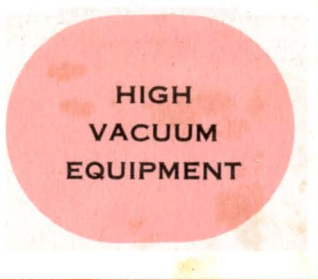




HUGHES AIRCRAFT COMPANY

VACUUM TUBE PRODUCTS DIVISION



OPERATES IN ANY POSITION
 FOR GLASS OR METAL VACUUM SYSTEMS
 WIDE PRESSURE RANGE – 10⁻⁸ to 1 MICRON
 EXTRA HEAVY FILAMENT FOR LONG SERVICE LIFE

VTP
 5
 0
 7

DESCRIPTION

The VTP-507 Ionization Gauge Tube is an all-glass unit designed for rugged, continuous duty in vacuum measuring circuits. It may be directly attached to a glass vacuum system or coupled to a metal system by suitable portcouples.

The gauge's envelope is of Nonex glass and has been formed with a large tubulation to minimize impedance to flow of gas. Internally the gauge uses an extra-heavy tungsten filament, center tapped for maximum operating life. The grid surrounding the filament is spaced to allow operation of the VTP-507 in any position. Internal shielding is also provided to prevent any leakage caused by evaporation of the filament.

The VTP-507 Ionization Gauge Tube has been engineered and constructed by the Vacuum Tube Products Division to provide maximum reliability and accurate reproduction of vacuum measurement. Its sensitivity is linear at 100 microamps per micron of Hg, and the tube can be operated at pressures up to 1 micron in non-corrosive gases. Outgassing can be quickly accomplished by either switching the filament power supply to the grid or by passing an induction coil around the tube itself.



ELECTRICAL SPECIFICATIONS*

| | |
|---|---|
| Filament voltage | 5 volts A.C. |
| Filament current | 5 amperes |
| Grid voltage | 150 volts |
| Grid current | 5 ma. |
| Grid power (Dissipation for outgassing) | .25 watts |
| Collector voltage | -20 volts |
| Collector current | Varies directly with gas pressure and with grid current |
| Sensitivity (for dry air at typical operating conditions) | 100 μ a/micron |
| Maximum operating pressure Air (or other corrosive gases) | 1 micron |
| Noble gases or hydrogen | 2 atmospheres |

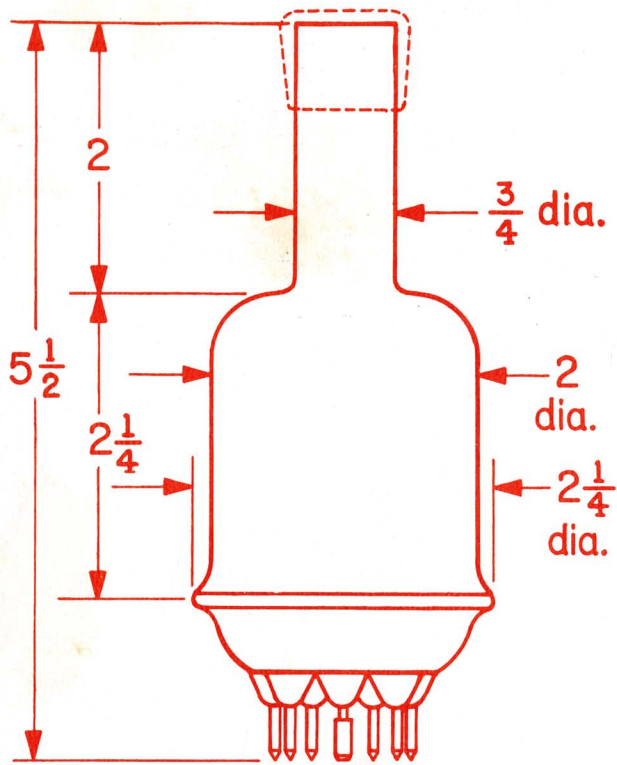
* typical operation

MECHANICAL SPECIFICATIONS

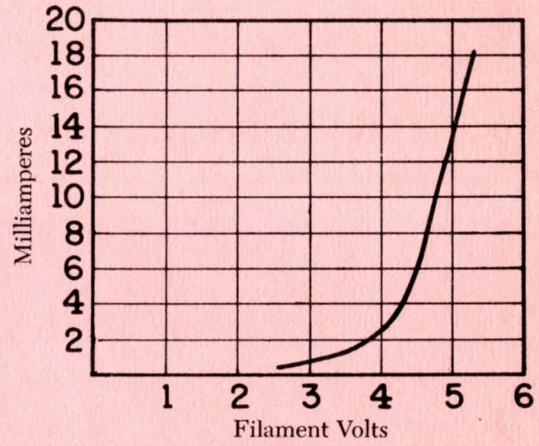
| | |
|--|---|
| Envelope material | Nonex 7720 glass |
| Envelope length | 4" overall |
| Tubulation length | .2" |
| Tubulation diameters | 3/4" OD, 1/16" ID |
| Base diameter | 2 1/4" OD |
| Base type | Medium Moulded Flare Septar 7 pin-JETEC E7-2 (fits Johnson socket type 122-247) |
| Filament material | Tungsten |
| Grid material | Tungsten |
| Mounting | Glass seal or portcouple |
| Mounting position | Any |
| Grid Outgassing – Apply 5 volts at approximately 5 amperes between grid connection (pins 5 and 6) until pressure reading is stable | |

OUTLINE DIMENSIONS

in inches

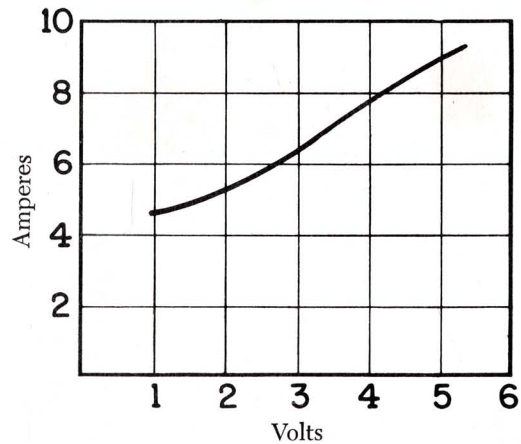


TYPICAL OPERATING CURVE



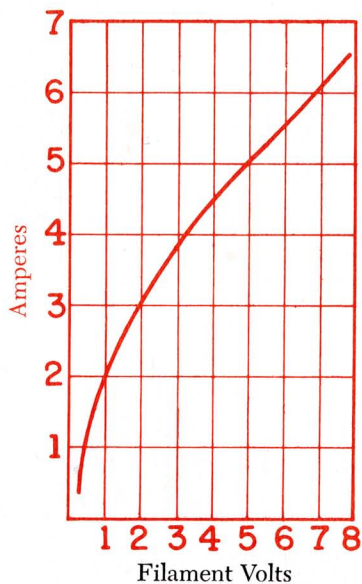
EMISSION CURRENT

OUTGASSING CURVE



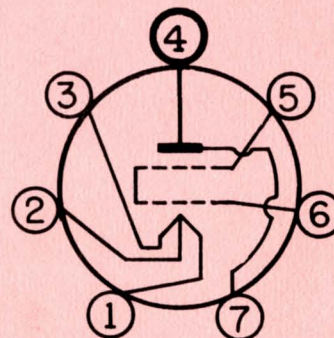
GRID OUTGAS CURRENT

TYPICAL OPERATING CURVE



HEATER CURRENT

BASING VIEW-BOTTOM



- | | |
|--------------|---------------|
| 1 - Filament | 4 - Collector |
| 2 - Filament | 5 - Grid |
| Center Tap | 6 - Grid |
| 3 - Filament | 7 - Collector |

V-1/3M/SL/9-60

CREATING A NEW WORLD WITH ELECTRONICS

HUGHES

HUGHES AIRCRAFT COMPANY

For additional information, please write:
 HUGHES AIRCRAFT COMPANY
 VACUUM TUBE PRODUCTS DIVISION
 MARKETING DEPARTMENT
 2020 SHORT STREET, OCEANSIDE, CALIFORNIA
 TELEPHONE SARATOGA 2-2101

HUGHES

HUGHES AIRCRAFT COMPANY

VACUUM TUBE PRODUCTS DIVISIONHIGH
VACUUM
EQUIPMENTION PUMP
POWER SUPPLY
MODEL VPC-100ION PUMP POWER SUPPLY
MODEL VPC-100

-DESCRIPTION-

The Hughes VPC-100 has been designed for compatible use with the Hughes Model VP-5 high vacuum ion pump.

The VPC-100 is completely self contained in an attractive portable cabinet housing all circuitry and controls necessary for pumping to pressures of 1×10^{-9} mm Hg. or less. System pressure may be read accurately concurrent with pumping. Controls located on the face of the unit include:

A large easy-to-read meter with calibrations indicating both voltage applied to the ion pump and pressure in mm of Hg.

A meter function switch - selects voltage or pressure indications.

A pressure, multiplier switch - selects pressure ranges from 10^{-4} to 10^{-9} . A "meter off" position is also provided.

A zero adjustment knob.

Off-on power switch with indicator light.

Separate high voltage off-on switch with indicator light.

Of special note in this control is the incorporation of a vacuum tube voltmeter in the metering circuit. This feature prevents meter burn-out due to accidental short circuits or sudden increases in pressure while operating in sensitive ranges.

-CONNECTIONS-

The VPC-100 is supplied complete with four feet of shielded cable fitted for connection to the Hughes ion pump.

A standard plug with ground lug or pin is supplied on the six foot AC power supply cord.

Precautionary measures normal with any high voltage equipment are recommended.

-SPECIFICATIONS-

| | |
|---------------------|---|
| Dimensions | 14" W x 8 1/2" H x 8 1/2" D |
| Weight | 26 lbs. net |
| Input | 110/120 volts, 50-60 cps, 1 phase |
| Output | 5000 volts, no load 20 ma short circuit current negative ground |
| Fusing | |
| Meter Circuit | 1 amp |
| High Voltage Supply | 2 amps |

-OPERATION-

1. Turn all switches "OFF".
2. Attach high voltage lead to pump, making sure ground lead is making proper contact. Evacuate system to pressure of 20 microns Hg., preferably 1 micron.
3. Turn power switch ON; allow warm-up of at least three minutes.
 - a. Zero meter.
 - b. Place pressure multiplier switch in OFF position.
4. Turn high voltage switch ON.
5. Advance pressure multiplier switch until meter reads above one.
6. Voltage may be measured by placing meter function switch in "VOLTAGE" position.

-PRICE-

FOB Oceanside, 30 days net \$310.00

For further information, please contact:

HUGHES AIRCRAFT COMPANY
Vacuum Tube Products Division
2020 Short Street
Oceanside, California
Saratoga 2-2101

HUGHES

HUGHES AIRCRAFT COMPANY

VACUUM TUBE PRODUCTS DIVISIONHIGH
VACUUM
EQUIPMENTCOLD CATHODE
DISCHARGE GAUGE
PGC-300

COLD CATHODE DISCHARGE GAUGE CONTROL
MODEL PGC-300

DESCRIPTION

The Hughes PGC-300 is the companion control designed for use with Hughes new Philips gauge tube, Model PG-7.

The PGC-300 provides all controls necessary to facilitate accurate readings of pressures to the area of 10^{-8} mm Hg. The unit is completely self contained in an attractive portable cabinet.¹ Controls conveniently located on the face of the panel include . . .

- *A large, easy-to-read meter with calibrations indicating pressure in mm of Hg. A separate scale having non linear calibration is used for readings in the range 10^{-4} mm Hg. Calibration of the scale used for all other decades is linear.
- *A pressure multiplier, switch for selecting pressure multiples of 10^{-4} , 10^{-5} , 10^{-6} , 10^{-7} , 10^{-8} , or turning the meter off.
- *Zero adjustment control.
- *Calibration adjustment.
- *Off-on switch.

CONNECTIONS

The PGC-300 is supplied complete with four feet of shielded high voltage cable fitted for connection to the Hughes PG-7 ionization gauge tube. The tube terminal connection has been specially designed to insure the inherent accuracy available from the PG-7 gauge tube.

A standard plug with ground lug or pin is supplied on the six foot AC power supply cord.

Two pin jacks are provided on the rear of the chassis to facilitate calibration of the control unit reference voltage. With proper circuitry the jacks may be used as recorder output terminals.

Precautionary measures normal with any high voltage equipment are recommended.

¹ Also available as a panel mounted unit. Specify PGC-300-R.

SPECIFICATIONS

| | |
|---------------------|-----------------------------------|
| Dimensions | 11" W x 7" H x 8 1/2" D |
| Weight | 18 lbs. net |
| Input | 110/120 volts, 50-60 cps. 1 phase |
| Output | 2500 volts @ 5 ma |
| Fusing | |
| High Voltage Supply | 3 amps |
| VTVM Circuit | 1 amp |

OPERATION

1. Turn line switch "OFF".
2. Attach high voltage lead to gauge tube, making sure ground lead makes proper contact.
 - a. Plug high voltage lead into rear of PGC-300 chassis.
 - b. Plug power cord into 117V AC, 50-60 cycle outlet.
3. Turn line switch "ON". Allow minimum warm-up of three (3) minutes. Zero meter, then calibrate to full scale position.
4. Turn pressure multiple switch to 10^{-4} position. (No damage to gauge tube will result from operation at atmospheric pressure.)
5. When meter indicates 1×10^{-4} position, advance range switch to 10^{-5} position. For remainder of ranges read linear scale, advancing switch to next decade when meter reads less than one in any given range.

For further information, please contact:

HUGHES AIRCRAFT COMPANY
Vacuum Tube Products Division
2020 Short Street
Oceanside, California
SARatoga 2-2101

HUGHES

HUGHES AIRCRAFT COMPANY

HIGH
VACUUM
EQUIPMENTPRICE LIST
OCTOBER 1, 1960**VACUUM TUBE PRODUCTS DIVISION**

VACUUM GAUGE TUBES

| <u>Number</u> | <u>Description</u> | <u>Price</u> |
|--------------------|---|--------------|
| Thermocouple Type: | | |
| 6343 | Fast response, metal | \$ 12.50 |
| 7822 | Medium response, metal | 11.00 |
| 6416 | Ruggedized, metal | 9.50 |
| Cold Cathode Type: | | |
| PG-7 | Demountable, metal | 75.00 |
| | With mating flanges | 87.50 |
| Ionization Type: | | |
| 6578 | Three filament, metal, flanged | 65.00 |
| 7169 | Three filament, nonex glass | 30.00 |
| VG1A | Pyrex glass, 1/2" tubulation | 21.75 |
| | With Jones plug, 4 prong or 6 prong (specify) | 24.00 |
| VG1B | Pyrex glass, 3/4" tubulation | 21.75 |
| | With Jones plug, 4 prong or 6 prong (specify) | 24.00 |
| 507 | Nonex glass, 3/4" tubulation | 24.00 |
| Ion Pump: | | |
| VP-5 | Metal or glass tubulation (specify) | 97.50 |
| | With mating flanges | 110.00 |
| | (Prices include magnets) | |

*Prices are for quantities of 1 - 9 units

*Terms FOB Oceanside, Net 30 days

For further information and quantity prices, contact:

HUGHES AIRCRAFT COMPANY
 Vacuum Tube Products Division
 2020 Short Street
 Oceanside, California
 SARatoga 2-2101

Effective: October 1, 1960

VACUUM GAUGE CONTROLS

| Number | Description | | | Price |
|------------------------|------------------------------|----------|-------|----------|
| Thermocouple type: | Scales | Stations | Tube | |
| TGC-100 | 1 | 1 | 6343 | \$100.00 |
| TGC-102 | 1 | 1 | 7822 | 100.00 |
| TGC-104 | 1 | 1 | 6416 | 100.00 |
| TGC-106 | 1 | 1 | 6343 | 75.00 |
| (Battery operated) | | | | |
| TGC-200 | 2 | 1 | 6343 | 135.00 |
| TGC-201 | 2 | 4 | 6343 | 150.00 |
| TGC-202 | 2 | 1 | 7822 | 135.00 |
| TGC-203 | 2 | 4 | 7822 | 150.00 |
| TGC-204 | 2 | 1 | 6416 | 135.00 |
| TGC-205 | 2 | 4 | 6416 | 150.00 |
| Cold Cathode Type: | | | | |
| PGC-200 | 3 | 1 | PG-7 | 190.00 |
| PGC-300 | 5 | 1 | PG-7 | 225.00 |
| Ionization Type: | | | | |
| IGC-200 | 2 | 1 | VG-1A | 300.00 |
| Ion Pump Power Supply: | | | | |
| VPC-100 | For VP-5 pump, includes VTVM | | | 310.00 |
| VPC-101 | For VP-5 pump, without VTVM | | | 235.00 |

*Contact meters available only on special order

*Add "-R" to model number for rack mounts (no increase in price for standard rack mounts)

*Combination units available on special order;
i. e. , PGC-200 & TGC-201 combined (price is combined price plus 10%)

*Prices DO NOT include tubes or pumps

*Terms FOB Oceanside, Net 30 days

*Prices are for quantities of 1-4 units

For further information, please contact:

HUGHES AIRCRAFT COMPANY
Vacuum Tube Products Division
2020 Short Street
Oceanside, California
SARatoga 2-2101