Typical Beam Plot

Ultrasound Beam, VM1
sonic pattern measured by moving a large flat surface into the beam

deadband

cm   0   5   10   15   20   25   30   35   40   45   50   55   60   65

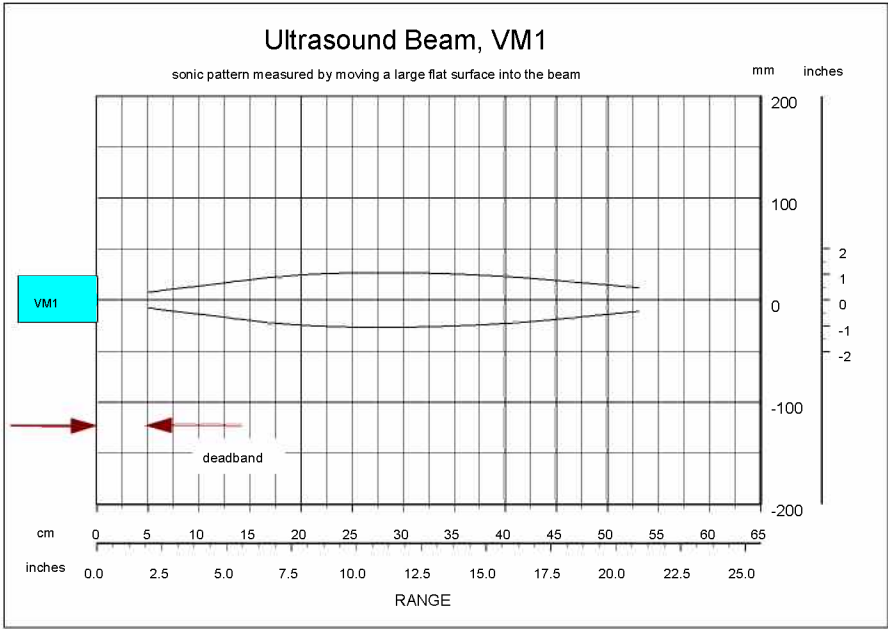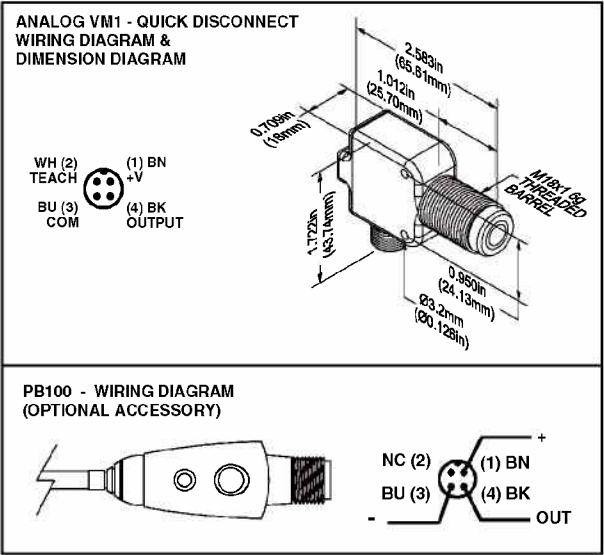inches   0.0   2.5   5.0   7.5   10.0   12.5   15.0   17.5   20.0   22.5   25.0

RANGE

Mounting / Alignment

Mount the sensor such that the surface of the object to be detected is approximately centered within the sensor's sensing field. Mount the sensor firmly to avoid vibration. The sensor face should be parallel to the liquid or material surface and free of air currents.

Wiring Connections and Dimensions, Connector Model

ANALOG VM1 - QUICK DISCONNECT
WIRING DIAGRAM &
DIMENSION DIAGRAM

WH (2) TEACH   (1) BN +V
BU (3) COM   (4) BK OUTPUT

2.583in (65.61mm)
1.012in (25.70mm)
0.709in (18mm)
1.722in (43.74mm)
M18x1 6G THREADED BARREL
0.950in (24.13mm)
Ø3.2mm (Ø0.126in)

PB100 - WIRING DIAGRAM
(OPTIONAL ACCESSORY)

NC (2)   (1) BN   +
BU (3)   (4) BK
                      OUT
                      -

Accessories

Model   PB100   Inline Pushbutton Switch (for teaching window)
Model   AC130   Straight, 4-Conductor Cable, Shielded, 5 meters (16 ft.)
Model   AC132   Right-Angle, 4-Conductor Cable, Shielded, 5 meters (16 ft.)
Model   AC228   Right-Angle Bracket

Sensing State Indicator LED's (Operation Mode)

Off: Sensor is not powered
Amber Only: Object is within span limits
Green Only: Object is outside span limits or no object is detected

Output Indicator LED

Orange: Intensity varies directly with output magnitude

Teach Sensing Span

Before operating the sensor, you should teach the sensor the sensing span, which is the distance between the near and far limits. The following procedure describes teaching the limits with a remote pushbutton. To teach the limits, press and hold the pushbutton. The amber LED fast flashes and then after 3 seconds, the green LED slowly flashes indicating the sensor is in teach mode. Release the pushbutton, and the green LED continues slowly flashing to indicate the sensor is waiting for the first limit. Place a target at the near or far limit where analog minimum is to occur, then press and release the pushbutton. While the pushbutton is pressed with a target present, the amber LED turns on indicating a valid echo is being detected. After the first limit is successfully taught, the amber LED slowly flashes to indicate the sensor is waiting for the second limit. Place a target at the second limit where the analog maximum is to occur, then press and release the pushbutton. While the pushbutton is pressed with a target present, the LED stops flashing, indicating a valid echo is being detected. After the second limit is taught, the two limits are saved in non-volatile memory and the green LED fast flashes for 3 seconds to indicate the limits were successfully saved.

If not using an optional pushbutton, the process is similar. The White teach wire (Pin 2) can be grounded to the Blue DC return wire (Pin 3) to simulate the pushing of the button. All LED indications and the teach sequence are identical to the above detailed process.

While setting either limit, if no echo is detected, the green and amber LEDs fast flash alternately indicating no object is detected. After 5 seconds, the sensor resumes operation with the old limits. If either limit is not set in 30 seconds, a limit timeout occurs, the green and amber LEDs flash for 3 seconds indicating the error, and then the sensor resumes operating with the old limits.

General Specifications

Power Supply:

Supply:	+15 to 24 VDC (±10%) @ 40 mA max (including output load)
Protection:	ESD and reverse-polarity

Analog Output;

Current:	4 - 20 milliamps
Load Resistance:	10 - 350 ohms
Protection:	ESD and short circuit

Pushbutton Input:

Active voltage level:	< 1.0 volt
Inactive voltage level:	> 2.5 volts
Activation On/Off time:	> 25 ms (3 seconds to arm for limit setup)

Response Time:	60 ms to 95% of final output value
Loss-Echo Time:	250 milliseconds
Loss-Echo State:	4 mA
Operating Temperature:	-30°C to 70°C (-22°F to 158°F)

Sensing: [T_A=20°C (68°F)] -Large Flat Target

Range:	50.8 mm (2.00 in.) to 508.0 mm (20.00 in.)
Maximum plane-reflector angle:	± 5°
Sonic Cone Angle:	See beam plot
Window-edge accuracy:	± 1.27 mm (0.050 in.) @ constant temperature
Minimum object size Rod:	2.5 mm (0.098 in) at 254.0 mm (10.00") range, 0° tilt
Factory Set sensing window	50.8 mm (2.00 in.) to 508.0 mm (20.00 in.)
Temperature Compensation	Temperature Compensation Enabled
Sensor Dimensions:	See Sensor Dimension section
Sensor Connector Cable:	Model AC130 or AC132 (see accessories section)

Sensor Materials:

Housing:	PBT
Transducer face:	Epoxy
Cable:	Non-toxic PVC jacket
LED:	Nylon

Sensor Ratings and Approvals:

NEMA 4X (Indoor Use Only) 5, 12, 12K, 13, and IP67

Installation/Overvoltage Category:	II

CE Mark Compliant: Declaration of conformity available upon request.

This Product is UL Listed if powered by a Class II Power Supply and protected by a 2.0A Max UL Listed Fuse

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VIRTU™
VM1-CA-Q
Ultrasonic Sensor with Analog Output
4-20 mA Analog Output, Dual Mount with Quick Connect
Autoslope teachable limits, 4 mA on loss-of-echo

OPERATOR INSTRUCTIONS

This self-contained ultrasonic sensor provides an analog output signal that is proportional to the object position relative to the teachable analog span limits. The Autoslope feature allows a reversible analog slope. The Inverse mode is selected by teaching the near limit first and the Direct mode is selected by teaching the far limit first (see diagram). Objects that are transparent, opaque, plastic, glass, metal, liquid, or solid can be detected within the sensing range. An amber and a green LED indicate sensing state, and an orange LED indicates the magnitude of the output.

The Analog span is determined by teachable near and far limits which can be set anywhere between the deadband (50.8 mm / 2.00 in.) and the maximum sensing range 508.0 mm / 20.00 in.). These limits are easily taught using an inline pushbutton (PB100) or a remote switch.
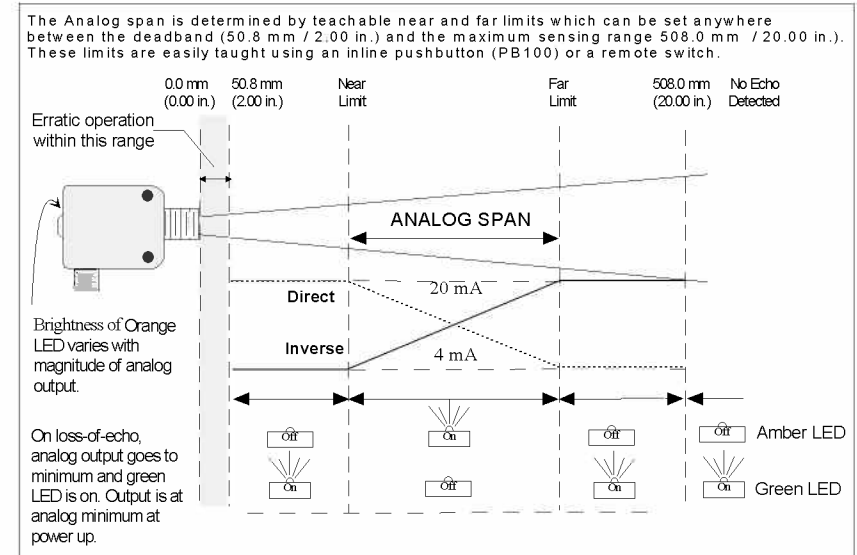
Figure 1

Literature and application engineering assistance are provided by Hyde Park and its authorized distributors to aid the customer in selecting the product for an application. The customer, however, is responsible for determining the suitability of the product in the application.

⚠ WARNING

UNINTENDED OPERATION

Do not use this product to detect objects within the deadband.

Failure to follow this instruction can result in death, serious injury or equipment damage.