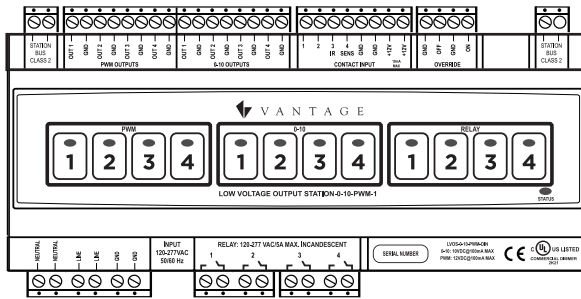


LVOS-0-10-PWM-1 / LVOS-0-10-PWM-P-1 • Les Numéros de Catalogue • Los Números de Catálogo:

Country of Origin: Made in China • Pays d'origine: Fabriqué en Chine • País de origen: Hecho en China

OVERVIEW


The Vantage LVOS-0-10-PWM-1 (LVOS) has four PWM and four analog low-voltage outputs along with four high-voltage relays. All twelve connections are independent from each other. The station is powered from a universal input of 120-277 VAC 50/60Hz source. The high-voltage relays are isolated from the station's high-voltage power supply. All outputs can be manually controlled and monitored from the front of the station. An Override switch may be connected allowing all the low-voltage loads and high-voltage relays to be ON or OFF for fail-safe applications. The station comes housed in a custom metal enclosure or may be ordered separately for installation into Vantage's IAUX enclosure. Communication to the Vantage System is via Station Bus.

FEATURES

- 4 PWM, low-voltage outputs
- 4 Analog, 0-10 low-voltage outputs
- 4 High-voltage relays – tied to low-voltage outputs in Design Center
- Twelve membrane style actuators and LED status indicators
- High resolution performance when dimming
- Communicates via Vantage Station Bus
- Housed in a custom, UL rated enclosure
 - Part #LVOS-0-10-PWM-1 includes station and enclosure
- Enclosure configurations
 - IAUX-2 – up to six stations per enclosure
 - IAUX-4 – up to ten stations per enclosure
- Override switch connections for ON and OFF states of all loads collectively

TWO WAYS TO ORDER

Part #	Description
LVOS-0-10-PWM-1	Station with Single Enclosure: Low-Voltage Output Station (PWM and 0-10) 120V-277V - Comes in a custom Vantage supplied, UL rated enclosure
LVOS-0-10-PWM-P-1	LVOS-0-10-PWM Station only - For installing in UL rated IAUX-2, IAUX-4, or LCAP series enclosures*

***WARNING:** This is not a DIN station and is not designed for DIN rail. Vantage's auxiliary enclosures, IAUX-2 / IAUX-4 and LCAP44A-6 enclosures are ordered separately.

SPECIFICATIONS

General	
Dimensions, HWD	9" x 10.5" x 2.75" (22.86cm x 26.67cm x 6.98cm)
Cover Dimensions, HWT	9.75" x 11.25" x 0.6" - 1/16" Thick (24.77cm x 28.58cm x 15mm-thick)
Station Only Dimensions, HWD	3.32" x 10.34" x 2.667" (8.43cm x 26.26cm x 6.77cm)
Weight with Box	5.85lbs (2.65kg)
LED Indicators	Microprocessor Status, Configuration, Loads
Ambient Operating Temperature	32-104°F / 0-40°C
Relative Humidity	Maximum 90%, non-condensing
Firmware	Upgradeable via Station Bus
Cooling	Convection
Manual Control	Overlay with control/status for each output
FreeRTOS™	Real-time scheduling provided by FreeRTOS (www.freertos.org)
Certifications	UKCA, CE, FCC, UL, cUL, EN 55032, EN 55035, EN 61000-3-2, EN 61000-3-3

AC Input - Power Supply	
Type	Universal Input
Input Voltage / Frequency	120 – 277 VAC 50-60Hz
Input Power	<16W
Connection Type	0.20" pitch removable plug
Connection Rating	300V 10A

Input / Output Connections (Low-voltage)	
Station Bus Connection	24V / 36V Station Bus
Station Bus Wire Specification	2C, 16AWG / 1.31mm ² , twisted, nonshielded, <30pF per foot. Separate a minimum of 12" / 30.5cm from other parallel communication and/or high-voltage runs
Station Wiring Configuration	Daisy-chain, Star, Branch
Station Equivalent InFusion	0.35W on IC-24 / 0.55W on IC-36
Auxiliary Inputs	4 Dry contacts (3 and 4 may be used for an IR receiver and light sensor respectively)
Override Inputs	Yes - All ON or All OFF contacts

Low-voltage Output - PWM Low	
Specification	IEC 60929 Annex E
Number of Outputs	4
Output Voltage	12V (Source only)
Output Current	100mA per channel, 400mA total
Loads Per Output	50@2.0mA per load (typical)
Resolution	>1024 steps
Duty Cycle	Variable 0% to 99.9%
Frequency	760Hz
Connection Type	0.20" Pitch removable plug
Connection Rating	300V 10A
Connection Torque	4.4 inch pounds

SPECIFICATIONS *(continued)*

Low-voltage Output - 0-10V	
Specification	IEC 60929 Annex E
Number of Outputs	4
Output Voltage	0-10V @ 100mA sink or source
External Source Voltage	Typical 10V / Maximum 20V
Loads per Output	50@2.0mA per load (typical)
Resolution	>1024 steps
Connection Type	0.20" pitch removable plug
Connection Rating	300V 10A
Connection Torque	4.4 inch pounds
Protection	
High-voltage Input, Over Voltage Protection	MOV
Low-voltage 0-10V Output Over Current Protection	PTC Fuse (self resetting)
Low-voltage PWM Output Over Current Protection	
High-voltage Output - Relays	
Number of Relays	4
Voltage Rating	120V-277 VAC
Type	Normally open
Load Rating, General Purpose	10A
Load Rating, Incandescent	5A
Electronic Ballast	5A
Relay Input Connected to Line Feed	No
Connection Type	0.20" Pitch removable plug
Connection Rating	300V 10A
Connection Torque	4.4 inch pounds

LOAD CONFIGURATIONS

PWM OUTPUTS, 12V (SOURCE)

Low-voltage outputs 1-4 may be configured as PWM (Pulse Width Modulation). PWM Duty Cycles are programmed using Power Profiles from 0%-Minimum On to 100%- Maximum On (99.9% actual). The load level is a percentage between the minimum and maximum duty cycle (Power Profile Minimum On and Maximum On). The output can be reversed in Design Center through the Power Profile. For example, a 0% duty cycle can either be load ON or load OFF.

LOW-VOLTAGE OUTPUTS, 0-10V (ANALOG)

Low-voltage controls 5-8 and Ground are used to control devices that work with an analog 0-10V signal. Ground provides the negative reference for the output voltages. All grounds are connected internally to each other. Each output, 5-8, can sink or source 0-100mA at any voltage from 0-10VDC. The load level sets the percentage between the minimum and maximum voltage that is selected for that load.

NOTE: Loads 1–8, Low-voltage outputs, should be limited to 250 feet / 76.2 meters for each wire run, using a minimum of 18AWG / 0.823mm2 gauge wire. All low-voltage connections use 4.4 inch pound torque. Stranded wire recommended.

LINE VOLTAGE RELAY OPERATION

There are four (4) AC line voltage relays on this LVOS station. They are single-pole, single-throw relays (SPST) and are initially independent from the low-voltage outputs. However, in Design Center, each relay may be programmed to automatically switch in conjunction with a selected low-voltage output, so up to four of these conjunctions are possible. When this conjunction is made in Design Center if the low-voltage output is >0, the corresponding relay is ON and if the low-voltage load is 0 then the relay is OFF. Not all low-voltage lighting installations require a switched, high-voltage relay, it depends on the fixture. Any relay not used in conjunction with a low-voltage output is free and may be programmed to operate as an independent relay load.

SOFTWARE / FIRMWARE

SOFTWARE / FIRMWARE

Design Center Software version 3.x or higher and accompanying Firmware, are compatible. For new projects it is recommended that software and firmware be kept to the most current release.

POWER PROFILES / POWER OUTAGES

The station stores Power Profile configuration data locally so that it will continue to operate correctly if communication with the system is lost. This information includes: load profile-duty cycle settings, and last load level. If a power outage occurs, when power is restored the station will return the loads to the last load level with all profiles at their last known settings. This occurs whether or not the station is connected to the Controller.

BUTTON OPERATION

ACTUATOR BUTTONS

The actuator buttons on the front of the station are for local control only and are not programmable through Design Center software. These buttons will not register in Monitor Button press.

LV Buttons	Low-Voltage Load Operation
Press/Release	1. The load ramps to 100% or fades to 0% over three seconds, alternating with every other press and release 2. If the button is pressed again before the three seconds time, the load stops ramping/fading at its current level
Press and Hold/Learn	<i>Press and Hold and Learned Level</i> features are not supported from the front panel buttons
HV Buttons	Relay Load Operation
Press/Release	1. ON - (instant) / OFF - (three second delay)

INSTALLATION

Installation of Legrand Architectural Dimming products should be performed or supervised by a certified Legrand installer. Each LVOS must be mounted in the custom electrical box provided. In areas that have a drop ceiling it may be installed in the ceiling close to the loads it is controlling. Low voltage connections are located through the top side of the LVOS. Line voltage connections are through the bottom side. Connect wiring to the electrical enclosure so low voltage and high voltage wires stay on their respective sides. The electrical box and the LVOS must be grounded to the systems electrical ground. See *Wiring Terminations* table.

STATION CONNECTION

The LVOS-0-10-PWM-DIN connects to a Legrand Architectural Dimming System via Station Bus. Two screw terminals are located in the low-voltage section of the electrical box (through top). The two connectors are internally wired, in parallel, to facilitate daisy chaining the Station Bus. The wire should comply with the Legrand Architectural Dimming Station Bus wiring specification.

REMOTE INFRARED RECEIVER OR DRY-CONTACT

A remote infrared receiver (part # REMOTEIR) may be connected to the LVOS-0-10-PWM-DIN dry-contact 3. This terminal is not compatible with remote infrared receivers from other manufacturers. The receiver connects to +12V, IR IN (dry contact 3) and GND. If not used with an IR receiver this input may be used as a standard dry contact input, connecting the contact between IR IN (dry contact 3) and GND.

SENSOR INPUT OR DRY-CONTACT

Dry contact 4 connects to +12V, SENSOR IN and GND. If not used for a light sensor, this input may be used as a standard dry contact input, connecting the contact between SENSOR IN (dry contact 4) and GND.

WIRING

Loads 1 – 8, low-voltage outputs, should be limited to 250 feet / 76.2 meters for each wire run, using a minimum of 18AWG / 0.823mm² gauge wire. All connections use 4.4 inch pound torque. Stranded wire recommended.

OVERRIDE

The station supports two Override modes, ON and OFF. When either switch is closed, using a simple toggle switch, all loads are ON or OFF depending on which override loop is closed. However, the ON override takes precedence over the OFF override if both switches are closed. NOTE: Station does not communicate to controller when in override.

POWER CONNECTION

A 120 – 277 VAC 50-60Hz line feed from breaker connects to the Line, Neutral, and Ground connections. This provides power for the LVOS and is required for the station to operate. The four high-voltage relays are not internally connected to this power source.

CONFIGURATION

When the LVOS is first powered the STATUS LED will blink three times. See table below for additional blink patterns. In Design Center, click the Configure Stations button on the toolbar. The Status LED will have a 5 blink pattern and the load LEDs will blink. With the LVOS highlighted in Design Center, press one of the load buttons on the front of the station three times to configure. The station may also be configured by typing the serial number in the project file, configuring when the system is programmed.

STATUS LED BLINK PATTERNS

Working normally, the Status LED blinks once per second. Other patterns are 2, 3, 4 or 5 blinks followed by a short pause.

NOTE 1: Station is not communicating with the Main Controller. Verify Station Bus wiring is correct.

Blink Cycle	Station Bus
1	Configured / Programmed
2	Communicating / Not Configured
3	No Station Bus Connection ⁽¹⁾
4	Station Problem
5	Configuration Mode

FIRMWARE UPGRADABLE FROM DESIGN CENTER

1. The station must always be configured and programmed to the system in order to perform a firmware update.
2. Click on System | Update Firmware | Update LVOS PWM Firmware.
3. Select the checkbox for each LVOS PWM station needing a firmware upgrade.
4. Complete the upgrade – wait for the process to finish.

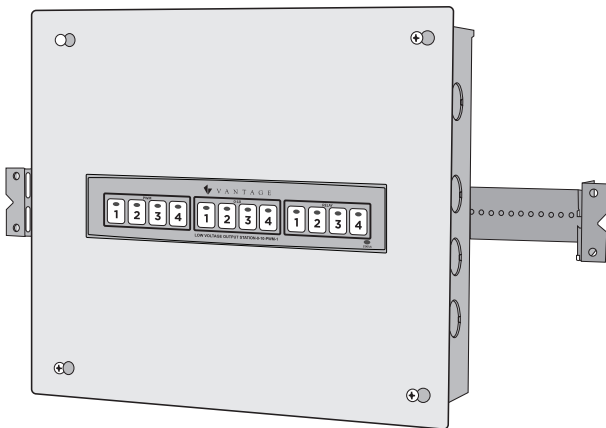
PLACING STATION IN BOOT CODE

If the application code is corrupted it may not be possible for Design Center to connect to the LVOS PWM station to update. If this condition is suspected, place the LVOS PWM station into boot code and then update following the steps above.

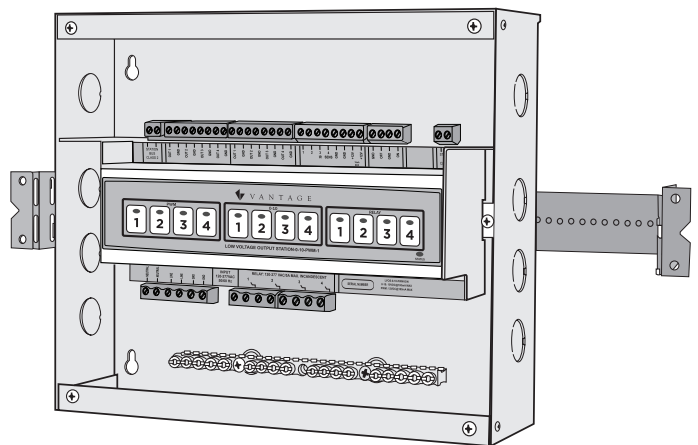
1. Remove HV power to the station.
2. Press and hold PWM buttons 2 and 3 while HV power is restored.
3. All of the station's load and status LED lights will flash in unison.
4. While in this mode attempt the regular firmware update steps 2-4 again. (Above - Firmware Upgradable From Design Center)
5. When the firmware update is finished the update dialog box will display a green checkmark and the station will reboot automatically.

LVOS DIAGRAMS

LVOS WITH COVER



LVOS COVER, REMOVED



WIRING TERMINATIONS

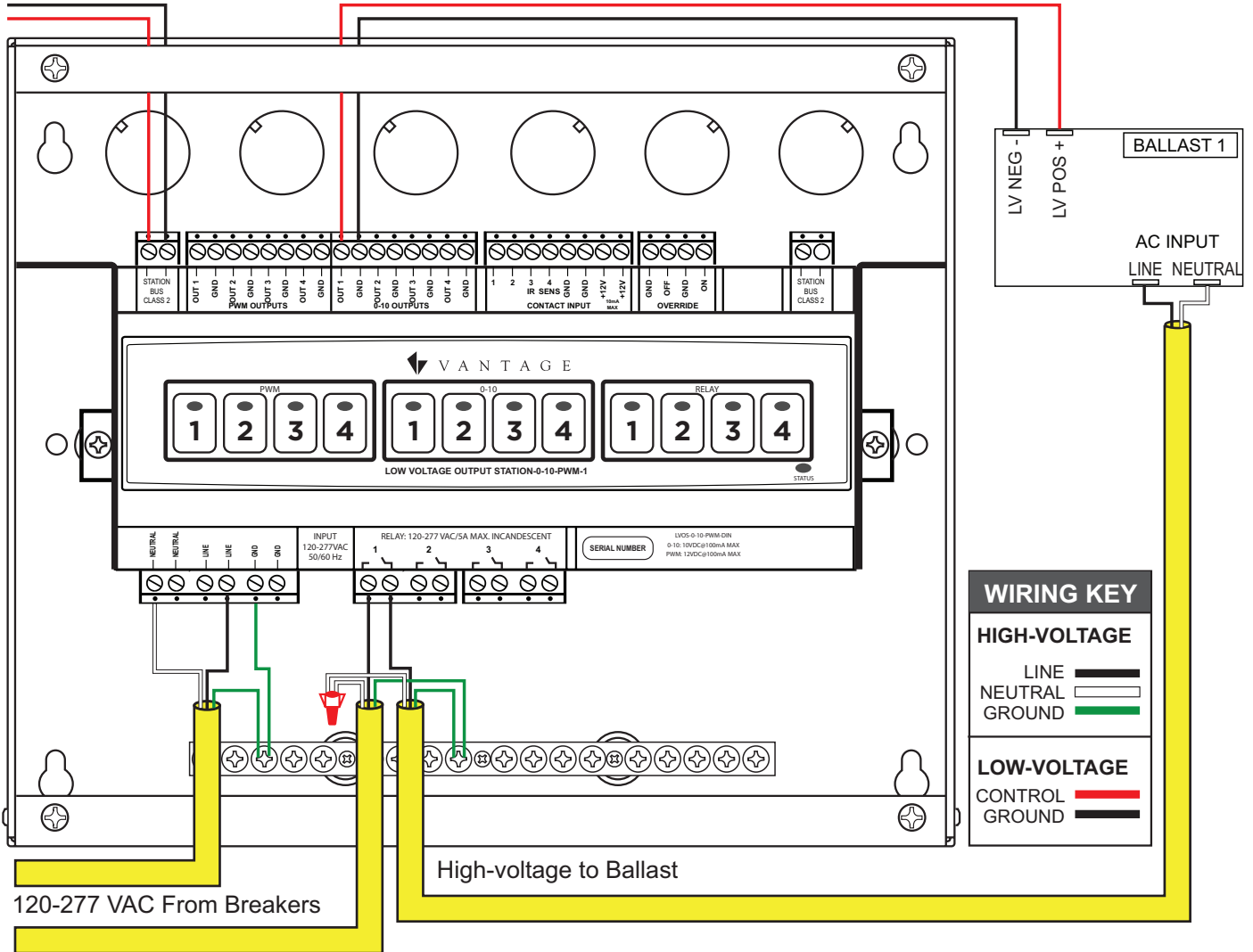
Connector	Torque	Wire Range
Screw Terminals	4.4 Inch Pounds	12-30 AWG*
Wire	Description	
Type	Copper, CU Wire only	
Temperature Rating	60° C	
* MUST MATCH BREAKER / LOAD WIRE GAUGE		

WIRING DIAGRAM

See **Wiring Terminations** table (above). Please refer to NEC and installed equipment guides for appropriate electrical install methodology for all installations. The example is similar for PWM controlled ballasts. NOTE: Some ballast models do not require the high-voltage to be switched as shown in this illustration. This example shows the wiring for one load. Please note that the HV-Relay, to the ballast, does not get its power from the station's HV power supply, however it may be possible to share the breaker as long as the breaker limit is not exceeded. Repeat for additional loads.

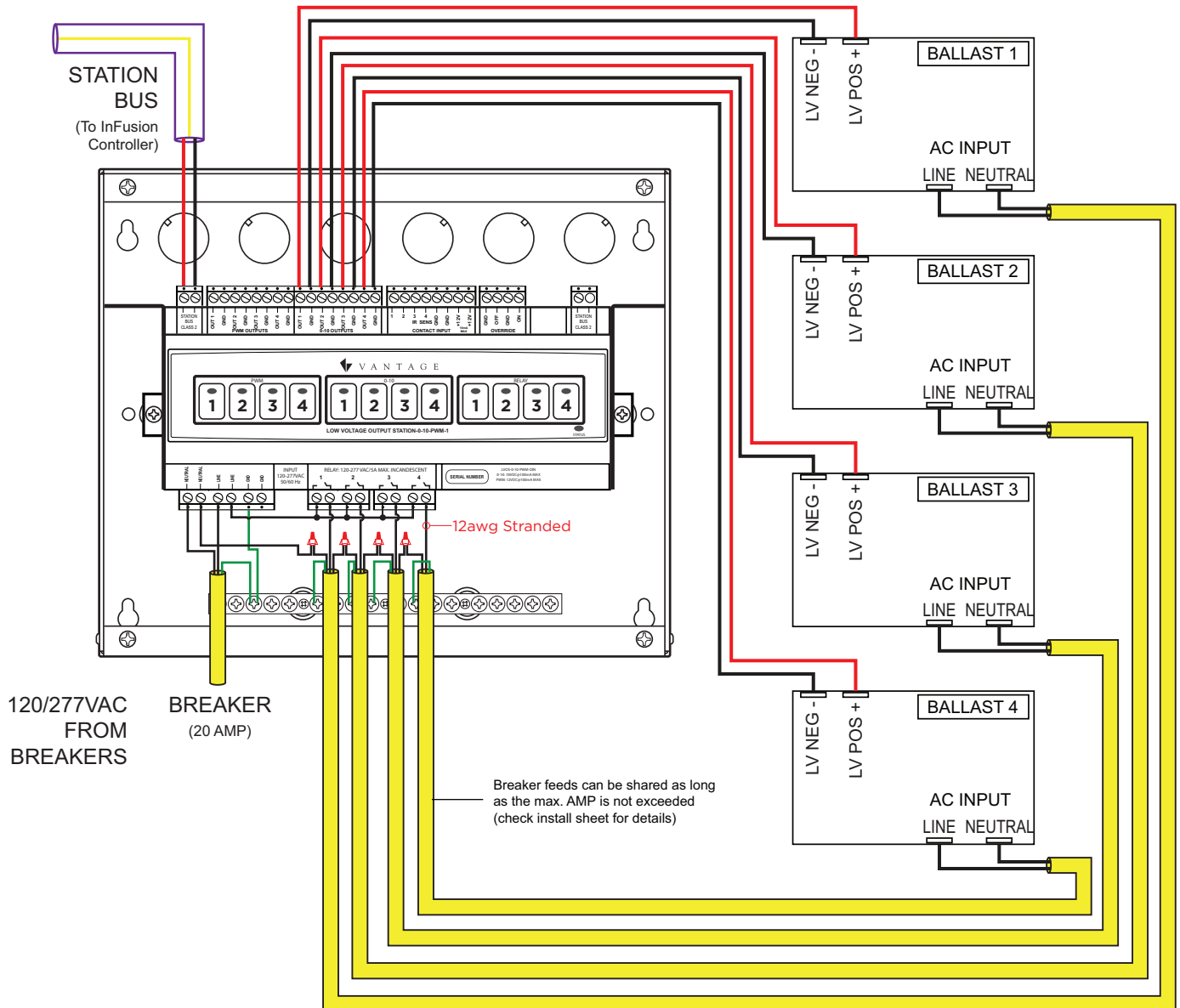
STATION BUS
(From InFusion Controller)

Low-Voltage Control Wire to Ballast Limit to 250ft / 76.2m,
max. length, using 18AWG / 0.823mm² wire



AUX ENCLOSURE WITH LVOS STATIONS WIRING DIAGRAM

LVOS Load Wiring Examples using Vantage auxiliary enclosures; order LVOS-0-10-PWM-P-1 for station only and IAUX-2(4) as needed. Notice all high voltage is through the LEFT or RIGHT sides of the enclosure and all low voltage is through the CENTER of the enclosure. These connections can be through the TOP and/or BOTTOM of the enclosure from the respective sides. The example below is identical to the wiring example on the previous page with the exception of the enclosure. Using Vantage's IAUX enclosures allows the system to be expanded to a large number of loads.



AUX ENCLOSURE WITH LVOS STATIONS EXAMPLE

LVOS Load Wiring Examples using Vantage auxiliary enclosures; order LVOS-0-10-PWM-P-1 for station only and IAUX-2(4) as needed. Notice all high voltage is through the LEFT or RIGHT sides of the enclosure and all low voltage is through the CENTER of the enclosure. These connections can be through the TOP and/or BOTTOM of the enclosure from the respective sides. The example below is identical to the wiring example on the previous page with the exception of the enclosure. Using Vantage's IAUX enclosures allows the system to be expanded to a large number of loads.

POSSIBLE LVOS LOADS IN IAUX-2

- Low-voltage Output: PWM.....24 Loads
- Low-voltage Output: 0-10 VDC.....24 Loads
- High-voltage 120-277 VAC Output Relays.....24 Loads

POSSIBLE LVOS LOADS IN IAUX-4

- Low-voltage Output: PWM.....40 Loads
- Low-voltage Output: 0-10 VDC.....40 Loads
- High-voltage 120-277 VAC Output Relays.....40 Loads

EXAMPLE 1 (Left side of IAUX Enclosure)

- Romex wire for station and load fed into the enclosure
- Neutrals are connected inside the enclosure and hot runs through one of the relay loads

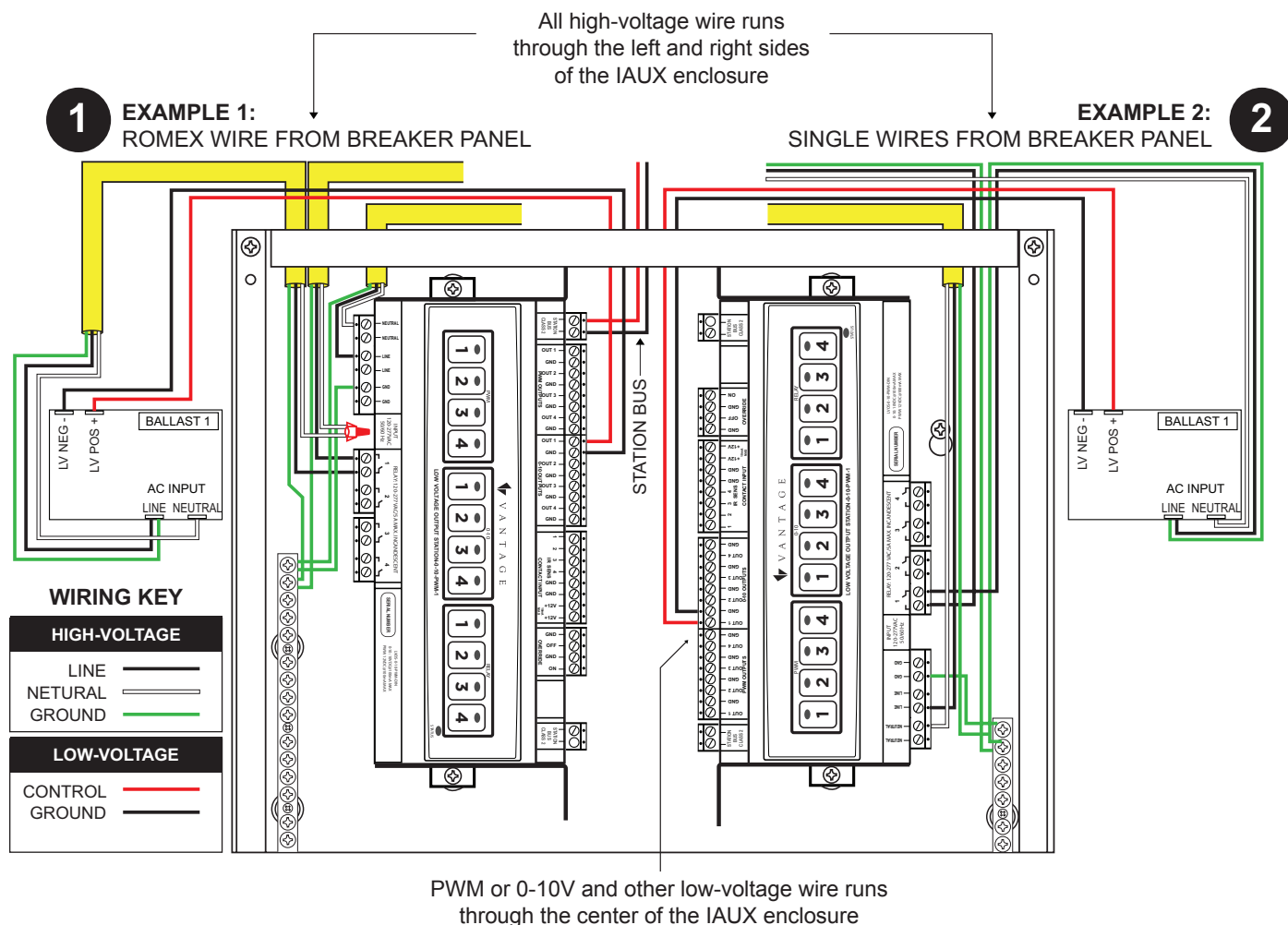
(SEE WIRING TERMINATIONS TABLE ABOVE RIGHT)

WIRING TERMINATIONS

Connector	Torque	Wire Range
Screws Terminals	4.4 Inch Pounds	12-30 AWG*
Wire	Description	
Type	Copper, CU Wire only	
Temperature Rating	60° C	
* MUST MATCH BREAKER / LOAD WIRE GAUGE		

EXAMPLE 2 (Right side of IAUX Enclosure)

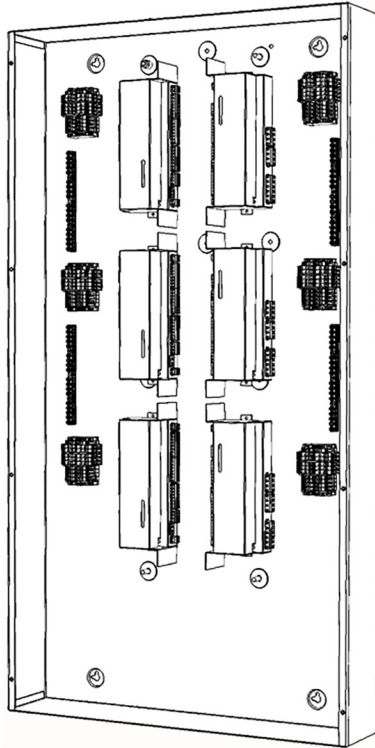
- Romex wire run for station power
- Load wire run is from single wires (run in conduit) HOT feed is fed into the enclosure, through one of the relay loads and back out to the fixture
- Neutrals/GND are straight to the lighting fixture



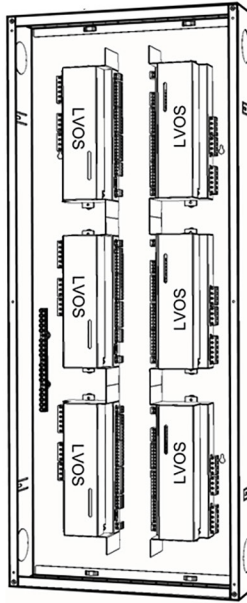
IAUX AND LCAP ENCLOSURES WITH LVOS STATIONS EXAMPLE

Examples of loaded IAUX and LCAP enclosures.

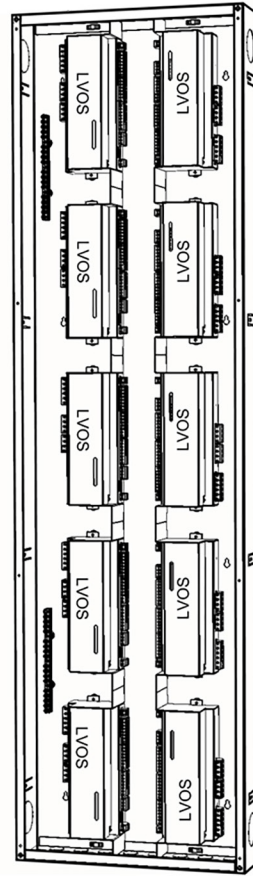
LCAP44A-6
6 LVOS STATIONS



IAUX-2
6 LVOS STATIONS



IAUX-4
10 LVOS STATIONS



RATINGS LABEL
(Located on side)

VANTAGE
LVOS-0-10-PWM-1

Wire Gauge Max.	12 AWG
Screw Torque Max.	4.4 in/lb.
Enclosure	Type 1 IP20
AC Input Power Maximum	16 W
Input Voltage	120-277 VAC
Input Frequency	50/60 Hz
Relay Load Incandescent Max.	5 A
Relay Load General Purpose Max.	10 A
Relay Load Electronic Ballast Max.	5 A



WIRE TERMINAL CONNECTIONS

STRIP BACK INSULATION
0.25" (6.5mm)

RECOMMENDED WIRE TYPE FOR SCREW TERMINALS

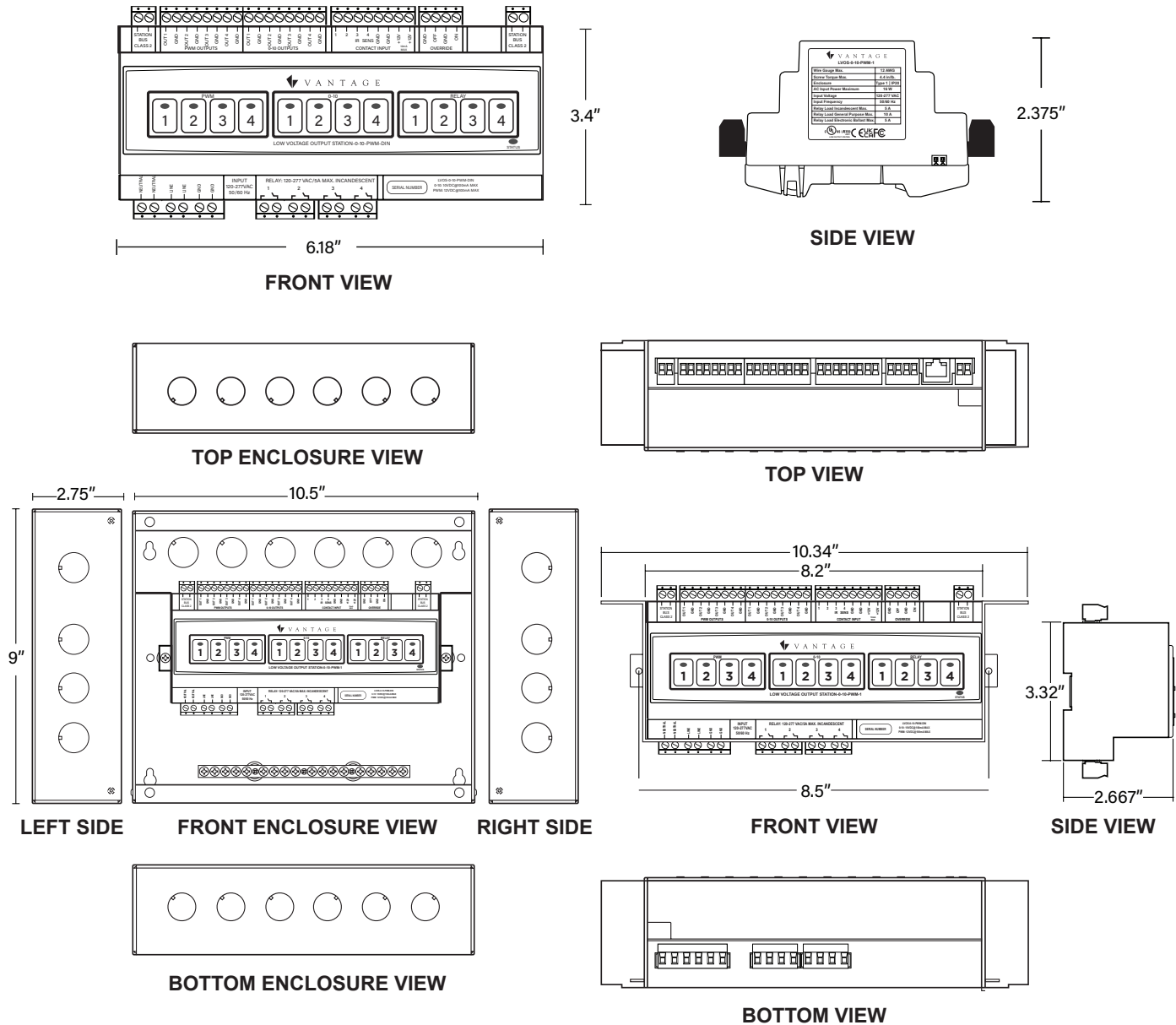
LOADS:

Stranded - 0.75 - 3.31mm² / 18-12 AWG
Copper wire; must match breaker wire gauge

STATION BUS:

Vantage Station Bus (see *Specifications* table)

MULTI-VIEW LINE DRAWINGS



WARRANTY INFORMATION

Vantage warrants its products to be free of defects in materials and workmanship for a period of five (5) years. There are no obligations or liabilities on the part of Vantage for consequential damages arising out of, or in connection with, the use or performance of this product or other indirect damages with respect to loss of property, revenue or profit, or cost of removal, installation or reinstallation.

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