Golden Gate Contracting

Submittal Records

Architect: Snyder Architects Inc.	Date: 2024-10-24
Attention: Amit Patel,	Project: Gymnasium Addition at Glenview PS
Subcontractor: Kirk Mechanical	Shop Drawings – SD 15-4

Copies	Title /Description	# Pages
1	Controls Work	29

Method of Delivery: Electronic

The Architect's review is for the sole purpose of ascertaining conformance with the general design concept and for the general arrangement. This review shall not mean approval of the detail design inherent in the shop drawings, responsibility for which shall remain with the Contractor and such review shall not relieve the Contractor of their responsibility for errors or omissions in the shop drawings or of their responsibility for meeting all requirements of the Contract Documents. The Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes, quantities or to techniques of construction and installation and for coordination of related work.

snyder architects

Date Nov 12 2024
By AP
Proj. No. 2314
No exceptions taken
Comply with notations ✓
Revise & Resubmit
Not reviewed

1038 Cooke Blvd. Unit 1, Burlington, ON L7T 4A8
Tel: 905-844-1122 fax: 905-844-0051

Submittal # 82329 **APPROVAL REQUIRED**

Project	22404247-MECH-SWO- HDSB Glenview PS. Gym Addition - 143 Townsend Ave
Leader	Lorenzo Belanger
Job Site	HDSB Glenview PS. Gym Addition - 143 Townsend Ave
Submission Date	2024-10-18
Sold To	KIRK
Submitted By	Mohammed Barbouti

Contacts

Role	Customer	Our Rep
Designer	Dei & Associates	Peter Washer
Owner	Halton District School Board *	Michael Harris

Services

Service ID	Service Description	Revision #
NO TAGS	Controls Work	0

REVIEWED

By KIRK MECHANICAL LIMITED at 6:13 am, Oct 21, 2024

Delivering Real Success®

HDSB Glenview PS. Gym Addition - 143 Townsend Ave

Rev #	Drawing Index
	1 - Title Page
	2 - Drawing Symbols & Legends
	3 - Network Architecture
	4 - Controller Schedule
	5 - HVAC-1 (Gymnasium)
	6 - HVAC-1 (Gymnasium) - Sequence
	7 - Exterior Storage Room
	8 - Typ. Heaters
	9 - Typ. Exhaust Fan
	10 - Schedules - Fan
	11 - Schedules - Heater

Rev #	Drawing Index

Revision History

Rev 0	October 18, 2024	Submittal

DEI Consulting Engineers
MECHANICAL | ELECTRICAL | AQUATIC

This review by DEI & Associates Inc. is for the sole purpose of ascertaining conformance with the general design concept. This review shall not mean that DEI & Associates Inc. approves the detail design inherent in the shop drawings, responsibility for which shall remain with the contractor submitting same, and such review shall not relieve the contractor of his responsibility for errors or omissions in the shop drawings or his responsibility for meeting all requirements of the construction and contract documents.

- [X] Reviewed
- [ ] Reviewed As Noted
- [ ] Not Reviewed
- [ ] Revise and Resubmit

PROJECT INFORMATION

HTS Project #:	22404247-MECH-SWO
Sold To:	Kirk Mechanical
Mechanical Consultant:	DEI Consulting
Site Address:	143 Townsend Avenue, Burlington, ON
Consultants Rep:	Lorenzo Belanger
HTS Project Manager:	Joe DiCarlo
Date:	October 18, 2024
Revision #:	0
Specification Section:	15900
Valve Lead Time:	3-4 Weeks
Damper Lead Time:	3-4 Weeks
Drawings Used:	Tender (04/30/2024)
Controller Manufacturer:	Alerton
OWS Interface Software:	Alerton
Programming Units:	Metric

WIRING INFORMATION - CONSULTANT TO REVIEW

Reviewed By: _____(please print)

Wiring Type:

Flex Type:

Power Wiring:

Network:

Mechanical Wiring:

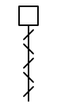
NOTE: The following shop drawings represent HTS Engineering Ltd's interpretation of the specifications and drawings for this project. Return of approved drawings constitutes acceptance of the specified interpretations.

Control Valve
Valve #, Fail Position

Thermostat
Insertion Well

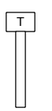
Pump

Pressure Sensor



Motorized Damper
Dpr #, Fail Position

Filter



Duct Temperature
Probe Style

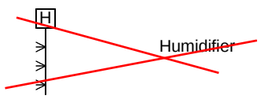
Duct Temperature
Averaging Style

Freezestat

High Temperature
Limit

Duct Temp/Humidity
Probe

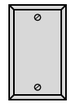
Coil



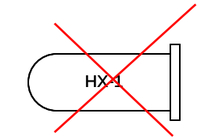
Humidifier

Fan

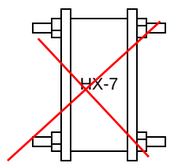
Space Sensor w/ LCD,
Setpoint Adjust



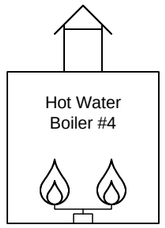
Space Sensor,
Stainless Steel Plate



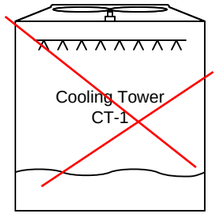
Heat Exchanger
Shell & Tube



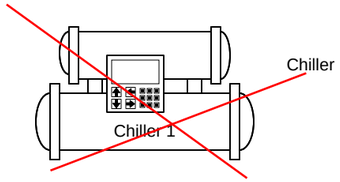
Heat Exchanger
Plate



Gas Fired Boiler

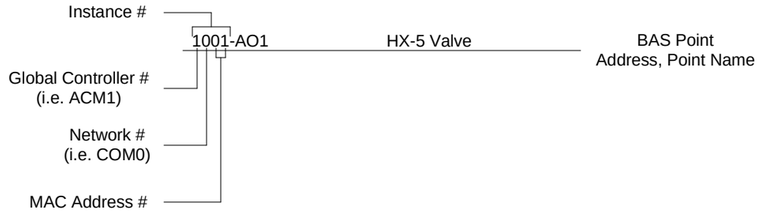


Cooling Tower



Chiller

Water Pipe
Field Wiring
Panel Wiring
Unit Wiring
Wiring by Others



VAV Box Inlet Areas		
Diameter [in]	Area [in^2]	Area [mm^2]
4	12.6	8107.3
5	19.6	12667.7
6	28.3	18241.5
7	38.5	24828.7
8	50.3	32429.3
9	63.6	41043.3
10	78.5	50670.7
11	95.0	61311.6
12	113.1	72965.9
13	132.7	85633.6
14	153.9	99314.7
15	176.7	114009.2
16	201.1	129717.1

CORRECT QUANTITIES, AND/OR SIZES AND DIMENSIONS ARE THE RESPONSIBILITY OF THE CONTRACTOR

DEI Consulting Engineers
MECHANICAL | ELECTRICAL | AQUATIC

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☐ Reviewed ☒ Reviewed As Noted
☐ Not Reviewed ☐ Revise and Resubmit

System Name:

Drawing Symbols & Legends

E				J			
D				I			
C				H			
B				G			
A	Oct 18,2024	Submittal	MB	F			

Shop Drawing Revision Information | Submittal | Rev: 0 | October 18, 2024

HDSB Glenview PS. Gym Addition - 143 Townsend Ave

HTS Engineering Ltd.
115 Norfinch Drive
North York, Ontario
M3N 1W8
Tel: 416.661.3400
Fax: 416.661.0100

HTS PROJECT NUMBER
22404247-MECH-SWO

DRAWING NUMBER
Schematics - 2

NOTE: Order that controllers wired in shown here for schematic purposes only. Actual order may differ on site.

Device ID	Description	Part #	Manufacturer	System	Qty
BAC-Router	BACnet Router 2 MS/TP Networks	BACRouter	SWG Automation	NetArch	1
Eth Switch	5-Port 10/100 Mbps Ethernet Switch	EISK5-100T	Contemporary Controls	NetArch	1

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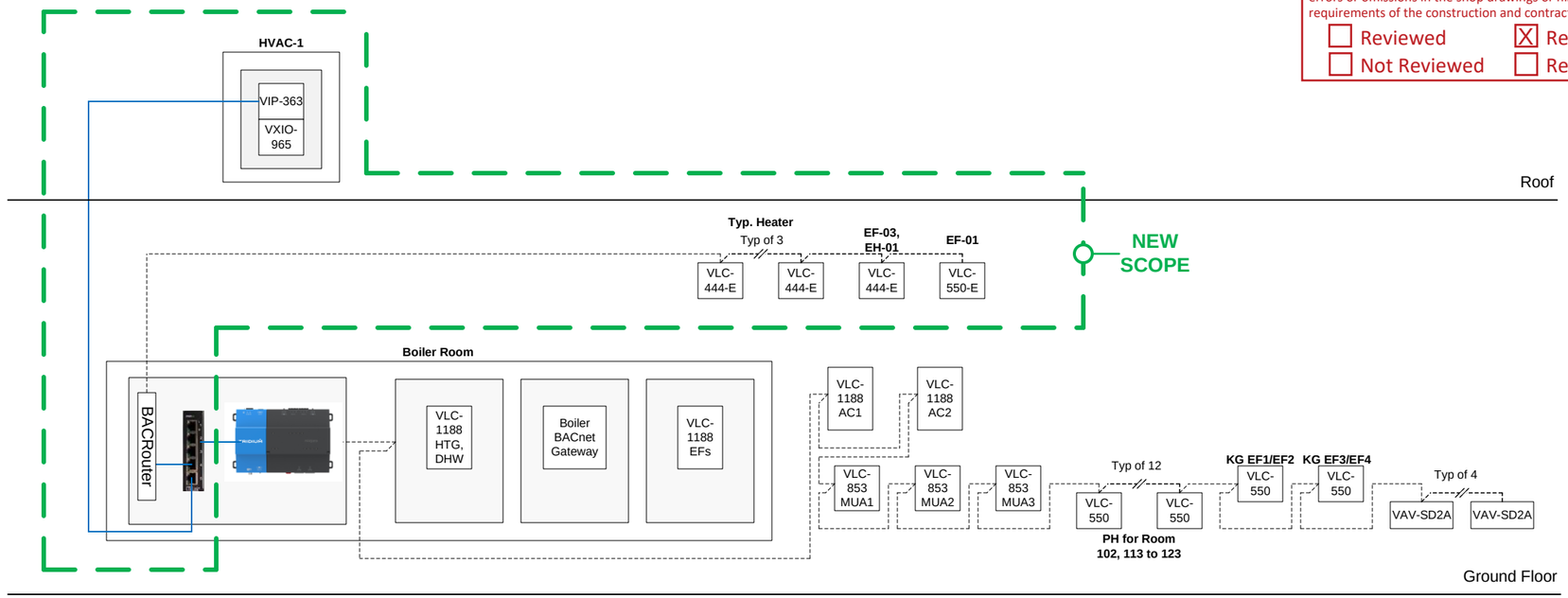

Line Type	Description	Details
----------	BACnet MS/TP 2C-22 AWG, Twisted Shielded Pair, Plenum Low Capacitance Connect controllers in Daisy Chain	Provo P/N 999201 (equal to Windy City P/N 0043280ALR-S). Connect controllers in Daisy Chain pattern (BLUE +, WHITE -). Maximum of 64 devices per trunk. At both ends of each network trunk segment (end of line EOL) install 120 ohm resistor across MS/TP terminals.
————	BACnet IP Ethernet Cable (Cat 6)	Follow Ethernet Wiring Rules

System Name:

Network Architecture

E				J			
D				I			
C				H			
B				G			
A	Oct 18,2024	Submittal	MB	F			

Shop Drawing Revision Information | Submittal | Rev: 0 | October 18, 2024

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HTS PROJECT NUMBER
22404247-MECH-SWO

DRAWING NUMBER
Schematics - 3

BACnet MS/TP & IP Network Schedule

Project: 22404247-MECH-SWO - HDSB Glenview PS. Gym Addition

Address / BACnet	Equipment	Controller	Location	Notes
	Head End	*ALER-8000*	*Boiler Room*	*Existing*
1166101	*AC-1*	*VLC-1188*	*E-Box in Ceiling Below Roof Unit*	*Existing*
1166102	*AC-2*	*VLC-1188*	*E-Box in Ceiling Below Roof Unit*	*Existing*
1166103	*HTG, DHW*	*VLC-1188*	*Boiler Room*	*Existing*
1166104	*HTG BACnet*	*BACNET/MSTP GATEWAY*	*Boiler Room*	*Existing*
1166105	*MUA1 (Library & Classrooms)*	*VLC-853*	*E-Box in Ceiling Below Roof Unit*	*Existing*
1166106	*MUA2 (Office and E/W Wings)*	*VLC-853*	*E-Box in Ceiling Below Roof Unit*	*Existing*
1166107	*MUA3(Gym)*	*VLC-853*	*E-Box in Ceiling Below Roof Unit*	*Existing*
1166108	*Perimeter Heater*	*VLC-550*	*Classroom 113*	*Existing*
1166109	*Perimeter Heater*	*VLC-550*	*Classroom 114*	*Existing*
1166110	*Perimeter Heater*	*VLC-550*	*Classroom 115*	*Existing*
1166111	*Perimeter Heater*	*VLC-550*	*Classroom 116*	*Existing*
1166112	*Perimeter Heater*	*VLC-550*	*Classroom 117*	*Existing*
1166113	*Perimeter Heater*	*VLC-550*	*Classroom 118*	*Existing*
1166114	*Perimeter Heater*	*VLC-550*	*Classroom 119*	*Existing*
1166115	*Perimeter Heater*	*VLC-550*	*Classroom 120*	*Existing*
1166116	*Perimeter Heater*	*VLC-550*	*Classroom 121*	*Existing*
1166117	*Perimeter Heater*	*VLC-550*	*Classroom 122*	*Existing*
1166118	*Perimeter Heater*	*VLC-550*	*Library 123*	*Existing*
1166119	*EF01/02/03/04/05/06/09*	*VLC-1188*	*Boiler Room*	*Existing*
1166120	*EF1-EF2 KG*	*VLC-550*	*Kindergarten E-Box Near Fan*	*Existing*
1166121	*EF3-EF4 KG*	*VLC-550*	*Kindergarten E-Box Near Fan*	*Existing*
1166122	*Perimeter Heater*	*VLC-550*	*Classroom 102*	*Existing*
1166123	*Bypass Box BP1*	*VAV-SD2A*	*Mounted on Bypass Box*	*Existing*
1166124	*Bypass Box BP2*	*VAV-SD2A*	*Mounted on Bypass Box*	*Existing*
1166125	*Bypass Box BP3*	*VAV-SD2A*	*Mounted on Bypass Box*	*Existing*
1166126	*Bypass Box BP4*	*VAV-SD2A*	*Mounted on Bypass Box*	*Existing*
1166127	*AC1*	*VLC-1188*	*N/A*	*Existing*
1166128	*AC2*	*VLC-1188*	*N/A*	*Existing*
1166200	**Head End Router**	**BACRouter**	**Boiler Room**	**New Scope**
1166203	**HVAC-1 (Gymnasium)**	**VIP-363 VXIO-965**	**E-Box in Ceiling Below Roof Unit**	**New Scope**
1166204	**EF-01**	**VLC-550-E**	**Roof**	**New Scope**
1166205	**EH-02**	**VLC-444-E**	**Washroom (134)**	**New Scope**
1166206	**EH-03**	**VLC-444-E**	**Washroom (135)**	**New Scope**
1166207	**EF-03, EH-01**	**VLC-444-E**	**Exterior Storage Room (140)**	**New Scope**
1166208	**EH-04**	**VLC-444-E**	**Vestibule (V-4)**	**New Scope**

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☐ Not Reviewed ☐ Revise and Resubmit

CORRECT QUANTITIES, AND/OR SIZES AND DIMENSIONS ARE THE RESPONSIBILITY OF THE CONTRACTOR

System Name:	E				J			
Controller Schedule	D				I			
	C				H			
	B				G			
	A	Oct 18,2024	Submittal	MB	F			
	Shop Drawing Revision Information		Submittal		Rev:	0	October 18, 2024	

HDSB Glenview PS. Gym Addition - 143 Townsend Ave

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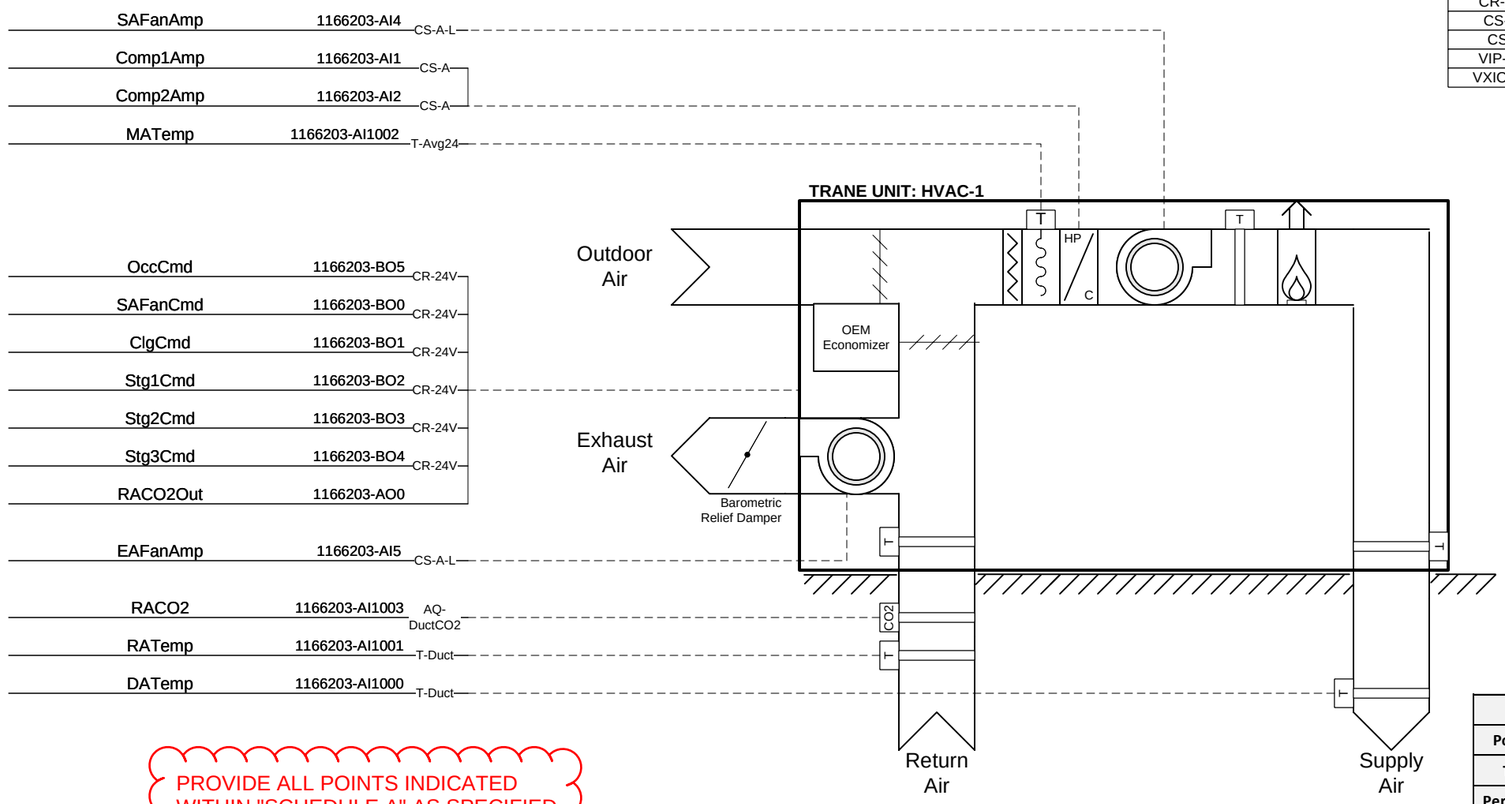
Fax: 416.661.0100

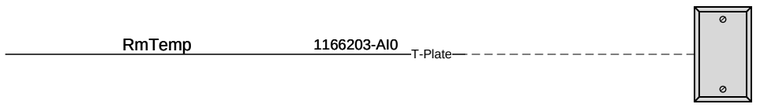
HTS PROJECT NUMBER
22404247-MECH-SWO

DRAWING NUMBER
Schematics - 4

Device ID	Description	Part #	Manufacturer	System	Qty
T-Duct	Duct Temp Probe 12" 10k-2	TSAPA24E	GREYSTONE	HVAC-1	2
T-Avg24	Duct Temp Flex Avg 24' 10k-2	TSDFA24L	GREYSTONE	HVAC-1	1
T-CLIP	Capillary Clip	M-648K	KELE	HVAC-1	8
AQ-DuctCO2	Duct CO2 Sensor 0-2000ppm 0-10V LCD	CT1D-A3D	SENVA	HVAC-1	1
CR-24V	Relay, 24 VAC Coil, DPDT	C7-A20/24VAC	RELECO	HVAC-1	6
CR-24V	Relay Base, DPDT	S7-C	RELECO	HVAC-1	6
CS-AL	Current Sensor, 5/10/20A, 0-5V	C-2343-L	SENVA	HVAC-1	2
CS-A	Current Sensor, 30/60/120A, 0-5V	C-2343	SENVA	HVAC-1	2
VIP-363	IP controller 3 UI, 6 BO, 3 UIO	VIP-363-HOA	ALERTON	HVAC-1	1
VXIO-965	I/O module 9 UI, 6 BO, 5 UIO	VXIO-965-HOA	ALERTON	HVAC-1	1



PROVIDE ALL POINTS INDICATED WITHIN "SCHEDULE A" AS SPECIFIED



CORRECT QUANTITIES, AND/OR SIZES AND DIMENSIONS ARE THE RESPONSIBILITY OF THE CONTRACTOR

BAS Terminal Strip Commands						Unit Summary		
Point Name	**Stg1Cmd**	**Stg2Cmd**	**ClgCmd**	**Stg3Cmd**	**SAFanCmd**			
Terminal	**Y1**	**Y2**	**W1**	**W2**	**G**	**MODE**	**HEAT PUMP STATUS**	**GAS HEAT STATUS**
Permutation 1	OPEN	OPEN	OPEN	OPEN	OPEN	OFF	DISABLED	DISABLED
Permutation 2	OPEN	OPEN	OPEN	OPEN	CLOSED	FAN ONLY	DISABLED	DISABLED
Permutation 3	CLOSED	OPEN	OPEN	OPEN	CLOSED	HEAT	STAGE 1 HEAT	DISABLED
Permutation 4	CLOSED	CLOSED	OPEN	OPEN	CLOSED	HEAT	STAGE 2 HEAT	DISABLED
Permutation 5	CLOSED	CLOSED	OPEN	CLOSED	CLOSED	HEAT	DISABLED	100% FIRING RATE
Permutation 6	CLOSED	OPEN	CLOSED	OPEN	CLOSED	COOL	STAGE 1 COOL	DISABLED
Permutation 7	CLOSED	CLOSED	CLOSED	OPEN	CLOSED	COOL	STAGE 2 COOL	DISABLED

Notes:
1) If the TRANE unit controller determines outdoor air is suitable for economizer operation: Y1 will be the economizer and Y1+Y2 will be economizer + HP STAGE 1 COOL.
2) W2 only applies to heating stages.

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System Name:

HVAC-1 (Gymnasium)

E				J			
D				I			
C				H			
B				G			
A	Oct 18,2024	Submittal	MB	F			

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HTS PROJECT NUMBER
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DRAWING NUMBER
Schematics - 5

Sequence of Operation

Gym Rooftop Unit (rtu_gym 0.1)

General

1. The rooftop unit (RTU) will provide heating, cooling, and ventilation to the gymnasium.

Modes of Operation

1. A time of day schedule will determine the occupied and unoccupied modes of operation.
2. The pre-occupancy mode will be enabled 30 minutes prior to the start of the Occupied Mode.

Pre-Occupancy Mode

1. The RTU will operate as per the occupied mode except for the following:
    I. Mixed air dampers will be positioned for full recirculation (OccCmd).

Occupied Mode

1. The supply fan will run (SAFanCmd).
2. The RTU OEM controls will control the economizer to maintain the return air CO2 at setpoint.
    I. The BAS will monitor return air CO2.
    II. The BAS will send a 0-10 VDC signal corresponding to return air CO2 to the RTU OEM controller.
    III. The CO2 setpoint is only adjustable locally at the RTU OEM controller.
3. The space temperature setpoint will be 19°C (66°F) with a +/-1°C (1.8°F) cooling and heating offset (RmTemp).
4. Heating and cooling will be controlled to maintain the space at heating / cooling setpoints (ClgCmd / StgxCmd)
    I. The RTU OEM controller will utilize the economizer as the first stage of cooling if it detects suitable ambient conditions.

Unoccupied Mode

1. The RTU will operate as per the occupied mode with the following exceptions:
    I. Space temperature setpoints:
        i. Space cooling setpoint will be 25°C (77°F).
        ii. Space heating setpoint will be 18°C (64°F).
    II. The supply fan will cycle on a call for heating or cooling. The fan will cycle off when the space temperature has been satisfied for at least 10 minutes.
    III. The mixed air dampers will be positioned for full recirculation.

High Priority Alarms (Alarm visible in Alarm Console, and visually on graphics)

1. Fan Failure - Fan command is on, but status is not received.

Low Priority Alarms (Alarm visible in Alarm Console, and visually on graphics)

1. The space temperature falls below 17°C (62.6°F).

Trends (15-minute intervals)

1. Space temperature and setpoint.
2. Supply and return air temperatures.
3. Return air CO2.
4. Unit command and supply/exhaust fan amps.
5. Heating and cooling commands.
6. Compressor amps.

I/O	Point Name	Signal	Device	Tag	# Cond	Term 1	Term 2	Term 3	T1 Col	T2 Col	T3 Col	Wire Type
IN0	RmTemp	10k	TE200AS24	RT	2C	SEN	NEG		WHT	BLK		2C-22AWG-S
IN1	Comp1Amp	0-10Vdc (I)	C-2343-L	C1A	2C	0-5V	GND		WHT	BLK		2C-18AWG-S
IN2	Comp2Amp	0-10Vdc (I)	C-2343-L	C2A	2C	0-5V	GND		WHT	BLK		2C-18AWG-S
BO0	SAFanCmd	24 VAC	VFD/Starter	SAFC	2C	TERM	TERM		WHT	BLK		2C-18AWG
BO1	ClgCmd	24 VAC	VFD/Starter	CC	2C	TERM	TERM		WHT	BLK		2C-18AWG
BO2	Stg1Cmd	24 VAC	VFD/Starter	S1C	2C	TERM	TERM		WHT	BLK		2C-18AWG
BO3	Stg2Cmd	24 VAC	VFD/Starter	S2C	2C	TERM	TERM		WHT	BLK		2C-18AWG
BO4	Stg3Cmd	24 VAC	VFD/Starter	S3C	2C	TERM	TERM		WHT	BLK		2C-18AWG
BO5	OccCmd	24 VAC	VFD/Starter	OC	2C	TERM	TERM		WHT	BLK		2C-18AWG
IN3/AO0	RACO2Out	0-10Vdc (O)	Unit Contact (AO)	RACO2O	2C	TERM	TERM		WHT	BLK		2C-18AWG-S
IN4/AO1	SAFanAmp	0-10Vdc (I)	C-2343	SAFA	2C	0-5V	GND		WHT	BLK		2C-18AWG-S
IN5/AO2	EAFanAmp	0-10Vdc (I)	C-2343	EAFA	2C	0-5V	GND		WHT	BLK		2C-18AWG-S

I/O	Point Name	Signal	Device	Tag	# Cond	Term 1	Term 2	Term 3	T1 Col	T2 Col	T3 Col	Wire Type
IN0	DATemp	10k	TSAPA24E (T-Duct)	DAT	2C	SEN	NEG		WHT	BLK		2C-22AWG-S
IN1	RATemp	10k	TSAPA24E (T-Duct)	RAT	2C	SEN	NEG		WHT	BLK		2C-22AWG-S
IN2	MATemp	10k	TSDFA24L (T-Avg24)	MAT	2C	SEN	NEG		WHT	BLK		2C-22AWG-S
IN3	RACO2	0-10Vdc (I)	CT1D-A3D	RACO2	3C	V (0-10V)	GND	PWR	WHT	BLK	RED	3C-18AWG-S
IN4												
IN5												
IN6												
IN7												
IN8												
BO0		24VAC										
BO1		24VAC										
BO2		24VAC										
BO3		24VAC										
BO4		24VAC										
BO5		24VAC										
IN9/AO0												
IN10/AO1												
IN11/AO2												
IN12/AO3												
IN13/AO4												

PROVIDE ALL POINTS INDICATED WITHIN "SCHEDULE A" AS SPECIFIED

CORRECT QUANTITIES, AND/OR SIZES AND DIMENSIONS ARE THE RESPONSIBILITY OF THE CONTRACTOR

DEI Consulting Engineers
MECHANICAL | ELECTRICAL | AQUATIC

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☐ Reviewed ☒ Reviewed As Noted
☐ Not Reviewed ☐ Revise and Resubmit

System Name:

HVAC-1 (Gymnasium) - Sequence

E				J			
D				I			
C				H			
B				G			
A	Oct 18,2024	Submittal	MB	F			

Shop Drawing Revision Information | Submittal | Rev: 0 | October 18, 2024

HDSB Glenview PS. Gym Addition - 143 Townsend Ave

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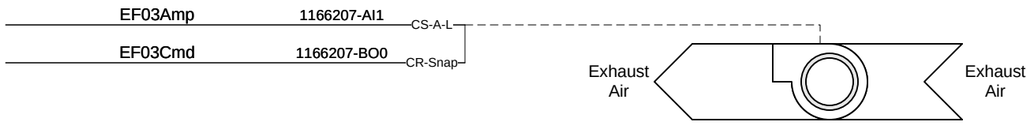
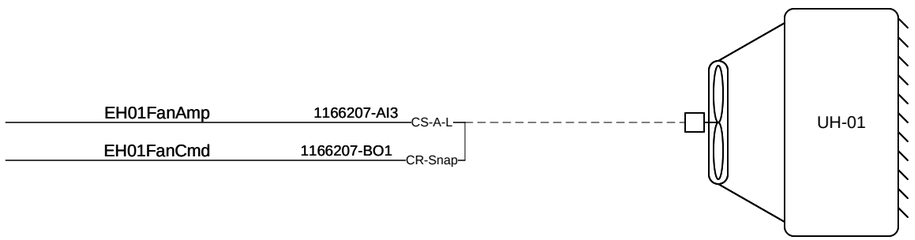
115 Norfinch Drive
North York, Ontario
M3N 1W8
Tel: 416.661.3400
Fax: 416.661.0100

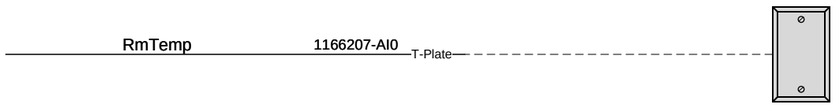
HTS PROJECT NUMBER
22404247-MECH-SWO

DRAWING NUMBER
Schematics - 6

Device ID	Description	Part #	Manufacturer	System	Qty
CR-Snap	Command Relay for Senva Current Sensor	CR3-24	SENVA	EF/UH	2
CS-A-L	Current Sensor, 5/10/20A, 0-5V	C-2343-L	SENVA	EF/UH	2
T-Plate	SS Plate Temp 10k-2	TE200AS24	GREYSTONE	EF/UH	1
VLC-444e	BACnet VLC Controller 444e w/ MS4 support	VLC-444e	ALERTON	EF/UH	1







Sequence of Operation

Exhaust Fan with Heater (eftemp/htr 0.0)

General

1. The exhaust fan will provide ventilation to the space.
2. The heater will provide heating to the space.

Safeties and Limits

1. The exhaust fan and heater will have minimum on and off times of 3 and 1 minute(s), respectively.
2. If the OAT is above 6°C (43°F) the heater will be disabled.

Modes of Operation

1. The system will continuously operate in the enabled mode.

Enabled Mode

1. The heater will cycle to maintain the space temperature at heating setpoint, initially set to 18°C (64.4°F).
2. The exhaust fan will cycle to maintain the space temperature at cooling setpoint, initially set to 27°C (80.6°F).

High Priority Alarms (Alarm visible in Alarm Console, and visually on graphics)

1. Space temperature is equal to or less than 5°C.
2. Space temperature is more than 3°C (5°F) (adjustable) below heating setpoint for more than 10 minutes (adjustable).

Low Priority Alarms (Alarm visible in Alarm Console, and visually on graphics)

1. Space temperature is equal to or less than 17°C.

Trends (15-minute intervals)

1. Exhaust fan amps.
2. Space temperature and space heating / cooling setpoint.
3. Heater fan command and amps.

PROVIDE ALL POINTS INDICATED WITHIN "SCHEDULE A" AS SPECIFIED

I/O	Point Name	Signal	Device	Tag	# Cond	Term 1	Term 2	Term 3	T1 Col	T2 Col	T3 Col	Wire Type
IN0	RmTemp	10k	TE200AS24	RT	2C	SEN	NEG		WHT	BLK		2C-22AWG-S
IN1	EF03Amp	0-5Vdc	C-2343-L	EF03A	2C	0-5V	GND		WHT	BLK		2C-18AWG-S
IN2	EH01FanAmp	0-10Vdc	C-2343-L	EH01FA	2C	0-5V	GND		WHT	BLK		2C-18AWG-S
IN3												
IN4												
BO0	EF03Cmd	24VAC	VFD/Starter	EF03C	2C	TERM	TERM		WHT	BLK		2C-18AWG
BO1	EH01FanCmd	24VAC	VFD/Starter	EH01FC	2C	TERM	TERM		WHT	BLK		2C-18AWG
BO2												
BO3												
BO4												

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☐ Reviewed ☒ Reviewed As Noted
☐ Not Reviewed ☐ Revise and Resubmit

CORRECT QUANTITIES, AND/OR SIZES AND DIMENSIONS ARE THE RESPONSIBILITY OF THE CONTRACTOR

System Name: Exterior Storage Room

E				J			
D				I			
C				H			
B				G			
A	Oct 18,2024	Submittal	MB	F			

Shop Drawing Revision Information | Submittal | Rev: 0 | October 18, 2024

HDSB Glenview PS. Gym Addition - 143 Townsend Ave

HTS Engineering Ltd.
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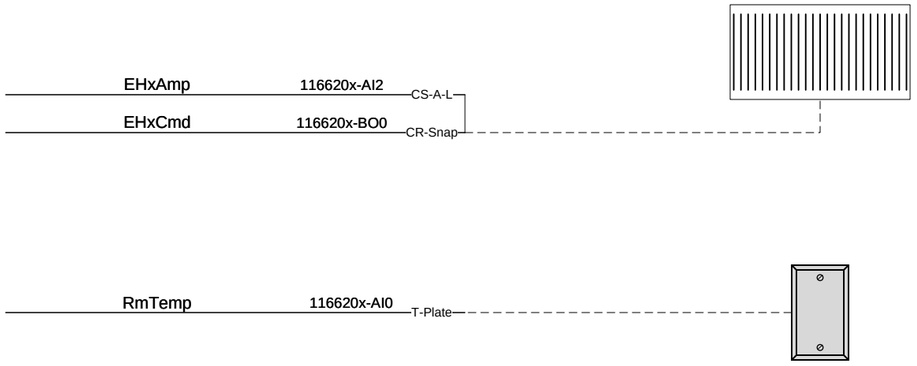
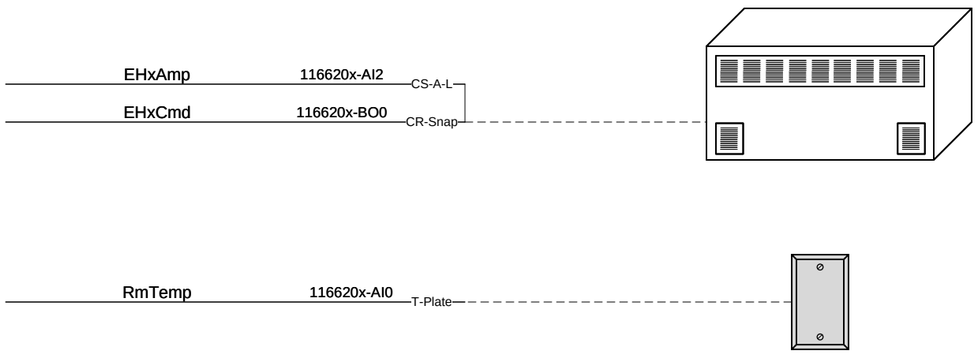
North York, Ontario
M3N 1W8
Tel: 416.661.3400
Fax: 416.661.0100

HTS PROJECT NUMBER: 22404247-MECH-SWO

DRAWING NUMBER: Schematics - 7



Typical Electric Baseboard Heater



Typical Electric Forced Flow Heater

Device ID	Description	Part #	Manufacturer	System	Qty
CR-Snap	Command Relay for Senva Current Sensor	CR3-24	SENVA	Typ. EH	3
CS-A-L	Current Sensor, 5/10/20A, 0-5V	C-2343-L	SENVA	Typ. EH	3
T-Plate	SS Plate Temp 10k-2	TE200AS24	GREYSTONE	Typ. EH	3
VLC-444e	BACnet VLC Controller 444e w/ MS4 support	VLC-444e	ALERTON	Typ. EH	3

Sequence of Operation

Ancillary Heater (ph_anc 0.1)

General

1. The heater will provide heating to the space.

Safeties and Limits

1. The heater will have minimum on and off times of 3 and 1 minute(s), respectively.
2. If the OAT is above 6°C (43°F) the heater will be disabled.

Modes of Operation

1. Heating set-point shall be 18°C and will be disabled by a 2°C dead-band.
2. The heater will cycle to maintain the space temperature at heating setpoint.

High Priority Alarms (Alarm visible in Alarm Console, and visually on graphics)

1. Space temperature is equal to or less than 5°C.
3. Space temperature is more than 3°C (5°F) (adjustable) below setpoint for more than 10 minutes (adjustable).

Trends (15-minute intervals)

1. Space temperature and space heating setpoint.
2. Heater fan command and amps.

PROVIDE ALL POINTS INDICATED WITHIN "SCHEDULE A" AS SPECIFIED

I/O	Point Name	Signal	Device	Tag	# Cond	Term 1	Term 2	Term 3	T1 Col	T2 Col	T3 Col	Wire Type
IN0	RmTemp	10k	TE200AS24	RT	2C	SEN	NEG		WHT	BLK		2C-22AWG-S
IN1												
IN2	EHxAmp	0-10Vdc	C-2343-L	EHA	2C	0-5V	GND		WHT	BLK		2C-18AWG-S
IN3												
BO0	EHxCmd	24VAC	VFD/Starter	EHC	2C	TERM	TERM		WHT	BLK		2C-18AWG
BO1												
BO2												
BO3												
AO0												
AO1												
AO2												
AO3												

I/O	Point Name	Signal	Device	Tag	# Cond	Term 1	Term 2	Term 3	T1 Col	T2 Col	T3 Col	Wire Type
IN0	RmTemp	10k	TE200AS24	RT	2C	SEN	NEG		WHT	BLK		2C-22AWG-S
IN1												
IN2	EHxFanAmp	0-10Vdc	C-2343-L	EHFA	2C	0-5V	GND		WHT	BLK		2C-18AWG-S
IN3												
BO0	EHxFanCmd	24VAC	VFD/Starter	EHFC	2C	TERM	TERM		WHT	BLK		2C-18AWG
BO1												
BO2												
BO3												
AO0												
AO1												
AO2												
AO3												

Sequence of Operation & Wiring Diagram

CORRECT QUANTITIES, AND/OR SIZES AND DIMENSIONS ARE THE RESPONSIBILITY OF THE CONTRACTOR

DEI Consulting Engineers
MECHANICAL | ELECTRICAL | AQUATIC

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☐ Not Reviewed ☐ Revise and Resubmit

System Name: Typ. Heaters

E				J				
D				I				
C				H				
B				G				
A	Oct 18,2024	Submittal	MB	F				

Shop Drawing Revision Information | Submittal | Rev: 0 | October 18, 2024

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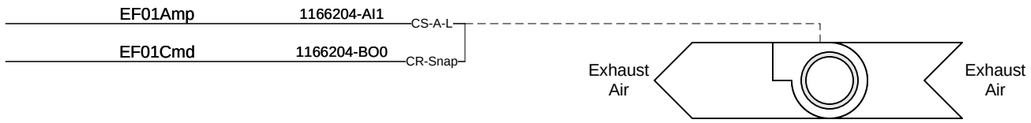
115 Norfinch Drive
North York, Ontario
M3N 1W8
Tel: 416.661.3400
Fax: 416.661.0100

HTS PROJECT NUMBER: 22404247-MECH-SWO

DRAWING NUMBER: Schematics - 8

Device ID	Description	Part #	Manufacturer	System	Qty
CR-Snap	Command Relay for Senva Current Sensor	CR3-24	SENVA	EF TOD	1
CS-A-L	Current Sensor, 5/10/20A, 0-5V	C-2343-L	SENVA	EF TOD	1
VLC-550-E	BACnet VLC Controller 550-E	VLC-550-E	ALERTON	EF TOD	1

PROVIDE ALL POINTS INDICATED
WITHIN "SCHEDULE A" AS SPECIFIED



Sequence of Operation

Exhaust Fan (Group C - Staff & Classroom Washrooms) (eftod 0.0)

General

1. The exhaust fan will provide ventilation to the space.

Modes of Operation

1. A time of day schedule will determine the occupied and unoccupied modes of operation and will match the school schedule and when the school is occupied by custodial or cleaning staff.

Occupied Mode

1. The exhaust fan will run.

Unoccupied Mode

1. The exhaust fan will stop.

Trends (15-minute intervals)

1. Exhaust fan amps.

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☐ Not Reviewed ☐ Revise and Resubmit

I/O	Point Name	Signal	Device	Tag	# Cond	Term 1	Term 2	Term 3	T1 Col	T2 Col	T3 Col	Wire Type
IN0												
IN1	EFxAmp	0-10Vdc	C-2343-L	EFA	2C	0-5V	GND		WHT	BLK		2C-18AWG-S
IN2												
IN3												
IN4												
BO0	EFxCmd	24VAC	VFD/Starter	EFC	2C	TERM	TERM		WHT	BLK		2C-18AWG
BO1												
BO2												
BO3												
BO4												

System Name:	E				J			
	D				I			
Typ. Exhaust Fan	C				H			
	B				G			
	A	Oct 18,2024	Submittal	MB	F			
	Shop Drawing Revision Information		Submittal		Rev:	0	October 18, 2024	

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HTS Engineering Ltd.
115 Norfinch Drive
North York, Ontario
M3N 1W8
Tel: 416.661.3400
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HTS PROJECT NUMBER
22404247-MECH-SWO

DRAWING NUMBER
Schematics - 9

FAN SCHEDULE								
Project:	22404247-MECH-SWO - HDSB Glenview PS. Gym Addition - 143 Townsend Ave							
ID	Location			Graphic File	Controller		Control Type	Notes
	Room #	Room Name	Dwg		Type	Address		
EF-01	134/135/137/138	Washrooms / Changerooms	M102	eftod	VLC-550-E	1166204	Time of Day	
EF-02	129	Staff Room	M102	Standlone as Per HDSB Specifications (Interlocked to Range Hood)				
EF-03	140	Exterior Storage Room	M102	ef/uh	VLC-444-E	1166207	Temperature	

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☐ Not Reviewed ☐ Revise and Resubmit

CORRECT QUANTITIES, AND/OR SIZES AND DIMENSIONS ARE THE RESPONSIBILITY OF THE CONTRACTOR

System Name:

Schedules - Fan

E				J			
D				I			
C				H			
B				G			
A	Oct 18,2024	Submittal	MB	F			

Shop Drawing Revision Information | Submittal | Rev: 0 | October 18, 2024

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HTS PROJECT NUMBER
22404247-MECH-SWO

DRAWING NUMBER
Schematics - 10

UNIT, CABINET UNIT HEATER SCHEDULE

Project: 22404247-MECH-SWO - HDSB Glenview PS. Gym Addition - 143 Townsend Ave

ID	Location			Graphic File	Controller		Sensor	Heating System	Notes
	Room #	Room Name	Dwg		Type	Address			
EH-01	140	Exterior Storage Room	M102	ef/uh	VLC-444-E	1166207	TE200AS24	Electric Unit Heater	
EH-02	134	Washroom	M102	ph_anc	VLC-444-E	1166205	TE200AS24	Electric Baseboard Heater	
EH-03	135	Washroom	M102	ph_anc	VLC-444-E	1166206	TE200AS24	Electric Baseboard Heater	
EH-04	V-4	Vestibule	M102	ffh_anc	VLC-444-E	1166208	TE200AS24	Electric Forced Flow Heater	

DEI Consulting Engineers
MECHANICAL | ELECTRICAL | AQUATIC

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CORRECT QUANTITIES, AND/OR SIZES AND DIMENSIONS ARE THE RESPONSIBILITY OF THE CONTRACTOR

System Name:

Schedules - Heater

E				J			
D				I			
C				H			
B				G			
A	Oct 18,2024	Submittal	MB	F			

Shop Drawing Revision Information | Submittal | Rev: 0 | October 18, 2024

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HTS PROJECT NUMBER
22404247-MECH-SWO

DRAWING NUMBER
Schematics - 11

ASCENT BY ALERTON VIP-363-HOA VIP-363-VAV

Powered by BACtalk

VIP-363-HOA

VIP-363-HOA

The VIP-363-HOA is designed for central plant systems, air handling units, clean rooms, fume hoods, large terminal units, and similar control and process equipment.

VIP-363-VAV

VIP-363-VAV

The VIP-363-VAV is designed for pressure-independent control of any single-duct variable air volume (VAV) box; it is ideally suited for critical environment applications such as Laboratory Airflow Tracking, Critical Patient Rooms, Operating Rooms, and other applications requiring precise control of airflows.

The VIP-363-VAV has a field replaceable integral airflow sensor. The airflow sensor is factory calibrated at multiple velocity points. Minimum, maximum, and reheat airflows can be entered using a Microset wall unit or compatible operator workstation software.

The Alerton® VisualLogic® IP Controller (VIP) is a BACnet Building Controller (B-BC) with a real-time clock, high resolution 16-bit universal inputs and outputs, and a 32-bit processor. The VIP controllers include on-board Hand-Off-Auto (HOA) switches for all outputs. It can operate as a stand-alone controller using its own real-time clock.

As a native BACnet B-BC, the VIP controllers integrate seamlessly with your BACnet system, communicating at up to 1000Mbps on BACnet/Ethernet, BACnet/IPv4, BACnet/IPv6 networks and Network Time Protocol (NTPv4). The VIP controllers have an integral 4-port switch that supports star, daisy-chain, and ring network topologies in addition to Rapid Spanning Tree Protocol (RSTP). Switch ports 2-4 can be enabled/disabled locally or via BACnet.

The VIP controllers support the Alerton Microtouch™, as well as the BACtalk® Microset, Microset II, and Microset 4 intelligent wall sensors, which offer convenient data display, setpoint adjustment, and technician access to equipment setup parameters.

All control logic is programmed using Alerton's easy-to-learn graphical programming language, VisualLogic®. The VIP controllers can execute more complex calculations to meet the needs of increasingly demanding sequences of operations for building systems. Programming and setup data are stored in non-volatile flash memory, ensuring stable and reliable operation.

The VIP controllers host automation features such as schedules, trendlogs, alarms, and zones (optimum start).

The VIP-363-HOA model supports up to eight expansion input/output modules VXIO-322-HOA and VXIO-965-HOA. The VIP-363-VAV does not support the VXIO modules.

The VIP-363-HOA model running firmware version 1.7.7 and newer supports alternate connectivity to a EIA-485 network for communicating via BACnet/MSTP.

VIP-363			
UI UNIVERSAL INPUTS	BO BINARY OUTPUTS	UIO UNIVERSAL INPUTS/OUTPUTS (selectable between UI and AO)	VAF VAV FLOW SENSOR (VIP-363-VAV only)
3	6	5	1

TECHNICAL DATA

POWER – 20 to 30 VAC @ 50-60 Hz. 15 VA minimum (maximum 100 VA across all BO loads). Half-wave rectified. Refer to the VIP-363 Installation and Operations Guide for more detailed information on power requirements and transformer sizing. See IMPORTANT NOTE below.

INPUTS – 16-bit universal inputs accept 10k thermistor (type II and III), dry contact, 1k platinum RTD, 0-20 mA, 0-10 V, or dry-contact pulse. No external resistor required for 0-20 mA. Pulse input maximum frequency of 100 Hz. Pulse input minimum duty cycle 5ms ON / 5ms OFF.

POWER OUTPUT FOR EXTERNAL SENSORS – 20 VDC ±10% @ 250 MA maximum.

BINARY OUTPUTS – Solid-state relay rated 20-30 VAC @ 50/60 Hz, 1.0 amp continuous, 3.5 amp inrush for 100ms. Hand-Off-Auto (H-O-A) switches for manual override, software controlled, monitored switch position status. See IMPORTANT NOTE below.

ANALOG OUTPUTS – 16-bit universal analog outputs support Voltage Mode: 0-10 VDC @ 10 mA maximum (1k ohm minimum); Current Mode: 4-20 mA @ 550 ohms Maximum; or Binary Mode: 12 VDC @ 20mA maximum relay coil current (for controlling low-coil current 12 VDC relays and solid-state relays). Hand-Off-Auto (H-O-A) switches with potentiometers for manual override, software controlled, monitored switch position and potentiometer status.

MICROSET – Supports BACtalk® Microset, Microset II, or Microset 4 on input 0 (IN-0).

INPUT/OUTPUT TERMINATIONS – Removable header-type screw terminals.

PRESSURE SENSOR (VIP-363-VAV) – 16-bit polarity insensitive pressure sensor. 0-2 in.w.c. (500 Pa) range. 0.0004 in.w.c. (0.1 Pa) zero-point accuracy. 0.5% span repeatability. 1/8-inch x 3/8-inch long barb-fitting. Field replaceable.

MAX DIMENSIONS – 5.32“ (135 mm) W x 4.33” (110 mm) H x 2.26” (57.4 mm) D.

MOUNTING – 35mm DIN rail or screw mounting.

ENVIRONMENTAL – Ambient: -20 to 55°C (-4 to 131°F) / Storage: -20 to 85°C (-4 to 185°F) / 5 to 95%RH non-condensing.

COMMUNICATIONS – Built-in 4-port Ethernet switch supports 10/100/1000BASE-T; and remote enable/disable of ports 2, 3, and 4 via BACnet.

VIP-363-HOA v1.7.7 and newer supports EIA-485 (RS-485) over twisted shielded-pair (TSP); auto-baud switching (9.6kbps, 19.2kbps, 38.4kbps, 76.8kbps, or 115.2kbps); communication status LED.

PROTOCOLS –BACnet/Ethernet, BACnet/IPv4, BACnet/IPv6, BACnet MSTP (VIP-363-HOA v1.7.7 and newer), Network Time Protocol v4 (NTPv4), and Rapid Spanning Tree Protocol (RSTP).

PROGRAMMING – Supports Alerton’s BD3 and BD9 DDC file formats using Alerton’s VisualLogic® toolset.

REAL TIME CLOCK – 24-hour, 365-day, multi-year calendar, with 24-hour power fail backup.

AUTOMATION FEATURES – Supports 100 trendlogs, 100 alarms, 10 schedules, and 1 zone (Optimum Start - internal points only)

MICROPROCESSOR – 32-bit ARM Cortex-A9, 800 MHz.

MEMORY – 1GB LPDDR3 RAM and 2GB solid-state disk storage.

I/O MICROCONTROLLER – 32-bit ARM Cortex-M4F, 180 MHz.

SECURITY – Integrated secure boot prevents loading of tampered firmware.

INPUT/OUTPUT EXPANSION – VIP-363-HOA model supports up to a maximum of eight expansion I/O modules VXIO-322-HOA and VXIO-965-HOA. Expansion I/O modules connect directly to VIP-363-HOA or can be remotely located up to 3000 feet away from the VIP-363-HOA. VIP-363-VAV does not support the VXIO modules.

ORDERING INFORMATION

ITEM NUMBER	
VIP-363-HOA	ASCENT VISUALLOGIC® IP CONTROLLER
VXIO-322-HOA	ASCENT VISUALLOGIC® EXPANSION I/O MODULE
VXIO-965-HOA	ASCENT VISUALLOGIC® EXPANSION I/O MODULE
VIP-363-VAV	ASCENT VISUALLOGIC® IP CONTROLLER WITH INTEGRAL AIRFLOW SENSOR
VAV-FILTER	SINGLE FILTER FOR VIP-363-VAV

CERTIFICATION AND CONFORMANCE

BACNET CONFORMANCE – BACnet Building Controller (B-BC) level device; BTL listing, certification, and compliance to Revision 18.

UL – Listed with Underwriters Laboratory for Energy Management Equipment (PAZX) under the UL Standard for Safety 60730-1; listing includes both U.S. and Canadian (CSA/cUL) certification. Listed in UL File# E87741. UL 2043 and CAN/ULC-S142 compliance for use in plenum applications.

EMC – EMC Directive 2014/30/EU (European CE Mark).

RoHS – RoHS Directive 2011/65/EU.

FCC – FCC Part 15, Subpart B.

IC – ICES-003 Issue 6.

IMPORTANT NOTE

This device is UL listed and limited to 100VA maximum. Binary output loads are restricted by this maximum VA rating. If all 6 binary outputs are connected and fully loaded (@24VA each) the total VA of the device will exceed the UL [illegible] and limited maximum rating. DO NOT EXCEED 100VA MAXIMUM RATING!

DEI Consulting Engineers
MECHANICAL | ELECTRICAL | AQUATIC

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☒ Reviewed ☐ Reviewed As Noted
☐ Not Reviewed ☐ Revise and Resubmit

16201 25th Avenue W., Lynnwood, WA 98087
Telephone: (425) 921-4900
alerton.com / sales@alerton.com

ASCENT BY ALERTON VXIO-322-HOA VXIO-965-HOA

Powered by BACtalk

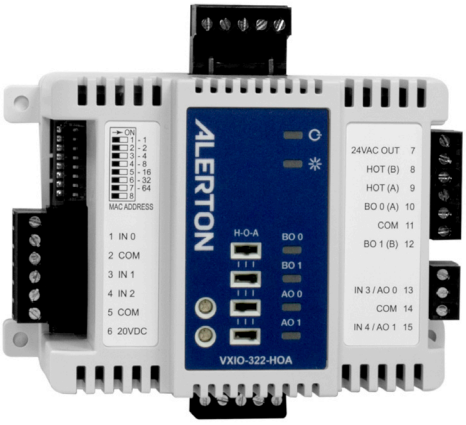
EXPANDING THE ALERTON VIP CONTROLLER CAPACITY

The Alerton® VisualLogic® Expansion Input/Output Modules (VXIO) are designed to expand the I/O capacity of Alerton® VisualLogic® IP Controllers (VIP).

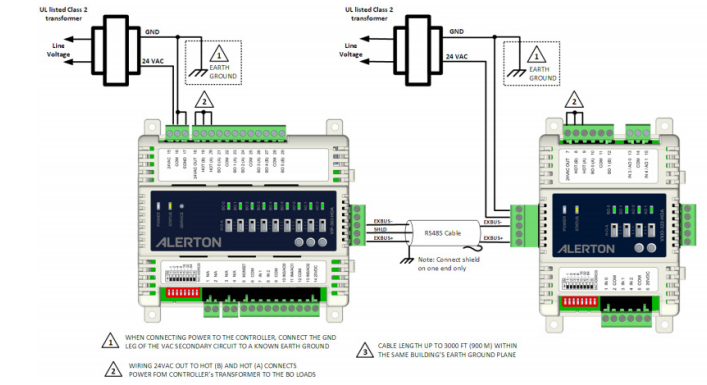
The VIP controller is a BACnet Advanced Application Controller (B-AAC) with a real-time clock, high resolution 16-bit universal inputs and outputs, and a 32-bit processor. The VIP-363-HOA model is designed to support up to eight VXIO modules providing the I/O expansion for applications such as central plant systems, air handling units, clean rooms, fume hoods, large terminal units, and similar control and process equipment.

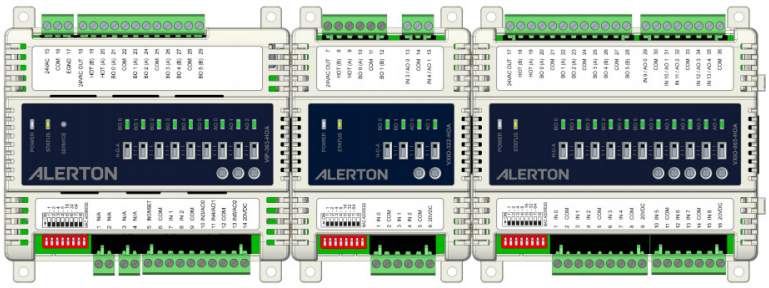
VXIO modules connect directly into the I/O expansion slot of a VIP-363-HOA controller or another VXIO module. Alternatively, VXIO modules can also be mounted remotely with total RS485 cable length of up to 3000 feet.

VXIO-965-HOA



VXIO-322-HOA





VIP-363-HOA controller, VXIO-232-HOA and VXIO-965-HOA expansion modules

VXIO-322-HOA			
UI UNIVERSAL INPUTS	BO BINARY OUTPUTS	UIO UNIVERSAL INPUTS/OUTPUTS (selectable between UI and AO)	AF AIR-FLOW SENSOR (VIP-363-VAV only)
3	2	2	0

VXIO-965-HOA			
UI UNIVERSAL INPUTS	BO BINARY OUTPUTS	UIO UNIVERSAL INPUTS/OUTPUTS (selectable between UI and AO)	AF AIR-FLOW SENSOR (VIP-363-VAV only)
9	6	5	0

TECHNICAL DATA

POWER – 20 to 30 VAC @ 50-60 Hz. VXIO-965-HOA: 35 VA minimum / VXIO-322-HOA:15 VA minimum. (maximum 100 VA across all BO loads). Half-wave rectified. See IMPORTANT NOTE below.

INPUTS – 16-bit universal inputs accept 10k thermistor (type II and III), dry contact, 1k platinum RTD, 0-20 mA, 0-10 V, or dry-contact pulse. Pulse input maximum frequency of 100 Hz. Pulse input minimum duty cycle 5ms ON / 5ms OFF.

POWER OUTPUT FOR EXTERNAL SENSORS – 20 VDC ±10% @ 250 mA maximum for VXIO-965-HOA and 100 mA maximum for VXIO-322-HOA.

BINARY OUTPUTS – Solid-state relay rated 20-30 VAC @ 50/60 Hz, 1.5 amps continuous, 3.5 amp inrush for 100ms. Hand-Off-Auto (H-O-A) switches for manual override, software controlled, monitored switch position status. See IMPORTANT NOTE below.

ANALOG OUTPUTS – 16-bit universal analog outputs support Voltage Mode: 0-10 VDC @ 10 mA maximum (1k ohm minimum); Current Mode: 4-20 mA @ 550 ohms Maximum; or Binary Mode: 12 VDC @ 20mA maximum relay coil current (for controlling low-coil current 12 VDC relays and solid-state relays). Hand-Off-Auto (H-O-A) switches with potentiometers for manual override, software controlled, monitored switch position and potentiometer status.

INPUT/OUTPUT TERMINATIONS – Removable header-type screw terminals.

MAX DIMENSIONS – VXIO-965-HOA: 5.32“ (135 mm) W x 4.33” (110 mm) H x 2.26” (57.4 mm) D. / VXIO-322-HOA: 3.35” (85 mm) W x 4.33” (110 mm) H x 2.26” (57.4 mm) D.

MOUNTING – 35mm DIN rail or screw mounting

ENVIRONMENTAL – Ambient: -20 to 55°C (-4 to 131°F) / Storage: -20 to 85°C (-4 to 185°F) / 5 to 95%RH non-condensing.

COMMUNICATIONS – Communications with the VIP controller is a proprietary protocol over RS-485.

MICROCONTROLLER – 32-bit ARM Cortex M4, 120 MHz.

MEMORY – 512KB of on-chip flash and 128KB of RAM.

SECURITY – Integrated secure boot prevents loading of tampered firmware.

ORDERING INFORMATION

ITEM NUMBER

VIP-363-HOA	ASCENT VISUALLOGIC® IP CONTROLLER
VXIO-322-HOA	ASCENT VISUALLOGIC® EXPANSION I/O MODULE
VXIO-965-HOA	ASCENT VISUALLOGIC® EXPANSION I/O MODULE

CERTIFICATION AND CONFORMANCE

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FCC – FCC Part 15, Subpart B.

IC – ICES-003 Issue 6.

IMPORTANT NOTE

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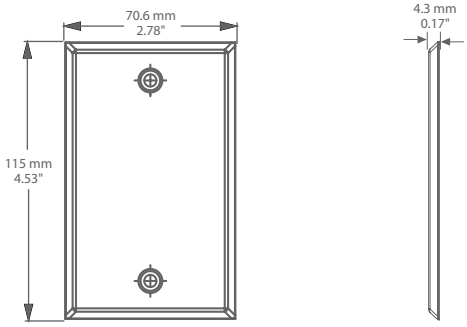
alerton.com / sales@alerton.com

GREYSTONE
ENERGY SYSTEMS INC

STAINLESS STEEL SURFACE TEMPERATURE SENSOR



TE200AS SERIES

PRODUCT DESCRIPTION

The TE200AS series is a single gang, blank stainless steel wall plate that incorporates a precision temperature sensor used to monitor room temperatures where additional security is required. Additional options are available that include manual override.

TYPICAL INSTALLATION

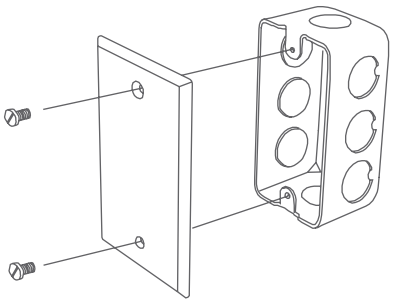
For complete installation and wiring details, please refer to the product installation instructions.

The TE200AS series can be flush mounted directly to a single gang electrical box or directly to a wall. Insulating foam is adhered to the back of the wall plate to provide a thermal barrier from internal wall temperatures.

A pigtail is used for connection to the Building Automation System.

SPECIFICATIONS

SENSOR TYPE	Various Thermistor or RTD
TEMPERATURE RANGE	-20 to 60°C (-4 to 140°F)
AMBIENT OPERATING RANGE	-20 to 60°C (-4 to 140°F)
ENCLOSURE	Stainless Steel - IP50 (NEMA 1)
DIMENSIONS	114.3mm L x 69.85mm W x 4.75mm D (4.5" x 2.75" x 0.1875")
TERMINATION	**Sensor Only:** Pigtail 2 or 3 wire **Sensor with Options:** Terminal Block
COUNTRY OF ORIGIN	Canada



ORDERING

PRODUCT	**TE200AS**	Stainless Steel Room Temperature Sensor
SENSOR	**2**	100 Ω Platinum, IEC 751, 385 Alpha, thin film
	5	1801 Ω NTC Thermistor, ±0.2°C
	6	3000 Ω NTC Thermistor, ±0.2°C
	7	10,000 Ω Type 3, NTC Thermistor, ±0.2°C
	8	2.252K Ω NTC Thermistor, ±0.2°C
	12	1000 Ω Platinum, IEC 751, 385 Alpha, thin film
	13	1000 Ω Nickel, Class B, DIN 43760
	14	10,000 Ω Type 3, NTC Thermistor, ±0.2°C c/w 11K shunt resistor
	20	20,000 Ω NTC Thermistor, ±0.2°C
	24	10,000 Ω Type 2, NTC Thermistor, ±0.2°C
	59	10,000 Ω @ 25°C, ±1%, B = 3435 ±1% (25/85)
OPTIONS (MULTIPLE SELECTIONS CAN BE MADE)	**BS**	Exposed push button momentary switch - N.O.
	GB	Grayhill exposed push button - N.O., SPST, 3A
	LY	Yellow LED
	LR	Red LED
	LG	Green LED
	CJ	3.5mm Phono jack for remote system access
	TP	Tamperproof screws
	GS	Greystone Customized Version (TE200AD*GS***)

PART NUMBER
TE200AS

NOTE: Greystone Energy Systems, Inc. reserves the right to make design modifications without prior notice.

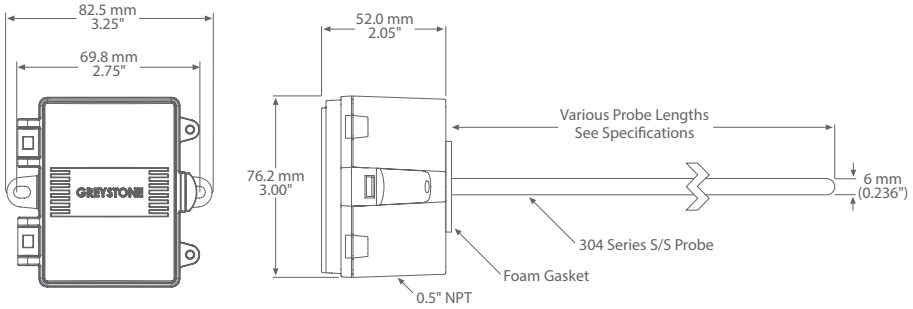
RoHS COMPLIANT

Greystone Energy Systems, Inc.
150 English Drive, Moncton,
New Brunswick, Canada E1E 4G7

Ph: +1 (506) 853-3057 Fax: +1 (506) 853-8014
North America: 1-800-561-5611
E-mail: mail@greystoneenergy.com

GREYSTONE
ENERGY SYSTEMS INC

ALL PURPOSE DUCT/IMMERSION TEMPERATURE SENSOR



TSAP SERIES

PRODUCT DESCRIPTION

The all purpose single point temperature sensor utilizes a precision sensor encapsulated in a 6 mm (0.236"), 304 series stainless steel probe and is available in various lengths. All probes provide excellent heat transfer, fast response and resistance to moisture penetration.

TYPICAL INSTALLATION

For complete installation and wiring details, please refer to the product installation instructions.

In duct applications the probes are installed in the side of the duct to monitor a single point temperature within the duct. Select a probe length that allows the probe to span the duct width. Install the probe in a straight section of duct at a suitable distance downstream from any heating, cooling, or humidification devices.

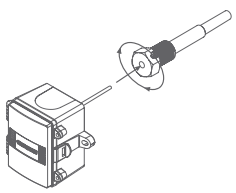
For immersion applications ensure the probe is installed in the appropriate length thermowell for the pipe size. Thermal conductive compound should be added inside the thermowell to provide optimum thermal transfer.

For immersion applications, a T2 Series thermowell is required. When using a T1 series thermowell an adapter will be required.

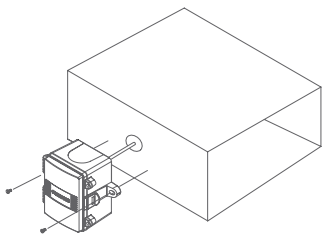
SPECIFICATIONS

SENSOR TYPE	Thermistor or RTD (see ordering chart)
SENSOR ACCURACY	**Thermistors:** ±0.2°C (±0.36°F) @ 25°C (77°F) **Platinum RTD's:** ±0.3°C (±0.54°F) @ 0°C (32°F) **Nickel RTD's:** ±0.4°C (±0.72°F) @ 0°C (32°F)
PROBE SENSING RANGE	-40 to 100°C (-40 to 212°F)
AMBIENT OPERATING RANGE	-40 to 50°C (-40 to 122°F), 5 to 95 %RH non-condensing
WIRE MATERIAL	PVC insulated, parallel bonded, 22 AWG
PROBE MATERIAL	304 series stainless steel
PROBE DIAMETER	6 mm (0.236")
STANDARD LENGTHS	50, 100, 150, 200, 300, and 450 mm (2", 4", 6", 8", 12", and 18")
ENCLOSURE	ABS, UL94-V0, IP65 (NEMA 4X) **C:** includes terminal block **E:** same as C, with thread adapter (1/2" NPT to M16), and cable gland fitting
TERMINATION	**A:** pigtail, 2 or 3 wire **C & E:** terminal block, 2 or 3 wire
COUNTRY OF ORIGIN	Canada

MOUNTING STYLES



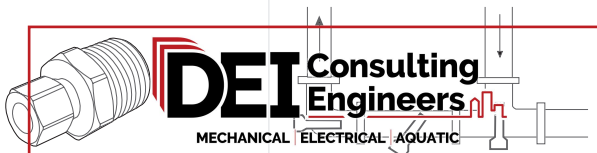
THERMOWELL MOUNTING



DUCT MOUNTING

(#0201001092)

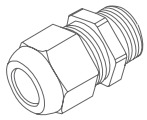
T1-AP THERMOWELL ADAPTER



THERMOWELL PLACEMENT

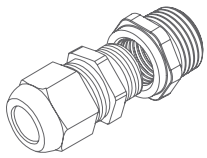
GREYSTONE
ENERGY SYSTEMS INC

ACCESSORIES - INCLUDED WITH E ENCLOSURE OPTION



CABLE GLAND FITTING

THREAD ADAPTER 1/2" NPT TO M16



ORDERING

PRODUCT	**TSAP**	All Purpose Duct/Immersion Temperature Sensor
ENCLOSURE	**A**	ABS, with hinged and gasketed cover
	C	Same as A, with terminal block
	E	Same as C, with thread adapter and cable gland fitting
SENSOR	**02**	100 Ω Platinum, IEC 751, 385 Alpha, thin film
	05	1801 Ω NTC Thermistor, ±0.2°C
	06	3000 Ω NTC Thermistor, ±0.2°C
	07	10,000 Ω Type 3, NTC Thermistor, ±0.2°C
	08	2.252K Ω NTC Thermistor, ±0.2°C
	12	1000 Ω Platinum, IEC 751, 385 Alpha, thin film
	13	1000 Ω Nickel, Class B, DIN 43760
	14	10,000 Ω Type 3, NTC Thermistor, ±0.2°C c/w 11K shunt resistor
	20	20,000 Ω NTC Thermistor, ±0.2°C
	24	10,000 Ω Type 2, NTC Thermistor, ±0.2°C
	59	10,000 Ω, 25°C, ±1%, B = 3435 ±1% (25/85)
PROBE LENGTH	**A**	50mm (2")
	B	100mm (4")
	C	150mm (6")
	D	200mm (8")
	E	300mm (12")
	F	450mm (18")

PART NUMBER

TSAP

NOTE: Greystone Energy Systems, Inc. reserves the right to make design modifications without prior notice.

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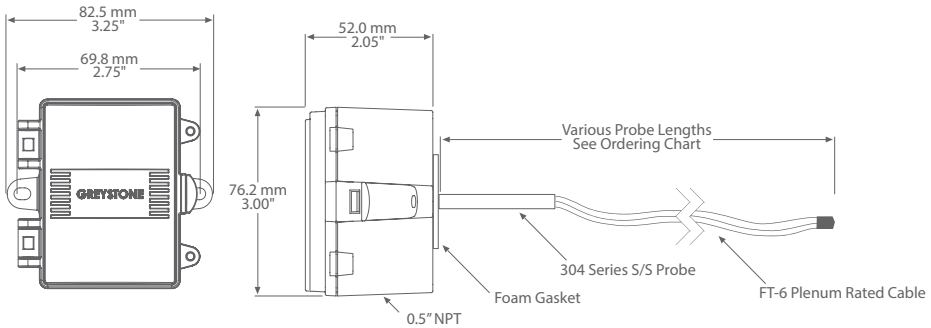
RoHS COMPLIANT

Greystone Energy Systems, Inc.
150 English Drive, Moncton,
New Brunswick, Canada E1E 4G7

Ph: +1 (506) 853-3057 Fax: +1(506) 853-6014
North America: 1-800-561-5611
E-mail: mail@greystoneenergy.com

GREYSTONE
ENERGY SYSTEMS INC

FLEXIBLE CABLE DUCT AVERAGE TEMPERATURE SENSOR



TSDF SERIES

PRODUCT DESCRIPTION

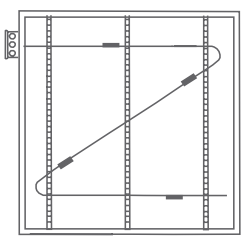
The flexible multi-point duct average temperature sensor utilizes several precision sensors spaced at equal distances. The probe is FT-6 rated plenum cable and is available in various lengths. All probes are constructed to provide excellent heat transfer and a fast response.

TYPICAL INSTALLATION

For complete installation and wiring details, please refer to the product installation instructions.

The flex-duct average probes are installed through a hole in the side of the duct to monitor an average temperature within the duct. Select a probe length that allows for criss-crossing the duct multiple times. Install the probes in a straight section of duct at a suitable distance downstream from any heating, cooling, or humidification devices. **The cable probe needs to be fastened onto hangers using tube clamps or wire ties and should be secured every 100 cm or 3' maximum to prevent movement of the wire and prevent wear. If sensor is to be used in high velocity or vibration environment use of rigid style duct probe is recommended.**

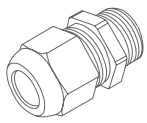
The enclosure provides mounting tabs for ease of installation.



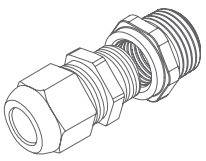
SPECIFICATIONS

SENSOR TYPE	Thermistor or RTD (see ordering chart)
SENSOR ACCURACY	**Thermistors:** ±0.2°C (±0.36°F) @ 25°C (77°F) **Platinum RTD's:** ±0.3°C (±0.54°F) @ 0°C (32°F) **Nickel RTD's:** ±0.4°C (±0.72°F) @ 0°C (32°F)
PROBE SENSING RANGE	-20 to 60°C (-4 to 140°F)
AMBIENT OPERATING RANGE	-40 to 50°C (-40 to 122°F), 5 to 95 %RH non-condensing
WIRE MATERIAL	FT-6 rated plenum cable, 22 AWG
STANDARD LENGTHS	1800, 3600, 6100, 7300mm (6', 12', 20', 24')
ENCLOSURE	ABS, UL94-V0, IP65 (NEMA 4X) **C:** includes terminal block **E:** same as C, with thread adapter (1/2" NPT to M16), and cable gland fitting
TERMINATION	**A:** pigtail, 2 or 3 wire **C & E:** terminal block, 2 or 3 wire
COUNTRY OF ORIGIN	Canada

ACCESSORIES - INCLUDED WITH E ENCLOSURE OPTION



CABLE GLAND FITTING



THREAD ADAPTER 1/2" NPT TO M16

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GREYSTONE
ENERGY SYSTEMS INC

ORDERING			PART NUMBER
PRODUCT	**TSDF**	Flexible Cable Duct Average Temperature Sensor	**TSDF**
ENCLOSURE	**A**	ABS, with hinged and gasketed cover	
	C	Same as A, with terminal block	
	E	Same as C, with thread adapter and cable gland fitting	
SENSOR	**02**	100 Ω Platinum, IEC 751, 385 Alpha, thin film	
	05	1801 Ω NTC Thermistor, ±0.2°C	
	06	3000 Ω NTC Thermistor, ±0.2°C	
	07	10,000 Ω Type 3, NTC Thermistor, ±0.2°C	
	08	2.252K Ω NTC Thermistor, ±0.2°C	
	12	1000 Ω Platinum, IEC 751, 385 Alpha, thin film	
	13	1000 Ω Nickel, Class B, DIN 43760	
	14	10,000 Ω Type 3, NTC Thermistor, ±0.2°C c/w 11K shunt resistor	
	20	20,000 Ω NTC Thermistor, ±0.2°C	
	24	10,000 Ω Type 2, NTC Thermistor, ±0.2°C	
	59	10,000 Ω, 25°C, ±1%, B = 3435 ±1% (25/85)	
PROBE LENGTH	**I**	1800mm (6′) 4 sensors	
	J	3600mm (12′) 4 sensors	
	K	6100mm (20′) 4 sensors	
	L	7300mm (24′) 9 sensors	

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RoHS COMPLIANT

Greystone Energy Systems, Inc.
150 English Drive, Moncton,
New Brunswick, Canada E1E 4G7

Ph: +1 (506) 853-3057 Fax: +1 (506) 853-6014
North America: 1-800-561-5611
E-mail: mail@greystoneenergy.com

THERMOSTATS & CONTROLLERS

THERMOSTAT REMOTE SENSOR ACCESSORIES

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

DESCRIPTION

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

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

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

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

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

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

PN-46 Aluminum sensor holder with adhesive backing

DESCRIPTION

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

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

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

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

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

Hole Diameter: 1.65"

C7-A2x

8-pin, miniature relay, 2-poles, faston

Type			**C7-A2x/ ... V** Standard relay 2 change-over contact
Maximum contact load			**10 A/250 V AC-1 0,5 A/110 V DC-1** **10 A/30 V DC-1 0,2 A/220 V DC-1**
Recommended minimum contact load			**10 mA/10 V Code 0, 9** **5 mA/5 V Code 8**

Contacts

Material	Standard	Code 0	AgNi
	Optional	Code 8	AgNi + 10 µ Au
	Optional	Code 9	AgNi + 0,2 µ Au
Rated current			10 A
Switch-on current max. (20 ms)			30 A
Switching voltage max.			250 V
AC load (Fig 1)			2,5 kVA
DC load			see Fig. 2

Coil

Coil resistance	see table; tolerance ± 10 %
Pick-up voltage	≤ 0,8 x U_N
Release voltage	≥ 0,1 x U_N
Nominal power	1,2 VA (AC)/1 W (DC)

Coil table

VAC	Ω	mA	VDC	Ω	mA
24	174	50	12	148	85
48	686	25	24	594	43
115	4K3	10,4	48	2K3	21
230	18K6	5,2	110	11K4	10

Insulation

	Volt rms, 1 min
Contact open	1000 V
Contact/contact	2,5 kV
Contact/coil	2,5 kV
Insulation resistance at 500 V	≥1 GΩ
Insulation, IEC 61810-1	2,5 kV/3

Specifications

Ambient temperature operation/storage	-40 (no ice)….60 °C /-40 ... 80 °C
Pick-up time/bounce time	16 ms/≤ 3 ms
Release time/bounce time	8 ms/≤ 1 ms
Mechanical life ops	AC: 10 Mill./DC: 20 Mill.
DC voltage endurance at rated load	≥100000 switching cycles
Switching frequency at rated load	≤ 1200/h
Protection class	IP40
Weight	43 g

Standard types

VAC 50 Hz/60 Hz: 24, 48, 115 (120), 230 (240)	**C7-A20/AC ... V**	**C7-A28/AC ... V**	**C7-A29/AC ... V**
LED	**C7-A20X/AC ... V**	**C7-A28X/AC ... V**	**C7-A29X/AC ...V**
VDC 12, 24, 48, 110	**C7-A20/DC ... V**	**C7-A28/DC ... V**	**C7-A29/DC ... V**
LED	**C7-A20X/DC ... V**	**C7-A28X/DC ... V**	**C7-A29X/DC ... V**
Free wheeling diode	**C7-A20DX/DC ... V**	**C7-A28DX/DC ...V**	**C7-A29DX/DC .V**
Polarity and free wheeling diode	**C7-A20FX/DC ... V**	**C7-A28FX/DC ... V**	**C7-A29FX/DC ...V**
AC/DC bridge rectifier 24 V, 48 V, 60 V	**C7-A20BX/UC ... V**	**C7-A28BX/UC ... V**	**C7-A29BX/UC ... V**

"..." Enter the voltage for full type designation

Accessories

Socket: **S7-C, S7-I/O, S7-L, S7-P, S7-PC**

Connection diagram

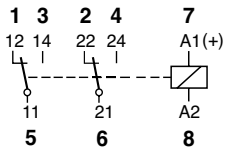


Fig. 1 AC voltage endurance

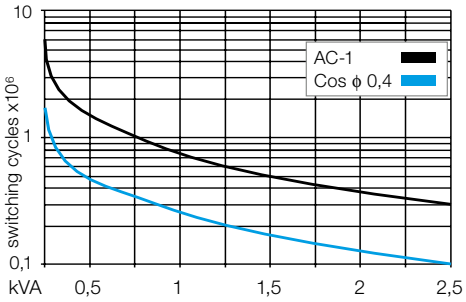
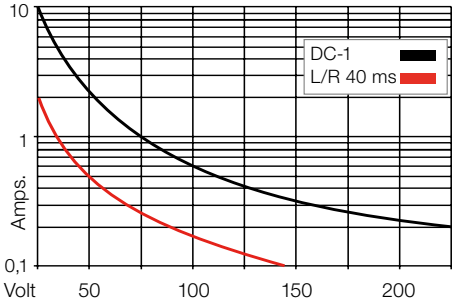
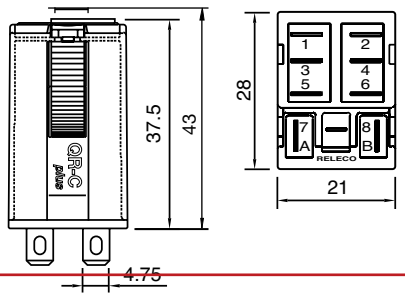


Fig. 2 DC load limit curve



Dimensions [mm]



Technical approvals, conformities

S7-C

Socket for miniature relays C7-... and C80 series time relays

Type:	**S7-C** 2-pole, 1 level integrated clip and marking label suitable for clips C80 series time relays coil bridge bus bar to connect in A2 plug-in slot for overvoltage suppressing units
Rated current	**10 A**

Specifications

Rated load	10 A / 250 V
Insulation	Test voltage Vrms / 1 min
– All terminal/DIN rail	2.5 kV
– Terminal/terminal	2.5 kV
Cross section of connecting wire	
– Single wire	4 mm^2, 2 x 1,5 mm^2
– Multi wire	2,5 mm^2 / AWG 16, 2 x 1 mm^2 / AWG 18
Max. screw torque	0.7 Nm
Screw dimensions	M3, Pozi, slot
Integrated retaining clip/plastic	for relays C7
Labelling space	detachable
Connection label	1 … 8, DIN/EN
Mounting	DIN rail TS35 or mounting plate
Ambient temperature operation/storage	-40 (no ice) … 60 °C / -40 … 80 °C
Weight	37g

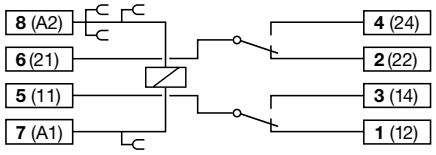
Associated plug-in 8-pin QRC relays	**C7-A2x, C7-T, C7-G, C7-X, C7-W, C7-H**
Associated C80 time relays	**C83, C85, 84**

Accessories

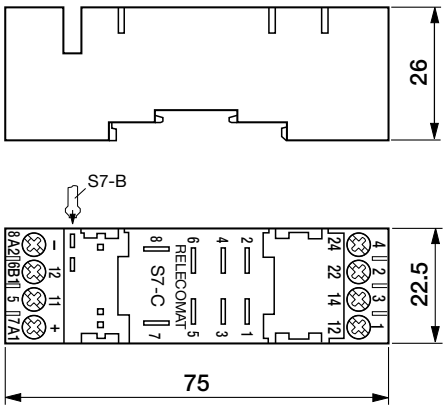
Coil bridge bus bar	**S7-BB**
Retaining clip, plastic	**CP-07B**

Please note:
This socket replaces former socket S7-M
fully compatible

Connection diagram



Dimensions [mm]



Technical approvals, conformities

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Analog
Current Sensors

0-5VDC, 0-10VDC 4-20mA outputs
Selectable range split-cores
Optional command relay
Fixed ranges on solid-cores

DESCRIPTION

Senva analog transducers measure AC current and provide a proportional output for load trending and control. Choose from easy to install split-core or compact solid core. Selectable ranges and optional command relay make for a versatile transducer.

APPLICATIONS

- Load trending
- Motor control
- Process control
- Fan/Pump status
- Motor load jamming
- Lighting load levels

FEATURES

Split-core switch selectable ranges (30, 60, 120A or 5, 10, 20A full scale ranges)

- Makes scaling easy
- Reduces inventory
- No call backs due to mis-sizing

0-5VDC, 0-10VDC, 4-20mA loop powered versions

- Versions compatible with any system

Superior split core design for easy installation

- 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

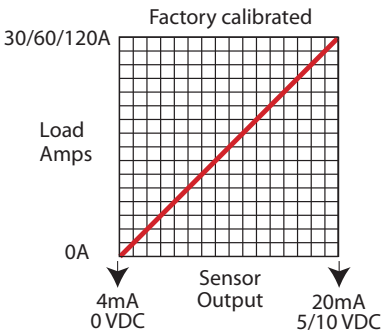
Snap-on command relay for unitary start/ stop/status

- Reduces the number of installed components… saves time and space
- Removable relay facilitates service

Reliable and cost-effective

- Industry leading 7 year limited warranty

SET-POINT OPERATION- MODELS C-2343, C-2344, C-2345



SPECIFICATIONS

Temperature Rating	-15-60 ° C
Insulation Class	600V RMS. For use on insulated conductors only! Use minimum 75 ° C insulated conductor
Frequency Range	50/

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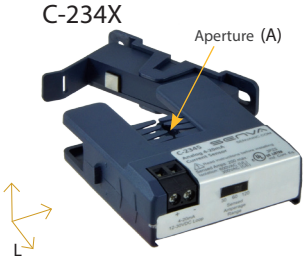
SPLIT CORE
C-234X



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 detach-able base toscrew or DIN mount
- Larger 0.75″ apeture accomodates oversize conductors

OPTIONAL RELAY

L: 0.84″ H: .72″ W: 2.06″

- Add to 234X series to get start/stop/status in a single device
- Reduces the number of installed components... saves time and space
- Removable relay facili-tates service

SOLID CORE
C-120X

L: 1.91″ H: .88″ W: 1.31″
A: 0.23″ diameter

- Compact design
- Apeture accomodates spade terminals

ORDERING INFORMATION

SPLIT CORE	Range A	Output	Sensor Power
C-2343	30A, 60A, 120A Selectable	0 - 5 VDC	Induced
C-2344	30A, 60A, 120A Selectable	0 - 10 VDC	Induced
C-2345	30A, 60A, 120A Selectable	4 - 20mA	Loop- powered, 30 VDC
C-2343-L	5A, 10A, 20A Selectable	0 - 5 VDC	Induced
C-2345-L	5A, 10A, 20A Selectable	4 - 20mA	Loop- powered, 30 VDC
C-2343-200	200A	0 - 5 VDC	Induced
SOLID CORE - MINI			
C-1203	15 A	0 - 5 VDC	Induced
C-1205	15 A	4 - 20mA	Loop- powered, 30 VDC
C-1203-L	5 A	0 - 5 VDC	Induced

COMMAND RELAY	Contact rating	Coil
CR3-24	N.O. 10A @ 125VAC	24VAC/DC, 10mA
CR4-24	N.C. 10A @ 125VAC	24VAC/DC, 10mA
CR3-12	N.O. 10A @ 125VAC	12VDC, 25mA
CR4-12	N.C. 10A @ 125VAC	12VDC, 25mA

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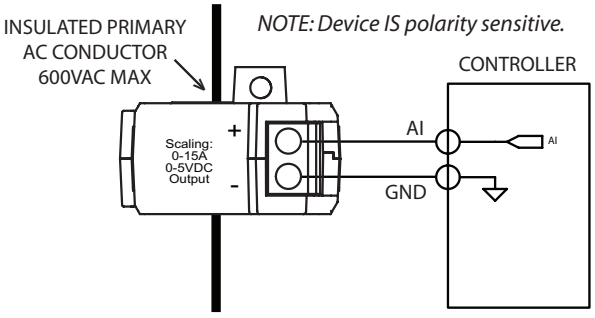
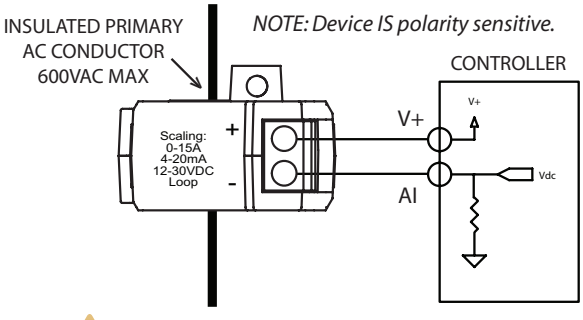
TYPICAL WIRING 0-5/10VDC OUTPUT



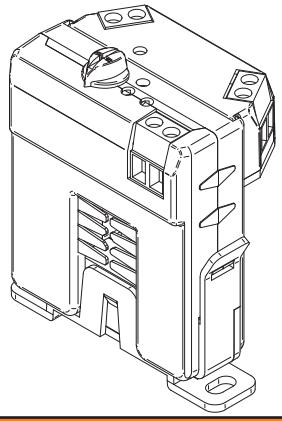
TYPICAL WIRING LOOP 4-20 MA



Warning: Refer to installation instructions that accompany product and heed all safety instructions. Do not rely on current status LED to indicate presence of power.

INSTALLATION INSTRUCTIONS

CR3-24V Relay Module, 1 x N.O. Fits C23xx series



3PZS
c UL US LISTED

DANGER

Failure to follow these instructions will result in death or serious injury.

Hazard of electrical shock, explosion, and arc flash

- Follow ALL requirements in NFPA 70E for safe work practices and for Personal Protective Equipment (USA) and other applicable local codes when installing this product
- Only qualified electrical personnel should install this product.
- Read, understand, and follow all instructions thoroughly
- Install only on insulated conductors
- Lock out and tag out all power sources prior to installation. Use properly rated voltage sensing instrument to determine no voltage is present

WARNING

Failure to follow these instructions could result in death or serious injury.

Automated equipment may start without warnng

- Equipment monitored/operated by this device may start without warning. Keep clear of apparatus at all times

IMPORTANT WARNINGS

- Only qualified trade installers should install this product
- This product is not intended for life-safety applications
- Do not install in hazardous or classified locations
- The installer is responsible for all applicable codes
- This product must be installed in a suitable electrical enclosure

PRODUCT APPLICATION LIMITATION:

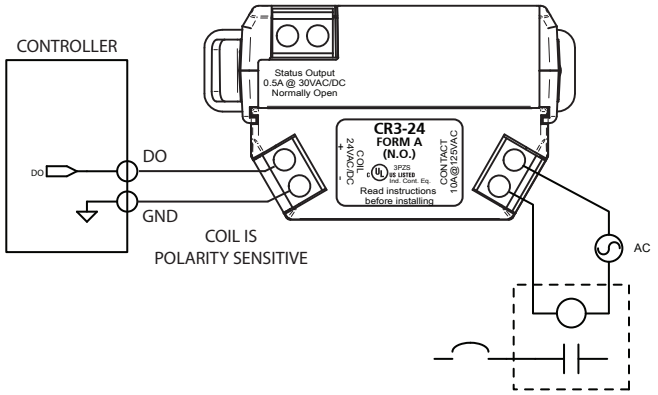
Senva products are not designed for life or safety applications. Senva products are not intended for use in critical applications such as nuclear facilities, human implantable device or life support. Senva is not liable, in whole or in part, for any claims or damages arising from such uses.

INSTALLATION

Disconnect, lock out and tag out all power supplies during installation

1. Slide relay module onto any C23xx series mini split-core sensor.
2. Wire relay module to control panel and to motor starter. Tighten terminals to 3.5 in-lb.
3. Observe polarity of relay coil terminals.

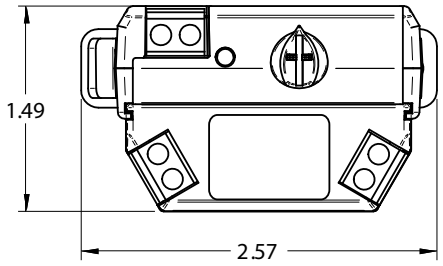
WIRING EXAMPLES



OPERATION

The CR3 command relay module slides onto any C23xx series sensor, providing a convenient means of controlling line-voltage devices such as motor starters from low-voltage control signals.

DIMENSIONS



Troubleshooting

Symptom	Causes	Remedy
LED not lit, relay not e[illegible]ed	Coil wiring incorrect	Check polarity
	Coil voltage too low	Check coil voltage

M[illegible]imum surrounding air temperature, 60 ° C.

For use in Pollution Degree 2 Environment.

Part Number	CR3-12	CR3-24
Coil	9-12VDC, 30mA nom.	24VAC/DC, 15mA nom.
Contact Arrangement	NO, (1 form A)	
Contact Rating	10A@250VAC (UL C300 RATED)	
Temperature Rating	-15~60 ° C	
Dimensions (LxWxH)	2.4" x 1.1" x 1.69" (1.4" H with relay module)	

CT1D Duct
CO_2 Sensor

LCD display with field calibration menu
2000/5000/10000 ppm CO_2
Integrated set-point relay
Field replaceable NDIR element

DESCRIPTION

Senva CO_2 sensors maximize energy savings by ensuring optimal ventilation. Measuring exhaled CO_2 levels ensures air is conditioned only when needed. The CT1D series is duct mount sensor with NDIR sensing element and features that include a standard LCD, optional thermistor for temperature, setpoint relay, menu selectable auto-calibration and provision to offset the reading +/-250ppm.

APPLICATIONS

- Controlling ventilation in response to occupancy
- Facilitates compliance with ASHRAE 62.1 standard for air quality
- Offices, conference rooms, and public assembly areas

FEATURES

Easy to install and maintain

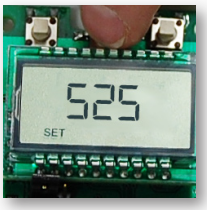
- Integrated display and push-button menus for field selectable scale, calibration, and operational modes
- Dual 4-20mA and 0-5V/0-10V output (dip-switch selectable)
- Integrated high-reliability solid-state set-point relay is ideal for direct control applications; easy to set up thanks to LCD

High reliability reduces call backs

- Non-dispersive infrared sensing element (NDIR)
- 15+ year life expectancy on CO_2 sensing element
- Industry leading 7-year limited warranty on electronics; NDIR module 3 years

High accuracy for improved system performance

- Selectable auto-calibration mode returns sensor to baseline values
- ±30ppm, ±3% of reading



Display and menu

- Easy set point and calibration adjustments. Set offsets for CO_2

PROUDLY MADE IN USA

7 year limited warranty

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ORDERING

CT1 D - [ ] 3 [ ]

Enclosure

D = Duct
O = Outdoor

Temperature

A = None
B = Transmitter
C = 100Pt (385)
D = 1000Pt (385)
E = 10k type 2
F= 10k type 3
G = 10k type 3 w/11k shunt
H = 3k
I = 2k2
J = 1k8
K = 20k
L = 100k

Display (LCD)

D = Display
X= None

To order replacement sensor elements, please consult factory

SPECIFICATIONS

Power Supply		12-30VDC, 50mA max / 24VAC(1), 100mA max.
Analog Outputs	Dual Analog	3-wire 4-20mA and 0-5V/0-10V (2) (dip switch selectable)
	Output scaling CO_2	0 - 2000 (default) or 0 - 5000/10000 ppm (selectable)
	Output Scaling Temp	32 to 122ºF (0-50ºC) or -40 to 140ºF (-40-60ºC) (Switch Selectable)
Digital Setpoint Output	Programmable	Solid-state, 1A @ 30VAC/DC, N.O.
Sensor Performance	Type	Non-dispersive Infrared (NDIR)
	Accuracy	±30ppm, ±3% of reading (0-2000ppm), 0-50ºC, 0-85%RH ±50ppm, ±5% of reading (2000-5000ppm), 0-50ºC, 0-85%RH Consult factory for 5000-10000ppm accuracy
	Response time	60s to 90% reading
	Output update rate	1s
	Operating Environment	14 to 122ºF (-10 to 50ºC), 0 to 95% RH
LCD Menu Setup Parameters	SPH, Setpoint, Hi (On point)	500ppm to full-scale (800ppm default)
	SPL, Setpoint, Lo (Off point)	400ppm to full-scale-50 (700ppm default)
	SCL, Scaling	0-2000ppm (default), 0-5000ppm, 0-10000ppm
	AdJ_ Adjustment	Offset adjustment +/-250ppm (0 default)
	CAL_ Calibration mode	Automatic mode ON or OFF (default=ON)
	run_ Run mode	Displays CO_2 in ppm
Operating Environment	Temperature	4 to 122ºF (-10 to 50ºC)
	Humidity	0-95% non-condensing
Enclosure	Material	ABS/Polycarbonate
	Dimensions	4.0" h x 4.4"w x 2.1"d (+6.8" probe)

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