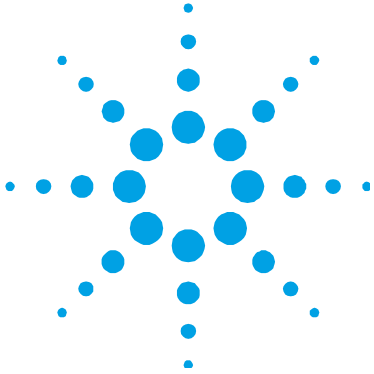

Ion Pumps Control Unit

Model
529-5001R001

User Manual

87-900-128-01 (D)
05/2011

Agilent Technologies

Notices

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CAUTION

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WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

Ion Pumps Control Unit

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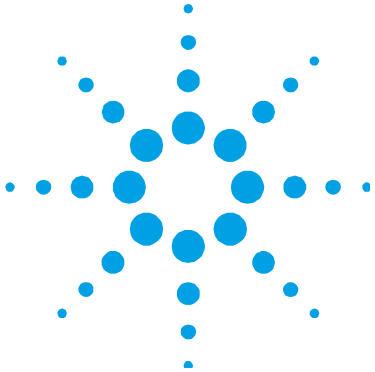

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Original Instructions

General Information

This equipment is destined for use by professionals. The user should read this instruction manual and any other additional information supplied by Agilent before operating the equipment. Agilent 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:

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

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.

NOTE The notes contain important information taken from the text.

Controller description

Agilent's controller is an ion pumps controller.

It can drive up to 2 Ion Pumps simultaneously and independently. The controller is designed to give the HV to the Ion Pumps when it is connected to the Mains supply (Max. Output Voltage = 5000 Vdc). (See the paragraph "Technical Informations" for details).

Agilent' s Ion Pump controller can be driven in Local/Remote I/O operating mode or in the Serial mode via the RS232 port. The selection of the operating mode is done by means of the SERIAL/LOCAL-Remote I/O switch on the controller front panel.

In the LOCAL-REMOTE I/O mode, all the commands are given by the front panel or by the connections to the DB25 "REMOTE" connector on the rear panel.

The pump operating conditions data are anyway available on the serial connection. In the SERIAL mode, all the commands are given through the serial connection and all the pump operating conditions data are available on the serial connection.

Storage

When transporting and storing the controller, the following environmental requirements should not be exceeded:

- temperature: from -20° to +70 °C
- relative humidity: 0 – 95 % (non-condensing)

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, be sure not to drop it and avoid any kind of sudden impact or shock vibration to it.

Do not dispose of the packing materials in an unauthorized manner. The material is 100 % recyclable and complies with EEC Directive 85/399.

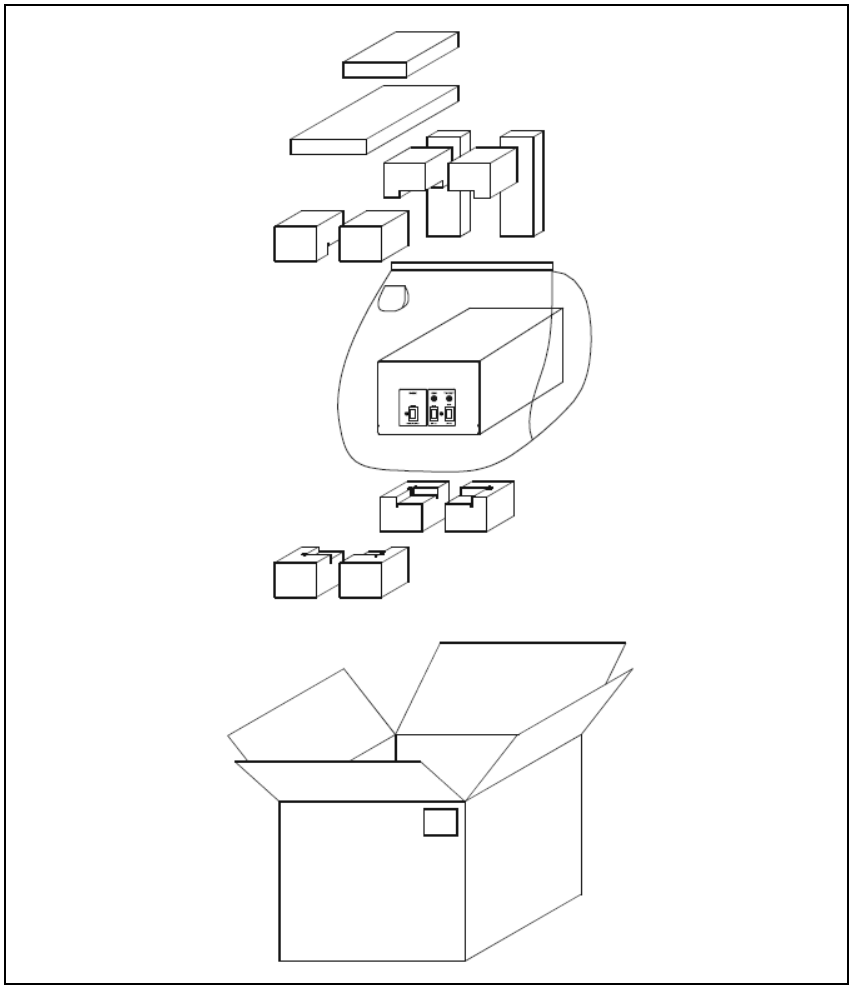


Figure 1 Packing

Installation

WARNING!

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

CAUTION!

The Controller must be positioned so that free air can flow through the holes of the top and the side cover. 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.

WARNING!

The controller must be installed in a way that allows an easy interruption of the line voltage (disconnection of the line plug or interruption on the rack general line switch).

During operation, the following environmental conditions must be respected:

- temperature: from +5 °C to +40 °C
- relative humidity: 0 – 95 % (non-condensing)

To connect the controller to the pump use the specific cables supplied.

See the appendix “Technical Information” for detailed information about the above mentioned and the other 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 Information”.

Make all vacuum manifold and electrical connections and refer to the connected 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 pump if the pump inlet is not connected to the system or blanked off.

Ion Pumps C.U. Front Panel Controls and Indicators

The figure and the table of the following page illustrate the Controller front panel controls and indicators with relevant description and function.

NOTE Some controls and indicators change their function and meaning according to the position of HV ON OFF switch. The table describes all function and meaning.

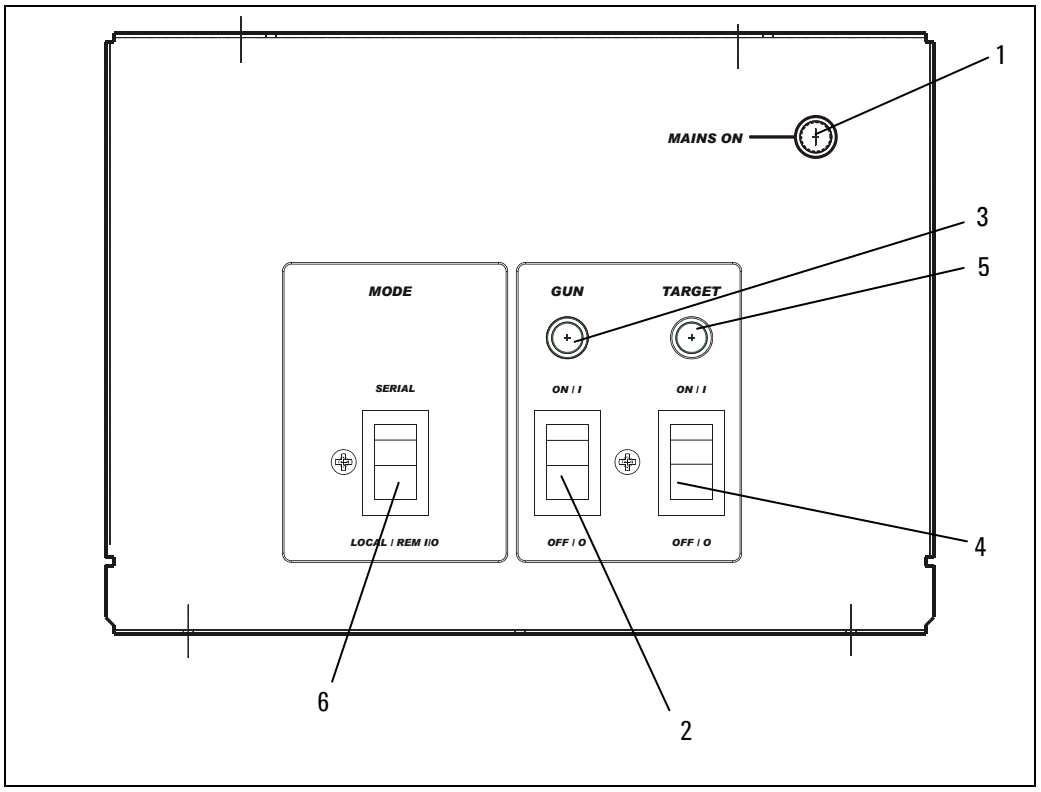


Figure 2 Ion Pumps C.U. Front Panel Controls and Indicators

REF.	SIGNAL	DESCRIPTION
1	MAINS ON LED	When On it means that the unit is connected to the Power Line and the Line Switch on the rear panel is in ON (I) position.
2	GUN ON/OFF SWITCH	When in ON (I) position, it switches On the HV to the GUN PUMP if the controller is set for LOCAL/REMOTE I/O operation and the external and HV Cable interlocks are closed.
3	GUN LED	It is On bold when the HV GUN PUMP is on and the voltage is over 1250 V (+/- 250 V hysteresys) volt. It is slow flashing (1 flash at second) when the voltage on HV GUN PUMP is lower than 1250 V (+/- 250 V hysteresys) volt. It is fast flashing in case of Fault (see paragraph "Technical Information" for details)
4	TARGET ON/OFF SWITCH	When in ON (I) position, it switches On the HV to the TARGET PUMP if the controller is set for LOCAL/REMOTE I/O operation and the external and HV Cable interlocks are closed.
5	TARGET LED	It is On bold when the HV TARGET PUMP is on and the voltage is over 1250 V (+/- 250 V hysteresys). It is slow flashing (1 flash at second) when the voltage on HV TARGET PUMP is lower than 1250 V (+/- 250 V hysteresys). It is fast flashing in case of Fault (see paragraph "Technical Information" for details).
6	SERIAL/LOCAL-REM I/O SWITCH	It allows to select the operating mode: SERIAL: all the commands are given through the serial line. LOCAL-REM I/O: all the commands are given through the unit front panel or through the 25 pin REMOTE connector on the rear panel.

Ion Pumps C.U. Rear Panel

The controller rear panel controls and connections are shown in the following figure. For detailed information about the connections see the appendix “Technical Information”.

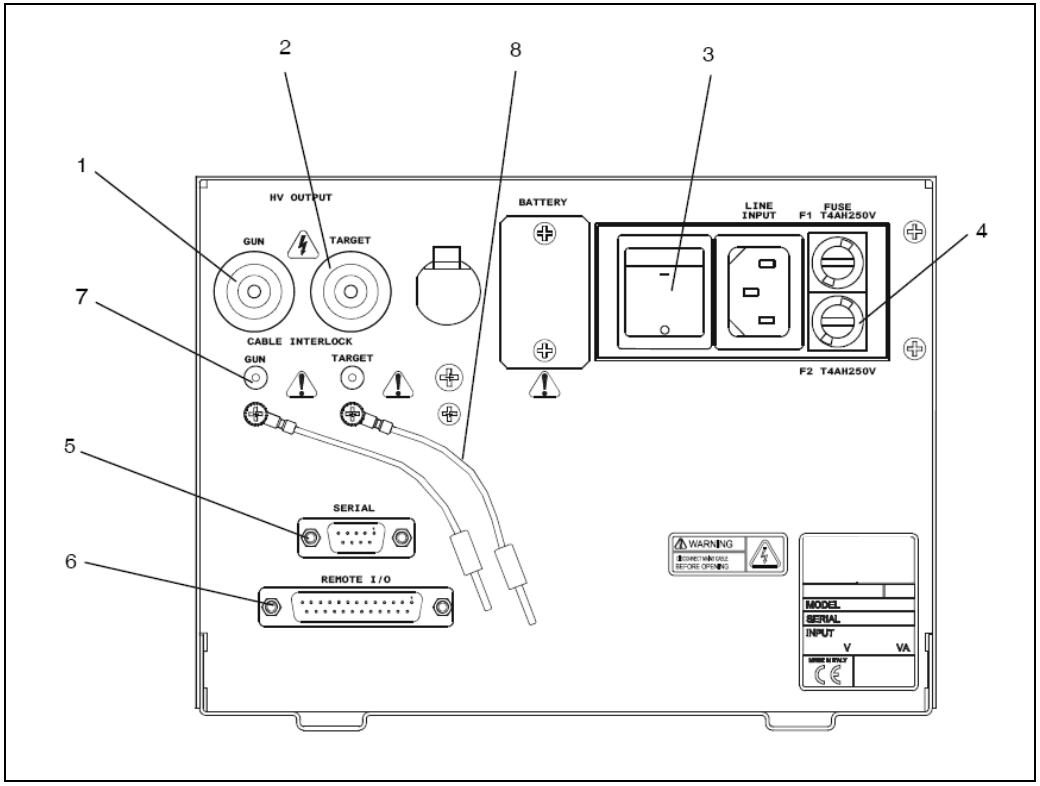


Figure 3 Ion Pumps C.U. Rear Panel

REF.	SIGNAL	DESCRIPTION
1	GUN Connector	HV Connector for Cable to GUN Pump
2	TARGET Connector	HV Connector for Cable to TARGET Pump
3	LINE INPUT	Module containing the Line Input cable plug and the Line Switch
4	FUSE	Protection Fuse holder (2 fuses)
5	SERIAL Connector	DB9 connector for the Serial cable
6	REMOTE Connector	DB25 connector for the REMOTE I/O connections
7	GUN Cable Interlock	
8	TARGET Cable Interlock	

Usage

This paragraph gives a general information on the use of the controller. For details refer to the “Technical Information” paragraph. When the controller is plugged to the Power Line and the Line Switch on the rear panel is ON (I), it is able to operate with its full set of features:

- 2 independent HV channels
- +5000 Vdc maximum output Voltage
- 40 W maximum output Power for channel 1
- 80 W maximum output Power for channel 2
- 30 mA maximum output current (short circuit condition) for gun
- 50 mA maximum output current (short circuit condition) for target
- LOCAL-REMOTE I/O/SERIAL operating mode
- START/PROTECT operation

Operating modes

Power Line supply

LOCAL-REMOTE I/O Operation

NOTE The 2 HV switches on the front panel and the 2 HV On/Off inputs on the DB25 "Remote" connector on the rear panel are functionally in series.

HV On/Off gun by front panel:

Connect together pin 8 and pin 21 of the remote I/O connector and move the gun switch on the front panel.

HV On/Off target by front panel:

Connect together pin 9 and pin 22 of the Remote I/O connector and move the gun switch on the front panel.

The correspondent HV cable Interlocks must be closed.

When the HV is ON, the corresponding HV LED on the front panel, will be ON.

WARNING!

Auto – start function:ON.
In case of power loss with GUN and/or TARGET ON, at next power-on the unit will switch on the HV (previously on) automatically.

Auto power-on function.
With front panel switches in ON position and remote I/O jumpers, the unit will switch on both channels as soon as the mains is on.

NOTE If the connection between the IPCU and the pump is done by means of an HV Cable with Safety Interlock, the cable must be connected to the pump F/T and the small “banana” connector on the cable controller side must be inserted in the corresponding “HV Cable Interlock” plug on the unit rear panel in order to be able to switch on the HV.

If the connection is done with a single pole HV Cable without the Safety Interlock, ensure that the jumper provided on the unit rear panel is inserted in the “HV Cable Interlock” plug.

SERIAL Operation

NOTE The SERIAL is set in order to operate by connecting the controller to an external PC that uses the “HYPER TERMINAL” or equivalent program (for example a proprietary user program) running under Windows Operating System or other. To operate in serial mode, connect the serial port to the controller “Serial” connector on the rear panel, run the Windows “HYPER TERMINAL” program on the PC with the following default settings:

- COM1
- 9600 baud
- No parity
- data bits
- 1 stop bit

This way of operation will allow to verify the functionality of the unit in the “SERIAL” operating mode, give the commands and get all the operating data.

NOTE In the serial operation, depending on the user environment, the O.S. used must have real time capability.

See the “Technical Information” paragraph for details.

START/PROTECT Operation

The controller can operate in two modes: Start and Protect.

In Start, the 2 output channels can provide all the output power regardless of the pump condition up to the short circuit condition.

This operating mode must be used to start the pump at high pressure.

In Protect, the controller limits the output current and switches off the HV when the current exceeds the threshold value (8 mA for 40 W channel and 16 mA for 80 W channel) for more than 2 seconds.

The default mode is “Start” mode.

Error Messages

On Front Panel

During the controller operation, if an error condition is detected, the HV LEDs on the front panel will give the indication:

GUN, TARGET

LEDS ON: Normal Operation = HV ON

Led GUN, TARGET flashing: error condition:

- 1 flash every 4 seconds = Interlock HV cable
- 2 flashes every 4 seconds = remote Interlock
- 3 flashes every 4 seconds = HV Over voltage (This Fault doesn' t switch-off the HV)
- 4 flashes every 4 seconds = error inside ADC
- 5 flashes every 4 seconds = overcurrent on HV (short circuit)
- 6 flashes every 4 seconds = the Local/Remote switch was moved with HV ON
- 7 flashes every 4 seconds = over temperature inside unit
- 8 flashes every 4 seconds = overcurrent in Protect (8 mA for 40W channel and 16 mA for 80W channel)
- 9 flashes every 4 seconds = HV Under voltage

In Local-Remote I/O mode, the Reset of the Fault condition is accomplished by switching to Off (0) the front panel switch of the corresponding channel.

In Serial mode, the Reset of the Fault condition is accomplished by sending the “F0n” command by the computer.

NOTE If one of the following conditions happens while the HV of the channel is On, the output of the channel is immediately set to Off, the LED on the front panel indicates the corresponding Fault condition and the Fault information is sent to the Serial output.

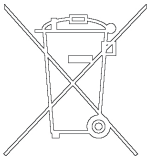
Auto retries function. If an under-voltage fail occur, for instance on GUN while both channels were on the unit do:

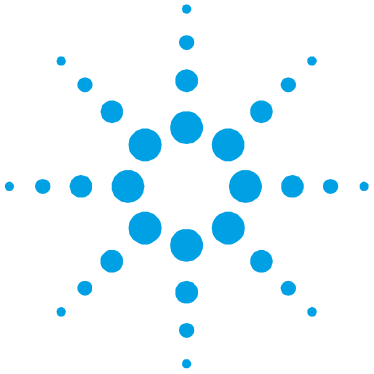
- Distinguish between a real low voltage and thermal switch (TS) intervention.
- Keep the Target ON, GUN switched off, no fail condition activated (fault relay remains open), current output recorder goes to 5 V.
- Start time out cont (30 min.)
- If the TS is restorted before the time out the gun goes on agin and time out count resetted.
- If the TS is not restorted after the time out the IPCU goes into fail and both GUN and TARGET are off.
- On “Remote” connector on Rear Panel.
- “Fault” output: N.C. contact (idle state) =
- The contact is Open in “Fault” condition (relay Off)
- The contact is Close in normal condition (relay On)
- “HV 1,2” output: N.O. contact (idle state) =
- The contact is Open with HV in Off state (relay Off)
- The contact is Closed with HV in On state (relay On)
- “HV 1,2” output current set point: N.O. contact (idle state) =
- The contact is Open with output current value is below the current set point (relay Off)
- The contact is Closed with output current value above the current set point (relay On)

Disposal

Meaning of the "WEEE" logo found in labels
The following symbol is applied in accordance with the EC WEEE (Waste Electrical and Electronic Equipment) Directive.
This symbol (**valid only in countries of the European Community**) indicates that the product it applies to must NOT be disposed of together with ordinary domestic or industrial waste but must be sent to a differentiated waste collection system.

The end user is therefore invited to contact the supplier of the device, whether the Parent Company or a retailer, to initiate the collection and disposal process after checking the contractual terms and conditions of sale.





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Ion Pump Controller Description

The Ion Pump controller is composed of a number of printed circuit boards:

- 1 board: (Power Supply), it converts the Line Voltage to the 24 Vdc that is used to generate the HV.
- 1 board: (Auxiliary Power Supply), it generates the + and – 12 Vdc for the analog circuitry, the 5 Vdc for the digital circuitry.
- 2 boards: (HV generation), they generate the HV for the 2 output channels.
- 1 board: (CPU), it contains all the digital circuitry and the microprocessor.
- 1 internal fan (OFF if for each channel the output current is <2 mA).

Controller Specifications

Tab. 1

Line:	
Voltage	100 - 240 Vac ± 10 %
Frequency	50 / 60 Hz ± 5 %
Max Power	200 VA
Operating conditions:	
Internal use only	
Max Altitude:	3000 m
Max Line Voltage variation:	± 10 %
Installation category:	II
Pollution degree:	2

Output for the pumps: Output Voltage (each channel) Output Current (each channel) Maximum Output Power GUN Maximum Output Power TARGET	Default value =+5000 V +1/-5 %, settable from +3000 to +5000 Vdc at steps of +/- 50 V by Serial Line command 30 mA ± 10 % for 40 W output, 50 mA +/- 10 % for 80 W output 40 W 80 W
Current Recorder Output signal	0 to 5 Vdc logarithmic, proportional to 1.0e-8 to 1.0e-1 A 1 recorder output for each pump. Minimum recorder input impedance: 1MOhm Precision: < than 1% Current Measurement Resolution: 10nA under 100µA; 1µA over 100µA
Operating Temperature	10 °C to 40 °C
Relative Humidity	0 – 95 % (non-condensing)
Storage Temperature	-20 °C to 70 °C
Compliance to Norms	Radio Interference: EN55011 Class A Group 1 Harmonics: EN61000/3/2 Flickers: EN61000/3/3 ESD: EN61000/4/2 4 kV Contact 8kV AIR Burst: EN61000/4/4 Vac Signal Radiated RF Immunity: EN61000/4/3 Surge: EN61000/4/5 Conducted noise imm.: EN61000/4/6 Line supply interruptions: EN61000/4/11 Compliance Safety: EN61010-1
Line fuse	Two T4AH250V
High Voltage Connection	2 High Voltage Fischer connectors

NOTE All connecting cables for remote I/O and serial connections, must be of the shielded type.

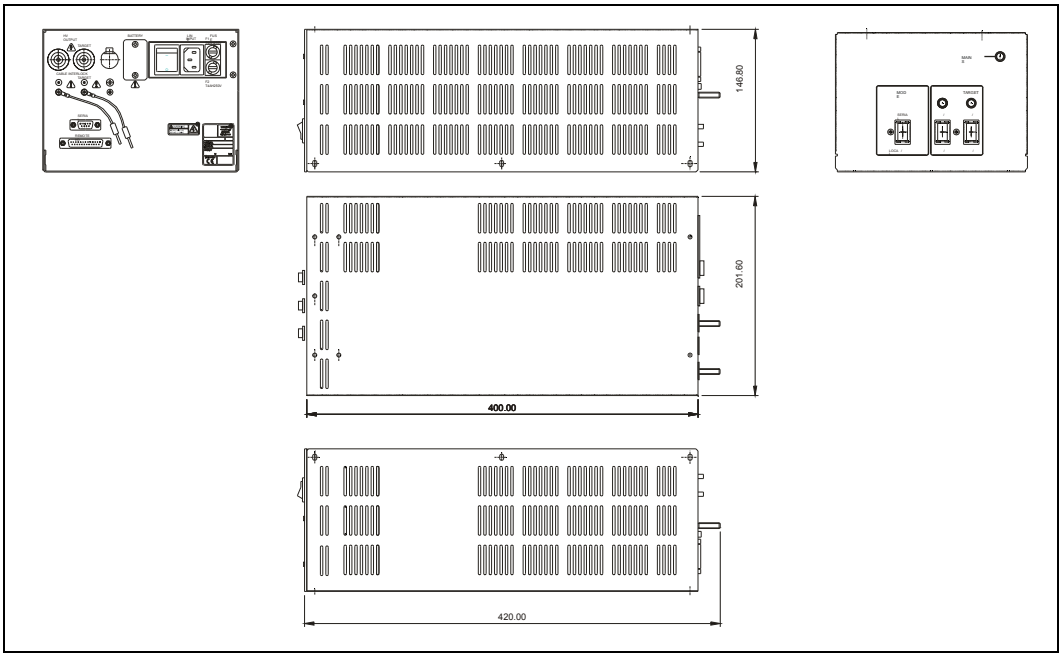

Figure 4 Controller Outline

Remote I/O Connector Pinout

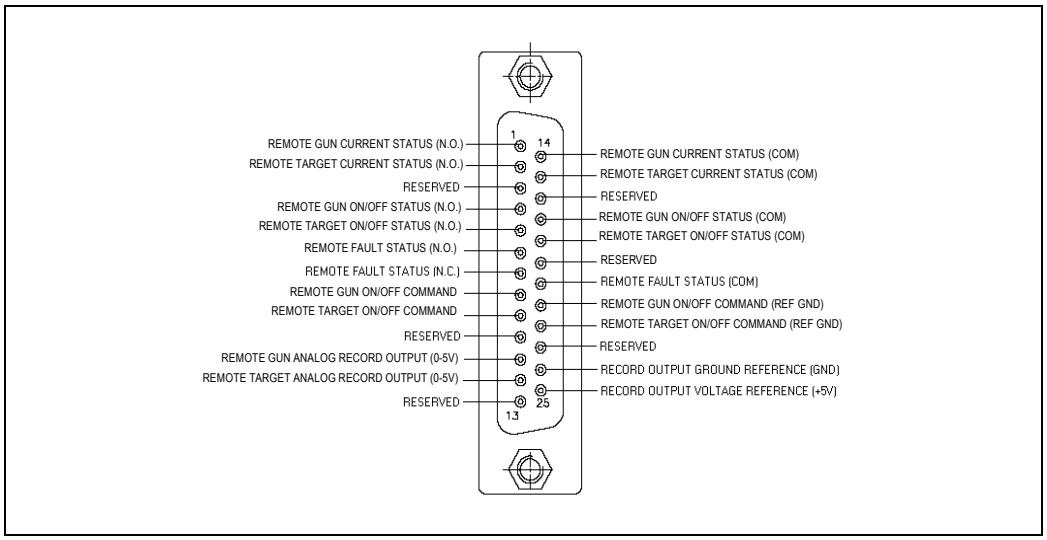

Figure 5 Remote I/O Pinout Rear Panel D-Shell Female 25P

In case there is the need to use the Remote Interlock function or to switch On and Off the HV on the 2 pumps by Remote, remove the two jumpers and follow the indications given in the above input commands connection pin out drawing.

Tab. 2 Remote I/O connector signals

25-Pin No.	IN - OUT	Name	Description
1-14	OUT	Remote GUN current status N.O.	Closed when Iout <Iset-point (2mA) Open when Iout >Iset-point (2mA)
2-15	OUT	Remote TARGET current status N.O.	Closed when Iout <Iset-point (2mA) Open when Iout >Iset-point (2mA)
4-17	OUT	Remote GUN status N.O.	Open: HV off Closed: HV on
5-18	OUT	Remote TARGET status N.O.	Open: HV off Closed: HV on
6-20	OUT	Remote FAULT status N.O.	Open: FAIL Closed: OK
7-20	OUT	Remote FAULT status N.C.	Open: OK Closed: FAIL
8-21	IN	Remote GUN ON/OFF command	Open: OFF Closed: ON
9-22	IN	Remote TARGET ON/OFF command	Open: OFF Closed: ON
11-24 (GND)	OUT	Remote GUN current analog record	0 to 5 volt (see below)
12-24 (GND)	OUT	Remote TARGET current analog record	0 to 5 volt (see below)

Input Commands Connection

Input signals: Optically Insulated

Insulated 24 Vdc (+10 %, -50 %) supply for input signal: Internally generated.

Output Signals Connection

Relay outputs.

Max voltage: 24 V

Max current: 200 mA

Min current: 10 µA

Bouncing Time: NO=1msec; NC=3msec

Analog Recorder Outputs

The analog recorder outputs are two indipendent outputs for each channel.

The voltage is related to the log10 of the current absorbed by the pump.

The exact formula is:

Vrec-out = 1.35 • log10 Iout + 6,77

[Vrec-out] = Volt; [Iout] = A

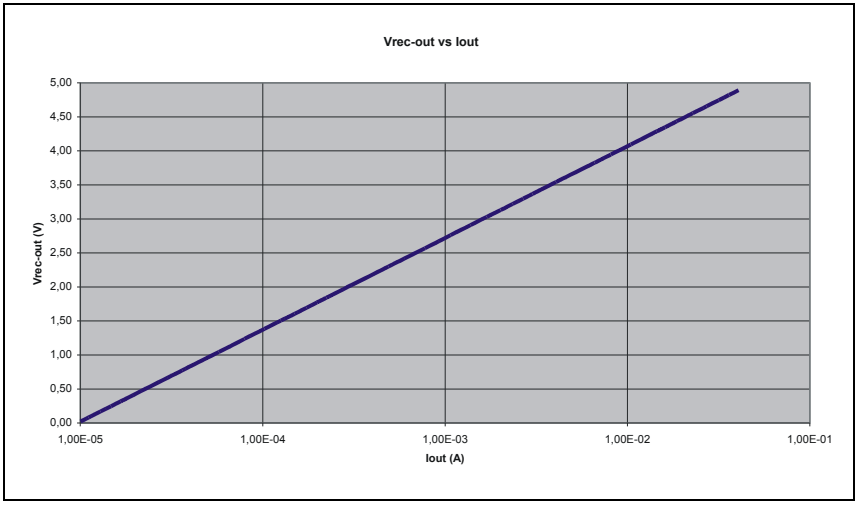

Figure 6

If the pump connected to the output is a 35l/s SEM the relation between Vrec-out and pressure is:

$$P[mbar] = 0{,}003 \bullet 10^{\frac{Vrecout - 6{,}77}{1{,}35}} + 5 \bullet 10^{-8}$$

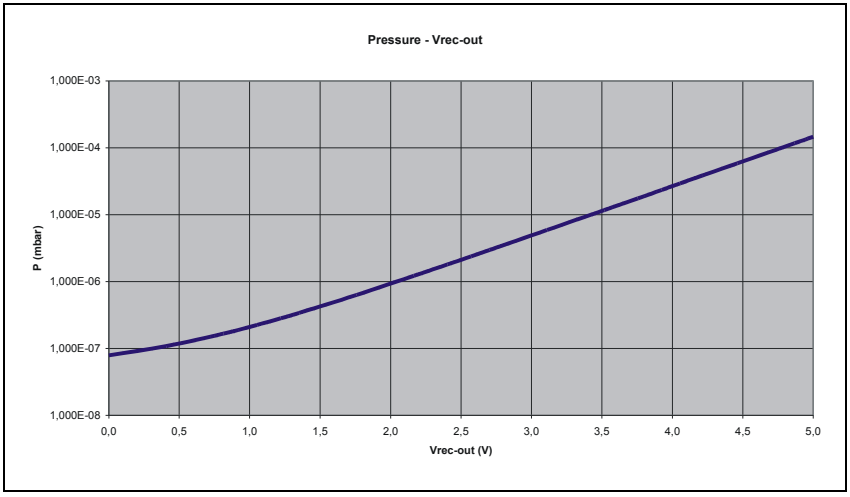

Figure 7

NOTE The current reading (using the analog recorder output or serial line) is fixed to the max current (30 mA for GUN, 50 mA for TARGET) untill the HV voltage cross the 1.5 KV.

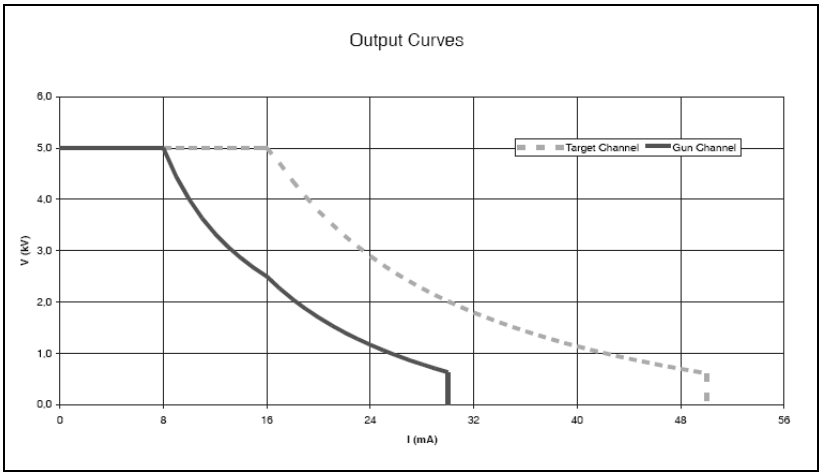

Figure 8

NOTE At Pin 25 a reference voltage corresponding to the 2 recorder outputs full-scale value (5 V +/- 5 %) is given. This reference allows getting a more precise reading from the 2 recorder outputs. It allows the scaling of the actual reading to the real value of the full scale.

Serial Operation

The Controller works on RS232 DCE Mode (like a Modem with DB9 FEMALE connector).

The Host/Terminal/Personal Computer works always on RS232 DTE Mode (like a PC with DB9 MALE connector).

The Cable Interconnections are 1 to 1 signals (DB9 Male/Female Standard CABLE).

Controller RS232 Standard Serial Pin outs (DB9 Female Connector)

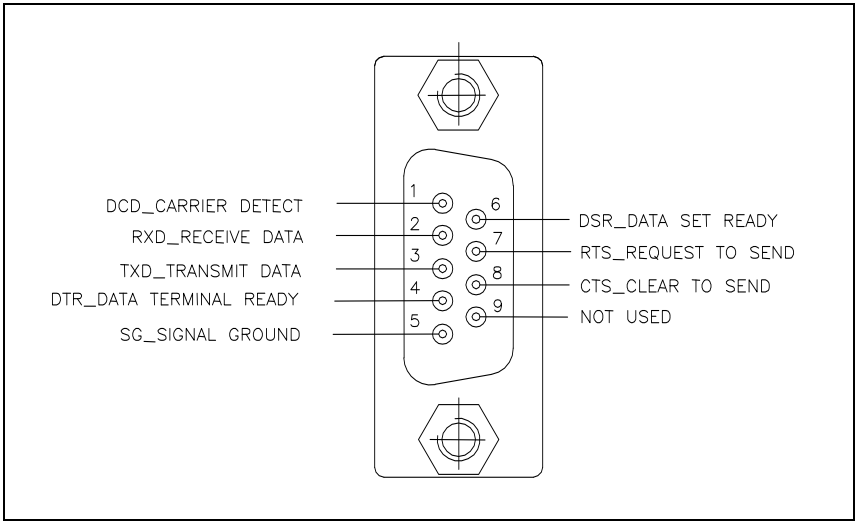

Figure 9 RS232 D-Shell Female 9P

Tab. 3 D Type 9 Pin FEMALE Connector

D-Type-9 Pin No.	Abbreviation	Full Name
Pin 3	TXD	Transmit Data
Pin 2	RXD	Receive Data
Pin 7	RTS	Request To Send
Pin 8	CTS	Clear To Send
Pin 6	DSR	Data Set Ready
Pin 5	SG	Signal Ground
Pin 1	DCD	Carrier Detect
Pin 4	DTR	Data Terminal Ready
Pin 9	RI	Ring Indicator

PIN Functions

Tab. 4

Abbreviation	Full Name	Function
TXD	Transmit Data	DTE Serial Data Output (TXD), IPCU Serial Data Input
RXD	Receive Data	DTE Serial Data Input (RXD), IPCU Serial Data Output
CTS	Clear to Send	This line indicates that the Modem (Controller) is ready to exchange data.
DCD	Data Carrier Detect	When the Modem (IPCU) detects a "Carrier" from the other end of the line, this line becomes active.
DSR	Data Set Ready	This tells the DTE that the Modem (IPCU) is ready to establish a link.
DTR	Data Terminal Ready	This is the opposite of DSR. This tells the Modem (Controller) that the DTE is ready to link.
RTS	Request To Send	This line informs the Modem (IPCU) is ready to exchange data.
RI	Ring Indicator	Goes active when Modem detects a ringing signal from the PSTN. Not used on the Controller.

RTS / CTS are jumpered together on the Controller connector and DTR is jumpered to DSR / DCD on IPCU connector. The DTE sees the IPCU like a Standard MODEM.

Ion Pump Control Unit - Operator / Host Serial Communication

The Controller Report and Operator/Host Command are ASCII strings CR (0D hexadecimal, 13 decimal) terminated.

Default Communication Parameters are 9600 bits/sec, no parity, 8 bits data, 1 stop bit.

Usually the human interface of the controller is a terminal emulator (Windows "HyperTerminal" communication program for example) running on Personal Computer.

Software program on PC or PLC can use the same ASCII protocol described below for human interface for doing automatic control and monitoring of the controller.

Every 100 (min) to 1000 (max) msec, if the controller is in Report mode (default), all the 2 Report strings made of 30 characters each, corresponding to the 2 HV channels are sent by the IPCU.

The string is made of different length depending on the report tipe selected for each HV channel (independently by the channel status).

A transmission from the external PC, turns the IPCU to the Command Mode.

To go back to the Report Mode complete the command string with CR (0x0D) or ESC (0x1B).

Every single received character is Echoed back in order to allow a control by the operator.

Controller Report Mode

Tab. 5 "HVn status fault start/protect current voltage"

HV	[HV]	2 characters 'HV'
n	[1, 2, 3]	1 character
' '	[0x20]	1 character SPACE
status	[OFF__, FAULT, ON___]	5 characters
' '	[0x20]	1 character SPACE
fault	[00, .., FF]	2 characters
' '	[0x20]	1 character SPACE
start/protect	[0, 1] 0=Start(default), 1=Protect	1 character
' '	[0x20]	1 character SPACE
current	[10 ... 99999 nA, 100 ... 60000 uA]	7 characters
' '	[0x20]	1 character SPACE
voltage	[0 ... 5999V]	6 characters 'CR'
' '	[0x0D]	1 character CR

Controller Commands Mode

Tab. 6 HV Channel On/Off Setting

"A0ns"[Enter] where :	
A0	HV Channel Serial Command for Status Set
N	HV Channel Number 1 or 2
s	0 for OFF, 1 for ON

Tab. 7 HV Channel Start/Protect Mode Setting

"C0ns"[Enter] where :	
C0	HV Channel Serial Command for Start/Protect Setting
n	HV Channel Number 1 or 2
s	0 for START mode, 1 for PROTECT mode

Tab. 8 Clear Fault (Reset)

"F0n"[Enter] where:	
F0	HV Channel Serial Command for Fault reset
n	HV Channel Number 1 or 2

Tab. 9 Bit positional Fault table when HV ON:

Err #	Description	Front Panel LED
0001]	Cable Interlock when HV On	1 blink of 200 ms every 4 s
[0002]	Remote Interlock when HV On	2 blink of 200 ms every 4 s
[0004]	HV Over Voltage when HV On	3 blink of 200 ms every 4 s
[0008]	Bad Current Offset starting HV On	4 blink of 200 ms every 4 s
[0010]	HV Over Power when HV On	5 blink of 200 ms every 4 s
[0020]	Panel Switch Moved when HV On	6 blink of 200 ms every 4 s
[0040]	HV Over Temperature when HV On	7 blink of 200 ms every 4 s
[0080]	HV Over Current – Protect=Enable	8 blink of 200 ms every 4 s
[0100]	HV Under Voltage when HV On	9 blink of 200 ms every 4 s

Tab. 10 Bit positional Event table when HV ON or OFF:

Err #	Description	Front Panel LED
[0001]	Cable Interlock when HV Off	No blink
[0002]	Remote Interlock when HV Off	No blink
[0004]	HV Over Voltage when HV On	No blink
[0008]	Bad Current Offset when HV Off	No blink
[0010]	HV Over Power when HV On	No blink
[0020]	Spare	No blink.
[0040]	Over Temperature	No blink
[0080]	HV Over Current – Protect=Disable	No blink
[0100]	Current Below Threshold when HV On	No blink
[0200]	HV Under Voltage when HV On	No blink

Tab. 11 Max Output Voltage setting

	"H0nxxxx"[Enter] where:
H0	HV Channel Serial Command for Voltage Target
n	HV Channel number 1 or 2 xxxx = Voltage Target (min 3000V, max 5000V in 50 V steps)

Tab. 12 Set-Point Current Threshold Setting (Minimum Access Level Required:"0")

"WR[space]Y[space] xxxxxx"[Enter]	
WR	Write
Y	14 for channel 1 15 for channel 2 xxxxxx = Current Set-Point value in nA (from 0 to 100000000)

Tab. 13 Set-Point Current Threshold reading

"RD[space]Y"[Enter]	
RD	Read
Y	14 for channel 1 15 for channel 2

Tab. 14 Report Setting

"RT[space]X"	
or	
"RT[space]X[space]Y"[Enter]	
or	
"RT[space]X[space]Y[space]Z"[Enter]	
X	type [0, ..., 5] (see detailed description on "About Report" chapter)
Y	time rate[0, ..., 255] based on 100 msec tick, default is "3". For time rate = 0, to stop continuous reporting mode and start report on request (see Request Report Command) **Z = mode[0, ..., 4]** where: '0' only Remarks, no channel reports '1' reports only channel 1 '2' reports only channel 2 '4' reports all channels

Tab. 15 Report Type Read

"RT"[Enter]

Tab. 16 Request Report (in NON Continuous Report Mode)

"RR"[Enter]

Tab. 17 Enable, Disable Receiving Input ECO

	(Access Level 1 Required) "WR[space]Y[space]X"[Enter]
WR	Write
Y	29 (parameter number)
X	0 for No input ECO 1 for input ECO (default value)

Tab. 18 Enable, Disable Remark Line Reporting

	(Access Level 1 Required) "WR[space]Y[space]X"[Enter]
WR	Write
Y	30 (parameter number)
X	0 for No remark lines (except the first three)1 for Remark Line (default value)

Tab. 19 Enable, Disable Value in Floating Point Report Mode

	(Access Level 1 Required) "WR[space]Y[space]X"[Enter]
WR	Write
Y	31 (parameter number)
X	0 for Standard Report Mode (default value) 1 for Floating Point Report Mode

About Report

The continuous report sent by the IPCU protocol communication is structured as follow:

At each main power on start up six remarking lines are sent.

- The first line sent is the firmware release, for instance:

  "* REL [20051117 ICPU]".

- The second line is the notification that the EEPROM's parameter are wrote into RAM:

  *** EVT [LOAD_EEPROM_PARAMETERS_INTO_RAM]**

- The third line is the notification that the calibration of the Analog to Digital Convert used for the measurement of output high voltage and current are done:

  *** EVT [ADC_CALIBRATION]**

- The fourth line is reporting that the internal I/O BUS are initialized:

  *** EVT [IO_BUS_INIT]**

- The fifth line is the notification that a main power on cold system startup reset is happened:

  *** EVT [COLD_RESET_SYSTEM_STARTUP]**

- The sixth and last line reports the number "n" of Power On Cold Reset happened up to that moment:

  *** POR [n]**

These six lines are sent also if the EEPROM's parameter n. 30 are set to "0" = Disable Remark Lines.

After these six lines, the normal report sequence starts, accordingly to the report type chosen notifying the user about the values of voltage, current and power, faults and events status for each channel.

When an ion pump discharge happens, the unit performs a warm system start reset automatically bringing to 0 V the HV to stop the discharge, then it sends again the first five remarking lines with the fifth changed to:

* EVT [WARM_RESET_SYSTEM_RESTART]

to inform that a warm reset system restart is happened and the HV output, that was in the ON state before the discharge, is automatically restarted.

After these five lines, the normal report sequence starts, accordingly to the report type chosen.

Enable – Disable Remark Lines

These five lines are sent also if the EEPROM's parameter n. 30 are set to "0" = Disable Remark Lines.

If the EEPROM's parameter n. 30 is set to "1", all the remark lines, the lines that begin with the symbol "*", are sent.

For EEPROM's parameter n. 30 = "0", all the remark lines are NOT sent, except the first six lines at the main power on reset (cold reset) and the first five lines after an ion pump discharge reset (warm reset) sent anyway.

Continuous and NON Continuous Report Mode

IPCU is able to send report only on request.

To do this, it is necessary to set the report mode with the time rate = 0.

After the "enter", the continuous report mode stops immediately.

According to the report type and mode, the unit sends one instantaneous report each time a "Request Report" (RR) command is received.

To return in the continuous report mode it is necessary to send a new “Report Setting” (RT) command with time rate ≠ 0.

After the “enter” the continuous report mode starts immediately.

Enable - Disable Input ECO Characters

By default, the unit transmits the ECO of all characters received from the host.

If required, It is possible to disable this feature.

See the command “Enable, Disable Receiving Input ECO” to do this.

The ECO of input characters may be used to understand that the physical communication between the unit and host is good so, disabling the ECO this feature is lost.

About Commands

When the unit receives a command, it transmits the plus symbol: “+” to confirm the command is executable.

If the command is not correct, the unit transmits the minus symbol: “-“.

When the parameter of a command is out of range, the unit sends:

“- [PARAMETER_ERROR]”.

The unit receives continuously input characters from host but they are hold only if the panel switch “Local-Remote/Serial” is on Serial.

If this switch is on Local-Remote and a character is received, the unit sends:

Report TYPE 0...6

The User Operator Reports Type 0, 2, 4 and 6 display the ‘continuous average value’ for the HV Channel Current, Voltage and Power, both in normal or scientific notation and the ‘instantaneous measured or control values’ in the hexadecimal format.

Technical Reports Type 1, 3 and 5 report the ‘instantaneous measured values’ for the HV Channel Current, Voltage and Power, both in normal or scientific notation and the ‘continuous average measured values’ in the hexadecimal format.

User Operator Report Type 0 and User Technician Report Type 1

Report Format: “HVc sssss iiiiixA vvvvV F=ffff E=eeee <CR>”

Report Fields:

- HVc HV Channel c= 1 or 2
- sssss HV Channel Status [‘OFF__’, ‘ON___’, ‘FAULT’]
- iiiii HV Channel Current in xA
- xA nA or uA (nano Ampere or micro Ampere)
- vvvv HV Channel Voltage in V (Volts)
- ffff Hexadecimal representation of HV Channel Faults
- eeee Hexadecimal representation of HV Channel Events

Example:

RT 0[Enter]

+

HV2 OFF 0uA 0V F=0000 E=0000

HV1 OFF 0uA 0V F=0000 E=0000

HV2 OFF 0uA 0V F=0000 E=0000

User Operator Report Type 2 and User Technician Report Type 3

Report Format:

“HVc sssss iiiiixA vvvvV F=ffff E=eeee pppppmW i=yyyy v=zzz c=www <CR>”

Report Fields:

HVc HV Channel c= 1 or 2

“- [LOCAL_MODE]”

to inform that a character is received but it is not possible to execute commands coming from the serial line.

When a command received is formally correct but can no be executed because the status of the unit does not allow this, (for instance a command: “A011” is sent but the cable interlock is not OK) the unit sends:

“- [COMMAND_UNEXECUTABLE]”

to inform that the request is not coherent with the status of the unit.

- sssss HV Channel Status [‘OFF__’, ‘ON___’, ‘FAULT’]
- iiiii HV Channel Current in nA or uA
- vvvv HV Channel Voltage in V

- ffff Hexadecimal representation of HV Channel Faults
- eeee Hexadecimal representation of HV Channel Events
- ppppp HV Channel Power in mW
- yyyy 16 Bits hexadecimal Current
- zzz 10 Bits hexadecimal Voltage
- www 12 Bits hexadecimal Control Output

Example:

RT 2[Enter]

+

HV2 OFF 0uA 0V F=0000 E=0000 0mW i=0001 v=000 c=D80

HV1 OFF 0uA 0V F=0000 E=0000 0mW i=0003 v=000 c=D80

HV2 OFF 0uA 0V F=0000 E=0000 0mW i=0001 v=000 c=D80

User Operator Report Type 4 and User Technician Report Type 5

Report Format:

“HVc sssss iiiiixA vvvvV F=ffff E=eeee pppppmW i=yyyy v=zzz c=www in=hhhh dac=dd <CR>”

Report Fields:

- HVc HV Channel c= 1 or 2
- sssss HV Channel Status [‘OFF__’, ‘ON___’, ‘FAULT’]
- iiiii HV Channel Current in nA or uA
- vvvv HV Channel Voltage in V
- ffff hexadecimal representation of HV Channel Faults
- eeee hexadecimal representation of HV Channel Events

- ppppp HV Channel Power in mW
- yyyy 16 Bits hexadecimal Current
- zzz 10 Bits hexadecimal Voltage
- www 12 Bits hexadecimal Control Output
- hhhh 16 Bits hexadecimal Digital Debounced Inputs
- dd 8 Bits hexadecimal DAC Output

Example:

RT 4[Enter]

+

HV2 OFF 0uA 0V F=0000 E=0000 0mW i=0001 v=000 c=D80 d=7407 r=00

HV1 OFF 0uA 0V F=0000 E=0000 0mW i=0003 v=000 c=D80 d=7407 r=00

HV2 OFF 0uA 0V F=0000 E=0000 0mW i=0001 v=000 c=D80 d=7407 r=00

HV1 OFF 0uA 0V F=0000 E=0000 0mW i=0003 v=000 c=D80 d=7407 r=00

HV2 OFF 0uA 0V F=0000 E=0000 0mW i=0001 v=000 c=D80 d=7407 r=00

Old IPCU Releases - Compatibility Report Type 6

Report Format: “HVc sssss ff p iiiiixA vvvvV <CR>”

Report Fields:

HVc HV Channel c= 1 or 2

Floating Point Notation

The floating point notation follows the ANSI/IEEE Standard 754-1985, for Binary Floating Point Arithmetic.

Example:

AL 1 11111111[Enter] (to grant access level 1)

1

wr 31 1[Enter] (set parameter n. 31 to 1)

+

RT 0 (select report type “0”)

+

HV2 OFF 0.0E-9A 0.0E+0V F=0000 E=0000

HV1 OFF 0.0E-9A 0.0E+0V F=0000 E=0000

HV2 OFF 0.0E-9A 0.0E+0V F=0000 E=0000

HV1 OFF 0.0E-9A 0.0E+0V F=0000 E=0000

HV2 OFF 0.0E-9A 0.0E+0V F=0000 E=0000

HV1 OFF 0.0E-9A 0.0E+0V F=0000 E=0000

HV2 OFF 0.0E-9A 0.0E+0V F=0000 E=0000

HV1 OFF 0.0E-9A 0.0E+0V F=0000 E=0000

HV2 OFF 0.0E-9A 0.0E+0V F=0000 E=0000

Cleaning

For safety reasons, before cleaning the controller:

1. Turn the controller off;
2. disconnect the controller power plug from the electrical outlet
3. disconnect all cables.
4. If the exterior of the controller becomes dirty, use a dry soft cloth.

The internal cleaning must be done only by Agilent operator.

- sssss HV Channel Status [‘OFF__’, ‘ON___’, ‘FAULT’]
- ff 8 bits HEX representation of HV Channel Faults
- p ‘0’=Start, ‘1’=Protect
- iiiii HV Channel Current in xA
- xA nA or uA (nano Ampere or micro Ampere)
- vvvv HV Channel Voltage in V (Volts)

Example:

RT 6

+

HV2 OFF 00 0 0uA 0V

HV1 OFF 00 0 0uA 0V

HV2 OFF 00 0 0uA 0V

HV1 OFF 00 0 0uA 0V

HV2 OFF 00 0 0uA 0V

Agilent Technologies

Vacuum Products Division

Dear Customer,

Thank you for purchasing an Agilent vacuum product. At Agilent Vacuum Products Division 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 products. 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.

Giampaolo LEVI

Vice President and General Manager
Agilent Vacuum Products Division

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

CUSTOMER REQUEST FOR CORRECTIVE / PREVENTIVE / IMPROVEMENT ACTION

TO: AGILENT VACUUM PRODUCTS DIVISION TORINO – QUALITY ASSURANCE

FAX N°: XXXX-011-9979350

ADDRESS: AGILENT TECHNOLOGIES ITALIA S.p.A. – Vacuum Products Division –

Via F.lli Varian, 54 – 10040 Leinì (TO) – Italy

E-MAIL: vpd-qualityassurance_pdl-ext@agilent.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 AGILENT VPD) LOG N° _____

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

Agilent Technologies

Agilent Technologies

Vacuum Products Division
Instructions for returning products

Dear Customer:

Please follow these instructions whenever one of our products needs to be returned.

1) Complete the attached Request for Return form and send it to Agilent Technologies (see below), taking particular care to identify all products that have pumped or been exposed to any toxic or hazardous materials.

2) After evaluating the information, Agilent Technologies will provide you with a Return Authorization (RA) number via email or fax, as requested.
Note: Depending on the type of return, a Purchase Order may be required at the time the Request for Return is submitted. We will quote any necessary services (evaluation, repair, special cleaning, eg).

3) **Important steps for the shipment of returning product:**
   - Remove all accessories from the core product (e.g. inlet screens, vent valves).
   - Prior to shipment, drain any oils or other liquids, purge or flush all gasses, and wipe off any excess residue.
   - If ordering an Advance Exchange product, **please use the packaging from the Advance Exchange to return the defective product.**
   - Seal the product in a plastic bag, and package product carefully to avoid damage in transit. You are responsible for loss or damage in transit.
   - Agilent Technologies is not responsible for returning customer provided packaging or containers.
   - **Clearly label package with RA number.** Using the shipping label provided will ensure the proper address and RA number are on the package. Packages shipped to Agilent without a RA clearly written on the outside cannot be accepted and will be returned.

4) Return only products for which the RA was issued.

5) **Product being returned under a RA must be received within 15 business days.**

6) **Ship to the location specified on the printable label, which will be sent, along with the RA number, as soon as we have received all of the required information.** Customer is responsible for freight charges on returning product.

7) Return shipments must comply with all applicable **Shipping Regulations** (IATA, DOT, etc.) and carrier requirements.

RETURN THE COMPLETED **REQUEST FOR RETURN** FORM TO YOUR NEAREST LOCATION:

EUROPE:	**NORTH AMERICA:**	**PACIFIC RIM:**
Fax: 00 39 011 9979 330		
Fax Free: 00 800 345 345 00	Fax: 1 781 860 9252	please visit our website for individual
Toll Free: 00 800 234 234 00	Toll Free: 800 882 7426, Option 3	office information
vpt-customercare@agilent.com	vpl-ra@agilent.com	http://www.agilent.com

Agilent Technologies

Vacuum Products Division
Request for Return Form
(Health and Safety Certification)

Please read important policy information on Page 3 that applies to all returns.

1) CUSTOMER INFORMATION

Company Name:	**Contact Name:**
Tel: **Email:**	**Fax:**
Customer Ship To:	**Customer Bill To:**
Europe only: **VAT reg. Number:**	USA/Canada only: ☐ **Taxable** ☐ **Non-taxable**

2) PRODUCT IDENTIFICATION

Product Description	Agilent P/N	Agilent S/N	Original Purchasing Reference

3) TYPE OF RETURN (**Choose one from each row** and supply Purchase Order if requesting a billable service)

3A. ☐ Non-Billable ☐ Billable ➡ New PO # (hard copy must be submitted with this form):

3B. ☐ Exchange ☐ Repair ☐ Upgrade ☐ Consignment/Demo ☐ Calibration ☐ Evaluation ☐ Return for Credit

4) HEALTH and SAFETY CERTIFICATION

AGILENT TECHNOLOGIES CANNOT ACCEPT ANY PRODUCTS CONTAMINATED WITH BIOLOGICAL OR EXPLOSIVE HAZARDS, RADIOACTIVE MATERIAL, OR MERCURY AT ITS FACILITY.
Call Agilent Technologies to discuss alternatives if this requirement presents a problem.

The equipment listed above (check one):

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

☐ **HAS** pumped or been exposed to the following toxic or hazardous materials. If this box is checked, the following information must also be filled out. Check boxes for all materials to which product(s) pumped or was exposed:

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

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

_____

NOTE: If a product is received at Agilent 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 Agilent employees as well as to any third party occurring as a result of exposure to toxic or hazardous materials present in the product.

Print Name: **Authorized Signature:** ..... **Date:**

5) FAILURE INFORMATION:

Failure Mode (REQUIRED FIELD. See next page for suggestions of failure terms):
Detailed Description of Malfunction: (Please provide the error message)
Application (system and model):

I understand and agree to the terms of Section 6, Page 3/3.
Print Name: **Authorized Signature:** ..... **Date:**

Agilent Technologies

Vacuum Products Division
Request for Return Form
(Health and Safety Certification)

Please use these Failure Mode to describe the concern about the product on Page 2.

TURBO PUMPS and TURBO CONTROLLERS

APPARENT DEFECT/MALFUNCTION		POSITION	PARAMETERS	
- Does not start	- Noise	- Vertical	Power:	Rotational Speed:
- Does not spin freely	- Vibrations	-Horizontal	Current:	Inlet Pressure:
- Does not reach full speed	-Leak	-Upside-down	Temp 1:	Foreline Pressure:
- Mechanical Contact	-Overtemperature	-Other:	Temp 2:	Purge flow:
- Cooling defective	-Clogging	.....	OPERATING TIME:	

ION PUMPS/CONTROLLERS

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

VALVES/COMPONENTS

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

LEAK DETECTORS

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

INSTRUMENTS

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

SCROLL AND ROTARY VANE PUMPS

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

DIFFUSION PUMPS

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

Section 6) *ADDITIONAL TERMS*

Please read the terms and conditions below as they apply to all returns and are in addition to the Agilent Technologies Vacuum Product Division – Products and Services Terms of Sale.

- Customer is responsible for the freight charges for the returning product. Return shipments must comply with all applicable **Shipping Regulations** (IATA, DOT, etc.) and carrier requirements.
- Customers receiving an Advance Exchange product agree to return the defective, rebuildable part to Agilent Technologies **within 15 business days**. Failure to do so, or returning a non-rebuildable part (crashed), will result in an invoice for the non-returned/non-rebuildable part.
- Returns for credit toward the purchase of new or refurbished Products are subject to prior Agilent approval and may incur a restocking fee. Please reference the original purchase order number.
- Units returned for evaluation will be evaluated, and a quote for repair will be issued. If you choose to have the unit repaired, the cost of the evaluation will be deducted from the final repair pricing. A Purchase Order for the final repair price should be issued within 3 weeks of quotation date. Units without a Purchase Order for repair will be returned to the customer, and the evaluation fee will be invoiced.
- A Special Cleaning fee will apply to all exposed products per Section 4 of this document.
- If requesting a calibration service, units must be functionally capable of being calibrated.

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