



# Low Cost Radar "Smart" Level Measurement Sensors



Order from: C A Briggs Company; Willow Grove, PA 19090  
 Tel: (215) 784 - 9250 Web: www.cabriggs.com  
 Fax: (215) 784 - 0611 E-mail: sales@cabriggs.com

## FEATURES

- Simple push-button calibration (Accurate)
- Output 4-20 mA /20-4mA (Isolated on 4 Wire Model's only)
- Optional RS232 OR RS485 communications with calibration, diagnostics & data logging software
- PLC compatible (Modbus RTU)
- Three or Four Wire Operation

## APPLICATIONS

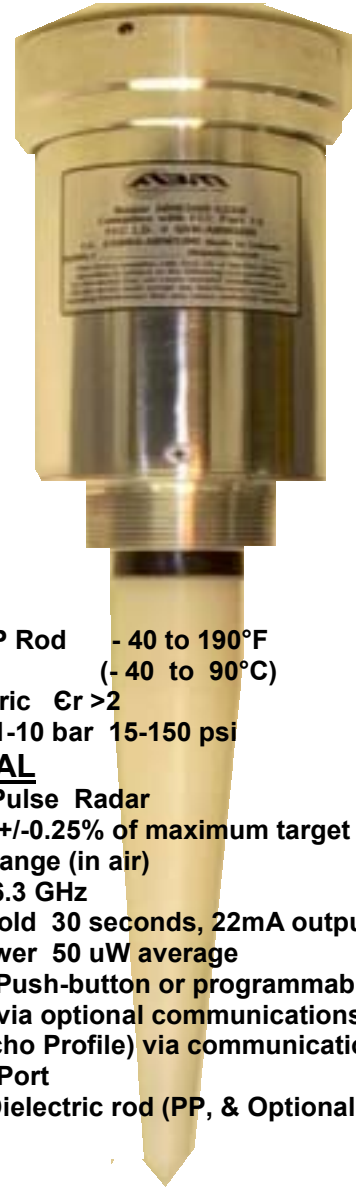
- Food and Beverages
- Water / Wastewater
- Chemicals with vapors

## MECHANICAL

Conduit Entry 1/2" NPT  
 Enclosure Aluminum Or Stainless Steel - 94V0  
 Ingress Protection NEMA 4 (IP65)

## ENVIRONMENTAL

Temperature - 40 to 140°F (- 40 to 60°C)  
 Installation Category Class II  
 Approvals FCC Part 15 - Low Power Communication Device

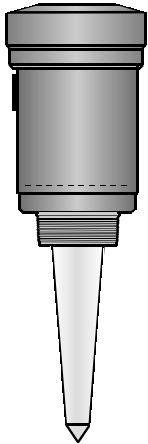


## PROCESS

Temperature PP Rod - 40 to 190°F (- 40 to 90°C)  
 Material Dielectric  $\epsilon_r > 2$   
 Pressure 1-10 bar 15-150 psi

## OPERATIONAL

Operation Pulse Radar  
 Accuracy +/-0.25% of maximum target range (in air)  
 Frequency 6.3 GHz  
 Loss of Echo Hold 30 seconds, 22mA output Time  
 Transmitter Power 50 uW average  
 Calibration Push-button or programmable via optional communications port.  
 Diagnostics (Echo Profile) via communications Port  
 Antenna Dielectric rod (PP, & Optional PTFE)



**ABMXXX-XXXR** Optional Communications- Specify  
 RS232 or RS485  
 R = Radar 6.3 GHz  
 XXX = Operating Range  
 400 = AC Power , 300 = DC Power

## TECHNICAL SPECIFICATIONS

MODEL	RANGE	RESOLUTION	MOUNTING
ABM300 - 050R 3 Wire - DC	* - 50 ft. * - 15 m	0.22" 5.7 mm	2.0" NPT
ABM300 - 100R 3 Wire - DC	* - 100 ft. * - 30 m	0.44" 11 mm	2.0" NPT
ABM400 - 050R 4 Wire - AC	* - 50 ft. * - 15 m	0.22" 5.7 mm	2.0" NPT
ABM400 - 100R 4 Wire - AC	* - 100 ft. * - 30 m	0.44" 11 mm	2.0" NPT

Note - \* Minimum Distance starts at the lower tip of the antenna .

## ELECTRICAL SPECIFICATIONS

Power	AC	115 VAC 60 Hz or 230 VAC 50 Hz (+/-20%) , 1.7 VA
	DC	12 to 30 VDC , 0.07 A max @ 24 Vdc R load = (Vs — 6) / 24 mA
Output		4-20 mA Output 6.1 uA resolution
		750 Ohms (Isolated on 4 Wire only)
		Optional RS232 or RS485 communications port.

# USER INSTRUCTION MANUAL

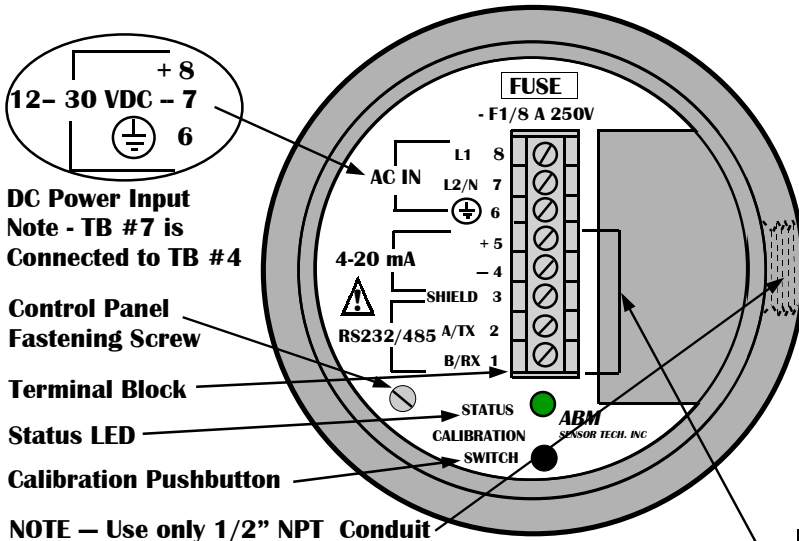
## For ABM300/400 (DC/AC) SENSORS



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### Inter-Connection Diagram

#### Top View of Sensor (Access Cover Removed)



**DC Power Input**  
 Note - TB #7 is Connected to TB #4

**Control Panel Fastening Screw**

**Terminal Block**

**Status LED**

**Calibration Pushbutton**

**NOTE** – Use only 1/2" NPT Conduit

#### FCC INFORMATION TO RADAR USERS

**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.

**WARNING**-Changes or Modifications not expressly approved by ABM Sensor Technology Inc. could void the user's authority to operate the equipment.

#### Wiring Information

- Ground shield at one end only.
- All terminal block wiring must be rated for 250V.
- Power input wiring must be protected by a 15A double pole circuit breaker .
- Terminal is for use only with equipment which has no live parts which are accessible .
- Terminal is for use with equipment which maintains basic insulation from hazardous voltage under normal and single fault conditions .
- Connection used at the remote end of external circuit .

#### Recommended Wiring

For AC Sensor –

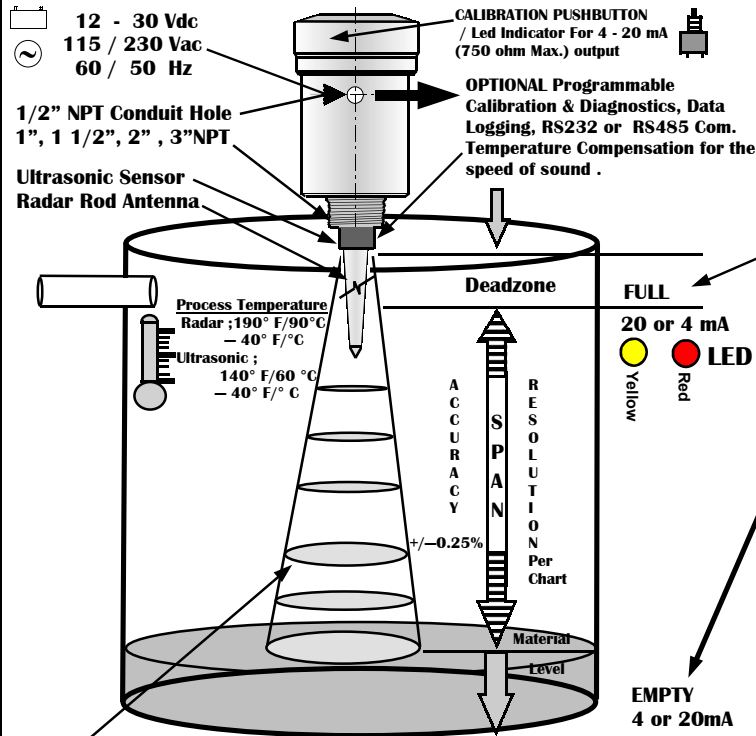
Power 3 Wire unshielded 22 AWG , 300 V  
 Current Output 1 Pair shielded 24 AWG , 300 V  
 Communication 1 Pair shielded 24 AWG , 300 V

For DC Sensor–

Power & Current output 3 Wire shielded 24 AWG , 300 V  
 Communication 1 Pair shielded 24 AWG , 300 V

### Typical Installation

- 1) DIRECT MOUNTING ULTRASONIC SENSOR -SIMPLY THREAD SENSOR DIRECTLY INTO METAL OR PLASTIC NOZZLE.
- 2) RADAR UNIT MUST BE INSTALLED INTO METAL FITTING WITH THE ANTENNA POINTING DOWNWARD.



#### Calibration – 4 -20 or 20 - 4 mA Output

**FULL** – Calibrate 20 mA or 4mA (Set Near Target)

1. Calibration mode LED color is Green.
- (for Radar Low Dielectric Materials has to be off)
2. Push button and hold until LED turns Yellow (20 mA) or push button and hold until LED turns Red (4 mA)
3. Release button, observe LED flashes to acknowledge the calibration.

**EMPTY**– Calibrate 4 mA or 20 mA (Set Far Target)

1. Calibration mode LED color is Green
- (for Radar Low Dielectric Materials has to be off)
2. Push button and hold until LED turns Red (4 mA) or push button and hold until LED turns Yellow (20 mA)
3. Release button, observe LED flashes to acknowledge the calibration.

**For Radar to turn the Low Dielectric Materials operation mode ON and OFF** (this mode is recommended for materials with dielectric constant lower than 4.)

- 1) To turn the Low Dielectric Materials ON. Push button and hold until LED goes OFF after the sequence of Yellow , Red and turns Off. The Low Dielectric Material operation is On when the LED'S Green light blinks constantly.
- 2) To turn the Low Dielectric Materials OFF. Push button and hold until LED goes OFF after the sequence of Yellow , Red and Turns OFF. The Low Dielectric Material operation is OFF when LED is continuously Green.

**Operation** - An ultrasonic/electromagnetic pulse is transmitted from the ABM sensor . The pulse travels to the surface being monitored and is reflected off this surface back to the sensor . The time of flight is divided by 2 and converted to an output signal directly proportional to the material level .

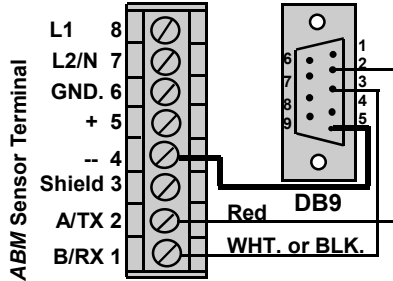
# INSTRUCTION MANUAL 10A385

## For ABM 300/400 (DC/AC) Sensors With Communication For a Single Or Network Level Sensors

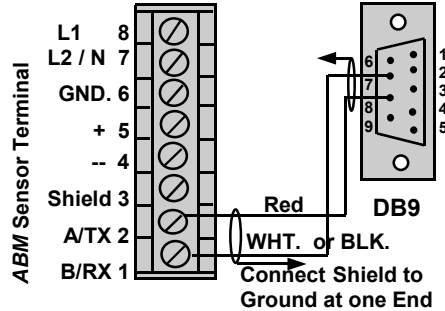


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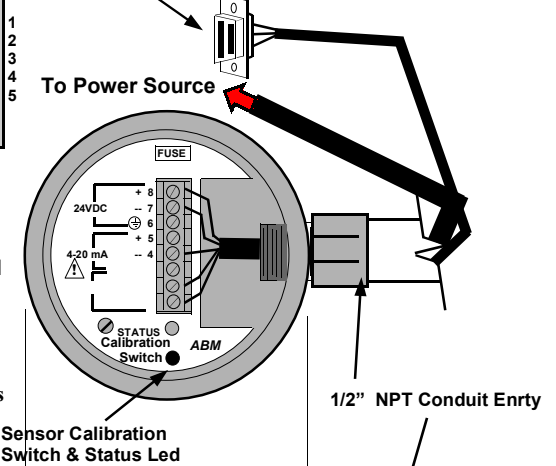
**Fig. # 1 RS232 Connection**



**Fig. # 2 RS485 Connection**



Connect to Serial Port of PC ,use  
Extension Cable length as required  
,Refer to Fig.# 1 or # 2 For Wiring



- 1) Load "ABM Gateway PC Software" into your PC .  
(Select SETUP.EXE from installation CD and follow instructions on the screen.)
- 2) Click on START and under PROGRAMS select "ABM Gateway PC".
- 3) Select "Start Data Link". You will see two bar graphs, displaying the last 8 echoes & the current output . When PC is connected to the probe, the application header displays the Probe ID and Freq. For PC connected to the Radar the application header displays the radar range. Traffic light icon at the bottom of the screen indicates communication status to probe.
- 4) Pick "Tools" and select "Show Calibration Data" .

Screen displays the following parameters,  
:Reset Max. Temperature (for ultrasonic probes)  
:Empty Tank Distance calibration  
:Full Tank Distance calibration -programmable with accuracy of 0.1"  
:Temperature Scale (for ultrasonic probes)  
:Low Dielectric Material (choose for low dielectric constant materials <4)  
:Pipe Mode On/Off (select this for microwave probes operating in metal pipes)  
:Select Pipe Diameter (for microwave probes only)

- 5) Show Calibration Data  
Screen displays the following parameters,  
:Sensor I.D. with single probe is 2  
:Current Frequency -shows the operating frequency  
:Empty Tank Distance  
:Full Tank Distance  
:Probe Software Rev.  
:D. Link Protocol  
:Max Temperature - shows the max. temperature of environment  
:Ntemp

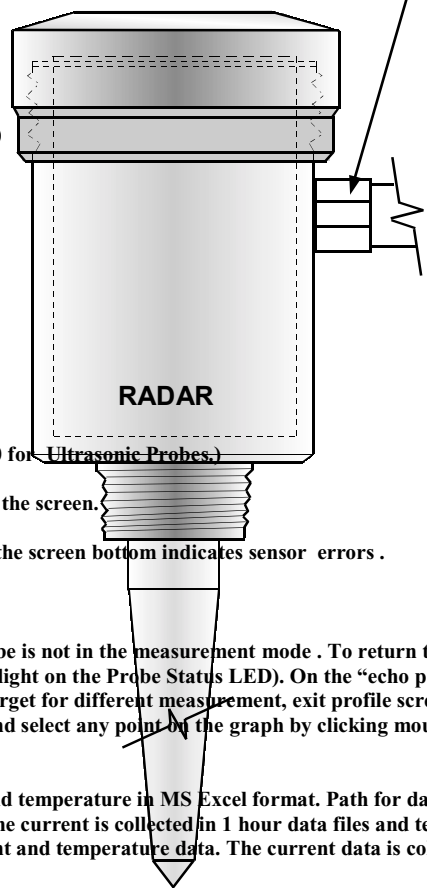
- 6) Select Protocol :RS485/232  
:MODBUS RTU (Holding Register address is 40109 for Radar Probes and 40080 for Ultrasonic Probes.)

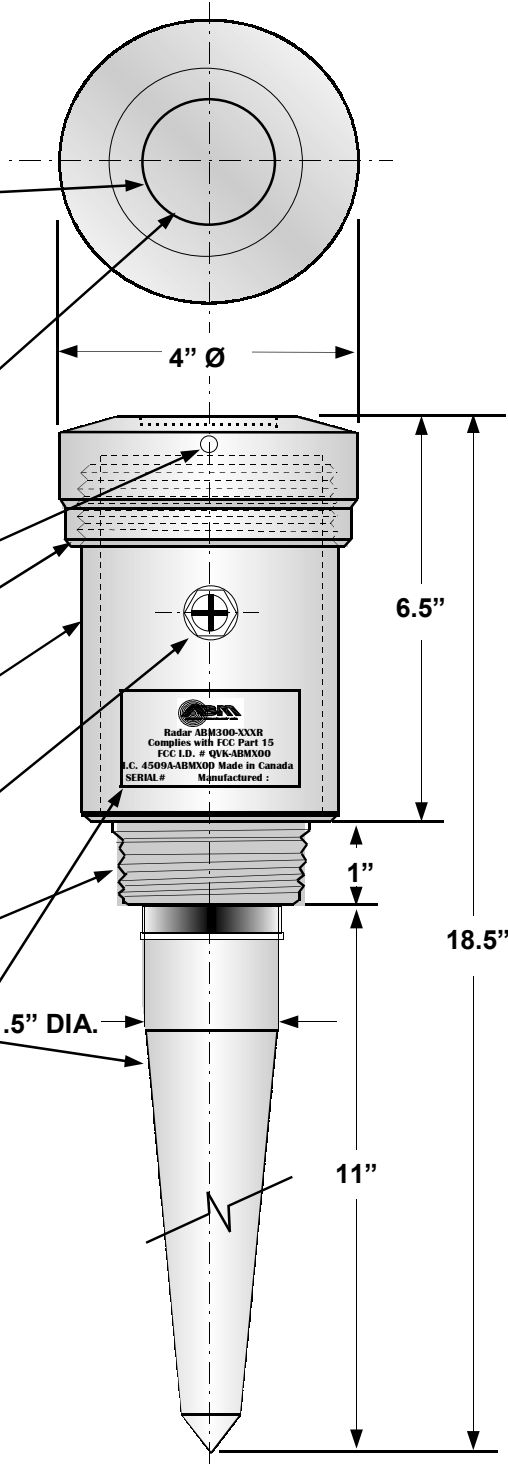
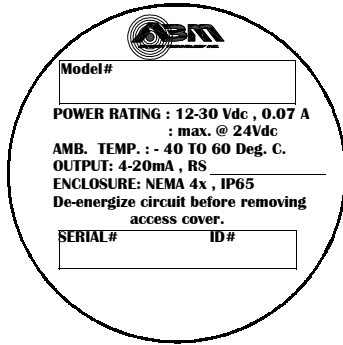
- 7) Fix point Calibration (the same as using the probe calibration Switch ) is in the top left corner of the screen.
- 8) By selecting "Diagnostic" the screen displays all information on "errors". Unhappy face icon at the screen bottom indicates sensor errors .
- 9) Echo chart displays information on stability of the echoes.

10) Echo Profile displays profiles of your ultrasonic probe . NOTE- when using this feature the probe is not in the measurement mode . To return to "measurement mode" exit the echo profile (select x) . Wait until you get the Data Link OK (green light on the Probe Status LED). On the "echo profile" you will see a marker where the software picked up an echo and the distance to the target. To change target for different measurement, exit profile screen, wait for updated data, and go to echo profile. The marker will pick up the new target . Freeze screen and select any point on the graph by clicking mouse to display the distance to selected target.

11) Select Data Logging Excel format (default) on FILE menu to collect history data for current and temperature in MS Excel format. Path for data collection: C:\ABM\GATEWAYPC\DATA\yyyy mm dd\sensorID\Data is collected for each sensor ID. The current is collected in 1 hour data files and temperature is collected in 24 hours data files. Use chart wizard in MS Excel to create the graph and view current and temperature data. The current data is collected every 0.5 second and temperature is collected every 1 minute.  
Select Data Logging (for Sensor Viewer) on FILE menu to collect history data for current and temperature for Sensor Viewer display. Follow instruction on Sensor Viewer Help menu.

- 12) Select AutoScan (only for networks) to collect data for all sensors connected in the network. Scanning time for one sensor is 30 seconds. Echo Profile display is disabled in Auto Scan mode.
- 13) For low dielectric constant materials such as oils choose Low Dielectric Material "On".
- 14) Select PIPE ON in Tools for microwave propagation in metal pipes, after that click on Select Pipe Diameter in Tools to choose proper diameter of metal pipe.





- Nameplate Recess
- Cover Tool Access Hole
- Thread on wiring access Cover (Aluminum or S.S.)
- Electronic Enclosure Aluminum or S.S. 3.5" Ø O.D.
- 1/2" NPT Conduit Entry
- Mounting Thread 2" NPT (Aluminum or S.S.)
- Antenna Polypropylene (Std,) Teflon (optional)

**Radar ABM300-XXXX**  
**Complies with FCC Part 15**  
**FCC I.D. # QVK-ABMX00**  
**I.C. 4509A-ABMX00 Made in Canada**  
**SERIAL# \_\_\_\_\_ Manufactured : \_\_\_\_\_**

"This device complies with Part 15 of the FCC Rules.  
 Operation is subject to the following two conditions:  
 (1) this device may not cause harmful interference and  
 (2) this device must accept any interference received,  
 including interference that may cause undesired operation "

**ABM300/400- 050R & 100R**

**FCC APPROVAL NAMEPLATE**

<b>SCALE</b> NTS	<b>TOLERANCES</b> DECIMAL      ANGULAR .x      ±.05      ± .5 deg .xx      ±.01 .xxx      ±.005	ALL DIMENSIONS IN INCHES UNLESS OTHERWISE NOTED	
<b>DATE</b> Nov. 20/02	<b>TITLE</b> <b>ABM 300/400 Radar Level</b> <b>Sensor Outline Detail</b>		
<b>DRAWN BY</b> HTV	<b>10A356</b> <b>R1</b>		<b>SHT.</b> 1/1