VANTAGE
Reference Design

classrooms

Eckerd College, Florida

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classrooms

Digital multimedia is transforming the modern classroom. Not only do teachers rely more on video and audio to complement their teaching style, but students and parents expect a media rich educational experience. This presents a challenge to teachers and administrators in determining how to adequately control the devices and lighting in the classroom. Since class time is limited, a teacher needs to be able to set the lighting, shades, projectors, and screens for a presentation quickly and easily.

Schools are always concerned about energy savings and the use of daylight, occupancy sensors, and schedules will ensure that lights and equipment are turned off in unoccupied spaces. A powerful, intuitive automation system is a must for the modern classroom.
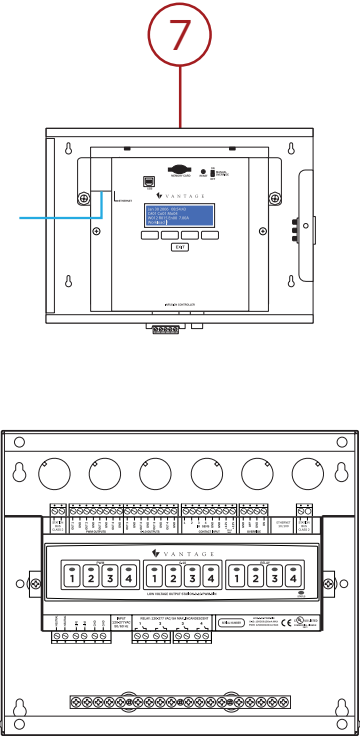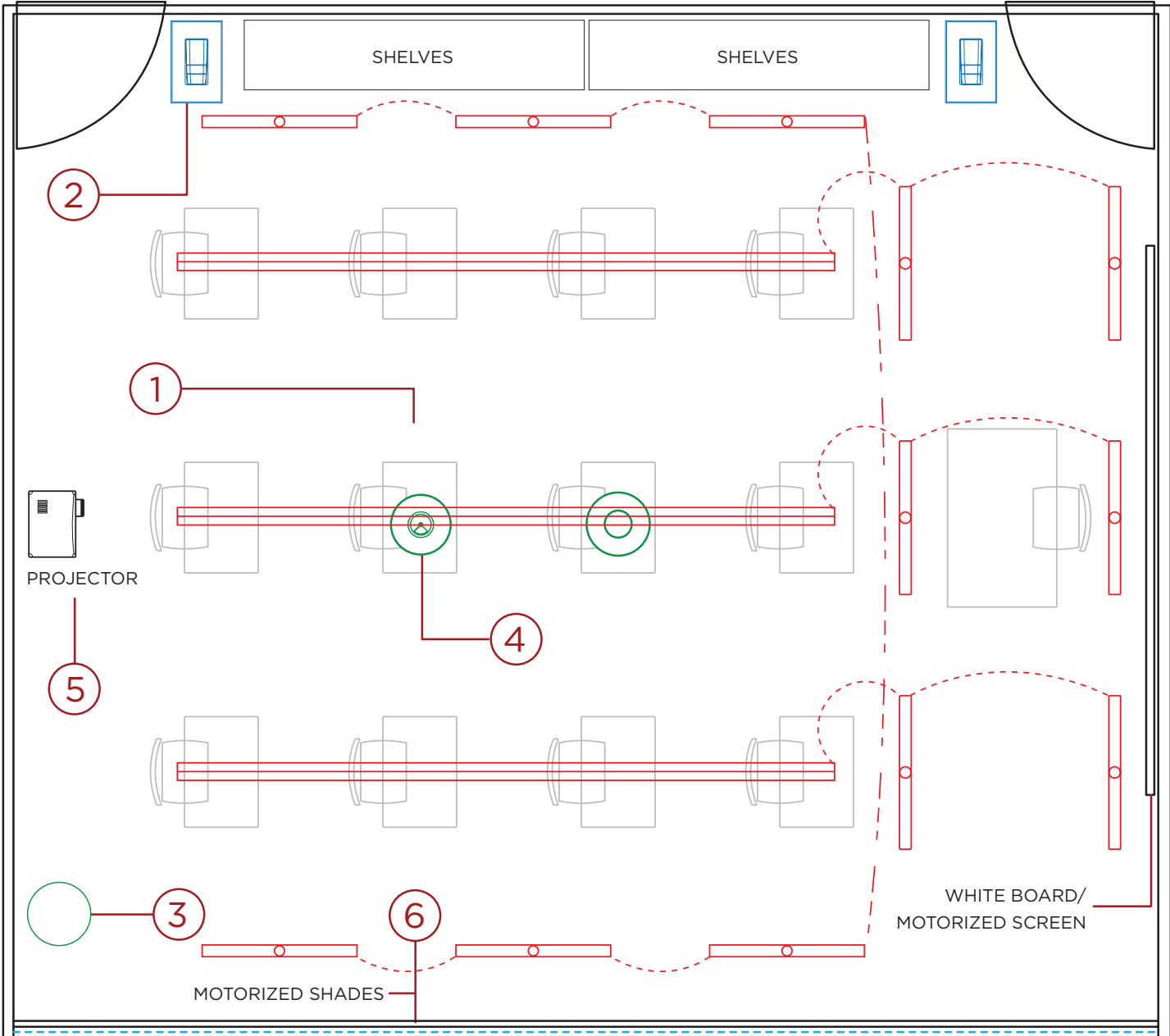
APPLICATION DESCRIPTION

SPACE USE	Classroom
ACTIVITIES DIMENSIONS	28' x 30'
CEILING HEIGHT	10'
WINDOWS	Along One Side of Room
LIGHTING	Direct and Indirect Fluorescent, 0-10V Lighting
LIGHTING APPS	Full On, Presentation Mode, Daylighting

CONTROL NEEDS & SOLUTIONS

LIGHTING	• Control via user, occupancy, timers, light levels. Fluorescent and 0-10V lighting. Full on, presentation mode, day lighting. (n.1)
INTERFACE	• Low-voltage keypads in classroom to move from ON/OFF/Presentation mode. Mobile apps or touchscreens in admin areas for overall control. (n.2)
HVAC	• Possible HVAC system or HVAC interface for occupancy (contacts), control from an administrative location. (n.3)
SENSORS	• Motion/Occupancy sensors, flush mount temp sensors, light sensors. (n.4)
AUDIO/VIDEO	• Possibility of projector and motorized screen control in classrooms. (n.5)
SHADES	• Motorized shades in classrooms, energized via relay or serial interface, controlled via user, mode, or timer. (n.6)
INFRASTRUCTURE	• Centralized processor, distributed 0-10v stations for load control. (n.7)
APPLICATION SPECIFIC NEEDS	• Presentation mode (shades closed, lights dimmed, projector on, screen down) ON by user, OFF by occupancy or timer.

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CLASSROOM FLOOR PLAN

SHELVES

SHELVES

②

①

④

PROJECTOR

⑤

⑦

③

⑥

WHITE BOARD/
MOTORIZED SCREEN

MOTORIZED SHADES
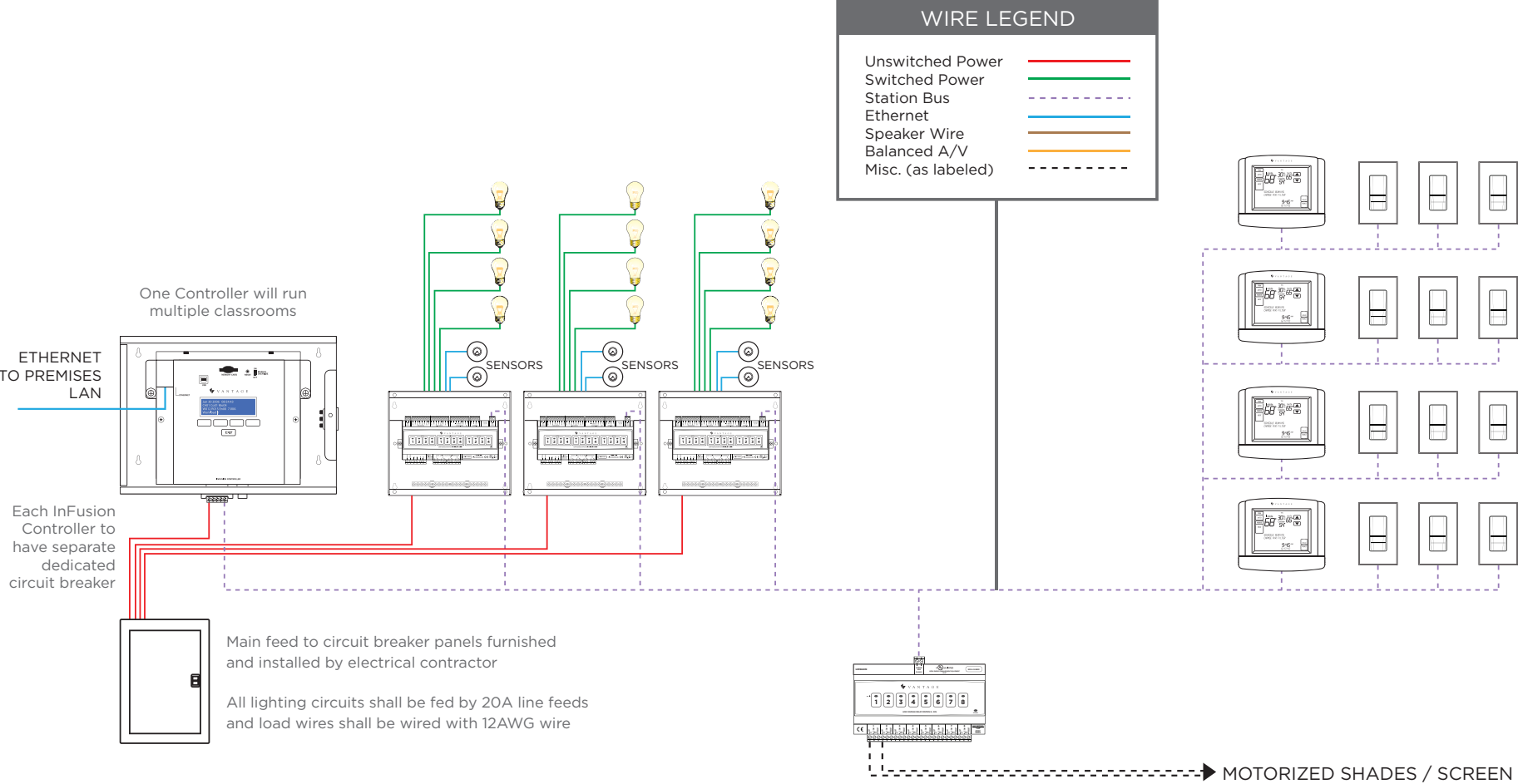
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DESIGN CONSIDERATIONS

• The Vantage system can simplify the control of complex tasks relating to lighting – both artificial lighting through dimming and natural lighting through shade control as well as control of HVAC and A/V devices. In this application an InFusion Controller is typically centralized and can provide control of multiple classrooms. Each classroom has a four zone 0-10V station to provide flexible, full range dimming control for the classroom space.

• A keypad is located in each room and individual keypad buttons are programmed to provide single press operation of lights. One button to turn lights on, another to turn lights off, other buttons for preset lighting levels as well as to set up shading, projectors and so on for presentation and other pre-determined activities.

• Occupancy sensors in each classroom allow for energy savings when the space is unoccupied by turning off lighting and other controlled equipment, applying temperature setpoints and setting shade positions to optimize seasonally varying heat load objectives. Light sensors in each classroom provide for energy savings through daylight harvesting, wherein target illumination is achieved by natural lighting first and artificial lighting second. Auto-timed shade control allows for additional security at night.

• It is important to note that Vantage system configuration is extremely flexible and variations on this design can accommodate for the specific requirements of any project.

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WIRING DIAGRAM

ELECTRICAL ROOM

CLASSROOM

WIRE LEGEND

Unswitched Power	
Switched Power	
Station Bus	
Ethernet	
Speaker Wire	
Balanced A/V	
Misc. (as labeled)	

One Controller will run multiple classrooms

ETHERNET TO PREMISES LAN

SENSORS

SENSORS

SENSORS

Each InFusion Controller to have separate dedicated circuit breaker

Main feed to circuit breaker panels furnished and installed by electrical contractor

All lighting circuits shall be fed by 20A line feeds and load wires shall be wired with 12AWG wire

MOTORIZED SHADES / SCREEN

BILL OF MATERIALS

CATEGORY	PART NUMBER	DESCRIPTION	QTY
Enclosures	ISME-36	InFusion Surface Mount Enclosure 36V	1
Controller	IC-36-1	InFusion Controller - 36V Station Bus	1
Load Control	LVOS-0-10-PWM	Low-voltage 1-10 PWM Station (w/Enclosure)	3
Sensors	EM-LIGHTSENSOR	Ambient Light Level Sensor	3
	FL-MS-MINI-360-16	PIR Motion Sensor - 16 ft Radius	3
	VDA-0015	Auxiliary Pigtail Cable Assemblies Each	3
Keypads (Standard EasyTouch II)	KS15TE-AWYA	KS EasyTouch II 5 Btn w/Trim AW Engraved	9
	FP1DTE-AWNP	FP EasyTouch II 1-G Dec TrimLine II Plastic AW	9
Integration/Misc	LVRS8-DIN	Low-voltage Relay Station 8 - DIN	3
HVAC	CC-STAT-WL-KIT	Contains STAT plus Q-ETS3	3
	FLUSHSENSOR	Flush Mount Thermostat Sensor	3

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INSTALLATION NOTES

• Install the InFusion Controller remote from the classroom in a temperature conditioned electrical closet. Each controller will manage from three to ten classrooms.

• Vantage two-conductor station bus cabling is run from the controller to keypads, 0-10V dimming stations, and thermostats. Topology is completely open, but total bus length limitations and maximum distance limitations exist (2000' maximum per bus, 1000' maximum distance).

• Occupancy and light sensors wire either to keypad or 0-10V dimming station via 22AWG cable with a minimum of three conductors.

• Four conductors run from 0-10VDC dimming station outputs to controlled lighting loads, two for switching line-voltage on/off and two for 0-10VDC dimming control signal.

• Thermostats may be located on-wall in classroom or remotely mounted with local flush wall-mount temperature sensor (maximum run 160 ft, 18AWG 2C).

• Multiple InFusion Controllers may be needed, depending on system size. These interconnect using 18AWG 2C twisted pair cabling, with controllers run in strict daisy-chain, total system run of 2000 ft (limit of 15 controllers). Alternately, InFusion Controllers can be interconnected via Ethernet LAN, where the system must cover a large area. Controllers may be connected by a combination of 2-wire direct connection and Ethernet up to 31 total controllers per system.

• An Ethernet port to at least one controller allows for centralized and remote system access as well as enabling interface apps on portable devices.

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1061 South 800 East
Orem, Utah 84097
800.555.9891
801.229.2800
801.224.0355 fax

www.vantagecontrols.com

The content in Vantage reference designs for classrooms is intended to provide a starting point for designers that are contemplating a classroom project with lighting control and integrated automation. The photos included, unless labeled, are not exact project replicas but are representative of this type of project.