

Translation of the Original

CU1000

Operating unit

Catalog No.
560-320

From software version
2.72 (LDS3000) / 2.72 (CU1000)

jina54en1-06-(1901)



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1 About these instructions

1.1 Target groups

These operating instructions are intended for the owner and for technically qualified personnel with experience in leak detection technology and integration of leak detection devices in leak detection systems. In addition, the installation and use of the device require knowledge of electronic interfaces.

1.2 Other associated documents

Mass spectrometer module operating instructions	jiqa54
Operating instructions bus module	jiqb10
Operating instructions I/O module	jiqc10
Protocol Descriptions	jira54

1.3 Warnings



⚠ DANGER

Imminent hazard resulting in death or serious injuries



⚠ WARNING

Hazardous situation resulting in potential death or serious injuries



⚠ CAUTION

Hazardous situation resulting in minor injuries

NOTICE

Hazardous situation resulting in damage to property or the environment

2 Safety

2.1 Intended use

The unit is intended for querying and configuring the data of the mass spectrometer module LDS3000.

- ▶ Install, operate and service the unit only in compliance with these instructions.
- ▶ Maintain the application limits (refer to Chapter 4.3, page 10).

2.2 Owner requirements

Safety conscious operation

Operate and install the device only in technically perfect working order and as specified, in a safety-conscious and hazard-conscious manner and in compliance with these instructions.

- ▶ Fulfill and ensure compliance with the following regulations:

- Intended use

Universally valid safety and accident prevention regulations

- International, national and local standards and guidelines

- Additional device-related provisions and regulations

- ▶ Use only original parts or parts approved by the manufacturer.
- ▶ Keep this manual available at the operating site.

Personnel qualifications

- ▶ All work must be performed only by technically qualified specialists who have been trained on the device.

- ▶ Allow personnel in training to work on the device only under the supervision of technically qualified specialists.

- ▶ Make sure that the authorized personnel have read and understood these instructions and all other applicable documents (refer to "Other associated documents"), especially the information on safety, maintenance and repairs, before starting work.

- ▶ Define responsibilities, authorizations and supervision of personnel.

2.3 Operator requirements

- ▶ Read, observe and follow the information in these instructions and the working instructions created by the owner, especially the safety instructions and warnings.

3 Shipment, Transport, Storage

Shipment

Item	Quantity
Control unit	1
Touch PIN	1
Operating instructions	1

- ▶ Please check the scope of delivery of the product for completeness after receipt.

Transport

NOTICE

Damage due to unsuitable packaging material

Transport in unsuitable packaging material can damage the device.

- ▶ ▶ Transport the device only in the original packaging.
- ▶ ▶ Keep the original packaging.

Storage

- ▶ Store the device taking into consideration the technical data, refer to Chapter 4.3, page 10.

4 Description

4.1 Device setup

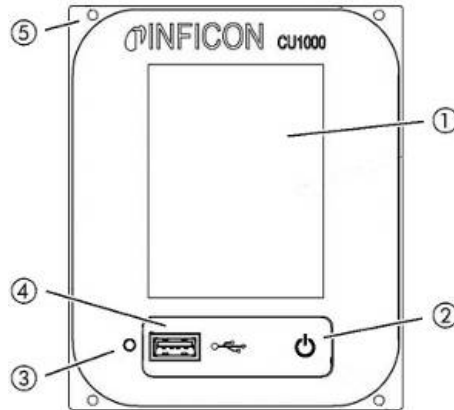


Fig. 1: Front view

1	Touchscreen	4	USB port
2	Status LED	5	Mounting holes
3	Rest button		

Status LED

Status LED illuminated	Control unit operates normally
Status LED flashing	Display is set to power saving mode

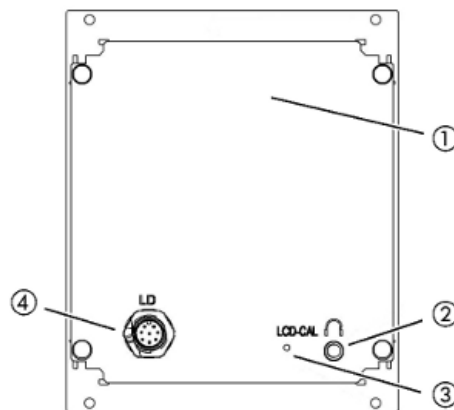


Fig. 2: Rear view

1	Rating plate with control unit	3	Calibration button for calibrating the touch screen (LCD-CAL), can be operated with touch PIN
2	Connection for headphones	4	Connection for the cable to the leak detector (LD)

4.2 Function

You can use the control unit to configure the mass spectrometer module LDS3000. It also lets you output the data stored in the MSB box.

4.3 Technical data

Mechanical data

	560-320
Dimensions (lxwxh)	106,2 mm x 128,4 mm x 49,2 mm

Electrical data

	560-320
Memory capacity for measured data	16 MB

Ambient conditions

	560-320
Max. altitude above sea level	2000 m
Max. relative humidity above 40 °C	50%
Max. relative humidity from 31 °C to 40 °C	80% to 50% (linear abfallend)
Max. relative humidity to 40 °C	80%
Storage temperature	-20 °C - 60 °C
Pollution degree	II

5 Installation

5.1 Connecting the control unit

Establish connection of "LD" of the control unit and "Control Unit" of the MSB box with the data cable.

The data cable on the control unit can also be connected or removed during operation.

- ▶ If needed, connect headphones or speakers to the headphones symbol.



DANGER

Hearing damage from loud volume setting

Loud volume setting can damage hearing.

- ▶ Do not set volume of headphones too loud.

5.2 Installing the control unit

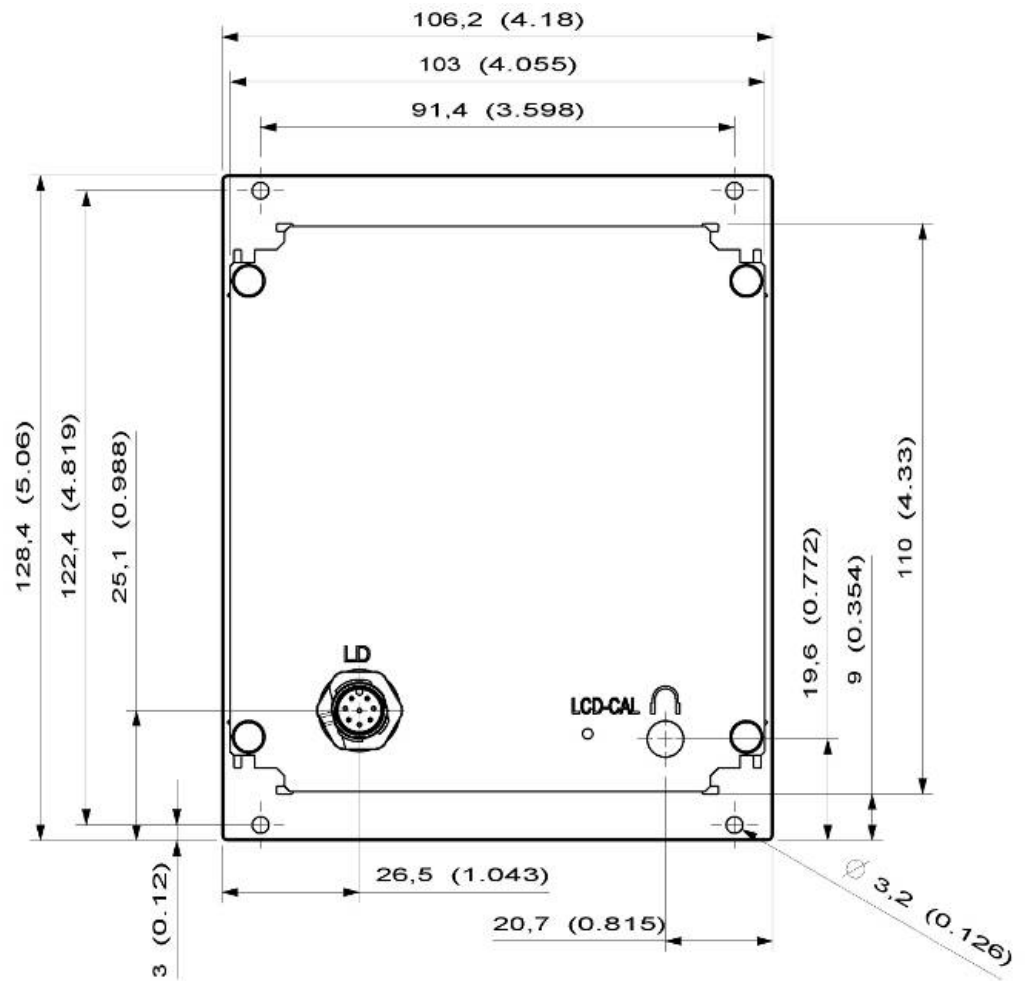


Fig. 3: Dimensions of the control unit in mm (inches in brackets)

- Recess for the control unit integrated in the test system.
- ▶ Push the control unit into the recess and screw it tight.
- ▶ Pull protection film from touch screen.

6 Operation CU1000

NOTICE

Damage to touch screen from incorrect operation.

The touch screen can be damaged with a hard or pointed item.

- ▶ Operate touch screen with fingers only.

6.1 Touchscreen elements

6.1.1 Measurement display elements

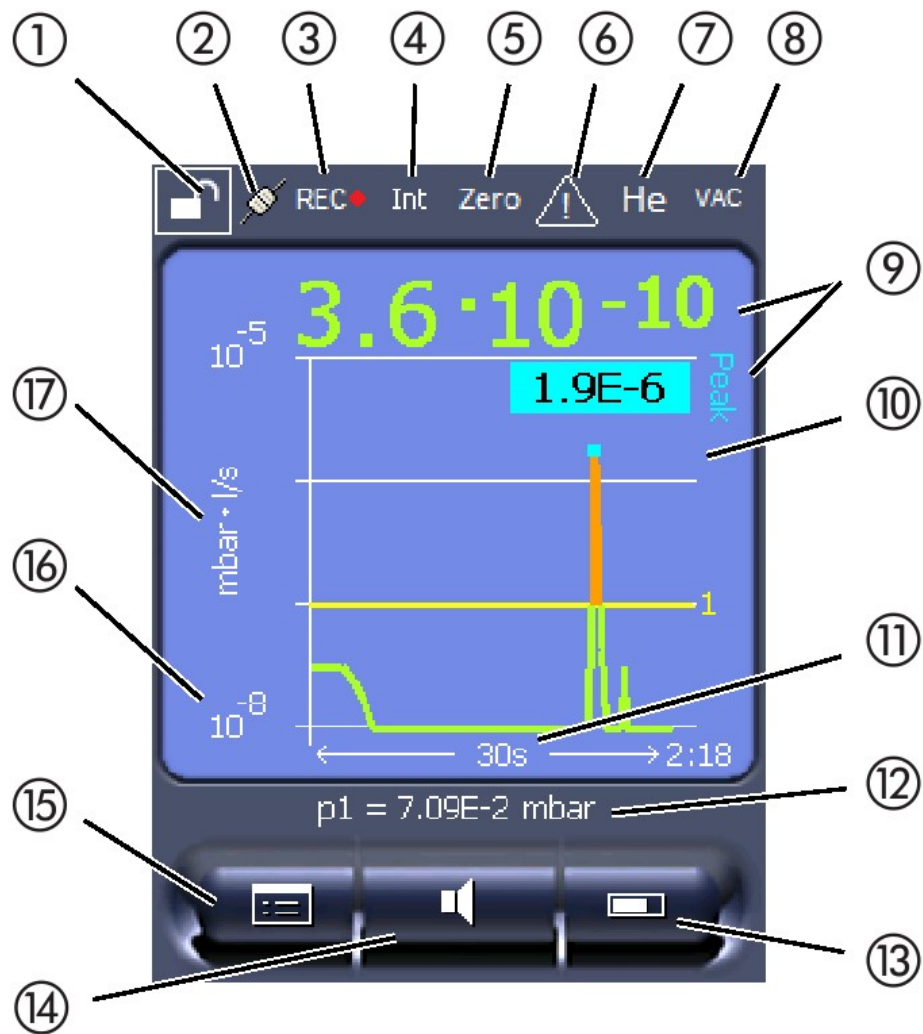


Fig. 4: Measurement display

1	Keyboard lock	2	Communication status	3	Data recording
4	Operator	5	Zero	6	Message
7	Tracer gas	8	Operation mode	9	Leak rate with peak hold function
10	Graphic representation of the leak rate and the peak hold function	11	Time axis	12	Foreline pressure
13	Button "Favorite 2"	14	Button "Favorite 1"	15	Menu
16	Value axis	17	Value axis		

1 - Keyboard lock

The control unit is locked or unlocked by pressing and holding the icon for the keyboard lock.

2 - Icon for the communication status

- Icon connected: The device communicates with the mass spectrometer module.
- Icon disconnected: The device does not communicate with the mass spectrometer module.

Establish communication:

- 1 Reset control unit.
- 2 Checking the status of the mass spectrometer module.
- 3 Check cable connection.

3 - Icon for the data recording

The measurement is recorded.

4 - Ser

The registered operator is shown abbreviated.

Display	Meaning
Ope	Operator
Sup	Supervisor
Int	Integrator
Ser	Service

For more information, see Chapter 6.2.2., Page 20.

5 - Zero

Background suppression is active.

6 - Caution icon

Active warnings are stored in the unit.

The active warnings can be displayed via the menu "Info > History > Warnings".

7 - Tracer gas

Set tracer gas and tracer gas concentration percentage.

Display	Meaning
He	Helium (^4He)
H2	Hydrogen
M3	E.g. H-D, ^3He or H_3

8 - Operation mode

Configured operation mode

Display	Operation mode
VA	Vacuum
SNIF	Sniff
LOW FLOW	XL sniffer adapter in LOW FLOW
HIGH FLOW	XL sniffer adapter in HIGH FLOW
Standby	XL sniffer adapter in HIGH FLOW on standby

9 - Leak rate

Current measurement for the leak rate.

10 - Graph

Graphic display of the leak rate $Q(t)$.

11 - Leak rate

Time axis of the leak rate $Q(t)$.

12 - Primary vacuum pressure (not with operation mode XL Sniffer Adapter)

Backing pressure p_1 .

13 - Button "Favorite 2"

You can assign preferred parameters to this button (see Page 19). In Fig. 4 the button "Favorite 2" is assigned the function "Start/Stop" for example.

14 - Button "Favorite 1"

You can assign preferred parameters to this button (see Page 19). In Fig. 4 the button "Favorite 1" is assigned the function "ZERO" for example.

15 - Icon for the menu

All functions and parameters of the control unit can be accessed using the "Menu" key .

A full display of the menu of the menu is included as a file on the USB flash drive supplied with the LDS3000.

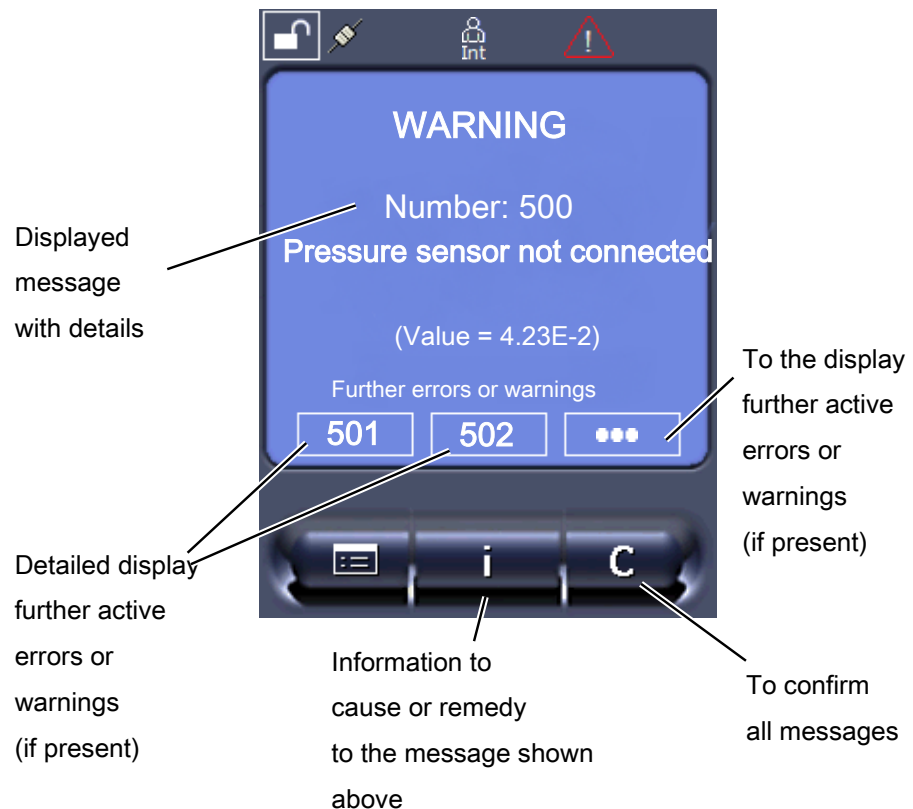
16 - Value axis

Value axis of the leak rate $Q(t)$.

17 - Device of measurement

Device of measurement of the value axis.

6.2 Elements of the error and warning display



You will find an overview of possible errors and warnings in the operating instructions of the LDS3000 (mass spectrometer module), chapter "Warning and error messages".

6.3 Settings and functions

Settings and functions of the control unit are explained in the following. You will find the settings and functions of the mass spectrometer module LDS3000 you can set using the control unit in the operating instructions of the mass spectrometer module.

6.3.1 Touch screen settings

The touch screen grays out the parameters if

- the user is not authorized to modify the values,
- the older version of the software run by mass spectrometer module LDS3000 does not support this parameter.

Scaling of the Q(t)axis

Linear or logarithmic	
Lin.	
Log.	
Control unit	
Display > Q(t) axis > Linear or logarithmic	
Number of decades with logarithmic view	
1	
2	
3	
4	
Control unit	
Display > Q(t) axis > Decades	
Autoscale	
Off (When "Off", you can change the appearance by pressing the intersection of the coordinate axes, then flicking and releasing the desired axis with your finger, or by pressing and releasing the end of the desired co-ordinate axis)	
On	
Control unit	
Display > Q(t) axis > Auto scale	

Scaling of the time axis

Scaling of the time axis	
15 s	240 s
30 s	480 s
60 s	960 s
120 s	
Control unit	
Display > Time axis > Time axis scale	

Display units	Device of pressure	
	Mbar	Atm
	Pa	Torr
	Control unit	
	Display > Units (display) > Pressure unit	
Measured value display	Type of graphic display	
	Diagram	
	Bar graph	
	Control unit	
	Display > Measurement view > Measurement view mode	
	Numeric representation of the measurements	
	Off	
	On	
	Control unit	
	Display > Measurement view > Show value	
Display brightness	Display brightness	
	20 ... 100%	
	Control unit	
	Display > Brightness > Display brightness	
Trigger display on the touch screen	Selection of the trigger (leak rate threshold) displayed on the touch screen.	
	1	
	2	
	3	
	4	
	Control unit	
	Settings > Trigger > Trigger sel.	
Assigning favorite buttons	The favorite buttons offer direct access to individual functions. They can be assigned with access control "Supervisor" or higher by the user.	
	Favorite 1: Middle button (see Fig. 4, Page 15).	
	Favorite 2: Right button	
	Favorite 3: Button on the bottom right of the main menu.	
	CAL	Volume
	ZERO (at AQ instead of ZERO: ZERO AQ)	- - - (= without function)
	Measurement view	Check CAL
Start/Stop	Flow control (At AQ additionally: AQ Wizard)	

	View settings	
	Control unit	Settings > Favorites > Favorite 1 (2, 3)
Display of messages on the touch screen	Warnings and error messages can be displayed on the touch screen.	
	Off	
	On	
	Control unit	Settings > Set up > Control unit > Messages > Show warnings
Show calibration note	Suppress or allow the calibration note with the following content:	
	<ul style="list-style-type: none"> Leak rate of the applied calibration leak No calibration should take place during the first 20 mins 	
	OFF (suppressed)	
	ON (allowed)	
	Control unit	Settings > Set up > Control unit > Messages > Show calibration notes
Show calibration request	The calibration request can be allowed or suppressed.	
	OFF (suppressed)	
	ON (allowed)	
	Control unit	Settings > Set up > Control unit > Messages > Show calibration request
Display of messages on the touch screen	Warnings and error messages can be displayed on the touch screen.	
	Off	
	On	
	Control unit	Settings > Set up > Control unit > Messages > Show warnings
Setting the audio alarm	Volume of the headphones or active speaker	
	--- No sound	
	Proportional: The frequency of the audible signal is proportional to the bar graph display or diagram height. The frequency range is 300 Hz to 3300 Hz.	
	Setpoint: The pitch is proportional to the leak rate. The signal sounds if the leak rate exceeds the selected trigger value.	

Pinpoint: The sound of the acoustic signal changes its frequency within a specific range of leak rates. **Range:** A decade below the selected trigger threshold up to one decade above. The sound keeps at a constant low and a constant high frequency below and above this range, respectively.

Trigger: If the selected trigger threshold is exceeded, a two-pitch signal sounds.

Control unit	Settings > Set up > Control unit > Audio > Audio alarm mode
--------------	---

Behavior with warnings or error messages: If the touch screen shows a warning or an error, then a two-pitch signal sounds simultaneously.

Automatic switch off of the touch screen

The touch screen can be switched off automatically after a specific time without any operation to save energy.

30 s	10 min
1 min	30 min
2 min	1 h ∞ (=never)
5 min	

Control unit	Settings > Set up > Control unit > Energy > Display off after
--------------	---

6.3.2 Operator types and authorizations

There are four different operator types that are distinguished by different authorizations. The integrator is registered ex works.

Additional operators can be registered. The following table shows options for individual operator types to register new operator types.

Operator registration

Viewer	Operator	Supervisor	Integrator
-	Operator	Supervisor	Integrator
	Viewer	Operator	Supervisor
		Viewer	Operator
			Viewer

For the types "Integrator", "Supervisor" and "Operator", a four-digit PIN must be assigned during registration (0000 ... 9999). "0000" is assigned to all operators ex works.

If an operator keeps the pin "0000", this operator will always be registered is during the start up of the system (without PIN query).

A key-operated switch can be used in addition to a PIN if an I/O module is connected. The key-operated switch is connected to the I/O module via three digital inputs (see operating instructions of the LDS3000).

The following table shows the authorizations of individual operator types.

6.3.2.1 Logging out the operator

The operator activates access level "Viewer" to log out. "Access Ctrl > Viewer"

6.3.3 Functions

6.3.3.1 Resetting the settings

Mass spectrometer module	The settings of the mass spectrometer module can be reset to factory settings.	
	Control unit	Functions > Data > Parameters > Reset > MSB settings
Access controls	The authorization for changing parameters can be reset to factory setting.	
	Control unit	Functions > Data > Parameters > Reset > Param. access control
Control unit	The control unit settings can be reset to factory settings.	
	Control unit	Functions > Data > Parameters > Reset > Control unit settings

6.3.3.2 Recording data

The data is saved as a TXT file. Each TXT file contains the following information:

- Date created
- Software version
- Serial number
- Start time
- Time stamp (measurement indicates offset in seconds in relation to start time)
- File name
- Time stamp (offset in seconds in relation to start time)
- Leak rate (expressed in selected unit)
- Pressure p1 (expressed in selected unit)
- Device status

Switching on/off	Switching data recording on/off	
	<ul style="list-style-type: none"> • Off • On 	
	Control unit	Functions > Data > Recorder > Settings > Data recording
Record interval	Time interval between data recordings	
	<ul style="list-style-type: none"> • 100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s 	

	Control unit	Functions > Data > Recorder > Settings > Record interval
Memory location	The data stored in the control unit can be saved to a USB stick. The memory in the control unit is limited to the recording of a 24-hour measurement.	
	<ul style="list-style-type: none"> • USB flash drive • Control unit 	
	Control unit	Functions > Data > Recorder > Settings > Storage location
Copy data	The data stored in the control unit can be saved to a USB stick. The memory in the control unit is limited to the recording of a 24-hour measurement.	
	<ul style="list-style-type: none"> • USB flash drive • Control unit 	
	Control unit	Functions > Data > Recorder > Copy > Copy files
Deleting data	The data stored in the control unit can be saved to a USB stick. The memory in the control unit is limited to the recording of a 24-hour measurement.	
	<ul style="list-style-type: none"> • USB flash drive • Control unit 	
	Control unit	Functions > Data > Recorder > Delete > Delete files

6.3.3.3 Calling up information

Different information and states of the system can be called up with the info menu.

Measurement values	<ul style="list-style-type: none"> • Preamplifier • Environment • TMP
Temperature	<ul style="list-style-type: none"> • Electronic • TMP
Energy and operating hours	<ul style="list-style-type: none"> • Energy values: Information on consumption values • Operation hours: Display for operating hours • Supply voltages: Information on internal supply voltages • Power supply: Information on the supply voltages of the components
History	<ul style="list-style-type: none"> • Error, error history / warning history • Calibration, calibration history • TMP error, TMP history • Warnings, active warnings

-
- Maintenance, maintenance history
- Control unit**
- Version control unit: Information on the software version
 - Memory: Information on available memory
 - Settings: Control unit settings.
 - Serial port wired: Information on the communication connection
 - Data exchange: Information on the data exchange between mass spectrometer module and the control unit
- Mass spectrometer module**
- MSB (1): Information on the software version
 - MSB (2): Information on operating parameters
 - TMP controller (1): Information on the turbo molecular pump
 - TMP controller (2): Information on the turbo molecular pump, continued
 - Ion source: Information on the ion source used
 - Preamplifier: Information on the preamplifier
 - Preamplifier test: Information on the preamplifier test.
- Interfaces**
- I/O module (1): Information on the software version, inputs and outputs
 - I/O module (2): Visualized information to the digital inputs

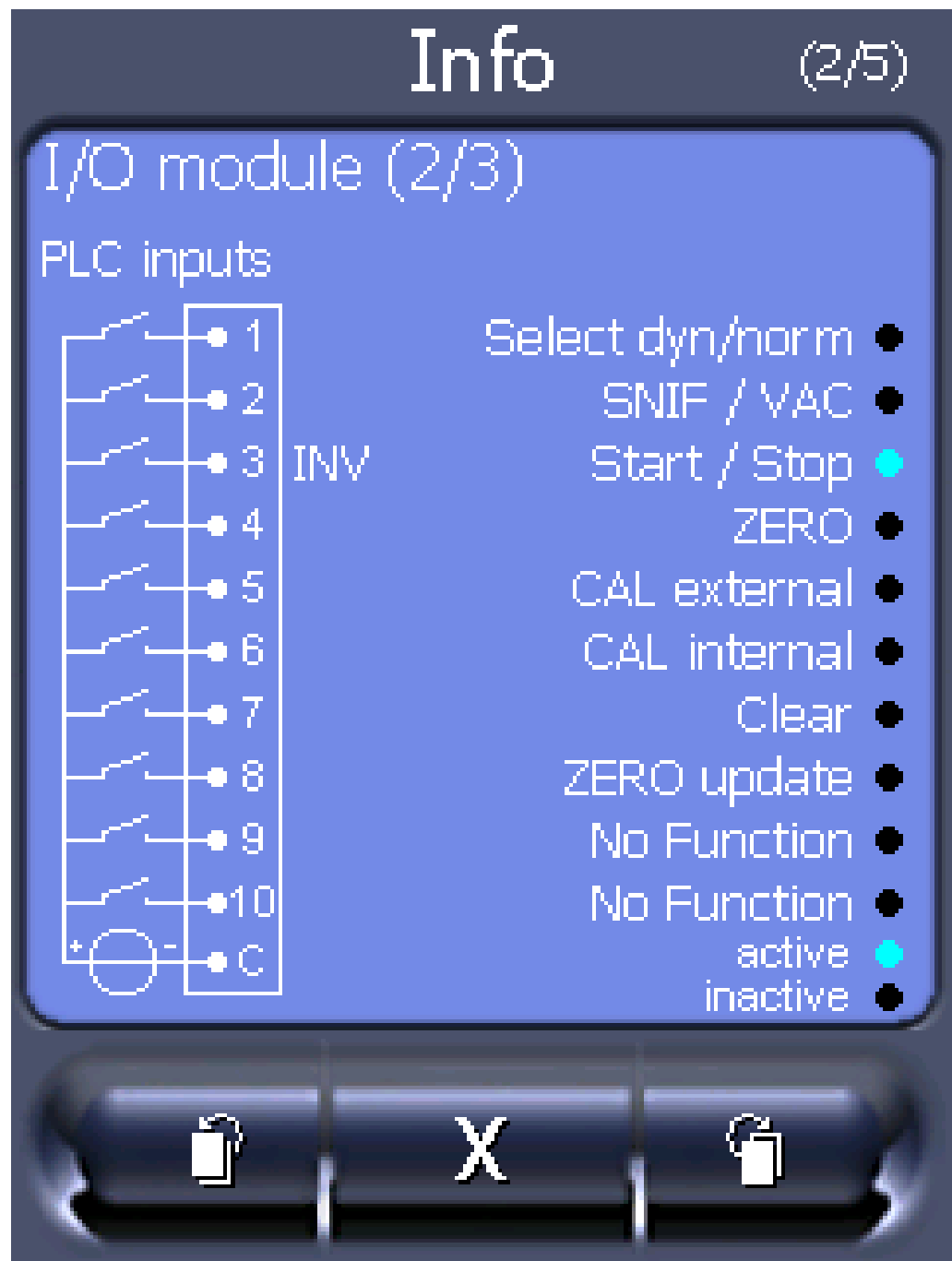


Fig. 5: I/O module (2): Visualized information to the digital inputs

1	Input signal condition	2	Configured function (INV = Function is inverted)
3	Status of the function (active or inactive)		

- I/O module (3): Visualized information to the digital outputs

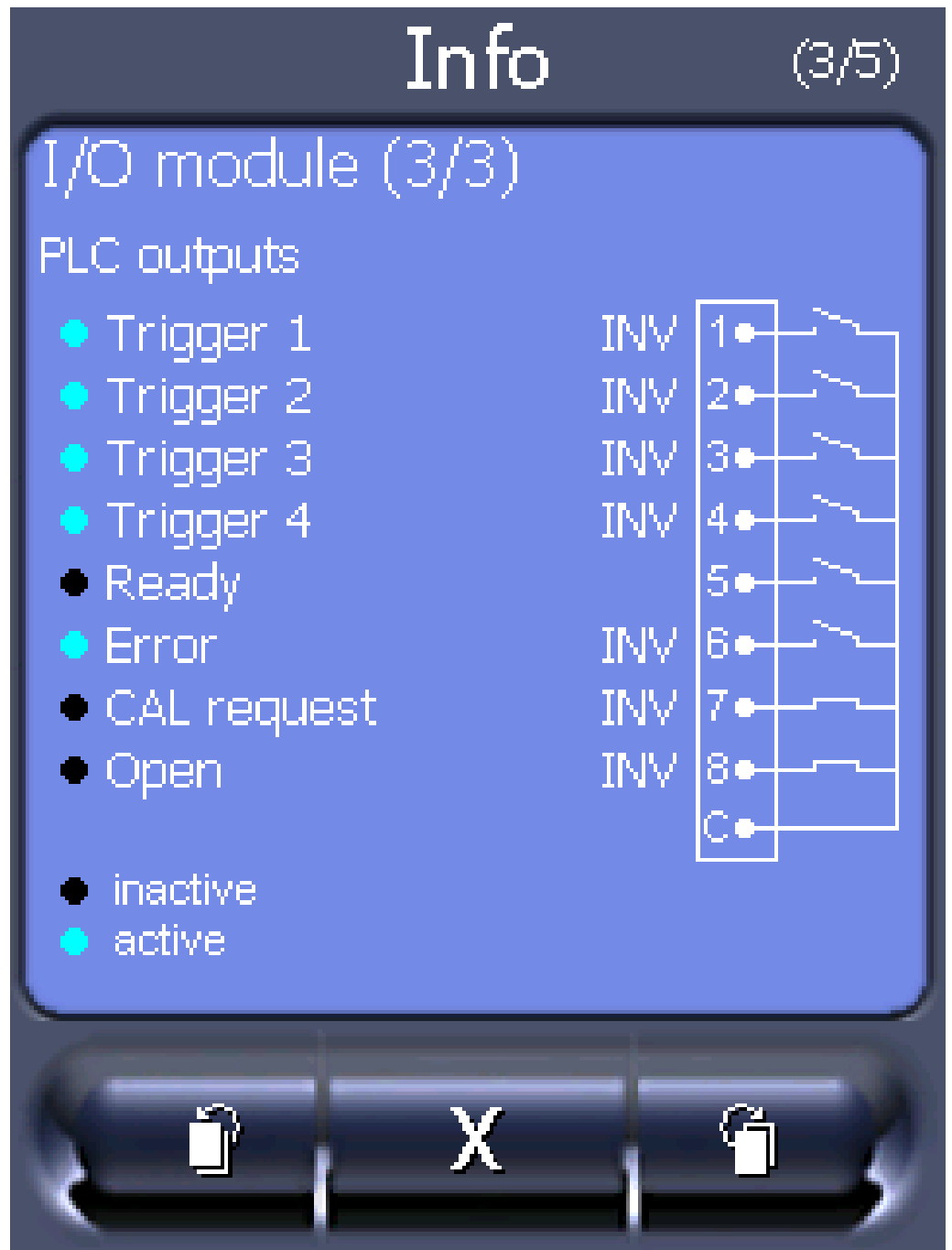


Fig. 6: Visualized information to the digital outputs

1	Configured function (INV = Function is inverted)	2	Output signal condition
3	Status of the function (active or inactive)		

- Bus module (1): Information on the bus module
- Bus module (2): Information on the bus module, continued

6.3.4 Updating the software

Software updates from INFICON are installed with the aid of a USB flash drive. The update function of the device can be found under "Functions > Data > Update".

An update is possible,

- if one or several updates are available on the USB flash drive, but only one update per type at most (control unit, MSB box, I/O module),
- if these parts are also connected free of disturbances and have an update function.

The corresponding buttons in the update menu such as "Control Unit", "MSB Box", and "I/O Module" are active and can be activated individually.

NOTICE

Aborted connection

Data loss due to an aborted connection

- ▶ Do not switch off the device and do not remove the USB flash drive while the software is being updated!

- ▶ Switch the device off and back on after a software update has taken place.

6.3.4.1 Updating the software of the control unit

The software is included in two files named Handset_IFC_Vx.xx.xx.exe and Handset_IFC_Vx.xx.xx.key.

- 1 Copy the file into the main directory of a USB flash drive.
- 2 Connect the USB flash drive to the USB port on the device.
- 3 Select: "Functions > Data > Update > Control unit".
 - ⇒ Do not switch off the device and do not remove the USB flash drive while the software is being updated!
- 4 Check the version information.
- 5 Select the "Start" button to start the update. Do not switch off the device and do not remove the USB flash drive while the software is being updated!
- 6 Follow the instructions on the touchscreen and wait until the update is complete.

6.3.4.2 Checking and updating the software version of the MSB box

The current software is available from the Inficon support.

The functions of the XL Sniffer adapter set are taken into consideration in system software version 2.11 or higher.

- 1** Copy the file `Flash_LDS3000_MSB_Vxx.xx.xxx.bin` into the main directory of a USB flash drive.
- 2** Connect the USB flash drive to the USB port on the device.
- 3** Select: "Functions > Data > Update > MSB".
 - ⇒ The display shows information on the current and the new software version as well as on the boot loader.
- 4** Check the version information.
 - ⇒ Select the "Start" button to start the update.
 - ⇒ Do not switch off the device and do not remove the USB flash drive while the software is being updated! Do not switch off the device and do not remove the USB flash drive while the software is being updated!
- 5** Follow the instructions on the touchscreen and wait until the update is complete.
- 6** If the system displays warning 104 or 106, confirm with "C".

6.3.4.3 Updating the software of the I/O module

The software of the I/O module can be updated from the control unit if the mass spectrometer module has the software version "MS module 1.02" or higher.

- 1** Copy the file `Flash_LDS3000_IO_Vxx.xx.xxx.bin` into the main directory of a USB flash drive.
- 2** Connect the USB flash drive to the USB port on the device.
- 3** Select: "Functions > Data > Update > I/O module"
 - ⇒ The display shows information on the current and the new software as well as on the current boot loader.
- 4** Check the version information.
- 5** Select the "Start" button to start the update.
 - ⇒ Do not switch off the device and do not remove the USB flash drive while the software is being updated!
- 6** Follow the instructions on the touchscreen and wait until the update is complete.
 - ⇒ The following tips are shown after selecting the "Start" button on the touchscreen:
 - Connect and switch on the IO1000.
 - Activate boot mode (switch DIP S2.3 on and off once).
 - When the STATUS LED flashes green, press OK.

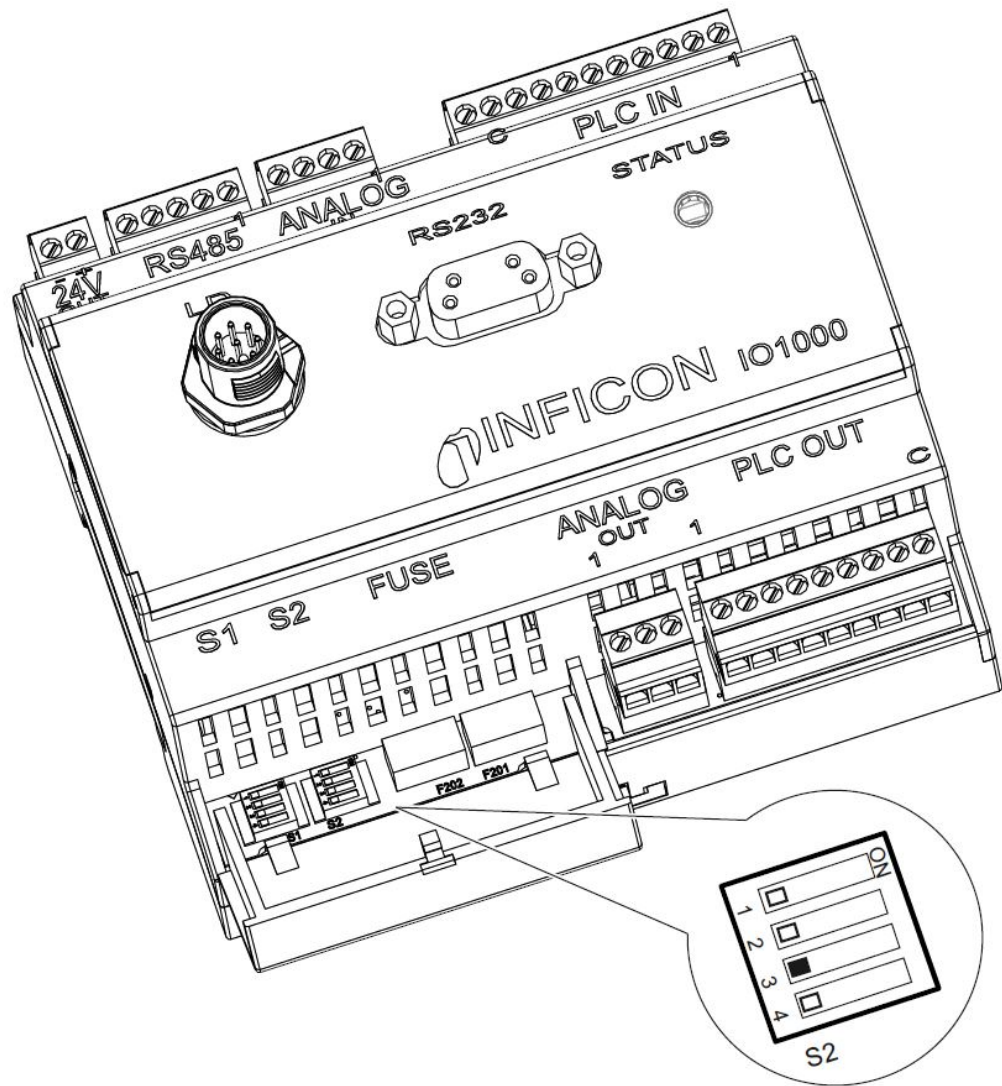


Fig. 7: DIP switch on the I/O module

7 Decommissioning the measuring instrument

7.1 Disposing of the device

The device can either be disposed of by the operator or be sent to the manufacturer. The device consists of materials that can be recycled. This option should be exercised to prevent waste and also to protect the environment.

During disposal, observe the environmental and safety regulations of your country.

7.2 Sending in the device



WARNING

Danger due to harmful substances

Contaminated devices could endanger the health. The contamination declaration serves to protect all persons who come into contact with the device.

- ▶ Fill in the declaration of contamination completely.

- 1** Please do not hesitate to contact us and send a completed declaration of contamination before sending anything to us.
⇒ You will then receive a return number from us.
- 2** Use the original packaging when returning.
- 3** Before sending the device, attach a copy of the completed contamination declaration. See below.

Declaration of Contamination

The service, repair, and/or disposal of vacuum equipment and components will only be carried out if a correctly completed declaration has been submitted. Non-completion will result in delay.
 This declaration may only be completed (in block letters) and signed by authorized and qualified staff.

1 Description of product

Type _____

Article Number _____

Serial Number _____

2 Reason for return

3 Operating fluid(s) used (Must be drained before shipping.)

4 Process related contamination of product:

toxic	no <input type="checkbox"/> 1)	yes <input type="checkbox"/>	<p>2) Products thus contaminated will not be accepted without written evidence of decontamination!</p>
caustic	no <input type="checkbox"/> 1)	yes <input type="checkbox"/>	
biological hazard	no <input type="checkbox"/>	yes <input type="checkbox"/> 2)	
explosive	no <input type="checkbox"/>	yes <input type="checkbox"/> 2)	
radioactive	no <input type="checkbox"/>	yes <input type="checkbox"/> 2)	
other harmful substances	no <input type="checkbox"/> 1)	yes <input type="checkbox"/>	

The product is free of any substances which are damaging to health
 yes

1) or not containing any amount of hazardous residues that exceed the permissible exposure limits

5 Harmful substances, gases and/or by-products

Please list all substances, gases, and by-products which the product may have come into contact with:

Trade/product name	Chemical name (or symbol)	Precautions associated with substance	Action if human contact

6 Legally binding declaration:

I/we hereby declare that the information on this form is complete and accurate and that I/we will assume any further costs that may arise. The contaminated product will be dispatched in accordance with the applicable regulations.

Organization/company _____

Address _____ Post code, place _____

Phone _____ Fax _____

Email _____

Name _____

Date and legally binding signature _____ Company stamp _____

Copies:
 Original for addressee - 1 copy for accompanying documents - 1 copy for file of sender

8 Appendix

8.1 CE Declaration of Conformity



EU Declaration of Conformity

We – INFICON GmbH - herewith declare that the products defined below meet the basic requirements regarding safety and health and relevant provisions of the relevant EU Directives by design, type and the versions which are brought into circulation by us. This declaration of conformity is issued under the sole responsibility of INFICON GmbH.

In case of any products changes made without our approval, this declaration will be void.

Designation of the product:

Operating unit

Models:

CU1000

Catalogue numbers:

560-320

Cologne, August 16th, 2017

Dr. Döbler, President LDT

The products meet the requirements of the following Directives:

- **Directive 2014/30/EU (Electromagnetic Compatibility)**
- **Directive 2011/65/EU (RoHS)**

Applied harmonized standards:

- **DIN EN 61326-1:2013**
Class B according to EN 55011
- **DIN EN 50581:2013**
- **DIN EN ISO 12100:2010**

Cologne, August 16th 2017

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8.2 RoHS

Restriction of Hazardous Substances (China RoHS)

有害物质限制条例（中国 RoHS）

		CU1000: Hazardous Substance CU1000: 有害物质				
Part Name 部件名称	Lead (Pb) 铅	Mercury (Hg) 汞	Cadmium (Cd) 镉	Hexavalent Chromium (Cr(VI)) 六价铬	Polybrominated biphenyls (PBB) 多溴联苯	Polybrominated diphenyl ethers (PBDE) 多溴联苯醚
PCB Mainboard PCB主板	X	O	O	O	O	O
PCB Interface board PCB接口板	X	O	O	O	O	O
USB stick U 盘	X	O	O	O	O	O
CPU Board 主板	X	O	O	O	O	O

This table is prepared in accordance with the provisions of SJ/T 11364.
本表是根据 SJ/T 11364 的规定编制的。

O: Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572.

O: 表示该部件所有均质材料中所含的上述有害物质都在 GB/T 26572 的限制要求范围内。

X: Indicates that said hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB/T 26572.

X: 表示该部件所使用的均质材料中，至少有一种材料所含的上述有害物质超出了 GB/T 26572 的限制要求。

(Enterprises may further provide in this box technical explanation for marking “X” based on their actual circumstances.)

(企业可以根据实际情况，针对含“X”标识的部件，在此栏中提供更多技术说明。)

