I N T E R F A C E D E S C R I P T I O N

iins70e1-c (1005)

Catalog No.

550-000, 550-001
550-100, 550-101
550-500, 550-501

from software version

V 4.4 (UL1000)
V 4.4 (UL1000 Fab)
V 4.4 (UL5000)

UL1000 (Fab)/ UL5000

Helium Leak Detectors

INFICON

Content

1 Interface Description

1.1 Preface

The RS232 porotocol uses an ASCII format: so every leak detector can be controlled with a simple terminal programm.

Choose the interface porotocol „ASCII“ to connect the leak detector with the computer via RS232 interface.

In case the leak detector shall also be controlled via computer (START, STOP, ZERO, etc.), set the “control location” at the leak detector to „RS232“ or „local and RS232“.

The following parameter of interfaces are in use:

19200 baud, 8 databits, 1 stopbit, no parity.

1.2 Interface Connecting Cable

The RS232 interface is wired as data communication equipment (DCE). The leak detector provides a 9-way sub-D socket for the connector. The signals are assigned as follows:

Pin	Name	Signal
2	RxD	Receive data (leak detector → PC)
3	TxD	Transmit data (PC → leak detector)
5	GND	Reference Ground

The other pins are not being used.

The levels on the RS232 interface are defined as follows:

Level	Low (L)	High (H)
Voltage Range	-3 V … -25 V	3 V … 25 V
Logic State	logical 1	logical 0
Level Designation	Mark	Space

1.3 Command Format

In ASCII protocol any command starts with « * » (ASCII code 42dec) and is finished with the end sign selected (e.g. CR). There is no differentiation between upper and lower case. A blank is required between the command and the parameter, no other blanks are allowed.

There is a short and an extended form of the command. Either the short or the extended command must be used, no other abbreviations are allowed. Command Words have to be separated by a colon. A command can be composed of up to three words. Parameters have to be separated by a comma.

Each command is answered with „ok“ or „EXX“ (in case of an error). For a list of all error message see section 4.1.3. The transmission can be cancelled with ESC (ASCII code 27dec), ^C (ASCII code 3dec) or ^X (ASCII code 24dec).

Some commands can be used as queries, some can be used to set menu parameter and some can be used for both. A query is marked by a „?“ (ASCII code 63dec) after the command, for setting data the command has to be followed by the new value to be set.

Parameter can be Boolean or numerical:

<b> Boolean 0 / 1 or OFF / ON

<No> Numeric representation format: integer, real (15.6) or exponential (4.5E-7)
Format: [space] [sign] [ddd] [.] [ddd] [e[sign]ddd] (d: digit)

Notice Always use a point as the decimal marker. If a comma is used during numerical data entry, the conversion of the number is cancelled at this point and only the integer part of the number will be used.

Commands in brackets - as in *status[:CAL] - are optional commands and do not necessarily need to be transmitted.

The following table lists all comands available in the ASCII mode.

Notice Between command words and Parameters is always a blank sign.

RS232 Connecting Cable

A standard RS232 cable can be used (straight-through connecting cable, RxD and TxD not crossed). The RS232 hardware handshake must be switched off (in RS232 control program written by the user). If switching off of the hardware handshake is not possible, an RS232 connecting cable wired as follows may also be used:

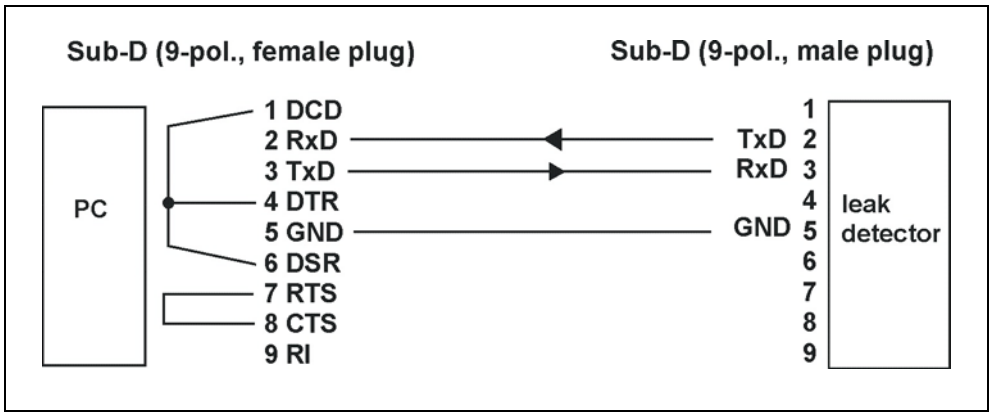

Fig. 1-1 RS232 cable

1.4 Error messages

0	ERR_OK	command completed
1	ERR_CMD_START	wrong command start (no "*")
2	ERR_ERR_BLANK	illegal blank
3	ERR_CMD_WORD_1	command word 1 illegal
4	ERR_CMD_WORD_2	command word 2 illegal
5	ERR_CMD_WORD_3	command word 3 illegal
6	ERR_DISABLED	control by RS232 not enabled
7	ERR_ARGUMENT	argument faulty
8	ERR_NO_DATA	no data available
9	ERR_BUFFER_OVERFLOW	buffer overflow
10	ERR_INVALID	command invalid
11	ERR_NO_QUERY	query not allowed
12	ERR_QUERY	only query allowed
13	ERR_NOT_IMPLEMENTED	not implemented

1.5 Parameter

<b>	Boolean:	0 / OFF or 1 / ON respectively
<NRf>	Numeric representation format: integer, real (15.6) or exponent (4.5E-7)	
[space] [sign] [ddd] [.] [ddd] [e|E[sign]ddd]		

1.6 Examples

Command	answer	
*stat? (CR)	MEAS (CR)	mode
*status? (CR)	MEAS (CR)	mode
*read? (CR)	2.876E-7 (CR)	leak rate according to programmed unit
*read:pa*m3/s? (CR)	2.876E-6 (CR)	leak rate in a different unit
*start (CR)	OK (CR)	start messurment
*conf:trig1? (CR)	1.0E-9	retrieve trigger 1
*conf:trig1 2.0E-9 (CR)	OK	set trigger 1

1.7 Command list

*CLS			clear Error
*IDN			identification
	:CRC		check sum
	:DEVice		name of instrument (UL1000, UL1000Fab, UL5000)
	:VERsion		software version
	:SERial		serial-Number
	:TURBO		software version TC600
	:MC68		hardware identification MC68
	:IOversion		hardware identification IO-Karte
	:GBversion		hardware identification control panel
	:VDversion		hardware identification mother board
	:DIP1		MC68 DipSwitch 1
	:DIP2		MC68 DipSwitch 2
	:TURBO		software version frequency converter
*STATus			mode of calibration routine
			INIT, ACCL, STBY, VENT, WAIT_EVAC, EVAC, MEAS, CAL, ERROR
	[:CAL]		mode calibration
			IDLE, EVAC, OPEN, TUNE, TUNE_RES, CLOSE, STABLE_CLOSE, WAIT_OK
	[:CALHist]		CAL History (1…12)
	[:CALMode]		kind of calibration INT_AUTO, INT_MAN, EXT
	[:ERRor]		error
	[:ERRorHist]		error History (1…12)
	[:ZERO]		zero
	[:RANGE]		measuring mode GROSS, FINE, ULTRA
	:BOOSTER		Booster-TMP State (UL5000 only): OFF, ACCL, NORM, FAIL
	:RESULT		AutoLeakTest state/result: IDLE, RUNNING, PASS, FAIL
	:TESTLog		Test-Log
*READ			leak rate (selected unit)
	[:<unit>]		leak rate (desired unit)
*STArt			start
*STOp			stop
*PURGE			Purge on
	:OFF		Purge off
*VENt			vent
*CAL			start calibration / proceed (see Chapter 1.8)
*ZERO			zero
	[:OFF]		zero off

*MEAS			
	:P1		inlet pressure
	:P2		foreline pressure
	:P3		inlet pressure (UL5000)
	:OFFset		offset current [A]
	:IMess		current raw values [A]
	:IFilter		current filtered [A]
	:UNV		amplifier voltage [V]
	:UVV		preamplifier voltage [V]
	:MIAP		anode potential [V]
	:MIKP		cathode potential [V]
	:MISP		suppressor potential [V]
	:MIAKP		anod-/cathode potential [V]
	:VALVE		valve voltage [V]
	:U24EXT		external voltage [V]
	:U24FB		voltage remote contol [V]
	:U24FAN		fan voltage [V]
	:TEMPeratur		
		:Amplifier	preamplifier temperature [°C]
		:Electronic	electronic temperature [°C]
	:TURBO		
		:Frequency	TMP frequency [Hz]
		:Voltage	TMP voltage [Hz]
		:Current	TMP current [A]
		:Power	TMP power [W]
	:BOOSTER		Booster-TMP frequency (UL5000 only)
*CONFig			
	:ALARMDelay		alarm delay after evacuation (0 ... 600, 65535)
	:AUDio		audio alarm type (PIN, SET, TRIG, PROP)
	:BACKGround <b>		background display (ON, OFF)
	:BEEP <b>		beep-sound (ON, OFF)
	:BOOster		Booster-TMP Mode: ON, OFF
	:CALAccess <b>		CAL access (ON, OFF)
	:CALleak		leak rate of test leak
		:INT	internal test leak
		:EXTVAC	external test leak in vacuum mode
		:EXTSNIFF	external test leak in sniff mode
	:CALREQ <b>		calibration request
	:CAThode		cathode
	:CONTrol		control location (LOCAL, RS232, PLC, LOCAL/RS232, LOCAL/PLC)
	:FREQuenz		mains frequency (50/60Hz)
	:HYDros		HYDROS: DISABLED, ON, OFF
	:ICAL <b>		filter type
	:LANGuage		language (ENGlish, DEUtsch, FRAncais, ITAliano, POLski, KATakana, CHInese, ESPanol, KORean)
	:LCDAutorange <b>		display range (auto, manual)
	:LCDContrast		display contrast (0 ... 99)
	:LCDDECades		number of display decades (2 ... 9)
	:LCDInvert <b>		invert display
	:LCDSCALELog <b>		display scale
	:LIMITLow		lower display limit (0 ... 7)
	:MASS		mass (2, 3, 4)
	:MFAE:		anode potential reference

		:M2	mass 2
		:M3	mass 3
		:M4	mass 4
	:MINVOLume		minimum audio volume (0 ... 15)
	:MODE		mode (HYDROS, AUTO, VAC, SNIFF, SNIFFSP)
	:PARTCOUNT		Part counting enabled: ON, OFF
	:PARTNO		Current part number
	:PEVACGROSS		Pressure switching level: EVAC to GROSS
	:PGROSSFINE		Pressure switching level: GROSS to FINE
	:PROTection		protecting functions
		:CONTamination <b>	contamination protection (ON, OFF)
		:CONTLimit	contamination protection limit
		:EVACtime	maximum evacuation time (0 – infinite)
		:PARTicle <b>	particle protection (ON, OFF)
		:PMAX	maximum pressure in sniff
		:PMIN	minimum pressure in sniff
	:PURGe <b>		Automatic purge: ON, OFF
	:RECorder		recorder output
		:LINK1_2 / 12 :LINK3_4 / 34	off, p1, p2, mant, exp, lr_lin,. Lr_log, p3
	:RS232		RS232 mode (ascii, binary)
	:SUPPRession		Background suppression: OFF, INTERN, INLET
	:TESTINGTime :TESTINGTIMEmax		Maximum testing time for AutoLeakTest
	:TESTINGTIMEMIN		Minimum testing time for AutoLeakTest
	:TIMEAXIS		Time axis resolution: AUTO or time in seconds
	:TMPVENT		TMP vent after power off: ON, OFF
	:TRIGger1		trigger 1
	:TRIGger2		trigger 2
	:UNIT		
		:LR	leak rate unit (mbar*l/s, Pa*m³/s, atm*cc/s, Torr*l/s, ppm, g/a, oz/yr)
		:Pressure	pressure unit (mbar, Pa, atm, Torr)
	:VENTdelay		vent delay (0, 1, 1.5, 2, NO)
	:VOLume		
	:ZERO		zero (OFF, ON, ULTRA)
*HOUR			
	:DATE		date
	:DEVICE		operating hours
	:POWer		time since power on
	:RUNup		run-up time
	:SERVice		
		:TURBO	service turbopump
		:FORE	service foreline pump
		:FILTER	service filter
	:TIME		time
	:TURBO		operating hours TMP
	:TC		operating hours frequency converter
*FACtor			
	:VACuum		calibration factor vacuum (selected mass)
		:M2	calibration factor vacuum (mass 2)
		:M3	calibration factor vacuum (mass 3)
		:M4	calibration factor vacuum (mass 4)

	:SNIFf		calibration factor sniff
		:M2	calibration factor sniff (mass 2)
		:M3	calibration factor sniff (mass 3)
		:M4	calibration factor sniff (mass 4)
	:MACHine		machine factor

1.8 Calibration via RS232

Two different kinds of calibration can be called via „*CAL“:

1.8.1 Internal Automatical Calibration

When the leak detector is in STAND-BY mode the command „*CAL“ evokes an internal autmatical calibration. The process is completely automatical. Via „STATus?“ the computer can realise if the calibration routine is finished.

1.8.2 External Calibration

When the leak detector is in measurement mode the command „*CAL“ evokes a calibration routine for external calibration. Before starting the external calibrated leak has to be opend and the leak rate signal has to be stable. Via the command „*STATus:CAL?“ the computer can detect when the external calibrated leak has to be closed

When the external calibrated leak is closed and the leak rate signal stable the computer has to advise the leak detector via a second command „*CAL“. Via the command „*STATus?“ the computer can recognize when the calibration routine has finished.

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