Liquid-Level Sensors

with Temposonics® Magnetostrictive Technology

DDA/LDF Network Test Measurements

551042 A

Technical tip #9

Introduction

Subject:
This document describes a standard procedure to test the proper functionality of the gauges. For this procedure, a digital multimeter is required.

General Procedure:
Your application may have 1 or more loops. Each loop is connected to 1 or more digital gauges (up to 20 per network; max. 8 if you are using the MTS Level Plus Monitor). The loops are connected to the computer (master) through barriers and RS232/485 converters. On the Level Plus Monitor (LPM) there is a direct connection. You need to open the LPM to access the barriers. Please test ONE LOOP PER TIME. To begin the test, please photocopy this document and use 1 copy per each loop test.
Please fill in the blank for all of the following questions, then fax it to MTS at 1 (800) 943-1145.

Loop # .....

Complete the following steps before making any additional changes:

1. How many gauges are connected to this net? ..... gauges.

   Please verify that ALL the gauges are properly connected. At this time, leave them connected (even if some / all are not working).

2. Verify that there is a good ground connection beginning from the safety barrier mounting bar to earth ground.
   This ground must be connected (separate from AC power ground) for proper communications and proper I.S. safety requirements.
3. Indicate any additional circuit that can affect the ground connection (cathode protections etc.). In this phase do not modify the circuit.
4. Please verify. Ground(s) connected ?? ☐YES ☐NO

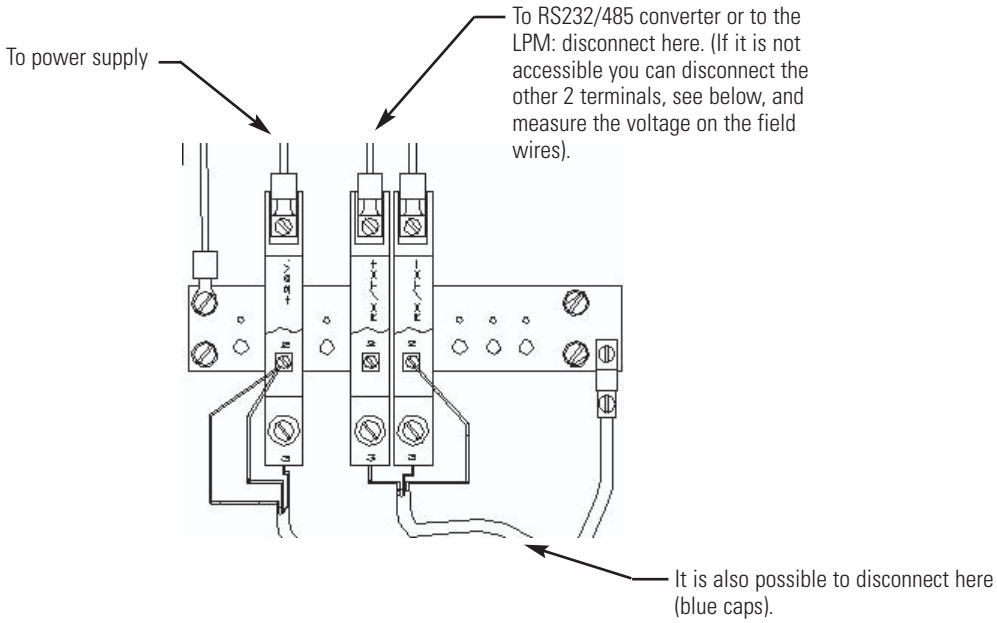
WARNING: ALWAYS OBSERVE NECESSARY PRECAUTIONS WHEN REMOVING THE DDA COVER IN A HAZARDOUS LOCATION. OBTAIN ANY NECESSARY PERMITS, ETC. BEFORE OPENING THE ENCLOSURE OR ANY TERMINAL BOX.

5. Continue with Procedure #1, Communication Voltage Test on page 2.

Procedure #1: Communication Voltage Test

Complete the following procedure to perform the Communication Voltage Test:

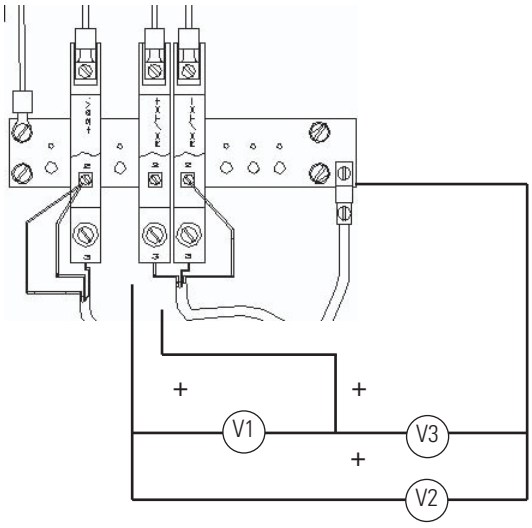
1. Suspend the communication to the gauges. (LPS-80: Exit the software completely. LPM: enter in the programming mode).
2. Disconnect the RS232/485 converter from the barriers (Rx/Tx+ and Rx/Tx-) or disconnect the 2 wires "RX/TX+" and "RX/TX-" (usually green and white) between the gauges and the barriers. Please pay attention: do not short them.



3. Measure and record the following wires / signals (loop side):

- V1) RX/TX+ to RX/TX- ..... DC V (typ. 0.625 V ± 0.05V)
- V2) RX/TX+ to ground (safety barrier mounting bar, "GND") ..... DC V (typ. 2.3 V ± 0.25V)
- V3) RX/TX - to ground (safety barrier mounting bar, "GND") ..... DC V (typ. 1.7 V ± 0.25V)

4. Continue with Procedure #2 Standby DC Current Measurement on page 3 and select the appropriate method.



Procedure #2: Standby DC current measurement (Method 1)

1. Measure and record the following wires / signals at the safety barrier terminals:

   - + 26V before barrier (power supply) to ground (safety barrier mounting bar, "GND") ..... DC V
   - + 26V after safety barrier to ground (safety barrier mounting bar, "GND") ..... DC V

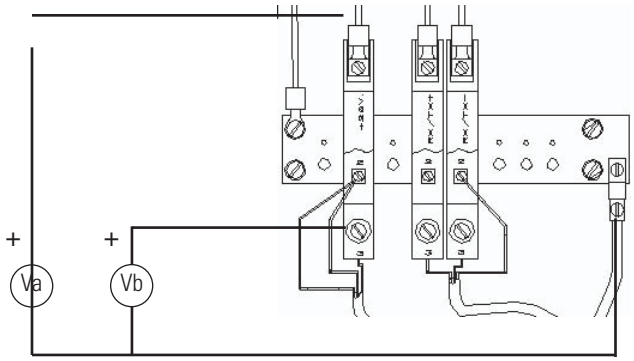
2. Perform the following calculations:

If you have STAHL barrier: (Value "A" - Value "B") / 0.201 = ……. (mA). This is the value of the current in the loop (with all gauges in sleep mode, i.e. without any communication) Correct value is 1.2 mA typical per gauge (if you have 6 gauges, then the correct current should be approx. 7.2 mA).

If you have Pepperl&Fuchs barrier. (Value "A" - Value "B") / 0.327 = ……. (mA). This is the value of the current in the loop (with all gauges in sleep mode, i.e. without any communication) Correct value is 1.2 mA typical per gauge (if you have 6 gauges, then the correct current should be approx. 7.2 mA).

If you have MTL barrier: (Value "A" - Value "B") / 0.340 = ……. (mA). This is the value of the current in the loop (with all gauges in sleep mode, i.e. without any communication) Correct value is 1.2 mA typical per gauge (if you have 6 gauges, then the correct current should be approx. 7.2 mA).

3. Continue with Procedure #3 Individual Gauge Test on page 4 if the value is either lower or higher than specified above. Procedure #3 will determine which gauge is causing the excessive current or the improper communication bias (voltage).

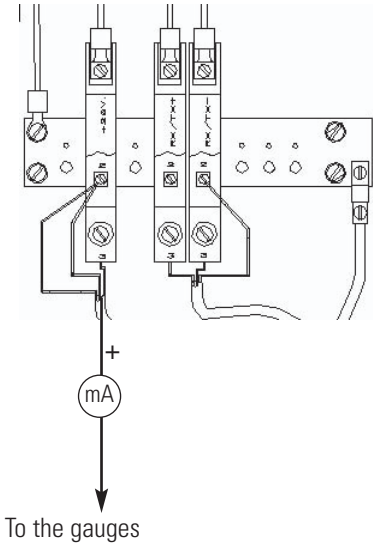


Procedure #2: Standby DC current measurement (Method 2)

Note: If you have intermittent failures we suggest to use the previous method.

1. Insert the current meter between the +Vdc power supply and the loop. By interrupting the connection, occasionally the fault will clear.
2. Continue with Procedure #3 Individual Gauge Test on page 4 if the value is either lower or higher. Procedure #3 will determine which gauge is causing the excessive current or the improper communication bias (voltage).

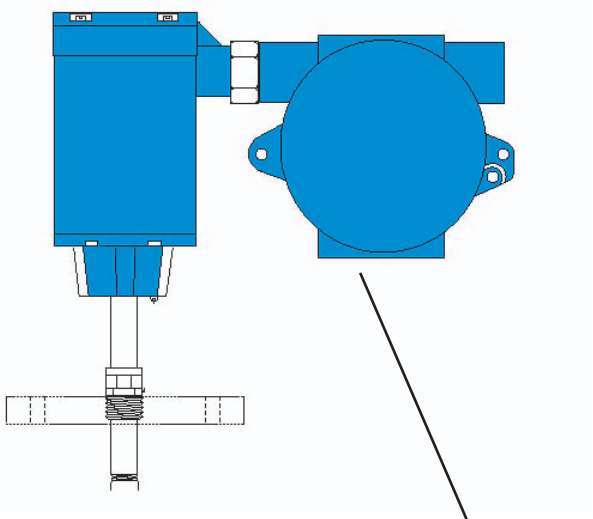
This is the value of the current in the loop (with all gauges in sleep mode, i.e. without any communication). Correct value is 1.2 mA typical per gauge (if you have 6 gauges, then the correct current should be approximately 7.2 mA).



Procedure #3: Individual gauge test

If the values (Procedures 1 &2) are different (lower or higher) we need to proceed to determine which gauge is causing the excessive current or the improper communication bias (voltage). Perform the following procedure to take measurements at each individual gauge:

1. Reconnect the 2 wires to the converter and to LPS-80.
2. Leave the LPS-80 not running (process stopped) or the LPM in "Configuration mode" (no scan).
3. If you do not have a junction box, perform the steps in procedure #4 on page 6.



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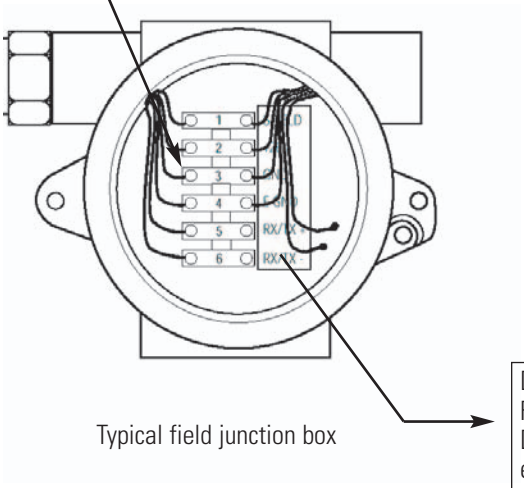
Note: If you do not have a junction box, perform the steps in procedure #4 on page 6.

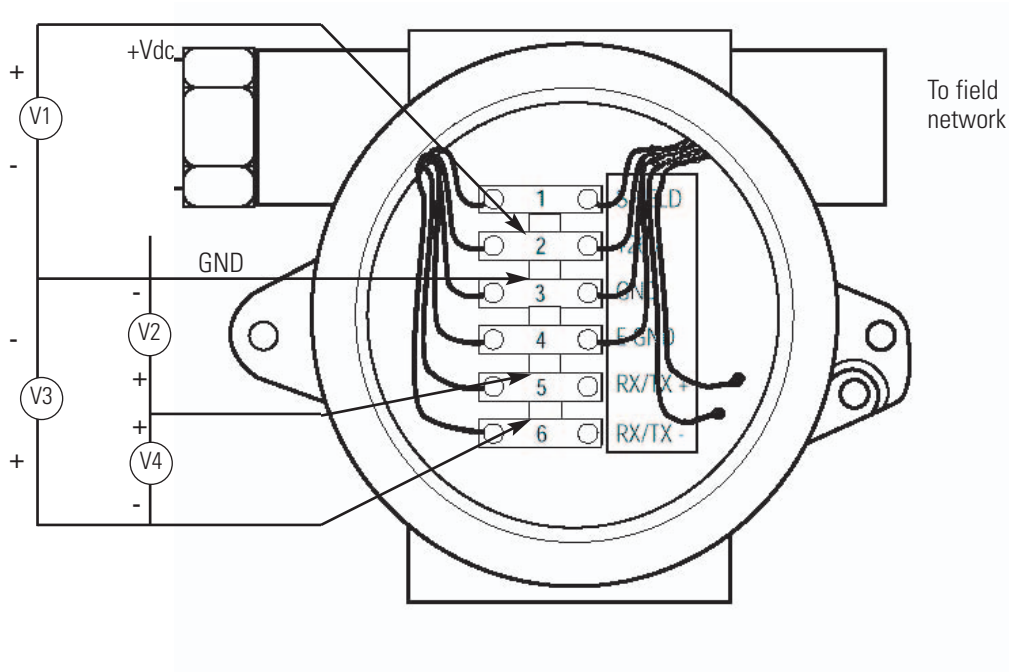
To DDA gauge



To field network

Typical field junction box

Disconnect Rx/Tx+ and RX/TX- (field network side). Do not allow the disconnected wires to short together or to the housing.

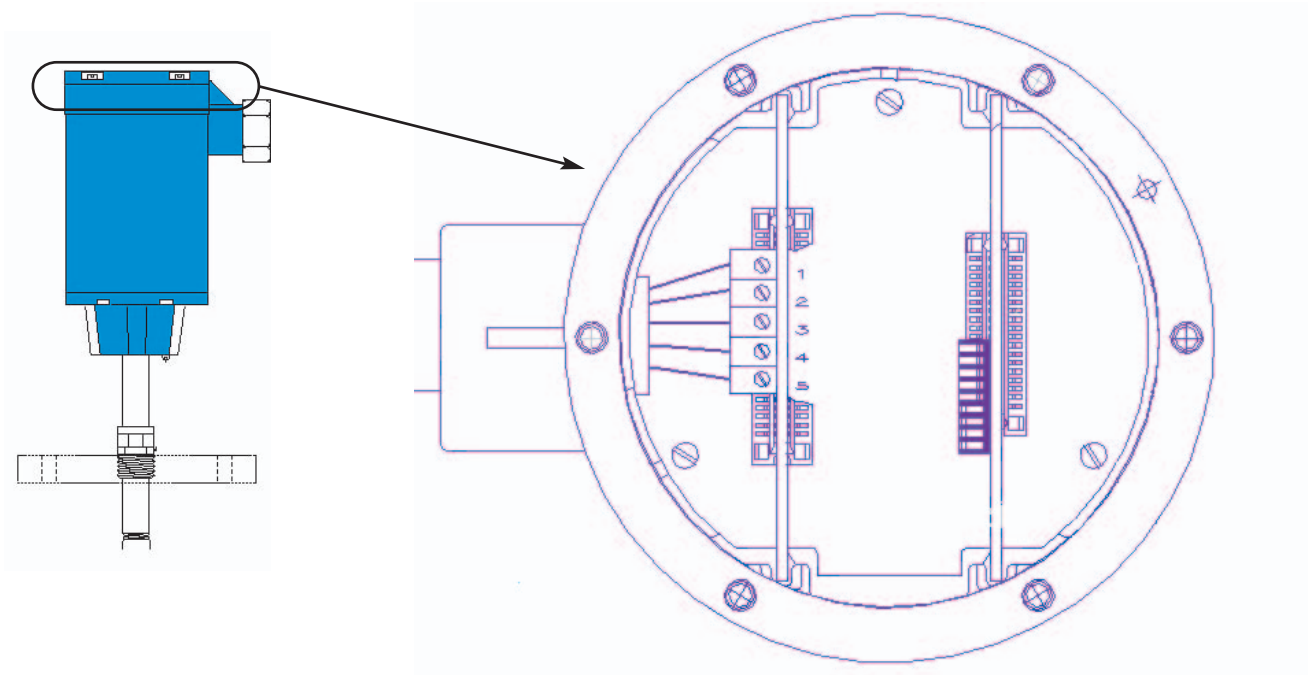


Tank Identification Number:	Your value:	Typ. Values
+ 26V (red wire) to power supply ground (black wire) **(V1)**		18..24
RX/TX+ (white wire) to RX/TX- (green wire) **(V4)**		0.625 (±0.05)
RX/TX+ (white wire) to power supply ground (black wire) **(V2)**		2.3 (±0.25)
RX/TX - (green wire) to power supply ground (black wire) **(V3)**		1.7 (±0.25)

NOTE: Digital signal (Rx/Tx) must be disconnected.

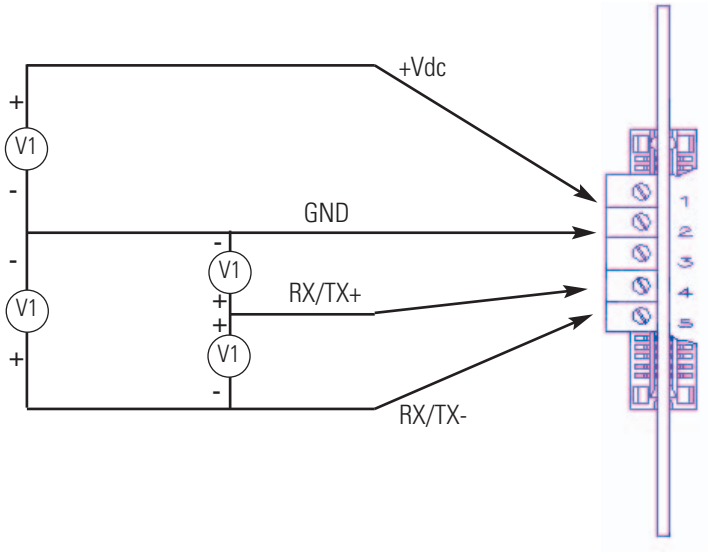
Procedure #4: If you do not have a junction box

VERIFY THAT ALL POWER HAS BEEN REMOVED AND THAT ALL REQUIRED SAFETY PROCEDURES HAVE BEEN FOLLOWED PRIOR TO OPENING THE GAUGE IN A HAZARDOUS AREA.



CAUTION: ALWAYS USE PROPER TECHNIQUES WHEN HANDLING STATIC SENSITIVE BOARDS AND COMPONENTS.

1. Using a 9/64" allen wrench, loosen the (6) cap screws located at the top of the gauge housing.
2. Remove the cover carefully, being sure not to damage the O-ring. Put the cover aside.



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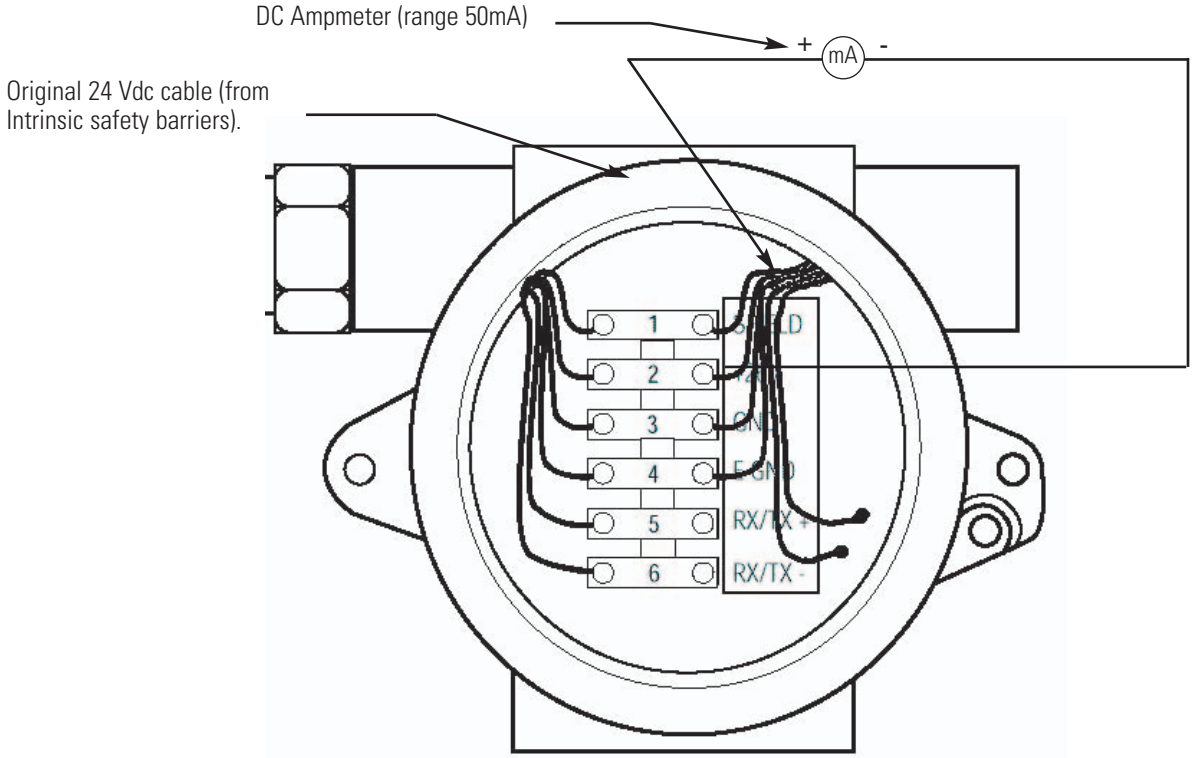
RX/TX - (green wire) to power supply ground (black wire) **(V3)**		1.7 (±0.25)

3. N.B.: Digital signal (Rx/Tx) must be disconnected (see previous page).

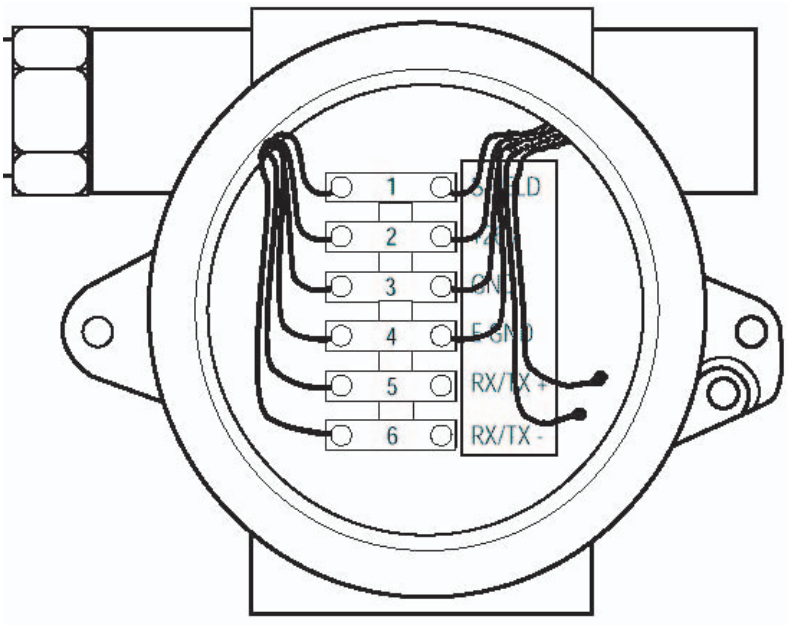
Procedure #5: Optional 'run mode' gauge current consumption tests

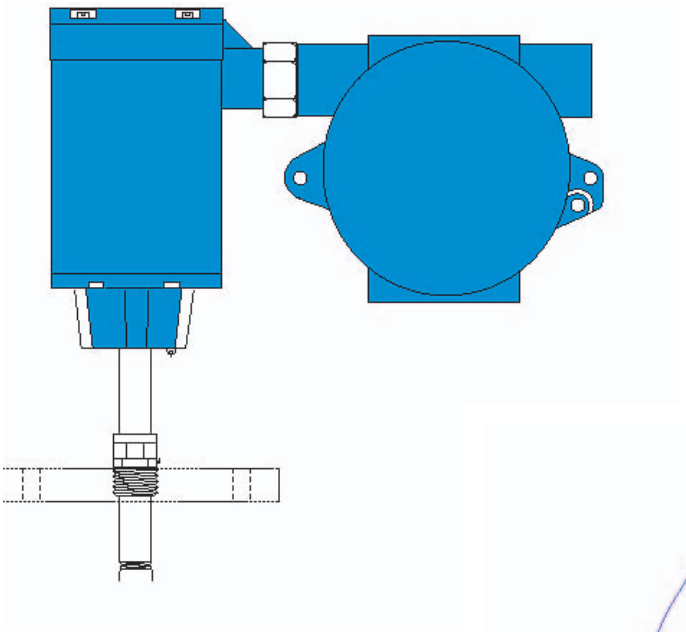
Perform the following steps to test the "run mode" gauge current consumption:

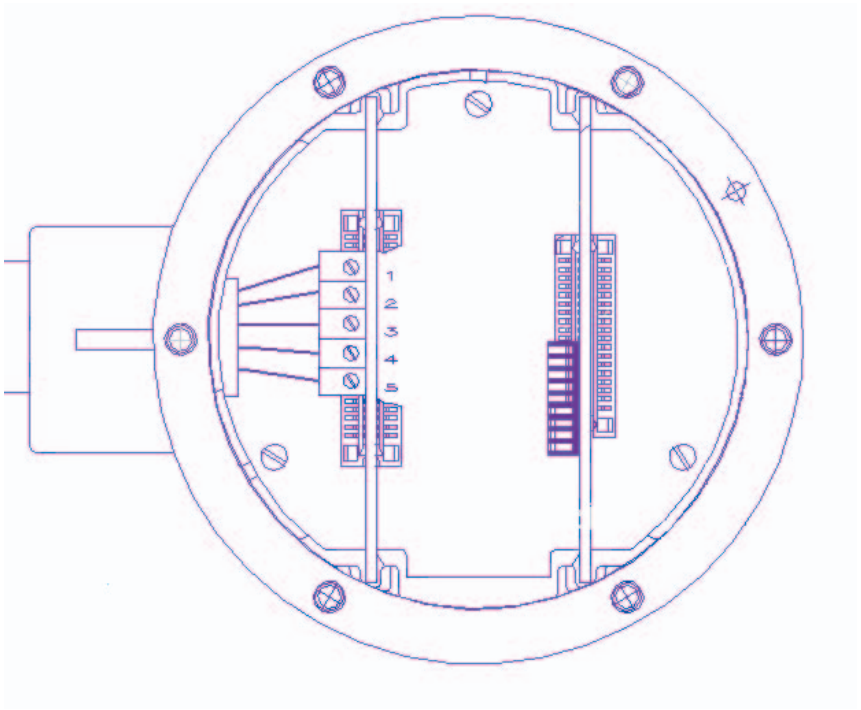
1. For the next test you need to connect a DC Ampmeter between the + 24 Vdc Power Supply field cable and the +26V terminal in the enclosure (terminal #2):



2. If you do not have a junction box you can also connect the multimeter as follows (in series to the Power Supply).







3. Read the Stand-by (sleep mode) current value on the DC Ampmeter and list below (typical 1.2 mA per each gauge):

Tank Identification Number:	
Current Value (mA)	

4. On one side of the digital board you will find a DIP-SWITCH. You can move the position of the switches with a pen or other small tools. Do not use a pencil. Follow these steps:

4a. Please observe and list current DDA address switch settings:

OFF									
ON									
	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	SW9

4b. Configure the following switch settings to put the DDA gauge into "dynamic" current test mode:

First set the address switches to the OFF position (up for all 9 switches):

OFF	X	X	X	X	X	X	X	X	X
ON									
	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	SW9

then, set switch #1 to the ON (down) position:

OFF		X	X	X	X	X	X	X	X
ON	X								
	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	SW9

This puts the DDA gauge into maximum "dynamic" current mode (typically 30 - 40 mA)

4c. Read the Current Value on the Ampmeter and record them below:

Tank Identification Number:	
Current Value (mA)	

4d. If you want to repeat this test, you must set all switches to the OFF position, then switch #1 to the ON position as shown above.

4e. Reset all switches to original (addressed) position.

Please be sure to:
1. Remove the Ampmeter.
2. Reconnect the wires in the original position.
3. Check again the switch setting.
4. Install the cover of the gauge and insure the cover o-ring is not damaged.
5. Install the terminal enclosure cover.
6. Move to the next gauge and repeat the procedure from page 4.
7. Test all gauges of the loop.
8. Prepare a new copy of this document and test the remaining loops.
9. Repeat the procedure from the beginning (page 1).
10. When you have finished all four loops, if you need technical assistance, please fax a copy of this test and/or additional notes to MTS (USA) (919) 677-2545 or 1 (800) 943-1145.

Technote 9 Rev. C (Aug 1988) has been edited, reformatted and released as this 07-05 551042 Rev A document. Your suggestions can be very useful to us, if you find any errors or have difficulty following any procedure in this document contact us at sensorsinfo@mts.com or phone us at 1 (800) 457-6620.

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