Madison Company

Sensor solutions for today and the future™

INSTRUCTION MANUAL
For Model R3 Explosion Proof Radar Sensors
With RS232 or RS485 Communication

FEATURES
Self Adjusting Tracking Radar
Simple push-button calibration
Output 4-20 mA / 20-4mA
Recommended RS232 OR RS485
For communications with calibration, diagnostics & data logging software
PLC compatible (Modbus RTU)
Three Wire Operation

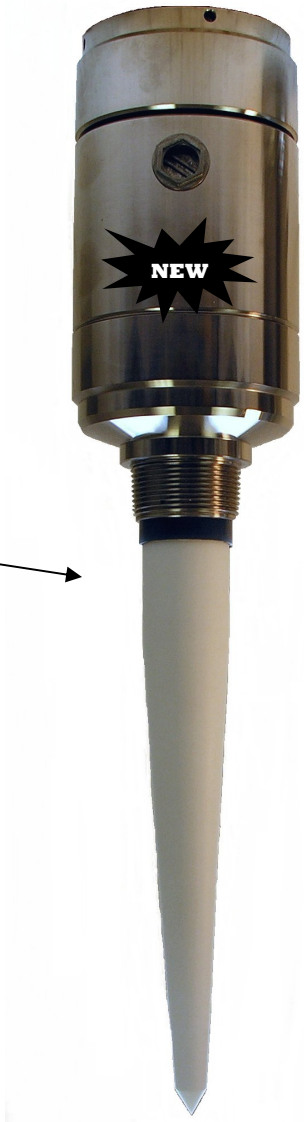
APPLICATIONS
Water / Wastewater
Chemicals with vapors
Solids Ranges Approximately 1/2 of liquids

MECHANICAL
Conduit Entry 1/2" NPT
Enclosures: Aluminum / SS / 94V0
Ingress Protection TYPE 4/4X, NEMA 4 (IP65)

ENVIRONMENTAL
Approvals: Explosion Proof For Class I, Div.1, Groups B, C, D: Dust-Ignition Proof Enclosure for Class II/III Div. 1, Groups E, F, G
Approvals: FCC Part 15 - Low Power Communication Device
Temperature: -40 to 140°F (-40 to 60°C)
Installation Category Class II

OPTIONAL
Antenna Extension 6"or 8" Lengths
For use with Teflon Antenna ONLY
High Temperature Unit
Teflon De-coupler and Teflon Antenna Required
Teflon De-coupler threads on with 2" NPT process connection

Antenna Extension



PROCESS
Material Dielectric: Єr >2
Pressure: 5 bar maximum (75 psi)
Temperature:
Standard Sensor: Polypropylene Antenna: - 40 to 140°F (- 40 to 60°C)
Optional High Temperature Sensor:
Teflon Antenna: - 40 to 400°F (- 40 to 204°C)
Teflon Temperature De-coupler Required

OPERATIONAL
Operation: Pulse Radar
Accuracy: +/- 0.1% of maximum range in lab using 4-20mA current output
+/-0.25% of maximum range (typically in field)
Frequency: 5.8 GHz or 6.3 GHz
Loss of Echo Hold: 1 minute, 22mA or 2 mA output
Transmitter Power: 50 uW average
Calibration: via communications port
Diagnostics: (Echo Profile) via communications port
Antenna: Dielectric rod Polypropylene or Optional PTFE

ELECTRICAL SPECIFICATIONS
Power: 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
RS232 or RS485 communication ports

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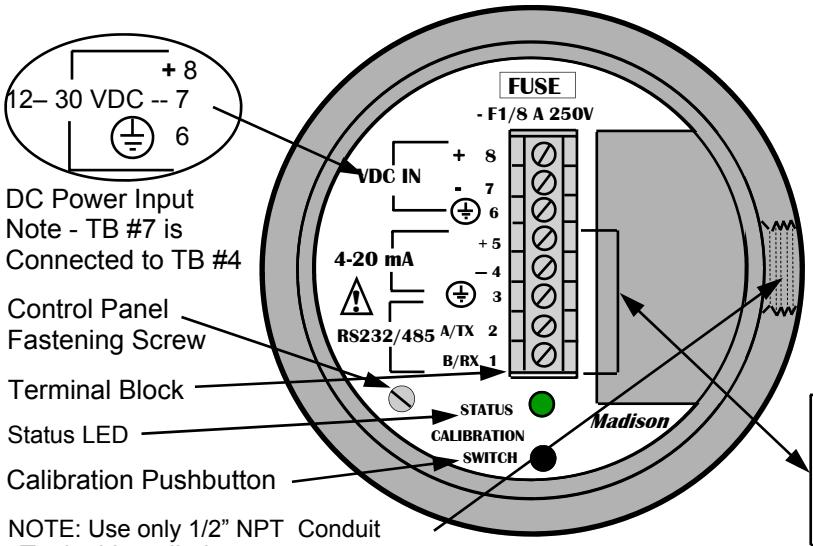
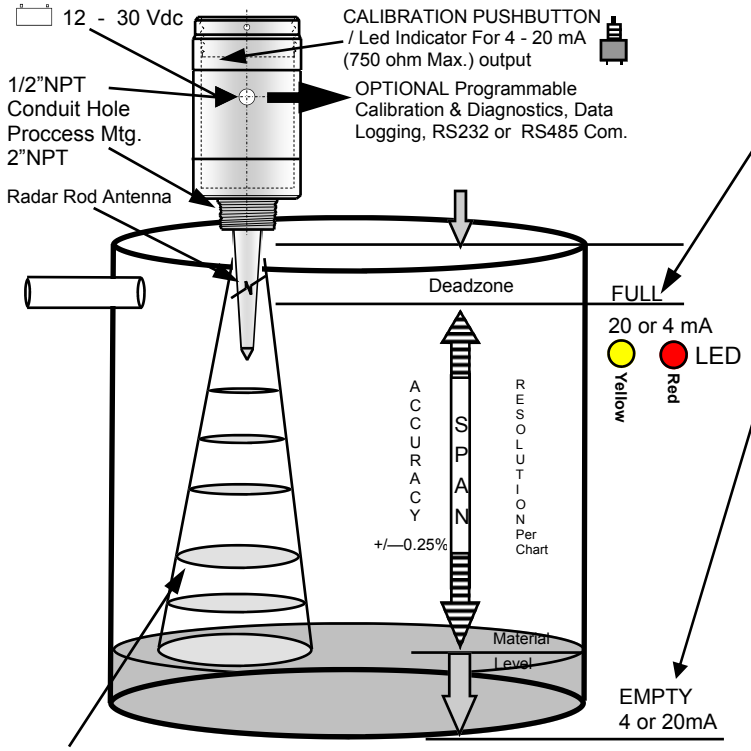
Inter-Connection Diagram
Top View of Sensor (Access Cover Removed)



NOTE: Use only 1/2" NPT Conduit

Typical Installation

1) RADAR UNIT MUST BE INSTALLED INTO METAL FITTING WITH THE ANTENNA
POINTING DOWNWARD.
2) DO NOT INSTALL IN CENTER OF DOMED TANK.



Operation - An electromagnetic pulse is transmitted from the 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 .

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 provided 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 Madison Company, 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 DC Sensor:
Power & Current output: 3 Wire shielded 24 AWG, 300 V
Communication: 1 Pair shielded 24 AWG, 300 V

Calibration: 4 -20 or 20 - 4 mA Output

Radar programmable through communication is recommended.

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 and also to eliminate multiple reflections in tank.)

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.
3) Use communication software.

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Fig. # 1 RS232 Connection

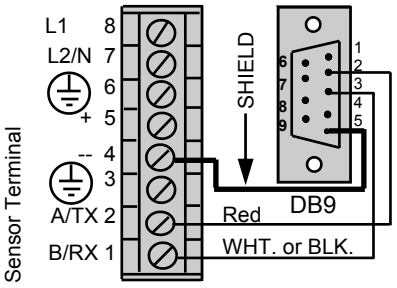
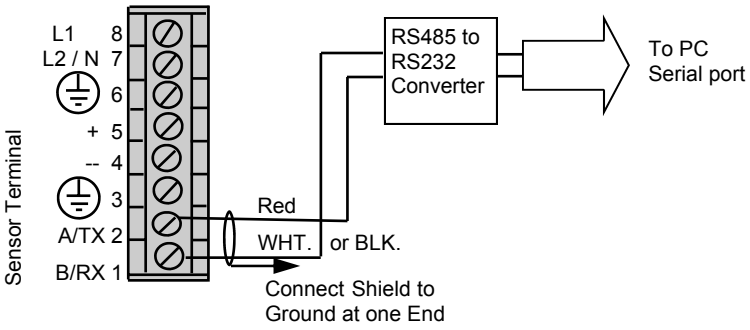
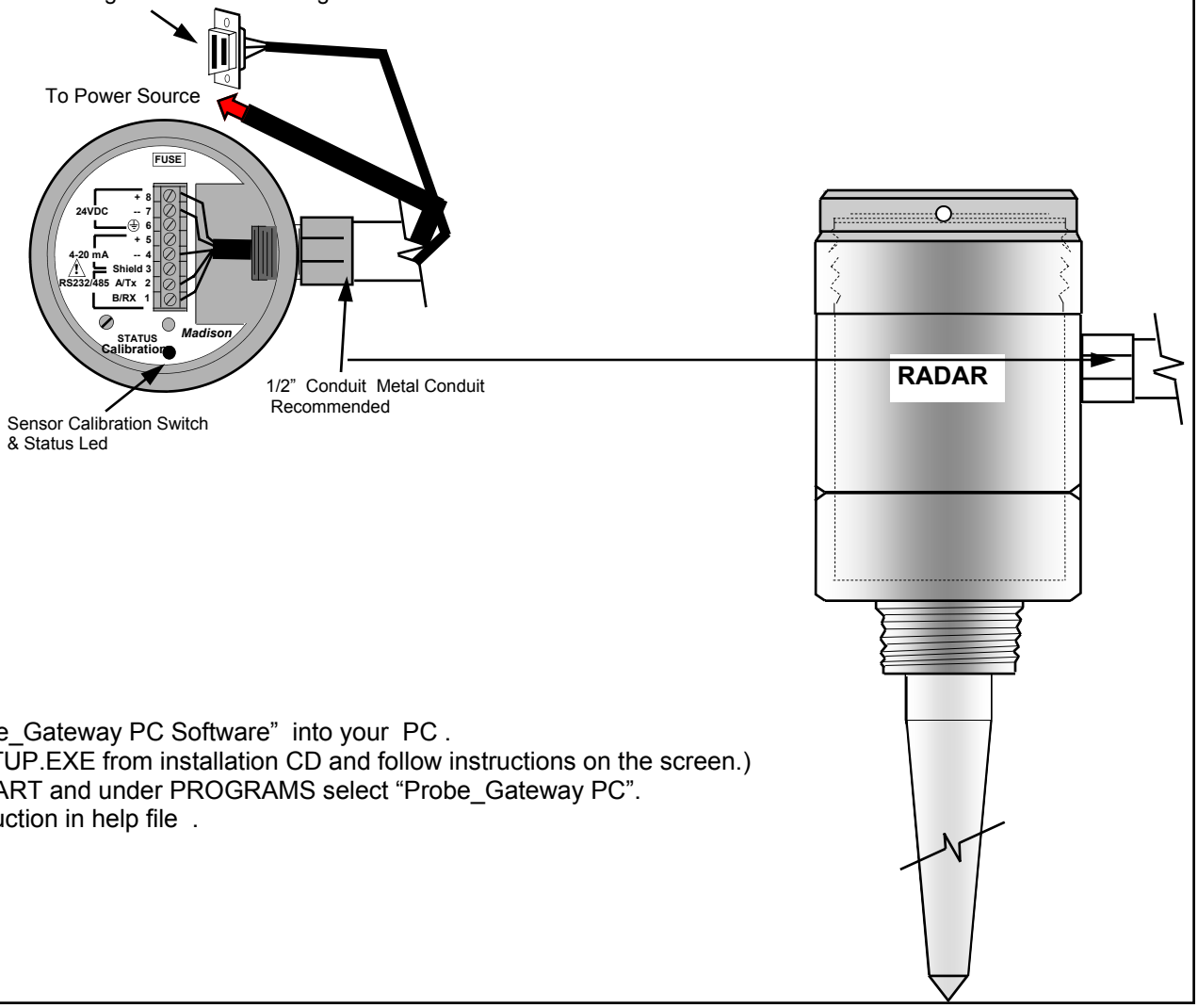


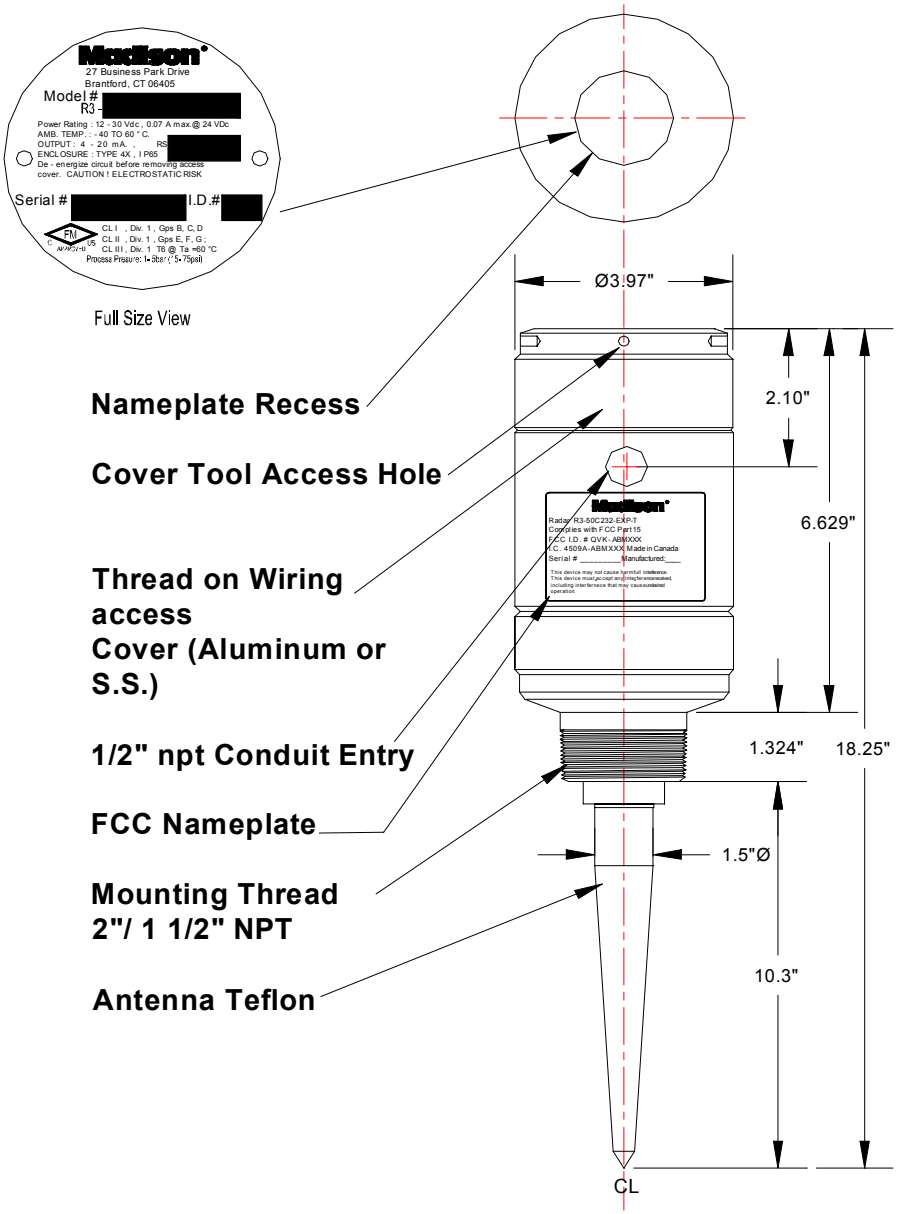
Fig. # 2 RS485 Connection



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



1) Load "Probe_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 "Probe_Gateway PC".
3) Follow instruction in help file .



R3-xxx Explosion Proof Radar Sensor Outline Dimensions