INNOTECH®

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Model:
VM01: VAVMax Controller

VAVMax Controller

Overview

The Innotech VAVMax Controller is a state of the art digital processing system designed to control VAV boxes in industrial and commercial environments. The VM01 is designed to operate on an Innotech Sub System Network managed by the IG01 Sub System Gateway, allowing the VM01 to receive time synchronisation signals and store logged data. Alternatively, the VM01 can operate as a stand-alone unit on an Innotech primary Netcomm network; however in these applications the device will not have all of its features available.

The VM01 is fitted with an on-board differential pressure sensor to track and calculate changes in air velocity pressure and respond as directed in its program.

The VM01 features Universal I/O channels (UIO), which combine the functions of Universal Input and Analogue Output channels into a single software programmable channel. Each UIO can be independently configured via software to have input or output functionality.

The VM01 controller can be configured using the Windows® based MAXCon software. MAXCon allows the user to configure the internal processes of the VM01 controllers by placing various process blocks and interconnecting lines to design the required control algorithm.

Features

- Differential Pressure Sensor
- 100 millisecond cycle/scan time
- 1 x dedicated thermistor input
- 2 x independent configurable universal inputs/outputs
- 4 x 24 V AC TRIAC outputs
- 1 x RS485 serial communication port
- User selectable Baud Rate:
  a. Innotech Net Comms 57600bps.
  b. IG01 Sub System Gateway Comms 115200bps
- All wire connections by pluggable screw terminals
- Program resides in non-volatile flash RAM
- Real-time Clock (not battery backed)
- Visual indication of power, comms, and system activity

Applications

The VM01 is designed for mounting inside an environment free from moisture and dust. It offers programmable channels, enabling it to monitor and control all types of external plant and equipment. Although the VM01 is flexible, it is primarily designed for the air conditioning and building automation industry. The small size of the VM01 also gives it the advantage of being installed in small places or duct sections.

The creation of control strategies is made simple by using the MAXCon software. With a powerful Graphical User Interface, MAXCon allows the user to create an entire control strategy using block diagrams.

Specifications

POWER SUPPLY REQUIREMENTS	
Power input	24VAC ±10% @ 50/60Hz
Transformer nominal rating Maximum TRIAC Load	35VA
Transformer nominal rating No TRIAC Load	10VA
The operating voltage must meet the requirements of Safety Extra Low Voltage (SELV) to EN60730. The transformer used must be a Class 2 safety transformer in compliance with EN60742 and be designed for 100% duty. It must also be sized and fused in compliance with local safety regulations.	

ENVIRONMENTAL	
Operating Temperature	0°C to 40°C non-condensing
Storage Temperature	0°C to 50°C non-condensing

ENCLOSURE	
Housed in a rectangular case suitable for DIN Rail mounting. Housing molded from flame retardant plastics recognized by UL as UL94-V0.	
Color	Grey
Dimensions (Maximum)	(W)71mm x (H)115mm x (D)67mm

APPROVALS
EN61326:2013 for CE Marking and RCM Labelling
Title 47 CFR, Part 15 Class A for FCC Marking
UL listed to UL916, File Number E242628

ANALOGUE MODE	
Input accuracy	±0.1 V
Input impedance	~75 kΩ
Input resolution	~10 mV
Output accuracy	±0.1 V (RLoad > 2 kΩ)
Output resolution	~40 mV

DIGITAL MODE	
Output current (Max)	10mA
Output voltage swing	0.3V – 9.5V @ 10mA
Input voltage range	0V – 10V
Input impedance (Dry)	~8.8KΩ
Switching threshold (Dry)	4.5V
Input impedance	~75KΩ
Switching threshold	5V
PWM duty cycle accuracy	±5%

TEMPERATURE MODE (with Innotech SEN Series Detectors)	
Nominal sensing range	-5°C to 60°C
Accuracy	±3.5%FS (R25°C = 10 kΩ)

TRIAC OUTPUTS	
4 TRIAC outputs switch 24VAC Power Supply through to the outputs	
Current rating	Min: 20mA / Max: 250mA
Modes	Modulated PWM or Digital ON/OFF
Pilot relays recommended when switching high voltage/inductive loads.	
Modulation On-Delay staggered between channels	

PRESSURE INPUT	
1 differential pressure input[1] (Non corrosive gases only)	
Maximum static pressure	3000 Pa
Maximum rated differential pressure	0 to +250 Pa
Differential operating pressure	-10 to +300 Pa
Accuracy	±5% FS

FIXED THERMISTOR INPUT (with Innotech SEN Series Detectors)	
1 fixed thermistor input	
Nominal sensing range	-5°C to 60°C
Accuracy	±3.5%FS (R25°C = 10 kΩ)

UNIVERSAL INPUTS / OUTPUTS

Total of 2 UIOs available, which can be configured with software as shown in the table below.

UIO Type		Input Range	Output Range
Analogue Input		0 – 10 V DC	0 – 10 V DC
Dry Digital Input		Open or Closed	OFF or ON
Voltage Digital Input		0 – 10 V DC	OFF or ON
Thermistor Input		96 kΩ – 677 Ω	-50°C to 100°C
LUX Sensor Input	Nominal	20 kΩ – 400 Ω	3 to 1000 LUX
	Full Range	1MΩ – 0 Ω	0 to 2500 LUX
Dry Pulse Counter Input		Open or Closed 20ms Min. ON Time 20ms Min. OFF Time	0 to 25 pulses per second ±1 pulse accuracy
Voltage Pulse Counter Input		0 – 10V Square Wave 20ms Min. ON Time 20ms Min. OFF Time	0 to 25 pulses per second ±1 pulse accuracy
Analogue Output		0 to 100%	0 – 10 V DC
Digital Output		OFF or ON	0 or 10 V DC
PWM		0 to 100%	0 to 100% Duty Cycle @ 13Hz

COMMUNICATIONS

1 RS485 serial communication channel

- Optimized for fast data transmission with IG01 Sub System Gateway
- Provides Net comms only if used without IG01
- Communication to handheld Commissioning Tool (CT01)
- 5 way pluggable screw terminal connector

[1] Pressure sensors for VAVs are generally very sensitive electromechanical devices. The pressure sensor of the VM01 is factory calibrated for best performance. Excessive stress will cause irreparable damage to the VM01 pressure sensor.

Please observe the following when handling the VM01:

- Do NOT apply pressure from sources other than a pitot tube
- Do NOT apply excessive static or differential pressure when connecting or disconnecting air supply to the VM01
- Do NOT drop the device

Status LEDs

LED Indicator		LED Colour	Description
Power		Red	Power is ON
Identification		Flashing Orange	Helps locate a VM01 with a specific device address during commissioning using the Ping command in iComm, or another HMI tool. Can also be used to aid in assigning a specific device address to a particular VM01.
Communication	Sub System Network	Red	Data transmit
		Green	Data receive

Installation

The VM01 should be installed in an environment that does not exceed the maximum operating parameters of the device. It should be mounted in a dry and clean environment free of vibration.

It is important to ensure proper ventilation, especially when the Digital TRIAC Outputs are in use. Ensure the VM01 is installed vertically for best accuracy and pressure sensor protection from dirt and fluids.

A pair of soft tubing with a minimum length of 50cm, and inside diameter in the range 5.5mm to 7.5mm should be used to connect the VM01 pressure ports.

Configuration

Auto Zero Function (Sensor Re-Calibration)

Each sample configuration is issued with an auto zeroing function. When activated, the VM01 fully closes the damper for a period of 4 minutes. It is expected that the airflow is reduced to minimal leakage. The pressure reading is set to zero and the VM01 returns to normal operation.

ⓘ This function should be executed every 24 hours.

Safe guards are in place to prevent false re-calibrations. These safe guards can be bypassed with the following commands:
MAXCon Menu: *Save the next VAVMax calibration*
Commissioning Tool Menu: *F.SP Calib*

RS485 Comms Termination

Generally a daisy chain network configuration is recommended for a high speed network such as the one provided by the IG01 Sub System Gateway. If the VM01 is situated at the end of such a network, the jumper must be moved to the EOL position.

ⓘ Without exception, ONLY 2 devices should have the jumper in the EOL position. All other devices should have the jumper in the NODE position. If the VM01 is connected to a primary network, the jumper should be in the NODE position.

ⓘ For more information please refer to the Installation Guide and Innotech Network Cabling Manual DS99.04.

Networks and Addressing

Network

The VM01 Controller is designed primarily for use with the IG01 Sub System Gateway, but can be used as a part of the standard Innotech Network or standalone. The mode of operation is configured by setting the User Selectable Baud Rate.

In a standard Innotech Network, the VM01 uses NET 57600 baud rate. Since the controller does not have Global Comms and data logging memory, the following features are not provided:

- Data Logging
- Global Points
- Alarms
- Real Time Synchronisation

In a Sub System Network, the VM01 uses 115200 baud rate. The IG01 Sub System Gateway transparently provides, for any VM01 on its network, the above features that the VM01 does not support in the standard Innotech Network mode.

Addressing

The VM01 has different addressing schemes associated with the network that it is configured for. The two addressing schemes are:
IG01 Sub System Gateway Automatic addressing – the IG01 Sub System Gateway will dynamically assign the address.
Standard Innotech Network Static addressing – the VM01 is assigned the address by the same means as any other controller on the standard Innotech Network.

Please note, in IG01 Sub System Gateway Addressing Mode the IG01 Sub System Gateway assigns the VM01 its address when it joins a Sub System Network or if the power is recycled.

Commissioning Tool

A special handheld Commissioning Tool (CT01) can be used to configure a VM01 on a Sub System Network. The configuration loaded on the VM01 determines the parameters associated with the control strategy that can be adjusted with the CT01.

If there is no configuration loaded into the VM01, then the VM01 is not operational; therefore no parameters can be changed or monitored.

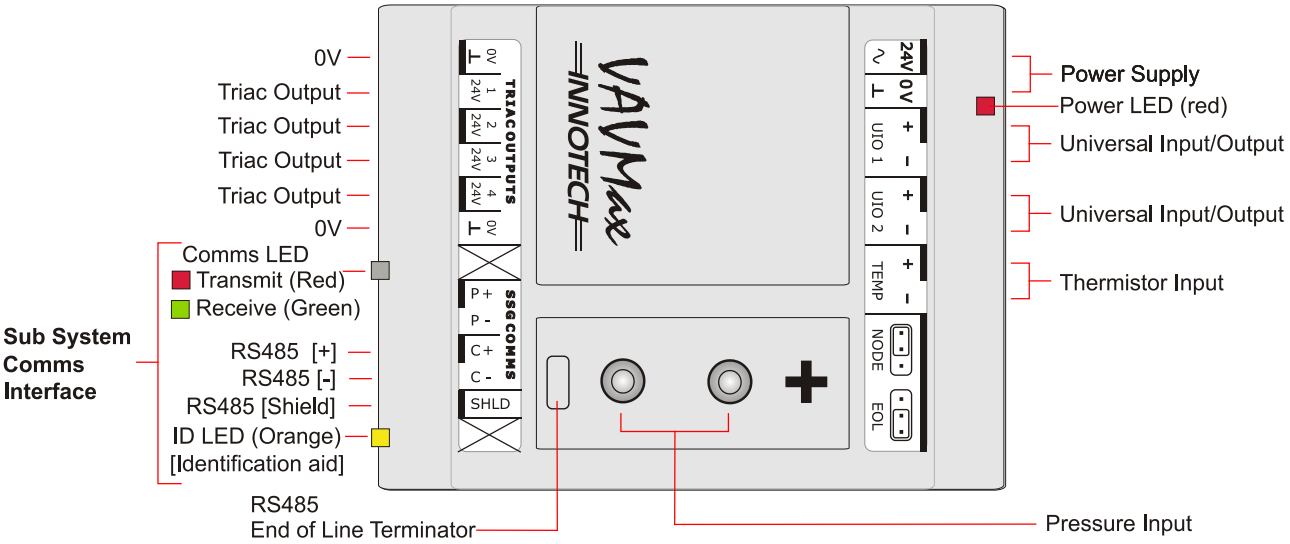
The CT01 can be connected directly to the VM01 or to the Sub System Network using the supplied adapter cable to configure multiple VM01 controllers. The IG01 Sub System Gateway has to be disconnected from the network when the CT01 is connected to the Sub System Network.

For ease of use the CT01 has a 4 line, 20 character Liquid Crystal Display and Keypad. The Keypad consists of seven push buttons to provide input into the VM01 of interest. These buttons are “Up”, “Down”, “Left”, “Right”, “Log On”, “Enter” and “Escape”. Using these buttons, the user can gain access to the VM01 controllers menu structure shown below.

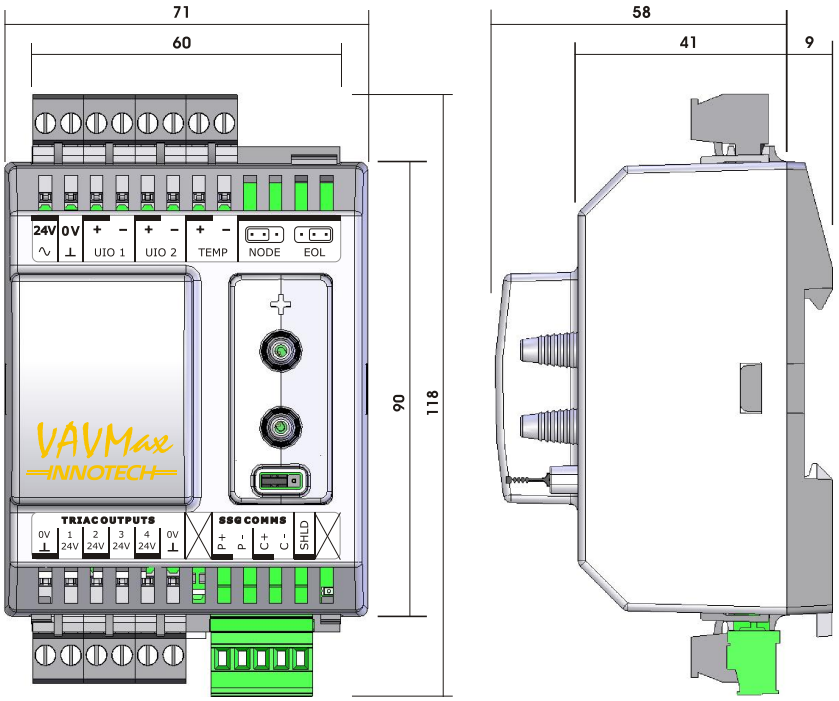
Default——Status——Clock——Setup——Commission
- Var Setup
- IO Config
- PID Par

For more detailed instructions, please refer to the documentation supplied with the Commissioning Tool CT01.

VAVMax Connection Diagram



VAVMax Dimension Diagram



FCC Class A Notice

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Modifications to this device, may void the authority granted to the user by the FCC to operate this equipment.

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