![INNOPSYS]

INNOSTAMP
User manual

Soft lithography device

Original instruction version: 1.0.5

INNOPSYS | Parc d'Activité Activestre 31390 CARBONNE - FRANCE

PAGE FINDER

1 Identification and Certification Label

Pictograms are associated with each connector to explain its function:

	Hot surface
	The magnetic field generated by the equipment is important. People with pacemakers or hearing aids should stay away from the equipment (more than 60cm). May be damaged: • Magnetic cards • Mechanical watches
	Flow controller
	Read the instruction on the user manual
	Plug the external gas source
	Ethernet RJ45 port
	Alternating current
250V 2A(T)	Current & rating of fuse to be replaced

	USB plug for USB key or joystick
cleaning overflow out in ● ● ●	Cleaning zone with the : -IN : "in-flow" tube -OUT : "out-flow" tube -OVERFLOW : safety-tube in case of overflow
drying	Drying zone
⚠ max = 10bar	Maximal pressure of the external gas source
support	Only for Innopsys support diagnostics
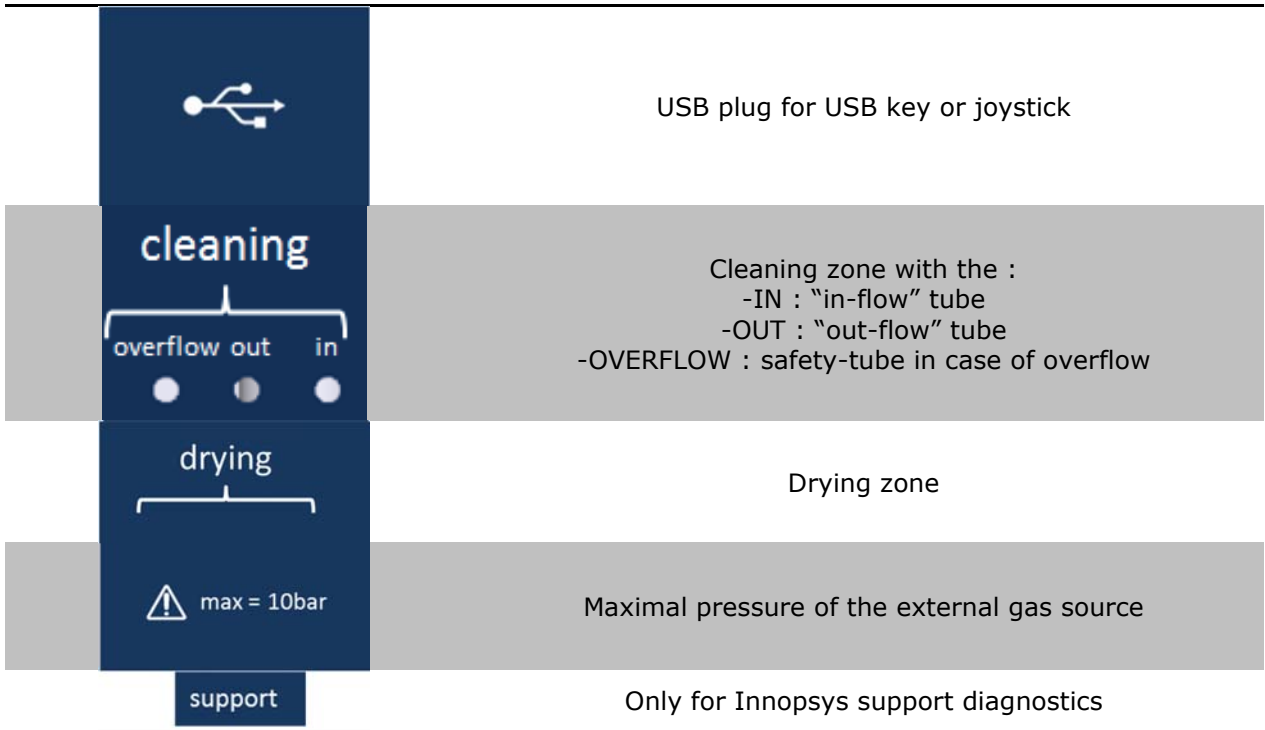
1.1 Equipment safety label
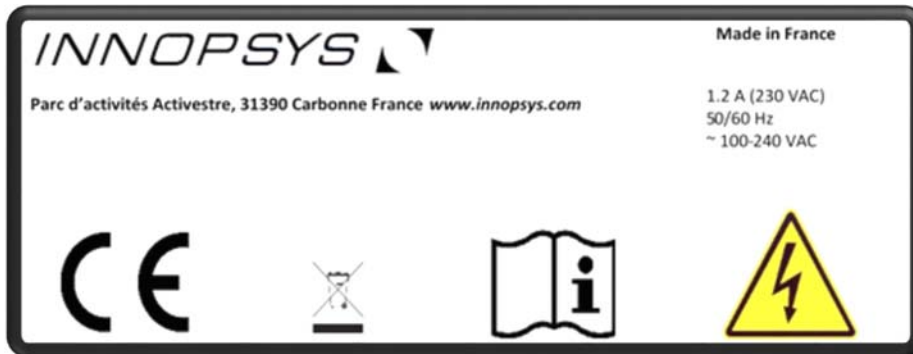
⊂€ : The CE marking certifies conformity of the product with European requirements.

: Logo WEEE (Waste Electrical and Electronic Equipment Directive). Producers provide for the organization and funding of the removal and treatment of waste from professional electrical and electronic equipment put on the market after 13 August 2005.

 The recycling of electrical equipment will help to conserve natural resources and avoid pollution.

To this end, "INNOPSYS" fulfills its obligations to end of life of InnoStamp and InnoScan he places on the market by financing the recycling process of Récylum dedicated WEEE Pro who gets them for free (information on www.recylum.com). **This only applies to products sold in France**, **in the overseas departments or regions and overseas collectivity**.

 : Please read the documentation supplied with the equipment before starting InnoStamp use.

 : The symbol ELECTRICAL HAZARD! warns the user that the non-compliance procedures, practices or conditions of use and maintenance described in this manual may result in electric shock.

1.2   Identification label of the InnoStamp
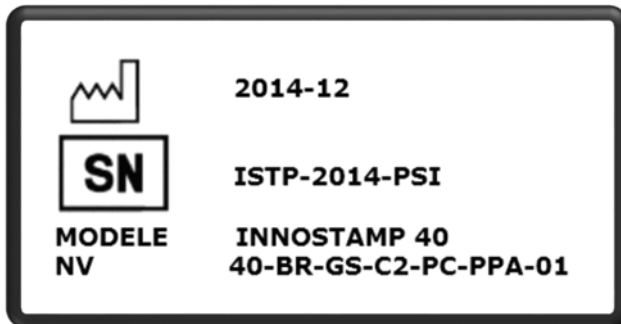
2014-12:	The Factory symbol followed by "year-month" is the date of manufacture of the equipment.
ISTP-2014-PSI:	The SN pictogram followed by the serial number of the equipment.
MODELE INNOSTAMP 40:	Information about the Innopsys product.
NV 40-BR-GS-C2-PC-PPA-01:	Version number of the InnoStamp device.

2 Safety: important information

Only qualified personnel who know and understand the safety warnings and precautions described in this document may be authorized to use the INNOSTAMP.

Use for any purpose other than the purpose indicated in this manual exposes the user to serious hazards.

2.1 Moving parts

Because the INNOSTAMP is an automated printer, it contains moving parts. These parts are harmless when the equipment is used for its intended purpose. In all other cases, these parts may cause bodily injury.

Do not attempt to gain access to the interior of the device.

2.2 Safety system

The INNOSTAMP has been designed to reduce all the above risks to a minimum when the equipment is used for its intended purpose. The device housing, more specially the cover, protects you from all danger.

Never attempt to open the housing. No user-serviceable parts inside. The user must call Technical Support if the machine exhibits any failure or malfunction. The housing may only be opened by qualified personnel appointed by Innopsys.

If the cover remains in the closed position for any reason whatsoever, preventing you from accessing to the interior, do not attempt to force it open: call Technical Support immediately.

The user has to indicate via the guided user interface (GUI) to open or close the cover / housing. After pressing the opening command, the drawer will open a few inches to allow you to get a grip on the cover and open it manually.

In the case of closing the cover, the user must manually lower the cover, then press the cover closing control, so that the drawer will automatically close.

Be careful to remove everything following its intended pathway.

If the drawer remains opened, do not attempt to force it closed. Immediately switch off the machine and contact Technical Support.

If a substrate, stamp or ink is broken or blocked inside the INNOSTAMP, try to open the cover and extract it.

Do not try and get it by force, but rather call technical support.

If the INNOSTAMP housing is damaged, do not use the equipment and contact Technical Support.

When replacing a fuse, be sure to use one of the same type with the following parameters:

- 2AT, 250V,

- Type: 5*20 mm

- Breaking capacity: 150A

Instructions to replace the fuse:

- Disconnect power cable and switch off the INNOSTAMP

- Turn a 5.5 mm flat screwdriver from right to left inside the fuse holder to remove it

- Replace the fuse and move back the fuse holder on the rear side of the INNOSTAMP

- Turn the screwdriver from left to right inside the fuse holder to lock it.

The maximum power assigned to INNOSTAMP is 320W. Some steps are more intensive than others:

• regulating the temperature of the inking zone (about 150 W)

• regulating the temperature of the deposition zone (about 110W)

• drying of the stamp maximum power (about 30W)

To ensure the safety of the user and the device, it is not advisable to run these 3 steps simultaneously.

Note: Repeated blowing of the fuse indicates a hardware failure. Contact Innopsys technical support.

If the equipment is damaged, the user must respect a safety distance of 30cm around it because of the presence of a strong magnetic field.

3   Use terms

The INNOSTAMP is designed for use in research only. It is not certified for human or veterinary diagnostic tests.

4   Installing the INNOSTAMP

4.1   List of packaged components

- INNOSTAMP

- Main power cable

- Joystick (optional)

- Dynamometer (optional)

- Filtering system (optional)

- Starter kit

- User manual

- The check stamp

- Small-substrate holder

- Alternative inking holder (optional)

4.2 Electrical Connection

Before you connect the INNOSTAMP to your electrical communication, please ensure that:

- the wall socket is grounded,

- your electrical communication follows these specifications:

  - Power supply: 100-240 V / 47-63 Hz

  - Fuse: 1A at 110V / 500mA at 220V

  - Electrical communication: circuit breaker able to switch at least in 40ms. The power supply of the device disconnects the INNOSTAMP in 16ms.

⚠️ Without a grounded socket and/or if your electrical circuit does not comply with these specifications, the equipment could be damaged and the user's safety cannot be ensured.

4.3 Installation

The INNOSTAMP must be located on a surface with the following characteristics:

- Horizontal

- Not subject to strong vibrations (centrifuge, vortex, etc.)

- Not exposed to direct sunlight

- Prevents the housing from coming into any contact with chemicals (especially acetone)

- That does not block the INNOSTAMP's ventilation and allows 5 cm of space from the rear panel of the device

- Able to withstand the weight of the INNOSTAMP (62Kg).

Do not move the INNOSTAMP when it is running.

If you do not have handling equipment, a minimum of 3 people are required for manual transport of the INNOSTAMP device.

To move the INNOSTAMP, place your hand in the following place:

INNOSTAMP handling
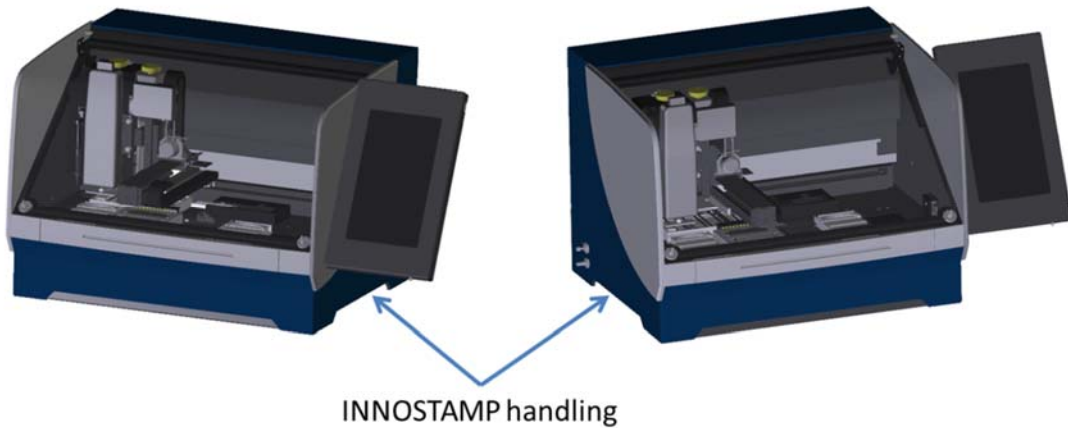
Connect the INNOSTAMP to a grounded main outlet (110V or 220V) by using the main power cable supplied.

4.4 Cleaning the INNOSTAMP

For clean room facilities, it shall be necessary to clean the INNOSTAMP. For that, a piece of paper generating no dust, imbibed with ethanol or isopropanol shall be used. No other solvent shall be used.

Stamps holder, drying rack, substrate holder and cleaning grid must be regularly cleaned in order to prevent contamination.

4.5 INNOSTAMP check after installing the printer

4.5.1 INNOSTAMP on/off switch

General switch
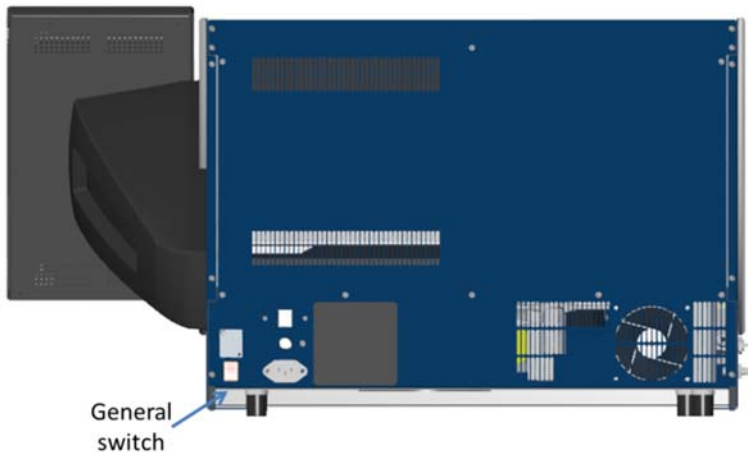
Turn on the INNOSTAMP by using the switch located on the rear panel.

4.5.2   Switch the software on/off
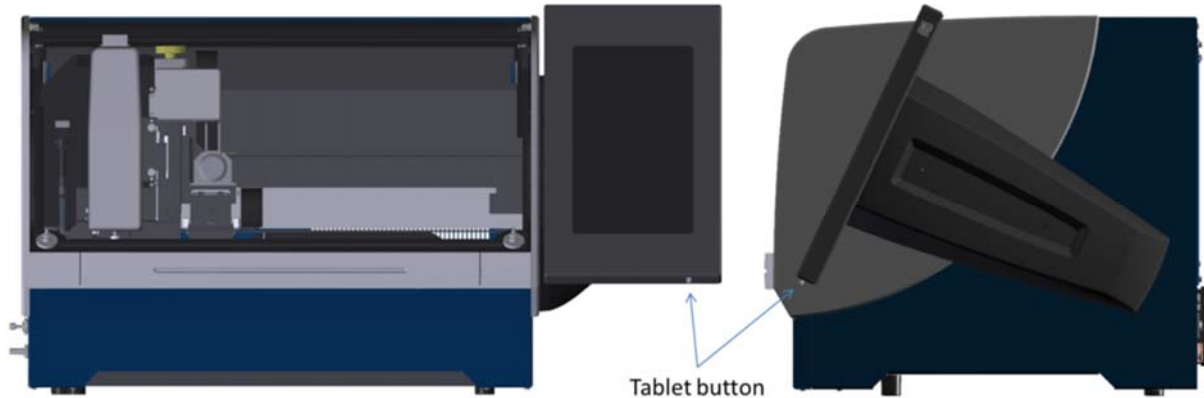
Tablet button

Turn on the touch pad using the switch located at the bottom right of the tablet (press the button until it vibrates).

The GUI will start automatically.

The software displays the initialization checked points and confirms that INNOSTAMP is functional. Otherwise, please contact your distributor.

To navigate through the GUI, use the touch screen at the right of the device.

Choose a user level and the language in which you will work.

After an initialization step, the INNOSTAMP can be used with all its functionalities. So, press on this button: To stop the software, press this button:

The 3 buttons shown below are always available on the GUI, and allow you to perform the actions described.

  : "Menu" button; this command refers to several functionalities depending on the context. These functionalities will be described in this user manual. In the main menu, the "Menu" button allows you to check the current software version.

  : "Home" button; this command will help you to reach the main menu.

   : "Back" button; this command allows you to return to the previous menu. By clicking on the "Back" command in the main menu, you will return to the start screen where you can:

- Change the user level
- Select a language
- Switch off the GUI

Perform the following tests to check the proper performance of all the basic functions.

- Open and close the drawer: *Interact/ Drawer/ Open/ Close*
- Open and close the cover: *Interact/ Lid/ Open/ Close*
- Move the motor along the X, Y & Z axes, and rotate the magnetic head θ (thêta): *Interact/Movement*: Refer to section *4.5.5 Motor displacement* for more information on the motor management.
- Perform a stamp seeking/releasing procedure (use the check stamp)
- Launch a camera recalibration

4.5.3   Open/close the drawer

Open and close the drawer:

- o   In the main menu, *Interact* tab

- o   *Drawer*

- o   *Open*

- o   *Close*

After each opening / closing of the drawer press *Finish* to continue.

When the drawer opens, in case of problem, you can *Interrupt* the movement thanks to the following button:

Be careful during drawer opening/closing, especially during closing. There is a hand-pinching risk.

In case of problem, press the interruption button.

The drawer will not be moved if the substrate's cover is not closed.

4.5.4   Open/close cover

Open and close the cover:

- o   In the main menu, *Interact* tab

o *Lid*

o *Open*

This allows the drawer to move slightly, thus enabling the cover to be opened.

o *Close*

Be careful during drawer opening/closing, especially during closing. There is a hand-pinching risk.

In case of problem, press the interruption button.

The drawer will not be moved if the substrate's cover is not closed.

The GUI will stay locked until the cover and the drawer are closed.

4.5.5 Motor displacement

Move the printing head along the X, Y Z and θ (theta: rotation of the printing head) axes:

o In the main menu, *Interact* tab

o To use the motor displacement GUI press the following button: *Movement*

Press the different arrows in order to move the respective motor. The motor will move until you release your finger from the arrow. To use the Z motor, press on the central button and then use the vertical arrow.

To come back to the X Y motor mode, press again on the central button.

Central button

X Y mode   Z mode
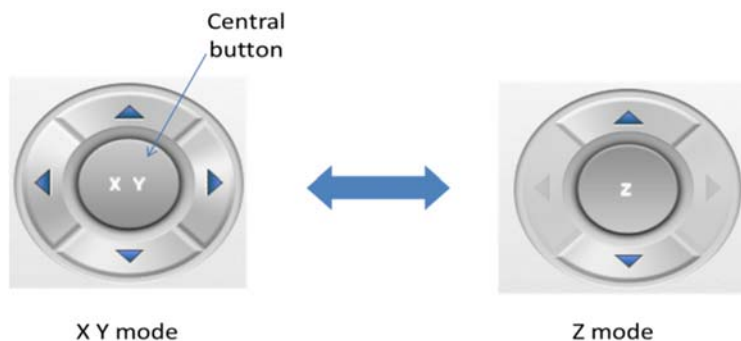
To use the angular motor, use the following spinner:

This button represents the head's angular position in degrees. As soon as you change this value, the head will turn.

The screen shown below allows the user to know the *Position* of each motor "X, Y, Z and Theta" of the printing head (in µm). The column *Shift* informs the user about the last relative movement (in µm). The *Global Shift* column reports all displacements since the arrival on moving panel (in µm).

Motor	Position	Shift	Global Shift
X	307322.7µm	0.0µm	0.0µm
Y	201533.7µm	0.0µm	0.0µm
Z	0	0	0
T	0	0	0

Stop   Validate Position   Seek stamp

It is possible to adjust the speed of the different engines through a specific menu as shown below:
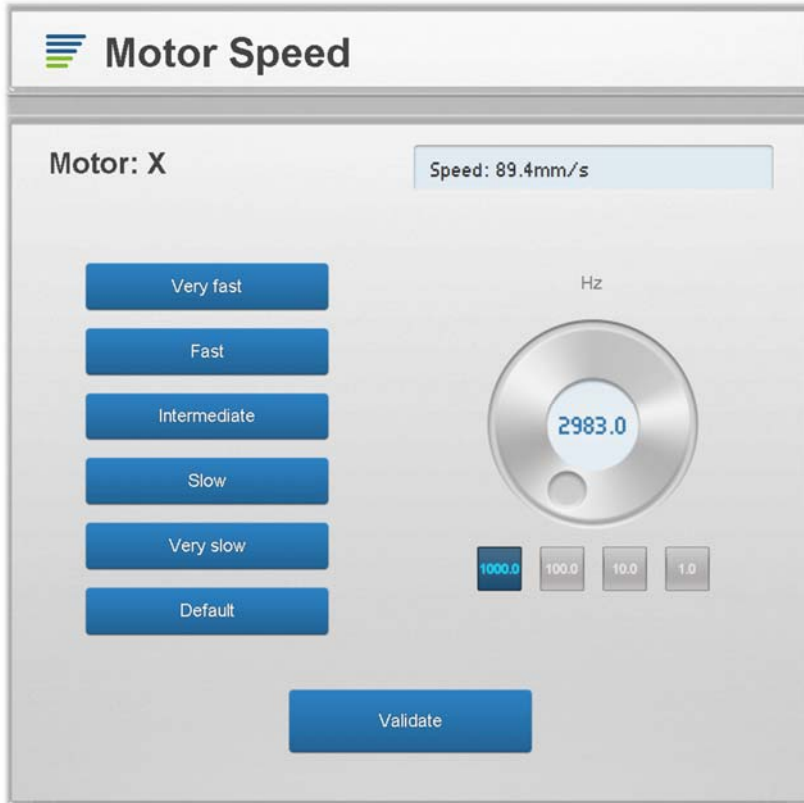
The speeds of movement are expressed in hertz, their correspondences are indicated in the window above the spinner (μm/s or mm/s).

⚠️	Be careful, there is no anti-collision safety during : 1. moving X,Y motors when θ motor is not at 0 2. moving down the Z motor In these cases, the user is responsible for the damage to the equipment.

- Stamp seeking/Stamp releasing
  - Place the magnetic head above the stamp,
  - To launch a stamp seeking, press the "*Seek stamp*" button (a beep and macrostamp icon inform the user of the presence of a stamp on the magnetic head),
  - To release the stamp, press the *Release stamp* button.

4.5.6 Camera recalibration
o To perform a substrate camera recalibration:
- In the main menu, *Parameters* tab,
- *Camera*

- Select *Substrate camera*

- Use the *"menu"* button in order to switch on the *Head LED* (It allows a better refresh speed of the camera).
- Align the two bow tie patterns on the frame of the InnoStamp40 as shown below:

  - Use conventional motor control commands in the *Position* tab,
  - In the *Parameters* tab, set the magnification level with the *Zoom* cursor, and adjust the brightness of the image using the *Pixel clock* cursor ("acquisition time")
  - Use the *Opacity* slider in the *Image* tab to check your alignment by superimposing the image acquired in real time with the reference image.
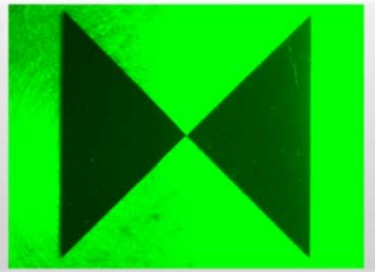
- Use the *Validate position* command to save the calibration.
- Proceed in the same way to configure the camera of the frame dedicated to stamps. The pattern to align is shown below.
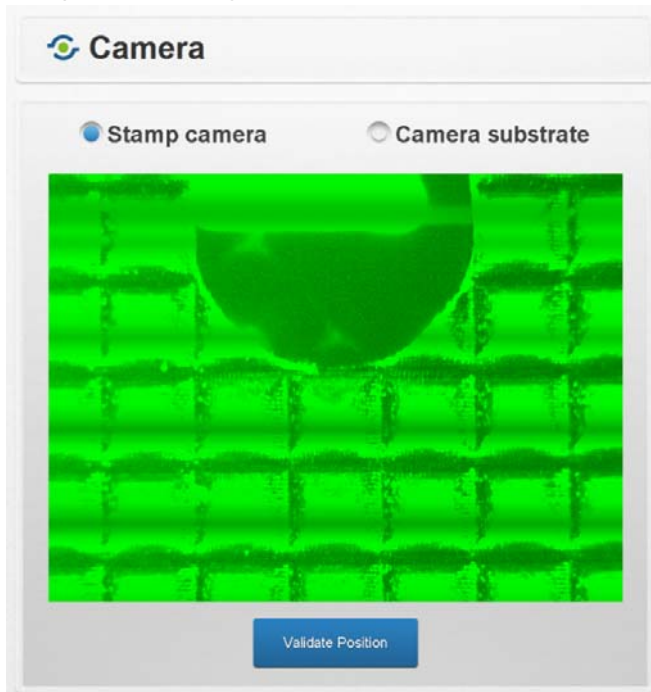
5   Operating the INNOSTAMP

5.1   Principle of magnetic field assisted microcontact printing

INNOSTAMP is a new fully automated micro-contact printing solution (soft lithography device). This device is able to print patterns with a sub-micron resolution and a high precision level. See « Magnetic field assisted microcontact printing: A new concept of fully automated and calibrated process » (J.-C. Cau et al./ Microelectronic Engineering 110 (2013) 207-214) for further information. Please contact us for information on the manufacture of Custom Stamps.

5.2 INNOSTAMP device architecture

Cleaning
Drying
Alignment
Unloading
Printing
Inking
Loading
Drawer

Magnetic Head
Cone pipette
Substrate Camera
Stamp sensor
Stamp
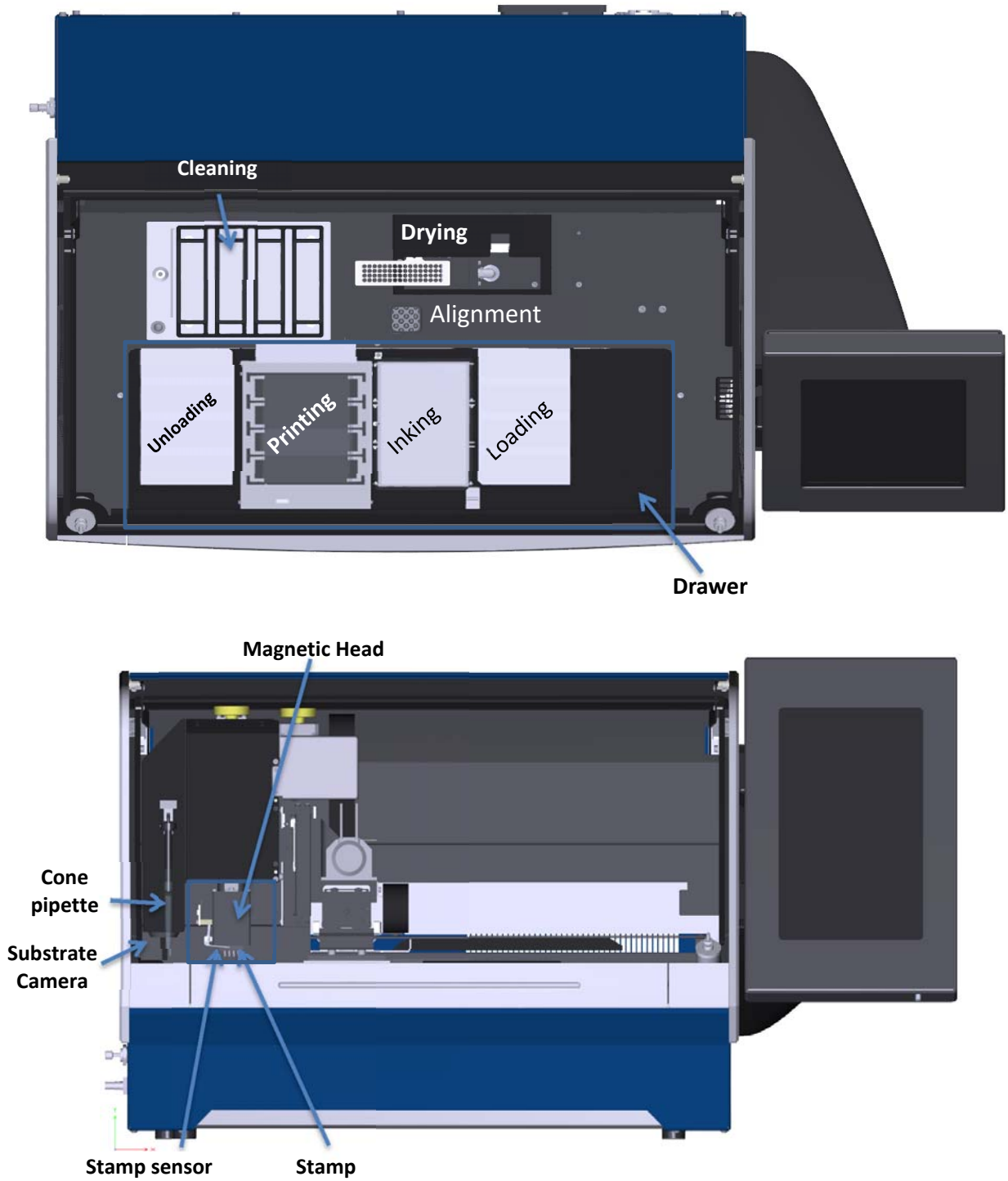
5.3   INNOSTAMP device for microcontact printing

5.3.1   Motor reference

To set a motor reference:

- In the main menu, *Interact* tab,

- *Reference*
- Select the motors for which you want to set a reference
- Press OK
- To cancel the references, press "cancel" button.

⚠	Be careful, you should launch a PIPETTE and Z motor reference at the same time that you launch a X or Y motor reference.

5.3.2   Dynamometer management

In order to perform pressure management:

- In the main menu, *Parameters* tab

- *Pressure*
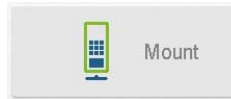
- Press the following button:
- Open the cover,
- Place and plug the dynamometer on the head as shown below:
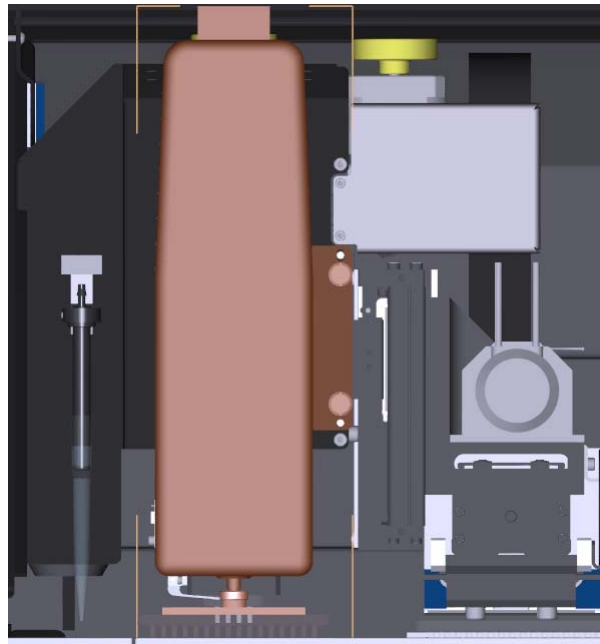
- Close the cover

Why generate a calibration curve?

A calibration curve is a file associated with one or more stamps having the same characteristics: **dimensions, iron concentration**. This file is necessary for the user who wishes to define a contact force in Pascal (Pa) in deposit protocols. Without this file, the "Force" of contact is defined by the position of the magnets (MA), or from extrapolations based on a calibration reference pre-recorded in the INNOSTAMP software.

Calibration involves measuring the F force for different values of magnets position, according a fixed and known position of the stamp (XYZθ). The magnets will go up and down in the deposition module, and the dynamometer will constantly measure the force. To achieve the acquisition of force versus position of the magnets:

- Use the ![button] button in order to define the XYZθ position of the stamp. The test will be done at this position, so choose a position where you wish to perform your next microcontact printing protocols.
- Define a stamp: shape, dimensions, iron ratio, thickness of magnetic PDMS, thickness of non-magnetic PDMS, or select a predefined stamp,
- Define a loop number (from 1 to 10): a high number improves the statistical power (refers to the number of measurements)

- To begin the measurement, use this button

- To stop the measurement, use this button
- Save your calibration curve.

5.3.3 Temperature management

To launch the temperature GUI press the following button in the main menu (*Parameters tab*):

2 graphs display real-time inking and printing temperature.

You can export the temperature data (See 5.3.11). This option is just available with the "expert" user.

To monitor the regulation:

Into a protocol, insert the following action (for further information about protocol management, see 5.3.9):

Actions list		Parameters
Inking temperature	StartInkingRegulation	It is possible to choose between a fixed temperature or the dew temperature with an offset. The spinner allows the user to define either the fixed temperature or the temperature offset.
	WaitInkingTemperature	No
	StopInkingRegulation	No
Printing temperature	StartPrintingRegulation	Determine the expected temperature, and the "gradient" which is the speed of the temperature regulation (°C /s).
	WaitPrintingTemperature	No
	StopPrintingRegulation	No

⚠️	Be careful, the printing module can heat up to 100°C.
⚠️	When the drawer is open, be careful of the printing module temperature. A warning message informs the user to the risk of injury if the inking or the depositing areas are not in a temperature range between 4 and 40°C.

5.3.4 Alignment management

In order to perform alignment management:

- In the main menu, *Interact* tab

- Press the *Alignment* tab button: ,
- Click the *Stamp* button,
- Enter the stamp data at the bottom of the page in order to avoid collisions and to anticipate the focus setting,
- Select the Preview mode and click on the *Launch preview* button in order to access an overview of the stamp (preview window),
- Draw a rectangle (zone) or select a point (position) in the preview window, and click on the corresponding button to start the preview,

 or
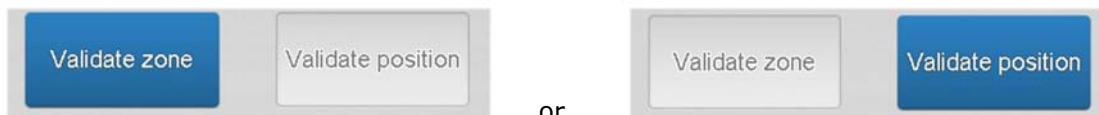
- Once the preview is displayed, you can switch to "live mode" automatically by clicking in the area where you want to achieve alignment,
- In the live mode, use the *Focus* tab to adjust the focus,
- Next, use the *Position* tab to adjust the camera position with your alignment baseline,

- More settings are available in the *Parameters* tab: Z*oom & Camera Settings*. The Camera Settings panel offers 4 presets:
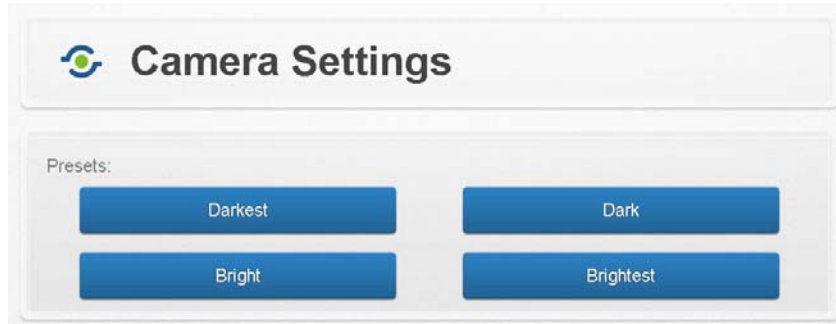
  You can also set these parameters manually (Pixel clock, Gain, Integration time in milliseconds).
- Draw the first alignment point by clicking on the live image of the stamp, or by using the *Orientation center begin* button in the *Image tab*.

Nota bene:

  The 8x zoom is the most accurate zoom.

  Orientation center begin use the position of the center of the red targeting reticule.

  A red dot should appear to represent the first alignment mark.
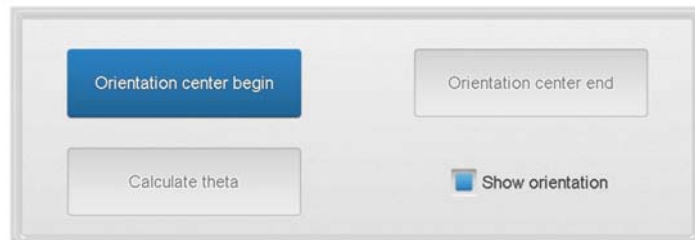
- Draw the second alignment point on the stamp in order to define an orientation by clicking on the live image, or by using the *Orientation center end*,
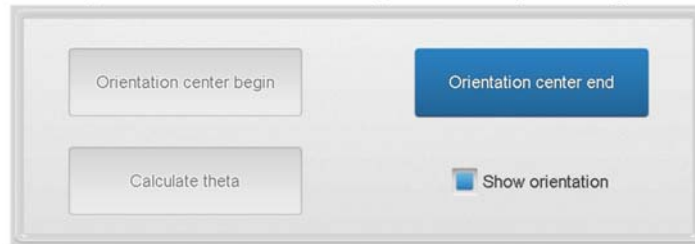
- An arrow appears on the live screen,
- Click on the *Substrate* button,
- Proceed the same way with the substrate,
- The two arrows will be used by the INNOSTAMP to align the stamp with the substrate,
- In the *Image* tab, apply the alignment angle by clicking on the *Calculate theta* button, **always check the alignment of the stamp after using the *Calculate theta* button**; an *Opacity* slider is also available to observe the proper superposition of the stamp and the substrate,

- Press the *Validate orientation* button to continue,
- Select an alignment method: *Align origin* will align the origins of the two arrows, *Align end* will align the ends of the two arrows (see figure below),
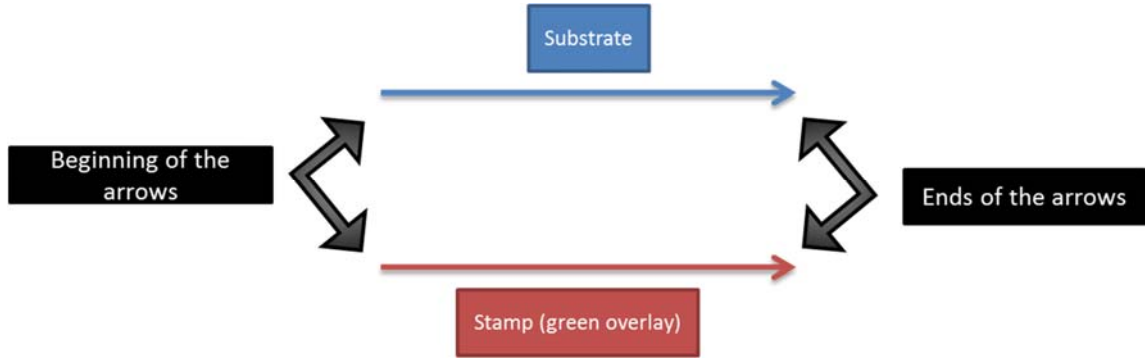
- Display alignment for an overlapping image of the stamp and the substrate (necessary to save an alignment image),
- Validate with the *Validate configuration* button.

5.3.5 Printing management

To easily monitor the printing, insert the following action into a protocol. For more information on protocol management, see chapter 5.3.9.

Action	Parameters
Unloading step	The location of the stamp onto the substrate, this step includes 3 actions : GoXYZ, Release Stamp, ReferenceZ

Print	Printing time (millisecond: ms)
	Select the repository that will determine the force applied on the stamp:
	    • *Physical pressure*: absolute physical value of pressure on the stamp. This mode requires the characteristics of the stamp and the substrate, or a pressure table (calibration curve, see chapter 5.3.2).
	    • *Magnet position*: This mode allows you to choose at which position the magnets of the drop zone will be positioned.
	Pressure table: choose the calibration curve corresponding to your stamp, or use the default curve.
	Stamp: If no pressure curve exists for this stamp, it could be interpolated based on this stamp data in order to create a new one.
	Substrate: substrate data is also needed to generate a pressure table.
	Pressure (Pa): if the contact force is determined by a "physical pressure", this dial allows you to choose the desired pressure value.

1		GoXYZ	0, 0Hz, 0, 0Hz, 0, 0Hz
2		ReleaseStamp	Return to reference true
3	●	ReferenceZ	
4		Print	0, 0.0s

To perform a print with alignment, you have to insert several actions in the protocol. These actions are presented here.

#	Command	Parameters
0	✖ GoXYZT	0, 3000Hz, 0, 3000Hz, 0, 2500Hz, 0, 200Hz
1	✔ ReleaseStamp	Return to reference true
2	✖ GoSurfaceDetection	0, 3000Hz, 0, 3000Hz, 0, 200Hz
3	✔ Alignment	
4	✔ GoSurfaceDetected	2500Hz
5	✔ ReleaseStamp	Return to reference true
6	✖ Print	0, 1.0s
7	✔ SeekStamp	
8	✖ GoZRelative	0, 2500Hz

The setup of such a protocol requires referring to section 5.3.9, and having an "Expert" user level on the equipment INNOSTAMP.

GoSurfaceDetection function save the Z position of a substrate thanks to the stamp sensor, and GoSurfaceDetected function bring the printing head to the Z position previously saved.

Realize this measure on your substrate, or on a blank substrate of identical thickness.

5.3.5.1   Keep up the pressure and continue the protocol
It is possible to deposit a stamp, to raise the magnets for printing, and to continue the protocol without lowering the magnets.

To do this, proceed as above and set the print period to "0 seconds." Thus the protocol will continue and magnets remain in the up position until the next deposition step.

NB: The drawer is locked until the magnets are not in references (low position).

5.3.6   Pipetting management
To easily monitor pipetting, insert the following action into a protocol:

Action	Parameters
GoXYZT	The location of the liquid to be pipetted,
GoZPIPETTE	The PipetteDown position,
GoPumpPipette	Set whether you made an aspiration or a liquid deposition, define the volume using the volume spinner in µL (microliter), Define the fill speed (depending of the viscosity of the liquid).

5.3.7   Cleaning management
To easily monitor cleaning, insert the following action into a protocol.

Action	Parameters
Unloading step	The location of the stamp into the cleaning module,
Clean	Define the duration of the cleaning step, Define the flux of the cleaning liquid. The spinner is in Hz. The

| | corresponding flux in mL/min is displayed next to the spinner. |

The "clean" function is composed of several phases:

>   • Filling of the cleaning tank: maximum flow.
>   • Cleaning of the stamp: according to the flow and duration defined by the user (counting the cleaning time begins once the tank is full). PumpIN and PumpOUT work simultaneously.
>   • Emptying the tank: maximum flow.

⚠	If the INNOSTAMP is not on a flat base, the liquid in the cleaning module can overflow into the equipment. In the case of an emptying problem, an overflow system permits an evacuation of the liquid from the equipment. Be careful to place a collection vessel to receive the liquid (the 3rd tube) The liquid can be : • aqueous buffer medium base • aqueous buffer medium acid • ethanol In case of liquid spillage, it will be evacuated from the equipment by the drainage hole beneath the printing platform. Clean up any spilled flammable liquids immediately. Follow the instructions described in the safety data sheet of the liquid you use.

5.3.8   Drying management

There are two different ways to proceed with stamp drying:

*   For a classical stamp, the grid is not used. The stamp stays on the head which moves above the gas flow. In this case, use the "HeadBackAndForth" action into a protocol (See 5.3.9). Here you must specify a start point and an end point (XYZθ), speed and duration.
*   For a macrostamp, it is placed into the grid which moves above the gas flow. First you have to insert an Unloading step at the grid position. This grid prevents contamination between the pads of stamps. In this case, use the "DryerBackAndForth" action into a protocol.

There are two possible sources for drying:

*   External source. The flux is defined by the valve on the left-side of the INNOSTAMP.   In this case use the "PowerValve" action in order to determine the open or closed state of the system. Its value is either ON or OFF.

⚠	The maximal pressure is 10 bars.

- Internal blower

In this case, use the "PowerBlower" action in order to control the airflow generated by the blower. Its value is between 0 to 100%.

Note: Inserting a "PowerBlower" command causes the start of the air flow from the execution of the command, to the next "PowerBlower" command. This command does not stop automatically after a "HeadBackAndForth" or "DryerBackAndForth" command. To stop the flow, insert another "PowerBlower" command with 0% power.

5.3.9   Protocol management
To create protocols, you must use an "Expert" profile.

- In the main menu, *Interact* tab

- *Protocol*

A list of protocols is displayed.

To view the description of a protocol, select one, and a description's text will appear.

Below the different available options are listed:

Edit	Delete	New	Import	Rename

For the standard user, the different actions of a protocol are displayed by pressing the *Edit* button.

"Expert" users can use every function.

Use the *Delete* function in order to delete a protocol.

Use the *New* function in order to create a new protocol.

Use the *Import* function in order to import protocols.

Use the *Rename* function in order to rename a protocol.

For "expert" users, it is possible to edit the protocol by pressing the *Edit* button. In this window it is possible to insert a command by:

- o   Selecting the previous command or group,
- o   Pressing *Insert* button,
- o   Selecting the commands to insert. The different commands are inserted in accordance with the order of selection.
- o   Pressing the "Validate" button.

For the meaning of the elementary actions, please visit our website: www.innopsys.com in order to download the last version of the document: elementary_actions.pdf

To insert a protocol:
- o Select the previous command or group
- o Press the *Insert* button
- o Press the *Protocol* button
- o Choose the protocol to be inserted
- o Press the *Import* button.

To delete a group or a command:
- o Select a group or command
- o Press the *Delete* button

To delete multiple commands at one time, **group these commands**, **close the group and then delete the group**.

To modify the parameters of a command:
- o Select a configurable command and it will show all the options in the lower window.

Create groups of commands:
- o Different actions can be assembled into a group. To create a group, click on the first step of the group, click *Group*, click the last step of the group, then validate with the *Validate group* button. The starting point of a group is identified by: ⊖ and the end point by: ⬤ By pressing the ⊖ button it is possible to close the group. By pressing the ⊕ button it is possible to open the group.

Create a repeat loop:
- o To create a repeat loop, click on the first step of the loop, click *Loop*, click the last step of the loop, then validate with the *Validate loop* button. Then select the *Number of iterations*, and *Validate*.
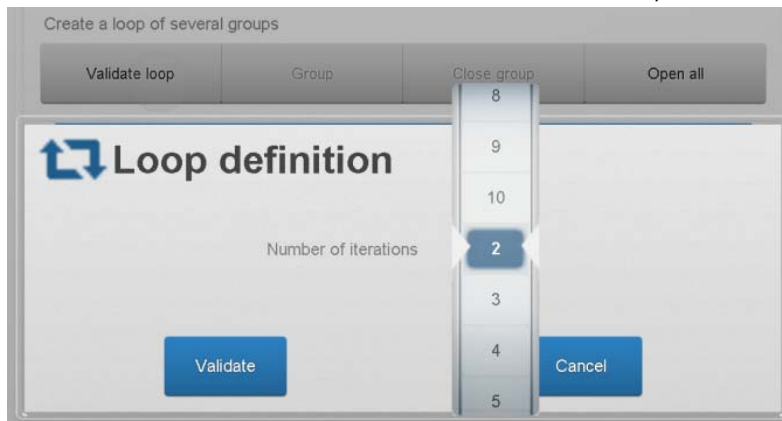
- o To create a loop with multiple groups, insert a "Commentary //" before the first group, and another command "Commentary //" after the last group that you want into the loop. Click on the first "// Commentary", click on the *Loop* button, click on the last command "Commentary //", and then *Validate the group*. Finally choose the "number of iterations".

Create a loop of several groups

Loop	Group	Close group	Open all

#	Command	Parameters
00	✔ OpenCloseDrawer	
01	✔ //	Loop start
02 ⊕	✔ // Loading step	Permits to take the stamp at a specified position.
06 ⊕	✔ // Inking step simple	permits to ink without any displacements.
10 ⊕	✔ // Drying step grid blower	permits to dry a macrostamp without any pollution thanks
18 ⊕	✔ // Printing step simple	permits to print hthanks to an additionnal magnetic press
25	✔ //	End of loop
26	✔ OpenCloseDrawer	

Full deposition procedure before replication of steps 01 to 30 (lines preceded by a ⊕ *symbol are groups of commands).*

Create a loop of several groups

Loop	Group	Close group	Open all

#	Command	Parameters
00	✔ OpenCloseDrawer	
01	✔ //	Loop start
02 ⊕	✔ // Loading step	Permits to take the stamp at a specified position.
06 ⊕	✔ // Inking step simple	permits to ink without any displacements.
10 ⊕	✔ // Drying step grid blower	permits to dry a macrostamp without any pollution thanks
18 ⊕	✔ // Printing step simple	permits to print hthanks to an additionnal magnetic press
25	✔ //	End of loop
26	✔ //	Loop start
27 ⊕	✔ // Loading step	Permits to take the stamp at a specified position.
31 ⊕	✔ // Inking step simple	permits to ink without any displacements.
35 ⊕	✔ // Drying step grid blower	permits to dry a macrostamp without any pollution thanks
43 ⊕	✔ // Printing step simple	permits to print hthanks to an additionnal magnetic press
50	✔ //	End of loop

Full deposition procedure after replication of steps 01 to 30

- o A group can be repeated on its own without adding a "Comment //" command.
- • Check a protocol:

o Execute a protocol by pressing the *Execute* button. The protocol can be stopped by pressing the *Stop* button: It can be paused by pressing the *Pause* button:

The *Menu* button at the bottom of the page allows you to *Execute* the protocol, to *Import* a new one, and especially to *Save* the one you are currently Editing.

Execute

Save

Import

When saving a protocol, the following window appears allowing the user to add a description to the protocol being created.

Save protocol

Name Script 1
Creation date 13/08/14 10:20
Modification date 13/08/14 10:20
Description

Save protocol   Save as...   Cancel
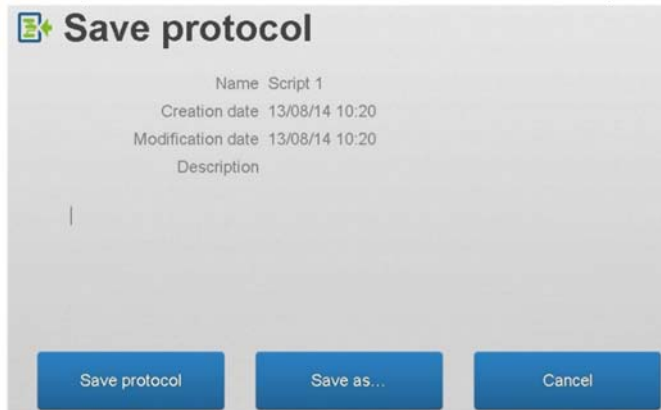
5.3.10 Go Relative

A relative movement is a movement made according to a number of micron or motor steps from an initial position. These commands are available for 6 motors (axes) on InnoStamp:

• GoXRelative: Move the gripper head along the X axis by a given number of µsteps (or microns).

• GoYRelative: Move the gripper head along the Y axis by a given number of µsteps (or microns).

Using GoXRelative and GoYRelative it is possible to shift as three different modes:

1. Camera shift: Shifts the gripping head by the distance between the substrate camera and the center of the printing head (positive or negative).

2. Pipette shift: Shifts the printing head by the distance between the pipette and the center of the gripper head (positive or negative).

3. Personalized Shift: Shifts the printing head by a value defined by the user (µPas).

• GoZRelative: Move the printing head along the Z axis by a given number of µsteps (or microns).

• GoZPIPETRelative: Move the pipette along the Z axis by a given number of µsteps (or microns).

• GoMARelative: Move the magnets under the printing area according to a number of µsteps (or microns).

• GoDRYERRelative: Move the drying grid along the X axis by a given number of µsteps (or microns).

Using GoZRelative, GoZPIPETRelative, and GoMARelative GoDRYERRelative, there is only one mode for shifting:

1. Custom Shift: Shifts the gripper head by a value defined by the user (µstep).

Relative displacements are done axis by axis, no relative displacements are performed simultaneously on two axes. To know the direction (+/-) of travel, refer to the diagram below.
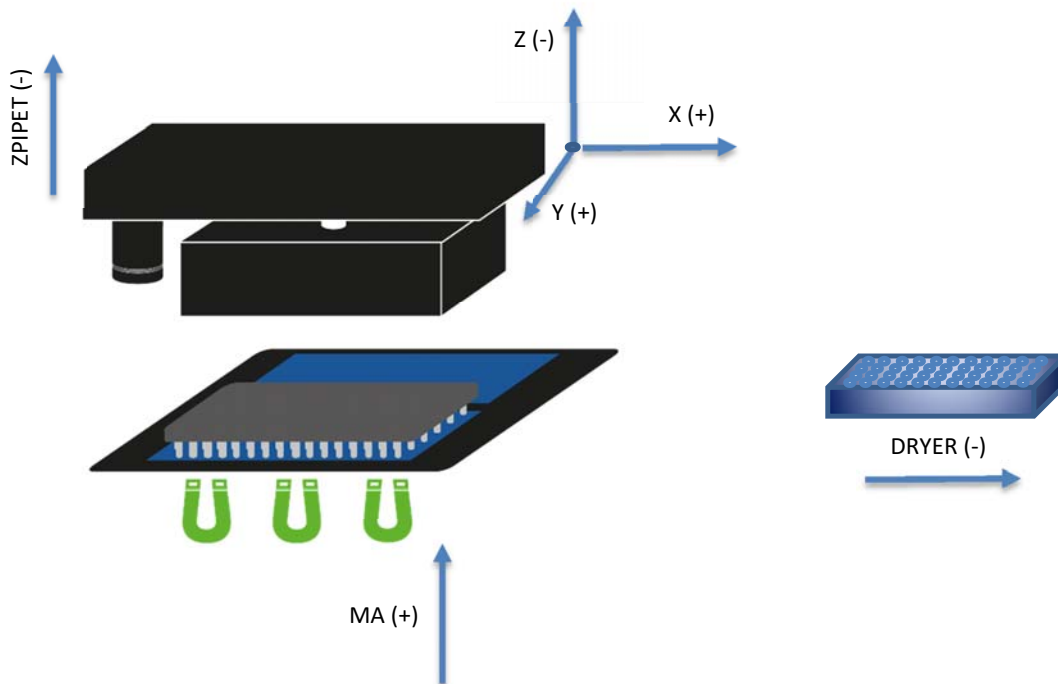
The speed of each relative displacement (GoRelative) is configurable (Hz and µm/s).

5.3.11 Take control of the displacement panel during a protocol/Create a protocol step by step
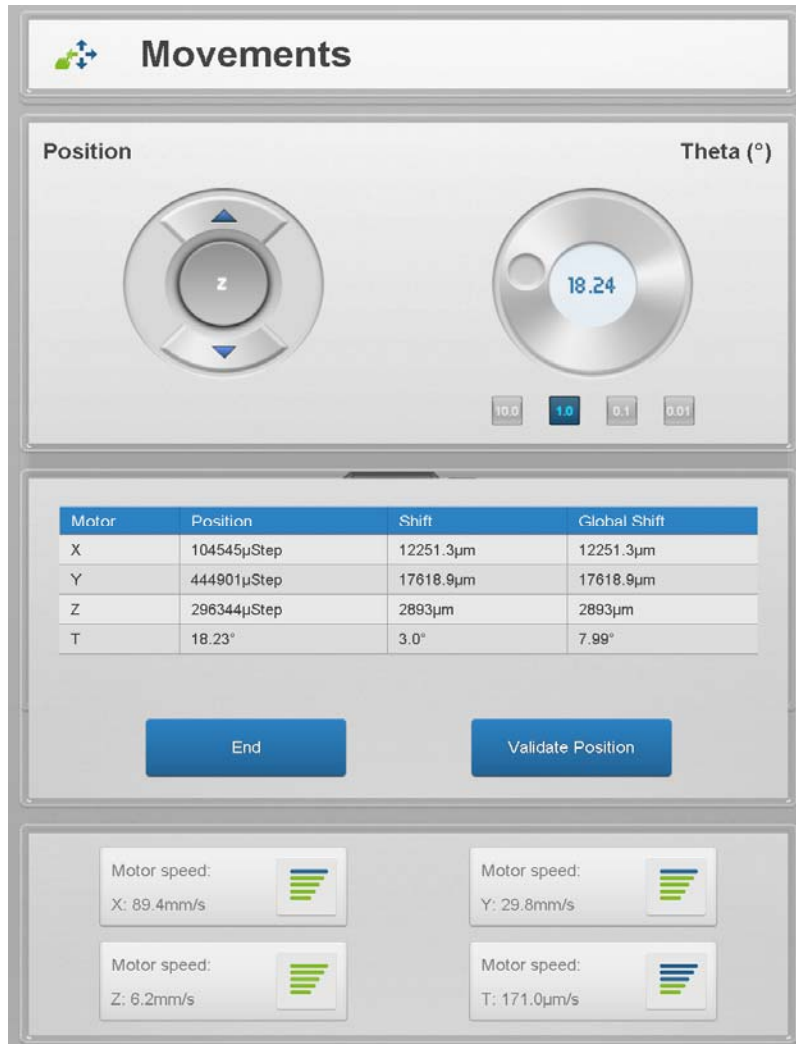
Some applications may need to take control of the displacement activity panel between two steps of a protocol. It may be the case prior to a relative displacement for example, as part of dynamic assembly experiments.

It may also be useful not to set every positions in advance, and let the user perform certain movements manually. The user will create his positions himself step by step during the protocol.

To manually control the equipment during a protocol, insert a command in your GoXYZTUser Protocol (moving panel).

During the course of your protocol, the GoXYZTUser command will trigger the occurrence of the panel below. This panel allows you to manipulate the X, Y, Z and Theta θ motors, and to adjust their speeds. It is not possible to catch or release a stamp in this step.

You can save the position in which you place the printing head using the *Validate Position* button. To proceed to the next command, use the *End* button, or the back arrow at the bottom of the screen.

5.3.12 Preventive maintenance management

To launch the preventive maintenance GUI, press the following button in the *Parameters* tab of the main menu:

It is possible to observe the lifetime of different elements. If one of them is too high, call your retailer.

5.3.13 Configuration

The equipment configuration can be achieved by Innopsys or an authorized dealer. It is not possible for a "standard" or an "expert" user to use these parameters. However, in case of malfunction of the equipment, you may be asked by the support to check the configuration settings.

In the *Parameters* tab of the main menu, use the *Configuration* button below:

5.3.14 Preferences

INNOSTAMP equipment is set to be effective in most applications. However it is possible to tune these settings to best suit your application.

In the *Parameters* tab of the main menu, use the *Preferences* button below:

The Preferences menu is divided into 3 distinct sections:

- Alignment:
    - Stamp camera position: Set the default position of the magnetic head when accessing the alignment of a stamp in *Interact, Alignment*.
    - Substrate camera position: Set the default position of the magnetic head when accessing the alignment of a substrate *Interact, Alignment*.
    - Substrate support type: Switch from 4'' Wafer mode to 4 microscope slides mode.
- Ink:
    - Calculation period(s) of the dewpoint temperature: The dew point temperature is calculated from the temperature and humidity. This setting controls how often the temperature is adjusted on the inking module.
    - Log period(s): Temperature values can be saved and exported by using a USB key. This parameter defines the frequency of records.
    - Regulation tolerance (°C): This parameter defines the frequency with which the device measures the temperature of the inking module (in order to adjust its temperature).
    - Sample regulation period(s): When a desired temperature is established in a protocol, a 'WaitInkingTemperature" function may be added to ensure that the process will not resume before the target temperature is reached. A tolerance around this target value may be set.

- Print:
  - Log period(s): Temperature values can be saved and exported by using a USB key. This parameter defines the frequency of records.
  - Sample regulation period(s): This parameter defines the frequency with which the equipment measures the temperature of printing module (to readjust its temperature).
  - Regulation tolerance (°C): When a desired temperature is established in a protocol, a 'WaitPrintingTemperature' function may be added to ensure that the process will not resume before the target temperature is reached. A tolerance around this target value may be set.
  - Speed (µm/s) of magnets: Determines the speed with which the magnets rise under the substrate in the deposition module. Substrates having low adhesion may require a gradual rise of magnets to ensure that the stamp does not slide on the print surface.

Save your changes using the *Saving* button at the bottom of this page.

5.4 Data management

The *Interact* tab contains a set of functions that allow the user to control the equipment, to drive these motors, and to create alignment configurations.

The *Data* tab contains a set of sub-menus allowing the user to return to the configurations generated in the *Interact* menu (Edit).

Positions : The Positions menu contains 4 actions:

• Edit: Select a position file, select *Edit*, change the position, press *Validate Position* to confirm, and name your configuration.

• Delete: Select a position file, press Delete, and confirm.

• Create: Create a file position in the same manner as in the *Movement* menu.

• Import: Import a position file from a USB key.

Stamp : Determine your stamp settings efficiently via this interface. The Stamps menu provides 3 actions:

• Edit: Select a stamp file, tap *Edit*, edit the parameters of the stamp, press *OK*.

• Delete: Select a stamp file, press *Delete*, and confirm *(OK)*.

• Create: Press *Create*, enter all the parameters of your stamp, press *OK*.

Substrate : Determine your substrate settings efficiently via this interface. The Substrate menu provides 3 actions:

• Edit: Select a substrate file, tap *Edit*, edit the parameters of the substrate, press *OK*.

• Delete: Select a substrate file, press *Delete*, and confirm *(OK)*.

• Create: Press *Create*, enter all the parameters of your stamp, press *OK*.

Alignment : The Alignment (Alignment configuration) menu provides 3 actions:

• Edit: Select an alignment file, tap *Edit*, edit the alignment, confirm your modifications, and rename your alignment file.

• Delete: Select an alignment file, press *Delete*, and confirm *(OK)*.

• Create: Here, create an alignment configuration in the same way as in the *Alignment* menu of the *Interact* tab.

An overview of your configurations is available, and able you to check the orientation of the alignments.

5.4.1 Export data on USB key

In order to export data from the INNOSTAMP to a USB key:

- Plug a USB key to the INNOSTAMP. The plug can be identified by the following picture:

- In the *Data* tab of the main menu, press the *Export* button:

- In this menu you can export different types of data:
  - Logs:
    - Software (available during 15 days), .zip format,
    - Firmware (available during 15 days),
    - Temperature (available during 30 days),
    - Execution Protocol (available during 15 days).
  - Positions
  - Protocols
  - Alignments
  - Pressures
- Select the data you want to export.
- Press the *Export* button.

5.4.2 Import data from USB key

You can import several types of data from a USB key to the INNOSTAMP:

- Connect USB key to the INNOSTAMP. The USB connector is identified by the icon below:

- In the *Data* tab of the main menu, use the *Import* button:

- You can import different types of data:
  - Positions
  - Protocols
  - Alignments
  - Pressures (calibration curve / pressure table)
- Select the data you want to import,
- Use the *Import* button

5.5 Update

5.5.1 Software and firmware update

We are constantly working to improve our products and services, and you might be asked to perform software or firmware updates to improve performance and reliability of your INNOSTAMP equipment.

For software updates:

- In the *Update* tab of the main menu, press the *Update Program* button:

- Insert a USB key containing the update,
- Press the *Update* button.

For the firmware update:

- In the *Update* tab of the main menu, press the *Update Firmware* button:

- Insert a USB key containing the update,
- Press the *Update* button.

	Do not attempt to insert other elements into the USB connector than those specified by INNOPSYS : - USB key - The joystick from INNOPSYS INNOPSYS cannot be held responsible for non-compliance with this rule. You must use the INNOPSYS USB key for software upgrades (software and firmware).

5.5.2 Resetting the motherboard

The Reset command should only be used on the request of your dealer or Innopsys support.

To reset the motherboard:

• In the *Update* tab of the main menu, use the *Reset* button shown below:

• Click *OK* to confirm the reset of the card.

5.6   Consumables

The consumables are placed on the drawer and are:

- Magnetic stamp or "Macrostamp"
- Inks
- Substrate (surface on which ink is deposited); glass slide, wafer…

5.6.1   Magnetic stamp or "Macrostamp"

There are two different types of stamps.

The first is a classic stamp that can be offered in a multitude of formats, including two main formats:

- The classic stamp, which is a rectangular stamp whose standards are approximately the following dimensions: 25 x 75 x 7mm. This stamp is compatible with glass slide.
- The wafer stamp, whose diameter is 4 inches, a classic in electronic.

Other formats such as squares are also possible.

The other type of stamp is the "Macrostamp". This tool enables users to multiplex the printing by inking several different molecules, and by printing these molecules on a surface without cross-contamination. See *Microscale multiple biomolecules printing in one step using a PDMS macrostamp H. LALO et al. / Microelectronic Engineering 86 (2009) 1428–1430.*

5.6.2   Inks

To install the inking module or a titration plate, pull the latch, align the module or plate to the mechanical stop and release the latch.

5.6.3   Substrate

To install or remove a blade or a wafer, press the button in front of the printing zone, in order to provide access to the slide holder.

Place slides or wafer in upward abutment.

Lower the holding element to lock the position of your substrate.

	Do not attempt to insert any object other than substrate, stamp or ink.
	Do not attempt to insert stamp thicker than :
	• 7mm for classical stamp
	• 12mm for macrostamp
	Do not attempt to put something thicker than 3mm on the microplate.
	Do not attempt to insert substrate thicker than 3mm.
	Be careful about the substrate material. In the case that its fusion temperature is lower than the printing temperature; the substrate can stick to the substrate holder.

5.7   Joystick

The joystick equipment is an optional device for improving the overall ergonomics of the INNOSTAMP.

To use this device:

• Connect the joystick to the USB port of the INNOSTAMP:

The joystick can be used to move the magnetic head; it is particularly useful for the creation of new protocols.

The joystick is available in the *Movement* menu, in the *Protocol* menu (*Interact* tab), and more generally whenever it is possible to interact the XYZθ axes.

The joystick can be used for position definitions; meaning that

that when the following picture appears:

The different actions of the joystick are:

#	Action
1	Head LED
2	Dark field LED
3	Alignment LED
6	Drying cart mode
7	Head's magnet mode
8	Pipette mode
10	Seek / Release stamp

The right button on the joystick (12) is used to switch to Z mode.

The left button on the joystick (11) is used to switch to XYT mode.

To stop an action, press a second time the button.

It is also possible to customize all this buttons thanks to the *Joystick* menu in the *Parameters* tab. Note that the correspondence between the buttons on the joystick and the numbers on the menu can be viewed by pressing the joystick buttons, they will illuminate on the screen. Joystick

The *Joystick* menu also contain a calibration tool for the joystick, press *Calibrate* and follow the instructions.
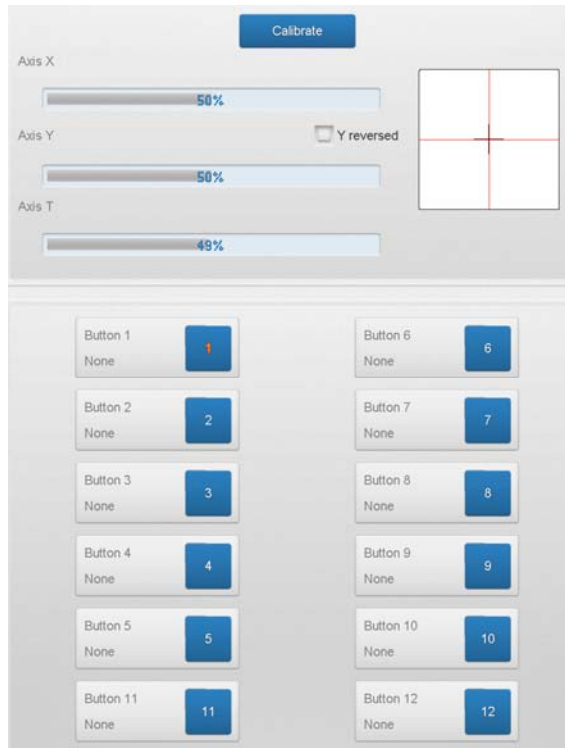
5.8 Filtering system (optional)
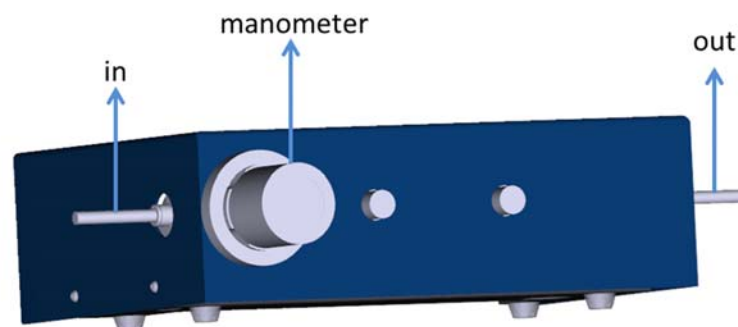
This system allows the filtration of gas flowing into the INNOSTAMP equipment. It is equipped with 3 filters which can remove the following:

- 99% of the 3 microns particles
- 99.9% of the 10nm particles
- Oil filter: 0.08ppm max oil output

The diameter of the inlet and outlet tubes should be about 6mm (outer diameter).

This system is equipped with a manometer.

5.9   Pipetting system

The INNOSTAMP is equipped with a pipetting system. The pipette cones are conventional cones like those of P1000 pipettes. The maximal volume is 1000µL.

To load a new pipette cone:

- In the *Cover* menu of the *Interact tab*, open the cover
- Remove the previous cone,
- Insert the new cone,

	Be careful that it is correctly inserted

- Close the cover.

6   INNOSTAMP self-tests and checks

The INNOSTAMP runs two levels of self-tests and checks.

6.1   Initialization checks

When the INNOPSTAMP is powered up, moving parts, communications, temperature management and cameras are all checked. If an error is detected, a message appears. If this happens, note the message, switch off the INNOSTAMP immediately and contact Technical Support.

6.2   Communication checks

All communications (camera, motherboard, temperature manager, and dynamometer) are constantly checked. If an error is detected, a message appears. If this happens, note the message, switch off the INNOSTAMP immediately and contact Technical Support.

7   Maintenance and Service

Fan filter replacement:

For models equipped with a fan filter, it is necessary to replace the filter <u>once a year</u>. In the event of failure to meet the deadline for replacement of the filter, the INNOSTAMP warranty will be revoked. The customer has to order a new filter from its distributor.
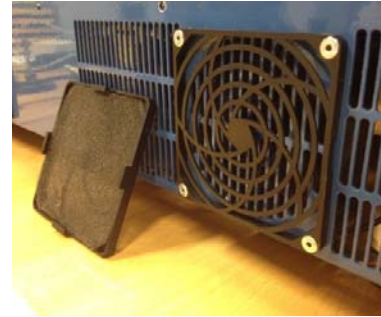
To replace the filter (see picture), remove the protection grid which is interlocked at the back of the INNOSTAMP, remove the old filter, insert the new filter and then interlock the protection grid by pressing each side.

For other maintenance elements, there is a preventive maintenance. If one of these elements is nearing the end of its lifetime, an alert appears. In this case please contact your distributor.

No other user maintenance is required.

No other user service is allowed.

If a problem occurrs, please contact your distributor.

8 Troubleshooting / Tips

Symptom	Diagnosis
INNOSTAMP does not turn on	Call your retailer.
INNOSTAMP initialization failed with the message "Critical program initialization error"	If this message appears for the first time : shut down the INNOSTAMP and restart it Otherwise, call your retailer.
The dynamometer was installed and connected to the INNOSTAMP, the cover has been closed, but pressure acquisition does not work.	Make sure you press the start button on the dynamometer, and it displays a value equal to 0 newtons of force. If this does not resolve the problem, contact your dealer.
The use of the cameras is slow and tedious. The refresh time seems long.	Use the "Menu" button at the bottom of the screen to activate the different light sources of the INNOSTAMP device. Better lighting improves the refresh period and facilitates the alignment.
Alignment is not accurate enough.	Several factors can influence the quality of an alignment. To set the alignment points, use the *Orientation center begin* and *Orientation center end* buttons rather than clicking on the

	"live" area of the screen.
	After using the *Calculate angle*, redraw the alignment arrow of the stamp and press *Calculate angle* again. Repeat as many times as necessary until you obtain a stable position.
	Use the 8x zoom level for maximum precision.
	Contact Innopsys support for more information.
"GoSurfaceDetection" command doesn't work.	The aim of the "GoSurfaceDetection" command is to detect the exact position of the substrate. To use this feature, use a "GoXYZθ" command at the coordinates of the substrate, a "ReleaseStamp" command and a "GoSurfaceDetection" command. The "GoSurfaceDetection" function doesn't work if the stamp has not been released.
	Note: Any "GoSurfaceDetected" command placed after "GoSurfaceDetection" command (whether or not other commands are between these two commands) will result in a movement along the Z axis to the measured value by the "GoSurfaceDetection" command.
After deposition step (printing), my stamp is not recovered by the gripping head, it seems to stay stuck to my substrate.	This problem may occur with certain stamp formats. To guard against this problem, insert a GoZRelative step (speed <100Hz; approximately 1000µm) between the SeekStamp command and the ReferenceZ command. Thus the printing head back slowly and does not leave the stamp on the substrate.
The loading step does not work, either manually or in a protocol. The printing head strength on the stamp without stopping.	The stamp sensor is an element that may be damaged during an ill-defined translation movement (and when the stamp is not on the printing head).
	To check the condition of the sensor, open the cover, and slide your fingers under the printing head. The sensor is a steel rod (17x4mm).
My protocol is not accepted by the InnoStamp 40 GUI. How to solve my problem? What is the failing command?	When the InnoStamp 40 GUI blocks the execution of a protocol, the *Executing protocol* panel specifies the command line that is involved in the error. To locate this line in your protocol, open all the groups of command with the *Open all* button.

9   FAQ: Technical data

What is the basic operating principle of the INNOSTAMP?

The automated system INNOSTAMP is a device which assembles different modules, corresponding to every step of the microcontact printing process. The magnetic stamp is

moved due to a magnetic head and several magnets are brought near the surface of the stamp to pick it up. A microcontact printing experiment follows successive steps:

- The first step is to load different items and consumables into the INNOSTAMP needed to for microcontact printing. Usually these are stamps, inks (elements to be deposited) and substrates. The INNOSTAMP is provided with an automatic drawer designed to hold each of these elements.
- The second step takes place when the magnetic head picks up the deposition tool, the magnetic stamp. This is the loading step and is linked to the first step. Standard stamps or "Macrostamps" can be picked up through the application of the magnetic field.
- Next the alignment step determines the position of the stamp very accurately relative to the substrate.
- The next step involves the inking of the stamp. The equipment offers a number of possibilities for inking. Do not hesitate to contact Innopsys for information on the best ways to ink a stamp for your application.
- A drying step is often required after the inking of the stamp. Again, there are several possibilities to remove residual droplets of ink on the stamp.
- The printing step: This critical step involves touching the stamp to the substrate to transfer the elements of interest. INNOSTAMP manages the contact force very finely between the stamp and substrate. We invite you to consult the publication: "*Magnetic field assisted microcontact printing: A new concept of fully automated and calibrated process*" J.-C. Cau et al., Microelectron. Eng. (2013) to learn more about the reliability and the quality of the deposits already made with INNOSTAMP.
- The next step is optional and consists of cleaning the stamp in a dedicated rinsing tank.
- The last step is the unloading of the stamp in a specific area.

How homogeneous is the magnetic pressure?

In the worst case, the magnetic force deviation is 20% of the mean.

Can I turn off/on the general LEDs?

In the *Movements* tab, there are these buttons at the bottom of the page. You can manage all the LEDs of the INNOSTAMP with this control panel list:

During the Alignment process, you can manage the lighting by clicking on the button

 at the left of the "Home" button.

How does the alignment step work?

The alignment consists of aligning the stamp with the substrate using 2 cameras which enable simultaneous visualization of the stamp and the substrate.

What is the accuracy of the alignment?

Alignment uses 2 cameras with a 1.6µm-resolution and offers a 20µm print resolution or 5µm when the high resolution printing module is included.

What is the accuracy of the mechanical positioning system?

The accuracy of the X and Y axis are about +/-3µm.

10 Specifications

Automated microcontact printing device. Creation and customization of printing protocol thanks to the Stamper GUI. Protocols are composed of scalable steps.

Several steps contain configurable parameters.

Loading step	
Compatible stamps	According to the stamp configuration chosen by the customer: - Square magnetic stamp/Rectangle magnetic stamp (min: 10 x10 mm²; max: 25 x 75 mm² / 1" x 3"); Capacity: up to 4 stamps (max size) - Magnetic wafer stamp (4" max); Capacity: 1 four inch wafer
Stamp handling	Automatic, thanks to magnetic handling
Drawer zone	Automatic drawer allowing an easy access to the consumables

Inking step	
Support	Compatible with 96-, 384-, 1536- wells microplates, et with others types of microplates
Management	Done by the user thanks to the Stamper GUI: time setting, temperature, inking mode
Time setting	Adjustable from 1 to 3600s ; steps of 1s
Temperature	Adjustable from 5°C to 50°C for a maximal ambient temperature of 20°C Accuracy of the temperature sensor: +/-0,1°C Maximum delay before reaching the target temperature: 2 minutes max Stability +/-0,5°C during 8h
Limited evaporation	Possibility to adjust the temperature on the dew-point temperature (if ambient temperature is under 20°C)
Drawer zone	Automatic drawer allowing an easy access to the consumables

Alignment step	
Optical Alignment	Automatic thanks to 2 cameras
Cameras	Resolution : 1.6 µm Lighting: bright field and dark field for the substrate, bright field only for the stamp Adjustable zoom Preview of the stamp or the substrate with a mosaic
Degrees of freedom	X-Y-Rotation (θ angle management only on the stamp)
Precision	(+/- 20µm)

Optional Module: High Resolution Alignment stamp/substrate	
Alignment on the X and Y axes	+/- 5µm

Drying step	
System	Automatic vertical flux
Sources	Option 1: Dry air thanks to a blower
	Option 2: Nitrogen gas with dust and oil filtration (99,9% of 10nm particles filtered and 0.08ppm max of oil). Option 3: The InnoStamp40 is adaptable to an external gas source like a compressor or a lab pipe network.

Duration

Adjust by the user thanks to the Stamper GUI; adjustable from 1 to 3600s; Steps of 1s

Printing step

Parameters	Format, number of substrates and position of stamping defined by the user via the Stamper GUI
Compatible ink	Nano-Objects, chemical compounds, biomolecules (proteins, DNA, …) *Contact us for more information*
Support	Depending on the configuration of the stamp holder choose by the customer: - 4 microscope slides holder - 4 inch wafer holder
Option	Possibility to connect the holder to the ground
Compatible substrates	Glass, plastic, silicon wafer… *Contact us for more information*
Maximal size of the printed surface	4" x 4"
Type of contact force	By magnets with a vertical displacement
Stamping force amplitude	From 0 to 120kPa depending on the magnetic module chosen by the customer: - Magnetic configuration 1: from 0 to 45kPa for all the compatible stamp surfaces; +/- 20% homogeneity - Magnetic configuration 2: from 0 to 120kPa for stamp surfaces larger than 20 x 20mm² The force depends on the position of the stamps under the printing area and on the concentration of iron in the PDMS stamp.
Duration	Adjust by the user thanks to the Stamper GUI. Adjustable from 1 to 3600s; steps of 1s
Reverse printing	The printing head can be rotated (180°).
Precision	X axis: +/- 3µm, Y axis: +/-3µm, rotation θ: +/-0.5°
Homogeneity	20 % min/max of the force
Patterns size	Depends on the design of the stamp and the type of ink to print Classic Microcontact printing: from 500nm to the stamp size Molding : from 230nm to the stamp size
Drawer zone	Automatic drawer allowing an easy access to the consumables

Optional module: Dynamometer

Functionalities	Measure of the force amplitude apply by the stamp on the substrate
Sensibility	0,01N
Operating range	Up to 20N
Precision	0,02%

Optional module: Molding

Functionalities	Molding experiment with ink or resist deposit by pipetting directly on the printing zone and by plate heating.
Plate heating	Range: from ambient temperature to 100°C Precision : +/- 0,5°C Resolution : 1°C
Pipetting tool	From 30µL to 1mL (by step of 30µL and with a precision of +/-2µL)
Fixation	On the printing head Others modules or elements can be integrated on the printing head, as electrode for example. Contact us for more information/project.

Cleaning step

Cleaning strategy	Cleaning by flow of solution
Solutions	acid-base buffer or ethanol as solvent
Tank	Max capacity: 130mm*105mm

Duration and number of cycles	Manage by the user thanks to the Stamper GUI Default protocol available
Flow	From 0 to 125mL/min (steps of 4mL/min)

Unloading step

Dimension	According to the Stamper version chosen by the customer: - 4 microscope slides - 4inch wafer (1 stamp, diameter of 96mm max)
Drawer zone	Automatic drawer allowing an easy access to the consumables

Interface

Interface	Tablet computer with Stamper GUI
OS System	Windows 8 Pro
Tablet computer	Intel® Core™ i5, Windows 8 Pro, RAM 4Go, SSD 128 Go
Display	Tactile, 10.8 inches, wide screen
Export/import format	.txt (temperature et humidity measured)
Export/import	USB

General Specifications

Weight	62Kg
Dimensions (Width x Depth x Height)	847 x 488 x 470 mm^3 with the Tablet Computer 626 x 488 x 457 mm^3
Alimentation	100-240 VAC - / 47-63 Hz
Fusible	4A to 110V / 2A to 220V
Power consumption	400W max

Norms

InnoStamp40 complies with	CEM 2004/108/CEE Directive Basse tension 2006/95/CEE Directive Machine 2006/42/CEE Directive DEEE 2002/96/CEE Directive RoHs 2002/95/CEE
Operating conditions	Temperature: from 18°C à 26°C Humidity : 20 – 50% RH
Storage conditions	Temperature: from -30°C to 50°C Humidity : 5 – 98% RH

11 Technical support

INNOPSYS

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	Function	Signature
Written by:	R&D department	
Approved by:	Quality manager	

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Original instruction version: 1.0.5