURE SET POINT:
DISCHARGE AIR SET POINT SHALL BE 55 DEF F (ADJ.).

DISCHARGE AIR TEMPERATURE RESET:

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RESET DISCHARGE AIR TEMPERATURE BASED ON THE ZONE WITH THE GREATEST CALL FOR COOLING. RESET THE TEMPERATURE AS FOLLOWS:

- WHEN WORST CASE TAB IS LESS THAN 90% (ADJ.) OPEN FOR TEN MINUTES (ADJ.) THEN THE DISCHARGE AIR TEMPERATURE SHALL INCREASE BY 1 DEG F (ADJ.). THIS SHALL CONTINUE UNTIL AHU MAXIMUM DISCHARGE AIR TEMPERATURE OF 60 DEG F (ADJ.) IS ACHIEVED.
- WHEN WORST CASE TAB IS MORE THAN 90% OPEN FOR TEN MINUTES (ADJ.) THEN THE DISCHARGE AIR TEMPERATURE SHALL DROP BY 1 DEG F (ADJ.).THIS SHALL CONTINUE UNTIL AHU MINIMUM DISCHARGE AIR TEMPERATURE OF 52 DEG F (ADJ.) IS ACHIEVED.
- THE MAXIMUM ALLOWABLE RETURN AIR HUMIDITY SETPOINT SHALL BE 60% (ADJ.). IF RETURN AIR HUMIDITY IS GREATER THAN SETPOINT, RESET DISCHARGE AIR TEMPERATURE TO 55 DEG F UNTIL RETURN AIR HUMIDITY IS 5% LESS THAN MAXIMUM SETPOINT FOR 10 MINUTES (ADJ.).

COOLING COIL OPERATION:

BAS SHALL MODULATE CHILLED WATER CONTROL VALVE AS REQUIRED TO MAINTAIN DISCHARGE AIR TEMPERATURE SET POINT.

PREHEAT COIL OPERATION:

PREHEAT COIL CONTROLS SHALL BE ENABLED WHEN OUTSIDE AIR TEMP DROPS BELOW 50 DEG F (ADJ.). PREHEAT COIL CONTROLS SHALL BE DISABLED WHEN OUTSIDE AIR TEMP RISES ABOVE 54 DEF F (ADJ.).

BAS SHALL MODULATE HEATING WATER CONTROL VALVE AS REQUIRED TO MAINTAIN DISCHARGE AIR TEMPERATURE SET POINT.

BYPASS VALVE CONTROL (WHERE SHOWN):

THE MINIMUM FLOW BYPASS CONTROL VALVE SHALL MODULATE OPEN PROPORTIONATELY AS THE ASSOCIATED COIL CONTROL VALVE CLOSES.

DEHUMIDIFICATION:

THE BAS SHALL MEASURE THE RETURN AIR HUMIDITY AND OVERRIDE THE COOLING SYSTEM TO MAINTAIN RETURN AIR HUMIDITY AT OR BELOW 55%. DEHUMIDIFICATION SHALL BE ENABLED WHENEVER THE SUPPLY FAN STATUS IS ON. DURING THE DEHUMIDIFICATION CYCLE THE COOLING COIL VALVE SHALL MODULATE TO MAINTAIN 50?F (ADJ.) SETPOINT AS SENSED BY THE COOLING COIL DISCHARGE AIR TEMP SENSOR. THE CHILLED WATER VALVE SHALL RETURN TO NORMAL OPERATION WHEN THE RA % RH IS BELOW 55% RH (ADJ.)

ULTRAVIOLET LIGHT MONITOR:

THE BAS WILL MONITOR THE OUTPUT POWER OF THE UV LIGHTS, THROUGH A RADIOMETER, AND WILL ALARM THE SYSTEM OPERATOR WHEN THE LEVEL DROPS BELOW ITS REPLACEMENT SETPOINT. UV LIGHTS WILL BE INTERLOCKED WITH DOOR SWITCHES IN ADJACENT ACCESS DOORS TO SHUT OFF LIGHTS WHENEVER THOSE DOORS ARE OPENED.

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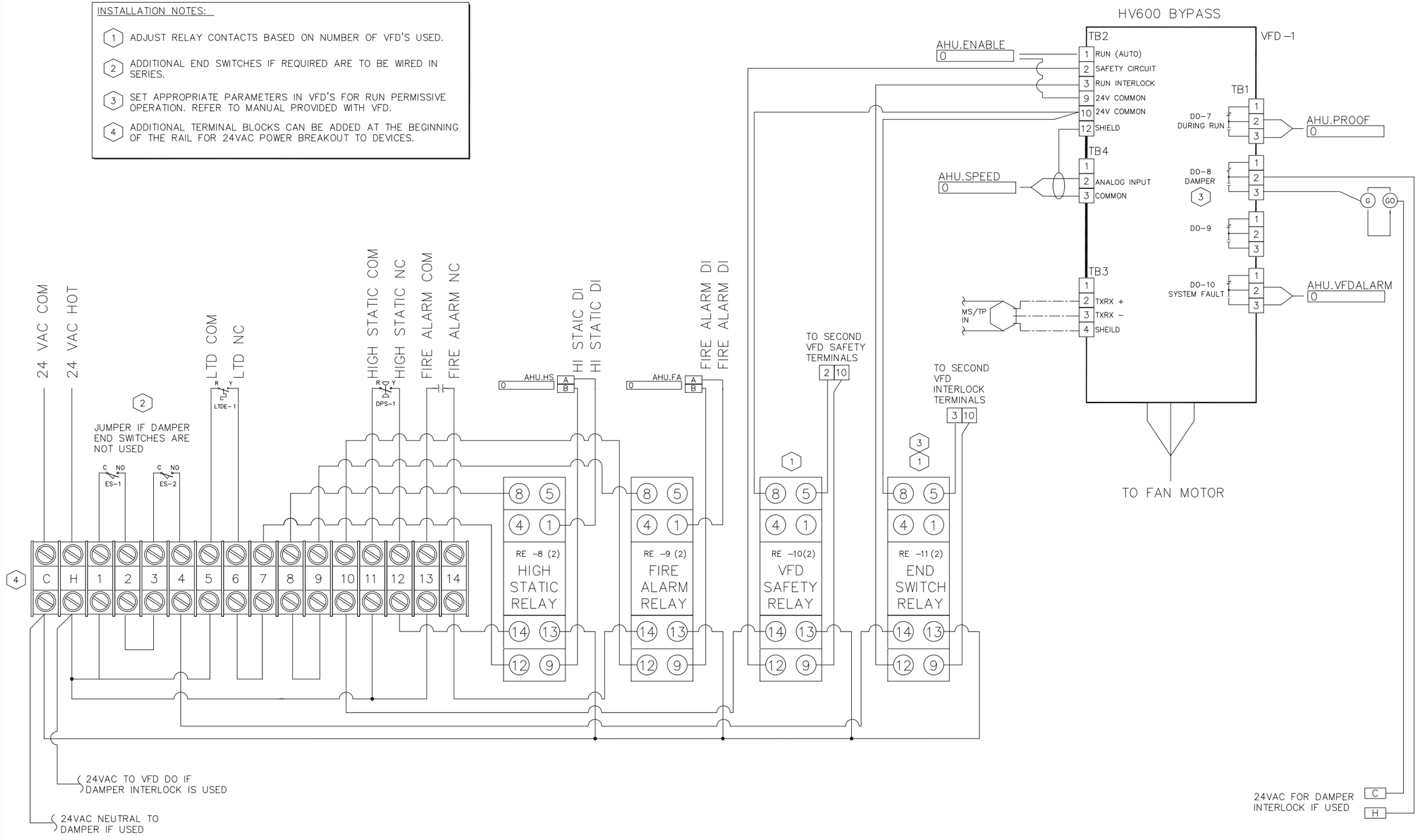
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INSTALLATION NOTES:

1. ADJUST RELAY CONTACTS BASED ON NUMBER OF VFD'S USED.
2. ADDITIONAL END SWITCHES IF REQUIRED ARE TO BE WIRED IN SERIES.
3. SET APPROPRIATE PARAMETERS IN VFD'S FOR RUN PERMISSIVE OPERATION. REFER TO MANUAL PROVIDED WITH VFD.
4. ADDITIONAL TERMINAL BLOCKS CAN BE ADDED AT THE BEGINNING OF THE RAIL FOR 24VAC POWER BREAKOUT TO DEVICES.



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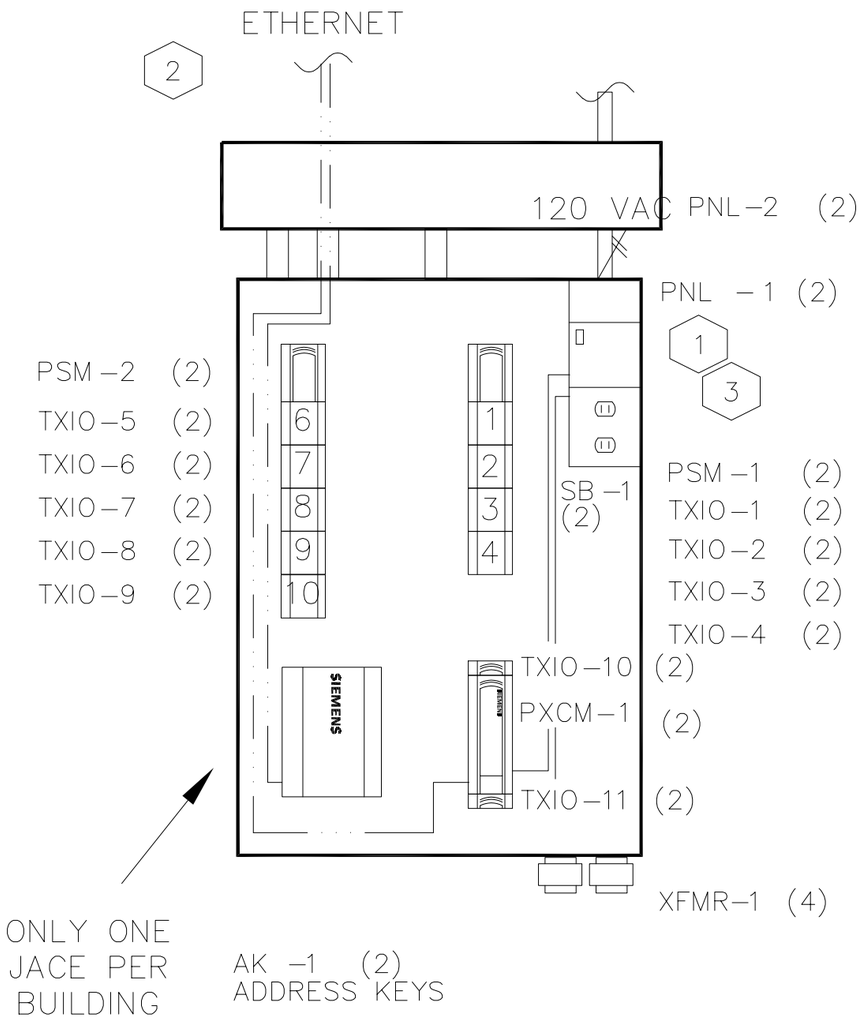
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AHU-M1 & M2 SYSTEM SAFETY

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1/015 AHU-M1 AND M2 CONTROL PANEL

TYPICAL OF TWO
JACE CONTROLLER LOCATED IN AHU-M1 ONLY

INSTALLATION NOTES:

1. COORDINATE WITH ELECTRICAL CONTRACTOR FOR 120VAC POWERS TO PANEL.
2. COORDINATE WITH THE DATA CONTRACTOR FOR NUMBER OF ETHERNET DROPS REQUIRED. DATA CABLING IS PROVIDED AND INSTALLED BY OTHERS.
3. SERVICE BOX CONTROL TRANSFORMER USED TO POWER DDC CONTROLER AND ASSOCIATED CONTROL DEVICES.
4. TRANSFORMER USED FOR DXR(S) POWER TRUNK(S). NO MORE THAN 8 DXRS TO A POWER TRUNK.

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AK 1	2	TXA1.K12	SIEMENS	149476	@ADDRESS KEY 1-12 + RESET KEY
PNL 1	2	PXA-ENC34	SIEMENS	149475	ENCLOSURE ASSY 34
PNL 2	2	TROUGH	N/A	N/A	Custom made Siemens Panel trough
PSM 1-2	4	TXS1.12F4	SIEMENS	149476	24VDC SUPPLY 1200MA, 4 A FUSE
PXCM 1	2	PXC100-E96.A	SIEMENS	149487	PXC MOD, BACNET, TX-I/O, 96 NODE, APOGEE
SB 1	2	PXA-SB115V192VA	SIEMENS	553131	SERVICE BOX 115V, 24VAC, 192VA
TXIO 1	2	TXM1.6R-M	SIEMENS	149476	6 RELAY OUTPUT MODULE W/OVD
TXIO 2	2	TXM1.16D	SIEMENS	149476	16 DIGITAL INPUT MODULE
TXIO 3	2	TXM1.8X-ML	SIEMENS	149476	8 UNIV I/O W/ 4-20MA, OVD&LCD
TXIO 4	2	TXM1.8X	SIEMENS	149476	8 UNIV I/O MODULE W/ 4-20MA
TXIO 5-8	8	TXM1.8U	SIEMENS	149476	8 UNIVERSAL I/O MODULE
TXIO 9	2	TXM1.6R	SIEMENS	149476	6 RELAY OUTPUT MODULE
TXIO 10	2	PXX-485.3	SIEMENS	149478	PXC MOD EXPANSION MODULE, 3 RS-485
TXIO 11	2	TXS1.EF4	SIEMENS	149476	BUS CONNECTION MODULE, 4A FUSE
XFMR ___ 1	4	X100CAA	VERIS	x_d	XFrmr,100VA,120-24VAC,CB,Ft & Single Hub

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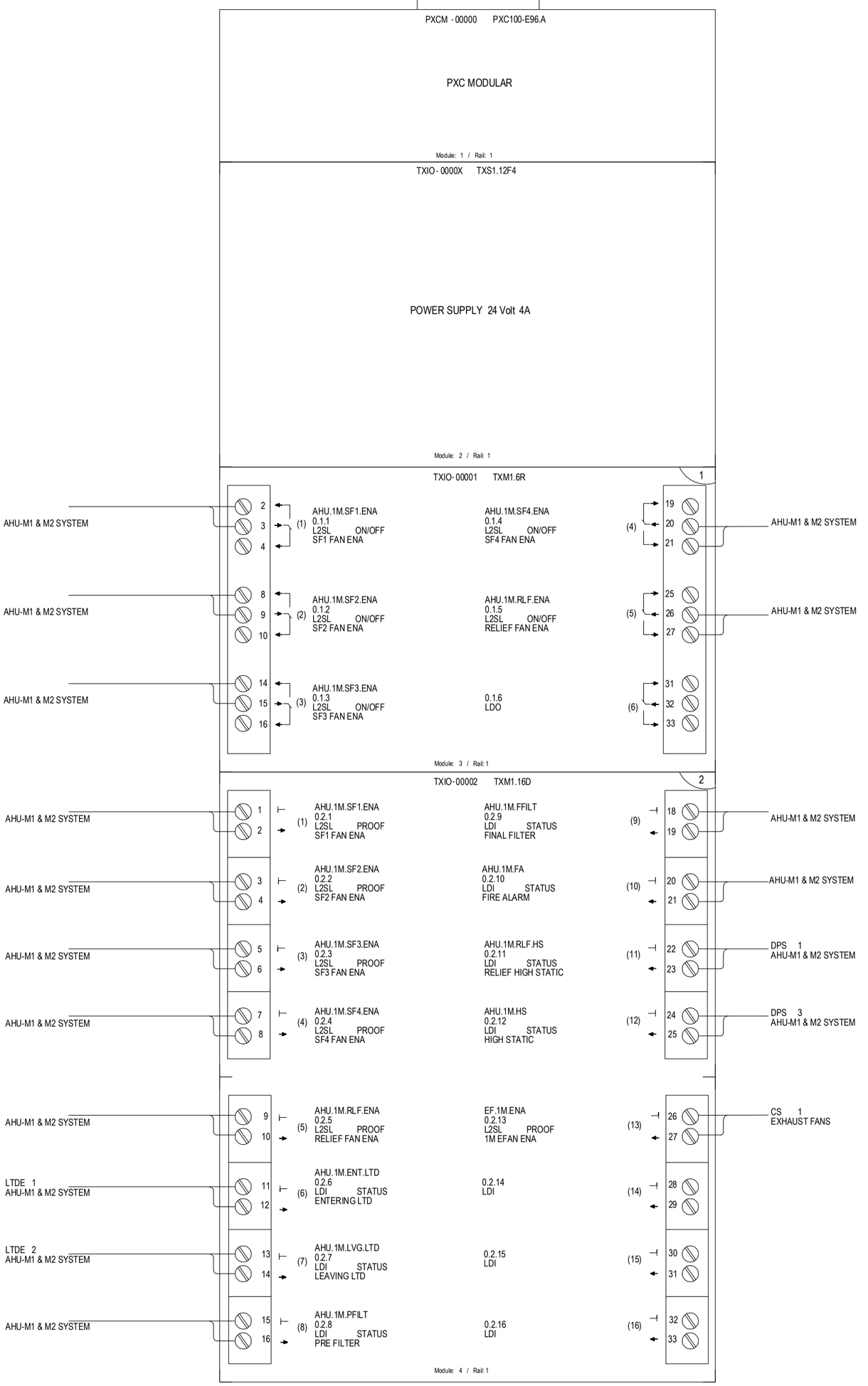
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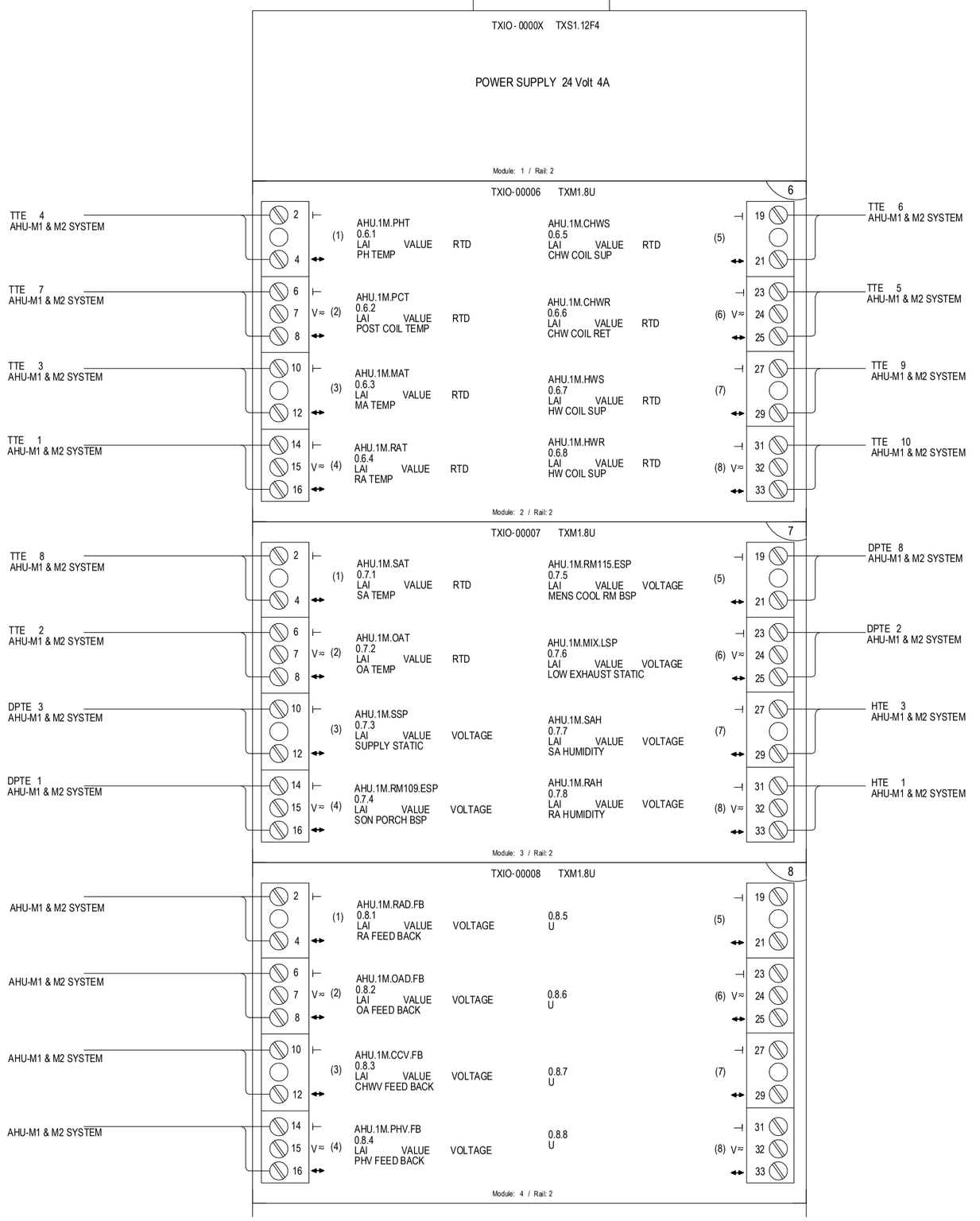
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PXCM - 00000 PXC100-E96.A

PXC MODULAR

Module: 1 / Rail: 1

TXIO - 0000X TXS1.12F4

POWER SUPPLY 24 Volt 4A

Module: 2 / Rail: 1

TXIO- 00001 TXM1.6R

AHU.2M.SF4.ENA 0.1.4 L2SL SF4 FAN ENA	AHU.2M.RLF.ENA 0.1.5 L2SL RELIEF FAN ENA	0.1.6 LDO										
AHU-M1 & M2 SYSTEM	AHU-M1 & M2 SYSTEM											
19 20 21	25 26 27	31 32 33										
(4)	(5)	(6)										
AHU.2M.SF1.ENA 0.1.1 L2SL SF1 FAN ENA	AHU.2M.SF2.ENA 0.1.2 L2SL SF2 FAN ENA	AHU.2M.SF3.ENA 0.1.3 L2SL SF3 FAN ENA										
(1)	(2)	(3)										
2 3 4	8 9 10	14 15 16										
AHU-M1 & M2 SYSTEM	AHU-M1 & M2 SYSTEM	AHU-M1 & M2 SYSTEM										

Module: 3 / Rail: 1

TXIO- 00002 TXM1.16D

AHU.2M.FFILT 0.2.9 LDI STATUS FINAL FILTER	AHU.2M.FA 0.2.10 LDI STATUS FIRE ALARM	AHU.2M.RLF.HS 0.2.11 LDI STATUS RELIEF HIGH STATIC	AHU.2M.HS 0.2.12 LDI STATUS HIGH STATIC	0.2.13 LDI	0.2.14 LDI	0.2.15 LDI	0.2.16 LDI					
AHU-M1 & M2 SYSTEM	AHU-M1 & M2 SYSTEM	AHU-M1 & M2 SYSTEM	AHU-M1 & M2 SYSTEM									
18 19	20 21	22 23	24 25	26 27	28 29	30 31	32 33					
(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)					
AHU.2M.SF1.ENA 0.2.1 L2SL SF1 FAN ENA	AHU.2M.SF2.ENA 0.2.2 L2SL SF2 FAN ENA	AHU.2M.SF3.ENA 0.2.3 L2SL SF3 FAN ENA	AHU.2M.SF4.ENA 0.2.4 L2SL SF4 FAN ENA	AHU.2M.RLF.ENA 0.2.5 L2SL RELIEF FAN ENA	AHU.2M.ENT.LTD 0.2.6 LDI ENTERING LTD	AHU.2M.LVG.LTD 0.2.7 LDI LEAVING LTD	AHU.2M.PFILT 0.2.8 LDI PRE FILTER					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)					
1 2	3 4	5 6	7 8	9 10	11 12	13 14	15 16					
AHU-M1 & M2 SYSTEM	AHU-M1 & M2 SYSTEM	AHU-M1 & M2 SYSTEM	AHU-M1 & M2 SYSTEM	AHU-M1 & M2 SYSTEM	AHU-M1 & M2 SYSTEM	AHU-M1 & M2 SYSTEM	AHU-M1 & M2 SYSTEM					

Module: 4 / Rail: 1

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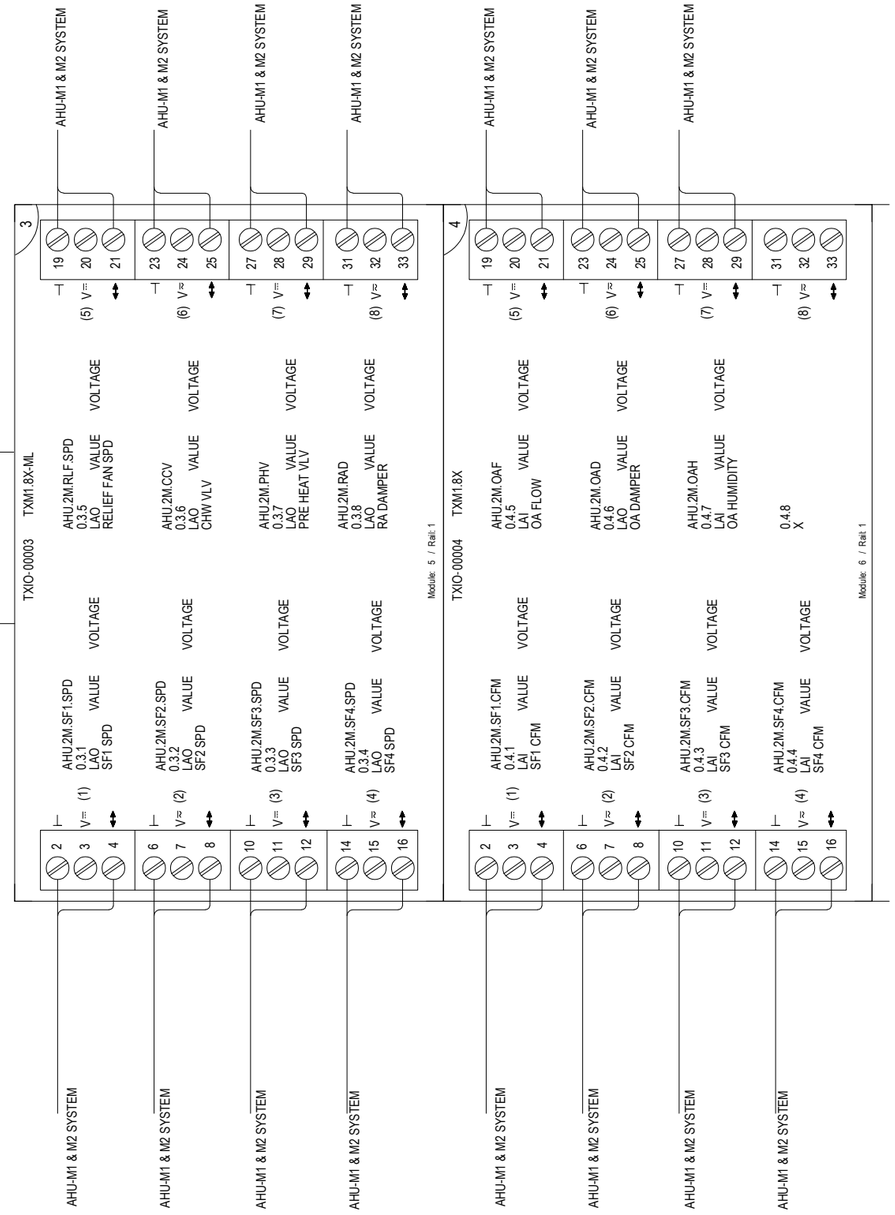
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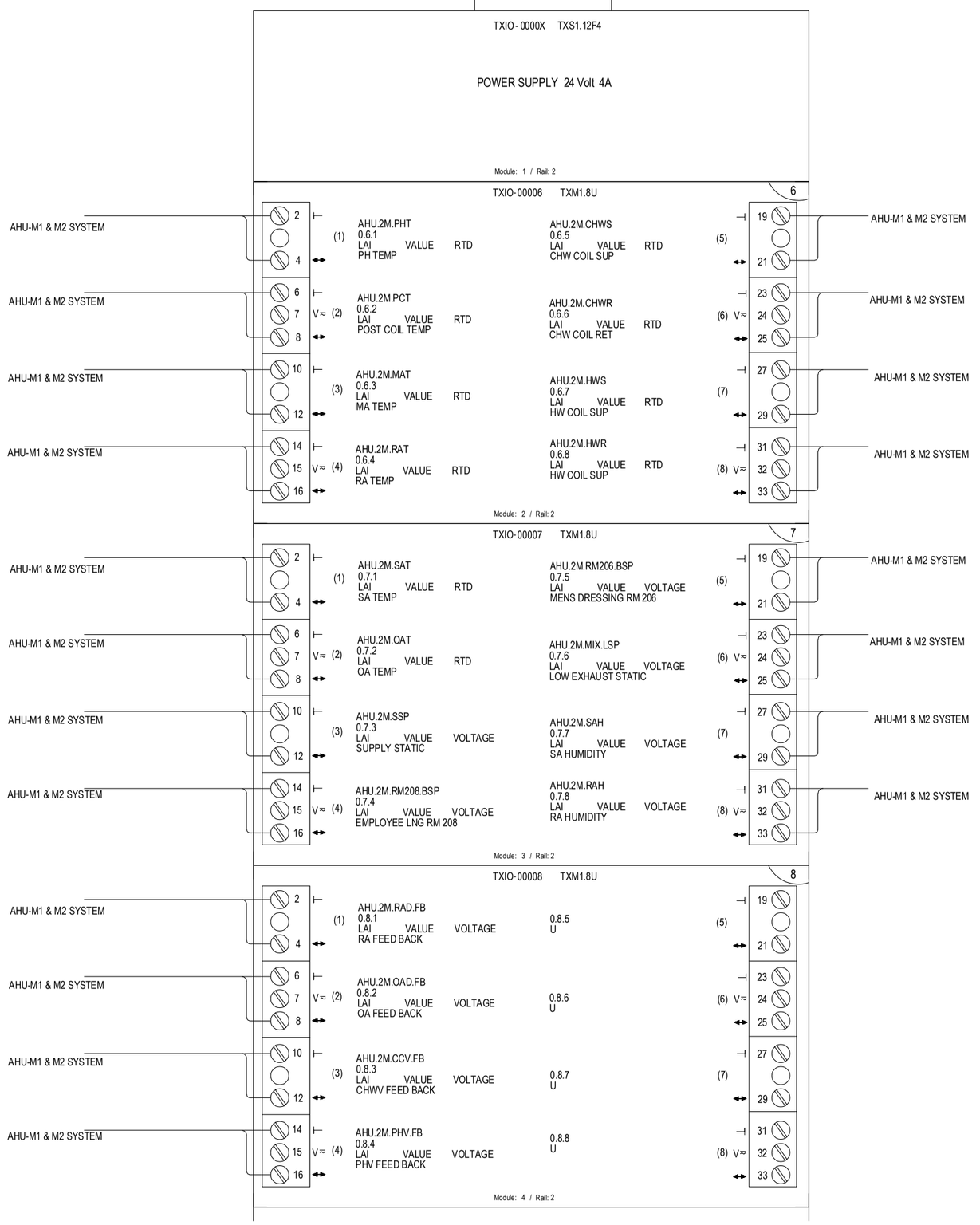
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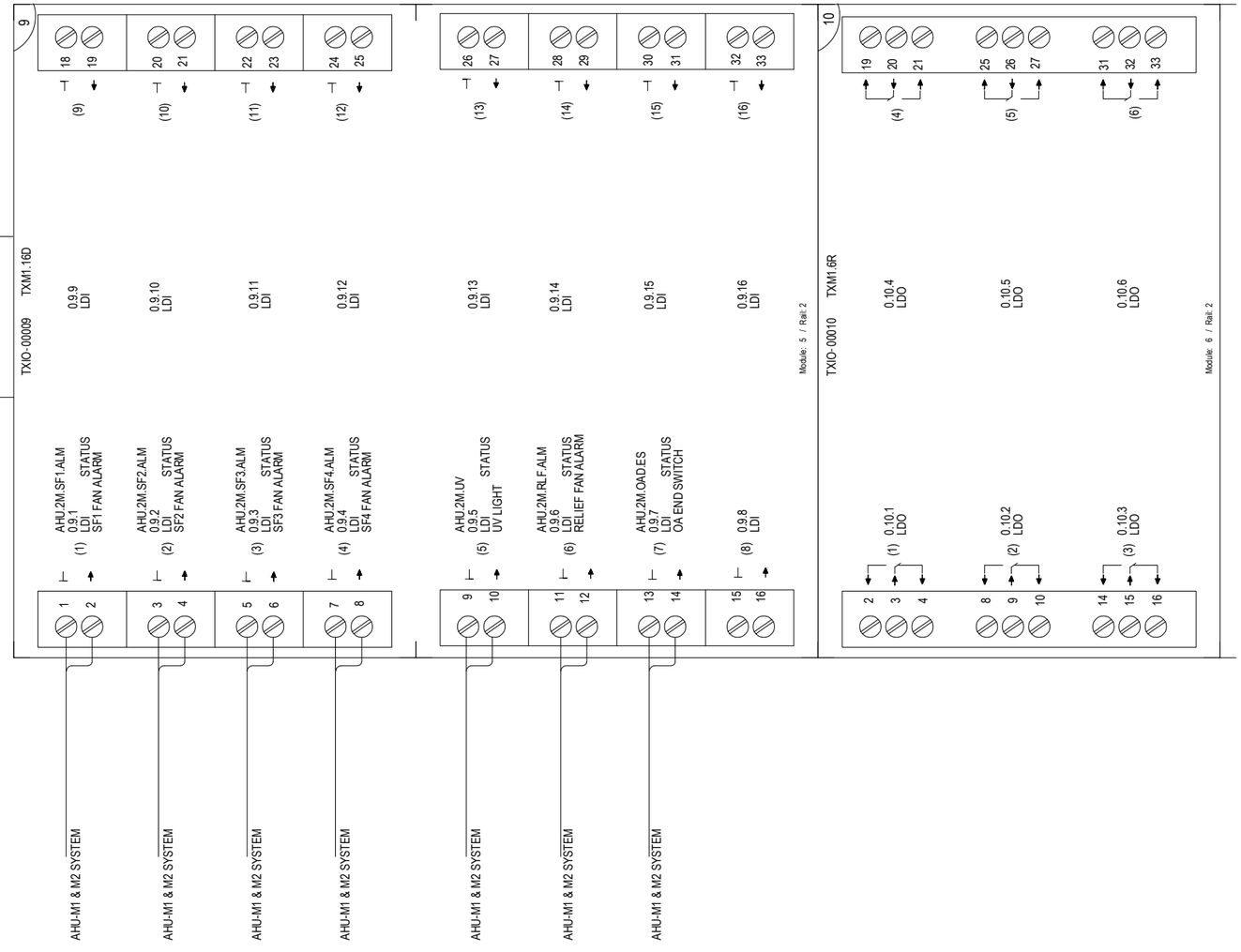
MAURICE BATHHOUSE CONTROLS
HOT SPRINGS, AR

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
MAP	MAP	JAD	10/03/25	10/06/25

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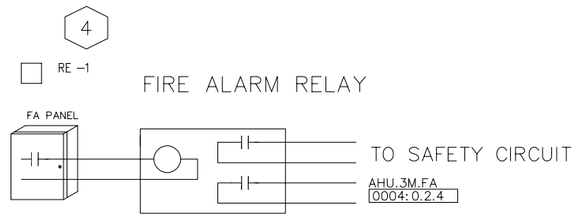
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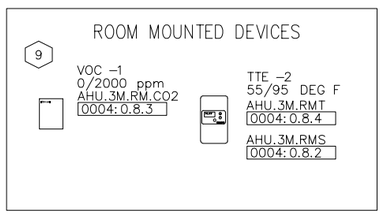
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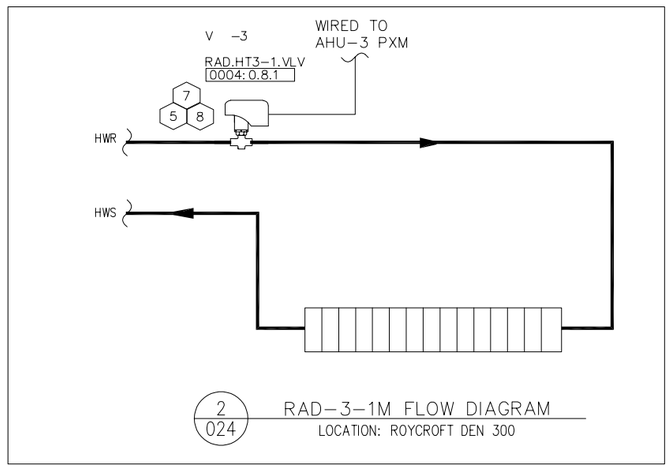
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INSTALLATION NOTES:

1. VFD FURNISHED AND INSTALLED BY UNIT MANUFACTURER. LOW VOLTAGE WIRING BY CONTROLS CONTRACTOR.
2. NEW SENSORS AND ACTUATORS FURNISHED AND INSTALLED BY CONTROLS CONTRACTOR.
3. MOUNT STATIC PROBE AND SENSOR 2/3 DOWN LONGEST OR CRITICAL DUCT. REFERENCE LOW SIDE TO SPACE.
4. NEW RELAYS FURNISHED BY CONTROLS CONTRACTOR. MOUNTED IN COMPONENT PANEL.
5. NEW VALVES FURNISHED AND WIRED BY CONTROLS CONTRACTOR. INSTALLED IN PIPE BY MECHANICAL CONTRACTOR.
6. DRAIN PAN MOISTURE SENSOR INSTALLED BY CONTROLS AND INTERLOCK FOR SAFETY SHUTDOWN.
7. NEW ROOM SENSORS FURNISHED AND INSTALLED BY CONTROLS CONTRACTOR.
8. PERIMETER RADIANT HEATER WIRED TO AHU-3M NEW CONTROL PANEL.





1/024 AHU-M3 FLOW DIAGRAM
LOCATION: SECOND FLOOR

2/024 RAD-3-1M FLOW DIAGRAM
LOCATION: ROYCROFT DEN 300

REF#	FIELD PANEL NAME	FIELD PANEL NODE NAME
0004	AHU-3M.PXM	MARAHU-3MPXM

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AHU-M3 SYSTEM

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Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AE 2-3	2	GCA161.1P	SIEMENS	154001	MOD(V) SR,24V, MED. PLNM
AFS 1	1	VOLU-FLO/OAM	AIR MONITOR CORP	VOLUFLOOAM	Outside Air Monitor
CS 1	1	H608	VERIS	H608	CUR SW SPLTCOR-ADJ SETPT W/LED
DPTE 1-2	2	141-0574	SIEMENS	155 052	AIR FLOW SWITCH .05-1.0 WC
DPTE 3	1	PX3ULX05	VERIS INDU	px3_d0118	PX3ULX05,Pressure,Dry,Universal,LCD
DPTE 4	1	ELECTRA-FLO	AIR MONITOR	ELECTRAFLO	THERMAL AIRFLOW AFS
DPTE 5	1	DPT 2500	N/A	DPT2500	DPT 2500 VELTRON - RANGE 0 - 2.0 "WG - N
HTE 1	1	QFM3160	SIEMENS	149991	DUCT RH & TEMP SENSOR, 0-10V, 2%
HTE 3	1	QFM3160	SIEMENS	149991	DUCT RH & TEMP SENSOR, 0-10V, 2%
LTDE 2	2	134-1504	SIEMENS	155 016	T'STAT, LOW TEMP,15/55,MANUAL
	8	M-648-K	KELE INC	M648K	CAPILLARY MOUNTING CLIP-INDIVIDUAL PIECE
RE 1	1	FKIT-VMD1B-F24A	VERIS	vmd1b	SPDT -F w/-F Socket,24VAC
RE 2	1	V120	VERIS	V120	V120, SPDT ENCLOSED RELAY
RE 3-6	4	FKIT-VMD1B-F24A	VERIS	vmd1b	SPDT -F w/-F Socket,24VAC
SPP 1-4	4	A-491	DWYER INST	A-491	6" straight static pressure tip w/flange
TTE 1	1	544-339-18	SIEMENS	149915	DCT PT TEMP, PT 1K OHM (375), 18" RIGID
	1	AQM2000	SIEMENS	129499	MOUNTING FLANGE FOR DUCT TEMP SENSOR
TTE 2	1	QAA2212.FWSN	SIEMENS	149714	RTS, 1K OHM PT (385), FULL HMI
TTE 3-4	2	544-342-24	SIEMENS	149915	DUCT AV. TMP, 1K OHM, PT(375), 24', FLEX
TTE 5-6	2	544-577-25	SIEMENS	149919	IMMERSION TMP SNSR, PT 1K OHM(375) 2.5"
TTE 8	1	544-339-18	SIEMENS	149915	DCT PT TEMP, PT 1K OHM (375), 18" RIGID
	1	AQM2000	SIEMENS	129499	MOUNTING FLANGE FOR DUCT TEMP SENSOR
TTE 9-10	2	544-577-25	SIEMENS	149919	IMMERSION TMP SNSR, PT 1K OHM(375) 2.5"
V					SEE VALVE SUBMITTAL
VFD 1	1	H6CPD016	YASKAWA		5 HP, 208 V, 16.7 A, 3PH Type 1
VOC 1	1	QPA2000	SIEMENS	149910	ROOM CO2 SENSOR, 0-10V

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
WS 1	1	3000543	KELE INC	3000543	AQUASWITCH WATER DETECTING SENSOR

SEQUENCE OF OPERATION:

WHEN AHU IS INDEXED TO RUN, THE FOLLOWING SHALL OCCUR:

- SUPPLY FANS SHALL BE ENABLED TO RUN.
- WHEN THE SUPPLY FANS HAVE STARTED THE RELIEF FAN SHALL BE ENABLED TO RUN.

SUPPLY FAN OPERATION:
BAS SHALL MODULATE SIGNAL TO SUPPLY FAN VFD'S TO MAINTAIN DUCT STATIC PRESSURE AS MEASURED BY STATIC PRESSURE TRANSMITTER NEAR THE END OF THE CRITICAL DUCT BRANCH.

RELIEF FAN OPERATION:
RELIEF FAN SHALL BE ENABLED TO RUN WHENEVER THE SUPPLY FAN IS INDEXED TO RUN. BAS SHALL MODULATE SIGNAL TO RELIEF FAN VFD AS REQUIRED TO MAINTAIN THE BUILDING STATIC PRESSURE AT +0.02" WC (ADJ.). WHEN THE RELIEF FAN IS INDEXED TO RUN THE FAN SHALL NOT START UNTIL THE DAMPER END SWITCH IS PROVEN. WHEN FAN IS INDEXED OFF, THE RELIEF DAMPER SHALL CLOSE AND THERE SHALL BE A 30 SECOND
DELAY BEFORE THE FAN IS SHUT DOWN.

SUPPLY FAN AND CONTROL VALVE OPERATION:
THE BAS WILL MODULATE THE SUPPLY FAN, COOLING CONTROL VALVE, AND HEATING CONTROL VALVE TO ACHIEVE THE ROOM TEMPERATURE OF 72 DEG F (ADJ.) WITH DEG 5 DEG F (ADJ.) DEAD BAND BASED ON A SIGNAL FROM A WALL MOUNTED TEMPERATURE SENSOR. SEE DRAWINGS FOR TEMPERATURE SENSOR REQUIREMENTS. SPACES WITH ADJUSTABLE THERMOSTATS WILL ALLOW A +/- DEG F (ADJ.) OFFSET FROM THE SETPOINT.

- AT A FULL COOLING, THE SUPPLY FAN IS AT MAXIMUM COOLING CFM SPEED AND THE COOLING CONTROL VALVE SHALL BE OPEN TO MAINTAIN 55 DEG F (ADJ) DISCHARGE AIR TEMPERATURE.
- AS THE ROOM AIR TEMPERATURE FALLS, THE SUPPLY FAN SHALL RAMP DOWN TO MAINTAIN ROOM TEMPERATURE SET POINT WHILE MAINTAINING A 55 DEG F (ADJ) DISCHARGE AIR TEMPERATURE SET POINT.
- ON A FURTHER FALL IN ROOM TEMPERATURE, THE SUPPLY FAN WILL REMAIN AT MINIMUM SPEED AND THE COOLING CONTROL VALVE SHALL MODULATE TO MAINTAIN ROOM AIR TEMPERATURE SET POINT. WHEN THE SUPPLY FAN IS AT MINIMUM SPEED THE AHU DISCHARGE AIR TEMPERATURE SHALL NOT CONTROL THE COOLING CONTROL VALVE.
- UPON A FURTHER FALL IN SPACE TEMPERATURE, THE BAS WILL MODULATE THE PERIMETER RADIATION CONTROL VALVES OPEN AS REQUIRED TO MAINTAIN THE SPACE TEMPERATURE.
- ON A FURTHER REDUCTION IN ROOM TEMPERATURE, THE HEATING CONTROL VALVE SHALL MODULATE OPEN TO MAINTAIN ROOM AIR TEMPERATURE SET POINT. THE DISCHARGE AIR TEMPERATURE SHALL NOT RISE ABOVE 95 DEG F AS THE HEATING CONTROL VALVE OPENS. THE SUPPLY FAN SHALL REMAIN AT MINIMUM HEATING CFM.
- ONCE THE HEATING CONTROL VALVE IS MAINTAINING 95 DEG F DISCHARGE AIR, THE SUPPLY FAN SPEED SHALL RAMP UP TO MAXIMUM HEATING SPEED TO MAINTAIN ROOM AIR TEMPERATURE SET POINT.

STATIC PRESSURE AND DISCHARGE AIR TEMPERATURE RESET PRIORITY: RESET THE DISCHARGE AIR TEMPERATURE PRIOR TO RESETTING THE DUCTWORK STATIC PRESSURE SETPOINT. ONCE THE MAXIMUM SUPPLY TEMPERATURE IS REACHED THEN THE SYSTEM SHALL ENABLE THE STATIC PRESSURE RESET

DEMAND CONTROL VENTILATION:
WHENEVER THE AIR HANDLING UNIT IS IN OCCUPIED MODE, THE OUTSIDE AIR DAMPER SHALL MODULATE OPEN. THE RETURN AIR AND OUTSIDE AIR DAMPER SHALL MODULATE IN OPPOSITION TO MAINTAIN THE MINIMUM OUTSIDE AIR FLOW RATE AS MEASURED AT THE OUTSIDE AIRFLOW MEASURING STATION. THE MINIMUM OUTSIDE AIR FLOW RATE SHALL BE RESET AS

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AHU-M3 SYSTEM BOM

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FOLLOWS:

- DURING OCCUPIED MODE, THE MINIMUM OA FLOW RATE SHALL NOT FALL BELOW THE AMOUNT LISTED IN THE AHU SCHEDULE.
- IF THE CO2 CONCENTRATION IS ABOVE ITS SCHEDULED SETPOINT, THE MINIMUM OA SETPOINT SHALL INCREASE UNTIL THE CO2 SETPOINT IS SATISFIED OR UNTIL THE DESIGN OCCUPIED HIGH MINIMUM OUTSIDE AIR FLOW ON THE AHU SCHEDULE IS REACHED.
- IF THE CO2 CONCENTRATION DROPS BELOW THE SCHEDULED CO2 SETPOINT, THE MINIMUM OUTSIDE AIR RATE SHALL BE RESET LOWER UNTIL THE CO2 CONCENTRATION REACHES ITS SETPOINT OR UNTIL THE AHU OUTSIDE AIR FLOW RATE REACHES THE MINIMUM OA RATE IN AHU SCHEDULE.

DEHUMIDIFICATION:

THE BAS SHALL MEASURE THE RETURN AIR HUMIDITY AND OVERRIDE THE COOLING SYSTEM TO MAINTAIN RETURN AIR HUMIDITY AT OR BELOW 55%. DEHUMIDIFICATION SHALL BE ENABLED WHENEVER THE SUPPLY FAN STATUS IS ON. DURING THE DEHUMIDIFICATION CYCLE THE COOLING COIL VALVE SHALL MODULATE TO MAINTAIN 50 DEG F (ADJ.) SETPOINT AS SENSED BY THE COOLING COIL DISCHARGE AIR TEMP SENSOR. THE CHILLED WATER VALVE SHALL RETURN TO NORMAL OPERATION WHEN THE RA % RH IS BELOW 55% RH (ADJ.)

ULTRAVIOLET LIGHT MONITOR:

THE BAS WILL MONITOR THE OUTPUT POWER OF THE UV LIGHTS, THROUGH A RADIOMETER, AND WILL ALARM THE SYSTEM OPERATOR WHEN THE LEVEL DROPS BELOW ITS REPLACEMENT SETPOINT. UV LIGHTS WILL BE INTERLOCKED WITH DOOR SWITCHES IN ADJACENT ACCESS DOORS TO SHUT OFF LIGHTS WHENEVER THOSE DOORS ARE OPENED.

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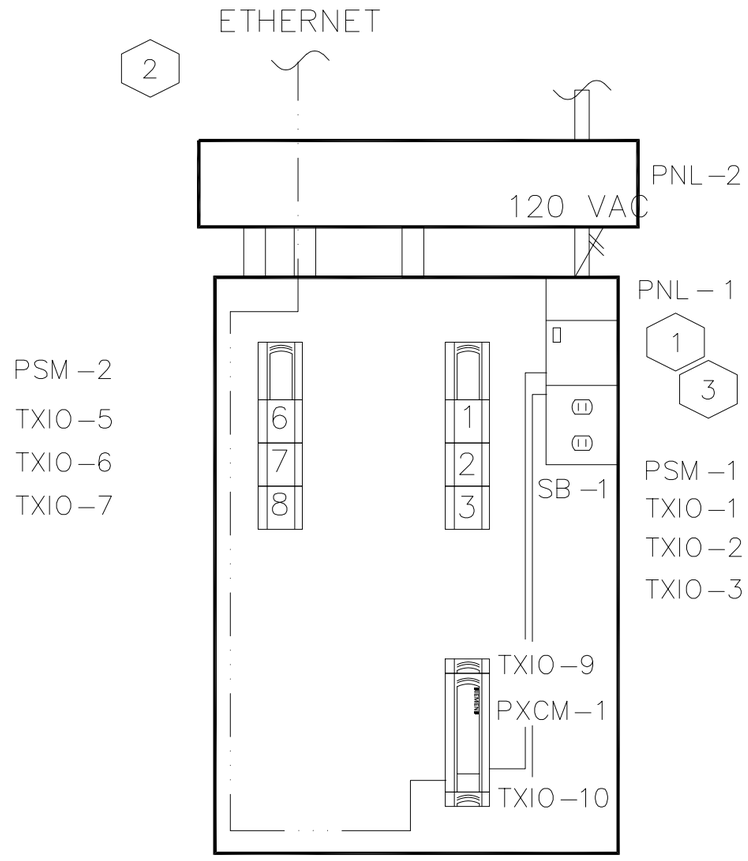
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AK –1
ADDRESS KEYS

INSTALLATION NOTES:

1. COORDINATE WITH ELECTRICAL CONTRACTOR FOR 120VAC POWERS TO PANEL.
2. COORDINATE WITH THE DATA CONTRACTOR FOR NUMBER OF ETHERNET DROPS REQUIRED. DATA CABLING IS PROVIDED AND INSTALLED BY OTHERS.
3. SERVICE BOX CONTROL TRANSFORMER USED TO POWER DDC CONTROLER AND ASSOCIATED CONTROL DEVICES.

Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AK 1	1	TXA1.K12	SIEMENS	149476	@ADDRESS KEY 1–12 + RESET KEY
PNL 1	1	PXA–ENC34	SIEMENS	149475	ENCLOSURE ASSY 34
PNL 2	1	TROUGH	N/A	N/A	Custom made Siemens Panel trough
PSM 1–2	2	TXS1.12F4	SIEMENS	149476	24VDC SUPPLY 1200MA, 4 A FUSE
PXCM 1	1	PXC100–E96.A	SIEMENS	149487	PXC MOD, BACNET, TX–I/O, 96 NODE, APOGEE
SB 1	1	PXA–SB115V192VA	SIEMENS	553131	SERVICE BOX 115V, 24VAC, 192VA
TXIO 1	1	TXM1.6R–M	SIEMENS	149476	6 RELAY OUTPUT MODULE W/OVD
TXIO 2	1	TXM1.16D	SIEMENS	149476	16 DIGITAL INPUT MODULE
TXIO 3	1	TXM1.8X–ML	SIEMENS	149476	8 UNIV I/O W/ 4–20MA, OVD&LCD
TXIO 5–6	2	TXM1.8U	SIEMENS	149476	8 UNIVERSAL I/O MODULE
TXIO 7	1	TXM1.8X	SIEMENS	149476	8 UNIV I/O MODULE W/ 4–20MA
TXIO 9	1	PXX–485.3	SIEMENS	149478	PXC MOD EXPANSION MODULE, 3 RS–485
TXIO 10	1	TXS1.EF4	SIEMENS	149476	BUS CONNECTION MODULE, 4A FUSE

1/027 AHU–M3
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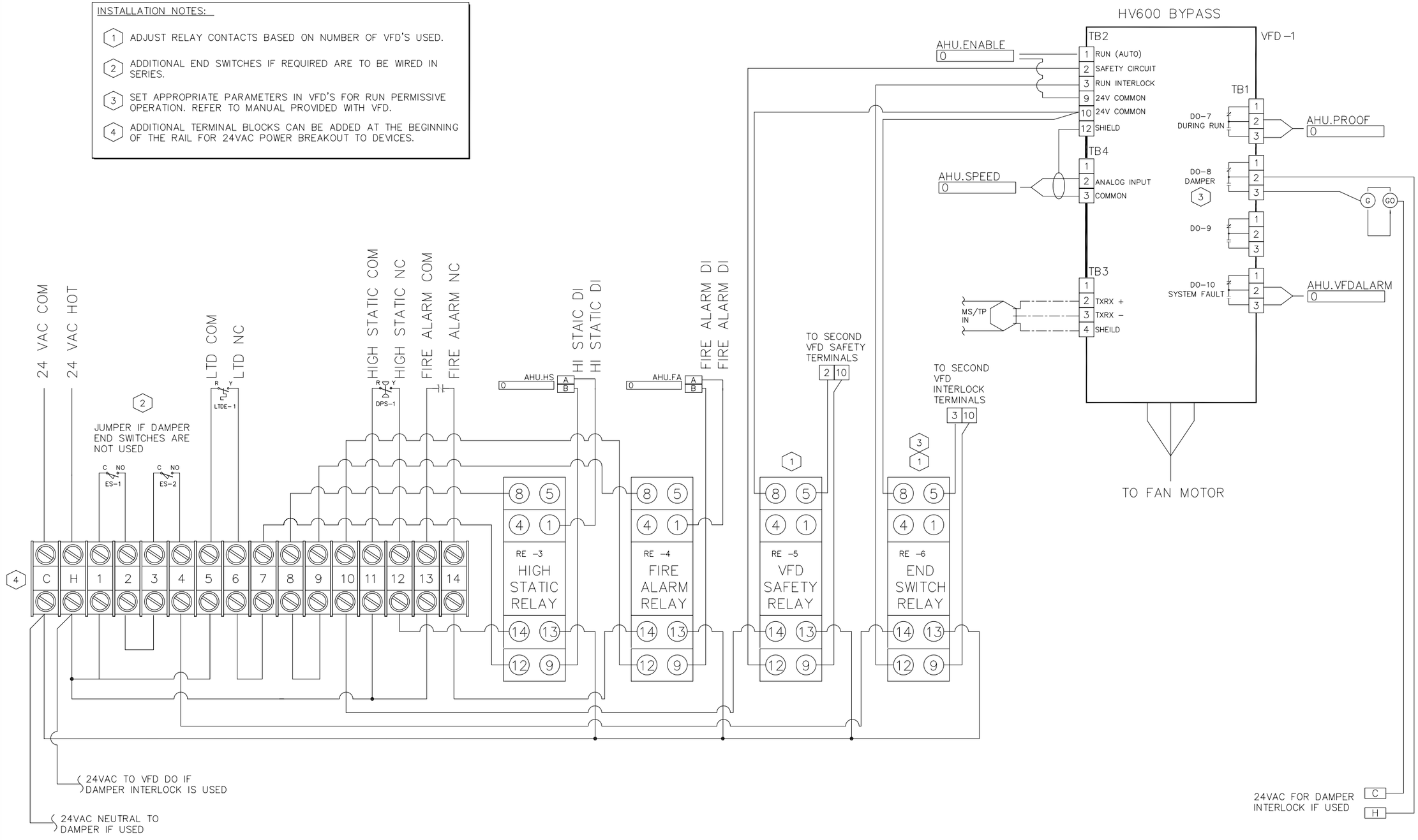
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INSTALLATION NOTES:

1. ADJUST RELAY CONTACTS BASED ON NUMBER OF VFD'S USED.
2. ADDITIONAL END SWITCHES IF REQUIRED ARE TO BE WIRED IN SERIES.
3. SET APPROPRIATE PARAMETERS IN VFD'S FOR RUN PERMISSIVE OPERATION. REFER TO MANUAL PROVIDED WITH VFD.
4. ADDITIONAL TERMINAL BLOCKS CAN BE ADDED AT THE BEGINNING OF THE RAIL FOR 24VAC POWER BREAKOUT TO DEVICES.



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AHU-M3 SYSTEM SAFETY

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PXCM - 00000 PXC100-E96.A

PXC MODULAR

Module: 1 / Rail: 1

TXIO - 0000X TXS1.12F4

POWER SUPPLY 24 Vdc 4A

Module: 2 / Rail: 1

TXIO- 00001 TXM1.6R

0.1.4
LDO

0.1.5
LDO

0.1.6
LDO

Module: 3 / Rail: 1

TXIO- 00002 TXM1.16D

AHU.3M.WS
0.2.9
LDI
STATUS
WAT SWITCH

0.2.10
LDI

0.2.11
LDI

0.2.12
LDI

0.2.13
LDI

0.2.14
LDI

0.2.15
LDI

0.2.16
LDI

Module: 4 / Rail: 1

WS 1
AHU-M3 SYSTEM

AHU.3M.SF.ENA
0.1.1
L2SL
ON/OFF
SF FAN ENA

0.1.2
LDO

0.1.3
LDO

AHU.3M.SF.ENA
0.2.1
L2SL
PROOF
SF FAN ENA

AHU.3M.SF.ALM
0.2.2
LDI
STATUS
SF FAN ALARM

AHU.3M.UV
0.2.3
LDI
STATUS
UV LIGHT

AHU.3M.FA
0.2.4
LDI
STATUS
FIRE ALARM

AHU.3M.FFILT
0.2.5
LDI
STATUS
FINAL FILTER

AHU.3M.PFILT
0.2.6
LDI
STATUS
PRE FILTER

AHU.3M.LTD
0.2.7
LDI
STATUS
LOW TEMP

AHU.3M.HS
0.2.8
LDI
STATUS
HIGH STATIC

AHU-M3 SYSTEM

CS 1
AHU-M3 SYSTEM

DPTE 2
AHU-M3 SYSTEM

DPTE 1
AHU-M3 SYSTEM

LTDE 2
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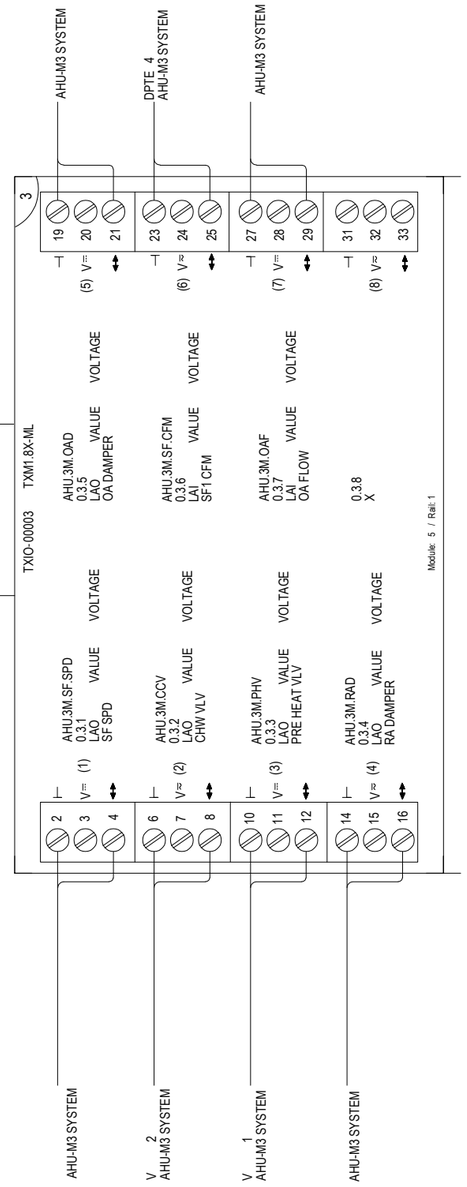
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TXIO - 0000X TXS1.12F4

POWER SUPPLY 24 Volt 4A

Module: 1 / Rail: 2

TXIO-00006 TXM1.8U

AHU.3M.CHWS				
0.6.5				
LAI				
CHW COIL SUP				
	(5)	VALUE	RTD	
AHU.3M.CHWR				
0.6.6				
LAI				
CHW COIL RET				
	(6) V≂	VALUE	RTD	
AHU.3M.HWS				
0.6.7				
LAI				
HW COIL SUP				
	(7)	VALUE	RTD	
AHU.3M.HWR				
0.6.8				
LAI				
HW COIL SUP				
	(8) V≂	VALUE	RTD	

Module: 2 / Rail: 2

TXIO-00007 TXM1.8U

AHU.3M.RAD.FB				
0.7.5				
LAI				
RA FEED BACK				
	(5)	VALUE	VOLTAGE	
AHU.3M.OAD.FB				
0.7.6				
LAI				
OA FEED BACK				
	(6) V≂	VALUE	VOLTAGE	
AHU.3M.CCV.FB				
0.7.7				
LAI				
CHWV FEED BACK				
	(7)	VALUE	VOLTAGE	
AHU.3M.PHV.FB				
0.7.8				
LAI				
PHV FEED BACK				
	(8) V≂	VALUE	VOLTAGE	

Module: 3 / Rail: 2

TXIO-00008 TXM1.8X

	0.8.5			
	X			
RAD.HT3-1.VLV				
0.8.1				
LAO				
RADIANT HEAT 3-1				
	(5) V⎓	VALUE	VOLTAGE	
	0.8.6			
	X			
AHU.3M.RMS				
0.8.2				
LAO				
ROOM SET				
	(6) V≂	VALUE	VOLTAGE	
	0.8.7			
	X			
AHU.3M.RM.CO2				
0.8.3				
LAI				
RM CO2				
	(7) V⎓	VALUE	VOLTAGE	
	0.8.8			
	X			
AHU.3M.RMT				
0.8.4				
LAI				
RM TEMP				
	(8) V≂	VALUE	RTD	

Module: 4 / Rail: 2

AHU.3M.PHT				
0.6.1				
LAI				
PH TEMP				
	(1)	VALUE	RTD	
AHU.3M.MAT				
0.6.2				
LAI				
MA TEMP				
	(2) V≂	VALUE	RTD	
AHU.3M.RAT				
0.6.3				
LAI				
RA TEMP				
	(3)	VALUE	RTD	
0.6.4				
U				
	(4) V≂	VALUE		

AHU.3M.SAT				
0.7.1				
LAI				
SA TEMP				
	(1)	VALUE	RTD	
AHU.3M.SSP				
0.7.2				
LAI				
SUPPLY STATIC				
	(2) V≂	VALUE	VOLTAGE	
AHU.3M.SAH				
0.7.3				
LAI				
SA HUMIDITY				
	(3)	VALUE	VOLTAGE	
AHU.3M.RAH				
0.7.4				
LAI				
RA HUMIDITY				
	(4) V≂	VALUE	VOLTAGE	

TTE 6 AHU-M3 SYSTEM

TTE 5 AHU-M3 SYSTEM

TTE 9 AHU-M3 SYSTEM

TTE 10 AHU-M3 SYSTEM

AHU-M3 SYSTEM

AHU-M3 SYSTEM

AHU-M3 SYSTEM

AHU-M3 SYSTEM

TTE 4 AHU-M3 SYSTEM

TTE 3 AHU-M3 SYSTEM

TTE 1 AHU-M3 SYSTEM

TTE 8 AHU-M3 SYSTEM

DPTE 3 AHU-M3 SYSTEM

HTE 3 AHU-M3 SYSTEM

HTE 1 AHU-M3 SYSTEM

V 3 AHU-M3 SYSTEM

AHU-M3 SYSTEM

VOC 1 AHU-M3 SYSTEM

AHU-M3 SYSTEM

REVISION HISTORY

SIEMENS

POWERS OF ARKANSAS

5440 NORTHSHORE DR
N. LITTLE ROCK, AR 72118

PHONE:
FAX:

MAURICE BATHHOUSE CONTROLS
HOT SPRINGS, AR

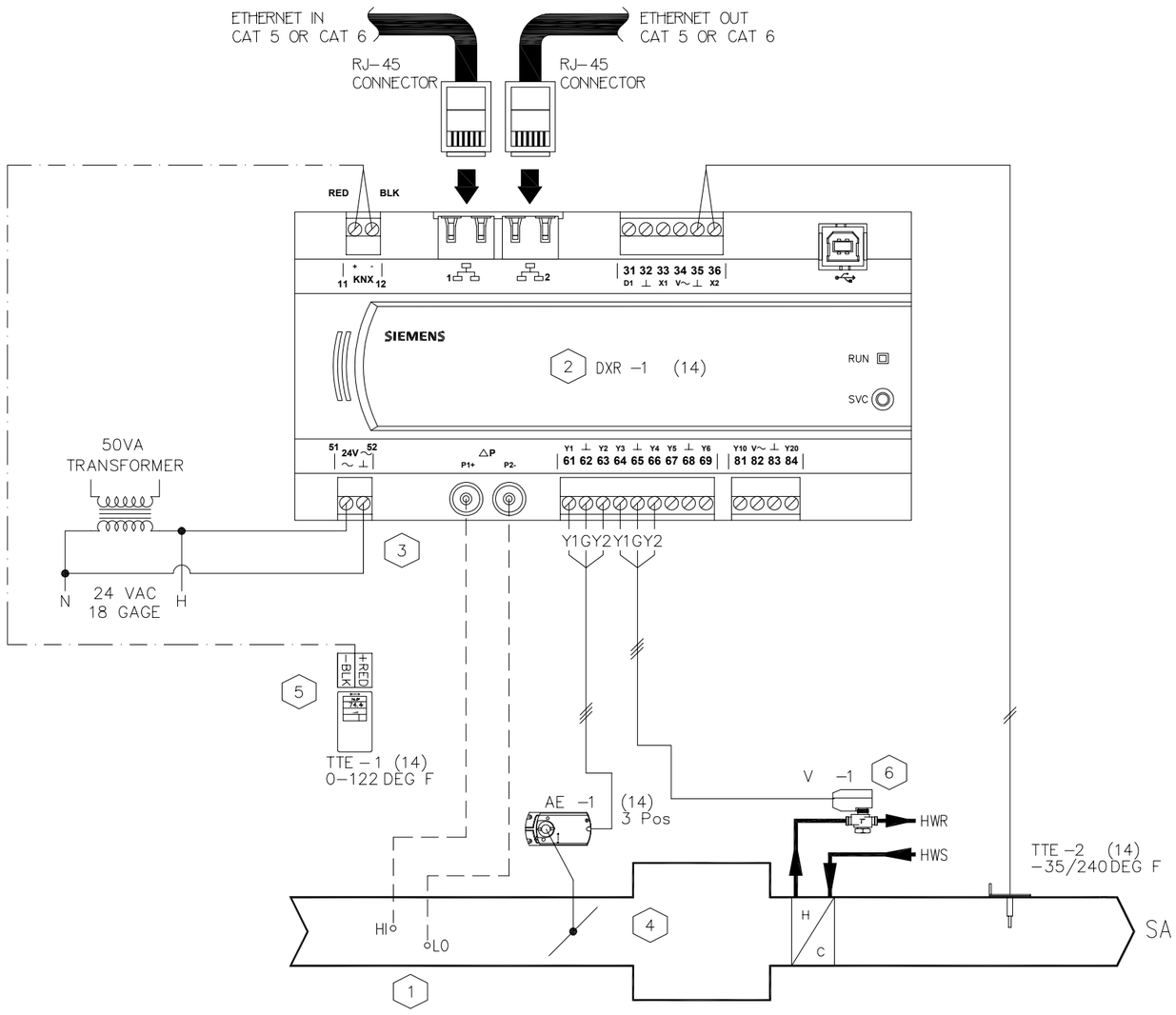
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1/032 VAV WITH REHEAT COIL (#14023)

LOCATION: 1ST AND 2ND FLOOR
SERVES: TAB-A CONTROL SEQUENCE
TYPICAL OF 14

INSTALLATION NOTES:

1. VAV BOX INSTALLED BY MECHANICAL CONTRACTOR WITH 3 TO 5 STRAIGHT DUCT DIAMETERS UPSTREAM OF BOX TO PROVIDE PROPER FLOW SENSING.
2. DXR TO BE MOUNTED IN MANUFACTURER SUPPLIED CONTROLLER ENCLOSURE
3. 24 VAC POWER TRUNK FURNISHED AND INSTALLED BY CONTROL CONTRACTOR.
4. MOUNT ACTUATOR WITH DAMPER IN FULL OPEN POSITION. VERIFY DXR-1 AND ACTUATOR REQUIREMENT WITH THE BOX MANUFACTURER
5. LOCATE AS SHOWN ON FLOOR PLANS/CONTRACT DOCUMENTS
6. CONTROL VALVE FURNISHED AND WIRED BY CONTROLS CONTRACTOR. CONTROL VALVE INSTALLED IN PIPE BY MECHANICAL CONTRACTOR.

TAB-A CONTROL

TAB-1-1M
TAB-1-4M
TAB-1-5M
TAB-1-6M
TAB-1-7M
TAB-1-8M
TAB-1-9M
TAB-1-10M
TAB-2-1M
TAB-2-2M
TAB-2-3M
TAB-2-4M
TAB-2-5M
TAB-2-6M

REVISION HISTORY

SIEMENS	5440 NORTHSHORE DR N. LITTLE ROCK, AR 72118
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HOT SPRINGS, AR

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
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VAV HW RH VAV

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Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AE 1	14	GDE131.1P	SIEMENS	154 011	ACT NSR PLENUM 24/108L 5Nm
DXR 1	14	DXR2.E12P-102B	SIEMENS	A6V10502844	DXR2.E12P Room Automation Station
TTE 1	14	QMX3.P34-1WSB	SIEMENS	QMX3	QMX3 ROOM TEMP WITH DISPLAY (COO=USA)
TTE 2	14	536-811	SIEMENS	149915	DCT PT TMP, 100K OHM, 4", BRACKET MNT
V					SEE VALVE SUBMITTAL

TAB CONTROL W/ HOT WATER REHEAT - TAB-A

SEQUENCE OF OPERATION:

- BAS TAB CONTROLLER SHALL MODULATE THE TAB DAMPER AND TAB HW REHEAT COIL CONTROL VALVE TO MAINTAIN SPACE TEMPERATURE OF 72DEG F
- (ADJ.) WITH 5DEG F (ADJ.) DEAD BAND BASED ON A SIGNAL FROM A WALL MOUNTED TEMPERATURE SENSOR. SEE DRAWINGS FOR TEMPERATURE SENSOR REQUIREMENTS. SPACES WITH ADJUSTABLE THERMOSTATS WILL ALLOW A +/- 3DEG F (ADJ.) OFFSET FROM THE DDC SETPOINT.
- AT FULL COOLING, THE TAB SHALL BE OPEN TO MAXIMUM CFM POSITION. THE REHEAT COIL CONTROL VALVE SHALL BE CLOSED.
- UPON A FALL IN SPACE TEMPERATURE, THE TAB SHALL MODULATE CLOSED UNTIL SPACE SETPOINT IS MAINTAINED, OR UNTIL IT REACHES ITS MINIMUM SCHEDULED CFM POSITION PER THE TAB SCHEDULE. THE REHEAT COIL CONTROL VALVE SHALL BE CLOSED.
- UPON A FURTHER FALL IN SPACE TEMPERATURE, THE REHEAT COIL CONTROL VALVE SHALL MODULATE OPEN TO MAINTAIN SPACE SETPOINT UNTIL THE SUPPLY AIR TEMPERATURE IS 20DEG F (ADJ.) ABOVE ROOM TEMPERATURE SETPOINT.
- UPON A FURTHER FALL IN SPACE TEMPERATURE, TAB SHALL OPEN TO MAINTAIN SETPOINT UNTIL TAB AIRFLOW REACHES ITS MAXIMUM HEATING SETTING. THE REHEAT CONTROL VALVE SHALL CONTINUE TO MODULATE OPEN TO MAINTAIN MAXIMUM DELTA T LISTED ABOVE.
- THE BAS SHALL UTILIZE OUTPUT FROM ALL TERMINAL AIR BOX POSITIONS TO RESET THE SUPPLY DUCT DIFFERENTIAL STATIC PRESSURE.

ALARMS, INTERLOCKS & SAFETIES:

- SEND AN ALARM TO THE BAS OPERATOR INTERFACE IF THE SPACE TEMPERATURE IS MORE THAN 10DEG F (ADJ.) ABOVE OR BELOW SETPOINT.

REVISION HISTORY

SIEMENS

POWERS OF ARKANSAS

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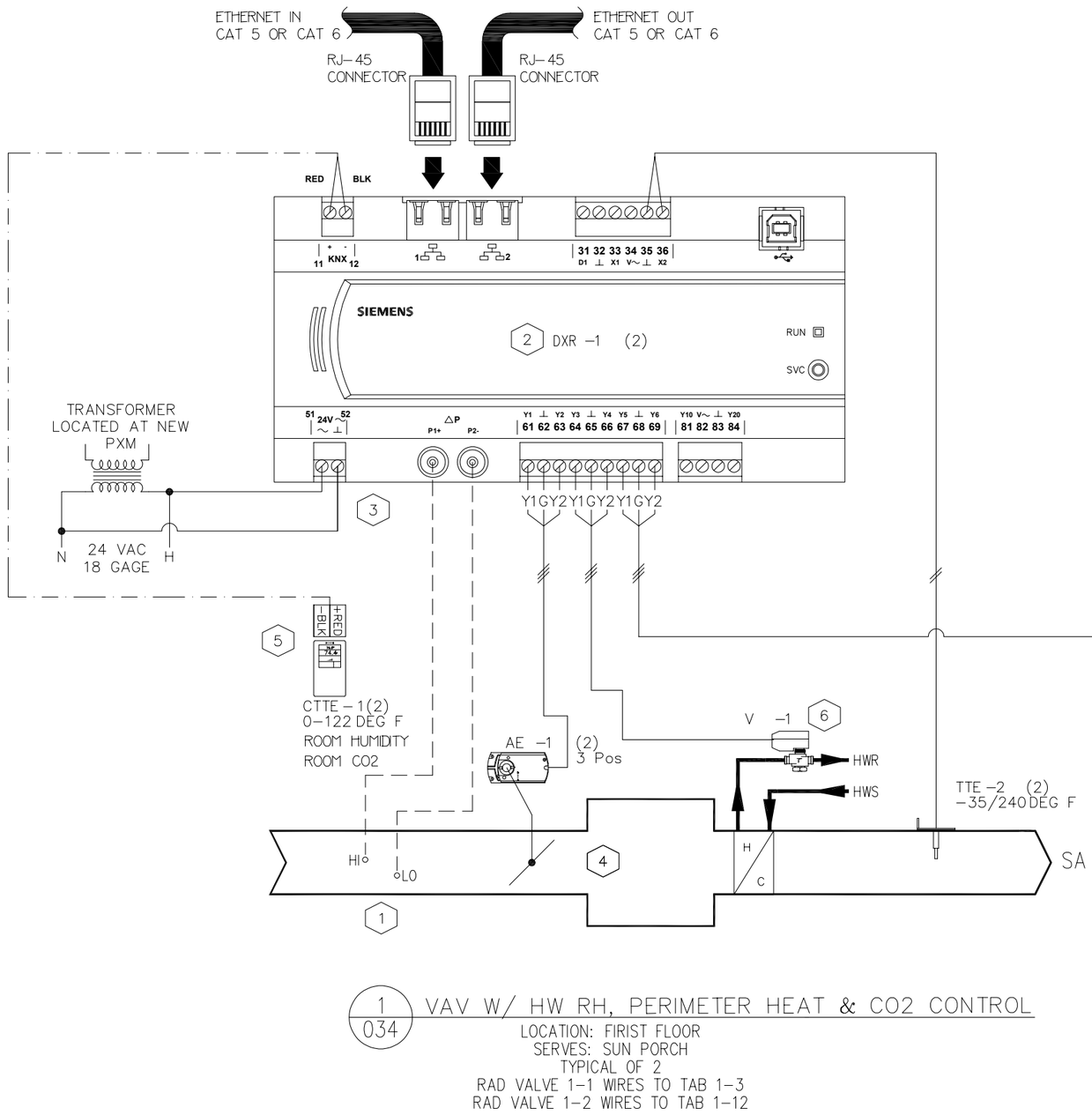
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HOT SPRINGS, AR

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
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VAV HW REHEAT DXR BOM

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1 / 034 VAV W/ HW RH, PERIMETER HEAT & CO2 CONTROL

LOCATION: FIRIST FLOOR
SERVES: SUN PORCH
TYPICAL OF 2
RAD VALVE 1-1 WIRES TO TAB 1-3
RAD VALVE 1-2 WIRES TO TAB 1-12

INSTALLATION NOTES:

1. VAV BOX INSTALLED BY MECHANICAL CONTRACTOR WITH 3 TO 5 STRAIGHT DUCT DIAMETERS UPSTREAM OF BOX TO PROVIDE PROPER FLOW SENSING
2. DXR2-1 TO BE MOUNTED IN MANUFACTURER SUPPLIED CONTROLLER ENCLOSURE
3. NEW TRANSFORMER FURNISHED AND INSTALLED BY CONTROL CONTRACTOR.
4. MOUNT ACTUATOR WITH DAMPER IN FULL OPEN POSITION. VERIFY DXR-1 AND ACTUATOR REQUIREMENT WITH THE BOX MANUFACTURER
5. LOCATE AS SHOWN ON FLOOR PLANS/CONTRACT DOCUMENTS
6. CONTROL VALVE FURNISHED AND WIRED BY CONTROLS CONTRACTOR. CONTROL VALVE INSTALLED IN PIPE BY MECHANICAL CONTRACTOR.

REVISION HISTORY

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VAV HW RH VAV + RAD HT & CO2

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Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AE 1	2	GDE131.1P	SIEMENS	154 011	ACT NSR PLENUM 24/108L 5Nm
DXR 1	2	DXR2.E12P-102B	SIEMENS	A6V10502844	DXR2.E12P Room Automation Station
TTE 1	2	QMX3.P74-1WSB	SIEMENS	QMX3	QMX3 ROOM TMP, RH & CO2, DISP (COO=USA)
TTE 2	2	536-811	SIEMENS	149915	DCT PT TMP, 100K OHM, 4", BRACKET MNT
V					SEE VALVE SUBMITTAL

TAB CONTROL W/ HOT WATER REHEAT AND CO2-BASED DEMAND CONTROL VENTILATION- TAB-C

SEQUENCE OF OPERATION:

- BAS TAB CONTROLLER SHALL MODULATE THE TAB DAMPER AND TAB HW REHEAT COIL CONTROL VALVE TO MAINTAIN SPACE TEMPERATURE OF 72DEG F (ADJ.) WITH 5DEG F (ADJ.) DEAD BAND BASED ON A SIGNAL FROM A WALL MOUNTED TEMPERATURE SENSOR. SEE DRAWINGS FOR TEMPERATURE SENSOR REQUIREMENTS. SPACES WITH ADJUSTABLE THERMOSTATS WILL ALLOW A +/- 3DEG F (ADJ.) OFFSET FROM THE DDC SETPOINT.
- AT FULL COOLING, THE TAB SHALL BE OPEN TO MAXIMUM CFM POSITION. THE REHEAT COIL CONTROL VALVE SHALL BE CLOSED.
- UPON A FALL IN SPACE TEMPERATURE, THE TAB SHALL MODULATE CLOSED UNTIL SPACE SETPOINT IS MAINTAINED, OR UNTIL IT REACHES ITS MINIMUM SCHEDULED CFM POSITION PER THE TAB SCHEDULE. THE REHEAT COIL CONTROL VALVE SHALL BE CLOSED.
- UPON A FURTHER FALL IN SPACE TEMPERATURE, THE REHEAT COIL CONTROL VALVE SHALL MODULATE OPEN TO MAINTAIN SPACE SETPOINT UNTIL THE SUPPLY AIR TEMPERATURE IS 20DEG F (ADJ.) ABOVE ROOM TEMPERATURE SETPOINT.
- UPON A FURTHER FALL IN SPACE TEMPERATURE, TAB SHALL OPEN TO MAINTAIN SETPOINT UNTIL TAB AIRFLOW REACHES ITS MAXIMUM HEATING SETTING. THE REHEAT CONTROL VALVE SHALL CONTINUE TO MODULATE OPEN TO MAINTAIN MAXIMUM DELTA T LISTED ABOVE.
- THE FMCS SHALL UTILIZE OUTPUT FROM ALL TERMINAL AIR BOX POSITIONS TO RESET THE SUPPLY DUCT DIFFERENTIAL STATIC PRESSURE. CO2 SENSOR-BASED DEMAND CONTROL VENTILATION: DURING OCCUPIED HOURS, THE BAS SHALL RESET THE ZONE MINIMUM AIRFLOW SETTING BASED ON THE ZONE CO2 SENSOR INPUT SIGNAL:
- WHEN THE ZONE CO2 SENSOR READS AMBIENT CO2 LEVEL PPM (ADJ.) PLUS 300 PPM (ADJ.) OR LESS, THE TAB MINIMUM AIRFLOW SETTING SHALL BE EQUAL TO THE MINIMUM SPECIFIED IN THE TAB SCHEDULE.
- WHEN THE ZONE CO2 SENSOR IS AT THE CO2 SETPOINT IN THE TAB SCHEDULE OR HIGHER, THE TAB MINIMUM AIRFLOW SETTING SHALL BE EQUAL TO THE TAB MAXIMUM AIRFLOW SETTING SPECIFIED IN THE TAB SCHEDULE.
- WHEN THE ZONE CO2 LEVEL IS BETWEEN AMBIENT CO2 LEVEL PPM + 300 PPM (ADJ.) AND THE ZONE CO2 SETPOINT, THE TAB MINIMUM AIRFLOW SHALL VARY PROPORTIONALLY BETWEEN THE SCHEDULED TAB MINIMUM AIRFLOW AND MAXIMUM AIRFLOW.

ALARMS, INTERLOCKS & SAFETIES:

- SEND AN ALARM TO THE BAS OPERATOR INTERFACE IF THE SPACE TEMPERATURE IS MORE THAN 10DEG F (ADJ.) ABOVE OR BELOW SETPOINT.
- SEND AN ALARM TO THE BAS OPERATOR INTERFACE IF THE SPACE CO2 CONCENTRATION IS ABOVE THE SCHEDULED SETPOINT FOR MORE THAN 60 MINUTES (ADJ.)

TAB CONTROL W/ HOT WATER REHEAT AND PERIMETER RADIATION - TAB-D

SEQUENCE OF OPERATION:

- BAS TAB CONTROLLER SHALL MODULATE THE TAB DAMPER, TAB HEATING WATER REHEAT COIL, AND PERIMETER RADIATION CONTROL VALVE TO MAINTAIN SPACE TEMPERATURE OF 72 DEG F (ADJ.) WITH 5 DEG F (ADJ.) DEAD BAND BASED ON A SIGNAL FROM A WALL MOUNTED TEMPERATURE SENSOR. SEE DRAWINGS FOR TEMPERATURE SENSOR REQUIREMENTS. SPACES WITH ADJUSTABLE THERMOSTATS WILL ALLOW A +/- 3 DEG F (ADJ.) OFFSET FROM THE DDC SETPOINT.
- AT FULL COOLING, THE TAB SHALL BE OPEN TO MAXIMUM CFM POSITION. THE REHEAT COIL CONTROL VALVE AND PERIMETER RADIATION CONTROL VALVE SHALL BE CLOSED.
- UPON A FALL IN SPACE TEMPERATURE, THE TAB SHALL MODULATE CLOSED UNTIL SPACE SETPOINT IS MAINTAINED, OR UNTIL IT REACHES ITS MINIMUM SCHEDULED CFM POSITION PER THE TAB SCHEDULE. THE REHEAT COIL CONTROL VALVE AND PERIMETER RADIATION CONTROL VALVE SHALL BE CLOSED.
- THE TAB CONTROLLER SHALL ENABLE PERIMETER RADIATION CONTROLS WHEN THE O.A. TEMP DROPS BELOW 35 DEG F (ADJ.). WHEN THE O.A. TEMP RISES ABOVE 40 DEG F (ADJ.) PERIMETER RADIATION CONTROLS SHALL BE DISABLED.
- AS SPACE TEMP DROPS BELOW SETPOINT AND TAB DAMPER IS AT MINIMUM SCHEDULED CFM, TAB CONTROLLER SHALL MODULATE THE PERIMETER RADIATION CONTROL VALVE OPEN AS REQUIRED TO MAINTAIN SPACE TEMP.
- UPON A FURTHER FALL IN SPACE TEMPERATURE, THE REHEAT COIL CONTROL VALVE SHALL MODULATE OPEN TO MAINTAIN SPACE SETPOINT UNTIL THE SUPPLY AIR TEMPERATURE IS 20DEG F (ADJ.) ABOVE ROOM TEMPERATURE SETPOINT.
- UPON A FURTHER FALL IN SPACE TEMPERATURE, TAB SHALL OPEN TO MAINTAIN SETPOINT UNTIL TAB AIRFLOW REACHES ITS MAXIMUM HEATING SETTING. THE REHEAT CONTROL VALVE SHALL CONTINUE TO MODULATE OPEN TO MAINTAIN MAXIMUM DELTA T LISTED ABOVE.
- THE FMCS SHALL UTILIZE OUTPUT FROM ALL TERMINAL AIR BOX POSITIONS TO RESET THE SUPPLY DUCT DIFFERENTIAL STATIC PRESSURE. ALARMS, INTERLOCKS & SAFETIES: SEND AN ALARM TO THE BAS OPERATOR INTERFACE IF THE SPACE TEMPERATURE IS MORE THAN 5DEG F (ADJ.) ABOVE OR BELOW SETPOINT.

ALARMS, INTERLOCKS & SAFETIES:

- SEND AN ALARM TO THE BAS OPERATOR INTERFACE IF THE SPACE TEMPERATURE IS MORE THAN 5 DEGF (ADJ.) ABOVE OR BELOW SETPOINT.

REVISION HISTORY

SIEMENS

POWERS OF ARKANSAS

5440 NORTHSHORE DR
N. LITTLE ROCK, AR 72118

PHONE:
FAX:

MAURICE BATHHOUSE CONTROLS
HOT SPRINGS, AR

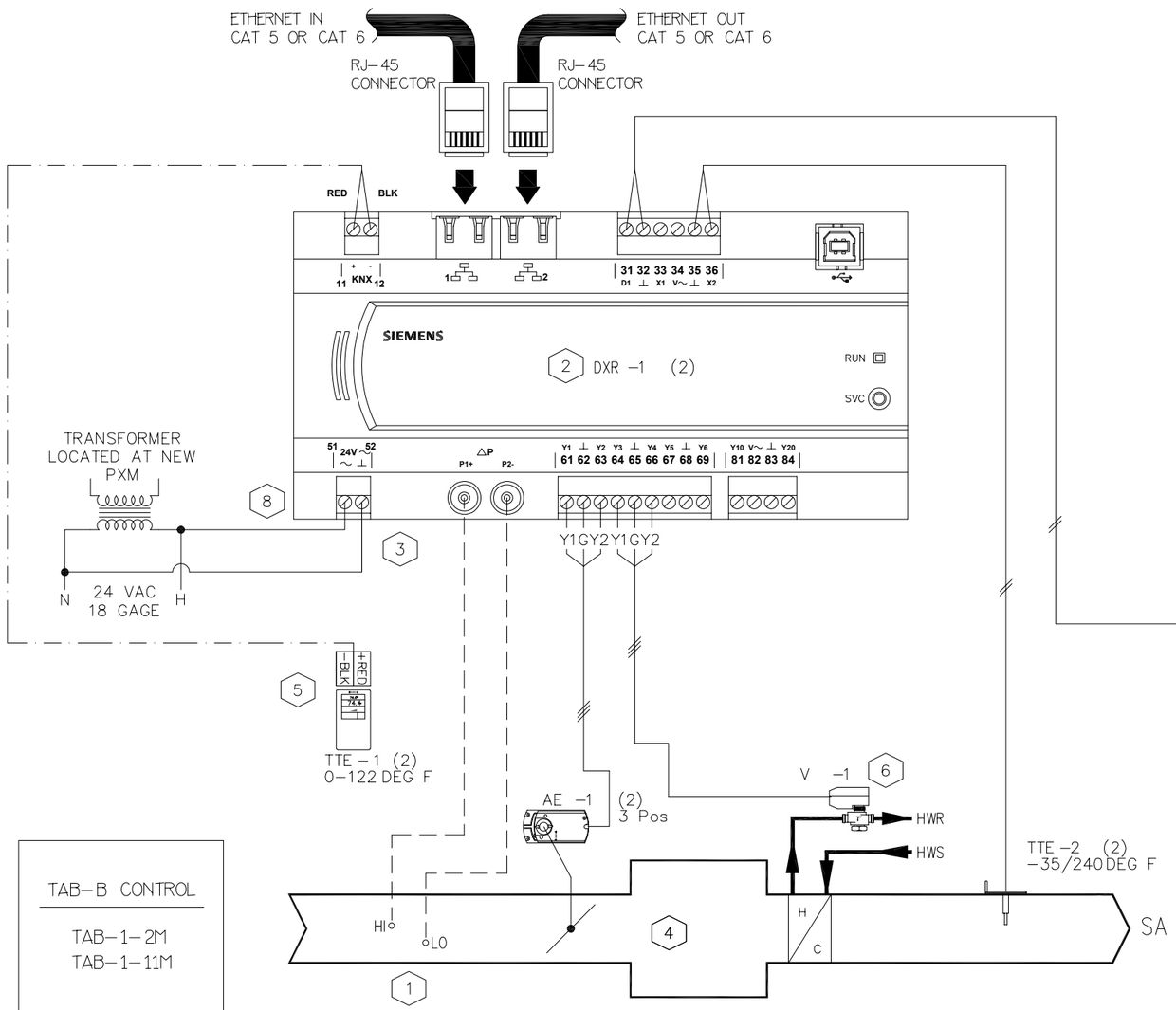
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VAV HW RH VAV + RAD HEAT BOM

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INSTALLATION NOTES:

1. VAV BOX INSTALLED BY MECHANICAL CONTRACTOR WITH 3 TO 5 STRAIGHT DUCT DIAMETERS UPSTREAM OF BOX TO PROVIDE PROPER FLOW SENSING.
2. DXR2-1 TO BE MOUNTED IN MANUFACTURER SUPPLIED CONTROLLER ENCLOSURE
3. 24 VAC POWER TRUNK FURNISHED AND INSTALLED BY CONTROL CONTRACTOR.
4. MOUNT ACTUATOR WITH DAMPER IN FULL OPEN POSITION. VERIFY DXR-1 AND ACTUATOR REQUIREMENT WITH THE BOX MANUFACTURER
5. LOCATE AS SHOWN ON FLOOR PLANS/CONTRACT DOCUMENTS
6. CONTROL VALVE FURNISHED AND WIRED BY CONTROLS CONTRACTOR. CONTROL VALVE INSTALLED IN PIPE BY MECHANICAL CONTRACTOR.
7. OCCUPANCY SENSORS WITH CONTACTS FOR CONTROLS FURNISHED AND INTALLED BY ELETRICAL CONTRACTOR.
8. 24VAC POWER TO BE INCORPORATED INTO VAV DAISY CHAINED POWER TRUCK.

TAB-B CONTROL

TAB-1-2M
TAB-1-11M

1/036 VAV WITH REHEAT COIL WITH OCCUPANCY CONTROL

LOCATION: 1ST FLOOR
SERVES: OFFICE & CLOAK RM
TYPICAL OF 2

REVISION HISTORY

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5440 NORTHSHORE DR
N. LITTLE ROCK, AR 72118

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MAURICE BATHHOUSE CONTROLS
HOT SPRINGS, AR

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
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VAV HW RH VAV + OCC

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Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
AE 1	2	GDE131.1P	SIEMENS	154 011	ACT NSR PLENUM 24/108L 5Nm
DXR 1	2	DXR2.E12P-102B	SIEMENS	A6V10502844	DXR2.E12P Room Automation Station
TTE 1	2	QMX3.P34-1WSB	SIEMENS	QMX3	QMX3 ROOM TEMP WITH DISPLAY (COO=USA)
TTE 2	2	536-811	SIEMENS	149915	DCT PT TMP, 100K OHM, 4", BRACKET MNT
V					SEE VALVE SUBMITTAL

TAB CONTROL W/ HOT WATER REHEAT AND OCCUPANCY CONTROL - TAB-B

SEQUENCE OF OPERATION:

OCCUPIED CONTROL:

- BAS TAB CONTROLLER SHALL MODULATE THE TAB DAMPER AND TAB HW REHEAT COIL CONTROL VALVE TO MAINTAIN SPACE TEMPERATURE OF 72DEG F (ADJ.) WITH 5DEG F (ADJ.) DEAD BAND BASED ON A SIGNAL FROM A WALL MOUNTED TEMPERATURE SENSOR. SEE DRAWINGS FOR TEMPERATURE SENSOR REQUIREMENTS. SPACES WITH ADJUSTABLE THERMOSTATS WILL ALLOW A +/- 3DEG F (ADJ.) OFFSET FROM THE DDC SETPOINT.
- AT FULL COOLING, THE TAB SHALL BE OPEN TO MAXIMUM CFM POSITION. THE REHEAT COIL CONTROL VALVE SHALL BE CLOSED. UPON A FALL IN SPACE TEMPERATURE, THE TAB SHALL MODULATE CLOSED UNTIL SPACE SETPOINT IS MAINTAINED, OR UNTIL IT REACHES ITS MINIMUM SCHEDULED CFM POSITION PER THE TAB SCHEDULE. THE REHEAT COIL CONTROL VALVE SHALL BE CLOSED. UPON A FURTHER FALL IN SPACE TEMPERATURE, THE REHEAT COIL CONTROL VALVE SHALL MODULATE OPEN TO MAINTAIN SPACE SETPOINT UNTIL THE SUPPLY AIR TEMPERATURE IS 20DEG F (ADJ.) ABOVE ROOM TEMPERATURE SETPOINT.
- UPON A FURTHER FALL IN SPACE TEMPERATURE, TAB SHALL OPEN TO MAINTAIN SETPOINT UNTIL TAB AIRFLOW REACHES ITS MAXIMUM HEATING SETTING. THE REHEAT CONTROL VALVE SHALL CONTINUE TO MODULATE OPEN TO MAINTAIN MAXIMUM DELTA T LISTED ABOVE.
- THE FMCS SHALL UTILIZE OUTPUT FROM ALL TERMINAL AIR BOX POSITIONS TO RESET THE SUPPLY DUCT DIFFERENTIAL STATIC PRESSURE.

UNOCCUPIED CONTROL:

- FMCS TAB CONTROL SHALL FOLLOW OCCUPIED CONTROL WITH THE FOLLOWING EXCEPTIONS.
- FMCS TAB CONTROLLER SHALL MAINTAIN AN UNOCCUPIED DEADBAND OF 15DEG F(ADJ.) FROM THE SPACE TEMPERATURE
- SETPOINT AFTER A 30 MIN. (ADJ.) TIME DELAY ONCE SPACE GOES INTO UNOCCUPIED MODE AS DETERMINED BY THE OCCUPANCY SENSOR.
- THE TAB MINIMUM CFM SHALL BE RESET TO 0 CFM WHEN IN UNOCCUPIED MODE.
-

ALARMS, INTERLOCKS & SAFETIES:

- SEND AN ALARM TO THE BAS OPERATOR INTERFACE IF THE SPACE TEMPERATURE IS MORE THAN 5DEG F (ADJ.) ABOVE OR BELOW SETPOINT.
- BELOW SETPOINT.

REVISION HISTORY

SIEMENS
POWERS OF ARKANSAS
5440 NORTHSHORE DR
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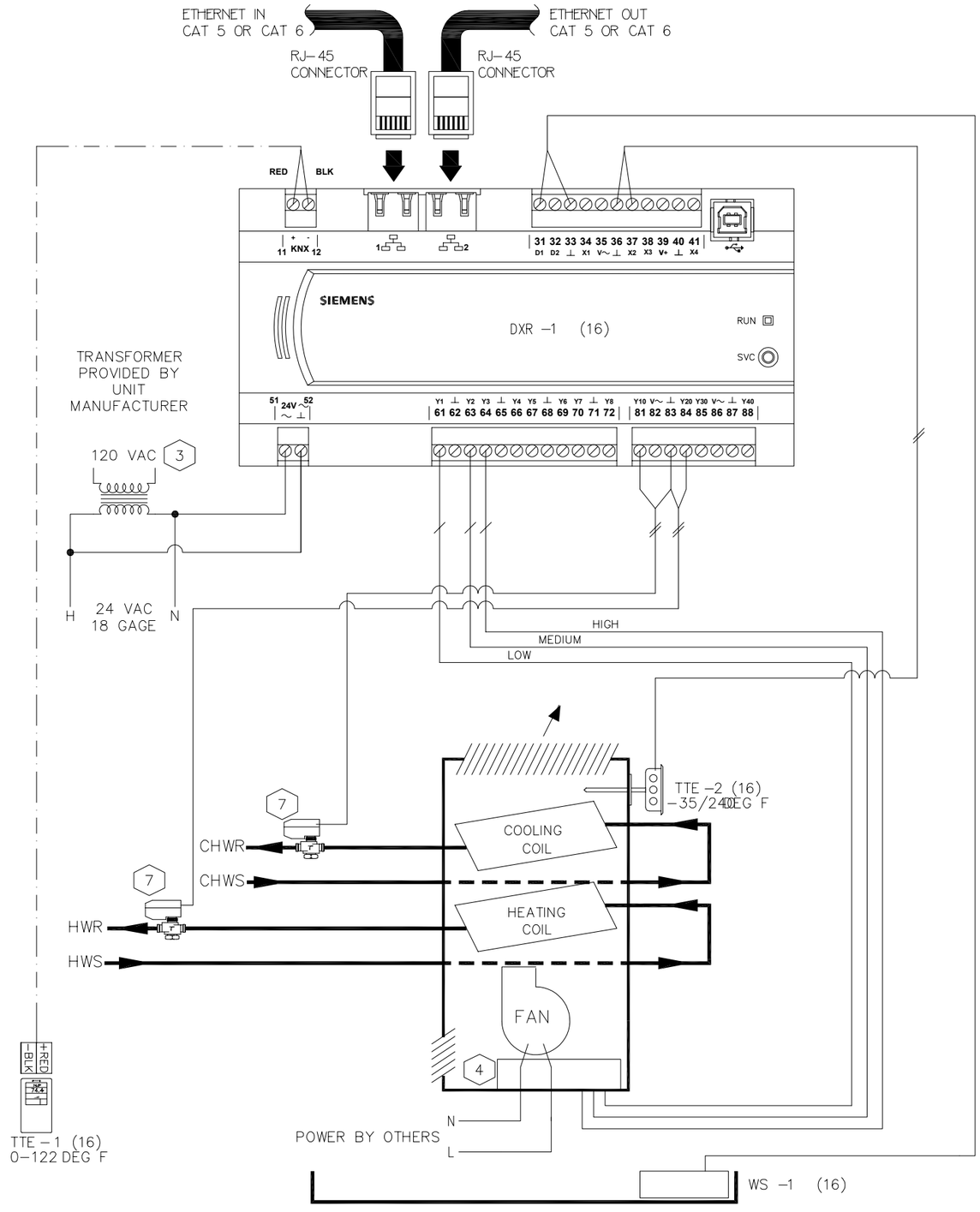
MAURICE BATHHOUSE CONTROLS
HOT SPRINGS, AR

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VAV HW RH VAV + OCC

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INSTALLATION NOTES:

1. VAV BOX INSTALLED BY MECHANICAL CONTRACTOR WITH 3 TO 5 STRAIGHT DUCT DIAMETERS UPSTREAM OF BOX TO PROVIDE PROPER FLOW SENSING.
2. DXR2-1 TO BE MOUNTED IN MANUFACTURER SUPPLIED CONTROLLER ENCLOSURE
3. TRANSFORMER FURNISHED BY VAV BOX MANUFACTURER.
4. MOUNT ACTUATOR WITH DAMPER IN FULL OPEN POSITION. VERIFY DXR-1 AND ACTUATOR REQUIREMENT WITH THE BOX MANUFACTURER
5. LOCATE AS SHOWN ON FLOOR PLANS/CONTRACT DOCUMENTS
6. 4" SENSOR SELECTED AS DEFAULT. SIZE AS APPROPRIATE.
7. VALVES FURNISHED BY FCU MANUFACTURER. INSTALLED IN PIPE BY MECHANICAL CONTRACTOR. WIRED BY CONTROLS CONTRACTOR.

1/038 FC 4-PIPE CW & HW (14051)
TYPICAL OF 16

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HOT SPRINGS, AR

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FAN COIL UNITS SYSTEM

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Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
DXR 1	16	DXR2.E18-101B	SIEMENS	A6V10502848	DXR2.E18 Room Automation Station
TTE 1	16	QMX3.P34-1WSB	SIEMENS	QMX3	QMX3 ROOM TEMP WITH DISPLAY (COO=USA)
TTE 2	16	536-811	SIEMENS	149915	DCT PT TMP, 100K OHM, 4", BRACKET MNT
V					SEE VALVE SUBMITTAL
WS 1	16	3000543	KELE INC	3000543	AQUASWITCH WATER DETECTING SENSOR

SEQUENCE OF OPERATION:
SUPPLY FAN OPERATION SHALL BE CONTROLLED BY THE FMCS THROUGH A CONTACTOR.

SUPPLY FAN AND CONTROL VALVE OPERATION: THE FMCS WILL MODULATE THE SUPPLY FAN, COOLING CONTROL VALVE, AND HEATING CONTROL VALVE TO ACHIEVE THE ROOM TEMPERATURE OF 72°F (ADJ.) WITH 5°F (ADJ.) DEAD BAND BASED ON A SIGNAL FROM A WALL MOUNTED TEMPERATURE SENSOR. SEE DRAWINGS FOR TEMPERATURE SENSOR REQUIREMENTS. SPACES WITH ADJUSTABLE THERMOSTATS WILL ALLOW A +/- 3°F (ADJ.) OFFSET FROM THE SETPOINT.

- AT A FULL COOLING, THE SUPPLY FAN IS AT MAXIMUM COOLING CFM SPEED AND THE COOLING CONTROL VALVE SHALL BE OPEN TO MAINTAIN 55?F (ADJ) DISCHARGE AIR TEMPERATURE.
- AS THE ROOM AIR TEMPERATURE FALLS, THE SUPPLY FAN SHALL RAMP DOWN TO MAINTAIN ROOM TEMPERATURE SET POINT WHILE MAINTAINING A 55?F (ADJ) DISCHARGE AIR TEMPERATURE SET POINT.
- ON A FURTHER FALL IN ROOM TEMPERATURE, THE SUPPLY FAN WILL REMAIN AT MINIMUM SPEED AND THE COOLING CONTROL VALVE SHALL MODULATE TO MAINTAIN ROOM AIR TEMPERATURE SET POINT. WHEN THE SUPPLY FAN IS AT MINIMUM SPEED THE AHU DISCHARGE AIR TEMPERATURE SHALL NOT CONTROL THE COOLING CONTROL VALVE.
- ON A FURTHER REDUCTION IN ROOM TEMPERATURE, THE HEATING CONTROL VALVE SHALL MODULATE OPEN TO MAINTAIN ROOM AIR TEMPERATURE SET POINT. THE DISCHARGE AIR TEMPERATURE SHALL NOT RISE ABOVE 95?F AS THE HEATING CONTROL VALVE OPENS. THE SUPPLY FAN SHALL REMAIN AT MINIMUM HEATING CFM.

DEHUMIDIFICATION CONTROL:
RETURN AIR HUMIDITY SENSOR SHALL OVERRIDE HEATING COIL CONTROL VALVE INCREMENTALLY OPEN AT (5%) STEPS COMPARED TO NORMAL SPACE TEMPERATURE CONTROL IF THE SPACE HUMIDITY SENSOR EXCEEDS 60% RH (ADJ.). IF SPACE HUMIDITY SENSOR IS BELOW 55% RH (ADJ.) DEHUMIDIFICATION SEQUENCE SHALL BE DISABLED.

BYPASS VALVE CONTROL (WHERE SHOWN):
THE MINIMUM FLOW BYPASS CONTROL VALVE SHALL MODULATE OPEN PROPORTIONATELY AS THE ASSOCIATED COIL CONTROL VALVE CLOSES.

ALARMS, INTERLOCKS & SAFETIES:
WHEN THE FIRE ALARM CONTROL PANEL INDICATES AN ALARM CONDITION, AHU SHALL SHUTDOWN.

A FLOAT SWITCH MOUNTED IN THE SECONDARY DRAIN PAN SHALL CLOSE THE CHILLED WATER VALVE AND PREVENT SUPPLY FAN OPERATION UPON DETECTION OF WATER AND SHALL INDICATE AN ALARM TO THE OPERATOR WORKSTATION.

FMCS SHALL INDICATE AN ALARM TO THE FMCS OPERATOR WORKSTATION IF THE FMCS COMMANDS ANY SUPPLY FAN TO OPERATE AND THE FAN CURRENT RELAY DETECTS INSUFFICIENT CURRENT FLOW.

WHENEVER AHU IS SHUTDOWN THE FOLLOWING SHALL OCCUR:

- HEATING AND CHILLED WATER CONTROL VALVES SHALL CLOSE.
- SUPPLY FAN SHALL BE DE-ENERGIZED.

REVISION HISTORY

SIEMENS

POWERS OF ARKANSAS

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MAURICE BATHHOUSE CONTROLS
HOT SPRINGS, AR

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FAN COIL UNITS SYSTEM

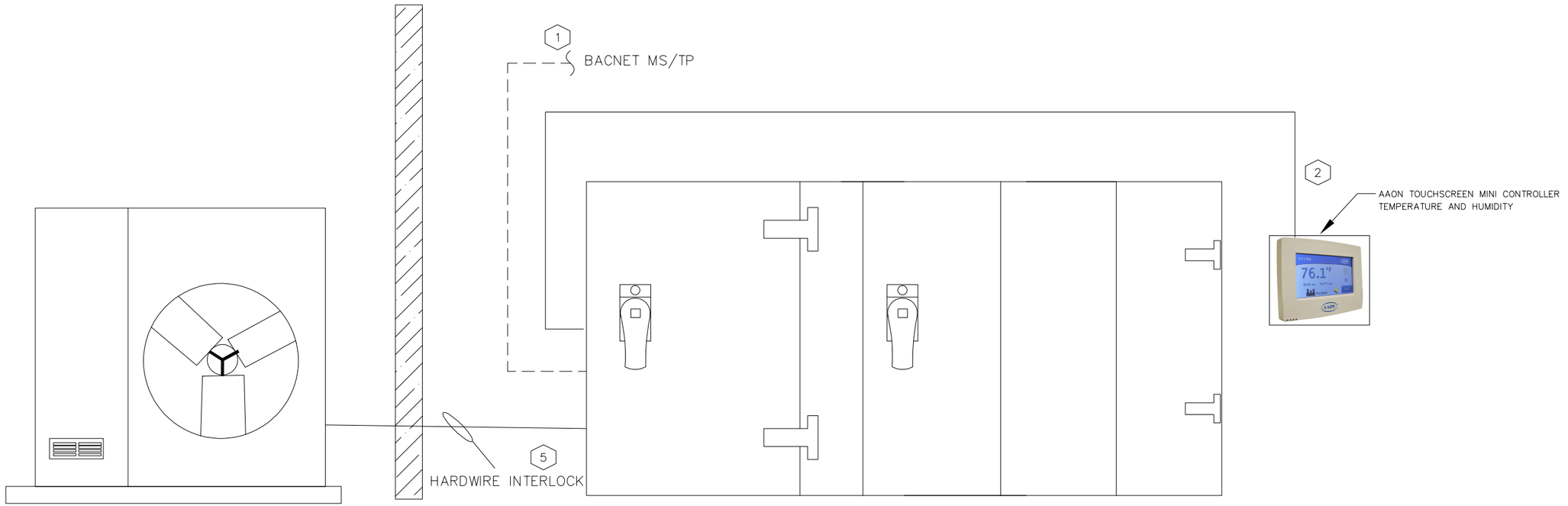
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INSTALLATION NOTES:

1. UNITS PROVIDED WITH FACTORY INSTALLED FULLY PROGRAMMED INDEPENDANT CONTROLLER WITH BACnet MS/TP INTERFACE. BACnet MS/TP TO EMS NETWORK BY CONTROL CONTRACTOR
2. FACTORY PROVIDED ROOM SENSOR TO BE INSTALLED AND WIRED BACK TO UNIT BACnet CONTROLLER BY THE CONTROLS CONTRACTOR.
3. EQUIPMENT SUPPLIER SHALL PROVIDE THE CONTROLS CONTRACTOR BACnet VARIABLE POINT LIST SHOWING ALL POINTS AVAILABLE FOR CONTROL AND MONITORING.
4. FACTORY TO PROVIDE ALL REQUIRED CONTROLS FOR A FULLY FUNCTIONAL UNIT, INCLUDING ROOM THERMOSTAT, STATIC PRESSURE SENSORS, ECT.
5. HARDWIRE INTERLOCK BETWEEN INDOOR UNIT AND ASSOCIATED OUTDOOR UNIT BY CONTROLS CONTRACTOR.



1/040 SPLIT SYSTEM DEHUM UNIT

LOCATION: CRAW SPACE B19
TYPICAL OF DHU-1M

REVISION HISTORY

SIEMENS

POWERS OF ARKANSAS

5440 NORTHSHORE DR
N. LITTLE ROCK, AR 72118

PHONE:
FAX:

MAURICE BATHHOUSE CONTROLS
HOT SPRINGS, AR

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
MAP	MAP	JAD	10/03/25	10/06/25

DEHUM UNITS SYSTEM

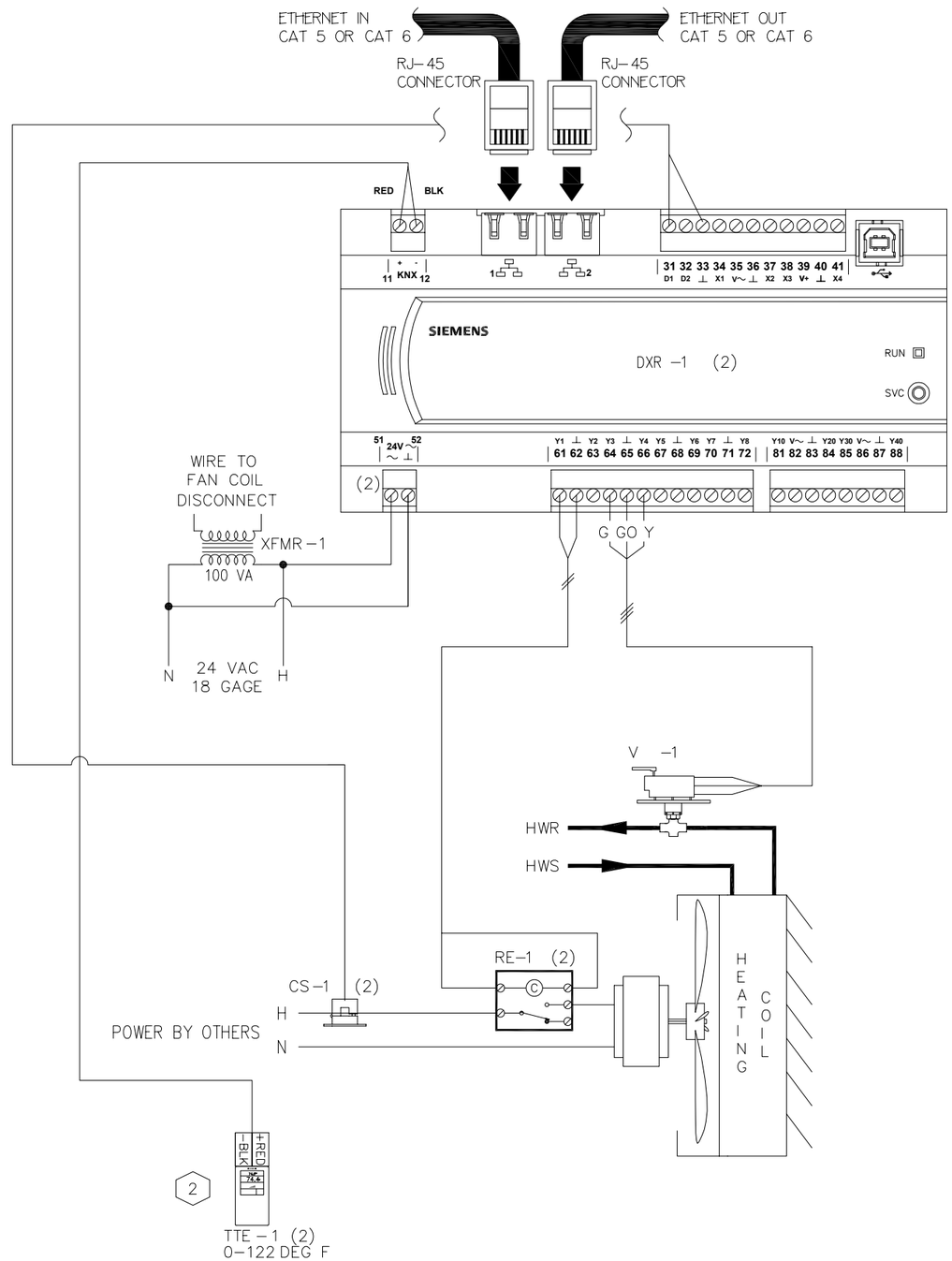
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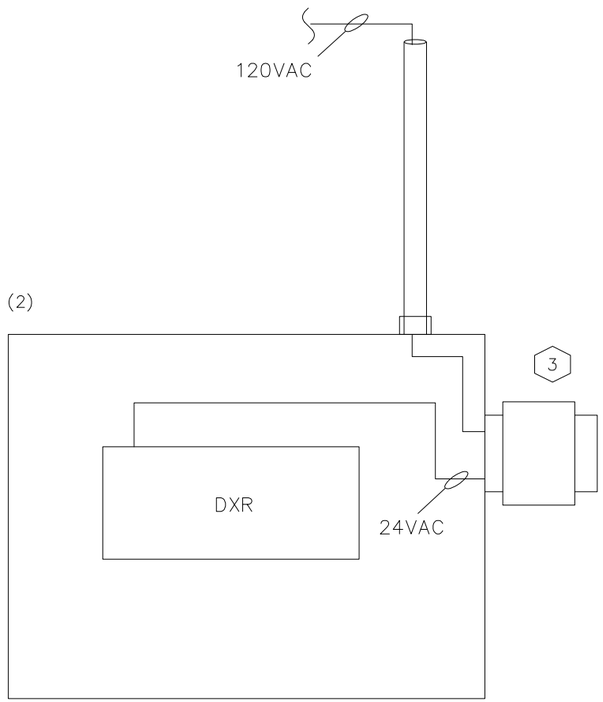
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INSTALLATION NOTES:

1. DXR TO BE MOUNTED IN MANUFACTURER SUPPLIED CONTROLLER ENCLOSURE
2. LOCATE AS SHOWN ON FLOOR PLANS/CONTRACT DOCUMENTS
3. TRANSFORMER FURNISHED AND INSTALLED BY CONTROLS CONTRACTOR.





1
041

UNIT HEATER DIAGRAM

LOCATION: MCEP AREA 2
SERVES: 2ND FLOOR MECH RM &
INTESTITIAL ATTIC 313
TYPIAL OF 2

REVISION HISTORY

SIEMENS	5440 NORTHSHORE DR N. LITTLE ROCK, AR 72118
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UNIT HEATERS

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Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
CS 1	2	H300	VERIS INDU	H-300	H300 MICRO-SPLITCORE GO/NO GO .15-60Amps
DXR 1	2	DXR2.E18-101B	SIEMENS	A6V10502848	DXR2.E18 Room Automation Station
RE 1	2	V120	VERIS	V120	V120, SPDT ENCLOSED RELAY
TTE 1	2	QMX3.P34-1WSB	SIEMENS	QMX3	QMX3 ROOM TEMP WITH DISPLAY (COO=USA)
V					SEE VALVE SUBMITTAL
XFMR 1	2	X050CAA	veris	x_d	XFrmr,050VA,120-24VAC,CB,Ft & Single Hub
Panel Mounted Devices					
PNL 1	2	SC121206WW	E M WIEGMANN	N/A	ENCLOSURE,NEMA 1,16 GA W/COVER

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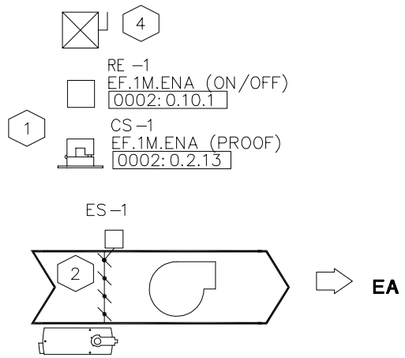
UNIT HEATERS

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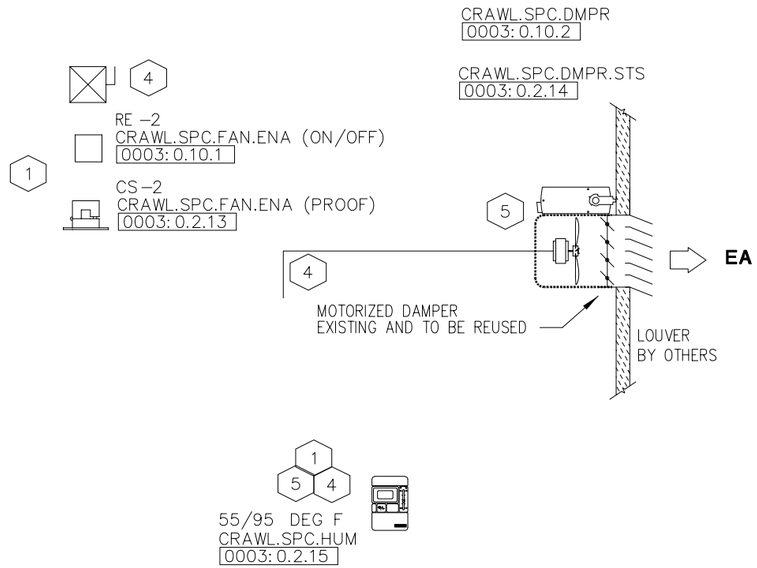
INSTALLATION NOTES:

1. CONTROLS TERMINATED AT NEW CONTROL PANEL.
2. DAMPER FURNISHED BY OTHERS AND DAMPER ACTUATOR FURNISHED AND INSTALLED BY CONTROLS.
3. RELAY AND CURRENT SWITCH TO BE LOCATED NEAR FAN SERVED.
4. COORDINATE WITH ELECTRICAL CONTRACTOR FOR JUNCTION BOX LOCATION NEAR FANS.
5. FANS AND CONTROLS ARE EXISTING. VERIFY FUNCTION AND REPORT TO PM IF NEW PARTS ARE NEEDED.



1 / 043 ROOF EXHAUST FAN – FAN–A

LOCATION: FIRST FLOOR RESTROOM
TYPICAL OF 1
SEE SHEET ME8.4



2 / 043 SIDEWALL EXHAUST FAN – FAN–B

LOCATION: CRAWL SPACE
TYPICAL OF 1
SEE SHEET ME8.4

REF#	FIELD PANEL NAME	FIELD PANEL NODE NAME
0003	AHU–2M.PXM	AHU–2MPXM
0002	AHU–1M.PXM	AHU–1MPXM

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EXHAUST FANS

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043

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Control Device		Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices						
AE	1	1	GMA121.1P	SIEMENS	154004	2PT SR 24V,62LBIN,PLM
CS	1–2	2	H300	VERIS INDU	H–300	H300 MICRO–SPLITCORE GO/NO GO .15–60Amps
ES	1	1	PK–1200	REED	0401cut001	DAMPER END SW,BLADE ACTUATED
RE	1–2	2	V120	VERIS	V120	V120, SPDT ENCLOSED RELAY

GENERAL EXHAUST FAN CONTOL- FAN -A:

SEQUENCE OF OPERATION:

EXHAUST FAN SHALL BE ENABLED BY THE BAS.

2–POSITION DAMPER SHALL FULLY OPEN WHEN FAN IS ENABLED. ONCE PROVEN OPEN BY THE END SWITCH THE FAN SHALL START. WHEN FAN IS DISABLED, 2–POSITION DAMPER SHALL FULLY CLOSE AFTER A 30 SECOND (ADJ.) THE DELAY

ALARMS, INTERLOCKS AND SAFETIES:
AN ALARM SHALL BE GENERATED AT THE BAS OPERATOR WORKSTATION IN THE EVENT THE FMCS COMMANDS THE EXHAUST FAN TO OPERATE AND THE CURRENT SENSING RELAY DETECTS INSUFFICIENT CURRENT DRAW.

EXISTING CRAWL SPACE EXHAUST FAN CONTOL- FAN -B:

SEQUENCE OF OPERATION: EXHAUST FAN SHALL BE ENABLED BY THE BAS. THE EXHAUST FAN SHALL START WHEN THE CRAWLSPACE RELATIVE HUMIDITY EXCEDS 60% (ADJ.). FAN SHALL SHUT DOWN WHEN THE SPACE RH IS BELOW 60% (ADJ.).

2–POSITION DAMPER SHALL FULLY OPEN WHEN FAN IS STARTED. ONCE PROVEN OPEN BY THE END SWITCH THE FAN SHALL START. WHEN FAN IS DISABLED, 2–POSITION DAMPER SHALL FULLY CLOSE AFTER A 30 SECOND (ADJ.) THE DELAY

ALARMS, INTERLOCKS AND SAFETIES:
AN ALARM SHALL BE GENERATED AT THE BAS OPERATOR WORKSTATION IN THE EVENT THE BAS COMMANDS THE EXHAUST FAN TO OPERATE AND THE CURRENT SENSING RELAY DETECTS INSUFFICIENT CURRENT DRAW.

REVISION HISTORY

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EXHAUST FANS

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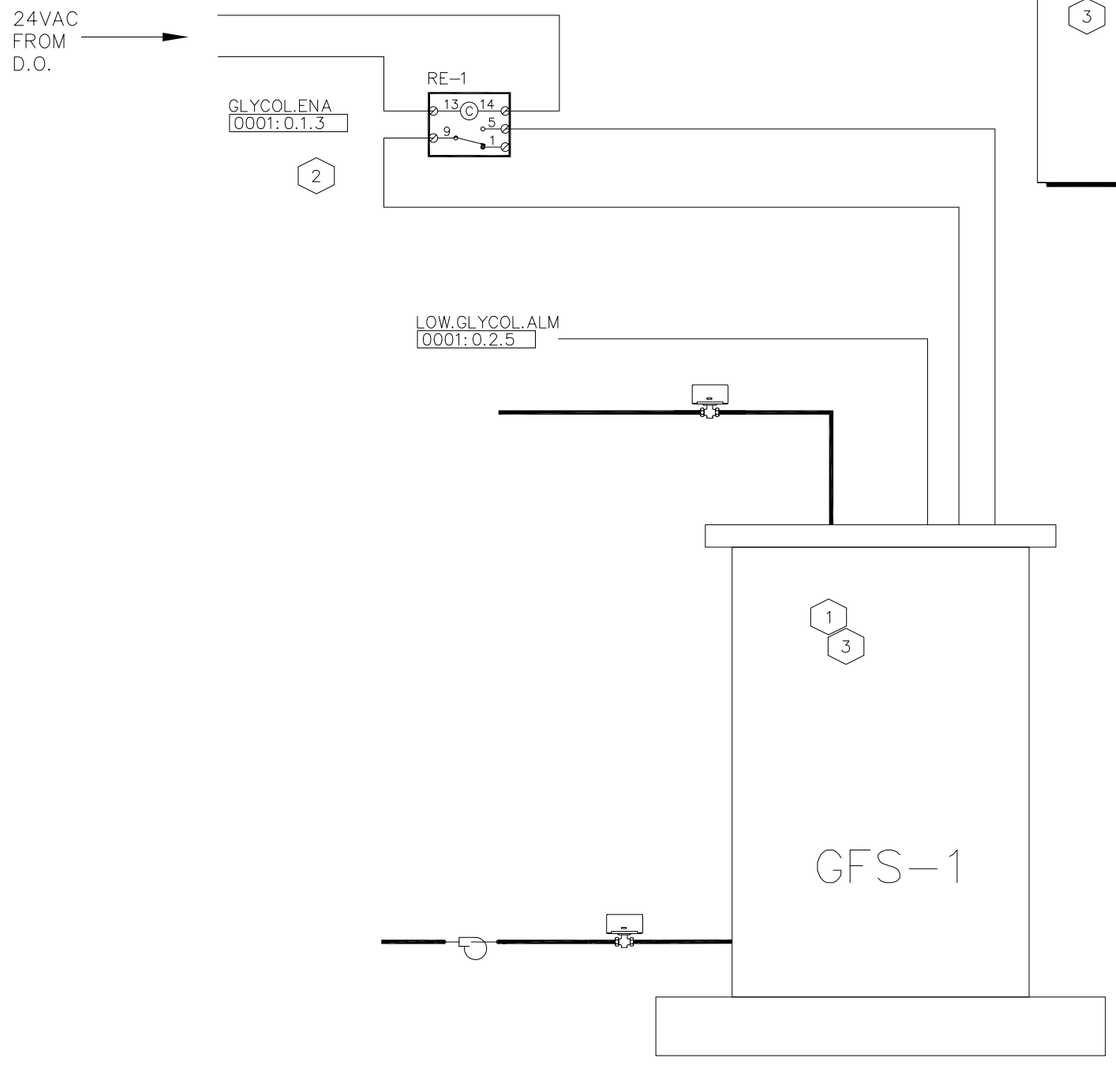
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Control Device	Qty	Product Number	Manufacturer	Document Number	Description
Field Mounted Devices					
RE 1	1	V120	VERIS	V120	V120, SPDT ENCLOSED RELAY

INSTALLATION NOTES:

1. GLYCOL FEED SYSTEM FURNISHED AND INSTALLED BY OTHERS.
2. FIELD VERIFY TERMINATIONS AND IF CONTACTS ARE DRY OR POWERED, USED ISOLATION RELAY IF NEEDED.
3. SYSTEM LOCATED ON SECOND FLOOR AND INTERLOCKED TO CHILL WATER HOT WATER PANEL FOR COMMUNICATION REDUCTION REASONS.



1/045 GLYCOL FEED PUMP

REF#	FIELD PANEL NAME	FIELD PANEL NODE NAME
0001	CHW-HW.PXM	MARCHWHWPXM

REVISION HISTORY

SIEMENS

POWERS OF ARKANSAS

5440 NORTHSHORE DR
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GLYCOL SYSTEM

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