



Interface Description

Sensistor[®] Sentrac[®]

Serial Protocol Description

Catalog No.

Type number: SEN.122.164, SEN.122.165, SEN.122.166

From software version

4.01.01



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1 General Information

1.1 Related Models

The descriptive contents of the interface description is intended for use the following INFICON leak detectors.

Sensistor Sentrac			Part no.
1	Sensistor Sentrac, desktop model	For stationary use	590-970
2	Sensistor Sentrac, portable model	12 hours operating time on batteries	590-971
3	Sensistor Sentrac, panel model	For stationary use	590-972

1.2 Related Manuals

Manual	
Sensistor Sentrac Combined Operating Manual	Part no. 592-186
IO1000 Operating Instructions	Document no. jjqc10en1

1.3 Document History

Revision	Date	Remark
01	10-2023	First public release

2 Connections

2.1 USB-C

When connected to a PC it can be used to control and configure the leak detector.
When a memory stick is connected it can be utilized for software upgrades, transfer of log files and import and export of parameter settings.

Data format: 115200 baud, 8 data bits, no parity, 1 stop bit

2.2 LD BUS

The LD Bus can be used to connect to IO1000 and BM1000 modules.
The current software version is only prepared for IO1000 operation.

Data format: 19200 baud, 8 data bits, no parity, 1 stop bit

2.3 I/O (APC) Port

The I/O (APC) port can be used to connect an AP29ECO.

The In and Out signals are 24 V.

Pin designation	Function	Status Output
P01	GND	GND
P02	24 V	24 V
P03	Output	
P07	Output	
P08	Output	
P09	Output	
P10	Output	ACCEPT
P11	Output	
P12	GND	GND
P13	Output	WAIT
P14	Output	SIGNAL
P15	Output	ON
P16	Output	CALIBRATION OK
P17	Output	REJECT
P18	Output	ERROR
P19	Input	
P20	Input	

Pin designation	Function	Status Output
P21	Input	
P22	Input	
P23	Input	
P24	GND	GND

2.4 24 V + GND

This connection is not described in this manual. It is included in this list for completeness only.

This connection is labelled Not Connected on the Desktop and Portable models.

2.5 PROBE CONNECTION

This connection is not described in this manual. It is included in this list for completeness only.

3 Protocols

Two serial Interface protocols can be used to communicate to this instrument. They are the ASCII Protocol and the LD Protocol.

The LD protocol will be enabled in the later software version 5.01.01.

ASCII- and LD protocol have nearly the same functional range, but each of them have some advantages and disadvantages:

ASCII protocol:

Advantages:

- human readable
- easy to use with simple terminal program
- Disadvantages:
- No checksum, therefore lower data security
- PC/ PLC software must convert numerical values from ASCII string to binary
- Lower efficiency (for example: 8 data bytes for one float value)

LD protocol:

Advantages:

- Leak detector status always transmitted in each slave telegram
- High data security due to CRC checksum
- Binary transmission of numerical values – no conversion needed in PC/PLC software
- High efficiency (for example: 4 Byte data bytes for one float value)

Disadvantages:

- Not human readable
- Not useable with simple terminal program

3.1 ASCII Protocol

3.1.1 Command Format

In ASCII protocol all commands start with « * » (ASCII code 42dec/2Ahex) and is finished with the end sign CR (ASCII code 13dex/0Dhex). 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 (In this document the short form is written in capitals but the SW don't difference upper and lower cases). Command Words have to be separated by a colon. A command can be composed of up to four words. Parameters have to be separated by a comma.

Each command is answered with the requested data, „ok“ or „EXX“ (in case of an error). A list of all error messages, can be found in chapter "Error Messages". The transmission can be cancelled and the receive-buffer will be cleared with ESC (ASCII code 27dec/1Bhex), ^C (ASCII code 3dec/03hex) or ^X (ASCII code 24dec/18hex).

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/3Fhex) 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:

	Boolean	0 / 1 or OFF / ON
<No>	Numeric representation format: integer, real (15.6) or exponential (4.5 ⁻⁷)	
	Format: [space] [sign] [ddd] [.] [e[sign]ddd] (d:digit)	



Error due to incorrect format

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.

► Always use a point as the decimal marker.

Timing recommendations for the PC/PLC - Program:

- Sample rate > 100 ms
- Timeout between request to and answer from Sentrac: 1500 ms

After sending a command the answer must be waited for before sending a new command. Otherwise the receive buffer may be overwritten.

3.1.2 Commands

Command	Meaning	Refers to LD command no.	Query	Format
*READ	Most recent measure value	128	R	Float as string: "%f"
*BEEP	Play a beep	423	W	Sound through the air
*CAL	Start a calibration, currently only when in APC mode	4	W	
*WAKE	Wake up screen from screensaver	2710	W	Screen wakes up
*START	Start APC measurement cycle if possible	1	W	
*IDN:SERial	Sentrac serial number	406	R	1-16 chars
*IDN:VERsion	Sentrac software version	310	R	major, minor, patch: MM.mm.pp
*IDN:BUILDTIME	Sentrac software time of build	2701	R	mon-dd-yyyy hh-mm-ss
*IDN:BUILDHASH	Git hash of Sentrac software	2703	R	8 chars mon dd yyy hh:mm:ss
*IDN:BLVersion	Sentrac boot loader version	318	R	
*IDN:SNSerial	Probe serial number	404	R	1-16 chars
*IDN:SNVersion	Probe software version	312	R	8 chars
*IDN:SNBLVersion	Probe boot loader version	2704	R	8 chars
*IDN:SNTYPE	Probe type	302	R	"Unknown", "Strix", "P60", "Combox60", ...
*IDN:IOVersion	IO module version	313	R	major.minor.patch
*IDN:IOSerial	IO module serial number	408	R	11 chars
*STATus:SERVHist	Service date	2641	R	dd-mm-yyyy hh:mm
*STATus:MODE	Current mode	401	R/W	One of mode list
*STATUS:BUS_WORD	Get the current bus statusword.	322	R	Hexadecimal representation of a u16, see table below
*STATUS:SWITCH_ON_COUNT	The number of startups for this unit	157	R	integer: [0, 65535]
*MEASure:U24	Read input voltage of leak detector	200	R	Float as string: "%f"
*MEASure:U24IO	Read input voltage of IO module	213	R	Float as string: "%f"
*MEASure:LDIN	Read input state of IO connector	255	R	2 hex digits as text, see table below

Command	Meaning	Refers to LD command no.	Query	Format
*MEASure:LDOuT	Read output state of IO connector	257	R	4 hex digits as text, see table below
*MEASure:MODIN	Read input state of PLC In on IO1000	261	R	4 hex digits as text, see table below
*MEASure:MODOuT	Read output state of PLC Out on IO1000	262	R	2 hex digits as text, see table below
*CONF:MUTE	Mute volume	18	R/W	"ON" or "OFF"
*CONF:VOLuMe	Read or set Sentrac volume	420	R/W	integer: [0, 20]
*CONF:AUDIO_BASE_FREQ	Read or set audio base frequency	2748	R/W	integer: One from base frequency list.
*CONF:MUTE_IF_HEADP	Mute or unmute speaker when headphone is connected	2749	R/W	"ON" or "OFF"
*CONF:MUTE_IF_SRNSAVE R	Mute or unmute speaker when screensaver is active	2750	R/W	"ON" or "OFF"
*CONF:RST_FACTDEF_CFG	Reset configuration to factory default	1161	W	
*CONF:RST_CAL_CFG	Reset calibration configuration	1161	W	
*CONF:RECIPE:ACTIve	Enable/disable recipe system	2705	R/W	"ON" or "OFF"
*CONF:RECIPE:CURRent	Read or set current recipe will load the recipe on set. If the recipe name does not exist. The command will fail silently.	2706	R/W	1-12 chars
*CONF:GAS:NAME	Read or set current measure gas (unrecognized text interpreted as user-custom unit)	2130	R/W	One from gas list or a custom gas(1-13 chars).
*CONF:GAS:VISCOsity	Read or set current measure gas viscosity, set only for custom gas.	2137	R/W	Float as string: "%f"
*CONF:GAS:DENSity	Read or set current measure gas density, set only for custom gas.	2732	R/W	Float as string: "%f"
*CONF:SHOW_GAS_NAME	Read or set if gas name should be displayed	2734	R/W	"ON" or "OFF"

Command	Meaning	Refers to LD command no.	Query	Format
*CONF:TRIGGER1	Read or set the current reject level	384	R/W	Float as string: "%f"
*CONF:LANGUAGE	Read or set the language	398	R/W	integer: Microsoft LCID from language list.
*CONF:SCRENSAVER	Read or set the screensaver time	2708	R/W	One from screensaver interval list.
*CONF:BRIGHTNESS	Read or set the screen brightness	2709	R/W	integer: [1, 10]
*CONF:SHOW_REJECT_LVL	Enable or disable displaying the reject level	2745	R/W	"ON" or "OFF"
*CONF:REJECT_CHOP	Enable or disable audio reject chop	2746	R/W	"ON" or "OFF"
*CONF:REJECT_FLASH	Enable or disable probe lamp reject flash	2747	R/W	"ON" or "OFF"
*CONF:CAL:CORRelation	Read or set the current correlation value	1467	R/W	Float as string: "%f"
*CONF:MEASURE:AUDIO_THRESHOLD	Read or set the current measure audio threshold	2735	R/W	integer: [0, 90]%
*CONF:MEASURE:MIN_PRESENTATION_TIME	Read or set the measure min presentation time	2736	R/W	integer: [0, 65535] ds
*CONF:MEASURE:DISPLAY_THRESHOLD	Read or set the measure display threshold	2737	R/W	integer: [0, 90]%
*CONF:MEASURE:READY_PULSE	Enable or disable measure ready pulse	2738	R/W	"ON" or "OFF"
*CONF:LOCATE:SENSitivity	Read or set the configuration sensitivity value	2744	R/W	integer: [1, 15]
*CONF:LOCATE:AUTO_RANGE	Read or set locate auto range enabled	2740	R/W	"ON" or "OFF"
*CONF:LOCATE:AUDIO_THRESHOLD	Read or set the locate audio threshold	2739	R/W	integer: [0, 90]%
*CONF:LOCATE:REJECT_INDICATE	Enable or disable locate reject indication	2741	R/W	"ON" or "OFF"
*CONF:LOCATE:READY_PULSE	Enable or disable locate ready pulse	2742	R/W	"ON" or "OFF"
*CONF:LOCATE:DIRECT_SENS_ADJ	Enable or disable locate direct sensitivity adjust	2743	R/W	"ON" or "OFF"

Command	Meaning	Refers to LD command no.	Query	Format
*CONF:UNIT:LRSNIFF	Read or set current measure-mode unit (unrecognized text interpreted as user-custom unit)	432	R/W	One of unit list or a custom unit(1-13 chars).
*CONF:PROBE_FUNCTION	Read or set probe button function	422	R/W	Text one from probe function list
*CONF:PROBE_LAMP	Enable or disable probe lamp	2751	R/W	"ON" or "OFF"
*CONF:BUSMODULE	Read or set busmodule type	2717	R/W	"IO1000" or "BM1000"
*CONF:BUSMODULE_ACTIVE	Enable or disable busmodule external 24V	2754	R/W	"ON" or "OFF"
*CONF:PROTOCOL_IO	Read or set io1000 protocol software configured	2593	R/W	"LD" or "ASCII"
*CONF:ACTIVE_PROT_IO	Read IO1000 protocol in use, software configured can be overruled by switches on module	1800	R/W	"LD" or "ASCII"
*CONF:CAL:UNIT	Read or set calibration unit (unrecognized text interpreted as user-custom unit)	428	R/W	One of unit list or a custom unit(1-13 chars).
*CONF:CAL:LEAK_VALUE	Read or set calibration leak value	830	R/W	Float as string: "%f"
*CONF:CAL:SAMPLE_TIME	Read or set calibration sampling time	2729	R/W	integer: [3, 60]
*CONF:CAL:GAS:NAME	Read or set calibration gas name	2730	R/W	One from gas list or a custom gas(1-13 chars).
*CONF:CAL:GAS:VISCosity	Read or set calibration gas viscosity, set only for custom gas.	2731	R/W	Float as string: "%f"
*CONF:CAL:GAS:DENSity	Read or set calibration gas density, set only for custom gas.	2733	R/W	Float as string: "%f"
*CONF:CAL:INTERVAL	Read or set calibration interval	418	R/W	One of Calibration interval list.
*CONF:CAL:INTERVAL_ENABLED	Read or set calibration interval enabled	419	R/W	"ON" or "OFF"
*APC:PURGE	Read or set APC purge state	15	W	

Command	Meaning	Refers to LD command no.	Query	Format
*CONF:APC:TIMER:ACCUMULATING	Read or set APC accumulating timer	2724	R/W	integer: [0, 4294967295]ds
*CONF:APC:TIMER:SAMPLING	Read or set APC sampling timer	2725	R/W	integer: [0, 4294967295]ds
*CONF:APC:TIMER:MEASURING	Read or set APC measuring timer	2726	R/W	integer: [0, 4294967295]ds
*CONF:APC:TIMER:AFTER_PURGE	Read or set APC after purge timer	2727	R/W	integer: [0, 4294967295]ds
*CONF:APC:PURGE_TRIGGER	Read or set APC purge trigger	2728	R/W	One of 0.0, 1.0, 2.0, 5.0, 10.0
*HOUR:DATE	Current date	450	R/W	dd-mm-yyyy
*HOUR:TIME	Current time (setting seconds is optional)	450	R/W	hh:mm
*HOUR:POWER	Time since power on in minutes	147	R	Unsigned decimal int as string: "%u"
*HOUR:DEVICE	Operating hours of unit in hours.	142	R	Unsigned decimal int as string: "%u"

3.1.3 Configuration values

These tables list the predefined values for certain settings, e.g. for the measure-mode gas these are the strings which are not treated as a user-custom setting.

Upper- and lowercase letters are ignored.

Gas	Setting string
Air	Air
H ₂	H2
He	He
N ₂	N2
r22	r22
r134a	r134a
r290	r290
r404a	r404a
r407c	r407c
r410a	r410a
r600a	r600a
r1234yf	r1234yf

Unit	Setting string
ppm	ppm
Pa m ³ /s	Pa m3/s
cc/s	cc/s
cc/min	cc/min
SCCM	SCCM
g/y	g/y
oz/y	oz/y
mbarl/s	mbarl/s
mm ³ /s	mm3/s
mm ³ /min	mm3/min

Language	MS-LCID
English	9
German	7
Chinese	4
Japanese	17
French	12
Italian	16
Spanish	10

Calibration interval

Off	OFF
1 hour	PT1H
2 hours	PT2H
4 hours	PT4H
8 hours	PT8H
12 hours	PT12H
1 day	P1D
2 days	P2D
7 days	P7D
14 days	P14D
30 days	P30D
60 days	P60D

Screensaver interval

Off	OFF
30 seconds	PT30S
1 minute	PT1M
2 minutes	PT2M
5 minutes	PT5M
10 minutes	PT10M
20 minutes	PT20M
30 minutes	PT30M
1 hour	PT1H
2 hours	PT2H

Mode

- Measure
- Locate
- Combined
- APC

Base frequency

- 200
- 300
- 400
- 500
- 600
- 700

Probe button

- NO_FUNCTION
- TOGGLE_MODE
- ZERO_LOCATE_SIGNAL
- PROBE_LAMP
- PRINT
- SENSITIVITY

Input / Output hex description

LD Outputs	Hex code	Logic
P03	0001	Not inverted
P04	0002	Not inverted
P05	0004	Not inverted
P06	0008	Not inverted
P07	0010	Not inverted
P08	0020	Not inverted
P09	0040	Not inverted
P10	0080	Not inverted
P11	0100	Not inverted
P13	0200	Not inverted
P14	0400	Not inverted
P15	0800	Not inverted
P16	1000	Not inverted
P17	2000	Not inverted
P18	4000	Not inverted

LD Inputs	Hex code	Logic
P19	01	Not inverted
P20	02	Not inverted
P21	04	Not inverted
P22	08	Not inverted
P23	10	Not inverted
PROBE 1	20	Inverted
PROBE 2	40	Inverted
Headphones	80	Inverted

Module Outputs	Hex code	Logic
PLC Out 1	01	Not inverted
PLC Out 2	02	Not inverted
PLC Out 3	04	Not inverted
PLC Out 4	08	Not inverted
PLC Out 5	10	Not inverted
PLC Out 6	20	Not inverted

Module Outputs	Hex code	Logic
PLC Out 7	40	Not inverted
PLC Out 8	80	Not inverted

Module Inputs	Hex code	Logic
PLC In 1	0001	Not inverted
PLC In 2	0002	Not inverted
PLC In 3	0004	Not inverted
PLC In 4	0008	Not inverted
PLC In 5	0010	Not inverted
PLC In 6	0020	Not inverted
PLC In 7	0040	Not inverted
PLC In 8	0080	Not inverted
PLC In 9	0100	Not inverted
PLC In 10	0200	Not inverted
DIP 1 (S1.1)	0400	Not inverted
DIP 2 (S1.2)	0800	Not inverted
DIP 3 (S1.3)	1000	Not inverted
DIP 4 (S1.4)	2000	Not inverted
DIP 5 (S2.1)	4000	Not inverted
DIP 6 (S2.2)	8000	Not inverted

Status word

ID	Name
0	COMBO
1	MEASURE
2	LOCATE
3	APC
4	MENU
5	CALIBRATE
6	SERVICE
7	SPLASH

Bit number	Function	Bit mask
1	STATE	0x000F
2		
3		
4		
5	ZERO	0x0010
6	STILL_WARNING	0x0020
7	PROBE_BUTTON	0x0040
8	USER_CHANGE	0x0080
9	PLC_OUT_CHANGE	0x0100
10	REJECT	0x0200
11	SIGNAL	0x0400
12	RESULT_READY	0x0800
13	CALIBRATION_OK	0x1000
14	WARNING	0x2000
15	ERROR	0x4000
16	COMMAND_ERROR	0x8000

3.1.4 Examples

*IDN:VERSION?<CR> is used to get the software version.

*HOUR:DATE dd-mm-yyyy<CR> is used to set or get the current date.

3.1.5 Error Messages

Message	Meaning
OK	command completed
E01	wrong command start (no „*“)
E02	illegal blank
E03	command word 1 illegal
E04	command word 2 illegal
E05	command word 3 illegal
E06	control by RS232 not enabled
E07	argument faulty
E08	no data available
E09	error buffer overflow
E10	command invalid
E11	query not allowed

Message	Meaning
E12	only query allowed
E13	not yet implemented
E14	command word 4 illegal



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