OPERATING INSTRUCTIONS

EN

Original

RS-232 FOR 3G LEAK DETECTORS

PFEIFFER VACUUM

MANUEL REFERENCE: **122215OEN**
EDITION: **05 - November 2015**

General contents

RS-232 for 3G leak detectors

GB 04843 - Edition 05 - Nov 15

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A

Introduction

Purpose of the PC computer interface

The RS-232 interface is used to control the leak detector with a PC compatible computer.

Which commands available for your leak detector

This manual lists all the commands available with the RS-232 protocol.

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Controlling the detector with a PC computer

Location of the RS-232 interface

It is a D-Sub 9 pin Male connector: refer to the leak detector Operating Instructions for location.

Types of modes

The differents modes and commands:

Input/Output: Serial link 1 and Serial link 2

From the "Settings" screen, press [**Advanced**] [**Input/Output**], then [**Serial link 1**] or [**Serial link 2**].	
Type	➔ Set the type of serial link: see table below.
Parameters	➔ Set the serial link mode: see detail below.

The operator must allocate the 2 serial links (1 and 2) according to their use.

Use	**Possible allocation**		**Type to select**
	Serial Link 1	Serial Link 2	
RS-232	yes	no	Serial
Bluetooth (1)	no	yes	Bluetooth
USB (2)	yes	yes	USB
Wi-Fi (3)	no	yes	Network
Ethernet (4)	no	yes	Network
RC 500 Remote control (5)	yes	yes	Serial
RC 500 WL Remote control (5)	yes	yes	Serial

(1) Option or accessory
(2) With all I/O boards (option or accessory)
(3) With I/O Wi-Fi board (option or accessory)
(4) With I/O Ethernet board (option or accessory)
(5) Accessory

Parameters: ➔ From the "Settings" screen, press [**Advanced**] [**Input/Output**] [**Serial Link 1**] or [**Serial link 2**], [**Parameters**].

➔ Modes available depending on use.

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Controlling the detector with a PC computer

Mode	Description
Basic	Continuous acquisition of data sent to the hyperterminal according to a defined time duration. At any time, a command can be sent to the leak detector. **Recommended mode during leak detector test procedure setting operations.**
Spreadsheet	Variant on the Basic mode. Continuous data acquisition, formatted in a spreadsheet such as Excel TM Microsoft or other similar software. **Recommended mode for drawing graphs.**
Advanced	Full control of the detector by a supervisor. The detector sends information at the supervisor's request. 5 V power supply available. **Recommended mode for automatic systems.**
Export Data	Export, via a PC, of "tickets" issued by the detector after: • Calibration with an internal/external calibrated leak, • Calibration control with an internal leak, • A test. **Serial links 1 and 2 must not be in “Export Data” mode at the same time.**
RC 500	Use a remote control with cable (model RC 500) (1)
RC 500 WL	Use of a wireless remote control (model RC 500 WL). (1)
Protocol HLT5xx	Protocol for compatibility with the HLT5xx detector protocol. List of orders for the protocol compatible: see chapter I.
Protocol HLT2xx	Protocol for compatibility with the HLT2xx detector protocol. List of orders for the protocol compatible: see chapter J.
Ext. Module	Full control of the detector by a supervisor. The detector sends information at the supervisor's request. 24 V power supply available. **A 24 V power supply is required for using an external module (example: profibus).**

(1) See Standard Remote Control Operating Instructions for more details.

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Controlling the detector with a PC computer

Modes selection
Control panel

From "Settings" menu, press on [**Advanced**] [**Input/Output**] [**Serial link 1**]:

- Set "Type = serial"
- Set the serial link mode: see "Types of modes" chapter.

2 types of commands

Shorts
1 character
(E)

Available only in Basic and Spreadsheet, and used under Hyperterminal to control simply the leak detector, or check the RS-232 connection.

Long
(F)

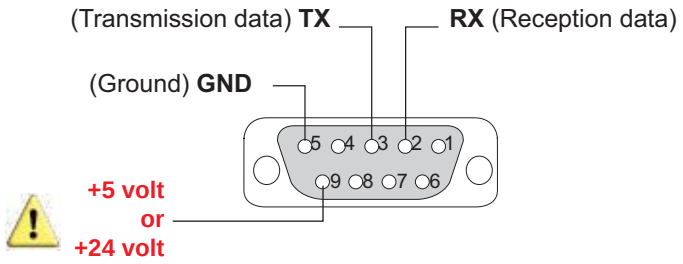
Available in the 3 modes. Used to send or receive parameters between the leak detector and a “master”.
Allow the discharge protocol.

Preparing the RS-232 link cable

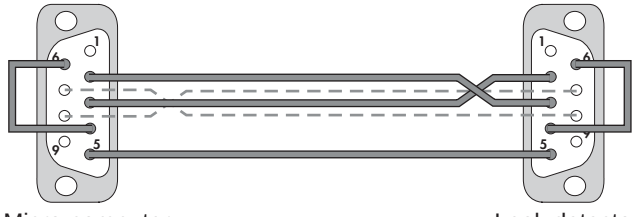
You can use the manufacturer cable, or make your own by following the pin connections specified below:
Use a D-Sub 9 pin, female connector.

Manufacturer cable P/N: **103616**

Pins used



Connection cable



(7 and 8 connections are necessary only if RTS and CTS are used in an user software)

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Controlling the detector with a PC computer

Connecting the detector to a micro-computer

For example, the user can communicate easily with the detector using a terminal software.

Interface configuration

Mode:	Asynchronous
Bauds:	9600
Bits:	8
Parity:	None
Stop bit:	1
Parity control:	None
Hand-check:	XON/XOFF or NONE

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Basic mode

Basic mode: Standard

A string of parameters is permanently sent to the terminal approximately every second.
This mode is often used in the phases of adjusting, finalizing or debugging the leak detection test process.
At any time, a command can be sent to the detector.
(see codes and commands list).

Composition of the string of parameters

/Test status/Emission status/Helium signal/Inlet pressure /Time/Pass-fail result
This string of parameters is sent without a $^{L}_{F}$ (line feed) character.

Example

HS TEST	ON	S=9.00E-07	P=4.40E+02	15:38:51	PASS	$^{C}_{R}$
1	2	3	4	5	6	

		Message	Description
1	Test status	STAND BY	The unit is in stand-by mode.
		ROUGHING	The unit is in roughing mode.
		GL TEST	The unit is in gross leak test mode.
		NORMAL TEST	The unit is in normal test mode
		HS TEST	The unit is in high sensitivity test mode.
		REFRESH	High vac. pump roughing (internal use only)
		SNIFFING	The unit is in sniffing test mode.
		CALIBRATION	The unit is in calibration mode.
		WARMING UP	The unit is warming up.
		PLEASE WAIT	
		EXHAUST	
		SNIF PROBE ON	
		SNIF PROBE OFF	
2	Emission status	ON	The filament is turned on.
		OFF	The filament is turned off.
3	Helium signal	S=9.00E-07	Helium leak rate in mbar.l/s.
4	Inlet pressure	P=4.40E+02	Inlet pressure in mbar.
5	Time	15:38:51	Time when the test was performed.
6	Pass-fail result	PASS	Pass result of the test.
		FAIL	Fail result of the test.

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Basic mode

Exceptional messages

In case of exceptional events, a line describing this state is sent by the detector with a $^{L}_{F}$ (line feed) character.
The line will not be deleted with the next status messages.

Location	Message
Default	FAILURE DETECTED + all error messages which could appear on the LCD
	CRITICAL FAILURE + all error messages which could appear on the LCD
Warning	WARNING + all warning messages which could appear on the LCD
Automatic electronic zero	ELECTRONIC ZERO COMPLETE
	ELECTRONIC ZERO FAILURE
	ELECTRONIC ZERO END
	ELECTRONIC ZERO IN PROGRESS
Autocalibration	CALIBRATION COMPLETE
	AUTOCAL ERROR
	CALIBRATION FAILURE
	CALIBRATION IN PROGRESS
Memo	MEMO ON
	MEMO OFF
Digital voice level	DIGITAL VOICE ADJUSTMENT START
	DIGITAL VOICE ADJUSTMENT END
Audio level	AUDIO ADJUSTMENT START
	AUDIO ADJUSTMENT END
Cycle end	AUTOMATIC CYCLE END MODE ON
	MANUAL CYCLE END MODE ON
Emission adjustment	EMISSION ADJUSTMENT START
	EMISSION ADJUSTMENT END
Acc voltage adjustment	VOLTAGE ADJUSTMENT START
	VOLTAGE ADJUSTMENT END
Inlet vent	INLET VENT ON
	INLET VENT OFF
Internal calibrated leak valve	CALIBRATED LEAK VALVE OPENED
	CALIBRATED LEAK VALVE CLOSED
	CALIBRATED LEAK VALVE OPENING
Electronic zero	ELEC. ZERO ADJUSTMENT START
	ELEC. ZERO ADJUSTMENT END
Zero	ZERO FUNCTION ON
	ZERO FUNCTION OFF
Start	UNIT WARMING UP
	LANGUAGE
Sniffer	SNIF PROBE ON
	SNIF PROBE OFF

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Basic mode

Basic mode: Spreadsheet

The spreadsheet mode is a variant of the Basic mode.
It offers a possibility to perform data acquisition and have the data formatted on a spreadsheet such as Excel or any equivalent software (see below).
This may be use to draw curves for instance.

Composition of the string of parameters

This string of parameters is the same in Basic or Spreadsheet mode but it is sent **with** a $^{L}_{F}$ (line feed) character:
so all the lines are displayed.

Example

HS TEST ON S=9.00E-07 P=4.40E+02 15:38:51 PASS L_F
HS TEST ON S=9.40E-07 P=4.40E+02 15:38:53 PASS L_F
HS TEST ON S=9.20E-07 P=4.40E+02 15:48:54 PASS L_F
Etc.

Spreadsheet mode and exceptional messages

There are not exceptional messages in Spreadsheet mode.

Commands available

In Basic mode, all commands (short and long) are available.

List of short commands E

List of long commands F

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Advanced mode

Protocols

The XON- XOFF protocol can be used in this mode.
It is inactive by default.

Commands available

In Advanced mode, only long commands are available.

List of long commands F

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Short commands of the RS-232

Short Commands

Short Commands list	Definition	Cancellation control	Definition
A	Autocalibration command	a	Stop autocalibration command
B	Sniffing mode command	b	Stop sniffing command
C	Cycle start command	c	Stop cycle command
D	Dynamic calibration ON	d	Dynamic calibration OFF
E	Electronic zero adjustment (*)	e	End of electronic zero adjustment
F	Filament OFF	f	Filament ON
G	Calculation of the dynamic calibration coefficient	-	-
I	LCD display language selection	-	-
J	Memorization command	j	End of memorization
K	Audio level adjustment (*)	k	End of audio level adjustment
M	Autocalibration OFF	m	Autocalibration ON
N	Normal Mode	n	High sensitivity mode selection
O	Zoom function ON	o	Zoom function OFF
P	Inhibit the PLC discrete I/O Interface	p	Activate the PLC discrete I/O Interface
Q	Emission adjustment (*)	q	End of emission adjustment
S	Digital voice audio level adjustment (*)	s	End of digital voice audio level adjustment
T	Peak adjustment (*)	t	End of peak adjustment
U	GL mode	u	Not valid
V	Inlet vent ON	v	Inlet vent OFF
W	Internal calibrated leak valve opening. To validate this command, operator must also validate “T” or “Q”.	w	Internal calibrated leak valve closing
Y	Locking front panel keys by password	y	Unlocking front panel keys by password
Z	Electronic zero automatic adjustment (valid if filament OFF)	z	End of electronic zero automatic adjustment (valid if filament OFF)
+	Increase a parameter	-	Decrease a parameter
space	Display commands menu		

(*) with + or -

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Long commands of the RS-232

Different types of long commands

There are 3 types of long commands:

- ■ immediate — An immediate command is a command without parameter that could be immediately executed.
- ■ request — A request command requires an answer from the leak detector.
- ■ with parameters — A command with parameters is a command that adjusts a parameter: only the discharge protocol confirms the good transmission and the good command interpretation.

All long commands finish with a $^{C}_{R}$ (carriage return) character. If there is an answer to this command, this answer will also finish with a $^{C}_{R}$ (carriage return) character.

Long commands discharge protocol

This mode return for the long commands a discharge value.

Example: $\mathbf{A_K}$ for 0x06 or $\mathbf{N_K}$ for 0x15.
$\mathbf{A_K}$ = correct command/Acknowledged
$\mathbf{N_K}$ = not recognized command /not acknowledged (message heading, message length)

Example: C = command ; R = answer
C: **?ST** $^{C}_{R}$ detector status request
R: **64596** $^{C}_{R}$ $\mathbf{A_K}$ detector answer
C: **?UU** $^{C}_{R}$ unknown command
R: $\mathbf{N_K}$ detector answer-no action from the detector
C: **=FE** $^{C}_{R}$ incorrect command
R: $\mathbf{N_K}$ detector answer action from the detector

The **CF** symbol means **C**ompressed **F**ormat and is used for any value using an exponent such as helium signal, inlet pressure, etc.

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Long commands of the RS-232

Examples:
■ For a helium leak value of 4.23E-07 (=423E-09), the **CF** format code will corresponds to 423-09.
The **CF** format uses a three significant digits mantissa plus a signed exponent.
■ For an inlet pressure of 300 (=300E00) mbar, the **CF** format code will correspond to 300-00.

Quick references lists by leak detector

See next pages.

You could find the complete list:
F p. 10 for the immediate commands (!…$^{C}_{R}$)
F p. 11 for the request long commands (?…$^{C}_{R}$)
F p. 34 for the commands with parameters (=…$^{C}_{R}$).

Immediate commands

Definition	Command
1. COMMON FUNCTIONS	
1.1 Detector parameters	
Reset of the default values	**!DE $^{C}_{R}$**
2. HARD VACUUM TEST MODE	
2.6 Automatic correction	
Calculate the external correction coefficient and validate it	**!AE $^{C}_{R}$**
3. SNIFFING TEST MODE	
3.3 Automatic correction	
Calculate the external correction coefficient and validate it	**!AE $^{C}_{R}$**
4. CALIBRATION	
4.1 Hard vacuum test - Internal calibration	
Start an autocalibration	**!AC $^{C}_{R}$**
Stop an autocalibration	**!AS $^{C}_{R}$**
4.2 Hard vacuum test - External calibration	
Start an autocalibration	**!AC $^{C}_{R}$**
Stop an autocalibration	**!AS $^{C}_{R}$**
External calibrated leak connected and opened	**!AC1 $^{C}_{R}$**
External calibrated leak connected and closed	**!AC2 $^{C}_{R}$**
4.3 Sniffing test - External calibration	
Start an autocalibration	**!AC $^{C}_{R}$**
Stop an autocalibration	**!AS $^{C}_{R}$**
External calibrated leak connected and opened	**!AC1 $^{C}_{R}$**
External calibrated leak connected and closed	**!AC2 $^{C}_{R}$**
External calibrated leak rate stable	**!AC3 $^{C}_{R}$**
Background stable	**!AC4 $^{C}_{R}$**

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Long commands of the RS-232

Immediate commands (ctd)

Definition	Command
4.4 Sniffing test - Calibration on concentration	
Start an autocalibration	**!AC $^{C}_{R}$**
Stop an autocalibration	**!AS $^{C}_{R}$**
External calibrated leak connected and opened	**!AC1 $^{C}_{R}$**
External calibrated leak rate stable	**!AC3 $^{C}_{R}$**
5. ANALYZER CELL	
Filament selection (swap to the other filament)	**!SW $^{C}_{R}$**
7. SERVICE	
7.1 Messages	
Memorized defaults reset	**!RE $^{C}_{R}$**
Warnings reset	**!WA $^{C}_{R}$**

Request long commands

Definition	Command
1. COMMON FUNCTIONS	
1.1 Detector parameters	
Request the values of the hour counters	**?CH $^{C}_{R}$**
Request the current status of the detector	**?CY $^{C}_{R}$**
Request the date	**?DA $^{C}_{R}$**
Request the visual information of the front panel	**?HMI $^{C}_{R}$**
Request the lower display limit value displayed for the signal	**?LDL $^{C}_{R}$**
Request the software version	**?MD $^{C}_{R}$**
Request the password	**?PW $^{C}_{R}$**
Request if the detector is ready to test	**?RDY $^{C}_{R}$**
Resquest the detector shutdown status	**?SHD $^{C}_{R}$**
Request the language	**?SP $^{C}_{R}$**
Request the detector status	**?ST $^{C}_{R}$**
Request the current hour	**?TI $^{C}_{R}$**
Request the time of the latest shutdowm	**?TIA $^{C}_{R}$**
Request the time of the latest start-up	**?TIM $^{C}_{R}$**
Request the measurement unit used	**?UN $^{C}_{R}$**
Request the Purge valve status	**?VPU $^{C}_{R}$**
Request the HLD status string digits	**?TR $^{C}_{R}$**
1.2 Helium measure	
Request the value of the calibrated helium signal (corrected)	**?LE $^{C}_{R}$**
Request the value of the calibrated helium signal (not corrected)	**?LE2 $^{C}_{R}$**

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Long commands of the RS-232

Request long commands (ctd)

Definition	Command
1.3 Sound	
Request the ON/OFF status of the loudspeaker and external headphone	**?HP** $^{C}_{R}$
Request the sound status	**?SO** $^{C}_{R}$
Request the digital voice status	**?SY** $^{C}_{R}$
1.4 Zero	
Request the zero status	**?AZ** $^{C}_{R}$
Request the bargraph display centered on the reject point status	**?ZR** $^{C}_{R}$
Request the parameters of the zero function status	**?ZB** $^{C}_{R}$
Request the zero reference status	**?SZ** $^{C}_{R}$
1.5 Pressure	
Request the gauge status	**?GAU** $^{C}_{R}$
Request the external gauge status	**?GAUM** $^{C}_{R}$
Request the external gauge full scale	**?GAUMS** $^{C}_{R}$
Request the external gauge voltage	**?GAUMT** $^{C}_{R}$
Request the gauge full scale	**?GAUS** $^{C}_{R}$
Request the gauge voltage	**?GAUT** $^{C}_{R}$
Pressure of the external gauge	**?PEM** $^{C}_{R}$
2. HARD VACUUM TEST MODE	
2.1 Air inlet	
Request if the vent is set in automatic or manual at the end on the cycle	**?VT** $^{C}_{R}$
Request the parameters of the vent function	**?IVP** $^{C}_{R}$
Request the status of the vent valve	**?IV** $^{C}_{R}$
2.2 Cycle parameters	
Request the test mode selected	**?CYT** $^{C}_{R}$
Request the hard vacuum external coefficient value	**?HV** $^{C}_{R}$
Request the inlet pressure value	**?PE** $^{C}_{R}$
Request the cycle counter	**?MCC** $^{C}_{R}$
Request the test method used in hard vacuum	**?TST** $^{C}_{R}$
2.3 Pressure threshold	
Request the gross leak mode pressure threshold	**?P1** $^{C}_{R}$
Request the gross leak mode pressure threshold in the current unit	**?P1U** $^{C}_{R}$
Request the normal mode pressure threshold	**?P2** $^{C}_{R}$
Request the normal mode pressure threshold in the current unit	**?P2U** $^{C}_{R}$
Request the high sensitivity pressure threshold	**?P3** $^{C}_{R}$
Request the high sens mode pressure threshold in the current unit	**?P3U** $^{C}_{R}$
2.4 Results	
Give the result of the latest test	**?RE** $^{C}_{R}$
2.5 Helium threshold	
Request the threshold value of the current test mode	**?S1** $^{C}_{R}$
Request the threshold value of the hard vacuum test mode	**?S1H** $^{C}_{R}$

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Long commands of the RS-232

Request long commands (ctd)

Definition	Command
2.6 Other functions	
Request the depollution parameters	**?AA** $^{C}_{R}$
Leak value for the external calibration in hard vacuum test	**?AEH** $^{C}_{R}$
Request the Background max	**?AR** $^{C}_{R}$
Request the parameters of the automatic cycle end in sniffing test function	**?CAS** $^{C}_{R}$
Request the parameters of the auto cycle end function	**?CA** $^{C}_{R}$
Request the Massive mode status	**?MAS** $^{C}_{R}$
Request the memo function status	**?ME** $^{C}_{R}$
Request the Bypass option status	**?PAD** $^{C}_{R}$
Resquest the status of the Regeneration or Burn-in function	**?REG** $^{C}_{R}$
3. SNIFFING TEST MODE	
3.1 Helium threshold	
Request the threshold value of the current test mode	**?S1** $^{C}_{R}$
Request the threshold value of the sniffing test mode	**?S1S** $^{C}_{R}$
Request target value in sniffing test	**?AES** $^{C}_{R}$
3.2 Test parameters	
Request the sniffing external coefficient value	**?SN** $^{C}_{R}$
3.4. LDS probe	
Request the sniffer probe clogged threshold value	**?S6** $^{C}_{R}$
Request the probe type	**?SPR** $^{C}_{R}$
Request the Smart probe clogged threshold value	**?SSS** $^{C}_{R}$
3.6 Other functions	
Request the status of the Regeneration or Burn-in function	**?REG** $^{C}_{R}$
4. CALIBRATION	
Request the autocalibration validation status	**?AC** $^{C}_{R}$
Request the current target value for an autocalibration	**?AC3** $^{C}_{R}$
Calibration Acknowledge	**?CAK** $^{C}_{R}$
Request the parameters of the autocalibration automatic request	**?ACA** $^{C}_{R}$
Request the parameters of the dynamic calibration	**?CV** $^{C}_{R}$
Request the value of the internal calibrated leak written on the label	**?FE** $^{C}_{R}$
Request the parameters of the calibrated leak used for the internal autocalibration (internal or external)	**?FEM** $^{C}_{R}$
Request the tracer gas used	**?GZ** $^{C}_{R}$
Request the temperature	**?TE** $^{C}_{R}$
Request the time of the latest autocalibration	**?TIC** $^{C}_{R}$
Select the calibrated leak for autocalibration	**?FEP** $^{C}_{R}$
5. ANALYZER CELL	
Request the zero status	**?AUZ** $^{C}_{R}$
Request the filaments sensitivity coefficients	**?CF** $^{C}_{R}$
Request filament availability	**?FM** $^{C}_{R}$
Request the emission current	**?IE** $^{C}_{R}$

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Long commands of the RS-232

Request long commands (ctd)

Definition	Command
Request the desired value of the filament 1 emission current	**?IE1 $^{C}_{R}$**
Request the desired value of the filament 2 emission current	**?IE2 $^{C}_{R}$**
Request the Background suppression status	**?RBF $^{C}_{R}$**
Request the analyzer cell status	**?SC $^{C}_{R}$**
Request the active filament	**?SW $^{C}_{R}$**
Request the current acceleration voltage in use	**?VO $^{C}_{R}$**
Request the desired value of the filament 1 acceleration voltage	**?VO1 $^{C}_{R}$**
Request the desired value of the filament 2 acceleration voltage	**?VO2 $^{C}_{R}$**
Request the electronic zero reference	**?ZE $^{C}_{R}$**
Request the analyzer cell pressure	**?PS $^{C}_{R}$**
7. SERVICE	
7.1 Messages	
Request the memorized defaults	**?ER $^{C}_{R}$**
Request the memorized warnings list	**?WA $^{C}_{R}$**
7.3 Primary pump	
Request the hour counter of the primary pump	**?MC0 $^{C}_{R}$**
7.4 High vac. pump	
Request the hour counter of the high vac. pump	**?MC1 $^{C}_{R}$**
Request information about the high vac. pump	**?T1 $^{C}_{R}$**
Request more information about the high vac. pump	**?T1M $^{C}_{R}$**
Request the high vac. pump speed	**?V1 $^{C}_{R}$**
Request the high vac. pump target speed for hard vacuum method	**?VITH $^{C}_{R}$**
Request the high vac. pump nominal speed	**?VITN $^{C}_{R}$**
Request the high vac. pump target speed for sniffer method	**?VITS $^{C}_{R}$**
9. INPUTS/OUTPUTS	
9.1 Logic inputs	
Request the logic inputs status	**?IN $^{C}_{R}$**
9.2 Logic outputs	
Request the pressure threshold value n°1	**?NP1 $^{C}_{R}$**
Request the pressure threshold value n°2	**?NP2 $^{C}_{R}$**
Request the pressure threshold value n°3	**?NP3 $^{C}_{R}$**
Request the logic outputs status	**?OU $^{C}_{R}$**
Request the additionnal threshold value n°2	**?S2 $^{C}_{R}$**
Request the additionnal threshold value n°3	**?S3 $^{C}_{R}$**
Request the additionnal threshold value n°4	**?S4 $^{C}_{R}$**
Request the additionnal threshold value n°5	**?S5 $^{C}_{R}$**
9.3 Analogic outputs	
Request the analogic output n°1 status of the interface board	**?AO1 $^{C}_{R}$**
Request the analogic output n°2 status of the interface board	**?AO2 $^{C}_{R}$**
Request the analogic output n°3 status of the interface board	**?AO3 $^{C}_{R}$**

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Long commands of the RS-232

Commands with paramaters

Definition	Command
1. COMMON FUNCTIONS	
1.1 Detector parameters	
Adjust the date	**=DAmmddyy $^{C}_{R}$**
Adjust the lower display limit value displayed for the signal	**=LDLCF $^{C}_{R}$**
Adjust the password and its validation	**=PWxxxxy $^{C}_{R}$**
Change the display language	**=SPx $^{C}_{R}$**
Adjust the time	**=Tlhhmmss $^{C}_{R}$**
Unit of measurement selection	**=UNx $^{C}_{R}$**
Set the purge valve status	**=VPUx $^{C}_{R}$**
1.3 Sound	
Set the status of the loudspeaker and the external headphone	**=HPx $^{C}_{R}$**
Sound volume	**=SOxy $^{C}_{R}$**
Digital voice volume	**=SYxy $^{C}_{R}$**
1.4 Zero	
Zero command	**=AZx $^{C}_{R}$**
Bargraph display centered on the reject point	**=ZRx $^{C}_{R}$**
Parameters of the zero function	**=ZBxy $^{C}_{R}$**
Advanced parameters of the zero function	**=ZBxyzzzzCF $^{C}_{R}$**
1.5 Pressure	
Set the gauge status	**=GAUIxxx $^{C}_{R}$**
Adjust the external gauge full scale	**=GAUMSxxxxx $^{C}_{R}$**
Adjust the gauge full scale	**=GAUSxxxxx $^{C}_{R}$**
2. HARD VACUUM TEST MODE	
2.1 Air inlet	
Inlet vent control at the end of the cycle	**=IVx $^{C}_{R}$**
Inlet vent function control	**=IVPxyzmmss $^{C}_{R}$**
Inlet vent valve activation in standby mode	**=VTx $^{C}_{R}$**
2.2 Cycle parameters	
Cycle request	**=CYx $^{C}_{R}$**
Test mode adjustment	**=CYTx $^{C}_{R}$**
Hard vacuum coefficient adjustment	**=HVCFx $^{C}_{R}$**
Test method used in hard vacuum	**=TSTx $^{C}_{R}$**
2.3 Pressure threshold	
Adjust the gross leak pressure threshold	**=P1CF $^{C}_{R}$**
Adjust the normal pressure threshold	**=P2CF $^{C}_{R}$**
Adjust the high sensitivity pressure threshold	**=P3CF $^{C}_{R}$**
Adjust the gross leak mode pressure threshold in the current unit	**=P1UCF $^{C}_{R}$**
Adjust the normal mode pressure threshold in the current unit	**=P2UCF $^{C}_{R}$**
Adjust the high sens mode pressure threshold in the current unit	**=P3UCF $^{C}_{R}$**

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Long commands of the RS-232

Commands with paramaters (ctd)

Definition	Command
2.5 Helium threshold	
Adjust the reject threshold in the current unit of measurement	**=S1CFx $^{C}_{R}$**
2.6 Other functions	
Depollution will trigger the end of the cycle if the helium signal exceeds the value set	**=AACFx $^{C}_{R}$**
Depollution control by GL selection	**=APCFx $^{C}_{R}$**
Control of the automatic cycle stop function	**=CAabccccdddd $^{C}_{R}$**
Set the Massive mode status	**=MASxy $^{C}_{R}$**
Memorization command	**=MEx $^{C}_{R}$**
Memorization command	**=MExbmmss $^{C}_{R}$**
Set the Bypass option status	**=PADabc $^{C}_{R}$**
Set the status of the Regeneration or Burn-in function	**=REGx $^{C}_{R}$**
Select and adjust the background max	**=ARCFx $^{C}_{R}$**
Select the background max	**=ARx $^{C}_{R}$**
3. SNIFFING TEST MODE	
3.1 Helium threshold	
Adjust the current reject threshold in the current test mode and current unit of measurement	**=S1CF $^{C}_{R}$**
3.2 Test parameters	
Sniffing mode activation	**=SFx $^{C}_{R}$**
Sniffing external coefficient adjustment	**=SNCFx $^{C}_{R}$**
3.3 External calibration	
Select the internal temperature sensor for autocalibration	**=TES $^{C}_{R}$**
3.4 LDS probe	
Adjustment of the sniffer probe clogged set point value	**=S6CF $^{C}_{R}$**
Set the probe type	**=SPRx $^{C}_{R}$**
Adjust the Smart sniffer probe clogged threshold value	**=SSSxxxx $^{C}_{R}$**
3.6 Other functions	
Set the Status of the Regeneration a Burn-in function	**=REGx $^{C}_{R}$**
4. CALIBRATION	
Set a warning “autocal required”	**=ACAabbbbbccccc $^{C}_{R}$**
Autocalibration activation	**=ACx $^{C}_{R}$**
External leak values for external calibration	**=AExCF $^{C}_{R}$**
Adjust the internal calibrated leak characteristics	**=FECFvxyyyytt $^{C}_{R}$**
Calibrated leak used for autocalibration	**=FEM $^{C}_{R}$**
Select the calibrated leak for autocalibration	**=FEPx $^{C}_{R}$**
Selection of the tracer gas mass	**=GZx $^{C}_{R}$**
Set the temperature for autocalibration with internal or external leak	**=TEVxx $^{C}_{R}$**
Select the internal temperature sensor for autocalibration	**=TES $^{C}_{R}$**
Select the temperature on preset value for autocalibration	**=TEV $^{C}_{R}$**
Dynamic calibration function setting	**=CVCF $^{C}_{R}$**
Dynamic calibration function check	**=CDx $^{C}_{R}$**

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Commands with paramaters (ctd)

Definition	Command
5. ANALYZER CELL	
Set the zero status	**=AUZxy $^{C}_{R}$**
Filament sensitivity coefficient adjustment	**=CFCFx $^{C}_{R}$**
Hour counter reset of the selected filament	**=CHx $^{C}_{R}$**
Adjust the ionization current of the filament	**=IExxx $^{C}_{R}$**
Adjust the desired value of the filament 1 ionization current	**=IE1xxx $^{C}_{R}$**
Adjust the desired value of the filament 2 ionization current	**=IE2xxx $^{C}_{R}$**
Set the Background suppression status	**=RBFx $^{C}_{R}$**
Turn the filament on off	**=SCx $^{C}_{R}$**
Filament selection (1 or 2)	**=SWx $^{C}_{R}$**
Adjust the acceleration voltage	**=VOyxxx $^{C}_{R}$**
Adjustment of the cell electronic zero	**=ZExxx $^{C}_{R}$**
7. SERVICE	
7.1 Messages	
Reset the cycle counter initial value	**=MCCZ $^{C}_{R}$**
Set the cycle counter initial value	**=MCCICF $^{C}_{R}$**
7.3 Primary pump	
Primary pump 1 control	**=T01xyyyy $^{C}_{R}$**
Set the hour counter of the primary pump 1	**=T01Hccccc $^{C}_{R}$**
Reset the primary pump hour counter	**=MC0Z $^{C}_{R}$**
Set the primary pump hour counter initial value	**=MC0Iyyyyy $^{C}_{R}$**
7.4 High vac. pump	
High vac. pump control	**=T1x $^{C}_{R}$**
Validate the high vac. pump speed measurement	**=V1x $^{C}_{R}$**
Adjust the high vac. pump speed	**=VITxyyyy $^{C}_{R}$**
Set the hour counter of the high vac. pump	**=T1Haaaaa $^{C}_{R}$**
Reset the high vac. pump hour counter	**=MC1Z $^{C}_{R}$**
Set the high vac. pump hour counter initial value	**=MC1Iyyyyy $^{C}_{R}$**
9. INPUTS/OUTPUTS	
Logic outputs are set through the RS-232	**=INS $^{C}_{R}$**
Output control	**=OUxxxxx $^{C}_{R}$**
Logic I/O are used by the leak detector	**=INA $^{C}_{R}$**
9.2 Analogic outputs	
Allocate the analogic output n° 1	**=AO1y $^{C}_{R}$**
Allocate the analogic output n° 1 and define the scale starting	**=AO1yCF $^{C}_{R}$**
Adjust the pressure threshold value n°1	**=NP1CF $^{C}_{R}$**
Adjust the pressure threshold value n°2	**=NP2CF $^{C}_{R}$**
Adjust the pressure threshold value n°3	**=NP3CF $^{C}_{R}$**
Allocate the analogic output n° 2	**=AO2y $^{C}_{R}$**
Allocate the analogic output n° 2 and define the scale starting	**=AO2yCF $^{C}_{R}$**

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Long commands of the RS-232

Immediate commands

The immediate command data format doesn't exceed 3 characters:
!xxx $^{C}_{R}$

Command	Definition
!AC $^{C}_{R}$	Start an autocalibration
!AC1 $^{C}_{R}$	External calibrated leak connected and opened
!AC2 $^{C}_{R}$	External calibrated leak connected and closed
!AC3 $^{C}_{R}$	External sniffer calibration: stable leak rate
!AC4 $^{C}_{R}$	External sniffer calibration: stable backgroung
!AE $^{C}_{R}$	Calculate the external correction coefficient and validate it
!AS $^{C}_{R}$	Stop an internal autocalibration with internal calibrated leak
!DE $^{C}_{R}$	Reset of the default values
!RE $^{C}_{R}$	Memorized defaults reset
!SW $^{C}_{R}$	Filament selection (swap to the other filament)
!WA $^{C}_{R}$	Warnings reset

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Long commands of the RS-232

Request long commands

A request long command requires an answer from the leak detector. The request command data format is the following:
?command $^{C}_{R}$

Quick reference list

Before reading the complete list, please refer to the list **p. 3** for a quick reference check.

Complete list description

The commands are listed in alphabetical order.

Command	Definition	Response	Description
?AA $^{C}_{R}$	Request the depollution parameters	**CF**x	**CF**: function start threshold by cycle stop **x** = E: function ON **x** = D: function OFF *Example: 500-07E* $^{C}_{R}$ *The function start threshold has been set at 5.00E-5. The depollution function is activated.*
?AC $^{C}_{R}$	Request the autocalibration validation status	x	**x** = E: autocalibration is valid **x** = D: autocalibration is unvalid *Example: E* $^{C}_{R}$ *The function "autocalibration" has been set ON in the menu.*
?AC3 $^{C}_{R}$	Request the current target value for an autocalibration	**CF**	**CF**: Calibration target value (corrected internal calibrated leak) *Example: 125-09* $^{C}_{R}$ *The current target value is 1.25E-7.*

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Command	Definition	Response	Description
?ACA $^{C}_{R}$	Request the parameters of the autocalibration automatic request	xyyyyyzzzzz	**x** = E: automatic warning **x** = D: no automatic warning **yyyyy**: warning every yyyyy cycles **zzzzz**: warning every zzzzz hour *Example: E1000022500* $^{C}_{R}$ *The automatic autocalibration is activated. The automatic "operator warning" through cycles or hour counters is activated (autocalibration required message). The cycles counter has been set at 10000 cycles. The hour counter has been set at 22500 hour.*
?AEH $^{C}_{R}$	Target value in hard vacuum test	**CF**	**CF**: leak value *Example: 235-09* $^{C}_{R}$ *The target value in hard vacuum test has been set at 2.35E-7.*
?AES $^{C}_{R}$	Request target value in sniffing test	**CF**	**CF**: leak value *Example: 633-08* $^{C}_{R}$ *The target value in sniffing test has been set at 6.33E-6.*
?AO1 $^{C}_{R}$	Request the analogic output n° 1 status of the interface board	x **----------** x**CF**	**x** = 1: Analyzer cell signal mantissa **x** = 4: Detector inlet pressure ---------- **x** = 2: Analyzer cell signal exponent **x** = 3: Analyzer cell signal logarithmic value (0-10 V) **CF**: Scale start value *Example: 1* $^{C}_{R}$ *The analogic output n° 1 gives the mantissa of the digital display (panel or remote).*

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Long commands of the RS-232

Command	Definition	Response	Description
?AO2 $^{C}_{R}$	Request the analogic output n° 2 status of the interface board	x ---------- x**CF**	**x** = 1: Analyzer cell signal mantissa **x** = 4: Detector inlet pressure ---------- **x** = 2: Analyzer cell signal exponent **x** = 3: Analyzer cell signal logarithmic value (0-8 V) **CF**: Scale start value *Example: 4 $^{C}_{R}$* *The analogic output n° 2 gives the detector inlet pressure.*
?AO3 $^{C}_{R}$	Request the analogic output n°3 status of the interface board	x**CF**	**x** = 2 : Analyzer cell signal exponent **CF**: Scale start value *Example: 2100-14 $^{C}_{R}$* *Analyzer cell signal exponent with start value at 1.00E-12.*
?AR $^{C}_{R}$	Request the Background max	**CF**x	**x** = E: Background max is active **x** = D: Background max is inactive **CF**: Background max value *Example: 100-10E $^{C}_{R}$* *The background max is active and the value is 1.00E-8.*
?AUZ $^{C}_{R}$	Request the zero status	xy	**x** = E: Zero is ON **x** = D: Zero is OFF **y** = 1: Exit Zero by press Zero key once **y** = 2: Exit Zero by press Zero key > 3 s *Example: **E2** $^{C}_{R}$* *The Zero is ON and you must press the Zero key more than 3 s for exit Zero.*
?AZ $^{C}_{R}$	Request the zero status	x	**x** = E: Zero is ON **x** = D: Zero is OFF *Example: **E** $^{C}_{R}$* *The Zero function is activated.*

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Long commands of the RS-232

Command	Definition	Response	Description
?CA $^{C}_{R}$	Request the parameters of the auto cycle end function in hard vacuum test	abccccdddd	**a** = E: automatic cycle end **a** = D: manual cycle end **b** = E: roughing timer in operation **b** = D: no roughing timer utilization **cccc**: maxi roughing time used (mm/ss) if **b** = E in mmss format If **b** = D there is not "**cccc**" part in the answer **dddd**: measure time in mm ss *Example: EE01000015* $^{C}_{R}$ *The auto cycle end is activated.* *The roughing timer is used and has been set at 1 mn.* *The measure timer has been set at 15 s.*
?CAK $^{C}_{R}$	Calibration Acknowledge	x	**x** = E: An acknowledgement for Calibration is needed **x** = D: No acknowledgement needed *Example: E* $^{C}_{R}$ *An acknowlegement for the current step of calibration is needed.*
?CAS $^{C}_{R}$	Request the parameters of the automatic cycle end in sniffing test function.	abccccccdddddd	**a** = E: automatic sniffer test end **a** = D: manual sniffer test end **b** = E: timer before measured leak control **b** = D: no timer before measured leak control **cccccc**: timer for measured leak control in hhmmss if **b** = E in hhmmss format If **b** = D there is not "cccccc" part in the answer **dddddd**: measure time in hhmmss *Example: EE000100000015* $^{C}_{R}$ *The auto sniffer test end is activated.* *The timer for measured leak control is used and has been set at 1 mn.* *The measurement time has been set at 15 s.*

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Long commands of the RS-232

Command	Definition	Response	Description
?CF $^{C}_{R}$	Request the filaments sensitivity coefficients	**CF**1**CF**2	**Returns** the coefficient of the sensitivity of the both filaments **CF1**: filament 1 sensitivity coefficient **CF2**: filament 2 sensitivity coefficient *Example: 132-02120-02* $^{C}_{R}$ *The sensitivity coefficient of filament 1 is set at 1.32.* *The sensitivity coefficient of filament 2 is set at 1.20.*
?CH $^{C}_{R}$	Request the values of the hour counters	aaaaabbbbbccccc	**aaaaa**: leak detector total hour of operation **bbbbb**: filament 1 total hour of operation **ccccc**: filament 2 total hour of operation *Example: 012000115000050* $^{C}_{R}$ *Leak detector total hour counter of operation = 1200 h.* *Hour counter filament 1 = 1150 h.* *Hour counter filament 2 = 50 h.*
?CV $^{C}_{R}$	Request the parameters of the dynamic calibration	**CF**1**CF**2xy	Returns the value of the dynamic calibration coefficient, and its status. **CF1**: leak value in mbar.l/s **CF2**: coefficient value **x** = E: dynamic calibration coef. active **x** = D: dynamic calibration coef. inactive **y** = C: calculation in progress **y** = S: calculation off *Example: 100-07100-02DC* $^{C}_{R}$ *Leak value =1.00E-05 mbar.l/s* *Coefficient value = 1.00* *Dynamic calibration coefficient Inactive.* *Calculation in progress.*
?CY $^{C}_{R}$	Request the current status of the detector	aa	**aa** = ST: start-up phase **aa** = CZ: electronic zero calibration **aa** = CM: other calibration **aa** = HV: hard vacuum cycle **aa** = SN: sniffing test mode *Example: HV* $^{C}_{R}$ *A hard vacuum cycle is started.*

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Command	Definition	Response	Description
?CYT $^{C}_{R}$	Request the test mode selected	y	**y** = 1: Atmosphere mode **y** = 2: GL mode **y** = 3: Normal mode **y** = 4: high sensitivity mode *Example: 3* $^{C}_{R}$ *The normal test mode has been selected.*
?DA $^{C}_{R}$	Request the date	mmddyy	**mm**: month **dd**: day **yy**: year *Example: 122107* $^{C}_{R}$ *December 21, 2007.*
?ER $^{C}_{R}$	Request the memorized defaults	xaaaabbbb…	**x**: current defaults number **aaaa**, **bbbb**, …: default code of each default Defaults codes list G *Example: 10019* $^{C}_{R}$ *1 defect has been identified: filament problem.*
?FE $^{C}_{R}$	Request the value of the internal calibrated leak written on the label	**CF**abccccdd	**CF**: value of the internal calibrated leak **a**: temperature coefficient **b**: aging coefficient **cccc**: year **dd**: calibration temperature of the leak on the sticker *Example: 100-0923200726* $^{C}_{R}$ *CF = 100-09 > leak rate = 1.00E-7 mbar.l/s* *Coefficient of temperature = 2 % °C* *Aging Coefficient = 3 %/year* *Year = 2007* *Temperature of the leak = 26 °C*

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Command	Definition	Response	Description
?FEM $^{C}_{R}$	Request the parameters of the calibrated leak used for the internal autocalibration (internal or external)	x**CF**yzaabbcc ddddee	**x** = 2: Hydrogen **x** = 3: Helium 3 **x** = 4: Helium 4 **CF**: calibrated leak value **y**: Unit (ditto ?UN $^{C}_{R}$) **z** = D: internal leak not connected (autocalibration on external leak) **z** = E: internal leak present with valve closed **z** = O: internal leak present with valve opened **aa**: Temperature coefficient in 1/10 of % **bb**: calibration temperature in °C **cc**: aging in % **dddd**: year of calibration **ee**: Temperature of the calibrated leak in °C internal or external *Example:* *4100-091E3020022 00522* $^{C}_{R}$ *It's an Helium 4 calibrated leak of 1.00E-7 mbar.l/s. It is inside the leak detector but not opened and its temperature is 22 °C.* *It loses 2 %/year of its value and varies of 3 %/°C.*
?FEP $^{C}_{R}$	Select the calibrated leak for autocalibration	x	**x** = D: autocalibration using an external leak **x** = E: internal leak present with valve closed **x** = O: internal leak present with valve opened *Example: D* $^{C}_{R}$ *Autocalibration will be performed using an external calibrated leak.*
?FM $^{C}_{R}$	Request filament availability	xy	**x** = 1: filament 1 available **x** = 0: filament 1 not available **y** = 1: filament 2 available **y** = 0: filament 2 not available *Example: 01* $^{C}_{R}$ *Filament 1 is not available.* *Filament 2 is available.*

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Command	Definition	Response	Description
?GAU $^{C}_{R}$	Request the gauge status	Iyyy	**I**: Gauge is used like internal gauge **yyy**: Name of the gauge **AP-** 0-10 V Pirani gauge **Pi3** Pi3C gauge **P-C** Piezo capacitive *Example: IAP-* $^{C}_{R}$ *The gauge used by the detector is a 0-10 V Pirani gauge.*
?GAUM $^{C}_{R}$	Request the external gauge status	xxx_yy	**xxx**: Name of the external gauge **NoG** No gauge **AP-** Pirani **P-C** Piezo Capacitive **yy**: Identifiant of the external gauge model *Example: AP-_03* $^{C}_{R}$ *An external Pirani gauge is connected and its idendifiant is 03.*
?GAUMS $^{C}_{R}$	Request the external gauge full scale	xxxxx	**xxxxx**: Full scale of Piezo/Capacitive external gauge *Example: 50000* $^{C}_{R}$ *The full scale of the external gauge is 50 000 mbar.*
?GAUMT $^{C}_{R}$	Request the external gauge voltage	xx.xxxxx	**xx.xxxxx**: Voltage ouput of the external gauge *Example: 05.21402* $^{C}_{R}$ *The voltage given by the external gauge is 5.21402 V.*
?GAUS $^{C}_{R}$	Request the gauge full scale	xxxxx	**xxxxx**: Full scale of Piezo/Capacitive gauge in mbar *Example: 50000* $^{C}_{R}$ *The full scale of the gauge is 50 000 mbar.*
?GAUT $^{C}_{R}$	Request the gauge voltage	xx.xxxxx	**xx.xxxxx**: Voltage ouput of the gauge *Example: 05.21402* $^{C}_{R}$ *The voltage given by the gauge is 5.21402 V.*

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Command	Definition	Response	Description
?GZ $^{C}_{R}$	Request the tracer gas used	x	**x** = 2: Hydrogen **x** = 3: Helium 3 **x** = 4: Helium 4 *Example: 4* $^{C}_{R}$ *The gas mass selected is Helium 4.*
?HMI $^{C}_{R}$	Request the visual information of the front panel	**CF**1x**CF**2**CF**3 usssssrza	**CF1**: Analyzer cell signal measured in current unit **x** = R: Analyzer cell signal not corrected (ditto ?LE $^{C}_{R}$) **x** = C: Analyzer cell signal corrected (ditto ?LE $^{C}_{R}$) **CF2**: Reject threshold in current unit (ditto ?S1 $^{C}_{R}$) **CF3**: Inlet pressure in current unit (ditto ?PE $^{C}_{R}$) **u** = 1: Unit in mbar (ditto ?UN $^{C}_{R}$) **u** = 2: Unit in Pa (ditto ?UN $^{C}_{R}$) **u** = 3: Unit in Torr (ditto ?UN $^{C}_{R}$) **u** = 4: Unit in atm (ditto ?UN $^{C}_{R}$) **u** = 5: Unit in ppm (ditto ?UN $^{C}_{R}$) **u** = 6: Unit in sccm (ditto ?UN $^{C}_{R}$) **u** = 7: Unit in sccs (ditto ?UN $^{C}_{R}$) **sssss**: Detector status (ditto ?ST $^{C}_{R}$) **r** = E: Reject threshold crossed (ditto ?RJT $^{C}_{R}$) **r** = D: Reject threshold not crossed (ditto ?RJT $^{C}_{R}$) **z** = E: Zero ON (ditto ?AZ $^{C}_{R}$) **z** = D: Zero OFF (ditto ?AZ $^{C}_{R}$) **a** = E: Autocalibration in progress **a** = D: Autocalibration not triggered *Example:* *490-12R100-09220-04123810DED* $^{C}_{R}$ *Analyzer cell signal not corrected:* *4.90E-10.* *Reject threshold: 1.00E-7 not crossed* *Inlet pressure: 2.20E-2 mbar.* *Auto zero function activated.* *No autocalibration triggered.*

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Command	Definition	Response	Description
?HP $^{C}_{R}$	Request the ON/ OFF status of the loudspeaker and external headphone	x	**x** = E: Loudspeaker ON and external headphone OFF **x** = D: Loudspeaker OFF and external headphone ON *Example: E* $^{C}_{R}$ *The loudspeaker is ON and the external headphone is OFF.*
?HV $^{C}_{R}$	Request the hard vacuum external coefficient value	**CF**x	**CF**: external coefficient value **x** = E: coefficient activated **x** = D: coefficient deactivated *Example: 100+00E* $^{C}_{R}$ *The hard vacuum is activated and equal to 100.*
?IE $^{C}_{R}$	Request the emission current	xxx	**xxx**: value of the present emission current in 1 / 100 of mA *Example: 060* $^{C}_{R}$ *The emission current is 0.6 mA.*
?IE1 $^{C}_{R}$	Request the desired value of the filament 1 emission current	xxx	**xxx**: desired value of the filament 1 emission current in 1/100 of mA *Example: 130* $^{C}_{R}$ *The emission current of the filament 1 has been set at 1.3 mA.*
?IE2 $^{C}_{R}$	Request the desired value of the filament 2 emission current	xxx	**xxx**: desired value of filament 2 emission current in 1 / 100 of mA *Example: 080* $^{C}_{R}$ *The emission current of the filament 2 has been set at 0.8 mA.*
?IN $^{C}_{R}$	Request the logic inputs status	xxxxxy	**xxxxx**: input status on a 5 digits integer. **y** = D: 15 pins I/O interface **y** = R: Input not available **y** = N: 37 pins I/O interface See ”Complementary information” p. 48.
?IV $^{C}_{R}$	Request the status of the vent valve	x	**x** = E: valve opened **x** = D: valve closed

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Command	Definition	Response	Description
?IVP $^{C}_{R}$	Request the parameters of the vent function	xyzmmss	**x** = M: opening triggered by the operator **x** = A: automatic opening **y**: opening delay in sec (0/1/2 sec) **z** = E: timer on opening state **z** = D: no timer on opening state **mm**: timer value of the open state (minute) **ss**: timer value of the open state (second) *Example: A2E0130* $^{C}_{R}$ *The inlet vent opening has been automatic, with a delay on the opening of 2 s. The valve will remain opened for 1 mn 30 s.*
?LDL $^{C}_{R}$	Request the lower display limit value displayed for the signal	**CF**	**CF**: Lower display limit *Example: 100-11* $^{C}_{R}$ *The value displayed for the signal can't be under 1.00E-09 mbar.l/s (if current unit is mbar.l/s).*
?LE $^{C}_{R}$	Request the value of the calibrated helium signal, corresponding to the test mode and corrected in the present unit of measurement (given on the 7th segment). Nota: the minimal value displayed in zero is the minimal detectable value in every test mode.	**CF**x	**CF**: helium signal value measured in the present state of the detector **x** = R: signal not corrected **x** = C: signal corrected *Example: 400-07C* $^{C}_{R}$ *The helium leak value is equal to 4.00E-5.* *The helium signal is corrected.*

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Command	Definition	Response	Description
?LE2 $^{C}_{R}$	Request the value of the calibrated helium signal, corresponding to the test mode but without correction and in the present unit (given by the bargraph)	**CF**	**CF**: signal value *Example: 735-09* $^{C}_{R}$ *The calibrated helium signal is equal to 7.35E-7.*
?MAS $^{C}_{R}$	Request the Massive mode status	xyz	**x** = E: The Massive mode is authorized **x** = D: The Massive mode is not authorized **y** = E: The Massive mode is in progress **y** = D: The Massive mode is not in progress **z** = E or D (not used) *Example: EDD* $^{C}_{R}$ *The Massive mode is authorized but is not in progress.* *Example: EED* $^{C}_{R}$ *The Massive mode is authorized and is in progress. A Massive leak is detected.*
?MC0 $^{C}_{R}$	Request the hour counter of the primary pump	xxxxxyyyyy	**xxxxx**: displayed value in hours **yyyyy**: initialization value in hours *Example: 0025603000* $^{C}_{R}$ *The displayed value of the primary pump counter is 256 hour.* *The initialization value is set at 3000 hours.*
?MC1 $^{C}_{R}$	Request the hour counter of the high vac. pump	xxxxxyyyyy	**xxxxx**: displayed value in hours **yyyyy**: initialization value in hours *Example: 0125002000* $^{C}_{R}$ *The displayed value of the high vac. pump counter is 1250 hours.* *The initialization value is set at 2000 hours.*

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Command	Definition	Response	Description
?MCC $^{C}_{R}$	Request the cycle counter	**CF**1**CF**2	**CF1**: displayed value in number of cycles **CF2**: initialization value in number of cycles *Example: 436-00500-00* $^{C}_{R}$ *The displayed value of the cycle counters is 436 cycles.* *The initialization value is set at 500 cycles.*
?MD $^{C}_{R}$	Request the supervisor software version	ASM 310 L0226 1.0R00	The detector answer is: Detector type + space + software code + software index. *Example: ASM310-L0226 1.0R00* $^{C}_{R}$ *ASM 310 model. The supervisor software code is L0226 and the software version is V1.0R00.*
?ME $^{C}_{R}$	Request the memo function status	xyzzzz**CF**	**x** = E: function in progress **x** = M: Memo function ON **x** = A: Memo function OFF **y** = E: Memo on timer **y** = D: Memo between 2 cycles **zzzz**: Memo time in mm ss **CF**: Memorized signal displayed value *Example: ME0130642-09* $^{C}_{R}$ *The memo function is activated on timer.* *The helium signal will stay memorized for 1 mn 30 s.* *The memorized helium signal displayed value is 6.42E-7.*
?NP1 $^{C}_{R}$	Request the pressure threshold value n°1	**CF**	**CF**: Pressure threshold n°1 *Example: 100-02 CR* *The output "Press. s.pt #1" is ON if the signal is under 1.00E+00.*
?NP2 $^{C}_{R}$	Request the pressure threshold value n°2	**CF**	**CF**: Pressure threshold n°2 *Example: 100-02 CR* *The output "Press. s.pt #2" is ON if the signal is under 1.00E+00.*

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Command	Definition	Response	Description
?NP3 $^{C}_{R}$	Request the pressure threshold value n°3	**CF**	**CF**: Pressure threshold n°3 *Example: 100-02 $^{C}_{R}$* *The output "Press. s.pt #3" is ON if the signal is under 1.00E+00.*
?OU $^{C}_{R}$	Request the logic outputs status	xxxxxy	**xxxxx**: output status on a 5 digits integer. **y** = D: 15 pins I/O interface **y** = R: Output not available **y** = N: 37 pins I/O interface See ”Complementary information” p. 48.
?P3 $^{C}_{R}$	Request the high sensitivity mode pressure threshold	**CF**	**CF**: Value in mbar *Example: 400-04 $^{C}_{R}$* *High sensitivity pressure threshold set at 4.0E-02 mbar.*
?P1 $^{C}_{R}$	Request the gross leak mode pressure threshold	**CF**	**CF**: Value in mbar *Example: 150-02 $^{C}_{R}$* *Gross leak pressure threshold set at 1.5 mbar.*
?P1U $^{C}_{R}$	Request the gross leak mode pressure threshold in the current unit	**CF**	**CF**: Threshold value *Example: 150-02 $^{C}_{R}$* *Threshold value is 1.5 mbar (if the current unit is mbar.l/s).*
?P2U $^{C}_{R}$	Request the normal mode pressure threshold in the current unit	**CF**	**CF**: Threshold value *Example: 500-03 $^{C}_{R}$* *Threshold value is 5.00-01 mbar (if the current unit is mbar.l/s).*
?P3U $^{C}_{R}$	Request the high sens mode pressure threshold in the current unit	**CF**	**CF**: Value of the threshold *Example: 400-04 $^{C}_{R}$* *The value of threshold is 4.00-02 mbar (if the current unit is mbar.l/s).*
?P2 $^{C}_{R}$	Request the normal mode pressure threshold	**CF**	**CF**: Value in mbar *Example: 500-03 $^{C}_{R}$* *Normal pressure threshold set at 5.0E-01 mbar.*

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Command	Definition	Response	Description
?PAD $^{C}_{R}$	Request the Bypass option status	abcd	**a** = 0: No Bypass connected **a** = E: Bypass connected and active **a** = D: Bypass connected and not active **b** = 0: Bypass mode: no Bypass **b** = 1: Bypass mode: Quick pump **b** = 2: Bypass mode: Partial flow **c** = 1: Internal pumping not delayed **c** = 2: Internal pumping delayed **d** = 0: Bypass valve OFF **d** = 1: Bypass valve ON *Example: E211* $^{C}_{R}$ *The Bypass option is connected and set on partial flow without internal pumping delay. The Bypass valve is ON.*
?PE $^{C}_{R}$	Request the inlet pressure value	**CF**	**CF**: inlet pressure value in the current status of the detector and expressed in the current unit of measurement. *Example: 400-02* $^{C}_{R}$ *The inlet pressure is at 4.*
?PEM $^{C}_{R}$	Pressure of the external gauge	**CF**	**CF**: Pressure of the external *Example: 100-01* $^{C}_{R}$ *The pressure of the external gauge is 10 mbar (if the current unit is mbar.l/s).*
?PS $^{C}_{R}$	Request the analyzer cell pressure	**CF**	**CF**: Pressure inside the analyzer cell expressed in the current unit of measurement *Example: 100-07* $^{C}_{R}$ *Pressure inside the analyzer cell: 1E-05 mbar.*
?PW $^{C}_{R}$	Request the password	xxxxy	**xxxx**: password **y** = E: password activated **y** = D: password deactivated *Example: 1998E* $^{C}_{R}$ *Password: 1998.* *Password activated.*

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Command	Definition	Response	Description
?RBF $^{C}_{R}$	Request the Background suppression status	xy	**x** = E: Background suppression ON **x** = D: Background suppression OFF **y** = E: Background suppression in lower limit **y** = D: Background suppression not in lower limit *Example: EE* $^{C}_{R}$ *The Background suppression is ON and is in lower limit.*
?RDY $^{C}_{R}$	Request if the detector is ready to test	x	**x** = E: Detector ready to test **x** = D: Detector not ready to test *Example: E* $^{C}_{R}$ *The detector is ready to test.*
?RE $^{C}_{R}$	Give the result of the latest test	x	**x** = E: good part **x** = D: bad part *Example: E* $^{C}_{R}$ *The latest part tested was good.*
?REG $^{C}_{R}$	Request the status of the Regeneration or Burn-in function	xyzzzz	**x** = 0: None **x** = 1: Regeneration function **x** = 2: Burn-in function without calibration **x** = 3: Burn-in function with calibration **y** = 0: Regeneration or Burn-in function can starting **y** = V: Regeneration or Burn-in function can't starting because Vent is not automatic **y** = S: Regeneration or Burn-in function can't starting because Sniffing test is in progress **y** = C: Regeneration or Burn-in function can't starting because Hard vacuum test is in progress **zzzz**: Start time of the function Regeneration or Burn-in function (hh:mm) *Example: 100023* $^{C}_{R}$ *Regeneration function is starting since 0 hour 23 minutes.*

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Command	Definition	Response	Description
?S1 $^{C}_{R}$	Request the threshold value of the current test mode	**CF**	**CF**: Threshold value in the current unit of measurement *Example: 200-09 $^{C}_{R}$* *The reject threshold of the current test mode has been set at 2.00E-7.*
?S1H $^{C}_{R}$	Request the threshold value of the hard vacuum test mode	**CF**	**CF**: Threshold value in the current unit of measurement *Example: 600-09 $^{C}_{R}$* *The reject threshold in hard vacuum test mode has been set at 6.00E-7.*
?S1S $^{C}_{R}$	Request the threshold value of the sniffing test mode	**CF**	**CF**: Threshold value in the current unit of measurement *Example: 350-07 $^{C}_{R}$* *The reject threshold in sniffing test mode has been set at 3.50E-5.*
?S2 $^{C}_{R}$	Request the additionnal threshold value n°2	**CF**	**CF**: Additionnal threshold n°2 *Example: 100-10 $^{C}_{R}$* *The output "Set point #2" is on if the signal is over 1.00E-08.*
?S3 $^{C}_{R}$	Request the additionnal threshold value n°3	**CF**	**CF**: Additionnal threshold n°3 *Example: 100-10 $^{C}_{R}$* *The output "Set point #3" is on if the signal is over 1.00E-08.*
?S4 $^{C}_{R}$	Request the additionnal threshold value n°4	**CF**	**CF**: Additionnal threshold n°4 *Example: 100-10 $^{C}_{R}$* *The output ""et point #4" is on if the signal is over 1.00E-08.*
?S5 $^{C}_{R}$	Request the additionnal threshold value n°5	**CF**	**CF**: Additionnal threshold n°5 *Example: 100-10 $^{C}_{R}$* *The output "Set point #5" is ON if the signal is over 1.00E-08.*
?S6 $^{C}_{R}$	Request the sniffer probe clogged threshold value	**CF**	**CF**: Threshold value in the current unit of measurement *Example: 300-07 $^{C}_{R}$* *The sniffer probe clogged threshold has been set at 3.00E-5.*

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Command	Definition	Response	Description
?SC $^{C}_{R}$	Request the analyzer cell status	xyz	**x**: emission info **1** = on **0** = off **y**: Cell safety (PI1) **0** = no safety triggered **1** = safety triggered **z**: triode safety **0** = no safety triggered **1** = safety triggered *Example: 100* $^{C}_{R}$ *The cell emission is On. No cell PI1 safety triggered. No triode safety triggered.*
?SN $^{C}_{R}$	Request the sniffing external coefficient value	**CF**x	**CF**: sniffing external coefficient value **x** = E: coefficient activated **x** = D: coefficient deactivated *Example: 240-01E* $^{C}_{R}$ *The signal in sniffing test mode is multiplied by 24.*
?SO $^{C}_{R}$	Request the sound status	xy	**x**: volume level **y** = E: sound turned on **y** = D: sound turned off *Example: 5E* $^{C}_{R}$ *The audio alarm is turned on.* *The audio alarm is set at a volume of 5.*
?SP $^{C}_{R}$	Request the language	xxx	**xxx**: language **ANG**: English **JAP**: Japanese **FRA**: French **ALL**: German **ESP**: Spanish *Example: SPA* $^{C}_{R}$ *The language selected is Spanish.*
?SPR $^{C}_{R}$	Request the probe type	x	**x** = 1: Standard probe **x** = 2: Smart probe *Example: 2* $^{C}_{R}$ *The probe is a Smart probe.*

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Command	Definition	Response	Description
?SHD $^{C}_{R}$	Request the detector shutdown status	x	**x** = 0: Detector is running **x** = 1: Detector is in shutdown *Example: 0* $^{C}_{R}$ *The detector is running.*
?SSS $^{C}_{R}$	Request the Smart probe clogged threshold value	xxxx	**xxxx**: Threshold of the Smart probe in sccm **x** = 1: Detector is in shutdown *Example: 0020* $^{C}_{R}$ *The Threshold of the Smart probe is 20 sccm.*
?ST $^{C}_{R}$	Request the detector status	xxxxx	Gives the detector status on a 5 digits integer. See ”Complementary information” p. 48.
?SW $^{C}_{R}$	Request the active filament	x	**x** = 1: filament 1 active **x** = 2: filament 2 active *Example: 1* $^{C}_{R}$ *The filament 1 is active.*
?SY $^{C}_{R}$	Request the digital voice status	xy	**x**: volume level **y** = E: digital voice turned on **y** = D: digital voice turned off *Example: 4E* $^{C}_{R}$ *The audio level has been set at 4.* *The digital voice is turned on.*
?SZ $^{C}_{R}$	Request the zero reference status	**CF**	**CF**: Signal captured as “zero” *Example: 300-07* $^{C}_{R}$ *The zero reference is 3.00E-05.*
?T1 $^{C}_{R}$	Request information about the high vac. pump	x	**x** = 0: default pump **x** = 1: rotation pump **x** = 2: synchronism pump **x** = 3: running-in pump **x** = S: pump stopped *Example: 2* $^{C}_{R}$ *The high vac. pump is at full speed (synchronism).*

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Command	Definition	Response	Description
?T1M $^{C}_{R}$	Request more information about the high vac. pump	yyyyyzz	**yyyyy**: hour counter **zz**: pump temperature (00 if not available) *Example: 256900* $^{C}_{R}$ *The hour counter of the high vac. pump is 2569 hours.* *The pump temperature is not available.*
?TE $^{C}_{R}$	Request the temperature	xxy	**xx**: temperature value in °C **y** = S: probe measure **y** = V: preadjusted value *Example: 22S* $^{C}_{R}$ *The temperature of the calibrated leak is at 22°C (probe measure).*
?TI $^{C}_{R}$	Request the current hour	hhmmss	**hh**: hours **mm**: minutes **ss**: seconds
?TIA $^{C}_{R}$	Request the time of the latest shutdowm	hhmmss	**hh**: hours **mm**: minutes **ss**: seconds *Example: 105336* $^{C}_{R}$ *The latest stop was at 10h53mn36s.*
?TIC $^{C}_{R}$	Request the time of the latest autocalibration	hhmmss	**hh**: hours **mm**: minutes **ss**: seconds *Example: 183050* $^{C}_{R}$ *The latest autocalibration was at 18h30mn50s.*
?TIM $^{C}_{R}$	Request the time of the latest start-up	hhmmss	**hh**: hours ***mm***: minutes **ss**: seconds *Example: 082602* $^{C}_{R}$ *The latest starting up was at 08h26mn02s.*
?TR $^{C}_{R}$	Request the HLD status string digits		See ”Complementary information” p. 48.

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Command	Definition	Response	Description
?TST $^{C}_{R}$	Request the test method used in hard vacuum	x	**x** = 0: Hard vacuum method **x** = 2: Sniffer method *Example: 0* $^{C}_{R}$ *The hard vacuum method is selected.*
?UN $^{C}_{R}$	Request the measurement unit used	x	**0**: ppm **1**: mbar.l/s **2**: Pa.m^3/h **3**: Torr.l/s **4**: gr/yr **5**: oz/yr **6**: lb/yr **7**: custom *Example: 1* $^{C}_{R}$ *The mbar.l/s is the unit of measurement used.*
?V1 $^{C}_{R}$	Request the high vac. pump speed Nota: use =VE CR to start the measurement and =VD CR to stop the measurement	xxxxxy	**xxxxx**: speed in RPM **y** = E: speed measurement valid **y** = D: measurement invalid *Example: 27000E* $^{C}_{R}$ *The high vac. pump speed is 27000 RPM. The speed measurement is valid.*
?VITH $^{C}_{R}$	Request the high vac pump target speed for hard vacuum method	xxxxyyyy	**xxxx**: Target speed in Hz **yyyy**: Current speed in Hz *Example: 15001422* $^{C}_{R}$ *The target speed is 1500 Hz and the current speed is 1422 Hz.*
?VITN $^{C}_{R}$	Request the high vac pump nominal speed	xxxxyyyy	**xxxx**: Nominal speed in Hz **yyyy**: Current speed in Hz *Example: 15001422* $^{C}_{R}$ *The nominal speed is 1500 Hz and the current speed is 1422 Hz.*
?VITS $^{C}_{R}$	Request the high vac pump target speed for sniffer method	xxxxyyyy	**xxxx**: Target speed in Hz **yyyy**: Current speed in Hz *Example: 15001422* $^{C}_{R}$ *The target speed is 1500 Hz and the current speed is 1422 Hz.*

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Command	Definition	Response	Description
?VO $^{C}_{R}$	Request the current acceleration voltage in use	xxx	**xxx**: acceleration voltage in Volt *Example: 224* $^{C}_{R}$ *The acceleration voltage is set at 224 V.*
?VO1 $^{C}_{R}$	Request the desired value of the filament 1 acceleration voltage	xxx	**xxx**: acceleration voltage in Volt *Example: 255* $^{C}_{R}$ *The acceleration voltage of the filament 1 is set at 255 V.*
?VO2 $^{C}_{R}$	Request the desired value of the filament 2 acceleration voltage	xxx	**xxx**: acceleration voltage in Volt *Example: 260* $^{C}_{R}$ *The acceleration voltage of the filament 2 is set at 260 V.*
?VPU $^{C}_{R}$	Request the Purge valve status	x	**x** = E: Purge valve set to "Open" **x** = A: Purge valve set to "Automatic" **x** = D: Purge valve set to "Close" *Example: E* $^{C}_{R}$ *Purge valve is set to "Open".*
?VT $^{C}_{R}$	Request if the vent is set in automatic or manual at the end on the cycle	x	**x** = E: inlet vent ON **x** = D: inlet vent OFF *Example: E* $^{C}_{R}$ *There is an automatic inlet vent at the end of the cycle.*
?WA $^{C}_{R}$	Request the memorized warnings list	xaaaabbbb…	**x**: current warnings number **aaaa**, **bbbb**, …: default code of each default See “Defaults codes list” G *Example: 10211* $^{C}_{R}$ *There is 1 message memorized: the calibration is manual.*

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Command	Definition	Response	Description
?ZB $^{C}_{R}$	Request the parameters of the zero function status	xyzzzz**CF**	**x** = A: function in automatic **x** = O: function controlled by the operator **y** = T: triggered on timer **y** = S: triggered on threshold crossing **y** = «-» if x = O (function controlled by the operator) **zzzz**: timer in mmss **CF**: threshold *Example: AT0230200-09* $^{C}_{R}$ *The zero function is triggered automatically on test. A new zero capture is done every 2 mn 30 s. The threshold has been set at 2.00E-7 for triggering the zero.*
?ZE $^{C}_{R}$	Request the electronic zero reference	xxx	**xxx**: electronic zero reference *Example: 110* $^{C}_{R}$ *The electronic zero reference value is 110.*
?ZR $^{C}_{R}$	Request the bargraph display centered on the reject point status	x	**x** = E: function ON **x** = D: function OFF *Example: E* $^{C}_{R}$ *The bargraph display is centered on the reject point.*

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Commands with parameters

The command with parameters data format is the following:
=command $^{C}_{R}$.

Quick reference list
Complete list description

Before reading the complete list, please refer to the list **p. 7** for a quick reference check.

The commands are listed in alphabetical order.

Command	Definition	Description
=AACFx $^{C}_{R}$	Depollution will trigger the end of the cycle if the helium signal exceeds the value set	**x** = E: cycle stop **x** = D: no cycle stop **CF**: threshold from which the cycle stop *Example: =AA500-07E $^{C}_{R}$* *Cycle stop if the 5.00E-5 threshold is crossed.*
=ACAabbbbb ccccc $^{C}_{R}$	Set a warning “autocal required”	**a** = E: warning is set **a** = D: warning is not set **bbbbb**: cycles number set for the automatic warning (00000 to 09999) **ccccc**: hour number set for the automatic warning (00000 to 09999) *Example: =ACAE0150002000 $^{C}_{R}$* *Autocalibration automatic: a warning “autocal required” is set every 1500 cycles or 2000 hours.*
=ACx $^{C}_{R}$	Autocalibration activation	**x** = E: autocal. ON (automatic calibration) **x** = D: autocal. OFF (manual calibration) *Example: =ACE $^{C}_{R}$* *Auto-calibration mode ON.*
=AExCF $^{C}_{R}$	External leaks values for external calibration (hard vacuum and sniffing)	**x** = H: leak value for the external calibration in hard vacuum test **x** = S: leak value for the external calibration in sniffing test **CF**: leak value *Example: =AES150-07 $^{C}_{R}$* *In sniffing test, the external leak value is 1.50E-5 for external calibration.*

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Command	Definition	Description
=AO1y $^{C}_{R}$	Allocate the analogic output n° 1	**y** = 1: Analyzer cell signal mantissa **y** = 4: Detector inlet pressure *Example: =AO11 $^{C}_{R}$* *The analogic output n° 1 is allocated to the analyzer cell signal mantissa.*
=AO1yCF $^{C}_{R}$	Allocate the analogic output n° 1 and define the scale starting	**y** = 2: Analyzer cell signal exponent **y** = 3: Analyzer cell signal logarithmic value **CF**: Scale starting value (10-14 to 103) *Example: =AO12100-05 $^{C}_{R}$* *The analogic output n° 1 is allocated to the analyzer cell signal exponent.* *The scale starting value is 1.00E-3.*
=AO2y $^{C}_{R}$	Allocate the analogic output n° 2	**y** = 1: Analyzer cell signal mantissa **y** = 4: Detector inlet pressure *Example: =AO24 $^{C}_{R}$* *The analogic output n° 2 is allocated to the detector inlet pressure.*
=AO2yCF $^{C}_{R}$	Allocate the analogic output n° 2 and define the scale starting	**y** = 2: Analyzer cell signal exponent **y** = 3: Analyzer cell signal logarithmic value for detector equipped with the P0307 interface board **y** = 3: 0/8 V corrected signal for detector equipped with the P0344 interface board **CF**: Scale starting value (10E-14 to 10E+3) *Example: =AO23300-06 $^{C}_{R}$* *The analogic output n° 2 is allocated to the analyzer cell signal logarithmic.* *The scale starting value is 1.00E-4.*
=APCFx $^{C}_{R}$	Depollution control by GL selection	**CF**: threshold of GL mode **x** = E: depollution ON **x** = D: depollution OFF *Example: =AP200-06E $^{C}_{R}$* *At 2.00E-4, selection of the GL mode.*

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Command	Definition	Description
=ARCFx $^{C}_{R}$	Select and adjust the background max	**CF**: Background max value **x** = E: Activate the background max **x** = D: Desactivate the background max *Example: =AR100-10E $^{C}_{R}$* *The Background max is active and the value is 1.00E-8.*
=ARx $^{C}_{R}$	Select the background max	**x** = E: Activate the Background max **x** = D: Deactivate the Background max *Example: =ARE $^{C}_{R}$* *The Background max is active.*
=AUZxy $^{C}_{R}$	Set the zero status	**x** = E: Zero ON **x** = D: Zero OFF **x** = R: Acquisition of the Zero reference **y** = 1: Exit Zero by press Zero key once **y** = 2: Exit Zero by press Zero key > 3 s *Example: =AUZE2 $^{C}_{R}$* *The zero in ON and you must press the zero key more than 3 s for exit zero.*
=AZx $^{C}_{R}$	Zero command	**x** = E: starts zero **x** = D: leaves zero *Example: =AZE $^{C}_{R}$* *Zero activated.*
=CAabccccdddd $^{C}_{R}$	Control of the automatic cycle stop function	**a** = E: automatic cycle stop **a** = D: manual cycle stop **b** = E: roughing timer utilization **b** = D: no timer for the roughing **cccc**: roughing timer value (mmss format) **dddd**: test timer value ; mm ss format *Example: =CAEE01000015 $^{C}_{R}$* *Automatic cycle stop, with a roughing timer used of 1 mn and a measure timer of 15 s.*

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Command	Definition	Description
=CDx $^{C}_{R}$	Dynamic calibration function check	**x** = E: coefficient active **x** = D: coefficient inactive **x** = C: start the dynamic calibration coefficient calculation (see dynamic calibration) **x** = S: stop the dynamic calibration coefficient calculation (see dynamic calibration) *Example: =CDE* $^{C}_{R}$ *Dynamic calibration activated.*
=CFCFx $^{C}_{R}$	Filament sensitivity coefficient adjustment	**CF**: coefficient compressed format (0.1 ≤ **CF** ≤ 30) **x** = 1: filament 1 coefficient adjustment **x** = 2: filament 2 coefficient adjustment Active even if autocalibration is on ! *Example: =CF290-011* $^{C}_{R}$ *Adjustment of the filament 1 coefficient at 29.*
=CHx $^{C}_{R}$	Hour counter reset of the selected filament	**x** = 1: reset the filament 1 counter **x** = 2: reset the filament 2 counter *Example: =CH1* $^{C}_{R}$ *Reset the hour counter of filament 1.*
=CVCF $^{C}_{R}$	Dynamic calibration function setting	**CF**: target value *Example: =CV150-09* $^{C}_{R}$ *The target value is set at 1.50E-7.*
=CYTx $^{C}_{R}$	Test mode adjustment	**y** = 1: test in atmospheric pressure **y** = 2: test in GL mode ***y*** = 3: test in normal mode **y** = 4: test in HS mode *Example: =CYT2* $^{C}_{R}$ *Test in GL mode.*
=CYx $^{C}_{R}$	Cycle request	**x** = E: cycle start **x** = D: cycle stop *Example: =CYE* $^{C}_{R}$ *A cycle has been started.*
=DAmmddyy $^{C}_{R}$	Adjust the date	**mm:** month **dd**: day **yy**: year *Example: =DA113005* $^{C}_{R}$ *The date is November 30, 2005.*

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Command	Definition	Description
=FECFvxyyyytt $^{C}_{R}$	Adjust the internal calibrated leak characteristics	**CF**: leak value in compressed format **v**: temperature correction coefficient value in %/°C **x**: aging correction coefficient value in %/year **yyyy**: year of last calibration **tt**: calibration temperature of the leak in °C *Example: =FE200-0923200520* $^{C}_{R}$ *leak rate: 2.00E-07 mbar.l/sec* *Temperature coefficient = 2 %* *Aging coefficient = 2 %* *temperature coefficient = 3 %* *Year of calibration: 2005* *Reference temperature for the calibration = 20 °C*
=FEM $^{C}_{R}$	Calibrated leak used for autocalibration	See **?FEM** $^{C}_{R}$ description *Example: =FEM4150-093D302106200320* $^{C}_{R}$ *The helium calibrated leak is external. Its value is 1.50E-07 Torr.l/s. It has been calibrated in 2003 at 21 °C. The leak lose 6 %/year and the value varies of 3 %/°C. The external temperature is 20 °C.*
=FEPx $^{C}_{R}$	Select the calibrated leak for autocalibration	**x** = D: external leak selected (Hard vacuum test only) **x** = E: internal leak selected with valve closed (Hard vacuum test only) **x** = O: internal leak selected with valve opened (Hard vacuum test only) **x** = M: machine selected (Hard vacuum test only) **x** = S: ext. sniffing selected (Sniffing test only) **x** = C: concentration selected (Sniffing test only) *Example: =FEPE* $^{C}_{R}$ *Internal leak selected and valve is closed.*
=GAUIxxx $^{C}_{R}$	Set the gauge status	**xxx**: Name of the gauge **AP-** 0-10 V Pirani gauge **Pi3** Pi3C gauge ***P-C*** *Piezo Capacitive* *Example: =GAUIAP-* $^{C}_{R}$ *The gauge used by the detector is a 0-10 V Pirani gauge.*
=GAUMSxxxxx $^{C}_{R}$	Adjust the external gauge full scale	**xxxxx**: Full scale of the Piezo/Capacitive external gauge *Example: =GAUMS50000* $^{C}_{R}$ *The full scale of the external gauge is 50 000 mbar.*

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Command	Definition	Description
=GAUSxxxxx $^{C}_{R}$	Adjust the gauge full scale	**xxxxx**: Full scale of the Piezo/Capacitive gauge *Example: =GAUS50000 $^{C}_{R}$* *The full scale of the gauge is 50 000 mbar.*
=GZx $^{C}_{R}$	Selection of the tracer gas mass	**x** = 2: Hydrogen **x** = 3: Helium 3 **x** = 4: Helium 4 *Example: =GZ4 $^{C}_{R}$* *Helium 4 selected.*
=HPx $^{C}_{R}$	Set the status of the loudspeaker and the external headphone	**x** = E : Loudspeaker ON and external headphone OFF **x** = D : Loudspeaker OFF and external headphone ON *Example: =HPE $^{C}_{R}$* *The loudspeaker is ON and the external headphone is OFF.*
=HVCFx $^{C}_{R}$	Hard Vacuum coefficient adjustment	**CF**: coefficient value **x** = E: coefficient activated (the coefficient parameter is modified) **x** = D: coefficient activated (the coefficient parameter is not modified) *Example: =HV120-01E $^{C}_{R}$* *The hard vacuum coefficient is equal to 12.* *The hard vacuum coefficient is activated.*
=IE1xxx $^{C}_{R}$	Adjust the desired value of the filament 1 ionization current	**xxx**: filament 1 ionization current in 1/100 of mA (Be careful: even if the autocalibration is ON!!) *Example: =IE1100 $^{C}_{R}$* *The filament 1 ionization current set at 1 mA.*
=IE2xxx $^{C}_{R}$	Adjust the desired value of the filament 2 ionization current	**xxx**: filament 2 ionization current in 1/100 of mA (Be careful: even if the autocalibration is ON!!) *Example: =IE2288 $^{C}_{R}$* *The filament 2 ionization current set at 2.88 mA.*
=IExxx $^{C}_{R}$	Adjust the ionization current of the filament	**xxx**: filament ionization current in 1/100 mA (Be careful: even if the autocal. Is ON !!) *Example: =IE0100 $^{C}_{R}$* *The emission current of the filament is set at 1 mA.*
=INA $^{C}_{R}$	Logic I/O are used by the leak detector.	

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Command	Definition	Description
=INS $^{C}_{R}$	Logic outputs are set through the RS-232 (= OUxxxxx $^{C}_{R}$).	
=IVx $^{C}_{R}$	Inlet vent control at the end of the cycle	**x** = E: inlet vent at the end of the cycle **x** = D: no inlet vent at the end of the cycle *Example: =IVE* $^{C}_{R}$ *Inlet vent at the end of the cycle.*
=IVPxyzmmss $^{C}_{R}$	Inlet vent function control	**x** = M: operator control of the opening the inlet vent valve **x** = A: automatic opening of the vent valve **y** = opening delay in sec (0/1/2 sec) **z** = E: timer on opening state **z** = D: no timer on opening state **mm** = timer value of the opening state (minute) **ss** = timer value of the opening state (second) as a supplement to =IVE $^{C}_{R}$ or =IVD $^{C}_{R}$ *Example: =IVPA1E0030* $^{C}_{R}$ *Inlet vent automatic opening selection with a delay set at 1s. Timer on opening state set at 30 s.*
=LDLCF $^{C}_{R}$	Adjust the lower display limit value displayed for the signal	**CF**: Lower display limit *Example: =LDL100-11* $^{C}_{R}$ *The value displayed for the signal can't be under 1.00E-09 mbar.l/s (if the current unit is mbar.l/s).*
=MASxy $^{C}_{R}$	Set the Massive mode status	**x** = E: Massive mode authorized **x** = D: Massive mode not authorized **y** = E: Massive mode in progress **y** = D: Massive mode not in progress *Example: =MASED* $^{C}_{R}$ *The Massive mode is authorized but is not in progress.*
=MC0Iyyyyy $^{C}_{R}$	Set the primary pump hour counter initial value	**yyyyy**: counter in hours *Example: =MC0I03000* $^{C}_{R}$ *The primary pump hour counter initial value is set at 3000 hours.*
=MC0Z $^{C}_{R}$	Reset the primary pump hour counter	

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Command	Definition	Description
=MC1Iyyyyy $^{C}_{R}$	Set the high vac. pump hour counter initial value	**yyyyy**: counter in hours *Example: =MC1I02000* $^{C}_{R}$ *The high vac. pump hour counter initial value is set at 2000 hours.*
=MC1Z $^{C}_{R}$	Reset the high vac. pump hour counter	
=MCCICF $^{C}_{R}$	Set the cycle counter initial value	**CF**: cycle counter initial value *Example: =MCCI300+01* $^{C}_{R}$ *Cycle counter initial value: 3000 cycles.*
=MCCZ $^{C}_{R}$	Reset the cycle counter initial value	
=MEx $^{C}_{R}$	Memorization command	**x** = E: enable the memorization **x** = D: disable the memorization **x** = L: reset the value of the Memorization signal *Example: =MEE* $^{C}_{R}$ *The memorization command is activated.*
=MExbmmss $^{C}_{R}$	Memorization command	**x** = M: Memo function ON **x** = A: Memo function OFF **b** = E: Memo stopped at the end of the timer **b** = D: Memo not stopped **mmss**: Memo on timer during minute second *Example: =MEME0130* $^{C}_{R}$ *Memo function activated and stopped after 1 mn 30 s.*
=NP1CF $^{C}_{R}$	Adjust the pressure threshold value n°1	**CF**: value in mbar *Example: =NP1100-01* $^{C}_{R}$ *The pressure threshold is set at 10 mbar.*
=NP2CF $^{C}_{R}$	Adjust the pressure threshold value n°2	**CF**: value in mbar *Example: =NP2100-02* $^{C}_{R}$ *The pressure threshold is set at 1 mbar.*
=NP3CF $^{C}_{R}$	Adjust the pressure threshold value n°3	**CF**: value in mbar *Example: =NP3100-03* $^{C}_{R}$ *The pressure threshold is set at 0.1 mbar.*
=OUxxxxx $^{C}_{R}$	Output control Only if =INS $^{C}_{R}$ command was sent prior to using the **=OUxxxxx** $^{C}_{R}$ command	**xxxxx**: output value See ”Complementary information” p. 48.

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Command	Definition	Description
=P1CF $^{C}_{R}$	Adjust the gross leak pressure threshold	**CF**: value in mbar *Example: =P1200-01* $^{C}_{R}$ *The gross leak pressure threshold is set at 20 mbar.*
=P1UCF $^{C}_{R}$	Adjust the gross leak mode pressure threshold in the current unit	**CF**: Threshold value *Example: =P1U150-02* $^{C}_{R}$ *Threshold value is 1.5 mbar (if the current unit is mbar.l/s).*
=P2CF $^{C}_{R}$	Adjust the normal pressure threshold	**CF**: value in mbar *Example: =P2100-02* $^{C}_{R}$ *The normal pressure threshold is set at 1 mbar.*
=P2UCF $^{C}_{R}$	Adjust the normal mode pressure threshold in the current unit	**CF**: Threshold value *Example: =P2U500-03* $^{C}_{R}$ *Threshold value is 5.00E.01 mbar (if the current unit is mbar.l/s).*
=P3CF $^{C}_{R}$	Adjust the high sensitivity pressure threshold	**CF**: value in mbar *Example: =P3200-04* $^{C}_{R}$ *The high sensitivity pressure threshold is set at* 2.10^{-2} *mbar.*
=P3UCF $^{C}_{R}$	Adjust the high sens mode pressure threshold in the current unit	**CF**: Threshold value *Example: =P3U400-04* $^{C}_{R}$ *Threshold value is 4.00E.02 mbar (if the current unit is mbar.l/s).*
=PADabc $^{C}_{R}$	Set the Bypass option status	**a** = E: Bypass active **a** = D: Bypass not active **b** = 1: Bypass mode: Quick pump **b** = 2: Bypass mode: Partial flow **c** = 1: Internal pumping not delayed **c** = 2: Internal pumping delayed *Example: =PADE21* $^{C}_{R}$ *The Bypass option is set on partial flow without internal pumping delay.*

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Long commands of the RS-232

Command	Definition	Description
=PWxxxxy $^{C}_{R}$	Adjust the password and its validation	**xxxx***:* password value on 4 digits between 1 and 9 **y** = E: password validation (user level =1) **y** = D: password inhibition (xxxx value is ignored) (user level = 4) *Example: =PW1998E* $^{C}_{R}$ *The password is 1998.* *The password is activated.*
=RBFx $^{C}_{R}$	Set the Background suppression status	**x** = E: Background suppression ON **x** = D: Background suppression OFF *Example: =RBFE* $^{C}_{R}$ *The Background suppression is ON.*
=REGx $^{C}_{R}$	Set the status of the Regeneration or Burn-in function	**x** = 0: Stop Regeneration or Burn-in function **x** = 1: Start Regeneration function **x** = 2: Start Burn-in function without calibration **x** = 3: Start Burn-in function with calibration *Example: =REG1* $^{C}_{R}$ *Regeneration function is started.*
=S1CF $^{C}_{R}$	Adjust the current reject threshold in the current test mode and current unit of measurement	**CF**: reject threshold in accordance to the cycle in progress *Example: =S1300-04* $^{C}_{R}$ *If the detector is in HS test mode, the hard vacuum reject threshold is 3.00E-02.*
=S1CFx $^{C}_{R}$	Adjust the reject threshold in the current unit of measurement	**CF**: reject threshold **x** = H: CF adjusts the reject threshold in hard vacuum test mode **x** = S: CF adjusts the reject threshold in sniffing test mode *Example: =S1500-09H* $^{C}_{R}$ *The reject threshold is set at 5.00E-7 in hard vacuum test mode in the current unit.*
=S6CF $^{C}_{R}$	Adjustment of the sniffer probe clogged set point value	**CF**: sniffer probe clogged set point in the current unit of measurement *Example: =S6100-06* $^{C}_{R}$ *The sniffer probe clogged set point value is set at 1.00E-4 in the current unit of measurement.*

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Long commands of the RS-232

Command	Definition	Description
=SCx $^{C}_{R}$	Turn the filament on off	**x** = E: switch on the filament **x** = D: switch off the filament **x** = R: reset the triode safety *Example: =SCE* $^{C}_{R}$ *The filament is switched on.*
=SFx $^{C}_{R}$	Sniffing mode activation	**x** = E: activating the sniffing mode **x** = D: stopping the sniffing mode *Example: =SFE* $^{C}_{R}$ *The leak detector is in the sniffing test mode.*
=SNCFx $^{C}_{R}$	Sniffing external coefficient adjustment	**CF**: value of the coefficient **x** = E: coefficient validation **x** = D: coefficient inhibition (the coefficient is not changed) *Example: =SN110-01E* $^{C}_{R}$ *The sniffing mode coefficient is set at 11.* *The sniffing coefficient is active.*
=SOxy $^{C}_{R}$	Sound volume	**x**: volume value on 1 digit between 0 to 9 **y** = E: sound validation **y** = D: sound inhibition (the volume is not changed) *Example: =SO5E* $^{C}_{R}$ *The audio alarm level has been set at 5* *The audio alarm setting has been turned ON.*
=SPx $^{C}_{R}$	Change the display language	**x** = 0: English **x** = 1: Spanish **x** = 2: German **x** = 3: French **x** = 4: Japanese *Example: =SP0* $^{C}_{R}$ *The language selected is English.*
=SPRx $^{C}_{R}$	Set the probe type	**x** = 1: Standard probe **x** = 2: Smart probe *Example: =SPR1* $^{C}_{R}$ *The probe is a standard probe.*
=SSSxxxx $^{C}_{R}$	Adjust the Smart sniffer probe clogged threshold value	**xxxx**: Threshold value of the Smart probe in sccm *Example: =SS0020* $^{C}_{R}$ *The threshold of the Smart probe is 20 sccm.*

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Long commands of the RS-232

Command	Definition	Description
=SWx $^{C}_{R}$	Filament selection (1 or 2)	**x** = 1: Active filament 1 **x** = 2: Active filament 2 *Example: =SW1* $^{C}_{R}$ *Filament 1 selection.*
=SYxy $^{C}_{R}$	Digital voice volume	**x**: volume value on 1 digit between 0 to 9 **y** = E: Digital voice validation **y** = D: Digital voice inhibition (the volume is not changed) *Example: =SY4E* $^{C}_{R}$ *Digital voice activated and digital volume set at 4.*
=T01Hccccc $^{C}_{R}$	Set the hour counter of the primary pump 1	**ccccc**: hour counter *Example: =T01H01259* $^{C}_{R}$ *The primary pump 1 hour counter is 1259 hours.*
=T1Haaaaa $^{C}_{R}$	Set the hour counter of the high vac. pump	**aaaaa**: hour counter value *Example: =T1H02100* $^{C}_{R}$ *The high vac. pump hour counter is set at 2100 hours.*
=T1x $^{C}_{R}$	High vac. pump control	**x** = E: pump start **x** = D: pump stop **x** = H: pump hour counter reset **x** = R: pump running in *Example: =T1D* $^{C}_{R}$ *High vac. pump stop.*
=TES $^{C}_{R}$	Select the internal temperature sensor for autocalibration	
=TEV $^{C}_{R}$	Select the temperature on preset value for autocalibration	
=TIhhmmss $^{C}_{R}$	Adjust the time	**hh**: hours **mm**: minutes **ss**: seconds *Example: =TI142233* $^{C}_{R}$ *The time is 14:22:33.*

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Long commands of the RS-232

Command	Definition	Description
=TSTx $^{C}_{R}$	Test method used in hard vacuum	**x** = 0: Hard vacuum method **x** = 2: Sniffer method *Example: =TST0* $^{C}_{R}$ *The hard vacuum method is selected.*
=UNx $^{C}_{R}$	Unit of measurement selection	**0**: ppm **1**: mbar.l/s **2**: Pa.m^3/h **3**: Torr.l/s **4**: gr/yr **5**: oz/yr **6**: lb/yr **7**: custom *Example: =UN1* $^{C}_{R}$ *Unit of measurement selected: mbar.l/s.*
=V1x $^{C}_{R}$	Validate the high vac. pump speed measurement	**x** = E: validate the speed measurement **x** = D: cancel the speed measurement *Example: =V1E* $^{C}_{R}$ *High vac. pump speed measurement validated.*
=VITxyyyy $^{C}_{R}$	Adjust the high vac pump speed	**x** = A: high vac pump speed for all methods **x** = H: high vac pump speed for hard vacuum method **x** = S: high vac pump speed for sniffer method **yyyy**: Speed value in Hz *Example: =VITA1000* $^{C}_{R}$ *The high vac pump speed for all methods is set to 1000 Hz.*
=VOyxxx $^{C}_{R}$	Adjust the acceleration voltage	**xxx**: acceleration voltage in volts. **y** = no character: xxx acceleration voltage of the filament that is currently in use **y** = 1: xxx acceleration voltage of the filament 1 **y** = 2: xxx acceleration voltage of the filament 2 (Be careful: this command is active even with the autocalibration ON !) *Example: =VO1255* $^{C}_{R}$ *Acceleration voltage of the filament 1 is: 255 V*

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Long commands of the RS-232

Command	Definition	Description
=VPUx $^{C}_{R}$	Set the purge valve status	**x** = E: Purge valve set to "Open" **x** = A: Purge valve set to "Automatic" **x** = D: Purge valve set to "Close" *Example: = VPUD* $^{C}_{R}$ *The purge valve is set to "Close".*
=VTx $^{C}_{R}$	Inlet vent valve activation in standby mode	**x** = A: valve always opened in standby **x** = D: valve always closed in standby *Example: = VTA* $^{C}_{R}$ *Inlet vent valve always opened in standby.*
=ZBxy $^{C}_{R}$	Parameters of the zero function	**x** = A: function triggered in automatically **x** = O: function controlled by the operator **y** = T: triggered by timer **y** = S: triggered when the threshold is crossed *Example: =ZBAT* $^{C}_{R}$ *The function is in automatic mode and triggered by timer.*
=ZBxyzzzzCF $^{C}_{R}$	Advanced parameters of the zero function	**x** = A: function triggered automatically **x** = O: function controlled by the operator **y** = T: triggered by timer **y** = S: triggered when the threshold is crossed **y** = «-» if x = O (function controlled by the operator) **zzzz**: timer in «mmss» **CF**: threshold *Example: =ZBAT0230100-08* $^{C}_{R}$ *The function is in automatic and triggered by timer set at 2 mn 30 s .*
=ZExxx $^{C}_{R}$	Adjustment of the cell electronic zero	**xxx:** 0 to 255 (in relation with the signal cell value) (Be careful: this command is active even with the autocalibration ON !) *Example: =ZE100* $^{C}_{R}$ *The reference value is set at 100 to obtain a correct zero electronic adjustment.*
=ZRx $^{C}_{R}$	Bargraph display centered on the reject point	**x** = E: function ON **x** = D: function OFF *Example: =ZRE* $^{C}_{R}$ *Bargraph display centered on the reject point.*

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Long commands of the RS-232

Complementary information

Coding of the detector status string characters (command: ?ST $^{C}_{R}$)

16 bites (binary code) represent the detector status. These 16 bites are transmitted in the format of a 5 digits integer (0 to 65535 in decimal basis). This coding is used in various commands.

Bites description:

Bites n°	Description	Values	
		0	1
0	Active filament 1 or 2	filament 1	filament 2
1	Filament ON/OFF	OFF	ON
2	Detector out/in cycle	out cycle	in cycle
3 & 4	If in cycle, atmosphere, normal, gross leak, high sensitivity 00 atmosphere/roughing 01 Gross leak 10 Normal 11 High sensitivity		
5	Sniffing ON/OFF	hard vacuum test	sniffing test
6	Autocalibration OK/NOK	NOK	OK
7	Locked control panel	locked	unlocked
8	Default presence	default presence	no default
9	Inlet vent valve status	no inlet vent	inlet vent
10	Cycle start available	not available	available
11	High vac. pump synchronism	no synchronism	synchronism
12	N/A		1
13	N/A		1
14	Sniffer probe clogged	clogged	not clogged
15	N/A		1

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Long commands of the RS-232

Coding of the data string characters (command: ?TR $^{C}_{R}$)

The data string digits gives the most critical information about the detector status in the following coded format:

Example: 991-12 (1) 65179 (2) 340+00 (3)

1 Helium signal corrected in compressed format (**CF**): 9.91E^{-10} mbar.l/s
2 Detector status code (see below “Bites description”)
3 Inlet pressure in compressed format (**CF**) in mbar: 3.4E^{-3} mbar

Bites signification:

Bites n°	Description	Values	
		0	1
0	Active filament 1 or 2	filament 1	filament 2
1	Filament ON/OFF	OFF	ON
2	Detector out/in cycle	out cycle	in cycle
3 & 4	If in cycle, atmosphere, normal, gross leak, high sensitivity 00 atmosphere/roughing 01 Gross leak 10 Normal 11 High sensitivity		
5	Sniffing ON/OFF	hard vacuum test	sniffing test
6	Autocalibration OK/NOK	NOK	OK
7	Locked control panel	locked	unlocked
8	Default presence	default presence	no default
9	Inlet vent valve status	no inlet vent	inlet vent
10	Cycle start available	not available	available
11	High vac. pump synchronism	no synchronism	synchronism
14	Sniffer probe clogged	clogged	not clogged
15	=0		

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Long commands of the RS-232

Example:

Bites n°	Decimal Value	Binary Decoded String	Description
0	1	1	Active filament 1
1	2	1	Filament ON
2	4	1	Detector in cycle
3 & 4	8 16	1 1	High sensitivity test mode
5	32	0	Sniffing test mode OFF
6	64	1	Auto-calibration
7	128	0	Locked control panel
8	256	0	No default present
9	512	0	Inlet vent valve ON
10	1024	0	Cycle start not-available
11	2048	1	High vac. pump at synchronism
14	4096	1	N/A
15	8192	1	N/A
14	16384	1	Sniffer probe not-clogged
15	32768	1	N/A
Total	64351	1111101101011111	

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Long commands of the RS-232

Logic inputs value (command: ?IN $^{C}_{R}$)

Input	With 15 pins I/O interface	With 37 pins I/O interface
1	14 - Ground	11 - Ground
2	Not used	30 - Ground
3	Not used	12 - Ground
4	Not used	31 - Ground
5	Not used	13 - Ground
6	Not used	32 - Ground
7.....16	Not used	Not used

Logic inputs value (command: ?OU $^{C}_{R}$)

Output	With 15 pins I/O interface	With 37 pins I/O interface
1	6 - Ground Test mode reached (except ASI 30/35) 6 - Ground Detector ready (ASI 30/35 only)	9 - 28
2	7 - Ground Threshold crossed	8 - 27
3	Not used	7 - 26
4	Not used	6 - 25
5	Not used	5 - 24
6	Not used	4 - 23
7	Not used	3 - 22
8	Not used	2 - 21
9	Not used	1 - 20
10...16	Not used	Not used

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Long commands of the RS-232

Valves affectation (command: ?VA $^{C}_{R}$ - = Vaxxxxx $^{C}_{R}$)

Example: P0411 board

		P0411 board			P0511/P0518 board	
Led	Value	ASM 310	ASM 380	ASI 30	ASM 340	ASI 35
V_0	00001	V_{R1}	V_{A1}	-		
V_1	00002	V_{T0}	V_{R1}	V_C	V_{R1}	-
V_2	00004	V_S	V_{T0}	-	V_{T1}	-
V_3	00008	V_{T1}	V_{C3}	-	V_{T0}	-
V_4	00016	V_P	V_C	-	V_{T2}	-
V_5	00032	V_C	V_{T2}	-	V_{T3}	-
V_6	00064	V_{T4}	V_S	-	V_{A1}	-
V_7	00128	V_{T3}	V_{T4}	-	V_C	V_{C2}
V_8	00256	V_{A1}	V_V	-	-	V_{C1}
V_9	00512	-	-	-	-	-
V_{10}	01024	-	-	-	V_S	V_S
V_{11}	02048	-	-	-	V_P	-
V_{12}	02048				-	-

V_{A1}	Inlet vent valve
V_C	Calibration valve
V_{C1}	Calibration valve - roughing
V_{C2}	Calibration valve - detection
V_{C3}	Calibration valve - Inlet vent
V_p	Purge valve
V_{R1}	Roughing valve
V_S	Sniffing valve
V_{T0}	Detection valve (gross leak mode)
V_{T1}	Exhaust valve
V_{T2}	Detection valve (normal mode)
V_{T3}	Detection valve (normal mode)
V_{T4}	Detection valve (high sensitivity mode)
V_V	Buffer volume valve

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List of messages

For all messages, note their contents in order to identify the origin of the message and take the corresponding corrective action if necessary.

General trouble shooting guide chapter D of your User's Manual

Level	RS Order	RS-232 Code	Information messages
1	?ER	e59	calib. test mode lost.
	?ER	e93	Dynamic Calib. Fail.
	?WA	w60	probe type or connector.
	?WA	w145	maintenance required.
	?WA	w150	primary pump maint.
	?WA	w160	high. vac pump maint.
	?WA	w180	new fil#2 required.
	?WA	w181	new fil#1 required.
	?WA	w182	No output on wire 2
	?WA	w183	No output on wire 1
	?WA	w211	manual calibration.
	?WA	w235	auto. cal. required.
	?WA	w240	auto. cal. required.
	?WA	w242	Int Pirani uncalib.
	?WA	w245	temperature too high.
2	?ER	e50	cell. zero stability.
	?ER	e56	background trouble.
	?ER	e57	lack of sensitivity.
	?ER	e58	sensitivity too high.
	?ER	e65	background too high.
	?ER	e70	peak adjust error.
	?ER	e80	cal. leak year error.
	?ER	e85	Temperature too high.
	?ER	e89	emission lost.
	?ER	e95	cell. zero off limits.
	?ER	e96	Autocal failure+2nd code
	?ER	e97	temperature too high.
	?ER	e98	temperature too low.
	?ER	e160	snif. probe clogged.
	?WA	w220	Filament Request Off.
3	?ER	e188	high. vac pump speed.
	?ER	e192	Fil Current Too High.
	?ER	e194	fil2-collector short.
	?ER	e195	fil1-collector short.
	?ER	e205	Primary pump failure.

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List of messages

Level	RS Order	RS-232 Code	Information messages
3	?ER	e206	ACP temp. too high.
	?ER	e210	Primary Pump Failure.
	?ER	e220	No collector voltage.
	?ER	e224	- 15 V cell. failure.
	?ER	e230	filaments #1&#2 bad.
	?ER	e231	No output on wire 1 and 2
	?ER	e235	cell pres.>1e-03 mbar.
	?ER	e238	no cell com.
	?ER	e239	No High Vac Pump com.
	?ER	e241	high. vac pump speed.
	?ER	e243	EEPROM error.
	?ER	e245	high. vac pump fail.
	?ER	e247	check ATH connector.
	?ER	e248	check MDP connector.
	?ER	e251	+ 15 V cell failure.
	?ER	e252	24 V cell failure.
	?ER	e253	time keeper ram fail.
	?ER	e255	An error occured +2nd code.
	?WA	w241	auto. cal. required.
	?WA	w244	VHS uncalibrated.
4	?ER	E180	no electrical current
	?ER	E185	triode SECU active
	?ER	E248	check MDP connection
	?ER	E75	PIC no found
	?ER	E99	24 V DC problems
	?WA	W203	calibrated leak External
	?WA	W205	shutdown of Autocal
5	?WA	w97	temperature too high.
	?WA	w98	temperature too low.
	?WA	w230	auto. cal. required.
	?WA	w255	Out start condition.

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Export Data mode

Tickets

Export of test tickets: 3 predefined models

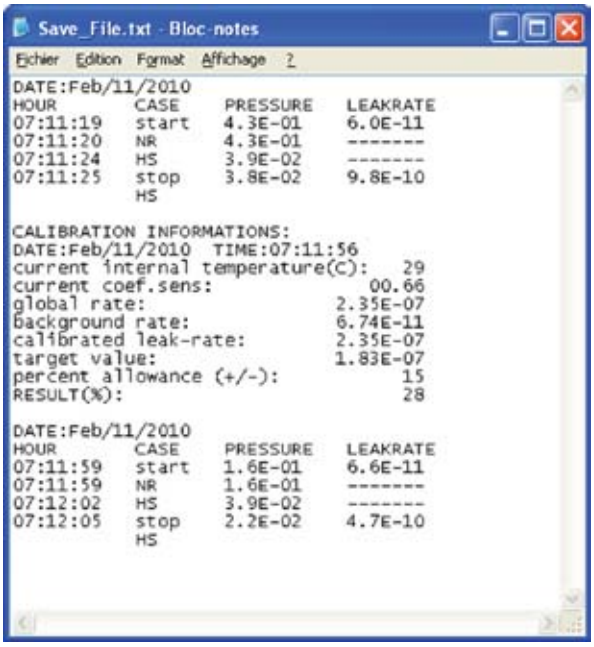
Test tickets	Export
Calibration with an internal or external calibrated leak	Automatic export after an internal calibration with an internal/ external leak
Calibration checking with an internal leak	Automatic export after a calibration checking with an internal leak
Test	Automatic export at the end of the test

Procedure

Communication parameters:

Port.	COM1
Baud rate.	9600
Data bits.	8
Stop bits.	1
Parity.	None
Flow control.	None

Example: « Save_File.txt » file created.



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HLT5xx Protocol

The HLT5xx protocol is not available for all the leak detectors.
To know if this protocol is available for your detector, please refer to the Operating instructions of the detector.

Only commands of the HLT5xx leak detector protocol, listed in this chapter, are taken back in the HLT5xx protocol of the detector. Any other commands, not listed in this chapter, wil be without effect.

Abreviations and symbols

Symbol	Meaning
ASCII	American Standard Code for Information Interchange
Send	Transfer from RS-232 to detector
Receive	Transfer from detector to RS-232

Protocol

The HLT5xx protocol uses the ASCII format, i.e. all data bytes are displayable characters with an ASCII code ≥ 32 (*1) with the exception of the EOT (end of telegram) character carriage return (CR, 13). The transferred commands are accommodated by a frame as follows without exception:

(*1) all numbers decimal

General protocol

Address	Action	Parameter number	Data length	Data	Checksum	CR
1	2	3	4	5	6	7

1	Address	"001" by default
2	Action	"00" = request command "10" = command with parameter
3	Parameter number (PV#)	Number of the parameter concerned, e.g. "303" (n_1 n_2 n_3)
4	Data length	e.g. "06" for six characters, corresponds to length of the "Data" field (d_1 d_2)
5	Data	Data in ASCII format. Format and size of the data depends of the following points: • transfer of values => *master commands and parameter description* • data request => *slave commands and parameter description* • error messages => *slave commands*
6	Checksum	Sum of all ASCII characters up to before checksum modulo 256 (decimal), (c_1 c_2 c_3) e.g. sum = 786, 786 modulo 256 = 18 => checksum = "018"
7	CR	carriage return (ASCII character 13)

With the master-slave behaviour a data exchange always takes place according to the scheme:

- Master sends (either setting demand or request).
- Slave answers (confirmation or send data / error messages).

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HLT5xx Protocol

Commands

Master commands

The instrument taking up communication (master, e.g. PC) can send the following commands:

Setting demand

0	0	1	1	0	n_1	n_2	n_3	d_1	d_2		c_1	c_2	c_3	CR
Address			Action		Parameter number			Data length		Data	Checksum			CR

Data request

0	0	1	0	0	n_1	n_2	n_3	0	2	=	?	c_1	c_2	c_3	CR
Address			Action		Parameter number			Data length		Data		Checksum			CR

Slave commands

The slave instrument (e.g. ASM xxx detector) cannot start communication by itself but only replies when it is addressed with a valid single address. Instruments addressed by the group (address 949) or global (address 000) address do not reply. Following commands are possible:

- Send request data (positive reply to "data request")

0	0	1	1	0	n_1	n_2	n_3	d_1	d_2		c_1	c_2	c_3	CR
Address			Action		Parameter number			Data length		Data	Checksum			CR

- Confirm the received setting demand (positive reply to "setting demand")

0	0	1	1	0	n_1	n_2	n_3	d_1	d_2		c_1	c_2	c_3	CR
Address			Action		Parameter number			Data length		Data	Checksum			CR

A confirmation of the received setting demand initially only means that the command sent by the master has been understood. If the operating state of the instrument allows an adjustment, this is also executed. Its is advisable to then request the parameter as a check.

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HLT5xx Protocol

Error messages

- Parameter number does not exist

0	0	1	1	0	n_1	n_2	n_3	0	6	N	O	_	D	E	F	c_1	c_2	c_3	CR
Address			Action		Parameter number			Data length		Data						Checksum			CR

- Transferred data outside allowed range

0	0	1	1	0	n_1	n_2	n_3	0	6	_	R	A	N	G	E	c_1	c_2	c_3	CR
Address			Action		Parameter number			Data length		Data						Checksum			CR

- Logic error (e.g. writing a read only parameter, command structure, control mode at RS-232, command not possible here)

0	0	1	1	0	n_1	n_2	n_3	0	6	_	L	O	G	I	C	c_1	c_2	c_3	CR
Address			Action		Parameter number			Data length		Data						Checksum			CR

Command examples

- Read current leak rate
  master ➔ slave

0	0	1	0	0	6	6	9	0	2	=	?	1	1	6	CR
Address			Action		Parameter number			Data length		Data		Checksum			CR

slave ➔ master

0	0	1	1	0	6	6	9	0	6	2	7	9	6	1	3	0	5	7	CR
Address			Action		Parameter number			Data length		Data						Checksum			CR

Leak rate = 2.796E-7

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HLT5xx Protocol

Command examples (ctd)

- Set setpoint 1 to 1.2E-7 mbar.l/s:
  master ➔ slave

0	0	1	1	0	6	8	1	0	6	1	2	0	0	1	3	0	3	0	CR
Address			Action		Parameter number			Data length		Data						Checksum			CR

slave ➔ master

0	0	1	1	0	6	8	1	0	6	1	2	0	0	1	3	0	3	0	CR
Address			Action		Parameter number			Data length		Data						Checksum			CR

- Switch on background
  master ➔ slave

0	0	1	1	0	6	5	1	0	1	1	0	3	2	CR
Address			Action		Parameter number			Data length		Data		Checksum		CR

slave ➔ master

0	0	1	1	0	6	5	1	0	1	1	0	3	2	CR
Address			Action		Parameter number			Data length		Data		Checksum		CR

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HLT5xx Protocol

Commands available

Parameter description

These may formatted differently depending on content of the data represented by a parameter.

Format	Description	Size in characters	Examples
0 - boolean_old	true/false in form of six zeros (ASCII 48) or ones (ASCII 49)	06	**000000** corresponds to false 111111 corresponds to true
1 - u_integer	signless integer with six digits	06	**000042 123456 001200**
2 - u_real	fixed point number with four places before and two after the point, standardised to 0.01	06	**001570** corresponds to 15.70 **000020** corresponds to 0.2
4 - string	any character string with ASCII characters ≥ 32 (decimal)	06	hallo! TC_600 hgnrfx
6 - boolean_new	true/false in the form of a zero (ASCII 48) or one (ASCII 49)	01	**0** corresponds to false **1** corresponds to true
7 - u_short_int	signless integer with three digits	03	**123 042 007**
10 - u_expo_new	positive exponential number 1.000E-20 to 9.999E79. The first four digits are mantissa with a place before the point ≠ 0, the last two the exponent with offset -20	06	123456 corresponds to 1.234E36 1**00000** corresponds to 1.000E-20 243**0**11 corresponds to 2.430E-9
11 - string16	any character string with ASCII characters ≥ 32 (decimal)	16	**abcdefghijklmnop QrStUvWxYzAbCdEf**

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HLT5xx Protocol

Commands of the serial interface RS-232

PV#	Name	Meaning	Command with parameter (10)	Request command (00)	Data format	Min	Max	Parameter description/ parameter options
016	PresMaxRng	Pressure gauge upper range value	x	x	7 - u_short_int	000	008	**000** = 0.1 mbar **001** = 1 mbar **002** = 10 mbar **003** = 100 mbar **004** = 1000 mbar **005** = 2000 mbar **006** = 5000 mbar **007** = 10000 mbar **008** = 50000 mbar
023	Motor_TMP	Motor TMP OFF/ ON	-	x	0 - boolean_old	000000	111111	**000000** = OFF **111111** = ON
303	Error_code	Current error number	-	x	4 - string			**000000** = no error **ErrABC** = error ABC **WrnABC** = warning ABC
309	Act_rotspd	Actual rotation speed turbo pump in Hz	-	x	1 - u_integer	000000	002000	
310	TMP_I-mot	Turbo pump current in A	-	x	2 - u_real	000000	001500	**0 - 15.00**
312	Fw_version	Software version MC68	-	x	4 - string			**Vx.xx** e.g. "V3.60"
314	Op_hours	Operating hours (detector switched on)	-	x	1 - u_integer	000000	999999	
340	Pv_mbar	Pressure of the external gauge in mbar	-	x	10 - u_expo_new	100016	500024	First 4 digits = mantissa Last 2 digits = exponent -20 e.g. 100016 = 1.00E-04
349	DeviceName	Detector name	-	x	4 - string			**ASM xxx**
600	OpModeST	Test method (writeable only in Stand-By, Test and Error state)	x	x	7 - u_short_int	000	001	Write and read: **000** = Hard vacuum **001** = Sniffing
630	ExtPresSns	Choose pressure gauge	x	x	6 - boolean_new	0	1	**0** = internal sensor active **1** = external sensor active
631	Ua_M2	Stored anode potential mass 2 in V	x	x	7 - u_short_int	000	330	Write and Read:
632	Ua_M3	Stored anode potential mass 3 in V	x	x	7 - u_short_int	000	330	Write and Read:
633	Ua_M4	Stored anode potential mass 4 in V	x	x	7 - u_short_int	000	330	Write and Read:

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HLT5xx Protocol

PV#	Name	Meaning	Command with parameter (10)	Request command (00)	Data format	Min	Max	Parameter description/ parameter options
642	Mass	Mass of gas to be detected in amu (writeable only in Stand-By, Test and Error state)	x	x	7 - u_short_int	002	004	Write and Read: **002** = mass 2 (Hydrogen) **003** = mass 3 (Helium 3) **004** = mass 4 (Helium 4)
643	Phys_units	Units	x	x	7 - u_short_int	000	060	Write and Read: Leak rate unit (pressure unit selected automatically) **000** = mbar.l/s (mbar) **010** = Pa.m^3/s (Pa) **020** = Atm.cc/s (mbar) **030** = Torr.l/s (Torr) **040** = sccm (mbar) **050** = sccs (mbar) **060** = ppm* (mbar) * only in sniffing mode
645	Filament	Used filament	x	x	7 - u_short_int	000	002	Write and Read: **000** = Emission OFF **001** = Filament 1, emission ON **002** = Filament 2, emission ON
651	Zero	Background suppression in Test	x	x	6 - boolean_new	0	1	Write and Read: **0** = switch OFF/ON **1** = Test
653	MeaStdby	Test (START/ STOP)	x	x	6 - boolean_new	0	1	Write and Read: **0** = Stand-By **1** = Test
654	CalRequest	Calibration request	x	x	7 - u_short_int	000	002	Write: **000** = switch OFF request **001** = activate request Read: **000** = request switched OFF **001** = request activated but unavaible **002** = request activated and available
655	Filtertype	Type of filter for calculation of leak rate (writeable only in Ready to start, Run-up and Error state)	x	x	7 - u_short_int	000	002	**000** = Without **001** = Static **002** = Dynamic
659	Sniff_Flow	Flow in sniffing method in sccm	-	x	7 - u_short_int	000	255	• With Standard probe: always 59 sccm (1 mbar.l/s) • With Smart probe: range 0 - 255 sccm

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HLT5xx Protocol

PV#	Name	Meaning	Command with parameter (10)	Request command (00)	Data format	Min	Max	Parameter description/ parameter options
660	Trigger_GL	Gross Leak mode crossing set point in mbar	x	x	2 - u_real	000010	002500	0.1 mbar to 25 mbar
661	Trigg_N	Normal mode crossing set point in mbar	x	x	2 - u_real	000010	000500	0.1 mbar to 5 mbar
663	Lock_N_vent	Test mode and inlet vent	x	x	7 - u_short_int	000	031	**Bit 0** = Enable Gross Leak mode **Bit 1** = Enable Normal mode **Bit 3** = Manual vent **Bit 4** = Automatic vent with delay
666	Curr_State	State of detector	-	x	7 - u_short_int	001	011	**001**: Stand-By **002**: Ready to start **003**: Pump down **004**: Stop **006**: Calibration is running **010**: Test in Gross Leak mode **011**: Test in Normal mode
667	GetCalStat	State of calibration	-	x	7 - u_short_int	000	012	**000** = Inactive **001** = Wait "Test leak connected" **004** = Adjustment of masses **008** = Wait "Calibrated leak closed" or "Background stable" **009** = Background in Normal mode **012** = Wait "Calibration result"
668	AckCalStep	acknowledgement stop of calibration	x	-	6 - boolean_new	0	1	**0** = Stop autocalibration **1** = Acknowledgement calibration step
669	Leakrate	Leak rate in chosen unit	-	x	10 - u_expo_new	100002	999999	**100000** = Underrange **999999** = Overrange **Otherwise valid value**
670	Ir_mbarls	Leak rate in mbar.l/s	-	x	10 - u_expo_new	100002	999932	
671	CLext_vac	External Calibrated leak (Hard vacuum) rate in: mbar.l/s Pa.m^3/s Atm.cc/s Torr.l/s	x	x	10 - u_expo_new	 100010 100009 987009 750009	 100020 100019 987019 750019	Write and Read: 1E-100 ...**1E-7**...1E+0 (for mbar.l/s)

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HLT5xx Protocol

PV#	Name	Meaning	Command with parameter (10)	Request command (00)	Data format	Min	Max	Parameter description/ parameter options
		sccm sccs ppm				592011 987009 100016	592021 987019 100026	
673	CLext_snif	External Calibrated leak (Sniffing) rate in: mbar.l/s Pa.m^3/s Atm.cc/s Torr.l/s sccm sccs ppm	x	x	10 - u_expo_new	 100014 100013 987013 750013 592015 987013 100020	 100020 100019 987019 750019 592021 987019 100026	Write and Read: 1E-6 ...**1E5-5**...1E+0 (for mbar.l/s)
676	CL_int	Internal Calibrated leak rate in: mbar.l/s	x	x	10 - u_expo_new	 100011	 100015	Write and Read: 1E-9 ...**1E-6**...1E-5 (for mbar.l/s)
679	Pressure	Roughing pressure in chosen unit	-	x	10 - u_expo_new	100013	100025	
680	Press_p2	Inlet port pressure	-	x	10 - u_expo_new	100013	100025	
681	Trigger_1	Reject point 1 in: mbar.l/s Pa.m^3/s Atm.cc/s Torr.l/s sccm sccs ppm	x	x	10 - u_expo_new	 100008 100007 987007 750007 592009 987007 100014	 100023 100022 987022 750022 592024 987022 100029	Write and Read: 1E-12 ...**1E-9**...1E+3 (for mbar.l/s)
690	Pressext	External gauge pressure in chosen unit	-	x	10 - u_expo_new	100013	100025	
694	GetCalFHi	Factor of calibration in Normal mode	-	x	10 - u_expo_new	100019	100022	
698	SetTLLoc	Calibrated leak selection	x	x	7 - u_short_int	000	002	**0** = Internal automatically (only with ^{4}He tracer gas + operator calibration) **1** = Internal manually **2** = External + operator calibration
699	StartCal	Start calibration	x	-	6 - boolean_new	1	1	**1** = Start calibration
738	Gaugetype	Type of the external pressure gauge (distinction by identification resistance)	-	x	4 - string	6*0X20	6*0X7f	"**nogauge**" = no gauge "**xxxTPR**" =TPR or PCR "**xxxPKR**" = PKR "**linear**" = lin.tube

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HLT5xx Protocol

Conversion table

DEC	HEX	Binary	ASCII
0	0	0000 0000	NUL
1	1	0000 0001	SOH
2	2	0000 0010	STX
3	3	0000 0011	ETX
4	4	0000 0100	EOT
10	A	0000 1010	LF
11	B	0000 1011	VT
12	C	0000 1100	FF
13	D	0000 1101	CR
14	E	0000 1110	SO
15	F	0000 1111	SI
16	10	0001 0000	DLE
17	11	0001 0001	DC1
18	12	0001 0010	DC2
19	13	0001 0011	DC3
20	14	0001 0100	DC4
21	15	0001 0101	NAK
22	16	0001 0110	SYSN
23	17	0001 0111	ETB
24	18	0001 1000	CAN
25	19	0001 1001	EM
26	1A	0001 1010	SUB
27	1B	0001 1011	ESC
28	1C	0001 1100	FS
29	1D	0001 1101	GS
30	1E	0001 1110	RS
31	1F	0001 1111	US
32	20	0010 0000	SP
33	21	0010 0001	!
34	22	0010 0010	"
35	23	0010 0011	#
36	24	0010 0100	$
37	25	0010 0101	%
38	26	0010 0110	&

DEC	HEX	Binary	ASCII
5	5	0000 0101	ENQ
6	6	0000 0110	ACK
7	7	0000 0111	BEL
8	8	0000 1000	BS
9	9	0000 1001	HT
41	29	0010 1001	)
42	2A	0010 1010	*
43	2B	0010 1011	+
44	2C	0010 1100	,
45	2D	0010 1101	-
46	2E	0010 1110	.
47	2F	0010 1111	/
48	30	0011 0000	0
49	31	0011 0001	1
50	32	0011 0010	2
51	33	0011 0011	3
52	34	0011 0100	4
53	35	0011 0101	5
54	36	0011 0110	6
55	37	0011 0111	7
56	38	0011 1000	8
57	39	0011 1001	9
58	3A	0011 1010	:
59	3B	0011 1011	;
60	3C	0011 1100	<
61	3D	0011 1101	=
62	3E	0011 1110	>
63	3F	0011 1111	?
64	40	0100 0000	@
65	41	0100 0001	A
66	42	0100 0010	B
67	43	0100 0011	C
68	44	0100 0100	D
69	45	0100 0101	E

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HLT5xx Protocol

DEC	HEX	Binary	ASCII
39	27	0010 0111	'
40	28	0010 1000	(
72	48	0100 1000	H
73	49	0100 1001	I
74	4A	0100 1010	J
75	4B	0100 1011	K
76	4C	0100 1100	L
77	4D	0100 1101	M
78	4E	0100 1110	N
79	4F	0100 1111	O
80	50	0101 0000	P
81	51	0101 0001	Q
82	52	0101 0010	R
83	53	0101 0011	S
84	54	0101 0100	T
85	55	0101 0101	U
86	56	0101 0110	V
87	57	0101 0111	W
88	58	0101 1000	X
89	59	0101 1001	Y
90	5A	0101 1010	Z
91	5B	0101 1011	[
92	5C	0101 1100	\
93	5D	0101 1101	]
94	5E	0101 1110	^
95	5F	0101 1111	_
96	60	0110 0000	`
97	61	0110 0001	a
98	62	0110 0010	b
99	63	0110 0011	c
100	64	0110 0100	d
101	65	0110 0101	e
102	66	0110 0110	f
103	67	0110 0111	g

DEC	HEX	Binary	ASCII
70	46	0100 0110	F
71	47	0100 0111	G
103	67	0110 0111	g
104	68	0110 1000	h
105	69	0110 1001	i
106	6A	0110 1010	j
107	6B	0110 1011	k
108	6C	0110 1100	l
109	6D	0110 1101	m
110	6E	0110 1110	n
111	6F	0110 1111	o
112	70	0111 0000	p
113	71	0111 0001	q
114	72	0111 0010	r
115	73	0111 0011	s
116	74	0111 0100	t
117	75	0111 0101	u
118	76	0111 0110	v
119	77	0111 0111	w
120	78	0111 1000	x
121	79	0111 1001	y
122	7A	0111 1010	z
123	7B	0111 1011	{
124	7C	0111 1100	|
127	7F	0111 1111	DEL
129	81	1000 0001	
130	82	1000 0010	
131	83	1000 0011	
132	84	1000 0100	
133	85	1000 0101	
134	86	1000 0110	
135	87	1000 0111	
136	88	1000 1000	136
137	89	1000 1001	

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HLT5xx Protocol

DEC	HEX	Binary	ASCII
138	8A	1000 1010	
139	8B	1000 1011	
140	8C	1000 1100	
141	8D	1000 1101	
142	8E	1000 1110	
143	8F	1000 1111	
144	90	1001 0000	
145	91	1001 0001	
146	92	1001 0010	
147	93	1001 0011	
148	94	1001 0100	
149	95	1001 0101	
150	96	1001 0110	
151	97	1001 0111	
152	98	1001 1000	
153	99	1001 1001	
154	9A	1001 1010	
155	9B	1001 1011	155
156	9C	1001 1100	156
157	9D	1001 1101	157
158	9E	1001 1110	158
159	9F	1001 1111	
160	A0	1010 0000	
161	A1	1010 0001	
162	A2	1010 0010	
163	A3	1010 0011	
164	A4	1010 0100	
165	A5	1010 0101	
166	A6	1010 0110	
167	A7	1010 0111	
168	A8	1010 1000	
169	A9	1010 1001	
170	AA	1010 1010	
171	AB	1010 1011	

DEC	HEX	Binary	ASCII
172	AC	1010 1100	
173	AD	1010 1101	
174	AE	1010 1110	
175	AF	1010 1111	
176	B0	1011 0000	
177	B1	1011 0001	
178	B2	1011 0010	
179	B3	1011 0011	
180	B4	1011 0100	
181	B5	1011 0101	
182	B6	1011 0110	
183	B7	1011 0111	
184	B8	1011 1000	
185	B9	1011 1001	185
186	BA	1011 1010	186
187	BB	1011 1011	187
188	BC	1011 1100	188
189	BD	1011 1101	189
190	BE	1011 1110	190
191	BF	1011 1111	191
192	C0	1100 0000	192
193	C1	1100 0001	193
194	C2	1100 0010	194
195	C3	1100 0011	195
196	C4	1100 0100	196
197	C5	1100 0101	197
198	C6	1100 0110	198
199	C7	1100 0111	199
200	C8	1100 1000	200
201	C9	1100 1001	201
202	CA	1100 1010	
203	CB	1100 1011	
204	CC	1100 1100	
231	E7	1110 0111	

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HLT5xx Protocol

DEC	HEX	Binary	ASCII
205	CD	1100 1101	
206	CE	1100 1110	
207	CF	1100 1111	
208	D0	1101 0000	
209	D1	1101 0001	
210	D2	1101 0010	
211	D3	1101 0011	
212	D4	1101 0100	
213	D5	1101 0101	
214	D6	1101 0110	
215	D7	1101 0111	
216	D8	1101 1000	
217	D9	1101 1001	
218	DA	1101 1010	
219	DB	1101 1011	
220	DC	1101 1100	
221	DD	1101 1101	
222	DE	1101 1110	
223	DF	1101 1111	
224	E0	1110 0000	
225	E1	1110 0001	
226	E2	1110 0010	
227	E3	1110 0011	
228	E4	1110 0100	
229	E5	1110 0101	
230	E6	1110 0110	

DEC	HEX	Binary	ASCII
232	E8	1110 1000	
233	E9	1110 1001	
234	EA	1110 1010	
235	EB	1110 1011	
236	EC	1110 1100	
237	ED	1110 1101	
238	EE	1110 1110	
239	EF	1110 1111	
240	F0	1111 0000	
241	F1	1111 0001	
242	F2	1111 0010	
243	F3	1111 0011	
244	F4	1111 0100	
245	F5	1111 0101	
246	F6	1111 0110	
247	F7	1111 0111	
248	F8	1111 1000	
249	F9	1111 1001	
250	FA	1111 1010	
251	FB	1111 1011	
252	FC	1111 1100	
253	FD	1111 1101	
254	FE	1111 1110	
255	FF	1111 1111	(Error)

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HLT2xx Protocol

The HLT2xx protocol is not available for all the leak detectors.
To know if this protocol is available for your detector, please refer to the Operating instructions of the detector.

Only commands of the HLT2xx leak detector protocol, listed in this chapter, are taken back in the HLT2xx protocol of the detector. Any other commands, not listed in this chapter, wil be without effect.

Abreviations and symbols

Symbol	Explanation
HOST	Computer or terminal
ASCII	American Standard Code for Information Interchange
ENQ	ASCII 05_h
Transmit	Data Transfer from HOST to detector
Receive	Data Transfer from detector to HOST

Protocol

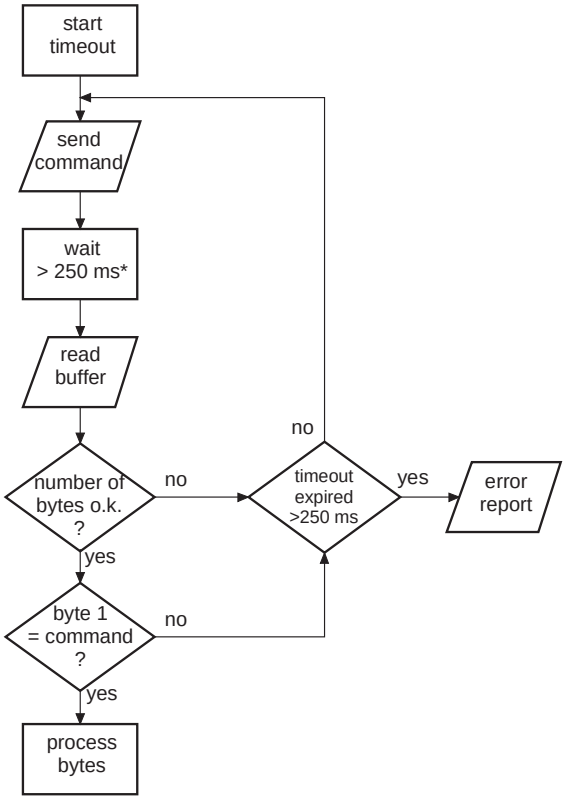
Communication

HOST — Detector

ENQ + Command code + parameters →

← Command code + parameters

Flow diagram (suggested)



* Reading of measuring values (command code:2; leak rate) is possible every 50 ms!

HLT2xx Protocol

Error handling

All command strings received are verified in the detector:
- If o.k., the command code is echoed.
- If not o.k., the detector transmits a negative acknowledgment <FF_h>.

Data types

Data format:

FLOAT	4 bytes, according to IEEE 754 ($\pm 10^{\pm 38}$)
LONGINT	4 bytes, signed integer LSB … MSB
INTEGER	2 bytes, signed integer L-Byte, H-Byte (-32768 ... 32767)
BYTE	1 byte, signed integer (-128 … +127)
UBYTE	1 byte, unsigned integer (0 … 255)
BOOL	1 byte, 0 = FALSE, otherwise TRUE

Commands

Codes

Hex	Dec	Name	Description	Data Format	Comment
0x02	2	LeakRate	Supplies current leak rate	Byte 0...3	Leak rate in mbar.l/s (FLOAT)
				Byte 4 & byte 5	1: Set point reached (BOOL) 0: Other (BOOL)
				Byte 6	1: Zero function activated (BOOL) 0: Other (BOOL)
0x00	0	StopMeasure	Brings the basic unit back to the "Ready to start" state		Stop measurement
0x13	19	StartMeasure	Starts measurement mode		Start measurement
0x0A	10	CurrentState	Supplies information on state	Byte 0	Detector status (BYTE) 1: Preparing vacuum system 2: Ready to start (stand-by) 3: Pumping for measuring (roughing) 5: Stopped (default status) or other internal status 6: Calibration 10: Measurement in Gross leak test mode 11: Measurement in Normal test mode 12: Measurement in High sensitivity test mode
				Byte 1	Always 0
0x03	3	SetMeasure-Filter	Sets measurement filter setting	Byte 0	Filter type (BYTE) 0: No filter (No signal processing) 1…4: Filter Enable (Signal processing)
0x66	102	SetMeasMode	Sets measurement mode	Byte 0	Measurement mode (BYTE) 0: Sniffer 1: Hard Vacuum
0x68	104	SetMassType	Sets mass to be measured	Byte 0	Mass (BYTE) 0: H_2 1: ^3He 2: ^4He
0x81	129	SetZeroMode	Sets the zero mode	Byte 0	0…255: Not managed (BYTE)
0x98	152	SetTestLeak-Location	Sets location of test leak	Byte 0	Test leak location (BOOL) 1: Internal Other: External

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HLT2xx Protocol

Codes (continued)

Hex	Dec	Name	Description	Data Format	Comment
0x71	113	SetValveValues	Sets pressure thresholds and inlocks	Byte 0…6	0…255: Not managed (BYTE)
0x9D	157	SetTestLeak-Value	Sets value of test leak	Byte 0…3	0…255: Not managed (FLOAT)
0x05	5	Zero	Suppresses current background		
0x06	6	ZeroReset	Disables background suppression		
0x9C	156	GetCalCF	Supplies calibration factors	Byte 0…3 Byte 4...7 Byte 8...11	Current factors for the current filament (FLOAT)

Examples

Bytes are represented in hexadecimal format.
Conversion between different number formats: see chapter I.

StartMeasure

HOST	Detector	Explanation
05 **13**	→	StartMeasure
←	**13**	Positive acknowledgement of command

Input error

HOST	Detector	Explanation
05 **4C C8**	→	Input error (non existent command code)
←	**FF**	Negative acknowledgment

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HLT2xx Protocol

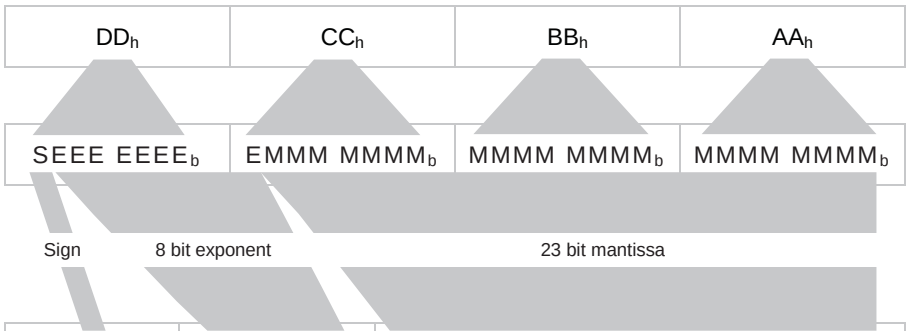
Conversion of a floating number according to IEEE 754

Number received

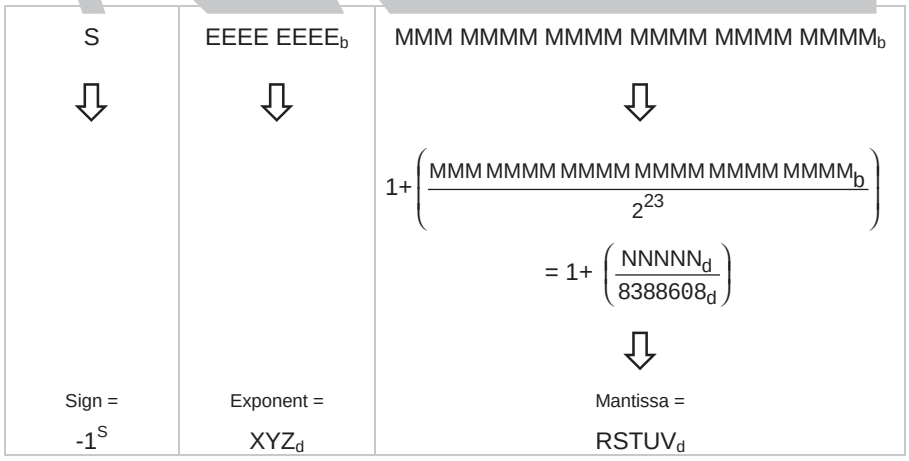
AA BB CC DD_h (4 byte, floating format)

1. Reverse the sequence of the HEX words

2. Separate into bytes



3. Calculate



Converted number

$$\text{Sign} \times 2^{(\text{Exponent}-127)} \times \text{Mantissa}$$

Legend:
XX_h Hexadecimal number (Base = 16)
XX_d Decimal number (Base = 10)
XX_b Binary number (Base = 2)

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HLT2xx Protocol

Example

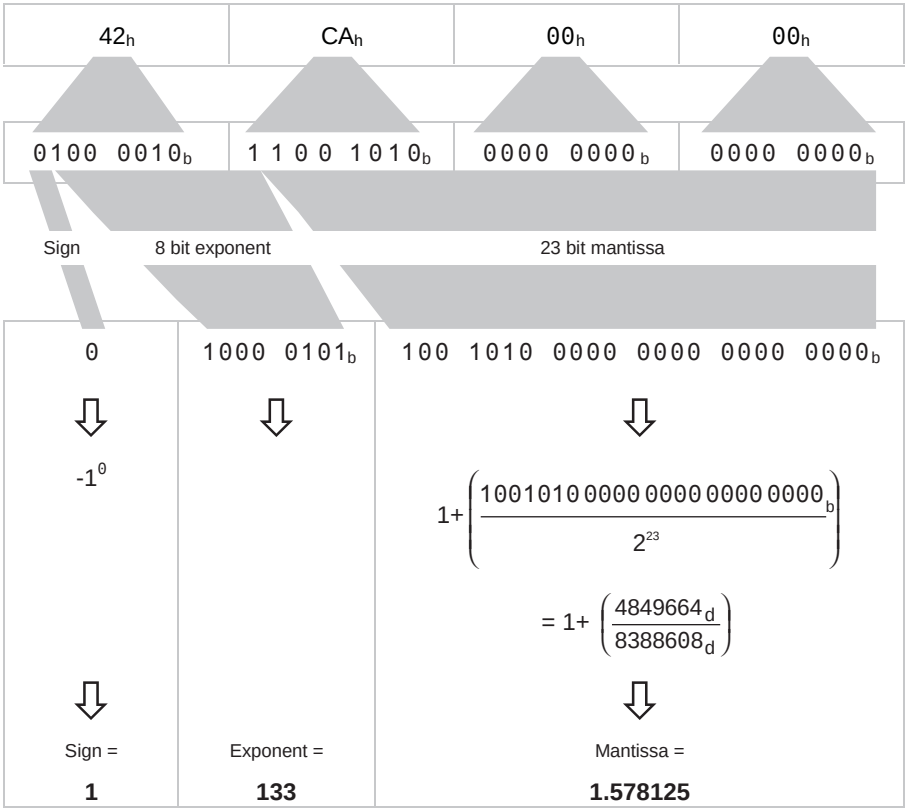
Number received

$00\ 00\ CA\ 42_h$ (4 byte, floating format)

1. Reverse the sequence of the HEX words

2. Separate into bytes

3. Calculate



Converted number

$$1 \times 2^{(133-127)} \times 1.578125 = 101$$

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