TITAN VERSA

VERSA

TITAN VERSA LEAK DETECTORS

COMMUNICATION INTERFACE USER MANUAL

LACO TECHNOLOGIES

TABLE OF CONTENTS

LIST OF TABLES

1. About This Manual

This manual outlines the communication interfaces offered in all models of the TITAN VERSA Leak Detector. This manual is only offered in the English language.

1.1. Related documents

- *TITAN VERSA Operations and Maintenance Manual* (SMT-07-1037)

- *TITAN VERSA Quick Start Manual* (SMT-07-1038)

1.2. Displaying information

See below for the range of warning messages used in this manual. The lower text in these messages indicates the severity range of the message group.

1.2.1 Warnings

> ⚠ **DANGER:** Imminent threat of danger resulting in death or severe injuries Dangerous situation potentially resulting in death or severe injuries

> ⚠ **WARNING:** Dangerous situation resulting in major injuries. Dangerous situation resulting in damage to property or the environment.

> ⚠ **CAUTION:** Dangerous situation resulting in minor injuries.

> **NOTICE:** Dangerous situation resulting in damage to property or the environment.

2. Safety

2.1. Warnings

To ensure your safety, adhere to the following:

Follow wiring guides as outlined in <u>Protocols and Connections</u>. Do not wire to areas unless otherwise directed.

- To use these communication methods described in this manual, individuals must be experienced and trained in communication protocols.

- For questions, please contact LACO Technologies:

  o **Phone:** 801-486-1004 | Toll Free: 800-465-1004

  o **Email:** Technical Support: <u>techsupport@lacotech.com</u>

3. Protocols and Connections

3.1. Serial Protocols

3.1.1 RS232 and RS485

Pinout

A female DB-9 serial port is provided that has both RS232 and RS485 protocol connections on the same port (see item 6 in figure below). Table 1 outlines the pinout details of this connection.

Cable

Typically, a crossover cable will be needed when connecting a TITAN VERSA to a computer. Part number TV5946 can be purchased. This cable has both a male and female ends.

Baud Rate / Settings

The following baud rates are available in Communication settings: 9600, 19,200, 57600 and 115,2000. These can be set at Menu > System > Communications. All communication adheres to the following additional serial settings:

- Bits: 8
- Parity: None
- Stop Bit: 1

➔ Serial communication should not have message rates faster than 100 msec per message.

ELECTRICAL INTERFACES
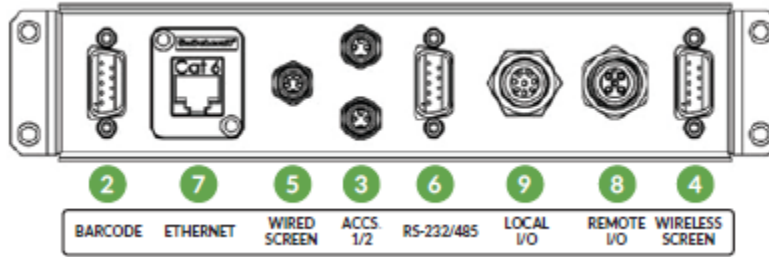
Table 1:   Serial DB-9 Pinout

PIN	Function
1	RS485 A+
2	RS232 TxD
3	RS232 RxD
4	Gnd
5	Gnd, RS232
6	NC
7	NC
8	NC
9	RS485 B-

3.2.   Serial Troubleshooting

Verify the following items to help troubleshoot if no serial communication is occurring.

➔ Verify using correct cable pinout per pinout table. Typically, a cross-over or null modem cable is needed.

➔ Verify Baud Rate is a match.

➔ Verify Syntax is correct. Ensure carriage return character is being sent. Verify correct command by sending a Request command (?).

4. Serial ASCII Protocol

4.1. Command Types

There are three types of serial ascii commands:

Immediate Command

1) <u>Immediate Commands</u> have no parameters and are immediately executed. Immediate commands always start with a "!" character.

Request Command

2) <u>Request Commands</u> require an answer from the leak detector and always start with a "?" character.

Request Command

3) <u>Parameter Commands</u> adjust an existing parameter or setting and always start with an "=" character

4.2. Command Syntax

Send End Syntax

All sent commands must finish with a <CR> (carriage return) 0x0D character.

Receive Command

The return message will confirm if the transmission was successful or not.

Successful Message

Successful message: <CR> 0x0D and <ACK> for 0x06.

Unsuccessful Message

Unsuccessful message (not recognized or bad message length): <NAK> for 0x15.

Table 2:   Example Messages

Send Command	Response Command	Comments
?ST<CR>	64596<CR><ACK>	Success
?UU<CR>	<NAK>	Unknown command
=FE<CR>	<NAK>	Incorrect command syntax

4.3. Compressed Format (CF)

The CF symbol means Compressed Format and is used for any value using an exponent such as helium signal, inlet pressure, etc. Refer to the table below for converting a raw reading to the CF format. The decimal point is implied to be after the mantissa value.

Table 3:   CF Examples

Example	Raw reading	CF format
Leak rate	4.23E-07	423-09
Pressure	3.00E+2 (300)	300-00
Factor	2.57E-1 (0.257)	257-03

4.4. Immediate Commands

Refer to the table below for all available Immediate commands. Immediate commands always start with a "!" character.

Table 4:   Immediate Commands

Command	Description
!@DE	Factory Reset
!AC	Start Calibration
!AC1	External calibrated leak connected and opened
!AC2	External calibrated leak connected and closed
!AC3	External calibrated leak rate stable
!AC4	Background stable
!AE	Calculate External correction coefficient
!AS	Stop Calibration
!CKC	Start Cal Check
!RE	Reset Warning
!SW	Filament Change
!WA	Reset Warning

4.5.   Request Commands

Refer to the table below for all available Request commands. Request commands always start with a "?" character.

Table 5:   Request Commands

Command	Description	Response	Details
?@AC1<CR>	Accessory 1 & 2 Setting (use AC2 or Accessory 2)	xyz	x = 0: none x = 1: High Flow Evac Valve x = 2: High Flow Vent Valve x = 5: Pass light x = 6: Fail light y = 0: No Evac Rough y = 1: Evac Rough: High Flow & LD Rough y = Evac Rough: High Flow Only z = 0: No Evac Measure z = 1: Evac Measure: LD Measure z = 2: Evac Measure: LD Measure & Evac
?@DL<CR>	Data Log Settings	abcccc	a = E: enabled a = D: disabled b = T: test summary b = S: stream data per log time b = C: Cycle Combo cccc = log time in mm:ss
?@LACR>	Language	x	English, Spanish, German, French x = 0: English x = 1: Spanish x = 2: German x = 3: French Example: =SP0 C
?@OP<CR>	Option button	x	x = 0: None x = 1: Zero x = 2: Vent x = 3: Data Log (Stream) x = 4: Mute
?@PP<CR>	Primary Pump Configured	x	X = 0: no pump X = 1: Tower Wet X = 2: Horizontal Wet X = 3: Tower Dry X = 4: Horizontal Dry
?@PW<CR>	Technician Password	bbbb	bbbb = password
?@PWA<CR>	Advanced Level Password	abbbb	a = E: Operator Level enabled a = D: Operator Level disabled bbbb = password
?@RS<CR>	Remote Screen Enabled	x	x = E: ON x = D: OFF
?@S2<CR>	RS232 Baud Rate	x	X = 0: 9600

Command	Description	Response	Details
			X = 1: 19200 X = 2: 57600 X = 3: 111520
?@S4<CR>	RS485 Baud Rate	x	X = 0: 9600 X = 1: 19200 X = 2: 57600 X = 3: 111520
?@SW<CR>	Software Revision	aaaa	e.g. 1.05
?AA<CR>	Gross leak settings	CFx	CF: Gross Leak Rate Setpoint x = E: ON x = D: OFF
?AC<CR>	Calibration Start Type	x	x = E: Calibrate on startup x = S: Manual x = D: Service (advanced) x = V: Cal check on startup
?AC1<CR>	Peak value in Calibration	CF	CF: corrected leak value
?AC2<CR>	Background end of calibration	CF	CF: corrected leak value
?AC3<CR>	Corrected internal calibrated leak	CF	CF: corrected leak value
?ACA<CR>	Cal Check mode and frequency timers	abbbbbccccc	a = E: Automatic (per counters) a = D: Manual bbbbb: cycle numbers for automated Cal Check ccccc: hours for automated Cal Check
?AEH<CR>	External hard vacuum calibrated leak value	CF	CF: leak value
?AES<CR>	External sniff calibrated leak value	CF	CF: leak value
?AR<CR>	Background Max	CFx	CF: Background max value x = E: activate x = D: not active
?AUZ<CR>	Zero settings	xy	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
?AZ<CR>	Zero status	x	x = E: Zero ON x = D: Zero OFF
?CA<CR>	Automatic cycle settings	abccccdddd	a = E: automatic cycle stop a = D: manual cycle stop b = E: rough timer on b = D: rough timer off cccc: rough timer value (mm:ss) dddd: test timer value (mm:ss)

Command	Description	Response	Details
?CAK<CR>	Manual calibration acknowledge	x	x = E: An acknowledgement for Calibration is needed x = D: No acknowledgement needed
?CAS<CR>	Automatic cycle settings, Sniff mode	abccccdddd	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
?CF<CR>	Cal Factor (Filament sensitivity Coefficient)	CF1CF2	CF1: filament 1 coefficient CF2: filament 2 coefficient
?CH<CR>	Filament hour counters	aaaaabbbbbcccc c	aaaaa: leak detector hours bbbbb: filament 1 hours ccccc: filament 2 hours
?CY<CR>	Leak Detector status	aa	aa = ST: start-up phase aa = CZ: electronic zero calibration aa = CM: other calibration aa = HV: hard vacuum cycle aa = SN: sniff mode
?CYT2<CR>	Test mode status	y	y = 2: Fine mode y = 3: Ultra mode y = 6: Gross mode
?DA<CR>	Request the date		mm: month dd: day yy: year
?ER<CR>	Current Fault Status	Xaaaabbbb...	x = current number of faults aaaa, bbbb, ... – fault id information. -return up to 3 error codes See fault list
?FEM<CR>	Calibrated leak information used for calibration (internal or external)	xCFyzaabbccdd ddee	x = 2: Hydrogen x = 3: Helium 3 x = 4: Helium 4 CF: calibrated leak value y: Unit (see ?UN) 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

Command	Description	Response	Details
			ee: Temperature of the calibrated leak in °C internal or external Example: 4100-091E302002200522 A 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 it varies 3% /C.
?FEP<CR>	Calibration leak type	x	x = D: autocalibration using an external leak x = E: internal leak present with valve closed x = O: internal leak present with valve open
?FM<CR>	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
?GZ<CR>	Tracer Gas	x	x = 2: Hydrogen x = 3: Helium 3 x = 4: Helium 4
?HAC	Get calibration log number	nnn	nnn=count of log entries

?HACnnn	Get calibration log entry nnn	Cjjmmaahhmm	C = result code
			jj = day
			mm = month
			aa = year
			hh = hour
			mm = minute
			C = calibration result
			    0 : not initialized
			    1 : Calibration Fail
			    2 : Calibration OK
			    3 : Calibration check Fail
			    4 : Calibration check OK

?HDE	Get event history log	nnn	nnn=Count of log entries
?HDEnnn	Get event number nnn	cccc	cccc=Event code
?HMI<CR>	Get status for display on HMI Specific to 340 HMI		
?HP<CR>	Speaker status	x	x = E: Speaker on x = D: Speaker off
?HV<CR>	Hard vacuum correction factor	CFx	CF: correction factor x = E: activated x = D: deactivated
?IV	Status of vent valve	x	x=E, valve opened x=D, valve closed
?IVP	Vent mode	xyzmmss	x = M, manual x= A. venting is automatic y = delay 0,1 2 seconds

Command	Description	Response	Details
			z=E, r used z=D, timer not used mm= timer minutes ss= timer seconds note- if enabled, timer applies to both manual and automatic
?LE<CR>	Leak rate (corrected, current unit)	CFx	CF: signal value x = R: signal not corrected (always true in Standby) x = C: signal corrected (only true if in cycle and correction factor enabled)
?LE2<CR>	Leak rate (corrected, current unit)	CF	CF: signal value
?LE7<CR>	Leak rate (same as LE2 but includes '>','<'.	CFnx	CF: signal value n = C: corrected Else: not corrected x = < or > or blank
?MAS<CR>	Massive Leak mode status	xyz	x = E: Massive mode authorized x = D: Massive mode not authorized y = E: Massive mode in progress y = D: Massive mode not in progress
?MC0<CR>	Backing pump hour counter	xxxxxyyyyy	xxxxx: displayed value in hours yyyyy: maintenance hour interval
?MC1<CR>	Turbo pump hour counter	xxxxxyyyyy	xxxxx: displayed value in hours yyyyy: maintenance hour interval
?MCC<CR>	Total number of test cycles	CF1CF2	CF1: displayed value in number of cycles CF2: maintenance hour interval
?MD<CR>	Software version	Type_softeware code_software index	Example: VISTA L0483 V3.7r09
?P1<CR> or ?P1U<CR>	Gross mode pressure setpoint	CF	CF: crossover pressure Standard in mbar. "U" setting in current unit.
?P2<CR> or ?P2U<CR>	Ultra mode pressure setpoint	CF	CF: crossover pressure Standard in mbar. "U" setting in current unit.
?P5<CR> or ?P5U<CR>	Fine mode pressure setpoint	CF	CF: crossover pressure Standard in mbar. "U" setting in current unit.
?PAD<CR>	Bypass option settings	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

Command	Description	Response	Details
?PE<CR>	Inlet pressure (in current pressure unit)	CF	CF: inlet pressure in current status of leak detector in current units selected.
?PS	Analyzer cell pressure (in current pressure unit)	CF	CF: Analyzer cell pressure in current units selected.
?PW<CR>	Password settings	xxxxy	xxxx: password y = E: password activated y = D: password deactivated
?RBF	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
?RDY	Detector ready to test?	x	x = E: Detector ready to test x = D: Detector not ready to test
?RE	Result of last test	X	x = E: good part x = D: bad part
?REG	Regenerator or Burn-in status	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 start because Sniffing test is in progress y = C: Regeneration or Burn-in function can't start because Hard vacuum test is in progress zzzz: Start time of the Regen function or Burn-in functions. (hh:mm)
?S1<CR>	Reject point in current test mode	CF	CF: reject point in current units
?S1H<CR>	Reject point in hard vacuum mode	CF	CF: reject point in current units
?S1S<CR>	Reject point in sniffing mode	CF	CF: reject point in current units
?S6<CR>	Sniffer probe clogged setpoint	CF	CF: reject point in current units
?SC<CR>	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

Command	Description	Response	Details
?SHD<CR>	Detector shutdown status	x	x = 0: Detector is running x = 1: Detector is in shutdown
?SN<CR>	Sniff mode correction factor	CFx	CF: correction factor x = E: activated x = D: deactivated
?SO<CR>	Sound status	xy	x: volume level y = E: sound turned on y = D: sound turned off
?ST<CR>	Detector status integer	xxxxx	See detail section below for details
?SW<CR>	Active filament	x	x = 1: filament 1 active x = 2: filament 2 active
?SY<CR>	Digital voice status	xy	x: volume level y = E: digital voice turned on y = D: digital voice turned off
?SZ	Zero reference status	CF	CF: signal captured as zero
?T1<CR>	Turbo pump status	x	x = 0: default pump x = 1: rotation pump x = 2: synchronism pump x = 3: running-in pump x = S: pump stopped
?T1M<CR>	Turbo pump information	yyyyzz	yyyyy: hour counter zz: pump temperature (00 if not available)
?TE<CR>	Calibrated Leak Temperature	xxy	xx: temperature value in °C y = S: probe measure y = V: preadjusted value
?TI<CR>	Time information	hhmmss	hh: hours mm: minutes ss: seconds
?TIA<CR>	Last shutdown time	hhmmss	hh: hours mm: minutes ss: seconds
?TIC<CR>	Last calibration time	hhmmss	hh: hours mm: minutes ss: seconds
?TIM<CR>	Last start-up time	hhmmss	hh: hours mm: minutes ss: seconds
?TR<CR>	Leak Detector full status		See detail section below for details
?TST<CR>	Test method in hard vacuum	x	x = 0: Hard vacuum method x = 2: Sniffer method
?UN<CR>	Unit of measure selection	x	0: ppm 1: mbar.l/s 2: Pa.m3/h

Command	Description	Response	Details
			3: Torr.l/s 4: gr/yr 5: oz/yr 6: lb/yr 7: custom
?V1<CR>	Turbo pump speed measurement	xxxxy	xxxx: speed in rpm y = E: speed measurement valid y = D: measurement invalid
?VA<CR>	Valve Status	xxxxx	See <u>detail section below</u> for details
?VITH<CR>	Turbo pump speed hard vacuum	xxxxyyyy	xxxx: Target speed in Hz yyyy: Current speed in Hz
?VITS<CR>	Turbo pump speed sniff mode	xxxxyyyy	xxxx: Target speed in Hz yyyy: Current speed in Hz
?VPU<CR>	Purge Valve settings	x	x = E: Purge valve set to "Open" x = A: Purge valve set to "Automatic" x = D: Purge valve set to "Close"
?VT<CR>	Vent Valve settings	x	x = E: inlet vent ON x = D: inlet vent OFF
?WA<CR>	Warning information	xaaaabbbb…	x: current warnings number aaaa, bbbb, …: default code of each default -will only return 2 warnings -sorted by priority -use !RE to rest See Troubleshooting section
?ZB<CR>	Parameters of zero function	xyzzzzCF	x=A, automatic x=O, manual y=T triggered on timer (if automatic) y=S triggered on threshold y=_ (manual) zzzz=timer in mmss CF= threshold

4.6.   Parameter Commands

Parameter commands always start with a "=" character.

Table 6:   Parameter Commands

Command	Description	Details	Default Setting
=@AC1xyz<CR>	Accessory 1 setting (use AC2 or Accessory 2)	x = 0: none x = 1: High Flow Evac Valve x = 2: High Flow Vent Valve x = 5: Pass light x = 6: Fail light y = 0: No Evac Rough y = 1: Evac Rough: High Flow & LD Rough y = Evac Rough: High Flow Only z = 0: No Evac Measure z = 1: Evac Measure: LD Measure z = 2: Evac Measure: LD Measure & Evac	000
=@DLabcccc<CR>	Data Log enable, method, and time	a = E: enabled a = D: disabled b = T: test summary b = S: stream data per log time b = C: Cycle Combo cccc = log time in mm:ss	DT0001
=@LAx<CR>	Language	English, Spanish, German, French x = 0: English x = 1: Spanish x = 2: German x = 3: French Example: =SP0 C	0
=@OPx<CR>	Option button	x = 0: None x = 1: Zero x = 2: Vent x = 3: Data Log (Stream) x = 4: Mute	0
=@PPx<CR>	Primary Pump Configured	X = 0: no pump X = 1: Tower Wet X = 2: Horizontal Wet X = 3: Tower Dry X = 4: Horizontal Dry	
=@PWAbbbb<CR>	Advanced Level Password	bbbb = password	5226
=@PWabbbb<CR>	Technician Password	a = E: Operator Level enabled a = D: Operator Level disabled bbbb = password	D1234
=@RSx<CR>	Remote Screen Enabled	x = E: ON x = D: OFF	D

Command	Description	Details	Default Setting
=@S2x<CR>	RS232 Baud Rate	X = 0: 9600 X = 1: 19200 X = 2: 57600 X = 3: 111520	0
=@S4x<CR>	RS485 Baud Rate	X = 0: 9600 X = 1: 19200 X = 2: 57600 X = 3: 111520	0
=AACF<CR>	Gross leak settings	CF: Gross Leak Rate Setpoint x = E: ON x = D: OFF	100-07D
=ACAabbbbbccccc<CR>	Cal Check mode and frequency timers	a = E: Automatic (per counters) a = D: Manual bbbbb: end numbers for automated Cal Check ccccc: hours for automated Cal Check	D0005000010
=ACx<CR>	Calibration Start Type	x = E: Calibrate on startup x = S: Manual x = D: Service (advanced) x = V: Cal check on startup	S
=AExCF<CR>	External Calibration leak values	x = H: hard vacuum test x = S: sniff test CF: leak value	H100-09 S500-08
=APCFx<CR>	Automated Background Cleanup (Gross Mode)	CF: Gross Leak Rate Setpoint x = E: ON x = D: OFF	300-06E
=ARCFx<CR>	Background max settings	CF: Background max value x = E: activate x = D: not active	100-10D
=ARx<CR>	Background max	x = E: activate x = D: not active	D
=AUx<CR>	Zero status	x = E: Zero ON x = D: Zero OFF	D
=AUZxy<CR>	Zero settings	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	D1
=CAabccccdddd<CR>	Automatic cycle settings	a = E: automatic cycle stop a = D: manual cycle stop b = E: rough timer on b = D: rough timer off cccc: rough timer value (mm:ss) dddd: test timer value (mm:ss)	DD000010

Command	Description	Details	Default Setting
=CASabccccdddd<CR>	Automatic cycle settings, Sniff mode	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	DD000010
=CFCF<CR>	Cal Factor (Filament sensitivity Coeff)	CF: coefficient (0.1 <= CF <= 30) X = 1: filament 1 coefficient adjustment X = 2: filament 2 coefficient adjustment	
=CHx<CR>	Filament hour counter	x = 1: Filament 1 reset x = 2: Filament 2 reset	
=CYTx<CR>	Leak Test Mode	x = 2: Fine test mode x = 3: Ultra test mode x = 6: Gross mode	3
=CYx<CR>	Cycle Start / Stop	x = E: cycle start x = D: cycle stop	D
=DAmmddyy<CR>	Adjust the date	mm: month dd: day yy: year	
=FEMxCFyzaabbccddddee<CR>	Set the parameters of the calibrated leak used for the internal autocalibration (internal or external)	x = 2: Hydrogen x = 3: Helium 3 x = 4: Helium 4 CF: calibrated leak value y: Unit (see ?UN) 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	4123-091E012301201922
=FEPx<CR>		x = D: autocalibration using an external leak x = E: internal leak present with valve closed x = O: internal leak present with valve open x = M: machine selected (Hard vacuum test only) x = S: ext. sniffing selected (Sniffing test only) x = C: concentration selected (Sniffing test only)	E

Command	Description	Details	Default Setting
=GZx\<CR>	Tracer Gas	x = 2: Hydrogen x = 3: Helium 3 x = 4: Helium 4	4
=HPx\<CR>	Speaker Status	x = E: Speaker On x = D: Speaker Off	D
=HVCFx\<CR>	Hard vacuum correction factor	CF: correction factor x = E: activated x = D: deactivated	100-02D
=IVPxyzmmss\<CR>	Vent settings	x = M: Manual control of Vent valve x = A: automatic control of the vent valve y = opening delay in sec (0/1/2 sec) z = E: Use vent valve timer z = D: No vent valve timer mm = Vent timer value (minute) ss = Vent timer value (second)	M0D0009
=IVx\<CR>	Vent status	x = E: Vent On x = D: No Vent	D
=LDLCF\<CR>	Min display leak rate	CF: Lower display limit	100-15
=MASxy\<CR>	Massive Leak mode setting	x = E: Massive mode authorized x = D: Massive mode not authorized y = E: Massive mode in progress y = D: Massive mode not in progress	DD
=MC0Iyyyyy\<CR>	Primary pump initial hour value	yyyyy: initialization value in hours	00000
=MC0Z\<CR>	Primary pump counter reset		
=MC1Iyyyyy\<CR>	Turbo pump maintenance interval	yyyyy: initialization value in hours	17200
=MC1Z\<CR>	Turbo pump counter reset		
=MCCICF\<CR>	Total number of test cycles	CF: cycle counter initial value	500+03
=MCCZ\<CR>	Cycle counter reset		
=P1CF\<CR> or =P1UCF\<CR>	Gross mode pressure setpoint	CF: crossover pressure Standard in mbar. "U" setting in current unit.	250-01
=P2CF\<CR> or =P2UCF\<CR>	Ultra mode pressure setpoint	CF: crossover pressure Standard in mbar. "U" setting in current unit.	500-03
=P5CF\<CR> or =P5UCF\<CR>	Fine mode pressure setpoint	CF: crossover pressure Standard in mbar. "U" setting in current unit.	500-02
=PADabc\<CR>	Bypass option settings	a = E: Bypass active a = D: Bypass not active b = 0: no Bypass mode b = 1: Bypass mode: Quick pump b = 2: Bypass mode: partial flow c = 1: Internal pumping not delayed c = 2: Internal pumping delayed	D01

Command	Description	Details	Default Setting
=PWxxxxy<CR>	Password Settings	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)	5555D
=RBFx	Background Suppression	x = E: Background suppression ON x = D: Background suppression OFF	E
=REGx<CR>	Background Cleanup and Burn-in status	x = 0: Stop Background Cleanup or Burn-in function x = 1: Start Background Cleanup x = 2: Start Burn-in function without calibration x = 3: Start Burn-in function with calibration	
=S1CF<CR>	Reject point in current test mode	CF: reject point in current units	
=S1CFx<CR>	Reject point	CF: reject point in current units x = H: Hard Vac mode x = S: Sniff Mode	
=S6CF<CR>	Sniffer probe clogged setpoint	CF: reject point in current units	
=SCx<CR>	Filament control	x = E: filament on x = D: filament off x = R: reset the triode safety	
=SFx<CR>	Sniff Mode enable	x = E: activate sniff mode x = D: stop sniff mode	
=SNCFx<CR>	Sniff mode correction factor	CF: correction factor x = E: activated x = D: deactivated	
=SOxy<CR>	Sound status	x: volume level y = E: sound turned on y = D: sound turned off	
=SWx<CR>	Active filament	x = 1: filament 1 active x = 2: filament 2 active	
=SYxy<CR>	Digital voice status	x: volume level y = E: digital voice turned on y = D: digital voice turned off	
=T1x<CR>	High vac pump control	x = E: pump start x = D: pump stop x = H: pump hour counter reset x = R: pump running in	
=TES<CR>	Manifold temp for calibration		
=TEV<CR>	Preset temperature for calibration		
=TIhhmmss <CR>	Time setting	hh: hours mm: minutes ss: seconds	

Command	Description	Details	Default Setting
=TIhhmmss<CR>	Time adjust	hh: hours mm: minutes ss: seconds	
=TSTx<CR>	Test method in hard vacuum	x = 0: Vacuum method x = 2: Sniffer method	0
=UNx<CR>	Unit of measure selection	0: ppm 1: mbar.l/s 2: Pa.m3/h 3: Torr.l/s 4: gr/yr 5: oz/yr 6: lb/yr 7: custom	1
=V1x<CR>	Turbo pump speed measurement	x = E: validate the speed measurement x = D: cancel the speed measurement	
=VITxyyyy<CR>	Turbo pump speed adjustment	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	
=VPUx<CR>	Purge Valve settings	x = E: Purge valve set to "Open" x = A: Purge valve set to "Automatic" x = D: Purge valve set to "Close"	
=VTx<CR>	Vent Valve in standby	x = A: valve always opened in standby x = D: valve always closed in standby	
=ZBxy<CR>	Zero function settings	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	
=ZBxyzz<CR>	Zero advanced settings	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 «mm:ss» CF: threshold	

4.7. Long Command Information

4.7.1   ST Command

The ST commands returns a 16-bit integer. Parse the 16-bit integer (0-65535) into a binary array of 0's and 1's, then refer the table below for the leak detector status information.

Table 7:   ST Command Table

Bit	Description	0 Value	1 value
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	In cycle status bit 4,3 0,0 = Roughing 0,1 = Fine or Gross Mode 1,0 = Ultra Mode		
5	Sniffing On / Off	Vacuum Method	Sniff Method
6	Calibration OK, Not OK	Not Ok	OK
7	Locked Control Panel	Locked	Unlocked
8	Fault	No Faults	Faults Active
9	Inlet Valve Status	No Vent	Inlet Vent
10	Cycle Start OK	No	Yes
11	Turbo Pump at speed	No	Yes
12	N/A		1
13	N/A		1
14	Sniffer Probe clogged	Clogged	Not clogged
15	N/A		1

Example: Receive integer 64351 and convert to binary.

Table 8:   Example ST command

Bit	Decimal	Binary Decode	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 vacuum pump at synchronism
12	4096	1	N/A
13	8192	1	N/A
15	16384	1	Sniffer probe not clogged
15	32768	1	N/A
Total	64351	11111011010111	

4.7.2   TR Command

The TR command comes in three packets of data: [CF][xxxxx][CF].

Example: 991-12 65179 340+00

1.   Helium signal corrected in compressed format (CF): $9.91E^{-10}$ mbar.l/s

2.   Detector status code. See ST Command above.

3.   Inlet pressure in compressed format (CF) in mbar: $3.4E_{-2}$ mbar

4.7.3   VA Command

The VA command returns a 5-digit integer. Parse the integer into a binary array of 0's and 1's and then refer to the table below for indication of which valves are open.

Table 9:   VA command reference table

Valve ID	Valve Description / Function
0	(none)
1	Rough
2	Foreline / Gross Test
3	Fine Test
4	Ultra-Test 1
5	Ultra-Test 2
6	Vent
7	Cal Leak
8	(none)
9	(none)
10	Sniffer
11	Purge
12	(none)

Manual Name: TITAN VERSA Communication Interface
Product Group: TITAN VERSA Leak Detector
Manual Rev Number: SMT-07-1039, Rev. A1