

CONTACT-LESS **ACOUSTIC** SENSING SYSTEM



CLASS[™]

The Multi-Function System for

- Obstruction Sensing
- Increased Passenger Protection
- Optimal Door Operation



Vapor Bus International

A Wabtec company

Vapor's Contact-Less Acoustic Sensing System – CLASS™ is the next generation in door actuation and passenger protection. Solid state acoustic technology improves passenger detection, reduces maintenance expense and enhances door system functionality.

CLASS Advantages

- Reduces maintenance expense by replacing mat switches, push buttons, tape switches, touch bars and light beams with solid state sensors
- Unique sensing technology reduces dwell time up to 3 seconds per stop
- Enhances function of sensitive edges
- Safe, inaudible and invisible ultrasound eliminates passenger contact with the doors
- Advanced signal processing limits false activations
- Robust components resist dirt, humidity and vandalism
- Applicable to new vehicles and retrofit installations



Multi-Function Solution

The **CLASS** system consists of three ultrasonic sensors and a signal processing module. When activated, the sensors emit bursts of ultrasonic pulses to survey specific spaces within the doorway. The echoes received by the sensors are analyzed by the signal processing module to determine whether or not an object (person, parcel, debris) is present. When an object is detected, the signal processing module signals the door controls, which initiate the appropriate door motion.

CLASS can be programmed to provide a different function during each phase of door operation. It can emulate a touch bar or touch tape for passenger actuation when a door is enabled but still closed, provide a "hold open" function for a stream of passengers exiting through an opened door, and enhance the sensitive edge function as the doors close.

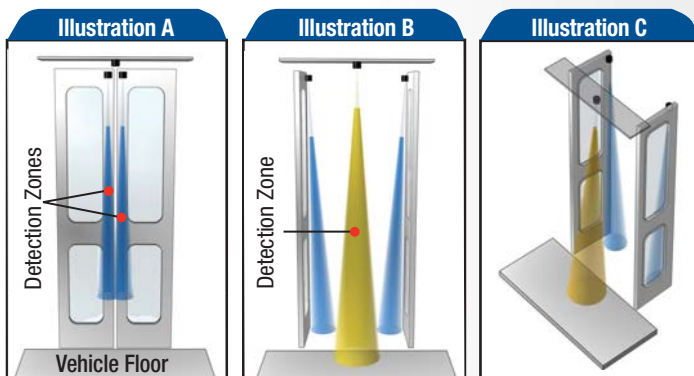
- **Touch to Open** - **CLASS** functions as a touch bar or touch tape for passenger actuation
- **Hold Open** - **CLASS** can detect a stream of exiting passengers, functioning like a treadle mat, and hold the door open, reducing dwell time
- **Contact-Less Sensing** - The **CLASS** panel sensors enhance the function of sensitive edges. As the doors close, **CLASS** enables passengers to exit without contact with the doors
- **Proximity Sensing** - While the bus is in motion, **CLASS** can detect a passenger standing close to, or leaning on the exit door, and activate a warning light, an alarm, or a voice announcement system.



CLASS In Action

The following illustrations provide an example of CLASS operation on a bus exit door. Other zone configurations can be used to optimize CLASS performance with specific vehicles and/or operating practices.

In illustration A, the bus has stopped and the driver has enabled the exit door. In response to the door enable signal, the CLASS signal processing module has activated the two door-mounted sensors and is looking at two detection zones that extend from approximately 12" (30cm) below the door header to approximately 43" (110cm) below the door header. These zones function similarly to a touch bar or a touch tape. If an exiting passenger places a hand within either detection zone, CLASS will sense that action and signal the door to open.



When a position sensor on the door actuator indicates that the doors are fully open, the CLASS signal processing module changes the configuration of the detection zones. The zones for the door-mounted sensors are extended almost to floor level and the header-mounted center sensor is activated. See illustrations B and C. In this mode, the center sensor will maintain the door open for an exiting passenger stream, while the door-mounted sensors enhance the function of the sensitive edge seals with an expanded detection zone.

This operating mode is maintained until the doors begin to close, at which time the lower end of the zone for the center sensor is raised to exclude a portion immediately above the floor. When the door is nearly closed, the mode will return to that shown in illustration A, provided that the door remains enabled.

The CLASS Difference

Programmable Detection Zones

Acoustic sensing enables CLASS to sense different spaces during various phases of the door operating cycle. This sets CLASS apart from other passenger protection systems based on infrared or visible light. Acoustic sensing also reduces the vulnerability of the system to the effects of light and moisture.

CLASS Application

The CLASS system is applicable to both high and low floor transit vehicles and to all common door geometries. It can be installed on new vehicles during manufacture and retrofitted to many existing vehicles. Retrofit applications should be reviewed by a Vapor representative to determine the most suitable configuration and functionality.

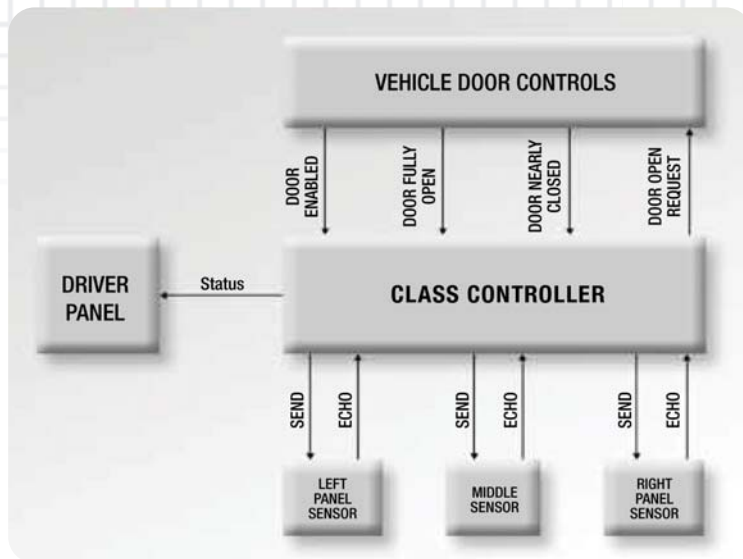
CLASS Voice Annunciator

With the optional CLASS Voice Annunciator, the CLASS System can provide short audio messages in the exit door area. Digitally recorded messages are delivered in response to inputs from the CLASS controller. The messages may be warnings, greetings or service announcements. A set of standard messages in English and Spanish is included with the unit. Additional messages and/or other languages can be provided.

This compact, rugged unit is easily installed in the door header space or adjacent to the doorway, and is applicable to both new vehicles and as a retrofit to existing CLASS III systems.

Additional information is available in Bulletin No. 53-3098 or from your Vapor representative.





Design Life

- 12 years

Power Supply

- Operating Voltage: 12VDC or 24VDC nominal
- Minimum Operating Voltage: 10VDC
- Maximum Operating Voltage: 37VDC
- Maximum Surge Voltage (1 sec. max. duration): 40VDC
- Transient Voltage Spikes (1 msec max. duration): ± 250 VDC
- Total System Power Consumption: 30W max.

Inputs

- Working voltage range is same as main power voltage specification. Inputs shall guarantee detection as ON when voltage is above 4V and guarantee detection as OFF when below 0.5V.

Outputs

- Dry contacts capable of driving 200mA inductive load.
- Solid-state outputs capable of sinking or sourcing 500mA.

Sensors

- Power: +12 volts from internal power supply
- Analog output: AC coupled 0-5 volts peak
- Operating Frequency: 120 kHz to 170 kHz

Temperature Range

- -20° C to +60° C

CONTACT-LESS ACOUSTIC SENSING
SYSTEMS



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