VARIAN

vacuum technologies

HeliTest with RS-232 Interface

Model 969-3501

MANUALE DI ISTRUZIONI

BEDIENUNGSHANDBUCH

NOTICE DE MODE D'EMPLOI

INSTRUCTION MANUAL

87-900-067-01 (B)
APRIL 2002

HeliTest with RS-232 Interface

VARIAN

vacuum technologies

Dear Customer,

Thank you for purchasing a VARIAN vacuum product. At VARIAN Vacuum Technologies we make every effort to ensure that you will be satisfied with the product and/or service you have purchased.

As part of our Continuous Improvement effort, we ask that you report to us any problem you may have had with the purchase or operation of our product. On the back side you find a Corrective Action Request form that you may fill out in the first part and return to us.

This form is intended to supplement normal lines of communications and to resolve problems that existing systems are not addressing in an adequate or timely manner.

Upon receipt of your Corrective Action Request we will determine the Root Cause of the problem and take the necessary actions to eliminate it. You will be contacted by one of our employees who will review the problem with you and update you, with the second part of the same form, on our actions.

Your business is very important to us. Please, take the time and let us know how we can improve.

Sincerely.

Sergio PIRAS

Vice President and General Manager
VARIAN Vacuum Technologies

Note: Fax or mail the Customer Request for Action (see backside page) to VARIAN Vacuum Technologies (Torino) - Quality Assurance or to your nearest VARIAN representative for onward transmission to the same address.

CUSTOMER REQUEST FOR CORRECTIVE / PREVENTIVE / IMPROVEMENT ACTION

TO : VARIAN VACUUM TECHNOLOGIES TORINO - QUALITY ASSURANCE

FAX N° : XXXX - 011 - 9979350

ADDRESS: VARIAN S.p.A. - Via F.lli Varian, 54 - 10040 Leinì (Torino) - Italy

E-MAIL : marco.marzio@varianinc.com

NAME	COMPANY	FUNCTION

ADDRESS :

TEL. N° : FAX N° :

E-MAIL :

PROBLEM / SUGGESTION :

REFERENCE INFORMATION (model n°, serial n°, ordering information, time to failure after installation, etc.) :

DATE

CORRECTIVE ACTION PLAN / ACTUATION (by VARIAN VTT) LOG N°

XXXX = Code for dialing Italy from your country (es. 01139 from USA; 00139 from Japan, etc.)

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INFORMAZIONI GENERALI

Il presente manuale si riferisce all'HeliTest con interfaccia RS-232 e deve essere utilizzato in abbinamento al manuale base HeliTest n. 87-900-045-01 del quale è parte integrante.

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 Information".

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.

IMMAGAZZINAMENTO

Durante il trasporto e l'immagazzinamento degli strumenti, devono essere soddisfatte le seguenti condizioni ambientali:

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

PREPARAZIONE PER L'INSTALLAZIONE

Durante l'operazione di disimballaggio, prestare particolare attenzione a non lasciar cedere gli strumenti e a non sottoporli ad urti.
Non disperdere l'imballo nell'ambiente. Il materiale è completamente riciclabile e risponde alla direttiva CEE 85/399 per la tutela dell'ambiente.

INSTALLAZIONE ED USO

PERICOLO!

Il Kit è fornito di caricabatterie e cavi di alimentazione a tre fili con una spina di tipo approvato a livello internazionale. Utilizzare sempre questi cavi di alimentazione ed inserire la spina in una presa con un adeguato collegamento di massa onde evitare scariche elettriche. All'interno degli strumenti si sviluppano alte tensioni che possono recare gravi danni o la morte.

Durante il funzionamento è necessario che siano rispettate le seguenti condizioni ambientali:

- temperatura: da -5 °C a +40 °C;
- umidità relativa: 0 - 95% (non condensante).

MANUTENZIONE

L'HeliTest con interfaccia RS-232 richiede solo la manutenzione dei filtri dei probe. Qualsiasi altro intervento deve essere eseguito da personale autorizzato.

PERICOLO!

Ogni intervento non autorizzato sul dispositivo potrebbe recare gravi danni a persone o cose.

In caso di guasto è possibile usufruire del servizio di riparazione Varian o del "Varian advanced exchange service", che permette di ottenere un dispositivo rigenerato in sostituzione di quello guasto.

Qualora un dispositivo, o parte di esso, dovesse essere rottamato, procedere alla sua eliminazione nel rispetto delle normative nazionali specifiche.

ALLGEMEINE INFORMATIONEN

Die Handbuch behandelt den HeliTest mit RS-232 Schnittstelle und sollte in Verbindung mit den Basishandbuch Nr. 87-900-045-01 benutzt werden, dessen integrierender Bestandteil es ist.

Die Geräte sind für Verwendung durch Experten vorgesehen. Der Anwender ist gehalten, diese Anweisungen und alle sonstigen von Varian gelieferten Informationen zu lesen, bevor er die Apparatur in Betrieb nimmt. Varian übernimmt keine Verantwortung für irgendwelche Folgen, die sich aus - auch nur teilweiser - Mißachtung dieser Anweisungen, falscher Benutzung durch Personen ohne entsprechende Ausbildung, unerlaubtes Manipulieren an der Apparatur oder irgendwelcher anderer Verletzungen der besonderen nationalen Vorschriften ergeben.

Die folgenden Abschnitte enthalten alle Informationen, die für die Sicherheit des Anwenders beim Betrieb von Bedeutung sind. Die darauf folgenden Kapitel liefern detaillierte Informationen.

In diesem Handbuch werden die folgenden Konventionen verwendet:

GEFAHR!

Die Gefahr-Meldungen haben den Zweck, die Aufmerksamkeit des Anwenders auf Verfahren oder Prozeduren zu lenken, die bei falscher Ausführung zu schweren Verletzungen führen können.

WICHTIG!

Diese Meldungen werden den Prozeduren vorangestellt, die bei falscher Ausführung die Maschine beschädigen können.

HINWEIS

Die Hinweise enthalten wichtige aus dem Text hervorgehobene Informationen.

EINLAGERUNG

Bei dem Transport und der Einlagerung der Geräte müssen folgende Umgebungsbedingungen eingehalten werden:

- Temperatur: -20 °C und + 70 °C
- Rel. Luftfeuchtigkeit: 0 - 95% (nicht kond.)

INSTALLATIONSVORBEREITUNGEN

Beim Auspacken sorgfältig darauf achten, dass die Geräte nicht herunterfallen oder gegen irgendetwas stoßen. Das Verpackungsmaterial entsprechend den Vorschriften entsorgen. Das Material kann zu 100% rezykliert werden und entspricht den EWG Normen der Richtlinie 85/399.

INSTALLATION UND BENUTZUNG

GEFAHR!

Das Kit hat ein Batterieladegerät und ein dreiadriges Stromkabel mit international zugelassenem Sicherheitsstecker. Kabel und Stecker müssen an eine Steckdose mit richtiger Erdung angeschlossen werden, um elektrische Schläge zu verhindern. Die im Gerät erzeugte Hochspannung kann schwere Verletzungen verursachen oder zum Tode führen.

Beim Betrieb müssen folgende Umgebungs-bedingungen eingehalten werden:

- Temperatur: -5 °C und + 40 °C
- rel. Luftfeuchtigkeit: 0 - 95% (nicht kond.)

WARTUNG

Die einzigen Wartungsarbeiten für den HeliTest mit RS-232 Schnittstelle sind der Wechsel der Filter für den Standard- und den visuellen Filter. Alle anderen Eingriffe dürfen nur von autorisiertem Personal durchgeführt werden.

GEFAHR!

Jeder Eingriff durch nicht autorisierte Personen kann zu schweren Verletzungen und Sachschäden führen.

Bei Defekten kann man sich Varians Reparaturservice oder “Varian Advanced Exchange Service” bedienen, die das defekte Gerät gegen ein generalüberholtes austauschen.

Wenn ein Gerät oder ein Teil davon verschrottet werden soll, muß dies nach den nationalen Vorschriften geschehen.

INFORMATIONS GENERALES

Ce manuel se réfère au dispositif HeliTest avec interface RS-232 et doit être utilisé avec le manuel de base HeliTest n. 87-900-045-01, dont il est une partie intégrante.

L'utilisation de cet équipement est réservée aux professionnels. L'utilisateur doit lire ces instructions pour l'utilisation et toute autre information supplémentaire fournie par la société Varian avant d'utiliser cet équipement. La société Varian décline toute responsabilité pour des dommages provoqués par le non-respect même partiel de ces instructions, par l'utilisation impropre de la part de personnel non adéquatement formé, par des modifications non autorisées ou par toute action contraire aux dispositions des normes nationales en la matière.

Les paragraphes suivants contiennent toutes les informations nécessaires pour la sécurité de l'opérateur pendant l'utilisation de l'équipement. Des informations détaillées sont contenues dans l'annexe "Informations techniques".

Ce manuel utilise les symboles suivants:

DANGER!

Les messages de danger servent à attirer l'attention de l'opérateur sur une procédure ou une opération spécifique qui, si elle n'est pas exécutée correctement, pourrait provoquer des graves lésions.

ATTENTION!

Les messages d'attention sont placés avant les procédures dont le non-respect pourrait entraîner des dommages à l'équipement.

NOTE

Il s'agit d'informations importantes tirées du texte.

STOCKAGE

L'équipement peut être transporté et stocké dans les conditions ambiantes suivantes:

- Température: -20 °C à +70 °C
- Humidité relative: 0 à 95% (sans condensat)

PREPARATION A L'INSTALLATION

Lors du déballage prenez soin de ne pas le faire tomber ou de lui faire subir des chocs.

Ne pas laisser l'emballage dans la nature. L'emballage est recyclable à 100% et est conforme aux normes CEE de la directive 85/399 pour la protection de l'environnement.

INSTALLATION ET UTILISATION

DANGER!

Le kit est livré avec un chargeur de batterie et un cordon d'alimentation doté d'une fiche à trois fils, homologuée au niveau international. Utilisez toujours ce cordon et branchez-le sur une prise d'alimentation dotée de mise à la terre appropriée pour éviter toute décharge électrique. La haute tension générée à l'intérieur de l'équipement peut entraîner des graves lésions, voire la mort.

L'équipement doit être utilisé dans les conditions ambiantes suivantes:

- Température: -5 °C à +40 °C;
- Humidité relative: 0 à 95% (sans condensats).

ENTRETIEN

En ce qui concerne l'entretien, le dispositif HeliTest avec interface RS-232 ne requiert que le remplacement des filtres standard et de ceux de la sonde visuelle. Toute autre intervention doit être effectuée par du personnel autorisé.

DANGER!

Toute intervention non autorisée effectuée sur le dispositif peut provoquer des lésions graves et des dommages aux biens.

En cas de défaillance du dispositif, vous pouvez vous adresser au service après-vente de la société Varian ou au "Varian Advanced Exchange Service" qui vous fournira un dispositif remis à neuf à la place de celui défaillant.

Si vous devez éliminer le dispositif, ou un de ses éléments, procéder à l'élimination conformément aux normes nationales en vigueur en la matière.

GENERAL INFORMATION

This manual is relevant to the HeliTest with RS-232 interface and is to be used in conjunction with the HeliTest base manual n. 87-900-045-01 of which is an integral part.

The equipment described in this manual is intended for professional use. The user must carefully read this instruction manual and any additional information provided by Varian before using the equipment. Varian declines all responsibility for damage caused by the total or partial misuse of the instructions provided herein, by the improper use of the equipment by untrained personnel, by unauthorized interventions or by negligence in complying with any specific national rule or regulation.

The following sections provide you with all the information needed to guarantee the operator's safety when using the equipment. Detailed information is provided in the appendix entitled "Technical Information".

The following conventions are used in this manual:

WARNING!

Danger messages call the operator's attention to a specific procedure or operation that could cause serious injury if not performed correctly.

CAUTION!

Warning messages are provided before procedures that could cause damage to the equipment if not complied with.

NOTE

Notes provide you with important information extracted from the text.

STORAGE

The equipment can be transported and stored under the following environmental conditions:

- Temperature: -20 °C to +70 °C
- Relative humidity: 0 to 95% (non-condensing)

PRIOR TO INSTALLATION

When unpacking the equipment, be careful to avoid dropping it or knocking it against anything.

Do not dispose the packaging material in the environment. The packaging material is totally recyclable and complies with EEC directives 85/399 for the safeguard of the environment.

INSTALLATION AND USAGE

WARNING!

The kit comes with a battery charger and with three-wire power cords fitted with internationally approved plugs. Always use these power cords and insert the related plugs into appropriately grounded power outlets so as to avoid electrostatic discharges. High voltages that could cause serious injury or even death are generated inside the equipment.

The equipment must be used under the following environmental conditions:

- Temperature: -5 °C to +40 °C
- Relative humidity: 0 to 95% (non-condensing).

MAINTENANCE

As far as maintenance is concerned, the HeliTest with RS-232 interface requires only the replacement of probe filters. Any other intervention must be performed by authorized personnel.

WARNING!

Every unauthorized intervention on the device could cause serious injury to persons and damage to objects.

In the event of failure, it is possible to use the Varian repair service or the "Varian Advanced Exchange Service" through which you are assigned a refurbished device in replacement of the faulty one.

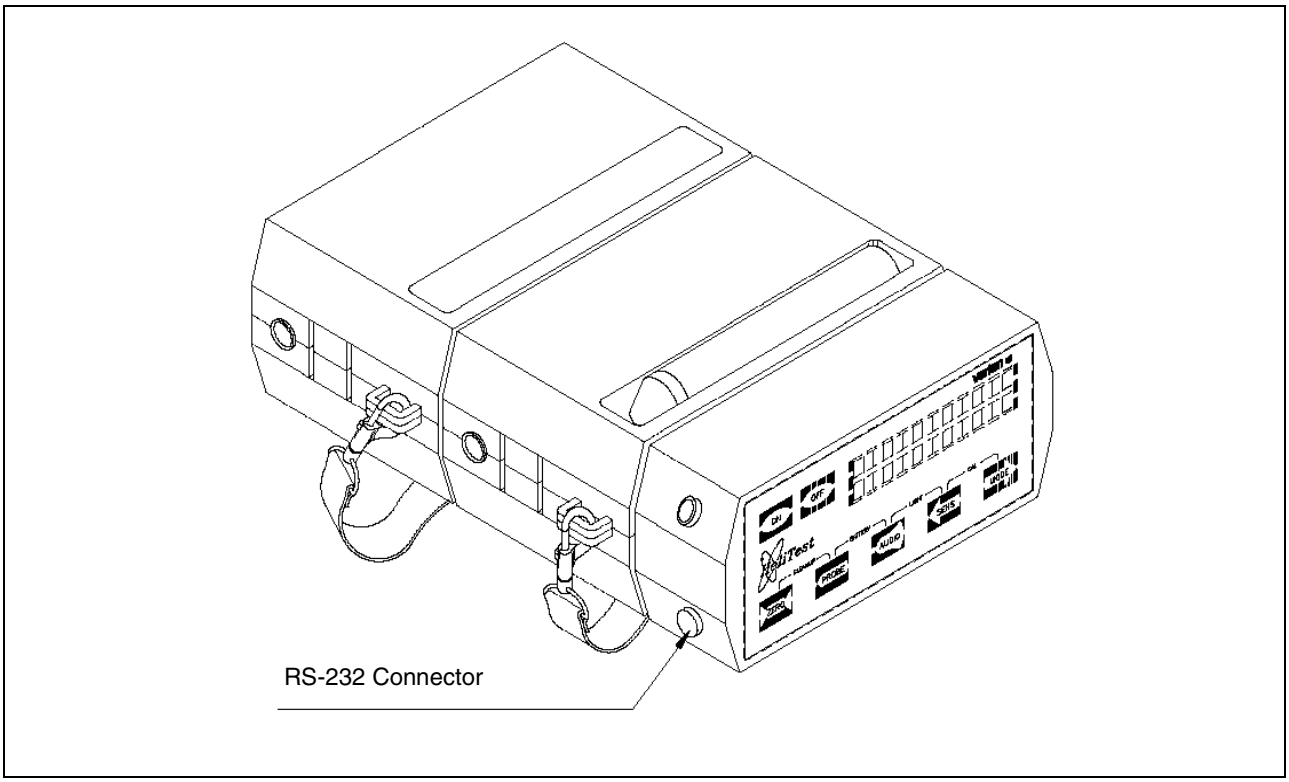
If a device, or a part of it, needs to be discarded, proceed to do so in compliance with the specific national standards.

OVERVIEW

The HeliTest with RS-232 interface is equipped with a communication serial port located on the side of the base module (see the following figure).

The communication serial port connections are shown in the figure "Serial Port Connection". Only the minimum configuration connection (3 wires) is available. No other connections or jumpers are required.

Note that all the connections into the HeliTest are optically isolated.



HeliTest with Battery and RS-232 Interface

COMMUNICATION CABLE ASSEMBLY

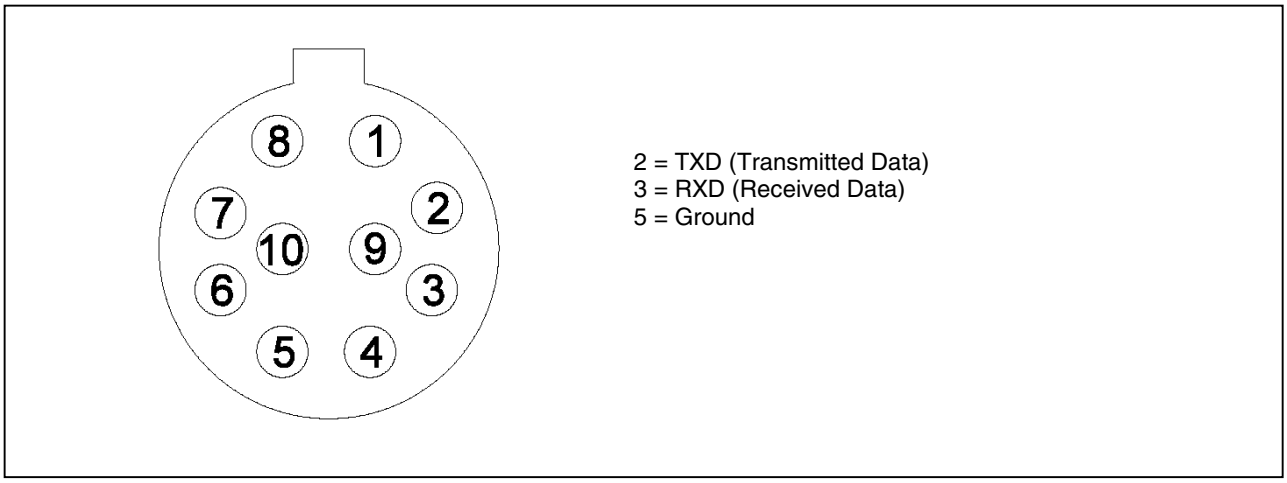
To connect the RS-232 interface with the host computer a communication cable must be assembled.

For this purpose a mating connector with the hardware necessary to connect the cable is provide, Varian P/N SR51-10400201.

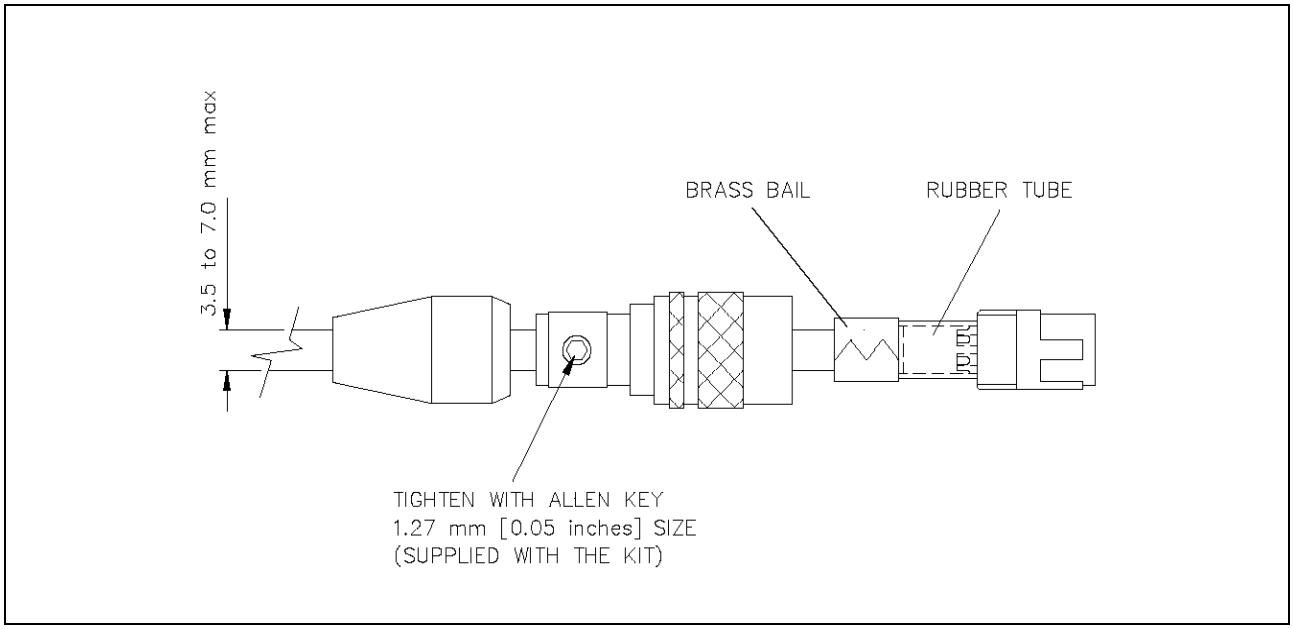
NOTE

The connecting cable should be shielded. The shield be connected to the Host computer ground.

For detail about the cable assembly and the connections see the following figures.



Serial Port Connections



Communication Cable Assembly

RS-232 COMMUNICATION DESCRIPTION

Communication Format

- 8 data bit
- no parity
- 2 stop bit
- baud rate 1200

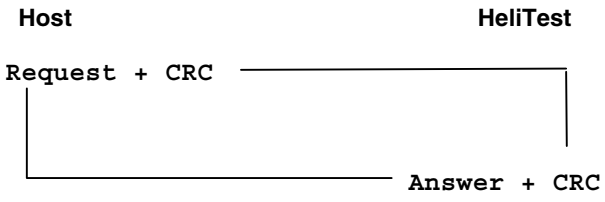
Communication Protocol

The communication protocol is a Master-Slave type:

Host computer = Master

Helitest = Slave

The communication is performed in the following way:



Request is an ASCII character identifying the action that must be performed by the HeliTest (command) or the requested information (request).

CRC corresponds to the sum with inverted sign of all the preceding bytes.

Answer is the answer of the HeliTest after a command or a request from the host.

The Helitest will always answer in one of the following ways:

- After a command:
  "ACK" + CRC
  or
  "NACK" + CRC

- After a request:
  "MESSAGE" + CRC where MESSAGE contains the requested information
  or
  "NACK" + CRC if the request has not been correctly received.

COMMANDS

LOCAL/REMOTE Selection

"@"+CRC

It allows to switch from LOCAL (commands sent to HeliTest via front panel) to REMOTE (commands sent to HeliTest via RS-232 interface) mode of operation.

It is equivalent to push PROBE + SENS buttons on the HeliTest front panel.

When set to REMOTE operation only the following functions are available on the HeliTest keyboard:

- OFF
- LIGHT
- AUDIO
- PROBE + SENS (local/remote selection)

The local/remote selection can be always done through the HeliTest front panel or through the RS-232 interface.

When the REMOTE mode of operation is selected an "R" is flashing in the lower right corner of the display.

CALIBRATION COEFFICIENT Writing

"H"+<-sign>+<+sign>+CRC

It writes the new calibration coefficient into the EEPROM of HeliTest. The new parameter is used immediately by the measurement software.
The Helitest will respond with "**ACK**" if writing is possible, or "**NACK**" if writing is not possible.

LIGHT ON/OFF

"J"+CRC

It allows to switch ON or OFF the retroillumination of the HeliTest display. It is equivalent to press the two button AUDIO and SENS together on the HeliTest front panel.

Configuration Parameters Writing

```
"K"+<language>+<meas.
unit>+<<set point
mantissa>+<setpoint
exponent>+CRC
```

where:

- "language" can be one of the following values:
  0 = Italian
  1 = English
  2 = French
  3 = German

- "measurement unit" can be one of the following values:

  0 = ppm
  1 = mbarL/s
  2 = cm^3/s
  3 = cm^3/min
  4 = TorrL/s
  5 = PaL/s
  6 = Pam^3/s
  7 = kg/h
  8 = g/y R12

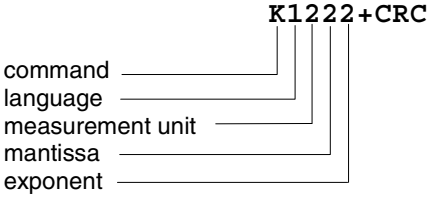
- "set point mantissa" is a number between 1 and 9

- "set point exponent" is a number between 0 and 6 depending on the chosen measurement unit according to the following table:

MEAS. UNIT	EXPONENT						
	0	1	2	3	4	5	6
0	10^{0}	10^{-1}	10^{-2}	10^{-3}	10^{-4}	10^{-5}	10^{-6}
1	10^{-6}	10^{-5}	10^{-4}	10^{-3}	10^{-2}	10^{-1}	10^{-0}
2	10^{-6}	10^{-5}	10^{-4}	10^{-3}	10^{-2}	10^{-1}	10^{-0}
3	10^{-4}	10^{-3}	10^{-2}	10^{-1}	10^{-0}	10^{-1}	10^{-2}
4	10^{-6}	10^{-5}	10^{-4}	10^{-3}	10^{-2}	10^{-1}	10^{-0}
5	10^{-4}	10^{-3}	10^{-2}	10^{-1}	10^{-0}	10^{-1}	10^{-2}
6	10^{-7}	10^{-6}	10^{-5}	10^{-3}	10^{-3}	10^{-2}	10^{-1}
7	10^{-8}	10^{-7}	10^{-6}	10^{-4}	10^{-4}	10^{-3}	10^{-2}
8	10^{-1}	10^{-0}	10^{-1}	10^{-3}	10^{-3}	10^{-4}	10^{-5}

Example:

to send a set point value of 2 x 10^{-4} cm^3/s with English language you must send the following command:



This command writes into EEPROM the configuration parameters. Incorrect value are not accepted.
The HeliTest will respond with **"ACK"** if writing is possible, or **"NACK"** if writing is not possible.

ZERO Function

```
"L" + CRC
```

This command switches the unit from AUTOMATIC (AZ) to FIX ZERO (FZ) mode and viceversa. It is equivalent to push the ZERO button on the HeliTest front panel.
This command is available only when the unit is in the REMOTE operation mode (letter "R" is flashing on the HeliTest display).

SENSITIVITY Selection

```
"M" + CRC
```

This command switches the unit from HIGH (HS) to LOW (LS) sensitivity mode and viceversa.
It is equivalent to push the SENS button on the HeliTest front panel.

This command is available only when the unit is in the REMOTE operation mode (letter "R" is flashing on the HeliTest display).

MODE Selection

```
"N" + CRC
```

This command switches the unit from MEASUREMENT (MS) to SET POINT (SP) mode and viceversa.
It is equivalent to push the MODE button on the HeliTest front panel.
This command is available only when the unit is in the REMOTE operation mode (letter "R" is flashing on the HeliTest display).

PROBE Function

```
"O" + CRC
```

This command enables or disables the sampling pump.
It is equivalent to push the PROBE button on the HeliTest front panel.
This command is available only when the unit is in the REMOTE operation mode (letter "R" is flashing on the HeliTest display).

AUDIO ON/OFF

```
"P" + CRC
```

This command switches the beeper ON or OFF.
It is equivalent to push the AUDIO button on the HeliTest front panel.
This command is available only when the unit is in the REMOTE operation mode (letter "R" is flashing on the HeliTest display).

CLEANUP Function

"Q" + CRC

This command activates the cleaning function.
It is equivalent to push the two buttons ZERO and PROBE together on the HeliTest front panel.
This command is available only when the unit is in the REMOTE operation mode (letter "R" is flashing on the HeliTest display).

REQUEST OF INFORMATION

Operating Status Request

"A" + CRC

The HeliTest answers with a character (+CRC) with the following meaning:

7	6	5	4	3	2	1	0

- bit 0 = zero: 0 =AZ; 1 = FZ
- bit 1 = probe: 0 = OFF; 1 = ON
- bit 2 = audio: 0 = OFF; 1 = ON
- bit 3 = sensitivity: 0 = HS; 1 = LS
- bit 4 = mode: 0 = MS; 1 = SP
- bit 5 = local/remote: 0 = loc.; 1 = rem.
- bit 6 = light: 0 = OFF; 1 = ON
- bit 7 = always 1.

This information can be requested also when the HeliTest is set for LOCAL operation.

Operating Phase Request

"B" + CRC

The HeliTest answers with a character (+CRC) (with the bit 7 always 1) indicating the actual operating phase.

The character has the meaning detailed in the following table.

CHARACTER	OPERATING PHASE DESCRIPTION
0 to 4	Self test phase
4	READY phase
6	STANDBY phase
7	Wait time STANDBY - OPERATIVE
8	Sampling line test
9	Measurement phase
10	Transition from High Sensitivity (HS) to Low Sensitivity (LS) during measurement phase
11	Transition from Low Sensitivity (LS) to High Sensitivity (HS) during measurement phase
13	Transition from High Sensitivity (HS) to Low Sensitivity (LS) during ready phase
14	Transition from Low Sensitivity (LS) to High Sensitivity (HS) during ready phase
17	Wait time before calibration routine
18	Calibration phase
20	Cleanup phase
21	Cleanup phase completed
22	Cleanup phase not completed. The HeliTest does not accept any more command and it must be turned off to be reset.
23	Transition from High Sensitivity (HS) to Low Sensitivity (LS) at the end of cleanup phase
25	Heater defective. The HeliTest does not accept any more command and it must be turned off to be reset.
26	Sampling line fault. The HeliTest does not accept any more command and it must be turned off to be reset.
27	Battery out of order or low voltage The HeliTest does not accept any more command and it must be turned off to be reset.
29	Sensitivity Test Fault. The HeliTest does not accept any more command and it must be turned off to be reset.

Self Test Phase Request

"C" + CRC

The HeliTest answers with a character (+CRC) (with the bit 7 always 1) indicating the actual self test phase (corresponding to the operating phase 0 to 4). The character has the following meaning:

CHARACTER	SELF TEST PHASE DESCRIPTION
0	Initial delay time
1	Start self test procedure
2	Heater test
3	Heater test OK
4	Battery test
5	Battery test OK
6	Sensitivity test
7	Sensitivity test result: if operating phase is 3, then sensitivity test is OK.
8	Sampling line test
15	Self test completed
21	Sensor test
23	The sensor test can not be completed due to a too high Helium concentration (the display shows the message SPRAY NITROGEN)

This information can be requested also when the HeliTest is set for LOCAL operation.

Filament Voltage Request

"D" + CRC

The HeliTest answers with a character (+CRC) corresponding to the filament voltage divided by 255.

I.e. Filament voltage = character x 13.7 / 255.

Filament Current Request

"E" + CRC

The HeliTest answers with a character (+CRC) corresponding to the filament current divided by 255.

I.e. Filament current = character x 4.545 / 255.

Sensor Current Request

"F" + CRC

The HeliTest answers with:

"Less Significant Byte"+
"Most Significant Byte"+CRC

corresponding to the sensor current expressed in quarters (0.25) of nanoampere.

Calibration Coefficient Request

"G" + CRC

The HeliTest answers with:

"Less Significant Byte"+
"Most Significant Byte"+CRC

corresponding to the actual value of the calibration coefficient.

Measurement Request

"I" + CRC

The HeliTest answers with:

"Exponent" + "Mantissa" + CRC

corresponding to the Helium concentration expressed in parts per million (ppm).

The He concentration is always expressed in ppm also if the measurement unit set on the HeliTest front panel is different.

In the following table the conversion factor from ppm to the other measurement units are shown.

1 ppm corresponds to:	
mbarL/s	2.5×10^{-6}
cm^3/s	2.5×10^{-6}
cm^3/min	1.5×10^{-4}
TorrL/s	1.9×10^{-6}
PaL/s	2.5×10^{-4}
Pam^3/s	2.5×10^{-7}
kg/h	1.1×10^{-8}
g/y R12	3.9×10^{-1}

Fine Measurement Request

"R" + CRC

The HeliTest answers with a character (+CRC) corresponding to the measured ppm in the range 0 to 100.

If the value is higher, the character is 255.

Set Point Request

"S" + CRC

The HeliTest answers with:

"Mantissa" + "Exponent" + CRC

corresponding to the set point value expressed in the set measurement unit.

For the exponent value see the table of command K in the previous pages.

Language/Measurement Unit Request

"T" + CRC

The HeliTest answers with the following characters:

"Language" + "Meas. unit" + CRC

corresponding to the set language and measurement unit.

For the character values see the command K in the previous pages.

Set Point Status Request

"U" + CRC

The HeliTest answers with a character (+CRC) corresponding to the set point status:

0 = threshold not exceeded
1 = threshold exceeded

Duty Cycle Request

"V" + CRC

The HeliTest answers with the following characters:

"n" + CRC

corresponding to the duty cycle value of the heater power control. The "n" value is from 460 to 18431, and the duty cycle value is n/18432.

TEST PROGRAM

A program to test all the HeliTest functionality is shown in the following pages.

The test also include a DEMO option to simulate the HeliTest front panel on the computer screen.

The program is written in BASIC.

In order to execute the program the following steps should be performed:

- store the program into a file with .BAS extension
- connect the HeliTest to the port COM1 of your PC
- activate the BASIC interpreter of your PC and load the program.

If the program is run with the HeliTest switched off or the RS232 interface disconnected, the program will send an error message.

```
DECLARE SUB answer (lung%)
OPEN "com1:1200,n,8,1,rs,ds" FOR RANDOM AS 1
ON ERROR GOTO ai
star:
demo = 0
CLS
WHILE 1
    PRINT "1-STATUS                          2-OPERATING PHASE"
    PRINT "3-SELF-TEST PHASE                 4-FILAMENT VOLTAGE"
    PRINT "5-FILAMENT CURRENT                6-SENSOR CURRENT"
    PRINT "7-READ CALIBRATION COEFFICIENT    8-MEASURE"
    PRINT "9-LIGHT ON/OFF                    0-LOCAL/REMOTE"
    PRINT "A-ZERO BUTTON                     B-SENS BUTTON"
    PRINT "C-MODE BUTTON                     D-PROBE BUTTON"
    PRINT "E-AUDIO BUTTON                    F-CLEANUP"
    PRINT "H-WRITE CALIBRATION COEFFICIENT   R-HIGH RESOLUTION"
    PRINT "K-WRITE CONFIGURATION             S-READ SETPOINT VALUE"
    PRINT "U-READ SETPOINT STATUS            T-READ CONFIGURATION"
    PRINT "V-READ DUTY CYCLE
    PRINT
    PRINT "G-DEMO"
    PRINT "Q-QUIT"
    a$ = ""
    WHILE a$ = "": a$ = INKEY$: WEND
    SELECT CASE a$
       CASE "G", "g"
dem:
       demo = 1
       CLS
       LOCATE 25, 1
       LOCATE 2, 10: PRINT "+----------------+"
       LOCATE 3, 10: PRINT "|----HeliTest----|"
       LOCATE 4, 10: PRINT "|                |"
       LOCATE 5, 10: PRINT "+----------------+"
       PRINT "1-ZERO  2-PROBE  3-AUDIO  4-SENS  5-MODE  6-CLEANUP  ";
       PRINT "7-LIGHT  8-LOC/REM   9-END";
       WHILE 1
    PRINT #1, "A"; CHR$(&HBF);
          answer 2
          IF risp$ = "" THEN
             LOCATE 8, 1: PRINT "NOT CONNECTED"
             WHILE risp$ = ""
                PRINT #1, "A", CHR$(&HBF);
                answer 2
                a$ = INKEY$
                IF a$ = "9" GOTO star
             WEND
          END IF
          LOCATE 8, 1: PRINT "                      "
          stato% = ASC(LEFT$(risp$, 1))
          LOCATE 4, 26
          IF (stato% AND &H20) THEN PRINT "R";  ELSE PRINT "*";
          PRINT #1, "B"; CHR$(&HBE);
          answer 2
          IF risp$ = "" THEN GOTO fineloop
          fase% = ASC(LEFT$(risp$, 1)) AND &H7F
          SELECT CASE fase%
             CASE 0, 1, 2, 3, 4
                 PRINT #1, "C"; CHR$(&HBD);
             answer 2
             IF risp$ = "" THEN GOTO fineloop
             fasest% = ASC(LEFT$(risp$, 1)) AND &H7F
             SELECT CASE fasest%
```

```
CASE 0:
 LOCATE 3, 11: PRINT "----HeliTest----"
 LOCATE 4, 11: PRINT "     Welcome   "
CASE 1:
 LOCATE 3, 11: PRINT "   Self  test   "
 LOCATE 4, 11: PRINT "    procedure  "
CASE 2:
 LOCATE 3, 11: PRINT "  Heater test   "
 LOCATE 4, 11: PRINT "                "
CASE 3:
 LOCATE 3, 11: PRINT "  Heater test   "
 LOCATE 4, 11: PRINT "                "
CASE 4:
 LOCATE 3, 11: PRINT "  Battery test  "
 LOCATE 4, 11: PRINT "                "
CASE 6:
 LOCATE 3, 11: PRINT "Sensitivity Test"
 LOCATE 4, 11: PRINT "                "
CASE 7:
 LOCATE 3, 11: PRINT "Sensitivity Test"
 LOCATE 4, 11
 IF fase% = 3 THEN
    PRINT "       OK      "
 ELSE
    PRINT " SPRAY HELIUM  "
 END IF
CASE 8:
 LOCATE 3, 11: PRINT " Sampling line  "
 LOCATE 4, 11: PRINT "                "
CASE 15:
 LOCATE 3, 11: PRINT "   Self test    "
 LOCATE 4, 11: PRINT "   COMPLETED    "
CASE 21:
 LOCATE 3, 11: PRINT "  Sensor test   "
 LOCATE 4, 11: PRINT "                "
END SELECT
CASE 5:
 LOCATE 3, 11: PRINT "     READY      "
 LOCATE 4, 11
 IF (stato% AND 8) THEN PRINT "LS";  ELSE PRINT "HS";
 LOCATE 4, 14
 IF (stato% AND &H10) THEN PRINT "SP";  ELSE PRINT "MS";
 LOCATE 4, 17
 IF (stato% AND 2) THEN PRINT "P.ON";  ELSE PRINT "P.OFF";
LOCATE 4, 23
 IF (stato% AND 1) THEN PRINT "FZ";  ELSE PRINT "AZ";
CASE 6:
 LOCATE 3, 11: PRINT "    STAND-BY    "
 LOCATE 4, 11
 IF (stato% AND 8) THEN PRINT "LS";  ELSE PRINT "HS";
 LOCATE 4, 14
 IF (stato% AND &H10) THEN PRINT "SP";  ELSE PRINT "MS";
 LOCATE 4, 17
 IF (stato% AND 2) THEN PRINT "P.ON";  ELSE PRINT "P.OFF";
 LOCATE 4, 23
 IF (stato% AND 1) THEN PRINT "FZ";  ELSE PRINT "AZ";
CASE 7, 8
 LOCATE 3, 11: PRINT "  --->> OPERATIVE"
 LOCATE 4, 11: PRINT "  PLEASE WAIT  "
CASE 10, 13, 23
 LOCATE 3, 11: PRINT "   HS -->> LS    "
 LOCATE 4, 11: PRINT "  PLEASE WAIT  "
CASE 11, 14
```

```
 LOCATE 3, 11: PRINT "   LS -->> HS    "
 LOCATE 4, 11: PRINT "  PLEASE WAIT  "
CASE 17
 LOCATE 3, 11: PRINT "-- Calibration "
 LOCATE 4, 11: PRINT "  PLEASE WAIT  "
CASE 20
 LOCATE 3, 11: PRINT "--- CLEANUP --- "
 LOCATE 4, 11: PRINT "               "
CASE 21
 LOCATE 3, 11: PRINT "--- CLEANUP --- "
 LOCATE 4, 11: PRINT "       OK      "
CASE 22
 LOCATE 3, 11: PRINT "--- CLEANUP --- "
 LOCATE 4, 11: PRINT " NOT COMPLETED  "
CASE 9
 LOCATE 4, 18: PRINT "ppm  "
 PRINT #1, "I"; CHR$(&HB7);
 answer 3
 IF risp$ = "" THEN GOTO fineloop
 b$ = risp$
 LOCATE 3, 11: PRINT "     ";
 a$ = RIGHT$(STR$(ASC(MID$(b$, 2, 1))), 1)
 IF a$ = "0" THEN LOCATE 3, 11: PRINT "|................|";
 IF a$ = "1" THEN LOCATE 3, 11: PRINT "|■...............|";
 IF a$ = "2" THEN LOCATE 3, 11: PRINT "|■■..............|";
 IF a$ = "3" THEN LOCATE 3, 11: PRINT "|■■■.............|";
 IF a$ = "4" THEN LOCATE 3, 11: PRINT "|■■■■............|";
 IF a$ = "5" THEN LOCATE 3, 11: PRINT "|■■■■■...........|";
 IF a$ = "6" THEN LOCATE 3, 11: PRINT "|■■■■■■..........|";
 IF a$ = "7" THEN LOCATE 3, 11: PRINT "|■■■■■■■.........|";
 IF a$ = "8" THEN LOCATE 3, 11: PRINT "|■■■■■■■■........|";
 IF a$ = "9" THEN LOCATE 3, 11: PRINT "|■■■■■■■■■.......|";
 PRINT a$; "E";
 a$ = RIGHT$(STR$(ASC(LEFT$(b$, 1))), 1)
 PRINT a$; "     "
 LOCATE 4, 23
 IF (stato% AND 1) THEN PRINT "FZ ";  ELSE PRINT "   ";
 LOCATE 4, 11
 IF (stato% AND 8) THEN PRINT "LS ";  ELSE PRINT "   ";
 LOCATE 4, 14
 IF (stato% AND &H10) THEN PRINT "SP  ";  ELSE PRINT "    ";
END SELECT
timeout = 1000
a$ = ""
WHILE timeout <<>> 0 AND a$ = ""
 timeout = timeout - 1
 a$ = INKEY$
WEND
IF a$ <<>><N>"" THEN
 SELECT CASE a$
  CASE "1"
   PRINT #1, "L"; CHR$(&HB4);
   answer 2
  CASE "2"
   PRINT #1, "O"; CHR$(&HB1);
   answer 2
  CASE "3"
   PRINT #1, "P"; CHR$(&HB0);
   answer 2
  CASE "4"
   PRINT #1, "M"; CHR$(&HB3);
   answer 2
```

```
      CASE "5"
        PRINT #1, "N"; CHR$(&HB2);
        answer 2
      CASE "6"
        PRINT #1, "Q"; CHR$(&HAF);
        answer 2
      CASE "7"
        PRINT #1, "J"; CHR$(&HB6);
        answer 2
      CASE "8"
        PRINT #1, "@"; CHR$(&HC0);
        answer 2
      CASE "9"
        GOTO star
    END SELECT
  END IF
fineloop:
  WEND
 CASE "A", "a"
  PRINT #1, "L"; CHR$(&HB4);
  answer 2
  IF risp$ = "" THEN
   PRINT "NOT CONNECTED"
  ELSE
   PRINT "ZERO BUTTON"
  END IF
  PRINT
 CASE "B", "b"
    PRINT #1, "M"; CHR$(&HB3);
    answer 2
    IF risp$ = "" THEN
       PRINT "NOT CONNECTED"
    ELSE
       PRINT "SENS BUTTON"
    END IF
    PRINT
 CASE "C", "c"
    PRINT #1, "N"; CHR$(&HB2);
    answer 2
    IF risp$ = "" THEN
       PRINT "NOT CONNECTED"
    ELSE
       PRINT "MODE BUTTON"
    END IF
    PRINT
 CASE "D", "d"
    PRINT #1, "O"; CHR$(&HB1);
    answer 2
    IF risp$ = "" THEN
     PRINT "NOT CONNECTED"
    ELSE
     PRINT "PROBE BUTTON"
    END IF
    PRINT
 CASE "E", "e"
    PRINT #1, "P"; CHR$(&HB0);
    answer 2
    IF risp$ = "" THEN
     PRINT "NOT CONNECTED"
    ELSE
     PRINT "AUDIO BUTTON"
    END IF
    PRINT
```

```
CASE "F", "f"
  PRINT #1, "Q"; CHR$(&HAF);
  answer 2
  IF risp$ = "" THEN
    PRINT "NOT CONNECTED"
  ELSE
    PRINT "CLEANUP"
  END IF
  PRINT
CASE "R", "r"
  PRINT #1, "R"; CHR$(&HAE);
  answer 2
  IF risp$ = "" THEN
    PRINT "NOT CONNECTED"
  ELSE
    PRINT "HIGH RESOLUTION= "; ASC(LEFT$(risp$, 1)); " ppm"
  END IF
  PRINT
CASE "1"
    PRINT #1, "A"; CHR$(&HBF);
    answer 2
    IF risp$ = "" THEN
      PRINT "NOT CONNECTED"
    ELSE
      b% = ASC(LEFT$(risp$, 1))
      PRINT "STATUS HELITEST : "; HEX$(b%)
      PRINT "ZERO   PROBE  AUDIO  SENS   MODE   LOC/REM    LIGHT"
      IF (b% AND 1) THEN PRINT "FZ     ";  ELSE PRINT "AZ     ";
      IF (b% AND 2) THEN PRINT "ON     ";  ELSE PRINT "OFF    ";
      IF (b% AND 4) THEN PRINT "ON     ";  ELSE PRINT "OFF    ";
      IF (b% AND 8) THEN PRINT "LS     ";  ELSE PRINT "HS     ";
      IF (b% AND &H10) THEN PRINT "SP     ";  ELSE PRINT "MS     ";
      IF (b% AND &H20) THEN PRINT "REMOTE     ";  ELSE PRINT "LOCAL      ";
      IF (b% AND &H40) THEN PRINT "ON   ";  ELSE PRINT "OFF  ";
      PRINT
    END IF
    PRINT
CASE "2"
    PRINT #1, "B"; CHR$(&HBE);
    answer 2
    IF risp$ = "" THEN
      PRINT "NOT CONNECTED"
    ELSE
      b% = ASC(LEFT$(risp$, 1)) AND &H7F
      PRINT "OPERATING PHASE: "; b%
    END IF
    PRINT
CASE "3"
    PRINT #1, "C"; CHR$(&HBD);
    answer 2
    IF risp$ = "" THEN
      PRINT "NOT CONNECTED"
    ELSE
      b% = ASC(LEFT$(risp$, 1)) AND &H7F
      PRINT "SELF-TEST PHASE : "; b%
    END IF
    PRINT
CASE "4"
    PRINT #1, "D"; CHR$(&HBC);
    answer 2
    IF risp$ = "" THEN
      PRINT "NOT CONNECTED"
  ELSE
```

```
    b% = ASC(LEFT$(risp$, 1))
    PRINT "FILAMENT VOLTAGE : "; ((13.77 * b%) / 255)
   END IF
   PRINT
CASE "5"
   PRINT #1, "E"; CHR$(&HBB);
   answer 2
   IF risp$ = "" THEN
    PRINT "NOT CONNECTED"
   ELSE
    b% = ASC(LEFT$(risp$, 1))
    PRINT "FILAMENT CURRENT : "; ((4.545 * b%) / 255)
   END IF
   PRINT
CASE "6"
   PRINT #1, "F"; CHR$(&HBA);
   answer 3
   IF risp$ = "" THEN
    PRINT "NOT CONNECTED"
   ELSE
    a$ = LEFT$(risp$, 2)
    PRINT "SENSOR CURRENT : "; CVI(a$)
   END IF
   PRINT
CASE "s", "S"
   PRINT #1, "S"; CHR$(&HAD);
   answer 3
   IF risp$ = "" THEN
    PRINT "NOT CONNECTED"
   ELSE
    a$ = LEFT$(risp$, 2)
    PRINT "MANTISSA : "; CHR$(48 + ASC(LEFT$(risp$, 1)))
    PRINT "EXPONENT : "; CHR$(48 + ASC(MID$(risp$, 2, 1)))
   END IF
   PRINT
CASE "t", "T"
   PRINT #1, "T"; CHR$(&HAC);
   answer 3
   IF risp$ = "" THEN
    PRINT "NOT CONNECTED"
   ELSE
    PRINT "LANGUAGE : "; CHR$(48 + ASC(LEFT$(risp$, 1)))
    PRINT "MEASUREMENT UNIT : "; CHR$(48 + ASC(MID$(risp$, 2, 1)))
   END IF
   PRINT
CASE "7"
   PRINT #1, "G"; CHR$(&HB9);
   answer 3
   IF risp$ = "" THEN
    PRINT "NOT CONNECTED"
   ELSE
    a$ = LEFT$(risp$, 2)
    PRINT "CALIBRATION COEFFICIENT : "; CVI(a$)
   END IF
   PRINT
CASE "v", "V"
   PRINT #1, "V"; CHR$(&HAA);
   answer 3
   IF risp$ = "" THEN
    PRINT "NOT CONNECTED"
   ELSE
    a$ = LEFT$(risp$, 2)
    PRINT "DUTY CYCLE : "; CVI(a$)
```

```
   END IF
   PRINT
CASE "u", "U"
   PRINT #1, "U"; CHR$(&HAB);
   answer 2
   IF risp$ = "" THEN
    PRINT "NOT CONNECTED"
   ELSE
    b% = ASC(LEFT$(risp$, 1))
    IF b% THEN
     PRINT "SET-POINT ON"
    ELSE
     PRINT "SET-POINT OFF"
    END IF
   END IF
   PRINT
CASE "H", "h"
   INPUT "ADJ. COEFFICIENT : ", ct%
   IF (ct% >>= 100) AND (ct% <<= 4170) THEN
    cm$ = "H" + MKI$(ct%)
    crc = 0
    PRINT
    FOR i = 1 TO LEN(cm$)
       crc = crc - ASC(MID$(cm$, i, 1))
       PRINT HEX$(ASC(MID$(cm$, i, 1))); " ";
   NEXT
   crc = crc AND &HFF
   PRINT HEX$(crc)
   cm$ = cm$ + CHR$(crc)
   PRINT #1, cm$;
   answer 10
   IF risp$ = "" THEN
    PRINT "NOT CONNECTED"
   ELSE
    PRINT "RECEIVED : "; LEN(risp$)
    FOR i = 1 TO LEN(risp$)
       PRINT HEX$(ASC(MID$(risp$, i, 1))); "  ";
    NEXT
    PRINT
   END IF
  PRINT
  END IF
CASE "K", "k"
  INPUT "LANGUAGE ", l%
  INPUT "MEASUREMENT UNIT ", u%
  INPUT "MANTISSA ", m%
  INPUT "EXPONENT ", e%
   cm$ = "K" + CHR$(l%) + CHR$(u%) + CHR$(m%) + CHR$(e%)
   crc = 0
   PRINT
   FOR i = 1 TO LEN(cm$)
    crc = crc - ASC(MID$(cm$, i, 1))
    PRINT HEX$(ASC(MID$(cm$, i, 1))); " ";
   NEXT
   crc = crc AND &HFF
   PRINT HEX$(crc)
   cm$ = cm$ + CHR$(crc)
   PRINT #1, cm$;
   answer 10
   IF risp$ = "" THEN
    PRINT "NOT CONNECTED"
   END IF
PRINT
```

```
  CASE "8"
     PRINT #1, "I"; CHR$(&HB7);
     answer 3
     IF risp$ = "" THEN
      PRINT "NOT CONNECTED"
     ELSE
      PRINT "MEASURE: "; ASC(MID$(risp$, 2, 1)); "e"; ASC(LEFT$(risp$, 1))
     END IF
     PRINT
  CASE "9"
     PRINT #1, "J"; CHR$(&HB6);
     answer 2
     IF risp$ = "" THEN
      PRINT "NOT CONNECTED"
     ELSE
      PRINT "RECEIVED : "; HEX$(ASC(LEFT$(risp$, 1)))
     END IF
     PRINT
  CASE "0"
     PRINT #1, "@"; CHR$(&HC0);
     answer 2
     IF risp$ = "" THEN
      PRINT "NOT CONNECTED"
     ELSE
      PRINT "RECEIVED : "; HEX$(ASC(LEFT$(risp$, 1)))
     END IF
     PRINT
  CASE "q", "Q"
     STOP
  CASE ELSE
     BEEP
  END SELECT
WEND
ai:
  CLOSE
  OPEN "com1:1200,n,8,1,rs,ds" FOR RANDOM AS 1
  IF demo = 0 THEN GOTO star ELSE GOTO dem
SUB answer (lung%)
SHARED risp$
timeout = 0
risp$ = ""
WHILE timeout <<<N>2000
  WHILE NOT EOF(1)
    a$ = INPUT$(1, 1)
    risp$ = risp$ + a$
    IF (LEN(risp$) = lung%) THEN EXIT SUB
  WEND
  timeout = timeout + 1
WEND
END SUB
```

VARIAN

Request for Return

ISO 9001 REGISTERED

1. A Return Authorization Number (RA#) **WILL NOT** be issued until this Request for Return is completely filled out, signed and returned to Varian Customer Service.
2. Return shipments shall be made in compliance with local and international **Shipping Regulations** (IATA, DOT, UN).
3. The customer is expected to take the following actions to ensure the **Safety** of workers at Varian: (a) Drain any oils or other liquids, (b) Purge or flush all gasses, (c) Wipe off any excess residues in or on the equipment, (d) Package the equipment to prevent shipping damage, (for Advance Exchanges please use packing material from replacement unit).
4. Make sure the shipping documents clearly show the RA# and then return the package to the Varian location nearest you.

North and South America	**Europe and Middle East**	**Asia and ROW**
Varian Vacuum Technologies 121 Hartwell Ave Lexington, MA 02421 Phone : +1 781 8617200 Fax: +1 781 8609252	Varian SpA Via Flli Varian 54 10040 Leini (TO) – ITALY Phone: +39 011 9979111 Fax: +39 011 9979330	Varian Vacuum Technologies Local Office

CUSTOMER INFORMATION

Company name: ……

Contact person: Name: …… Tel: ……

Fax: …… E-Mail: ……

Ship Method: …… Shipping Collect #: …… P.O.#: ……

Europe only: VAT reg. Number: …… *USA only:* ☐ Taxable ☐ Non-taxable

Customer Ship To: …… Customer Bill To: ……

…… ……

…… ……

PRODUCT IDENTIFICATION

Product Description	Varian P/N	Varian S/N	Purchase Reference

TYPE OF RETURN *(check appropriate box)*

☐ Paid Exchange ☐ Paid Repair ☐ Warranty Exchange ☐ Warranty Repair ☐ Loaner Return
☐ Credit ☐ Shipping Error ☐ Evaluation Return ☐ Calibration ☐ Other ……

HEALTH and SAFETY CERTIFICATION

Varian Vacuum Technologies **CAN NOT ACCEPT** any equipment which contains **BIOLOGICAL HAZARDS** or **RADIOACTIVITY**. Call Varian Customer Service to discuss alternatives if this requirement presents a problem.

The equipment listed above (check one):

☐ **HAS NOT** been exposed to any toxic or hazardous materials

OR

☐ **HAS** been exposed to any toxic or hazardous materials. In case of this selection, check boxes for any materials that equipment was exposed to, check all categories that apply:

☐ Toxic ☐ Corrosive ☐ Reactive ☐ Flammable ☐ Explosive ☐ Biological ☐ Radioactive

List all toxic or hazardous materials. Include product name, chemical name and chemical symbol or formula.

……

Print Name: …… Customer Authorized Signature: ……

Print Title: …… Date: ……/……/……

NOTE: If a product is received at Varian which is contaminated with a toxic or hazardous material that was not disclosed, **the customer will be held responsible** for all costs incurred to ensure the safe handling of the product, and **is liable** for any harm or injury to Varian employees as well as to any third party occurring as a result of exposure to toxic or hazardous materials present in the product.

Do not write below this line

Notification (RA)#: …… Customer ID#: …… Equipment #: ……

VARIAN

Request for Return

ISO 9001 REGISTERED

FAILURE REPORT

TURBO PUMPS and TURBOCONTROLLERS

☐ Does not start	☐ Noise	POSITION	PARAMETERS		
☐ Does not spin freely	☐ Vibrations	☐ Vertical	Power:		Rotational Speed:
☐ Does not reach full speed	☐ Leak	☐ Horizontal	Current:		Inlet Pressure:
☐ Mechanical Contact	☐ Overtemperature	☐ Upside-down	Temp 1:		Foreline Pressure:
☐ Cooling defective		☐ Other:	Temp 2:		Purge flow:
		……	OPERATION TIME:		

TURBOCONTROLLER ERROR MESSAGE:

ION PUMPS/CONTROLLERS

☐ Bad feedthrough	☐ Poor vacuum
☐ Vacuum leak	☐ High voltage problem
☐ Error code on display	☐ Other

Customer application:

VALVES/COMPONENTS

☐ Main seal leak	☐ Bellows leak
☐ Solenoid failure	☐ Damaged flange
☐ Damaged sealing area	☐ Other

Customer application:

LEAK DETECTORS

☐ Cannot calibrate	☐ No zero/high backround
☐ Vacuum system unstable	☐ Cannot reach test mode
☐ Failed to start	☐ Other

Customer application:

INSTRUMENTS

☐ Gauge tube not working	☐ Display problem
☐ Communication failure	☐ Degas not working
☐ Error code on display	☐ Other

Customer application:

PRIMARY PUMPS

☐ Pump doesn't start	☐ Noisy pump (describe)
☐ Doesn't reach vacuum	☐ Over temperature
☐ Pump seized	☐ Other

Customer application:

DIFFUSION PUMPS

☐ Heater failure	☐ Electrical problem
☐ Doesn't reach vacuum	☐ Cooling coil damage
☐ Vacuum leak	☐ Other

Customer application:

FAILURE DESCRIPTION

(Please describe in detail the nature of the malfunction to assist us in performing failure analysis):

NOTA: Su richiesta questo documento è disponibile anche in Tedesco, Italiano e Francese.
REMARQUE : Sur demande ce document est également disponible en allemand, italien et français.
HINWEIS: Auf Aufrage ist diese Unterlage auch auf Deutsch, Italienisch und Französisch erhältlich.

Sales and Service Offices

Argentina
Varian Argentina Ltd.
Sucursal Argentina
Av. Ricardo Balbin 2316
1428 Buenos Aires
Argentina
Tel: (54) 1 783 5306
Fax: (54) 1 786 5172

Australia
Varian Australia Pty Ltd.
679-701 Springvale Road
Mulgrave, Victoria ZZ 3170
Australia
Tel: (61) 395607133
Fax: (61) 395607950

Benelux
Varian Vacuum Technologies
Rijksstraatweg 269 H,
3956 CP Leersum
The Netherlands
Tel: (31) 343 469910
Fax: (31) 343 469961

Brazil
Varian Industria e Comercio Ltda.
Avenida Dr. Cardoso de Mello 1644
Vila Olimpia
Sao Paulo 04548 005
Brazil
Tel: (55) 11 3845 0444
Fax: (55) 11 3845 9350

Canada
Central coordination through:
Varian Vacuum Technologies
121 Hartwell Avenue
Lexington, MA 02421
USA
Tel: (781) 861 7200
Fax: (781) 860 5437
Toll Free: (800) 882 7426

China
Varian Technologies - Beijing
Room 1201, Jinyu Mansion
No. 129A, Xuanwumen Xidajie
Xicheng District
Beijing 1000031 P.R. China
Tel: (86) 10 6608 1530
Fax: (86) 10 6608 1534

France and Wallonie
Varian s.a.
7 avenue des Tropiques
Z.A. de Courtaboeuf – B.P. 12
Les Ulis cedex (Orsay) 91941
France
Tel: (33) 1 69 86 38 13
Fax: (33) 1 69 28 23 08

Germany and Austria
Varian Deutschland GmbH
Alsfelder Strasse 6
Postfach 11 14 35
64289 Darmstadt
Germany
Tel: (49) 6151 703 353
Fax: (49) 6151 703 302

India
Varian India PVT LTD
101-108, 1st Floor
1010 Competent House
7, Nangal Raya Business Centre
New Delhi 110 046
India
Tel: (91) 11 5548444
Fax: (91) 11 5548445

Italy
Varian Vacuum Technologies
Via F.lli Varian, 54
10040 Leini, (Torino)
Italy
Tel: (39) 011 997 9111
Fax: (39) 011 997 9350

Japan
Varian Vacuum Technologies
Sumitomo Shibaura Building, 8th Floor
4-16-36 Shibaura
Minato-ku, Tokyo 108
Japan
Tel: (81) 3 5232 1253
Fax: (81) 3 5232 1263

Korea
Varian Technologies Korea, Ltd.
Shinsa 2nd Bldg. 2F
966-5 Daechi-dong
Kangnam-gu, Seoul
Korea 135-280
Tel: (82) 2 3452 2452
Fax: (82) 2 3452 2451

Mexico
Varian S.A.
Concepcion Beistegui No 109
Col Del Valle
C.P. 03100
Mexico, D.F.
Tel: (52) 5 523 9465
Fax: (52) 5 523 9472

Taiwan
Varian Technologies Asia Ltd.
18F-13 No.79, Hsin Tai Wu Road
Sec. 1, Hsi Chih
Taipei Hsien
Taiwan, R.O.C.
Tel: (886) 2 2698 9555
Fax: (886) 2 2698 9678

UK and Ireland
Varian Ltd.
28 Manor Road
Walton-On-Thames
Surrey KT 12 2QF
England
Tel: (44) 1932 89 8000
Fax: (44) 1932 22 8769

United States
Varian Vacuum Technologies
121 Hartwell Avenue
Lexington, MA 02421
USA
Tel: (781) 861 7200
Fax: (781) 860 5437
Toll Free: (800) 882 7426

Other Countries
Varian Vacuum Technologies
Via F.lli Varian, 54
10040 Leini, (Torino)
Italy
Tel: (39) 011 997 9111
Fax: (39) 011 997 9350

Internet Users:

Customer Service & Technical Support:
vtt.customer.service@varianinc.com

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Order On-line:
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