EM *Solutions*™ *5/7/11/13* VAV
Terminal Unit Controller
Model Numbers: SST-05-VAV-0-0, SST-07-VAVRH-0-0, SST-11-VAVRH-0-0, and SST-13-VAVRH-0-0

Applications

The EM Solutions 5/7/11/13 VAV is a micro-processor based energy management and direct digital controller. It is commonly used to monitor and control mechanical and electrical equipment in industrial and commercial heating, ventilating and air conditioning operations. Typical systems include variable air volume mixing boxes, same with Terminal Reheat and same with custom monitoring and controlling functions. Control Pak International's definable operating parameter programming software provides unique control decisions achieved through a simple and powerful data entry process.

Description

The EM Solutions 5/7/11/13 VAV is a compact and powerful terminal unit controller. It consists of an integrated Central Processing Unit (CPU), externally accessible RJ-11 style RS-232 port for PC Host communications, integrated velocity pressure transducer, Input/Output (I/O) components, I/O termination strips, EM Solutions Series Local Area Network (LAN) connection, Ten (10) element LED Display for LAN data traffic and Digital Input/Output status indication, ON/OFF power switch, and 24 VAC Input Power Supply.

When an EM Solutions Series Large or Small (SSL/SSS) controller is used as LAN address 01, the real time is synchronized for the entire LAN and is battery backed for Ninety (90) days. As well, the SST gains the time based Timeclock (ON/OFF), Zone (Heating/Cooling Set point and Optimized Start), Outside Air Temperature based Summer/Winter, and "Throughput" Digital Output commands from the SSL/SSS Unit.

The SSL/SSS unit read Network (NW) Object (I/O and operating parameter) values from the SST for generating and issuing Trend and Alarm Log Reports to the ManagePak™ EW host software for Windows™ (Mpak EW for Windows). The SSTs respond to Object value requests of the Mpak EW for Windows for graphic displays and User Interface, thus the SST becomes part of a networked full-function Building Automation System. The EM Solutions LAN enables up to 127 SSL/SSS/SST units to communicate at 9600 baud via a two wire cable up to 4,000 feet. User decisions can be entered via the Mpak EW for Windows Server software resulting in operating parameters being automatically burned into non-volatile Flash memory in the SST Unit. The Mpak EW for Windows software is Server/Client based to enable multiple PCs to communicate in a TCP/IP Ethernet thereby providing more addresses, faster communication, less set-up time, and enhanced user interface features.

SPECIFICATIONS:

Ambient Temperature Limits -
Operating: 32°F (0°C) to 113°F (45°C)
Shipping & Storage: 0°F (-17.8°C) to 140°F (60°C)

Ambient Humidity Limits -
Operating: 10 to 95 % RH, non-condensing.
Shipping & Storage: 10 to 95 % RH, non-condensing.

Power Requirements –
Input power 24VAC, 60HZ, single-phase, 25 Watts.

Equipment Protection –
Fuse: ¾ Amp Resetable Polyfuse on the AC input.
Opto Isolation: These devices protect the LAN, Digital Input and Output points through power isolation from internal circuits.

Chassis -
A 1/8th inch formed plastic enclosure with dimensions of 9" H x 5" W x 2 1/4" D. The unit is designed to mount directly on the surface of the Mechanical Terminal Unit it is to control. Exposed access to the I/O terminal strips, the velocity high and low pressure tubes from the pitol tube, the bit switch block for unit addressing, RJ-12 RS-232 port, LED display and ON/OFF power switch are provided for swift installation and commissioning. The mounting dimensions for the SST units are 8 10/16" H1 and 2.5" W1 and designed for zip screw installation.
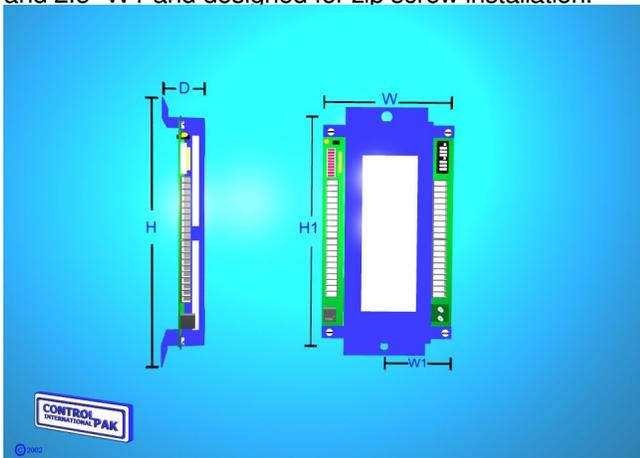
CPU -
The SST Unit has an integrated, multifunction Central Processing Unit (CPU) which executes all data acquisition, control decisions and Output execution while supporting LAN data exchange and User Decision entry. The Unit comes with the appropriate firmware for the model selected and the User decisions are ON/OFF and set point/threshold values which combine to form the custom control sequence required for the specific application. These values are automatically burned into Flash memory as a result of simple User commands at the Mpak EW for Windows Server or Graphics level while the controller is in on-line service.

Flash Memory: The SST Controllers come with appropriate default commands burned into the non-volatile Flash Memory for initial start-up and power failure recovery in the event of a LAN disconnection. All Operator decisions are field definable and automatically stored in Flash memory via the Mpak EW for Windows Software.   Time and set point decisions are updated thereafter through communications with the EM Solutions Series Large or Small (SSL/SSS) controller over the LAN.

SSL/SSS Controller Relationship: when an SSL/SSS controller is used as LAN address 01:

1. Real time is synchronized for the entire LAN and is battery backed for Ninety (90) days,
2. SSL/SSS will self adjust automatically for Leap Year and Daylight Savings Time,
3. SST gains time based Timeclock (ON/OFF) and Zone (Heating/Cooling Set point and Optimized Start) commands from SSL/SSS ,
4. SSL/SSS unit can read Network (NW) Object (I/O and operating parameter) values from the SST for generating and issuing Trend and Alarm Log Reports to the host system,
5. SSL/SSS/SST responds to Object value requests of the host system software for graphic displays and User Interface,
6. Objects from multiple SSTs can appear on the same graphic screen as real time information,
7. SSL/SSS provides Fifteen (15) character alpha-numeric English Language labels for all input/output points and key relational decision making objects for display to LTU, RTU, SS-POT, computer terminal emulation or via ManagePak™ Engineering Workstation host software for Windows™.
8. SSL/SSS can command select "Throughput " DOs for custom control actions via the SST.

Communication Ports -
Computer Direct Connect Port: RJ-12, RS-232 external serial port to link an SST to a directly connected host computer running CPI's ManagePak™ Engineering Workstation host software for Windows™ at Baud rates up to 9600 (115 Kbaud*).

Local Area Network (LAN) Port: RS-485 external serial port for LAN communication up to 4000 feet without optional repeaters at 9600 baud (115 Kbaud*) using a single twisted pair of wires. Remote unit access and Network Objects values can be shared in real time. Up to 127 controllers on one network can monitor and control up to over 12,000 (24,000*) I/O points total.

Firmware Direct Connect Port: A five pin external communication port provides access to field connection of a firmware loading tool for applying new versions of firmware as new features become available.

Input/Outputs -

Analog Inputs: 1000 Ohm Balco or 1000 Ohm Resistor internally powered. AI resolution is twelve (12) bits. 4-20 Ma CO_2 sensors can be used with resistors to cause a selectable parts per million set point based outside air intake control to maintain air quality during periods of high occupancy.

Digital Inputs: Dry Contacts for internally powered equipment or override status. The DI's are optically isolated, instantaneous, and have a minimum input pulse width of 29.4 ms HIGH or LOW. 24 VAC is provided to the peripheral device.

Digital Outputs: Optically Isolated triac outputs, internally powered, with a maximum rating of four (4) Amps on state RMS current. 24 VAC is provided to the peripheral device.

Analog Outputs: 0-10 VDC range, 2500 Ohm resistance minimum load, with 9 bit analog resolution.

ORDERING INFORMATION:

CONTROLLER OPTIONS:

☐   **EM Solutions 5-VAV**: M/N SST-05-VAV-0-0
Consists of four (4) Analog Inputs (intended for Space Temperature, Space Temperature Set Point Adjustment, Supply Air Temperature, and Integrated Velocity Pressure Transducer) and One (1) Analog Output (Intended for VAV Damper positioning Control) for a total of Five (5) I/O points.

☐   **EM Solutions 7-VAVRH**: M/N SST-07-VAVRH-0-0
Consists of four (4) Analog Inputs (intended for Space Temperature, Space Temperature Set Point Adjustment, Supply Air Temperature, and Integrated Velocity Pressure Transducer) and Two (2) Analog Outputs (Intended for VAV Damper and Reheat Coil Valve Positioning), and One (1) Digital Output (Intended for Dry Contacts for VAV Booster Fan Start/Stop) for a total of Seven (7) I/O points.

☐   **EM Solutions 11-VAVRH**: M/N SST-11-VAVRH-0-0
Consists of four (4) Analog Inputs (intended for Space Temperature, Space Temperature Set Point Adjustment, Supply Air Temperature, and Integrated Velocity Pressure Transducer), Two (2) Digital Inputs (Intended for Dry Contacts for VAV Booster Fan and Motion Detector Occupancy Status], Three (3) Analog Outputs (Intended for VAV Volume Damper, Reheat Coil Valve and perimeter Hot Water Valve positioning), and Two (2) Digital Outputs (Intended for Dry Contacts for VAV Booster Fan Start/Stop, and a spare DO for ON/OFF Control [i.e. Exhaust Fans, Lights, Electrical Equipment, etc.]) for a total of Eleven (11) I/O points.

☐   **EM Solutions 13-VAVRH**: M/N SST-13-VAVRH-0-0
Consists of four (4) Analog Inputs (intended for Space Temperature, Space Temperature Set Point Adjustment, Supply Air Temperature, and Integrated Velocity Pressure Transducer), Two (2) Digital Inputs (Intended for Dry Contacts for VAV Booster Fan and Motion Detector Occupancy Status], Three (3) Analog Outputs (Intended for VAV Volume Damper, Reheat Coil Valve and perimeter Hot Water Valve positioning), and Four (4) Digital Outputs (Intended for Dry Contacts for VAV Booster Fan Start/Stop, Two (2) Stages of Electric Reheat Coils, and a spare DO for ON/OFF Control [i.e. Exhaust Fans, Lights, Electrical Equipment, etc.]) for a total of Thirteen (13) I/O points.
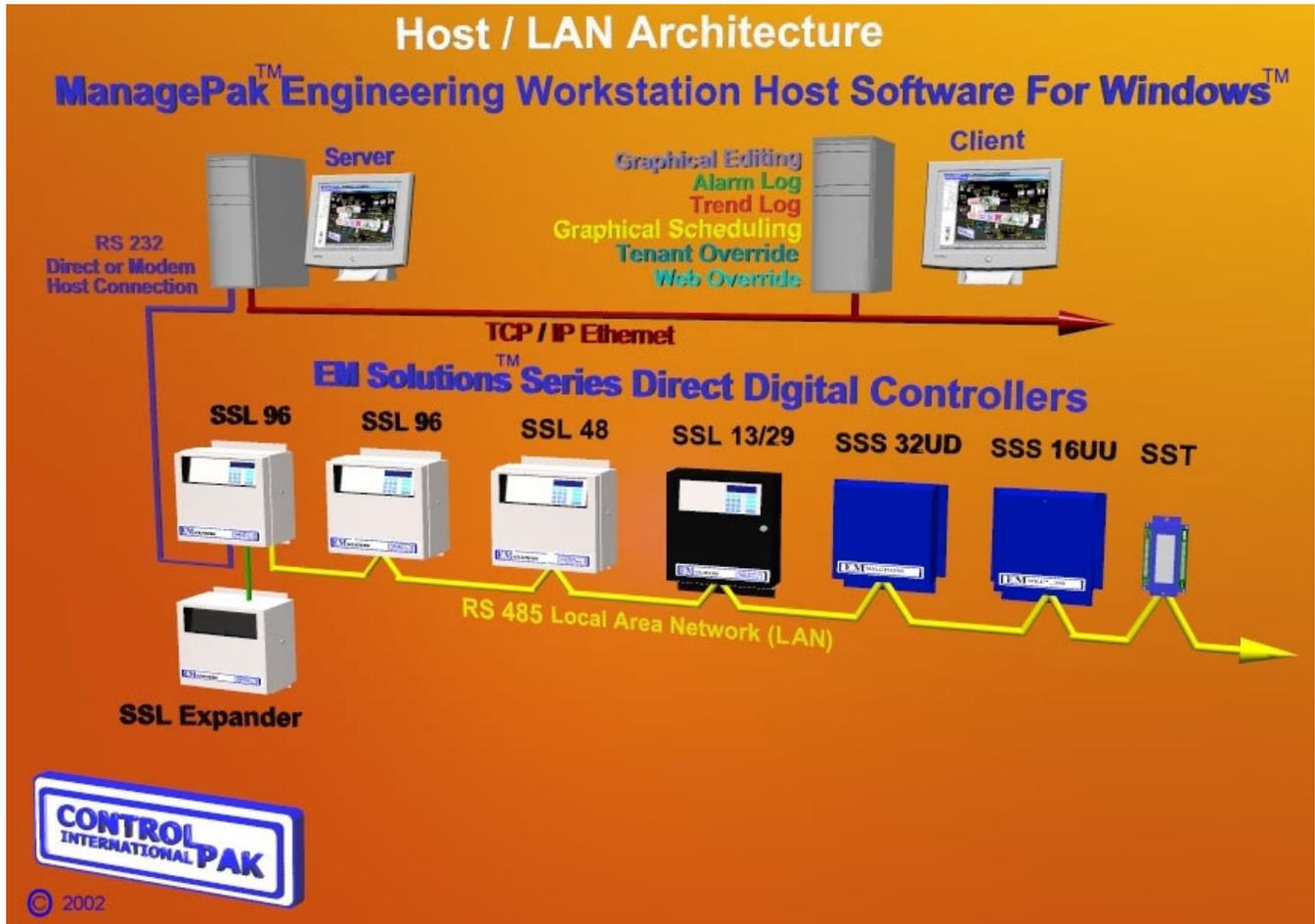
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* = Future Feature in Firmware Evolution (present Hardware is capable)