Instructions/Parts List

For PRO Xs Series Electrostatic Spray Guns

Test Fixture, High Voltage Probe, and kV Meter

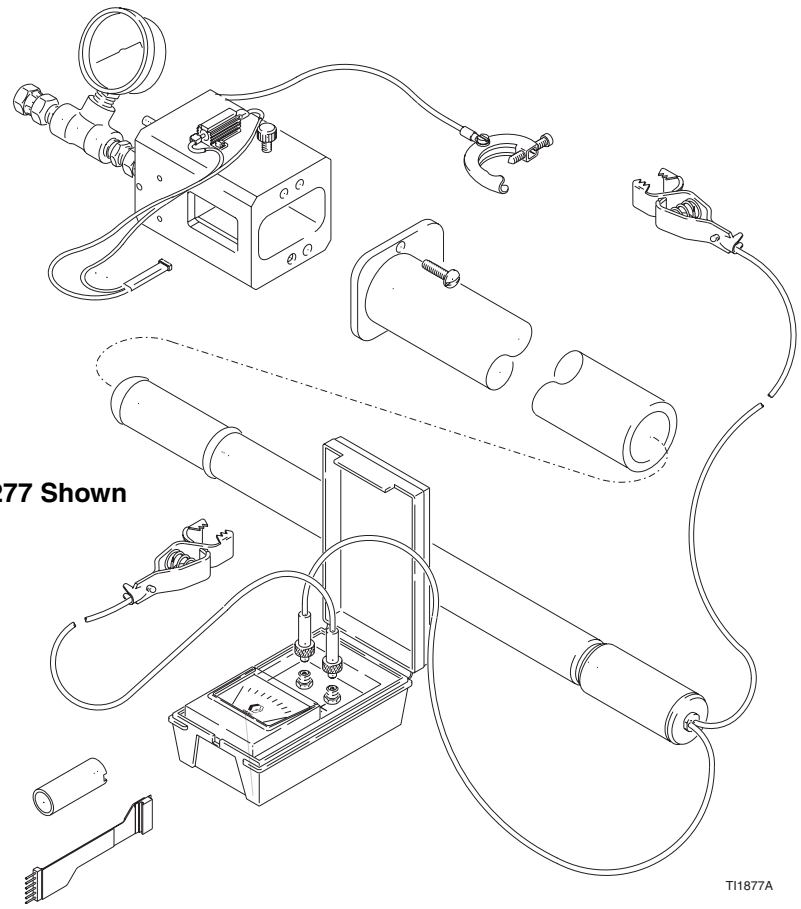
309455 rev.A

Part No. 245277

Includes Test Fixture, High Voltage Test Probe, and kV Meter to test the electrostatic voltage of the spray gun, as well as the condition of the turbine alternator and power supply when disassembled from the gun. See page 14 for parts.

Part No. 236003

Includes High Voltage Test Probe and kV Meter to test the electrostatic voltage of the spray gun. See page 14 for parts.



Part No. 245277 Shown

PROVEN QUALITY. LEADING TECHNOLOGY.

Graco Inc. P.O. Box 1441 Minneapolis, MN 55440-1441

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⚠ WARNING

Fire, Explosion, and Electric Shock Hazard

Equipment misuse can cause the equipment to malfunction and cause a fire, explosion, or electric shock, resulting in death or serious injury. Improper grounding, poor air ventilation, open flames, or sparks can cause a hazardous condition and result in a fire, explosion, or electric shock.

- This equipment is for professional use only.
- Read all manuals, tags, and labels before operating the equipment.
- Electrostatic equipment must be used only by trained, qualified personnel who understand the requirements in this manual.
- Use the equipment only for its intended purpose. If you are uncertain, call your Graco distributor.
- Do not alter or modify equipment. Use only genuine Graco parts and accessories.
- Check the equipment daily. Repair or replace worn or damaged parts immediately.
- Only use the probe to test direct negative current (DC) electrostatic voltage.
- Only use this equipment to test Graco PRO Xs Electrostatic Gun Models. Never use it to test “stiff” or “hot” systems.
- Always ground the fixture, probe, and kV meter as described in this manual.
- Ground or remove all metal and conductive objects, including tools, from the test area.
- Never touch the probe above its handle while testing.
- Never use the fixture to test the gun turbine alternator or power supply in a hazardous location.
- Never test the power supply without the probe shroud installed.

Operation

Testing the Gun While It is Operating

⚠ WARNING

Pressurized Equipment Hazard

Before testing the gun, follow the **Pressure Relief Procedure** in your gun manual to reduce the risk of fluid injection or splashing of fluid in the eyes or on the skin.

NOTE: The maximum voltage read by the kV meter and probe may be less than the rated voltage of the gun or power supply that you are testing. This is due to voltage losses that are intrinsic to the measurement of high voltage in air. These losses include current draw through the probe and meter and also the inability to capture 100% of the electrons being emitted by the gun electrode.

1. Connect the probe's red wire (D) to the kV meter (2) and its green/yellow ground wire (C) to a true earth ground (B). See Fig. 1.

2. Connect the kV meter's green/yellow ground wire (6) between the kV meter (2) ground connection and a true earth ground (B).

3. Holding onto the probe (3) handle, touch the end of the probe to the spray gun electrode (A). Move the end of the probe slightly until the maximum kV reading is obtained.

4. Read the voltage on the kV meter (2). Refer to Table 1 for your gun model.

NOTE: When the kV meter (2) is not in use, place a jumper wire across the kV meter connectors to prevent excessive needle movement.

Table 1: Typical Gun Voltage Readings in Air

Gun Model	Voltage (kVdc)
PRO Xs2	15-25
PRO Xs3	55-65
PRO Xs4	75-85

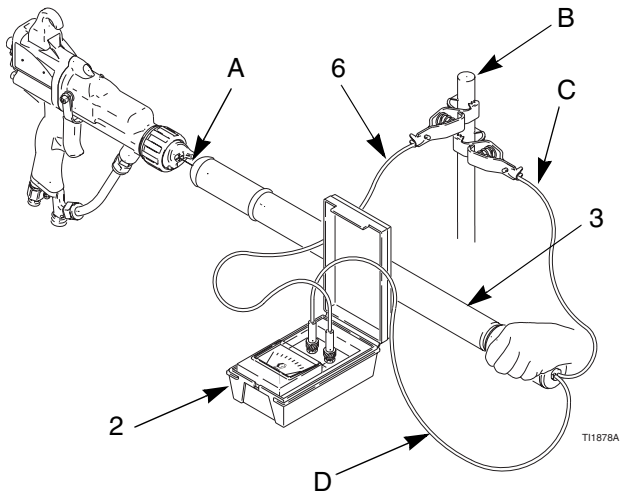


Fig. 1. Testing the Gun While It is Operating

Testing the Turbine Alternator

⚠ WARNING

Sound Hazard

To reduce the risk of hearing loss or damage, always wear hearing protection when operating the turbine alternator.

⚠ CAUTION

To avoid demagnetization of the alternator, never place it close to another alternator or any other ferromagnetic objects.

1. Remove the turbine alternator from the power supply as instructed in the spray gun manual. Bring the equipment to a non-hazardous location to do the testing.

⚠ WARNING

Fire, Explosion, and Electric Shock Hazard

To reduce the risk of fire, explosion, or electric shock, which can result in serious injury and property damage, never use the Graco PRO Xs Test Fixture to test the gun turbine alternator or power supply in a hazardous location.

2. Visually inspect the turbine alternator (L). See Fig. 2. If any of the holes (R) are plugged, unplug them. If excess wear appears on the alternator bearings or shaft, replace or rebuild the alternator. See **"Accessories"** to order a Turbine Alternator Repair Kit.

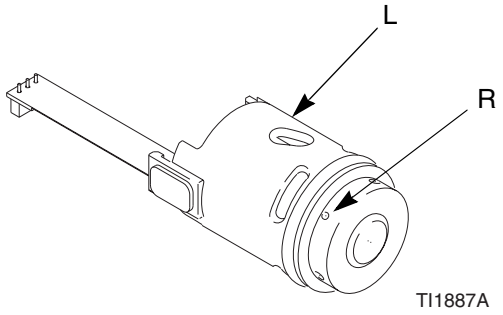


Fig. 2. Turbine Alternator

3. Place the 3-pin connector (J) through the side window (M) and connect it to the turbine alternator connector (K). The orientation of the 3-pin connector does not affect the test. See Fig. 3.

4. Lubricate the alternator o-ring with non-silicone grease, Part No. 111265. Do not over-lubricate.

5. Place the turbine alternator (L) inside the fixture (H), with the slot (G) facing the side window (M). Use the alignment tool (21) to push the alternator into the housing cavity. Tighten the top locking screw (8) until the screw extends past the alternator tab.

6. Connect the probe shroud (16) to the fixture (H) with the screw (17).

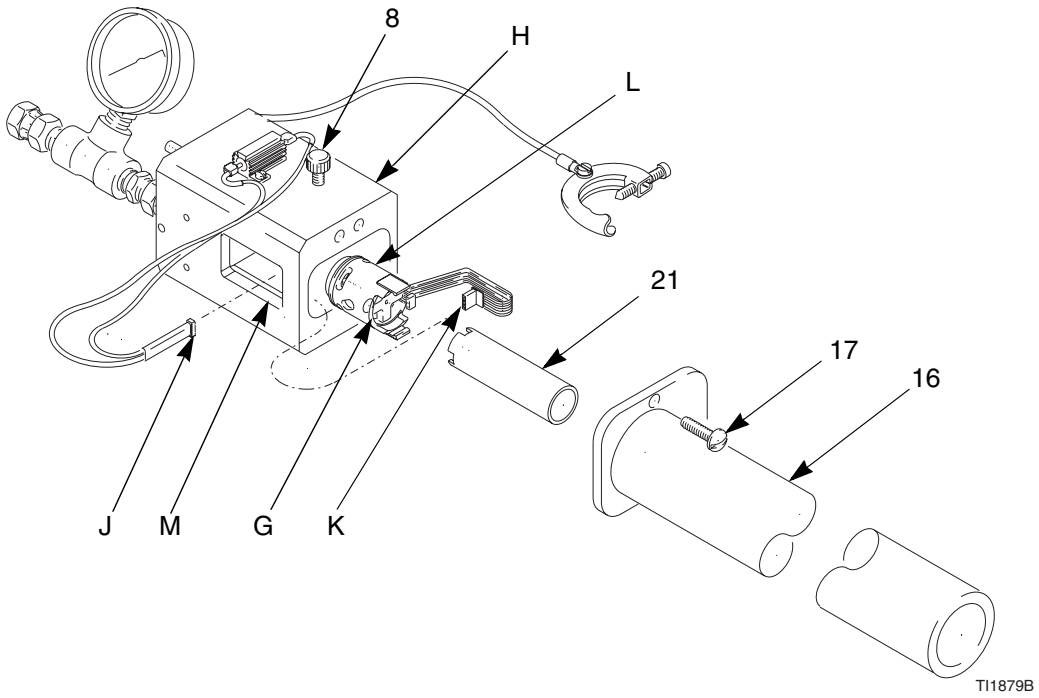


Fig. 3. Install Turbine Alternator in Fixture

7. Connect the fixture's grounding clamp (12) to a true earth ground (B). See Fig. 4.

8. Connect an air line (E) to the fixture. Set the air pressure to 26 psi (1.8 bar, 0.18 MPa).

9. Measure the turbine alternator AC voltage output with a voltmeter (N), measuring across the fixture terminals (9) as shown in Fig. 4.

   NOTE: To measure frequency and voltage, you need a multimeter. See **"Accessories".**

   The turbine alternator voltage should read in the range shown in Table 2 . If the readings vary from these values, replace the alternator or rebuild it. See **"Accessories"** to order an Alternator Repair Kit.

Table 2: Turbine Alternator Voltage

Gun Model	Frequency (Hz)	Voltage (V)
All PRO Xs Models	600 Hz maximum	6.4 V

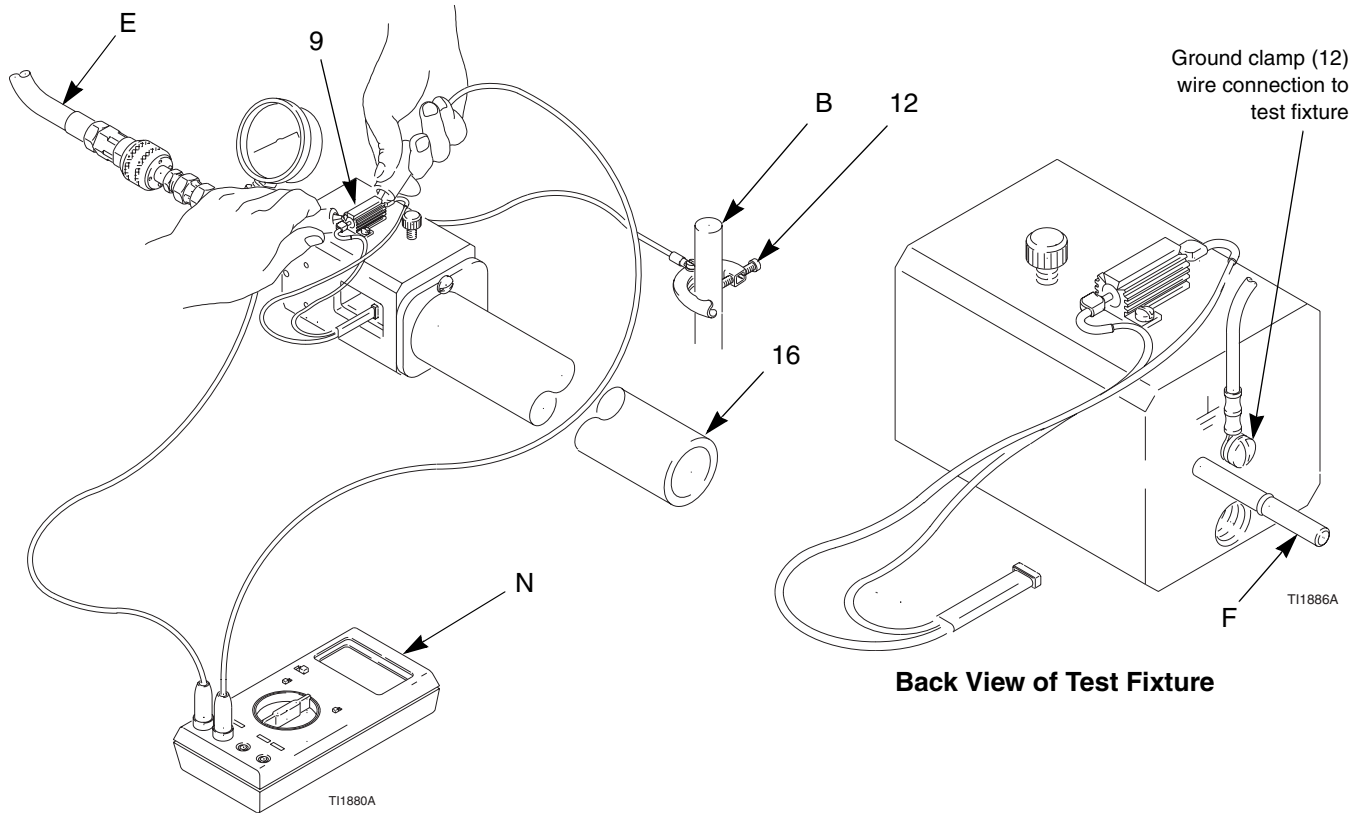
10. Remove the probe shroud (16).

11. Disconnect the 3-pin connector (J) and loosen the locking screw (8). Use the plunger (F) on the back of the fixture to push out the turbine alternator.

12. Test the alternator coil by measuring the resistance between the two outer terminals of the 3-pin connector (K) with a multimeter. The resistance should be 2.5-3.5 ohms.

    Measure the resistance between each outer terminal of the 3-pin connector and the exterior of the turbine alternator (L). The resistance should be greater than 400 ohms.

    If the readings vary from these values, replace the alternator coil.



Back View of Test Fixture

Fig. 4. Testing the Turbine Alternator

Notes

Testing the Power Supply Cartridge

NOTE: You do not use the fixture's 3-pin connector (J) to test the power supply cartridge.

1. Remove the power supply cartridge from the gun as instructed in your spray gun manual and bring the equipment to a non-hazardous location to do the testing.

⚠ WARNING

Fire, Explosion, and Electric Shock Hazard

To reduce the risk of fire, explosion, or electric shock, which can result in serious injury and property damage:

- Never use the Graco PRO Xs Test Fixture to test the gun turbine alternator or power supply in a hazardous location.
- Never test the power supply without the shroud (16) installed.

2. Lubricate the alternator o-ring with non-silicone grease, Part No. 111265. Do not over-lubricate.

3. Install the power supply cartridge (P) into the fixture (H), orientated as shown in Fig. 5. Push in until the alternator bottoms out in the cavity.

4. Secure the shroud (16) to the fixture (H) with the screw (17).

5. Lubricate the probe o-ring (5) to ease insertion into the shroud.

6. Insert the probe (3) into the shroud (16) and touch its tip to the end of the power supply.

7. Connect the probe's red wire (D) to the kV meter and its green/yellow ground wire (C) to a true earth ground (B). See Fig. 6.

8. Connect the kV meter's green/yellow ground wire (6) between the kV meter and a true earth ground.

9. Connect the fixture's grounding clamp (12) to a true earth ground.

10. Connect an air line (E) to the fixture. Set the air pressure to 30 psi (0.21 MPa, 2.1 bar).

11. Read the power supply cartridge voltage output with the kV meter. See Table 3 for typical readings.

Table 3: Typical Power Supply Voltage Readings with Test Fixture

Gun Model	Voltage (kVdc)
PRO Xs2	15-25
PRO Xs3	55-65
PRO Xs4	75-85

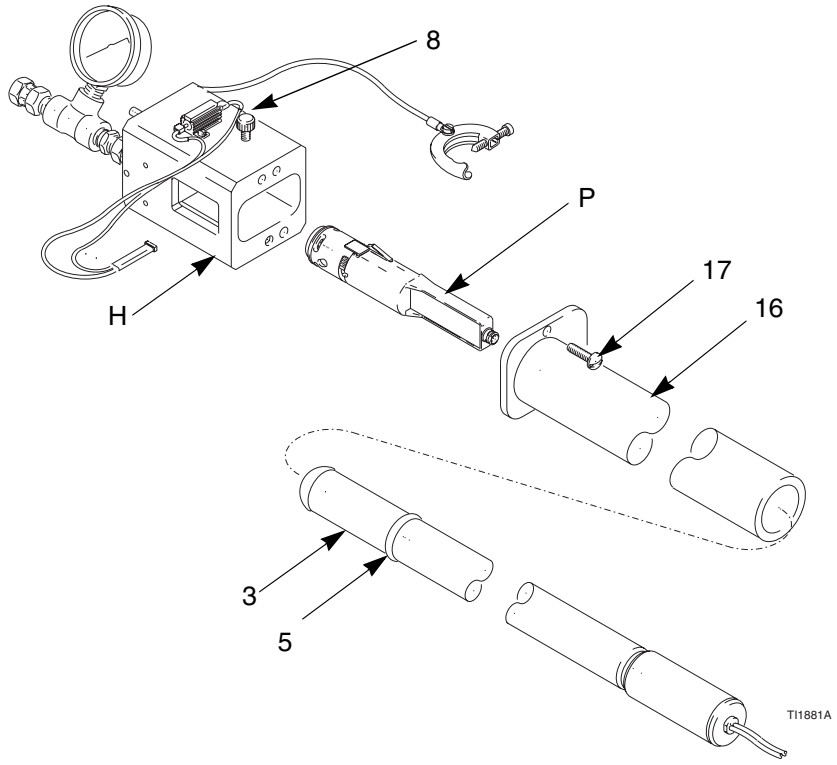
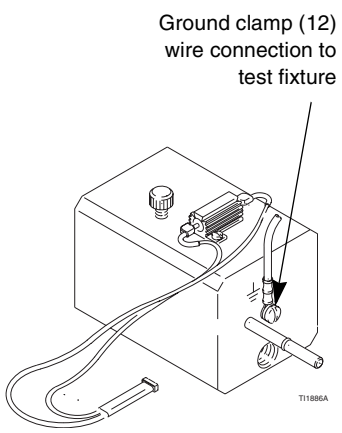


Fig. 5. Install Power Supply in Fixture



Back View of Test Fixture

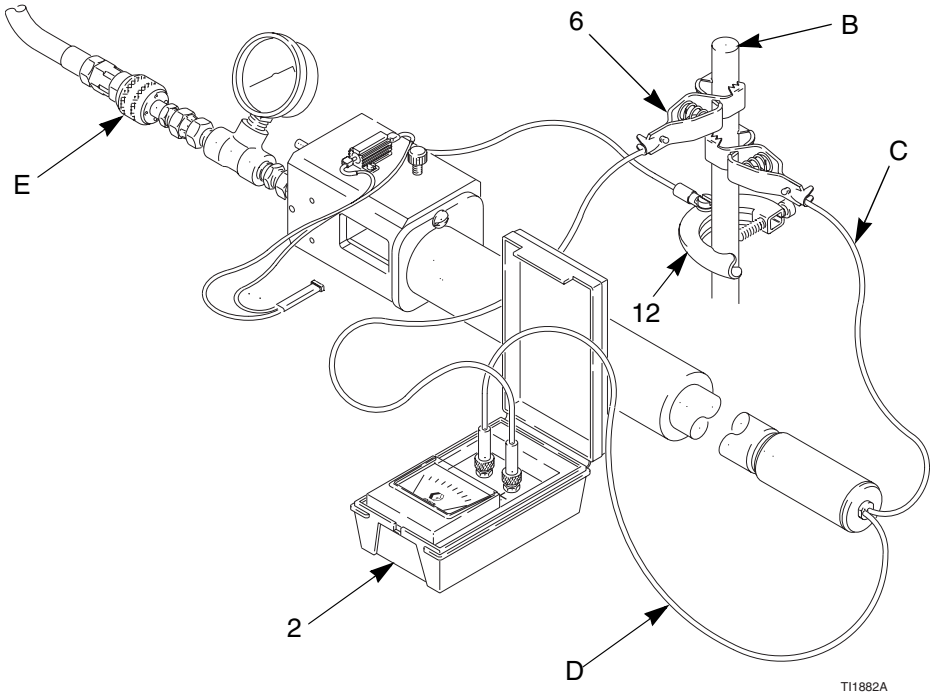
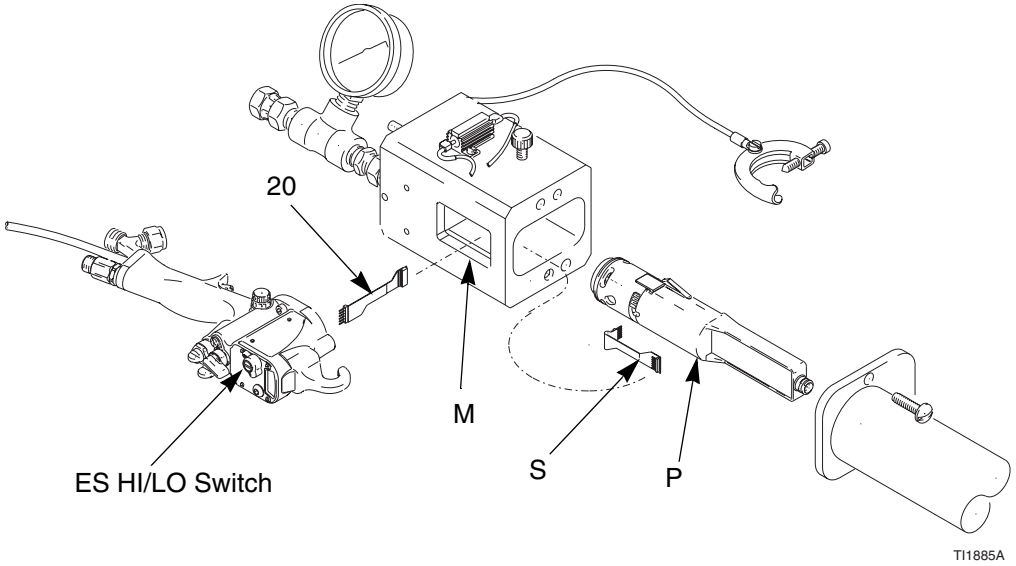


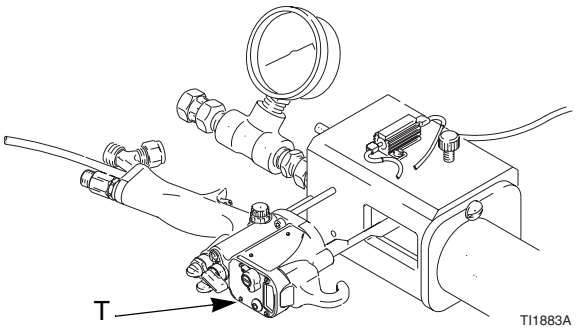
Fig. 6. Testing the Power Supply

Testing the Smart Handle's ES HI/LO Setting

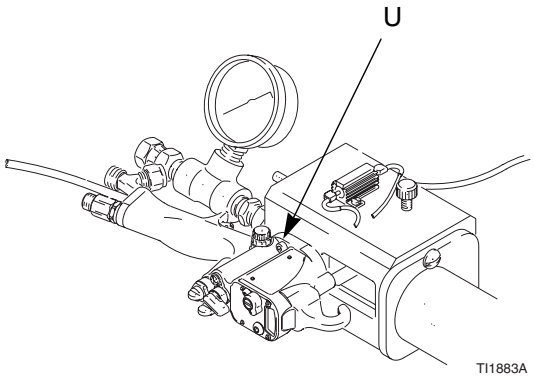
1. Use the ES HI/LO switch on the back of the gun to change the power supply output to either high voltage or low voltage setting. See Detail A of Fig. 7.
2. Connect the flexible circuit test adapter (20) to the flex circuit (S) on the power supply cartridge (P). Thread the connected circuits through the side window (M) of the fixture and connect to the smart handle.
3. Mount the smart handle (T) loosely to the fixture. See Detail B.
4. Tighten the smart handle screws (U) to the fixture. See Detail C.



Detail A: Connect the flexible circuit adapter.



Detail B: Install the smart handle loosely.



Detail C: Tighten the smart handle to the fixture.

Fig. 7. Testing the Smart Handle

Low Voltage Adjustment (Smart Guns Only)

The ES HI/LO switch enables you to switch between full voltage and a lower voltage output. The lower voltage is factory set, but can be adjusted.

1. Set the ES HI/LO switch to LO.

2. Remove the LO VOLTAGE adjustment plug. Set the desired voltage, using a small screwdriver to slide switches 1 and 2 ON or OFF, according to Table 4 . Also see Fig. 8.

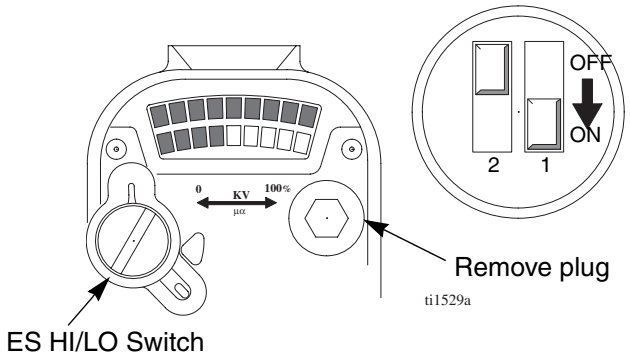


Fig. 8. Low Voltage Adjustment Switches

Table 4: Low Voltage Adjustment

	60 kV Guns			85 kV Guns		
	1	**2**	**kV**	**1**	**2**	**kV**
	ON	ON	50	ON	ON	70
Factory Setting >	ON	OFF	40	ON	OFF	60
	OFF	ON	35	OFF	ON	50
	OFF	OFF	30	OFF	OFF	40

Troubleshooting

Problem	Cause	Solution
Spray gun test shows low voltage.	Gun ES HI/LO switch on low (smart guns only).	Check switch position.
	Gun ES ON/OFF valve turned OFF.	Turn ON.
	Air pressure to gun too low.	Increase air pressure; air pressure must be at least 40 psi (2.8 bar) at the gun air inlet.
	KV meter not grounded.	Connect the kV meter ground wire to a true earth ground; see Fig. 1.
	KV meter connected wrong.	Correct connection; see Fig. 1.
	Fluid resistivity too low.	Check fluid resistivity with paint meter and probe.
	Faulty gun resistance.	Check gun resistance; see gun manual.
	Fluid leaks from needle packing and causes short.	Clean needle cavity and replace fluid needle assembly.
	Dirty gun.	Clean the gun.
	Faulty power supply.	Test power supply; replace if faulty.
	Faulty turbine alternator.	Test alternator; replace or rebuild if faulty.*
Power supply test shows low voltage.	Gun's ES switch is positioned for low voltage setting.	Move ES switch to high voltage setting position; see Fig. 7.
	Probe is not making contact with power supply contact.	Remove the probe, then push it into the shroud until it presses firmly against the power supply contact.
	KV meter not grounded.	Connect the kV meter ground wire to a true earth ground; see Fig. 1.
	KV meter connected wrong.	Correct connection; see Fig. 1.
	Air pressure to fixture too low.	Increase air pressure; air pressure to fixture must be at least 30 psi (0.21 MPa, 2.1 bar).
	Fixture's air bypass not plugged.	Make sure the probe shroud is tightly secured to the fixture.
	Faulty alternator.	Test alternator; replace or rebuild if faulty.*

** See **"Accessories"** to order a repair kit.*

Problem	Cause	Solution
Turbine alternator test shows no frequency or voltage.	No connection to load resistor.	Check connection.
	Alternator coil has open circuit.	Test coil. Resistance should be 2.5-3.5 ohms. Replace coil if necessary.
Turbine alternator test shows frequency or voltage is out of range.	Air pressure to fixture too low.	Increase air pressure; air pressure to fixture must be at least 30 psi (0.21 MPa, 2.1 bar).
	Fixture's air bypass not plugged.	Make sure the probe shroud is tightly secured to the fixture.
	Alternator bearings worn.	Replace or rebuild alternator.*
	Coil resistance out of range.	Replace coil.
	Alternator armature worn.	Replace armature.*
	Alternator holes are plugged.	Unplug the holes.
Operator gets shock.	Operator not properly grounded.	Be sure floor is properly grounded; wear shoes with conductive soles or wear personal grounding straps; be sure operator is not in contact with or carrying any metallic items which could build up electrical charge; if a glove is worn, it must be conductive or modified as shown in your gun manual.
	Probe not properly grounded.	Connect the probe's ground wire to a true earth ground; see Fig. 1.
	Gun not properly grounded.	Ground the gun; see your gun manual.

** See **"Accessories"** to order a repair kit.*

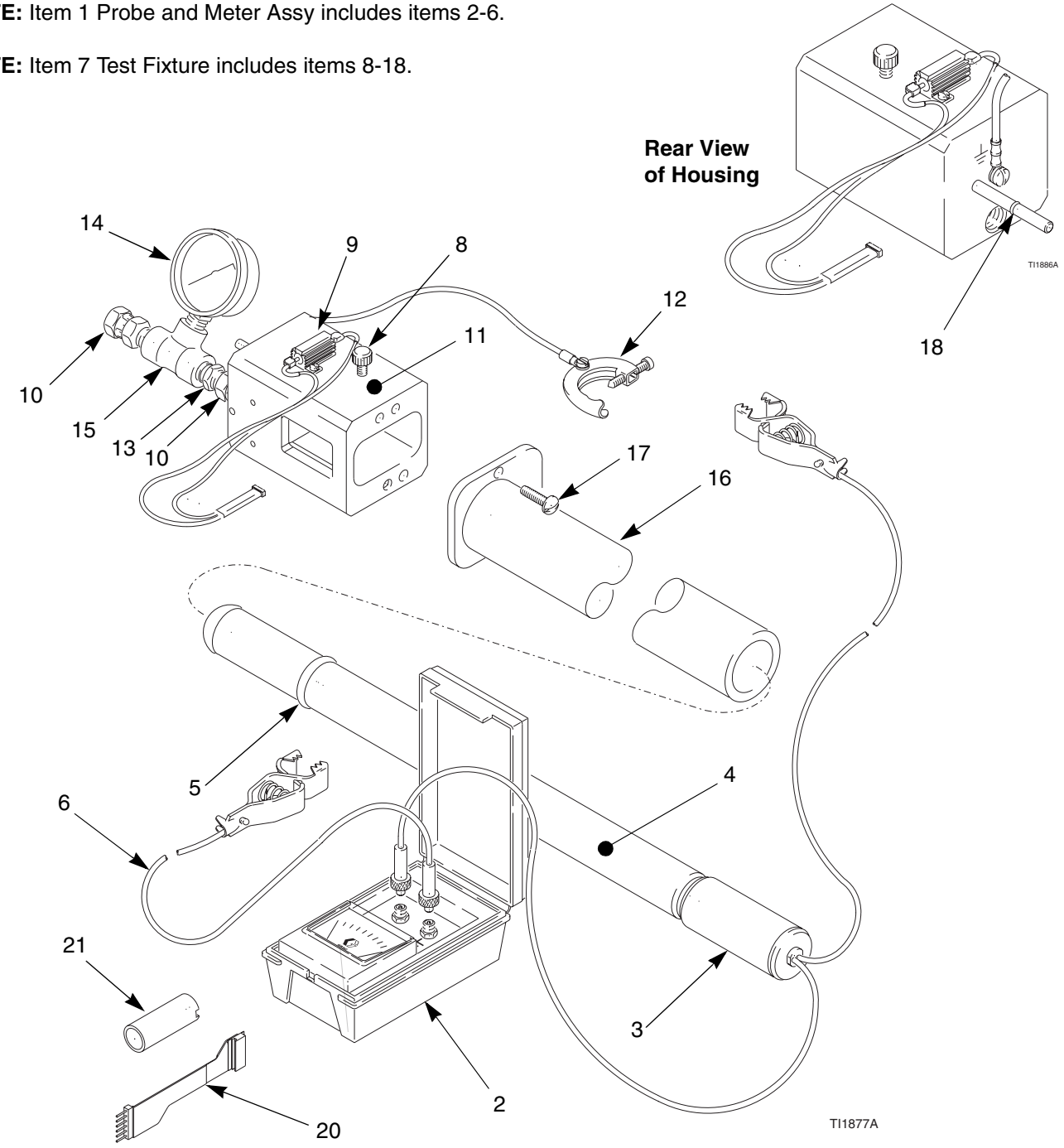
Parts

Part No. 245277, Series A

Test Fixture, Probe, and kV Meter

NOTE: Item 1 Probe and Meter Assy includes items 2-6.

NOTE: Item 7 Test Fixture includes items 8-18.



Part No. 245277, Series A

Test Fixture, Probe, and kV Meter

Ref. No.	Part No.	Description	Qty
1	236003	PROBE AND METER ASSY; includes items 2-6	1
2	224904	. kV METER	1
3	224911	. HIGH VOLTAGE TEST PROBE; includes items 4 and 5	1
4▲	187465	. . LABEL, warning	1
5	110466	. . O-RING; Viton®	1
6	223267	. kV METER GROUND WIRE	1
7	245278	PRO Xs ES TEST FIXTURE ASSY; includes items 8-18	1
8	187468	. LOCKING SCREW	1
9	245326	. RESISTOR ASSY	1
10	156823	. UNION, swivel; 1/4 npt(m x f)	2
11▲	187466	. LABEL, warning	1
12	224952	. FIXTURE GROUND WIRE	1
13	162453	. NIPPLE; 1/4 npsm x 1/4 npt	1
14	160430	. GAUGE, air pressure; 0-100 psi (0-0.7 MPa, 0-7 bar)	1
15	104984	. TEE; 1/4 npt(f)	1
16	224899	. SHROUD	1
17	112325	. SCREW; 1/4-20	1
18	168518	. O-RING; Viton®	2
19	112234	CASE, carrying (not shown)	1
20	245302	FLEX CIRCUIT, test assembly	1
21	179802	TOOL, power supply alignment	1

▲ Replacement Warning labels, signs, tags, and cards are available at no cost.

Accessories

Wavetek Multimeter Model DM25XT

The Wavetek Multimeter (or equivalent meter that can read voltage and frequency) can be used to test the turbine alternator. This meter can be purchased through most industrial electronic product distributors.

To order, contact:

Wavetek Corporation
Instruments Division
9045 Balboa Avenue
San Diego, CA 92123-1509

Paint Probe

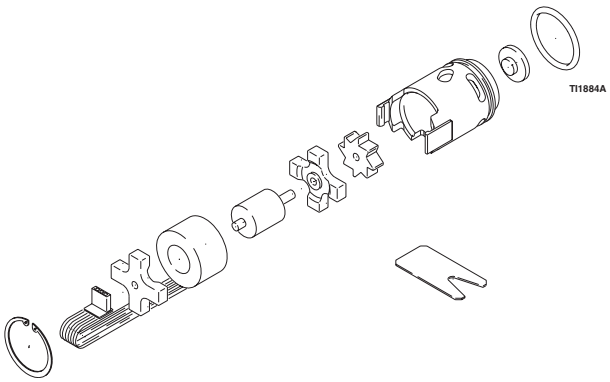
722860 Use with 722886 Paint Resistance Meter to measure resistance of paint.
Not for use in hazardous areas.

Paint Resistance Meter

722886 Use with 722860 Paint Probe to measure resistance of paint.
Not for use in hazardous areas.

Alternator Bearing Kit

223688 To repair the turbine alternator. Includes bearings, fan, and spacer tool. Refer to manual 308034.



Turbine Alternator Armature

217590 To repair the turbine alternator. Refer to manual 308034.

Non-Silicone Lubricant

111265 4 oz (113 g) tube of sanitary (non-silicone) lubricant.

Technical Data

Category	Data
Maximum Air Pressure to PRO Xs ES Test Fixture Inlet	40 psi (0.28 MPa, 2.8 bar)
Minimum Air Pressure to PRO Xs ES Test Fixture Inlet	30 psi (0.21 MPa, 2.1 bar)
Maximum Testing Voltage	90 kV DC
kV Probe and Meter Accuracy	+/- 5% full scale
kV Probe Resistance	7 gigohm +/- 5%
Multimeter Specifications	To test the turbine alternator, the multimeter must read voltage and frequency. See **"Accessories"** to order.

Viton® is a registered trademark of the DuPont Company.

Graco Standard Warranty

Graco warrants all equipment manufactured by Graco and bearing its name to be free from defects in material and workmanship on the date of sale by an authorized Graco distributor to the original purchaser for use. With the exception of any special, extended, or limited warranty published by Graco, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment determined by Graco to be defective. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

This warranty does not cover, and Graco shall not be liable for general wear and tear, or any malfunction, damage or wear caused by faulty installation, misapplication, abrasion, corrosion, inadequate or improper maintenance, negligence, accident, tampering, or substitution of non-Graco component parts. Nor shall Graco be liable for malfunction, damage or wear caused by the incompatibility of Graco equipment with structures, accessories, equipment or materials not supplied by Graco, or the improper design, manufacture, installation, operation or maintenance of structures, accessories, equipment or materials not supplied by Graco.

This warranty is conditioned upon the prepaid return of the equipment claimed to be defective to an authorized Graco distributor for verification of the claimed defect. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor, and transportation.

THIS WARRANTY IS EXCLUSIVE, AND IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.

Graco's sole obligation and buyer's sole remedy for any breach of warranty shall be as set forth above. The buyer agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property, or any other incidental or consequential loss) shall be available. Any action for breach of warranty must be brought within two (2) years of the date of sale.

Graco makes no warranty, and disclaims all implied warranties of merchantability and fitness for a particular purpose in connection with accessories, equipment, materials or components sold but not manufactured by Graco. These items sold, but not manufactured by Graco (such as electric motors, switches, hose, etc.), are subject to the warranty, if any, of their manufacturer. Graco will provide purchaser with reasonable assistance in making any claim for breach of these warranties.

In no event will Graco be liable for indirect, incidental, special or consequential damages resulting from Graco supplying equipment hereunder, or the furnishing, performance, or use of any products or other goods sold hereto, whether due to a breach of contract, breach of warranty, the negligence of Graco, or otherwise.

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Graco Phone Numbers

TO PLACE AN ORDER, contact your Graco distributor, or call this number to identify the distributor closest to you:

1-800-367-4023 Toll Free
612-623-6921
612-378-3505 Fax

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