

TECHNICAL MANUAL  
CALIBRATION PROCEDURE  
FOR  
FUEL QUANTITY TESTER  
PSD30-2, PSD30-2AF

(SIMMONDS)



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**FUEL QUANTITY TESTER****PSD30-2, PSD30-2AF****(SMMONDS)****1 CALIBRATION DESCRIPTION:***Table 1.*

<b>Test Instrument (TI) Characteristics</b>	<b>Performance Specifications</b>	<b>Test Method</b>
AC Excitation	Range: 20 VAC @ 6000 Hz  Accuracy: $\pm 0.5$ VAC, $\pm 500$ Hz	Measured with a Digital multimeter and Frequency Counter
DC Voltage	Range: 0 to +40 VDC  Accuracy: $\pm 0.5\%$ FS	Compared to a Meter Calibrator
Insulation Resistance	Range: 100 k $\Omega$ to 2,000 M $\Omega$  Accuracy: $\pm 10\%$ rdg 0 to 50 $^{\circ}$ C $\pm 15\%$ rdg -20 to 0 $^{\circ}$ C	Compared to a Standard Resistor
DC Capacitance Measurement & Simulation	Range: 0.1 pF to 1999.9 pF  Accuracy: $\pm 0.1\%$ rdg or 0.05 pF which ever is greater	Compared to a Standard Capacitor

**2 EQUIPMENT REQUIREMENTS:**

<b>Noun</b>	<b>Minimum Use Specifications</b>	<b>Calibration Equipment</b>	<b>Sub- Item</b>
2.1 DIGITAL MULTIMETER	Range: 20 VAC  Accuracy: $\pm 0.5\%$	Fluke 8922A	
2.2 FREQUENCY COUNTER	Range: 6000 Hz  Accuracy: $\pm 2\%$	Hewlett Packard 5345A	

	<b>Noun</b>	<b>Minimum Use Specifications</b>	<b>Calibration Equipment</b>	<b>Sub-Item</b>
2.3	METER CALIBRATOR	Range: 0 to 40 VDC Accuracy: ±0.1%	Fluke 5700A	
2.4	RESISTORS	Range: 10, 100 MΩ and 1 GΩ Accuracy: ±2.5%	As Available	
2.5	CAPACITANCE CALIBRATION TEST UNIT	Range: 10 to 900 pF Accuracy: Measured	Simmonds 473292	
2.6	CAPACITANCE MEASUREMENT SYSTEM	Range: 0 to 900 pF Accuracy: ±0.025%	General Radio 1620A	
2.7	CAPACITOR	Range: 0.0001 μF Accuracy: Measured	ARCO SS32	

**3 PRELIMINARY OPERATIONS:**

3.1 Review and become familiar with entire procedure before beginning calibration process. Use only that portion of the calibration process that pertains to TI being calibrated.



Unless otherwise designated, and prior to beginning the Calibration Process, ensure that all test equipment voltage and/or current outputs are set to zero (0) or turned off, where applicable. Ensure that all equipment switches are set to the proper position before making connections or applying power.

3.2 Connect test equipment to 115 VAC/60 Hz, set POWER to ON and allow 30 minutes warm-up.

3.3 Measure and note the capacitance of the test leads that are to be used during TI DC Capacitance Measurement Calibration.

3.4 Measure and note the capacitance of the Capacitor (2.7) and test leads that are to be used during TI DC Capacitance Measurement Calibration.

3.5 Set TI POWER to ON and allow 5 minutes warm-up.

3.6 Since the accuracy of TI Capacitance Simulation is a result of Capacitance Measurement accuracy the TI will be considered fully certified even though the Capacitance Simulation is not checked.

#### **4 CALIBRATION PROCESS:**

##### **NOTE**

Unless otherwise specified, verify the results of each test and take corrective action whenever the test requirement is not met, before proceeding.

#### **4.1 AC EXCITATION CALIBRATION:**

- 4.1.1 Set TI FUNCTION SEL switch to MEASURE EXT.
- 4.1.2 Ensure the Frequency Counter CHANNEL A 50 $\Omega$ /1 M $\Omega$  switch is set to 1 M $\Omega$ .
- 4.1.3 Connect the Frequency Counter CH A and Digital Multimeter to TI LOZ and DC+ jacks.
- 4.1.4 The Digital Multimeter, set to measure VAC, must indicate 19.5 to 20.5 VAC.
- 4.1.5 The Frequency Counter must indicate 5500 to 6500 Hz.
- 4.1.6 Disconnect the Digital Multimeter and Frequency Counter from TI.

#### **4.2 DC VOLTAGE CALIBRATION:**

- 4.2.1 Set TI FUNCTION SEL switch to MEASURE DVM.
- 4.2.2 Connect the Meter Calibrator to TI DVM jacks.
- 4.2.3 Set the Meter Calibrator controls as necessary for 28 VDC output, OPR/STDBY to OPR.
- 4.2.4 The TI Digital Multimeter must indicate 27.80 to 28.20 VDC. ■
- 4.2.5 Set the Meter Calibrator OPR/STDBY switch to STDBY.
- 4.2.6 Set the Meter Calibrator controls as necessary for 38 VDC output, OPR/STDBY to OPR.
- 4.2.7 The TI Digital Multimeter must indicate 37.80 to 38.20 VDC. ■
- 4.2.8 Set the Meter Calibrator OPR/STDBY switch to STDBY.
- 4.2.9 Disconnect the Meter Calibrator from TI.

#### **4.3 INSULATION RESISTANCE CALIBRATION:**

- 4.3.1 Set TI FUNCTION SEL switch to MEGGER position.
- 4.3.2 Set TI MEGGER SEL switch to DVM JACKS position.
- 4.3.3 Connect the 10 M $\Omega$  Resistor to TI DVM jacks.
- 4.3.4 The TI Digital Multimeter must indicate 9.00 to 11.00 M $\Omega$  (with respect to Resistor actual value).
- 4.3.5 Disconnect the Resistor from TI.

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4.3.6 Repeat steps 4.3.3 through 4.3.5 using the 100 M $\Omega$  and 1 G $\Omega$  Resistor with limits of 90.0 to 110.0 M $\Omega$  and 900 to 1100 M $\Omega$  with respect to measured value.

#### **4.4 DC CAPACITANCE MEASUREMENT CALIBRATION:**

##### **NOTE**

If any adjustments to either zero or limits is made to TI, both zero and limits must be rechecked as the adjustments inter act.

4.4.1 Set TI FUNCTION SEL switch to MEASURE EXT and RANGE to LO.

4.4.2 Verify TI display indicates 00.00.

4.4.3 Set TI RANGE switch to HI.

4.4.4 Verify TI display indicates 000.0.

■ 4.4.5 Connect the Capacitor (2.7) to the Capacitance Calibration Test Unit J1 LOW Z and J2 HI Z jacks.

4.4.6 Connect the Capacitance Calibration Test Unit J1 LO Z, DC+, DC- and CHASSIS jacks to TI LO Z, DC+, DC- and CHASSIS jacks respectively.

4.4.7 Set TI RANGE switch to LO.

■ 4.4.8 The TI display must indicate within  $\pm 0.11$  pF of the sum of the measured values of Capacitor (2.7) and the Capacitance Calibrator Test Unit.

4.4.9 Disconnect TI from the Capacitance Calibration Test Unit.

4.4.10 Connect the Capacitance Calibration Test Unit J3 LO Z, DC+, DC- and CHASSIS jacks to TI LO Z, DC+, DC- and CHASSIS jacks respectively.

4.4.11 Set TI RANGE switch to HI.

4.4.12 The TI display must indicate within  $\pm 0.5$  pF of the measured value of the Capacitance Calibrator Test Unit.

4.4.13 Disconnect TI from the Capacitance Calibration Test Unit.

4.4.14 Connect the Capacitance Calibration Test Unit J5 LO Z, DC+, DC- and CHASSIS jacks to TI LO Z, DC+, DC- and CHASSIS jacks respectively.

4.4.15 The TI display must indicate within  $\pm 0.9$  pF of the measured value of the Capacitance Calibrator Test Unit.

■ 4.4.16 Disconnect TI from the Capacitance Calibration Test Unit.

■ 4.4.17 Connect the Capacitance Calibration Test Unit J1 LO Z, DC+, DC- and CHASSIS jacks to TI LO Z, DC+, DC- and CHASSIS jacks respectively.

■ 4.4.18 Set TI RANGE switch to LO.

■ 4.4.19 The TI display must indicate within  $\pm 0.05$  pF of the measured value of the Capacitance Calibrator Test Unit.

- 4.4.20 Disconnect TI from the Capacitance Calibration Test Unit. ■
- 4.4.21 Connect the Capacitance Calibration Test Unit J1, J3 and J5 (10, 500, and 900 pF LO Z) in parallel. ■
- 4.4.22 Connect the Capacitance Calibration Test Unit 10, 500, and 900 pF DC+ and DC- jacks in parallel. ■
- 4.4.23 Connect TI to the Capacitance Calibration Test Unit J5 LO Z, DC+, DC- and CHASSIS jacks respectively. ■
- 4.4.24 Set TI RANGE switch to HI. ■
- 4.4.25 The TI display must indicate within  $\pm 1.41$  pF of the sum measured values of the Capacitance Calibrator Test Unit. ■
- 4.4.26 Repeat steps 4.4.5 through 4.4.25 for all Probe types while modifying the Capacitance Calibration Test Unit values as follows. ■
- 4.4.26.1 Probe type B, multiply the Capacitance Calibration Test Unit values by 0.98875. ■
- 4.4.26.2 Probe type D, multiply the Capacitance Calibration Test Unit values by 1.0097. ■
- 4.4.27 Set Power to OFF or STANDBY, disconnect and secure all equipment. ■

CALIBRATION PERFORMANCE TABLE

4.1 EXCITATION CALIBRATION:

<u>Applied</u>	<u>Limits</u>
20 VAC	19.5 to 20.5 VAC
6000 Hz	5500 to 6500 Hz

4.2 DC VOLTMETER CALIBRATION:

<u>Range</u>	<u>Applied</u>	<u>Limits</u>
0 to 40 VDC	28 VDC	27.80 to 28.20 VDC ■
	38 VDC	37.80 to 38.20 VDC ■

4.3 INSULATION RESISTANCE CALIBRATION:

<u>Range</u>	<u>Applied</u>	<u>Limits</u>
100 M $\Omega$ to 2000 M $\Omega$	10 M $\Omega$	9 to 11 M $\Omega$
	100 M $\Omega$	90 to 110 M $\Omega$
	1000 M $\Omega$	900 to 1100 M $\Omega$

CALIBRATION PERFORMANCE TABLE (Cont.)

4.4 DC CAPACITANCE CALIBRATION:

<u>Range</u>	<u>Applied</u>	<u>Limits</u>
0.1 to 1999.9 pF	110 pF	109.89 to 110.11 pF
	500 pF	499.5 to 500.5 pF
	900 pF	899.1 to 900.9 pF
■	*10 pF	9.95 to 10.05 pF
■	*1410 pF	1408.6 to 1411.4 pF
■	*PSD30-2AF only	