87-900-066-01
May 1996

Instruction Manual

RS 232-422 Computer Interface card

Model 929-4100

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 transístores 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

Varian SpA
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20.10.1998

S. Pilot

Vice President and General Manager

General

The RS 232-422 Computer Interface card (Fig. 1-1) is an optional card that can be added to the Varian's MultiVac controller so as its operations can be controlled via a remote host computer.

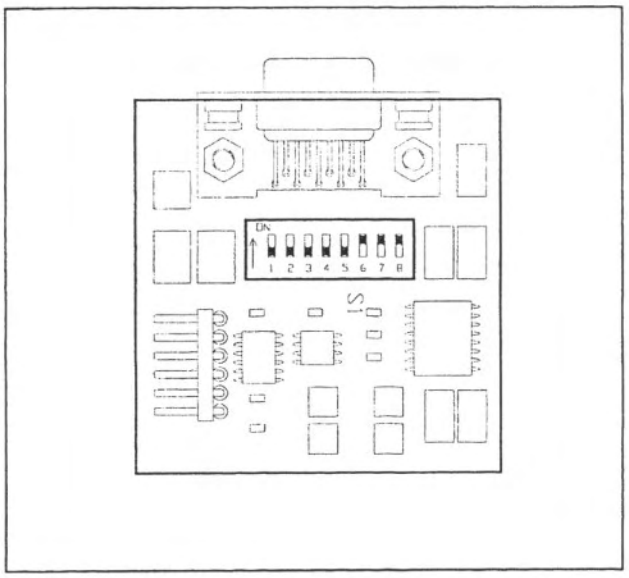


Fig. 1-1 - RS 232/422 Computer Interface Card

RS 232-422 Computer Interface Card Description

The card (see Fig. 1-2) consists of a receiving/transmitting circuitry that permits the communication between the MultiVac controller and the host computer.

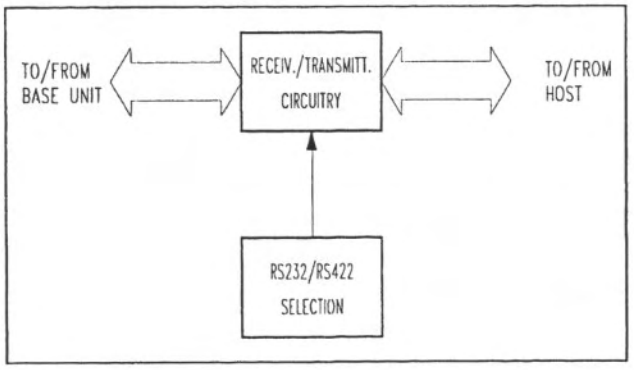


Fig. 1-2 - Block Diagram

Eight dip-switches enable the selection between RS 232 and RS 422 communication interface standard.

The card communicate with the base unit microprocessor by means of a 6-pin connector, and with the external by means of a 9-pin "D" type connector. The following table summarise the signals onto the 9-pin connector for the RS 232 and RS 422 interface.

Pin	RS232	RS422
1	Not connected	TX NEG.
2	RX	RX POS.
3	TX	TX POS.
4	Not connected	Not connected
5	SIG. GND	SIG. GND
6	Not connected	Not connected
7	Not connected	Not connected
8	Not connected	Not connected
9	Not connected	RX NEG.

Data are transmitted in asynchronous serial mode according to the following format:

- 1 start bit
- 8 data bits
- no parity
- 1 stop bit.

The baud rate and the serial protocol are selected by means of the dip switches on the microprocessor board of the base unit as follows (see Fig. 1-3):

Sw.	Selection	Description
1, 2	Sw1 Sw2	Baud Rate
	OFF OFF	= 1200 (default value)
	ON OFF	= 2400
	OFF ON	= 4800
	ON ON	= 9600
5	ON	ASCII protocol
	OFF	Standard protocol

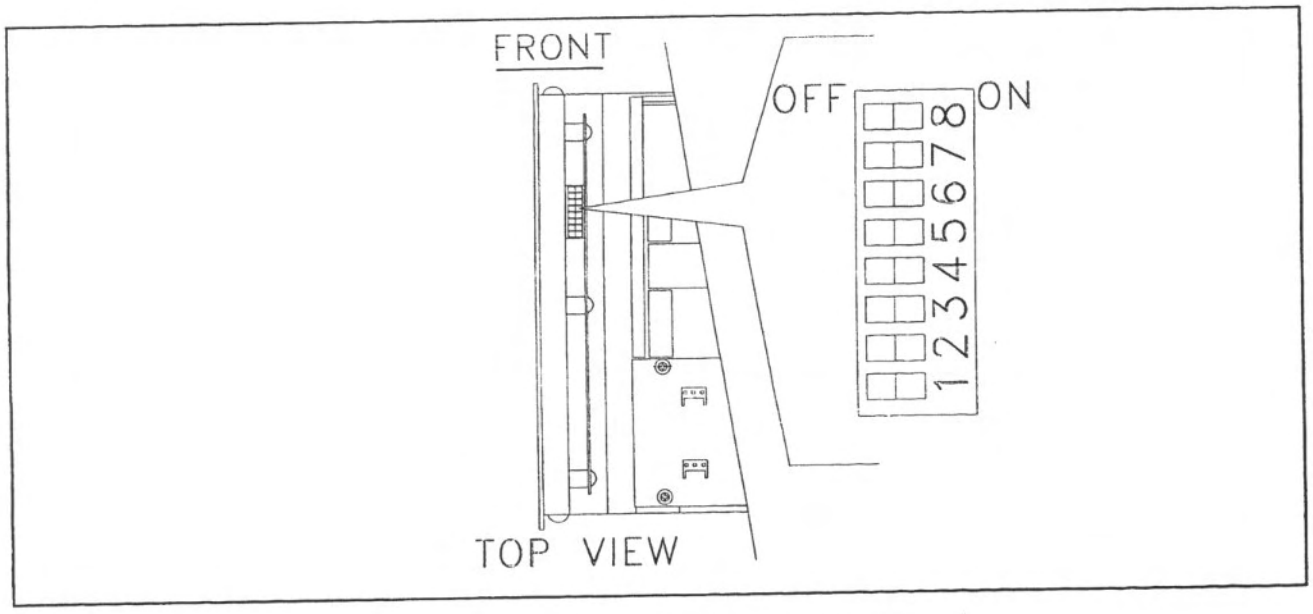


Fig. 1-3 - Microprocessor Board Dip-Switches

2.1 General

Inspect the card for any shipping damage.

WARNING
High voltage developed in the controller can cause severe injury or death. Before servicing the unit, disconnect the input power cable.

2.2 Card Installation

- Open the unit by removing the four screws (1) aside of the unit (see Fig. 2-1)
- Remove all the cards inside the controller
- Remove the four screws (2) securing the rear panel (see Fig. 2-1) and open it
- Precept the card dip-switches according to the desired communication interface (RS 232 or RS 422) as detailed in the following table (see Fig 2-2):

Switch	RS 232	RS 422
1	OFF	ON
2	OFF	ON
3	OFF	ON
4	OFF	ON
5	OFF	ON
6	ON	OFF
7	ON	OFF
8	ON	OFF

- Carefully insert the card into its slot (see Fig. 2-3)
- Reassemble the rear panel and secure the card interface connector with the two turrets
- Reassemble the other cards into the base unit
- Enable the RS 232-422 Computer Interface setting to ON dip-switch 3 of microprocessor board (see Fig. 2-4)
- Verify that there is no loose hardware or metal parts inside the MultiVac base unit. Replace the cover and secure it with screws.

Before connecting the power cord to the wall socket be sure that the voltage change over is currently set.

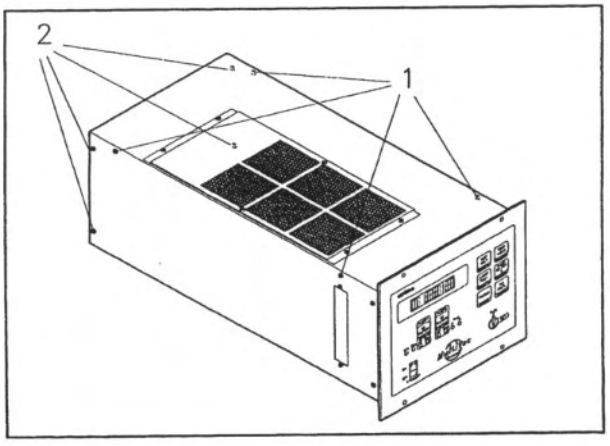


Fig. 2-1 - Base Unit Screws

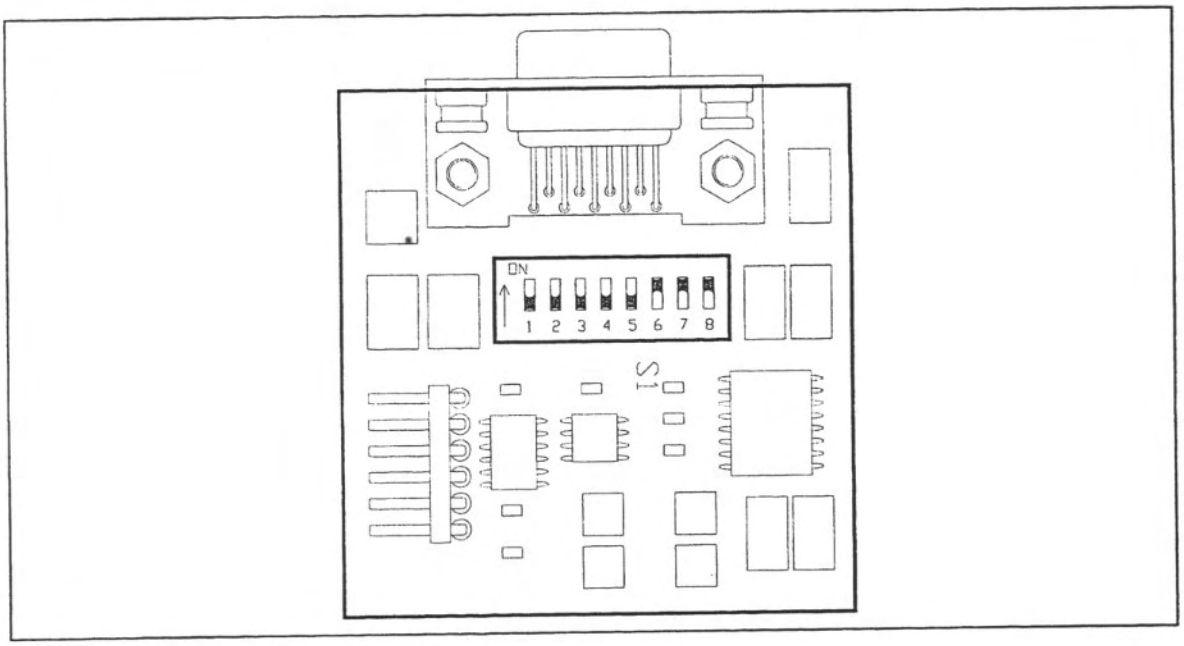


Fig. 2-2 - RS 232/422 Dip-Switches Selection

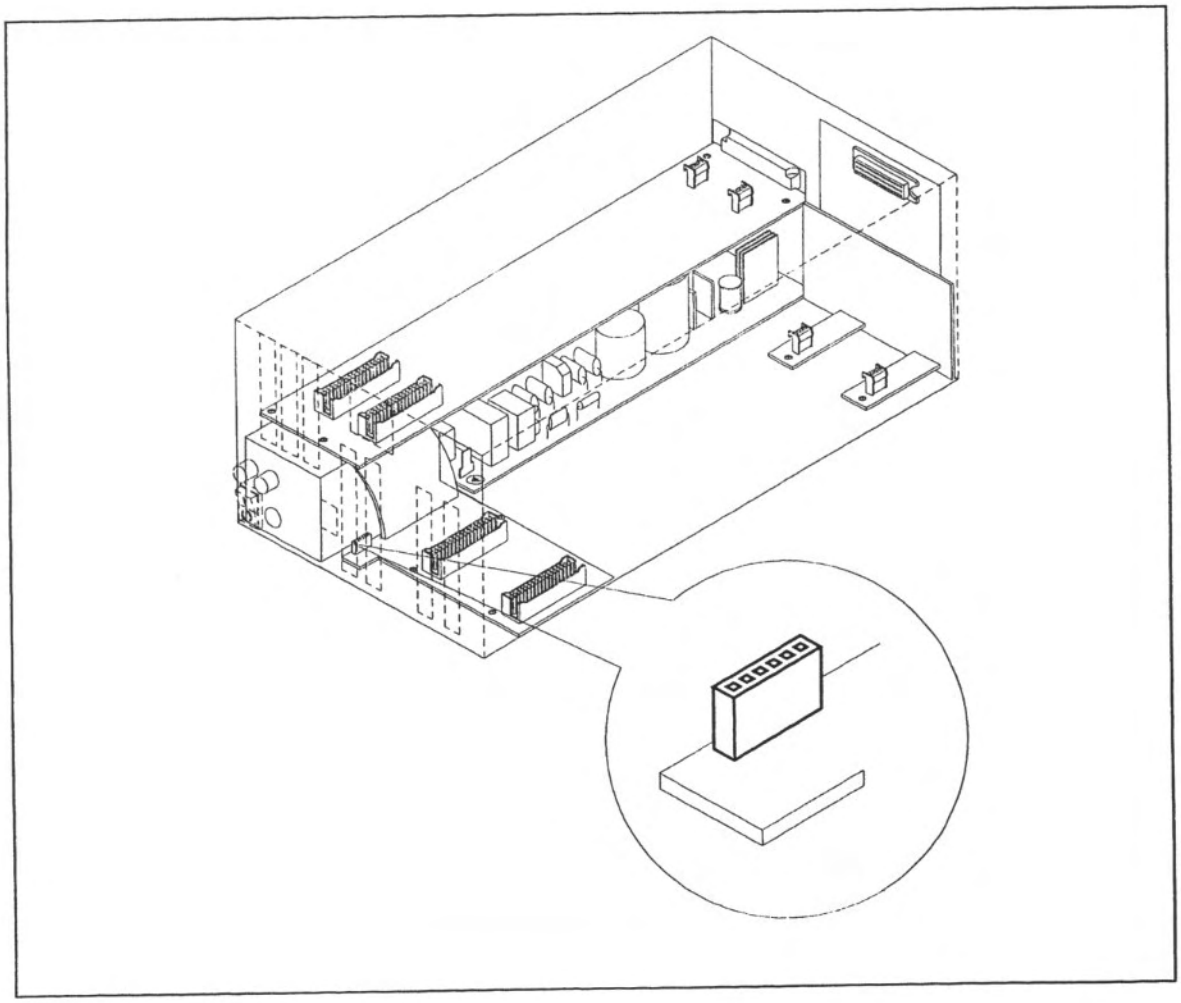


Fig. 2-3 - Card Installation

2.3 Communication Port

The communication port connections are shown in Fig. 2-5.

The communication port mating connector is not supplied with the card.

The external cable (not supplied) between the host computer and the card may require some crossed wires so that the signals are connected correctly.

NOTE
It is advisable to use a shielded cable to connect the host computer and the card

For example, the Transmit data signal from the controller (pin 3) must be connected to the host computer's Receive data line and viceversa. Consult the host computer's instruction manual for its serial port connections.

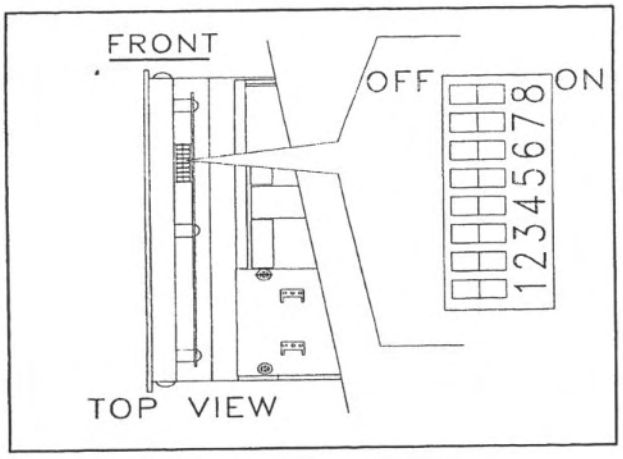
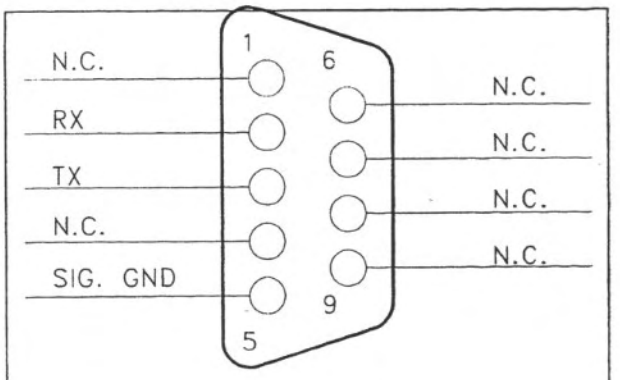
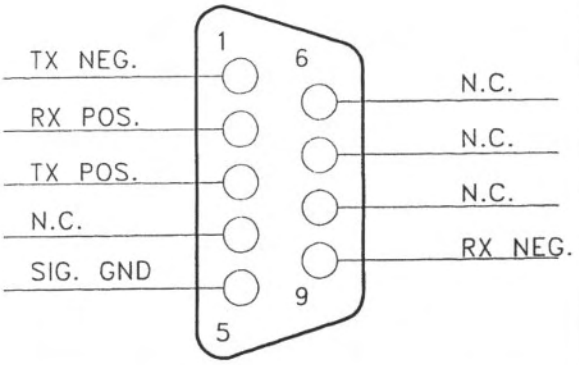


Fig. 2-4 - Microprocessor Board Dip-Switches



(a) Signals with RS 232 interface setting



(b) Signals with RS 422 interface setting

Fig. 2-5 - Communication Port

3.1 General

When the RS 232-422 Computer Interface card is installed and enabled, the MultiVac default operating mode is REMOTE COMM.

At any time it is possible to change the operating mode: refer to the MultiVac controller base unit Instruction Manual.

3.2 Serial Communication Protocol

The protocol is of the Master/Slave type where MultiVac is the slave unit.

The message format is:

- **Address**: it's a number between 1 and 32 (1h to 20h). In the message from Host to MultiVac the address byte value is obtained summing 128 to the actual address valve. In such a way the first byte of the message has always this MSB at 1 in order to use the Wake-up feature of the microprocessor. In the following bytes (from computer to MultiVac) the MSB should not have the MSB at 1 to avoid that it can be seen as a trial to communicate to others other MultiVac linked to the same net.

- **Data packet length**: the data packet length is expressed with two figures where each figure is a number between 0 (ASCII code 30h) and 9 (ASCII code 39h)

- **Data packet**: the data packet contains the commands from the host computer and the reports to the host. The packet format is described in a separate section.

- **Checksum**: the checksum is calculated by XOR of all the serial message bytes, leaving out the checksum itself, and masking with 7Fh to obtain the MSB at Ø. Also all the messages sent by the MultiVac to Host will have the checksum with the MSB at Ø, because all the bytes of the packet will have the MSB at Ø.

- **Example**: Answer to the command A01? (message from MultiVac to Host)

ASCII	.	0	5	A	0	1	-	3	Z
HEX	01	30	35	41	30	31	2D	33	90

node — lenght — command — message — checksu

Example : of message from Host to MultiVac

ASCII	ü	0	4	A	0	1	?	*
HEX	81	30	34	41	30	31	3F	7A

3.3 **Example :** of messages from computer Host to MultiVac:

- E 00 ? (firmware version request)

- I 0100350 (maximum operating current setting "I max "at 350 mA form M.V. channel 1)

- I 02 ? (request of the maximum operating current "I max " for M.V. channel 2 valve)

- A 011 (Command to switch-on H.V. on channel 1)

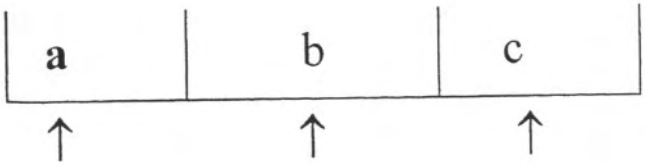
- M 012.0E-05 (Setting of I step 1 for H.V. channel 1 at 20 µA)

Example: of messages from MultiVac to computer Host

- I 0200350 (Reading of the maximum operating current on Channel 2) (valve at 350mA).

- M 011.7E-05 (Reading of Istep 1 on channel 1)(1.7 E-05 valve).

3.4 Data Packet Format



command code **channel number** **command parameter**

a - Command code: It's a capitol or lower case letter that indicates the messages meaning (see the following pages).

b - Channel number: It indicates which is (inside the MultiVac) the channel that is the receiver of the command sent to the Host is related. Should the number be "00", the command is a general one, independent from the channel number (ex. firmware version request). When in the channels 3 or 4 there is a thermocouple Gauge card, to gain access to the data of the 4 gauge heads that can be connected to it (TC1, TC2, TC3, TC4,), the channel number is as following:

Gauge	Board installed in slot 3	Board installed in slot 4
TC1	"13" (31hex, 33hex)	"14" (31hex, 34hex)
TC2	"23" (32hex, 33hex)	"24" (32hex, 34hex)
TC3	"33" (33hex, 33hex)	"34" (33hex, 34hex)
TC4	"43" (34hex, 33hex)	"44" (34hex, 34hex)

All other numbers are meaningless.

- **Command parameter**: it depends on the command type and can be:

- **Question**: the character "?" is the request of the status on of the value of the functional parameter indicated by the command code.

- **Status**: it's a one figure number (or sequence of numbers) that indicates the status of the functional parameter indicated by the command code.

- **Numerical**: five figures number; it's the value that the numerical parameter associated to the command code has (always write five digits, for example 05000)

- **Exponent**: two figures from 0 to 9 separated by the decimal point, the character "E" (or "e"), the sign "+" or "-" and two other figures from 0 to 9 to set the exponent (always write seven characters, for example 5.2E-09).

NOTE

When the message from Host to MultiVac is a command, the MultiVac answers with "ACK".

Command output	Code	Command type	Notes to the command and Answer codes
Pump or Gauge ON/OFF	A	Status Question	0 switches off the pump or the gauge 1 switches on the pump or the gauge -n: pump or gauge failure 0: pump or gauge switched off n: pump or gauge switched on (see the Command "A" and "z" code table at the end of the paragraph).
Fixed V / mode selection	B	Status Question	0 sets Fixed V operating mode 1 sets Step V operating mode Note: The command is accepted only if the High Voltage is off. 0 = Fixed V operating mode selected 1 = Step V operating mode selected
Start / Protect mode selection	C	Status Question	0 sets Start operating mode 1 sets Protect operating mode 0 = Start operating mode selected 1 = Protect operating mode selected
Pressure measurement unit selection (only for the MultiVac front panel display)	D	Status Question	0 sets Torr for the display 1 sets mbar for the display 2 sets Pascal for the display 0 = the selected pressure unit for the display is Torr 1 = the selected pressure unit for the display is mbar 2 = the selected pressure unit for the display is Pascal Note: The command is independent from the channel number The pressure value on the serial line is always expressed in Torr. Conversion is: 1 Torr = 1.33322 mbar 1 Torr = 133.322 Pascal
EPROM software version	E	Question	Gives back an answer of the following type: #01.00 17/09/92 Note: The command is independent by the channel number.

Command output	Code	Command type	Notes to the command and Answer codes
Device type	F	Question	Gives back a number from 0 to 15 that identifies the gauge or the type/size of the pump selected on the H.V. card (see the pump type/size table).
Polarity selection	G	Status	0 sets a negative polarity 1 sets a positive polarity Note: The pump must be off. This selection is allowed only if "Spare" pump has been selected on the H.V. card. The polarity selected by the serial line must correspond to the one set with the multiplier module of the H.V. card. If not, a "polarity error" will occur when there is a tentative to switch on the H.V. card.
		Question	0 = Negative polarity selected 1 = Positive polarity selected
Vmax	H	Numerical	Vmax value (format: 0XXXX) in Volt Note: The new value is accepted only if the High Voltage is off. Values exceeding or below the limits are rejected.
		Question	Vmax value.
Imax	I	Numerical	Imax value (format: 00XXX) in mA Note: The new value is accepted only the High Voltage is off. Values exceeding or below the limits are rejected.
		Question	Imax value.
Pmax	J	Numerical	Pmax value (format: 00XXX) in Watt Note: The new value is accepted only if the High Voltage is off. Values exceeding or below the limits are rejected.
		Question	Pmax value.

Command output	Code	Command type	Notes to the command and Answer codes
Iprotect	K	Numerical	Iprotect value (format: 00XXX) in mA Note: The new value is accepted only if the High Voltage is off. Values exceeding or below the limits are rejected.
		Question	Iprotect value.
1st step voltage (Vop1)	L	Numerical	Vop1 value (format: 0XXXX) in Volt Note: The new value is accepted only if the High Voltage is off. Values exceeding or below the limits are rejected.
		Question	Vop1 value.
1st step current (Iop1)	M	Exponential	Iop1 value (format: X.XE-0X) in A Note: The new value is accepted only if the High Voltage is off. Values exceeding or below the limits are rejected.
		Question	Iop1 value.
2nd step voltage (Vop2)	N	Numerical	Vop2 value (format: 0XXXX) in Volt Note: The new value is accepted only if the High Voltage is off. Values exceeding or below the limits are rejected.
		Question	Vop2 value.
2nd step current (Iop2)	O	Exponential	Iop2 value (format: X.XE-0X) in A Note: The new value is accepted only if the High Voltage is off. Values exceeding or below the limits are rejected.
		Question	Iop2 value.

Command output	Code	Command type	Notes to the command and Answer codes
Set point 1 (SetPt1)	P	Exponential	SetPt1 value (format: X.XE-XX) in Torr Note: The new value is accepted only if the High Voltage is off. Values exceeding or below the limits are rejected. The Remote I/O and Set Points card must be present into the base unit.
		Question	SetPt1 value. Note: The Remote I/O and Set Points card must be present into the base unit.
Set-point 2 (SetPt2)	Q	Exponential	SetPt2 value (format: X.XE-XX) in Torr Note: The new value is accepted only if the High Voltage is off. Values exceeding or below the limits are rejected. The Remote I/O and Set Points card must be present into the base unit.
		Question	SetPt2 value. Note: The Remote I/O and Set Points card must be present into the base unit.
Set Point Status	R	Question	Reads the Set Points status on Remote I/O and Set Points card. 0 = SetPt1 "OFF", SetPt2 "OFF" 1 = SetPt1 "ON", SetPt2 "OFF" 2 = SetPt1 "OFF", SetPt2 "ON" 3 = SetPt1 "ON", SetPt2 "ON" Note: The Remote I/O and Set Points card must be present into the base unit. The High Voltage must be ON.
Output Voltage	S	Question	Actual output voltage value. Note: The High Voltage must be ON.
Pump Current	T	Question	Pump current value. Note: The High Voltage must be ON.

Command output	Code	Command type	Notes to the command and Answer codes
Pump Pressure	U	Question	Pump pressure value, or gauge pressure measurement. Note: The High Voltage or the gauge must be ON.
Pump Pressure value at I=100 nA	V	Exponential	Setting of the pump pressure value for I = 100 nA on "Spare" pump (format: X.XE-XX) in Torr. Note: The new value is accepted only if High Voltage is OFF. This setting is allowed only if "Spare" pump has been selected on High Voltage card.
		Question	Pressure value for I = 100 nA.
Pump Pressure value at I=10 nA	W	Exponential	Setting of the pump pressure value for I = 10 nA on "Spare" pump (format: X.XE-XX) in Torr. Note: The new value is accepted only if High Voltage is OFF. This setting is allowed only if "Spare" pump has been selected on High Voltage card.
		Question	Pressure value for I = 10 nA.
Pump Pressure value at I=10 mA	X	Exponential	Setting of the pump pressure value for I = 10 mA on "Spare" pump (format: X.XE-XX) in Torr. Note: The new value is accepted only if High Voltage is OFF. This setting is allowed only if "Spare" pump has been selected on High Voltage card.
		Question	Pressure value for I = 10 mA.
Pump Pressure value at I=400 mA	Y	Exponential	Setting of the pump pressure value for I = 400 mA on "Spare" pump (format: X.XE-XX) in Torr. Note: The new value is accepted only if High Voltage is OFF. This setting is allowed only if "Spare" pump has been selected on High Voltage card.
		Question	Pressure value for I = 400 mA.
Operating mode selection	Z	Numerical	001 sets the MultiVac in REMOTE COMM. operating mode 000 sets the MultiVac in LOCAL operating mode.
		Question	00? operating mode status.

Command output	Code	Command type	Notes to the command and Answer codes
Error Table	!	Question	Gives back the code of the error when an operation through the serial line has failed. The code is read in hexadecimal (see the error code table).
Degas command	a	Status Question	1 activate the degas function for the B/A and UHV MultiGauge boards 0 deactivate the degas function. 1 = the degas function is activated 0 = the degas function is deactivated.
Sensitivity value setting	b	Numeric Question	Setting of the sensitivity value of B/A and UHV MultiGauge boards. Sensitivity value.
Gas correction value setting	c	Numeric Question	Setting of the gas correction value of B/A, UHV and Cold Cathode MultiGauge boards. Gas correction value.
Auto on gauge function	d	Status Question	1 activate the Auto on function for Thermocouple MultiGauge board 0 deactivate the Auto on function. 1 = the Auto on function is activated 0 = the Auto on function is deactivated.
Auto on gauge value	e	Exponential Question	Setting of the Auto on function threshold value for the Thermocouple MultiGauge board. Auto on function threshold value.
Emission value setting	i	Numeric Question	Setting of the emission value of B/A and UHV MultiGauge boards. Emission value.
Auto on HV1 function	l	Status Question	1 activate the Auto on HV1 function for the B/A, UHV and Cold Cathode MultiGauge boards 0 deactivate the Auto on HV1 function. 1 = the Auto on HV1 function is activated 0 = the Auto on HV1 function is deactivated.
Auto on HV1 value	m	Exponential Question	Setting of the Auto on HV1 function threshold value for the B/A, UHV and Cold Cathode MultiGauge board. Auto on HV1 function threshold value.

Command output	Code	Command type	Notes to the command and Answer codes
Auto on HV2 function	n	Status	1 activate the Auto on HV2 function for the B/A, UHV and Cold Cathode MultiGauge boards 0 deactivate the Auto on HV2 function.
		Question	1 = the Auto on HV2 function is activated 0 = the Auto on HV2 function is deactivated.
Auto on HV2 value	o	Exponential	Setting of the Auto on HV2 function threshold value for the B/A, UHV and Cold Cathode MultiGauge board.
		Question	Auto on HV2 function threshold value.
HigVoltage module measurement reading	s	Question	Reading of voltage (measurement unit: Volt), current (measurement unit: A) and pressure (measurement unit: Torr or mbar) measurements of an High Voltage module. Example for the H.V. module of channel 1: from Host to MultiVac: s01? from the MultiVac to Host: s01v05050i1.1E-02p3.7E-6.
MultiVac configuration command	z		It is a read only command. The MultiVac answers sending to the host all the available information about its configuration. The answer is by means of 15 bytes for the standard serial protocol, or by means of 30 bytes for the ASCII serial protocol. The answer decoding is according to the following code:

bytes	information about ...	possible content
0, 1, 2	MultiVac base	
3, 4, 5	Channel 1	Information about High Voltage module, or Channel unused
6, 7, 8	Channel 2	Information about High Voltage module, or Channel unused
9, 10, 11	Channel 3	Information about Remote I/O board, MultiGauge board, or Channel unused
2, 13, 14	Channel 4	Information about MultiGauge board, or Channel unused.

			The single bit description is detailed in the Bytes Content of "z" Command table

3.5 Error Code Table

hex.	dec.	Error
1	1	The sent character is unknown.
2	2	Tried to communicate with an unknown channel.
4	4	Syntax error on the command.
8	8	Packet length incorrect.
10	16	Value out limits.
20	32	Not allowed value (ex. 3220 V).
40	64	Tried to change values with High Voltage ON.
80	128	Tried to read values with High Voltage OFF.
100	256	Unable to switch on an High Voltage card due to an existing H/W interlock.
200	512	Tried to communicate with an High Voltage card not existing.
400	1024	Polarity error.
800	2048	Tried to operate on a Remote I/O card not existing.
1000	4096	Tried to operate on a MultiVac set for operation in "Local" mode.
2000	8192	Modification allowed only on "Spare" pump.

3.5.1 Pump Type/Size Table

Pump type/size	Decimal code
500 l/s StarCell/Triode	0
300 l/s StarCell/Triode	1
150 l/s StarCell/Triode	2
40, 55, 75 l/s StarCell/Triode	3
20 l/s StarCell	4
400 l/s Triode	5
220 l/s Triode	6
110 l/s Triode	7
30, 60 l/s Triode	8
25 l/s Triode	9
500 l/s Diode/Noble Diode	10
300 l/s Diode/Noble Diode	11
150 l/s Diode/Noble Diode	12
40, 55, 75 l/s Diode/Noble Diode	13
25 l/s Diode/Noble Diode	14
Spare	15

3.5.2 Bytes Content of "z" Command Table

Bit	Description
MultiVac Base	
00	0 = Torr 1 = mbar
01	0 = local 1 = remote
02 to 06	1
07	0
08	0 = slot 0 unused 1 slot 0 occupied
09	0 = slot 1 unused 1 slot 1 occupied
10	0 = slot 2 unused 1 slot 2 occupied
11	0 = slot 3 unused 1 slot 3 occupied
12 to 15	0
16 to 22	1
23	0
Unused slot	
00 to 06	1
07	0
08 to 14	1
15	0
16 to 22	1
23	0

Bit	Description
High Voltage Module	
00	0 = H.V. off 1 = H.V. on
01	0 = no fault 1 = fault
02	0 = start mode 1 = protect mode
03	0 = fixed V mode 1 = step V mode
04 to 06	High Voltage module identification (01hex - 001bin)
07	0
08 to 14	Switching ON or fault code (see the following table) (100dec = switched OFF)
15	0
16 to 22	Pump code (see the Pump Type/Size table)
23	0
Remote I/O Module	
00	0 = set point 1 HV1 off 1 = set point 1 HV1 on
01	0 = set point 2 HV1 off 1 = set point 2 HV1 on
02	0 = set point 1 HV2 off 1 = set point 1 HV2 on
03	0 = set point 2 HV2 off 1 = set point 2 HV2 on
04 to 06	Remote I/O module identification (02hex - 010bin)

Bit	Description
Remote I/O Module	
07	0
08 to 15	0
16 to 22	Remote I/O code (A8hex)
23	0
MultiGauge B/A, UHV, Cold Cathode	
00	0 = off HV 1 = on HV
01	0 = no fault 1 = fault
03	0
04 to 06	MultiGauge identification (03hex - 011bin)
07	0
08 to 14	Switching ON or fault code (see the following table) (100dec = switched OFF)
15	0
16 to 22	MultiGauge code: 30hex = Standard Bayard/Alpert - 20hex = Broad Range Bayard/Alpert - 10hex = UHV - 38hex = Cold Cathode
23	0

Bit	Description
MultiGauge Thermocouple	
00	0 = no fault TC1 1 = fault TC1
01	0 = no fault TC2 1 = fault TC2
02	0 = no fault TC3 1 = fault TC3
03	0 = no fault TC4 1 = fault TC4
04 to 06	MultiGauge Thermocouple identification (04hex - 100bin)
07	0
08	0 = TC1 off 1 = TC1 on
09	0 = TC2 off 1 = TC2 on
10	0 = TC3 off 1 = TC3 on
11	0 = TC4 off 1 = TC4 on
12 to 14	1
15	0
16 to 22	MultiGauge TC code (40hex)
23	0

3.6 "A" and "z" Command Codes Table

Board	Description	"A" Command Code	"z" Command Code
H.V.	Switched off by "Configuration Changed"	-2	02 hex
H.V.	Switched off by "Front Panel Switch or Cover Interlock"	-3	03 hex
H.V.	Switched off by "Remote Interlock"	-4	04 hex
H.V.	Switched off by "Polarity Error"	-5	05 hex
H.V.	Switched off by "Overcurrent"	-6	06 hex
H.V.	Switched off by "Hardware Fault"	-7	07 hex
H.V.	Switched off by "Overtemperature"	-8	08 hex
H.V.	Switched off by "CH1 Connection Fault"	-10	0A hex
H.V.	Switched off by "CH2 Connection Fault"	-11	0B hex
H.V., B/A, UHV, CC, TC	Switched off by regular serial line command	0	64 hex
H.V.	Switched on in "Start - Step V" mode	1	65 hex
H.V.	Switched on in "Start - Fixed V" mode	2	66 hex
H.V.	Switched on in "Protect - Step V" mode	3	67 hex
H.V.	Switched on in "Protect - Fixed V" mode	4	68 hex
B/A, UHV, CC	Switched off by "Overtemperature"	-80	14 hex
CC	Switched off by "Power Supply"	-79	15 hex
B/A, UHV	Switched off by "Grid"	-78	16 hex
B/A, UHV	Switched off by "Undercurrent"	-77	17 hex
UHV	Switched off by "Overcurrent"	-76	18 hex
B/A	Switched off by "Degas Undercurrent"	-75	19 hex
B/A, UHV, CC	Switched off by "Means Out of Limits"	-74	1A hex
TC	Switched off by "No Cable TC1"	-73	1B hex
TC	Switched off by "No Cable TC2"	-72	1C hex

Board	Description	"A" Command Code	"z" Command Code
TC	Switched off by "No Cable TC3"	-71	1D hex
TC	Switched off by "No Cable TC4"	-70	1E hex
TC	Switched off by "Power Supply TC"	-69	1F hex
B/A, UHV, CC, TC	Switched on	1	65 hex
B/A, UHV	Switched on in "Degas"	16	74 hex

4.1 General

Replacement controllers are available on advance exchange basis through Varian Service, but, if necessary, information are provided to aid the operator in determining malfunctions and corrective steps to be taken through minor actions.

WARNING

High voltage in the controller can cause severe injury or death. Service must be performed by authorised personnel only.

Before servicing, turn power off and disconnect the power cord.

4.2 No communication with the serial line

If this occurs, it may be that:

- the RS 232-422 Computer Interface card or the microcomputer board are defective
- the communication cable is defective
- the microcomputer board is blocked.

Try to change the communication cable with a new one and turn off and on again the unit. Should the error still be present, call the maintenance service.

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