Quality People. Building Solutions.

Comfort Systems USA (Arkansas), Inc.
P.O. Box 16620
Little Rock, AR 72231
Phone 501-834-3320
Fax 501-834-5416

Date: 3/13/2024
Return Request: 3/23/2024
Project: Stone Bank HQ - Chenal
Supplier: Harrison Energy Partners
Manufacturer: Various
Submittal: Controls
Submittal Number: 23 09 00-01
Drawing # and Installation: Mechanical Drawings

ARCHITECT
WDD Architects
5050 Northshore Lane
N. Little Rock, AR 72118
501-376-6681

ENGINEER
Batson Inc.
1300 Brookwood Dr.
Little Rock, AR 72202
501-664-3311

GENERAL CONTRACTOR
East Harding
2230 Cottondale Lane #3
Little Rock, AR 72202
501-661-1646

MECHANICAL SUBCONTRACTOR
Comfort Systems USA (Arkansas), Inc.
9924 Landers Rd.
N. Little Rock, AR 72117
501-834-3320

Notes:

dpierce@comfortar.com

Harrison
Energy Partners

Controls Submittal

Date: 03/06/2024
Project Name: Stone Bank HQ
Project Location: Little Rock, AR

Prepared For:

COMFORT SYSTEMS USA
NORTH LITTLE ROCK, AR

Sold To: COMFORT SYSTEMS USA

HEP Team:

Account Manager: JOSH ROBINSON

Project Manager: CHRIS MURRELL

Design By: JERRY PICKETT

HEP Office:

HARRISON ENERGY PARTNERS
1501 WESTPARK AVE STE 9
LITTLE ROCK, AR 72204

Phone: 5016610621
Fax:
Web: http://www.harrisonenergy.com

Harrison
Energy Partners

Submittal Contents

The following is a list of documents included in this submittal in the order that they appear.

STONE BANK
CHENAL PARKWAY HQ
LITTLE ROCK, AR

Mechanical Contractor

COMFORT SYSTEMS

HEP TEAM

SALESPERSON:

JOSH ROBINSON

PROJECT MANAGER:

CHRIS MURRELL

DESIGNED BY:

JERRY PICKETT

Drawing Title

Title Page

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

SALESPERSON	PROJECT MGR	DESIGNED BY	DRAWN		APPROVED	
JOSH ROBINSON	**CHRIS MURRELL**	**JERRY PICKETT**		DATE 03/06/2024	BY	DATE

Project Title

STONE BANK
CHENAL PARKWAY HQ
LITTLE ROCK, AR

124012 Stone Bank HQ.vsdx

Harrison Energy Partners

Office Information
Harrison Energy Partners
1501 Westpark Dr.
Suite. 9
Little Rock, AR 72204
(501) 661-0621

CONTRACT NUMBER

124012

DRAWING NUMBER

1 of 19

Drawing Index			
Dwg#	Drawing Title	Revision	Revision Date
1	Title Page	Original	03/06/2024
2	Drawing Index		
3	Riser		
4	Water Source Heat Pump Loop System		
5	Water Source Heat Pump Loop Sequence		
6	WSHP Loop BAC-5901 Controller Detail		
7	WSHP Loop CAN-5901 Expansion Module		
8	Water Source Heat Pumps		
9	WSHP Sequence		
10	WSHP BAC-9301 Controller Detail		
11	Water Source Heat Pumps w/HGRH		
12	WSHP w/HGRH Sequence		
13	WSHP w/HGRH BAC-9301 Controller Detail		
14	Fresh Air Water Source Heat Pumps		
15	Fresh Air WSHP Sequence		
16	Fresh Air WSHP BAC-9301 Controller Detail		
17	Miscellaneous Controls		
18	Server PC Detail		
19	Wring Details		

Drawing Title

Drawing Index

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

SALESPERSON	PROJECT MGR	DESIGNED BY	DRAWN		APPROVED	
JOSH ROBINSON	CHRIS MURRELL	JERRY PICKETT	DATE	03/06/2024	BY	DATE

Project Title

STONE BANK
CHENAL PARKWAY HQ
LITTLE ROCK, AR

124012 Stone Bank HQ.vsdx

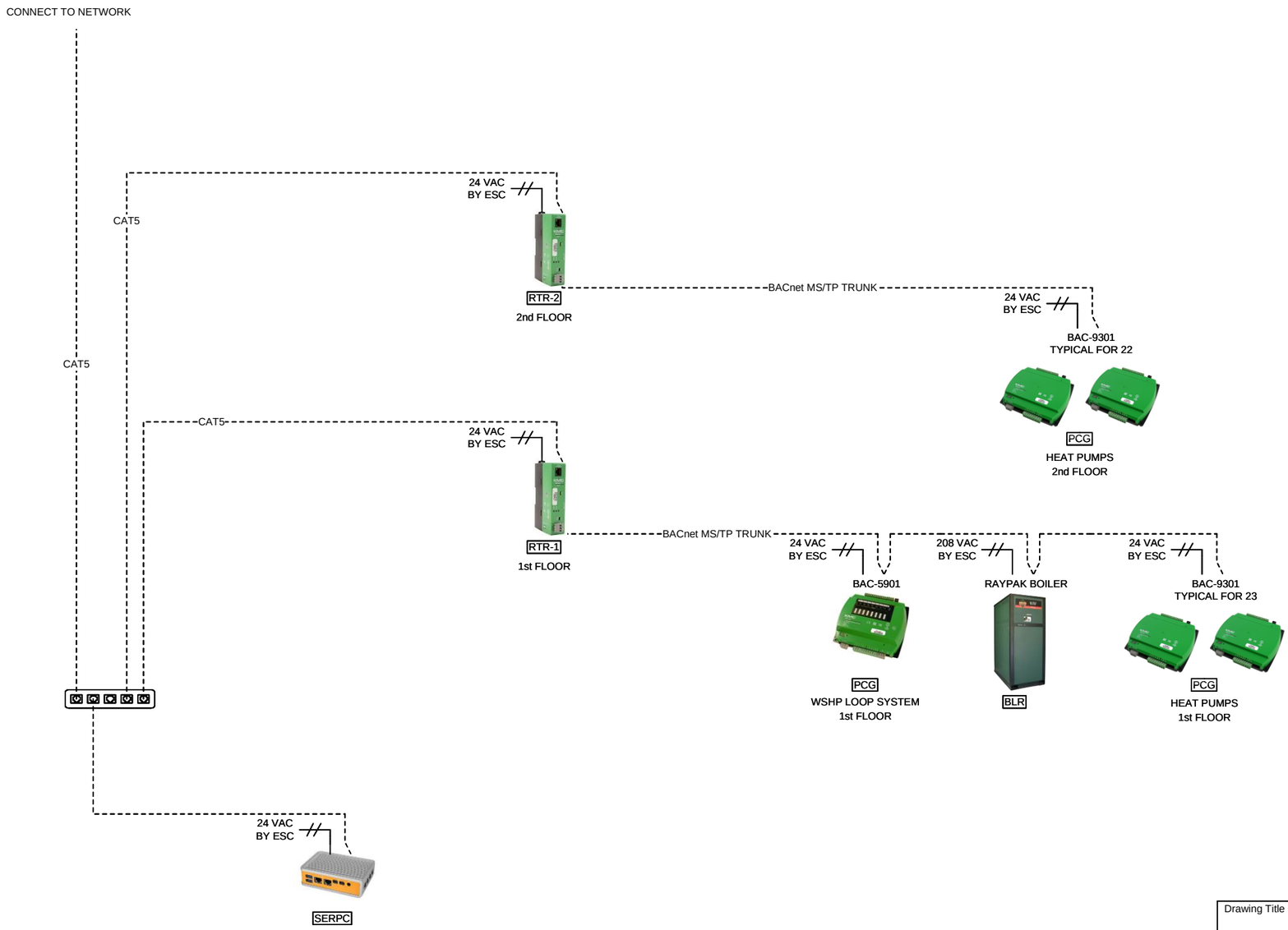
Harrison Energy Partners

Office Information
Harrison Energy Partners
1501 Westpark Dr.
Suite. 9
Little Rock, AR 72204
(501) 661-0621

CONTRACT NUMBER
124012

DRAWING NUMBER
2 of 19

BAS RISER



Drawing Title

Riser

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

SALESPERSON	PROJECT MGR	DESIGNED BY	DRAWN		APPROVED	
JOSH ROBINSON	CHRIS MURRELL	JERRY PICKETT	DATE	03/06/2024	BY	DATE

Project Title

STONE BANK
CHENAL PARKWAY HQ
LITTLE ROCK, AR

124012 Stone Bank HQ.vsdx

Harrison Energy Partners

Office Information

Harrison Energy Partners
1501 Westpark Dr.
Suite. 9
Little Rock, AR 72204
(501) 661-0621

CONTRACT NUMBER

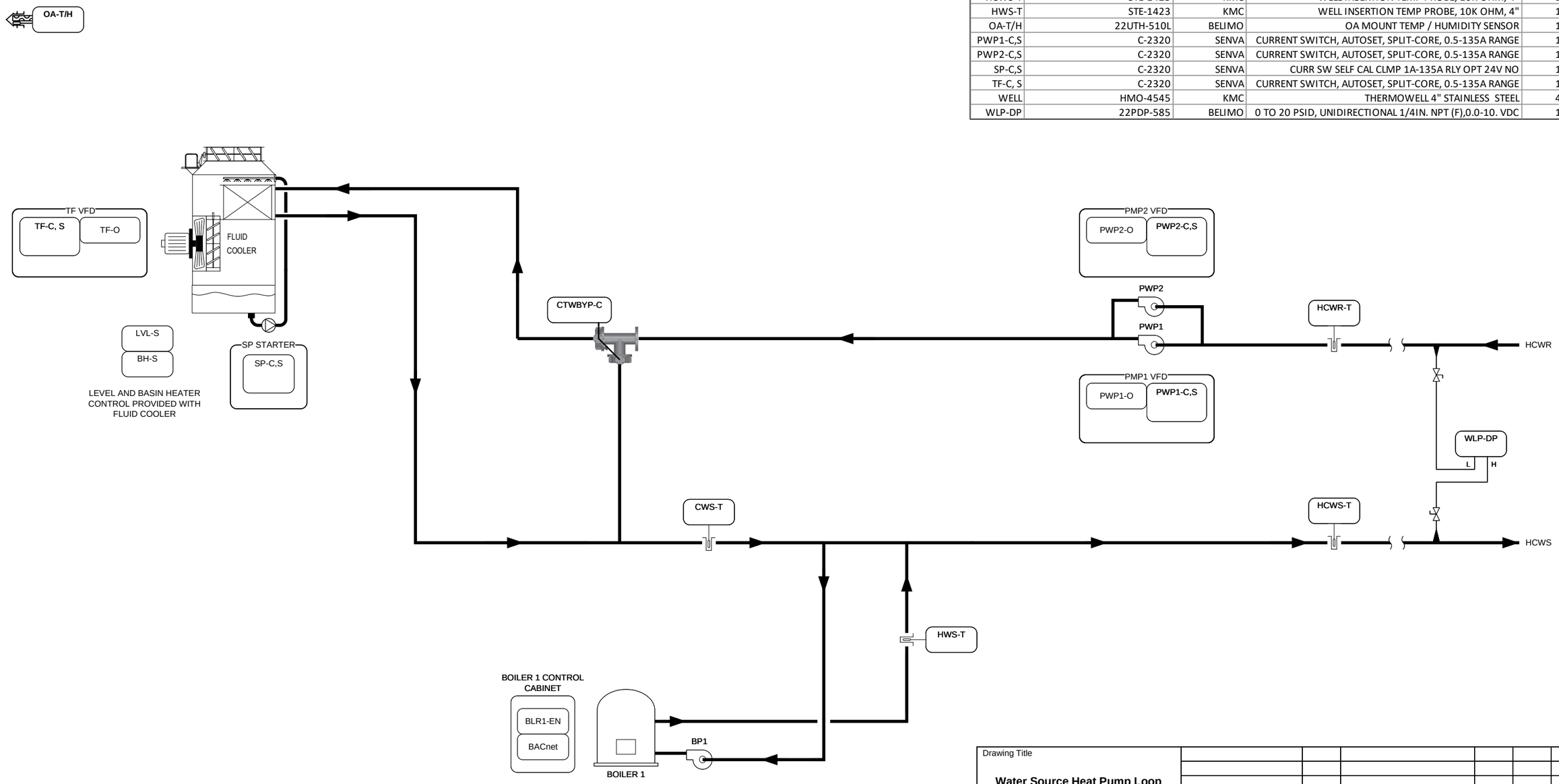
124012

DRAWING NUMBER

3 of 19

WATER SOURCE HEATPUMP LOOP SYSTEM

Bill_of_Material				
TAG	PART NO	VENDOR	DESCRIPTION	QTY
CTWBYP-C	F780HD+2*GMCX24-3-T-X1 N4	BELIMO	BUTTERFLY VALVE 3", 3WAY, OPEN/CLOSE, 24VAC, NSR	1
CWS-T	STE-1423	KMC	WELL INSERTION TEMP PROBE, 10K OHM, 4"	1
HCWR-T	STE-1423	KMC	WELL INSERTION TEMP PROBE, 10K OHM, 4"	1
HCWS-T	STE-1423	KMC	WELL INSERTION TEMP PROBE, 10K OHM, 4"	1
HWS-T	STE-1423	KMC	WELL INSERTION TEMP PROBE, 10K OHM, 4"	1
OA-T/H	22UTH-510L	BELIMO	OA MOUNT TEMP / HUMIDITY SENSOR	1
PWP1-C,S	C-2320	SENVA	CURRENT SWITCH, AUTOSET, SPLIT-CORE, 0.5-135A RANGE	1
PWP2-C,S	C-2320	SENVA	CURRENT SWITCH, AUTOSET, SPLIT-CORE, 0.5-135A RANGE	1
SP-C,S	C-2320	SENVA	CURR SW SELF CAL CLMP 1A-135A RLY OPT 24V NO	1
TF-C, S	C-2320	SENVA	CURRENT SWITCH, AUTOSET, SPLIT-CORE, 0.5-135A RANGE	1
WELL	HMO-4545	KMC	THERMOWELL 4" STAINLESS STEEL	4
WLP-DP	22PDP-585	BELIMO	0 TO 20 PSID, UNIDIRECTIONAL 1/4IN. NPT (F),0.0-10. VDC	1



Drawing Title

Water Source Heat Pump Loop System

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

SALESPERSON	PROJECT MGR	DESIGNED BY	DRAWN	APPROVED
JOSH ROBINSON	CHRIS MURRELL	JERRY PICKETT	DATE 03/06/2024	BY / DATE

Project Title

STONE BANK
CHENAL PARKWAY HQ
LITTLE ROCK, AR

124012 Stone Bank HQ.vsdx

Harrison Energy Partners

Office Information
Harrison Energy Partners
1501 Westpark Dr.
Suite. 9
Little Rock, AR 72204
(501) 661-0621

CONTRACT NUMBER: 124012

DRAWING NUMBER: 4 of 19

SEQUENCE OF OPERATION: WATER SOURCE HEAT PUMP SYSTEM:

GENERAL DESCRIPTION:
DURING COOLING CONDITIONS, THE SYSTEM'S HEAT PUMPS ARE ADDING HEAT TO THE WATER LOOP, A CLOSED LOOP EVAPORATIVE FLUID COOLER IS USED TO REMOVE THE HEAT. AS THE LOOP WATER TEMPERATURE RISES, THE DAMPERS ON SIDE OF THE FLUID COOLER OPEN TO ALLOW NATURAL VENTILATION TO COOL THE WATER. IF THE LOOP WATER TEMPERATURE CONTINUES TO INCREASE, A WATER SPRAY IS ENABLED AND IF THE LOOP WATER TEMPERATURE CONTINUES TO INCREASE, THE COOLER FAN IS ENABLED. A CLOSED LOOP EVAPORATOR FLUID COOLER IS USED TO REMOVE HEAT FROM THE SYSTEM DURING COOLING OPERATION AND BOILERS TO ADD HEAT TO THE SYSTEM DURING HEATING OPERATION.

WSHP LOOP PUMP CONTROL:
WHEN ENABLED, THE SYSTEM LOOP DISTRIBUTION PUMP SHALL OPERATE CONTINUOUSLY.

DISTRIBUTION PUMP LEAD/LAG:
THE DISTRIBUTION PUMP LEAD/LAG SEQUENCE SHALL BE ROTATED ON A WEEKLY SCHEDULE. THE SEQUENCE SHALL BE BASED ON CALCULATED RUN TIME WITH THE PUMP HAVING THE LEAST RUN TIME DESIGNATED AS LEAD; THE PUMP WITH THE NEXT LOWEST RUN TIME SHALL BE THE SECOND IN THE SEQUENCE (OR LAG PUMP) AND SO ON. AN OPERATOR SHALL BE ABLE TO MANUALLY CHANGE THE LEAD/LAG SEQUENCE FROM THE BAS CONTROLLER'S HUMAN-INTERFACE PANEL OR BAS WORKSTATION.

DISTRIBUTION PUMP FAILURE:
IF THE LEAD PUMP VFD IS ENABLED AND THE CURRENT SWITCH STATUS IS OFF FOR MORE THAN 30 SECONDS (ADJ.), THE ASSOCIATED CONTROLLER SHALL ANNUNCIATE A DISTRIBUTION WATER PUMP FAILURE ALARM TO THE BAS AND SHALL START THE LAG PUMP. ONCE THE PROBLEM HAS BEEN CORRECTED, THE OPERATOR SHALL BE ABLE TO CLEAR THE ALARM FAILURE FROM THE BAS CONTROLLER'S HUMAN-INTERFACE PANEL, BAS WORKSTATION, OR BY MANUALLY, MOMENTARILY OVERRIDING THE PUMP ON.

DISTRIBUTION PUMP SPEED:
WHEN THE DISTRIBUTION PUMP VFD IS ENABLED, THE ASSOCIATED CONTROLLER SHALL MODULATE THE PUMP VFD TO MAINTAIN THE DISTRIBUTION LOOP WATER DIFFERENTIAL PRESSURE SETPOINT OF 9PSI (ADJ.).

WSHP LOOP TEMPERATURE CONTROL:
WHEN THE SYSTEM LOOP SUPPLY WATER TEMPERATURE INCREASES ABOVE 87°F (ADJ.), THE CT BYPASS VALVE WILL OPEN TO THE FLUID COOLER. TOWER FAN, SPRAY PUMP AND DAMPERS WILL OPERATE IN SEQUENCE TO MAINTAIN LOOP WATER SUPPLY TEMPERATURE AT THE SETPOINT OF 87°F. THE TOWER SHALL BE TURNED OFF AS THE LOOP SUPPLY WATER TEMPERATURE DROPS BELOW 87° F + 1.5°F DIFFERENTIAL.

WHEN THE SYSTEM LOOP SUPPLY WATER TEMPERATURE DECREASES BELOW 68°F (ADJ.), THE CT BYPASS VALVE WILL CLOSE TO THE FLUID COOLER, THE BOILER CIRCULATION HOT WATER PUMP SHALL BE ENABLED ON AND BOILER WILL BE ENABLED AND WILL OPERATE TO MAINTAIN LOOP WATER SUPPLY TEMPERATURE AT THE SETPOINT OF 68°F.

WHEN THE LOOP WATER SUPPLY TEMPERATURE IS BETWEEN 68°F AND 87°F, THE TOWER AND BOILER WILL BE OFF.

AN ALARM SHALL ANNUNCIATE TO THE BAS WHENEVER THE SYSTEM LOOP SUPPLY WATER TEMPERATURE DROPS BELOW 50 DEG. F (ADJ.) OR RISES ABOVE 105 DEG. F (ADJ.).

Drawing Title

Water Source Heat Pump Loop Sequence

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

SALESPERSON	PROJECT MGR	DESIGNED BY	DRAWN		APPROVED	
JOSH ROBINSON	CHRIS MURRELL	JERRY PICKETT		DATE 03/06/2024	BY	DATE

Project Title

STONE BANK
CHENAL PARKWAY HQ
LITTLE ROCK, AR

124012 Stone Bank HQ.vsdx

Harrison Energy Partners

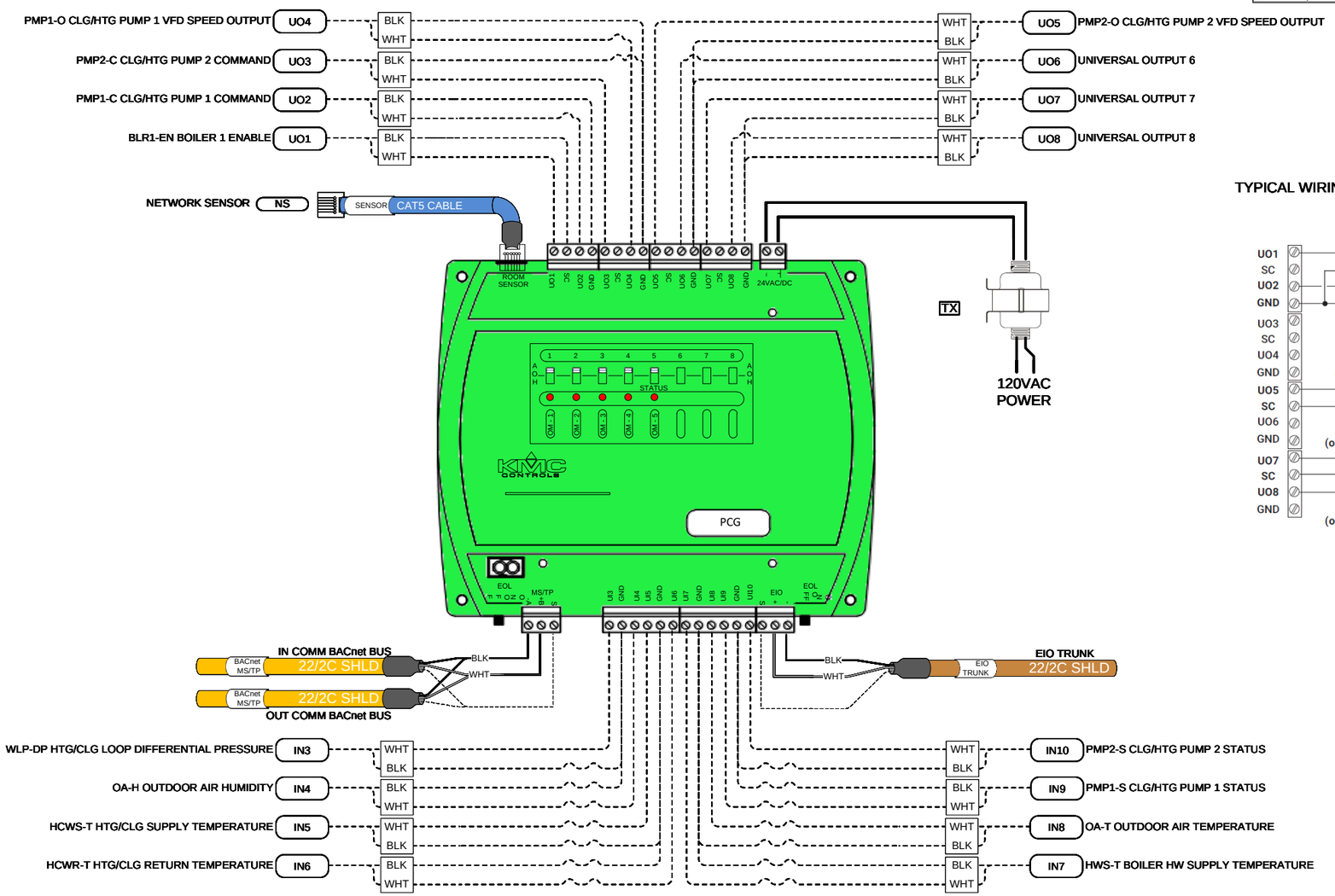
Office Information
Harrison Energy Partners
1501 Westpark Dr.
Suite. 9
Little Rock, AR 72204
(501) 661-0621

CONTRACT NUMBER
124012

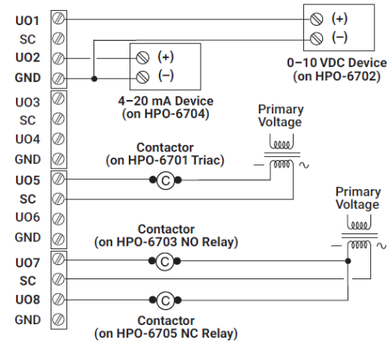
DRAWING NUMBER
5 of 19

CONTROLLER WIRING DETAIL

Bill_of_Material				
TAG	PART NO	VENDOR	DESCRIPTION	QTY
ENC	NSTA2620VA200-GY	KELE	NEMA 1 26" X 20" ENCLOSURE W/200 VA TRANSFORMER	1
OM - 1	HPO-6703	KMC	OUTPUT MODULE HOA, NO RELAY	1
OM - 2	HPO-6703	KMC	OUTPUT MODULE HOA, NO RELAY	1
OM - 3	HPO-6703	KMC	OUTPUT MODULE HOA, NO RELAY	1
OM - 4	HPO-6702	KMC	OUTPUT MODULE HOA, 0-12VDC	1
OM - 5	HPO-6702	KMC	OUTPUT MODULE HOA, 0-12VDC	1
PCG	BAC-5901C	KMC	PROGRAMMABLE CONTROLLER	1



TYPICAL WIRING DIAGRAM FOR OVERRIDE BOARDS

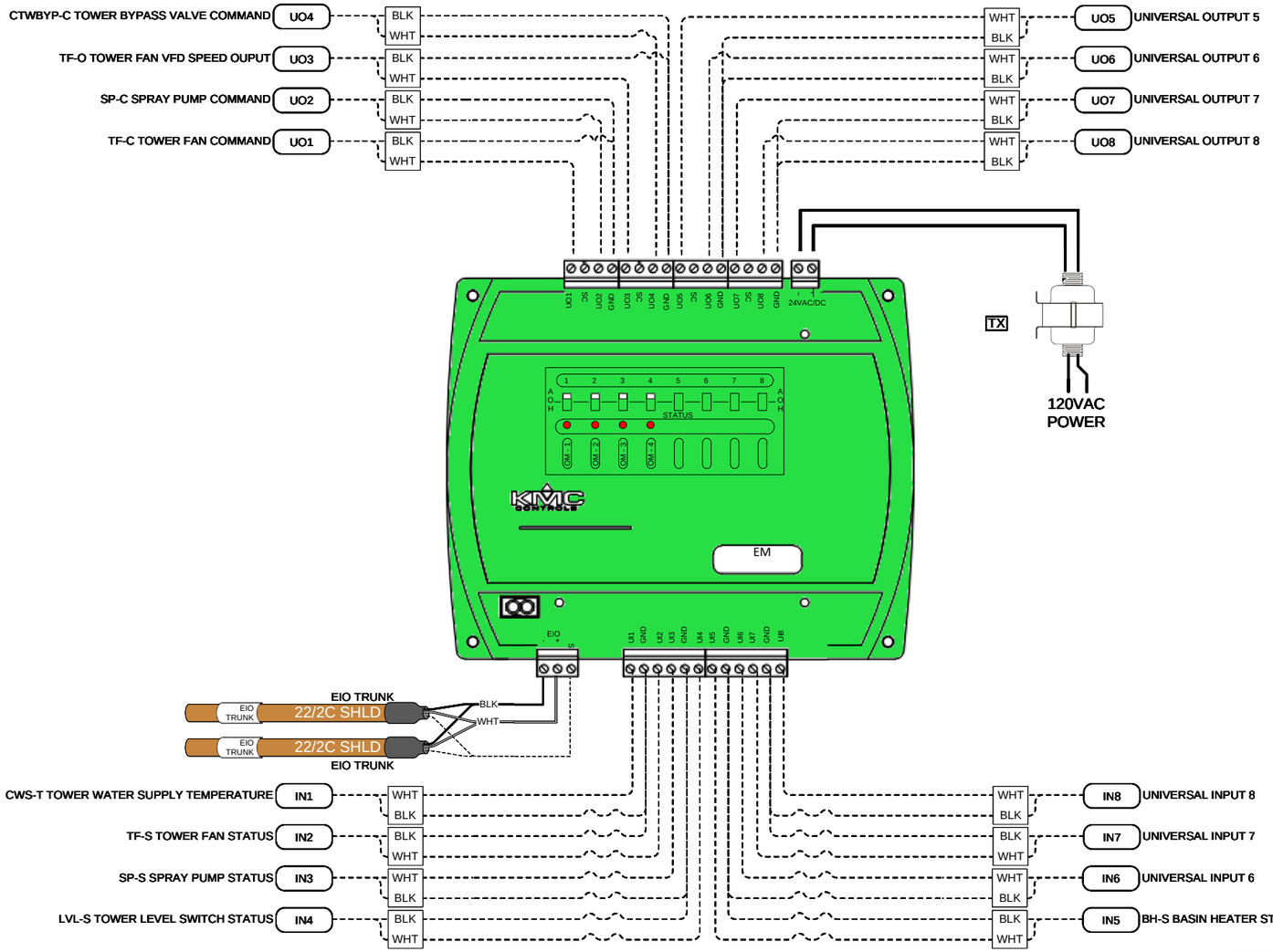


ENC

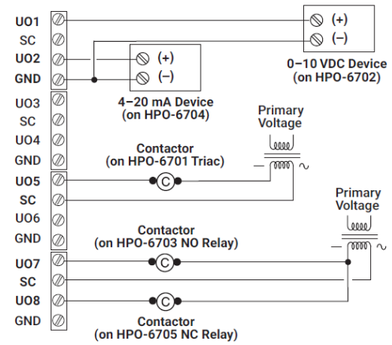
Drawing Title: **WSHP Loop BAC-5901 Controller Detail**						
REFERENCE DRAWING	NO.	REVISION-LOCATION		ECN	DATE	BY
SALESPERSON: JOSH ROBINSON	PROJECT MGR: CHRIS MURRELL	DESIGNED BY: JERRY PICKETT	DRAWN: DATE 03/06/2024		APPROVED: BY	DATE
Project Title: *STONE BANK CHENAL PARKWAY HQ LITTLE ROCK, AR*			Office Information: Harrison Energy Partners, 1501 Westpark Dr. Suite. 9, Little Rock, AR 72204, (501) 661-0621		CONTRACT NUMBER: 124012	
124012 Stone Bank HQ.vsdx			Harrison Energy Partners		DRAWING NUMBER: 6 of 19	

Bill_of_Material				
TAG	PART NO	VENDOR	DESCRIPTION	QTY
EM	CAN-5901	KMC	EXPANSION MODULE	1
OM - 1	HPO-6703	KMC	OUTPUT MODULE HOA, NO RELAY	1
OM - 2	HPO-6703	KMC	OUTPUT MODULE HOA, NO RELAY	1
OM - 3	HPO-6702	KMC	OUTPUT MODULE HOA, 0-12VDC	1
OM - 4	HPO-6703	KMC	OUTPUT MODULE HOA, NO RELAY	1

CONTROLLER WIRING DETAIL



TYPICAL WIRING DIAGRAM FOR OVERRIDE BOARDS



Drawing Title

WSHP Loop CAN-5901 Expansion Module

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

SALESPERSON	PROJECT MGR	DESIGNED BY	DRAWN		APPROVED	
JOSH ROBINSON	CHRIS MURRELL	JERRY PICKETT	DATE 03/06/2024	BY	DATE	

Project Title

STONE BANK
CHENAL PARKWAY HQ
LITTLE ROCK, AR

124012 Stone Bank HQ.vsdx

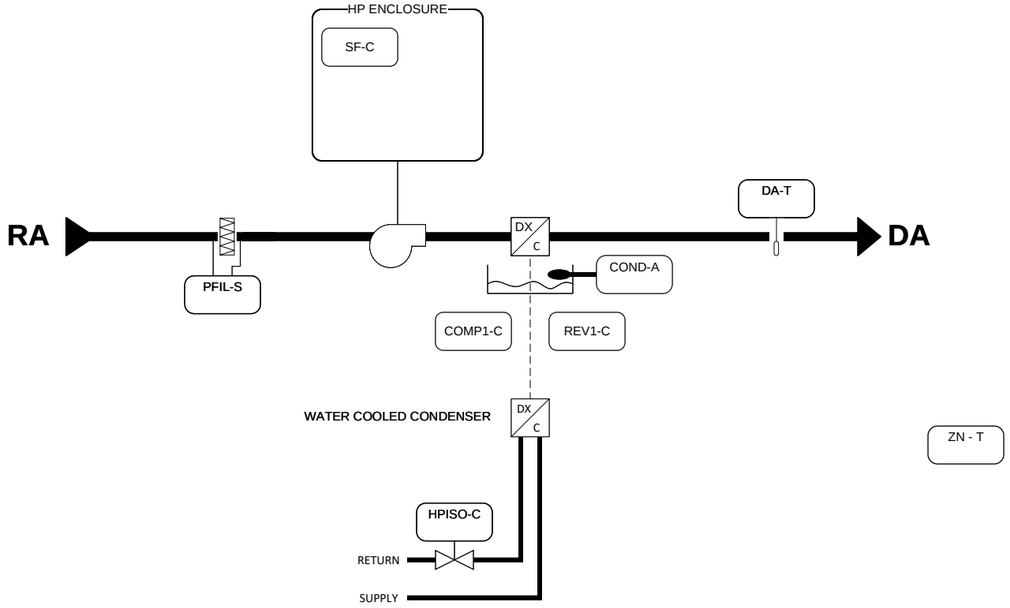
Harrison Energy Partners

Office Information
Harrison Energy Partners
1501 Westpark Dr.
Suite. 9
Little Rock, AR 72204
(501) 661-0621

CONTRACT NUMBER
124012

DRAWING NUMBER
7 of 19

WATER SOURCE HEAT PUMPS
TYPICAL FOR 28
HP-2, 3, 4, 6, 7, 9 ~ 22, 27, 29, 30, 33, 36, 37, 78, 100, 101



Bill_of_Material				
TAG	PART NO	VENDOR	DESCRIPTION	QTY
COND-A	KCFS-SC	KELE	SPDT FLOAT SWITCH W/SPRNG	28
DA-T	STE-1405	KMC	PROBE TEMPERATURE SENSOR 4"	28
PFIL-S	01APS-50U	BELIMO	DIFF AIR PRESSURE SWITCH	28
ZN - T	STE-9001W	KMC	NET SPACE TEMP SENSOR	28

Drawing Title

Water Source Heat Pumps

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

SALESPERSON	PROJECT MGR	DESIGNED BY	DRAWN		APPROVED	
JOSH ROBINSON	CHRIS MURRELL	JERRY PICKETT	DATE	03/06/2024	BY	DATE

Project Title

STONE BANK
CHENAL PARKWAY HQ
LITTLE ROCK, AR

124012 Stone Bank HQ.vsdx

Harrison Energy Partners

Office Information
Harrison Energy Partners
1501 Westpark Dr.
Suite. 9
Little Rock, AR 72204
(501) 661-0621

CONTRACT NUMBER
124012

DRAWING NUMBER
8 of 19

WATER SOURCE HEAT PUMP SEQUENCE

UNIT ENABLE:
WHEN THE NETWORK INPUT UNIT ENABLE SWITCH IS SET TO OCCUPIED, THE CONTROL SEQUENCE WILL BE ENABLED.

SUPPLY FAN CONTROL:
DURING OCCUPIED MODE, THE CONSTANT SPEED SUPPLY FAN WILL BE STARTED WHEN OCCUPIED AND WILL RUN CONTINUOUSLY.

HEAT PUMP CONTROL:
WHEN THE ZONE TEMPERATURE FALLS BELOW THE ZONE TEMPERATURE SETPOINT, THE REVERSING VALVE WILL BE INDEXED TO PROVIDE HEATING WHEN THE COMPRESSOR IS RUNNING. WHEN THE ZONE TEMPERATURE RISES ABOVE THE ZONE TEMPERATURE SETPOINT, THE REVERSING VALVE WILL BE INDEXED TO PROVIDE COOLING WHEN THE COMPRESSOR IS RUNNING. UPON A CALL FOR THE COMPRESSOR AN ISOLATION VALVE FOR THE WATER COOLED CONDENSER WILL OPEN. AFTER A TIME DELAY (20 SECONDS), THE COMPRESSOR WILL START.

TEMPERATURE CONTROL:
THE UNIT WILL CONTROL TO MAINTAIN THE ZONE TEMPERATURE SETPOINT AS SENSED BY THE ZONE TEMPERATURE SENSOR.

OCCUPIED MODE:
OCCUPANCY MODE WILL BE CONTROLLED VIA A NETWORK INPUT. OCCUPANCY MODE CAN ALSO BE OVERRIDDEN BY A NETWORK INPUT OR A TEMPORARY OCCUPANCY BUTTON ON THE ZONE TEMPERATURE SENSOR. WHEN THE CONDENSATE FLOAT SWITCH IS IN "ALARM", THE COOLING CONTROL SEQUENCE WILL BE DISABLED. THEN THE FAN WILL BE DISABLED.

UNOCCUPIED MODE:
THE UNIT WILL CYCLE ON TO MAINTAIN UNOCCUPIED ZONE SETPOINTS DURING UNOCCUPIED PERIODS.

Drawing Title

WSHP Sequence

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

SALESPERSON	PROJECT MGR	DESIGNED BY	DRAWN		APPROVED	
JOSH ROBINSON	CHRIS MURRELL	JERRY PICKETT	DATE	03/06/2024	BY	DATE

Project Title

STONE BANK
CHENAL PARKWAY HQ
LITTLE ROCK, AR

124012 Stone Bank HQ.vsdx

Harrison Energy Partners

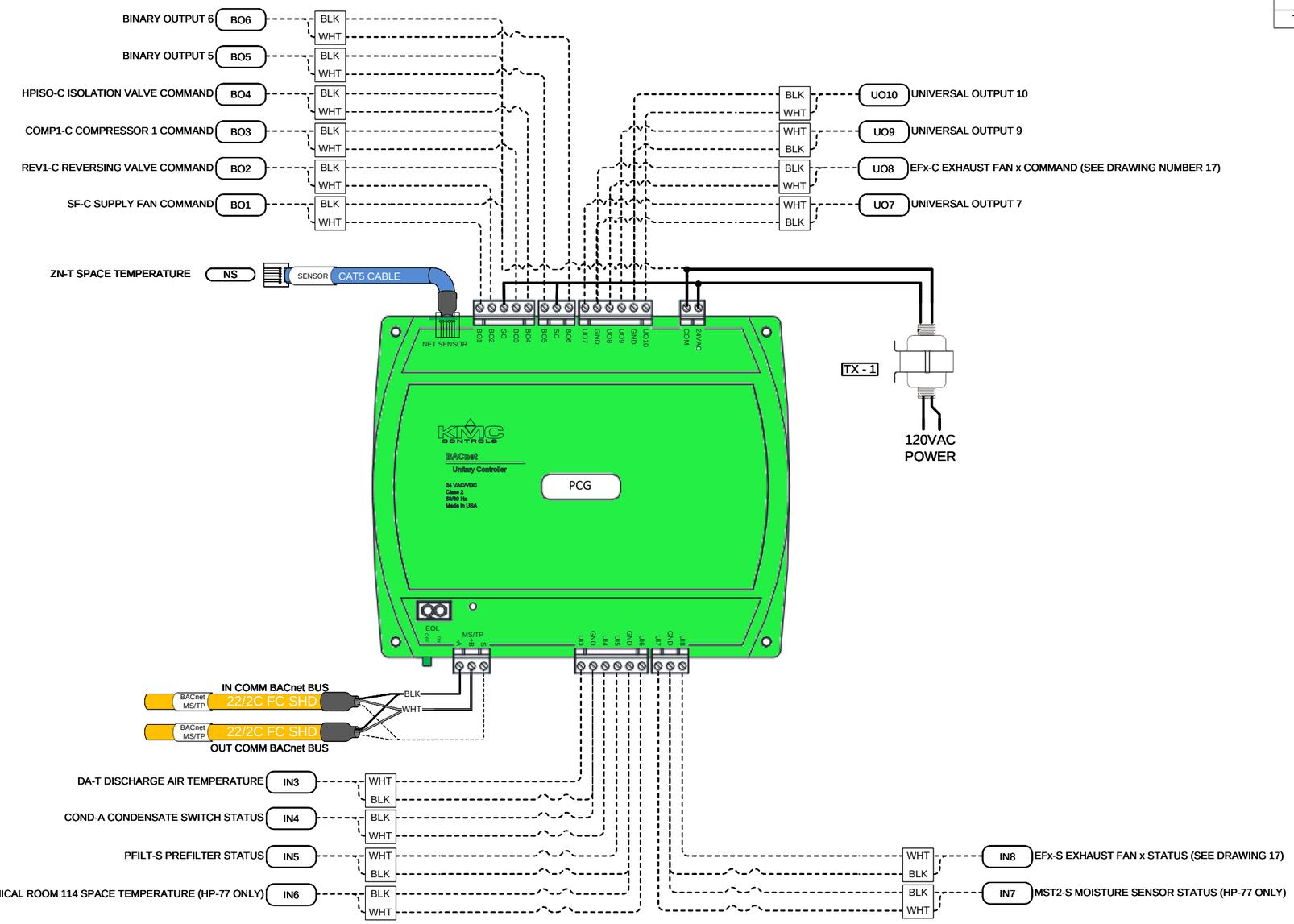
Office Information
Harrison Energy Partners
1501 Westpark Dr.
Suite. 9
Little Rock, AR 72204
(501) 661-0621

CONTRACT NUMBER
124012

DRAWING NUMBER
9 of 19

UNITARY CONTROLLER WIRING DETAIL

Bill_of_Material				
TAG	PART NO	VENDOR	DESCRIPTION	QTY
PCG	BAC-9301	KMC	UNITARY PROGRAMMABLE CONTROLLER	28
TX - 1	TR50VA005	RIB	TRANSFORMER 120 VAC - 24 VAC	28



Drawing Title

WSHP BAC-9301 Controller Detail

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

SALESPERSON	PROJECT MGR	DESIGNED BY	DRAWN		APPROVED	
JOSH ROBINSON	CHRIS MURRELL	JERRY PICKETT	DATE 03/06/2024	BY	DATE	

Project Title

STONE BANK
CHENAL PARKWAY HQ
LITTLE ROCK, AR

124012 Stone Bank HQ.vsdx

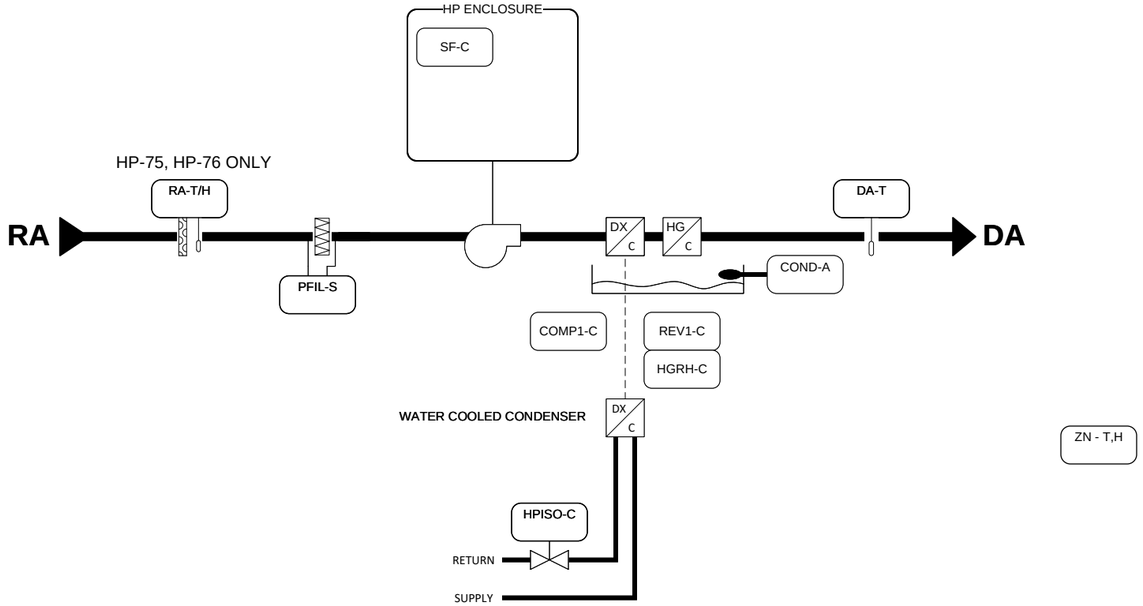
Harrison Energy Partners

Office Information
Harrison Energy Partners
1501 Westpark Dr.
Suite. 9
Little Rock, AR 72204
(501) 661-0621

CONTRACT NUMBER
124012

DRAWING NUMBER
10 of 19

WATER SOURCE HEAT PUMPS WITH HGRH
TYPICAL FOR 13
HP-24, 26, 27, 31, 32, 35, 38, 40, 72 ~ 76



Bill_of_Material				
TAG	PART NO	VENDOR	DESCRIPTION	QTY
COND-A	KCFS-SC	KELE	SPDT FLOAT SWITCH W/SPRNG	13
DA-T	STE-1405	KMC	PROBE TEMPERATURE SENSOR 4"	13
PFIL-S	01APS-50U	BELIMO	DIFF AIR PRESSURE SWITCH	13
RA-T/H	22DTH-51ML	BELIMO	DUCT PROBE 2% HUMIDITY ELEMENT W/THERMISTOR TEMP	2
ZN - T,H	STE-9021W	KMC	NET SPACE TEMP, HUMIDITY SENSOR	11

Drawing Title

Water Source Heat Pumps w/ HGRH

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

SALESPERSON	PROJECT MGR	DESIGNED BY	DRAWN		APPROVED	
JOSH ROBINSON	CHRIS MURRELL	JERRY PICKETT	DATE	03/06/2024	BY	DATE

Project Title

STONE BANK
CHENAL PARKWAY HQ
LITTLE ROCK, AR

124012 Stone Bank HQ.vsdx

Harrison Energy Partners

Office Information
Harrison Energy Partners
1501 Westpark Dr.
Suite. 9
Little Rock, AR 72204
(501) 661-0621

CONTRACT NUMBER
124012

DRAWING NUMBER
11 of 19

WATER SOURCE HEAT PUMP SEQUENCE

UNIT ENABLE:
WHEN THE NETWORK INPUT UNIT ENABLE SWITCH IS SET TO OCCUPIED, THE CONTROL SEQUENCE WILL BE ENABLED.

SUPPLY FAN CONTROL:
DURING OCCUPIED MODE, THE CONSTANT SPEED SUPPLY FAN WILL BE STARTED WHEN OCCUPIED AND WILL RUN CONTINUOUSLY.

HEAT PUMP CONTROL:
WHEN THE ZONE TEMPERATURE FALLS BELOW THE ZONE TEMPERATURE SETPOINT, THE REVERSING VALVE WILL BE INDEXED TO PROVIDE HEATING WHEN THE COMPRESSOR IS RUNNING. WHEN THE ZONE TEMPERATURE RISES ABOVE THE ZONE TEMPERATURE SETPOINT, THE REVERSING VALVE WILL BE INDEXED TO PROVIDE COOLING WHEN THE COMPRESSOR IS RUNNING. UPON A CALL FOR THE COMPRESSOR AN ISOLATION VALVE FOR THE WATER COOLED CONDENSER WILL OPEN. AFTER A TIME DELAY (20 SECONDS), THE COMPRESSOR WILL START.

TEMPERATURE CONTROL:
THE UNIT WILL CONTROL TO MAINTAIN THE ZONE TEMPERATURE SETPOINT AS SENSED BY THE ZONE TEMPERATURE SENSOR.

DEHUMIDIFICATION MODE:
WHEN THE SPACE HUMIDITY RISES ABOVE THE SETPOINT, THE UNIT CONTROLLER SHALL STAGE THE DX COOLING AND ENERGIZE THE HOT GAS REHEAT AS REQUIRED TO MAINTAIN THE SPACE HUMIDITY SETPOINT. WHEN THE SPACE HUMIDITY FALLS BELOW THE SETPOINT THE CONTROLLER SHALL DISABLE HOT GAS REHEAT.

OCCUPIED MODE:
OCCUPANCY MODE WILL BE CONTROLLED VIA A NETWORK INPUT. OCCUPANCY MODE CAN ALSO BE OVERRIDDEN BY A NETWORK INPUT OR A TEMPORARY OCCUPANCY BUTTON ON THE ZONE TEMPERATURE SENSOR. WHEN THE CONDENSATE FLOAT SWITCH IS IN "ALARM", THE COOLING CONTROL SEQUENCE WILL BE DISABLED. THEN THE FAN WILL BE DISABLED.

UNOCCUPIED MODE:
THE UNIT WILL CYCLE ON TO MAINTAIN UNOCCUPIED ZONE SETPOINTS DURING UNOCCUPIED PERIODS.

Drawing Title

WSHP w/HGRH Sequence

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

SALESPERSON	PROJECT MGR	DESIGNED BY	DRAWN	APPROVED
JOSH ROBINSON	CHRIS MURRELL	JERRY PICKETT	DATE 03/06/2024	BY / DATE

Project Title

STONE BANK
CHENAL PARKWAY HQ
LITTLE ROCK, AR

124012 Stone Bank HQ.vsdx

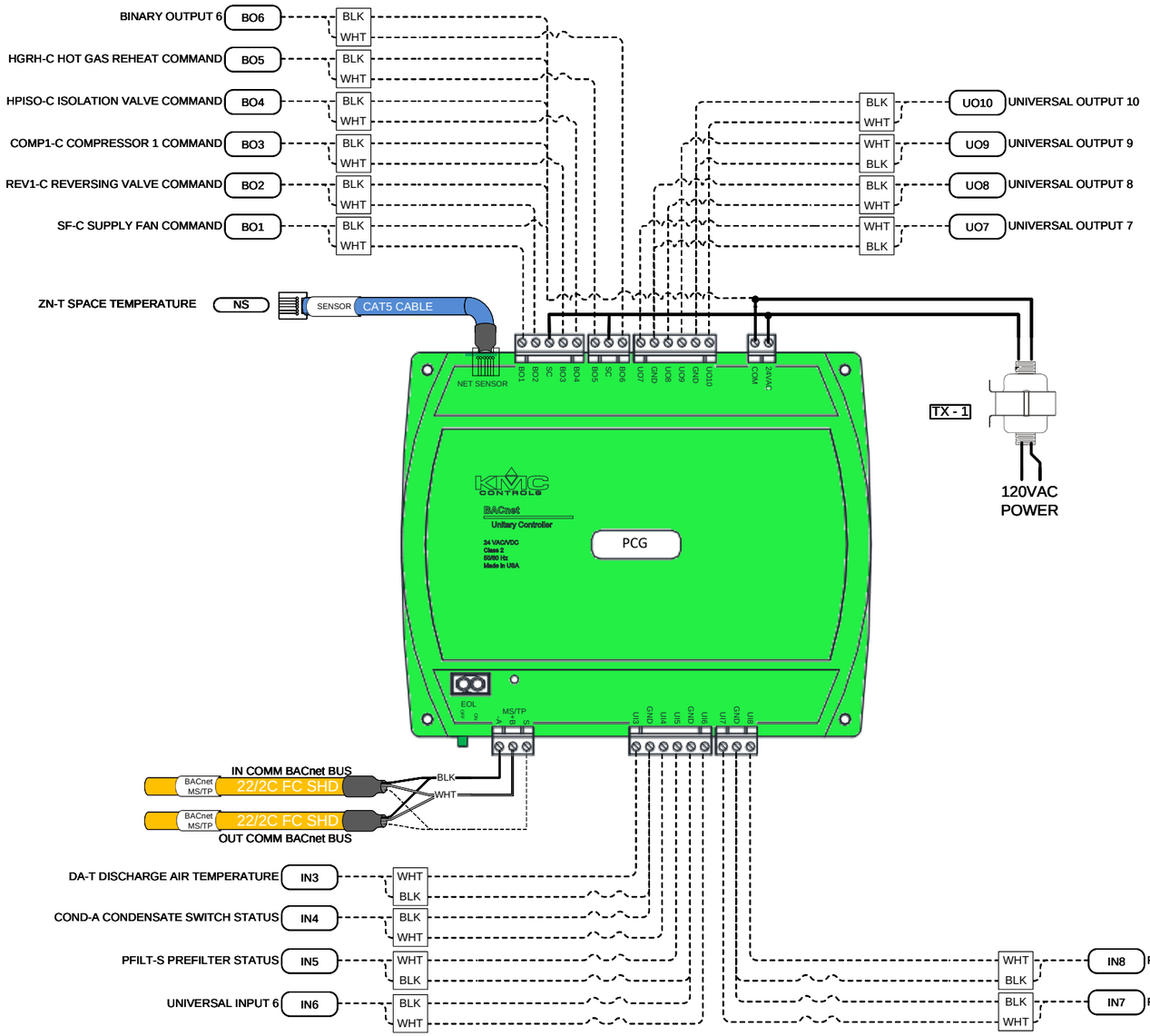
Harrison Energy Partners

Office Information
Harrison Energy Partners
1501 Westpark Dr.
Suite. 9
Little Rock, AR 72204
(501) 661-0621

CONTRACT NUMBER
124012

DRAWING NUMBER
12 of 19

UNITARY CONTROLLER WIRING DETAIL



Bill_of_Material

TAG	PART NO	VENDOR	DESCRIPTION	QTY
PCG	BAC-9301	KMC	UNITARY PROGRAMMABLE CONTROLLER	13
TX - 1	TR50VA005	RIB	TRANSFORMER 120 VAC - 24 VAC	13

Drawing Title

WSHP w/HGRH BAC-9301 Controller Detail

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

SALESPERSON	PROJECT MGR	DESIGNED BY	DRAWN		APPROVED	
JOSH ROBINSON	CHRIS MURRELL	JERRY PICKETT	DATE 03/06/2024	BY	DATE	

Project Title

STONE BANK
CHENAL PARKWAY HQ
LITTLE ROCK, AR

124012 Stone Bank HQ.vsdx

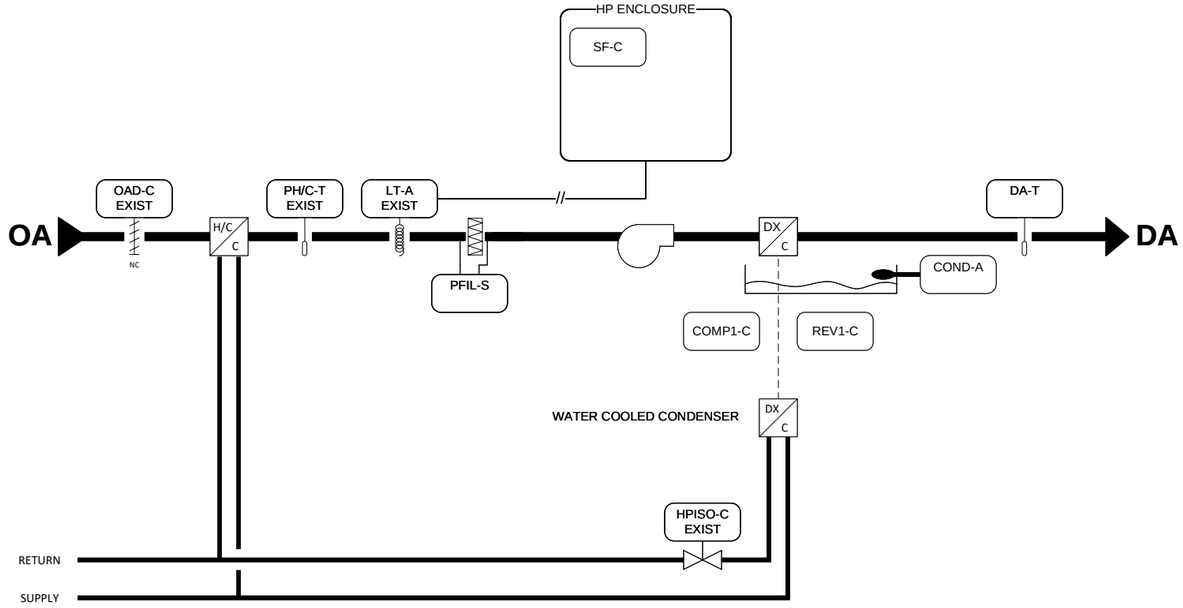
Harrison Energy Partners

Office Information
Harrison Energy Partners
1501 Westpark Dr.
Suite. 9
Little Rock, AR 72204
(501) 661-0621

CONTRACT NUMBER
124012

DRAWING NUMBER
13 of 19

EXISTING FRESH AIR WATER SOURCE HEAT PUMPS
TYPICAL FOR 4
HP-66, 67, 68, 69



Bill_of_Material				
TAG	PART NO	VENDOR	DESCRIPTION	QTY
COND-A	KCFS-SC	KELE	SPDT FLOAT SWITCH W/SPRNG	4
DA-T	STE-1405	KMC	PROBE TEMPERATURE SENSOR 4"	4
PFIL-S	01APS-50U	BELIMO	DIFF AIR PRESSURE SWITCH	4

Drawing Title

Fresh Air Water Source Heat Pumps

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

SALESPERSON	PROJECT MGR	DESIGNED BY	DRAWN	APPROVED
JOSH ROBINSON	CHRIS MURRELL	JERRY PICKETT	DATE 03/06/2024	BY / DATE

Project Title

STONE BANK
CHENAL PARKWAY HQ
LITTLE ROCK, AR

124012 Stone Bank HQ.vsdx

Harrison Energy Partners

Office Information
Harrison Energy Partners
1501 Westpark Dr.
Suite. 9
Little Rock, AR 72204
(501) 661-0621

CONTRACT NUMBER
124012

DRAWING NUMBER
14 of 19

WATER SOURCE HEAT PUMP: SEQUENCE OF OPERATION

OCCUPIED:
DURING OCCUPIED PERIODS, THE OUTDOOR AIR DAMPER SHALL OPEN, SUPPLY FAN SHALL RUN CONTINUOUSLY. THE DX HEATING AND COOLING SHALL CONTROL TO MAINTAIN THE ACTIVE DISCHARGE AIR TEMPERATURE SETPOINT OF 70°F (ADJ).

UNOCCUPIED:
DURING UNOCCUPIED PERIODS, THE OUTDOOR AIR DAMPER SHALL CLOSE, SUPPLY FAN SHALL BE OFF.

COOLING MODE:
THE UNIT CONTROLLER SHALL USE DISCHARGE TEMPERATURE AND DISCHARGE TEMPERATURE SETPOINT TO DETERMINE WHEN TO STAGE THE COOLING. WHEN THE DISCHARGE TEMPERATURE RISES ABOVE THE SETPOINT, THE UNIT CONTROLLER SHALL STAGE THE DX COOLING AS REQUIRED TO MAINTAIN THE DISCHARGE TEMPERATURE SETPOINT. WHEN THE DISCHARGE TEMPERATURE FALLS BELOW THE SETPOINT THE CONTROLLER SHALL DISABLE DX COOLING.

HEATING MODE:
THE UNIT CONTROLLER SHALL USE THE DISCHARGE TEMPERATURE AND DISCHARGE TEMPERATURE SETPOINT TO DETERMINE WHEN TO INITIATE REQUESTS FOR HEAT. WHEN THE DISCHARGE TEMPERATURE DROPS BELOW THE SETPOINT, THE UNIT CONTROLLER SHALL ENABLE DX HEATING TO MAINTAIN THE DISCHARGE TEMPERATURE SETPOINT. ONCE THE DISCHARGE TEMPERATURE RISES ABOVE THE SETPOINT THE DX HEATING SHALL BE DISABLED.

SUPPLY FAN:
THE SUPPLY FAN SHALL BE ENABLED WHILE IN THE OCCUPIED MODE AND OFF DURING THE UNOCCUPIED MODE.

CONDENSATE SWITCH STATUS:
A CONDENSATE SWITCH SHALL MONITOR THE PAN FOR WATER. IF WATER IS DETECTED, THE UNIT WILL SHUT DOWN.

Drawing Title

Fresh Air WSHP Sequence

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

SALESPERSON	PROJECT MGR	DESIGNED BY	DRAWN		APPROVED	
JOSH ROBINSON	CHRIS MURRELL	JERRY PICKETT	DATE	03/06/2024	BY	DATE

Project Title

STONE BANK
CHENAL PARKWAY HQ
LITTLE ROCK, AR

124012 Stone Bank HQ.vsdx

Harrison Energy Partners

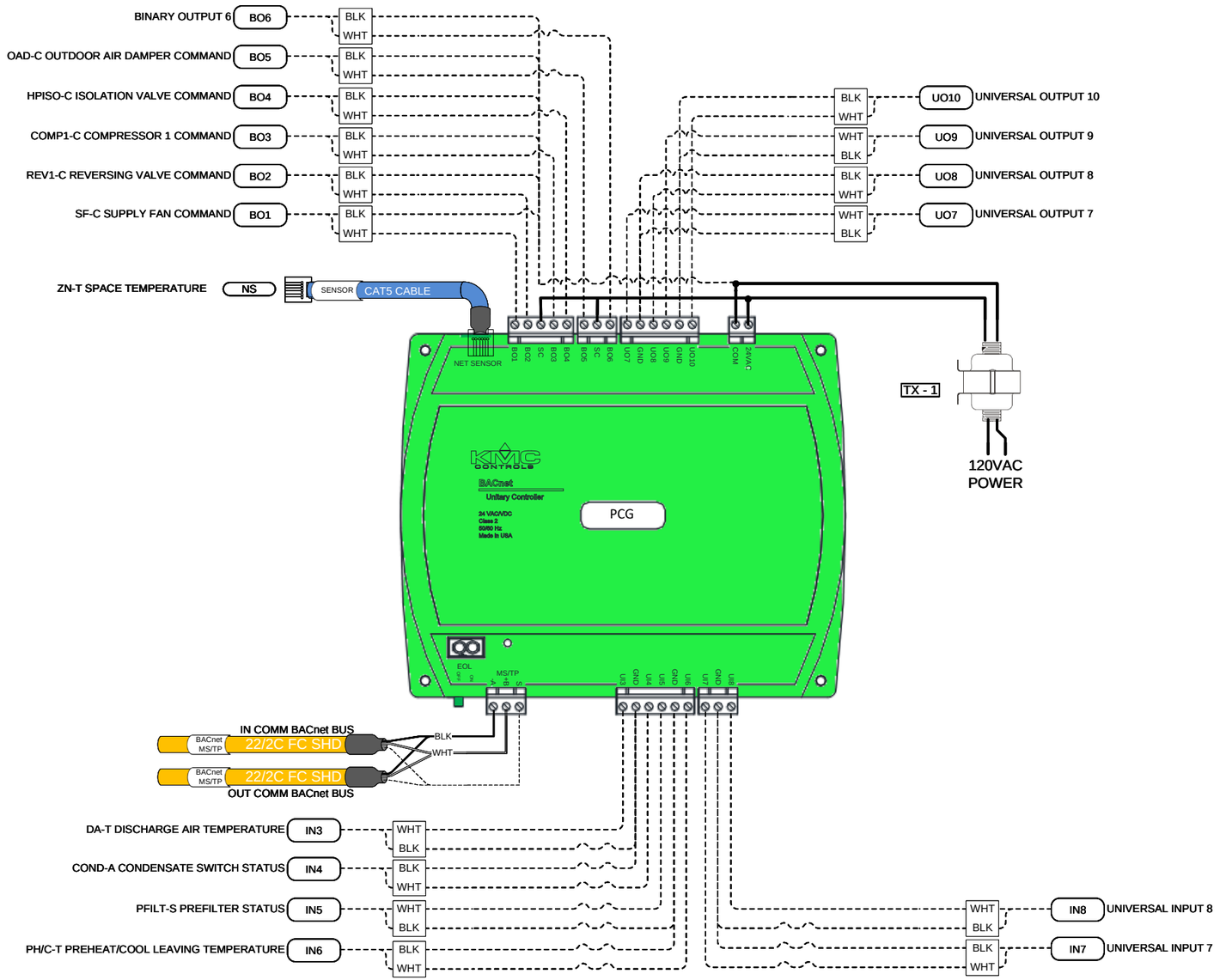
Office Information
Harrison Energy Partners
1501 Westpark Dr.
Suite. 9
Little Rock, AR 72204
(501) 661-0621

CONTRACT NUMBER
124012

DRAWING NUMBER
15 of 19

UNITARY CONTROLLER WIRING DETAIL

Bill_of_Material				
TAG	PART NO	VENDOR	DESCRIPTION	QTY
PCG	BAC-9301	KMC	UNITARY PROGRAMMABLE CONTROLLER	4
TX - 1	TR50VA005	RIB	TRANSFORMER 120 VAC - 24 VAC	4



Drawing Title

Fresh Air WSHP BAC-9301 Controller Detail

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

SALESPERSON	PROJECT MGR	DESIGNED BY	DRAWN	APPROVED
JOSH ROBINSON	CHRIS MURRELL	JERRY PICKETT	DATE 03/06/2024	BY / DATE

Project Title

STONE BANK
CHENAL PARKWAY HQ
LITTLE ROCK, AR

124012 Stone Bank HQ.vsdx

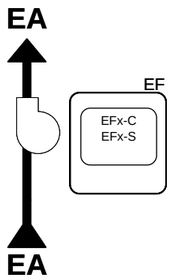
Harrison Energy Partners

Office Information
Harrison Energy Partners
1501 Westpark Dr.
Suite. 9
Little Rock, AR 72204
(501) 661-0621

CONTRACT NUMBER
124012

DRAWING NUMBER
16 of 19

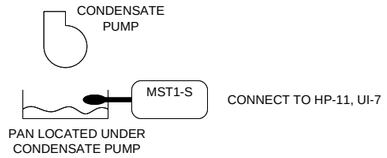
EXHAUST FANS EF-4 ~ 12, 23 ~ 25
TYPICAL FOR 12



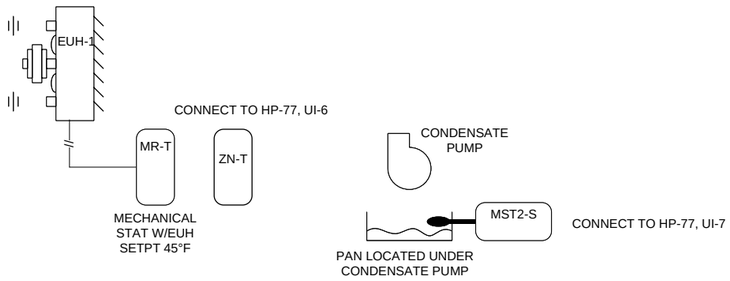
CONNECTION TABLE

EF #	HP#	UO#	UI#
4	9	8	8
5	6	8	8
6	12	8	8
7	15	8	8
8	11	8	8
9	31	8	8
10	26	8	8
11	40	8	8
12	36	8	8
23	19	8	8
24	24	8	8
25	78	8	8

JANITOR ROOM 143



MECHANICAL ROOM 114



Bill_of_Material

TAG	PART NO	VENDOR	DESCRIPTION	QTY
EFx-C	C-2320/CR3-24	SENVA	CURRENT SWITCH, PRESET, N.O. , SPLIT-CORE, 0.45-100A RANGE	12
MST1-S	WD3-LP-D2	DWYER	SPDT MOISTURE SWITCH	1
MST2-S	WD3-LP-D2	DWYER	SPDT MOISTURE SWITCH	1
ZN-T	STS-24	KELE	S/S PLATE TEMP SENSOR	1

Drawing Title

Miscellaneous Controls

REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY

SALESPERSON	PROJECT MGR	DESIGNED BY	DRAWN		APPROVED	
JOSH ROBINSON	CHRIS MURRELL	JERRY PICKETT	DATE 03/06/2024	BY	DATE	

Project Title

STONE BANK
CHENAL PARKWAY HQ
LITTLE ROCK, AR

124012 Stone Bank HQ.vsdx

Harrison Energy Partners

Office Information
Harrison Energy Partners
1501 Westpark Dr.
Suite. 9
Little Rock, AR 72204
(501) 661-0621

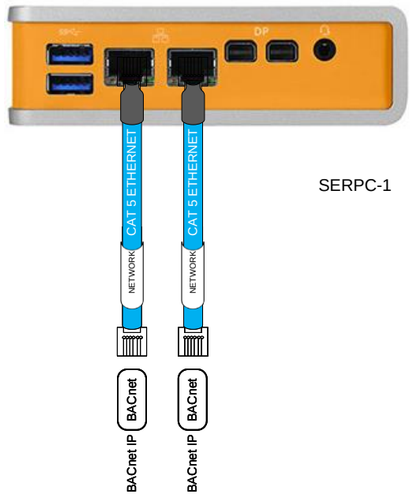
CONTRACT NUMBER
124012

DRAWING NUMBER
17 of 19

Bill_of_Material

TAG	PART NO	VENDOR	DESCRIPTION	QTY
ENC	NSTA2018VA100-GY	KELE	NEMA 1 20" X 18" ENCLOSURE W/100 VA TRANSFORMER	1
ES-1	EISK5-100T	CONTEMPORARY CONTROLS	SKORPION-5 10/100 SWITCH - ETHERNET	1
RTR	BAC-5051AE	KMC	BACnet MS/TP ROUTER	1
SERPC-1	CL210DG-11	ONLOGIC	ONLOGIC SERVER PC	1

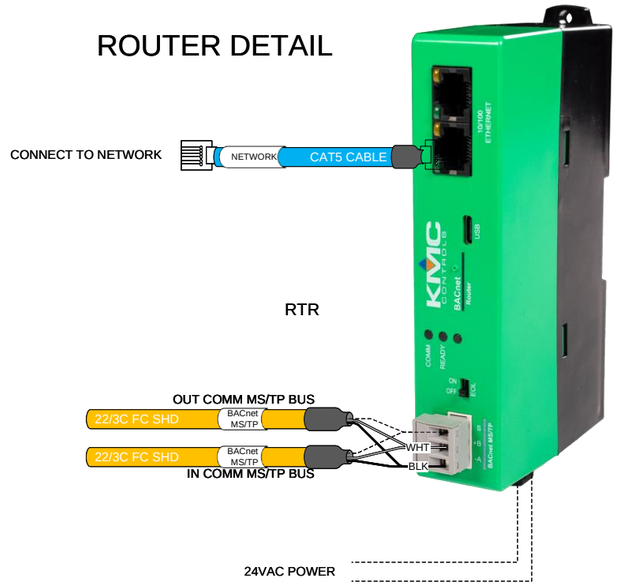
SERVER PC DETAIL



SERPC-1

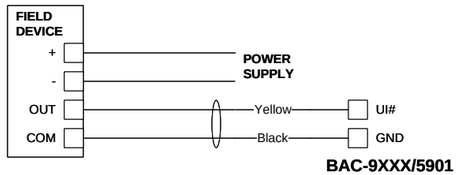
ENC

ROUTER DETAIL



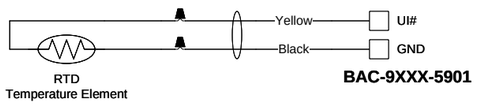
Drawing Title						
Server PC Detail						
REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY	
SALESPERSON: JOSH ROBINSON	PROJECT MGR: CHRIS MURRELL	DESIGNED BY: JERRY PICKETT	DRAWN DATE 03/06/2024	APPROVED BY	DATE	
Project Title: STONE BANK CHENAL PARKWAY HQ LITTLE ROCK, AR			Office Information: Harrison Energy Partners 1501 Westpark Dr. Suite. 9 Little Rock, AR 72204 (501) 661-0621	CONTRACT NUMBER: 124012		
124012 Stone Bank HQ.vsdx				DRAWING NUMBER: 18 of 19		

DETAIL F101 — VOLTAGE INPUT - EXTERNAL SOURCE



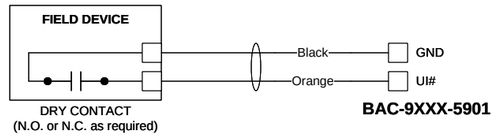
BAC-9XXX/5901

DETAIL F131 — TEMPERATURE SENSOR INPUT



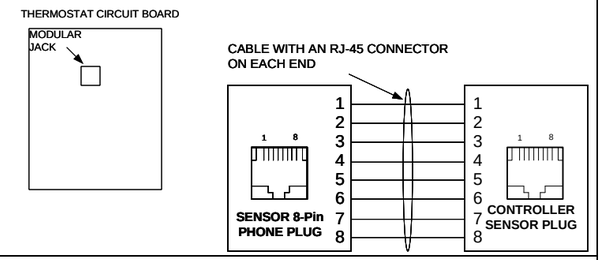
BAC-9XXX-5901

DETAIL F301 — BINARY INPUT (DRY CONTACT)

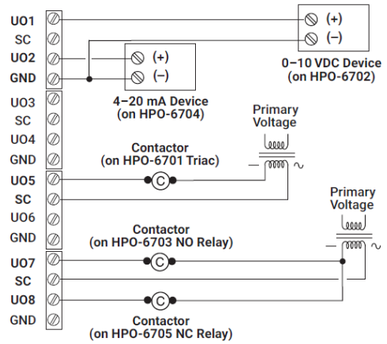


BAC-9XXX-5901

DETAIL NS201 — STE-9000 NET SENSOR MODULAR JACK

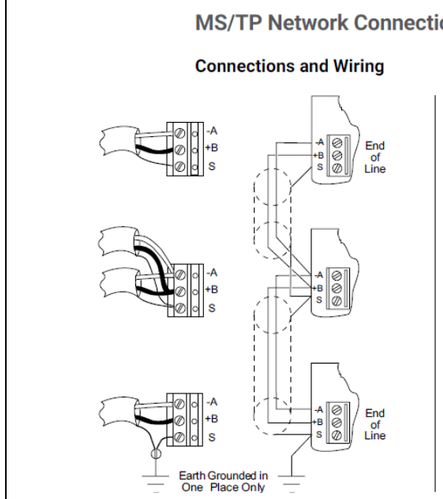


DETAIL F211 — OUTPUT USING OVERRIDE CARD



BAC-5901

DETAIL B201 — MS/TP Network Connections



Drawing Title: **Wring Details**					
REFERENCE DRAWING	NO.	REVISION-LOCATION	ECN	DATE	BY
SALESPERSON: **JOSH ROBINSON**	PROJECT MGR: **CHRIS MURRELL**	DESIGNED BY: **JERRY PICKETT**	DRAWN DATE: 03/06/2024	APPROVED BY	APPROVED DATE
Project Title: ***STONE BANK CHENAL PARKWAY HQ LITTLE ROCK, AR***					
124012 Stone Bank HQ.vsdx					

Harrison Energy Partners

Office Information
Harrison Energy Partners
1501 Westpark Dr.
Suite. 9
Little Rock, AR 72204
(501) 661-0621

CONTRACT NUMBER: 124012

DRAWING NUMBER: 19 of 19

Harrison
Energy Partners

Datasheet Index

The following is a list of datasheets.

Controllers

Devices

CL210G-11

Our Smallest Fanless PC

Ultra-reliable and feature rich, the CL200 Series combines the ease of x86 architecture with our Hardshell™ Fanless Technology in an Ultra Small Form Factor.

onlogic.com/cl210g-11

IoT Ready (4G)

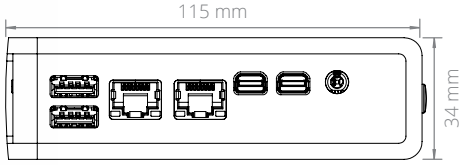
Ready for the Industrial IoT edge, the CL200 Series is configurable with 4G LTE capability or Wi-Fi and Bluetooth - all in one ultra-small device.

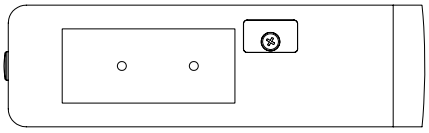
Sealed, Fanless Design

Hardshell Fanless Technology seals components in a durable, ventless enclosure that cools and protects the system. Measuring at just 34 mm x 115 mm x 82 mm, the CL200 Series installs virtually anywhere.

x86 Architecture

The CL200 Series makes development easy and integration seamless, thanks to its x86 architecture. Backed by a stable Linux or Windows 10 OS, the CL200 Series lets you focus on optimizing your application.





US Office
Phone: +1 802 861 2300 | Email: info@onlogic.com | www.onlogic.com

EU Office
Phone: +31 088 5200 700 | Email: info@onlogic.eu | www.onlogic.com

System

Processor	Intel Pentium N4200
Processor Speed	1.1 GHz
Processor Cores	4
Integrated Graphics	Intel HD Graphics 500
Memory	LPDDR4 4 GB

Rear I/O

USB	1 USB 2.0 port
Serial	1 COM Port (RS-232)
Power	1 DC Input Jack (12 V)
Other	Power Button, power indicator LED 1 MicroSD Card slot

Front I/O

USB	2 USB 3.0 Ports
Ethernet	2 Gb LAN Ports with Realtek RTL8111G
Video	2 Mini-DisplayPort
Other	1 Audio Jack (Mic-in, Line-out)

Side I/O

Other	4 Antenna jacks

Expansion & Features

Expansion & Storage	1 PCIe Mini Card (Half-Height) MicroSD Card mSATA (Shared PCIe Mini Card Slot)
Features	64 GB onboard EMMC Storage

Mechanical

Dimensions (WxHxD)	115 mm x 82 mm x 34 mm
Mounting Options	DIN-mount VESA-mount Wall-mount

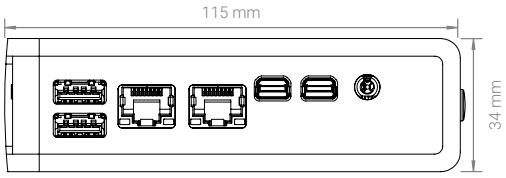
Environmental & Regulatory

Operating Temperature	0°C ~ 40°C
Certifications	2002/96/EC (WEEE Directive) 2011/65/EU (RoHS 2 Directive) Additional Safety and EMC certifications pending CB scheme CE EN 55024 EN 55032 EN 62368-1 FCC 47 CFR Part 15 IEC 62368-1 IP50 UL Listed

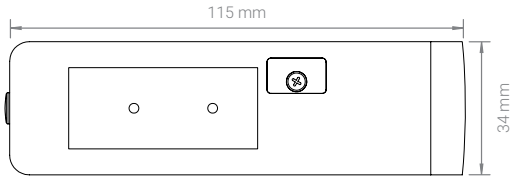
CL210G-11 Dimensional Drawings

Industrial USFF Edge Device

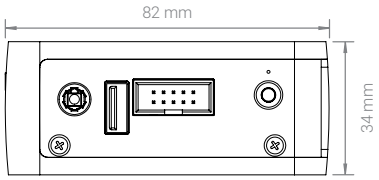
All measurements in mm



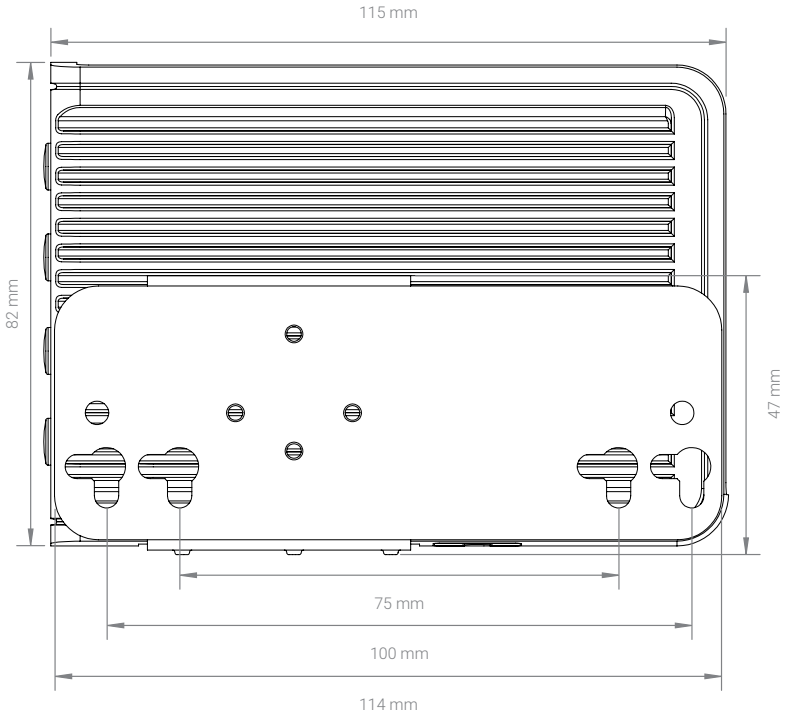
CL210G-11 FRONT



BACK



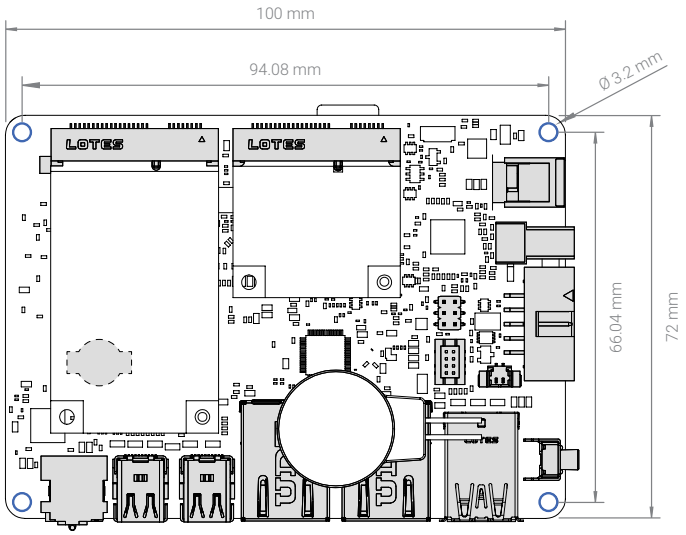
SIDE



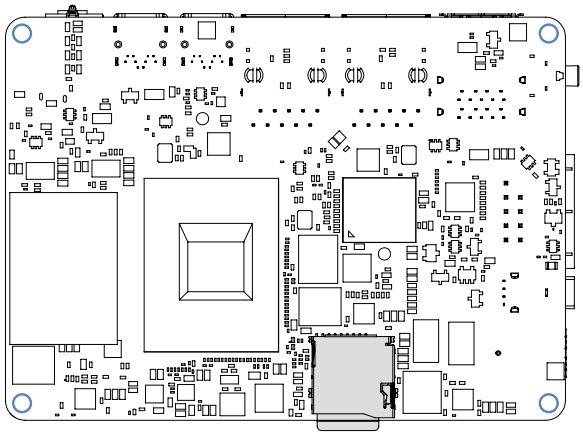
TOP

EPM162 Dimensional Drawings

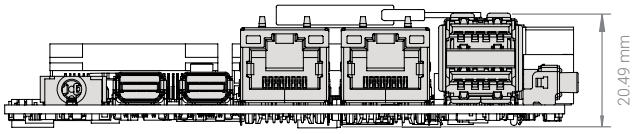
All measurements in mm



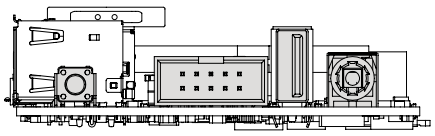
TOP



BOTTOM



FRONT



SIDE

data sheet

niagara 4 supervisor

PRODUCT DEFINITION

The Niagara 4 Supervisor is an IoT (Internet of Things) software platform used in server-class applications. It makes managing all buildings at an enterprise level possible, giving facilities managers the ability to quickly respond to problems and insights to optimize their system.

The Niagara 4 Supervisor allows multiple Niagara-based JACE® controllers, along with other IP-based controllers and field devices, to be networked together. It serves real-time graphical information to standard Web-browser clients and provides server-level functions. These functions include centralized data logging/trending, archiving to external databases, alarming, dashboarding, system navigation, master scheduling, database management, and integration with other enterprise software applications through an XML interface (oBIX standard). Also, it provides a comprehensive graphical engineering toolset for application development.

ORDERING INFORMATION

Part number	Description
SUP-0	No Niagara network – Devices only (18mo SMA req)
SUP-0-SMA-INIT	18mo initial SMA (3YR or 5YR can be substituted)
SUP-1	1 Niagara network connection (18mo SMA req)
SUP-1-SMA-INIT	18mo initial SMA (3YR or 5YR can be substituted)
SUP-2	2 Niagara network connections (18mo SMA req)
SUP-2-SMA-INIT	18mo initial SMA (3YR or 5YR can be substituted)
SUP-3	3 Niagara network connections (18mo SMA req)
SUP-3-SMA-INIT	18mo initial SMA (3YR or 5YR can be substituted)
SUP-10	10 Niagara network connections (18mo SMA req)
SUP-10-SMA-INIT	18mo initial SMA (3YR or 5YR can be substituted)
SUP-100	100 Niagara network connections (18mo SMA req)
SUP-100-SMA-INIT	18mo initial SMA (3YR or 5YR can be substituted)
SUP-UNL	Unlimited Niagara network connections (18mo SMA req)
SUP-UNL-SMA-INIT	18mo initial SMA (3YR or 5YR can be substituted)
SUP-DEMO	Niagara 4 Supervisor demo
SUP-UP-1	Adds one additional Niagara connection to Supervisor
SUP-UP-100	Upgrades small Supervisor to 100 Niagara connections
SUP-UP-UNL	Upgrades Supervisor 100 to unlimited Niagara connections
SUP-DEVICE-10	10 device core (STD drivers included)
SUP-DEVICE-25	25 device core (STD drivers included)
SUP-DEVICE-50	50 device core (STD drivers included)
SUP-DEVICE-100	100 device core (STD drivers included)
SUP-DEVICE-200	200 device core (STD drivers included)
SUP-AX	Enables Supervisor to run Niagara AX (v3.8)
SUP-[0-UNL]-SMA-[1,3,5]YR	Supervisor [0-UNL] Maintenance – [1,3,5] YR extensions

*If Maintenance coverage is not purchased for any period, the price of Maintenance for the next period for which it is purchased will be (i) the Maintenance fee for the period(s) for which Maintenance was not purchased, up to a maximum of 5 years; and (ii) the Maintenance fee for the next year.

KEY ADVANTAGES

- Centralized system management
- Quickly navigate to individual buildings using tags to diagnose problems
- Compare data between buildings
- Export system data to external databases
- Integrate BAS to other enterprise applications
- Integrate to other applications, such as work order management, analytics, etc.
- Single tool used to program JACE controllers and Supervisor
- Remotely back up JACE applications to Supervisor
- Batch provisioning of JACE firmware upgrades from Supervisor
- Robust built-in analytic capabilities supported by standard Niagara components and visualizations
- Compatibility with Niagara Analytics 2.0, adding data source, functional and mathematical programming blocks to enable sophisticated analytic algorithms

powered by niagara framework®

SUPPORTED DRIVERS

Many open protocol IP drivers are included with Niagara 4. Others can be purchased separately à la carte. For an up-to-date list of supported drivers, visit our resource library on tridium.com.

COMPATIBILITY

In any given Niagara system, the Niagara Supervisor must be running the highest version of any Niagara instance in the architecture.

When connecting to JACEs that are running older versions of Niagara, these compatibility guidelines apply:

- **Niagara AX:** Niagara 4 Supervisors can connect to JACEs running Niagara AX versions 3.6u4, 3.7u1, 3.8R and higher.
- **R2:** Niagara AX and Niagara 4 Supervisors can connect to JACEs running R2 through the oBIX XML interface only. oBIX is included in all Niagara AX and Niagara 4 Supervisors as a means of integrating Niagara-based Release 2 (R2) JACEs. With Niagara Release 2.3.522 or higher, the oBIX driver can be added to expose all data points, schedules, trends and alarms to a Niagara AX or Niagara 4 system. This oBIX driver is both a client and a server.

PLATFORM REQUIREMENTS FOR NIAGARA 4.2

Niagara 4 Supervisors may run acceptably on lower-rated platforms, or may even require more powerful platforms, depending on the application, number of data points integrated, data poll rate, number of concurrent users, performance expectations, etc.

- **Processor:** Intel® Xeon® CPU E5-2640 x64 (or better), compatible with dual- and quad-core processors
- **Operating System:** Windows 10, 64-bit Windows 8.1 Enterprise, 2012 R2 Standard, RHEL-7
- **Memory:** 1 GB minimum, 4 GB or more recommended for larger systems
- **Hard Drive:** 4 GB minimum, more recommended depending on archiving requirements
- **Display:** Video card and monitor capable of displaying 1024 x 768 pixel resolution or greater
- **Network Support:** Ethernet adapter (10/100 Mb with RJ-45 connector)
- **Connectivity:** Full-time high-speed ISP connection recommended for remote site access (i.e., T1, ADSL, cable modem) and IPv6 compliant

Platform requirements for older versions of Niagara Supervisors are included in the Release Notes for each particular version.

SPECIFICATIONS

HTML5 and Java-enabled user interface (UI); JavaScript data interface library included (BajaScript)
Supports an unlimited number of users over the Internet / intranet with a standard Web browser (depending on the host PC resources)
Optional enterprise-level data archival using SQL, MySQL or Oracle databases and HTTP/HTML/XML, CSV or text formats
“Audit Trail” of database changes, database storage and backup, global time functions, calendar, central scheduling, control and energy management routines
Sophisticated alarm processing and routing, including email alarm acknowledging
Access to alarms, logs, graphics, schedules and configuration data with a standard Web browser
Niagara follows industry best practices for cyber security, with support for features such as strong hashed passwords, TLSv1 for secure communications and certificate management tools for authentication
HTML-based help system that includes comprehensive online system documentation
Supports multiple Niagara-based stations connected to a local Ethernet network, or the Internet
Provides online/offline use of the Niagara Framework® Workbench AX graphical configuration tool and a comprehensive Java Object Library
Optional direct Ethernet-based driver support for most Open IP field bus protocols (see supported drivers document)

The Niagara 4 Supervisor is available through a wide variety of original equipment manufacturers. Our open distribution business model and open protocol support allow a vendor-neutral application compatible with devices and systems throughout the world.

To learn more about how to purchase, install and start using the Niagara 4 Supervisor, or if you are an original equipment manufacturer and would like to add the Niagara 4 Supervisor to your suite of offerings, please contact us.

2016-0010

Conquest BAC-5051AE

BACnet Router

DESCRIPTION

The KMC Controls BAC-5051AE is a multi-port BACnet router. It is powerful enough for heavy network traffic and small enough to use as a control technician's service tool.

Routing Install the BAC-5051AE for BACnet IP, Ethernet, and MS/TP routing. IP routing is fully compliant with BACnet Standard 134-2012, Annex J.

Browser Configuration Configure the BAC-5051AE using only an Internet browser. There is no special software to learn or load.

Flexible Mounting Two mounting choices for permanent installations–DIN rail or surface mount.

Diagnostics Embedded metrics include: total number of devices, frame counts, frames in error, data frames, duplicate MAC addresses, token passing, and poll-for-master count.

MS/TP Diagnostics Capture Troubleshoot MS/TP issues by capturing, saving, and analyzing network traffic. Data is saved in industry standard .pcap files.

Automatically Learns Networks Detects and configures routing for the actual discovered networks.

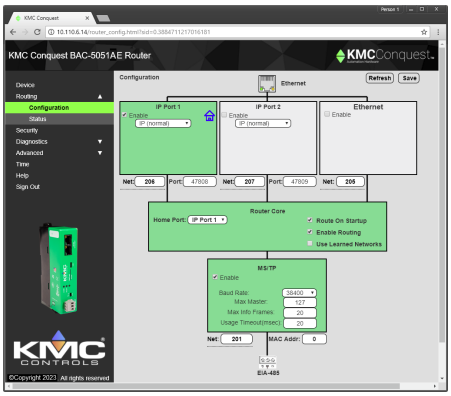
Enable and Disable Routing Use the router as a diagnostic tool to monitor traffic without routing traffic.

VAV Airflow Balancing Use with an Internet browser as an airflow balancing tool for BAC-8000 and BAC-9000 series VAV controllers.

AFMS Configuration Use the router to set up an **Airflow Measurement System (AFMS)**.

Zone Configuration Use the router to set up a **BAC-120063CW-ZEC zoning Flexstat**.

KMC Conquest™
Automation Hardware



Router network configuration

SPECIFICATIONS

Configuration Tools

Normal configuration from internally served browser pages. Requires HTML5-compliant versions of Microsoft Internet Explorer, Chrome, or Firefox.

Routing Protocols

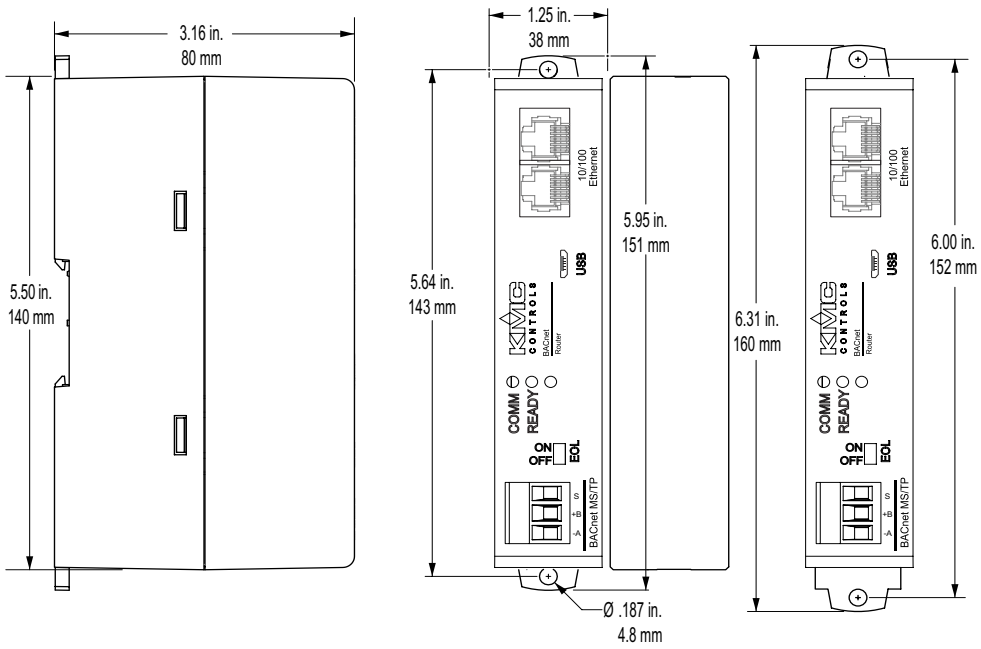
- One MS/TP network
- One BACnet Ethernet
- Two IP ports that can be set up for any of the following protocols:
  - Normal BACnet IP network routing
  - BACnet broadcast management device with network and port address translation
  - Foreign device registration with BACnet broadcast management devices (BBMD)
  - PAD (packet assembling/disassembling) routing

MODEL

DESCRIPTION	MODEL
BACnet router	BAC-5051AE

SPECIFICATIONS

Dimensions



35 x 7.5 mm DIN rail mounting Surface mount

Hardware Features

Processor and Memory

Processor	32-bit ARM® Cortex-M7
Memory	Configuration parameters and diagnostics are stored in nonvolatile memory; auto restart on power failure

Indicators

- Power
- MS/TP communication
- Ethernet status

Installation

Power

AC supply voltage	24 volts AC (–15%, +20%), 50/60 Hz, Class 2 only; non-supervised All circuits, including supply voltage, are power limited circuits.
DC supply voltage	24 volts DC (–15%, +20%) 5 volts DC through USB connection for temporary service connection
Required power	8 VA

Enclosure and Mounting

Weight	5.4 ounces (154 grams)
Case material	Green and black flame retardant plastic
Mounting	Surface mount or 35 × 7.5 mm DIN rail

Environmental Limits

Operating	32 to 120° F (0 to 49° C)
Shipping	–40 to 160° F (–40 to 71° C)
Humidity	0 to 95% relative humidity, non-condensing

Network connections

BACnet Ethernet and IP

Two 10/100BaseT, RJ-45 connectors

BACnet MS/TP

- One MS/TP port, supports speeds from 9,600 to 115,200 baud
- Removable three-screw terminal block, 12–22 AWG wire
- Switched end-of-line termination

USB

USB-A connection for power and communication to use as a service tool.

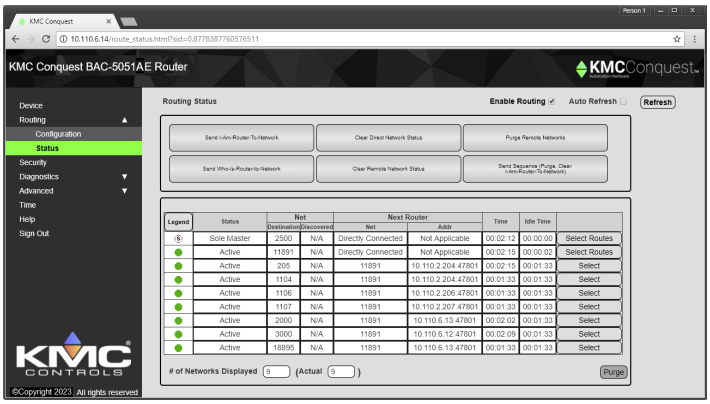
Timekeeping

The router is a BACnet time master device that can maintain time with or without an SNTP server. Time messages can be broadcast daily, weekly, or monthly to all or selected networks. Time messages are formatted as UTC, local, or both.

Agency and Regulatory Approvals

BTL	Pending
UL	UL 916 Energy Management Equipment
RoHS	RoHS compliant
CE	Pending
FCC	FCC Class A, Part 15, Subpart B and complies with Canadian ICES-003 Class A*

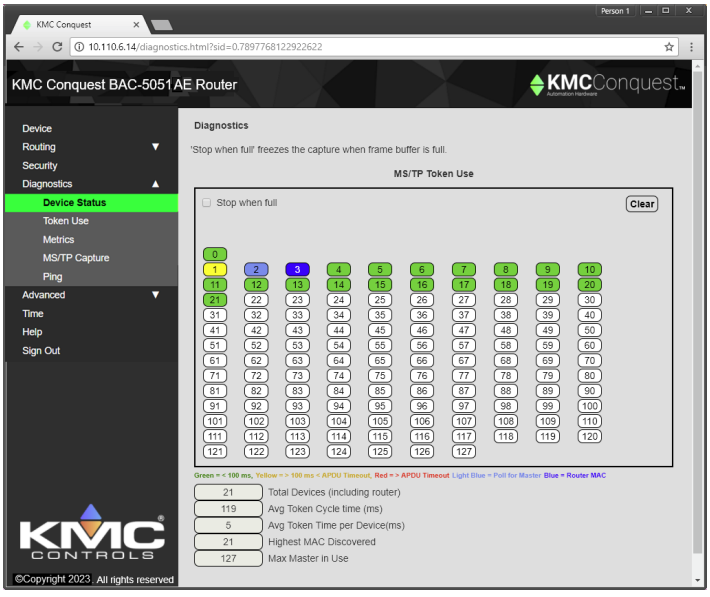
*This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.



BACnet routing status

ACCESSORIES

KMD-5567	MS/TP network surge suppressor
XEE-6111-050	50 VA, single-hub transformer
XEE-6112-050	50 VA, dual-hub transformer
HSO-9001	Ethernet patch cable, 50 feet
HSO-9011	Ethernet patch cable, 50 feet, plenum rated



MS/TP network diagnostics

SUPPORT

Additional resources for installation, configuration, application, operation, programming, upgrading and much more are available on the web at **www.kmccontrols.com**. To see all available files, log-in to the KMC Partners site.

data SHEET

5-Port Skorpion Switch

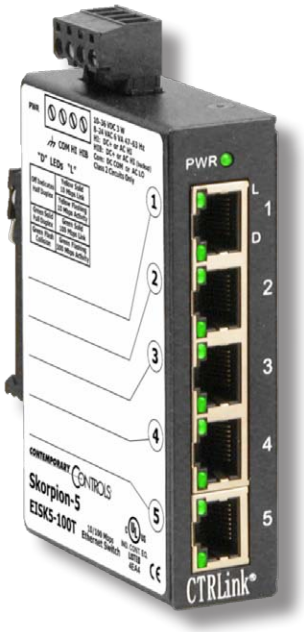
Cost Effective, 100 Mbps-speed — Compact Size

The EISK5-100T Skorpion Switch is a five-port unmanaged Ethernet switch that provides 100 Mbps performance on all ports in order to accommodate a range of control devices and workstations commonly found in an automation project. For 10 Mbps legacy devices, the switch will automatically reduce its port-speed accordingly. This low-cost compact unit utilizes a rugged metal enclosure and is intended for installation in control panels using DIN-rail mounting.

This is a plug-and-play Ethernet switch which requires no configuration. All ports automatically configure their data rate and duplex using the Auto-Negotiation protocol. Depending on the capability of the link partner, communication is set at 10 or 100 Mbps and at either half- or full-duplex. Each port will accommodate either a straight-through or crossover cable by using the Auto-MDIX protocol.

The unit is powered from a choice of low-voltages (AC or DC). Redundant power connections are provided for back-up power schemes. LED indicators assist in troubleshooting network issues.

- Plug-and-Play operation
- 10BASE-T/100BASE-TX
- Shielded RJ-45 connectors
- Auto-negotiation of speed and duplex
- Auto-MDIX supports cable inversion



- DIN-rail mounting
- Rugged metal enclosure
- Diagnostic LEDs
- Enhanced EMC compliance
- UL 508 listed, c-UL listed, CE mark
- 24 VAC/VDC powered

CTRLink®

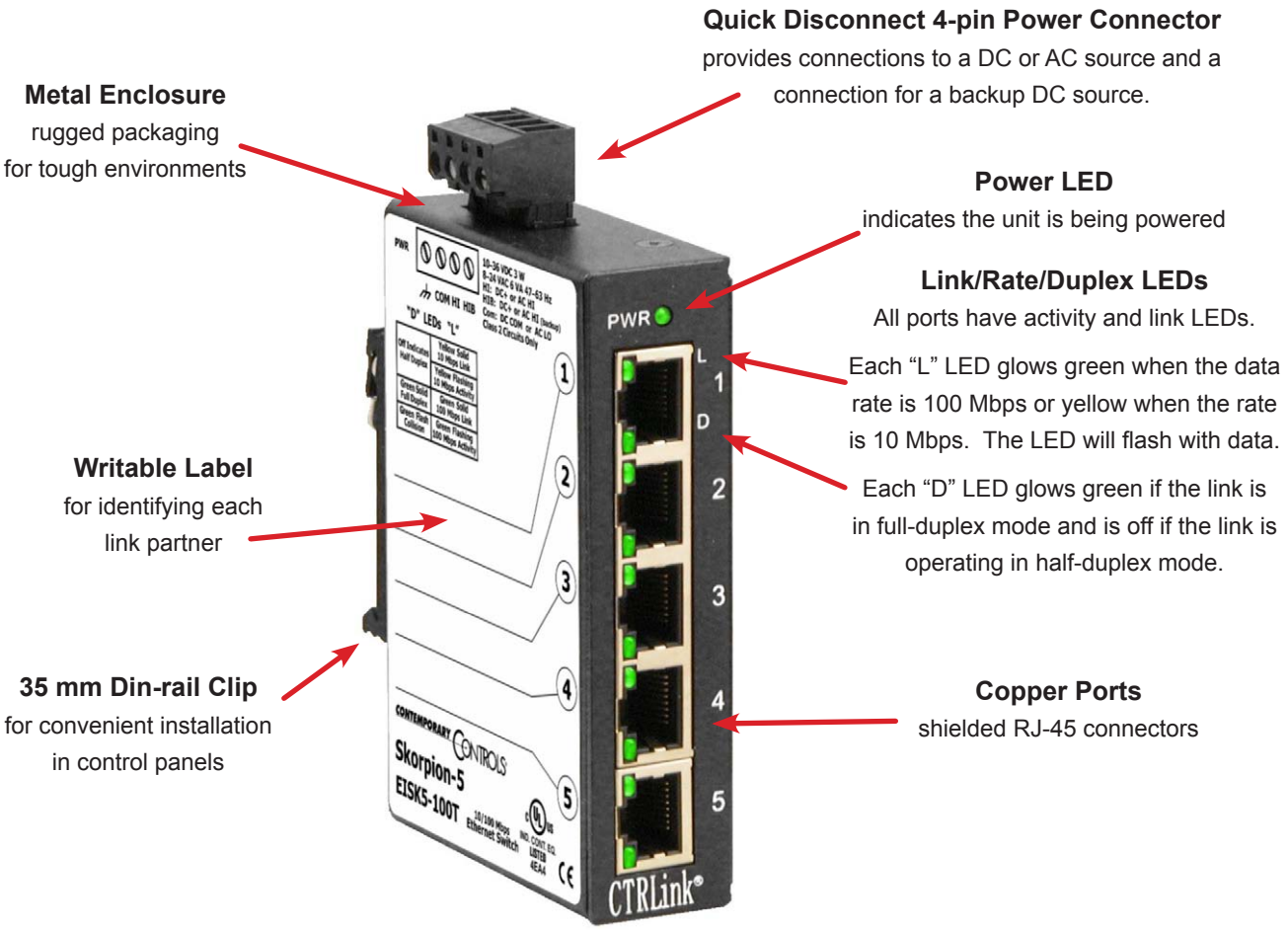
Overview

The Skorpion Switch is intended for control panel installations where DIN-rail space is at a premium by requiring a width of only one inch (26 mm) of rail space. A metal DIN-rail clip attached to the aluminium enclosure can survive the toughest installation. A writable side label allows the installer an opportunity to document field cabling locations right on the unit.

The switch can be powered from either a 10–36 VDC or 24 VAC (±10%) source. Its half-wave rectified low-voltage power supply allows the sharing of power with other 24 VAC/VDC control devices from a common power supply. With redundant power connections, a backup power scheme can be supported. A removable power connector facilitates the servicing of the unit.

LEDs built into the connector indicate data rate and activity on each of the five ports. For each port, the data rate will be indicated along with port activity thereby greatly assisting in troubleshooting connection issues.

The switch is UL 508 Listed and c-UL Listed for Industrial Control Equipment. It complies with CFR 47 Part 15 Class A, and carries the CE Mark. It is RoHS compliant.



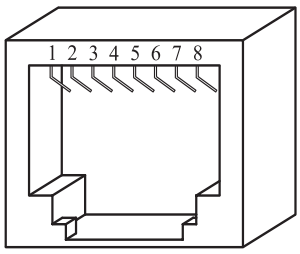
Specifications

Power Requirements	10–36 VDC 3 W or 24 VAC ±10% 6 VA 47–63 Hz
Operating Temperature	0°C to 60°C
Storage Temperature	–40°C to 85°C
Relative Humidity	10–95%, non-condensing
Protection	IP30
Mounting	TS-35 DIN-rail
Shipping Weight	1 lb (0.45 kg)
Ethernet Communications	IEEE 802.3 10/100 Mbps data rate using RJ-45 connectors, 100 m (max)
LEDs	Power — Green = power OK "L" LEDs — Green = 100 Mbps communication established Yellow = 10 Mbps communication established Flashing = data transmissions occurring "D" LEDs — Green = Full-duplex communication established Off = Half-duplex communication established
Regulatory Compliance	CE Mark; CFR 47, Part 15 Class A; RoHS; UL 508 Industrial Control Equipment

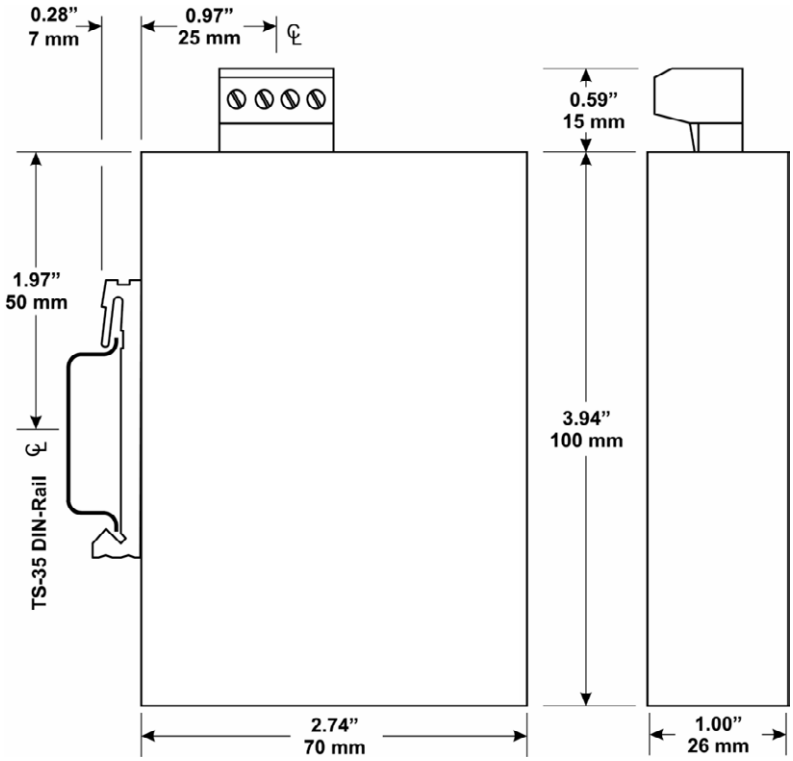
RJ-45 Connector Pin Assignments

Pin	Function
1	TD+
2	TD–
3	RD+
4	Not Used
5	Not Used
6	RD–
7	Not Used
8	Not Used

MDI and MDIX



Mechanical Drawing

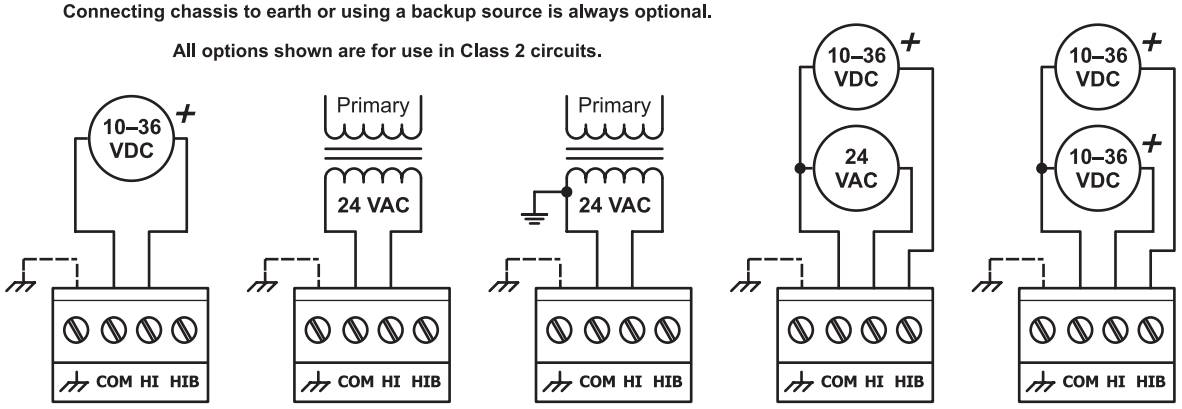


Power Considerations

Applied voltage must be in the specified range and deliver a current commensurate with power consumption. The recommended size for solid power conductors is 16–20 AWG; and for stranded conductors use 16–18 AWG. Zero volts (COM) is isolated from chassis (earth). Input connections are reverse-polarity protected.

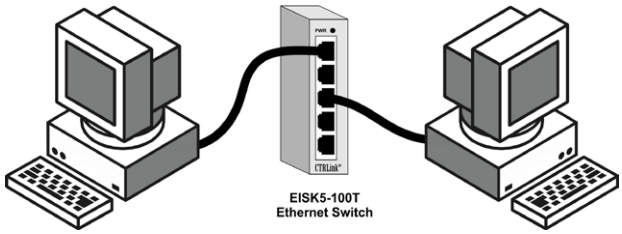
Input power: 10–36 VDC or 24 VAC ± 10%, 47–60 Hz.
Connecting chassis to earth or using a backup source is always optional.

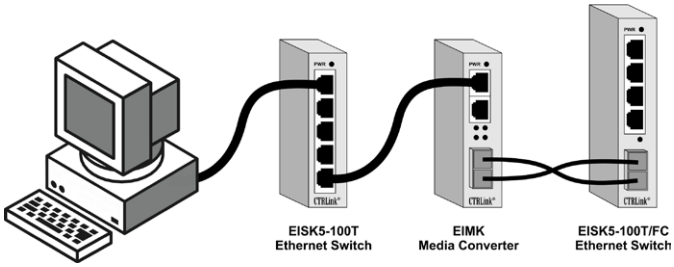
All options shown are for use in Class 2 circuits.



DC Powered | **AC Powered** | **AC Powered with Grounded Secondary** | **Redundant Power** | **Redundant Power**

Typical Switch Installations





Ordering Information

Model	*Description*
EISK5-100T	Skorpion 5-Port 10/100Mbps Switch

United States
Contemporary Control Systems, Inc.
2431 Curtiss Street
Downers Grove, IL 60515
USA

Tel: +1 630 963 7070
Fax:+1 630 963 0109

info@ccontrols.com
www.ccontrols.com

China
Contemporary Controls (Suzhou) Co. Ltd
11 Huoju Road
Science & Technology Industrial Park
New District, Suzhou
PR China 215009

Tel: +86 512 68095866
Fax: +86 512 68093760

info@ccontrols.com.cn
www.ccontrols.asia

United Kingdom
Contemporary Controls Ltd
14 Bow Court
Fletchworth Gate
Coventry CV5 6SP
United Kingdom

Tel: +44 (0)24 7641 3786
Fax:+44 (0)24 7641 3923

info@ccontrols.co.uk
www.ccontrols.eu

Germany
Contemporary Controls GmbH
Fuggerstraße 1 B
04158 Leipzig
Germany

Tel: +49 341 520359 0
Fax: +49 341 520359 16

info@ccontrols.de
www.ccontrols.eu

INSTA-PANEL™ SERIES
MODEL NSTA2018VA100

DESCRIPTION

Frequently jobs are done on a fast track basis in our industry. **Insta-Panels** were created for a fast turnaround on a control panel job, saving time and labor. **Insta-Panels** are built at Kele in three sizes: small, medium, and large. Each panel is set up with transformer(s), terminal blocks, wire duct, convenience outlet, additional DIN rail and a perforated back panel for easy mounting of customer parts. Pick your size panel based on the interior space needed for mounting components.

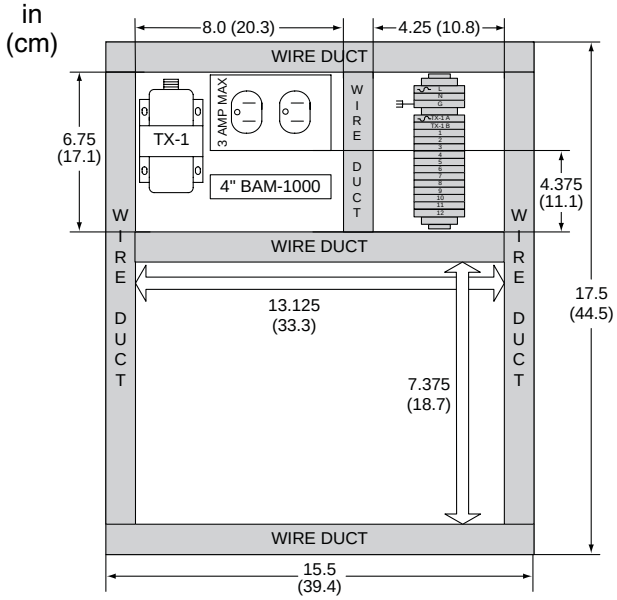
FEATURES

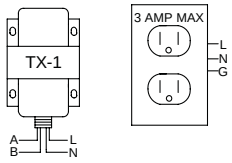
- ***NEMA 1 enclosure***
- ***Convenience outlet***
- ***An extra piece of DIN rail is provided***
- ***Fused primary (incoming 120 volt 10 Amp)***
- ***Fused secondary (24 volts 4 amps)***
- ***White wire duct 3" high x 1" wide***
- ***Separation of high and low voltage wiring***
- ***Prewired power terminals, primary and secondary***
- ***Blown fuse indication on incoming 120 VAC***
- ***Perforated back panel***

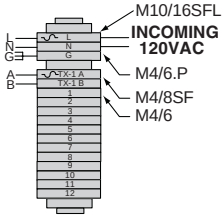
SPECIFICATIONS

Power	(1) 120/24 Volt transformer 100 VA
Weight	31 lb (14 kg)
Panel size	20"H x 18"W x 7"D (50.8 x 45.7 x 17.8 cm)
Panel Color	Dark brown body and light tan door
Interior panel mounting dimensions	See detail

DIMENSIONS / WIRING







Bill of Materials

1 - RET2018ULP Enclosure and Perf Panel
1 - 691-K1 Transformer
1 - PRK Duplex Receptacle
1 - BAM-1000 Aluminum DIN Rail
1 - M10/16SFL Primary Fuse Holder
1 - M4/6.P Grounding Terminal Block
14 - M4/6 Terminal Block
1 - M4/8SF 8mm Fuseholder
1 - FEM8S Fuse Holder End Section
2 - FEM6 End Section
3 - BAM2 End Stop
1 - RC610/1-50 Marker Tags
1 - RC610/B Blank Marker Tag
2 - T1-1030W White Wiring Duct
1 - GF-10 Primary Fuse
1 - K235-4 Secondary Fuse
1 - LEN indication lamp for blown fuse

ORDERING INFORMATION

MODEL	DESCRIPTION
NSTA2018VA100	**20" x 18" Insta-Panel, (1) 100 VA transformer, outlet, 12 available terminal blocks**

BAC-5900 Series

BACnet General Purpose Controllers (B-AAC)

DESCRIPTION

KMC Conquest™ BAC-5900 series controllers are designed to control building systems and HVAC equipment. The integrated alarming, scheduling, and trending enable these BACnet Advanced Application Controllers to be powerful edge devices for the modern smart building ecosystem.

The controllers feature simple, menu-driven setup choices using an STE-9000 series digital sensor, which can be installed permanently as the room sensor or used temporarily as a technician's service tool.

Alternately, quick configuration of controller properties can be done using NFC (Near Field Communication) from a smart phone, tablet, or computer (using KMC Connect Lite™ app) while the controller is unpowered.

The Ethernet-enabled BAC-5901C**E** can also be configured by connecting an HTML5-compatible web browser to the built-in configuration web pages.

To meet the most demanding building automation custom requirements, these controllers are also fully programmable. Custom configuration and programming, with wizards for application programming selection/configuration, are enabled by KMC Connect™ software and the KMC Converge™ module for Niagara Workbench.

KMC Converge and TotalControl™ software additionally provide the capability of creating custom graphical web pages (hosted on a remote web server) to use as a custom user-interface for the controllers.

The 10 inputs and 8 outputs can be expanded up to 72 inputs and 40 outputs using CAN-5900 Series Expansion Modules.

(BAC-5901C with MS/TP Shown)

KMC Conquest™ Automation Hardware

MADE IN USA

APPLICATIONS

Can be used with the following types of equipment:

- Air handling units
- Boilers
- Chillers
- Chilled beams
- Cooling towers
- Fan coil units
- Heat pump units
- Pumps
- Roof top units
- Unit ventilators
- Other HVAC and building automation system equipment

NOTE: Applications generally require custom programming. (See also **Sample Installation on page 6**.)

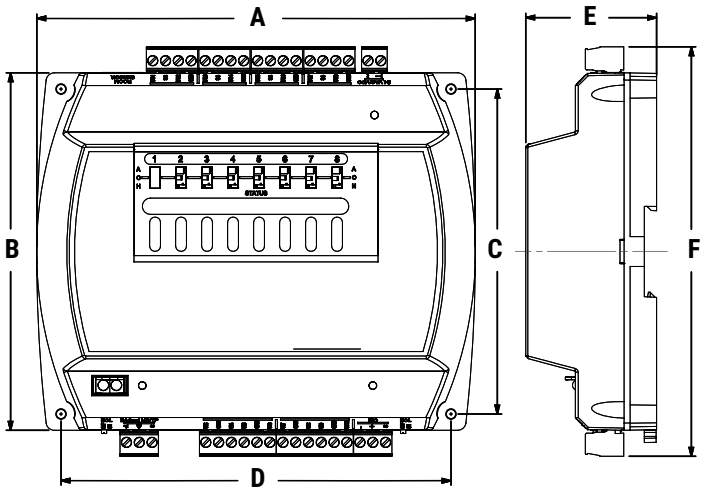
MODELS

APPLICATIONS	INPUTS*	OUTPUTS*	FEATURES			MODEL
			Real Time Clock (RTC)	Ethernet Port	MS/TP Port	
AHU, chillers, boilers, cooling towers, pumps, lighting, FCU, HPU, RTU, unit ventilators, other HVAC	10 total: • 2 analog (temperature sensor port) • 8 universal inputs (software configurable as analog, binary, or accumulator on terminals)	8 universal: • Software configurable as analog or binary • Override boards give additional options**	✔		✔	BAC-5901C
				✔		BAC-5901CE

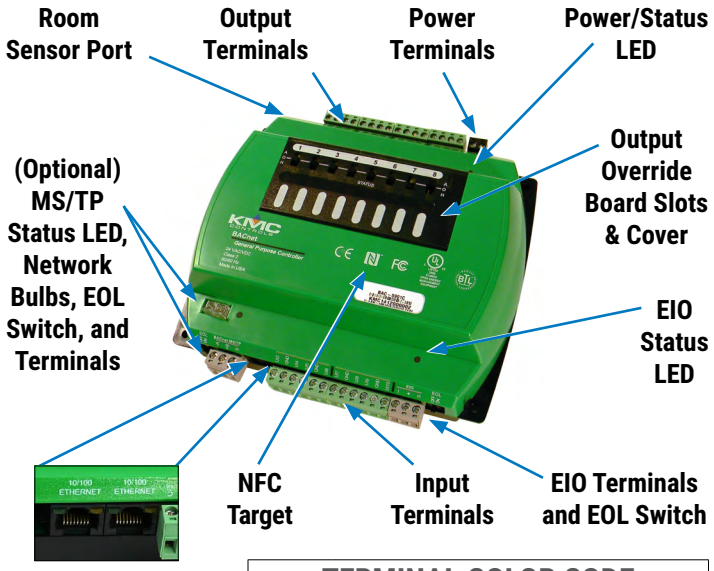
*Up to four CAN-5900 series I/O expansion modules can be used with BAC-5900 series controllers to provide up to 74 physical (Room Sensor port and terminal block) inputs and up to 40 outputs.

**HPO-6700 series output override board series provide (triac, NC/NO relays, 4–20 mA, adjustable 0–10 VDC) options for devices that cannot be powered from a standard universal output. The boards can also be used with the CAN-5901.

SPECIFICATIONS



DIMENSIONS		
A	6.750 inches	171 mm
B	5.500 inches	140 mm
C	5.000 inches	127 mm
D	6.000 inches	152 mm
E	2.012 inches	51 mm
F	6.300 inches	160 mm



TERMINAL COLOR CODE	
Black	24 VAC/VDC Power
Gray	MS/TP and CAN Communications
Green	Inputs and Outputs

Inputs and Outputs

Inputs, Universal (8 on Terminal Blocks)

Universal inputs	Configurable as analog, binary, or accumulator objects
Termination	1K and 10K ohm sensors, 0–12 VDC, or 0–20 mA (without need for an external resistor)
Resolution	16-bit analog-to-digital conversion
Protection	Overvoltage protection (24 VAC, continuous)
Wire size	12–24 AWG, copper, in removable screw terminal blocks

Input, Dedicated Room Sensor Port

Connector	Modular connector for STE-9xx1 series digital wall sensors or STE-6010/6014/6017 analog temperature sensors
Cable	Uses standard Ethernet patch cable up to 150 feet (45 meters)

Outputs, Universal (8 on Terminal Blocks)

Universal outputs	Configurable as an analog (0 to 12 VDC) or binary object (0 or 12 VDC, on/off); alternately, an output override board is installed for devices that cannot be powered from a standard universal output
Power/protection	Each short-circuit protected universal output capable of driving up to 100 mA (at 0–12 VDC) or 300 mA total for all outputs
Resolution	12-bit digital-to-analog conversion
Wire size	12–24 AWG, copper, in removable screw terminal blocks

Communications

Auxiliary	One serial port with mini Type B connector (reserved for future use)
Expansion (EIO)	One CAN serial bus connection (terminal block) for daisy-chaining I/O expansion modules up to 200 feet (61 meters) from the controller via standard shielded twisted-pair wire
Ethernet (optional)	On “E” model only, two 10/100BaseT Ethernet connectors for BACnet IP, Foreign Device, and Ethernet 802.3 (ISO 8802-3); segmentation supported; up to 328 ft (100 m) between controllers (using T568B Category 5 or better cable)
MS/TP (optional)	One EIA-485 port (removable terminal block) for BACnet MS/TP, operating at 9.6, 19.2, 38.4, 57.6, 76.8, or 115.2 kilobaud; max. length of up to 4,000 feet (1,200 meters) of 18 AWG shielded twisted-pair, no more than 51 pf/ft

	(167 pf/m); use repeaters for longer distances
NFC	NFC (Near Field Communication) up to 1 inch (2.54 cm) from the top of the enclosure
Room sensor	Modular STE connection jack for STE-9000 series digital sensors and STE-6010/6014/6017 analog sensors

Configurability

OBJECTS*	MAXIMUM #**
Inputs and Outputs	
Analog, binary, or accumulator input	106
Analog or binary output	40
Values	
Analog value	300
Binary value	300
Multi-state value	100
Program and Control	
Program (Control Basic)	30
PID loop	50
Schedules	
Schedule	20
Calendar	10
Logs	
Trend log	40
Trend log multiple	20
Alarms and Events	
Notification class	20
Event enrollment	100
Tables	
Input tables	20
Control Basic tables	20

*Configuration allows creation and deletion of objects (with the maximum number of objects shown). The number and configuration of default objects depends on the selected application. For lists of default objects, see the **KMC Conquest Controller Application Guide**. See also the PIC statement for all supported BACnet objects.

**Maximum number values are for 4 MB expanded-memory BAC-5900 series controllers that started shipping on May 1, 2018. Earlier controllers had 2 MB memory and a reduced maximum number of objects. Up to four CAN-5900 series I/O expansion modules can be added to provide up to 74 physical (Room Sensor port and terminal block) inputs and up to 40 outputs.

Configuring, Programming, and Designing

SETUP PROCESS			KMC CONTROLS TOOL
Configuration	**Programming (Control Basic)**	**Web Page Graphics***	
✔			Conquest NetSensor
✔			Internal configuration web pages in Conquest Ethernet "E" models**
✔			KMC Connect Lite™ (NFC) app***
✔	✔		KMC Connect™ software
✔****	✔****	✔	TotalControl™ software
✔	✔		KMC Converge™ module for Niagara WorkBench
		✔	KMC Converge **GFX** module for Niagara WorkBench

*Custom graphical user-interface web pages can be hosted on a remote web server, but not in the controller.

Conquest Ethernet-enabled "E" models with the latest firmware can be configured with an HTML5 compatible web browser from pages served from within the controller. For information, see the **Conquest Ethernet Controller Configuration Web Pages Application Guide.

***Near Field Communication via enabled smart phone or tablet running the KMC Connect Lite app.

****Full configuration and programming of KMC Conquest controllers is supported starting with TotalControl ver. 4.0.

Hardware Features

Processor, Memory, and Clock

Processor	32-bit ARM® Cortex-M4
Memory	Programs and configuration parameters are stored in nonvolatile memory; auto restart on power failure
RTC	Real time clock with (capacitor) power backup for 72 hours ("C" model only) for network time synchronization or full stand-alone operation

Indicators and Isolation

LED indicators	Power/status, MS/TP and EIO (CAN) communication, and Ethernet status
MS/TP bulbs	One network bulb assembly indicates reversed polarity and isolates circuit
Switches	EOL (end of line) for MS/TP network and EIO (CAN bus)

Installation

Power

Supply voltage	24 VAC (50/60 Hz) or 24 VDC; –15%, +20%; Class 2 only; non-supervised (all circuits, including supply voltage, are power limited circuits)
Required power	14 VA, plus external loads
Wire size	12–24 AWG, copper, in a removable screw terminal block

Enclosure and Mounting

Weight	14 ounces (0.4 kg)
Case material	Green and black flame retardant plastic
Mounting	Direct mounting to panels or DIN rails

Environmental Limits

Operating	32 to 120° F (0 to 49° C)
Shipping	–40 to 160° F (–40 to 71° C)
Humidity	0 to 95% relative humidity (non-condensing)

Warranty, Protocol, and Approvals

Warranty

KMC Limited Warranty	5 years (from mfg. date code)

BACnet Protocol

Standard	Meets or exceeds the specifications in ANSI/ASHRAE BACnet Standard 135-2010 for Advanced Application Controllers
Type	BTL-certified as a B-AAC controller type

CAN (External Inputs Outputs) Protocol

CAN	CAN (Controller Area Network) bus on (EIO) terminals

Regulatory Approvals

UL	UL 916 Energy Management Equipment listed
	UL 864 Smoke Control Equipment listed (UUKL), 10th edition—for smoke control applications, see **Smoke Control Manual for KMC Conquest Systems**, P/N 000-035-18)
BTL	BACnet Testing Laboratory listed as Advanced Application Controller (B-AAC)
CE	CE compliant
RoHS 2	RoHS 2 compliant
FCC	FCC Class A, Part 15, Subpart B and complies with Canadian ICES-003 Class A*

*This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. (NFC operation meets FCC compliance while the controller is in an unpowered state.)

ACCESSORIES

NOTE: For accessory details, see the respective product data sheets and installation guides.

Actuators

MEP-4xxx	Actuators, 25 to 90 in-lb., fail-safe and non-fail-safe
MEP-7xxx	Actuators, 180 and 320 in-lb., fail-safe and non-fail-safe

Communications

BAC-5051E	BACnet router with single MS/TP and IP/Ethernet ports
HPO-0055	Replacement network bulb assembly (pack of 5)
HPO-5551	Router technician cable kit
HPO-9003	NFC Bluetooth/USB module (fob)
HSO-9001	Ethernet patch cable, 50 feet
HSO-9011	Ethernet patch cable, 50 feet, plenum rated
HSO-9012	Ethernet patch cable, 75 feet, plenum rated
KMD-5567	Network surge suppressor

I/O Expansion and Output Override Boards

CAN-5901	8-input, 8-output expansion module*
CAN-5902	16-input expansion module*
HPO-6701	Triac output w/ zero-cross switching (AC only)**
HPO-6702	0–10 VDC analog with adjustable override potentiometer
HPO-6703	Relay, NO contacts (AC/DC)
HPO-6704	4–20 mA DC current loop with adjustable override potentiometer**
HPO-6705	Relay, NC contacts (AC/DC)

***NOTE:** Up to four CAN-5900 series I/O expansion modules can be used with BAC-5900 series controllers to provide up to 74 physical (Room Sensor port and terminal block) inputs and up to 40 outputs.

****NOTE:** Only the HPO-6701 and HPO-6704 of the HPO-6700 series output override boards are approved for smoke control applications.

Miscellaneous Hardware

HCO-1103	Steel control enclosure (single controller) with DIN rail mounting, 10 x 7.5 x 2.5 inches (257 x 67 x 193 mm)
HCO-1035	Steel control enclosure, 20 x 24 x 6 inches (508 x 610 x 152 mm)*
HCO-1036	Steel control enclosure, 24 x 36 x 6 inches (610 x 914 x 152 mm)*
HPO-0063	Replacement output (override board) jumper, 2-pin (pack of 5)
HPO-9901	Controller replacement parts kit with terminal blocks (1 gray, 1 black, 2 green 3-terminal, 4 green 4-terminal, 2 green 5-terminal, 2 green 6-terminal) and DIN clips (2 small for router and 1 large for controllers)
KMD-5567	MS/TP suppressor module and terminal connector (required for EIA-485 terminals of MS/TP model controllers in smoke control applications)
SP-001	(KMC branded) screwdriver with a hex end (for NetSensor cover screws) and a flat blade end (for controller terminals)

***NOTE**: For smoke control applications, the controller must be mounted in a UL Listed FSCS enclosure or listed enclosure with minimum dimensions. The HCO-1035 and HCO-1036 are approved for such applications.

Room Sensors, Analog

STE-6010W10	Temperature sensor, white
STE-6014W10	Sensor with rotary setpoint dial, white
STE-6017W10	Sensor with rotary setpoint dial and override button, white
HPO-9005	Room sensor adapter allows the use of other sensors and optional setpoint potentiometers (with wire leads or terminal blocks) to be used instead of STE-601x sensor models with modular jacks

NOTE: Other STE-6000 series sensors are not fully compatible with the dedicated sensor port. However, various other models can be used with an HPO-9005 adapter or with the controller screw terminals. See the STE-6000 series data sheet for more information. For digital sensor information, see the STE-9000 series.

NOTE: To order the STE-601x sensor with light almond color instead of white, drop the W on the end of the model number (e.g., STE-6010W is white and STE-6010 is light almond).

Room Sensors, Digital (LCD Display)

STE-9000 Series	KMC Conquest NetSensor digital room temperature sensors for viewing, configuring, and optional humidity, occupancy, and CO_2 sensing
HPO-9001	NetSensor distribution module

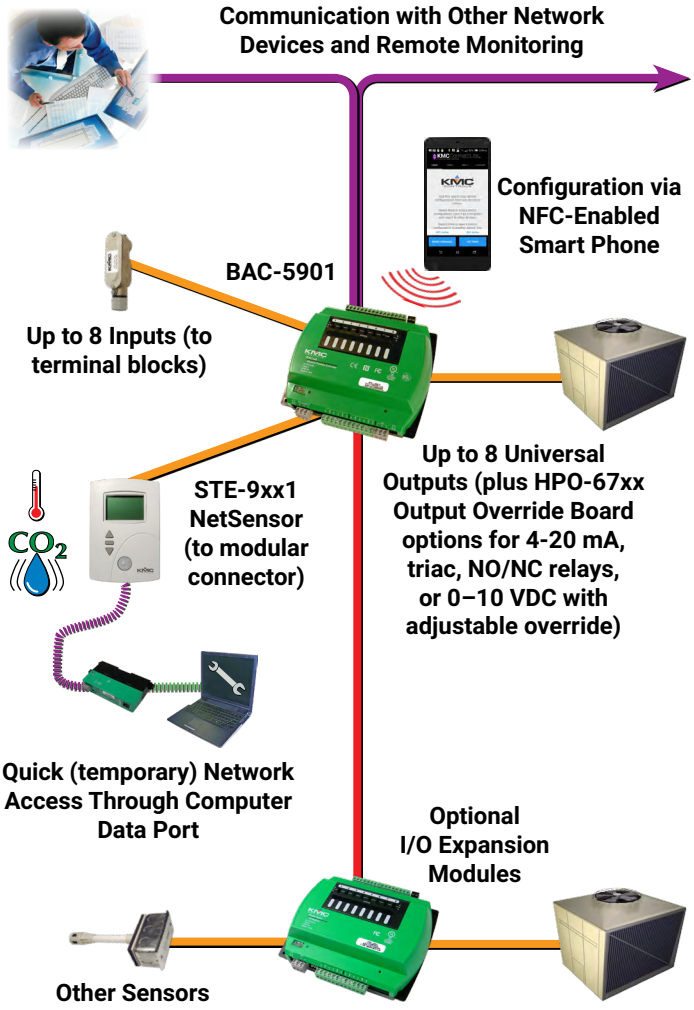
Sensors, Miscellaneous

STE-1405	DAT sensor with plenum-rated cable
STE-1451	OAT sensor

Transformers, 120 to 24 VAC

XEE-6111-050	50 VA, single-hub
XEE-6112-050	50 VA, dual-hub
XEE-6112-100	96 VA, dual-hub (approved for smoke control applications)

SAMPLE INSTALLATION



For more information about installation and operation, see:

- **BAC-5900 Series Controller Installation Guide**
- **KMC Conquest Controller Application Guide**
- **KMC Conquest Wiring: BAC-5900 Series Controllers (Video)**
- **Smoke Control Manual for KMC Conquest Systems**

SUPPORT

Additional resources for installation, configuration, application, operation, programming, upgrading, and much more are available on the web at **www.kmccontrols.com**. Log-in to see all available files.

CAN-5900 Series

I/O Expansion Modules

DESCRIPTION

KMC Conquest™ CAN-5900 series input/output expansion modules are designed for use with BAC-5900 series controllers. Multiple modules can be connected to a controller via the EIO communications port (a CAN bus). Each CAN-5901 supports up to eight inputs and eight outputs. Each CAN-5902 supports up to sixteen inputs.

A BAC-5900 series controller with four connected CAN-5900 series modules can access up to 74 physical (Room Sensor port and terminal block) inputs and up to 40 outputs:

- With four CAN-5901 modules, the controller can access 42 inputs and 40 outputs.
- With four CAN-5902 modules, the controller can access 74 inputs and 8 outputs.
- CAN-5901 and CAN-5902 modules can also be "mixed and matched" for a desired number of inputs and outputs.

One BAC-5901 And...		Provides...	
CAN-5901s	CAN-5902s	Inputs*	Outputs
0	0	10	8
1	0	18	16
2	0	26	24
3	0	34	32
4	0	42	40
0	1	26	8
0	2	42	8
0	3	58	8
0	4	74	8
1	3	66	16
2	2	58	24
3	1	50	32

*Up to 74 physical inputs are possible, but up to 106 input objects can be created (with 32 unused) for addressing.

KMC Conquest™ Automation Hardware

MADE IN USA

APPLICATIONS

I/O expansion modules for BAC-5900 series controllers can be used with equipment such as:

- Air handling units
- Boilers
- Chillers
- Pumps
- Cooling towers
- Roof top units
- Heat pump units
- Fan coil units
- Unit ventilators
- Other HVAC and building automation system equipment

(See also **Sample Installation on page 5**.)

MODELS

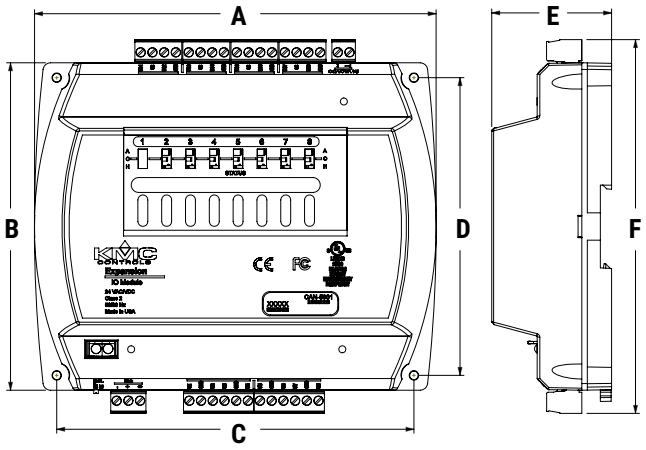
APPLICATIONS	INPUTS*	OUTPUTS*	MODEL
Input/Output Expansion	8 universal (software configurable as analog, binary, or accumulator)	8 universal • Software configurable as analog or binary • Override boards give additional options**	**CAN-5901**
Input Expansion	16 universal (software configurable as analog, binary, or accumulator)	None	**CAN-5902*** **

*Up to four CAN-5900 series expansion modules can be used with BAC-5900 series controllers to provide up to 74 inputs or 40 outputs. CAN-5900 modules have only terminal block inputs and do not have a Room Sensor port.

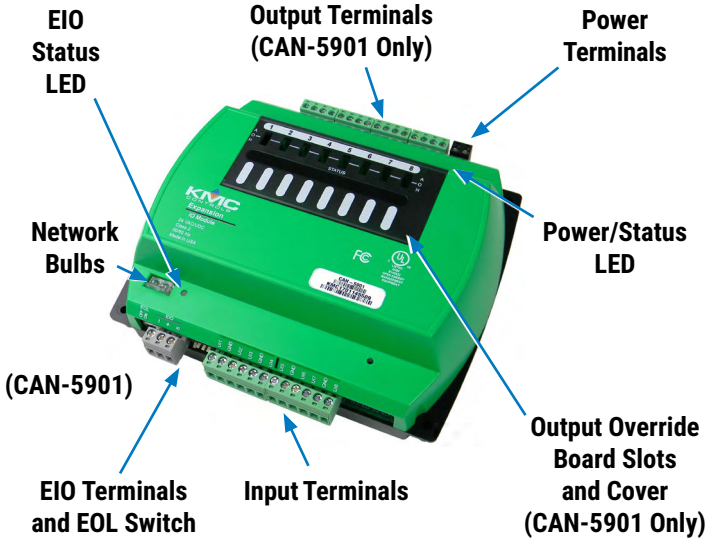
**HPO-6700 series output override board series provide (triac, NC/NO relays, 4–20 mA, adjustable 0–10 VDC) options for devices that cannot be powered from a standard universal output. The boards can also be used with the CAN-5901.

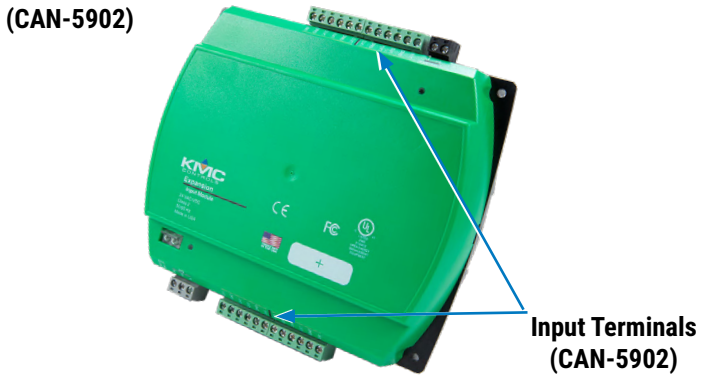
***A CAN-590**2** requires a BAC-5900 series controller with firmware version R1.2.0.9 or later.

SPECIFICATIONS



DIMENSIONS		
A	6.744 inches	171 mm
B	5.500 inches	140 mm
C	6.000 inches	152 mm
D	5.000 inches	127 mm
E	2.012 inches (CAN-5901) 1.500 inches (CAN-5902)	51 mm (CAN-5901) 38 mm (CAN-5902)
F	6.279 inches	159 mm





Inputs and Outputs

Inputs, Universal

Universal inputs	Configurable as analog, binary, or accumulator objects (8 on CAN-5901, 16 on CAN-5902)
Termination	1K and 10K ohm sensors, 0–12 VDC, or 0–20 mA (without need for an external resistor)
Resolution	16-bit analog-to-digital conversion
Protection	Overvoltage protection (24 VAC, continuous)
Wire size	12–24 AWG, copper, in removable screw terminal blocks

TERMINAL COLOR CODE	
Black	24 VAC/VDC Power
Gray	CAN Communications
Green	Inputs/Outputs

Outputs, Universal (CAN-5901 Only)

Universal outputs	Configurable as an analog (0 to 12 VDC) or binary object (0 or 12 VDC, on/off); alternately, an output override board is installed for devices that cannot be powered from a standard universal output (8 on CAN-5901)
Power/protection	Each short-circuit protected universal output capable of driving up to 100 mA (at 0–12 VDC) or 300 mA total for all outputs
Resolution	12-bit digital-to-analog conversion
Wire size	12–24 AWG, copper, in removable screw terminal blocks

Communication Ports

EIO Expansion	One CAN serial bus connection (terminal block) for daisy-chaining I/O expansion modules up to 200 feet (61 meters) from the controller via standard shielded twisted-pair wire

Configuration Tools

Via BAC-5901	KMC Connect software, TotalControl software, or KMC Converge module for Niagara WorkBench

Hardware Features

Processor, Memory, and Clock

Processor	32-bit ARM® Cortex-M4
Memory	Configuration parameters are stored in nonvolatile memory; auto restart on power failure

Indicators and Isolation

LED indicators	Power/status and EIO (CAN) communication
Communication bulbs	One EIO (CAN) communications bulb assembly indicates reversed polarity and isolates circuit
Switch	EOL (end of line) for EIO (CAN) bus

Installation

Power

Supply voltage	24 VAC (50/60 Hz) or 24 VDC; –15%, +20%; Class 2 only; non-supervised (all circuits, including supply voltage, are power limited circuits)
Required power	14 VA, plus external loads
Wire size	12–24 AWG, copper, in a removable screw terminal block

Enclosure and Mounting

Weight	14 ounces (0.4 kg)
Case material	Green and black flame retardant plastic
Mounting	Direct mounting to panels or DIN rails

Environmental Limits

Operating	32 to 120° F (0 to 49° C)
Shipping	–40 to 160° F (–40 to 71° C)
Humidity	0 to 95% relative humidity (non-condensing)

Warranty, Protocol, and Approvals

Warranty

KMC Limited Warranty	5 years (from mfg. date code)

Protocol

CAN	CAN (Controller Area Network) bus on EIO terminals

Regulatory Approvals

UL (both)	UL 916 Energy Management Equipment listed
(CAN-5901 only)	UL 864 Smoke Control Equipment listed (UUKL), 10th edition—for smoke control applications, see **Smoke Control Manual for KMC Conquest Systems**, P/N 000-035-18)
CE	CE compliant
RoHS	RoHS compliant
FCC (for CAN-5901)	FCC Class A, Part 15, Subpart B and complies with Canadian ICES-003 Class A*
FCC (for CAN-5902)	FCC Class B, Part 15, Subpart B and complies with Canadian ICES-003 Class B*

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

ACCESSORIES

NOTE: For accessory details, see the respective product data sheets and installation guides.

Actuators and Sensors

MEP-4xxx	Actuators, 25 to 90 in-lb., fail-safe and non-fail-safe
MEP-7xxx	Actuators, 180 and 320 in-lb., fail-safe and non-fail-safe
STE-60xx	Room temperature sensors
STE-14xx	DAT, OAT, and other temp. sensors

Miscellaneous Hardware

HCO-1103	Steel control enclosure, 10-1/8 x 2-5/8 x 7-19/32 inches (257 x 67 x 193 mm)
HCO-1035	Steel control enclosure, 20 x 24 x 6 inches (508 x 610 x 152 mm)*
HCO-1036	Steel control enclosure, 24 x 36 x 6 inches (610 x 914 x 152 mm)*
HPO-0055	Replacement network bulb assembly (pack of 5)
HPO-0063	Replacement output (override board) jumper, 2-pin (pack of 5)
HPO-9901	Controller replacement parts kit with terminal blocks and DIN clips

***NOTE:** For smoke control applications, the CAN-5901 must be mounted in a UL Listed FSCS enclosure or listed enclosure with minimum dimensions. The HCO-1035 and HCO-1036 are approved for such applications. The CAN-5902 is not approved for smoke control applications.

Output Override Boards (for CAN-5901)

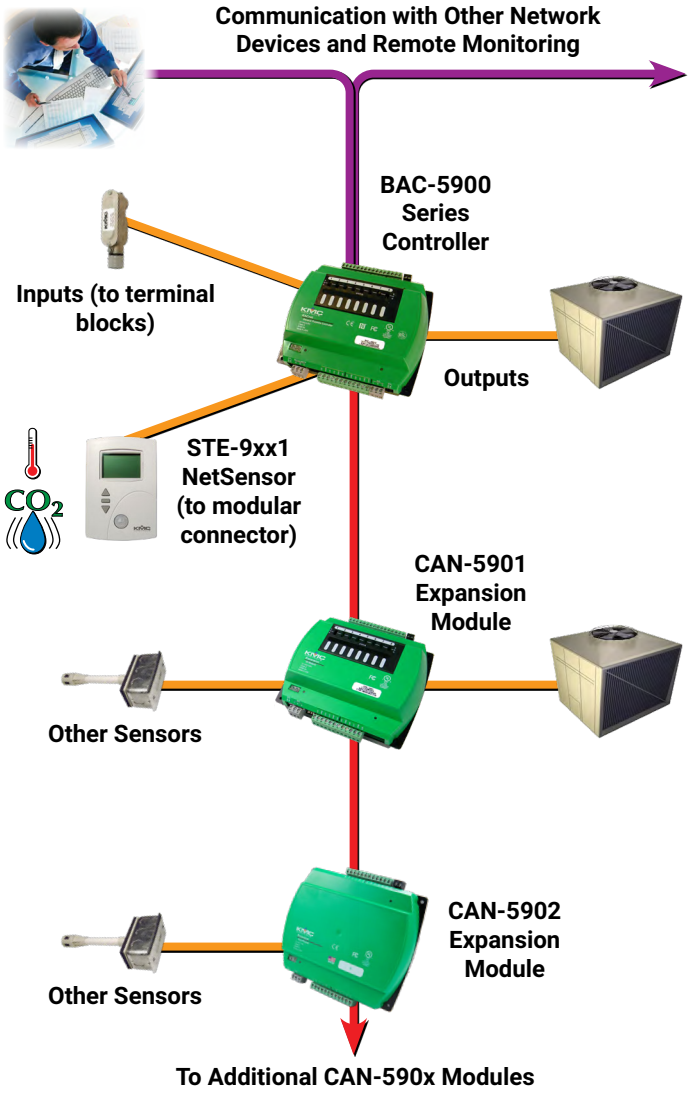
HPO-6701**	Triac output w/ zero-cross switching (AC only)
HPO-6702	0–10 VDC analog with adjustable override potentiometer
HPO-6703	Relay, NO contacts (AC/DC)
HPO-6704**	4–20 mA DC current loop with adjustable override potentiometer
HPO-6705	Relay, NC contacts (AC/DC)

****NOTE:** Only the HPO-6701 and HPO-6704 of the HPO-6700 series output override boards are approved for smoke control applications. The CAN-5902 is not approved for smoke control applications, and it does not have outputs.

Transformers, 120 to 24 VAC

XEE-6111-050	50 VA, single-hub
XEE-6112-050	50 VA, dual-hub
XEE-6112-100	96 VA, dual-hub (approved for smoke control applications)

SAMPLE INSTALLATION



For more information about installation and operation, see:

- **CAN-5900 Series Expansion I/O Module Installation Guide**
- **KMC Conquest Controller Application Guide**
- **Smoke Control Manual for KMC Conquest Systems** (CAN-5901 only)

SUPPORT

Additional resources for installation, configuration, application, operation, programming, upgrading, and much more are available on the web at **www.kmccontrols.com**. Log-in to see all available files.

HPO-6700 Series

Output Override Boards

DESCRIPTION

For enhanced controller output options (such as manual control, using large relays, or for devices that cannot be powered directly from a standard output), install a relevant HPO-6700 series output override board (in supporting controller models only).

The **HPO-6701/6703/6705** boards are designed to convert a binary/digital output to a **relay** contact or **triac** output and to provide "Hand-Off-Auto" control and feedback functions. These boards provide:

- **Optical isolation** between the controller and the load, plus zero-cross switching (HPO-6701 triac).
- **Mechanical isolation** between the controller and the load (HPO-6703/6705 relays).

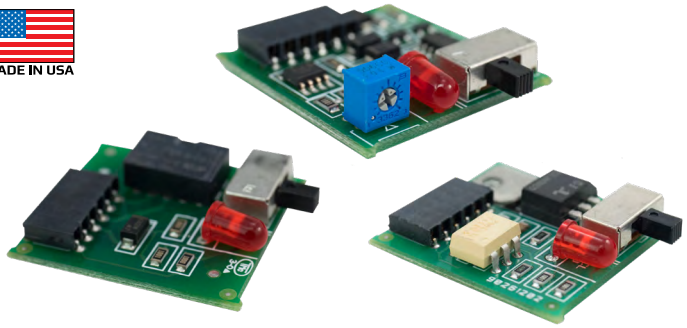
The **HPO-6702** enhances the analog **voltage output** with a "Hand-Off-Auto" control while providing an adjustable **potentiometer** for override settings while in the "Hand" position.

The **HPO-6704** converts a standard analog voltage output to a **4–20 mA** output with "Hand-Off-Auto" control while providing an adjustable **potentiometer** for override settings while in the "Hand" position. (Since the HPO-6704 supplies the power, it will not work with a 4–20 mA device that also supplies its own power.)

Each output board (except HPO-6703-1) has an accessible three-position slide switch for selecting the **"Hand-Off-Auto"** functions. While in the "Hand" position, the output is manually energized, and the controller is provided with a feedback signal to indicate the output has been overridden. While in the "Off" position, the output is manually de-energized, and the controller is provided with a feedback signal to indicate the output has been overridden. While in the "Auto" position, the output is under the command of the controller.

Each output board also has a red **LED** indicator that is On when that board's output is turned On (either manually or automatically).

MADE IN USA



MODELS

Analog (DC Voltage or Current) Outputs

HPO-6702	0–10 VDC with an adjustable override potentiometer for "Hand" output
HPO-6704[1]	4–20 mA DC (@ 10 VDC) current loop with an adjustable override potentiometer for "Hand" output

Relays (AC or DC)[2]

HPO-6703[3]	Relay, Normally Open contacts (AC or DC)
HPO-6705	Relay, Normally Closed contacts (AC or DC)

Triac (AC)[2]

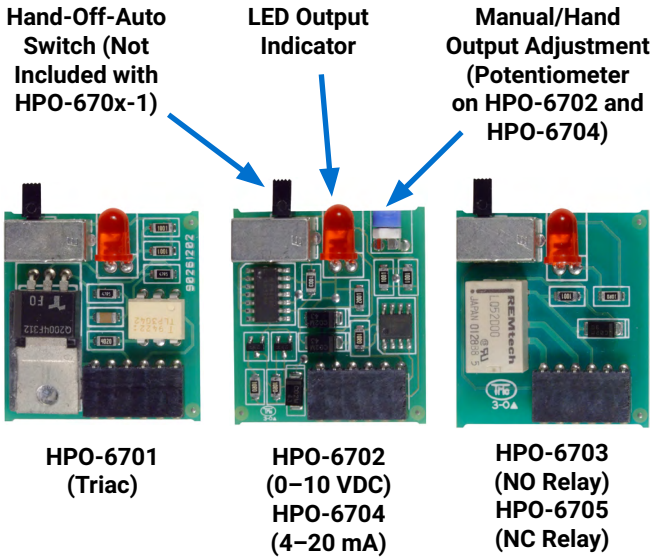
HPO-6701[1]	Triac output w/ zero-cross switching (AC only)

[1]**NOTE:** Only the HPO-6701 and HPO-6704 are approved for **smoke control** applications. See Smoke Control Manuals 000-035-08 (BACnet) and/or 000-035-09 (KMDigital) for more information.

[2]**NOTE:** Connecting 24 volts to an analog ground will result in improper operation and may result in equipment damage. **With the HPO-6701 triac and HPO-6703/6705 relays, use only the Switched Common terminal (in the same output bank as the output terminal) on the controller instead of Ground for the signal common.** Switched Common output terminals are unconnected in the controller unless an appropriate override output board is installed, and they are isolated from the grounds used for the universal output analog circuitry in the controller.

[3]**NOTE:** HPO-6703-**1** is always in auto mode and does not have the manual slide switch.

SPECIFICATIONS



Outputs

NOTE: All circuits are power limited and non-supervised.

Analog (DC) with short protection

HPO-6702	0–10 VDC, 100 mA maximum, adjustable override potentiometer
HPO-6704	4–20 mA, 100 ohms min. to 500 ohms max., adjustable override potentiometer **(since the HPO-6704 supplies the power, it will not work with a 4–20 mA device that also supplies its own power)**

Relay (AC/DC)

HPO-6703	Normally open, 30 VAC/VDC, 2 A max., power factor 0.4
HPO-6705	Normally closed, 30 VAC/VDC, 2 A max., power factor 0.4

Triac (AC)

HPO-6701	Zero-cross switching, optical isolation, 12 VAC min. and 30 VAC max. voltage, 20 mA min. current and max. current = 1 A for 1 board (0.8 A max. for 2 boards, 0.6 A for 3–4 boards, and 0.5 A for 5–8 boards)

Warranty

KMC Limited Warranty 5 years (from mfg. date code)

Regulatory Approvals

(HPO-6701/6704 Only) UL 916 Energy Management Equipment listed
UL 864 Smoke Control Equipment listed (UUKL), 10th edition

NOTE: Only the HPO-6701 triac and HPO-6704 4–20 mA boards are approved for smoke control applications. For information about such applications, see the smoke control manuals available on the KMC **web site** under Installation Guides linked to models **HPO-6701** or **HPO-6704**.

Physical Characteristics

Mounting	Rack mount in controller slots
Size	1.23 x 1.38 inches (31.2 x 35.1 mm)
Weight	3 ounces (85 grams)

Environmental Limits

Operating	32 to 120° F (0 to 40° C)
Shipping	–40 to 140° F (–40 to 60° C)
Humidity	0 to 95% relative humidity (non-condensing)

ACCESSORY

HPO-6802

Output board raised cover with labels—it is **required** for controllers or expansion modules with **metal and older "side-mounting" plastic cases** (e.g., BAC-A1616BC, CAN-A168EIO, BAC-5831, KMD-5831, KMD-5205/5221/5270). It is not applicable to current model controllers with raised plastic cases (e.g., BAC-5901, CAN-5901, BAC-5801/5802, KMD-5801/5802).

MAINTENANCE

Maintenance is not required. Each component is designed for dependable, long-term reliability and performance. Careful installation will also ensure long-term reliability and performance.

SUPPORT

For information about installation and operation, see:

- **HPO-6700 Series Output Override Boards Installation Guide**
- **(Video) KMC Controls' HPO-6700 Series Override Boards (Overview and Operation)**
- **(Video) KMC Controls' HPO-6700 Series Digital Override Boards (Triac/Relay Selection and Wiring)**
- **(Video) KMC Controls' HPO-6700 Series Analog Override Boards (0–10 VDC and 4–20 mA Selection and Wiring)**

Additional resources are available on the web at **www.kmccontrols.com**. Log in to see all available files.

INSTA-PANEL™ SERIES
MODEL NSTA2620VA200

DESCRIPTION

Frequently jobs are done on a fast track basis in our industry. **Insta-Panels** were created for a fast turnaround on a control panel job, saving time and labor. **Insta-Panels** are built at Kele in three sizes: small, medium, and large. Each panel is set up with transformer(s), terminal blocks, wire duct, convenience outlet, additional DIN rail and a perforated back panel for easy mounting of customer parts. Pick your size panel based on the interior space needed for mounting components.

FEATURES

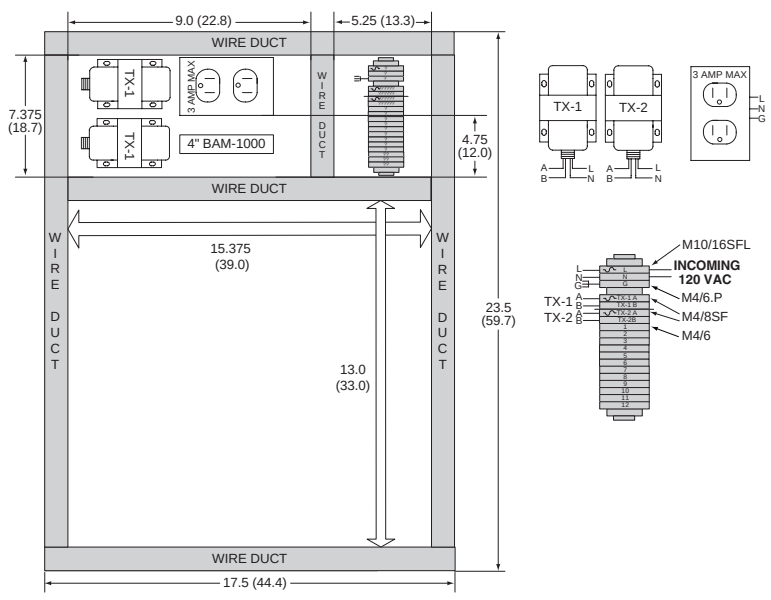
- ***NEMA 1 enclosure***
- ***Convenience outlet***
- ***An extra piece of DIN rail is provided***
- ***Fused primary (incoming 120 volt 10 Amp)***
- ***Fused secondary (24 volts 4 amps)***
- ***White wire duct 3" high x 1" wide***
- ***Separation of high and low voltage wiring***
- ***Prewired power terminals, primary and secondary***
- ***Blown fuse indication on incoming 120 VAC***
- ***Perforated back panel***

SPECIFICATIONS

Power	(2) 120/24 Volt transformer 200 VA
Weight	45 lb (20.4 kg)
Panel size	26"H X 20"W X 7"D (66 x 50.8 x 17.8 cm)
Panel Color	Dark brown body and light tan door
Interior panel mounting dimensions	See detail

DIMENSIONS / WIRING

in
(cm)



Bill of Materials

1 - RET2620 Enclosure and Perf Panel
2 - 691-K1 Transformer
1 - PRK Duplex Receptacle
1 - BAM-1000 Aluminum DIN Rail
1 - M10/16SFL Primary Fuse Holder
1 - M4/6.P Grounding Terminal Block
15 - M4/6 Terminal Block
2 - M4/8SF 8mm Fuseholder
2 - FEM8S Fuse Holder End Section
2 - FEM6 End Section
3 - BAM2 End Stop
1 - RC610/1-50 Marker Tags
1 - RC610/B Blank Marker Tag
2 - T1-1030W White Wiring Duct
1 - GF-10 Primary Fuse
2 - K235-4 Secondary Fuse
1 - LEN indication lamp for blown fuse

ORDERING INFORMATION

MODEL	DESCRIPTION
NSTA2620VA200	**26" x 20" Insta-Panel, (2) 100 VA transformers, outlet, 12 available terminal blocks**

BAC-9300 Series

BACnet Unitary Controllers (B-AAC)

DESCRIPTION

KMC Conquest™ BAC-9300 series controllers are designed to operate unitary and terminal equipment. The integrated alarming, scheduling, and trending enable these BACnet Advanced Application Controllers to be powerful edge devices for the modern smart building ecosystem.

The factory-supplied programming covers common unitary applications. The controllers feature simple, menu-driven setup choices using an STE-9000 series digital sensor, which can be installed permanently as the room sensor or used temporarily as a technician's service tool.

Alternately, quick configuration of controller properties can be done using NFC (Near Field Communication) from a smart phone, tablet, or computer (using KMC Connect Lite™ app) while the controller is unpowered.

The Ethernet-enabled BAC-93x1C**E** models can also be configured by connecting an HTML5-compatible web browser to the built-in configuration web pages.

To meet the most demanding building automation custom requirements, these controllers are also fully programmable. Custom configuration and programming, with wizards for application programming selection/configuration, are enabled by KMC Connect™ software and the KMC Converge™ module for Niagara Workbench.

KMC Converge and TotalControl™ software additionally provide the capability of creating custom graphical web pages (hosted on a remote web server) to use as a custom user-interface for the controllers.

(BAC-9301C with MS/TP Shown)

KMC Conquest™ Automation Hardware

MADE IN USA

APPLICATIONS

Can be used with the following types of unitary equipment:

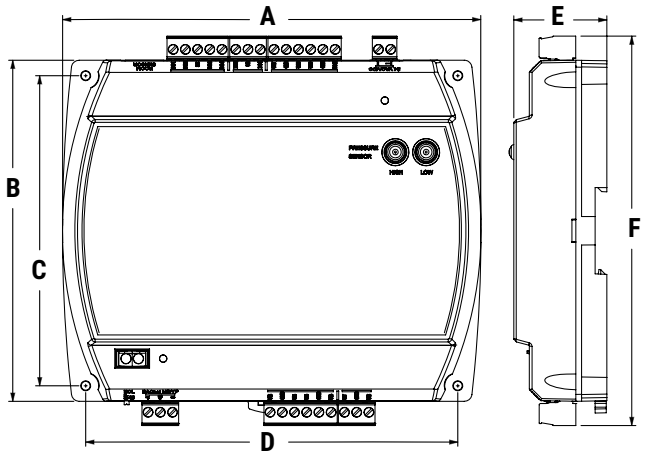
- Air handling units (AHU)
- Chilled beams
- Constant air volume (CAV) with external actuator
- Fan coil units (FCU)
- Heat pump units (HPU)
- Roof top units (RTU)
- Unit ventilators
- Variable air volume (VAV) with external actuator

(Some applications require custom programming. See also **Sample Installation on page 6**.)

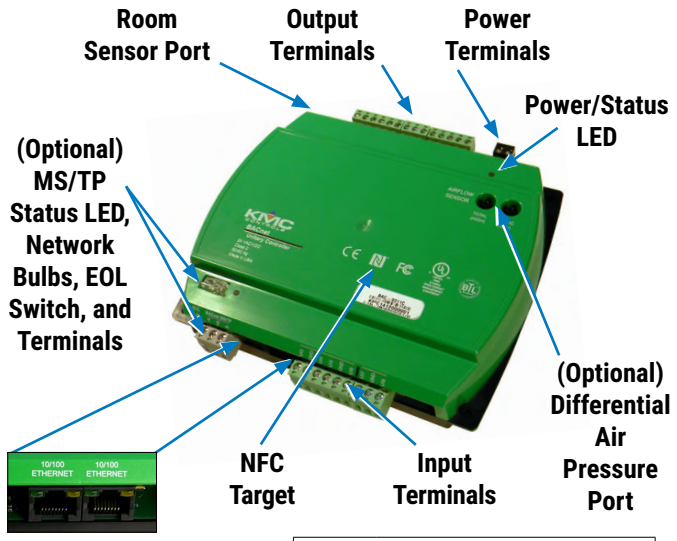
MODELS

APPLICATIONS	INPUTS	OUTPUTS	FEATURES				MODEL
			Air Pressure Sensor (Input)	Real Time Clock (RTC)	Ethernet Port	MS/TP Port	
RTU, HPU, FCU, AHU, and unit ventilator	1 opt. air pressure sensor and 8 (total) standard: • 2 analog (temp. sensor port) • 6 universal inputs (software configurable as analog, binary, or accumulator on terminals)	10 total: • 6 triacs (binary) • 4 universal (software configurable as analog or binary)				✔	BAC-9301
				✔		✔	BAC-9301C
				✔	✔		BAC-9301CE
VAV/CAV (with external tri-state actuator), RTU/ HPU static pressure monitoring/control			✔			✔	BAC-9311
			✔	✔		✔	BAC-9311C
			✔	✔	✔		BAC-9311CE

SPECIFICATIONS



DIMENSIONS					
A	6.744 inches	171 mm	**D**	6.000 inches	152 mm
B	5.500 inches	140 mm	**E**	1.500 inches	38 mm
C	5.000 inches	127 mm	**F**	6.279 inches	159 mm



TERMINAL COLOR CODE	
Black	24 VAC/VDC Power
Gray	MS/TP Communications
Green	Inputs and Outputs

Inputs and Outputs

Inputs, Universal (6 on Terminal Blocks)

Universal inputs	Configurable as analog, binary, or accumulator objects
Termination	1K and 10K ohm sensors, 0–12 VDC, or 0–20 mA (without need for an external resistor)
Resolution	16-bit analog-to-digital conversion
Protection	Overvoltage protection (24 VAC, continuous)
Wire size	12–24 AWG, copper, in removable screw terminal blocks

Input, Dedicated Room Sensor Port

Connector	Modular connector for STE-9xx1 series digital wall sensors or STE-6010/6014/6017 analog temperature sensors
Cable	Uses standard Ethernet patch cable up to 150 feet (45 meters)

Input, Integrated Air Pressure Sensor (BAC-9311)

Δ pressure range	0 to 2" wc (0 to 500 Pa)
Sensor accuracy	±4.5% of the reading or (when near zero) 0.0008" wc (0.2 Pa), whichever is greater (@ 25° C); internally linearized and temperature compensated
Connections	Barbed for 1/4 inch FR (Flame Retardant) tubing

Outputs, Universal (4 on Terminal Blocks)

Universal outputs	Configurable as an analog (0 to 12 VDC) or binary object (0 or 12 VDC, on/off)
Power/protection	Each short-circuit protected universal output capable of driving up to 100 mA (at 0–12 VDC) or 100 mA total for all outputs
Resolution	12-bit digital-to-analog conversion
Wire size	12–24 AWG, copper, in removable screw terminal blocks

Outputs, Triac (6 Binary)

Triac outputs	Optically isolated zero-crossing triac output configured as a binary object
Power	Maximum switching 24 VAC at 1.0 A for each output; maximum total for controller is 3.0 A
Wire size	12–24 AWG, copper, in removable screw terminal blocks

Communication Ports

MS/TP (optional)	One EIA-485 port (removable terminal block) for BACnet MS/TP, operating at 9.6, 19.2, 38.4, 57.6, 76.8, or 115.2 kilobaud; max. length of up to 4,000 feet (1,200 meters) of 18 AWG shielded twisted-pair, no more than 51 pf/ft (167 pf/m); use repeaters for longer distances
Ethernet (optional)	On "E" models only, two 10/100BaseT Ethernet connectors for BACnet IP, Foreign Device, and Ethernet 802.3 (ISO 8802-3); segmentation supported; up to 328 ft (100 m) between controllers (using T568B Category 5 or better cable)
NFC	NFC (Near Field Communication) up to 1 inch (2.54 cm) from the top of the enclosure
Room sensor	Modular STE connection jack for STE-9000 series digital sensors and STE-6010/6014/6017 analog sensors
Auxiliary	One serial port with mini Type B connector (reserved for future use)

Configurability

OBJECTS*	MAXIMUM #	
Inputs and Outputs		
Analog, binary, or accumulator input	8 for BAC-9301	9 for BAC-9311
Analog or binary output	10	
Values		
Analog value	120	
Binary value	80	
Multi-state value	40	
Program and Control		
Program (Control Basic)	10	
PID loop	10	
Schedules		
Schedule	2	
Calendar	1	
Logs		
Trend log	20	
Trend log multiple (must be created)	4 (default 0)	
Alarms and Events		
Notification class	5	
Event enrollment	40	
Tables		
Input tables	20	
Control Basic tables	20	

*Configuration allows creation and deletion of objects (maximum number of objects shown). The number and configuration of default objects depends on the selected application. For lists of default objects, see the **KMC Conquest Controller Application Guide**. See also the PIC statement for all supported BACnet objects.

Configuring, Programming, and Designing

SETUP PROCESS			KMC CONTROLS TOOL
Configuration	**Programming (Control Basic)**	**Web Page Graphics***	
✔			Conquest NetSensor
✔			Internal configuration web pages in Conquest Ethernet "E" models**
✔			KMC Connect Lite™ (NFC) app***
✔	✔		KMC Connect™ software
✔****	✔****	✔	TotalControl™ software
✔	✔		KMC Converge™ module for Niagara WorkBench
		✔	KMC Converge **GFX** module for Niagara WorkBench

*Custom graphical user-interface web pages can be hosted on a remote web server, but not in the controller.

Conquest Ethernet-enabled "E" models with the latest firmware can be configured with an HTML5 compatible web browser from pages served from within the controller. For information, see the **Conquest Ethernet Controller Configuration Web Pages Application Guide.

***Near Field Communication via enabled smart phone or tablet running the KMC Connect Lite app.

****Full configuration and programming of KMC Conquest controllers is supported starting with TotalControl ver. 4.0.

Hardware Features

Processor, Memory, and Clock

Processor	32-bit ARM® Cortex-M4
Memory	Programs and configuration parameters are stored in nonvolatile memory; auto restart on power failure
RTC	Real time clock with (capacitor) power backup for 72 hours ("C" model only) for network time synchronization or full stand-alone operation

Indicators and Isolation

LED indicators	Power/status and MS/TP communication or Ethernet status
MS/TP bulbs	One network bulb assembly indicates reversed polarity and isolates circuit
Switch	EOL (end of line) for MS/TP

Installation

Power

Supply voltage	24 VAC (50/60 Hz) or 24 VDC; –15%, +20%; Class 2 only; non-supervised (all circuits, including supply voltage, are power limited circuits)
Required power	8 VA, plus external loads
Wire size	12–24 AWG, copper, in a removable screw terminal block

Enclosure and Mounting

Weight	14 ounces (0.4 kg)
Case material	Green and black flame retardant plastic
Mounting	Direct mounting to panels or on DIN rails

Environmental Limits

Operating	32 to 120° F (0 to 49° C)
Shipping	–40 to 160° F (–40 to 71° C)
Humidity	0 to 95% relative humidity (non-condensing)

Warranty, Protocol, and Approvals

Warranty

KMC Limited Warranty	5 years (from mfg. date code)

BACnet Protocol

Standard	Meets or exceeds the specifications in ANSI/ASHRAE BACnet Standard 135-2010 for Advanced Application Controllers
Type	BTL-certified as a B-AAC controller type

Regulatory Approvals

UL	UL 916 Energy Management Equipment listed
	UL 864 Smoke Control Equipment listed (UUKL), 10th edition—for smoke control applications, see **Smoke Control Manual for KMC Conquest Systems**, P/N 000-035-18)
BTL	BACnet Testing Laboratory listed as Advanced Application Controller (B-AAC)
CE	CE compliant
RoHS 2	RoHS 2 compliant
FCC	FCC Class A, Part 15, Subpart B and complies with Canadian ICES-003 Class A*

*This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. (NFC operation meets FCC compliance while the controller is in an unpowered state.)

ACCESSORIES

NOTE: For accessory details, see the respective product data sheets and installation guides.

Actuators

NOTE: See also the selection chart in the Connecting a Remote Actuator to a BAC-9311 section of the **KMC Conquest Controller Application Guide**.

MEP-4xxx	Actuators, 25 to 90 in-lb., fail-safe and non-fail-safe
MEP-7xxx	Actuators, 180 and 320 in-lb., fail-safe and non-fail-safe

Differential Air Pressure Sensors

SSS-1012	Sensor, 3-5/32 inches (80 mm) length
SSS-1013	Sensor, 5-13/32 in. (137 mm) length
SSS-1014	Sensor, 7-21/32 in. (194 mm) length
SSS-1015	Sensor, 9-29/32 in. (252 mm) length

Miscellaneous Hardware

HCO-1103	Steel control enclosure with DIN rail mounting, 10 x 7.5 x 2.5 inches (257 x 67 x 193 mm)
HCO-1035	Steel control enclosure, 20 x 24 x 6 inches (508 x 610 x 152 mm)*
HCO-1036	Steel control enclosure, 24 x 36 x 6 inches (610 x 914 x 152 mm)*
SP-001	Screwdriver (KMC branded) with a hex end (for NetSensor cover screws) and a flat blade end (for controller terminals)
HPO-9901	Controller replacement parts kit with terminal blocks (1 gray, 1 black, 2 green 3-terminal, 4 green 4-terminal, 2 green 5-terminal, 2 green 6-terminal) and DIN clips (2 small for router and 1 large for controllers)

***NOTE:** For smoke control applications, the controller must be mounted in a UL Listed FSCS enclosure or listed enclosure with minimum dimensions. The HCO-1035 and HCO-1036 are approved for such applications.

Network Communications

BAC-5051E	BACnet router with single MS/TP and IP/Ethernet ports
HPO-0055	Replacement network bulb assembly (pack of 5)
HPO-5551	Router technician cable kit
HPO-9003	NFC Bluetooth/USB module (fob)
HSO-9001	Ethernet patch cable, 50 feet
HSO-9011	Ethernet patch cable, 50 feet, plenum rated
HSO-9012	Ethernet patch cable, 75 feet, plenum rated
KMD-5567	MS/TP suppressor module and terminal connector (required for EIA-485 terminals of MS/TP model controllers in smoke control applications)

Room Sensors, Analog

STE-6010W10	Temperature sensor, white
STE-6014W10	Sensor with rotary setpoint dial, white
STE-6017W10	Sensor with rotary setpoint dial and override button, white
HPO-9005	Room sensor adapter allows the use of other sensors and optional setpoint potentiometers (with wire leads or terminal blocks) to be used instead of STE-601x sensor models with modular jacks

NOTE: Other STE-6000 series sensors are not fully compatible with the dedicated sensor port. However, various other models can be used with an HPO-9005 adapter or with the controller screw terminals. See the STE-6000 series data sheet for more information. For digital sensor information, see the STE-9000 series.

NOTE: To order the STE-601x sensor with light almond color instead of white, drop the W on the end of the model number (e.g., STE-6010W is white and STE-6010 is light almond).

Room Sensors, Digital (LCD Display)

STE-9000 Series	KMC Conquest NetSensor digital room temperature sensors for viewing, configuring, and optional humidity, occupancy, and CO_2 sensing
HPO-9001	NetSensor distribution module

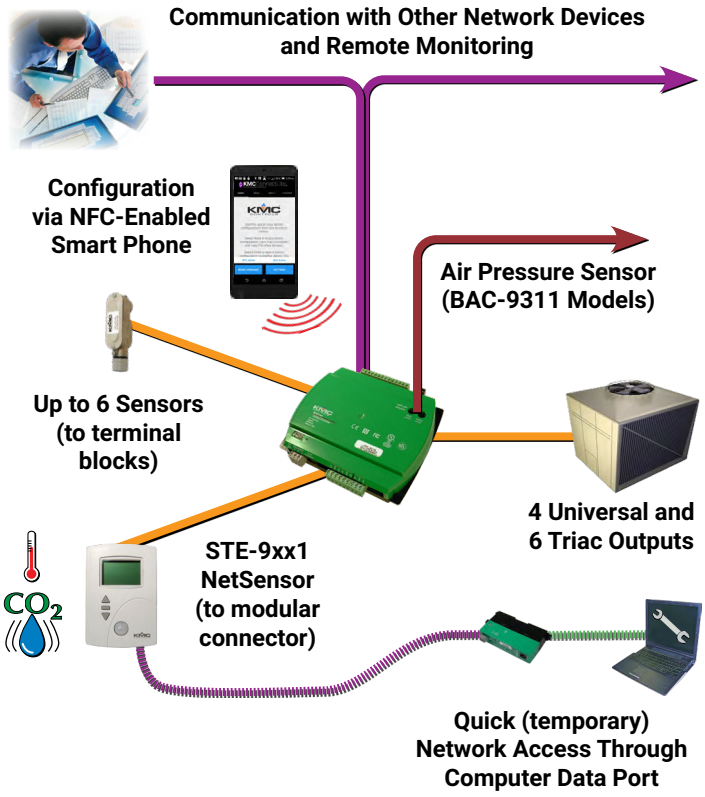
Sensors, Miscellaneous

STE-1405	DAT sensor with plenum-rated cable
STE-1451	OAT sensor

Transformers, 120 to 24 VAC

XEE-6111-050	50 VA, single-hub
XEE-6112-050	50 VA, dual-hub
XEE-6112-100	96 VA, dual-hub (approved for smoke control applications)

SAMPLE INSTALLATION



For more information about installation and operation, see:

- **BAC-9300 Series Controller Installation Guide**
- **KMC Conquest Controller Application Guide**
- **KMC Conquest Wiring: BAC-9300 Series Controllers (Video)**
- **Smoke Control Manual for KMC Conquest Systems**

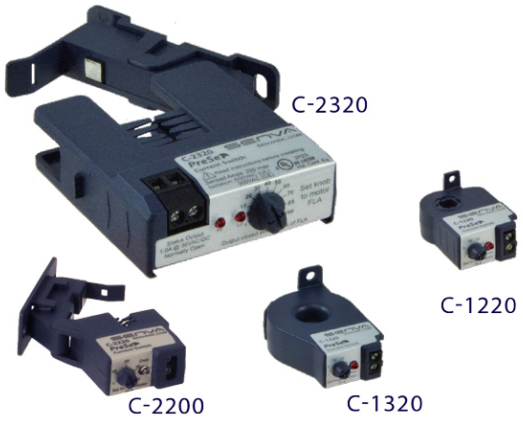
SUPPORT

Additional resources for installation, configuration, application, operation, programming, upgrading, and much more are available on the web at **www.kmccontrols.com**. Log-in to see all available files.

PreSet Series

Scaled Adjustable Current Switches

Scaled calibration for proof of flow set-point
Split and solid core models to 150A
N.O. 30VAC/DC or 120VAC output
Optional command relay

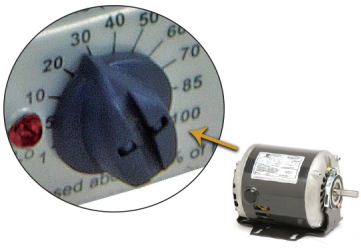


DESCRIPTION

PreSet™ allows for matching sensor set-point to the motor nameplate, eliminating the need to calibrate in energized enclosures and reducing installation time. The sensor will detect motor undercurrent conditions such as belt loss, coupling shear, and mechanical failure on fans and pumps.

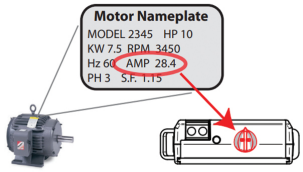
APPLICATIONS

- Detecting belt loss, coupling shear, and mechanical failure on fans and pumps
- Monitoring status of industrial processes
- Monitoring status of critical motors
- Great for data center current switch sensing



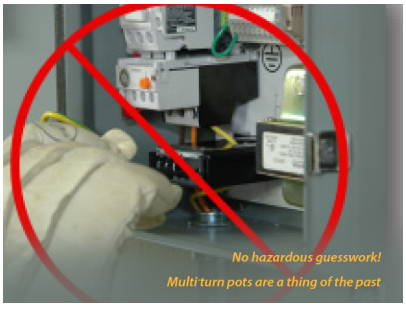
Just set to motor full load amps for proof of flow. Simple and safe.

Optional CR command relay for stop/start/status in a single labor saving device.



Adjust knob on sensor to motor full load amperage (FLA) indicated on nameplate

Never clibrate in live enclosures again. Redicing risk of an arc flash exposure.



No hazardous guesswork. Muli-turn pots are a think of the past.

Proven 1/2 hour savings per install over manually calibrated devices.

FEATURES

- Preset scaled calibration enables set-point adjustment for proof of flow by simply matching dial to motor full load amps (FLA) nameplate
- Safer--eliminates calibration in energized enclosures, reduces arc flash hazard
- Proven to save up to 1/2 hour per install...no need to return to calibrate live
- Prevents call-backs, no multi-turn potentiometers, and guesswork to find set-point
- A super low turn-on for compatibility with smaller motors
- Solid-state-more reliable than mechanical pressure switches for proof of flow
- Quality backed by a 7-year limited warranty
- PATENTED

ORDERING

SPLIT CORE	Range (Amps)	Max Amps	N.O. Output	Trip LED	Power LED
C-2320-L	0.45A	50A	1.0A@30VAC/DC	•	•
C-2320	0.50A	100A	1.0A@30VAC/DC	•	•
C-2320-H *	0.50A	150A	1.0A@30VAC/DC	•	•
C-2320HV	0.50A	100A	0.2A@120VAC	•	•
C-2320HV-L	0.45A	50A	0.2A@120VAC	•	•
SPLIT CORE - MINI					
C-2220	1.00A	50A	1.0A@30VAC/DC	•	
SOLID CORE					
C-1320	0.75A	50A	1.0A@30VAC/DC	•	
SOLID CORE - MINI					
C-1220-L	0.75A	5A	1.0A@30VAC/DC	•	
C-1220	0.75A	50A	1.0A@30VAC/DC	•	
C-1220HV-L	0.75A	5A	1.0A@30VAC/DC	•	
C-1220HV	0.75A	50A	0.2A@120VAC	•	

COMMAND RELAY - DIRECT MOUNT (MOUNTS ON ALL 2300 SERIES CURRENT DEVICES)	Contact rating	Coil
CR3-24	N.O. 10A @ 125VAC	24VAC/DC 15mA nominal
CR4-24	N.C. 10A @ 125VAC	24VAC/DC 15mA nominal
CR3-12	N.O. 10A @ 125VAC	9-12VDC 30mA nominal
CR4-12	N.C. 10A @ 125VAC	9-12VDC 30mA nominal

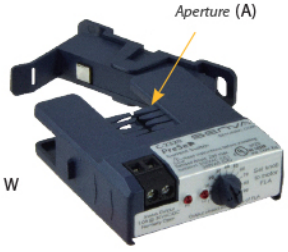
Other coil voltages available—consult factory

Ordering tip: *For best resolution, choose the sensor lowest maximum amperage which accommodates your motor (e.g. 0-50A us -L, 50-100A use standard, 100 to 150A use -H)*

** Now with a new, lower turn on setting!*

DIMENSIONS

SPLIT CORE C-2320



L: 2.5" H: 0.57" W: 2.23"
A: 0.75"x 0.75"

- Mount sensor without removing conductor for installation savings
- Clamp on conductor with iris, or use detachable base to screw or DIN mount
- Larger 0.75" aperture accomodates oversize conductors

OPTIONAL RELAY for additional labor savings

L: .84" H: .72" W: 2.06"

- Add to 2320 series to get start/stop/status in a single device
- Reduces the number of installed components... saves time and space
- Removable relay facilitates service

SPLIT CORE - MINI C-2220

L: 2.00" H: .75" W: 1.75"
A: .040"x 0.32"

- Mount sensor without removing conductor for installation savings
- Fits in small enclosures
- Clamp on conductor with iris, or screw mount detachable base

SOLID CORE C-1320

L: 2.40" H: 1.04" W: 1.6"
A: 0.52" diameter

- Compact design
- Aperture accomodates spade terminals

SOLID CORE - MINI C-1220

L: 1.91" H: .88" W: 1.31"
A: 0.30" diameter

- Super small—fits anywhere
- Low cost

Warning: The datasheet is designed for reference only. Refer to installation instructions that accompany the product and heed all safety instructions. Product improvement is a continuing process at Senva. Changes may occur to products without prior notice.

SPECIFICATIONS	
Standard Output Rating	1.0A@30VAC/DC
Line Voltage Output Rating	0.2A@120VAC (-HV ONLY)
Output Type	NO, solid-state FET
Environmental Rating	5-140 °F (-15-60 ° C) 10-90% RH Non-condensing
Insulation Class	600V RMS. For use on insulated conductors only! Use minimum 75 ° C insulated conductor
Sensor Power	Induced
Frequency Range	50/60Hz

** Product improvement is a continual process at Senva and product features and specification may change without prior notice. Refer to instructions that accompany the product for installation and wiring.*

Differential pressure switch

For monitoring overpressure, vacuum, and differential air pressure or other non-combustible, non-aggressive gases for both HVAC and energy management applications with setpoint adjustment and automatic reset.

5-year warranty

Type Overview

Type	Measuring range pressure [Pa]	Measuring range pressure [inch WC]	Repeating accuracy	Switching differential (pressure)	Burst pressure
01APS-50R	20...300	0.08...1.20	±5%, min. ±0.02 inch WC [5 Pa]	10 Pa	40 inch WC [10 kPa]
01APS-50U	50...500	0.20...2.00	±2.5%, min. ±0.02 inch WC [5 Pa]	20 Pa	40 inch WC [10 kPa]
01APS-501	200...1000	0.80...4.00	±1%, min. ±0.02 inch WC [5 Pa]	100 Pa	40 inch WC [10 kPa]
01APS-504	500...2500	2.00...10.00	±1%, min. ±0.02 inch WC [5 Pa]	150 Pa	40 inch WC [10 kPa]

Technical data

Electrical Data	Electrical connection	terminals for wire 0.5...1.5 mm²
	Cable entry	Cable gland with strain relief ø6...8 mm (1/2" NPT conduit adapter included)
Functional Data	Application	air
	Output signal pressure switch note	contact current max. 1.0 A / AC 250 V
	Service life	min. 1'000'000 switching operations
Measuring Data	Measured values	Differential pressure
	Measuring fluid	air, non-combustible and non-aggressive gases
Specification Pressure	Long term stability	≤±15% deviation over 250'000 operations/ cycles acc. EN1854
Materials	Housing	Bottom Part: PA 6.6 Top Cover: PS
Safety Data	Degree of protection IEC/EN	IP54
	Degree of protection NEMA/UL	NEMA 13
	Low voltage directive	CE according to 2014/35/EU
	EU Conformity	CE Marking
	Certification IEC/EN	IEC/EN 60730-1
	Quality Standard	ISO 9001
	UL Approval	ETL listed, UL508, CSA C22.2 No.14
	Ambient humidity	Max. 95% RH, non-condensing
	Ambient temperature	-5...140°F [-20...60°C]

Technical data

Safety Data	Fluid temperature	-5...140°F [-20...60°C]
	Storage temperature	-40...185°F [-40...85°C]

Safety Notes

This device has been designed for use in stationary heating, ventilation and air-conditioning systems and must not be used outside the specified field of application. Unauthorized modifications are prohibited. The product must not be used in relation with any equipment that in case of a failure may threaten humans, animals or assets.

Ensure all power is disconnected before installing. Do not connect to live/operating equipment.

Only authorized specialists may carry out installation. All applicable legal or institutional installation regulations must be complied with during installation.

The device contains electrical and electronic components and must not be disposed of as household refuse. All locally valid regulations and requirements must be observed.

Installation notes

Permissible installation orientation

The specifications for the switching pressure refer to a vertical installation position, which is also recommended with downward pressure connections. For horizontal installation position with upwards directed AMP connecting lugs, the switching point is approx. 20 Pa higher.

It is not permitted to mount the pressure switch upside down!

Parts included

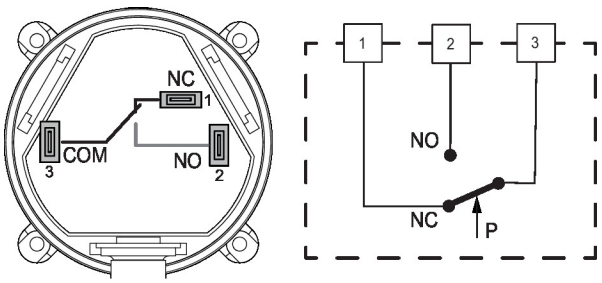
PVC tube 2 m
2x pitot tubes (plastic)
Screws
1/2" NPT conduit adapter

Accessories

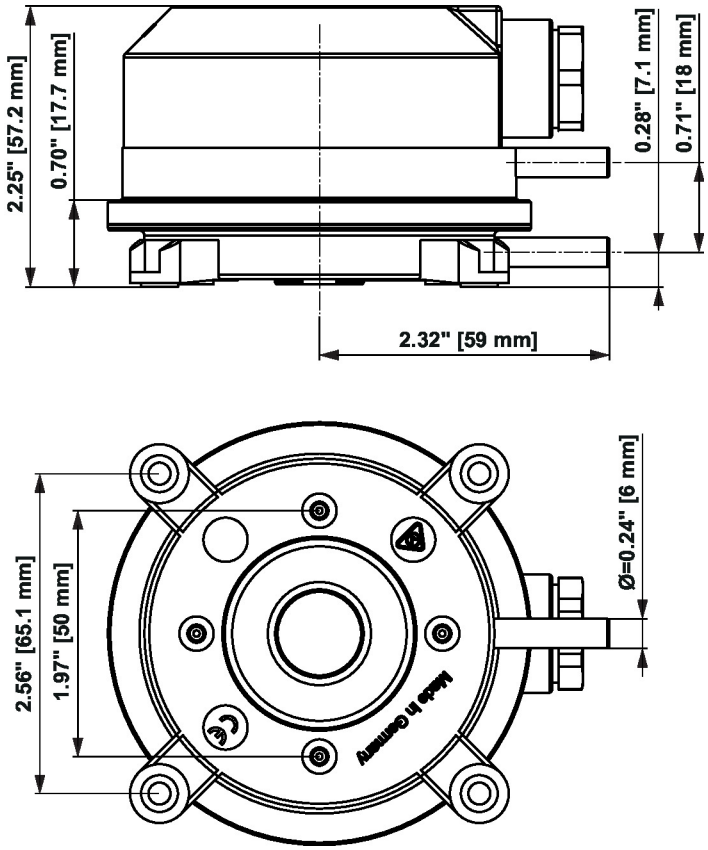
Optional accessories

Description	Type
Mounting bracket L form for 01APS-.., Metal	A-22AP-A06
Mounting bracket S form for 01APS-.., Metal	A-22AP-A07
Cable entry, M20x1.5, for 01APS-.., Multipack 10 pcs.	A-22AP-A11.1
Duct connector kit for 01APS-.., PVC tube 2 m, 2 connection elements (Plastic), Multipack 50 pcs.	A-22AP-A05.1

Wiring Diagram



Dimensions



Type	Weight
01APS-50R	0.26 lb [0.12 kg]
01APS-50U	0.26 lb [0.12 kg]
01APS-501	0.26 lb [0.12 kg]
01APS-504	0.26 lb [0.12 kg]

Further documentation

- Installation instructions

Duct sensor Humidity / Temperature

For measuring the relative or absolute humidity and temperature in duct applications. Instead of the humidity signal, the enthalpy or the dewpoint can be selected as an output signal. NEMA 4X / IP65 rated enclosure.

5-year warranty

Type Overview

Type	Output signal active humidity	Output signal passive temperature
22DTH-51MB	0...5 V, 0...10 V	Pt1000
22DTH-51ME	0...5 V, 0...10 V	Ni1000 (JCI)
22DTH-51ML	0...5 V, 0...10 V	NTC10k (10k2)
22DTH-51MM	0...5 V, 0...10 V	NTC10k3 (Precon)
22DTH-51MQ	0...5 V, 0...10 V	NTC20k

Technical data

Electrical Data	Nominal voltage	AC/DC 24 V
	Remark about nominal voltage range	AC 21.6...26.4 V / DC 13.5...26.4 V
	Power consumption AC	0.8 VA
	Power consumption DC	0.4 W
	Electrical connection	Pluggable spring loaded terminal block max. 2.5 mm²
	Cable entry	Cable gland with strain relief ø6...8 mm (1/2" NPT conduit adapter included)
Functional Data	Sensor technology	polymer capacitive sensor with stainless steel wire mesh
	Application	air
	Voltage output	1 x 0...5 V, 0...10 V, min. resistance 10 kΩ
	Output signal active note	output 0...5/10 V with jumper adjustable
	Output signal passive temperature	Pt1000 Ni1000 (JCI) NTC10k (10k2) NTC10k3 (Precon) NTC20k
Measuring Data	Measured values	relative humidity Absolute humidity Dew point Enthalpies Temperature
Specification Temperature	Measuring range	-30...160°F [-35...70°C] (Passive sensor)

Technical data

Specification Temperature	Accuracy temperature passive	Passive sensors depending on used type Pt.. : ±0.5°F @ 32°F [±0.3°C @ 0°C] Ni.. : ±0.7°F @ 32°F [±0.4°C @ 0°C] NTC.. : ±0.35°F @ 77°F [±0.2°C @ 25°C]
	Time constant τ (63%) in the air duct	Typical 136 s @ 3 m/s
Specification Humidity	Measuring range	0...100% RH non-condensing
	Measuring range absolute humidity	adjustable at the transducer: 0...50 g/m³ (default setting) 0...80 g/m³
	Measuring range enthalpy	0...85 kJ/kg
	Measuring range dew point	adjustable at the transducer: 40...140°F [0...50°C] (default setting) 0...200°F [-20...80°C]
	Accuracy	±2% between 0...80% RH @ 77°F [25°C]
	Long term stability	±0.3% RH p.a. @ 70°F [21°C] @ 50% RH
	Time constant τ (63%) in the air duct	Typical 10 s @ 3 m/s
Materials	Cable gland	PA6, black
	Housing	Cover: PC, orange Bottom: PC, orange Seal: NBR70, black UV resistant UL94 5VA
Safety Data	Protection class IEC/EN	III, Safety Extra-Low Voltage (SELV)
	Power source UL	Class 2 Supply
	Degree of protection IEC/EN	IP65
	Degree of protection NEMA/UL	NEMA 4X
	Enclosure	UL Enclosure Type 4X
	EU Conformity	CE Marking
	Certification IEC/EN	IEC/EN 60730-1
	Quality Standard	ISO 9001
	UL 2043 Compliant	Suitable for use in air plenums per Section 300.22(C) of the NEC and Section 602 of the IMC
	Type of action	Type 1
	Rated impulse voltage supply	0.8 kV
	Pollution degree	3
	Ambient humidity	Max. 95% RH, non-condensing
	Ambient temperature	-35...50°C [-30...122°F]
	Fluid humidity	short-term condensation permitted
	Fluid temperature	-40...175°F [-40...80°C]
	Operating condition airflow	max. 40 ft/s [12 m/s]

Safety Notes

This device has been designed for use in stationary heating, ventilation and air-conditioning systems and must not be used outside the specified field of application. Unauthorized modifications are prohibited. The product must not be used in relation with any equipment that in case of a failure may threaten humans, animals or assets.

Ensure all power is disconnected before installing. Do not connect to live/operating equipment.

Only authorized specialists may carry out installation. All applicable legal or institutional installation regulations must be complied with during installation.

The device contains electrical and electronic components and must not be disposed of as household refuse. All locally valid regulations and requirements must be observed.

Remarks

General Remarks Concerning Sensors

Sensing devices with a transducer should always be operated in the middle of the measuring range to avoid deviations at the measuring end points. The ambient temperature of transducer electronics should be kept constant. The transducers must be operated at a constant supply voltage (±0.2 V). When switching the supply voltage on/off, onsite power surges must be avoided.

Remark: Occurring draft leads to a better carrying-off of dissipative power at the sensor. Thus temporally limited fluctuations might occur upon temperature measurement.

Build-up of self-heating by electrical dissipative power

Temperature sensors with electronic components always have a dissipative power which affects the temperature measurement of the ambient air. The dissipation in active temperature sensors shows a linear increase with rising operating voltage. The dissipative power should be taken into account when measuring temperature.

In case of a fixed operating voltage (±0.2 V), this is normally done by adding or reducing a constant offset value. As Belimo transducers work with a variable operating voltage, for reasons of production engineering only one operating voltage can be taken into consideration. Transducers 0...10 V / 4...20 mA have a standard setting at an operating voltage of DC 24 V. This means that at this voltage, the expected measuring error of the output signal will be the least. For other operating voltages, the offset error will be increased by a changing power loss of the sensor electronics.

If a readjustment directly at the active sensor should be necessary during later operation, this can be done with the following adjustment methods.

- For sensors with NFC or dongle with the corresponding Belimo app
- For sensors with a trimming potentiometer on the sensor board
- For bus sensors via bus interface with a corresponding software variable

Application notice for humidity sensors

The humidity sensor is extremely sensitive. Touching the sensor element or exposing it to aggressive substances like chlorine, ozone, ammonia, hydrogen peroxide or ethanol (i.e. as a cleaning agent) may affect the measurement accuracy.

Long term operation outside the recommended conditions (5...60°C and 20...80% RH) can result in a temporary offset. After returning into the recommended range, this effect disappears.

Parts included

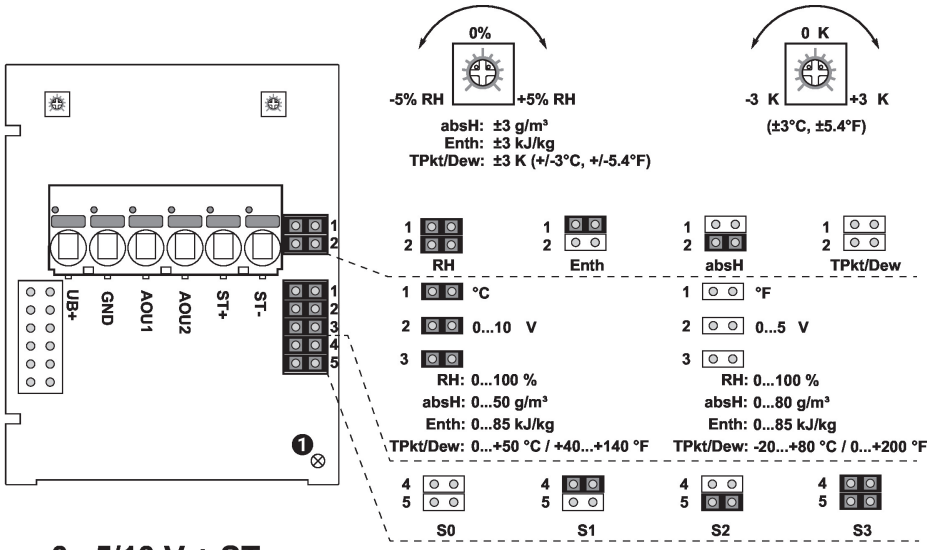
Description	Type
Mounting flange for duct sensor 19.5 mm, up to max. 120°C [248°F], Plastic	A-22D-A34
1/2" NPT conduit adapter	

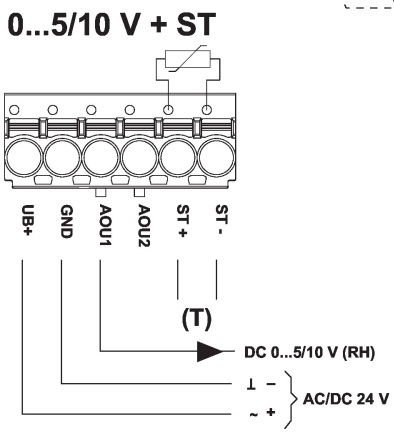
Accessories

Optional accessories

Description	Type
Replacement filter sensor probe tip, wire mesh, Stainless steel	A-22D-A06

Wiring Diagram

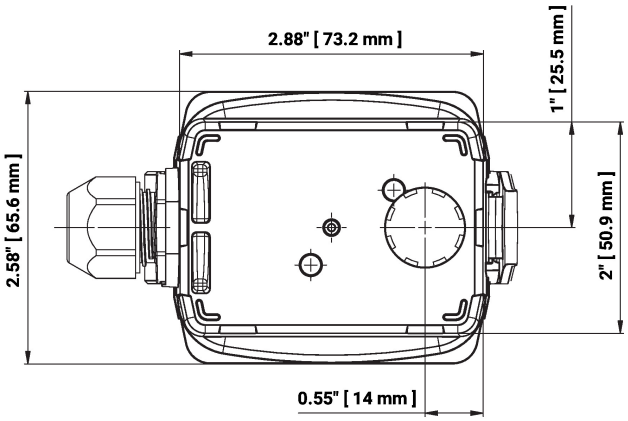


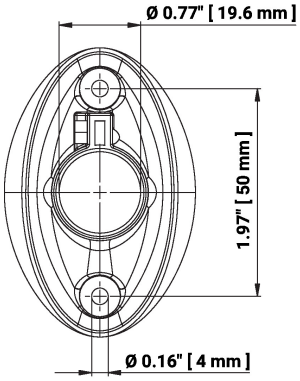


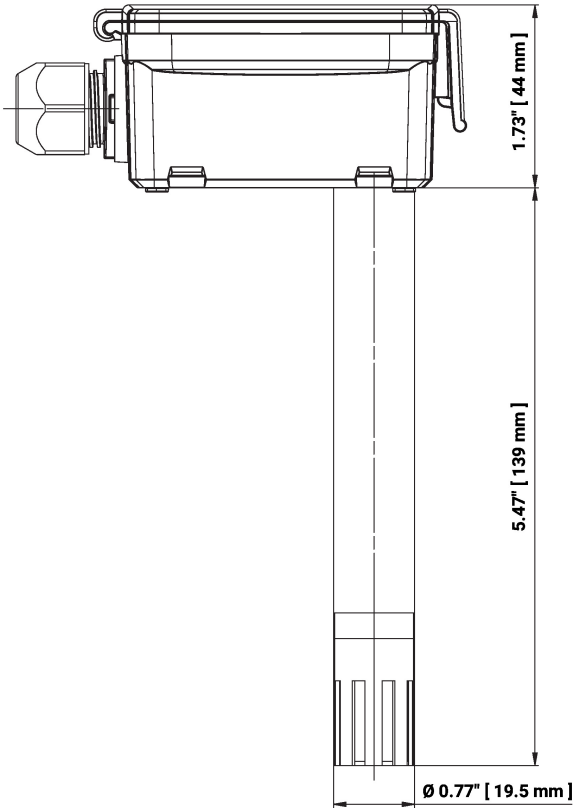
① Status LED
RHRelative humidity
absHAbsolute humidity
EntHEnthalpy
TPkt/DewDew point
(Measurement value available on Output AOU1)

Connectors ST+ / ST- are only used for sensor types which additionally have a passive resistance sensor element for temperature measurement.
The adjustment of the measuring ranges is made by changing the bonding jumpers.
The output value in the new measuring range is available after 2 seconds.

Dimensions







Type	Probe length	Weight
22DTH-51MB	5.5" [140 mm]	0.31 lb [0.14 kg]
22DTH-51ME	5.5" [140 mm]	0.31 lb [0.14 kg]
22DTH-51ML	5.5" [140 mm]	0.31 lb [0.14 kg]
22DTH-51MM	5.5" [140 mm]	0.31 lb [0.14 kg]
22DTH-51MQ	5.5" [140 mm]	0.31 lb [0.14 kg]

Further documentation

- Installation instructions
- Resistance characteristics

Differential pressure sensor Water

Active sensor (4...20 mA / 0...5 V / 0...10 V) for differential pressure measurement in HVAC systems. The sensor is suitable for water and water-glycol mixtures. IP65/NEMA 4X rated enclosure and with LCD display.

5-year warranty

Type Overview

Type	Measuring range [psi] [psi]	Output signal active pressure	Overpressure	Overpressure note	Burst pressure
22PDP-585	0...100	4...20 mA, 0...5 V, 0...10 V	200 psi	Single-sided	2000 psi
22PDP-588	0...250	4...20 mA, 0...5 V, 0...10 V	500 psi	Single-sided	5000 psi

Technical data

Electrical Data	Nominal voltage	AC/DC 24 V
	Nominal voltage range	AC 21.6...26.4 V / DC 21.6...26.4 V
	Power consumption AC	3.1 VA
	Power consumption DC	1.4 W
	Electrical connection	Pluggable spring-loaded terminal block max. 2.5 mm²
	Cable entry	Cable gland with strain relief ø6...8 mm
Functional Data	Application	water Water-glycol mixture
	Multirange	4 measuring ranges selectable
	Voltage output	1 x 0...5 V, 0...10 V, min. resistance 10 kΩ
	Current output	1x 4...20 mA, max. resistance 500 Ω
	Output signal active note	0...5/10 V or 4...20 mA output, selectable with switch
	Mechanical connection	pressure connector: 1/4" NPT
	Display	LCD, 16 x 38 mm
	Typical response time	<0.5 s
Measuring Data	Measured values	Differential pressure
Specification pressure	Measuring range pressure settings	Type Range1 [psi] Range2 [psi] Range3 [psi] Range4 [psi] ..-585 0...100 0...10 0...20 0...50 ..-588 0...250 0...25 0...50 0...125 Factory setting: Range1

Technical data

Specification pressure	Accuracy	Range1: ±1.0% FS Range2: ±0.5% FS Range3: ±0.4% FS Range4: ±0.4% FS ...@ 22°C [72°F] ±0.03% FS / K for each pressure transmitter FS = full scale (FS always references the maximum sensor measuring range, independent of the selected measuring range)
	Long term stability	±0.25% FS p.a. and per pressure transmitter
Safety Data	Protection class IEC/EN	III, Safety Extra-Low Voltage (SELV)
	Degree of protection IEC/EN	IP65
	Degree of protection NEMA/UL	NEMA 4X
	Enclosure	UL Enclosure Type 4X
	EU Conformity	CE Marking
	Certification IEC/EN	IEC/EN 60730-1 and IEC/EN 60730-2-6
	Quality Standard	ISO 9001
	UL Approval	cULus acc. to UL60730-1/-2-6, CAN/CSA E60730-1/-2
	Type of action	Type 1
	Rated impulse voltage supply	0.8 kV
	Pollution degree	4
	Ambient humidity	Max. 95% RH, non-condensing
	Ambient temperature	0...50°C [32...122°F]
	Fluid temperature	-40...220°F [-40...105°C] Frost protection must be guaranteed at fluid temperatures <2 °C [<36°F]
	Storage temperature	-40...140°F [-40...60°C]
Materials	Cable gland	PA6, black
	Housing	Cover: PC, transparent Bottom: PC, orange Cable: PVC, grey Seal: NBR
	Fluid wetted parts	Stainless steel 17-4 PH

Safety Notes

This device has been designed for use in stationary heating, ventilation and air-conditioning systems and must not be used outside the specified field of application. Unauthorized modifications are prohibited. The product must not be used in relation with any equipment that in case of a failure may threaten humans, animals or assets.

Ensure all power is disconnected before installing. Do not connect to live/operating equipment.

Only authorized specialists may carry out installation. All applicable legal or institutional installation regulations must be complied with during installation.

The device contains electrical and electronic components and must not be disposed of as household refuse. All locally valid regulations and requirements must be observed.

Remarks

Manual zero-point calibration

In normal operation zero-point calibration should be executed every 12 months.

A sensor zeroing can be initiated by pressing and holding the internal ZERO switch for at least 3 seconds. If both pressure ports are close to zero pressure, the device will calibrate with a new zero point. The zeroing can also be initiated by pressing the optionally connected remote switch, and thus by holding the ZERO terminal low for 3 seconds.

Please make sure on the system side that the same pressure conditions exist at both remote sensors as precondition of a correct zeroing.

Indicators and Operation

Indicators

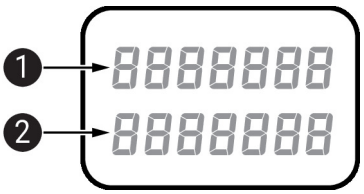
The display has 2 lines with 8 characters each.

The software version, model pressure range and output signal type are displayed during booting.

The display is menu-guided and used for programming during installation as well as for display of pressure read from sensors.

The menu allows to set parameters such as output signal, pressure range, pressure scale, pressure port, damping and backlight.

For a convenient reading of the display, an upright wall mounting of the sensor housing with the display at the top, electrical connections on the right and at the bottom is recommended.



1 Start and programming

Line 1: Parameter
Line 2: Value

2 Operation

Line 1: Differential pressure value
Line 2: Differential pressure unit

Parts included

Description	Type
Mounting plate L housing	A-22D-A10
Cable Gland with strain relief ø6...8 mm	
Dowels	
Screws	

Accessories

Optional accessories

Description	Type
3-valve manifold with bracket, for installing and isolating pipe differential sensors	EXT-GS-3WM
Reduction adapter, G 1/4" (internal thread) to G 1/2" (external thread)	A-22WP-A02
Connection adapter flex conduit, M20x1.5, for cable gland 1x 6 mm, Multipack 10 pcs.	A-22G-A01.1

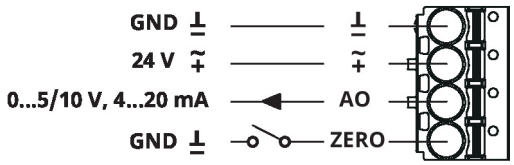
Wiring Diagram

Notes

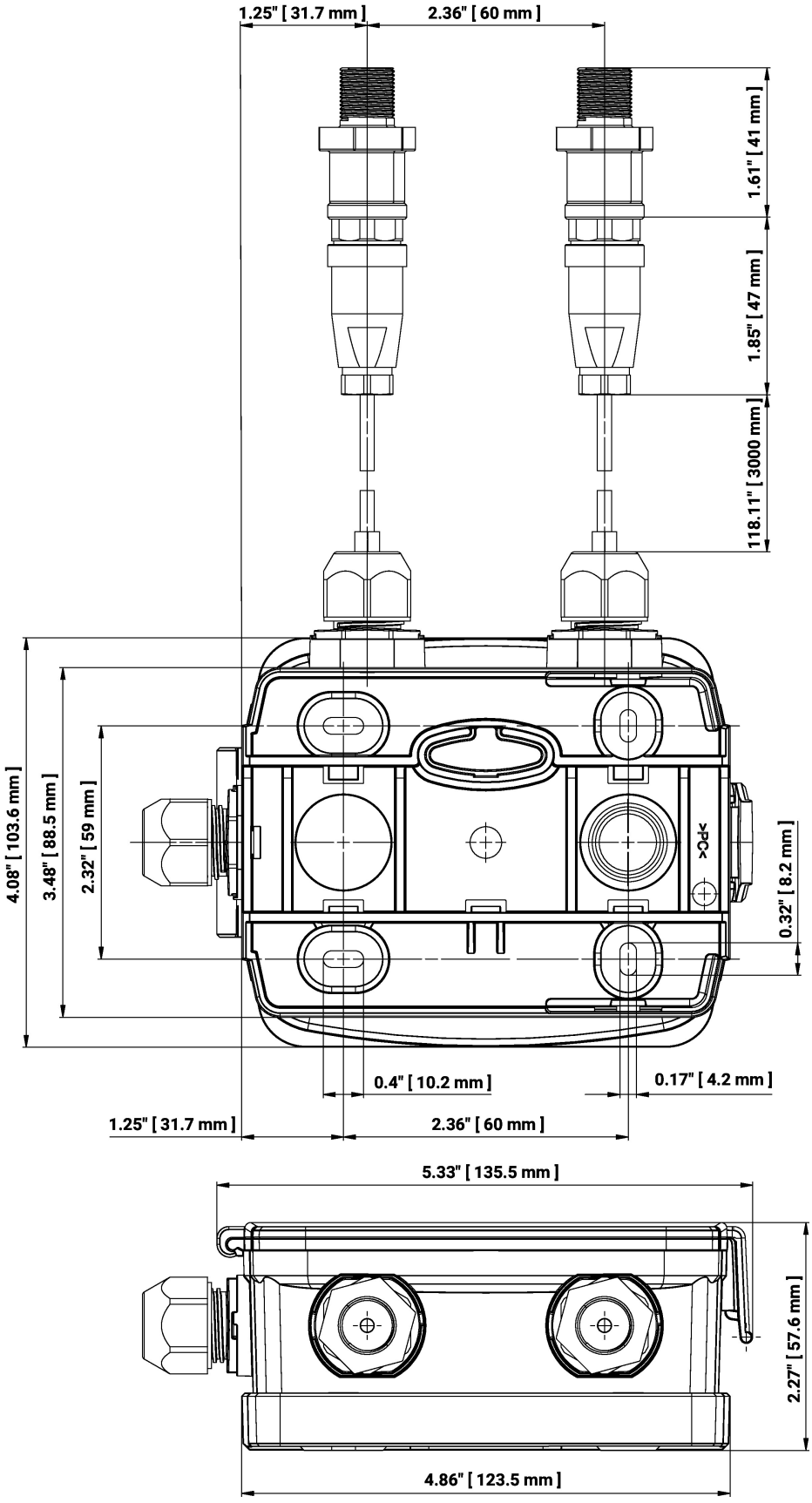
The external switch at terminal ZERO is optional. It can be used in case remote zeroing is required. Otherwise, ZERO terminal can be left open. Zeroing can be initialized by pressing the internal ZERO key in this case.

See also details under chapter manual zero-point calibration.

Wiring Diagram



Dimensions


1.25" [31.7 mm]
2.36" [60 mm]
1.61" [41 mm]
1.85" [47 mm]
118.11" [3000 mm]
4.08" [103.6 mm]
3.48" [88.5 mm]
2.32" [59 mm]
0.32" [8.2 mm]
0.4" [10.2 mm]
0.17" [4.2 mm]
1.25" [31.7 mm]
2.36" [60 mm]
5.33" [135.5 mm]
2.27" [57.6 mm]
4.86" [123.5 mm]

Further documentation

- Installation instructions
- Operating instructions

Outdoor sensor with weather shield
Humidity / Temperature

For measuring the relative or absolute humidity and temperature in outdoor areas. Instead of the humidity signal, the enthalpy or the dewpoint can be selected as an output signal. NEMA 4X / IP65 rated enclosure.

5-year warranty

Type Overview

Type	Output signal active humidity	Output signal passive temperature
22UTH-510B	0...5 V, 0...10 V	Pt1000
22UTH-510E	0...5 V, 0...10 V	Ni1000 (JCI)
22UTH-510L	0...5 V, 0...10 V	NTC10k (10k2)
22UTH-510M	0...5 V, 0...10 V	NTC10k3 (Precon)
22UTH-510Q	0...5 V, 0...10 V	NTC20k

Technical data

Electrical Data	Nominal voltage	AC/DC 24 V
	Remark about nominal voltage range	AC 21.6...26.4 V / DC 13.5...26.4 V
	Power consumption AC	0.8 VA
	Power consumption DC	0.4 W
	Electrical connection	Pluggable spring loaded terminal block max. 2.5 mm²
	Cable entry	Cable gland with strain relief ø6...8 mm (1/2" NPT conduit adapter included)
Functional Data	Sensor technology	polymer capacitive sensor with stainless steel wire mesh
	Application	air
	Voltage output	1 x 0...5 V, 0...10 V, min. resistance 10 kΩ
	Output signal active note	output 0...5/10 V with jumper adjustable
	Output signal passive temperature	Pt1000 Ni1000 (JCI) NTC10k (10k2) NTC10k3 (Precon) NTC20k
Measuring Data	Measured values	relative humidity Absolute humidity Dew point Enthalpies Temperature
Specification Temperature	Measuring range	-30...120°F [-35...50°C] (Passive sensor)
	Accuracy temperature passive	Passive sensors depending on used type Pt.. : ±0.5°F @ 32°F [±0.3°C @ 0°C] Ni.. : ±0.7°F @ 32°F [±0.4°C @ 0°C] NTC.. : ±0.35°F @ 77°F [±0.2°C @ 25°C]

Technical data

Specification Temperature	Time constant τ (63%) in the air duct	Typical 396 s
Specification Humidity	Measuring range	0...100% RH non-condensing
	Measuring range absolute humidity	adjustable at the transducer: 0...50 g/m³ (default setting) 0...80 g/m³
	Measuring range enthalpy	0...85 kJ/kg
	Measuring range dew point	adjustable at the transducer: 40...140°F [0...50°C] (default setting) 0...200°F [-20...80°C]
	Accuracy	±2% between 0...80% RH @ 77°F [25°C]
	Long term stability	±0.3% RH p.a. @ 70°F [21°C] @ 50% RH
	Time constant τ (63%) in the air duct	Typical 16 s @ 0 m/s
Materials	Cable gland	PA6, black
	Housing	Cover: PC, orange Bottom: PC, orange Seal: NBR70, black UV resistant UL94 5VA
Safety Data	Protection class IEC/EN	III, Safety Extra-Low Voltage (SELV)
	Power source UL	Class 2 Supply
	Degree of protection IEC/EN	IP65
	Degree of protection NEMA/UL	NEMA 4X
	Enclosure	UL Enclosure Type 4X
	EU Conformity	CE Marking
	Certification IEC/EN	IEC/EN 60730-1
	Quality Standard	ISO 9001
	UL 2043 Compliant	Suitable for use in air plenums per Section 300.22(C) of the NEC and Section 602 of the IMC
	Type of action	Type 1
	Rated impulse voltage supply	0.8 kV
	Pollution degree	3
	Ambient humidity	short-term condensation permitted
	Ambient temperature	-35...50°C [-30...122°F]
	Fluid humidity	short-term condensation permitted
	Fluid temperature	-35...50°C [-30...122°F]

Safety Notes

This device has been designed for use in stationary heating, ventilation and air-conditioning systems and must not be used outside the specified field of application. Unauthorized modifications are prohibited. The product must not be used in relation with any equipment that in case of a failure may threaten humans, animals or assets.

Ensure all power is disconnected before installing. Do not connect to live/operating equipment.

Only authorized specialists may carry out installation. All applicable legal or institutional installation regulations must be complied with during installation.

The device contains electrical and electronic components and must not be disposed of as household refuse. All locally valid regulations and requirements must be observed.

Remarks

General Remarks Concerning Sensors

When using lengthy connection wires (depending on the cross section used) the measuring result might be falsified due to a voltage drop at the common GND-wire (caused by the voltage current and the line resistance). In this case, 2 GND-wires must be wired to the sensor - one for supply voltage and one for the measuring current.

Sensing devices with a transducer should always be operated in the middle of the measuring range to avoid deviations at the measuring end points. The ambient temperature of transducer electronics should be kept constant. The transducers must be operated at a constant supply voltage (±0.2 V). When switching the supply voltage on/off, onsite power surges must be avoided.

Remark: Occurring draft leads to a better carrying-off of dissipative power at the sensor. Thus temporally limited fluctuations might occur upon temperature measurement.

Build-up of self-heating by electrical dissipative power

Temperature sensors with electronic components always have a dissipative power which affects the temperature measurement of the ambient air. The dissipation in active temperature sensors shows a linear increase with rising operating voltage. The dissipative power should be taken into account when measuring temperature.

In case of a fixed operating voltage (±0.2 V), this is normally done by adding or reducing a constant offset value. As Belimo transducers work with a variable operating voltage, for reasons of production engineering only one operating voltage can be taken into consideration. Transducers 0...10 V / 4...20 mA have a standard setting at an operating voltage of DC 24 V. This means that at this voltage, the expected measuring error of the output signal will be the least. For other operating voltages, the offset error will be increased by a changing power loss of the sensor electronics.

If a readjustment directly at the active sensor should be necessary during later operation, this can be done with the following adjustment methods.

- For sensors with NFC or dongle with the corresponding Belimo app
- For sensors with a trimming potentiometer on the sensor board
- For bus sensors via bus interface with a corresponding software variable

Application notice for humidity sensors

The humidity sensor is extremely sensitive. Touching the sensor element or exposing it to aggressive substances like chlorine, ozone, ammonia, hydrogen peroxide or ethanol (i.e. as a cleaning agent) may affect the measurement accuracy.

Long term operation outside the recommended conditions (5...60°C and 20...80% RH) can result in a temporary offset. After returning into the recommended range, this effect disappears.

Parts included

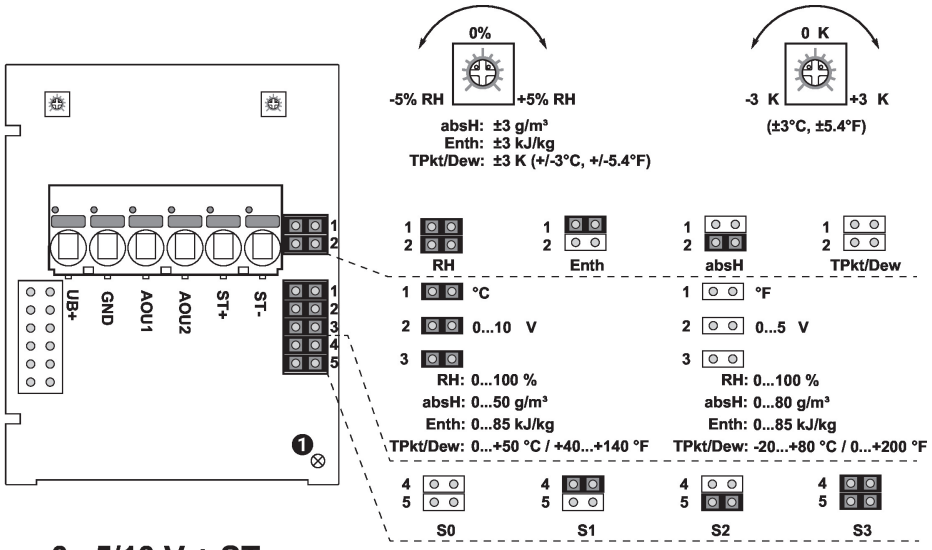
Description	Type
Mounting plate L housing	A-22D-A10
Rain cover, for 22UTH-..	A-22U-A01
Dowels	
Screws	
1/2" NPT conduit adapter	

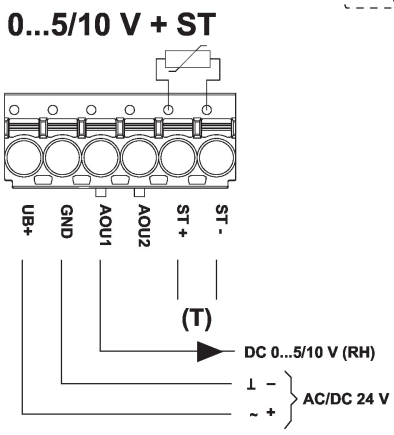
Accessories

Optional accessories

Description	Type
Replacement filter sensor probe tip, wire mesh, Stainless steel	A-22D-A06

Wiring Diagram

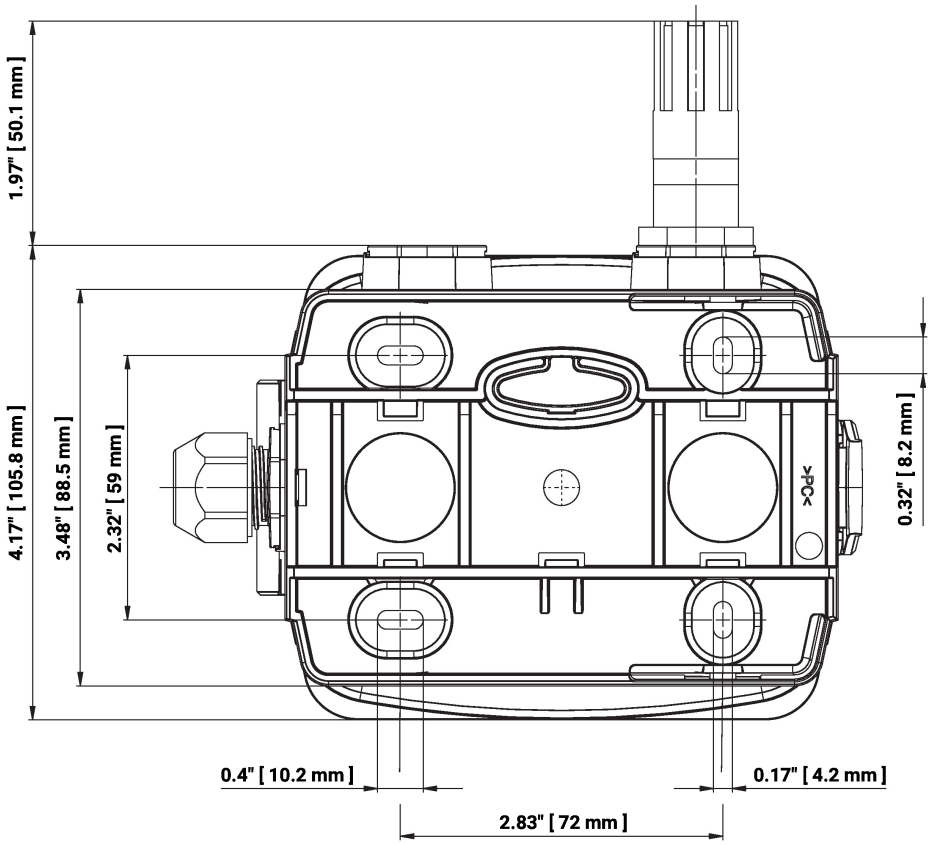


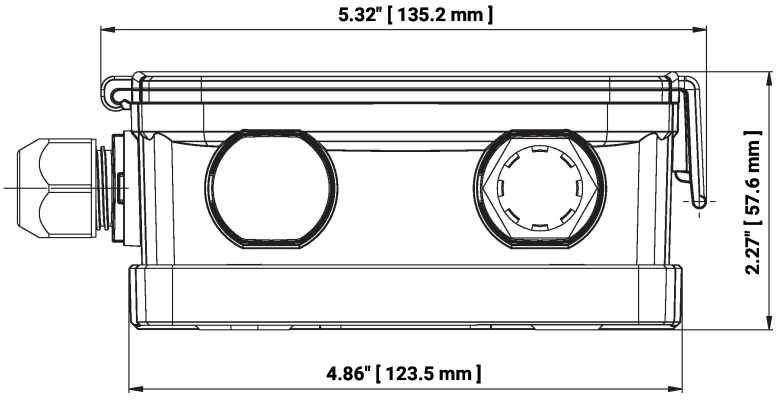


① Status LED
RHRelative humidity
absHAbsolute humidity
EntHEnthalpy
TPkt/DewDew point
(Measurement value available on Output AOU1)

Connectors ST+ / ST- are only used for sensor types which additionally have a passive resistance sensor element for temperature measurement.
The adjustment of the measuring ranges is made by changing the bonding jumpers.
The output value in the new measuring range is available after 2 seconds.

Dimensions





Type	Weight
22UTH-510B	0.62 lb [0.28 kg]
22UTH-510E	0.62 lb [0.28 kg]
22UTH-510L	0.62 lb [0.28 kg]
22UTH-510M	0.62 lb [0.28 kg]
22UTH-510Q	0.62 lb [0.28 kg]

Further documentation

- Installation instructions
- Resistance characteristics

BELIMO

Resilient Seat, 304 Stainless Steel Disc

Butterfly Valve with Lug types
- Disc 304 stainless steel
- Bubble tight shut-off
- Resilient seat
- Valve face-to-face dimensions comply with API 609 & MSS-SP-67
- Completely assembled and tested, ready for installation

Technical data sheet F780HD

5-year warranty

Type overview

Type	DN
F780HD	80

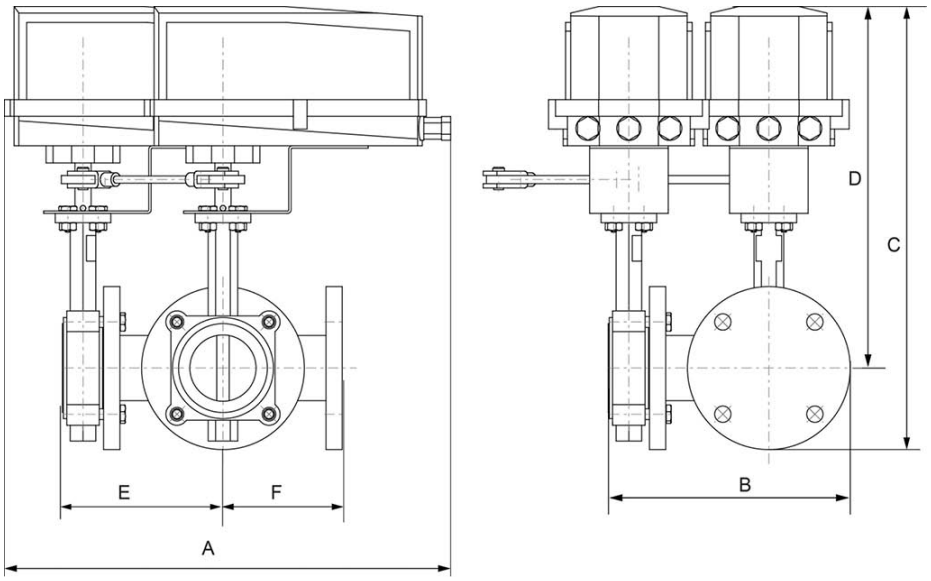
Technical data

Functional data	Valve size [mm]	3" [80]
	Fluid	chilled or hot water, up to 60% glycol
	Fluid Temp Range (water)	-22...250°F [-30...120°C]
	Body Pressure Rating	ANSI Class Consistent with 125, 232 psi CWP
	Close-off pressure Δps	200 psi
	Flow characteristic	modified linear
	Servicing	maintenance-free
	Flow Pattern	3-way Mixing/Diverting
	Leakage rate	0%
	Controllable flow range	90° rotation
	Cv	302
	Maximum Velocity	12 FPS
	Lug threads	5/8-11 UNC
Materials	Valve body	Ductile cast iron ASTM A536
	Body finish	epoxy powder coating (blue RAL 5002)
	Stem	416 stainless steel
	Seat	EPDM
	Pipe connection	for use with ANSI class 125/150 flanges
	Bearing	RPTFE
	Disc	304 stainless steel
	Gear operator materials	Gears - hardened steel
Suitable actuators	Non-Spring	(2*GMB(X))
	Electrical fail-safe	(2*GKB(X))

Dimensions

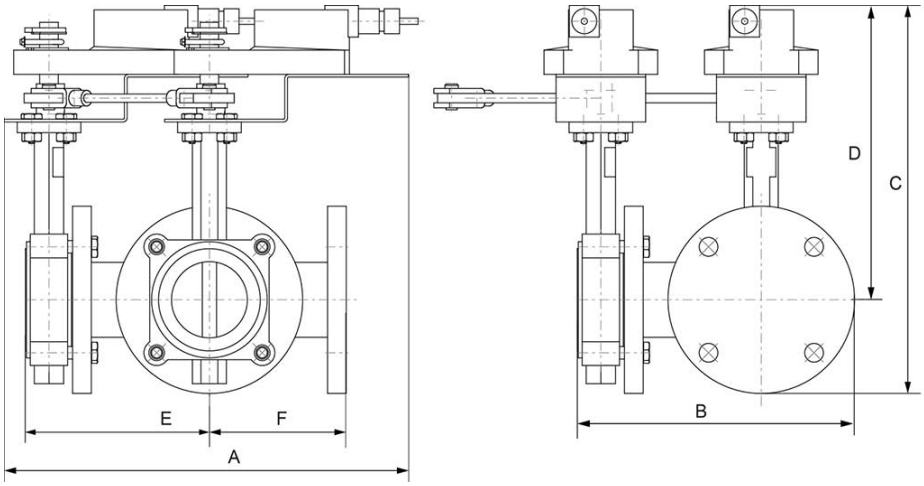
Type	DN	Weight
F780HD	80	51 lb [23 kg]

Valve with 2*GM...N4 Actuator



A	B	C	D	E	F	Number of Bolt Holes
20.6" [522]	11.2" [284]	20.5" [521]	16.7" [425]	7.4" [187]	5.5" [140]	4

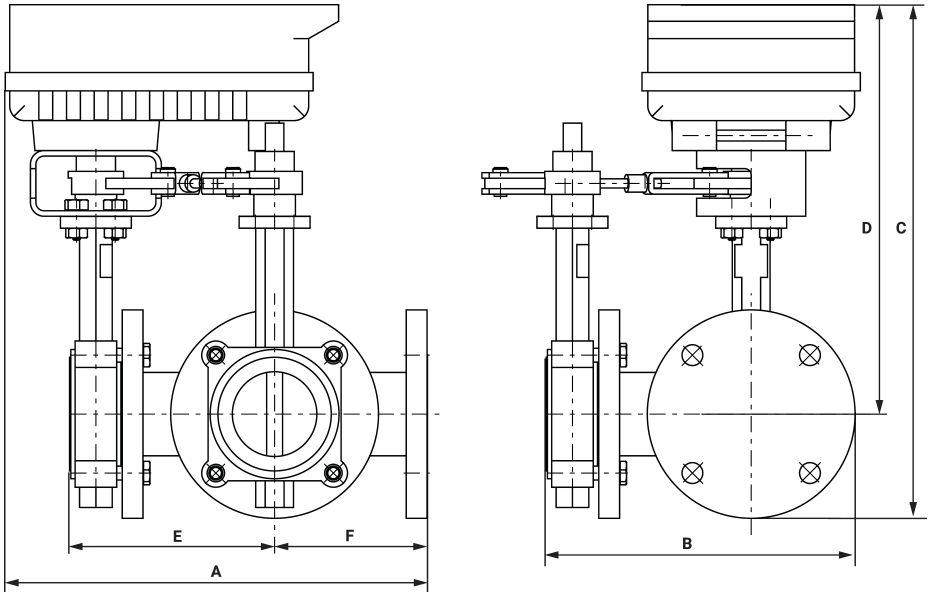
Valve with 2*GM Actuator



A	B	C	D	E	F	Number of Bolt Holes
15.5" [394]	11.2" [284]	15.5" [393]	11.8" [300]	7.4" [187]	5.5" [140]	4

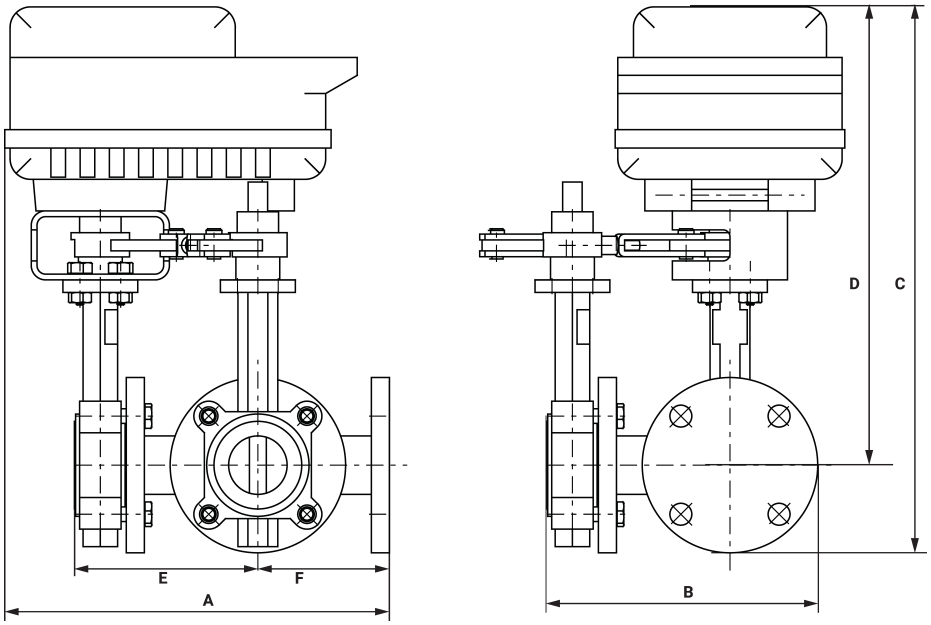
A	B	C	D	E	F	Number of Bolt Holes
17.3" [440]	11.2" [284]	16.8" [426]	13.1" [334]	7.4" [187]	5.5" [140]	4

Valve with PR Actuator



A	B	C	D	E	F	Number of Bolt Holes
15.3" [388]	11.3" [286]	18.5" [470]	14.7" [374]	7.4" [187]	5.5" [140]	4

Valve with PK Actuator



A	B	C	D	E	F	Number of Bolt Holes
15.3" [388]	11.3" [286]	20.3" [515]	16.5" [419]	7.4" [187]	5.5" [140]	4

BELIMO

NEMA 4, On/Off, Floating Point Control, Non-Spring Return Actuator, Direct Coupled, AC 24 V

Technical data sheet 2*GMCX24-3-T-X1 N4

2-year warranty

Technical data

Electrical data	Nominal voltage	AC/DC 24 V
	Nominal voltage frequency	50/60 Hz
	Power consumption in operation	8 W
	Power consumption in rest position	2.5 W
	Transformer sizing	22 VA (class 2 power source)
	Electrical Connection	Terminal blocks
	Overload Protection	electronic throughout 0...95° rotation
Functional data	Direction of motion motor	selectable with switch 0/1
	Manual override	external push button
	Angle of rotation	Max. 95°
	Angle of rotation note	adjustable with mechanical stop
	Running Time (Motor)	35 s / 90°
	Running time motor note	constant, independent of load
	Noise level, motor	45 dB(A)
	Position indication	Mechanically, 5...20 mm stroke
Safety data	Degree of protection IEC/EN	IP66
	Degree of protection NEMA/UL	NEMA 4X
	Enclosure	UL Enclosure Type 4X
	Agency Listing	cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2014/30/EU and 2014/35/EU
	Quality Standard	ISO 9001
	Ambient temperature	-22...122°F [-30...50°C]
	Ambient temperature note	-40...50°C for actuator with integrated heating
	Storage temperature	-40...176°F [-40...80°C]
	Ambient humidity	Max. 100% RH
	Servicing	maintenance-free
Materials	Housing material	Die cast aluminium and plastic casing

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

Accessories

Electrical accessories	Description	Type
	Battery backup system, for non-spring return models	NSV24 US
	Battery, 12 V, 1.2 Ah (two required)	NSV-BAT
	Auxiliary switch 1 x SPDT add-on	S1A
	Auxiliary switch 2 x SPDT add-on	S2A
	Feedback potentiometer 140 Ω add-on, grey	P140A GR
	Feedback potentiometer 1 kΩ add-on, grey	P1000A GR
	Feedback potentiometer 10 kΩ add-on, grey	P10000A GR
	Feedback potentiometer 2.8 kΩ add-on, grey	P2800A GR
	Feedback potentiometer 500 Ω add-on, grey	P500A GR
	Feedback potentiometer 5 kΩ add-on, grey	P5000A GR
Factory add-on option only	**Description**	**Type**
	Heater, with adjustable thermostat	N4 Heater Add-on 24V (-H)

Electrical installation

INSTALLATION NOTES

A Actuators with appliance cables are numbered.

1 Provide overload protection and disconnect as required.

3 Actuators may also be powered by DC 24 V.

6 Actuators Hot wire must be connected to the control board common. Only connect common to neg. (-) leg of control circuits. Terminal models (-T) have no-feedback.

10 For triac sink the Common connection from the actuator must be connected to the Hot connection of the controller. Position feedback cannot be used with a triac sink controller; the actuator internal common reference is not compatible.

11 Actuators may be connected in parallel if not mechanically linked. Power consumption and input impedance must be observed.

12 IN4004 or IN4007 diode. (IN4007 supplied, Belimo part number 40155).

16 Actuators are provided with a numbered screw terminal strip instead of a cable.

46 Actuators may be controlled in parallel. Current draw and input impedance must be observed.

47 Master-Slave wiring required for piggy-back applications. Feedback from Master to control input(s) of Slave(s).

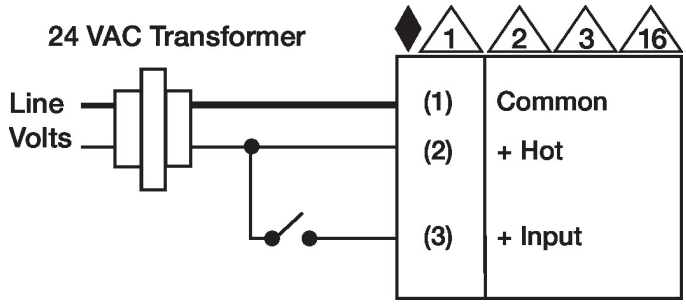
Meets cULus requirements without the need of an electrical ground connection.

Warning! Live electrical components!

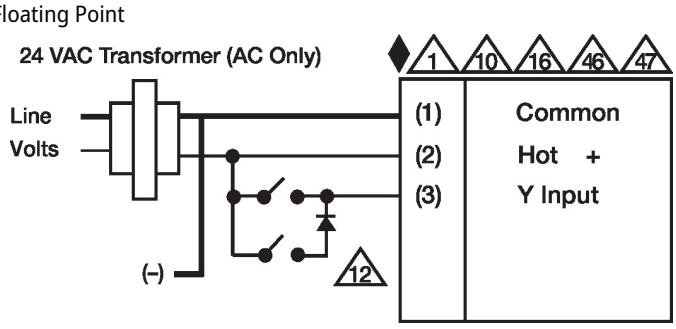
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow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

Wiring diagrams

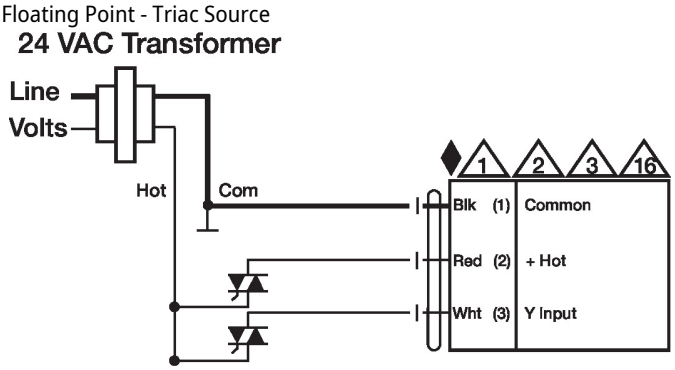
On/Off



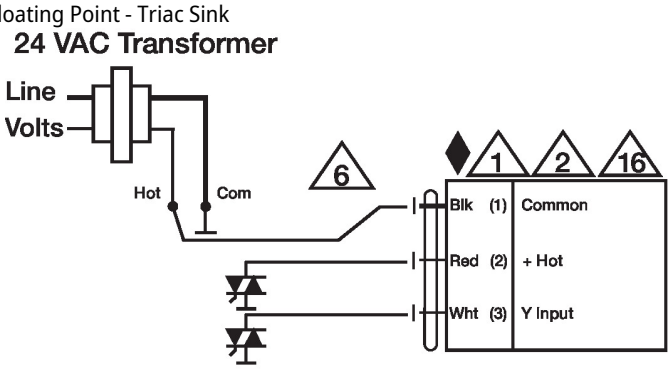
Floating Point



Floating Point - Triac Source



Floating Point - Triac Sink



FLOAT SWITCH
KCFS SERIES

DESCRIPTION

The **Kele KCFS Series** float switch provides a cost effective solution for applications such as condensate drip pan monitoring. The **KCFS-SC** features a spring clip and the **KCFS-LB** an L bracket for mounting.

FEATURES

- ***Simple installation***
- ***Low cost***
- ***SPDT contacts***

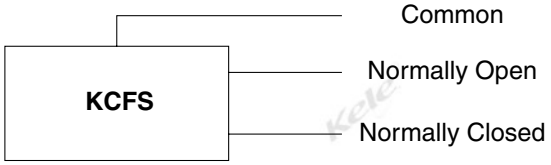
KCFS-SC

KCFS-LB

SPECIFICATIONS

Relay Tpe	SPDT	**Operating Temperature**	Maximum 150°F (70°C)
Relay Rating	5A @ 125 VAC 3A @ 250 VAC	**Dimensions**	3.5" (8.9 cm) clip to float
Mounting Orientation	Horizontal	**Weight**	0.2 lb (0.1 Kg)
Wiring Terminations	6" (15 cm) leads 18 AWG	**Warranty**	1 year

WIRING



ORDERING INFORMATION

MODEL	DESCRIPTION
KCFS-LB	Float switch with L bracket mount
KCFS-SC	Float switch with spring clip mount

MULTI-LEVEL SWITCH
MLS SERIES

DESCRIPTION

The **Solutions with Innovation MLS Series** multi-level switch can be customized to meet application requirements. The unit can be configured with up to four independent switch points and stem lengths up to 48" (122 cm). The **MLS Series** is mounted vertically and shipped in the normally open position. For normally closed operation, simply invert the float.

FEATURES

- ***Up to four independent switch points***
- ***50 VA SPST switch operation (120-240 VAC)***
- ***Easy installation***
- ***Hermetically sealed***

MLS

SPECIFICATIONS

Relay Type	SPST	**Mounting Orientation**	Vertical (± 30°)
Relay Rating	50 VA @ 120 VAC	**Process Connection**	1/2" NPT(M), 1" NPT(M)
Differential	1" to 1.75", ±1/8" (2.5 to 4.4,0.32 cm)	**Operating Temperature**	
Operating Pressure		**Stainless Steel**	-40° to 300°F (-40° to 149°C)
Stainless Steel	120 psig (8.3 bar)	**Buna-N**	-40° to 180°F (-40° to 82°C)
Buna-N	150 psig (10.3 bar)	**Wiring Terminations**	pigtails
Specific Gravity		**Dimensions**	Up to 48" L x 1.0" diameter
Stainless Steel	0.85	**Approvals**	UL File #E203716
Buna-N	0.65	**Warranty**	1 year
Wetted Materials	Brass stem, Buna-N float, 316 SS stem, Buna-N float, 316 SS stem, 316 SS float		

STE-1400 Series

Temperature Sensors

DESCRIPTION AND APPLICATION

STE-1400 Series, 10,000 ohm, Type III thermistor, temperature sensors are available for duct, immersion, strap-on, room, and outside air applications. See also **Models on page 2**. Applicable probes are constructed to provide good heat transfer and fast response.

The **STE-1430 room** sensor, designed for inconspicuous and tamper-resistant temperature measurement of occupied spaces, can be mounted on an interior hollow wall in a standard single-gang electrical box. The sensor is mounted to the back of a flat, brushed stainless-steel plate.

The **STE-1451 outside** air sensor is mounted in a gasketed weatherproof LB-style aluminum enclosure for protection against the outdoor elements. It comes with an c/w 1/2" NPT fitting for connection to conduit.

An **STE-1411/1412/1413/1414/1415/1416/1417 averaging duct** sensor incorporates numerous sensors and is available in a 5/16-inch OD bendable copper probe or in a flexible plenum-rated cable. The completed assembly acts as a single sensor and any temperature change is averaged across the sensor. The probes can flex to fit any size duct.

Each **STE-1401/1402/1404/1405 duct** sensor is encapsulated in a rigid 1/4-inch OD stainless-steel probe. The probe protrudes from the sensor housing (if included). The probe can be inserted directly into the duct for single-point monitoring, and mounting holes are provided to rigidly support the assembly.

An **STE-1423/1424 immersion/duct** sensor is encapsulated in a rigid 1/4-inch OD 304 stainless-steel probe. The probe protrudes from the sensor housing for insertion into an HMO-4545/4546 stainless-steel thermowell for immersion applications. (See **Accessories on page 3** for thermowells and thermal compound.) These sensors can also be used (without thermowells) as a rigid-probe duct sensors for small ducts.

The **STE-1455 strap-on** sensor is encapsulated in a two-inch-long, 1/4-inch OD stainless-steel probe. The probe has a five-foot lead wire. The **STE-1454** strap-on sensor also comes with an enclosure. A strap-on sensor is typically used if an immersion sensor is impractical.

FEATURES

- Type III 10,000 ohm thermistor encapsulated temperature sensors.
- Available in a number of models to accommodate various installation applications.
- Models are available with and without enclosures and with different length leads.

SPECIFICATIONS

Sensor	Type III thermistor, 10K ohm @ 77° F (25° C)
Accuracy	±0.36° F (±0.20° C)
Temperature Limits	See installation guides for the different models
Wiring	Wire leads pigtail or cable, dependent on model
Mfg. Process	ISO 9001 registered quality system
Approvals	CE and RoHS compliant

NOTE: These specifications are for models that started shipping May 2020. For specifications of earlier models, see Rev. Q of this document.

MODELS

MODEL	SENSOR TYPE	PROBE TYPE	PROBE LENGTH	ENCLOSURE	CONNECTIONS*
STE-1405	Duct, Rigid	1/4-inch OD stain-less-steel	4 inches (100 mm)	None (mounting bracket only)	10-ft. FT-6 plenum-rated, 22 AWG cable
STE-1401			8 inches (200 mm)		
STE-1402			8 inches (200 mm)	Plastic, UL94-V0, IP65 (NEMA 4X) ABS	PVC insulated, 22 AWG, wire leads
STE-1404			12 inches (300 mm)		
STE-1411	Duct, Averaging	Copper, bend-able	6 feet (1.8 m)		FT-6 plenum-rated, 22 AWG wire leads
STE-1412			12 feet (3.6 m)		
STE-1414			20 feet (6.1 m)		
STE-1413			24 feet (7.3 m)		
STE-1415		Flexible, FT-6 plenum-rated cable	6 feet (1.8 m)		
STE-1416			12 feet (3.6 m)		
STE-1417			24 feet (7.3 m)		
STE-1423	Immersion** or Rigid Duct	1/4-inch OD stain-less-steel (w/o well)	4 inches (100 mm)		PVC insulated, 22 AWG, wire leads
STE-1424			6 inches (150 mm		
STE-1454	Strap On	1/4-inch OD stain-less-steel	2 inches (50 mm)		5-ft. non-plenum-rated, PVC insulated, 22 AWG cable (between sensor and enclosure for STE-1454)
STE-1455				None	
STE-1430	Room	Sensor is behind a blank, flat, stainless steel plate for mounting on a (not supplied) single-gang electrical box			Wire leads
STE-1451	Outside Air	Inside an LB-type aluminum, IP65 (NEMA 4X), enclosure			

***NOTE**: All sensors have short leads except for those with five-foot or ten-foot cables.

****NOTE**: For immersion applications, the STE-1423 sensor requires an HMO-4545 thermowell, and the STE-1424 requires an HMO-4546. See **Accessories on page 3**.

ENCLOSURES

The STE-1401, STE-1405, and STE-1455 have no enclosures.

The STE-1430 sensor is behind a blank, flat, brushed stainless steel plate for mounting on a (not supplied) single gang electrical box. It has an IP50 (NEMA 1) rating after mounting.

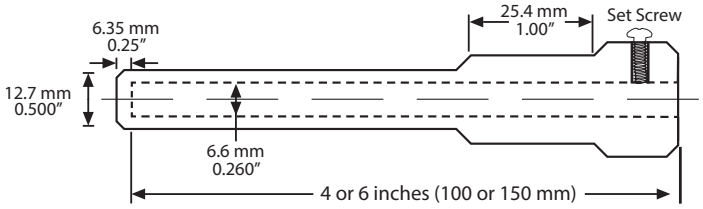
The STE-1451 outside air temperature sensor has an aluminum LB enclosure with an IP65 (NEMA 4X) rating.

All others have a UL94-V0, IP65 (NEMA 4X) ABS plastic utility box, with a hinged and gasketed cover.

ACCESSORIES

For the STE-1421 and STE-1422 **immersion sensors,** these thermowells and thermal compound are available:

HMO-4532	Thermal compound for thermowells, 1 oz.
HMO-4545	4" 304 stainless-steel well (for the STE-1423)
HMO-4546	6" 304 stainless-steel well (for the STE-1424)



NOTE: STE-1423/1424 sensor probe is secured inside the thermowell with a set screw. Using HMO-4532 thermal compound inside the well ensures optimal heat transfer.

NOTE: STE-1423/1424 immersions sensors replace older STE-1421/1422 sensors used with (threaded) HMO-4534/4544 thermowells. When replacing an STE-1421/1422 sensor with an STE-1423/1424, the thermowell also needs to be replaced with an HMO-4545/4546.

SUPPORT

Additional product and other resources are available on the web at **www.kmccontrols.com**.

KMC Controls, Inc.
19476 Industrial Drive
New Paris, IN 46553
574.831.5250
www.kmccontrols.com
info@kmccontrols.com

STE-9000 Series NetSensors

Digital Room Sensors

DESCRIPTION

KMC Conquest™ STE-9000 series NetSensors are wall-mounted digital space temperature sensors designed for use with KMC Conquest BAC-5900/9000/9300 series controllers. Key features include the following:

- Up to four sensors in a single package minimizes labor, wiring, and wall space, while optional humidity, motion, and CO_2 sensors allow expanded energy-efficient control of humidity, temperature setback, lighting, and ventilation.
- A user-friendly three-button integrated operator interface (on models with a display, i.e. **non**-NDL models) provides system and IAQ monitoring and adjusting for occupants.
- The upper (default) LCD display (on non-NDL models) shows room temperature and setpoints. A lower (default) display shows local time and can be enabled to show (dependent on sensors and controller configuration) % relative humidity, CO_2 ppm, and outside air temperature (°F or °C) in rotation. Both displays can be configured to show any controller default or calculated analog or binary values (such as airflow or energy consumption), and multiple values can show in rotation.
- It allows up to two separate passwords (on non-NDL models) for adjusting setpoints and configuring/commissioning/balancing.
- Up to 32 additional command points can be configured for user control and monitoring of a connected system (e.g., lighting, fan, or AHU control) from the display
- It connects to a controller via a modular jack connection using standard Ethernet patch cables.
- It installs permanently as a room sensor or (for models with a display) temporarily as a service tool; as a service tool, it commissions controllers without software, configures communication and application settings, and balances VAV air flow.

NDL (no display) models

MADE IN USA

KMC Conquest™ Automation Hardware

- An HPO-9001 NetSensor® distribution module allows up to eight STE-9000 series NetSensors to be linked to one controller or allows one STE-6010/6014/6017 analog temperature sensor to be connected with up to seven NetSensors.

APPLICATIONS

Temperature sensing to BAC-5900/9000/9300 series controllers for such applications as RTUs, HPUs, FCUs, AHUs, VAV terminal units, and unit ventilators.

Optional **humidity** sensing is for dehumidification and/or humidification sequences. Optional **motion** sensing (for models with a display) enhances occupancy-based control for lighting control, temperature setback, or self-learning schedules. Optional **CO_2** sensing enables demand-control ventilation (DCV) for optimizing ventilation and energy efficiency.

MODELS

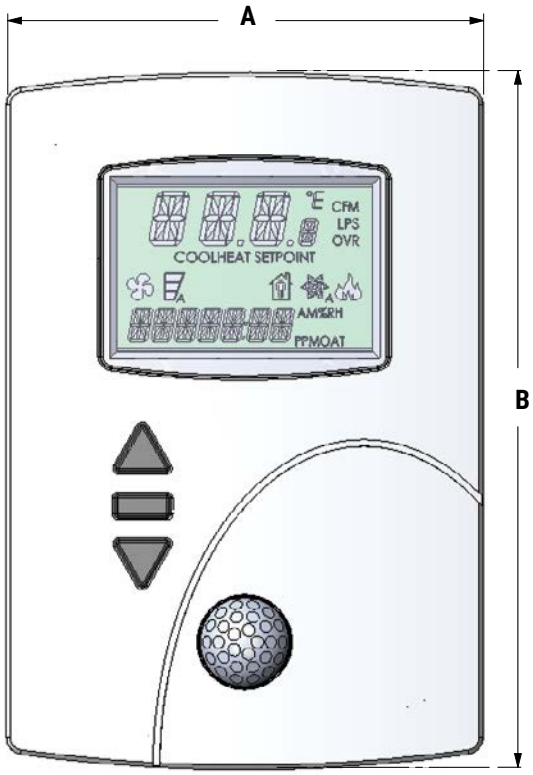
APPLICATIONS: TEMPERATURE CONTROL PLUS...	INTEGRATED SENSORS*					MODEL**
	Temp.	Humidity	Motion	CO_2	Display	
Temperature control only	✓				✓	STE-9001W
Temperature control only						STE-9001W-NDL
Humidity control for dehumidification/humidification		✓			✓	STE-9021W
Humidity control for dehumidification/humidification		✓				STE-9021W-NDL
Enhanced occupancy-based control (lighting/setback/self-learning)			✓		✓	STE-9201W
Humidity and occupancy control		✓	✓		✓	STE-9221W
DCV (Demand-Control Ventilation)				✓	✓	STE-9301W
DCV (Demand-Control Ventilation)				✓		STE-9301W-NDL
Humidity and ventilation control		✓		✓	✓	STE-9321W
Humidity and ventilation control		✓		✓		STE-9321W-NDL
Occupancy and ventilation control			✓	✓	✓	STE-9501W
Humidity, occupancy, and ventilation control		✓	✓	✓	✓	STE-9521W

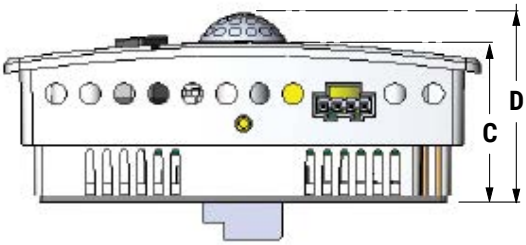
*All units have a temperature sensor (standard). See above for additional sensor options.

**A W at the end of the model number indicates a white case. To order the sensor with light almond color (for models with a display only) instead of white, drop the W on the end of the model number (e.g., STE-9001W is white and STE-9001 is light almond).

SPECIFICATIONS

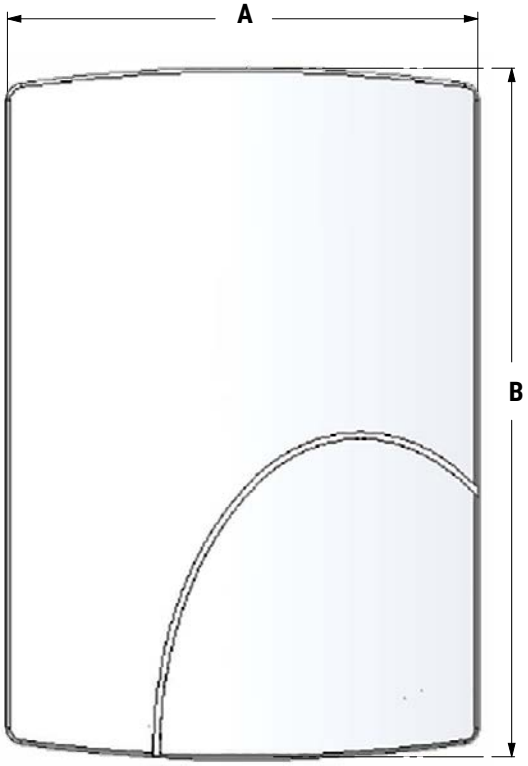
Models with a Display

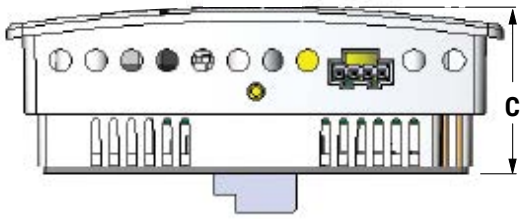




DIMENSIONS		
A	3.500 inches	89 mm
B	5.124 inches	130 mm
C	1.125 inches	29 mm
D	1.336 inches	34 mm

Models without a Display (NDL Models)





DIMENSIONS		
A	3.500 inches	89 mm
B	5.124 inches	130 mm
C	1.125 inches	29 mm

Sensors

Temperature Sensor (without humidity sensor)

Sensor type	Thermistor, 10K Type II
Accuracy	±0.36° F (±0.2° C)
Resistance	10,000 ohms at 77° F (25° C)
Operating range	48 to 96° F (8.8 to 35.5° C)

Temperature Sensor (with humidity sensor)

Sensor type	CMOS
Accuracy	±0.9° F (±0.5° C) offset from 40 to 104° F (4.4 to 40° C)
Operating range	36 to 120° F (2.2 to 48.8° C)

Humidity Sensor (optional)

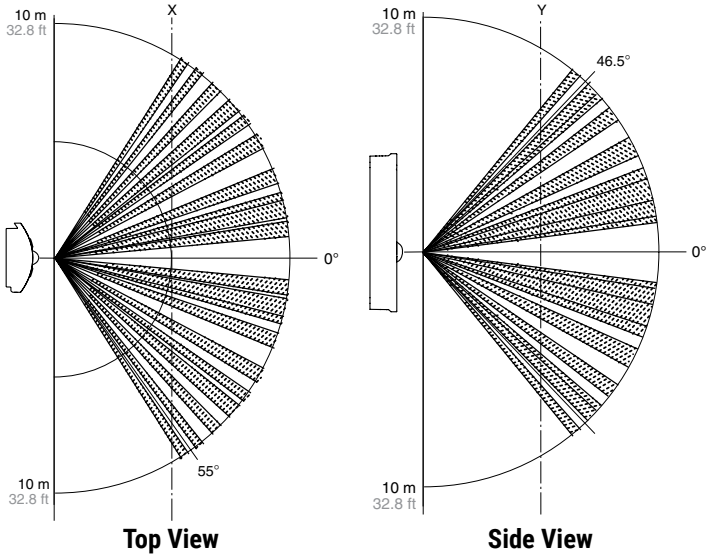
Sensor type	CMOS
Range	0 to 100% RH
Accuracy @ 25°C	±2% RH (10 to 90% RH)
Response time	Less than or equal to 4 seconds

CO_2 Sensor (optional)

Detector type	Non Dispersive Infrared (NDIR), with solid-state source and detector
Sample method	Diffusion
Rated life	15 years minimum
Operating limits	34° to 122° F (1.1 to 50° C)
Shipping limits	–22° to 140° F (–30°C to 60° C)
CO_2 range	0 to 2000 ppm, 0–1%
Accuracy	±50 ppm, ±3% of reading*
Non-linearity	< 1% of full scale
Calibration	Automatic calibration built-in*
Pressure dependence	0.13% of reading per mm Hg
Oper. pressure range	950 to 1050 bar
Warm-up time	10 seconds

***NOTE:** The CO_2 sensor uses a self-calibration technique designed to be used in applications where **CO_2 concentrations will periodically drop to outside ambient conditions** (approximately 400 ppm), typically during unoccupied periods. The sensor will typically reach its operational accuracy after 25 hours of continuous operation if it was exposed to ambient reference levels of air at 400 ±10 ppm CO_2. The sensor will maintain accuracy specifications if it is exposed to the reference value at least four times in 21 days.

Optional (for models with a display) Motion Sensing Coverage



Motion Sensor (optional for models with a display)

Detector type	Passive infrared
Range and Coverage	33 feet (10 meters)

Installation

Connections

Connector type	Eight-wire RJ-45 modular jack
Cable type	Standard T568B (Category 5 or better) Ethernet patch cable up to 150 feet (45 meters)
Power	Supplied by connected controller

Display (on non-NDL models)

Type	Multifunctional LCD with backlight
Size	1.88 x 1.25 inches (48 x 32 mm)
Icons	Language-independent symbols for mode and operating status
Features	Four-character upper display (with units of °F, °C, CFM, LPS, OVR, COOL, HEAT, and SETPOINT) for room temperature and setpoints (see the drawing under **Specifications on page 2**)
	Icons showing fan, speed, occupancy, heating, cooling, and auto
	Seven-character lower display (with units of AM, PM, PPM, %, RH, and OAT) for local time and optional analog or binary values

Enclosure and Mounting

Weight	2.8 ounces (80 grams)
Case material	Flame-retardant plastic
Mounting	Surface mount directly to any flat surface or to a 2 x 4 inch or 4 x 4 inch electrical box (mounting on a 4 x 4 box or a horizontal 2 x 4 box requires an HMO-10000/10000W mounting backplate)

Environmental Limits

Operating	34° to 125° F (1.1 to 51.6° C)*
Shipping	–40° to 140° F (–40°C to 60° C)*
Humidity	0 to 95% relative humidity non-condensing

***NOTE:** For models with the optional CO_2 sensor, see the reduced range in the operating and shipping limits in **CO_2 Sensor (optional) on page 3**.

Warranty, Protocol, and Approvals

Warranty

KMC Limited Warranty	5 years (from mfg. date code)

Controller Protocol Compatibility

BACnet	BAC-5900/9000/9300 series

Regulatory Approvals

UL	UL 916 Energy Management Equipment listed
CE	CE compliant
RoHS 2	RoHS 2 compliant
FCC	FCC Class A, Part 15, Subpart B and complies with Canadian ICES-003 Class A*

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

HPO-9001 DISTRIBUTION MODULE

The HPO-9001 NetSensor distribution module allows up to eight STE-9000 series NetSensors to be linked to one BAC-5900/9000/9300 series controller (see **Sample Installation on page 6**).

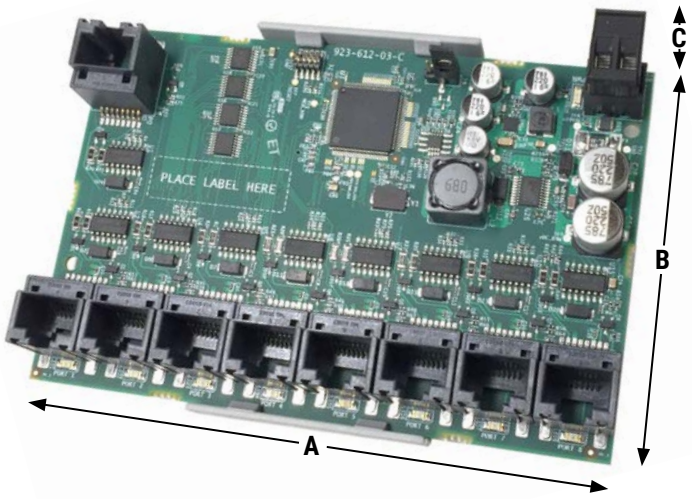
The module provides power (from a connected 24 VAC transformer) and addressing (according to the connected port) for each NetSensor. It also allows one STE-6010/6014/6017 analog temperature sensor to be connected to a controller along with up to seven NetSensors.

The module may be connected to a controller with an Ethernet patch cable up to 150 feet (45 meters) long. Cables from the module to any NetSensors may also be up to 150 feet (45 meters) long.

The module board is mounted via supplied Snap Track.

Using the HPO-9001 requires custom configuration of objects and custom Control Basic code. See the **HPO-9001 installation guide and sample programs** for more information. One sample application selects the average temperature, highest temperature, or lowest temperature among three NetSensors. Another sample application is for eight NetSensors in eight zones with eight individual (HW valves for baseboard) heating setpoints but a combined single setpoint for (RTU) cooling.

Installation



Dimensions		
A	5 inches	127 mm
B	3-1/2 inches	89 mm
C	1-3/8 inches	35 mm

MADE IN USA

RoHS COMPLIANT LEAD FREE

Connections

Connector type	Eight-wire RJ-45 modular jacks
Cable type	Standard (Category 5 or better) Ethernet patch cable up to 150 feet (45 meters)

Power

Supply voltage	24 VAC (–15%, +20%), 50/60 Hz, Class 2 only; non-supervised (all circuits, including supply voltage, are power limited circuits)
Required power	12 VA
Wire size	12–24 AWG, copper, in removable screw terminal block

Enclosure and Mounting

Weight	3.2 ounces (91 grams)
Mounting	Provided with 3.25 x 4 inch (83 x 102 mm) Snap Track
Enclosures	An **HCO-1034/1035/1036** or an **HCO-1101**

Environmental Limits

Operating	32 to 120° F (0 to 49° C)
Shipping	–40 to 160° F (–40 to 71° C)
Humidity	0 to 95% relative humidity (non-condensing)

Warranty, Protocol, and Approvals

Warranty

KMC Limited Warranty	5 years (from mfg. date code)

Controller Compatibility

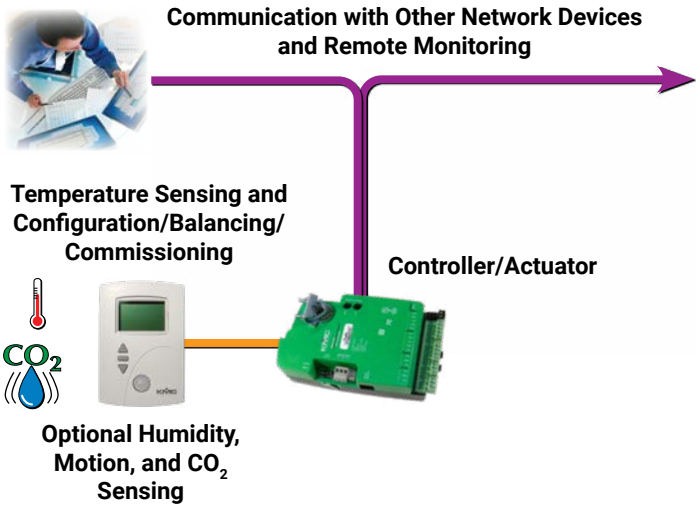
KMC Conquest	BAC-5900/9000/9300 series

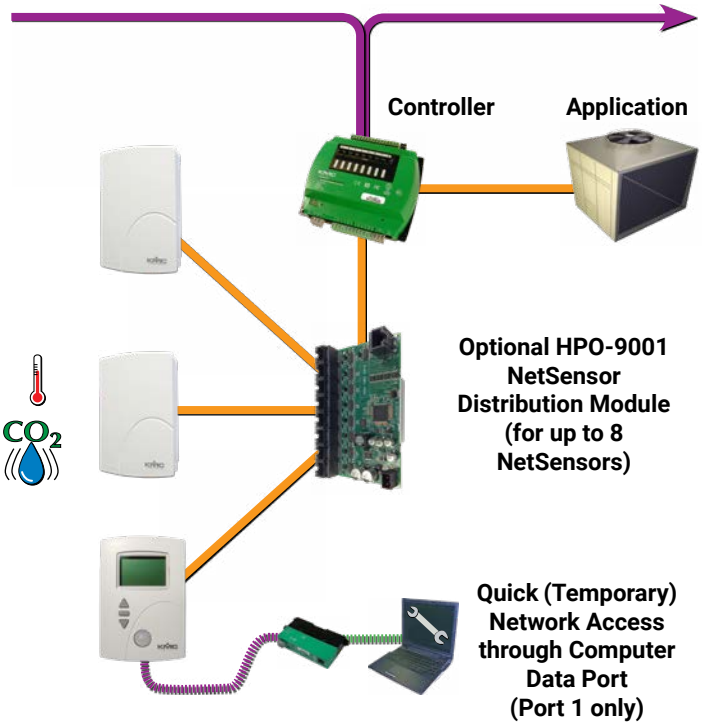
Regulatory

UL	UL Recognized, US and Canada
RoHS 2	RoHS 2 compliant
FCC	FCC Class A, Part 15, Subpart B and complies with Canadian ICES-003 Class A*

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

SAMPLE INSTALLATION





For more information about installation and operation, see:

- **STE-9000 Series NetSensors Installation Guide**
- **Room Sensor and Thermostat Mounting and Maintenance Application Guide**
- **KMC Conquest Controller Application Guide**

ACCESSORIES

NOTE: For accessory details, see the respective product data sheets and installation guides.

HMO-10000	Light almond mounting plate, allows mounting to horizontal 2 x 4 or 4 x 4 inch electrical boxes
HMO-10000W	White version of HMO-10000
HPO-0044	Replacement cover hex screw
HPO-9001	NetSensor distribution module (see **HPO-9001 Distribution Module on page 5**)
HPO-9002	Foam insulating gasket (mounts between the black backplate and the electrical box)
HSO-9001	Ethernet patch cable, 50 feet
HSO-9011	Ethernet patch cable, 50 feet, plenum rated
HSO-9012	Ethernet patch cable, 75 feet, plenum rated
SP-001	Screwdriver (KMC branded) with hex end (for NetSensor cover screws) and flat blade end (for controller terminals)

SUPPORT

Additional resources for installation, configuration, application, operation, programming, upgrading, and much more are available on the web at **www.kmccontrols.com**. Log-in to see all available files.

STAINLESS STEEL FLUSH-MOUNT THERMISTOR AND RTD SENSORS

ST-S SERIES*

DESCRIPTION

The **PreCon Model ST-S* Stainless Steel Flush-Mount Thermistor and RTD Sensor** provides precision room temperature sensing for building automation systems. The active sensing element is made of a highly stable precision thermistor material or Platinum RTD. This material is ruggedized to provide moisture/vapor resistance and is bonded to a 430 stainless steel plate. The back is insulated to reduce interior wall temperature influence. This sensor is intended for interior use only.

ST-S*

FEATURES

- ***Lifetime warranty***
- ***±0.36°F (0.2°C) thermistor accuracy***
- ***±0.27°F (0.15°C) or 0.54°F (0.30 RTD°C) RTD accuracy***
- ***Wide selection of thermistor and RTD curves***
- ***Insulated backing for room temperature response***
- ***Vandal-resistant flush mounting***
- ***Adaptable with many options***
- ***430 Stainless steel finish***
- ***Easy to mount to wall or back box***
- ***Standard size plate to cover mounting holes***

APPLICATION

The **Model ST-S*** is designed to be wall mounted indoors. It is ideal for use in schools or cold storage lockers, where vandalism or fork lifts can damage ordinary wall sensors. The sensor has an insulated back which reduces conductive influences of wall temperatures, yet allows significant convective influences to be sensed. Security screws, **XS** option, are available where tamper proofing is required.

OPERATION

- ***Setpoint adjustment***
- ***Momentary switch override***
- ***Security screws***

SPECIFICATIONS

Accuracy	
Thermistor	±0.36°F (0.2°C)
RTD	
Type 63	±0.72°F (0.40°C)
Type 71	+/-0.0774°F (0.043°C)
Type 81, 85	±0.27°F (0.15°C)
Type 91	±0.54°F (0.30°C)
Sensor Type	
Thermistor	2.252 kΩ, 3 kΩ, 10 kΩType II, III & III w/11K shunt, 20 kΩ, 100 kΩ
RTD	
Type 63	1000Ω Nickel
Type 71, 81	100Ω Pt 385 Curve
Type 85	1000Ω Pt 385 Curve
Type 91	1000Ω Pt 375 Curve
Temperature Range	
Thermistor/RTD	-40° to 221°F (-40° to 105°C)
Temperature Coefficient	
Thermistor	Negative temperature coefficient
RTD	Positive temperature coefficient
Temperature Stability	
Thermistor	0.24°F (0.13°C) over five years
RTD	Max 0.04% after 1k hours @ 500 °C
Heat Dissipation	2.7 mW/°C (power needed to raise the temperature by 1°C)
Enclosure Rating	NEMA 1, Brushed stainless steel
Mounting	Directly to wall or single gang box
Wiring Terminations	8' of 24 AWG pigtails prestripped ends, Type 71 & 81 sensors have 18" leads
Weight	0.2 lb (0.1 Kg)
Approvals	CE
Warranty	Lifetime

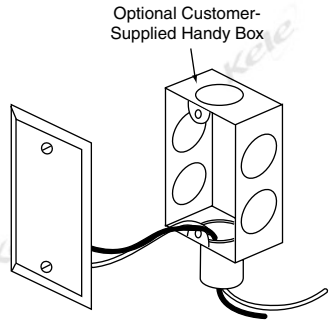
STAINLESS STEEL FLUSH-MOUNT THERMISTOR AND RTD SENSORS

ST-S SERIES*

MOUNTING

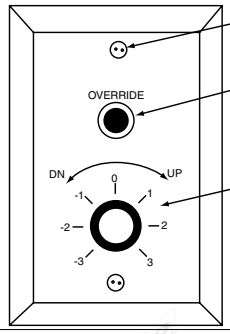
Toggle bolts or other direct wall-mount screws can be used where conduit is not required. Adapters are not required when mounting directly to electrical outlet boxes. Tighten mounting screws, crushing foam gasketing until plate edges lightly touch the wall. Insulate or seal all interior holes to prevent drafts from affecting the temperature readings. Terminate with butt splices or soldering. Twist on wire connectors are not recommended.

Basic model comes with screws for stainless steel faceplate, two #6-32 screws for handy-box mounting, and 8' (2.4m) of 24 AWG wire. Security screws (**XS** Option) are #6-32 with a spanner head.



The sensor should be mounted approximately five feet above the floor, on an interior wall, away from any heating or cooling generating devices.

TYPICAL COVER WITH MULTIPLE OPTIONS

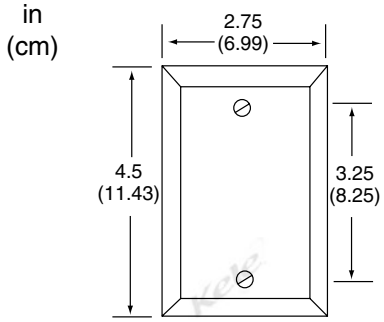


XS
Security Screws

XM
Momentary
Push Button

XA
Setpoint Adjust provides a
0Ω to 10 kΩ ± 3% resistance input

DIMENSIONS



ORDERING INFORMATION

MODEL	DESCRIPTION
ST-S3	10,000Ω flush-mount thermistor @ 77°F (25°C), Type III (gray leads)
ST-S11K	10,000Ω flush-mount thermistor @ 77°F (25°C), Type III with 11K shunt (gray leads)
ST-S21	2252Ω flush-mount thermistor @ 77°F (25°C), Type II (green leads)
ST-S22	3000Ω flush-mount thermistor @ 77°F (25°C), Type II (blue leads)
ST-S24	10,000Ω flush-mount thermistor @ 77°F (25°C), Type II (yellow leads)
ST-S27	100,000Ω flush-mount thermistor @ 77°F (25°C), Type II (gray leads)
ST-S42	20,000Ω flush-mount thermistor @ 77°F (25°C), Type IV (green leads)
ST-S63	1000Ω flush-mount RTD @ 70°F (21°C), nickel curve (yellow leads)
ST-S71	100Ω flush-mount RTD @ 32°F (0°C), 385 platinum curve (yellow leads)
ST-S81	100Ω flush-mount RTD @ 32°F (0°C), 385 platinum curve (yellow leads)
ST-S85	1000Ω flush-mount RTD @ 32°F (0°C), 385 platinum curve (blue leads)
ST-S91	1000Ω flush-mount RTD @ 32°F (0°C), 375 platinum curve (green leads)

OPTIONS	
X25	25' (7.6m) lead length 24 AWG
XA	Setpoint adjustment (0 to 10kΩ)
XA1K	Setpoint adjustment (0 t0 1,000Ω resitance input)
XA1500	Setpoint adjustment (0Ω to 1,500Ω, resistance input)
XD	Dual sensors
XK	Custom logo
XM	Momentary switch wired N.O. to terminal block
XN	Certificate of conformance
XN1	NIST certificate, one reference point 32°F(0°C)
XN2	NIST certificate, two reference points 32°F/158°F(0°C/70°C)
XN3	NIST certificate, three reference points 32°F/77°F/158°F(0°C/25°C/70°C)
XP	Matched sensor pair, matched to ±0.1°F, 0.05°C (must order two sensors)
XS	Security screws (SD-6 spanner screwdriver required)
XZ	Three wire RTD connections (Optional only on Type 81, standard on Type 71)

ST-S27 - XM

Example: **ST-S27-XM** 100,000Ω Type II stainless steel flush-mount sensor with momentary switch

RELATED PRODUCTS

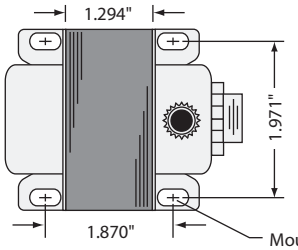
KT1	Mounting screwdriver 1/16" allen key
SD-6	Security spanner screwdriver (required for XS option)
T81U-XR	100 ohm, Type 81 4-20 mA temperature transmitter, custom rangeable
T85U-XR	1000 ohm, Type 85 4-20 mA temperature transmitter, custom rangeable
T91U-XR	1000 ohm, Type 91 4-20 mA temperature transmitter, custom rangeable
UR	Moisture-resistant three-wire butt splice

TRANSFORMER

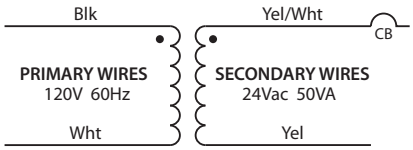
TR50VA005

Transformer 50 VA, 120 to 24 Vac, Circuit Breaker, Foot and Single Threaded Hub Mount

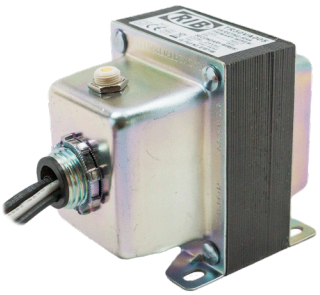
c UL us LISTED Class 2

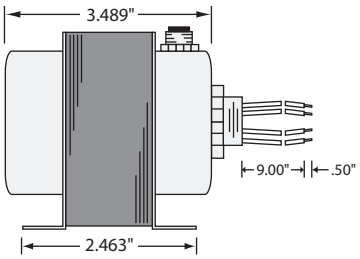


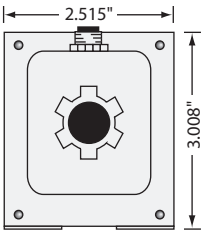
Mounting Hole = .350" x .175"



Secondary Yel/Wht wire in phase with Primary Blk wire.







SPECIFICATIONS

VA Rating: 50
Frequency: 50/60 Hz
Mounting: Foot & Single Threaded Hub
Over Current Protection: Circuit Breaker
Dimensions: 3.489˝ x 2.515˝ x 3.008˝ (w/ .500˝ NPT Hub)
Wire Length: 9˝ Typical w/ .5˝ Strip
Operating Temperature: -30 to 140° F
MTBF: 100,000 Hours @ 77° F
Construction: Split-Bobbin
Approvals: Class 2 UL5085-3 Listed, C-UL, CE, RoHS

Functional Devices, Inc.
101 Commerce Drive
Sharpsville, IN 46068

Toll-free: (800) 888-5538
Office: (765) 883-5538
Fax: (765) 883-7505

Email: sales@functionaldevices.com
Website: www.functionaldevices.com

TERMS AND CONDITIONS OF SALE

1. OFFER, GOVERNING PROVISIONS AND CANCELLATIONS: This document constitutes an offer or counter-offer by Functional Devices, Inc. or any of its affiliates ("**Seller**") to sell various products as agreed by Seller ("**Products**") to the buyer named on the reverse side of this document or in other applicable print or electronic documentation ("**Buyer**") in accordance with these terms and conditions. This writing is not an acceptance of any offer made by Buyer. This offer or counter-offer is expressly conditioned upon Buyer's assent to these terms and conditions and no others. Buyer is deemed to have assented to these terms and conditions (including Seller's warranty) when the first of the following occurs: A. Buyer signs and delivers to Seller an acknowledgement copy of any of Seller's quotation, order acknowledgement or invoice forms; B. Buyer gives to Seller (orally or in writing) specifications of quantity and/or type, assortments thereof, delivery dates, shipping instructions, instructions to bill, or the like as to all or any part of the Products; C. Buyer receives delivery of any of the Products; or, D. Buyer has otherwise assented to the terms and conditions hereof.

Where an attachment to this Agreement or separate document referencing this Agreement consists of a quotation, the quotation remains open for acceptance for a period of thirty (30) days or such other period as specified in the quotation. Seller hereby rejects any additional or different terms or provisions contained in any purchase order, acknowledgment or other communication heretofore or hereafter received from Buyer. Seller's delivery of Products does not constitute an assent to any terms proposed by Buyer. Except for an officer of Seller, no representative of Seller has any authority to waive, alter, vary, amend, or add to the terms hereof. **THESE TERMS AND CONDITIONS OF SALE CONSTITUTE THE ENTIRE AGREEMENT ("AGREEMENT") BETWEEN SELLER AND BUYER WITH RESPECT TO THE MATTERS ADDRESSED HEREIN.**

2. PRICES: The prices for the Products are based on the terms and conditions herein, including the limitations of liability and warranties, and all such terms and conditions are material to the sale of the Products. In the event Seller fails to provide a price quote and/or terms prior to the acceptance of the order, Buyer will pay Seller's then-current list price for such Products. All quotations and invoices show the net selling price of each item quoted. In the event of a mathematical error, the quoted price per Product governs.

3. TERMS OF PAYMENT: Buyer will pay the fees specified in each invoice provided by Seller in United States Dollars within thirty (30) calendar days after the invoice date unless otherwise agreed to in writing by an authorized representative of Seller. Any amount due under this Agreement that remains unpaid after its due date will bear interest from the date that such payment became delinquent until the date it is paid in full at the lower of 1.5% per month, which equals an annual percentage rate of 18%, or the maximum rate permitted by law. Seller reserves the right to establish, revoke or modify credit terms for Buyer at any time. No discounts are allowed unless otherwise agreed to in writing by an authorized representative of Seller. Buyer will pay any collection fees, legal fees, or court costs incurred by Seller to collect past due amounts. No offsets or setoffs of payments due to Seller hereunder are allowed with respect to any other agreement between the parties. Seller hereby retains a lien on the goods sold for unpaid purchase money as herein provided.

4. TAXES AND OTHER CHARGES: In addition to the prices quoted or invoiced, Buyer will pay any sales tax, excise tax, use tax, value added or consumption tax, customs duty (that is assessed on the delivery of Product(s) to a destination outside of the U.S.A.), fee or charge of any nature whatsoever imposed by any governmental authority on or measured by the transaction between Seller and Buyer. In the event Seller is required to pay any amount, Buyer will reimburse Seller therefore; or provide Seller, at the time the order is submitted, an exemption certificate or other document acceptable to the authority imposing the same. Seller does not accept and will not pay any fines, penalties or chargebacks from Buyer for any reason.

5. DELIVERY, RISK OF LOSS, CLAIMS AND FORCE MAJEURE:

A. All prices quoted for products are Ex-Works (Incoterms 2010) at a shipping facility determined by Seller, unless otherwise noted by Seller ("**Seller's Shipping Facility**"). Risk of loss or damage, and beneficial ownership, of the Products are transferred to Buyer when the Products are made available to Buyer at Seller's Shipping Facility. All delivery dates are approximate.

B. Buyer will only make written claims to Seller for damages, shortages or other delivery errors within seven (7) calendar days after receipt of shipment. All Products received by Buyer, or Buyer's clients, customers, or agents, that are not rejected within such time will be deemed accepted. Failure to provide such written notice constitutes a waiver of all such claims regarding such shipment by Buyer. Buyer will not revoke acceptance.

C. Seller is not liable for any damage as a result of any delay or failure to deliver due to any act of God, act of Buyer, embargo or other governmental act, regulation or request, fire, accident, power outage, strike, civil unrest, weather, slowdown or other labor difficulties, war, riot, act of terrorism, delay in transportation, defaults of common carriers, inability to obtain necessary labor, materials or manufacturing facilities or, without limiting the foregoing, any other delays beyond Seller's control. Buyer's sole and exclusive remedy for any delays or for Seller's inability to deliver Products for any reason, in each case, that persists for more than ninety (90) days, is to cancel the order pursuant to Seller's Order Policies and Guidelines available upon request.

6. WARRANTY; DISCLAIMER. Products are warranted to be free from manufacturing defects under normal use and conditions for five (5) years (the "**Warranty Period**").

The warranty does not apply to: (a) Damage caused by accident, abuse, mishandling, or dropping; (b) Products which have been subjected to unauthorized repair, opened, or taken apart; (c) Products not used in accordance with directions; (d) Damages exceeding the cost of such Product; and (e) Damages caused by lightning, water, or condensation. If warranty service is required during the Warranty Period, and if examination shall disclose to Seller's satisfaction that such Product was originally defective, then Seller will at its option repair or replace the product without charge upon prepaid delivery of such Product to Seller's facility with proof of date of purchase. Corrections of such defects by repair to or supplying of replacements for defective parts shall constitute fulfillment of all obligations of Seller.

Seller shall not be liable for loss, damage, or expense directly or indirectly caused from the failure of Products to perform as expected.

EXCEPT AS SET FORTH HEREIN, SELLER DISCLAIMS ALL REPRESENTATIONS OR WARRANTIES OF ANY KIND WHATSOEVER, WHETHER EXPRESS, IMPLIED OR STATUTORY, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, NON-INFRINGEMENT, FITNESS FOR A PARTICULAR PURPOSE OR ANY WARRANTY ARISING FROM A COURSE OF DEALING OR USAGE OF TRADE. NO PERSON (INCLUDING ANY AGENT, DEALER OR REPRESENTATIVE OF SELLER) IS AUTHORIZED TO MAKE ANY REPRESENTATION OR WARRANTY CONCERNING PRODUCTS EXCEPT TO REFER BUYER TO THIS AGREEMENT. BUYER WARRANTS THAT BUYER HAS NOT RELIED ON ANY OTHER WARRANTIES OR REPRESENTATIONS CONCERNING THE PRODUCTS OR THIS AGREEMENT.
For warranty service, call factory for RA number and send such Product prepared with sales receipt to: FUNCTIONAL DEVICES, INC., 101 COMMERCE DRIVE, SHARPSVILLE, IN 46068.

7. LIMITATION OF LIABILITY: SELLER WILL NOT BE LIABLE FOR ANY LOSS OF PROFIT, INTERRUPTION OF BUSINESS OR ANY OTHER SPECIAL, CONSEQUENTIAL OR INCIDENTAL DAMAGES SUFFERED OR SUSTAINED BY BUYER FOR ANY REASON. EXCEPT FOR CLAIMS OF DEATH OR PERSONAL INJURY, IN NO EVENT WILL SELLER'S AGGREGATE LIABILITY TO BUYER ARISING UNDER OR IN ANY WAY RELATED TO THIS AGREEMENT FOR ANY REASON (INCLUDING, BUT NOT LIMITED TO, LIABILITY ARISING FROM NEGLIGENCE OR ON THE BASIS OF STRICT LIABILITY, OR OTHERWISE) EXCEED THE TOTAL AMOUNT PAID BY BUYER TO SELLER HEREUNDER FOR ANY PRODUCT GIVING RISE TO A CLAIM UNDER THIS AGREEMENT.

8. RETURNS: Unless otherwise approved by Seller in writing in its sole discretion, except in the case of a non-conforming shipment or a warranty issue, Buyer may not return Products. If Seller approves the return of Products pursuant to the preceding sentence, such returned Products must be returned within ninety (90) days from date of invoice and will be subject to a 25% restocking fee. In the event of a non-conforming shipment or a warranty issue, Buyer may return Products, but only if Buyer first: (a) provides notice to Seller as required in this Agreement, (b) obtains prior authorization from Seller, and (c) all Products or containers for which return is properly authorized have been marked with a return authorization number supplied by Seller. Buyer will make all returns via a traceable form such as Federal Express, UPS or insured mail and in resalable condition. Buyer will pay all return shipping charges and any other charges associated therewith.

9. CANCELLATIONS: Cancellation or deferment of all or part of an order is subject to acceptance by the Seller. If accepted, any reduction in quantity of any item to less than 85% of the original item quantity is subject to a 15% cancellation charge. If an order cancellation is accepted, the Buyer will make delivery and pay for all material manufactured and in stock or in process at time of notice for such order, and for any special materials on orders for which the Seller must take delivery.

10. EXPORTS. Buyer agrees that it will comply with any and all U.S. Export Controls and will not pay for, resell, transfer or knowingly sell Products in violation of U.S. Export Controls. If Buyer resells Products within or exports Products to a country or region which imposes upon Seller and/or Buyer an obligation to fund or undertake reuse, recycling, composting, recovery of Products, or any similar obligation (e.g., the European Union's Waste Electrical and Electronic Equipment Directive, EC 2002/96/EC) (the "**Obligations**"), Buyer shall wholly undertake the Obligations or duties and shall be entirely responsible for all associated costs therewith. Seller shall have no obligation to reimburse Buyer for execution of the Obligations. In the event that Seller is named in a proceeding based upon the Obligations, Buyer shall indemnify, defend and hold Seller harmless from all actions related thereto, including all civil and governmental actions.

11. MISCELLANEOUS. This Agreement is governed by the laws of the State of Indiana, without giving effect to its conflict of laws principles. Buyer hereby irrevocably consents and submits to the exclusive jurisdiction and venue of the state and federal courts in Marion County, Indiana. The United Nations Convention for Contracts for the International Sale of Goods is explicitly excluded. Each provision contained in this Agreement constitutes a separate and distinct provision severable from all other provisions. If any provision (or any part thereof) is unenforceable under or prohibited by any present or future law, then such provision (or part thereof) will be amended, and is hereby amended, so as to be in compliance with such law, while preserving to the maximum extent possible the intent of the original provision. Any provision (or part thereof) that cannot be so amended will be severed from this Agreement; and, all the remaining provisions of this Agreement will remain unimpaired. No modification, addition or deletion, or waiver of any rights under this Agreement is binding on a party unless made in a non-preprinted agreement clearly understood by the parties to be a modification or waiver, and signed by a duly authorized representative of each party.

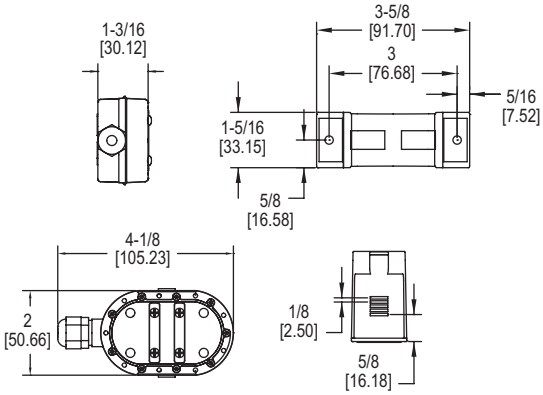
Series Series WD3 Water Leak Detector

Specifications - Installation and Operating Instructions

WD3-BP

WD3-LP

Bracket



WD3 Bracket

The **Series WD3 Water Leak Detector** protects equipment from water damage by detecting the presence of water in drip pans in air handler units, under raised floors in data centers, or on floors around sump pumps and drains. Water is detected once it reaches a level that bridges the two conductive strips on the bottom of the housing. Depending on the model ordered, audible and visual alerts provide local indication of the alarm condition and an internal switch will give remote indication or control to prevent further build up of water.

For applications where power is not available, the Model WD3-BP-D1-A is battery powered. Otherwise, either AC or DC supply voltages can be used to power the water detector. The sensing height can be adjusted to as low as 1/32″ using the included adjustable mounting bracket. The mounting bracket can attach to any flat surface by either using the attached adhesive strips or mounting screws.

INSTALLATION

Mounting

The Series WD3 mounts horizontally using an adjustable mounting bracket that allows detection from 1/32″ up to 17/32″. The tabs on the side of the water detector fit into the slots on the bracket as shown in Figure 1. The mounting bracket mounts to the drip pan or flat surface by either the attached adhesive strips or using two #6 or #8 screws.

Figure 1: Mounting WD3 to Mounting Bracket

NOTICE Before attaching the mounting bracket to the desired surface, the Series WD3 will need to be attached to the mounting bracket. The adhesive is very strong and is not easily removed once attached.

SPECIFICATIONS

Service: Water or conductive fluids.
Minimum Sensing Gap: 1/32″.
Switch Type: Battery powered models: SPST NO SSR; External powered models: DPDT relay.
Electrical Ratings: Battery powered model: Pilot duty rating 250 mA @ 24 VDC; External powered models: 1A @ 24 VAC/DC.
Audible Alarm: At least 85 dB @ 1 foot distance (depends on model).
Visual Alarm: Red LED for water level; Yellow LED for low battery (battery powered models only); Green LED for power condition (external powered models only).
Temperature Limits: 32 to 122°F (0 to 50°C).
Power Requirements: Battery Powered Model: 3V CR2450 lithium metal battery, installed functional, user replaceable; External Powered Models: 24 VAC ±10%, 11-27 VDC.
Power Consumption: Battery powered model: 0.9 mA steady state / 3.0 mA during alarm condition; External powered models: 30 mA steady state / 85 mA during alarm condition.
Battery Life: 5 years steady state / 48 hours during alarm condition.
Electrical Connections: 4.9 ft (1.5 m), 22 AWG, PVC, UL plenum rated cable (10 ft (3 m) cable on WD3-LP-D2-10 model).
Enclosure Material: ABS and polycarbonate with flammability classification UL 94 V-0.
Enclosure Rating: Audible alarm models: Water-tight up to 3/4 of the body height; Non-audible alarm models: NEMA 6P (IP 68) submersible.
Weight: 4.85 oz (137.5 g).
Agency Approvals: CE.

Replacing Batteries (Battery Powered Model Only)
When the battery is low, a yellow warning LED will begin to flash and an audible alarm will sound every 300 seconds to alert that it is time to change the battery. Using a large flat head screw driver, turn the battery cover 1/4 turn in the direction of the arrows on the cover. Remove the battery cover by lifting it up. Remove the coin cell battery from its compartment. Insert a new 3V CR2450 coin cell battery in the compartment with the positive (+) side of the battery facing up. Replace the battery cover and twist the cover using the large flat head screw driver in the opposite direction of the arrows on the cover.

MODEL CHART				
Model	**Output**	**Power**	**Audible Alarm**	**Cable Length**
WD3-BP-D1-A	SPST NO SSR	Battery	Yes	4.9 ft (1.5 m)
WD3-LP-D2	DPDT Relay	24 VAC ±10%, 11-27 VDC	No	4.9 ft (1.5 m)
WD3-LP-D2-A	DPDT Relay	24 VAC ±10%, 11-27 VDC	Yes	4.9 ft (1.5 m)
WD3-LP-D2-10	DPDT Relay	24 VAC ±10%, 11-27 VDC	No	10 ft (3 m)

Wiring
The wires in the 4.9 ft (1.5 m) or 10 ft (3 m) model dependent cable for the Series WD3 are color coded to reduce wiring errors. For battery powered models, Figure 2 has the wiring diagram. For external powered models, Figure 3 has the wiring diagram.

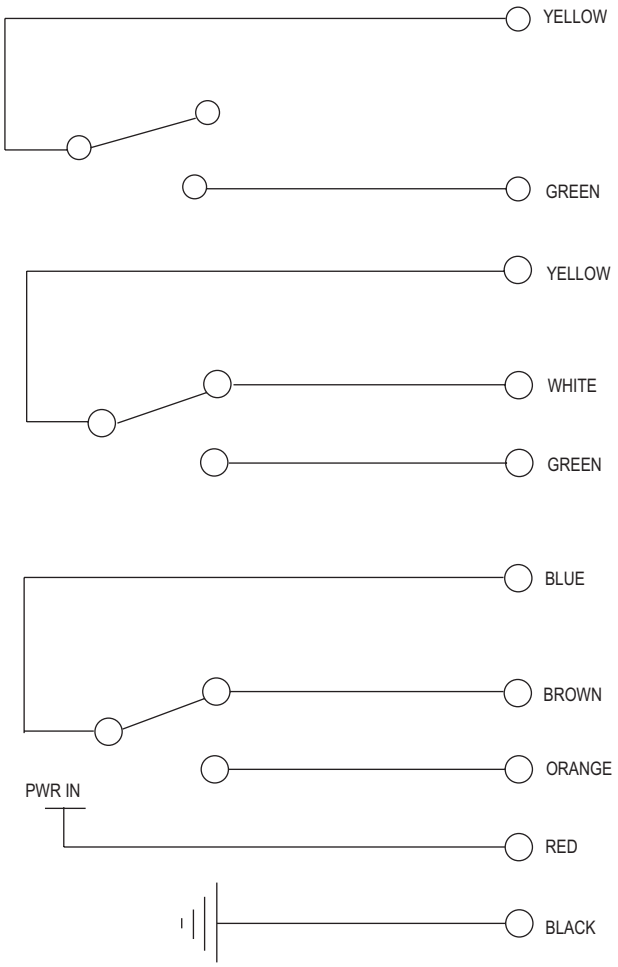


Figure 3: Wiring for WD3-LP-D2, WD3-LP-D2-A and WD3-LP-D2-10

Operation
After mounting and wiring the Series WD3, it is ready for operation. The water is detected when it bridges the two conducting strips on the bottom of the unit. Upon detecting water, the relay contact will close and a red LED will begin to flash. On models with the built in annunciator, the annunciator will begin to chirp until the water bridge between the conducting strips evaporates. After water evaporates, the relay contacts will return to their normal state.

LED Indicators
For Models WD3-LP-D2, WD3-LP-D2-A and WD3-LP-D2-10
Green – On when power is supplied to the unit
Red – On when water is detected

For Model WD3-BP-D1-A
Yellow – On when low battery condition is detected
Red – On when water is detected

MAINTENANCE/REPAIR
Upon final installation of the Series WD3 no routine maintenance is required. The Series WD3 is not field serviceable with the exception of replacing the batteries on battery powered model and should be returned if repair is needed. Field repair should not be attempted and may void warranty.

WARRANTY/RETURN
Refer to "Terms and Conditions of Sales" in our catalog and on our website. Contact customer service to receive a Return Goods Authorization number before shipping the product back for repair. Be sure to include a brief description of the problem plus any additional application notes.

Printed in U.S.A. 2/20
FR# 444159-00 Rev.3

DWYER INSTRUMENTS, INC.
P.O. BOX 373 • MICHIGAN CITY, INDIANA 46360, U.S.A.
Phone: 219/879-8000 **www.dwyer-inst.com**
Fax: 219/872-9057 **e-mail: info@dwyermail.com**