

Safety, Operation, and Procedure Instructions for the PFT Series of AC Hipots



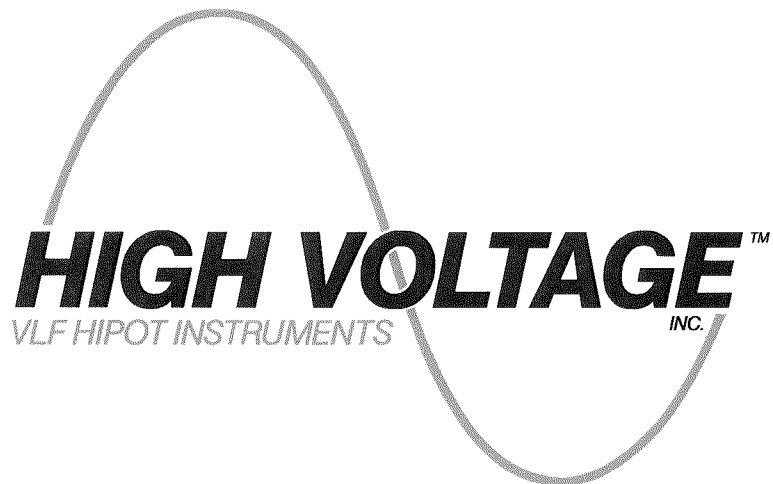
Please Refer to
Documentation
Before Operation

Danger- Lethal Voltages:

Equipment to be used by trained personnel only

This Operator Manual contains instructions for the operation of a High Voltage power source. The operator of this equipment must use good judgement and follow all safety precautions noted in this guide to ensure the protection of himself and others in close proximity to the test area. **Failure to follow the instructions could result in injury or death. Proper grounding of the test set must be done prior to connecting this unit to a power source.**

Operator Manual



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About the Operator Manual

Important

This Operator Manual describes the features and safe operation of a High Voltage Test Set. The instructions are intended to be clear and simple, but the operator must be trained and qualified according to established procedures for the use of this type of equipment.

This Operator Manual is organized to provide information on the PFT Series of Hipots in steps that familiarize the new operator with the operation of this test set.

Section 1: Specifications and Controls.

Section 2: Setup and Operation.

Section 3: Performing Special Operations.

The Functions, Features, and Specifications of the PFT Series of AC Hipots are also discussed in the PFT Brochure available from High Voltage, Inc.

General Information

This section familiarizes the operator with the features and specifications of the **PFT Series of Power Frequency AC Test Sets** manufactured by **HIGH VOLTAGE, INC.**

Features and Specifications

The PFT Series of AC hipot test sets provide continuously adjustable output voltages for the GO/NO-GO testing of high voltage insulation. Earlier versions of the PFT Series were equipped with operator controlled capacitive compensation switches to minimize input primary currents. The new simplified controls incorporate this feature transparently.

Standard features of the PFT Series of include:

- Continuously adjustable output voltage
- Fixed overload, factory set to 120% of variable transformer rated output current
- "Zero Start" and External Interlock provision
- Secondary connected dual-range voltmeter
- Shielded output cable (50 kV and below) precludes unnecessary insulated support of the cable
- One piece portable design (50 kV and below)
- Transit protected meters prevent meter damage between test sites
- Capacitive load compensation incorporated to allow up to 3 KVA output power with less than 15 Amperes input line current.
- Fault Burn Reactor (Optional)

PFT MODEL SPECIFICATIONS

	PFT-103	PFT-303	PFT-503	PFT-1003
<p>SEE SPECIFICATIONS ON LAST SHEET OF PARTS LIST</p>				

Table 1 *PFT Series Specifications.*

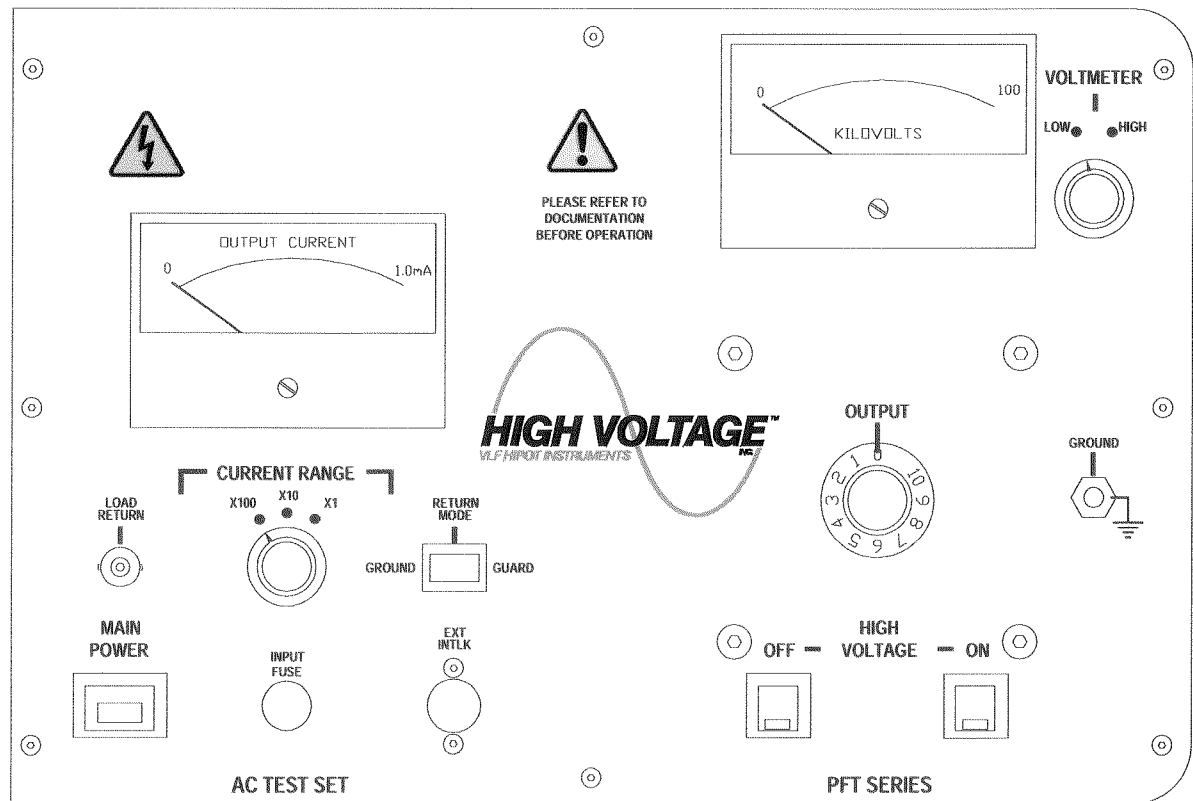


Figure 1 PFT Series front panel controls.

MAIN POWER

The **MAIN POWER** pushbutton switch provides the power to the control and power circuits. The neon lamp in the switch will light when the power is on and voltage is available through the input line cord. The **INPUT FUSE** located electrically before the **MAIN POWER** switch provides line fault protection for the unit.

EXT INTLK (EXTERNAL INTERLOCK)

The **Ext Intlk** connector is provided to allow for a normally open safety interlock switch to control the energizing of the high voltage output.

HIGH VOLTAGE ON/OFF

The **HIGH VOLTAGE ON** and **OFF** pushbuttons control the high voltage power circuits. The red and green LEDs provide life long positive indication of the circuit status. The red LED lights when high voltage is energized and the green LED lights when the high voltage is de-energized.

OUTPUT CONTROL

The **OUTPUT** control variable transformer adjusts the output voltage. The 0-10 markings on the knob indicate the low to high setting. The control must be at **ZERO (0)** to energize the high voltage circuits. **The output control must always be returned to zero at the completion of testing, prior to de-energizing the output**

VOLTMETER AND RANGE SWITCH

The **KILOVOLT METER** and associated range switch allows for more accurate output voltage readings. 1-% precision resistors minimize the need for re-calibration due to aging shift. See **Voltmeter Re-calibration** in Section 3 for details on calibration.

CURRENT METER

The **CURRENT METER** is for accurate secondary load current readings. The range multiplier switch (X1, X10, X100) allows readings to be taken as low as .1mA (5 divisions) and up to 100mA.

LOAD RETURN CONNECTOR

The **LOAD RETURN** connector is for the low side of the test load. It connects to the shielded return lead for more accurate load current readings.

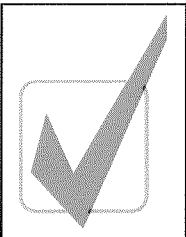
RETURN MODE

The **RETURN MODE** switch allows for accurate secondary load current readings. In the **GUARD** position, all ground currents are shunted around the meter. The load must be isolated from ground to use in the **GUARD** position. In the **GROUND** position, the return point is grounded and all currents (load and ground losses) are metered.

BURN (OPTIONAL)

The **BURN** toggle is provided for tests when the load has faulted and the insulation must be further scored to find the problem. The **BURN** feature will limit current on the output below the overload value and allow for thorough marking of the fault area.

List of included components



Black test lead with black boot for ground connections. (2 leads for PFT-1003)

Ext. Intlk. Jumper plug

Attached 20 ft. X-Ray shielded output cable (50kV and below)

Alligator and hook connections for working end of output cable (50kV and below)

20 ft. RG58/U coax return lead

SETTING UP THE EQUIPMENT

The setup of this equipment has been minimized by careful consideration of the operator during design. The PFT Series' one-piece construction (50kV and below) minimizes misplaced components while allowing for convenient portability.

1. **Select a location** for the unit that will allow easy viewing of the meters at a safe distance from the test object.
2. **Be sure that all the controls are off**, in their de-energized or fully counterclockwise position.
3. **Secure a ground test lead to the panel.** The Ground post on the front panel should be used for that purpose. A black test lead with black boot has been provided for the ground connection. A second ground lead is provided for two-piece units for the grounding of the high voltage section.
4. **Insert the EXT INTLK plug into the socket on the panel.** The plug may also be wired to a normally open contact of a safety switch for added protection. Hand-held safety switches are available from High Voltage to plug directly into the EXT INTLK socket.
5. **If applicable, connect the interconnect cable between the control and high voltage section.**
6. The red booted alligator clamp on the output cable is used to connect the output cable to the test object. (50kV and below). Connection of the output toroid on the PFT-1003 high voltage section to the load is accomplished by using a customer provided test lead or tubing (metallic) between the toroid (HV output) and test object.

Operating the Equipment

This section provides step-by-step instruction on various test methods. Many facilities have their own in-house test procedures that should not be superceded by this manual. The purpose of this section is to explain the capabilities of this test set in real-world applications.

AC Insulation Testing

1. Ensure that all the steps listed in **Setting up the Equipment** have been accomplished. Take special note to ground the control panel to a solid earth ground using the supplied black test lead.
2. Select the desired **VOLTMETER RANGE** for the test voltage level expected.
3. *Prior* to connecting the output cable (toroid) to the test sample, be sure that the test sample is de-energized.
4. Connect the output lead to the test sample. **Be sure that there is enough clearance to grounded objects for the expected test voltage.** The *minimum* clearance in air is **10 kV ac/inch**.
5. Return the low side of the test sample to the **LOAD RETURN** connector using the supplied shielded return lead. See the **GUARD/GROUND** explanation (pp. 9,10) for direction on which mode may be appropriate for your testing requirements.
6. Connect the input power cord to a grounded source (See the specification table for unit input requirements).
7. Depress the **MAIN POWER** switch to energize the control circuits.

*****CAUTION*****

**POTENTIALLY LETHAL VOLTAGES
MAY BE PRESENT**

- 8.** With the **OUTPUT** control at zero (zero start interlock engaged), depress the **HV ON** pushbutton. The **HV ON** light will glow.
- 9.** Increase the output by rotating the **OUTPUT** control slowly clockwise until the desired output voltage is reached.

Note: The high voltage output cable shield is grounded. This grounded shield appears as a load even under 'no load' conditions. The current on a PFT-503CM is about 18mA at full output with the **RETURN MODE** in the **GROUND** position.

- 10.** Maintain the output voltage for the test time specified in your standard procedures.
- 11.** After the test is complete, rotate the **OUTPUT** control to zero, prior to depressing the **HV OFF** pushbutton.
- 12.** If the test sample fails during the test, the internal overload relay will de-energize the high voltage. **This relay is in the primary circuit and is sensitive to primary current overloads.** The overload is set to 120% of the rated current of the variable transformer. The use of a gapped transformer in the high voltage tank will null the primary currents (up to 1.5 KVA) and the overload will allow operation to the full output rating of 3 KVA. When testing purely resistive loads, the unit will overload above 1500 VA of input power to the tank.
- 13.** Prior to removing the output cable from the load, observe that the output voltmeter is at zero.
- 14.** Always ground the output cable (or toroid) and test sample prior to disconnecting the test object.

Using the Guarded Return

The use of the GUARD/GROUND return feature of this test set provides for very accurate leakage current measurements if certain conditions exist allowing for the GUARD circuit to be employed. The following explanation will detail different test samples and methods that lend themselves to the use of this circuit. The same setup precautions such as proper grounding still apply to the test but the grounds will be manipulated to accomplish the test requirements.

1. **Grounded Return-** With the output return in the grounded mode, the current meter reads all current to ground, internal and external to the test set. This current might include corona, surface tracking, and any shunt resistance. The typical diagram for grounded return operation is shown in Figure 2 below.
2. **Guarded Return-** With the output return in the guarded mode, the current meter will only read currents through the test sample. The test sample must be isolated from ground on the low side as shown in Figure 3 below.

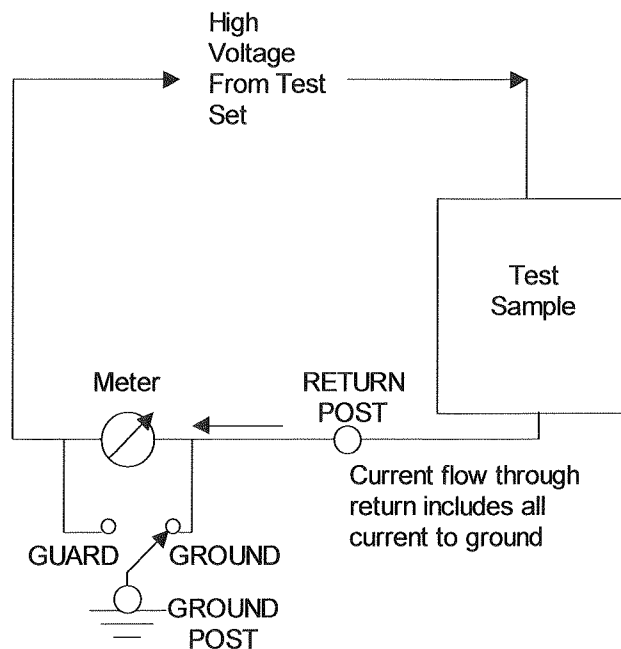


Figure 2, Grounded Return Diagram

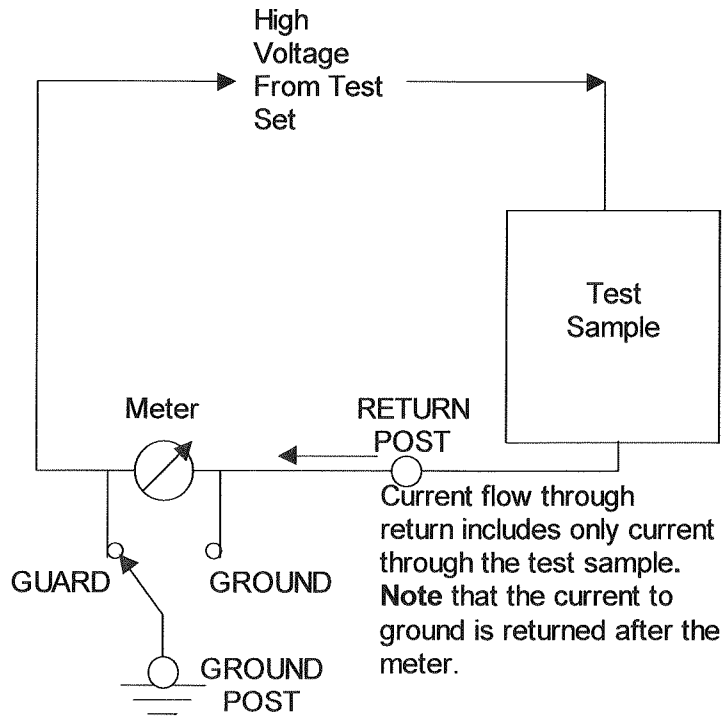


Figure 3, Guarded Return Diagram

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PERFORMING SPECIAL OPERATIONS

The following section contains information on the care and upkeep of your new PFT SERIES Power Frequency AC Test Set. There are some notes on troubleshooting and service, which will save much time and money over the life of the unit.

Meter Re-calibration

The PFT SERIES of hipots use precision metal film resistors for measurement and calibration of the voltmeter. The use of these resistors in both the high voltage tank and the metering circuits has minimized circuit drift due to aging and temperature. Adjustment of potentiometer (R4) on the voltmeter and current meter PCB can be used to correct for movement changes from the aging of the meter.

The certification of meters on a yearly basis is recommended to ensure accurate test results.

Voltmeter Re-calibration

1. Locate the unit in a position that will allow easy reading of the meters.
2. Remove the panel screws and support the panel vertically to gain access to the calibration pot on the back of the voltmeter.
3. Zero the meter movement using the zero adjustment below the scale window.
4. Perform the steps in **Setting up the Equipment** at the start of **SECTION 2**. Be sure to ground the front panel to a solid earth ground using the supplied black ground test lead prior to connecting the unit to input power.
5. Set the **VOLTMETER RANGE** to **LOW** position.
6. Connect the output cable to a calibrated reference meter with ability to read to the full output voltage of the unit. Be sure to ground the low side of the meter.

7. Raise the output to one half scale on the unit meter. Adjust R4 as required.
8. Check calibration at full scale and on the high range at both half and full scale. If the customer facility calibration certification requires more points of reference, follow those procedures instead of these.
9. Calibration must then be verified with the panel in the horizontal operating position to check for any meter balance affect on the calibration.

Current Meter Re-calibration

10. Locate the unit in a position that will allow easy reading of the meters.
11. Remove the current meter panel screws and support the panel vertically to gain access to the calibration pot on the back of the current meter.
12. Zero the meter movement using the zero adjustment below the scale window.
13. Perform the steps in **Setting up the Equipment** at the start of **SECTION 2**. Be sure to ground the front panel to a solid earth ground using the supplied black ground test lead prior to connecting the unit to input power.
14. Set the **CURRENT RANGE** to **X1** position.
15. Connect the output cable to a calibrated reference meter with ability to read 1mA ac. Use a series resistance or capacitance to allow for precise resolution when calibrating. Be sure to connect the low side of the reference current meter to **LOAD RETURN** and place the **RETURN MODE** switch in **GUARD** position.
16. Raise the output to one half scale on the unit meter. Adjust R4 as required.
17. Check calibration at full scale. If the customer facility calibration certification requires more points of reference, follow those procedures instead of these.
18. Calibration must then be verified with the panel in the horizontal operating position to check for any meter balance affect on the calibration.
19. Check other ranges to verify accuracy. 1% range resistors should not require any adjustment on higher ranges. The output current can only be run to full output current with a capacitive load. Resistive loads are limited to about 1/2 rated current.

Miscellaneous

Oil Insulated High Voltage Tanks

The oil-filled tanks in all the PFT SERIES of hipots are field serviceable. The only requirement is that the tank must be oil filled under vacuum at re-assembly if left out of the oil for longer than 3 hours. The parts to service the tank are available from HIGH VOLTAGE, INC. at the address noted on the inside front cover of this manual.

The oil level in the tank should be .5 inches from the lid when the oil temperature is 20°C.

Packing the Cables

The output cable will easily fit into the cable storage area next to the control panel. Care should be used to avoid damaging the output cable jacket when coiling into the compartment. As the final step, the ground and return leads will coil neatly inside the output cable coil.

RETURNED MATERIAL

If for any reason it becomes necessary to return any equipment or materials to High Voltage, Inc., the Service Department of High Voltage, Inc. must be notified, and authorization received, prior to the shipment of the equipment. When notified, the following information must be provided:

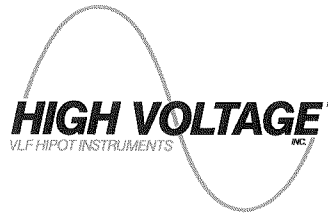
MODEL:
SERIAL NO:
PART NO:
REASON FOR RETURN:
SUSPECTED DEFECT:
CAUSE OF DEFECT:

With the above information provided, High Voltage, Inc. will determine if the return of the equipment is appropriate. If deemed appropriate, a Return Authorization Number will be issued. At that time, the Purchaser will be instructed how to mark and return the equipment.

The above procedure must be adhered to in order to ensure prompt service. No equipment should be returned without the prior knowledge and authorization of High Voltage, Inc.

REPLACEMENT PARTS ORDERING

To order replacement parts, first refer to the Parts List for the product in question. Every part is issued a part number. It is necessary for this part number and the product model and serial number to be provided. When calling High Voltage, Inc. request the Service Department.



LIMITED WARRANTY; LIMITED RESPONSIBILITY FOR DAMAGES

High Voltage, Inc. ("High Voltage") warrants to the original purchaser of any new product, purchased from High Voltage, that the product is free from defects in material and workmanship under normal use and service for a period of one year from the date of shipment to the original purchaser by High Voltage.

This warranty is valid only for normal use of the product. Any use outside High Voltage's written operation instructions will void this warranty. In addition, any one of the following events will void this warranty: (a) any defects due to negligence, alteration, modification, accidental or intended physical abuse, faulty installation, and/or misuse: (b) attempted or actual dismantling, service or repair by any person or firm not authorized in writing by High Voltage: (c) defects caused due to handling or transit, either by carrier or purchaser.

This warranty only covers those parts deemed defective by High Voltage. The liability of High Voltage is limited to only the repair, replacement with new or reconditioned parts, or issuance of credit for those parts deemed defective within the scope of this warranty. Any additional costs incurred by the purchaser for labor and/or materials incidental to the inspection, repair, replacement or issuance of credit for product or materials under warranty is the sole responsibility of the purchaser. This warranty applies solely to products manufactured by High Voltage. It does not apply to parts, accessories, or materials not manufactured by High Voltage, or to consumables. If purchaser's claim relates to materials manufactured by a supplier to High Voltage, High Voltage reserves the right to disclaim responsibility and liability and may require the purchaser to deal directly with the other manufacturer of the defective part. High Voltage may elect to assist the purchaser in settling such claim against such other manufacturer without prejudicing High Voltage's position as to its own liability.

WARRANTY CLAIM PROCEDURE

Compliance with the following Warranty Claim Procedure is a condition precedent to the obligation of High Voltage under this warranty:

- a) Purchaser must notify High Voltage as soon as is reasonably possible of any alleged defect in material, workmanship, or operation of any product covered under this warranty, provided that any notification must be received by High Voltage within twelve months after the shipment date of the product in question. Such notice must describe in detail the defect, any and all defective parts, and the alleged cause of the defect.

- b) At the exclusive option of High Voltage, purchaser may be directed to dismantle the product at the purchaser's cost and expense and ship the product prepaid to High Voltage Refer to the Returned Material section for instructions regarding the return of any material to High Voltage If High Voltage elects to inspect the product at the purchaser's site, and possibly repair, replace, or ship the defective product to High Voltage's factory, purchaser, at its own cost and expense, shall provide suitable facilities for such work as needed to inspect and evaluate and possibly repair/replace subject product. If inspection discloses that the defect is not one for which High Voltage is liable, that is, is outside the stated terms of this warranty provided by High Voltage, then the purchaser agrees to reimburse High Voltage for all expenses incurred.
- c) Upon receipt of the defective material or product, or following access to the same, High Voltage shall inspect and evaluate the material or product and determine the validity of the purchaser's claim.

The validity of any warranty claim, the purchaser's compliance with this warranty and Warranty Claim Procedure, and the obligation to replace, repair, or issue credit for any product, shall be solely and exclusively determined by High Voltage and any determination shall be final and binding.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED ON THE PART OF HIGH VOLTAGE, INCLUDING THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR USE, AND NON-INFRINGEMENT ARISING FROM ANY BREACH THEREOF AND HIGH VOLTAGE NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON, FIRM, OR CORPORATION TO ASSUME ANY LIABILITY OR OBLIGATION IN CONNECTION WITH THIS WARRANTY ON ITS BEHALF AND PURCHASER ACKNOWLEDGES THAT NO REPRESENTATIONS EXCEPT THOSE MADE HEREIN HAVE BEEN MADE TO PURCHASER. THIS WARRANTY SHALL BE GOVERNED AND CONSTRUED ACCORDING TO THE INTERNAL LAWS OF THE STATE OF NEW YORK.

LIMITATION OF LIABILITY. TO THE MAXIMUM EXTENT PERMITTED UNDER APPLICABLE LAW, AND NOTWITHSTANDING ANYTHING ELSE IN THIS DOCUMENT OR OTHERWISE, INCLUDING THAT HIGH VOLTAGE WAS WARNED THAT DAMAGES WOULD OCCUR OR WERE LIKELY TO OCCUR, HIGH VOLTAGE SHALL NOT BE LIABLE UNDER ANY CONTRACT, NEGLIGENCE, STRICT LIABILITY OR OTHER LEGAL OR EQUITABLE THEORY FOR (A) ANY AMOUNTS IN EXCESS IN THE AMOUNT PAID TO HIGH VOLTAGE FOR THE PARTICULAR PRODUCT OR PART THEREOF WHICH GAVE RISE TO THE APPLICABLE CAUSE OF ACTION, OR CLAIM, OR (B) ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, LOST PROFITS OR LOST DATA, OR (C) COST OF PROCUREMENT OF SUBSTITUTE GOODS, TECHNOLOGY OR SERVICES. HIGH VOLTAGE SHALL HAVE NO LIABILITY FOR ANY FAILURE OR DELAY DUE TO MATTERS BEYOND ITS REASONABLE CONTROL.

Parts List PFT-503CM (120V)

Schematic # PFT-1022S

<u>REF.</u>	<u>QUAN</u>	<u>HVI#</u>	<u>DESCRIPTION</u>
CAB	1	32-033	CABINET, PORTABLE TRANSIT ENCLOSURE. CHARCOAL GRAY.18W x 10D x 14 H ID
D1	1	04-030	DIODE, 1N5408A
D2,3	2	04-025	DIODE, 1N4007A
F1	1	06-043	FUSE, 15A, 250V, ABC-15
	1	06-015	FUSE HOLDER, LITTELFUSE # 342004A
J2	1	07-440	CONNECTOR, BULKHEAD, 2 SOCKET, CINCH #S302AB
J3	1	07-010	CONNECTOR, BULKHEAD, CIRCULAR, PART OF HIGH VOLTAGE TANK
J4	1	07-206	CONNECTOR, BULKHEAD, BNC, AMPHENOL # UG1094A/U
K1	1	11-150	CONTACTOR, 3PDT , 15A, 120 Vac COIL, MAGNECRAFT # W389ACX-14
M1	1	13-136	METER, ANALOG, 100 μ A MOVEMENT, SCALED 0-25/50 AC KILOVOLTS
M2	1	13-151	METER, ANALOG, 100 μ A MOVEMENT, SCALED 0-1.0 AC MILLIAMPERES
MOV1	1	06-207	METAL OXIDE VARISTOR, # V130LA10A
MOV2	1	06-210	METAL OXIDE VARISTOR, # V250LA20A
P1	1	22-505	INPUT POWER CABLE, 16/3, 12 ft.
P2	1	07-442	CONNECTOR, CABLE, 2 CIRCUIT, CINCH# P302CCT
P3	1	07-014	CONNECTOR, CABLE, 7 PIN CIRCULAR, AMPHENOL # 97-3106B-20-15S
PCB-001-PFT5	1	82-258	PRINTED CIRCUIT BOARD, VOLT METER
PCB-034	1	82-274	PRINTED CIRCUIT BOARD, AC OVERLOAD/CURRENT METER
S1	1	10-214	SWITCH, PB, MAINT'D, 250Vac, 15A, DPST, NO , NEON LAMP, MICROSWITCH #AML32FBB4AD
	1	10-250	SWITCH, PB COVER, BLACK, MICROSWITCH # AML52-N10K
S2	1	10-222	SWITCH, PB, MOM., 125 Vac, 15A, SPDT, GRN LED, MICROSWITCH # AML22CBS2AA
S3	1	10-218	SWITCH, PB, MOM., 125 Vac, 15A, SPDT, RED LED, MICROSWITCH # AML22CBC2AA
	2	10-252	SWITCH, PB COVER, BLACK, MICROSWITCH # AML52-C10K
S4	1	10-106	SWITCH, SNAP ACTION, SHORT ARM, OMRON #A-20GV22-B7-K
S5	1	10-514	SWITCH, ROTARY, 6 POL, 2 POS, MOUSER # 10YX062
S6	1	10-510	SWITCH, ROTARY, 4 POL, 3 POS, MOUSER # 10WW043
S7	1	10-402	SWITCH, ROCKER, DPDT, CARLINGSWITCH # 62115929-0-0-V
SG1-3	3	06-205	SPARK GAP, 90V, CP CLARE, CG90L
T1	1	25-108	TRANSFORMER, VARIABLE, SUPERIOR TYPE 116
T2	1	T080	TRANSFORMER, CURRENT, HVI #080
HV TNK	1		TANK, HIGH VOLTAGE 50 kVac , HV # PFT-1006S REV B
PCB-001-PFT5		82-258	VOLT METER PCB
C1	1	03-060	CAPACITOR, ELECTROLYTIC, RADIAL LEADS, 100 μ F, 50 Vdc, MOUSER # 140-XRL50V100
D1	1	04-025	DIODE, 1N4007A
D2	1	04-415	DIODE, FULL WAVE BRIDGE, 1.5A, 1kVdc, MOUSER # 583-RB157
J1	1	07-136	CONNECTOR, HEADER, 8 PIN, .1" SPACING, MOLEX # 22-23-2081
NE1,2	2	15-114	NEON LAMP, #NE2
P1	1	07-120	CONNECTOR, CABLE, 8 PIN, .1" SPACING, MOLEX # 22-01-2087
	8	07-104	CONNECTOR PINS, .1" SPACING, MOLEX # 08-50-0114
PCB	1	14-001	PRINTED CIRCUIT BOARD, HVI # PCB- 001
R1,2	2	01-156	RESISTOR, METAL FILM, 0.25W, 249K, 1%
R3	1	01-094	RESISTOR, METAL FILM, 0.25W, 6.65K, 1%

R4	1	02-018	RESISTOR, POTENTIOMETER, 0.25W, 10K, MOUSER # 569-25PR-10K
R5,6	2	01-310	RESISTOR, CARBON FILM, 1W, 1K, 5%
RY1	1	11-110	RELAY, PCB MOUNT, SPDT, 24 Vdc COIL, P&B # T70L5D131-24
PCB-034			
		82-274	AC OVERLOAD/CURRENT METER
C1	1	03-060	CAPACITOR, ELECTROLYTIC, RADIAL LEADS, 100 μ F, 50 Vdc, MOUSER # 140-XRL50V100
D1,2	2	04-415	DIODE, FULL WAVE BRIDGE, 1.5A, 1kVdc, MOUSER # 583-RB157
D3	1	04-025	DIODE, 1N4007A
J1	1	07-136	CONNECTOR, HEADER, 8 PIN, .1" SPACING, MOLEX # 22-23-2081
J2	1	07-130	CONNECTOR, HEADER, 5 PIN, .1" SPACING, MOLEX # 22-23-2051
NE1	1	15-114	NEON LAMP, #NE2
P1	1	07-120	CONNECTOR, CABLE, 8 PIN, .1" SPACING, MOLEX # 22-01-2087
P2	1	07-114	CONNECTOR, CABLE, 5 PIN, .1" SPACING, MOLEX # 22-01-2057
	12	07-104	CONNECTOR, CRIMP PIN, .1" SPACING, MOLEX # 08-05-114
PCB	1	14-034	PRINTED CIRCUIT BOARD, HVI # PCB-034
R1	1	01-054	RESISTOR, METAL FILM, 0.25W, 750 Ω , 1%
R2	1	01-092	RESISTOR, METAL FILM, 0.25W, 5.9K, 1%
R3	2	01-214	RESISTOR, METAL FILM, 0.5W, 133 Ω , 1%
R4,7	2	02-018	RESISTOR, POTENTIOMETER, 0.25W, 10K, MOUSER # 569-25PR-10K
R5	1	01-098	RESISTOR, METAL FILM, 0.25W, 7.68K, 1%
R6	1	01-138	RESISTOR, METAL FILM, 0.25W, 49.9K, 1%
R8,9	2	01-312	RESISTOR, CARBON FILM, 1W, 1.6K OHM, 5%
RY1,2	2	11-140	RELAY, PCB MOUNT, SPDT, 24 Vdc COIL, P&B # T70L5D131-24
MISC.			
	1	23-109	KNOB, SKIRTED, DIAL, MOUSER # 45KN021
	2	23-119	KNOB, SKIRTED, POINTER, ALCO # PKD-70B-1/4
	1	34-316	BRACKET, ZERO START, HVI # BKT-1003D
	1		GROUND LEAD, GROUND, BLACK, 20 FT. WITH CLIP AND BOOT
	1	88-006	SHIELDED RETURN LEAD, 10 FT. RG58/U WITH CONNECTOR AND CLIP
	1	08-891	TERMINAL BLOCK, 5 POS., # 5-141
	1	34-215	U-WRAP, HVI # PFT-1001D, REV F
	1		SCHEMATIC, WIRING, HVI # PFT-1022S REV H
	1	34-118	PANEL, CONTROL, HVI # PFT-1102D REV0.
HV TANK			
	1		PFT-503 HIGH VOLTAGE TANK, SCHEMATIC # PFT-1006S REV B
J1	1	07-010	CONNECTOR, BULKHEAD, CIRCULAR, AMPHENOL # 97-3102E-20-15P
R1	1	01-454	RESISTOR, METAL FILM, 15.5W, 200M, 1%, EBG # SSX124-200M
T1	1	T253	TRANSFORMER, HIGH VOLTAGE, HVI # 253
	1	34-055	TANK AND HEADER ASSEMBLY, HVI # TNK-0060D

SPECIFICATIONS

	PFT-503CM Part No. PFT-1022S
Input	120 V, 15 amps, 50/60Hz, single phase
HV Output	0-50kVac, 1.0KVA resistive load 3KVA capacitive load
Output Termination	20 ft. long shielded cable
Duty	3KVA: 1 hour ON, 1 hour OFF 1.5KVA: continuous
Distortion	<5%
Meter Accuracy	2%
Kilovoltmeter	3.5 inch Scaled 0-25/50kVac (RMS)
Current Meter	3.5 inch Scaled 0-1.0 milliamperes with x1, x10, x100 range multiplier
Case Size	20w x 11.5d x 15.5 high
H.V. TANK	High Voltage Tank Included
Weight	75 lbs. (34kg)

Table 1 *PFT-503CM Specifications.*

Parts List PFT-503CMF (230V)

Schematic # PFT-1026S

<u>REF.</u>	<u>QUAN</u>	<u>HVI#</u>	<u>DESCRIPTION</u>
CAB	1	32-033	CABINET, PORTABLE TRANSIT ENCLOSURE. CHARCOAL GRAY.18W x 10D x 14 H ID
D1	1	04-030	DIODE, IN5408A
D2,3	2	04-025	DIODE, IN4007A
F1	1	06-038	FUSE, 10A, 250V, AGC-10
	1	06-015	FUSE HOLDER, LITTELFUSE # 342004A
J2	1	07-440	CONNECTOR, BULKHEAD, 2 SOCKET, CINCH #S302AB
J3	1	07-010	CONNECTOR, BULKHEAD, CIRCULAR, PART OF HIGH VOLTAGE TANK
J4	1	07-206	CONNECTOR, BULKHEAD, BNC, AMPHENOL # UG1094A/U
K1	1	11-150	CONTACTOR, 3PDT , 15A, 120 Vac COIL, MAGNECRAFT # W389ACX-14
M1	1	13-136	METER, ANALOG, 100 μ A MOVEMENT, SCALED 0-25/50 AC KILOVOLTS
M2	1	13-151	METER, ANALOG, 100 μ A MOVEMENT, SCALED 0-1.0 AC MILLIAMPERES
MOV1,2	2	06-210	METAL OXIDE VARISTOR, # V250LA20A
P1	1	22-422	INPUT POWER CABLE, 16/3, INT'L COLORS.
P2	1	07-442	CONNECTOR, CABLE, 2 CIRCUIT, CINCH# P302CCT
P3	1	07-014	CONNECTOR, CABLE, 7 PIN CIRCULAR, AMPHENOL # 97-3106B-20-15S
PCB-001-PFT5	1		PRINTED CIRCUIT BOARD, VOLT METER
PCB-034	1		PRINTED CIRCUIT BOARD, AC OVERLOAD/CURRENT METER
R1	1	01-332	RESISTOR, CARBON FILM, 2W, 51 Ω , 5%
S1	1	10-214	SWITCH, PB, MAINT'D, 250 Vac, 10A, DPST, NO, NEON LAMP, MICROSWITCH #AML32FBB4AD
	1	10-250	SWITCH, PB COVER, BLACK, MICROSWITCH # AML52-N10K
S2	1	10-222	SWITCH, PB, MOM., 125 Vac, 15A, SPDT, GRN LED, MICROSWITCH # AML22CBS2AA
S3	1	10-218	SWITCH, PB, MOM., 125 Vac, 15A, SPDT, RED LED, MICROSWITCH # AML22CBC2AA
	2	10-252	SWITCH, PB COVER, BLACK, MICROSWITCH # AML52-C10K
S4	1	10-106	SWITCH, SNAP ACTION, SHORT ARM, OMRON #A-20GV22-B7-K
S5	1	10-514	SWITCH, ROTARY, 6 POL, 2 POS, MOUSER # 10YX062
S6	1	10-510	SWITCH, ROTARY, 4 POL, 3 POS, MOUSER # 10WW043
S7	1	10-402	SWITCH, ROCKER, DPDT, CARLINGSWITCH # 62115929-0-0-V
SG1-3	3	06-205	SPARK GAP, 90V, CP CLARE, CG90L
T1	1	25-114	TRANSFORMER, VARIABLE, SUPERIOR TYPE 216
T2	1	T080	TRANSFORMER, CURRENT, HVI #080
HV TNK	1		TANK, HIGH VOLTAGE 50 kVac , HV # PFT-1006S REV B
PCB-001-PFT5			VOLT METER PCB
C1	1	03-060	CAPACITOR, ELECTROLYTIC, RADIAL LEADS, 100 μ F, 50 Vdc, MOUSER # 140-XRL50V100
D1	1	04-025	DIODE, IN4007A
D2	1	04-415	DIODE, FULL WAVE BRIDGE, 1.5A, 1kVdc, MOUSER # 583-RB157
J1	1	07-136	CONNECTOR, HEADER, 8 PIN, .1" SPACING, MOLEX # 22-23-2081
NE1,2	2	15-114	NEON LAMP, #NE2
P1	1	07-120	CONNECTOR, CABLE, 8 PIN, .1" SPACING, MOLEX # 22-01-2087
	8	07-104	CONNECTOR PINS, .1" SPACING, MOLEX # 08-50-0114
PCB	1	14-001	PRINTED CIRCUIT BOARD, HVI # PCB- 001
R1,2	2	01-156	RESISTOR, METAL FILM, 0.25W, 249K, 1%
R3	1	01-094	RESISTOR, METAL FILM, 0.25W, 6.65K, 1%
R4	1	02-108	RESISTOR, POTENTIOMETER, 0.25W, 10K, MOUSER # 569-25PR-10K
R5,6	2	01-310	RESISTOR, CARBON FILM, 1W, 1K, 5%

RY1	1	11-110	RELAY, PCB MOUNT, SPDT, 24 Vdc COIL, P&B # T70L5D131-24
PCB-034		AC OVERLOAD/CURRENT METER	
C1	1	03-060	CAPACITOR, ELECTROLYTIC, RADIAL LEADS, 100 μ F, 50 Vdc, MOUSER # 140-XRL50V100
D1,2	2	04-415	DIODE, FULL WAVE BRIDGE, 1.5A, 1kVdc, MOUSER # 583-RB157
D3	1	04-025	DIODE, 1N4007A
J1	1	07-136	CONNECTOR, HEADER, 8 PIN, .1" SPACING, MOLEX # 22-23-2081
J2	1	07-130	CONNECTOR, HEADER, 5 PIN, .1" SPACING, MOLEX # 22-23-2051
NE1	1	15-114	NEON LAMP, #NE2
P1	1	07-120	CONNECTOR, CABLE, 8 PIN, .1" SPACING, MOLEX # 22-01-2087
P2	1	07-114	CONNECTOR, CABLE, 5 PIN, .1" SPACING, MOLEX # 22-01-2057
	12	07-104	CONNECTOR, CRIMP PIN, .1" SPACING, MOLEX # 08-05-114
PCB	1	14-034	PRINTED CIRCUIT BOARD, HVI # PCB-034
R1	1	01-054	RESISTOR, METAL FILM, 0.25W, 750 Ω , 1%
R2	1	01-092	RESISTOR, METAL FILM, 0.25W, 5.9K, 1%
R3	2	01-214	RESISTOR, METAL FILM, 0.5W, 133 Ω , 1%
R4,7	2	02-018	RESISTOR, POTENTIOMETER, 0.25W, 10K, MOUSER # 569-25PR-10K
R5	1	01-098	RESISTOR, METAL FILM, 0.25W, 7.68K, 1%
R6	1	01-138	RESISTOR, METAL FILM, 0.25W, 49.9K, 1%
R8,9	2	01-312	RESISTOR, CARBON FILM, 1W, 1.6K OHM, 5%
RY1,2	2	11-140	RELAY, PCB MOUNT, SPDT, 24 Vdc COIL, P&B # T70L5D131-24
MISC.			
	1	23-109	KNOB, SKIRTED, DIAL, MOUSER # 45KN021
	2	23-101	KNOB, SKIRTED, POINTER, ALCO # PKD-70B-1/4
	1	34-316	BRACKET, ZERO START, HVI # BKT-1003D
	1		GROUND LEAD, GROUND, BLACK, 20 FT. WITH CLIP AND BOOT
	1	88-002	SHIELDED RETURN LEAD, 20 FT. RG58/U WITH CONNECTOR AND CLIP
	1	34-215	U-WRAP, HVI # PFT-1001D, REV F
	1		SCHEMATIC, WIRING, HVI # PFT-1026S REV G
	1		PANEL, CONTROL, HVI # PFT-1102D REV0.
HV TANK			
	1		PFT-503 HIGH VOLTAGE TANK, SCHEMATIC # PFT-1006S REV B
J1	1	07-010	CONNECTOR, BULKHEAD, CIRCULAR, AMPHENOL # 97-3102E-20-15P
R1	1	01-454	RESISTOR, METAL FILM, 15.5W, 200M, 1%, EBG # SSX124-200M
T1	1	T253	TRANSFORMER, HIGH VOLTAGE, HVI # 253
	20 ft.		CABLE, SHIELDED, X-RAY WITH FITTINGS
	1	34-055	TANK AND HEADER ASSEMBLY, HVI # TNK-0060D

SPECIFICATIONS

	PFT-503CMF Part No. PFT-1026S
Input	230 V, 10 amps, 50/60Hz, single phase
HV Output	0-50kVac, 1.0KVA resistive load 3KVA capacitive load
Output Termination	20 ft. long shielded cable
Duty	3KVA: 1 hour ON, 1 hour OFF 1.5KVA: continuous
Distortion	<5%
Meter Accuracy	2%
Kilovoltmeter	3.5 inch Scaled 0-25/50kVac (RMS)
Current Meter	3.5 inch Scaled 0-1.0 milliamperes with x1, x10, x100 range multiplier
Case Size	19w x 11d x 15.5 high
H.V. TANK	High Voltage Tank Included
Weight	70 lbs. (32kg)

Table 1 *PFT-503CMF Specifications.*