



MODEL 9080 TRANSMITTER

User Manual

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A Product of Arjay Engineering Ltd.
Oakville, Ontario, Canada

INTERNET www.arjayeng.com

9080

The 9080 sensing probe monitors the capacitance field around the active probe. As the volume of product increases in the vessel, the probe capacitance changes. A 4-20 mA output signal is provided for interface with customer controls and systems. A quick calibration can be set at any two points along the probe length.

■ Features and Benefits

- no moving parts
- electronics is integral to the probe
- high corrosion resistant Teflon and stainless steel wetted parts
- capacitance technology responds to all product types
- HF capacitance technology does not require routine cleaning
- easy calibration and control set-up

■ Technical Specifications - Electronics

Ambient Temperature	0°C to 50°C
Power Input	12-24 vdc, 0.1 amp
Output	4-20 mA non-isolated, non-loop powered
Interface	RS-485 Modbus available
Standards	UL, CSA, Entela
Enclosure	epoxy coated cast aluminum, explosion proof, Class 1, Zone 1 or 2 (DIV 1 or 2)

■ Technical Specifications - Probe

Process Temperature	-60°C to 260°C
	ABSA-CRN #OF07450.2



All calibration and power wiring is available at the main control unit. This is mounted directly onto the probe.

Arjay SS-06



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<u>MODEL</u> 9080 LEVEL TRANSMITTER	<u>DOCUMENT TYPE</u> USER MANUAL	<u>DOCUMENT FILE NAME</u> 9080UM20.DOC	<u>REV.</u> 2.0
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1.0 INSTRUMENT OVERVIEW

1.1 FEATURES

- Intelligent Level Transmitter
- Field selectable 0-20 or 4-20mA output
- 3 wire mA out connection or 4 wire Network connection for up to 15 series 9000 transmitters
- Local Pushbutton calibration or remote calibration via network
- Advanced Diagnostics every 5 seconds for improved reliability
- Temperature correction capability

1.2 SPECIFICATIONS

OPERATING PRINCIPLE

RF Capacitance. The 9080 consists of a customer specified type and length of capacitance probe and an integral intelligent 4-20mA transmitter.

USER INTERFACE

Local via rotary switches, pushbutton and LED's.
Remote via. HART RS-485 compatible digital communication.

RANGE

0 - 1000pF (most applications are 100pF to 500pF)

PERFORMANCE

Resolution 0.5% of FS Level on 4-20 / 0-20mA output
0.05% of Level via network display
0.002% of FS capacitance via network display
Accuracy 0.5% of FS on 4-20mA
0.2% of Level or FS capacitance via network display.

CONTROL OUTPUTS

4 - 20 mA output 0.5% resolution
Load resistor: 350 Ohms max. (12VDC in)
900 Ohms max. (24VDC in)

POWER

Standard 12 - 24VDC @ 0.1A max.
Optional 120VAC / 60Hz @ 1 mA (0.12VA)

MECHANICAL SPECIFICATIONS

Enclosure Type Nema 4X cast Alum. (std) or Nema4X stainless steel
Weight 2.5Kg max. (excluding Probe. Probe length is customer specified.)

ENVIRONMENTAL SPECIFICATIONS

Operating Temp. -20 - 60 Deg C (Transmitter)
Relative Humidity 0 - 95% non condensing

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2.0 INSTALLATION

NOTE: If any damage to the instrument is found, please notify an Arjay Engineering representative as soon as possible prior to installation.

2.1 PROBES

The 9080 Level Transmitter consists of the transmitter enclosure fitted with a capacitance probe selected from a variety of styles for use with liquids, liquid interfaces, and granular materials. The probe length is customer specified for the height of material desired to be measured. Usually Teflon coated probes are used.

2.2 PROBE INSTALLATION

Standard probe entry in to a tank is via a 3/4" NPT opening (standard probes) or 1" NPT opening (heavy duty probes). Flanges and concentric shields are available as options. The entrance configuration may vary depending on the application requirements.

TO SCREW IN PROBE (THREADED ENTRY) USE WRENCH ON LOWER HEX. The probe fittings are compression type with Teflon ferrules assembled by applying torque between the two hex sections. The fittings are sealed at the factory to provide a compression seal capable of withstanding high pressures. Once opened they cannot be reassembled without new ferrules.

The probe should be mounted vertically and parallel to a reference ground surface, which is typically the vertical wall of the tank or a concentric shield around the probe. The following points are important when installing the probe:

- 1- **Reference ground:** This is VERY IMPORTANT and is typically the metal walls of the tank. For non-metallic tanks, a concentrically shielded probe is required in which case the shield provides its own Ground. **IMPORTANT:** For standard threaded entry and flange entry probes (without concentric shields), make sure the fittings are clean to ensure a **GOOD ELECTRICAL CONNECTION BETWEEN THE PROBE HEAD ENCLOSURE AND THE TANK (REFERENCE GND)**.
- 2- **The distance between the probe and the ground reference:**
This only applies to probes without concentric shields. The closer the distance to the tank wall, the greater the sensitivity of measurement; too close and bridging problems may occur.
- 3- **The degree of parallelism between the probe and the reference ground:**
The probe must be parallel to the reference ground for a linear output signal. Note: that the concentric shield option is inherently linear due to the concentric shield.
- 4- **The measurement accuracy is affected by the temperature change of the material in the tank.** The amount of measurement error depends on the material. If the temperature change is excessive, temperature correction will be required. Contact the Arjay representative for more information.
- 5- **Agitators or moving objects in the tank:**
Moving objects in the tank close to the probe such as agitator blades, moving baffles etc. appear as moving ground references to a capacitance probe and will cause measurement errors. In applications where these objects are present, a concentrically shielded probe must be used.

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CAUTION: INSTALL PROBE WITH CARE: DAMAGE TO TEFLON SHEATH WILL CAUSE MEASUREMENT ERRORS.

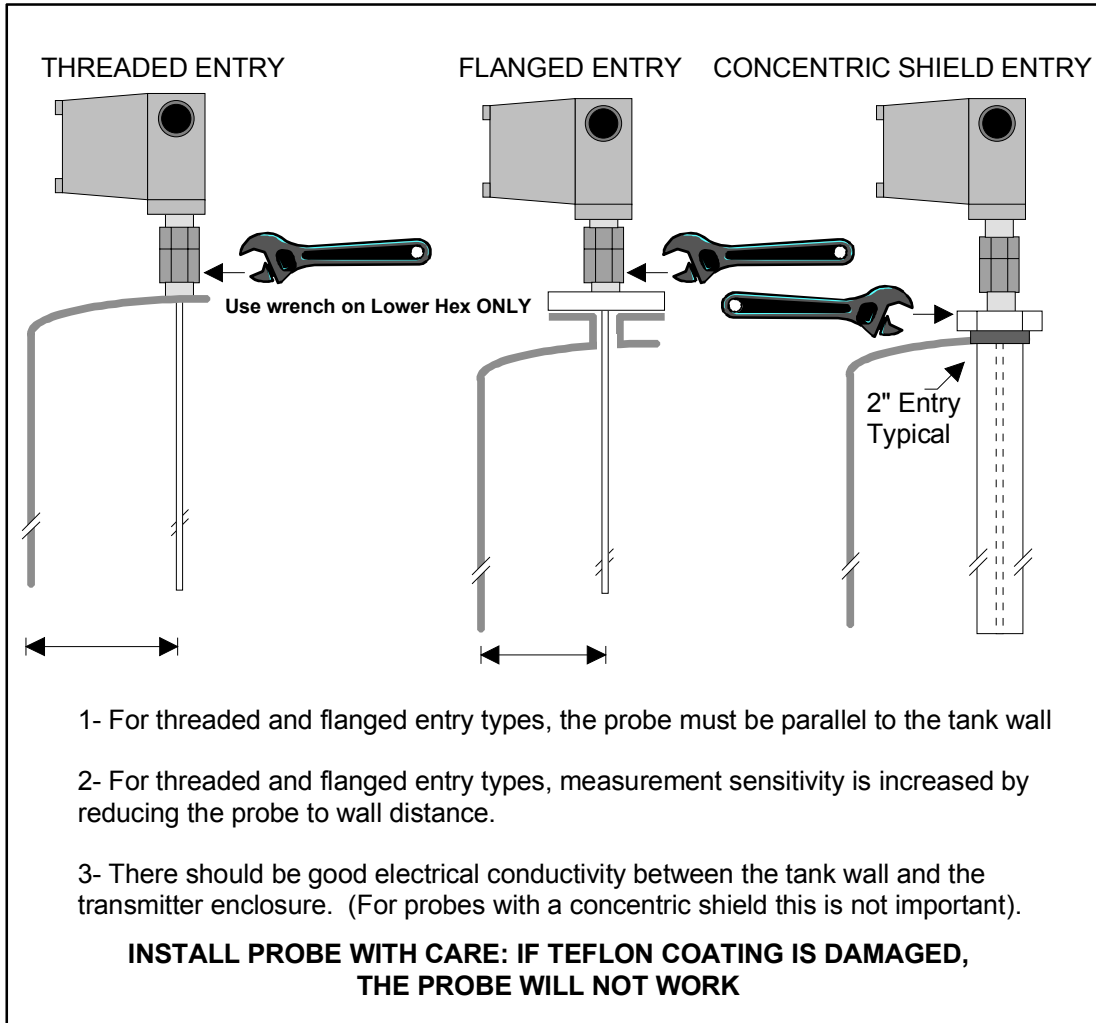


Figure 2.0

MODEL 9080 LEVEL TRANSMITTER	DOCUMENT TYPE USER MANUAL	DOCUMENT FILE NAME 9080UM20.DOC	REV. 2.0
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2.3 ELECTRICAL INSTALLATION

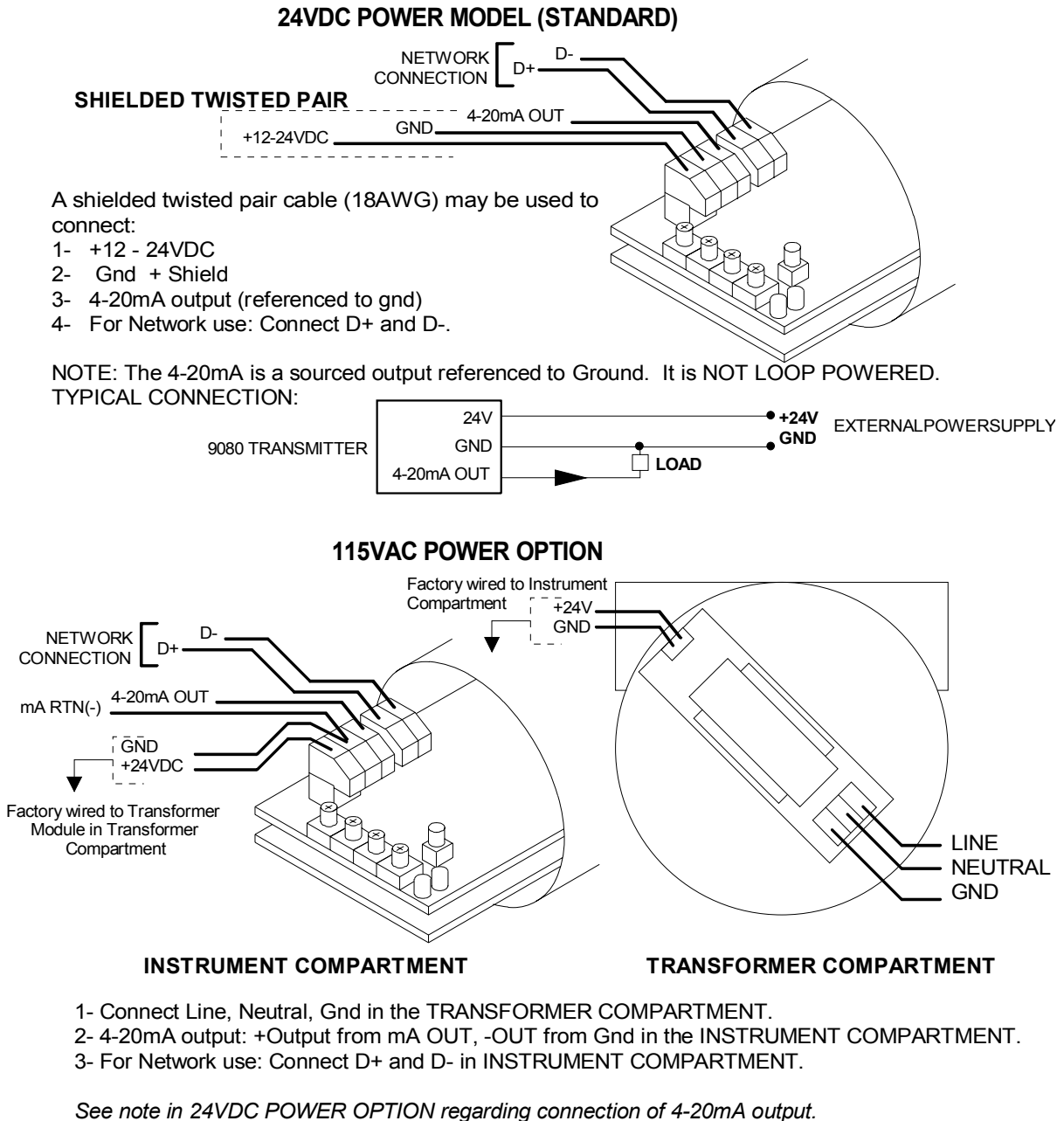


Figure 2.1

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3.0 STARTUP AND CALIBRATION

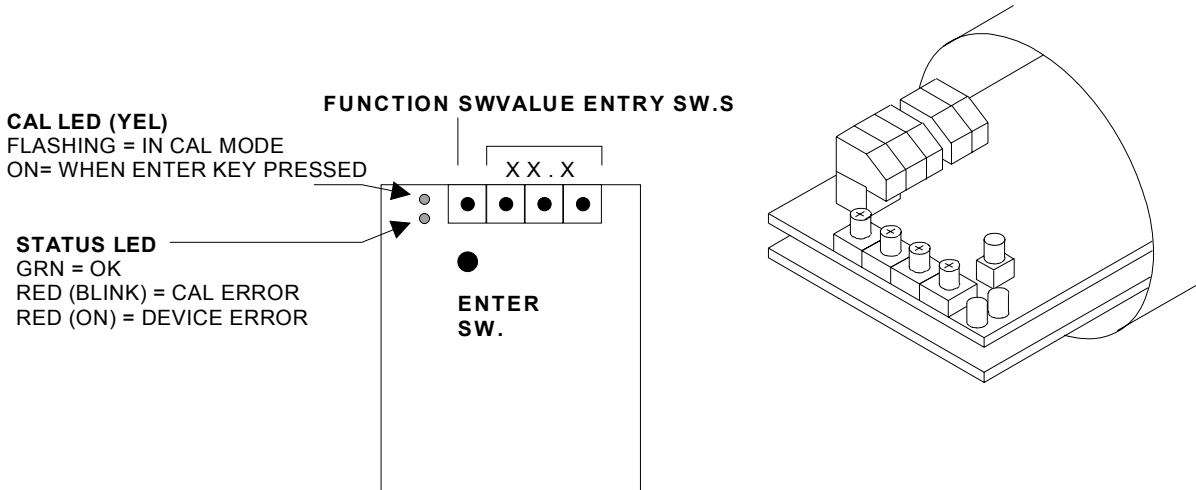


Figure 3.0

1. **Power up the 9080 level transmitter:**
The CAL LED should be OFF
The Status LED should be GREEN: **if not, then call for service: (800) 387 - 9487**
2. **Locate the Function switch, Value Entry switches (3), and the Enter pushbutton as shown.**
3. **Enter the Calibration mode:**
Set the Function switch to 0
Set the Value Entry switches to 99.9
Press the Enter pushbutton until the CAL LED stays on.
The CAL LED should start flashing
4. **Enter the 1st Calibration point:**
Set the Function switch to 1
Set the Value Entry switches to the current level value in % (e.g. 23.4% entered as 234 on Value entry switches.
Press the Enter pushbutton until CAL LED stays on.
The 1st Calibration point has now been entered.

CHANGE THE LEVEL IN THE VESSEL BY A MINIMUM OF 10%

The level may be raised or lowered. A change of less than 10% may be used in some applications but is not recommended to ensure calibration accuracy).

5. **Enter the 2nd. Calibration point:**
Set the Function switch to 2
Set the Value Entry switches to the new level in % & press the Enter pushbutton.
The STATUS LED should remain Green.
The CAL LED should continue to flash until step 7 (4-20mA polarity) has been completed.

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NOTE: A level value of 100.0 % is not possible: either use 99.9% or keep the 2nd. level less than 100.0%
The 2nd. Calibration point has now been entered.

IF THE STATUS LED BLINKS RED FOR 2 SECONDS THEN A CALIBRATION FAULT HAS OCCURRED. CHECK THE FOLLOWING:

- 1- The Value Entry switches were accidentally left at the 1st Calibration point % level:
Set new level % and press the Enter pushbutton.
- 2- The level in the vessel was not changed from the 1st Calibration point:
Repeat steps 5 and 6
- 3- **IF 1 OR 2 ARE NOT THE CAUSE THEN CALL FOR SERVICE: (800) 387 - 9487**

6. Select the 4-20mA polarity:

Set the Function switch to 3

For DIRECT mA output (0% level = 4mA, 100% level = 20mA):

Set Value Entry switches to 11.1 (or any value greater than 00.0) and press the Enter pushbutton.

For INVERSE mA output (0% level = 20mA, 100% level = 4mA):

Set the Value Entry switches to 00.0 and press the Enter pushbutton

7. CALIBRATION IS DONE:

The CAL LED stops flashing and goes off.
The STATUS LED remains Green.

8. Select mA output type: 4-20 or 0-20mA

The CAL LED should be OFF before proceeding. If it is not, set the Function switch to 0 and press the Enter pushbutton.

For 4-20mA output: Set the Value Entry switches to any non zero value other than 999 and press the Enter pushbutton.

For 0-20mA output: Set the Value Entry switches to 000 and press the Enter pushbutton.

NOTE:

FUNCTION SWITCH SETTINGS 4 TO 8 ARE FOR FACTORY USE ONLY AND SHOULD NOT BE USED IN THE FIELD.

THIS COMPLETES THE SETUP AND CALIBRATION PROCEDURE FOR THE 9080 LEVEL TRANSMITTER

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4.0 NETWORK

The 9080 Level Transmitter may be monitored and calibrated via HART (RS-485) protocol compatible digital communications.

Typical features are:

- 1- Ease of wiring in multiple level point monitoring:
Up to 15 9080's (or other Arjay Series 9000 level monitors) may be connected together in a daisy chain (4 wire) connection to an Arjay Remote Access monitor which allows viewing data and setup of any of the transmitters on the network. The 4-20mA output may still be used if necessary.
- 2- An Arjay Handheld field calibrator may be directly connected to any 9080 (or other members of the Arjay 9000 series family) for level viewing, diagnostics and calibration via the calibrator keypad and 4 line LCD.
- 3- In custom applications, the level information from multiple 9080's (or other 9000 series family members) may be used by the Remote Access monitor/controller to provide more complex control.

To setup the 9080 for networking operation the following steps are required:

- 1- Set the 9080 Node or Tag number:
This is a number from 1 - 15 which uniquely identifies each 9080 in a network system i.e. each 9080 (or other 9000 series family members) must have a unique number (1-15) when connected in a network system with no duplicate numbers allowed. To set the tag number:
 - Enter the CAL mode by setting the Function switch to 0, the Value Entry switches to 99.9 and press the Enter pushbutton. The CAL LED should start flashing.
 - Set the Function switch to 9, the Value Entry switches to the tag number desired. For example if desired number is 1 then set the switches to 00.1
For a Tag number of 15 then set the switches to 01.5.
Press The Enter pushbutton.
 - Exit the CAL mode by setting the Function switch to 0 and pressing the Enter pushbutton.

FOR USE OF THE REMOTE ACCESS MONITOR CONTROLLER OR THE HANDHELD FIELD CALIBRATOR, REFER TO THE APPROPRIATE USER MANUALS.

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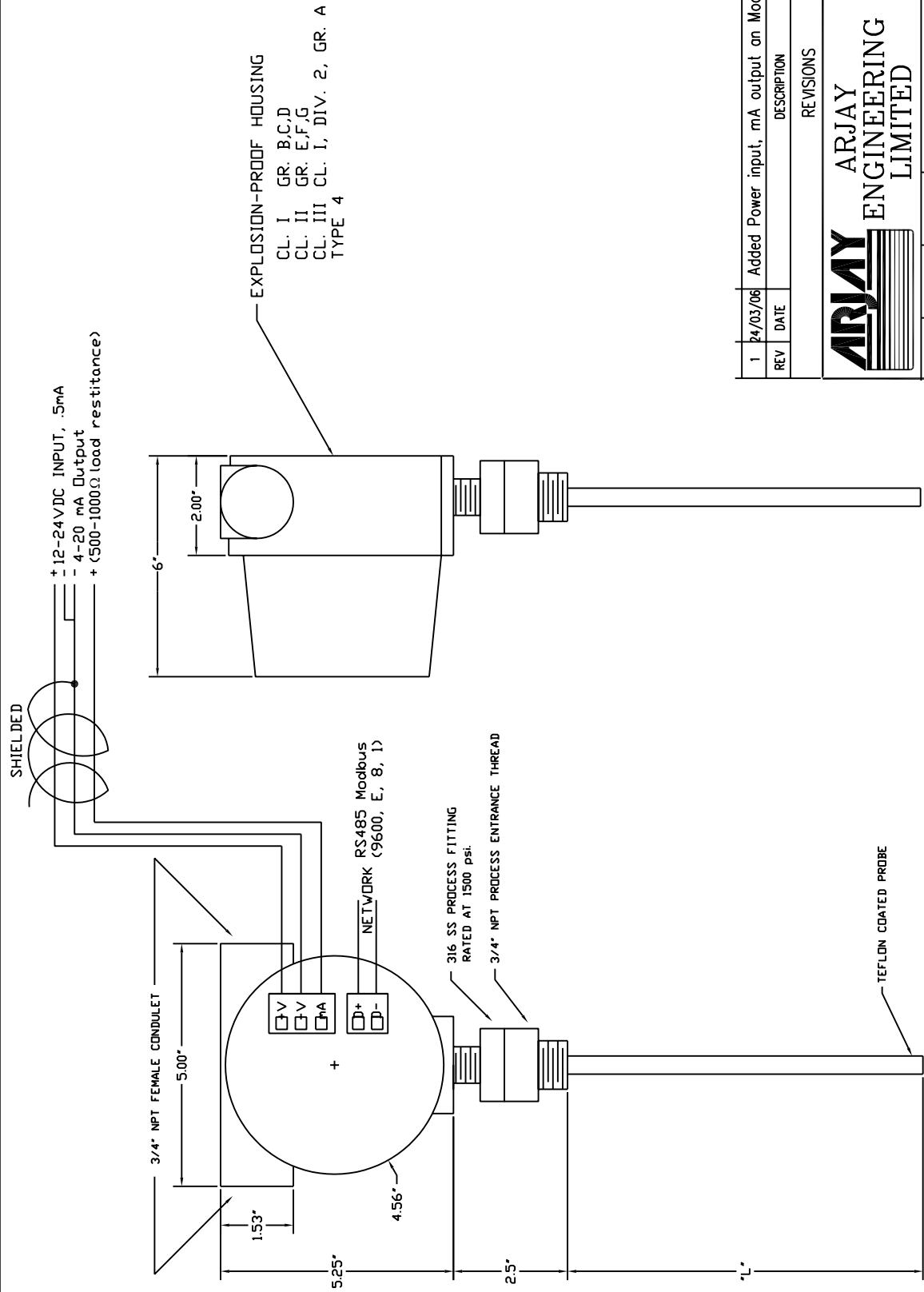
5.0 TROUBLESHOOTING

CONDITION	DO THIS
1. Status LED is OFF and the mA output is 0mA	Check the power to the unit. If the unit is a 24VDC (standard model) then check the external source of 24V. Make sure the polarity is correct. If the unit is a 115VAC unit then check the 115VAC line to the transformer module in the transformer compartment. Also check the wiring from the transformer module to the instrument compartment.
2. If the status LED (see figure 3.0) is RED	This indicates a major error such as memory failure, no probe signal etc. Check the following: <ul style="list-style-type: none"> • Microprocessor may have lost its parameters due to a surge in the line. Go into cal mode and adjust function to 9. Set value switches to 001 and press the cal button. If status light goes back to green then parameters have been reset. • Call Arjay Technical Support.
3. mA output does not match the level.	First determine if the problem is in the mA output or the unit is not calibrated to the vessel. <ul style="list-style-type: none"> • Unlock the unit by setting the value switches to 999 and the Function switch to 0. Then press the Enter pushbutton. The CAL LED should start to flash indicating the unit is unlocked. • Set the Function key to 4. • The value keys now set the mA output. The rightmost (least sig. digit) is the first place of decimal. For example, setting the value keys to 150 should set the mA output to 15.0mA. The resolution is 0.08mA. • If the mA output tracks the key settings then make sure the mA action (direct or inverse) is set as desired. See section 3 for details. If the action is OK then try recalibrating the unit. • If the mA output does not track the value settings then call Arjay Technical Support. • To lock the unit and enter normal operation set the Function switch to 0 and press the Enter pushbutton. The yellow LED should stop flashing. • IMPORTANT: THE UNIT <u>SOURCES</u> mA OUT FROM THE mA OUTPUT TERMINAL. <u>THIS TERMINAL SHOULD NOT BE CONNECTED TO +24V</u>. IT IS NOT A 2 WIRE mA TRANSMITTER. See Figure 2.1 for electrical hookup details.

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<p>4. Status led goes red on second cal point</p>	<ul style="list-style-type: none"> • Locate the Blue wire from the probe which comes up from the base of the enclosure and to a connector J3 on the base of the interface card which has the LED's and switches. Make sure the connection to the board is secure. This wire is disconnected midway during shipment and has to be connected up at installation. • Ensure that there is a jumper (shunt) on the top two posts of JP2. • Make sure that the liquid level in the tank is changing and that concentric shield (if used) has a vent hole in the top to allow liquid to rise up in the tube.
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**ARJAY ENGINEERING TECHNICAL SUPPORT
(800) 387-9487**



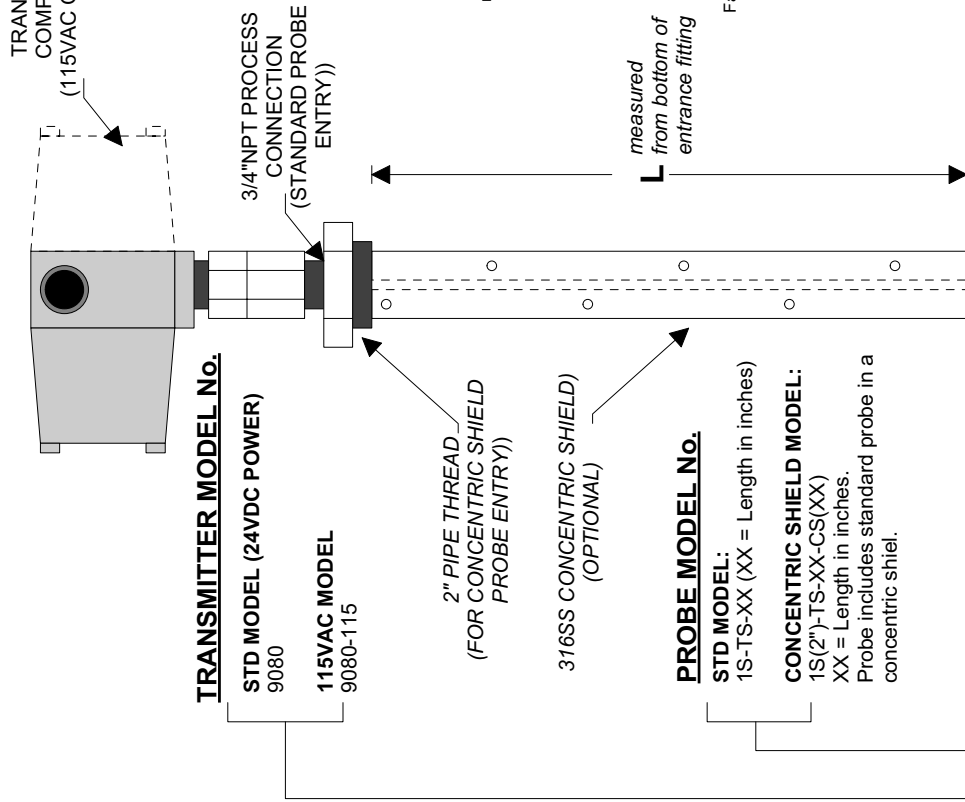
SHIELDED
 +12-24VDC INPUT, .5mA
 -4-20 mA Output
 + (500-1000Ω load resistance)

EXPLOSION-PROOF HOUSING
 CL. I GR. B,C,D
 CL. II GR. E,F,G
 CL. III CL. I, DIV. 2, GR. A
 TYPE 4

MODEL 9080-24-IS-TS-L*

1	24/03/06	Added Power input, mA output on Modbus description	CHK'D	APP'D
REV	DATE	DESCRIPTION	REVISIONS	
		PROJECT: _____		
		ARJAY ENGINEERING LIMITED		
		MODEL 9080		
		DIMENSIONAL DRAWING		
DWG. STATUS	BY	DATE	TITLE	
DRAWN	C.M.P	02/02/00		
CHECKED				
APPROVED				
SCALE	REF. DWGS.	DWG. NO.	REV.	
N.T.S.		990240	1 1	

9080 TRANSMITTER OVERVIEW



TRANSMITTER MODEL No.

STD MODEL (24VDC POWER)
9080

115VAC MODEL
9080-115

2" PIPE THREAD
(FOR CONCENTRIC SHIELD
PROBE ENTRY)

316SS CONCENTRIC SHIELD
(OPTIONAL)

PROBE MODEL No.

STD MODEL:
1S-TS-XX (XX = Length in inches)

CONCENTRIC SHIELD MODEL:
1S(2")-TS-XX-CS(XX)

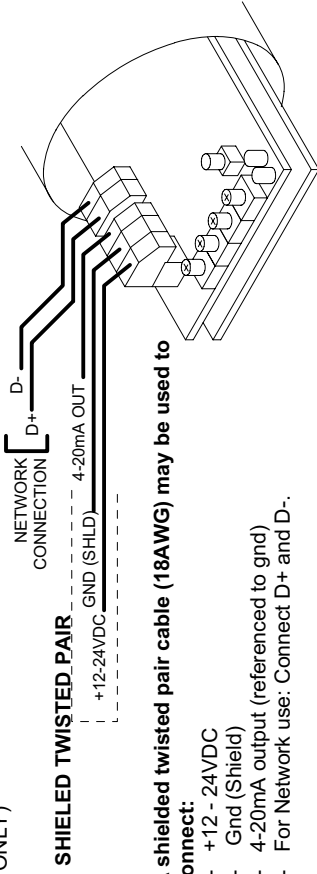
XX = Length in inches.
Probe includes standard probe in a
concentric shield.

COMPLETE MODEL No = TRANSMITTER MODEL No. - PROBE MODEL No.

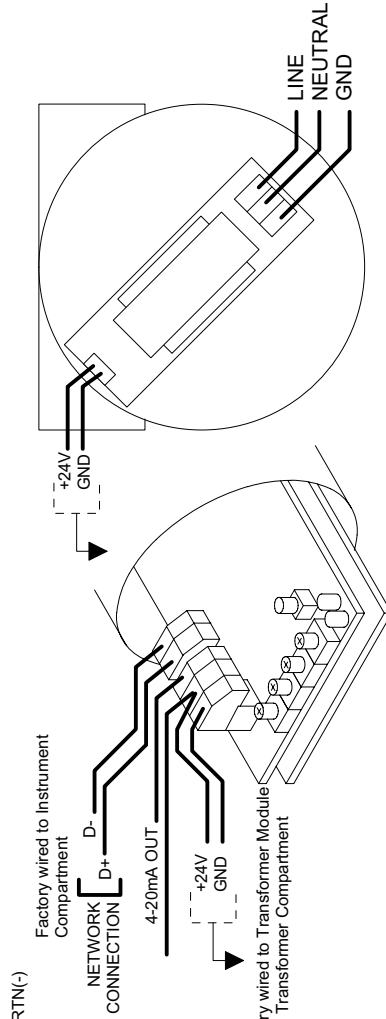
Use Concentric Shield Probe if the tank is non-metallic, or if there is no convenient vertical wall (used by probe as a ground reference: must be parallel to probe), or to increase measurement sensitivity for low dielectric materials.

ELECTRICAL INSTALLATION

24VDC POWER MODEL (STANDARD)



115VAC POWER OPTION



INSTRUMENT COMPARTMENT

TRANSFORMER COMPARTMENT

- 1- Connect Line, Neutral, Gnd in the TRANSFORMER COMPARTMENT.
- 2- 4-20mA output: +Output from mA OUT, -OUT from Gnd in the INSTRUMENT COMPARTMENT.
- 3- For Network use: Connect D+ and D- in INSTRUMENT COMPARTMENT.

TEFLON COATED PROBE
(STANDARD PROBE)

Rev	Date	Description
2.1	7 Jul 99	All hatching (fitting threads) replaced with gray shades

ARJAY ENGINEERING LIMITED		PROJECT / CUSTOMER 9080 LEVEL TRANSMITTER	
DRAWN B. CARDOZA	TITLE OVERVIEW		
SCALE NONE			
DATE 15th Nov. 1995	DWG. NO. 9080-OVR.DSF	SHT. 1 of 1	REV. 2.1