ECL-VAV

LonMark® Certified VAV Controller

Overview

The ECL-VAV Series controllers are microprocessor-based programmable variable air volume (VAV) controllers designed to control any variable air volume box. Each controller uses the LonTalk® communication protocol and is LonMark certified as an SCC VAV.

Applications

- ☐ Cooling Only VAV Boxes
- ☐ Dual-Duct VAV Systems
- ☐ Cooling with Reheat VAV Boxes
- ☐ Parallel Fan VAV Boxes
- ☐ Series Fan VAV Boxes
- ☐ Room Pressurization
- ☐ Smart Room Control support for HVAC, light, and shades/sunblinds

Features & Benefits

Flexible Inputs and Outputs

This controller has various input types including resistance, voltage, and digital-based ones. Moreover, it provides digital, floating, pulse width modulation, and proportional control outputs for valves, heating elements, fans, and lighting applications. This controller covers all industry-standard HVAC unitary applications.

Highly Accurate Universal Inputs

Highly accurate universal inputs support thermistors and resistance temperature detectors (RTDs) that range from 0 Ohms to 350,000 Ohms, as well as support for inputs requiring 0 to 10VDC or 0 to 20mA with an external resistor. This provides the freedom of using your preferred or engineer-specified sensors, in addition to any existing ones.

Rugged Inputs/Outputs

Rugged hardware inputs and outputs eliminate need for external protection components, such as diodes for 12V DC relays.

Preloaded Applications

Factory preloaded applications allow these controllers, straight out of the box, to operate standard VAV equipment with a proven energy-efficient sequence of operation thereby eliminating the need for programming.

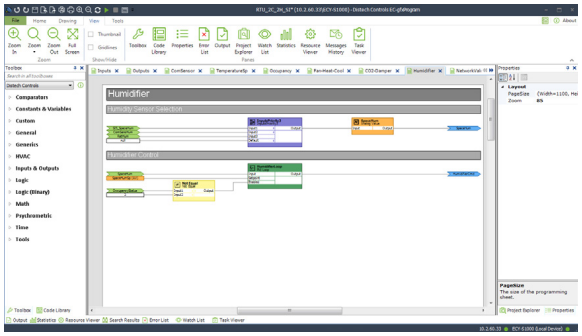
The preloaded application can be selected using an Allure EC-Smart-Vue sensor even before the network has been installed for rapid deployment or through the EC-Net™ solution using Distech Controls' *dcgfx*Applications.

Integrated VPACC

Integrated VAV Performance Assessment Control Charts (VPACC) control sequences, provides a means of automatically detecting when the VAV is operating outside of its design parameters including: Persistent High/Low Space Temperature, Persistent High/Low Discharge Temperature, Persistent High/Low Air Flow, and Unstable Air Flow.

Programmability

Supports Distech Controls' EC-*gfx*Program, which makes Building Automation System (BAS) programming effortless, by allowing you to visually assemble building blocks to create a custom control sequence for any HVAC / building automation application.



Increased Energy Efficiency

Improves energy efficiency when combined with:

- Motion detectors to automatically adjust a zone's occupancy mode from standby to occupied when presence is detected
- CO_2 sensors as part of a demand-controlled ventilation strategy that adjusts the amount of fresh air intake according to the number of building occupants
- Light switches to control both lighting and a room's HVAC occupancy / standby mode setting

On-Board Air Flow Sensor

This controller is equipped with an accurate on-board air flow sensor for precise air flow monitoring and control at low and high air flow rates, allowing the design for maximum energy efficiency while maintaining an optimal comfort level

The on-board air flow sensor has a range of ±2 inches of water column (±500 Pascal) and is polarity free.

Built-in Actuator

A built-in actuator with a brushless motor and integrated position feedback system eliminates periodic damper re-initialization and ensures worry-free operation, providing increased occupant comfort and extended service life.

The built-in actuator for precise damper positioning used for loads requiring up to 45 inch-pounds (5 Newton-meters) of torque.

Robust Hardware Design

This Controller features durable pitot terminal barbs which help prevent damage when connecting and disconnecting the pitot tubes. The anchor point and mounting bracket are metallic, making the mounting of the VAV very solid.

Extended Daisy-Chaining

The power supply uses power factor correction (PFC) to optimize power usage when multiple controllers are connected to the same transformer. This allows for up to 20 VAV controllers or up to 950 feet of wiring to be connected to the same transformer, offering an opportunity to save not only on installation costs, but also on overall wiring costs.

Optimized Air Balancing

Optimized air balancing process saves time during commissioning: the flow sensor requires no zero flow calibration, and its variable-speed motor goes to minimum and maximum flow position in half the time of typical VAV actuators.

Smart Room Control Support

The Smart Room Control solution is an end-to-end system for the control of HVAC equipment, lighting, and shades/sunblinds, achieving the highest levels of comfort for occupants while cutting costs from installation time and wiring/ material requirements to energy consumption. This solution combines:

- Lighting and shade/sunblind expansion modules to control lights (DALI, on/off or dimming) and shades/sunblinds (24 VDC or 100-240 VAC, up/down and angle rotation).
- Multi-sensor combining motion and luminosity (Lux) sensors and equipped with an Infrared receiver that works with a convenient remote control.
- Wireless (infrared) personal remote control for increased occupant comfort.
- Allure™ Series Communicating Sensors for increased occupant comfort settings.

Open-to-Wireless™ Solution

Open-to-Wireless™

The controllers are Open-to-Wireless™ ready, and when paired with the Wireless Receiver, work with a variety of wireless battery-less sensors and switches, to reduce the cost of installation and minimize the impact on existing partition walls. For supported frequencies in your area, refer to the Open-to-Wireless Solution Guide.

Available with an optional Wireless Receiver that supports up to 18 wireless inputs to create wire-free installations.

Allure™ Series Communicating Sensor Support

These controllers work with a wide range of sensors, such as the Allure Series Communicating Sensors that are designed to provide intelligent sensing and control devices for increased user experience and energy efficiency.

- Allure EC-Smart-Vue sensors feature a backlit-display and graphical menus that provide precise environmental zone control, with any combination of the following: temperature, humidity, CO_2, and motion sensor.
- Allure EC-Smart-Comfort sensors feature colored LED indicators to provide user feedback, rotary knobs to adjust the setpoint offset and fan speed, and an occupancy override push button. This sensor can also be expanded with a combination of up to 4 add-on push button modules for lighting and shade/ sunblind control.
- Allure EC-Smart-Air sensors combine precise environmental sensing in a discreet and alluring enclosure for temperature, humidity, and CO_2.

Supported Platforms

EC-Net Solution

The EC-Net multi-protocol integration solution is web-enabled and powered by the Niagara Framework, establishing a fully Internet-enabled, distributed architecture for real-time access, automation and control of devices. The EC-Net open framework solution creates a common development and management environment for integration of LonWorks®, BACnet® and other protocols. Regardless of manufacturer and protocol, the EC-Net system provides a unified modeling of diverse systems and data, providing one common platform for development, management and enterprise applications.

Model Selection

Model	ECL-VAV
Points	12-Point VAV
Universal hardware inputs	4
Built-in flow sensor	■
Wireless inputs[1]	18
15 Vdc Power Supply	■
Digital (Triac) outputs	4
Universal outputs	2
Built-in actuator	■

1. All controllers are Open-to-Wireless ready. Available when an optional Wireless Receiver is connected to the controller. Some wireless sensors may use more than one wireless input from the controller.

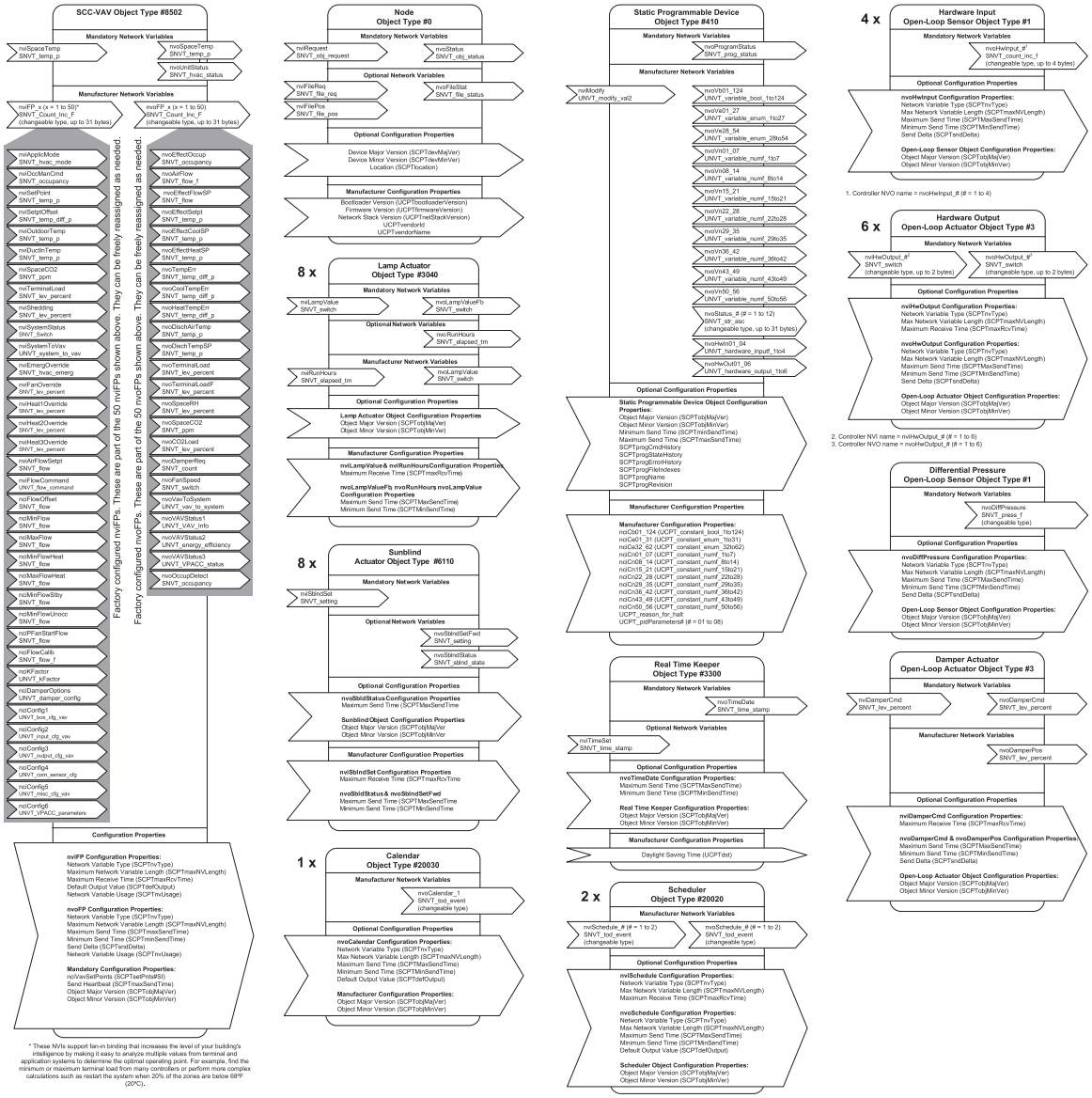
Accessories

Terminal covers	Terminal cover designed to conceal the controller's wire terminals. Required to meet local safety regulations in certain jurisdictions.

Objects List

Calendar Objects	1
□ Events per calendar	25
Schedule Objects	2
□ Special events per schedule	5
PID Loop Objects	8
Constants:	
□ Boolean	124
□ Enumeration	62
□ Numeric	56
Variables:	
□ Boolean	124
□ Enumeration	54
□ Numeric	56
nciSetpoint	■
Total Network Variables	171
Network Variable Input (General Usage):	
□ NVI Changeable Type, Up to 31 Bytes	50
Network VariableOutput (General Usage):	
□ NVO Changeable Type, Up to 31 Bytes	50
Hardware Input Network Variable:	
□ nvoHwInput per Hardware Input	■
Hardware Input Network Variable:	
□ nviHwInput per Hardware Output	■
□ nvoHwInput per Hardware Output	■
Lamp Object	8
Sunblind Object	8

Functional Profile



Product Specifications

Power Supply Input

Voltage Range[1]	24VAC/DC; ±15%; Class 2
Frequency Range	50/60Hz
Overcurrent Protection	Field replaceable fuse
Fuse Type	3.0A
Power Consumption	4 VA typical plus all external loads[2], 75 VA max. (including powered triac outputs)
Power Factor	>90%

1. 24VDC does not support DO (triac outputs).
2. External loads must include the power consumption of any connected modules such as subnet devices, wireless module (1VA) and triac outputs. Refer to the respective module's datasheet for related power consumption information.

Communications

Communication	LonTalk Protocol
Transceiver	FT 5000 Free Topology Smart Transceiver
Channel	TP/FT-10; 78Kbps
LonMark Interoperability Guidelines	Version 3.4
Device Class	SCC VAV

LonMark Functional Profile :

☐ Input Objects	Open-Loop Sensor #1
☐ Output Objects	Open-Loop Actuator #3
☐ Node Object	Node Object #0
☐ Real Time Clock	Real Time Keeper #3300
☐ Scheduler	Scheduler #20020
☐ Calendar	Calendar #20030
☐ Programmable Device	Static Programmable Device #410
☐ SCC Object	SCC VAV #8502

Hardware

Processor	STM32 (ARM Cortex™ M3) MCU, 32 bit
CPU Speed	68 MHz
Memory	384 kB Non-volatile Flash (applications) 1 MB Non-volatile Flash (storage) 64 kB RAM
Real Time Clock (RTC)	Built-in Real Time Clock without battery Network time synchronization is required at each power-up cycle before the RTC become available
Status Indicator	Green LEDs: power status & LAN Tx Orange LEDs: controller status & LAN Rx

Subnetwork[1]

Communication	RS-485
Cable	Cat 5e, 8 conductor twisted pair
Connector	RJ-45
Connection Topology	Daisy-chain Configuration
Maximum number of supported devices per controller combined	4
□ Allure Series sensor	Up to 4[1]
□ EC-Multi Sensor	Up to 4
□ ECx-Light-4 / ECx-Light-4D / ECx-Light-DALI	Up to 2
□ ECx-Blind-4 / ECx-Blind-4LV	Up to 2

1. A controller can support a maximum of two Allure Series Communicating Sensor models equipped with a CO_2 sensor. The remaining connected Allure Series Communicating Sensor models must be without a CO_2 sensor.

Wireless Receiver[1]

Communication Protocol	EnOcean wireless standard
Number of Wireless Inputs[2]	18
Supported Wireless Receivers	Refer to the Open-to-Wireless Solution Guide
Cable	Telephone cord
□ Connector	4P4C modular jack
□ Length (maximum)	6.5ft (2m)

1. Available when an optional external Wireless Receiver module is connected to the controller. Refer to the Open-to-Wireless Solution Guide for a list of supported EnOcean wireless modules.
2. Some wireless modules may use more than one wireless input from the controller.

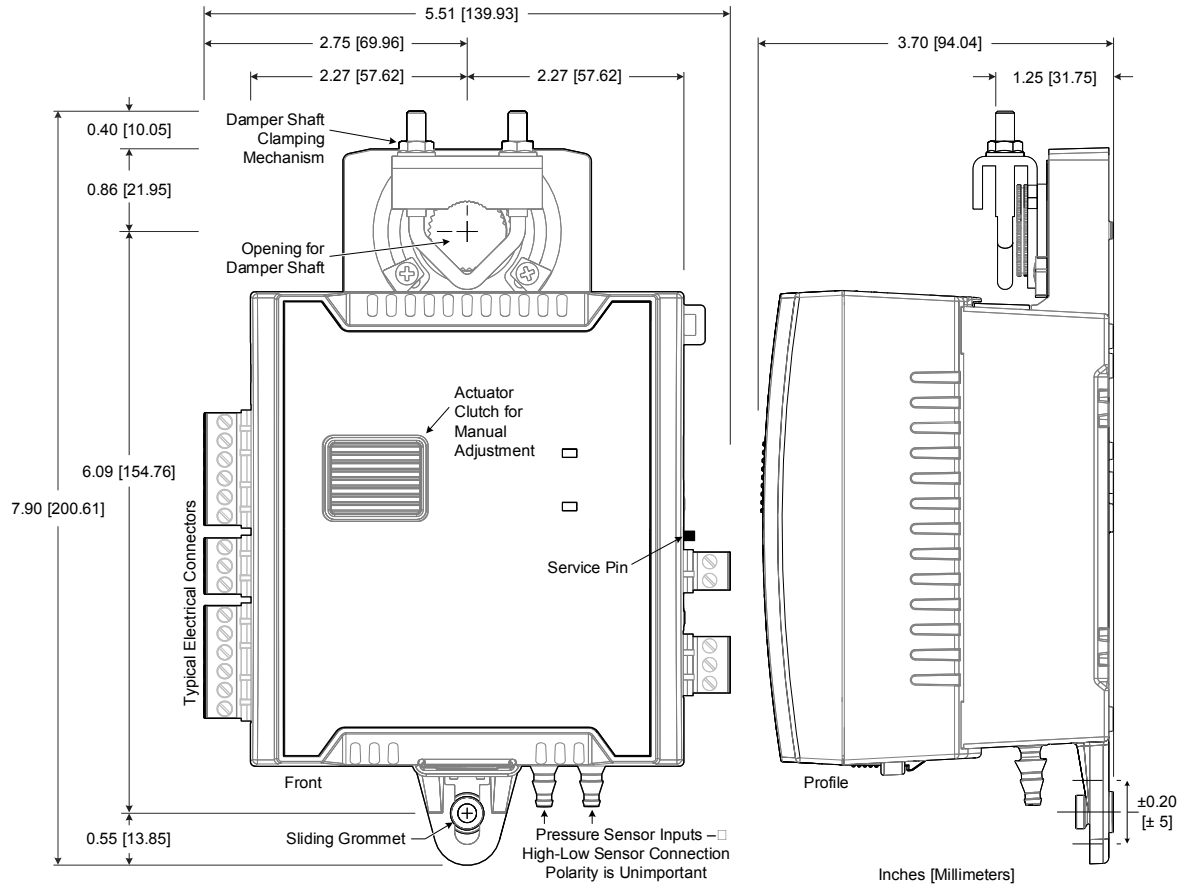
Integrated Damper Actuator

Motor	Belimo brushless DC motor
Torque	45 in-lb, 5 Nm
Degrees of Rotation	95º adjustable
Shaft Diameter	5/16 to 3/4”; 8.5 to 18.2mm
Acoustic Noise Level	< 35 dB (A) @ 95º rotation in 95 seconds

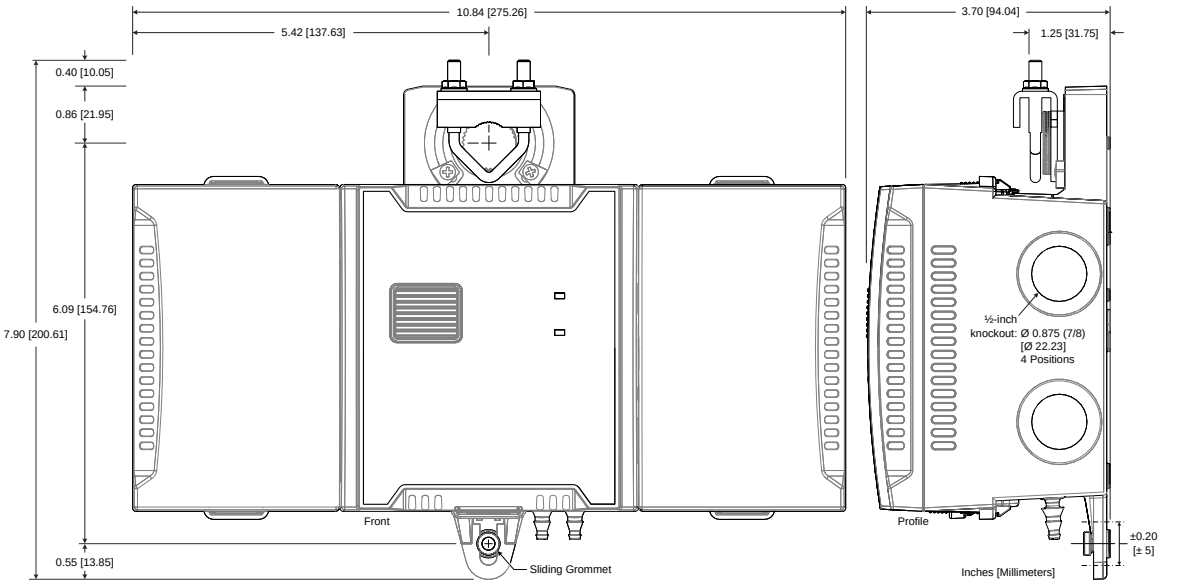
Mechanical

Dimensions:

□ Without Terminal covers (H × W × D)	7.90 × 5.51 × 3.70" (200.61 × 139.93 × 94.04 mm)



□ With Terminal covers (H × W × D) — 7.90 × 10.84 × 3.70" (200.61 × 275.26 × 94.04 mm)



Shipping weight:

□ Controller — 1.95lbs (0.89 kg)

□ Terminal Cover (one side, bulk packaged) — 0.30lbs (0.14 kg)

Enclosure Material[1] — FR/ABS

Enclosure Rating — Plastic housing, UL94-5VB flammability rating
Plenum rating per UL1995

1. All materials and manufacturing processes comply with the RoHS directive and are marked according to the Waste Electrical and Electronic Equipment (WEEE) directive

Environmental

Operating Temperature	32 to 122°F (0 to 50°C)
Storage Temperature	-4 to 122°F (-20 to 50°C)
Relative Humidity	0 to 90% non-condensing
Ingress Protection Rating	IP20
Nema Rating	1

Standards and Regulations

CE:

□ Emission	EN61000-6-3: 2007; A1:2011; Generic standards for residential, commercial and light-industrial environments
□ Immunity	EN61000-6-1: 2007; Generic standards for residential, commercial and light-industrial environments
FCC	This device complies with FCC rules part 15, subpart B, class B
UL Listed (CDN & US)	UL916 Energy management equipment
CEC Appliance Database	Appliance Efficiency Program[1]

1. California Energy Commission's Appliance Efficiency Program: The manufacturer has certified this product to the California Energy Commission in accordance with California law.

Specifications – On-Board Air-Flow Sensor

Differential Pressure Range	±2.0 in. W.C. (±500 Pa)
	Polarity-free high-low sensor connection
Input Resolution	0.00007 in. W.C. (0.0167 Pa)
Air Flow Accuracy	±4.0% @ > 0.05 in. W.C. (12.5 Pa)
	±1.5% once calibrated through air flow balancing @ > 0.05 in. W.C. (12.5 Pa)
Pressure Sensor Accuracy	±(0.2 Pa +3% of reading)

Specifications - Universal Inputs (UI)

General

Input Type	Universal; software configurable
Input Resolution	16-bit analog / digital converter
Power Supply Output	18 VDC; maximum 80mA

Contact

Type	Dry contact

Counter

Type	Dry contact
Maximum Frequency	1Hz maximum,
Minimum Duty Cycle	500milliseconds On / 500milliseconds Off

0 to 10VDC

Range	0 to 10VDC (40kΩ input impedance)

0 to 5VDC

Range — 0 to 5VDC (high input impedance)

0 to 20mA

Range — 0 to 20mA

— 249Ω external resistor wired in parallel

Resistance/Thermistor

Range — 0 to 350 KΩ

Supported Thermistor Types — Any which operate in this range

Pre-configured Temperature Sensor Types:

- Thermistor — 10KΩ Type 2, 3 (10KΩ @ 77ºF; 25ºC)
- Platinum — Pt1000 (1KΩ @ 32ºF; 0ºC)
- Nickel — RTD Ni1000 (1KΩ @ 32ºF; 0ºC)

— RTD Ni1000 (1KΩ @ 69.8ºF; 21ºC)

Specifications – Universal Outputs (UO)

General

Output Type — Universal; software configurable

Output Resolution — 10-bit digital to analog Converter

Output Protection — Built-in snubbing diode to protect against back-EMF, for example when used with a 12VDC relay
Output is internally protected against short circuits

Auto-reset fuse — Provides protection from accidental 24VAC connection

0 or 12VDC (On/Off)

Range — 0 or 12VDC

PWM

Range — Adjustable period from 2 to 65seconds

Thermal Actuator Management — Adjustable warm up and cool down time

Floating

Minimum Pulse On/Off Time — 500milliseconds

Drive Time Period — Adjustable

0 to 10VDC

Source:

- Voltage Range — 0 to 10VDC linear
- Source Current — Maximum 20 mA at 10VDC (minimum resistance 600Ω)

Sink:

- Voltage Range — 0 to 10VDC linear
- Sink Current — Maximum 2.5 mA at 1VDC (minimum resistance 4kΩ)

Specifications – Digital Outputs (DO)

General

Output Type	24VAC Triac; software configurable
Maximum Current per Output	0.5A continuous
	1A @ 15% duty cycle for a 10-minute period
Power Source	External or internal power supply (jumper selectable)

0 or 24VAC (On/Off)

Range	0 or 24VAC

PWM

Range	Adjustable period from 2 to 65seconds

Floating

Minimum Pulse On/Off Time	500milliseconds
Drive Time Period	Adjustable
Power Source	Adjustable