VARIAN

vacuum technologies

MultiVac Controller

MANUALE ISTRUZIONI

BEDIENUNGSHANDBUCH

NOTICE DE MODE D'EMPLOI

INSTRUCTION MANUAL

Base Unit

Model 929-4000
Model 929-4001
Model 929-4010
Model 929-4011

High Voltage Card

Model 929-4025
Model 929-4035
Model 929-4040
Model 929-4050

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VARIAN

DICHIARAZIONE DI CONFORMITA'

Varian S.p.A. dichiara sotto la propria responsabilità che gli alimentatori per pompe da vuoto sputter-ioniche delle serie: 9290022, 9290023, 9290190, 9290191, 9290196, 9290197, 9290200, 9290201, 9290290, 9290291, 9290300, 9290301, 9212001, 9294040, 9294050, 9294100, 9294110, 9295000, 9295001, 9295002, 9295003, 9295004, 9295005, 9295006, 9295007, 9296000, 9296001, 9296002, 9296003, 9296004, 9296005, 9296006, 9296007, 9296008, 9296009, 9296010, 9296011, 9296012, 9296013, 9296014, 9296015, rispettano i requisiti indicati dalla direttiva compatibilità elettromagnetica 89/336/CEE e dalla direttiva bassa tensione 73/023/CEE. Si garantisce la conformità dei prodotti sopracitati alle seguenti norme:

EN-CENELEC 55011	Classe A gruppo 1 Limiti e metodi di misura delle caratteristiche di radiodisturbo degli apparecchi industriali.
IEC 1000-4-2 (ex 801-2)	Compatibilità elettromagnetica delle misure in processi industriali. Parte 2: requisiti delle scariche elettrostatiche
IEC 1000-4-3 (ex 801-3)	Compatibilità elettromagnetica delle misure in processi industriali. Parte 3: requisiti dei campi elettromagnetici irradiati.
IEC 1000-4-4 (ex 801-4)	Compatibilità elettromagnetica delle misure in processi industriali. Parte 4: requisiti dei transitori elettrici di breve durata/a guizzo.
EN 61010-1	Prescrizioni di sicurezza per apparecchi elettrici di misura, controllo e per utilizzo in laboratorio. Parte 1: Prescrizioni generali.

KONFORMITÄTSERKLÄRUNG

Die Firma Varian S.p.A. erklärt unter eigener Haftung, daß die Speisegeräte für Sputter-Ionenpumpen der Serien 9290022, 9290023, 9290190, 9290191, 9290196, 9290197, 9290200, 9290201, 9290290, 9290291, 9290300, 9290301, 9212001, 9294040, 9294050, 9294100, 9294110, 9295000, 9295001, 9295002, 9295003, 9295004, 9295005, 9295006, 9295007, 9296000, 9296001, 9296002, 9296003, 9296004, 9296005, 9296006, 9296007, 9296008, 9296009, 9296010, 9296011, 9296012, 9296013, 9296014, 9296015, den Anforderungen der Richtlinie für elektromagnetische Kompatibilität 89/336/EWG und der Richtlinie für Niederspannung 73/023/EWG entsprechen. Es wird die Übereinstimmung der oben genannten Produkte mit den folgenden Normen garantiert:

EN-CENELEC 55011	Klasse A Gruppe 1 Einschränkungen und Meßmethoden der Funkstörungsmerkmale von industriellen Geräten.
IEC 1000-4-2 (ex 801-2)	Elektromagnetische Kompatibilität der Messungen bei industriellen Prozessen. Teil 2: Anforderungen zu elektrostatischen Abladungen
IEC 1000-4-3 (ex 801-3)	Elektromagnetische Kompatibilität der Messungen bei industriellen Prozessen. Teil 3: Anforderungen zu elektromagnetisch bestrahlten Feldern.
IEC 1000-4-4 (ex 801-4)	Elektromagnetische Kompatibilität der Messungen bei industriellen Prozessen. Teil 4: Anforderungen zu Kurzzeit-/Spitzenströmen.
EN 61010-1	Sicherheitsvorschriften für elektrische Meß- und Kontrollgeräte sowie für Geräte für den Laborgebrauch. Teil 1: Allgemeine Vorschriften.

DECLARATION DE CONFORMITE

Varian S.p.A. déclare, sous sa propre responsabilité, que les alimentations pour pompes à vide sputter-ioniques des séries 9290022, 9290023, 9290190, 9290191, 9290196, 9290197, 9290200, 9290201, 9290290, 9290291, 9290300, 9290301, 9212001, 9294040, 9294050, 9294100, 9294110, 9295000, 9295001, 9295002, 9295003, 9295004, 9295005, 9295006, 9295007, 9296000, 9296001, 9296002, 9296003, 9296004, 9296005, 9296006, 9296007, 9296008, 9296009, 9296010, 9296011, 9296012, 9296013, 9296014, 9296015, respectent les conditions requises par la directive concernant la compatibilité électromagnétique 89/336/CEE et par la directive basse tension 73/023/CEE. On garantit que les produits indiqués ci-dessous sont conformes aux normes suivantes:

EN-CENELEC 55011	Classe A groupe 1 Limites et méthodes de mesure des caractéristiques d'interférence des appareils industriels.
IEC 1000-4-2 (ex 801-02)	Compatibilité électromagnétique des mesures dans des processus industriels. Partie 2: conditions requises des décharges électrostatiques.
IEC 1000-4-3 (ex 801-03)	Compatibilité électromagnétique des mesures dans des processus industriels. Partie 3: requises des champs électromagnétiques irradiés.
IEC 1000-4-3 (ex 801-03)	Compatibilité électromagnétique des mesures dans des processus industriels. Partie 4: conditions requises des transitoires électriques rapides/à éclatement.
EN 61010-1	Prescriptions de sécurité des appareils électriques de mesure, de contrôle et pour utilisation en laboratoire. 1ère partie: Prescriptions générales

DECLARACIÓN DE CONFORMIDAD

Varian S.p.A. declara bajo su responsabilidad que los alimentadores para bombas de vacío sputter-iónicas de las series: 9290022, 9290023, 9290190, 9290191, 9290196, 9290197, 9290200, 9290201, 9290290, 9290291, 9290300, 9290301, 9212001, 9294040, 9294050, 9294100, 9294110, 9295000, 9295001, 9295002, 9295003, 9295004, 9295005, 9295006, 9295007, 9296000, 9296001, 9296002, 9296003, 9296004, 9296005, 9296006, 9296007, 9296008, 9296009, 9296010, 9296011, 9296012, 9296013, 9296014, 9296015, respetan los requisitos indicados por la directiva sobre la compatibilidad electromagnética 89/336/CEE CEE y por la norma de baja tensión 73/023/CEE. Se garantiza la conformidad de los productos anteriormente citados con las normas siguientes:

EN-CENELEC 55011	Clase A grupo 1 Límites y métodos de medición de las características de radioperturbación de los aparatos industriales.
IEC 1000-4-2 (ex 801-2)	Compatibilidad electromagnética de las mediciones en procesos industriales. Parte 2: requisitos de las descargas electrostáticas.
IEC 1000-4-3 (ex 801-3)	Compatibilidad electromagnética de las mediciones en procesos industriales. Parte 3: requisitos de los campos electromagnéticos irradiados.
IEC 1000-4-4 (ex 801-4)	Compatibilidad electromagnética de las mediciones en procesos industriales. Parte 4: requisitos de los transitorios eléctricos de poca duración/de salto.
EN 61010-1	Prescripciones de seguridad para equipos eléctricos de medición, control y para uso en laboratorio. Parte 1: Prescripciones generales.

DECLARAÇÃO DE CONFORMIDADE

A Varian S.p.A. declara, sob sua responsabilidade, que os alimentadores para bombas de vácuo sputter-iónicas das séries 9290022, 9290023, 9290190, 9290191, 9290196, 9290197, 9290200, 9290201, 9290290, 9290291, 9290300, 9290301, 9212001, 9294040, 9294050, 9294100, 9294110, 9295000, 9295001, 9295002, 9295003, 9295004, 9295005, 9295006, 9295007, 9296000, 9296001, 9296002, 9296003, 9296004, 9296005, 9296006, 9296007, 9296008, 9296009, 9296010, 9296011, 9296012, 9296013, 9296014, 9296015, respeitam os requisitos indicados pela directriz de compatibilidade electromagnética 89/336/EEC e pela directriz de baixa tensão 73/023/CEE. Garante-se a conformidade dos produtos citados acima com as seguintes normas:

EN-CENELEC 55011	Classe A grupo 1 Limites e métodos de medição das características de interferência na rádio-recepção dos aparelhos industriais.
IEC 1000-4-2 (ex 801-2)	Compatibilidade electromagnética das medidas em processos industriais. Parte 2: requisitos das descargas electrostáticas.
IEC 1000-4-3 (ex 801-3)	Compatibilidade electromagnética das medidas em processos industriais. Parte 3: requisitos dos campos electromagnéticos irradiados.
IEC 1000-4-4 (ex 801-4)	Compatibilidade electromagnética das medidas em processos industriais. Parte 4: requisitos dos transistores eléctricos de breve duração/por deslize.
EN 61010-1	Prescrições de segurança para aparelhos eléctricos de medição, controlo e para a utilização em laboratório. Parte 1: Prescrições gerais

CONFORMITEITSVERKLARING

Varian S.p.A. verklaart onder eigen verantwoordelijkheid dat de voedingsinrichtingen voor verstuivingsionenvacuümpompen en vacuümpompen van de series 9290022, 9290023, 9290190, 9290191, 9290196, 9290197, 9290200, 9290201, 9290290, 9290291, 9290300, 9290301, 9212001, 9294040, 9294050, 9294100, 9294110, 9295000, 9295001, 9295002, 9295003, 9295004, 9295005, 9295006, 9295007, 9296000, 9296001, 9296002, 9296003, 9296004, 9296005, 9296006, 9296007, 9296008, 9296009, 9296010, 9296011, 9296012, 9296013, 9296014, 9296015, aan de veiligheidseisen aangegeven in de richtlijn elektrische compatibiliteit 89/336/EEG en de richtlijn laagspanning 73/023/EEG voldoen. Men garandeert de conformiteit van bovengenoemde produkten aan de volgende normen:

EN-CENELEC 55011	Klasse A groep 1 Grenswaarden en meetmethodes van radiostoringskenmerken van industriële apparatuur.
IEC 1000-4-2 (ex 801-2)	Elektromagnetische compatibiliteit voor metingen van industriële processen. Deel 2: Eisen voor elektrostatische ontladingen.
IEC 1000-4-3 (ex 801-3)	Elektromagnetische compatibiliteit voor metingen van industriële processen. Deel 3: Eisen voor uitgestraalde elektromagnetische velden.
IEC 10004-4 (ex 801-4)	Elektromagnetische compatibiliteit voor metingen van industriële processen. Deel 4: Eisen voor snelle elektrische transiënten/bursts.
EN 61010-1	Veiligheidsvoorschriften voor elektrische meet- en regelapparatuur en voor gebruik in laboratoria. Deel 1: Algemene voorschriften.

OVERENSSTEMMELSESERKLÆRING

Varian S.p.A erklærer på eget ansvar, at strømkilderne til vakuumpumper ved ionpulverisering og vakuumpumper i serien 9290022, 9290023, 9290190, 9290191, 9290196, 9290197, 9290200, 9290201, 9290290, 9290291, 9290300, 9290301, 9212001, 9294040, 9294050, 9294100, 9294110, 9295000, 9295001, 9295002, 9295003, 9295004, 9295005, 9295006, 9295007, 9296000, 9296001, 9296002, 9296003, 9296004, 9296005, 9296006, 9296007, 9296008, 9296009, 9296010, 9296011, 9296012, 9296013, 9296014, 9296015, opfylder de krav, der er opstillet i direktivet vedr. elektromagnetisk kompatibilitet 89/336/EØF og lavspændingsdirektivet 73/023/EØF. Producenten forsikrer, at ovenstående produkter er i overensstemmelse med følgende normer:

EN-CENELEC 55011	Klasse A, gruppe 1 Begrænsninger for og metoder til måling af radiostøj ved industriudstyr.
IEC 1000-4-2 (tidligere 801-2)	Elektromagnetisk kompatibilitet i forbindelse med måling ved industriprocesser. Del 2: krav til elektrostatiske udladninger.
IEC 1000-4-3 (tidligere 801-3)	Elektromagnetisk kompatibilitet i forbindelse med måling ved industriprocesser. Del 3: krav til udstrålede elektromagnetiske felter.
IEC 1000-4-4 (tidligere 801-4)	Elektromagnetisk kompatibilitet i forbindelse med måling ved industriprocesser. Del 4: krav til spændingsspidser.
EN 61010-1	Sikkerhedsforskrifter vedr. elektrisk måle-, kontrol- og laboratorieudstyr. Del 1: Generelle forskrifter.

OVERENSSTEMMELSESERKLÆRING

Varian S.p.A erklærer under eget ansvar at strømkildene til vakuumpumper ved avskyting og vakuumpumper i serien 9290022, 9290023, 9290190, 9290191, 9290196, 9290197, 9290200, 9290201, 9290290, 9290291, 9290300, 9290301, 9212001, 9294040, 9294050, 9294100, 9294110, 9295000, 9295001, 9295002, 9295003, 9295004, 9295005, 9295006, 9295007, 9296000, 9296001, 9296002, 9296003, 9296004, 9296005, 9296006, 9296007, 9296008, 9296009, 9296010, 9296011, 9296012, 9296013, 9296014, 9296015, oppfyller kravene i direktivet vedr. elektromagnetisk kompatibilitet 89/336/EØF og lavspenningsdirektivet 73/023/EØF. Produsenten forsikrer at ovenstående produkter er i overensstemmelse med følgende normer:

EN-CENELEC 55011	Klasse A, gruppe 1 Begrensinger og metoder for måling av radiostøy ved industriutstyr.
IEC 1000-4-2 (tidligere 801-2)	Elektromagnetisk kompatibilitet i forbindelse med måling ved industriprosesser. Del 2: krav til elektrostatiske nedladinger.
IEC 1000-4-3 (tidligere 801-3)	Elektromagnetisk kompatibilitet i forbindelse med måling ved industriprosesser. Del 3: krav til utstrålte elektromagnetiske felt.
IEC 1000-4-4 (tidligere 801-4)	Elektromagnetisk kompatibilitet i forbindelse med måling ved industriprosesser. Del 4: krav til spenningsspisser
EN 61010-1	Sikkerhetsforskrifter vedrørende elektrisk måle-, kontroll- og laboratorieutstyr Del 1: Generelle forskrifter.

FÖRSÄKRAN OM ÖVERENSSTÄMMELSE

Varian S.p.A försäkrar på eget ansvar strömkällorna för vakuumpumpar med förstoftning och vakuumpumpar i serien 9290022, 9290023, 9290190, 9290191, 9290196, 9290197, 9290200, 9290201, 9290290, 9290291, 9290300, 9290301, 9212001, 9294040, 9294050, 9294100, 9294110, 9295000, 9295001, 9295002, 9295003, 9295004, 9295005, 9295006, 9295007, 9296000, 9296001, 9296002, 9296003, 9296004, 9296005, 9296006, 9296007, 9296008, 9296009, 9296010, 9296011, 9296012, 9296013, 9296014, 9296015, uppfyller de krav som omnämns i direktivet om elektromagnetisk kompatibilitet 89/336/EU samt lågspänningsdirektivet 73/023/EU. Tillverkaren garanterar ovan nämnda produkters överensstämmelse med följande normer:

EN-CENELEC 55011	Klass A, grupp 1 Gränser och metoder för mätning av radiostörningar hos industriutrustning.
IEC 1000-4-2 (f.d. 801-2)	Elektromagnetisk kompatibilitet i samband med mätning vid industriprocesser. Del 2: krav på elektrostatiska urladdningar.
IEC 1000-4-3 (f.d. 801-3)	Elektromagnetisk kompatibilitet i samband med mätning vid industriprocesser. Del 3: krav på utstrålade elektromagnetiska fält.
IEC 1000-4-4 (f.d. 801-4)	Elektromagnetisk kompatibilitet i samband med mätning vid industriprocesser. Del 4: krav på spänningsspetsar.
EN 61010-1	Säkerhetsföreskrifter för elektriska mät-, kontroll- och laboratorieinstrument. Del 1: Allmänna föreskrifter.

VAATIMUSTENMUKAISUUSVAKUUTUS

Varian S.p.A vakuuttaa, että sarjan 9290022, 9290023, 9290190, 9290191, 9290196, 9290197, 9290200, 9290201, 9290290, 9290291, 9290300, 9290301, 9212001, 9294040, 9294050, 9294100, 9294110, 9295000, 9295001, 9295002, 9295003, 9295004, 9295005, 9295006, 9295007, 9296000, 9296001, 9296002, 9296003, 9296004, 9296005, 9296006, 9296007, 9296008, 9296009, 9296010, 9296011, 9296012, 9296013, 9296014, 9296015, virtalähteet tyhjiöpumpuille ionipulveroinnilla vastaavat sähkömagneettista yhteensopivuutta koskevan direktiivin 89/336/EY ja pienjännitedirektiivin 73/023/EY vaatimuksia. Valmistaja takaa, että edellämainitut tuotteet ovat seuraavien vaatimusten ja normien mukaisia:

EN-CENELEC 55011	Luokka A, ryhmä 1 Tehdaslaitteiden ilmastohäiriöiden mittausmenetelmät ja -rajoitukset.
IEC 1000-4-2 (entinen 801-2)	Tehdaskäyttöisten mittauksien sähkömagneettisuuden yhteensopivuus. Osa 2: sähköstaattisten purkausten vaatimukset.
IEC 1000-4-3 (entinen 801-3)	Tehdaskäyttöisten mittauksien sähkömagneettisuuden yhteensopivuus. Osa 3: säteilyn sähkömagneettikentän vaatimukset.
IEC 1000-4-4 (entinen 801-4)	Tehdaskäyttöisten mittauksien sähkömagneettisuuden yhteensopivuus. Osa 4: jännitekärkien vaatimukset.
EN 61010-1	Mittaus-, ohjaus- ja laboratoriolaitteiden turvallisuusvaatimukset. Osa 1: Yleiset vaatimukset.

ΔΗΛΩΣΗ ΣΥΜΜΟΡΦΩΣΗΣ

Η εταιρεία **Varian S.p.A.** δηλώνει, αναλαμβάνοντας πλήρη ευθύνη, ότι οι τροφοδότες για αντλίες κενού της σειράς 9290022, 9290023, 9290190, 9290191, 9290196, 9290197, 9290200, 9290201, 9290290, 9290291, 9290300, 9290301, 9212001, 9294040, 9294050, 9294100, 9294110, 9295000, 9295001, 9295002, 9295003, 9295004, 9295005, 9295006, 9295007, 9296000, 9296001, 9296002, 9296003, 9296004, 9296005, 9296006, 9296007, 9296008, 9296009, 9296010, 9296011, 9296012, 9296013, 9296014, 9296015, συμμορφώνονται με τις ουσιαστικές προϋποθέσεις ασφαλείας που αναφέρονται στην Οδηγία ηλεκτρομαγνητικής συμβατικότητας **89/336/CEE**. και στην οδηγία χαμηλής τάσης **73/023/CEE** Εγγυούμαστε τη συμμόρφωση των παραπάνω προϊόντων με τους ακόλουθους κανονισμούς

EN-CENELEC 55011	Κλάση Α ομάδα 1 Όρια και μέθοδοι μέτρησης των χαρακτηριστικών των ραδιοπαρασίτων των βιομηχανικών συσκευών
IEC 1000-4-2 (ex 801-2)	Ηλεκτρομαγνητική συμβατικότητα των μετρήσεων στις βιομηχανικέςδιαδικασίες. Μέρος **2**: προϋποθέσεις των ηλεκτροστατικών εκκενώσεων.
IEC 1000-4-3 (ex 801-3)	Ηλεκτρομαγνητική συμβατικότητα των μετρήσεων στις βιομηχανικές διαδικασίες. Μέρος **3**: προϋποθέσεις των εκπεμπομένων ηλεκτρομαγνητικών πεδίων.
IEC 1000-4-4 (ex 801-4)	Ηλεκτρομαγνητική συμβατικότητα των μετρήσεων στις βιομηχανικές διαδικασίες. Μέρος **4**: προϋποθέσεις των ηλεκτρικών μεταβάσεων μικρής διαρκείας και απότομων
EN 61010-1	Διατάξεις ασφαλείας για ηλεκτρικές συσκευές μέτρησης, ελέγχου και για χρήση σε εργαστήριο. Μέρος 1: Γενικές διατάξεις

CONFORMITY CERTIFICATE

Varian S.p.A. declares under its own responsibility that the series 9290022, 9290023, 9290190, 9290191, 9290196, 9290197, 9290200, 9290201, 9290290, 9290291, 9290300, 9290301, 9212001, 9294040, 9294050, 9294100, 9294110, 9295000, 9295001, 9295002, 9295003, 9295004, 9295005, 9295006, 9295007, 9296000, 9296001, 9296002, 9296003, 9296004, 9296005, 9296006, 9296007, 9296008, 9296009, 9296010, 9296011, 9296012, 9296013, 9296014 and 9296015, sputter-ionic vacuum pump power supplies comply with the requirements of the electromagnetic compatibility Directive 89/336/EEC and by the low voltage Directive 73/023/EEC. It guarantees that the products listed above comply with the following standards:

EN-CENELEC 55011	Class A group 1 Limits and measuring methods for the radio-frequency interference characteristics of industrial equipment.
IEC 1000-4-2 (formerly 801-2)	Electromagnetic compatibility for industrial process measurement. Part 2: Electromagnetic discharge requirements.
IEC 1000-4-3 (formerly 801-3)	Electromagnetic compatibility for industrial process measurement. Part 3: Radiated electromagnetic field requirements.
IEC 1000-4-4 (formerly 801-4)	Electromagnetic compatibility for industrial process measurement. Part 4: Electrical fast transient/burst requirements.
EN 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use. Part 1: general requirements

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20.10.1998

S. Piras

Vice President and General Manager

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INFORMAZIONI GENERALI

Questa apparecchiatura è destinata ad uso professionale. L'utilizzatore deve leggere attentamente il presente manuale di istruzioni ed ogni altra informazione addizionale fornita dalla Varian prima dell'utilizzo dell'apparecchiatura. La Varian si ritiene sollevata da eventuali responsabilità dovute all'inosservanza totale o parziale delle istruzioni, ad uso improprio da parte di personale non addestrato, ad interventi non autorizzati o ad uso contrario alle normative nazionali specifiche.
Nei paragrafi seguenti sono riportate tutte le informazioni necessarie a garantire la sicurezza dell'operatore durante l'utilizzo dell'apparecchiatura. Informazioni dettagliate sono fornite nell'appendice "Technical Informations".
Questo manuale utilizza le seguenti convenzioni:

PERICOLO!

I messaggi di pericolo attirano l'attenzione dell'operatore su una procedura o una pratica specifica che, se non eseguita in modo corretto, potrebbe provocare gravi lesioni personali.

ATTENZIONE!

I messaggi di attenzione sono visualizzati prima di procedure che, se non osservate, potrebbero causare danni all'apparecchiatura.

NOTA

Le note contengono informazioni importanti estrapolate dal testo.

DESCRIZIONE DEL CONTROLLER

Il controller MultiVac della Varian è un controller per le pompe ioniche modulare e flessbile. L'unità può essere preconfigurata in fabbrica a seconda delle necessità del cliente, o le parti possono essere ordinate separatamente e l'utente può aggiungere o cambiare le possibilità del controller semplicemente inserendo o rimuovendo schede opzionali.

La configurazione minima del controller MultiVac è la seguente:

- 1 unità base MultiVac
- 1 scheda Vaclon Pump High Voltage

La configurazione minima può essere espansa aggiungendo schede opzionali. La tabella seguente elenca le schede opzionali disponibili.
Nell'installare schede opzionali occorre soddisfare alle seguenti limitazioni:

- un massimo di due schede High Voltage
- un massimo di altre due schede.

NOTA

Il controller MultiVac con numero di parte 929-4000/4001/4010/4011 non possono comandare una scaheda MultiGage. Per installare una scheda MultiGage il controller deve essere aggiornato tramite un apposito kit. Per maggiori dettagli contattare l'Assistenza Varian.

DESCRIZIONE	NUMERO DI PARTE
Unità Base MultiVac	
Unità Base predisposta per una tensione di alimentazione di 220 Vac	929-4000 929-4001 (con scheda RS-232 installata)
Unità Base predisposta per una tensione di alimentazione di 110 Vac	929-4010 929-4011 (con scheda RS-232 installata)
Schede Opzionali	
Scheda Medium Vaclon Pump High Voltage (H.V.)	929-4025 o 929-4035
Scheda Large Vaclon Pump High Voltage (H.V.)	929-4040 o 929-4050
Scheda Set Point/Remote Control	969-4110
Scheda RS 232-422 Computer Interface	929-4100
Multi Gauge Bayard-Alpert	L6427-301
Multi Gauge UHV	L8321-301
Multi Gauge Cold Cathode	L6433-301
Multi Gauge Thermocouple	L6430-301

Il controller MultiVac in configurazione base ed insieme alle schede H.V. può controllare un massimo di due pompe ioniche dalla 20 l/s alla 500 l/s con polarità positiva o negativa. Permette di eseguire delle letture affidabili di pressione fino a 10^{-11} Torr, ottimizzando le prestazioni della pompa sull'intero campo operativo.
Le schede Multi Gauge permettono di eseguire letture di pressione con differenti precisioni e campi di misura.
Il controller MultiVac può essere comandato sia in modo LOCAL, sia in modo REMOTE I/O nel caso in cui sia installata la scheda Set Point Remote Control, sia in modo REMOTE COMMUNICATION nel caso in cui sia installata la scheda RS 232-422 Computer Interface.
Nel modo LOCAL tutti i comandi sono dati tramite il pannello frontale. Nel modo REMOTE I/O tutti i comandi sono dati tramite il connettore della scheda Set Point/Remote Control presente sul pannello posteriore. Nel modo REMOTE COMMUNICATION tutti i comandi sono dati tramite un computer principale attraverso la scheda RS 232-422 Computer Interface.

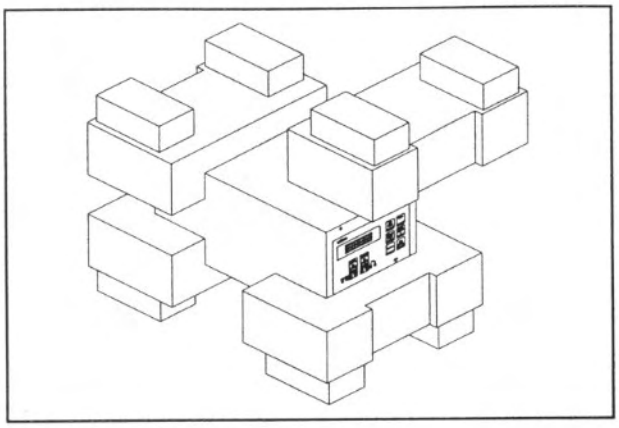
IMMAGAZZINAMENTO

Durante il trasporto e l'immagazzinamento del controller devono essere soddisfatte le seguenti condizioni ambientali:

- temperatura: da -20 °C a +70 °C
- umidità relativa: 0 - 95% (non condensante)

PREPARAZIONE PER L'INSTALLAZIONE

Il controller viene fornito in un imballo protettivo speciale; se si presentano segni di danni, che potrebbero essersi verificati durante il trasporto, contattare l'ufficio vendite locale.
Durante l'operazione di disimballaggio, prestare particolare attenzione a non lasciar cadere il controller e a non sottoporlo ad urti.



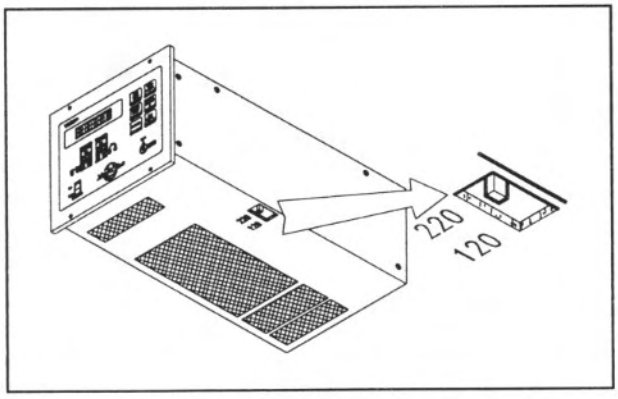
Imballaggio del Controller

Non disperdere l'imballo nell'ambiente. Il materiale è completamente riciclabile e risponde alla direttiva CEE 85/399 per la tutela dell'ambiente.
Il controller MultiVac è predisposto in fabbrica per le seguenti tensioni di alimentazione:

- modelli 929-4000/929-4001 per 220 Vac (tensione di ingresso da 180 a 265 Vac),
- modelli 929-4010/929-4011 per 110 Vac (tensione di ingresso da 90 a 130 Vac).

Nel caso in cui fosse necessario cambiare la tensione di alimentazione, eseguire la seguente procedura:

- Spegnere il controller e staccare il cavo di alimentazione dalla rete.
- Sul fondo del controller, selezionare la tensione di alimentazione desiderata spostando il deviatore sulla posizione 110 Vac o 220 Vac come mostrato nella figura seguente.



Deviatore di Selezione Tensione di Alimentazione

Se occorre cambiare il cavo di alimentazione, esso va cablato nel seguente modo:
blu = neutro
marrone = fase
giallo-verde = terra

INSTALLAZIONE

PERICOLO!

Il controller MultiVac è munito di un cavo di alimentazione a 3 fili con una spina di sicurezza (approvata a livello internazonale). Utilizzare questo cavo di alimentazione e la spina insieme ad una presa munita di collegamento di terra onde evitare folgorazioni. Verificare che il collegamento di terra sia collegato in modo corretto.
All'interno del controller si sviluppano alte tensioni che possono recare gravi danni o la morte. Prima di eseguire qualsiasi operazione di installazione o manutenzione del controller scollegarlo dalla alimentazione.

ATTENZIONE!

Il controller può essere usato sia come unità da tavolo sia come modulo a rack, in ogni caso deve essere posizionato in modo tale che l'aria possa circolare liberamente attraverso i fori di areazione presenti sulla copertura superiotre ed inferiore.
Se il controller viene utilizzato come modulo a rack, DEVE essere inserito in un adattatore alto quattro unità rack per evitare che cada all'interno del rack stesso. Il pannello frontale del MultiVac non è previsto per reggere il peso dell'unità.
Non installare o utilizzare il controller in un ambiente esposto ad agenti atmosferici (pioggia, neve, ghiaccio), polvere, gas corrosivi, o in un ambiente esplosivo o ad alto rischio di infiammabilità.

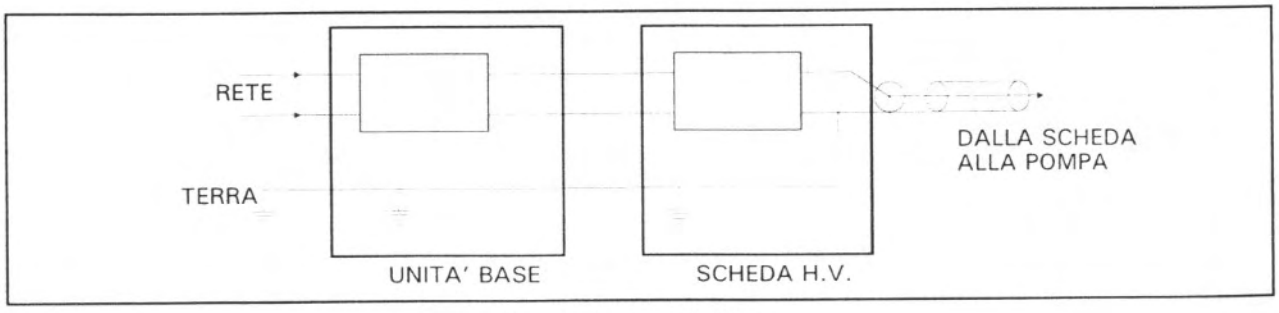
NOTA

Se il controller è utilizzato come unità da tavolo, estrarre i due piedini frontali. Se il controller è installato in un rack, rimuovere i quattro piedini e posizionarlo con almeno 30 mm (1.2 pollici) di spazio sopra e sotto.

Durante il funzionamento, occorre che siano rispettate le seguenti condizioni ambientali:

- temperatura: da 0 °C a +45 °C
- umidità relativa: 0 - 90% (senza condensa)

Per collegare il controller alla pumpa utilizzare il cavo specifico fornito come opzione.
Vedere l'appendice "Technical Information" per informazioni dettagliate su questi ed altri collegamenti, e sull'installazione delle schede opzionali.



Collegamenti delle Masse

USO

In questo paragrafo sono riportate le principali procedure operative. Per ulteriori dettagli e per procedure che coinvolgono collegamenti o particolari opzionali, fare riferimento al paragrafo "use" dell'appendice "Technical Informations".
Prima di usare il controller effettuare tutti i collegamenti elettrici e pneumatici e fare riferimento al manuale della pompa collegata.

PERICOLO!

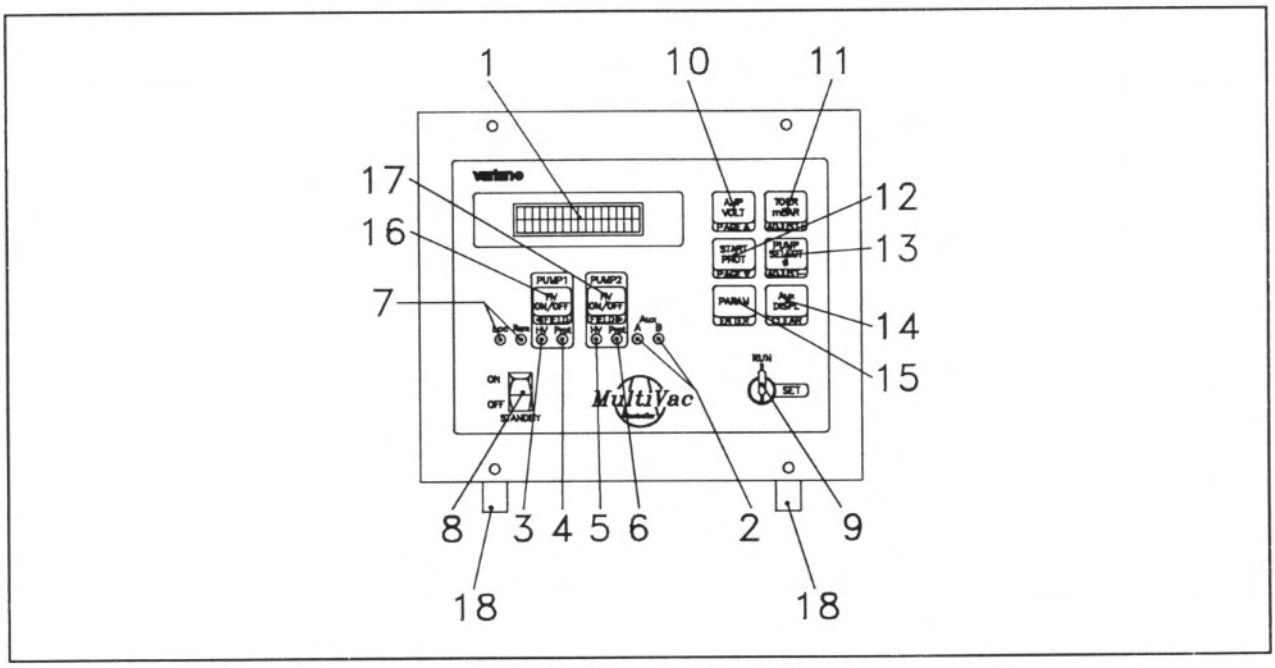
Per evitare danni alle persone ed all'apparato, nel caso in cui la pompa sia appoggiata su di un tavolo assicurarsi che sia stabile. Non far funzionare mai la pompa se la flangia di ingresso non è collegata al sistema o non è chiusa con la flangia di chiusura.

Controlli ed Indicatori del Pannello Frontale del MultiVac

La figura seguente illustra il pannello frontale del controler MultiVac.
Il significato e la funzione dei controlli e degli indicatori è dettagliato nella seguente tabella.

NOTA

Il significato dei pulsanti del pannello frontale del MultiVac cambia a seconda della posizione della chiave RUN-SET.
Le scritte bianche su sfondo nero sono valide quando la chiave è in posizione RUN.
Le scritte rosse su sfondo bianco sono valide quando la chiave è in posizione SET.



MultiVac front panel controls

Rif.	Nome del Controllo/Indicatore	Decsrizione del Controllo/Indicatore
1		Display LCD a matrice di punti retroilluminato, 16 caratteri, 2 linee.
2	**AUX A/B**	Due LED verdi accesi se le schede opzionali sono installate (per esempio se la scheda Set Point/Remote Control è installata nello slot #3 all'interno dell'unità, il LED A è acceso).
3	**PUMP 1 - HV**	LED giallo acceso quando la scheda H.V. della pompa 1 è accesa.
4	**PUMP 1 - Prot.**	LED verde acceso quando è stato selezionato il modo di funzionamento Protect per la pompa 1.
5	**PUMP 2 - HV**	LED giallo acceso quando la scheda H.V. della pompa 2 è accesa.
6	**PUMP 2 - Prot.**	LED verde acceso quando è stato selezionato il modo di funzionamento Protect per la pompa 2.
7	**Loc - Rem**	Due LED verdi che indicano il modo di funzionamento selezionato: – **Loc** è acceso quando è selezionato il modo di funzionamento LOCAL; – **Rem** è acceso quando è selezionato il modo di funzionamento REMOTE I/O o REMOTE COMMUNICATION.
8	ON OFF STANDBY	Quando è in posizione OFF le Pompe 1 e 2 sono disabilitate; quando è in posizione ON le pompe possono essere accese. Permette di spegnere entrambe le pompe contemporaneamente in condizioni di emergenza.

Rif.	Nome del Controllo/Indicatore	Decsrizione del Controllo/Indicatore	
9	RUN SET	Il selettore a chiave RUN/SET permette di cambiare il significato dei pulsanti a doppia funzione del pannello frontale. La posizione RUN è la normale posizione durante il funzionamento della pompa. La posizione SET permette di definire i parametri della pompa.	
		Chiave in posizione RUN	**Chiave in posizione SET**
10	AMP VOLT PAGE▲	**AMP/VOLT** Quando viene premuto permette di visualizzare sul display LCD la misura di corrente o tensione della pompa selezionata tramite il controllo (13). Se la pompa selezionata è spenta, il pulsante è inattivo.	**PAGE ▲** Quando viene premuto passa alla pagina video di predisposizione precedente.
11	TORR mBAR ADJUST+	**TORR/mBAR** Quando viene premuto permette di visualizzare sul display LCD la misura di pressione in Torr o mbar della pompa selezionata tramite il controllo (13). Se la pompa selezionata è spenta, il pulsante è inattivo.	**ADJUST +** Quando viene premuto permette di modificare il valore di predisposizione. Permette inoltre di avviare la procedura standard di spegnimento di una sola pompa.
12	START PROT PAGE▼	**START/PROTECT** Quando viene premuto il modo di funzionamento della pompa selezionata con il controllo (13) viene cambiato da START a PROTECT o viceversa. Se viene selezionato il modo PROTECT per una pompa, il corrispondente LED verde Prot (4) o (6) si accende.	**PAGE ▼** Quando viene premuto passa alla pagina video di predisposizione seguente.
13	PUMP SELECT # ADJUST–	**PUMP SELECT** Permette di selezionare, sul display, la pompa sulla quale viene eseguita l'azione successiva (ad esempio il cambio del modo di funzionamento, o la visualizzazione dei parametri pompa). La pompa selezionata viene indicata sul display dal simbolo # seguito dal numero 1 o 2. Se è installato un solo modulo H.V. il pulsante è inattivo.	**ADJUST -** Quando viene premuto permette di modificare i valori di predisposizione. Permette inoltre di avviare la procedura standard di spegnimento di una sola pompa.
14	Aux DISPL CLEAR	**Aux DISPL** Permette di selezionare di quale scheda MultiGauge è da visualizzare sul display la relativa letura.	**CLEAR** Quando viene premuto permette di ritornare alla precedente selezione se il pulsante ENTER non è stato ancora premuto, o, se premuto due volte, di ritornare alla prima pagina del menu selezionato da qualsiasi pagina.
15	PARAM ENTER	**PARAM** Quando viene premuto permette di visualizzare i parametri della pompa selezionata sulla scheda H.V. indicata sul display dal simbolo #. I parametri visualizzati sono: **Pump size**: la dimensione della pmpa selezionata **Imax**: la corrente di corto circuito della pompa selezionata **Iprot**: il valore di corrente al quale interviene la protezione "Overcurrent " **PWRmax**: la potenza massima della pompa selezionata **Vmax**: La polarità (+ o -) e la tensione massima della pompa selezionata **Fixed V** o **Step V**: il modo operativo selezionato **STP1/STP2**: i valori dei Set Point 1 e 2, e l'informazione se i set point sono stati sorpassati (il simbolo ˆ indica che il corrispondente set point è stato superato o che la H. V. è spenta) **NOTA**: Le indicazioni relative ai set point vengono mostrate solo se la scheda Set point/Remote Control è installata.	**ENTER** Quando viene premuto si conferma il parametro visualizzato.

Rif.	Nome del Controllo/Indicatore	Decsrizione del Controllo/Indicatore	
		Chiave (9) in posizione RUN	**Chiave (9) in posizione SET**
16	PUMP1 HV ON/OFF ◄FIELD HV Prot	**PUMP 1 HV ON/OFF** Quando viene premuto accende o spegne la scheda H.V. della pompa 1. Funziona come interruttore bistabile. La sua azione è indipendente dalla linea selezionata sul display. Per accendere la scheda H. V., l'interruttore STANDBY ON/OFF (8) deve essere in posizione ON.	**< FIELD** Ha tre funzioni: - cambia il menu visualizzato (View, Mode, Set); - seleziona il campo all'interno della pagina durante l'operazione di predisposizione - cambia la pagina in lettura dalla pompa 1 alla pompa 2 e viceversa quando entrambe le pompe sono accese.
17	PUMP2 HV ON/OFF FIELD► HV Prot	**PUMP 2 HV ON/OFF** Quando viene premuto accende o spegne la scheda H.V. della pompa 2. Funziona come interruttore bistabile. La sua azione è indipendente dalla linea selezionata sul display. Per accendere la scheda H. V., l'interruttore STANDBY ON/OFF (8) deve essere in posizione ON.	**FIELD >** Ha tre funzioni: - cambia il menu visualizzato (View, Mode, Set); - seleziona il campo all'interno della pagina durante l'operazione di predisposizione - cambia la pagina in lettura dalla pompa 1 alla pompa 2 e viceversa quando entrambe le pompe sono accese.
18		Piedini frontali estratti solo nel caso di installazione su tavolo.	

Pannello Posteriore del MultiVac

La figura seguente mostra i controlli e le connessioni del pannello posteriore del controller MultiVac. La configurazione illustrata prevede una scheda H.V., una scheda Set Point/Remote Control card e una scheda RS 232/422 Computer Interface.

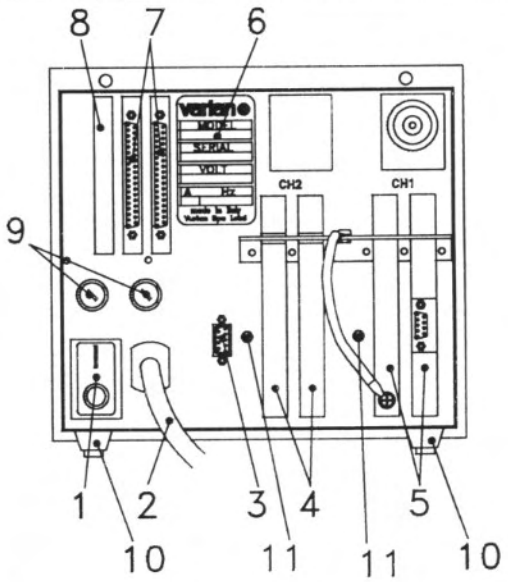
PROCEDURE DI USO

Modi di Funzionamento

Il controller MultiVac può funzionare nei modi LOCAL, REMOTE input/output (I/O) o REMOTE COMMUNICATION.

Se non è presente alcuna scheda opzionale (Remote I/O and Set-Points o RS232-422), il solo modo di funzionamento disponibile è LOCAL. Nel modo LOCAL tutti i comandi sonop dati da pannello frontale.
Se è installata solo la scheda Remote I/O and Set-Points, il MultiVac può funzionare nei modi LOCAL o REMOTE I/O. Nel modo REMOTE I/O tutti i comandi sono dati tramite il connettore di input/output del pannello posteriore. Dopo una interruzione dell'alimentazione il MultiVac ritorna al modo di funzionamento precedentemente selezionato.
Se è installata la scheda RS232-422 ed è stata abilitata dal dip switch 3 (vedere l'appendice Technical Information) sono disponibili i modi di funzionamento LOCAL e REMOTE COMMUNICATION nel quale tutti i comandi sono dati tramite la linea RS 232-422. Dopo una interruzione dell'alimentazione il MultiVac ritorna sempre al modo di funzionamento REMOTE COMMUNICATION anche se il modo precedentemente selezionato era LOCAL.

Se sono installate entrambe le schede RS232-422 e Remote I/O, sono disponibili tutti i tre modi di funzionamento. Dopo una interruzione dell'alimentazione il MultiVac ritorna sempre al modo di funzionamento REMOTE COMMUNICATION anche se il modo precedentemente selezionato era LOCAL o REMOTE I/O.



1. Interruttore di alimentazione: acceso (I)/spento (O)
2. Cavo di alimentazione
3. Connettore RS 232/422 opzionale
4. Slot numero 2 (per i collegamenti della scheda Pump 2 H.V.
5. Slot numero 1 (per i collegamenti della scheda Pump 1 H.V.; deve essere sempre occupato da una scheda High Voltage)
6. Etichetta del Modello e del Numero di Serie
7. Slot numero 3 (per una scheda opzionale)
8. Slot numero 4 (per una scheda opzionale)
9. Fusibili di rete
10. Piedini posteriori (solo per l'uso su di un tavolo)
11. Viti di fissaggio delle schede H.V.

Pannello Posteriore del MultiVac

L'unità è progettata per funzionare in diversi modi:

- **modo START o PROTECTED**
- **modo STEP o FIXED VOLTAGE**

Nel **modo START** il controller fornisce l'intera potenza, indipendentemente dalle condizioni della pompa, fino alla corrente di corto circuito. Questo modo di funzionamento deve essere usato per avviare la pompa ad alta pressione.

Nel **modo PROTECTED** il controller limita la corrente di uscita e spegne l'alta tensione quando il valore di corrente supera la currente di soglia per più di 0.2 secondi.

Nel **modo STEP** quando la corrente assorbita dalla pompa raggiunge i valori di soglia, il controller cambia la tensione di uscita.

Nel **modo FIXED VOLTAGE** la tensione di uscita rimane sempre al valore massimo.

NOTA

L'unità è predisposta in fabbrica nel seguente modo:

- *modo di funzionamento LOCAL se la scheda Computer Interface non è installata*
- *modo di funzionamento REMOTE se la scheda Computer Interface è installata*
- *chiave RUN/SET in posizione RUN*
- *modo di funzionamento: START, STEP VOLTAGE*

Durante il normale uso del controller la chaive RUN/SET DEVE essere in posizione RUN.

Informazioni dettagliate sui modi di funzionamento sono contenute nell'appendice "Technical Information".

Accensione della Scheda H.V.

Per accendere la scheda H.V. la chiave RUN/SET deve essere in posizione RUN, l'interruttore **STANDBY** el'interruttore di alimentazine del pannello posteriore devono essere in posizione ON.

NOTA

Con una sola scheda H.V. installata entrambe le linee sono dedicate alla pompa numero uno, con due schede installate ogni linea è dedicata ad una pompa diversa.

Il display mostra:

1	#		2	0		S	t	a	r	C	e	l	l		

Premere il pulsante **PUMP 1 HV ON/OFF** (o **PUMP 2 HV ON/OFF** a seconda di quale pompa si vuole accendere), e il display mostra:

1	#		C	u	r	r	e	n	t		(	A	)		

Per visualizzare il valore della tensione premere il pulsante **AMP/VOLT**.

Per visualizzare la pressione premere il pulsante **TORR/mBAR**.

NOTA

*Il cambio avviene solo nella linea con il simbolo #. Premere il pulsante **PUMP SELECT** # per spostare il simbolo # da una linea all'altra.*

Accanto al valore letto, appare uno dei simboli descritti nella tabella seguente.

Simbolo	Descrizione
>	Il valore sta aumentando
<	Il valore sta diminuendo
■	Il valore è stabile

NOTA

Nel caso in cui la corente è troppo bassa (cioè $< 1 \times 10^{7}$ A), il valore di pressione non viene letto ed appare il messaggio "LOW PRESSURE".

Funzionamento dei Ventilatori

Quando il controller viene acceso e le schede H.V. sono spente, i ventilatori ruotano lentamente in modo che sia assicurato un leggero flusso di aria alll'interno dell'unità.
Quando viene accesa una scheda H.V., i ventilatori iniziano a ruotare ad alta velocità in modo da assicurare un alto flusso d'aria all'interno dell'unità quando la tensione è maggiore di 5 KV o la potenza di uscita è maggiore di 30 W.

Accensione delle Schede MultiGauge

Per accendere le schede MultiGauge eseguire la seguente procedura:

- Accendere l'interruttore di alimentrazione sul pannello posteriore.
- Mettere su ON l'interruttore STAND-BY/INTERLOCK del pannello frontale. Verrà visualizzato il messaggio "MULTIVAC INITIALIZATION" per pochi secondi e quindi i tipi di pompe selezionate sulle schede High Voltage installate nei canali 1 e 2.
- Premere il pulsante AUX DISPL, il display visualizzerà il tipo di scheda installata negli slot A e B (terzo e quarto).
- Portare la chiave inposizione SET, il display visualizzerà il messaggio "MAIN MENU - VIEW".
- Premere ENTER, il display visualizzerà uno dei canali, spostarsi attrverso i 4 canali tramite i due pulsanti FIELD LEFT e FIELD RIGHT fino a vedere visualizzata la scheda che si vuole accendere.
- Premere ENTER; nel caso in cui la scheda fosse stata spenta precedentemente da un guasto, il display mostrerà il motivo del guasto.
- Premere ENTER ed il display richiederà se si vuole accendere la scheda Gauge. La risposta di default è YES, se si vuole scegliere NO premere uno dei pulsanti FIELD.
- Premere ENTER, il MultiVac accenderà il sensore della scheda Gauge ed il display visualizzerà il messaggio "WARM UP" per circa 10 - 20 secondi.

Quando la scheda Gauge è accesa, il display mostra il valore di pressione letto.

Lettura dei Parametri della Pompa

Quando una scheda H.V. è accesa si possono leggere i parametri della pompa premendo il pulsante **PARAM**. La lettura che si ottiene è tipiocamente del seguente tipo:

1	#		2	0		S	t	a	r	C	e	l	l		

1	#		I	m	a	x		1	5	0		m	A		

1	#		I	p	r	o	t		2	0		m	A		

1	#		P	W	R	m	a	x		1	5	0		W	

1	#		V	m	a	x		-	7	0	0	0		V	

1	#		S	T	E	P		V							

Spegnimento della Scheda H.V.

Per spegnere una scheda H.V. premere il corrispondente pulsante **PUMP HV ON/OFF** sul pannello frontale del controller.

Per spegnere contemporaneamente entrambe le pompe in condizioni di emergenza, si può mettere l'interruttore STAND-BY/INTERLOCK del pannello frontale in posizione OFF. In questo caso i LED **HV** lampeggiano ed il display mostra

S	T	A	N	D	B	Y	/	I	N	T	L	K			
S	E	E		M	A	N	U	A	L						

per circa 5 secondi, quindi ritorna nelle condizioni normali.

MANUTENZIONE

Il controller MultiVac non richiede alcuna manutenzione. Qualsiasi intervento deve essere eseguito da personale autorizzato.
In caso di guasto è possibile usufruire del servizio di riparazione Varian o del "Varian advance exchange service", che permette di ottenere un controller nuovo in sostituzione di quello guasto.

PERICOLO!

Prima di effettuare qualsiasi intervento sul controller scollegare il cavo di alimentazione.

Qualora un controller dovesse essere rottamato, procedere alla sua eliminazione nel rispetto delle normative nazionali specifiche.

MESSAGGI DI ERRORE

Per certi tipi di guasti il controller esegue una auto-diagnostica e visualizza uno dei messaggi mostrati nella tebella seguente.

MESSAGGIO	DESCRIZIONE	AZIONE CORRETTIVA
POLARITY ERROR SEE MANUAL	Non c'è corrispondenza tra la polarità del tipo di pompa selezionata da pannelo frontale della scheda e la polarità del modulo Multiplier.	Invertire la polarità del modulo Multiplier (vedere l'appendice "Technical Information").
H.V. CARD FAULT SEE MANUAL	C'è un malfunzionamento nella circuiteria di lettura della corrente della scheda H.V. o nella circuiteria di controllo. Il LED corripondente del pannello frontale lampeggia.	Spegnere e riaccendere l'unità. Se l'errore si ripresenta chiamare l'assistenza Varian.
PUMP OVERCURRENT SEE MANUAL	Nel modo di funzionamento Protect il valore di corrente supera la corrente di soglia per più di 0,2 secondi. Il LED del pannello frontale corrispondente alla scheda H.V. lampeggia.	Selezionare il modo START affinchè il controller possa funzionare fino alla corrente di corto circuito senza soglia.
REMOTE INTERLOCK SEE MANUAL	Quando è presente la scheda Remote I/O e l'ingresso 1 (interlock esterno) è a livello alto (aperto), non si può accendere la scheda High Voltage, o, se è già accesa, viene spenta. Il LED corripondente del pannello frontale lampeggia.	Rimuovere l'interlock esterno.
STANDBY/INTLK SEE MANUAL	E' stata rimossa la copertura dell'unità con almeno un modulo H.V. acceso, o si è cercato di accendere il modulo H.V. con la copertura aperta. Il LED corripondente del pannello frontale lampeggia.	Chiudere la copertura.
	E' stato spento il modulo H.V. con l'interruttore Standby ON/OFF del pannello frontale, o si è cercato di accendere il modulo H.V. con lo stesso interruttore in posizione OFF. Il LED corripondente del pannello frontale lampeggia.	Ripetere correttamente la procedura di spegnimento o di accensione.
OVERTEMPERATURE SEE MANUAL	Si è attivata la protezione termica del modulo H.V.. Il LED corripondente del pannello frontale lampeggia.	Migliorare la circolazione dell'aria attorno l'unità.
TEST ERROR SEE MANUAL	L'auto test all'accensione ha rilevato un guasto, o non è presente alcuna scheda High Voltage nello slot 1.	Installare la scheda H.V. nello slot 1. Spegnere e riaccendere l'unità. Se l'errore si ripresenta chiamare l'assistenza Varian.
CHECK HV1 CONN. SEE MANUAL	La scheda High Voltage non è installata correttamente.	Spegnere il controller e staccarlo dalla rete di alimentazione. Rimuovere la scheda H.V. ed installarla nuovamente con attenzione.
DEGAS UNDERCURR	La scheda MultiGauge Bayard-Alpert ha rilevato un errore di corrente di degas troppo bassa.	Spegnere e riaccendere la scheda. Se l'errore si ripresenta chiamare l'assistenza Varian.
OVERCURRENT	La scheda Multi Gauge UHV ha rilevato un errore di sovracorrente del filamento, o la scheda Multi Gauge Cold Cathode ha rilevato un errore di sovracorrente.	Spegnere e riaccendere la scheda. Se l'errore si ripresenta chiamare l'assistenza Varian.
UNDERCURRENT	Le schede Multi Gauge Bayard-Alpert o UHV hanno rilevato un errore di corrente di filamento troppo bassa (il sensore non è collegato, o il filamento del sensore è interrotto).	Verificare il collegamento del sensore e spegnere e riaccendere la scheda. Se l'errore si ripresenta chiamare l'assistenza Varian.
GRID ERROR	Le schede Multi Gauge Bayard-Alpert o UHV hanno rilevato un errore della griglia (la griglia del sensore non è collegata).	Spegnere e riaccendere la scheda. Se l'errore si ripresenta chiamare l'assistenza Varian.
OVERTEMPERATURE	Le schede Multi Gauge Bayard-Alpert o UHV o Cold Cathode hanno rilevato un errore di sovratemperatura.	Spegnere e riaccendere le schede. Se l'errore si ripresenta chiamare l'assistenza Varian.
POWER SUPPLY	Le schede Multi Gauge Cold Cathode o Thermocouple hanno rilevato un errore di alimentazione.	Spegnere e riaccendere le schede. Se l'errore si ripresenta chiamare l'assistenza Varian.
MEAS OUT LIMITS	Le schede Multi Gauge Bayard-Alpert o UHV o Cold Cathode, durante il periodo di riscaldamento, non sono state in grado di fornire una lettura significativa.	Spegnere e riaccendere le schede. Se l'errore si ripresenta chiamare l'assistenza Varian.

ALLGEMEINES

Dieser Apparat ist für Fachbetriebe bestimmt. Vor Gebrauch sollte der Benutzer dieses Handbuch sowie alle weiteren mitgelieferten Zusatzdokumentationen genau lesen. Bei Nichtbeachtung - auch teilweise - der enthaltenen Hinweise, unsachgemäßem Gebrauch durch ungeschultes Personal, nicht autorisierten Eingriffen und Mißachtung der einheimischen, hier zur Geltung kommenden Bestimmungen übernimmt die Firma Varian keinerlei Haftung.
In den folgenden Abschnitten sind alle erforderlichen Informationen für die Sicherheit des Bedieners bei der Anwendung des Geräts aufgeführt. Detaillierte technische Informationen sind im Anhang "Technical Information" enthalten.

In dieser Gebrauchsanleitung werden Sicherheitshinweise folgendermaßen hervorgehoben:

GEFAHR!

Die Gefahrenhinweise lenken die Aufmerksamkeit des Bedieners auf bestimmte Vorgänge oder Praktiken, die bei unkorrekter Ausführung schwere Verletzungen hervorrufen können.

ACHTUNG!

Die Warnhinweise vor bestimmten Prozeduren machen den Bediener darauf aufmerksam, daß bei Nichteinhaltung Schäden an der Anlage entstehen können.

ANMERKUNG

Die Anmerkungen enthalten wichtige Informationen, die im Text hervorgehoben werden.

BESCHREIBUNG DES CONTROLLERS

Der MultiVac-Controller der Firma Varian ist ein Gerät zur Steuerung von modularen oder flexiblen Ionenpumpen. Das Gerät kann im Werk nach den Angaben des Kunden voreingestellt werden oder in Einzelkomponenten geliefert werden, so daß der Kunde den Controller durch Einsetzen bzw. den Austausch zusätzlicher Karten individuell konfigurieren kann.

Die Standardausführung des MultiVac-Controllers besteht aus:

- 1 MultiVac- Grundeinheit;
- 1 'Vaclon Pump High Voltage'-Karte.

Diese Standardausführung kann durch den Einsatz zusätzlicher Karten erweitert werden. In der nachstehenden Tabelle sind die lieferbaren Karten zur Konfigurationserweiterung aufgeführt.
Für die Installation von Zusatzkarten gelten folgende Grenzen:

- maximal zwei High-Voltage-Karten;
- maximal zwei weitere Karten.

ANMERKUNG

Die MultiVac-Controller mit der Kennummer 929-4000/4001/4010/4011 können nicht zur Steuerung einer MultiGauge-Karte verwendet werden. Zur Installation einer MultiGauge-Karte müssen diese Controller mittels eines entsprechenden Bausatzes erweitert werden. Wenden Sie sich für genauere Informationen an den Varian-Kundendienst.

BESCHREIBUNG	TEILENUMMER
MultiVac- Grundeinheit	
Grundeinheit für Versorgungsspannung 220 V Ws	929-4000 929-4001 (bereits mit Karte RS 232 installiert)
Grundeinheit für Versogungsspannung 110 V Ws	929-4010 929-4011 (bereits mit Karte RS 232 installiert)
Zusatzkarten	
Karte Medium Vaclon Pump High Voltage (H.V.)	929-4025 oder 929-4035
Karte Large Vaclon Pump High Voltage (H.V.)	929-4040 oder 929-4050
Karte Set Point/Remote Control	969-4110
Karte RS 232-422 Computer Interface	929-4100
Multi Gauge Bayard-Alpert	L6427-301
Multi Gauge UHV	L8321-301
Multi Gauge Cold Cathode	L6433-301
Multi Gauge Thermocouple	L6430-301

Der MultiVac-Controller kann in der Grundausführung und zusammen mit Hochspannungs- (HV)-Karten bis zu 2 Ionenpumpen von 20l/s bis 500 l/s mit positiver oder negativer Polung steuern. Er gewährleistet eine zuverlässige Ablesung von Druckwerten bis zu 10^{-11} Torr und verbessert die Leistung der Pumpe innerhalb des Arbeitsbereiches.
Die MultiGauge-Karten ermöglichen eine Ermittlung des Druck mit verschiedenen Feinheiten und Meßbereichen.
Der MultiVac-Controller kann LOKAL oder bei Einsatz der Karte 'Set Point Remote Control' über den Modus REMOTE I/O oder über die Karte 'RS 232-422 Computer Interface' im Modus REMOTE COMMUNICATION ferngesteuert werden.
Im Modus LOKALSTEUERUNG werden alle Steuerbefehle über ein frontales Schaltpult eingegeben. Im Modus REMOTE I/O werden die Steuerbefehle über den Steckverbinder der im hinteren Schaltpult installierten Karte 'Set Point/Remote Control' übertragen. In der Betriebsart REMOTE COMMUNICATION können alle Steuerbefehle über einen mittels einer Karte 'RS 232-422 Computer Interface' angeschlossenen Computer eingegeben werden.

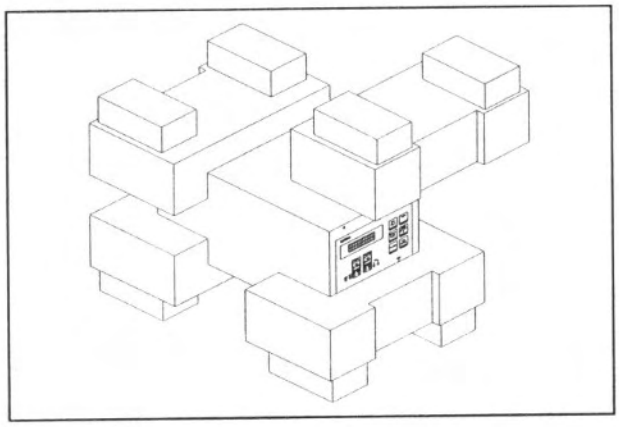
LAGERUNG

Beim Transport und bei der Lagerung der Controller müssen folgende klimatischen Verhältnisse eingehalten werden:

- Temperatur: von -20 °C bis +70 °C
- Relative Luftfeuchtigkeit: 0-95 % (nicht kondensierend)

VOR DER INSTALLATION

Der Controller wird mit einer speziellen Schutzverpakkung geliefert. Eventuelle Transportschäden müssen der zuständigen örtlichen Verkaufsstelle gemeldet werden. Beim Auspacken vorsichtig vorgehen, damit der Controller nicht fällt oder Stößen ausgesetzt wird.



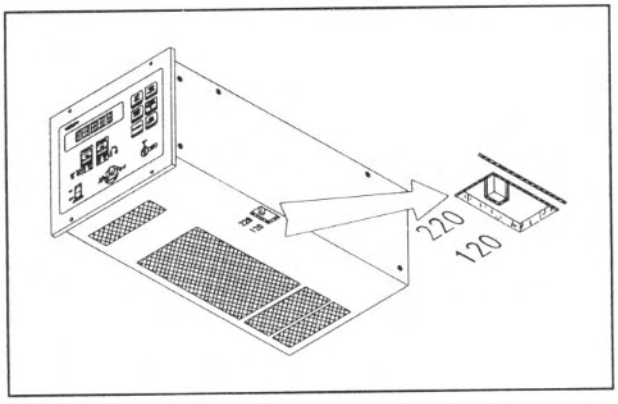
Verpackung des Controllers

Das Verpackungsmaterial muß korrekt entsorgt werden. Es ist vollständig recyclebar und entspricht der EG-Richtlinie 85/399 für Umweltschutz.
Die MultiVac-Controller sind werkseitig für folgende Versorgungspannungen ausgelegt:

- Modelle 929-4000/929-4001 für 220 V Ws (Eingangsspannung von 180 bis 265 V Ws)
- Modelle 929-4010/ 929-4011für 110 V Ws (Eingangsspannung von 90 bis 130 V Ws)

Soll die Versorgungsspannung geändert werden, so gehen Sie wie folgt vor:

- Schalten Sie den Controller aus, und ziehen Sie das Netzkabel.
- Stellen Sie über den Umschalter auf der Rückseite des Controllers die gewünschte Versorgungsspannung ein (110 V Ws oder 220 V Ws, siehe Zeichnung).



Umschalter zur Einstellung der Versorgungsspannung

Sollte ein Austausch des Netzkabels vorgenommen werden so müssen die Leiter wie folgt angeschlossen werden:
blau = neutral
braun = Phase
grün-gelb = Erde

INSTALLATION

GEFAHR!

Der MultiVac-Controller wird mit einem Netzkabel mit 3 Leitern und mit einem den internationalen Normen entsprechenden Netzstecker geliefert. Es sollte immer dieses Netzkabel benutzt werden, das an eine vorschriftsmäßig geerdete Steckdose anzuschließen ist, um Stromentladungen zu vermeiden.
Im Inneren des Controllers entstehen hohe Spannungen, die schwere Schäden verursachen und lebensgefährlich sein können. Vor jedem Montage- bzw. Wartungseingriff muß deshalb der Netzstecker gezogen werden.

ACHTUNG!

Der Controller kann auf einen Tisch oder ein Gestell montiert werden. In beiden Fällen muß eine ungehinderte Zirkulation der Kühlluft durch die im Gehäuse vorne und unten eingelassen Luftöffnungen gewährleistet sein.
Wenn der Controller in einem Gestell montiert wird, MUSS er in einer vier Rackeinheiten hohen Adapter-Einheit installiert werden, um zu vermeiden, daß der Controller nicht in das Gestell fällt. Die vordere Schalttafel des MultiVac-Controllers ist nicht geeignet, das gesamte Gewicht der Einheit zu tragen.
Der Controller darf nicht in Umgebungen installiert u/o benutzt werden, die Witterungseinflüssen (Regen, Frost, Schnee), Staub und aggressiven Gasen ausgesetzt sind und in denen Explosions- und erhöhte Brandgefahr besteht.

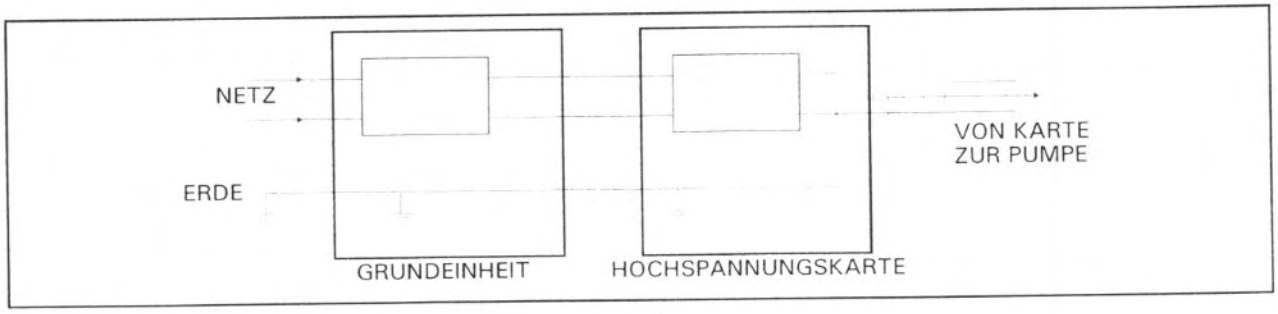
ANMERKUNG

Zur Tischaufstellung des Controllers müssen die beiden vorderen Füße ausgezogen werden. Wenn der Controller in einem Gestell installiert werden soll, müssen alle vier Füße abmontiert werden; lassen Sie bei Rack-Installation des Controllers über- und unterhalb einen Raum von wenigstens 30 mm (1,2 Zoll).

Während des Betriebs müssen folgende Umgebungsbedingungen eingehalten werden:

- Temperatur: von +0 °C bis +45 °C
- Relative Luftfeuchtigkeit: 0 - 95 % (nicht kondensierend)

Für den Anschluß des Controllers an die Pumpe muß das zum Controller gehörende Kabel benutzt werden.
Detailliertere Hinweise zu weiteren Anschlußarten sowie zum Einsatz von Zusatzkarten finden Sie im Anhang "Technical Information".



Anschlüsse

GEBRAUCH

In diesem Kapitel sind die wichtigsten Betriebsvorgänge aufgeführt. Für weitere Hinweise bezüglich Anschluß und Montage des bestellbaren Zubehörs verweisen wir auf das Kapitel "Use" im Anhang zu "Technical Information".
Vor Benutzung des Controllers müssen sämtliche elektrischen und pneumatischen Anschlüsse ausgeführt und die Betriebsanleitung der angeschlossenen Pumpe durchlesen werden.

GEFAHR!

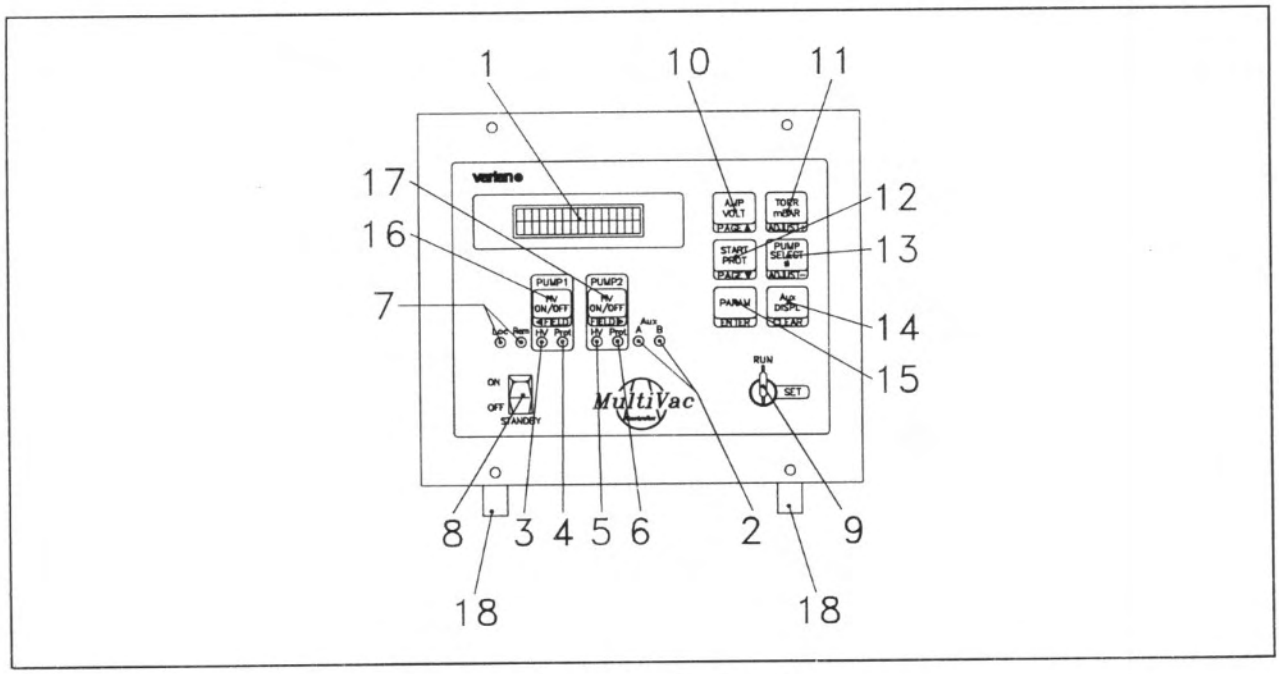
Steht die Pumpe auf einem Tisch, muß auf den stabilen Stand geachtet werden, da sonst die Gefahr von Personen- und Geräteschäden besteht. Die Pumpe nie einschalten, wenn der Eingangsflansch nicht am System angeschlossen bzw. nicht mit dem Schließflansch abgedeckt ist.

Schalter und Anzeigen auf der vorderen Schalttafel des MultiVac-Controllers

Nachstehend wird die vordere Schalttafel des MulitiVac-Controllers gezeigt.
Die jeweilige Bedeutung und Funktion der Schalter und Anzeigen wird in der nachstehenden Tabelle beschrieben.

ANMERKUNG

Die Funktion der auf der vorderen Schalttafel des MultiVac befindlichen Schalter ist von der jeweiligen Stellung des Schlüsselschalters RUN/SET abhängig.
Die negativen Schriften auf schwarzem Grund gelten, wenn der Schlüsselschalter auf RUN steht.
Die roten Schriften auf weißem Grund gelten, wenn der Schlüsselschalter auf SET steht.



Vordere Schalttafel des MultiVac-Controllers

Pos.	Bezeichnung des Schalters/der Anzeige	Funktion des Schalters / der Anzeige
1		Rückbeleuchtetes LCD-Display, 16 Buchstaben, 2 Zeilen
2	**AUX A/B**	Die beiden grünen LEDs leuchten auf, wenn Zusatzkarten installiert wurden (z. B. leuchtet das LED A bei Installation der Karte 'Set Point/Remote Control' im Steckplatz Nr. 3 im Inneren der Einheit auf).
3	**PUMP 1 - HV**	Das gelbe LED leuchtet auf, wenn die HV-Karte der Pumpe Nr. 1 zugeschaltet wurde.
4	**PUMP 1 - Prot.**	Das grüne LED leuchtet auf, wenn für die Pumpe Nr. 1 die Funktionsart 'Protect' selektioniert wurde.
5	**PUMP 2 - HV**	Das gelbe LED leuchtet auf, wenn die HV-Karte der Pumpe Nr. 2 zugeschaltet wurde.
6	**PUMP 2 - Prot.**	Das grüne LED leuchtet auf, wenn für die Pumpe Nr. 2 die Funktionsart 'Protect' selektioniert wurde.
7	**Loc - Rem**	Die beiden grünen LEDs zeigen die jeweils gewählte Funktionsart an: - **Loc** steht für LOKALE Steuerung; - **Rem** steht für die beiden Fernsteuerungsarten REMOTE I/O und REMOTE COMMUNICATION.
8	ON OFF STANDBY	Wenn der Schalter auf OFF steht, sind die Pumpen Nr. 1 und 2 abgeschaltet; in Position ON können beide Pumpen eingeschaltet werden. Der Schalter dient zur gleichzeitigen Notabschaltung beider Pumpen.

Pos.	Bezeichnung des Schalters/der Anzeige	Funktion des Schalters / der Anzeige	
9	RUN SET	Über den Schlüsselschalter RUN/SET kann die Funktion der auf der vorderen Schalttafel befindlichen Schalter mit Doppelfunktion geändert werden. Die Position RUN ist die normale Position für den Pumpenbetrieb. Die Position SET ermöglicht die Eingabe von Parametern zum Pumpenbetrieb.	
		Schlüsselschalter in Position RUN	**Schlüsselschalter in Position SET**
10	AMP VOLT PAGE ▲	**AMP/VOLT** Bei Betätigung dieser Taste kann auf dem LCD-Display der Strom- oder Spannungswert der über den Schalter Nr. 13 selektionierten Pumpe angezeigt werden. Ist die selektionierte Pumpe abgeschaltet, so ist die Taste nicht aktiv.	**PAGE ▲** Taste zum Übergang zur Bildschirmseite der vorigen Einstellung.
11	TORR mBAR ADJUST+	**TORR/mBAR** Bei Betätigung dieser Taste kann auf dem LCD-Display der Druck der über den Schalter Nr. 13 selektionierten Pumpe in Torr oder mBar angezeigt werden. Ist die selektionierte Pumpe abgeschaltet, so ist die Taste nicht aktiv.	**ADJUST +** Taste zur Modifizierung der Einstellungswerte. Die Taste ermöglicht außerdem die Aktivierung der Standardabschaltung einer einzigen Pumpe.
12	START PROT PAGE ▼	**START/PROTECT** Durch Betätigung dieser Taste wird der Funktionsmodus der über den Schalter Nr. 13 selektionierten Pumpe von START auf PROTECT und umgekehrt geändert. Wurde für eine Pumpe der Modus PROTECT selektioniert , so leuchtet das entsprechende grüne LED (4) oder (6) auf.	**PAGE ▼** Übergang zur Bildschirmseite der nächstfolgenden Einstellung.
13	PUMP SELECT # ADJUST−	**PUMP SELECT** Über Betätigung dieser Taste wird die für den nächsten Arbeitszyklus einzusetzende Pumpe selektioniert (z.B. bei Umschaltungen der Funktionsart oder zur Abbildung von Parametern zur Pumpeneinstellung). Die selektionierte Pumpe wird auf dem Display durch das Symbol # gefolgt von der Zahl 1 oder 2 angezeigt. Bei Installation eines einzigen H.V.-Moduls ist die Taste nicht aktiv.	**ADJUST -** Taste zur Modifizierung der Einstellungswerte. Die Taste ermöglicht außerdem die Aktivierung der Standardabschaltung einer einzigen Pumpe.
14	Aux DISPL CLEAR	**Aux DISPL** Ermöglicht die Selektion der Abbildung auf dem Display der abgelesenen Parameter einer bestimmten MultiGauge-Karte.	**CLEAR** Über diese Taste kommen Sie auf die vorige Selektion zurück, sofern die Taste ENTER noch nicht gedrückt wurde; bei zweimaliger Betätigung kommen Sie von jeder beliebigen Bildschirmseite auf die erste Seite des selektionierten Menüs zurück.
15	PARAM ENTER	**PARAM** Bei Betätigung dieser Taste werden die Parameter der über die HV-Karte selektionierten Pumpe abgebildet, die auf dem Display durch das #-Symbol identifiziert wird. **Pump Size:** Abmessungen der selektionierten Pumpe **Imax:** Kurzschlußstrom der selektionierten Pumpe **Iprot:** Wert der Zuschaltung der Schutzfunktion "Overcurrent". **PWRmax:** maximale Leistung der selektionierten Pumpe. **Vmax:** Polarität (+/-) und maximale Spannung der selektionierten Pumpe. **Fixed V oder Step V:** selektionierter Betriebsmodus. **STP1/STP2:** Die Set-Point-Wert 1 und 2 zur Information, ob die Einstellungswerte überschritten wurden (das Symbol 'E' bedeutet, daß der entsprechende Set-Point überschritten wurde oder daß die HV-Karte abgeschaltet ist. **ANMERKUNG:** Die Angaben zu den Set-Points werden nur angezeigt, wenn die Karte 'Set Point/Remote Control' installiert ist.	**ENTER** Taste zur Bestätigung des abgebildeten Parameters.

Pos.	Bezeichnung des Schalters/der Anzeige	Funktion des Schalters / der Anzeige	
		Schlüsselschalter (9) in Position RUN	**Schlüsselschalter (9) in Position SET**
16	PUMP1 HV ON/OFF ◄FIELD HV Prot	**PUMP 1 HV ON/OFF** Über Betätigung dieser Taste kann die HV-Karte der Pumpe Nr. 1 ein- oder ausgeschaltet werden (bistabiler Schalter). Die Taste wirkt unabhängig zur über das Display selektionierten Linie. Zur Zuschaltung der HV-Karte muß die Taste STANDBY ON/OFF (8) auf ON stehen.	< FIELD Diese Taste hat folgende drei Funktionen: - Wechsel des abgebildeten Menüs (View, Mode, Set); - Selektion eines Feldes auf der Bildschirmseite während des Einstellungsvorgangs; - Wechsel von der Bildschirmseite zur Pumpe Nr. 1 auf die Seite der Pumpe Nr. 2 und umgekehrt, wenn beide Pumpen zugeschaltet sind.
17	PUMP2 HV ON/OFF FIELD► HV Prot	**PUMP 2 HV ON/OFF** Über Betätigung dieser Taste kann die HV-Karte der Pumpe Nr. 2 ein- oder ausgeschaltet werden (bistabiler Schalter). Die Taste wirkt unabhängig zur über das Display selektionierten Linie. Zur Zuschaltung der HV-Karte muß die Taste STANDBY ON/OFF (8) auf ON stehen.	FIELD > Diese Taste hat folgende drei Funktionen: - Wechsel des abgebildeten Menüs (View, Mode, Set); - Selektion eines Feldes auf der Bildschirmseite während des Einstellungsvorgangs; - Wechsel von der Bildschirmseite zur Pumpe Nr. 1 auf die Seite der Pumpe Nr. 2 und umgekehrt, wenn beide Pumpen zugeschaltet sind.
18		Vordere Standfüße ausgezogen (nur bei Tischaufstellung)	

Hintere Schalttafel des MultiVac-Controllers

Die nebenstehende Abbildung zeigt die Schalter und Anschlußstellen der hinteren Schalttafel des MultiVac-Controllers. Die Abbildung zeigt die Auslegung bei Einsatz einer HV-Karte, einer Karte 'Set Point/Remote Control' und einer Karte 'RS 232/422 Computer Interface'.

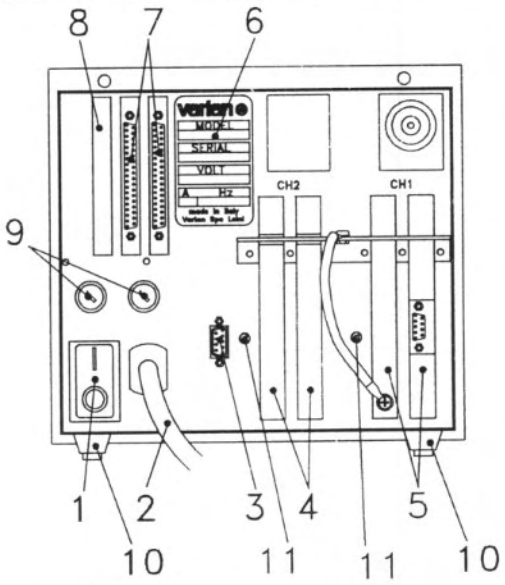
BEDIENUNG

Bedienungsarten

Der MultiVac-Controller kann in den Bedienungsarten LOKALE STEUERUNG sowie FERNSTEUERUNG Eingang/Ausgang (I/O) oder REMOTE COMMUNICATION betrieben werden.

Wenn keine Zusatzkarte installiert ist (Remote I/O / Set-Points, RS232-422), kann der Controller nur lokal gesteuert werden. In der Betriebsart LOKALE STEUERUNG müssen alle Steuerbefehle über die frontale Schalttafel eingegeben werden.
Wenn nur die Karte 'Remote I/O / Set-Points' installiert ist, kann der Controller in den Bedienungsarten LOKALE STEUERUNG und FERNSTEUERUNG I/O betrieben werden. In der Bedienungsart Fernsteuerung I/O werden die Steuerbefehle über die Steckverbindungen der Eingänge und Ausgänge auf der hinteren Schalttafel übertragen. Nach einem Ausfall der Versorgungsspannung nimmt der MultiVac-Controller die vorher selektionierte Bedienungsart automatisch wieder auf.
Bei Installation der Karte 'RS232-422' und bei Freigabe über entsprechende Einstellung des Dip-Switch-Schalters Nr. 3 (siehe Anhang 'Technical Information') kann der Controller in den Bedienungsarten LOKALE STEUERUNG und REMOTE COMMUNICATION betrieben werden; bei der Fernsteuerung über Computer werden die Steuersignale über die Schnittstelle RS232-422 übertragen. Nach einem Ausfall der Versorgungsspannung schaltet sich der MultiVac-Controller immer in die Bedienungsart REMOTE COMMUNICATION, auch wenn vorher die Bedienungsart LOKALE STEUERUNG selektioniert war.

Wenn beide Karten (RS232-422 und Remote I/O / Set-Points) installiert sind, kann der Controller in allen drei Bedienungsarten betrieben werden. Nach einem Ausfall der Versorgungsspannung schaltet sich der MultiVac-Controller immer in die Bedienungsart REMOTE COMMUNICATION, auch wenn vorher die Bedienungsarten LOKALE STEUERUNG oder FERNSTEUERUNG I/O selektioniert war.



1. Hauptschalter: ein (I), aus (O)
2. Netzkabel
3. Steckverbindung RS232-422 (Sonderzubehör)
4. Steckplatz Nr. 2 (zum Einsatz der Karte Pump 2 H.V.)
5. Steckplatz Nr. 1 (zum Einsatz der Karte Pump 1 H.V.: in diesen Steckplatz muß immer eine HV-Karte installiert sein)
6. Typenschild mit Seriennummer
7. Steckplatz Nr. 3 (zum Einsatz einer Zusatzkarte)
8. Steckplatz Nr. 4 (zum Einsatz einer Zusatzkarte)
9. Sicherungen Stromversorgung
10. Hintere Standfüße (nur für Tischaufstellung)
11. Schrauben zur Installation der H.V.-Karten

Hintere Schalttafel des MultiVac-Controllers

Der Controller kann in folgenden Betriebsarten betrieben werden:

- **Betriebsart START oder PROTECTED;**
- **Betriebsart STEP oder FIXED VOLTAGE.**

In der **Betriebsart START** arbeitet der Controller unabhängig vom Pumpenzustand bei voller Leistung bis zum voreingestellten Kurzschlußstromwert. Diese Betriebsart muß zur Steuerung von Hochdruckpumpen gewählt werden.

In der **Betriebsart PROTECTED** werden der Stromausgangswert des Controllers begrenzt und die Hochspannung abgeschaltet, sobald der Strom den voreingestellten Schwellenwert länger als 0,2 Sekunden überschreitet.

In der **Betriebsart STEP** wird die Ausgangsspannung des Controllers umgeschaltet, sobald der von der Pumpe aufgenommene Strom einen bestimmten Grenzwert erreicht.

In der **Betriebsart FIXED VOLTAGE** bleibt die Ausgangsspannung permanent auf dem voreingestellten Wert.

ANMERKUNG

Der Controller ist werkseitig wie folgt eingestellt:

- *Bedienungsart LOCAL (lokale Steuerung), wenn die Karte 'Computerschnittstelle' nicht installiert ist;*
- *Bedienungsart REMOTE (Fernsteuerung), wenn die Karte 'Computerschnittstelle' installiert ist;*
- *Schlüsselschalter RUN/SET in Stellung RUN;*
- *Betriebsart START, STEP VOLTAGE.*

Während des normalen Betriebs des Controllers muß der Schlüsselschalter RUN/SET auf 'RUN' gestellt sein.

Nähere Informationen können Sie dem Anhang 'Technical Information' entnehmen.

Zuschaltung der H.V.- (Hochspannungs-)Karte

Zur Zuschaltung der H.V.-Karte muß der Schlüsselschalter RUN/SET auf RUN stehen; der **STANDBY**-Schalter und der Hauptschalter auf der hinteren Schalttafel müssen auf ON stehen.

ANMERKUNG

Wenn nur eine H.V.-Karte installiert ist, beziehen sich beide Kanäle des Controllers auf die Pumpe Nr. 1; bei Installation beider H.V.-Karten beziehen sich die Kanäle des Controllers auf jeweils eine Pumpe.

Auf dem Display erscheint folgende Meldung:

1	#		2	0		S	t	a	r	C	e	l	l		

Betätigen Sie den Schalter **PUMP 1 HV ON/OFF** (bzw. **PUMP 2 HV ON/OFF**, je nach dem, welche Pumpe gesteuert werden soll); auf dem Display erscheint folgende Meldung:

1	#		C	u	r	r	e	n	t		(	A	)		
						.									

Drücken Sie zur Abbildung des Spannungswertes die Taste **AMP/VOLT**.

Drücken Sie zur Anzeige des Druckwertes die Taste **TORR/mBAR**.

ANMERKUNG

Die Umschaltung findet nur für den mit # gekennzeichneten Kanal statt. Durch Betätigung der Taste **PUMP SELECT** *kann das #-Symbol auf den jeweils anderen Kanal gebracht werden.*

Neben dem auf dem Display angezeigten Wert erscheint eines der in der nachstehenden Tabelle aufgeführten Symbole:

Symbol	Funktion
>	Erhöhung des Wertes
<	Reduzierung des Wertes
■	Der Wert bleibt unverändert

ANMERKUNG

Sollte die Spannung unter einem bestimmten Wert liegen (1 x 10^{1} A), so kann der Druck nicht abgelesen werden und auf dem Display erscheint die Meldung 'LOW PRESSURE'.

Funktion der Gebläse

Wenn der Controller bei ausgeschalteten HV-Karten eingeschaltet wird, laufen die Gebläse auf einer niedrigen Stufe, so daß ein leichter Luftstrom zur Kühlung der Einheit erzeugt wird.
Sobald eine HV-Karte zugeschaltet wird, rotieren die Gebläse mit maximaler Drehzahl, so daß die Kühlung der Einheit auch bei Spannungswerten über 5 KV und bei einer Ausgangsleistung über 30 KW gewährleistet ist.

Zuschaltung der MultiGauge-Karten

Gehen Sie zur Zuschaltung der MultiGauge-Karten wie folgt vor:

- Schalten Sie den Controller über den auf der hinteren Schalttafel befindlichen Hauptschalter ein.
- Stellen Sie den auf der vorderen Schalttafel installierten Schalter STANDBY/INTERLOCK auf ON. Auf dem Display erscheint für einige Sekunden die Meldung 'MULTIVAC INITIALIZATION' sowie die Angabe der für die Kanäle 1 und 2 installierten HV-Karten.
- Drücken Sie den Schalter AUX DISPL; auf dem Display wird die Art der in den Steckplätzen A und B (Steckplatz 3 und 4) installierten Karte angezeigt.
- Stellen Sie den Schlüsselschalter auf SET; auf dem Display erscheint die Meldung 'MAIN MENU - VIEW'.
- Drücken Sie die ENTER-Taste; auf dem Display wird einer der Kanäle abgebildet. Über die Tasten FIELD LEFT und FIELD RIGHT kann die jeweils zu aktivierende Karte abgebildet werden.
- Drücken Sie die ENTER-Taste. Sollte die Karte durch eine Störung ausgefallen sein, so wird auf dem Display der Grund der Störung abgebildet.
- Drücken Sie die ENTER-Taste; sie werden nun gefragt, ob die Gauge-Karte zugeschaltet werden soll. Die standardmäßige Einstellung ist YES; drücken Sie eine der FIELD-Tasten, wenn Sie NO selektionieren wollen.
- Drücken Sie die ENTER-Taste; der Controller aktiviert nun den Sensor der Gauge-Karte; auf dem Display erscheint für etwa 10 - 20 Sekunden die Meldung 'WARM UP'.

Sobald die Gauge-Karte zugeschaltet ist, wird auf dem Display der abgelesene Druckwert angezeigt.

Ablesung der Parameter zum Pumpenbetrieb

Bei einer zugeschalteten HV-Karte können auf dem Display über Betätigung der Taste **PARAM** die Parameter zum Betrieb der Pumpe abgebildet werden. Es erscheinen folgende Meldungen:

1	#		2	0		S	t	a	r	C	e	l	l		

1	#		I	m	a	x		1	5	0		m	A		

1	#		I	p	r	o	t		2	0		m	A		

1	#		P	W	R	m	a	x		1	5	0		W	

1	#		V	m	a	x		-	7	0	0	0		V	

1	#		S	T	E	P		V							

Abschaltung der HV-Karte

Drücken Sie zur Abschaltung einer der HV-Karten die entsprechende Taste **PUMP HV ON/OFF** auf der vorderen Schalttafel des Controllers.

Stellen Sie zur gleichzeitigen Notabschaltung beider Pumpen die auf der vorderen Schalttafel des Controllers installierte Taste STANDBY/INTERLOCK auf OFF. Die LEDS der **HV-Karten blinken auf, und auf dem Display erscheint für die Dauer von etwa 5 Sekunden die Meldung:**

S	T	A	N	D	B	Y	/	I	N	T	L	K			
S	E	E		M	A	N	U	A	L						

Danach kehren die Anzeigen des Displays in den normalen Status zurück.

WARTUNG

Die MultiVac-Controller sind wartungsfrei. Eventuell erforderliche Eingriffe müssen von dazu befugtem Fachpersonal ausgeführt werden.
Bei Störungen kann der Varian-Reparaturdienst bzw. der "Varian advanced exchange service" in Anspruch genommen werden, der für den Austausch defekter Controller sorgt.

GEFAHR!

Vor jedem Eingriff am Controller muß der Netzstecker gezogen werden.

Eine eventuelle Verschrottung muß unter Einhaltung der einschlägigen landesüblichen Vorschriften erfolgen.

FEHLERMELDUNGEN

In einigen Störungsfällen zeigt das Selbstdiagnosesystem des Controllers die in der nachstehenden Tabelle zusammengefaßten Meldungen an.

MELDUNG	BESCHREIBUNG	STÖRUNGSBEHEBUNG
POLARITY ERROR SEE MANUAL	Keine Übereinstimmung zwischen der Polarität der über die vordere Schalttafel bzw. die entsprechende Karte selektionierten Pumpe und der Polariät des Multiple-Moduls.	Umkehrung der Polung des Multiplier-Moduls (siehe Anhang 'Technical Information').
H.V. CARD FAULT SEE MANUAL	Störung im Schaltkreis der Ablesung des Stroms der HV-Karte oder Störung im Steuerkreis. Das entsprechende LED auf der vorderen Schalttafel blinkt auf.	Schalten Sie den Controller aus und wieder ein. Sollte die Störung weiterhin vorliegen, so wenden Sie sich an den Varian-Kundendienst.
PUMP OVERCURRENT SEE MANUAL	In der Betriebsart 'Protect' wurde der voreingestellte Stromschwellenwert mehr als 0,2 Sekunden lang überschritten. Das LED der entsprechenden HV-Karte auf der vorderen Schalttafel blinkt auf.	Wählen Sie den Betriebsmodus START, so daß der Controller ohne Kurzschlußstromschwellenwert betrieben werden kann.
REMOTE INTERLOCK SEE MANUAL	Auf dem Eingang Nr. 1 (externe Sperre) der Karte 'Remote I/O ist ein hoher Wert präsent (offen), so daß die HV-Karte nicht aktiviert werden kann. Das entsprechende LED auf der vorderen Schalttafel blinkt auf.	Bauen Sie die externe Sperrvorrichtung aus.
STANDBY/INTLK SEE MANUAL	Das Gehäuse des Controllers wurde bei aktiviertem HV-Modul geöffnet, oder bei geöffnetem Gehäuse wurde der Versuch einer Zuschaltung des HV-Moduls unternommen. Das entsprechende LED auf der vorderen Schalttafel blinkt auf.	Schließen Sie das Gehäuse des Controllers.
	Über den auf der vorderen Schalttafel befindlichen Schalter ON/OFF wurde das HV-Modul abgeschaltet bzw. es wurde der Versuch einer Zuschaltung unternommen, während der ON/OFF-Schalter auf 'OFF' stand. Das entsprechende LED auf der vorderen Schalttafel blinkt auf.	Führen Sie den vorgeschriebenen Vorgang der Ein- und Ausschaltung durch.
OVERTEMPERATURE SEE MANUAL	Der Überhitzungsschutz des HV-Moduls wurde aktiviert. Das entsprechende LED auf der vorderen Schalttafel blinkt auf.	Sorgen Sie für bessere Kühlungsbedingungen.
TEST ERROR SEE MANUAL	Bei Einschaltung des Controllers wurde während des Selbsttests eine Störung angetroffen, oder im Steckplatz Nr. 1 ist keine HV-Karte präsent.	Setzen Sie die HV-Karte in den Steckplatz Nr. 1 ein. Schalten Sie den Controller aus und wieder ein. Sollte die Störung weiterhin vorliegen, so wenden Sie sich an den Varian-Kundendienst.
CHECK HV1 CONN. SEE MANUAL	Die HV-Karte ist nicht vorschriftsmäßig installiert.	Schalten Sie den Controller aus, und ziehen Sie den Netzstecker. Bauen Sie die HV-Karte aus, und setzten Sie sie mit Umsicht wieder in den Steckplatz ein.
DEGAS UNDERCURR	Die Bayard-Alpert-MultiGauge-Karte hat einen zu niedrigen Degas-Stromwert angetroffen.	Schalten Sie die Karte aus und wieder ein. Sollte die Störung weiterhin vorliegen, so wenden Sie sich an den Varian-Kundendienst.
OVERCURRENT	Die UV-MultiGauge-Karte oder die Cold Cathode-MultiGauge-Karte hat einen Überstromfehler in der Verkabelung des Controllers angetroffen.	Schalten Sie die Karte aus und wieder ein. Sollte die Störung weiterhin vorliegen, so wenden Sie sich an den Varian-Kundendienst.
UNDERCURRENT	Die Bayard-Alpert- oder die UV-MultiGauge-Karte hat eine zu niedrige Spannung ermittelt (der Sensor ist nicht angeschlossen oder es liegt eine Unterbrechung der Verkabelung des Sensors vor).	Kontrollieren Sie den vorschriftsmäßigen Anschluß des Sensors; schalten Sie die Karte aus und wieder ein. Sollte die Störung weiterhin vorliegen, so wenden Sie sich an den Varian-Kundendienst.
GRID ERROR	Die Bayard-Alpert- oder die UV-MultiGauge-Karte hat eine Anomalie des Gridkonkaktes ermittelt (der Gridkontakt des Sensors ist nicht angeschlossen).	Schalten Sie die Karte aus und wieder ein. Sollte die Störung weiterhin vorliegen, so wenden Sie sich an den Varian-Kundendienst.
OVERTEMPERATURE	Die Bayard-Alpert- oder die UV-MultiGauge-Karte oder die Cold Cathode-Karte hat eine Überhitzungsstörung ermittelt.	Schalten Sie die Karte aus und wieder ein. Sollte die Störung weiterhin vorliegen, so wenden Sie sich an den Varian-Kundendienst.
POWER SUPPLY	Die Cold Cathode-MultiGauge-Karte oder die Thermocouple-Karte hat eine Störung der Versorgungsspannung angetroffen.	Schalten Sie die Karte aus und wieder ein. Sollte die Störung weiterhin vorliegen, so wenden Sie sich an den Varian-Kundendienst.
MEAS OUT LIMITS	Die Bayard-Alpert- oder die UV-MultiGauge-Karte oder die Cold Cathode-Karte konnte in der Beheizungsphase kein signifikantes Signal ermitteln.	Schalten Sie die Karte aus und wieder ein. Sollte die Störung weiterhin vorliegen, so wenden Sie sich an den Varian-Kundendienst.

INDICATIONS GENERALES

Cet appareillage a été conçu en vue d'une utilisation professionnelle. Il est conseillé à l'utilisateur de lire attentivement cette notice d'instructions ainsi que toute autre indication supplémentaire fournie par Varian, avant l'utilisation de l'appareillage. Varian décline par conséquent toute responsabilité en cas d'inobservation totale ou partielle des instructions données, d'utilisation incorrecte de la part d'un personnel non formé, d'opérations non autorisées ou d'un emploi contraire aux réglementations nationales spécifiques.
Les paragraphes suivants donnent toutes les indications nécessaires à garantir la sécurité de l'opérateur pendant l'utilisation de l'appareillage. Des renseignements plus détaillés se trouvent dans l'appendice "Technical Informations".

Cette notice utilise les signes conventionnels suivants:

DANGER!

Les messages de danger attirent l'attention de l'opérateur sur une procédure ou une manoeuvre spéciale qui, si elle n'est pas effectuée correctement, risque de provoquer de graves lésions.

ATTENTION!

Les message d'attention apparaissent avant certaines procédures qui, si elles ne sont pas observées, pourraient endommager sérieusement l'appareillage.

NOTE

Les notes contiennent des renseignements importants, isolés du texte.

DESCRIPTION DU CONTROLEUR

Le contrôleur MultiVac de la société Varian est un contrôleur modulaire et flexible pour les pompes ioniques. Cette unité peut être préconfigurée en usine selon les exigences du client, ou bien les différentes pièces peuvent être commandées séparément et l'utilisateur peut ajouter ou modifier les possibilités du contrôleur, simplement en introduisant ou en enlevant des cartes optionnelles.

La configuration minimum du contrôleur MultiVac est la suivante:

- 1 unité de base MultiVac
- 1 carte Vaclon Pump High Voltage

La configuration minimum peut être étendue par l'adjonction de cartes optionnelles. Le tableau qui suit indique toutes les cartes optionnelles disponibles.
Lors de l'installation de cartes optionnelles, il faut veiller à ajouter:

- un maximum de deux cartes High Voltage
- un maximum de deux autres cartes

NOTE

Les contrôleurs MultiVac au numéro de pièce 929-4000/4001/4010/4011 ne peuvent commander une carte MultiGage. Pour installer une carte MultiGage, le contrôleur doit être mis à jour à l'aide d'un kit spécial. Pour plus de détails, contacter le service après-vente Varian.

DESCRIPTION	NUMERO DE PIECE
Unité de Base MultiVac	
Unité de Base pré-équipée pour 9 une tension d'alimentation de 220 Vac	929-4000 929-4001 (à carte RS-232 installée)
Unité de Base pré-équipée pour une tension d'alimentation de 110 Vac	929-4010 929-4011 (à carte RS-232 installée)
Cartes Optionnelles	
Cartes Medium Vaclon Pump High Voltage (H.V.)	929-4025 ou 929-4035
Carte Large Vaclon Pump High Voltage (H.V.)	929-4040 ou 929-4050
Carte Set Point/Remote Control	969-4110
Carte RS 232-422 Computer Interface	929-4100
Multi Gauge Bayard-Alpert	L6427-301
Multi Gauge UHV	L8321-301
Multi Gauge Cold Cathode	L6433-301
Multi Gauge Thermocouple	L6430-301

Le contrôleur MultiVac, en configuration de base et avec les cartes H.V., peut contrôler un maximum de deux pompes ioniques, de la 20 l/s à la 500 l/s, à polarité positive ou négative. Il permet de procéder à des lectures fiables de pression jusqu'à 10^{-11} Torrs, en optimisant les performances de la pompe sur tout le champ opérationnel.
Les cartes Multi Gauge permettent de procéder à des lectures de pression aux précisions et champs de mesure différents.
Le contrôleur MultiVac peut être commandé soit en mode LOCAL soit en mode ELOIGNE E/S en cas d'installation de la carte Set Point Remote Control, soit encore en mode TELEGESTION en cas d'installation de la carte RS 232-422 Computer Interface.
Dans le mode LOCAL, toutes les commandes sont données par l'intermédiaire du tableau frontal. Dans le mode ELOIGNE E/S, toutes les commandes sont données par le connecteur de la carte Set Point/Remote Control présente sur le tableau dorsal. Dans le mode TELEGESTION, toutes les commandes sont données par un ordinateur principal à travers la carte RS 232-422 Computer Interface.

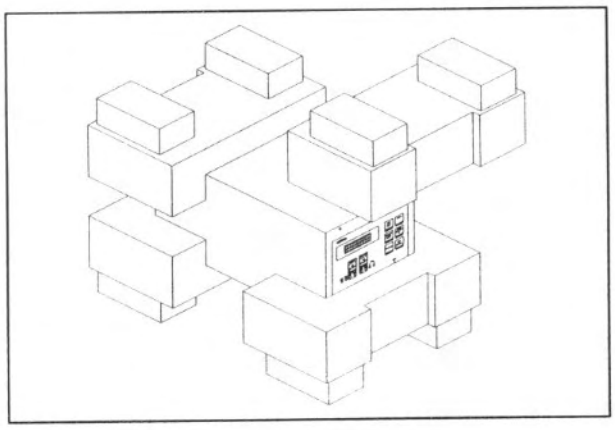
EMMAGASINAGE

Pendant le transport et l'emmagasinage du contrôleur, il faudra veiller à respecter les conditions environnementales suivantes:

- température: de -20°C à +70°C
- humidité relative: 0 - 95 % (non condensante).

PREPARATION POUR L'INSTALLATION

Le contrôleur est fourni dans un emballage de protection spécial; si l'on constate des marques de dommages pouvant s'être produits pendant le transport, contacter aussitôt le bureau de vente local.
Pendant l'opération d'ouverture de l'emballage, veiller tout particulièrement à ne pas laisser tomber le contrôleur et à ne lui faire subir aucun choc.



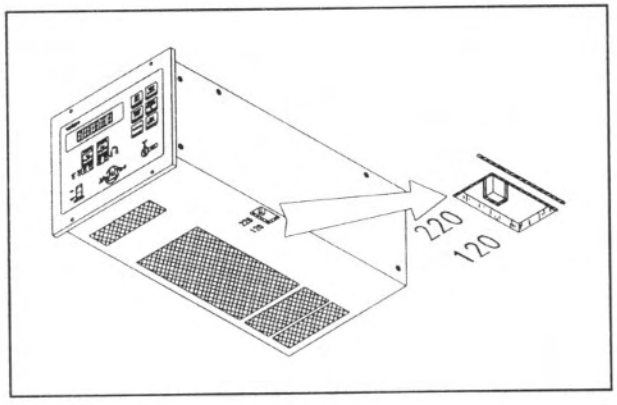
Emballage du contrôleur

Ne pas jeter l'emballage dans la nature. Le matériel est entièrement recyclable et il est conforme aux directives CEE 83/399 en matière de protection de l'environnement.
Le contrôleur MultiVac est pré-équipé en usine pour les tensions d'alimentation suivantes:

- modèles 929-4000/929-4001 pour 220 Vac (tension d'entrée de 180 à 265 Vac)
- modèles 929-4010/929/4011 pour 110 Vac (tension d'entrée de 90 à 130 Vac).

S'il est nécessaire de changer la tension d'alimentation, procéder comme suit:

- Eteindre le contrôleur et débrancher le câble d'alimentation du réseau.
- Sur le fond du contrôleur, sélectionner la tension d'alimentation voulue, en déplaçant le commutateur sur la position 110 Vac ou 220 Vac, comme l'indique la figure ci-dessous.



Commutateur de Sélection de la Tension d'Alimentation

S'il est nécessaire de changer le câble d'alimentation, le câblage doit être effectué de la façon suivante:
bleu = neutre
marron = phase
jaune-vert = terre

INSTALLATION

DANGER!

Le contrôleur MultiVac est pourvu d'un câble d'alimentation à 3 fils avec fiche de sécurité (approuvée à l'échelle internationale). Utiliser ce câble d'alimentation ainsi que la fiche avec une prise munie de connexion à la terre, pour éviter tout risque d'électrocution. S'assurer que la connexion à la terre est correctement effectuée.
A l'intérieur du contrôleur se développent de hautes tensions qui peuvent causer de graves dommages et même la mort. Avant d'effectuer toute opération d'installation ou d'entretien du contrôleur, le débrancher de la prise d'alimentation.

ATTENTION!

Le contrôleur peut être utilisé aussi bien comme unité de table que comme module à rack. Il doit, en tout cas, être placé de façon à ce que l'air puisse circuler librement à travers les trous d'aération situés sur la couverture supérieure et inférieure.
Si le contrôleur est utilisé comme module à rack, il DOIT être inséré dans un adaptateur haut de quatre unités de rack, pour éviter qu'il ne tombe à l'intérieur du rack lui-même. Le tableau frontal du MultiVac n'est pas prévu pour supporter le poids de l'unité.
Ne pas installer ni utiliser le contrôleur dans des milieux exposés à des agents atmosphériques (pluie, gel, neige), à des poussières, à des gaz de combat ainsi que dans des milieux explosifs ou à risque élevé d'incendie.

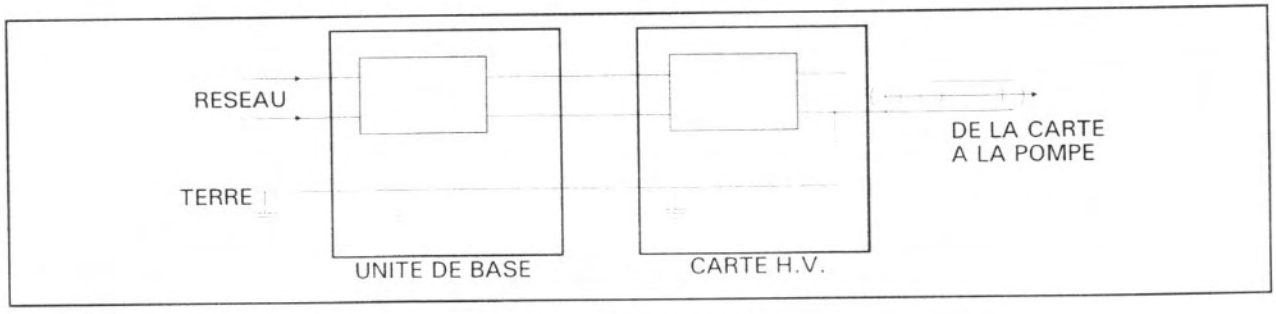
NOTE

Si le contrôleur est utilisé comme unité de table, extraire les deux pieds frontaux. Si le contrôleur est installé dans un rack, enlever les quatre pieds et le placer de manière à avoir un espace libre d'au moins 30 mm (1,2 pouces) au-dessus et au-dessous.

Pendant le fonctionnement, il est nécessaire de respecter les conditions environnementales suivantes:

- température: de 0°C à +45°C
- humidité relative: 0 - 90% (non condensante).

Pour connecter le contrôleur à la pompe, utiliser le câble spécial fourni en option.
Voir l'appendice "Technical Information" pour toutes informations détaillées sur ces connexions et sur d'autres connexions ainsi que sur l'installation des cartes en option.



Connexions des Masses

UTILISATION

Dans ce paragraphe, on indique les principales procédures opérationnelles. Pour tous autres détails et pour les procédures concernant des connexions ou des éléments en option, se reporter au paragraphe "USE" de l'appendice "Technical Informations".
Avant d'utiliser le contrôleur, effectuer toutes les connexions électriques et pneumatiques et se reporter à la notice de la pompe connectée.

DANGER!

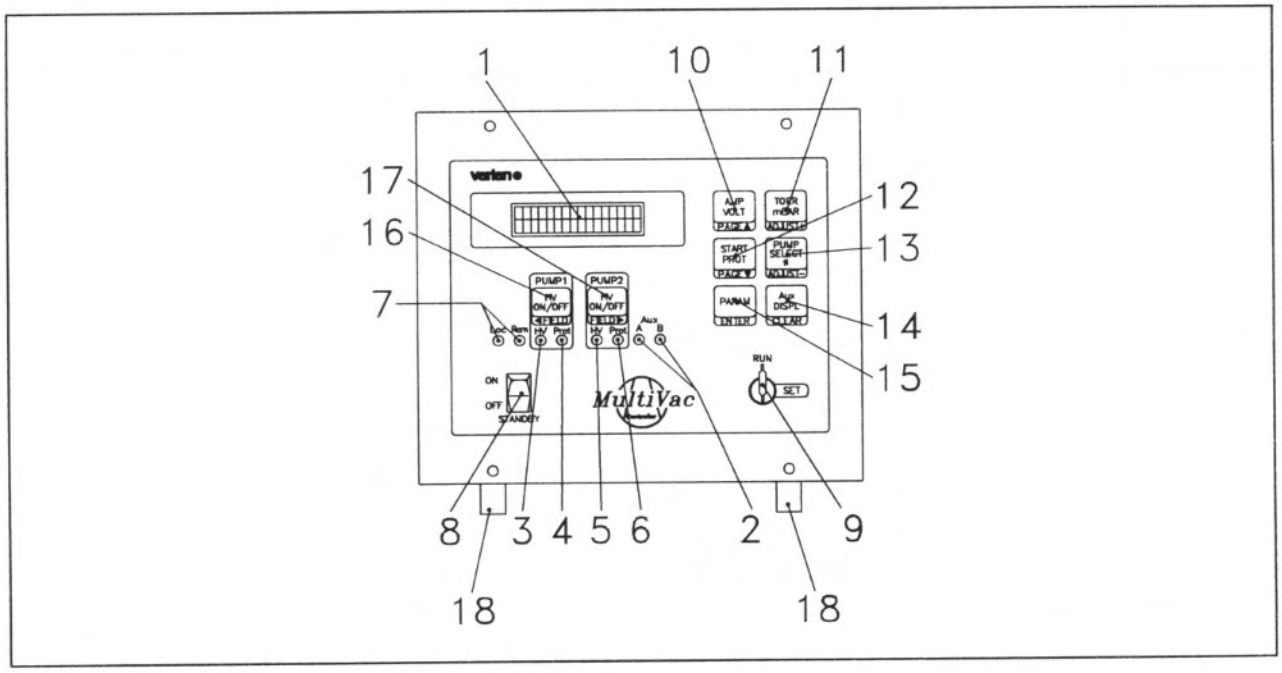
Pour éviter tous dommages aux personnes et à l'appareil, si la pompe est placée sur une table, s'assurer que celle-ci est parfaitement stable. Ne jamais faire fonctionner la pompe si la bride d'entrée n'est pas connectée au système ou n'est pas fermée à l'aide de la bride de fermeture.

Commandes et Diodes du Tableau Frontal du MultiVac

La figure suivante présente le tableau frontal du contrôleur MultiVac.
La signification et la fonction des commandes et des diodes sont indiquées dans le tableau suivant.

NOTE

La signification des touches du tableau frontal du MultiVac change en fonction de la position de la clé RUN-SET.
Les inscriptions blanches sur fond noir sont valables lorsque la clé est en position RUN.
Les inscriptions rouges sur fond blanc sont valables lorsque la clé est en position SET.



Commandes du Tableau Frontal du MultiVac

Réf.	Nom Commande/Diode	Description de la Commande/Diode
1		Afficheur à cristaux liquides, à matrice de points, éclairé par l'arrière, 16 caractères, 2 lignes.
2	**AUX A/B**	Deux DEL vertes allumées si les cartes en option sont installées (par exemple, si la carte Set Point/Remote Control est installée dans le slot #3 à l'intérieur de l'unité, la DEL A est allumée).
3	**PUMP 1 - HV**	DEL jaune allumée lorsque la carte H.V. de la pompe 1 est allumée.
4	**PUMP 1 - Prot.**	DEL verte allumée lorsque le mode de fonctionnement Protect pour la pompe 1 a été sélectionné.
5	**PUMP 2 - HV**	DEL jaune allumée lorsque la carte H.V. de la pompe 2 est allumée.
6	**PUMP 2 - Prot.**	DEL verte allumée lorsque le mode de fonctionnement Protect pour la pompe 2 a été sélectionné.
7	**Loc - Rem**	Deux DEL vertes qui indiquent le mode de fonctionnement sélectionné: - **Loc** est allumée lorsque le mode de fonctionnement LOCAL est sélectionné; - **Rem** est allumée lorsque le mode de fonctionnement ELOIGNE E/S ou TELEGESTION est sélectionné.
8	ON OFF STANDBY	Lorsque la touche est en position OFF, les pompes 1 et 2 sont désactivées; lorsqu'elle est en position ON, les pompes peuvent être allumées. En conditions d'urgence, elle permet d'arrêter les deux pompes en même temps.

Réf.	Nom Commande/Diode	Description de la Commande/Diode	
9	RUN SET	Le sélecteur à clé RUN/SET permet de changer la signification des touches à deux fonctions du tableau frontal. La position RUN est la position normale pendant le fonctionnement de la pompe. La position SET permet de définir les paramètres de la pompe.	
		Clé en position RUN	**Clé en position SET**
10	AMP VOLT PAGE ▲	**AMP/VOLT** Sa pression permet d'afficher sur l'écran à cristaux liquides la mesure de courant ou tension de la pompe sélectionnée par la commande (13). Si la pompe sélectionnée est désactivée, la touche est hors service.	**PAGE ▲** Sa pression permet de passer à la page-écran de prédéfinition précédente.
11	TORR mBAR ADJUST+	**TORR/mBAR** Sa pression permet d'afficher sur l'écran à cristaux liquides la mesure de pression en Torr ou en mbar de la pompe sélectionnée par la commande (13). Si la pompe sélectionnée est désactivée, la touche est hors service.	**ADJUST +** Sa pression permet de modifier la valeur de prédéfinition. Cette touche permet également de mettre en route la procédure standard d'arrêt d'une seule pompe.
12	START PROT PAGE ▼	**START/PROTECT** Sa pression permet de changer le mode de fonctionnement de la pompe sélectionnée par la commande (13) de START en PROTECT ou vice-versa. Si le mode PROTECT est sélectionné pour une pompe, la DEL correspondante verte Prot (4)ou (6) s'allume.	**PAGE ▼** Sa pression permet de passer à la page-écran de prédéfinition suivante.
13	PUMP SELECT # ADJUST−	**PUMP SELECT** Sa pression permet de sélectionner sur l'écran la pompe sur laquelle est effectuée l'action suivante (par exemple, le changement du mode de fonctionnement ou l'affichage des paramètres de la pompe). La pompe sélectionnée est indiquée sur l'écran par le symbole # suivi du numéro 1 ou 2. Si un seul module H.V. est installé, la touche est hors fonction.	**ADJUST -** Sa pression permet de modifier les valeurs de prédéfinition. Egalement de mettre en Elle permet route la procédure standard d'arrêt d'une seule pompe.
14	Aux DISPL CLEAR	**Aux DISPL** Sa pression permet de sélectionner la lecture de la carte MultiGauge à afficher sur l'écran.	**CLEAR** Sa pression permet de retourner à la sélection précédente si la ENTER n'a pas encore été touche pressée; ou bien sa pression par deux fois permet de retourner à la première page du menu sélectionné depuis n'importe quelle page.
15	PARAM ENTER	**PARAM** Sa pression permet d'afficher les paramètres de la pompe sélectionnée sur la carte H.V. indiquée sur l'écran par le symbole #. Les paramètres affichés sont: **Pump size**: la dimension de la pompe sélectionnée **Imax**: le courant de court-circuit de la pompe sélectionnée. **Iprot**: la valeur de courant à laquelle intervient la protection "Overcurrent" **PWRmax**: la puissance maxi de la pompe sélectionnée **Vmax**: la polarité (+ ou -) ou la tension maxi de la pompe sélectionnée **Fixed V** ou **Step V**: le mode d'exploitation sélectionné **STP1/STP2**: les valeurs des Set Points 1 et 2 et l'information si les Set Points ont été dépassés (le symbole ^ indique que le set point correspondant a été dépassé ou que la H.V. est éteinte). **NOTE:** Les indications relatives aux set points ne sont affichées que si la carte Set Point / Remote Control est installée.	**ENTER** Sa pression permet de confirmer le paramètre affiché.

Réf.	Nom Commande/Diode	Description de la Commande/Diode	
		Clé (9) en position RUN	**Clé (9) en position SET**
16	PUMP1 HV ON/OFF ◄FIELD HV Prot	**PUMP 1 HV ON/OFF** Sa pression fait s'allumer ou s'éteindre la carte H.V. de la pompe 1. Elle fonctionne comme un interrupteur bistable. Son action est indépendante de la ligne sélectionnée sur l'écran. Pour allumer la carte H.V., l'interrupteur STANDBY ON/OFF (8) doit être dans la position ON.	**< FIELD** Elle a trois fonctions: - elle change le menu affiché (View, Mode, Set); - elle sélectionne le champ à l'intérieur de la page pendant l'opération de prédéfinition; - elle change la page en lecture de la pompe 1 à la pompe 2 et vice-versa lorsque les deux pompes sont allumées.
17	PUMP2 HV ON/OFF FIELD► HV Prot	**PUMP 2 HV ON/OFF** Sa pression fait s'allumer ou s'éteindre la carte H.V. de la pompe 2. Elle fonctionne comme un interrupteur bistable. Son action est indépendante de la ligne sélectionnée sur l'écran. Pour allumer la carte H.V., l'interrupteur STANDBY ON/OFF (8) doit être dans la position ON.	**FIELD >** Elle a trois fonctions: - elle change le menu affiché (View, Mode, Set); - elle sélectionne le champ à l'intérieur de la page pendant l'opération de prédéfinition; - elle change la page en lecture de la pompe 1 à la pompe 2 et vice-versa lorsque les deux pompes sont allumées.
18		Pieds frontaux à extraire uniquement en cas d'installation sur une table.	

Tableau Dorsal du MultiVac

La figure suivante indique les commandes et les connexions du tableau dorsal du contrôleur MultiVac. La configuration représentée prévoit une carte H.V., une carte Set Point/Remote Control card et une carte RS 232/422 Computer Interface.

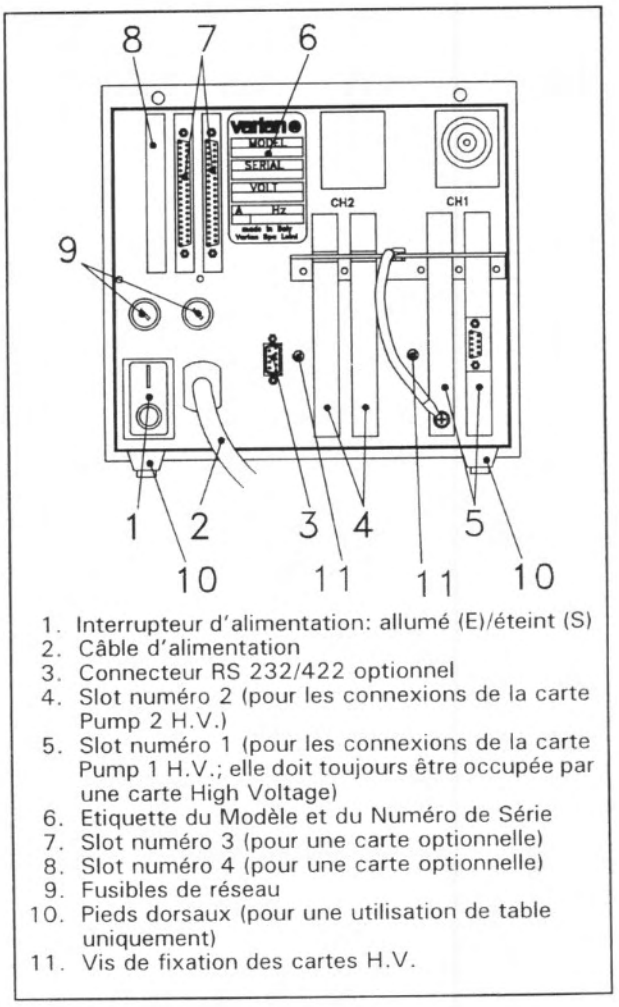
UTILISATION

Modes de Fonctionnement

Le contrôleur MultiVac peut fonctionner dans les modes LOCAL, ELOIGNE entrée/sortie (E/S) ou TELEGESTION.

Si aucune carte optionnelle (Remote I/O and Set-Points ou RS232-422) n'est présente, le seul mode de fonctionnement disponible est le mode LOCAL. Dans le mode LOCAL, toutes les commandes sont données depuis le tableau frontal.
Si seule la carte Remote I/O and set-Points est installée, le MultiVac peut fonctionner dans les modes LOCAL ou ELOIGNE E/S. Dans le mode ELOIGNE E/S, toutes les commandes sont données par le connecteur d'entrée/sortie du tableau dorsal. Après une coupure d'alimentation, le MultiVac retourne au mode de fonctionnement précédemment sélectionné.
Si la carte RS232-422 est installée et si elle a été activée par l'interrupteur à positions multiples 3 (voir l'appendice "Technical Informations"), le MultiVac peut fonctionner dans les modes LOCAL et TELEGESTION où toutes les commandes sont données par la ligne RS 232-422. Après une coupure d'alimentation, le MultiVac retourne toujours au mode de fonctionnement TELEGESTION, même si le mode précédemment sélectionné était LOCAL.

Si les deux cartes RS 232-422 et Remote I/O sont installées, le MultiVac peut fonctionner dans les trois modes. Après une coupure d'alimentation, le MultiVac retourne toujours au mode de fonctionnement TELEGESTION, même si le mode précédemment sélectionné était LOCAL ou ELOIGNE E/S.



1. Interrupteur d'alimentation: allumé (E)/éteint (S)
2. Câble d'alimentation
3. Connecteur RS 232/422 optionnel
4. Slot numéro 2 (pour les connexions de la carte Pump 2 H.V.)
5. Slot numéro 1 (pour les connexions de la carte Pump 1 H.V.; elle doit toujours être occupée par une carte High Voltage)
6. Etiquette du Modèle et du Numéro de Série
7. Slot numéro 3 (pour une carte optionnelle)
8. Slot numéro 4 (pour une carte optionnelle)
9. Fusibles de réseau
10. Pieds dorsaux (pour une utilisation de table uniquement)
11. Vis de fixation des cartes H.V.

Tableau Dorsal du MultiVac

L'unité a été conçue pour fonctionner dans les modes suivants:

- **mode START ou PROTECTED**
- **mode STEP ou FIXED VOLTAGE**

Dans le **mode START**, le contrôleur fournit toute la puissance, indépendamment des conditions de la pompe, jusqu'au courant de court-circuit. Ce mode de fonctionnement doit être utilisé pour mettre la pompe en marche à haute pression.

Dans le **mode PROTECTED**, le contrôleur limite le courant de sortie et éteint la haute tension lorsque la valeur de courant dépasse le courant de seuil pendant plus de 0,2 secondes.

Dans le **mode STEP**, lorsque le courant absorbé par la pompe atteint les valeurs de seuil, le contrôleur change la tension de sortie.
Dans le **mode FIXED VOLTAGE**, la tension de sortie reste toujours à sa valeur maximale.

NOTE

L'unité est préréglée en usine comme suit:
- *dans le mode de fonctionnement LOCAL si la carte Computer Interface n'est pas installée*
- *dans le mode de fonctionnement ELOIGNE si la carte Computer Interface est installée*
- *avec la clé RUN/SET dans la position RUN*
- *dans le mode de fonctionnement START, STEP VOLTAGE*

Pendant l'utilisation normale du contrôleur, la clé RUN/SET DOIT être dans la position RUN.

Pour toutes informations plus détaillées sur les modes de fonctionnement, consulter l'appendice "Technical Informations".

Pour allumer la Carte H.V.

Pour allumer la carte H.V. la clé RUN/SET doit être dans la position RUN, l'interrupteur **STANDBY** et l'interrupteur d'alimentation du tableau dorsal doivent être dans la position ON.

NOTE

Si une seule carte est installée, les deux lignes sont consacrées à la pompe numéro un; si deux cartes sont installées, chaque ligne est consacrée à une pompe différente.

L'écran affiche:

1	#		2	0		S	t	a	r	C	e	l	l		

Presser la touche **PUMP 1 HV ON/OFF** (ou bien **PUMP 2 HV ON/OFF**, selon la pompe que l'on veut activer), et l'écran affiche:

1	#		C	u	r	r	e	n	t		(	A	)		

Pour afficher la valeur de la tension, presser la touche **AMP/VOLT**.

Pour afficher la pression, presser la touche **TORR/mBAR**.

NOTE

Le changement ne se produit que dans la ligne ayant le symbole #. Presser la touche **PUMP SELECT #** *pour déplacer le symbole # d'une ligne à l'autre.*

A côté de la valeur lue, apparaît l'un des symboles indiqués dans le tableau suivant:

Symbole	Description
>	La valeur augmente
<	La valeur diminue
■	La valeur est stable

NOTE

Si le courant est trop faible (c'est-à-dire 1×10^{7} A), la valeur de pression n'est pas lue et le message "LOW PRESSURE" est affiché.

Fonctionnement des Ventilateurs

Lorsque le contrôleur est allumé et que les cartes H.V. sont éteintes, les ventilateurs tournent lentement, de manière à assurer un léger flux d'air à l'intérieur de l'unité.
Lorsqu'une carte H.V. est allumée, les ventilateurs commencent à tourner à grande vitesse, de manière à assurer un flux d'air élevé à l'intérieur de l'unité lorsque la tension dépasse 5 KV ou que la puissance de sortie dépasse 30 W.

Pour allumer les Cartes MultiGauge

Pour allumer les cartes MultiGauge, procéder comme suit:

- Allumer l'interrupteur d'alimentation situé sur le tableau dorsal.
- Mettre sur ON l'interrupteur STAND-BY/INTERLOCK du tableau frontal: le message "MULTIVAC INITIALIZATION" sera alors affiché pendant quelques secondes, puis seront affichés les types de pompes sélectionnées sur les cartes High Voltage installées dans les slots 1 et 2.
- Presser la touche AUX DISPL: l'écran affichera le type de carte installée dans les slots A et B (troisième et quatrième).
- Tourner la clé dans la position SET: l'écran affichera le message "MAIN MENU - VIEW".
- Presser ENTER: l'écran affichera l'un des slots; se déplacer à travers les 4 slots à l'aide des deux touches FIELD LEFT et FIELD RIGHT jusqu'à ce que soit affichée la carte que l'on souhaite allumer.
- Presser ENTER; si une panne a précédemment éteint la carte, l'écran indiquera la raison de la panne.
- Presser ENTER: l'écran demandera si l'on souhaite allumer la carte Gauge. La réponse implicite est YES; si l'on veut choisir NO, presser l'une des touches FIELD.
- Presser ENTER: le MultiVac allumera le capteur de la carte Gauge et l'écran affichera le message "WARM UP" pendant 10 à 20 secondes.

Lorsque la carte Gauge est allumée, l'écran affiche la valeur de pression lue.

Lecture des Paramètres de la Pompe

Lorsqu'une carte H.V. est allumée, il est possible de lire les paramètres de la pompe en pressant la touche **PARAM**. La lecture obtenue est généralement la suivante:

1	#		2	0		S	t	a	r	C	e	l	l		

1	#		I	m	a	x		1	5	0		m	A		

1	#		I	p	r	o	t		2	0		m	A		

1	#		P	W	R	m	a	x		1	5	0		W	

1	#		V	m	a	x		-	7	0	0	0		V	

1	#		S	T	E	P		V							

Pour éteindre la Carte H.V.

Pour éteindre une carte H.V., presser la touche correspondante **PUMP HV ON/OFF** située sur le tableau frontal du contrôleur.

Pour éteindre les deux pompes à la fois, en état d'urgence, il est possible de mettre l'interrupteur STAND-BY/INTERLOCK du tableau frontal dans la position OFF. Dans ce cas-là, les DEL **HV** clignotent et l'écran affiche

S	T	A	N	D	B	Y	/	I	N	T	L	K			
S	E	E		M	A	N	U	A	L						

pendant 5 secondes environ, puis retourne aux conditions normales.

ENTRETIEN

Le contrôleur MultiVac n'exige aucun entretien. Toute opération doit être effectuée par un personnel agréé. En cas de panne, il est possible de s'adresser au Service de réparation Varian ou bien au "Varian advance exchange service" qui permet d'obtenir un contrôleur neuf à la place du contrôleur détraqué.

DANGER!

Avant d'effectuer toute opération sur le contrôleur, débrancher le câble d'alimentation.

En cas de mise au rebut du contrôleur, procéder à son élimination conformément aux réglementations nationales en la matière.

MESSAGES D'ERREUR

Pour certains types de panne, le contrôleur procède à un autodiagnostic et affiche l'un des messages d'erreur indiqués dans le tableau suivant.

MESSAGE	DESCRIPTION	INTERVENTION
POLARITY ERROR SEE MANUAL	La polarité du type de pompe sélectionnée depuis le tableau frontal de la carte ne correspond pas à la polarité du module Multiplier.	Inverser la polarité du module Multiplier (voir l'appendice "Technical Informations").
H.V. CARD FAULT SEE MANUAL	Il existe un dysfonctionnement des circuits de lecture du courant de la carte H.V. ou des circuits de commande. La DEL du tableau frontal correspondant à la carte H.V. clignote.	Eteindre et rallumer l'unité. Si l'erreur se présente à nouveau s'adresser au service après-vente Varian.
PUMP OVERCURRENT SEE MANUAL	Dans le mode de fonctionnement Protect, la valeur de courant dépasse le courant de seuil pendant plus de 0,2 secondes. La DEL du tableau frontal correspondant à la carte H.V. clignote.	Sélectionner le mode START, afin que le contrôleur puisse fonctionner jusqu'au courant de court-circuit sans seuil.
REMOTE INTERLOCK SEE MANUAL	Lorsque la carte Remote I/O est présente et que l'entrée 1 (interlock extérieur) est au niveau haut (ouverte), il est impossible d'allumer la carte High Voltage ou, si elle est déjà allumée, elle est éteinte. La DEL correspondante du tableau frontal clignote.	Enlever l'interlock extérieur.
STANDBY/INTLK SEE MANUAL	On a enlevé la couverture de l'unité avec au moins un module H.V. allumé, ou on a essayé d'allumer le module H.V. avec la couverture ouverte. La DEL correspondante du tableau frontal clignote.	Fermer la couverture.
	Le module H.V. a été éteint à l'aide de l'interrupteur Standby ON/OFF du tableau frontal ou bien on a essayé d'allumer le module H.V. avec le même interrupteur en position OFF. La DEL correspondante du tableau frontal clignote	Répéter correctement la procédure de mise hors tension ou de mise sous tension.
OVERTEMPERATURE SEE MANUAL	La protection thermique du module H.V. s'est activée. La DEL correspondante du tableau frontal clignote.	Améliorer la circulation de l'air autour de l'unité.
TEST ERROR SEE MANUAL	L'auto-test à l'allumage a détecté une panne, ou bien aucune carte High Voltage n'est présente dans le slot 1.	Installer la carte H.V. dans le slot 1. Eteindre et rallumer l'unité. Si l'erreur se présente à nouveau s'adresser au Réseau Après-vente Varian.
CHECK HV1 CONN. SEE MANUAL	La carte High Voltage n'est pas correctement installée.	Eteindre le contrôleur et le débrancher du réseau d'alimentation. Enlever la carte H.V. et l'installer à nouveau avec attention.
DEGAS UNDERCURR	La carte MultiGauge Bayard-Alpert a détecté une erreur de courant de degas trop bas.	Eteindre et rallumer la carte. Si l'erreur se présente à nouveau s'adresser au Service après-vente Varian.
OVERCURRENT	La carte Multi Gauge UHV a détecté une erreur de surintensité du filament ou bien la carte Multi Gauge Cold Cathode a détecté une erreur de surintensité.	Eteindre et rallumer la carte. Si l'erreur se présente à nouveau s'adresser au Service après-vente Varian.
UNDERCURRENT	Les cartes Multi Gauge Bayard-Alpert ou UHV ont détecté une erreur de courant de filament trop bas (le capteur n'est pas connecté ou le filament du capteur est coupé).	Vérifier la connexion du capteur et éteindre et rallumer la carte. Si l'erreur se présente à nouveau, s'adresser au Service après-vente Varian.
GRID ERROR	Les cartes Multi Gauge Bayard-Alpert ou UHV ont l'erreur détecté une erreur de la grille (la grille du capteur n'est pas connectée)	Eteindre et rallumer la carte. Si l'erreur se présente à nouveau s'adresser au Service après-vente Varian.
OVERTEMPERATURE	Les cartes Multi Gauge Bayard-Alpert ou UHV ou Cold Cathode ont détecté à une erreur de surtempérature.	Eteindre et rallumer les cartes. Si l'erreur se présente nouveau, s'adresser au Service après-vente Varian.
POWER SUPPLY	Les cartes Multi Gauge ou Thermocouple ont détecté une erreur d'alimentation.	Eteindre et rallumer les cartes. Si l'erreur se présente à nouveau, s'adresser au Service après-vente Varian.
MEAS OUT LIMITS	Les cartes Multi Gauge Bayard-Alpert ou UHV Cold Cathode, pendant la période de chauffage, n'ont pas été à même de fournir une lecture significative.	Eteindre et rallumer les cartes. Si l'erreur se présente à nouveau, s'adresser au Service après- vente Varian.

GENERAL INFORMATION

This equipment is destined for use by professionals. The user should read this instruction manual and any other additional information supplied by Varian before operating the equipment. Varian will not be held responsible for any events occurring due to non-compliance, even partial, with these instructions, improper use by untrained persons, non-authorised interference with the equipment or any action contrary to that provided for by specific national standards.
The following paragraphs contain all the information necessary to guarantee the safety of the operator when using the equipment. Detailed information is supplied in the appendix "Technical Information".
This manual uses the following standard protocol:

WARNING

The warning messages are for attracting the attention of the operator to a particular procedure or practice which, if not followed correctly, could lead to serious injury.

CAUTION

The caution messages are displayed before procedures which, if not followed, could cause damage to the equipment.

NOTE

The notes contain important information taken from the text.

CONTROLLER DESCRIPTION

Varian's MultiVac controller is a half-rack modular and flexible ion pumps controller. The unit can be factory configured according to the customer's needs, or the parts can be ordered separately and the user can add or change the process control capability in the field by simply inserting or moving option cards.

The MultiVac controller minimum configuration is:

- 1 MultiVac base unit
- 1 Vaclon Pump High Voltage card

The minimum configuration can be expanded adding optional cards. The available optional cards are detailed in the following table.
The optional cards can be installed with the following limitations:

- a maximum of two high voltage cards
- a maximum of two other cards.

NOTE

MultiVac controller with part number 929-4000/4001/4010/4011 cannot control a MultiGage card. To install a MultiGage card the controller must be updated by means of a suitable kit. Call Varian Service for more information.

DESCRIPTION	PART NUMBER
MultiVac Base Unit	
Base Unit set for 220 Vac input voltage	929-4000 929-4001 (with RS-232 card installed)
Base Unit set for 110 Vac input voltage	929-4010 929-4011 (with RS-232 card installed)
Optional cards	
Medium Vaclon Pump High Voltage (H.V.) card	929-4025 or 929-4035
Large Vaclon Pump High Voltage (H.V.) card	929-4040 or 929-4050
Set Point/Remote Control card	969-4110
RS 232-422 Computer Interface card	929-4100
Multi Gauge Bayard-Alpert	L6427-301
Multi Gauge UHV	L8321-301
Multi Gauge Cold Cathode	L6433-301
Multi Gauge Thermocouple	L6430-301

The MultiVac controller base unit in conjunction with the H.V. cards can operate a maximum of two ion pumps with positive or negative polarity from 20 l/s to 500 l/s.
It allows a reliable pressure reading down to 10^{-11} Torr range, while optimising the pumping performance throughout the entire operating range.
The Multi Gauge cards allow pressure readings with different precision and measurement range.
The MultiVac controller can be operated in LOCAL mode, in REMOTE I/O mode when the Set Point Remote Control card is installed, or in REMOTE COMMUNICATION mode when the RS 232-422 Computer Interface card is installed.
In LOCAL mode all controls are given on front panel. In REMOTE I/O mode all controls are given on the rear panel connector of the Set Point/Remote Control card. In REMOTE COMMUNICATION mode all controls are given by an host computer through the RS 232-422 Computer Interface card.

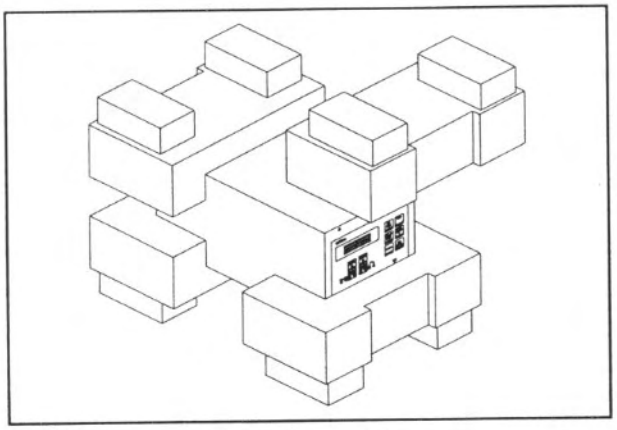
STORAGE

When transporting and storing the controllers, the following environmental requirements should be satisfied:

- temperature: from -20 °C to +70 °C
- relative humidity: 0 - 95% (without condensation)

PREPARATION FOR INSTALLATION

The controller is supplied in a special protective packing. If this shows signs of damage which may have occurred during transport, contact your local sales office. When unpacking the controller, ensure that it is not dropped or subjected to any form of impact.
Do not dispose of the packing materials in an unauthorized manner. The material is 100% recyclable and complies with EEC Directive 85/399.



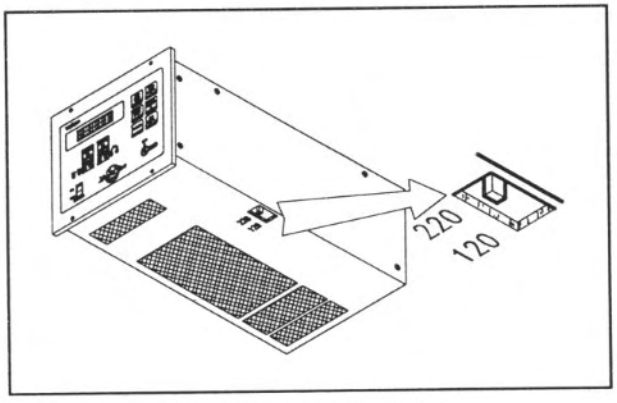
Controller packing

The MultiVac controller base unit is factory set for:

- model 929-4000/929-4001 set to 220 Vac (input 180 to 265 Vac),
- model 929-4010/929-4011 set to 110 Vac (input 90 to 130 Vac).

If a change in line voltage operation is desired, proceed as follows:

- Switch off the controller and unplug the power cord from the wall socket.
- On bottom cover of the controller, select the desired operating voltage by moving the switch to either 110 Vac or 220 Vac position as shown in the following figure.



Operating voltage switch

If the power cord plug must be changed, rewire as follows:

blue = neutral
brown = phase
yellow-green = ground

INSTALLATION

WARNING

The MultiVac controller base unit is equipped with a 3-wire power cord and plug (internationally approved) for user's safety. Use this power cord and plug in conjunction with a properly grounded power socket to avoid electrical shock.
Verify that the ground connections are properly connected.
High voltage developed in the controller can cause severe injury or death. Before servicing the unit, disconnect the input power cable.

CAUTION

The controller can be used as a bench unit or as a rack module, but it must be positioned so that free air can flow through the holes of the top and bottom cover.
If the controller is used as a rack module, it MUST be inserted in a 4 unit height rack adapter chassis to avoid the controller to fall inside the rack.
The MultiVac front panel is not designed to support the MultiVac weight.
Do not install or use the controller in an environment exposed to atmospheric agents (rain, snow, ice), dust, aggressive gases, or in explosive environments or those with a high fire risk.

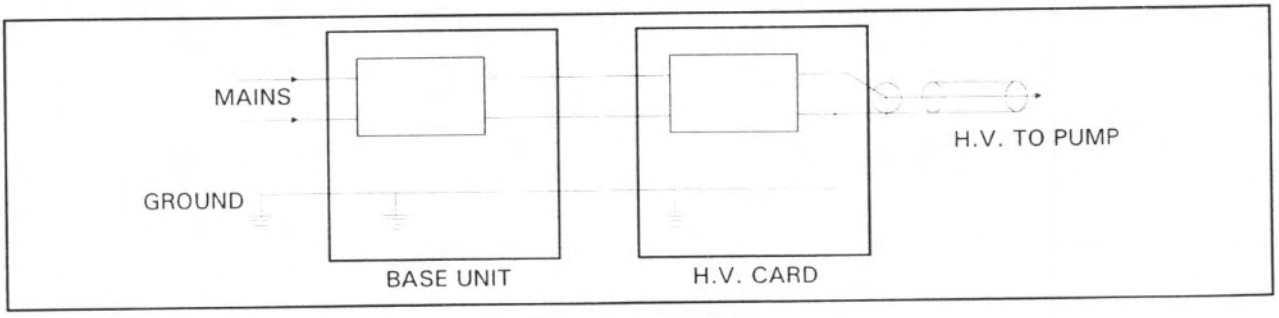
NOTE

If the controller is used as a bench unit, pull out the two front legs.
If the controller is installed on a rack, remove the four feet and position it with at least 30 mm (1.2 inches) of clearance on top and bottom.

During operation, the following environmental conditions must be respected:

- temperature: from 0 °C to +45 °C
- relative humidity: 0 - 90% (without condensation)

To connect the controller to the pump use the specific cable supplied as an option.
See the appendix "Technical Information" for detailed information about the above mentioned and the other connections, and about the optional cards installation.



Ground connections

USE

This paragraph describes the fundamental operating procedures. Detailed information and operating procedures that involve optional connections or options are supplied in the paragraph "USE" of the appendix "Technical Informations".
Make all vacuum manifold and electrical connections and refer to Turbo-V pump instruction manual prior to operating the controller.

WARNING

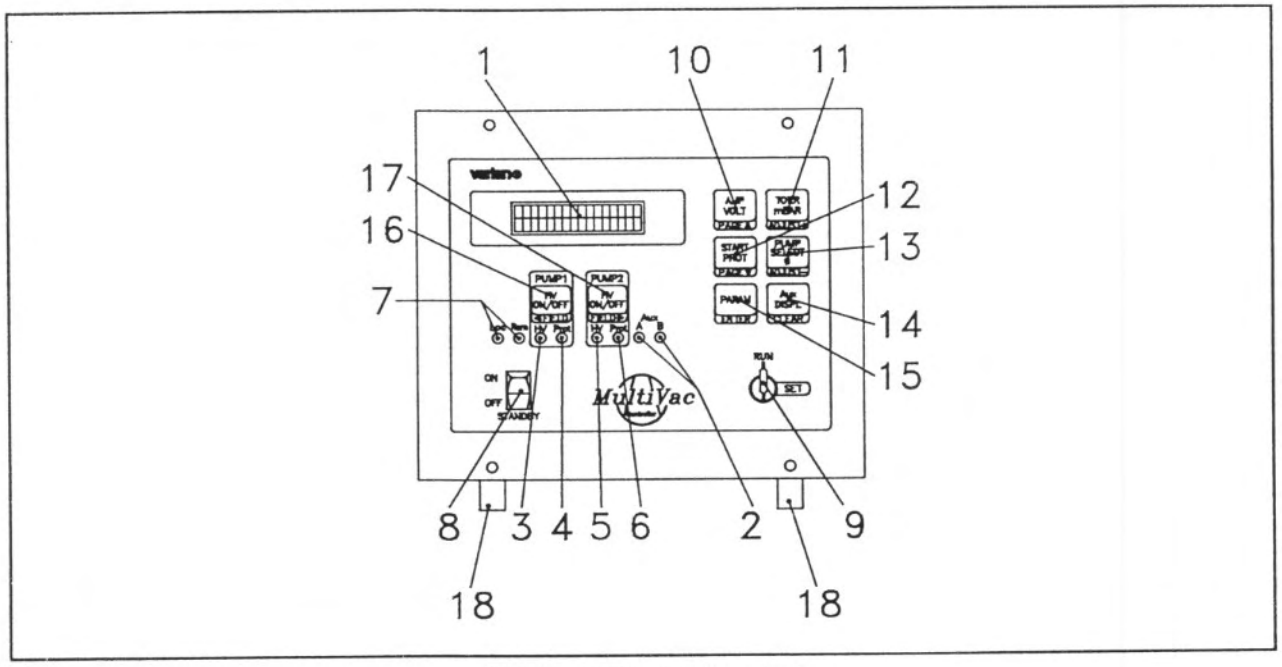
To avoid injury to personnel and damage to the equipment, if the pump is laying on a table make sure it is steady.
Never operate the Turbo-V pump if the pump inlet is not connected to the system or blanked off.

MultiVac Front Panel Controls and Indicators

The MultiVac controller base front panel is shown in the following figure.
The controls and indicators meaning and function is detailed in the following table.

NOTE

The meaning of push buttons of the MultiVac front panel changes according to the RUN-SET selection key position.
The white writings on black background are valid when the key is in RUN position.
The red writings on white background are valid when the key is in SET position.



MultiVac front panel controls

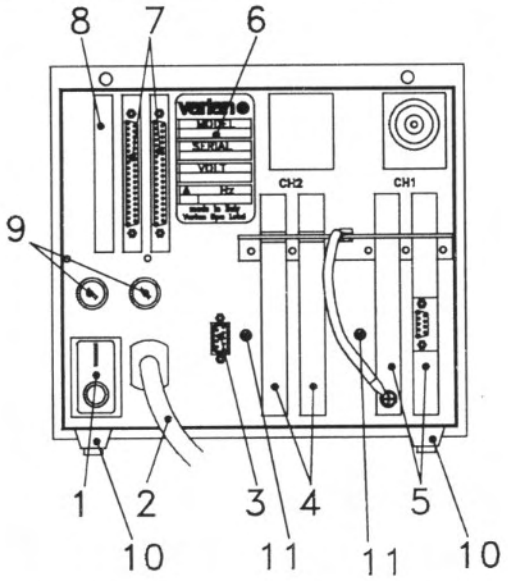
Ref.	Control/Indicator Name	Control/Indicator Description
1		LCD back lighted alphanumeric display dot matrix, 16 characters, 2 lines.
2	**AUX A/B**	Two green LEDs that are on if additional cards are installed (for example if the Set Point/Remote Control card is installed in slot #3 inside the unit, the LED A will be on).
3	**PUMP 1 - HV**	A yellow LED that is ON when the H. V. on Pump 1 is ON.
4	**PUMP 1 - Prot.**	A green LED that is ON when the Protect mode of operation has been selected for Pump 1.
5	**PUMP 2 - HV**	A yellow LED that is ON when the H. V. on Pump 2 is ON.
6	**PUMP 2 - Prot.**	A green LED that is ON when the Protect mode of operation has been selected for Pump 2.
7	**Loc - Rem**	Two green LEDs that show which operating mode is selected: – **Loc** is ON when the LOCAL mode of operation is selected; – **Rem** is ON when the REMOTE I/O or the REMOTE COMMUNICATION mode is selected.
8	ON OFF STANDBY	When in OFF position the Pump 1 and Pump 2 are disabled; when in ON position the pumps can be switched ON. It allows to switch off both pumps at the same time in emergency condition.

Ref.	Control/Indicator Name	Control/Indicator Description	
9	RUN SET	The RUN/SET key selector allows to change the meanings of the double function front panel push buttons. The RUN position is the normal position during the pump functioning. The SET position allows to set the pump parameters.	
		Key in RUN position	**Key in SET position**
10	AMP VOLT PAGE ▲	**AMP/VOLT** When pressed it allows to display on the LCD display the current or voltage measurements of the pump selected by means of control (13). If the selected pump is off, the push button is inoperative.	**PAGE ▲** When pressed it changes the displayed setting page to the previous one.
11	TORR mBAR ADJUST+	**TORR/mBAR** When pressed it allows to display on the LCD display the pressure measurement in Torr or in mBAR of the pump selected by means of control (13). If the selected pump is off, the push button is inoperative.	**ADJUST +** When pressed it allows to modify the setting values. It also allows to access to the standard switch off routine for the single pump.
12	START PROT PAGE ▼	**START/PROTECT** When pressed it switches from START to PROTECT or viceversa the operational mode for the pump selected by means of control (13). If the PROTECT mode has been selected for a pump the corresponding green LED Prot (4) or (6) is ON.	**PAGE ▼** When pressed it changes the displayed setting page to the following one.
13	PUMP SELECT # ADJUST–	**PUMP SELECT** It allows to select, on the display, the pump subject to the following action (for example to change the operating mode or to display the pump parameters). The selected pump is indicated on the display by the # symbol followed by the number 1 or 2. If only one H. V. module is installed, the push button is inactive.	**ADJUST -** When pressed it allows to modify the setting values. It also allows to access to the standard switch off routine for the single pump.
14	Aux DISPL CLEAR	**Aux DISPL** It allows to select the Multi Gauge card reading to be displayed on the LCD display.	**CLEAR** When pressed it reverts to the previous selection if the ENTER push button has not been pressed, or, if pressed twice, goes back to the menu first page from any page of the selected menu.
15	PARAM ENTER	**PARAM** When pressed it allows to display the parameters of the pump selected on the H. V. card that is indicated on the display by the symbol #. The displayed parameters are: **Pump size**: the selected pump size **Imax**: the short circuit current for the selected pump size **Iprot**: the current value at which the "Overcurrent "protection intervenes **PWRmax**: the maximum power for the selected pump size **Vmax**: The polarity (+ or -) and the maximum voltage for the selected pump size **Fixed V** or **Step V**: the selected operating mode **STP1/STP2**: the set Set Point 1 and 2, and the information if the set points are passed (a ^ mark indicates that the corresponding set point has been passed or that the H. V. is OFF) **NOTE**: The indications of the set points will be shown only if the Set point/Remote Control card is installed.	**ENTER** When pressed it confirms the displayed parameters.

Ref.	Control/Indicator Name	Control/Indicator Description	
		Key (9) in RUN position	Key (9) in SET position
16	PUMP1 HV ON/OFF ◄FIELD HV Prot	**PUMP 1 HV ON/OFF** When pressed it directly switches ON and OFF the H. V. of the pump 1. It works in toggle mode. Its operation is independent from the selected line on the display. To switch ON the H. V., the STANDBY ON/OFF rocker switch (8) must be in ON position.	**< FIELD** It allows three functions: - to change the displayed menu (View, Mode, Set); - to select the field within the page during the setting operation - to change the reading page from pump 1 to pump 2 and viceversa when both pumps are ON.
17	PUMP2 HV ON/OFF FIELD► HV Prot	**PUMP 2 HV ON/OFF** When pressed it directly switches ON and OFF the H. V. of the pump 2. It works in toggle mode. Its operation is independent from the selected line on the display. To switch ON the H. V., the STANDBY ON/OFF rocker switch (8) must be in ON position.	**FIELD >** It allows three functions: - to change the displayed menu (View, Mode, Set); - to select the field within the page during the setting operation - to change the reading page from pump 1 to pump 2 and viceversa when both pumps are ON.
18		Front legs extracted for bench operation only	

MultiVac Rear Panel

The MultiVac controller base rear panel controls and connections are shown in the following figure where a configuration with one H. V. card, one Set Point/Remote Control card and one RS 232/422 Computer Interface card is shown.



1. Controller power ON (I)/OFF (O) switch
2. Line cord
3. Optional RS 232/422 connector
4. Slot number 2 (for Pump 2 H.V. card connections)
5. Slot number 1 (for Pump 1 H.V. card connections; must always be occupied by an High Voltage card)
6. Model and Serial number label
7. Slot number 3 (for expansion card)
8. Slot number 4 (for expansion card)
9. Mains fuses
10. Rear feet (for bench operation only)
11. H.V. card fixing screws

MultiVac base rear panel

USE PROCEDURE

Operating Modes

The MultiVac controller can be operated in the LOCAL, REMOTE input/output (I/O) or REMOTE COMMUNICATION mode.

If no optional card (Remote I/O and Set-Points card or RS232-422 card) is installed, the only available operating mode is LOCAL. In the LOCAL mode all controls are given on front panel.

If only the Remote I/O and Set-Points card is installed, the MultiVac can operate in the LOCAL or REMOTE I/O mode. In the REMOTE I/O all controls are given via the I/O connector. After a power failure the MultiVac will return to the previously selected operating mode.

If the communication card RS232-422 is installed and enabled by the dip switch 3 (see the appendix Technical Information) the available operating modes are LOCAL and REMOTE COMMUNICATION in which all controls are given via the RS 232-422 line. After a power failure the MultiVac will always return to REMOTE COMMUNICATION mode also if the previous selection was LOCAL.

If both RS232-422 and Remote I/O cards are installed, the three operational modes are available. After a power failure the MultiVac will always return to REMOTE COMMUNICATION mode also if the previous selection was LOCAL or REMOTE I/O.

The unit is designed to operate in different modes:

- **START or PROTECTED mode**
- **STEP or FIXED VOLTAGE mode**

In the **START mode** of operation the controller supplies full power, disregarding the pump condition, up to the short circuit current. This operating mode should be used to start the pump at high pressure.

In the **PROTECTED mode** of operation the controller limits the output current and it turns off the high voltage when the current value exceeds the trip current for more than 0.2 seconds.

In the **STEP mode** of operation when the current drawn by the pump reaches the threshold values, the controller changes the voltage output.

In the **FIXED VOLTAGE mode** of operation the output voltage remains always at the maximum value.

NOTE

The unit is factory set for:

- *LOCAL mode operation if the computer interface is not installed*
- *REMOTE mode operation if the computer interface is installed*
- *RUN/SET key in RUN position*
- *Operating mode: START, STEP VOLTAGE*

For normal use of the controller the RUN/SET key MUST be in RUN position.

Detailed information about the operating modes are contained in the appendix "Technical Information".

H.V. Card Switching ON

To switch ON the H.V. card the RUN/SET key must be in RUN position, the **STANDBY** rocker switch and the power switch on rear panel must be set to ON position.

NOTE

With one H.V. card installed both lines are dedicated to the pump number one, with two card installed each line is dedicated to different pump.

The display shows:

1	#		2	0		S	t	a	r	C	e	l	l		

Then press the **PUMP 1 HV ON/OFF** pushbutton (or **PUMP 2 HV ON/OFF** according to the pump to be switched ON), and the display shows:

1	#		C	u	r	r	e	n	t		(	A	)		

To display the voltage value press the **AMP/VOLT** pushbutton.

To display pressure press the **TORR/mBAR** pushbutton.

NOTE

*Changes will occur only in the line with the # symbol. Press the **PUMP SELECT #** pushbutton to move the # symbol from one line to the other.*

Close to the read-out value, one of the symbols described in the following table can appear.

Symbol	Description
>	The value is increasing
<	The value is decreasing
■	The value is stable

NOTE

Should the current value be very low (i.e. $< 1 \times 10^{-7}$ A), the pressure value is not read and appear the message "LOW PRESSURE".

Fan Operation

When the controller is switched ON and the H.V. cards are OFF, the fans rotate slowly so that a low air flow is assured inside the unit.
When one H.V. card is switched ON, the fans start rotating at higher speed to assure a high air flow inside the unit when the voltage is greater than 5 KV or the output power is greater than 30 W.

Switching On of the MultiGauge Cards

To switch on the MultiGauge cards execute the following procedure:

- Switch on the Mains switch on the rear panel.
- Switch on the STAND-BY/INTERLOCK switch on the front panel. The display will show the message "MULTIVAC INITIALIZATION" for few seconds and then the Pump Size selection of the High Voltage cards installed in channels 1 and 2.
- Press the pushbutton AUX DISPL, the display will show the type of the card installed in the slots A and B (3rd and 4th).
- Turn the key to SET position, the display will show the message "MAIN MENU - VIEW".
- Press ENTER, the display will show one of the channels, move through the 4 channels by means of the two pushbuttons FIELD LEFT and FIELD RIGHT until you find the indication of the card you want to switch on.
- Press ENTER; if the card has been previously switched off by a fault, the display will indicate the reason of the fault.
- Press ENTER and the display will ask you if you want to switch on the gauge card. The default is YES, if you want to choose NO press one of the pushbuttons FIELD.
- Press ENTER, the MultiVac will switch on the gauge head and the display will show the message "WARM UP" for about 10 - 20 seconds.

When the gauge is on, the display shows the pressure value.

Pumps Parameters Reading

When a H.V. card is switched ON you can read the pump preset parameters by pressing the **PARAM** pushbutton.
The read-out is typically of the following type:

1	#		2	0		S	t	a	r	C	e	l	l		

1	#		I	m	a	x		1	5	0		m	A		

1	#		I	p	r	o	t		2	0		m	A		

1	#		P	W	R	m	a	x		1	5	0		W	

1	#		V	m	a	x		-	7	0	0	0		V	

1	#		S	T	E	P		V							

H.V. Card Switching OFF

To switch OFF one H.V. card press the corresponding **PUMP HV ON/OFF** pushbutton on the controller front panel.

To switch off both the pumps at the same time in an emergency condition, you can turn the front panel rocker switch to the OFF position. In this case the **HV** Led flashes. and the display shows

S	T	A	N	D	B	Y	/	I	N	T	L	K			
S	E	E		M	A	N	U	A	L						

for about 5 seconds, then resume the normal condition.

MAINTENANCE

The MultiVac controller does not require any maintenance. Any work performed on the controller must be carried out by authorized personnel.
When a fault has occurred it is possible to use the Varian repair service. Replacement controllers are available on an advance exchange basis through Varian.

WARNING

Before carrying out any work on the controller, disconnect it from the supply.

If a controller is to be scrapped, it must be disposed of in accordance with the specific national standards.

ERROR MESSAGES

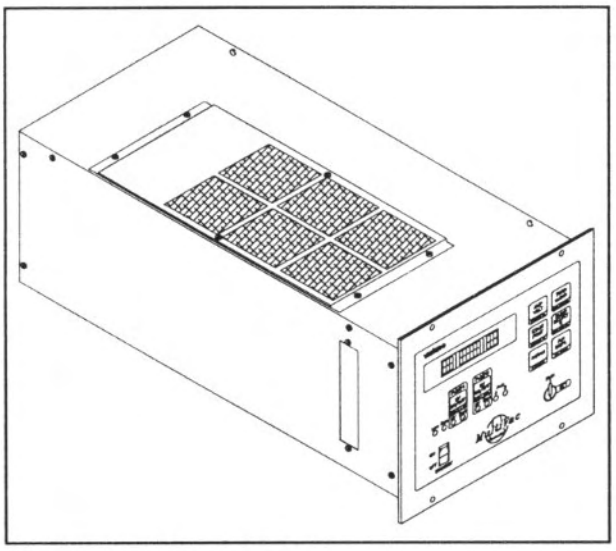
For a certain type of failure, the controller will self-diagnose the error and the messages described in the following table are displayed.

MESSAGE	DESCRIPTION	REPAIR ACTION
POLARITY ERROR SEE MANUAL	There is a mismatch between the polarity of the pump type selected by front panel card and the actual polarity of the multiplier module.	Reverse the polarity of the multiplier module (see the appendix "Technical Information").
H.V. CARD FAULT SEE MANUAL	There is a malfunction in the HV card current reading circuitry or in the control circuitry. The corresponding front panel LED is blinking.	Turn off and on again the unit. Should the error still be present, call Varian offices.
PUMP OVERCURRENT SEE MANUAL	In the Protect mode of operation the current value exceeds the trip current for more than 0.2 seconds. The corresponding H.V. card front panel LED is blinking.	Select START mode to allow the controller to work up to the short circuit current without trip-off.
REMOTE INTERLOCK SEE MANUAL	When the Remote I/O card is present and the input 1 (external interlock) is at high (open) level, you can't turn on the High Voltage card, or, if it is already on, it is switched off. The corresponding front panel LED is blinking.	Remove the external interlock.
STANDBY/INTLK SEE MANUAL	The unit cover is removed with at least one HV module on, or you tried to turn on the HV module with the cover opened. The corresponding front panel LED is blinking.	Close the cover.
	You turned off the HV module with the front panel Standby ON/OFF switch, or you tried to turn on the HV module with the front panel ON/OFF switch in OFF position. The corresponding front panel LED is blinking.	Repeat correctly the switching off or the switching on procedure.
OVERTEMPERATURE SEE MANUAL	The HV module thermal protections have been activated. The corresponding front panel LED is blinking.	Improve the air circulation around the unit.
TEST ERROR SEE MANUAL	The power on auto test has failed or no High Voltage card is installed on slot 1.	Install the H.V. card on slot 1. Turn off and on again the unit. Should the error still be present, call the Varian offices.
CHECK HV1 CONN. SEE MANUAL	The High Voltage card is not properly installed.	Turn off the controller and unplug the mains. Remove the H.V. card and carefully reinstall it.
DEGAS UNDERCURR	The MultiGauge Bayard-Alpert card has detected a degas undercurrent error.	Turn off and on again the card. Should the error still be present, call the Varian offices.
OVERCURRENT	The Multi Gauge UHV card detected a filament overcurrent error, or the Multi Gauge Cold Cathode card detected an overcurrent error.	Turn off and on again the card. Should the error still be present, call the Varian offices.
UNDERCURRENT	The Multi Gauge Bayard-Alpert or UHV cards detected a filament undercurrent error (the gauge head is not connected, or the filament of the gauge head is broken).	Check the head connection and turn off and on again the cards. Should the error still be present, call the Varian offices.
GRID ERROR	The Multi Gauge Bayard-Alpert or UHV cards detected a grid error (the grid of the gauge head is not connected).	Turn off and on again the cards. Should the error still be present, call the Varian offices.
OVERTEMPERATURE	The Multi Gauge Bayard-Alpert or UHV or Cold Cathode cards detected an overtemperature error.	Turn off and on again the cards. Should the error still be present, call the Varian offices.
POWER SUPPLY	The Multi Gauge Cold Cathode or Thermocouple cards detected a power supply error.	Turn off and on again the cards. Should the error still be present, call the Varian offices.
MEAS OUT LIMITS	The Multi Gauge Bayard-Alpert or UHV or Cold Cathode cards, during the warm-up time, has not be able to give a meaningful reading.	Turn off and on again the cards. Should the error still be present, call the Varian offices.

MULTIVAC CONTROLLER DESCRIPTION

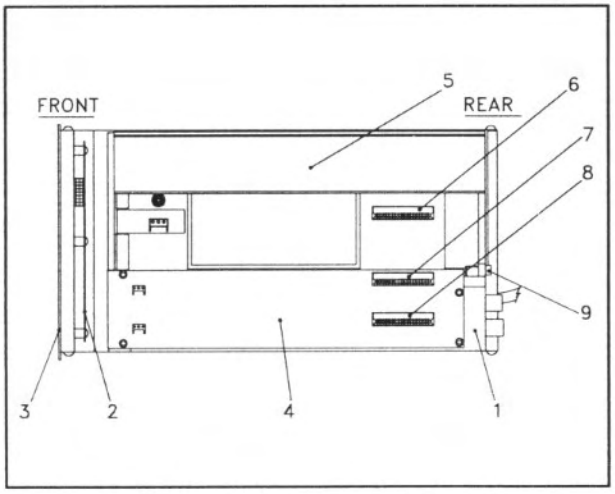
The MultiVac controller base is available in two versions which differ only in the factory set input voltage.

- Model 929-4000/929-4001 set for 220 Vac 50/60 Hz
- Model 929-4010/929-4011 set for 110 Vac 50/60 Hz



MultiVac Controller

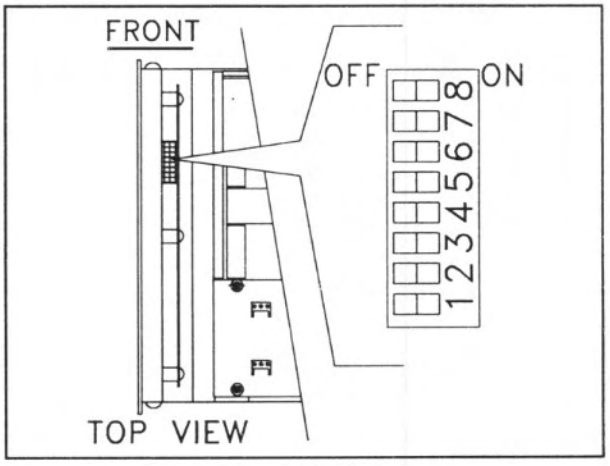
It consists of various boards. The following figure shows the minimum configuration.



MultiVac controller boards (Top view)

1) DC power supply and bus connection board: it contains the line voltage change over and the EMI filter.
The ac input voltage is rectified and the needed DC output voltages are generated.
The bus allows communication between the microprocessor and the cards located in the 4 slots and supplies the cards with the needed DC voltages. It consists of 36 lines.

2) Microprocessor board (located on front panel): it is based on a single chip microprocessor (Motorola 68 HC 11) with a large input/output capability. It manages commands coming from the front panel keyboard and from the various cards and drives the front panel display and all output card functions.
On the upper side of the board there are dip switches used for selection of different functions (see the following figure and the following table).



Dip switches

NOTE

Dip switches position do not need to be changed unless the operating conditions must be different from default settings

The "standby" ON/OFF rocker switch is located at the bottom side of the board.

Sw.	Selection	Function/Description
1, 2	Sw1 Sw2 OFF OFF ON OFF OFF ON ON ON	Serial computer interface speed communication baud rate: = 1200 (default value) = 2400 = 4800 = 9600
3	OFF ON	Serial computer interface inoperative (default for unit without computer interface) Serial computer interface operative (default for unit with computer interface)
4	OFF ON	Autostart H.V. after line failure (default) Not autostart after line failure
5	 OFF ON	Used when the Serial Computer Interface card is installed: Standard serial protocol ASCII serial protocol
6	OFF ON	Base unit in normal operation Base unit self test
7	OFF ON	Base unit in normal operation Non volatile memory reset
8	OFF ON	Base unit in normal operation Base unit manufacturing diagnostic and software revision check

NOTE

Dip switches 6, 7 and 8 are for service purpose only. **DO NOT** *move them.*

3) Display and front panel keyboard: it contains the functional push buttons, the key to select the operating mode, the LEDs indicating the operating channels and the active mode of operation, and the LCD display.

4) Internal expansion board: it allows the housing of the Auxiliary cards.

5) Slot #1: it contains the 1st H.V. card (controlling the pump n. 1) and must always be present

6) Slot #2: it can contain the 2nd H.V. card (controlling the pump n.2) (optional).

7) Slot #3 (located on the Internal Expansion board): it can contain an expansion card (Remote I/O Card or MultiGauge Card).

8) Slot #4 (located on the Internal Expansion board): it can contain a MultiGauge Card.

9) The mother board base location for accepting the RS 232-422 optional card.

10) Interlock cover switch (not shown in the figure).

11) Cooling fans: they are on the top cover to force the air into the unit for cooling purpose.

NOTE

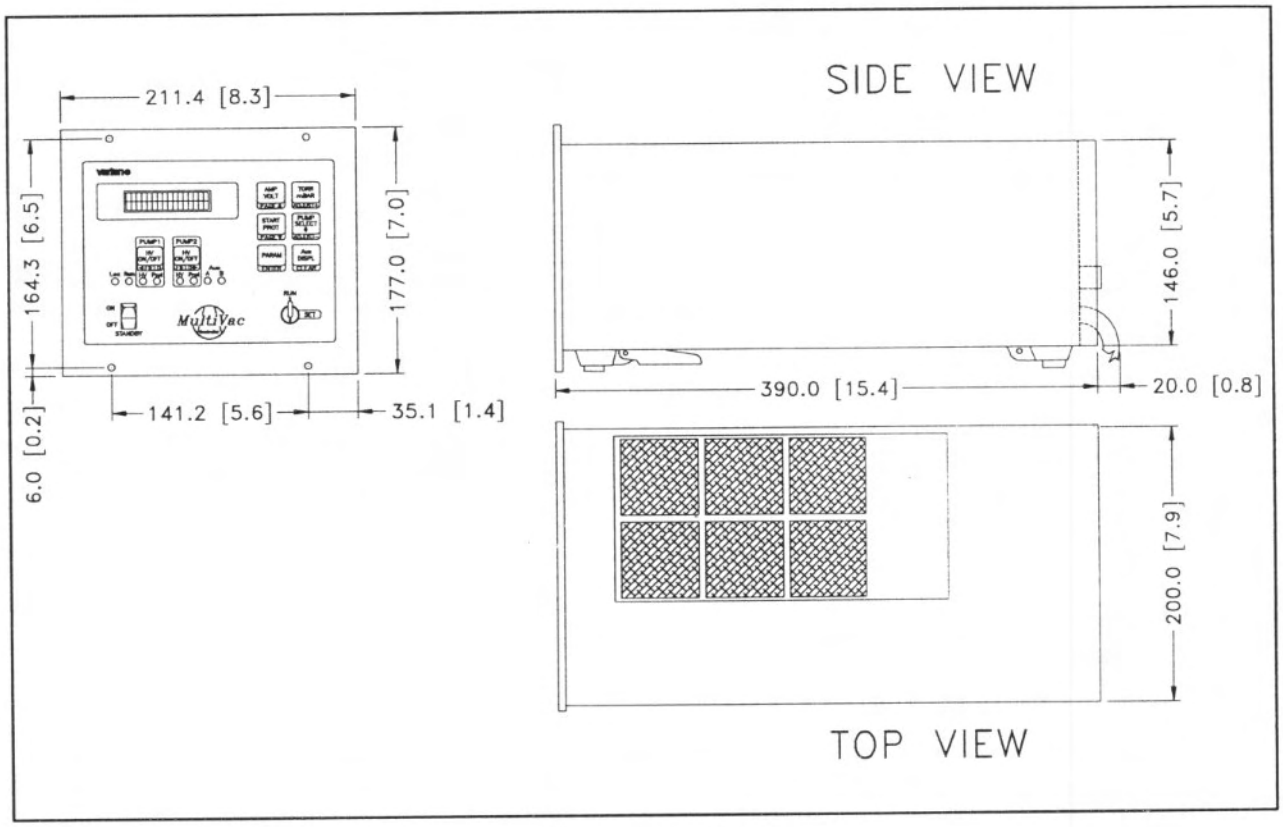
Leave at least 30 mm (1.2 inches) of free air circulation on top and bottom of the unit for an efficient cooling of the cards. Blind with the provided covers the unused slots. on rear panel

MULTIVAC BASE SPECIFICATIONS

Input: - Voltage (selectable at the bottom of the case) - Frequency - Power - Fuse	 90 to 130 Vac - 1 phase (use setting 110) 180 to 265 Vac - 1 phase (use setting 220) 47 to 63 Hz 1200 W (for maximum configuration) 15A slow blow (qty 2)
Operating: - Temperature - Humidity	 0 to + 45° C 90% maximum non condensing humidity
Radio interference suppression	Conforms to: EN 55011 class A group 1 IEC 1000-4-2/3/4
Disturbances limit	IEC 555 - 1,2,3
Safety requirements	Conforms to: CEI66-3 IEC 348 CSA C 22.2/0 and CSA C 22.2/151
Cables	Mains (2 meter long, 3 wires)
Weight (base unit)	8.5 kg (18.7 lbs)

CONTROLLER OUTLINE

The outline dimensions for the MultiVac controller base unit are shown in the following figure.



Controller outline

LARGE VACION PLUS HIGH VOLTAGE CARD

Card Description

The Large Vaclon Plus High Voltage (H.V.) card is a power supply designed to meet a wide range of requirements when used in conjunction with the MultiVac controller base unit.

It is a compact and light card, specifically designed to operate ion pumps with both positive and negative polarity from 20 l/s to 500 l/s and up to 400 W output power.

The card is programmed with 15 pre-defined pump settings and the user can tailor for his purpose the polarity, voltage, short circuit current, maximum power, pressure versus current curve for one more pump not included in the pre-defined type of pumps. Using a patented operation principle, the controller is capable of reading pressure down to the 10^{-11} Torr range, while optimizing the pumping speed in the entire operating range.

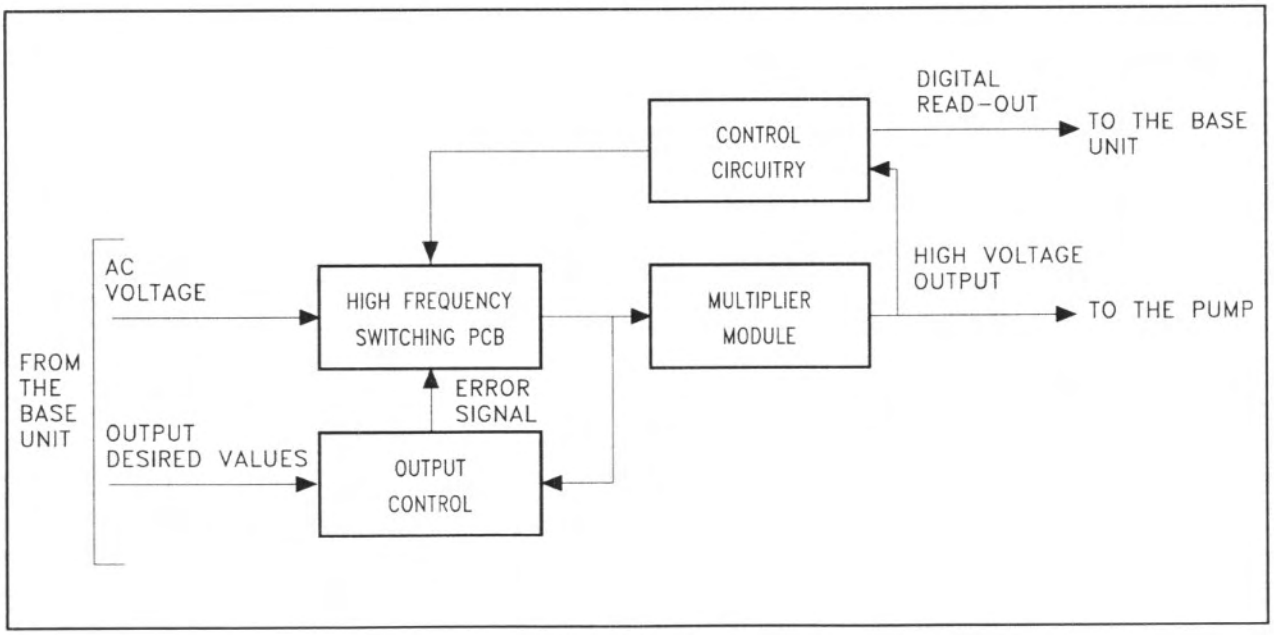
The card is basically composed of 3 parts (see the following block diagram):

a) High frequency switching PCB for high voltage generation and control. The ac voltage from base unit is rectified and feeds a group of power MOSFETS. A power wave modulator (PWM) generates a high frequency square wave with a variable duty-cycle.

This wave is then applied to the gates of the power MOSFETS making them commutate between conduction and interdiction. The output is applied to a transformer whose secondary winding is connected to a high voltage multiplier. The resulting output voltage and current are continuously measured and compared with the desired values set by the microprocessor. The PWM changes its output proportionally to mantain the desired values.

b) High voltage multiplier module.
This is composed of a multiplier ladder made by capacitors and diodes that rectify and multiply the voltage coming from the secondary of the transformer and then sent to the output connector.

c) Read-out circuitry.
The output voltage and the current drawn by the pump are continuously updated. This information is sent to the PWM controller closing the output regulation loop and also converted into a digital signal and sent to the microprocessor in the base unit.

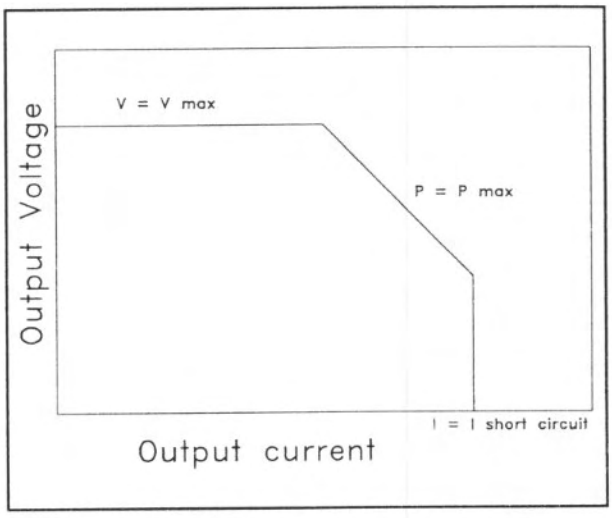


Block diagram

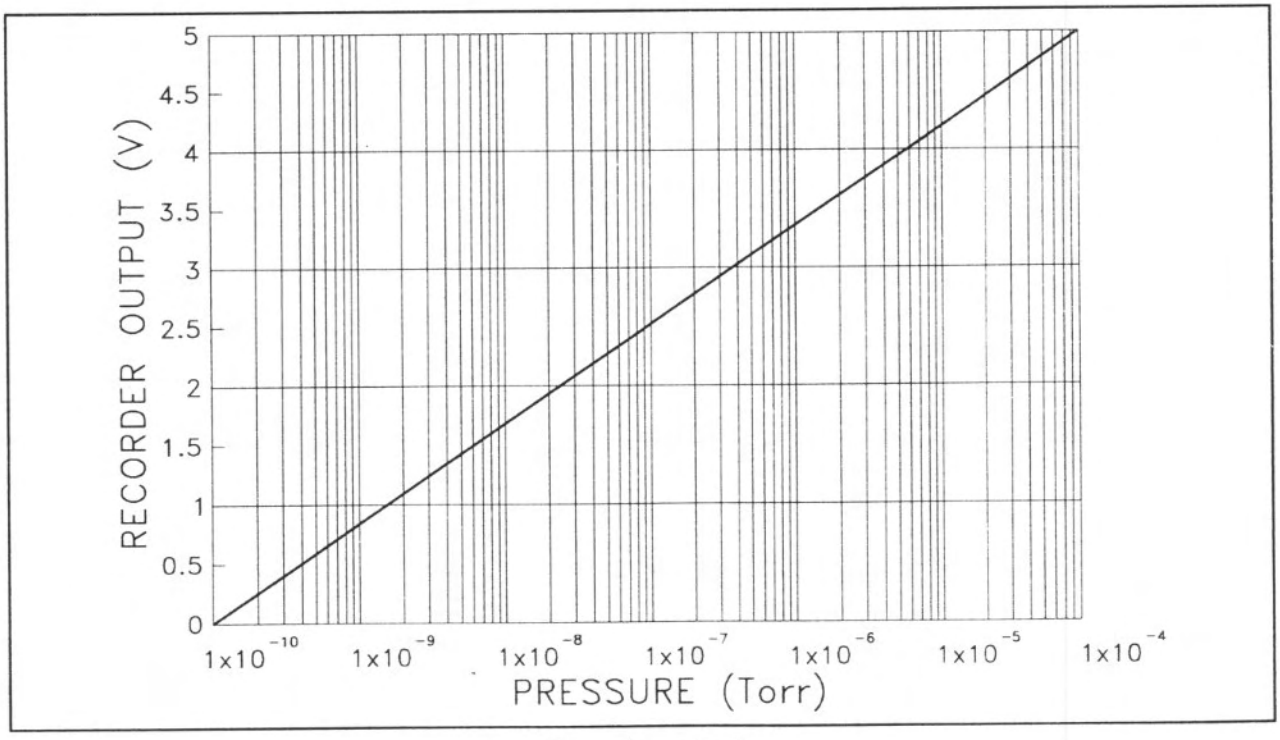
Card Specifications

(See the table in the following page for the different pump models)

Output (max):	
- Voltage	± 7000 Vdc + 2% -10% (see the output voltage vs current curve)
- Current	400 mA maximum
- Power	400 W maximum
- Polarity	Positive or negative selected through internal module
- Recorder	Analog signal 0 to + 5 Vdc (see the recorder output diagram) (Minimum recorder input impedance 1 MΩ) Logarithmic, proportional to pressure
- For Protect and Step mode of operation see the following tables.	
Weight	2,5 kg (5.5 lbs)



Output voltage vs current curve



Recorder output

Start mode of operation

Pump size/type	Model number	Maximum voltage and polarity	Short circuit current	Maximum power
500 StarCell® / Triode	919-0106 919-0206	-7000V	400 mA	400 W
300 StarCell/ Triode	919-0105 919-0205	-7000V	400 mA	400 W
150 StarCell/ Triode	919-0104 919-0204	-7000V	300 mA	400 W
75, 55, 40 StarCell Triode	919-0103 919-0102 919-0101 919-0203 919-0202 919-0201	-7000V	250 mA	200 W
20 StarCell	919-0235 919-0236	-7000V	150 mA	150 W
400 l/s Triode	912-7022	-7000V	400 mA	400 W
220 l/s Triode	912-7014	-7000V	400 mA	400 W
110 l/s Triode	912-7006	-7000V	300 mA	400 W
30, 60 l/s Triode	911-5032 911-5034	-7000V	250 mA	200 W
25 Triode	911-5030	-5000V	150 mA	150 W
500 Diode Noble Diode	919-0406 919-0306	+7000V	400 mA	400 W
300 Diode Noble Diode	919-0405 919-0305	+7000V	400 mA	400 W
150 Diode Noble Diode	919-0404 919-0304	+7000V	300 mA	400 W
75 Diode Noble Diode 55 Diode Noble Diode 40 Diode Noble Diode	919-0403 919-0303 919-0402 919-0302 919-0401 919-0301	+7000V	250 mA	200 W
25 Diode Noble Diode	911-5036 911-5050	+5000V	150 mA	150 W
Spare	-	± 7000V	400 mA	400 W

Protect mode of operation

When the current value exceeds the trip current for more than 0.2 seconds, the power supply turns off the high voltage, and an error message is displayed.

Pump size/type	Protect trip current
500 StarCell/Triode	100 mA
300 StarCell/Triode	100 mA
150 StarCell/Triode	50 mA
40 - 55 - 75 StarCell/Triode	30 mA
20 StarCell	20 mA
400 l/s Triode	100 mA
220 l/s Triode	100 mA
110 l/s Triode	50 mA
30 - 60 l/s Triode	30 mA
25 Triode	20 mA
500 Diode/Noble Diode	100 mA
300 Diode/Noble Diode	100 mA
150 Diode/Noble Diode	50 mA
40 - 55 - 75 Diode/Noble Diode	30 mA
25 Diode/Noble Diode	20 mA
Spare	400 mA

Step mode of operation

When the current reaches the value listed in the table, the controller changes the voltage output.

Pump size/type	Current value for switching from 7.0 to 5 KV		Current value for switching from 5 to 3 KV
500 StarCell Triode	9.0×10^{-4} A	see also Fig. 1	2.5×10^{-5} A
300 StarCell Triode	5.5×10^{-4} A		1.6×10^{-5} A
150 StarCell Triode	3.0×10^{-4} A		8.5×10^{-6} A
40, 55, 75 StarCell Triode	1.3×10^{-4} A		3.8×10^{-6} A
20 StarCell	6.5×10^{-5} A		1.9×10^{-6} A
400 l/s Triode	2.0×10^{-3} A		4.4×10^{-5} A
220 l/s Triode	1.1×10^{-3} A		2.5×10^{-5} A
110 l/s Triode	6.2×10^{-4} A		1.2×10^{-5} A
30, 60 l/s Triode	2.7×10^{-4} A		6.7×10^{-6} A
25 Triode	-	see also Fig. 2	2.8×10^{-6} A
500 Diode Noble Diode	1.4×10^{-3} A	see also Fig. 1	3.9 x 10-5 A
300 Diode Noble Diode	7.2×10^{-4} A		2.1×10^{-5} A
150 Diode Noble Diode	3.6×10^{-4} A		9.5×10^{-6} A
40, 55, 75 Diode Noble Diode	2.2×10^{-4} A		6.7×10^{-6} A
25 Diode Noble Diode	-	see also Fig. 2	2.7×10^{-6} A
Spare	User selection	-	User selection

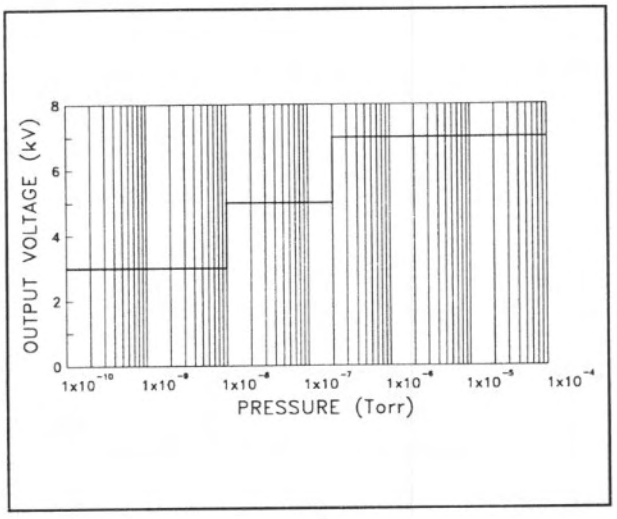


Fig. 1 - Output voltage change-over vs pressure

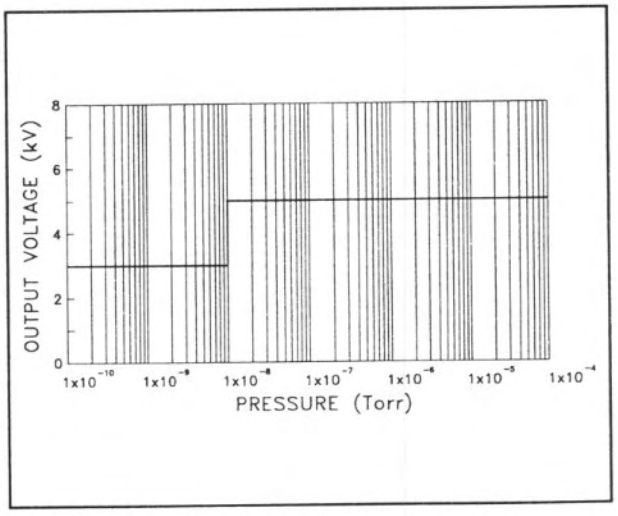


Fig. 2 - Output voltage change-over vs pressure

MEDIUM VACION PLUS HIGH VOLTAGE CARD

Card Description

The Medium Vaclon Plus High Voltage (H.V.) card is a power supply designed to meet a wide range of requirements when used in conjunction with the MultiVac controller base unit.

It is a compact and light card, specifically designed to operate ion pumps with both positive and negative polarity from 20 l/s to 75 l/s and up to 200 W output power.

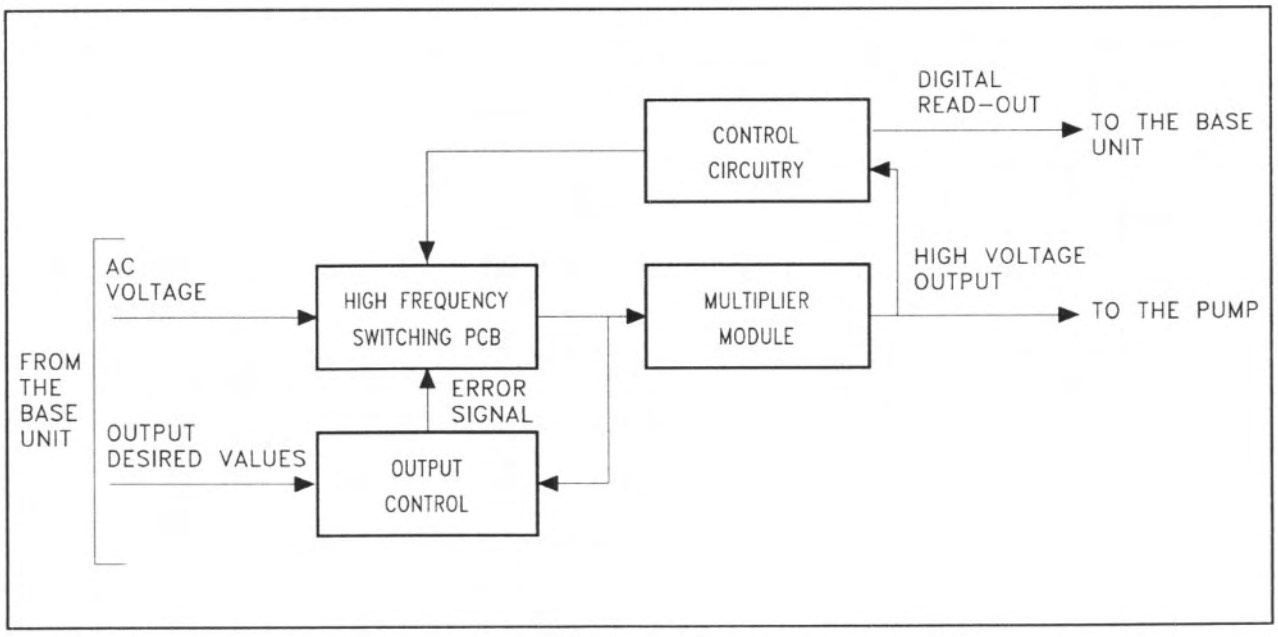
The card is programmed with 6 pre-defined pump settings. Using a patented operation principle, the controller is capable of reading pressure down to the 10^{-11} Torr range, while optimizing the pumping speed in the entire operating range.

The card is basically composed of 3 parts (see the following block diagram):

a) High frequency switching PCB for high voltage generation and control. The ac voltage from base unit is rectified and feeds a group of power MOSFETS. A power wave modulator (PWM) generates a high frequency square wave with a variable duty-cycle. This wave is then applied to the gates of the power MOSFETS making them commutate between conduction and interdiction. The output is applied to a transformer whose secondary winding is connected to a high voltage multiplier. The resulting output voltage and current are continuously measured and compared with the desired values set by the microprocessor. The PWM changes its output proportionally to mantain the disired values.

b) High voltage multiplier module.
This is composed of a multiplier ladder made by capacitors and diodes that rectify and multiply the voltage coming from the secondary of the transformer and then sent to the output connector.

c) Read-out circuitry.
The output voltage and the current drawn by the pump are continuously updated. This information is sent to the PWM controller closing the output regulation loop and also converted into a digital signal and sent to the microprocessor in the base unit.

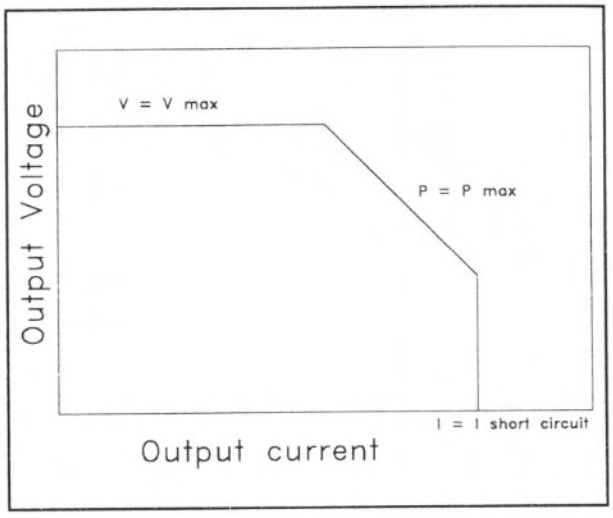


Block diagram

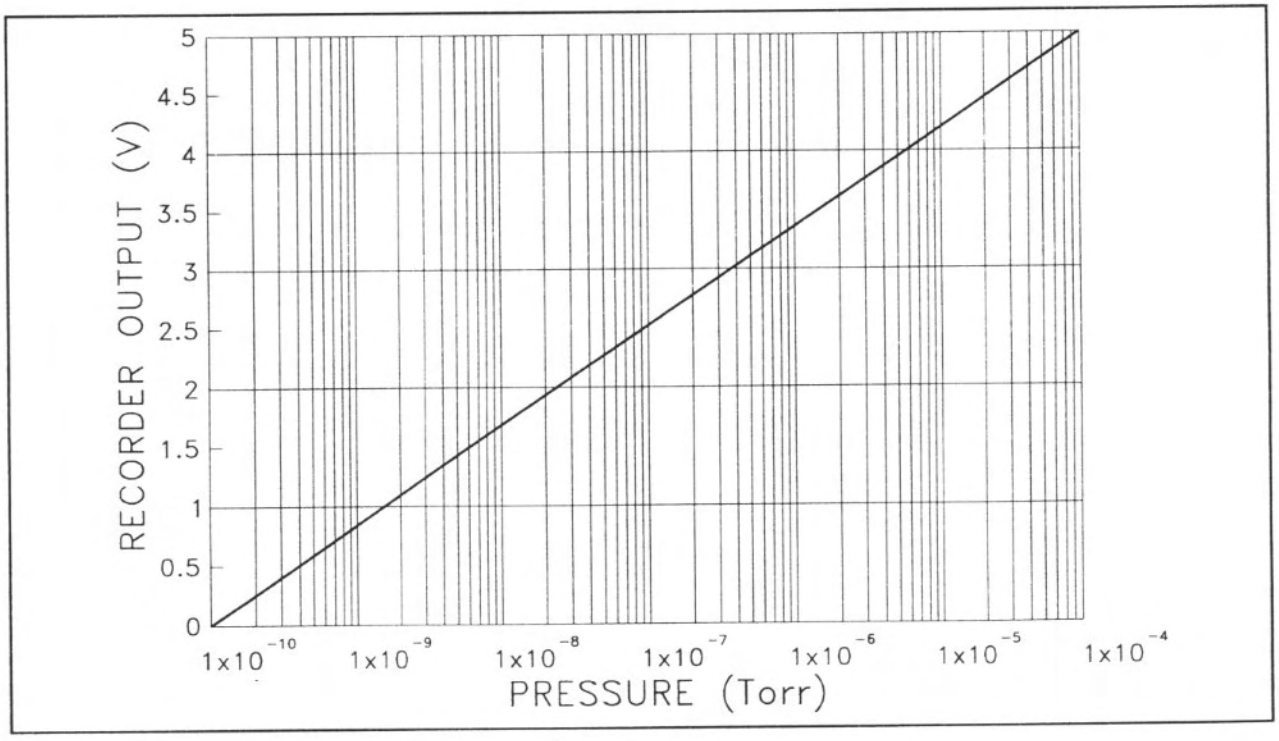
Card Specifications

(See the table in the following page for the different pump models)

Output (max):	
- Voltage	± 7000 Vdc + 2% -10% (see the output voltage vs current curve)
- Current	200 mA maximum
- Power	200 W maximum
- Polarity	Positive or negative selected through internal module
- Recorder	Analog signal 0 to + 5 Vdc (see the recorder output diagram) (Minimum recorder input impedance 1 MΩ) Logarithmic, proportional to pressure
- For Protect and Step mode of operation see the following tables.	
Weight	2,5 kg (5.5 lbs)



Output voltage vs current curve



Recorder output

Start mode of operation

Pump size/type	Model number	Maximum voltage and polarity	Short circuit current	Maximum power
75, 55, 40 StarCell Triode	919-0103 919-0102 919-0101 919-0203 919-0202 919-0201	-7000V	250 mA	200 W
20 StarCell	919-0235 919-0236	-7000V	150 mA	150 W
30, 60 l/s Triode	911-5032 911-5034	-7000V	250 mA	200 W
25 Triode	911-5030	-5000V	150 mA	150 W
75 Diode Noble Diode 55 Diode Noble Diode 40 Diode Noble Diode	 919-0403 919-0303 919-0402 919-0302 919-0401 919-0301	+7000V	250 mA	200 W
25 Diode Noble Diode	 911-5036 911-5050	+5000V	150 mA	150 W

Protect mode of operation

When the current value exceeds the trip current for more than 0.2 seconds, the power supply turns off the high voltage, and an error message is displayed.

Pump size/type	Protect trip current
40 - 55 - 75 StarCell/Triode	30 mA
20 StarCell	20 mA
30 - 60 l/s Triode	30 mA
25 Triode	20 mA
40 - 55 - 75 Diode/Noble Diode	30 mA
25 Diode/Noble Diode	20 mA

Step mode of operation

When the current reaches the value listed in the table, the controller changes the voltage output.

Pump size/type	Current value for switching from 7.0 to 5 KV		Current value for switching from 5 to 3 KV
40, 55, 75 StarCell Triode	1.3×10^{-4} A	see also Fig. 3	3.8×10^{-6} A
20 StarCell	6.5×10^{-5} A		1.9×10^{-6} A
30, 60 l/s Triode	2.7×10^{-4} A		6.7×10^{-6} A
25 Triode	-	see also Fig. 4	2.8×10^{-6} A
40, 55, 75 Diode Noble Diode	2.2×10^{-4} A	see also Fig. 3	6.7×10^{-6} A
25 Diode Noble Diode	-	see also Fig. 4	2.7×10^{-6} A

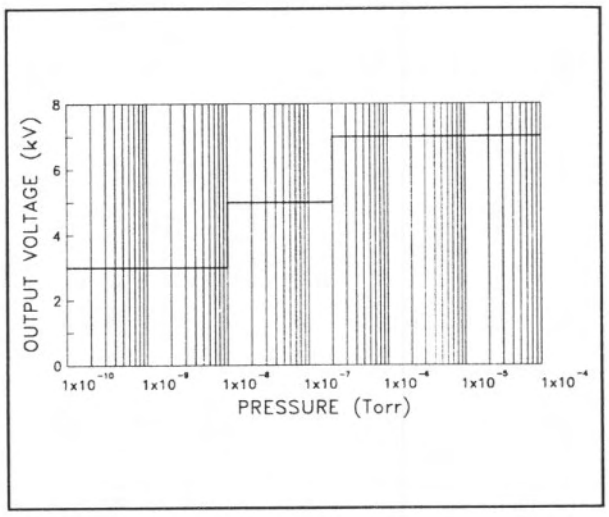


Fig. 3 - Output voltage change-over vs pressure

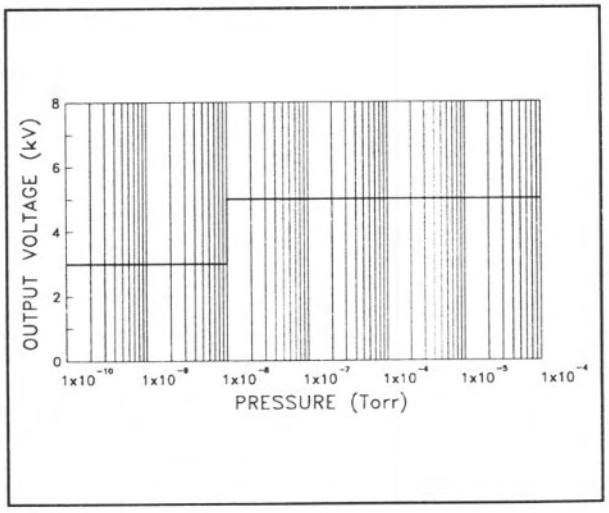
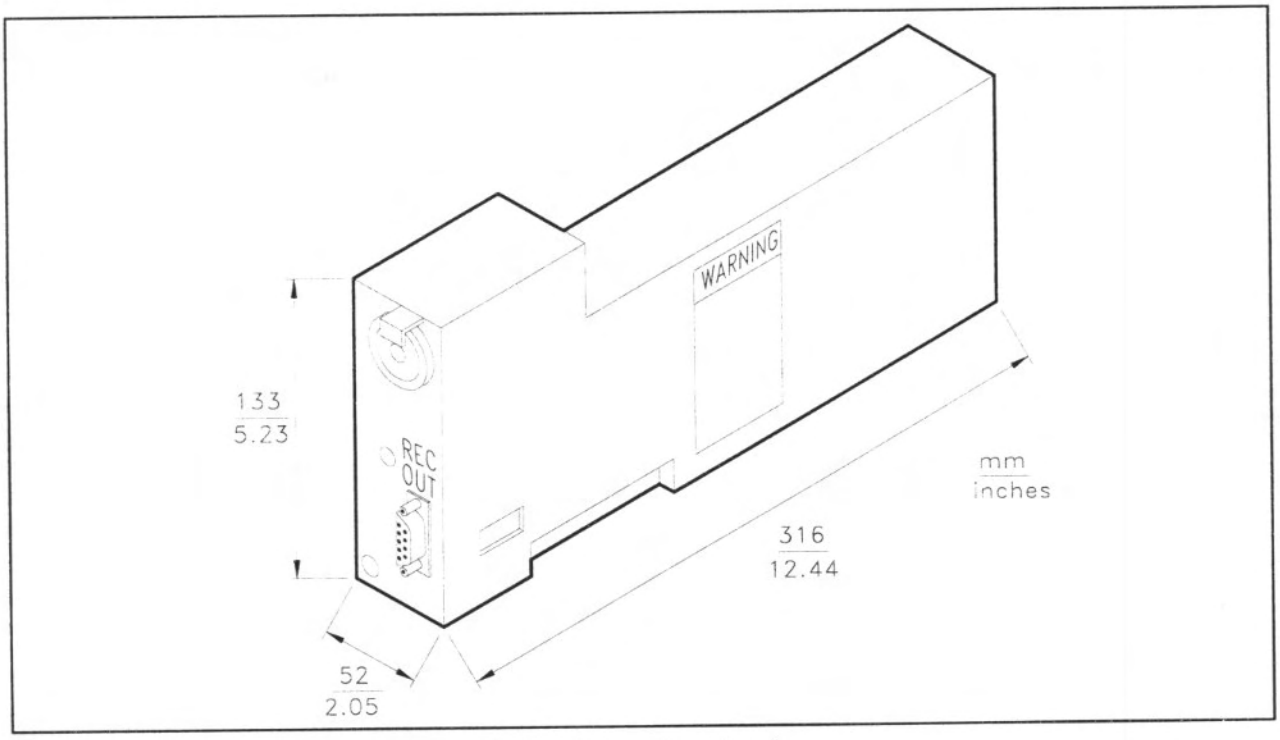


Fig. 4 - Output voltage change-over vs pressure

H.V. CARDS OUTLINE

The outline dimensions for the H.V. cards are shown in the following figure.



H.V. card outline drawing

H.V. CARD INSTALLATION

General

Inspect the VIP HV card for any shipping damage. The HV card is factory set to:

- models 929-4040 (Large Vaclon Plus H.V. card) and 929-4025 (Medium Vaclon Plus H.V. card) set to Negative polarity
- models 929-4050 (Large Vaclon Plus H.V. card) and 929-4035 (Medium Vaclon Plus H.V. card) set to Positive polarity

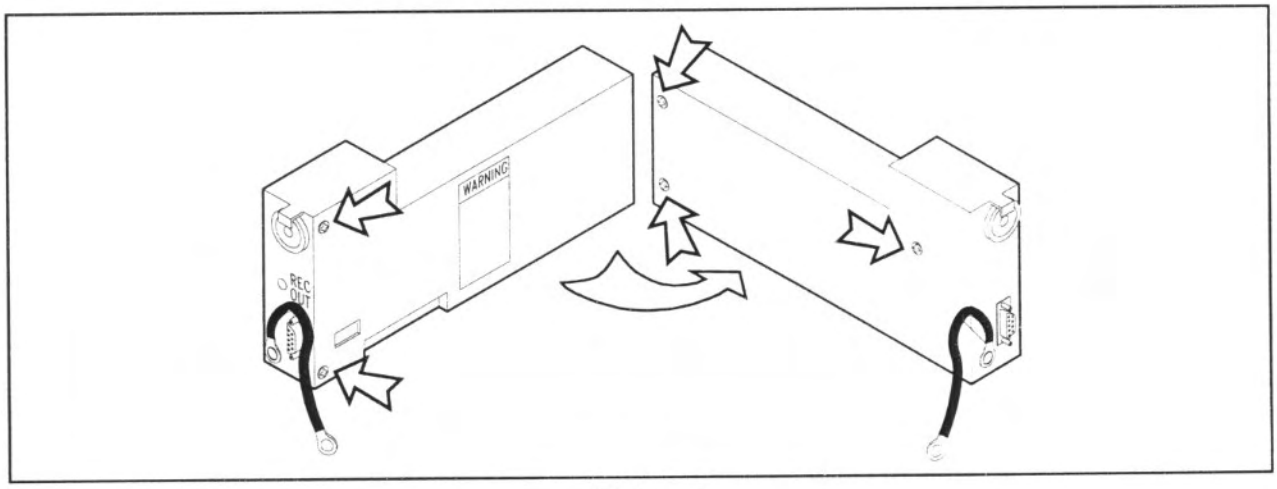
WARNING

High voltage developed in the card can cause severe injury or death. Before servicing the card disconnect the input power cable of the MultiVac controller base unit.

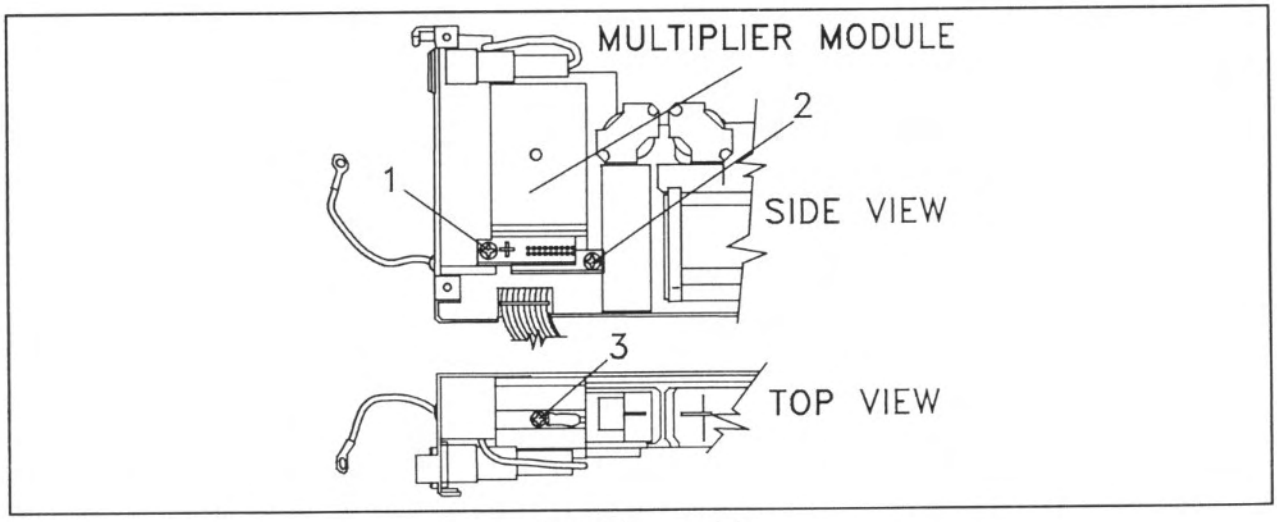
Polarity Change Over

If there is a need to change the output polarity, proceed as follows:

- Be sure that no power is applied to the Multi-Vac controller base unit (remove the power cable).
- Unscrew the two H.V. card fixing screws on the MultiVac rear panel and the ground braid then remove the card from the base unit.
- On the HV card undo the 5 screws, indicated by the arrows in the following figure and open in two parts the card.
- Undo the screws 1, 2, 3 and remove the multiplier module.
- Select the desired polarity according to the pump in operation by turning the module and reinstall it.
- Reinsert the Vaclon Plus HV card following the following paragraph instructions.



H.V. card



Multiplier module

Card Installation

If the MultiVac has not been ordered in the final configuration, the following procedure must be executed for H.V. card insertion into the slots of the base unit.

- Open the unit by removing the four screws on the sides of the unit.
- Remove the fixing screw from the card and insert the H.V. card as showed in the following figures.

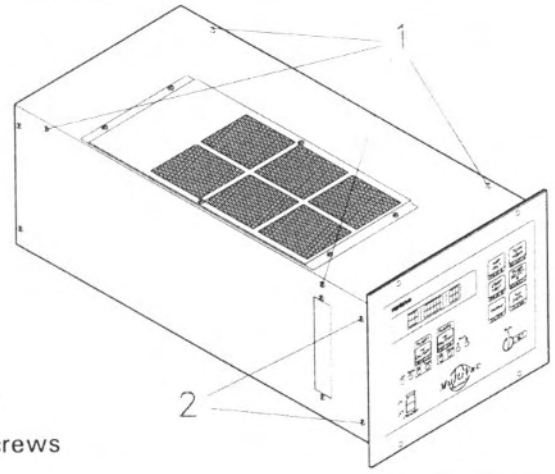
NOTE

During installation the card side must slide on the reference pin and must be pushed towards the rear panel.
After the insertion, the hook point must enter into the hole.

- After the H.V. card has been inserted, fix it with the screws on the rear panel and on the bottom side of the base unit, and connect the external ground wire.
- Be sure that the provided blank filler plates are installed in any open rear panel locations.
- Verify that there is no loose hardware or metal parts inside the unit; replace the cover and secure it with the 4 screws.

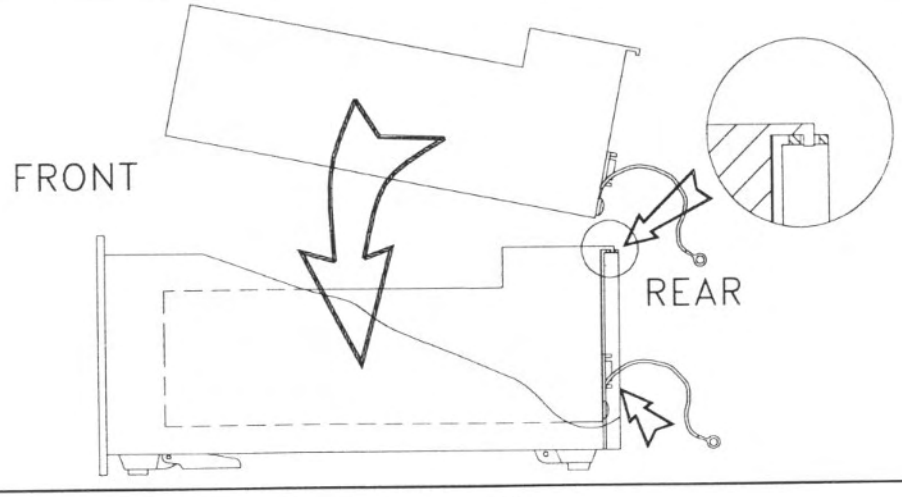
NOTE

Slot number 1 must always be occuped by an High Voltage card. If not a "Test Error" will be displayed.

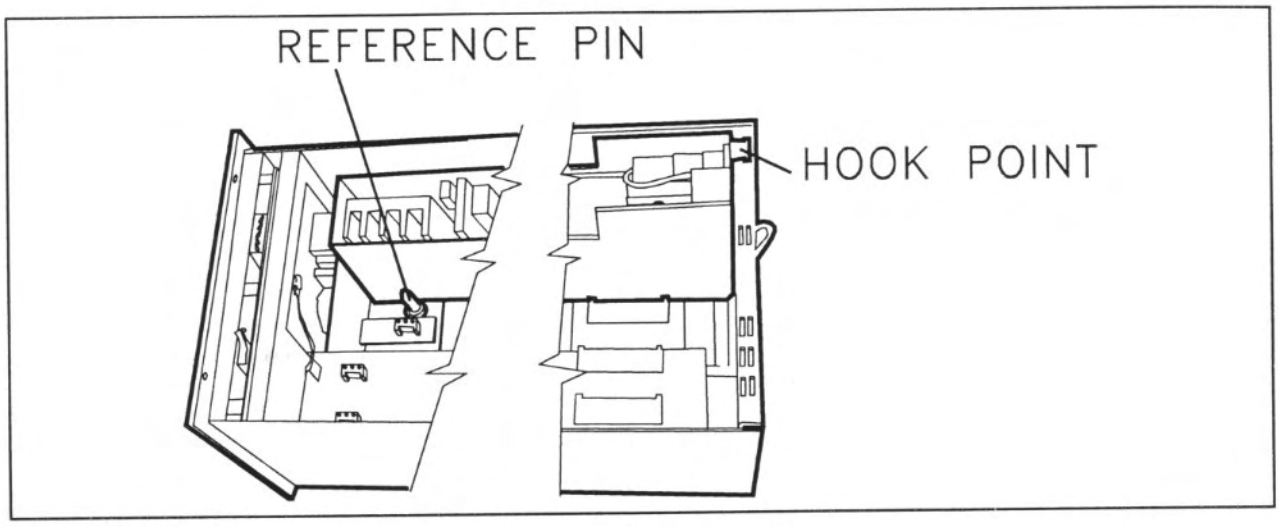


1. Cover removal screws
2. Front panel removal screws

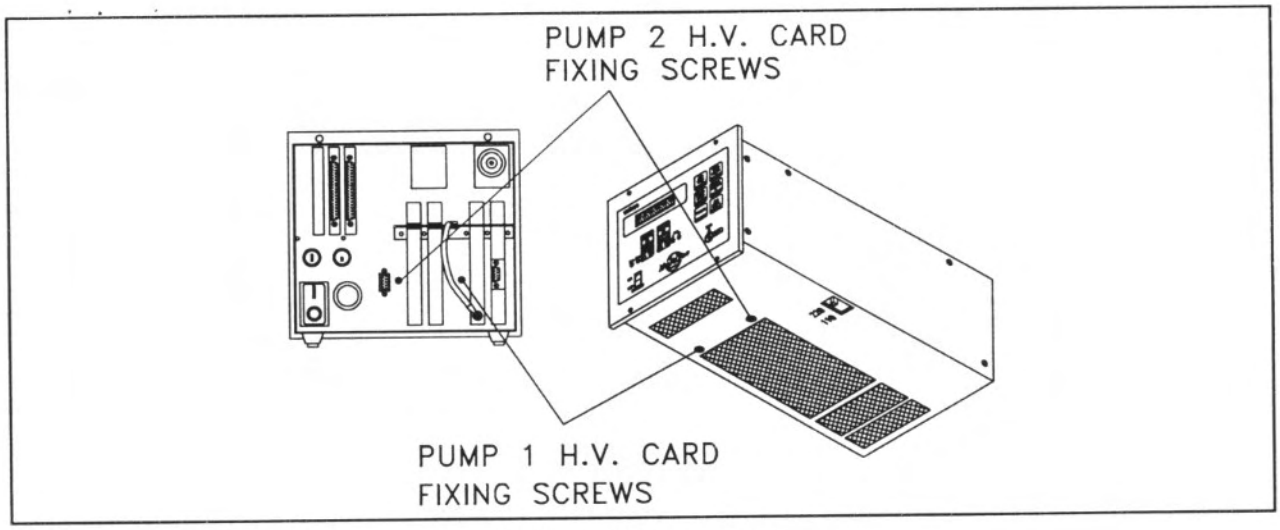
Cover and front panel fixing screws



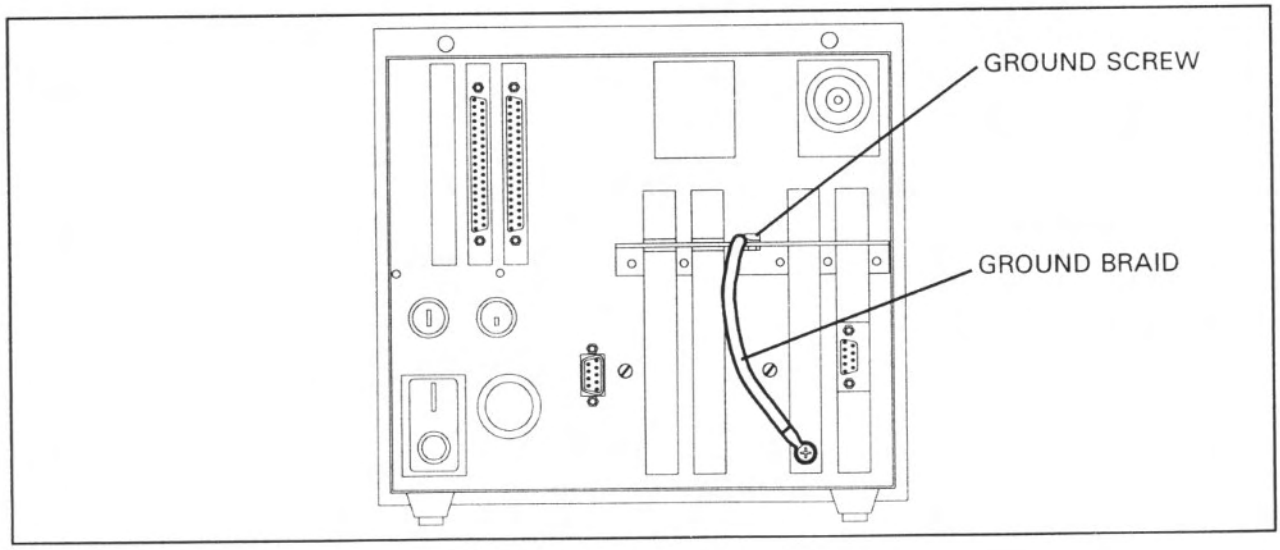
Card insertion



Installing the H.V. card



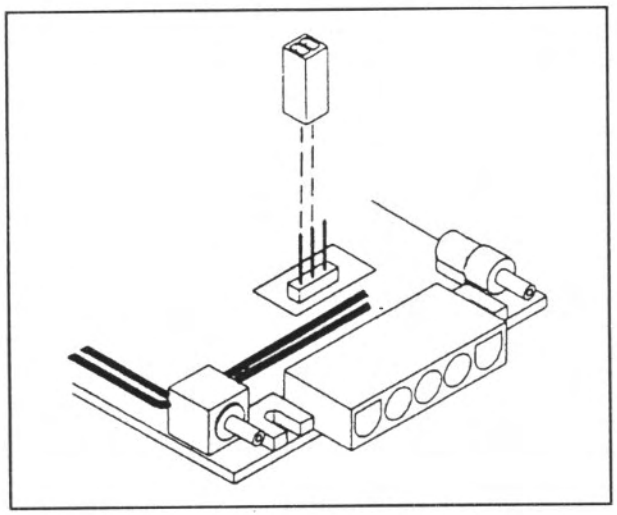
H.V. card fixing screws



Ground connection

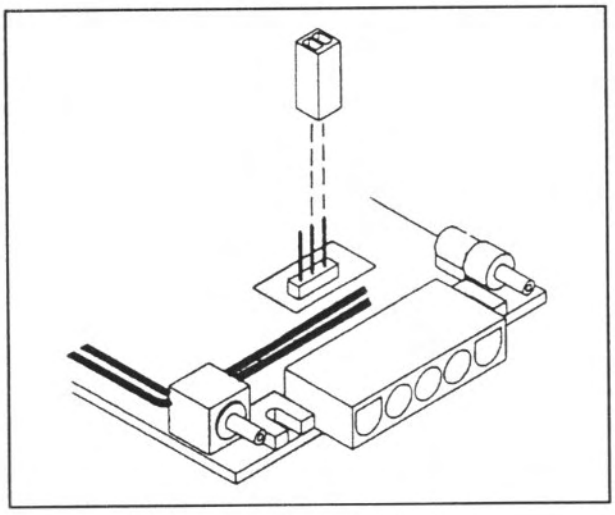
BAYARD ALPERT CARD DESCRIPTION

The Bayard-Alpert (B/A) control printed circuit board, when used with a MultiVac unit, contains all required circuitry to operate a 563, 564, 571, 572, 580, or similar ion gauge. It is necessary to set a jumper on the B/A board to identify the type of B/A type being used. To operate a standard B/A tube (563, 571 or 572), position the jumper as shown in the following figure where the connector plate has been removed for illustration clarity.



Jumper position, standard tube

To operate a broad range B/A tube (564 or 580), position the jumper as shown in the following figure where the connector plate has been removed for illustration clarity.

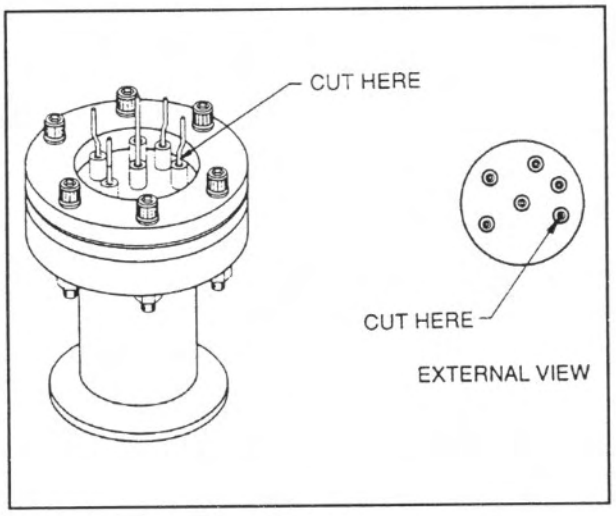


Jumper position, standard tube

The jumper is set at the factory to the standard B/A tube position.

CAUTION

When using the B/A card to operate a Varian 580 nude gauge, it is necessary to cut the grid support pin flush with the standoff as shown in the following figure. Failure to do so may cause the grid error message to be displayed and/or result in erratic operation of the B/A card. WEAR EYE PROTECTION WHILE CUTTING THE PIN.



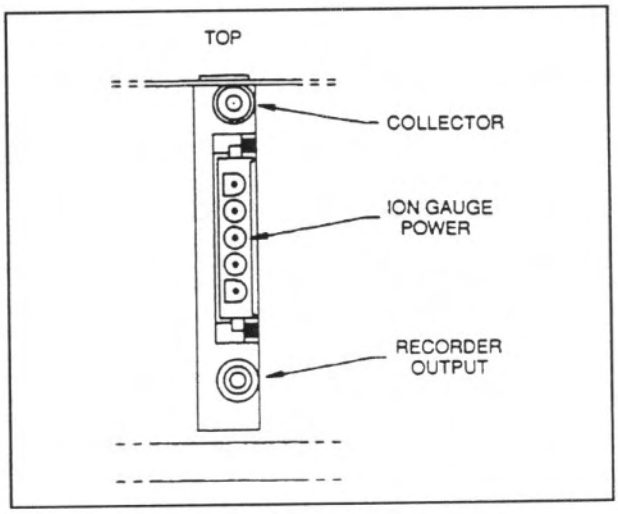
The grid support

Bayard Alpert Card Specifications

Electrometer Accuracy	$>10^{-10}$ Torr ± 5% of ion current reading (ion current ≥ 10 pA) $<10^{-10}$ ± 20% of ion current reading (ion current ≤ 10 pA, I >4 pA)
Emission Current Range	Set to 4.00 mA as a default, currents can be set from 10 µA to 9.99 mA through the keypad on the front panel of the MultiVac unit. The emission current will remain constant as long as the pressure is $<1x10^{-5}$ Torr or the emission current is set to ≤1.00 mA. The MultiVac automatically reduces the current by a factor of 10 when the pressure is $>5x10^{-5}$ Torr and the emission current is set to ≥1.01 mA.
Alternate Filament Selection	Automatic for a dual filament gauge.
Overpressure Protection	Automatic gauge tube turn-off when pressure equals or exceeds $1x10^{-3}$ Torr for standard B/A tubes (563, 571 and 572) or $1x10^{-1}$ Torr for broad range B/A tubes (564 and 580).
Degas	Resistive, 25 W. Can activate only if pressure is $<10^{-5}$ Torr and no other ion gauge card is degassing. Automatic time-out of approximately one hour.
Recorder Output	1V/decade log-linear output (two-conductor Micro Jax connector plug supplied with board). Recorder output reflects changes in sensitivity and gas correction factors.
Fault Detections	No ion current; Emission current or amplifier fault; Low grid voltage (low degas voltage when in Degas mode); Open filament or no filament current; Filament circuit/cable short; Over temperature shutdown - gauge power shuts off when internal temperature reaches ≥65 °C.
Cable Length	Standard cables with lengths of 10, 25, 50, 75 and 100 feet are available from stock. Non-standard length cables (up to 500 feet) are available on special order (see the followiong table). Connections are made at the rear of the card (see the following figure).
Sensitivity	The default setting is 10.0 per Torr for standard B/A tubes (563, 571 and 572) and 8.0 per Torr for broad range B/A tubes (564 and 580). Can be set from 0.1 to 99.9 per Torr through the keypad.
Gas Correction	Set to 1.00 (N_2) as a default, can be set from 0.01 to 9.99 through the keypad.

NOTE

Measurements in the high vacuum range may be inaccurate or impossible due to increased leakage currents and other effects due to long cable lengths. It is recommended that teflon low-capacitance cable be used and that it be rigidly mounted to avoid triboelectric and leakage effects.



Card connections

Non Standard Cables

Length (feet)	Wire size (AWG) each wire
Up to 50	18
75	16
100	14
200	12
500	8

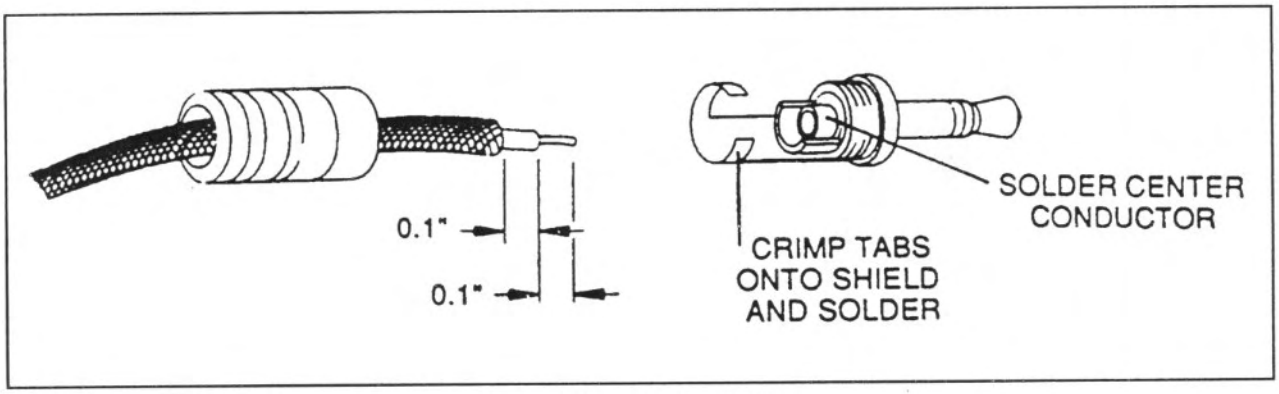
Using the Recorder Output

To use the recorder output feature, assemble a cable to the Micro Jax plug supplied with the B/A control card. Varian strongly recommends using a coaxial cable to maintain compliance with FCC regulations. Refer to the following figure for instructions on assembling the cable.

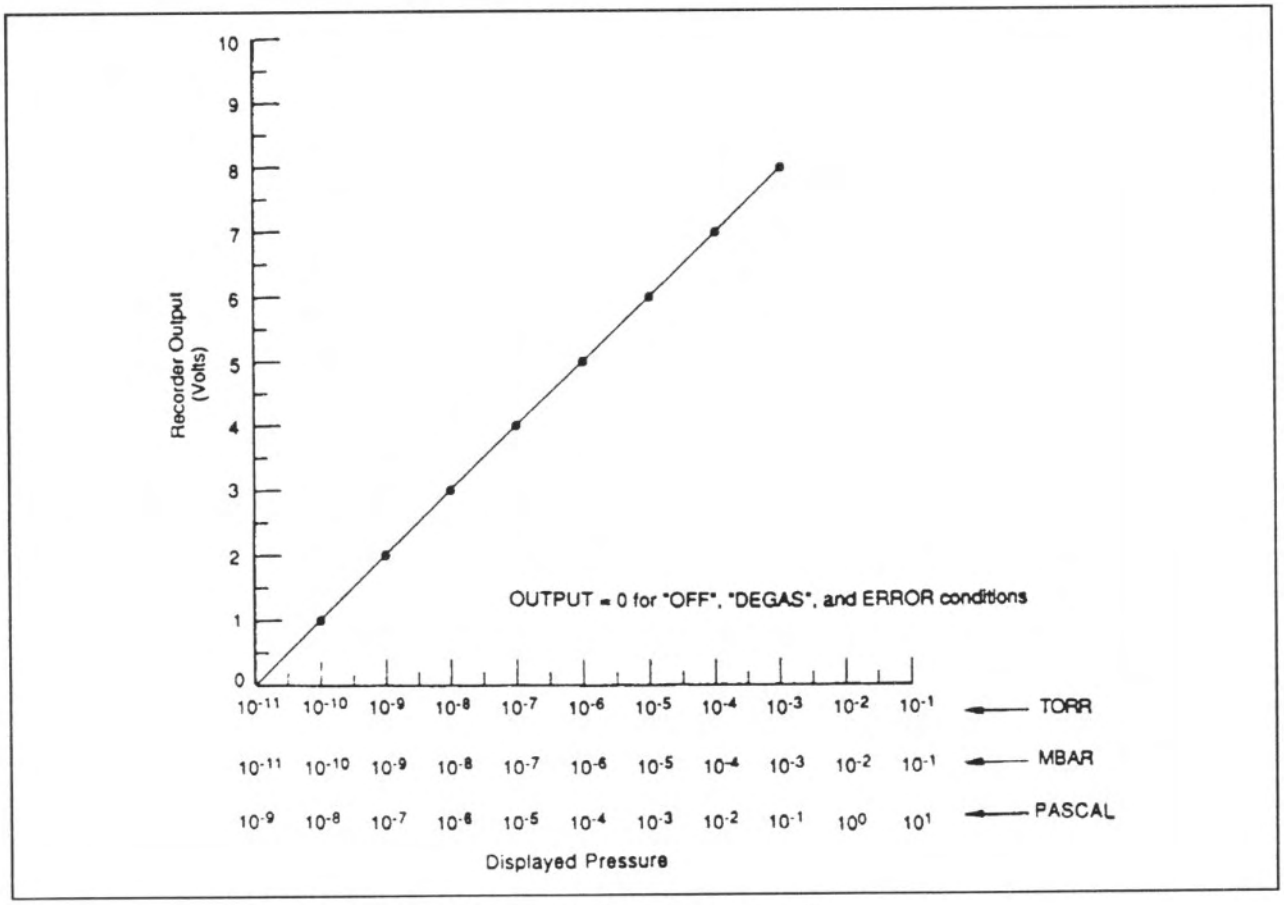
Any recorder with an input impedance greater than 2,000 ohms and which has a full scale input range of +10 V can be used.

The output characteristics are shown in the following figure.

The recorder output reflects the reading on the display and does not require adjustments to compensate for different emission or sensitivity settings. When the gauge is off, the output is 0 V.



Assembling the Cable/Plug



Recorder Output Characteristics

UHV CARD DESCRIPTION

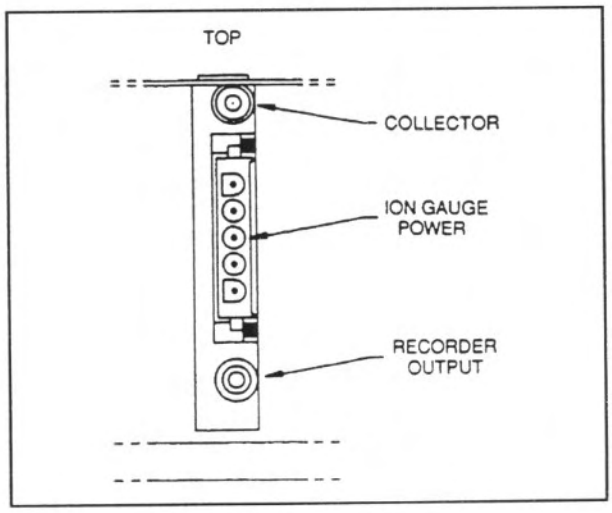
The UHV control printed circuit board, when used with a MultiVac unit, contains all required circuitry to operate a UHV-24 or similar ion gauge. It can be installed in any one of the two slots in the unit.

Specifications

Electrometer Accuracy	$>10^{-10}$ Torr ± 5% of ion current reading (ion current ≥ 10 pA) $<10^{-10}$ ± 20% of ion current reading (ion current ≤ 10 pA, I >4 pA)
Emission Current Range	Set to 4.00 mA as a default, currents can be set from 10 µA to 9.99 mA through the keypad on the front panel of the MultiVac unit. The emission current will remain constant as long as the pressure is $<1x10^{-5}$ Torr or the emission current is set to ≤1.00 mA. The MultiVac automatically reduces the current by a factor of 10 when the pressure is $>5x10^{-5}$ Torr and the emission current is set to ≥1.01 mA.
Alternate Filament Selection	Automatic for a dual filament gauge.
Overpressure Protection	Automatic gauge tube turn-off when pressure equals or exceeds $1x10^{-3}$ Torr.
Degas	Electron beam bombardment, including the collector lead: 400 V at 65 mA. Can activate only if pressure is $<10^{-5}$ Torr and no other board is degassing. Automatic time-out of approximately 15 minutes.
Recorder Output	1V/decade log-linear output (two-conductor Micro Jax connector plug supplied with board). Recorder output reflects changes in sensitivity and gas correction factors.
Fault Detections	No ion current; Emission current or amplifier fault; Low grid voltage (low degas voltage when in Degas mode); Open filament or no filament current; Filament circuit/cable short; Over temperature shutdown - gauge power shuts off when internal temperature reaches ≥65 °C.
Cable Length	Standard cables with lengths of 10, 25, 50, 75 and 100 feet are available from stock. Longer cables are available on special order (see the following table). Connections are made at the rear of the card as shown in the following figure.
Sensitivity	Set to 25 per Torr as a default, can be set from 0.1 to 99.9 per Torr through the keypad.
Gas Correction	Set to 1.00 (N_2) as a default, can be set from 0.01 to 9.99 through the keypad.

NOTE

Measurements in the high vacuum range may be inaccurate or impossible due to increased leakage currents and other effects due to long cable lengths. It is recommended that teflon low-capacitance cable be used and that it be rigidly mounted to avoid triboelectric and leakage effects.



Card connections

Non Standard Cables

Length (feet)	Wire size (AWG) each wire
Up to 50	18
75	16
100	14
200	12
500	8

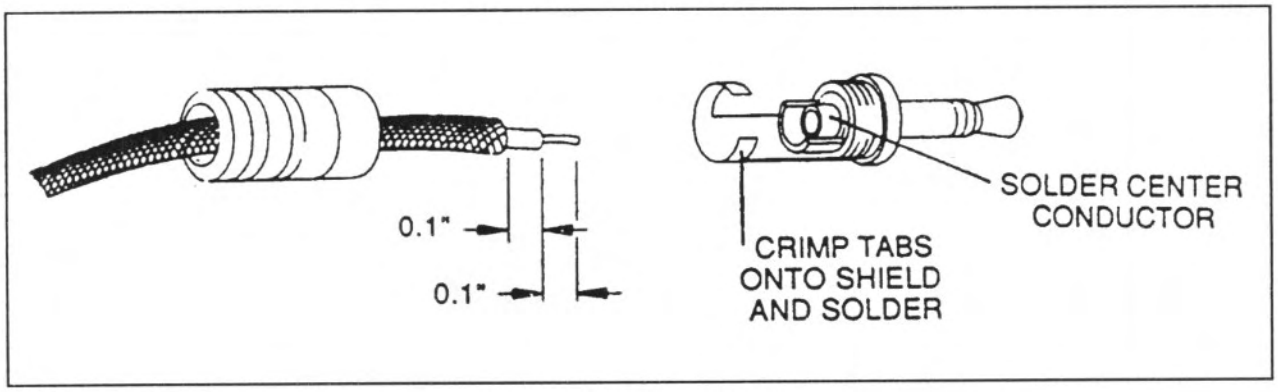
Using the Recorder Output

To use the recorder output feature, assemble a cable to the Micro Jax plug supplied with the UHV control card. Varian strongly recommends using a coaxial cable to maintain compliance with FCC regulations. Refer to the following figure for instructions on assembling the cable.

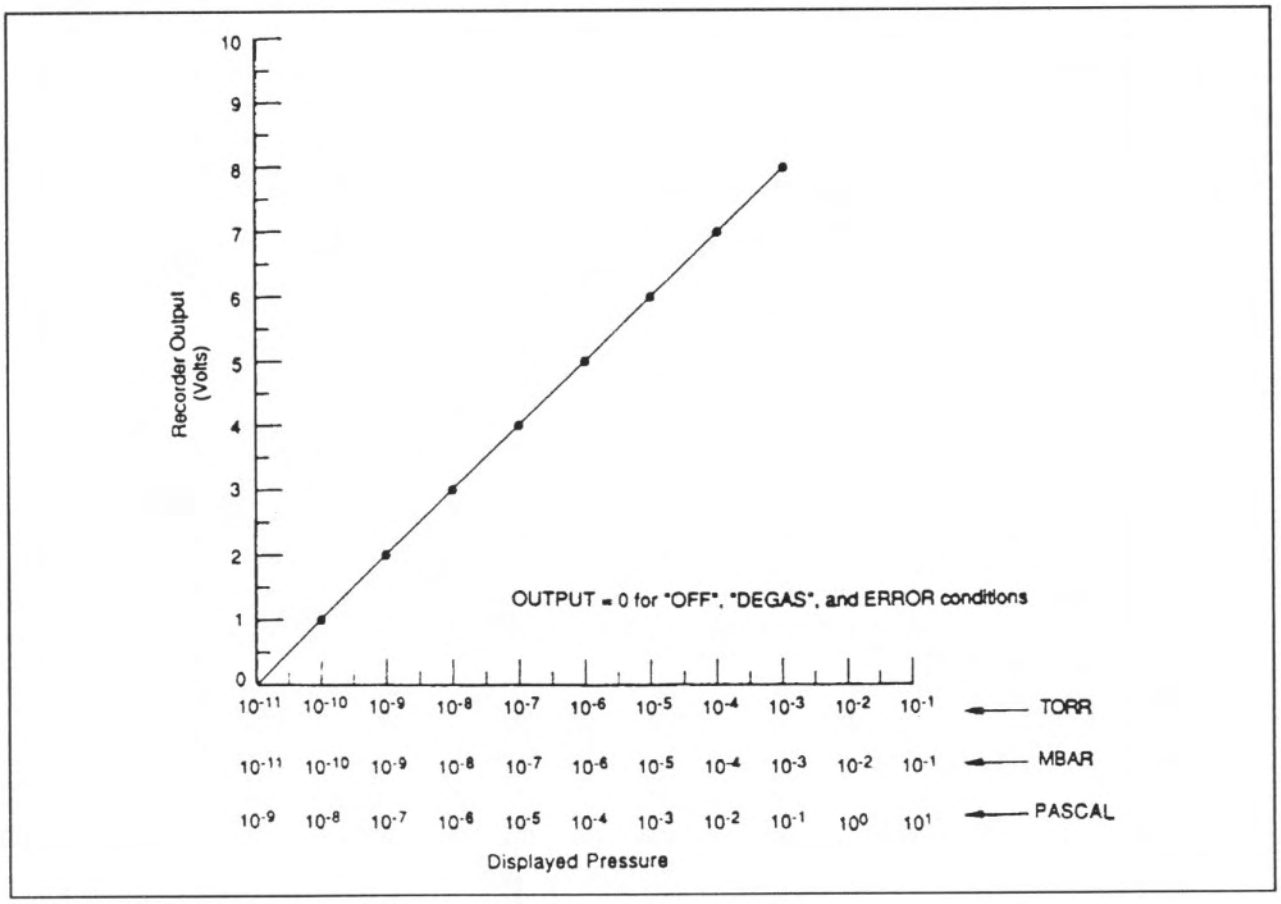
Any recorder with an input impedance greater than 2,000 ohms and which has a full scale input range of +10 V can be used.

The output characteristics are shown in the following figure.

The recorder output reflects the reading on the display and does not require adjustments to compensate for different emission or sensitivity settings. When the gauge is off or degassing, the output is 0 V.



Assembling the Cable/Plug



Recorder Output Characteristics

COLD CATHODE BOARD DESCRIPTION

The Cold Cathode Board is designed to operate the Varian 524 (bakeable) and 525 (non-bakeable) gauge heads with cable lengths up to 500 feet. Its operating voltage is -2 kV. The use of software linearization and dynamic power modulation allows a useful range exceeding $1x10^{-2}$ to $1x10^{-7}$ Torr.

WARNING

Cold Cathode Gauges require the use of a HIGH-VOLTAGE source which can be LETHAL. Proper grounding of the MultiVac unit and the gauge head are necessary. USE EXTREME CAUTION when working with these instruments; the instrument must be operated only by properly trained personnel. DO NOT OPERATE THE MULTIVAC WITH THE COVER OFF.

Specifications

Electrometer Accuracy	$>10^{-6}$ Torr ± 5% of ion current reading (ion current ≥5 mA)
Overpressure Protection	Automatic gauge tube turn-off when pressure equals or exceeds $2x10^{-2}$ Torr.
Recorder Output	1V/decade log-linear output (two-conductor Micro Jax connector plug supplied with board). Recorder output reflects changes in sensitivity and gas correction factors.
Cable Length	Standard cables with lengths of 10, 25, 50, 75 and 100 feet are available from stock. Longer cables (up to 500 feet long) are available on special order. Connections are made at the rear of the card as shown in the following figure.
Gas Correction	Set to 1.00 (N_2) as a default, can be set from 0.01 to 9.99 through the keypad second function F GAS CORR.

NOTE

Measurements in the high vacuum range may be inaccurate or impossible due to increased leakage currents and other effects due to long cable lengths. It is recommended that teflon low-capacitance cable be used and that it be rigidly mounted to avoid triboelectric and leakage effects.

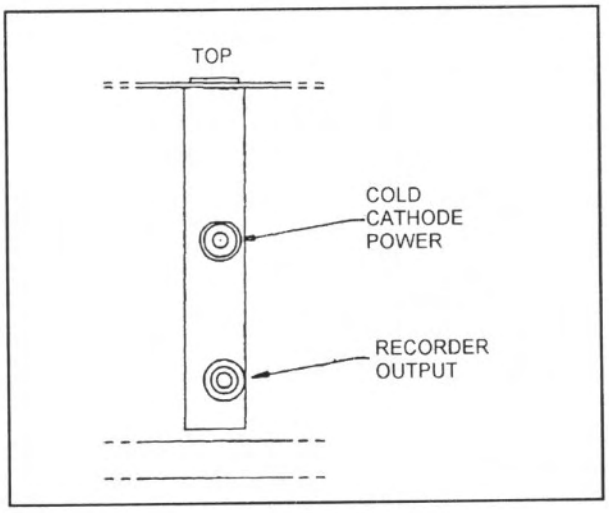
Using the Recorder Output

To use the recorder output feature, assemble a cable to the Micro Jax plug supplied with the Cold Cathode Board. Varian strongly recommends using a coaxial cable to maintain compliance with FCC regulations. Refer to the figure in the following page for instructions on assembling the cable.

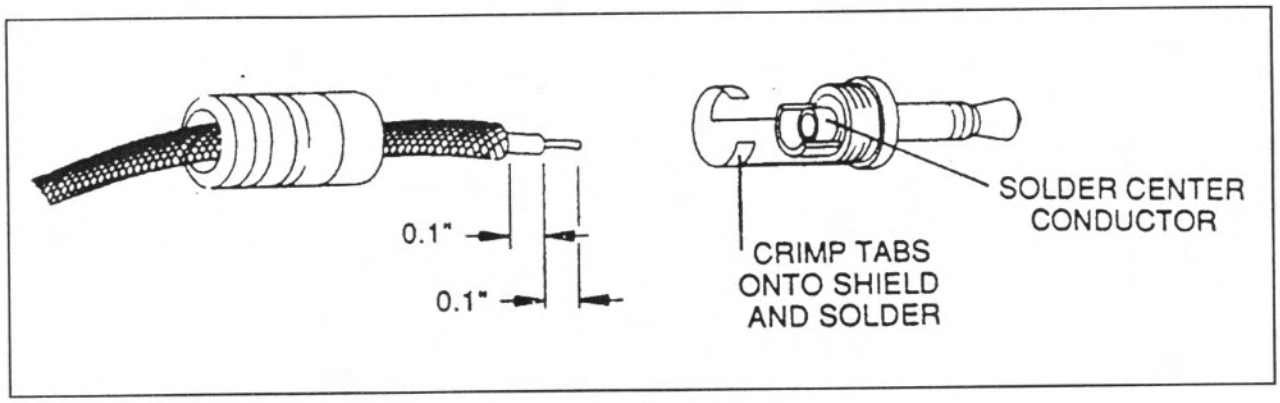
Any recorder with an input impedance greater than 2,000 ohms and which has a full scale input range of +10 V can be used.

The output characteristics are shown in the figure of the following page.

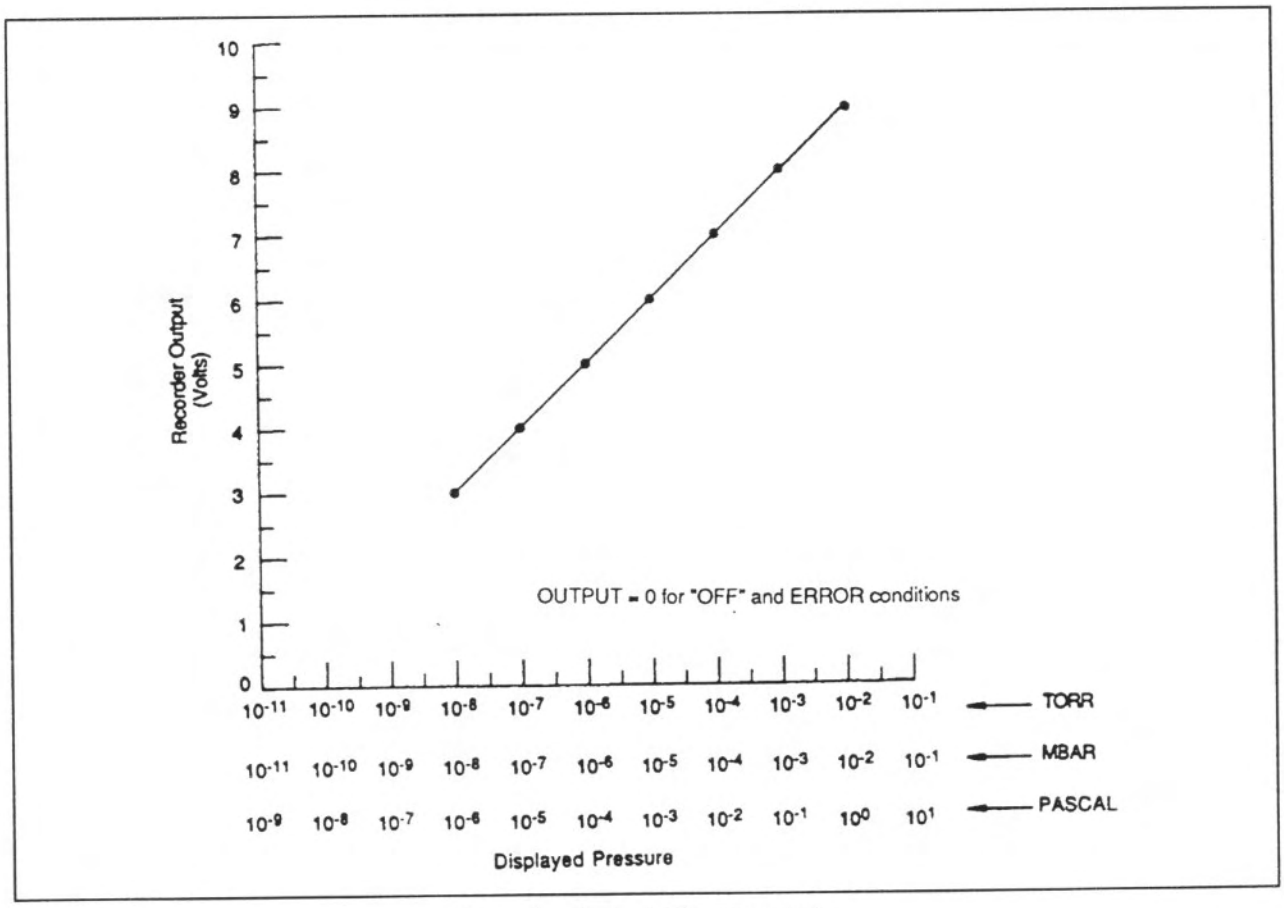
The recorder output reflects the reading on the display and does not require adjustments to compensate for different emission or sensitivity settings. When the gauge is off, the output is 0 V.



Card connections



Assembling the Cable/Plug



Recorder Output Characteristics

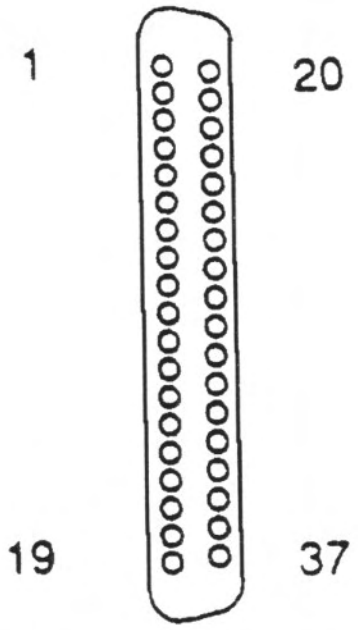
THERMOCOUPLE PRINTED CIRCUIT BOARD DESCRIPTION

The Thermocouple Printed Circuit Board, when used with a MultiVac unit, contains all the circuitry required to operate four Model 531 thermocouple gauge tubes. It can be installed in any one of the two slots in the MultiVac unit. After installation, the TC label should be placed on the area provided to help in identifying the card after the cover is installed. Up to two TC cards may be installed for a total of eight available thermocouples.

Specifications

Pressure range	2 Torr to 1×10^{-3} Torr
TC heater current	165 mA ±10%
Recorder Output	0 to 10 V non-linear; see the following figure for connections of user-supplied wiring. Varian recommends the use of shielded wiring to maintain compliance with FCC regulations for radiated emissions. The recorder output does not reflect ATM or VAC settings.
Fault Detections	No cable or open TC circuit; TC power supply fault.

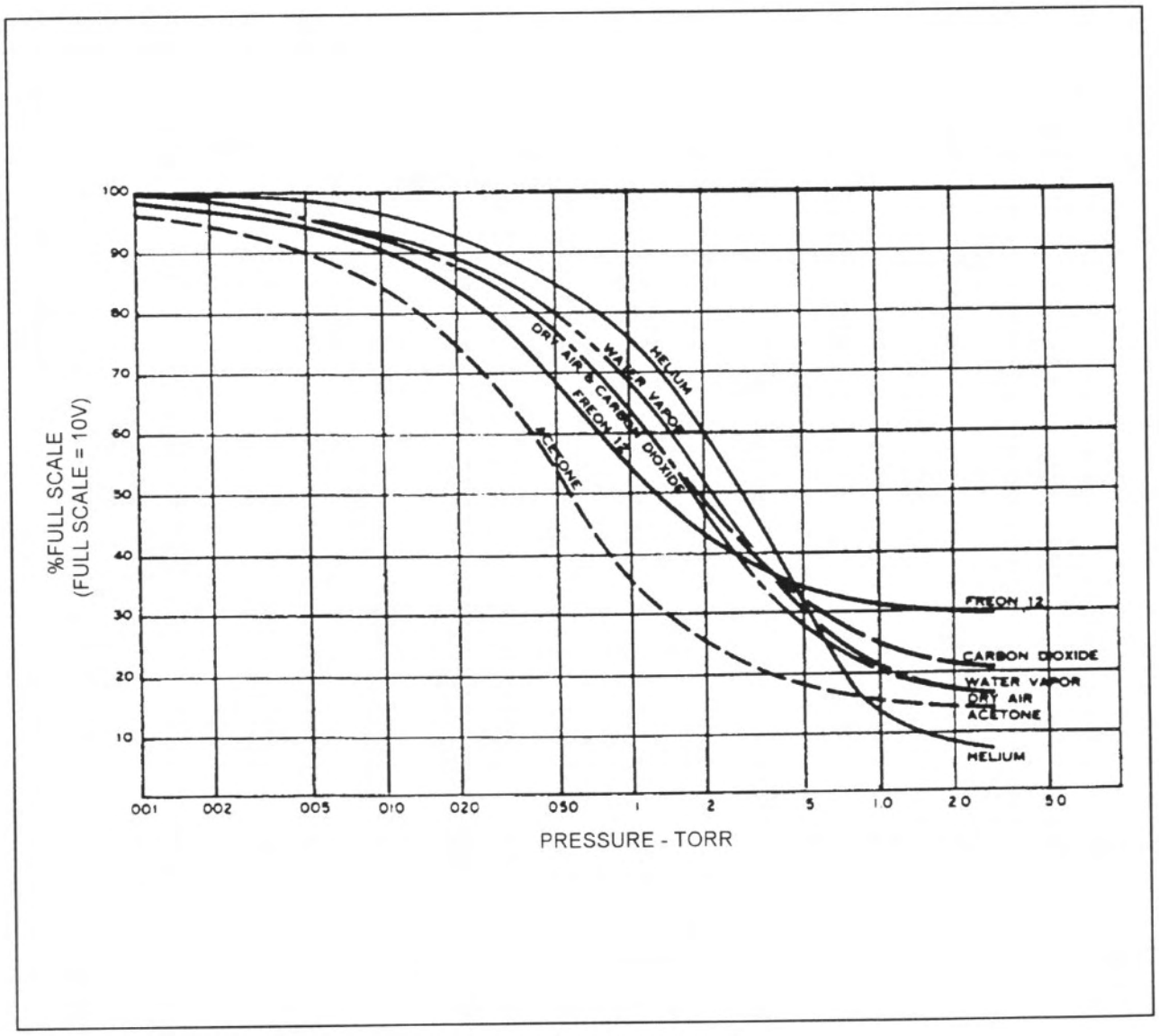
Signal	Pin N.
TC1 rec out	3
TC1 rec gnd	20
TC2 rec out	10
TC2 rec gnd	24
TC3 rec out	15
TC3 rec gnd	27
TC4 rec out	6
TC4 rec gnd	31



Pin connector

Recorder Output

The following figure shows a plot of nominal thermocouple response versus pressure for various common gases as available at the recorder output terminal. Since the recorder output does not reflect the result of using the ATM or VAC functions, use of these outputs should be restricted to providing an indication of changes in pressure levels as opposed to absolute measurements.



Response vs pressure curves

MULTI GAUGE CARDS INSTALLATION

WARNING

Before servicing the unit, check that the line cord is not plugged into a power source.

CAUTION

The MultiGauge Cards can be installed into the base unit only if the software revision level is 3.7 or higher.
Before install the cards make sure that the software revision level is correct.

Software revision check

To check the current software revision operate as follows:

1) Turn the MultiVac controller to OFF (rear panel)

2) Unplug the MultiVac controller, remove the cover and be sure that the ON/OFF rocker switch on front panel is in OFF position.

3) On microprocessor board put the dip switch number 8 to ON.

4) Install cover, plug the power cord and switch on (rear panel) the MultiVac controller. The front panel display will show:

D	E	B	U	G		O	P	E	R	A	T	I	O	N	

for about 5 seconds, and then changes automatically to:

			M	A	I	N		M	E	N	U				
						V	I	E	W						

Press the push button FIELD to select

			M	A	I	N		M	E	N	U				
						M	O	D	E						

then press ENTER. The display shows:

P	R	E	S	S	U	R	E		U	N	I	T	:		
						X	X	X	X						*

where XXXX may be TORR or mBAR and * define the selection made.

Press ENTER once again. The display shows:

V	E	R	S	I	O	N	:								
#	X	.	X					d	d	/	m	m	/	y	y

where X.X shows the current software revision (two digits with a decimal point between them; dd/mm/yy indicates the software revision date: day/month/year).

If the software revision level is not correct call the Varian Service.

Card installation procedure

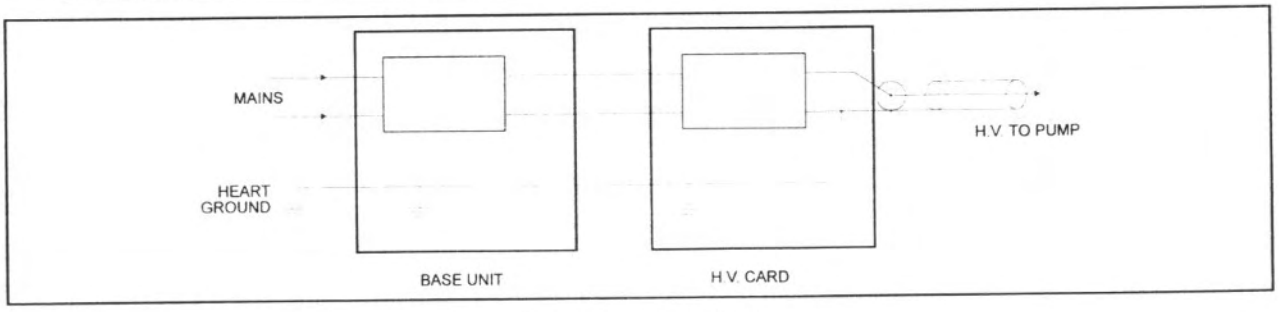
1. Open the MultiVac base cover.
2. Install the gauge controller card in one of the two slots at the right side of the unit (channel 3 and 4).
3. Replace the cover.
4. Make all the external connections (Gauge head cable, recorder output connection).

PUMP CONNECTION

The pump is connected to the controller rear panel via the Fischer connector of the H.V. card, by a coaxial high voltage cable assembly.

WARNING

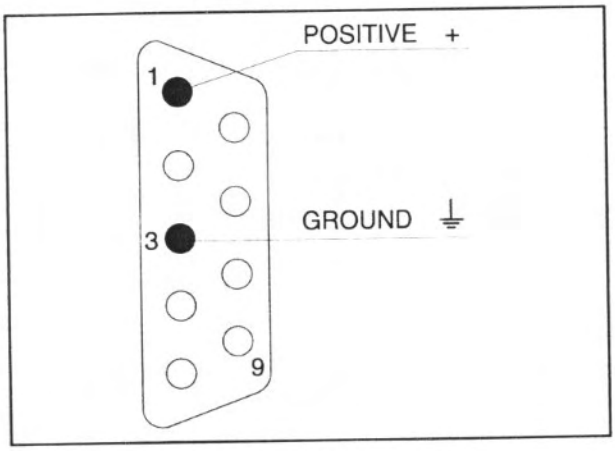
High voltage can cause severe injury or death.
When installing the high voltage cable:
- Turn the power off.
- On the Pump feedthrough make sure that the ground spring is in place.
- Install the pump connector and secure it with the screws (for 929-0770 cable).
- Plug the controller connector.
  When removing the connector make sure that power is off.



Ground connections

RECORDER OUTPUT CONNECTION

An external analog recorder can be connected to the recorder output connector J1 pin 3 (ground) and pin 1 (positive) taking care that the minimum recorder input impedance should be 1 MΩ.



Recorder output connection

USE

Operating Mode Selection

NOTE

The unit is factory set for:

- *LOCAL mode operation if the computer interface is not installed*
- *REMOTE mode operation if the computer interface is installed*
- *RUN/SET key in RUN position*
- *Operating mode: START, STEP VOLTAGE*

To modify the pressure measurement unit and the operating mode procede as follows.

NOTE

Before switching on power be sure that the Stand by ON/OFF switch on the front panel is in OFF position

The following procedure is valid when both the Remote I/O and the RS232-422 cards are installed and enabled by the dip-switch number 3. If one of the two cards is not installed, the relevant pages will not appear on the display.

On rear panel, switch on the power, and on front panel put the **RUN/SET** key switch to SET.
The display shows:

			M	A	I	N		M	E	N	U				
						V	I	E	W						

Press **FIELD** to select on the display:

			M	A	I	N		M	E	N	U				
						M	O	D	E						

Press **ENTER**.

If the RS 232-422 card is installed and enabled, the display shows directly the operating mode selection message, otherwise the display shows the pressure unit selection previously done: e.g.

P	R	E	S	S	U	R	E		U	N	I	T	:		
						T	o	r	r						*

where * always indicates the previous selection.
To change the pressure units press **FIELD**, and the display shows:

P	R	E	S	S	U	R	E		U	N	I	T	:		
						m	b	a	r						

To select this pressure unit press **ENTER**.
After **ENTER** is pressed the display shows the page where the operating mode can be selected:

O	P	E	R	A	T	I	O	N		M	O	D	E	:	
					L	O	C	A	L						*

Press **FIELD** and the display shows:

O	P	E	R	A	T	I	O	N		M	O	D	E	:	
			R	E	M	O	T	E		I	/	O			

Press **FIELD** and the display shows:

O	P	E	R	A	T	I	O	N		M	O	D	E	:	
	R	E	M	O	T	E		C	O	M	M	.			

Press **ENTER** when the operating mode you want is displayed and this mode will be selected.

NOTE

If the selected operating mode is LOCAL, the "Loc" LED on the front panel will be ON.
If the selected operating mode is REMOTE I/O or REMOTE COMMUNICATION, the "Rem" LED on the front panel will be ON.

It is always possible to change the operating mode by the front panel following the procedure described above.
To change the operating condition from STEP VOLTAGE to FIXED VOLTAGE set the RUN/SET key in SET position and follow the flow chart of Flow 1, Flow 2 or Flow 3. At the end of the operation turn the RUN/SET key in RUN position.

Using the MultiVac Controller with RUN/SET Key in RUN Position

Verifing the pump type

Make all vacuum manifold and electrical connections and refer to the Ion Pump instruction manual prior to operate the MultiVac controller.
Plug the controller power cable into a suitable power source.
At the first installation must be verified that the MultiVac controller is correctly set for the desired pump type and mode of operation.

To verify the pump type switch on the controller on the rear panel. The display shows e.g.:

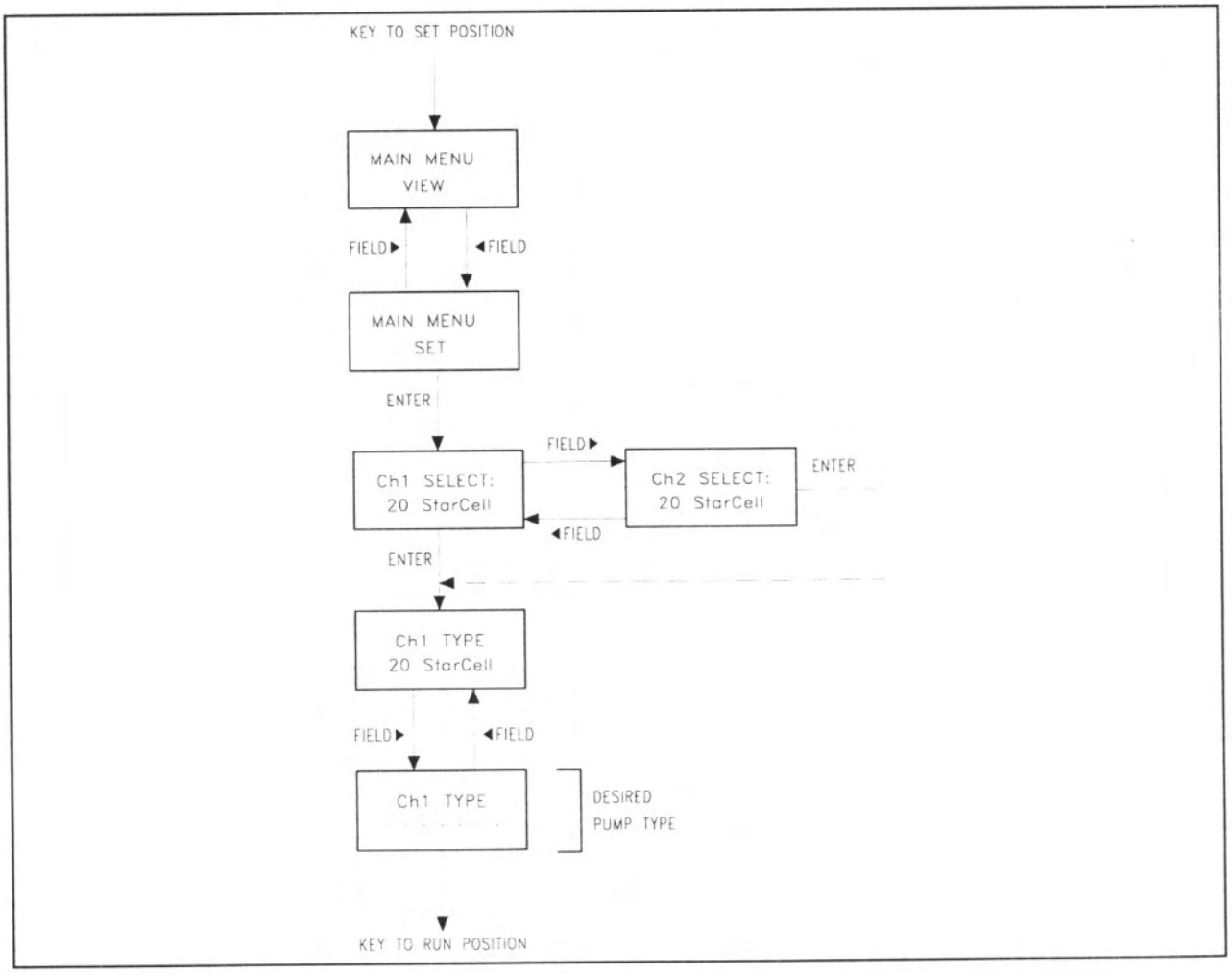
1	#		2	0		S	t	a	r	C	e	l	l		

if only one H.V. card is installed.
If the pump is not of the desired type, it must be selected according to the flow chart of the following figure.

If two H.V. cards are installed it will show:

1	#		2	0		S	t	a	r	C	e	l	l		
2	#		2	5		D	i	o	d	e	/	N	D		

To switch from START to PROTECT mode of operation, press the **START/PROTECT** pushbutton of the MultiVac front panel. When the PROTECT mode of operation is selected for a pump, the corresponding "**Prot**" LED lights.



Pump type selection

Using the MultiVac Controller with RUN/SET Key in SET Position

Controller start-up and pump type selection
For different controller configurations follow the related flow charts according to the following table to select the desired pump type and operating mode:

Controller configuration	Figure
H.V. card installed	Flow 1
H.V. card and Set Point/Remote Control card installed	Flow 2
H.V. card, RS232-422 Computer Interface card installed and enabled	Flow 3
H.V. card and Bayard Alpert or UHV MultiGauge card installed	Flow 4
H.V. card and Cold Cathode MultiGauge card installed	Flow 5
H.V. card and Thermocouple MultiGauge card installed	Flow 6

NOTE

The asterisk close to a value or other messages in the display indicates the actually selected value.

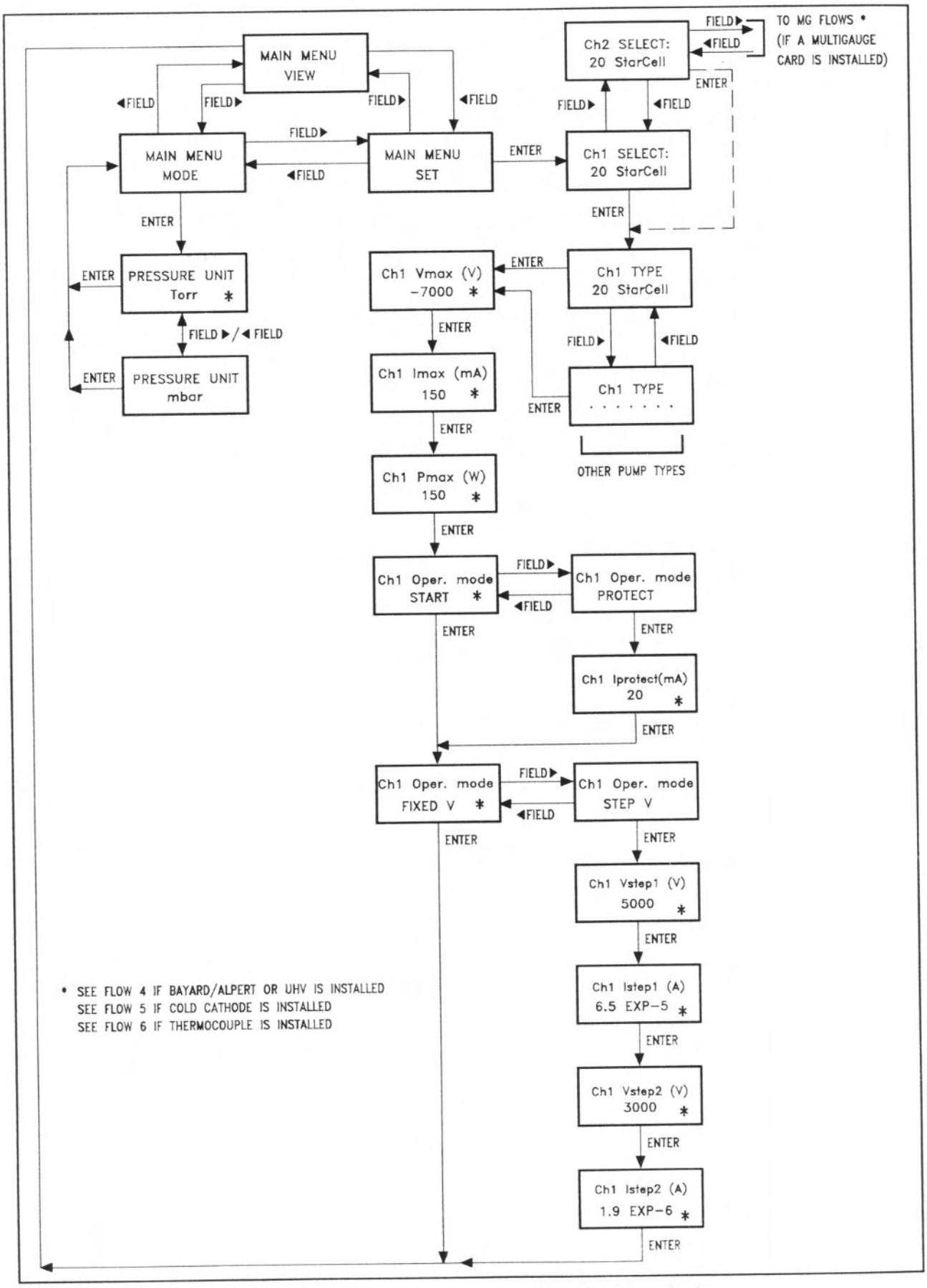
To change the displayed pump type when you are in the corresponding display page, you must press the **FIELD** pushbuttons until the desired pump is displayed, and then press **ENTER** to select and make it the actual pump type.
Note that for the Large Vaclon Plus H.V. card the displayed pump types are 16, while for a Medium Vaclon Plus H.V. card the pump types are 6 (see tables in paras. Large Vaclon Plus H.V. card specifications and Medium Vaclon Plus H.V. card specifications).

Spare Pump Parameters

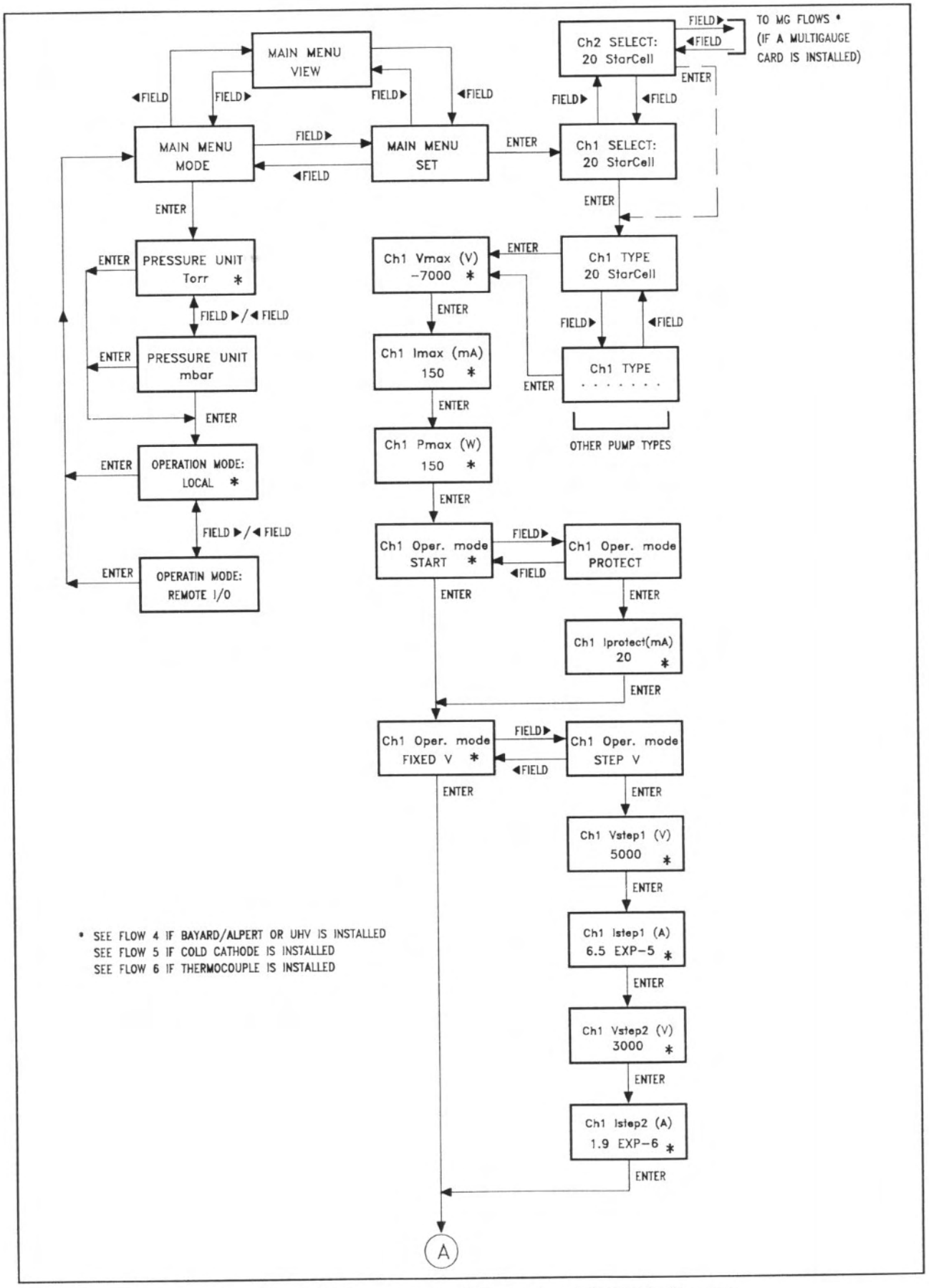
To operate the controller with a pump listed in para. Large Vaclon Plus H.V. card specifications as "SPARE" you must set the pump parameters. Follow flow chart of Flow 7 figure to select and store the pump parameter when the OPERATION MODE is LOCAL or REMOTE I/O.
Use the front panel pushbuttons + and - to increase and decrease the values and the pushbuttons **FIELD** to change between negative and positive values.
The default values and the adjustable range of SPARE pump parameter is listed in the following table.

Parameter	Default values	Adjustable range
V max = I max = P max =	- 3000 10 10	± 3000 V to ± 7000 V 10 to 400 mA 10 to 400 W
If the PROTECT mode is selected:		
I protect =	10 mA	10 to 400 mA
If the STEP voltage is selected:		
V step 1 = I step 1 = V step 2 = I step 2 =	- 3000 6.5×10^{-5}A - 3000 1.9×10^{-6}A	± 3000 V to ± V max 1×10^{-7}A to 1 A ± 3000 V to V step 1 1×10^{-5}A to I step 1 setting

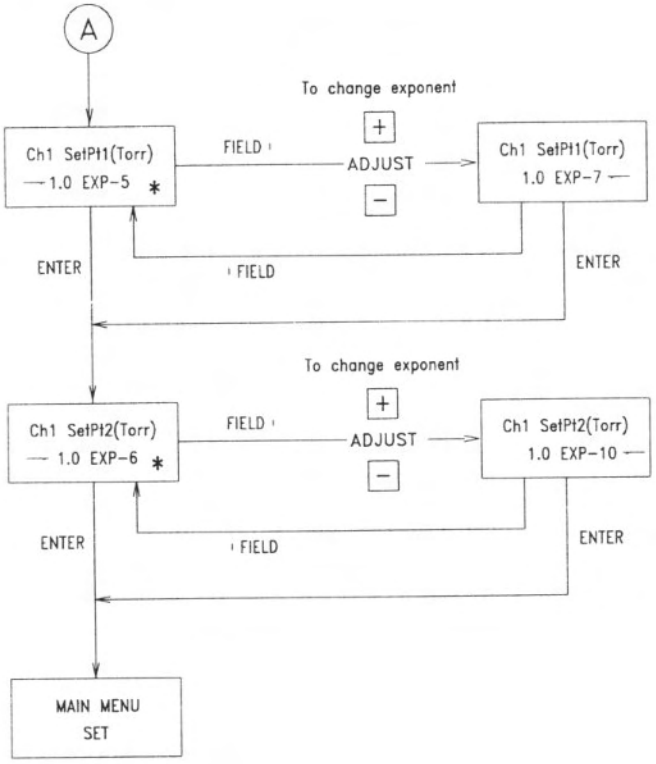
The operating mode is factory set to START and STEP V.



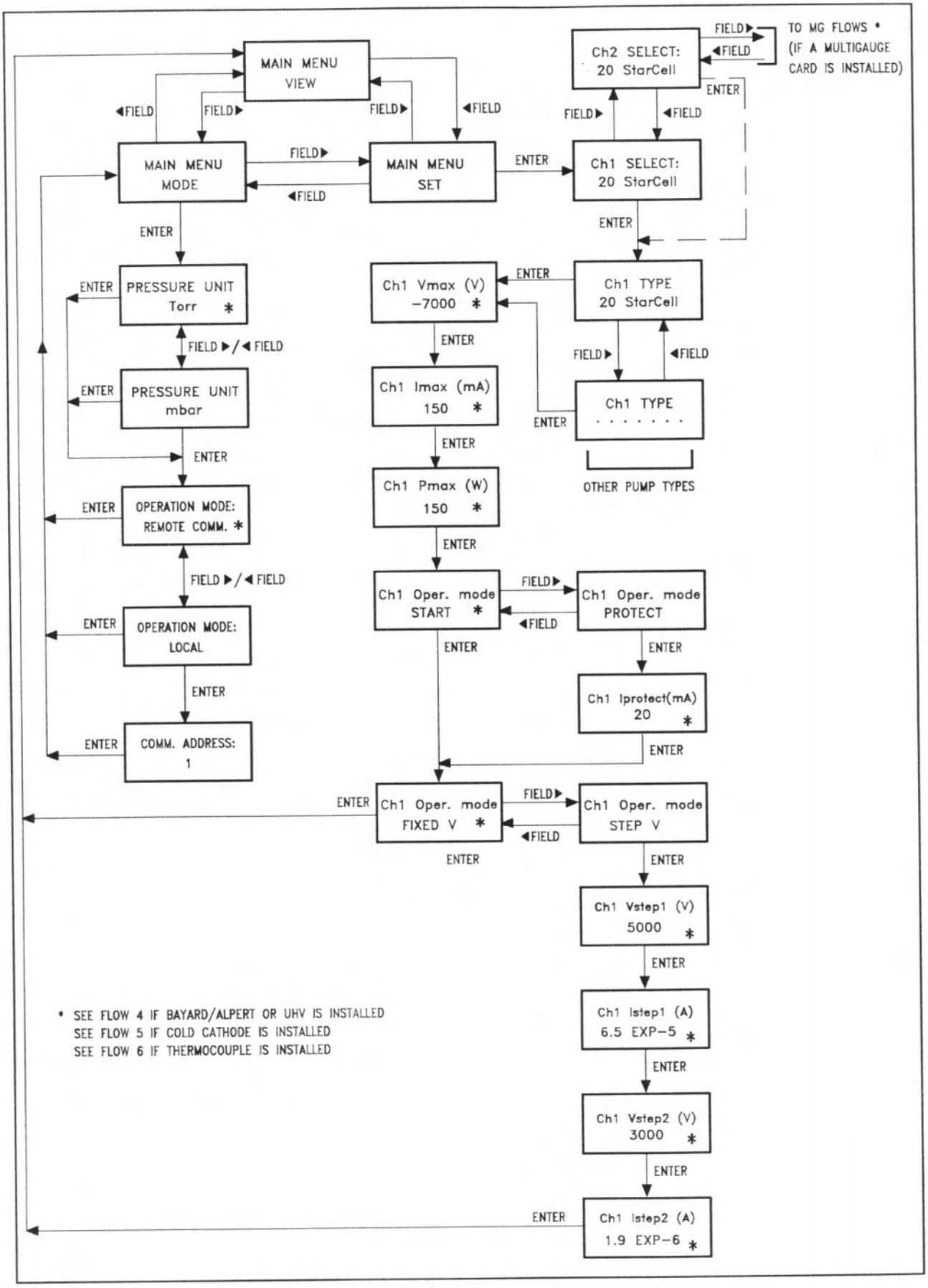
Flow 1 - MultiVac start-up: only H.V. card installed



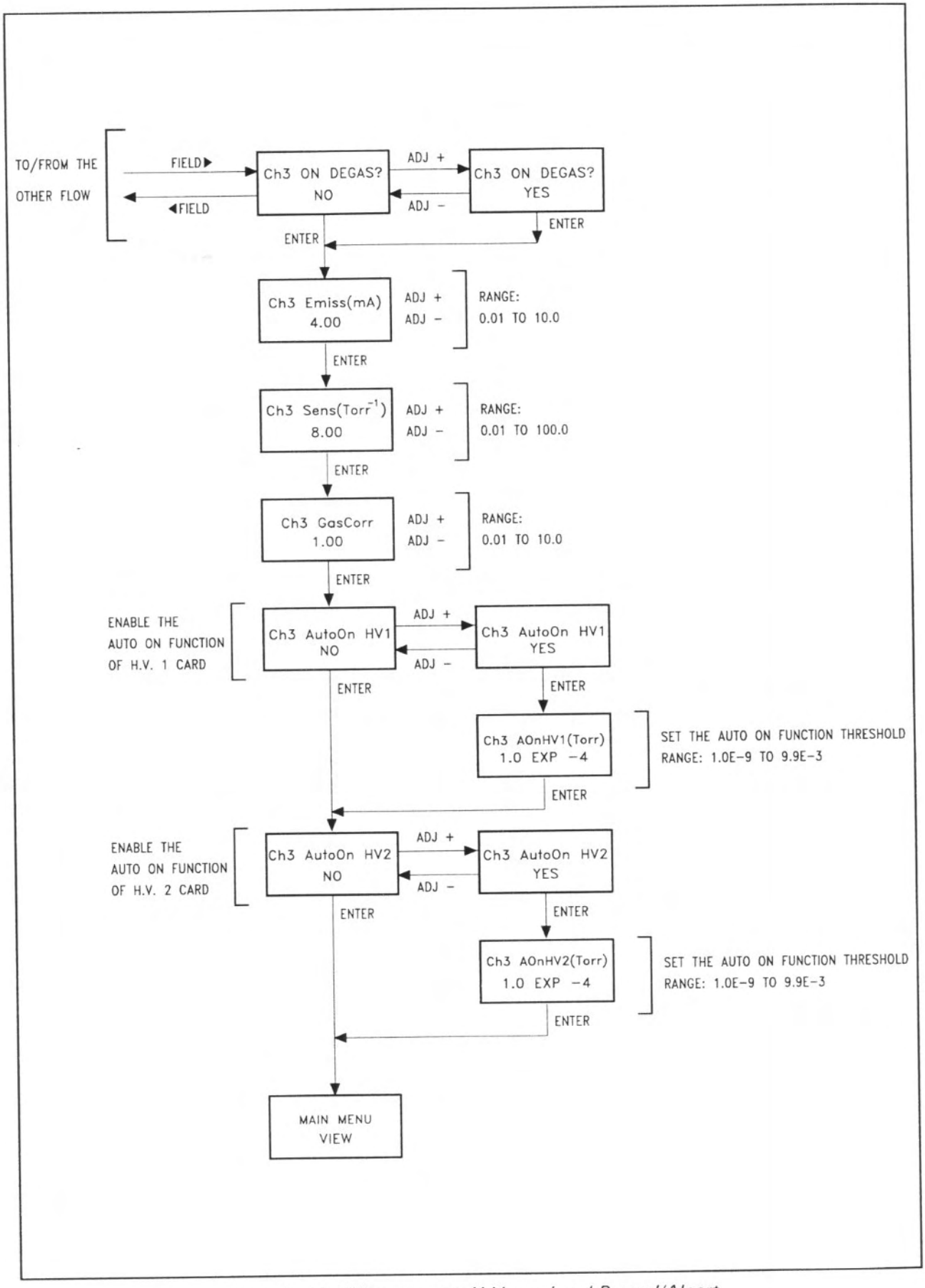
Flow 2 - MultiVac start-up: H.V. card and Set Point/Remote Control card installed (Sheet 1 of 2)



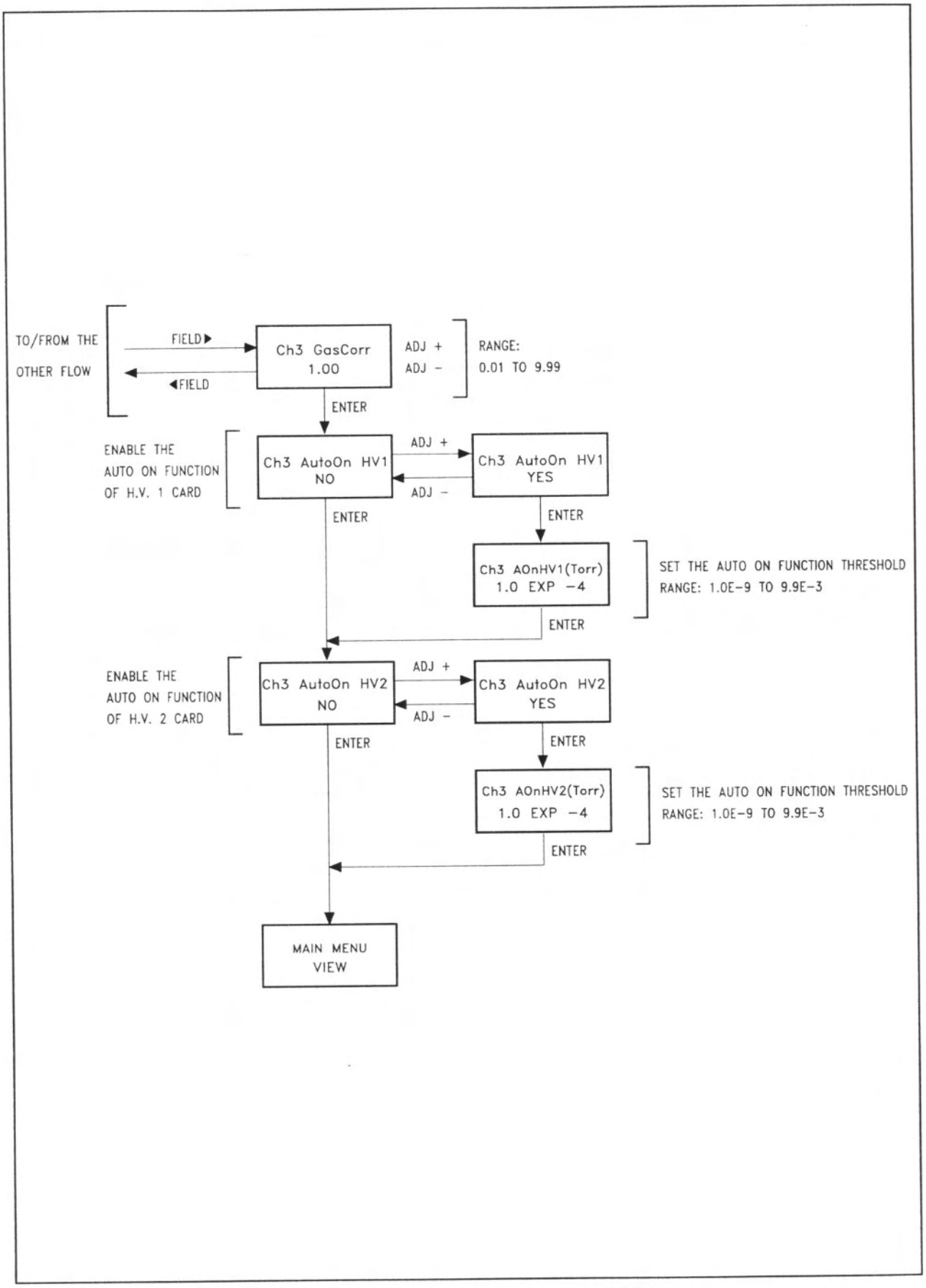
Flow 2 - MultiVac start-up: H.V. card and Set Point/Remote Control card installed (Sheet 2 of 2)



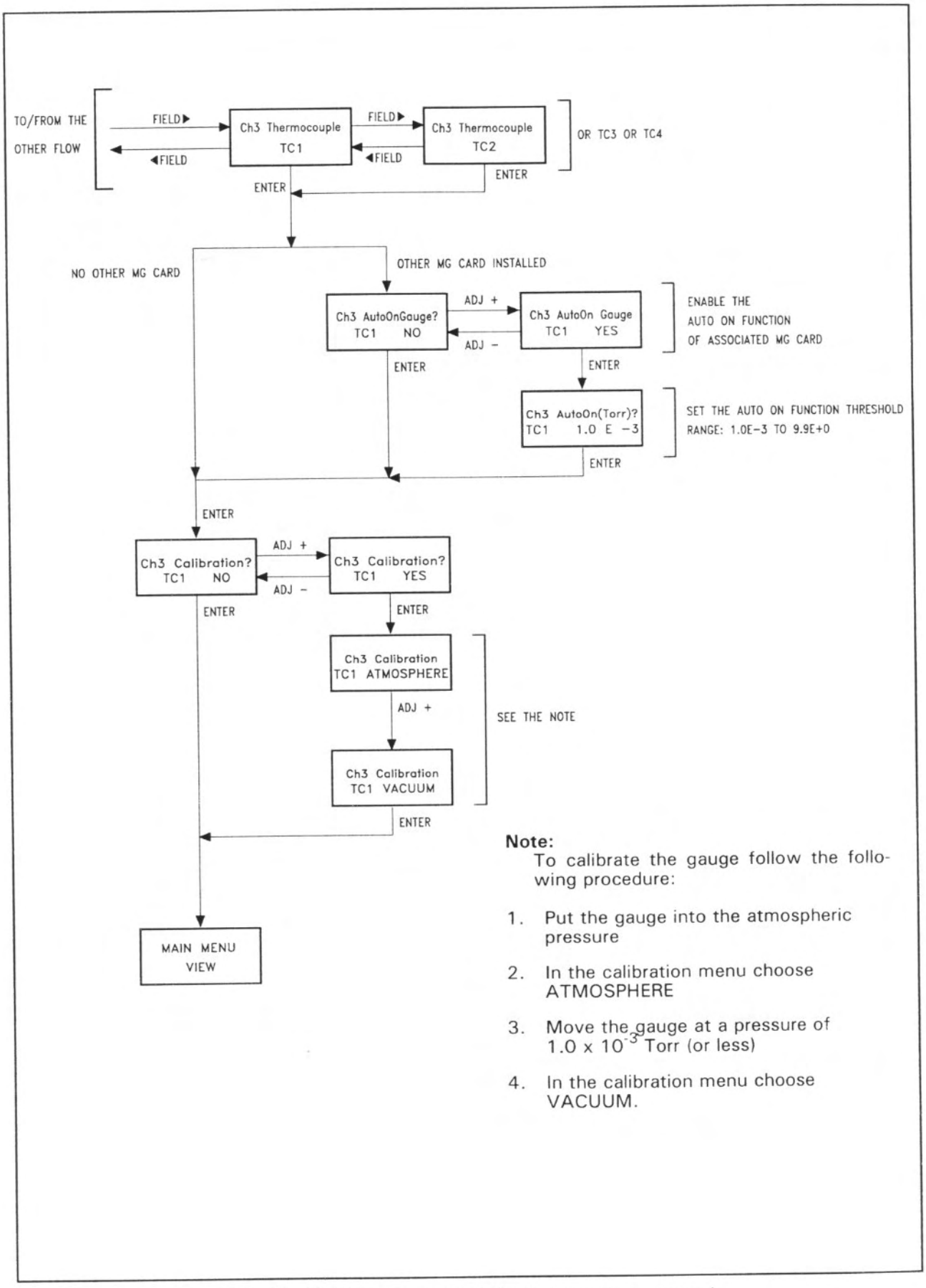
Flow 3 - MultiVac start-up: H.V. card and RS232-422 Computer Interface card installed



Flow 4 - MultiVac start-up: H.V. card and Bayard/Alpert or UHV MultiGauge card installed



Flow 5 - MultiVac start-up: H.V. card and Cold Cathode MultiGauge card installed



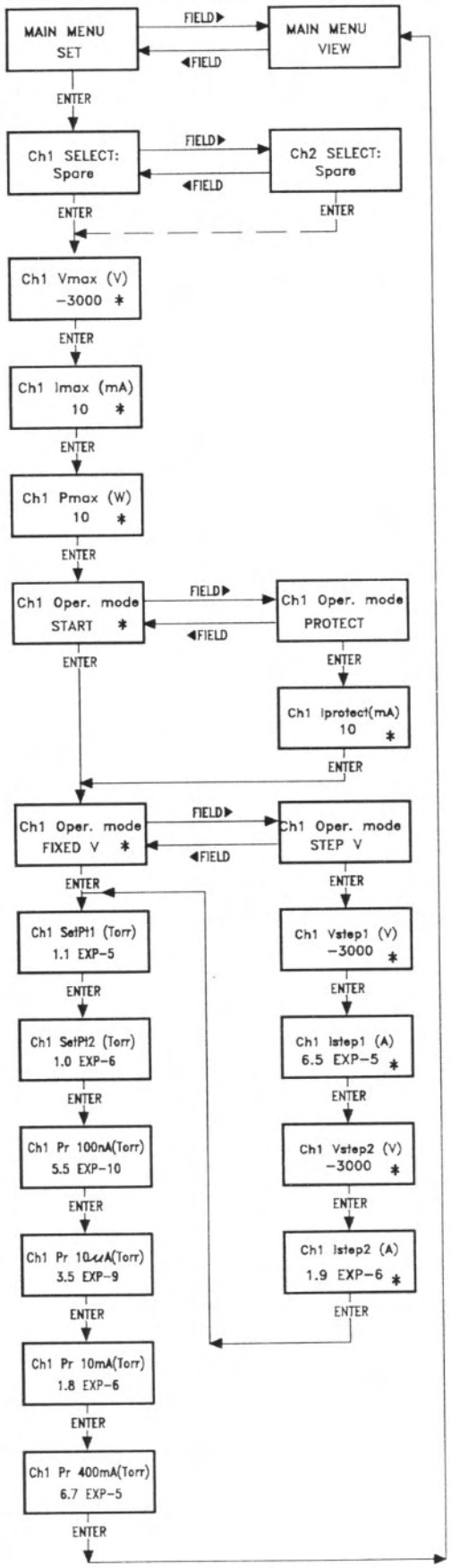
Note:
To calibrate the gauge follow the following procedure:

1. Put the gauge into the atmospheric pressure
2. In the calibration menu choose ATMOSPHERE
3. Move the gauge at a pressure of 1.0×10^{-3} Torr (or less)
4. In the calibration menu choose VACUUM.

Flow 6 - MultiVac start-up: H.V. card and Thermocouple MultiGauge card installed

Note 1:

When this page is displayed the operator should store the pressure value corresponding to the pump current of 100 nA with 5000 V applied on the pump in use.
Store the pressure value for other three pump current values (10 µA, 10 mA, 400 mA).
Storing these values allows the MultiVac to convert the pump current into pressure values even if the operating voltage is different from 5000 V.
The correction factor due to the different voltage is automatically applied by the MultiVac software in order to obtain a continuous correct pressure reading.
Note that some pressure values are stored by default.



Flow 7 - Spare pump parameters setting

H. V. Card Switching ON

To switch on the H.V. card you must set the front panel rocker switch to ON position, switch ON the controller and then follow the steps detailed in the flow chart of Flow 8 figure.
Note that when the H.V. is switched on, the fans can start running faster as detailed in the related paragraph.

Degas Function

The DEGAS function can be enabled for the Bayard/Alpert and the UHV MultiGauge Cards.
The DEGAS function can be enabled setting to YES the YES/NO parameter shown on the display when the message "Ch3 ON DEGAS?" of the Menu SET is displayed.
To enable the function the Card must be activated (EMIS ON), and the pressure must be less or equal to 10^{-5} Torr.
The DEGAS function is automatically disabled after a preset time from the enabling (60 minutes for the Bayard/Alpert Card, or 10 minutes for the UHV Card), or when the card is disactivated.

Auto On Function

The two H.V. cards can be automatically switched ON when a Bayard/Alpert or a UHV or a Cold Cathode Card is installed.
The Auto On function can be enabled setting to YES the YES/NO parameter shown on the display when the message "Ch3 AutoOn HV1 (or HV2)" of the Menu SET is displayed.
To enable the function the gauge must be in OFF state and the Auto On function of the second MultiGauge Card (if installed) must be disabled.
The function is active for once H.V. card switching on only.
When the Auto On function is enabled, the switching on pressure threshold must be set (the message displayed is "Ch3 AOnHV1(Torr)"). The threshold range is from $1x10^{-9}$ to $9.9x10^{-3}$ Torr; the default value is $1x10^{-4}$ Torr.

The Auto On function of the Thermocouple card, when enabled, activates the Auto On function of the associated MultiGauge Card.
In this case the pressure threshold range is from $1x10^{-3}$ to 9.9 Torr.

Thermocouple Calibration Function

When a Thermocouple Card is installed the associated Gauge can be calibrated by means of the Calibration function.
The Calibration function can be enabled setting to YES the YES/NO parameter shown on the display when the message "Ch3 Calibration" of the Menu SET is displayed.
To activate the calibration function the selected thermocouple must be in ON state.
When the Calibration function is activated, the thermocouple must be put into the atmospheric pressure when the display shows the message:

C	h	3		C	a	l	i	b	r	a	t	i	o	n
T	C	2		A	T	M	O	S	P	H	E	R	E	

and the ENTER key must be pressed to store the first calibration value.
Then the thermocouple must be put into a pressure of $1x10^{-3}$ Torr (or less) and the value VACUUM (instead of ATMOSPHERE) must be set in the preceeding message. Then the ENTER key must be pressed to store the second calibration value.

Pumps Operating Parameters Reading

The last three blocks of flow chart in Flow 8 figure are the pump operating parameters reading.
In these pages you can read the pump current, voltage and pressure actual values.
The read-out is typically of the following type:

C	h	1		V	o	l	t	a	g	e		(	V	)
				-	3	0	0	0						

C	h	1		C	u	r	r	e	n	t		(	A	)
	0	.	0		E	X	P		-	8	=	=	=	

C	h	1		P	r	e	s	s		(	T	o	r	r	)
		L	O	W		P	R	E	S	S	U	R	E		

Close to the read-out value, one of the symbols described in the following table can appear.

Symbol	Description
+ >	The value is increasing at a slow rate
+ >>	The value is increasing at a medium rate
+ >>>	The value is increasing at a fast rate
< -	The value is decreasing at a slow rate
<< -	The value is decreasing at a medium rate
< <<-	The value is decreasing at a fast rate
= =	The value is stable

NOTE

Should the current value be very low (i.e. $< 1 \times 10^{-7}$ A), the pressure value is not read and appear the message "LOW PRESSURE".

Emergency Switch Off of the Two Pumps

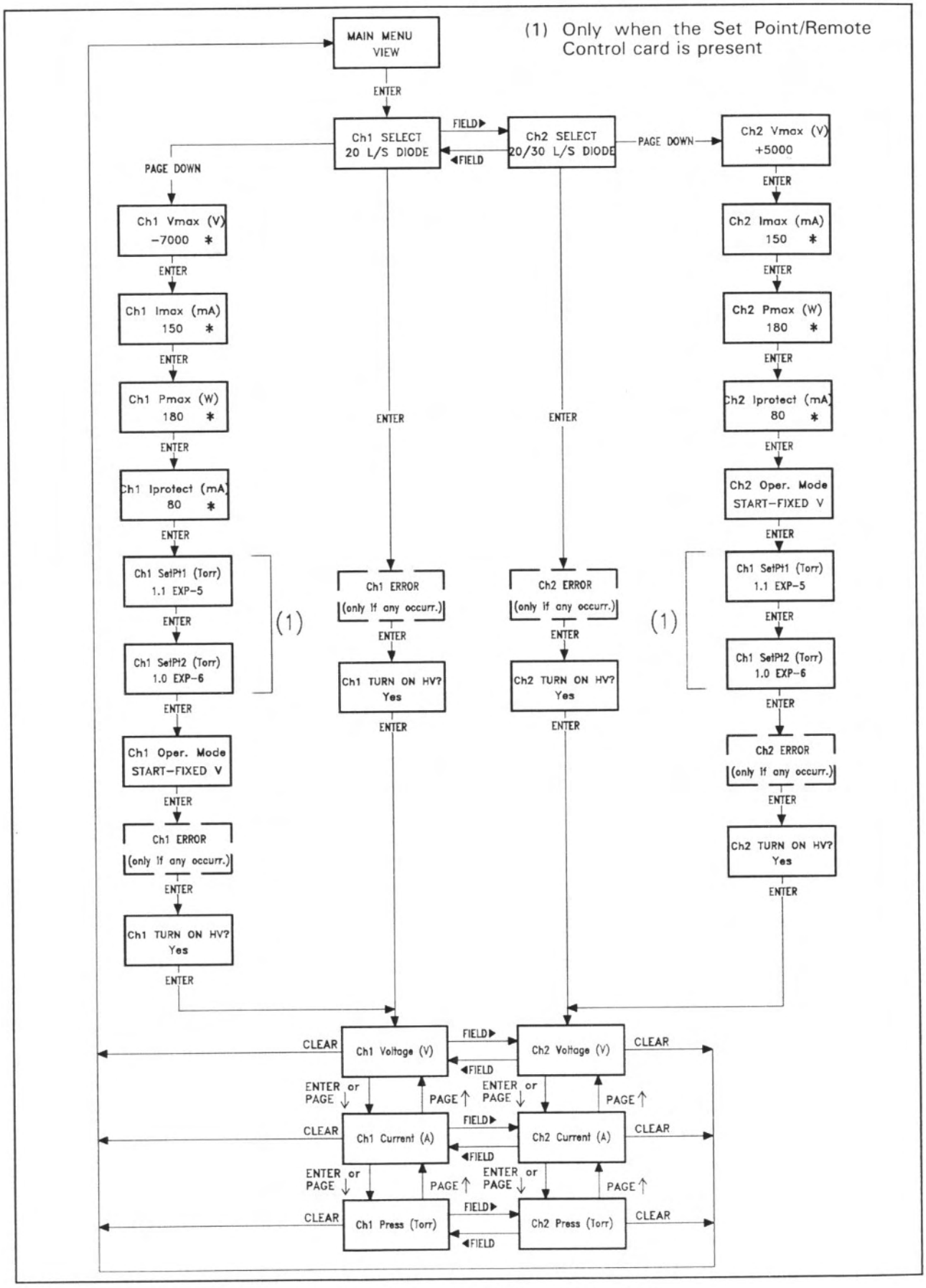
To switch off both the pumps at the same time, you can turn the front panel rocker switch to the OFF position.
In this case the **HV** Led flashes.
If you try to switch on the pumps, the message

S	T	A	N	D	B	Y	/	I	N	T	L	K		
S	E	E		M	A	N	U	A	L					

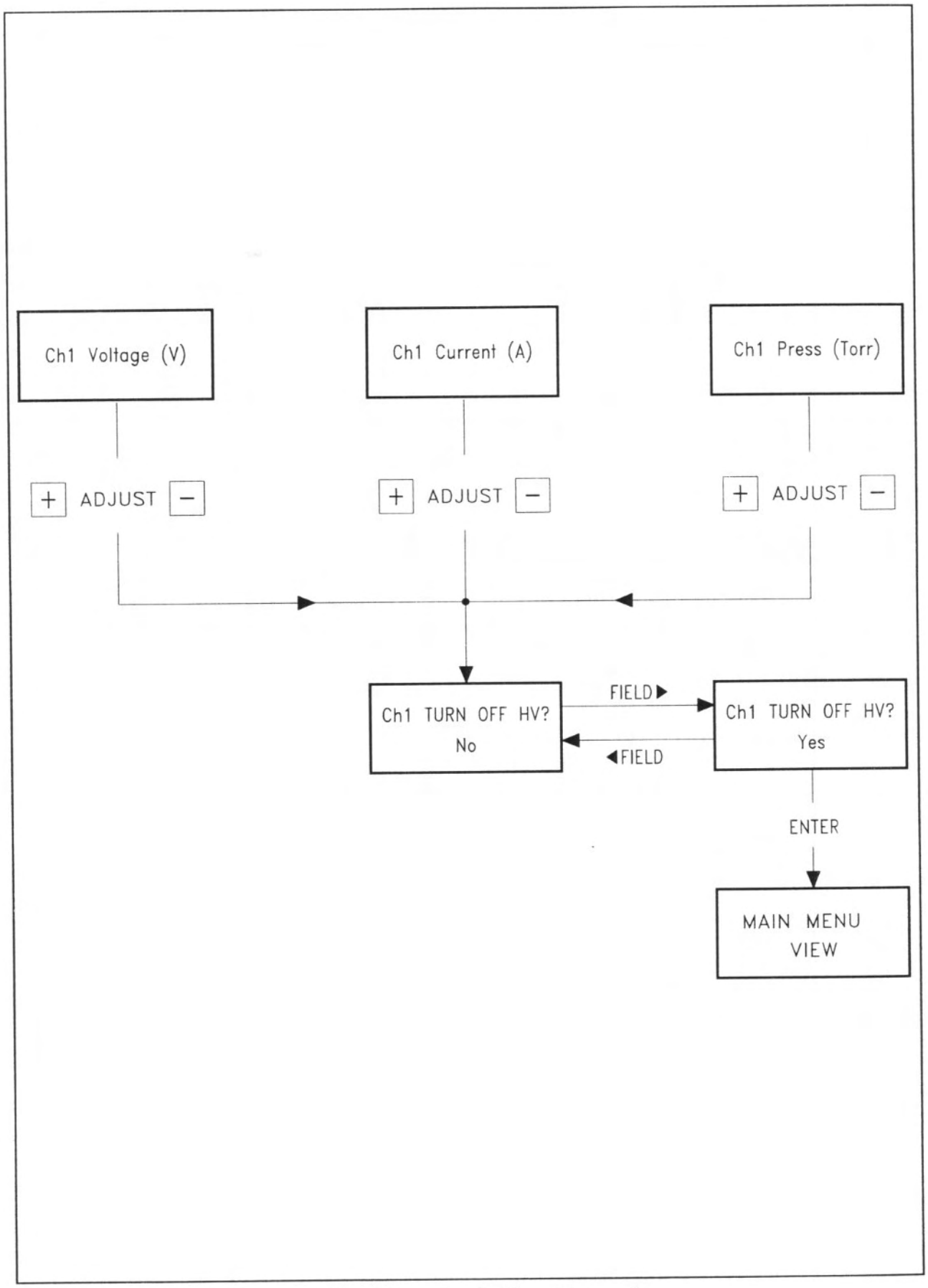
is displayed. In this case it is necessary to press **ENTER** and then the High Voltage can be switched on.

Switch Off of One Pump

To switch off one pump, you must follow the flow chart of Flow 9 figure when you are in one of the pump parameter reading pages.



Flow 8 - H.V. card switching on procedure: RUN/SET key in SET position



Flow 9 - H.V. card switching off procedure

CONTROLLER PARTS

The MultiVac Controller parts are listed in the following table.

Part Number	Description
HV Cards	
929-4025	Medium Vaclon Pumps HV Card, negative output preset (for Vaclon *Plus* pumps up to 75)
929-4035	Medium Vaclon Pumps HV Card, positive output preset (for Vaclon *Plus* pumps up to 75)
929-4040	Large Vaclon Pumps HV Card, negative output preset (for Vaclon *Plus* pumps up to 500)
929-4050	Large Vaclon Pumps HV Card, positive output preset (for Vaclon *Plus* pumps up to 500)
Options	
929-4100	RS 232-422 Computer Interface card
929-4110	Set Point/Remote Control card
929-0064	Rack adapter
Cables	
929-0770	HV bakeable cable, 4 m long to be used with all Vaclon *Plus* pumps except the Vaclon *Plus* 25.
929-0780	HV bakeable cable, 4 m long to be used with Vaclon *Plus* 25.

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